final report

October 7, 2021

Traffic Impact Study

Preston Highway at Interchange Drive
Louisville, KY

Prepared for

Louisville Metro Planning Commission
Kentucky Transportation Cabinet

DIANE B. ZIMMERMAN
Traffic Engineering, LLC

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

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INTRODUCTION

The development plan for three lots on the northeast corner of Preston Highway and Interchange Drive in Louisville, KY shows a gas station with convenience store and two fast-food restaurants. **Figure 1** displays a map of the site. Access to the development will be from Interchange Drive, and a right-in/right-out on Preston Highway. 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 Preston Highway with Interchange Drive, and Cooper Chapel Road, and Mt. Washington Road.

Figure 1. Site Map

EXISTING CONDITIONS

Preston Highway (KY 61) is maintained by the Kentucky Transportation Cabinet (KYTC) with an estimated 2021 ADT of 34,600 vehicles per day south of Cooper Chapel Road, as estimated from the turning movement count using a K factor of 9.90. The road is a four-lane road with twelve-foot lanes with ten-foot paved shoulders. Northbound widens to three lanes north of Maple Springs Drive to the interchange with I 265. The southbound third lane drops 300 feet south of the intersection at Commerce Crossings Drive. The posted speed limit is 50 mph. There are no sidewalks. The intersections with Commerce Crossing Drive, Interchange Drive, and Mt. Washington Road are controlled with a traffic signal. At the intersection with Cooper Chapel Road, there are dual left turn lanes on each approach, except northbound. There is a right turn lane eastbound and southbound; and dual right turn lanes on westbound Cooper Chapel Road. At the intersection with Interchange Drive there are left turn lanes on all approaches and right turn lanes on the southbound and eastbound approaches. At the intersection with Mt. Washington Road there are left and right turn lanes on all approaches, except westbound Mt. Washington Road. Mt. Washington Road has a shared left/thru lane. Preston Highway is served by TARC.

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

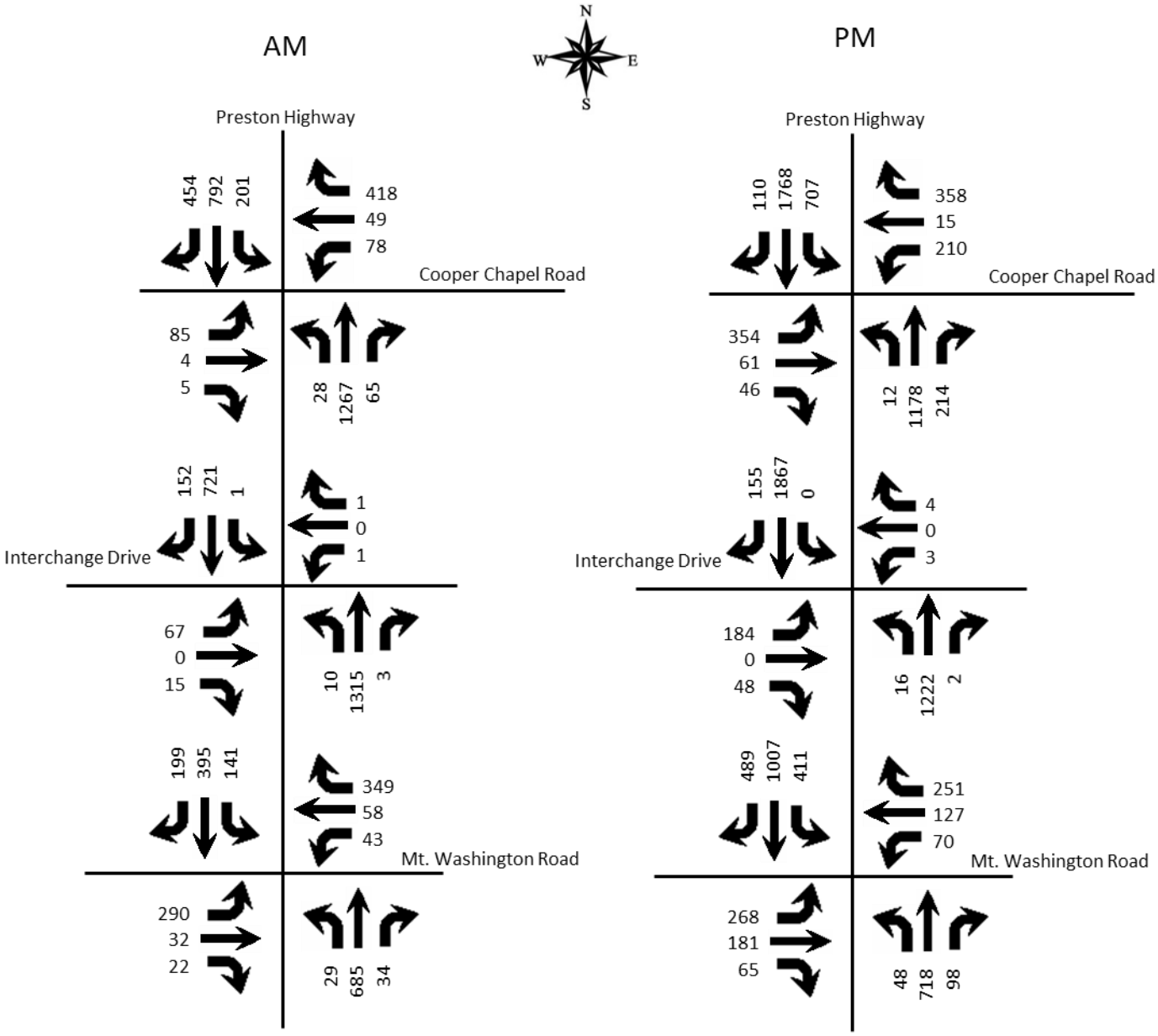

Figure 2. Existing Peak Hour Volumes

FUTURE CONDITIONS

The requested analysis year for this project is 2022. To predict traffic volumes in 2022, one half percent annual growth in traffic was added to the 2021 volumes. This growth rate is the same as was used in the Menards Traffic Impact Study dated April 9, 2019. **Figure 3** displays the 2022 No Build volumes.

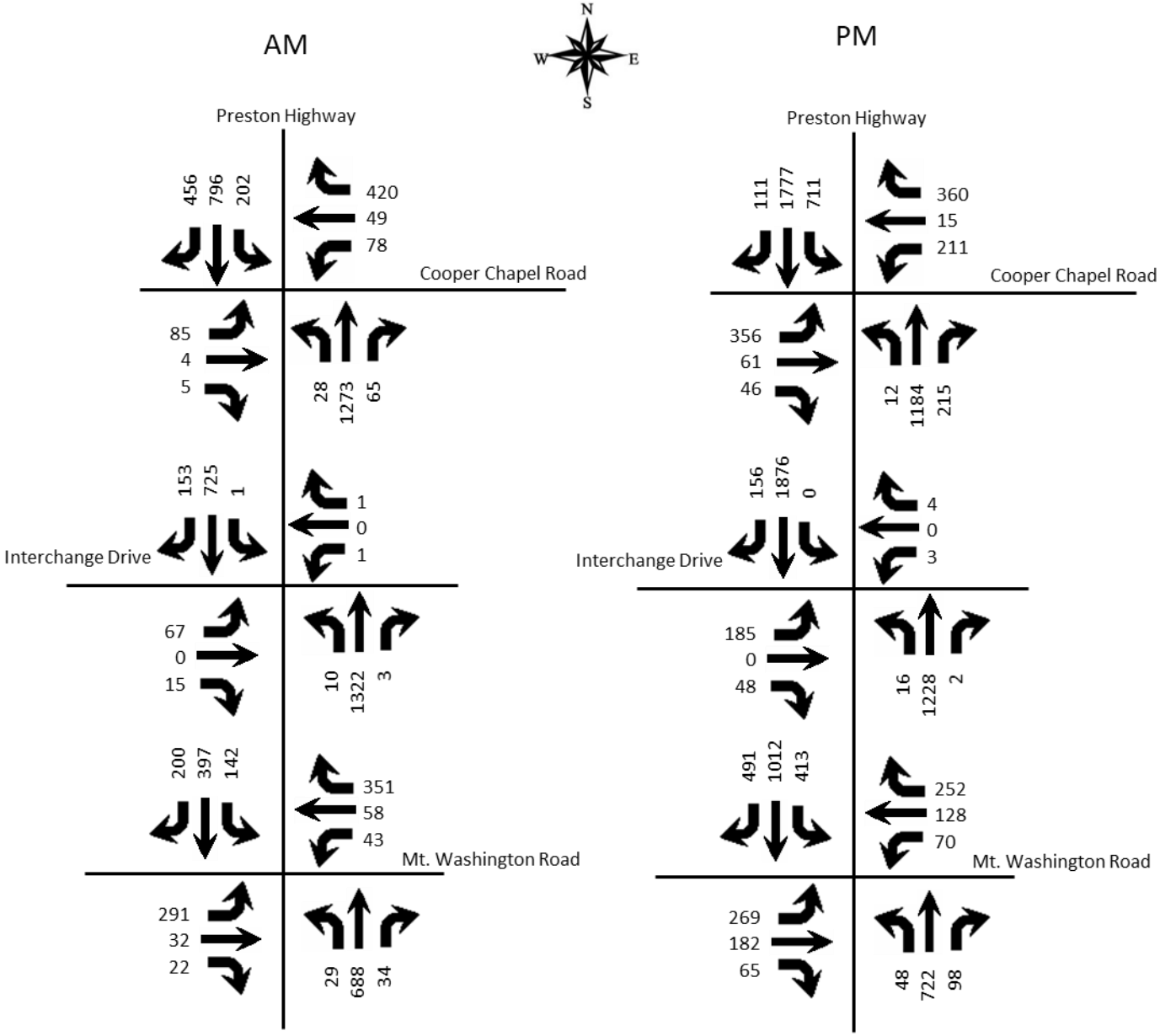

Figure 3. 2022 No Build Peak Hour Volumes

TRIP GENERATION

The Institute of Transportation Engineers Trip Generation Manual, 11th Edition contains trip generation rates for a wide range of developments. The land uses were reviewed and determined to be the best match. The trip generation

results are listed in **Table 1**. At the request of KYTC, the peak hour of the generator has been used for the Fast-Food Restaurant with Drive-Through Window. The primary trips were assigned to the highway network with the percentages shown in **Figure 4**. The pass-by trips are assigned using the existing traffic passing the site. These trips are shown in parenthesis. **Figure 5** shows the trips generated by this development and distributed throughout the road network for the year 2022 during the peak hours. **Figure 6** displays the individual turning movements for the year 2022 for the peak hours when the development is completed.

Table 1. Peak Hour Trips Generated by Site

	A.M. Peak Hour				P.M. Peak Hour			
Land Use	Trips	In	Out	Pass-by	Trips	In	Out	Pass-by
Convenience Market with Gas (16 fueling spots)	433	217	216	329	364	182	182	272
Fast-Food with Drive-Through (6,740 sq ft)	341	177	164	170	343	175	168	189
Total	**774**	**394**	**380**	**499**	**707**	**357**	**350**	**461**

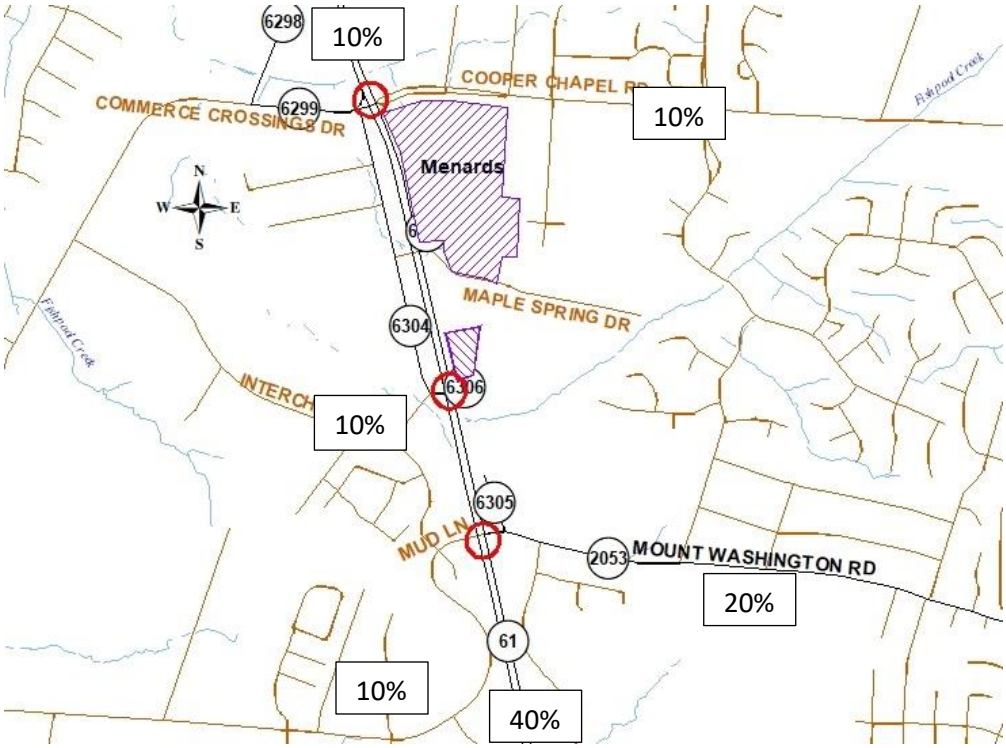

Figure 4. Trip Distribution Percentages

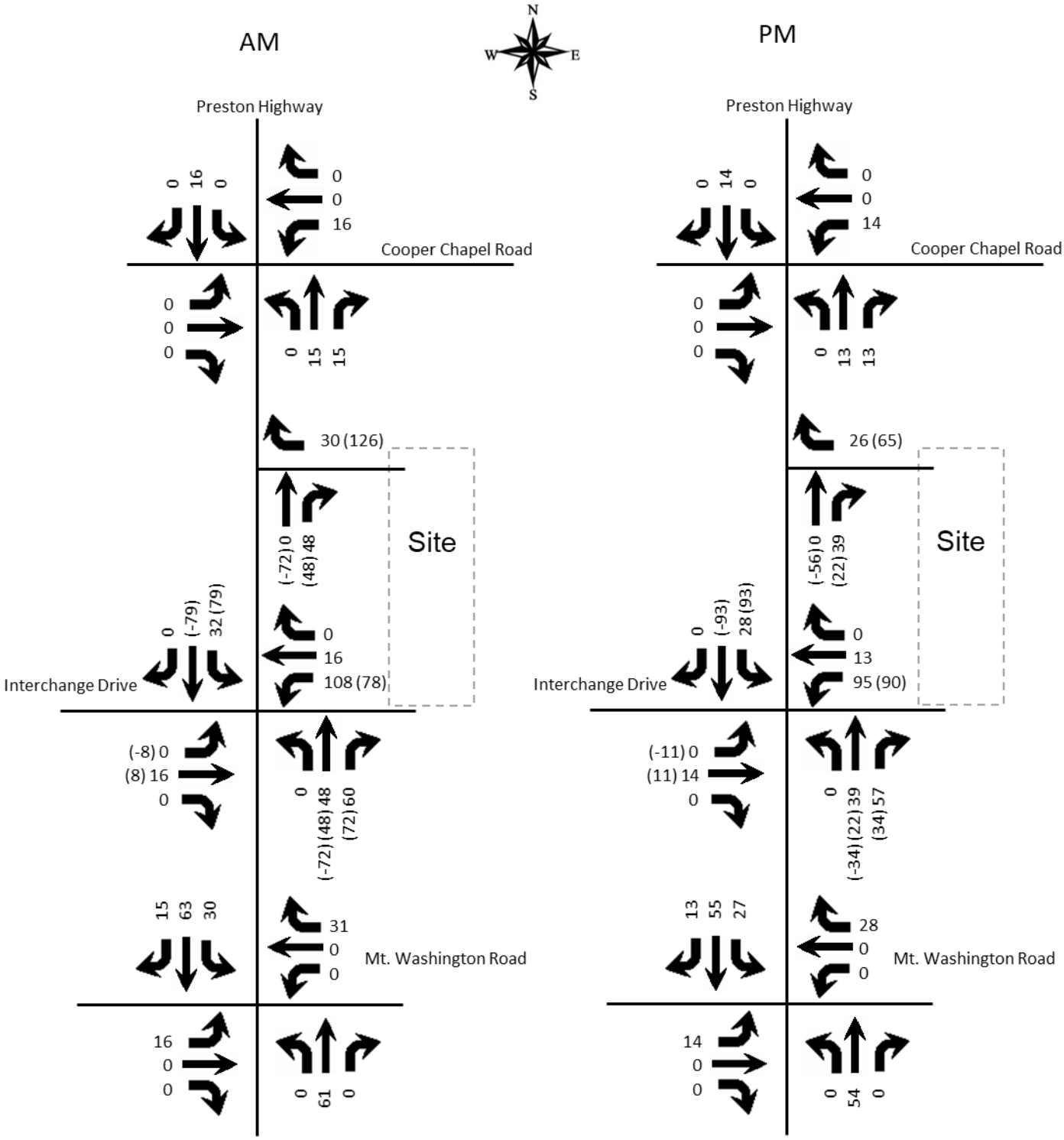

Figure 5. Peak Hour Trips Generated by Site

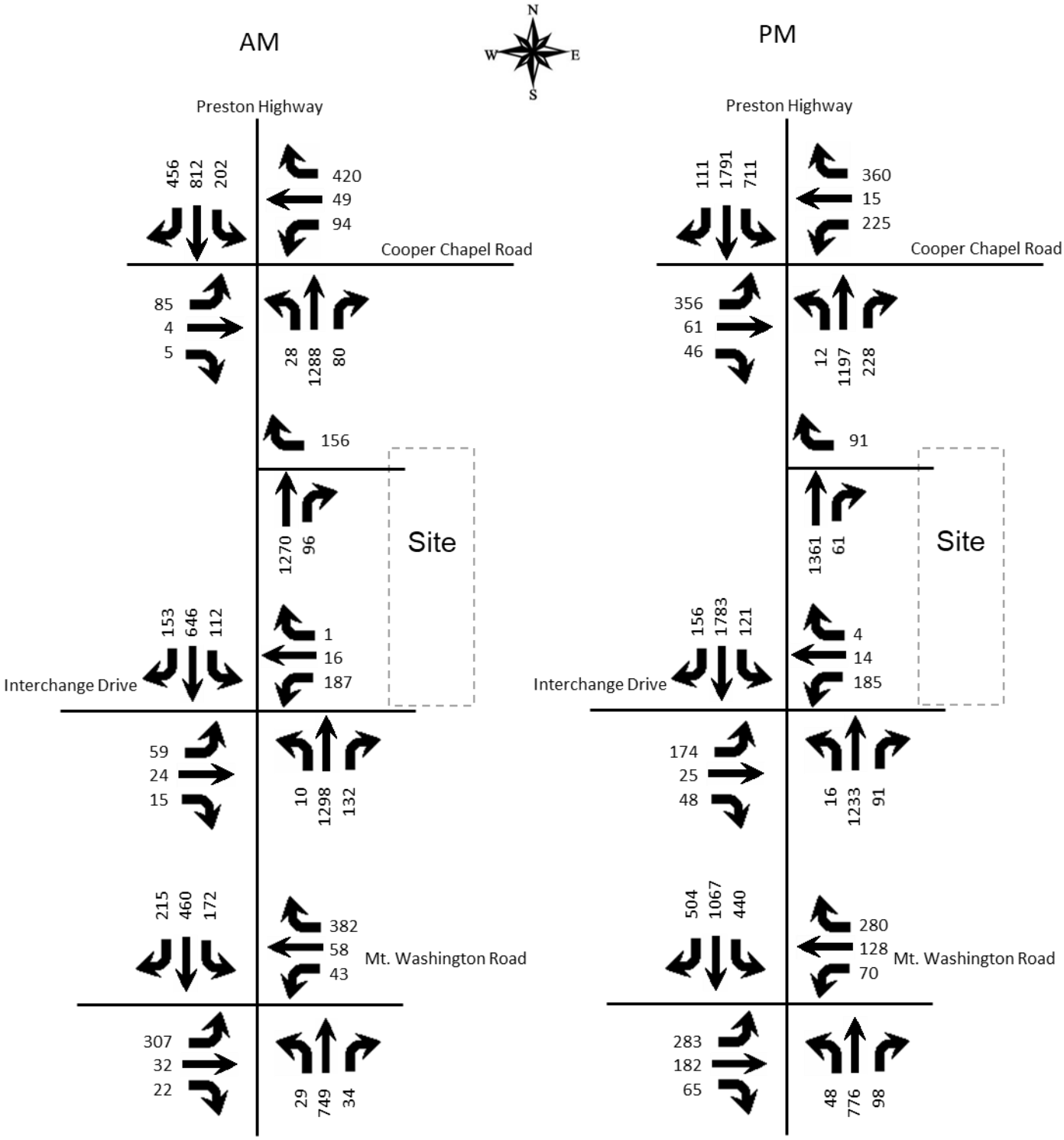

Figure 6. 2022 Peak Hour Build

ANALYSIS

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

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

Table 2. Peak Hour Level of Service

	A.M.			P.M.		
Approach	2021 Existing	2022 No Build	2022 Build	2021 Existing	2022 No Build	2022 Build
Preston Highway at Cooper Chapel Road	**C 29.6**	**C 29.1**	**C 29.0**	**D 44.5**	**D 44.7**	**D 38.1**
Commerce Crossings Eastbound	E 59.2	E 59.8	E 58.4	E 77.6	E 77.5	E 77.7
Cooper Chapel Road Westbound	D 43.1	D 42.1	D 41.7	E 60.3	E 60.2	E 60.6
Preston Highway Northbound	C 25.6	C 25.2	C 24.9	D 52.7	D 53.4	C 28.7
Preston Highway Southbound	C 25.5	C 25.1	C 24.9	C 30.7	C 30.8	C 30.8
Preston Highway at Interchange Drive	**A 7.4**	**A 7.4**	**C 27.5**	**B 19.3**	**B 19.4**	**D 40.5**
Interchange Drive Eastbound	E 72.6	E 72.6	E 69.1	E 75.0	E 75.0	E 77.0
Entrance Westbound	F 87.9	F 87.9	E 73.0	F 84.8	F 84.8	F 94.8
Preston Highway Northbound	A 4.1	A 4.1	B 20.6	A 8.8	A 8.7	C 32.7
Preston Highway Southbound	A 5.9	A 5.9	C 23.0	B 19.2	B 19.3	C 34.8
Preston Highway at Mt. Washington Road	**D 43.9**	**D 44.8**	**D 44.7**	**D 45.3**	**D 45.4**	**D 49.6**
Mud Lane Eastbound	E 59.3	E 59.4	E 60.1	E 79.7	E 79.9	F 81.6
Mt. Washington Road Westbound	D 49.4	D 49.9	D 50.1	E 61.8	E 61.8	E 58.7
Preston Highway Northbound	D 42.8	D 43.4	D 46.9	D 51.6	D 51.9	D 53.7
Preston Highway Southbound	C 34.7	C 36.3	C 33.1	C 28.7	C 28.7	D 36.6

Key: Level of Service, Delay in seconds per vehicle

The entrance that aligns with Interchange Drive was analyzed as a split phase signal, to allow the continued operation of the dual left turn lanes on Interchange Drive. The exit should have a dedicated left turn lane and a shared thru and right turn lane. The entrances were evaluated for turn lanes using the Kentucky Transportation Cabinet Highway Design Guidance Manual dated July, 2020. The traffic impact policy requires using volumes for ten years beyond build-out, or 2032. The 2032 volumes were determined applying a one-half percent annual growth rate from 2021. Figure 7 illustrates the 2032 No Build volumes. Figure 8 illustrates the 2032 Build Volumes. Using the volumes in Figure 8, a right turn lane will be required at the right-in/right-out entrance on Preston Highway. The right turn lane will be designed to KYTC standards. Table 3 summarizes the delay and Level of Service for 2032.

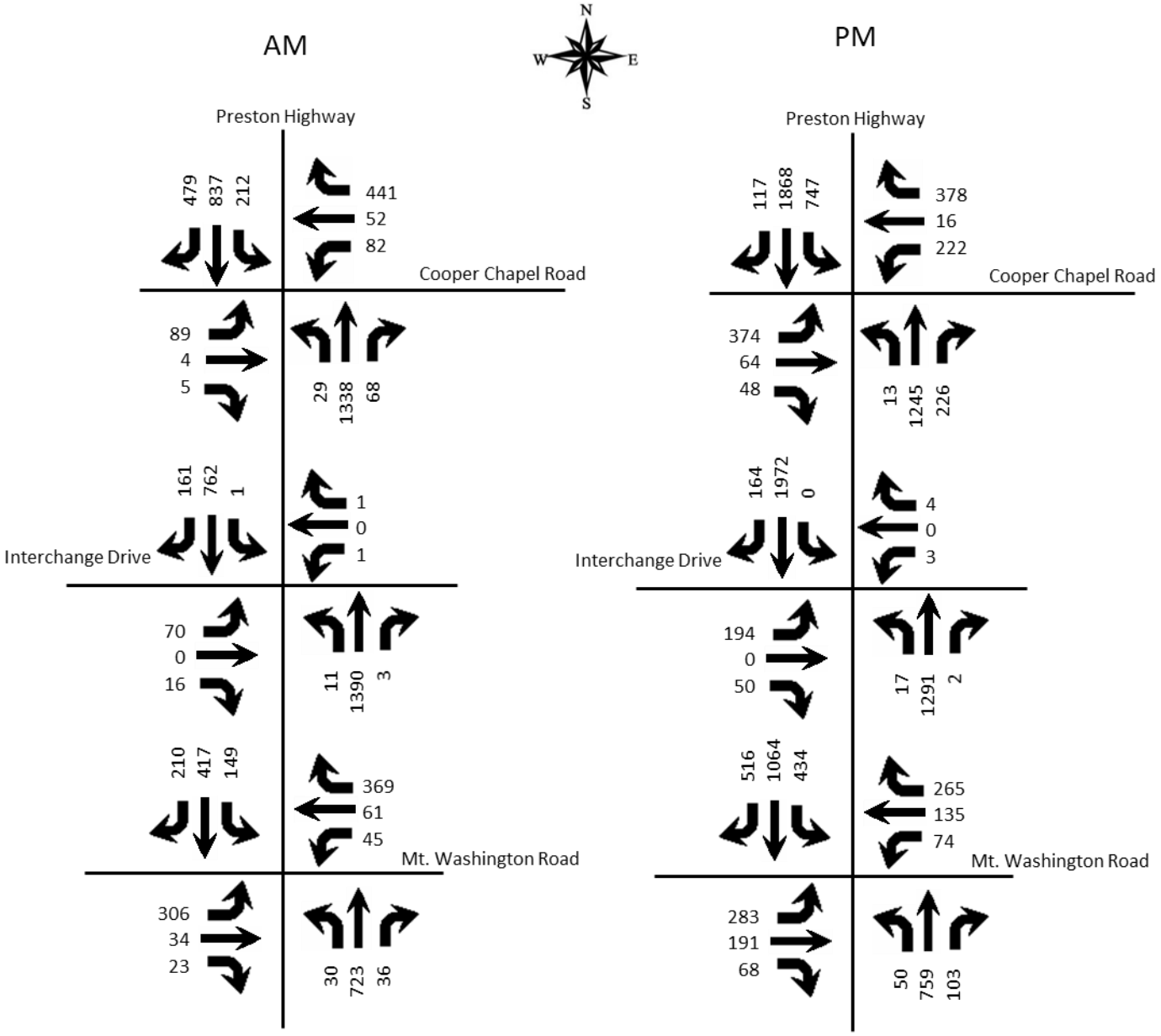

Figure 7. 2032 Peak Hour No Build

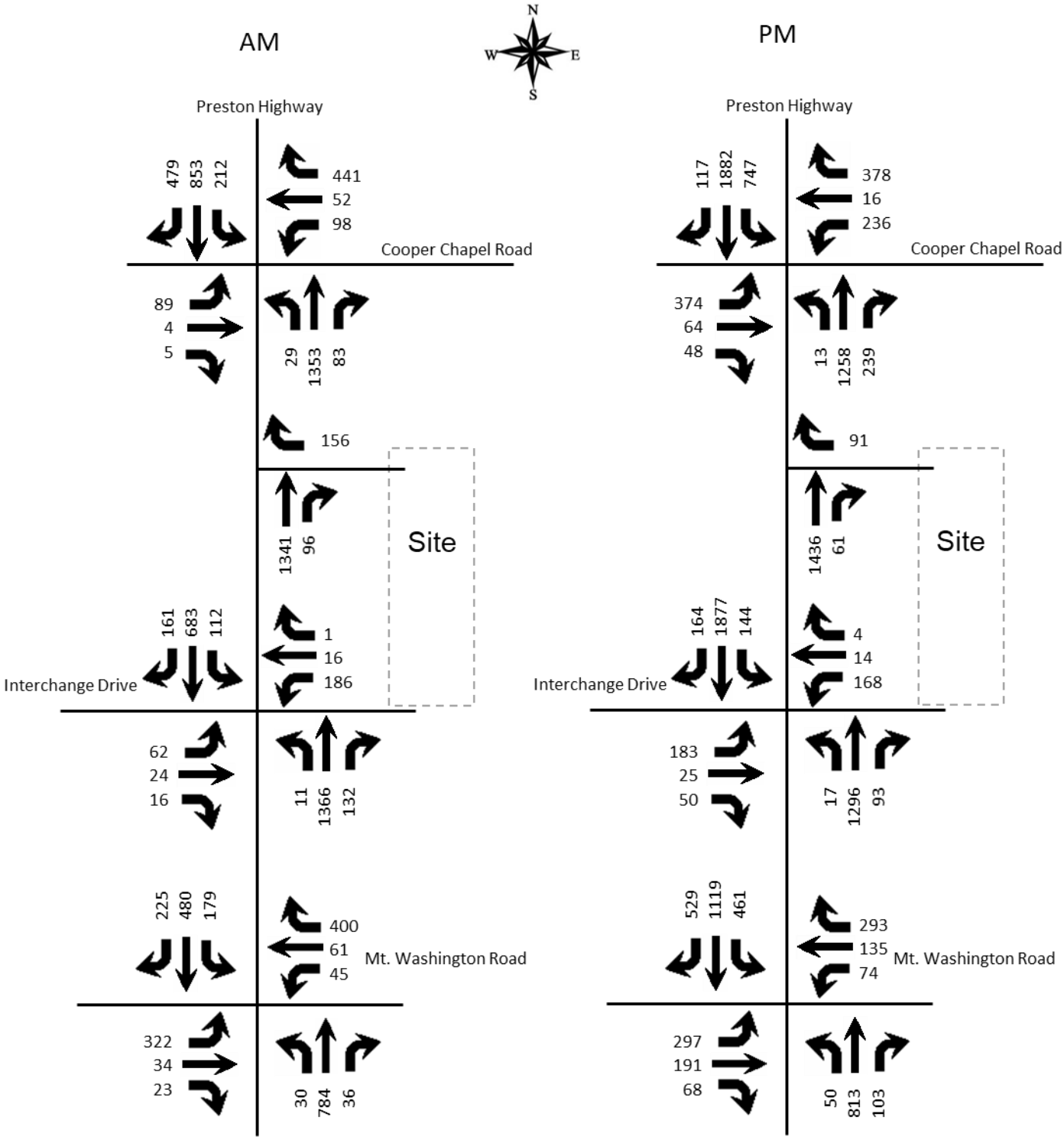

Figure 8. 2032 Peak Hour Build

Table 3. Peak Hour Level of Service

	A.M.			P.M.		
Approach	2021 Existing	2032 No Build	2032 Build	2021 Existing	2032 No Build	2032 Build
Preston Highway at Cooper Chapel Road	**C 29.6**	**C 30.7**	**C 30.5**	**D 44.5**	**D 46.6**	**D 39.6**
Commerce Crossings Eastbound	E 59.2	E 64.1	E 62.8	E 77.6	E 76.8	E 77.0
Cooper Chapel Road Westbound	D 43.1	D 44.8	D 44.3	E 60.3	E 59.2	E 59.6
Preston Highway Northbound	C 25.6	C 26.7	C 26.4	D 52.7	D 57.9	C 31.8
Preston Highway Southbound	C 25.5	C 26.1	C 25.9	C 30.7	C 32.5	C 32.4
Preston Highway at Interchange Drive	**A 7.4**	**A 7.5**	**C 28.1**	**B 19.3**	**B 18.9**	**D 42.9**
Interchange Drive Eastbound	E 72.6	E 73.0	E 69.5	E 75.0	E 75.2	E 77.0
Entrance Westbound	F 87.9	F 87.9	E 73.0	F 84.8	F 84.8	F 96.2
Preston Highway Northbound	A 4.1	A 4.2	C 22.2	A 8.8	A 7.9	D 35.0
Preston Highway Southbound	A 5.9	A 5.9	C 22.8	B 19.2	B 19.1	D 37.9
Preston Highway at Mt. Washington Road	**D 43.9**	**D 44.9**	**D 45.5**	**D 45.3**	**D 48.8**	**D 53.6**
Mud Lane Eastbound	E 59.3	E 60.3	E 61.2	E 79.7	F 83.5	F 85.5
Mt. Washington Road Westbound	D 49.4	D 50.5	D 51.1	E 61.8	E 62.1	E 59.3
Preston Highway Northbound	D 42.8	D 44.4	D 48.7	D 51.6	D 53.3	D 54.7
Preston Highway Southbound	C 34.7	C 34.9	C 32.4	C 28.7	C 33.7	D 43.0

Key: Level of Service, Delay in seconds per vehicle

An additional comparison was made for the Interchange Drive intersection without the right-in right-out. The absence of the second entrance requires all the site traffic to use the signal at Interchange Drive. The results are shown in **Table 4.** In both a.m. and p.m. peaks the intersection functions better with the proposed right-in/ right-out.

Table 4. 2032 Comparison with and without Right-in/Right-out

	A.M.		P.M.	
Approach	2032 Build	2032 Build No Right-in/Right-out	2032 Build	2032 Build No Right-in/Right-out
Preston Highway at Interchange Drive	**C 28.1**	**C 32.2**	**D 42.9**	**D 44.0**
Interchange Drive Eastbound	E 69.5	E 69.5	E 77.0	E 77.0
Entrance Westbound	E 73.0	E 69.1	F 96.2	F 88.4
Preston Highway Northbound	C 22.2	C 25.0	D 35.0	D 35.6
Preston Highway Southbound	C 22.8	C 24.0	D 37.9	D 38.0

Key: Level of Service, Delay in seconds per vehicle

CONCLUSIONS

Based upon the volume of traffic generated by the development and the amount of traffic forecasted for the year 2022 and 2032, there will be an impact to the existing highway network. The proposed right-in/right-out provides improved operating conditions when compared to without the additional access. A right turn lane will be required at the right-in/right-out entrance on Preston Highway. The exit opposite Interchange Drive should have two lanes with a dedicated left and a shared thru/right. The southbound left turn lane will need additional storage.

APPENDIX

Traffic Counts

Classified Turn Movement Count || All vehicles

Marr Traffic DATA COLLECTION
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Preston Highway, KY

Site 1 of 3
KY-61 Preston Hwy (South)
KY-61 Preston Hwy (North)
Commerce Crossings Dr
Cooper Chapel Rd

Date
Tuesday, April 13, 2021

Weather
Cloudy
61°F

Lat/Long
38.103518°, -85.672625°

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

	Northbound					Southbound					Eastbound					Westbound					
	KY-61 Preston Hwy (South)					KY-61 Preston Hwy (North)					Commerce Crossings Dr					Cooper Chapel Rd					
	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Int
TIME	1.1	1.2	1.3	1.4	Total	1.5	1.6	1.7	1.8	Total	1.9	1.10	1.11	1.12	Total	1.13	1.14	1.15	1.16	Total	Total
0700 - 0715	2	306	13	0	321	25	144	88	1	258	20	0	2	0	22	15	9	130	0	154	755
0715 - 0730	8	327	16	0	351	34	189	86	1	310	23	1	2	0	26	16	8	109	0	133	820
0730 - 0745	5	365	19	0	389	56	191	93	0	340	24	1	1	0	26	9	14	117	0	140	895
0745 - 0800	10	298	15	0	323	59	221	173	0	453	13	1	1	0	15	24	16	97	0	137	928
Hourly Total	25	1296	63	0	**1384**	174	745	440	2	**1361**	80	3	6	0	**89**	64	47	453	0	**564**	**3398**
0800 - 0815	5	277	15	0	297	52	191	102	0	345	25	1	1	0	27	29	11	95	0	135	804
0815 - 0830	6	259	18	0	283	54	155	67	0	276	15	1	3	0	19	21	3	82	0	106	684
0830 - 0845	4	267	26	0	297	39	187	59	0	285	15	5	2	0	22	28	3	106	0	137	741
0845 - 0900	6	253	25	0	284	44	199	51	0	294	28	3	3	0	34	38	7	84	0	129	741
Hourly Total	21	1056	84	0	**1161**	189	732	279	0	**1200**	83	10	9	0	**102**	116	24	367	0	**507**	**2970**
Grand Total	46	2352	147	0	**2545**	363	1477	719	2	**2561**	163	13	15	0	**191**	180	71	820	0	**1071**	**6368**
Approach %	1.81	92.42	5.78	0.00	-	14.17	57.67	28.07	0.08	-	85.34	6.81	7.85	0.00	-	16.81	6.63	76.56	0.00	-	
Intersection %	0.72	36.93	2.31	0.00	39.97	5.70	23.19	11.29	0.03	40.22	2.56	0.20	0.24	0.00	3.00	2.83	1.11	12.88	0.00	16.82	
PHF	0.70	0.87	0.86	0.00	**0.87**	0.85	0.90	0.66	0.25	**0.80**	0.85	1.00	0.63	0.00	**0.87**	0.67	0.77	0.89	0.00	**0.97**	**0.93**

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

	Northbound					Southbound					Eastbound					Westbound					
	KY-61 Preston Hwy (South)					KY-61 Preston Hwy (North)					Commerce Crossings Dr					Cooper Chapel Rd					
	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Int
TIME	1.1	1.2	1.3	1.4	Total	1.5	1.6	1.7	1.8	Total	1.9	1.10	1.11	1.12	Total	1.13	1.14	1.15	1.16	Total	Total
1600 - 1615	1	297	49	0	347	173	436	46	2	657	97	12	8	0	117	45	5	116	0	166	1287
1615 - 1630	3	261	55	0	319	173	411	48	1	633	60	18	10	0	88	60	4	113	0	177	1217
1630 - 1645	4	313	57	0	374	159	380	35	2	576	120	22	17	0	159	45	4	93	1	143	1252
1645 - 1700	1	297	50	1	349	186	445	26	0	657	61	11	9	0	81	54	4	78	0	136	1223
Hourly Total	9	1168	211	1	**1389**	691	1672	155	5	**2523**	338	63	44	0	**445**	204	17	400	1	**622**	**4979**
1700 - 1715	2	272	51	0	325	156	454	39	0	649	122	15	14	0	151	56	6	87	0	149	1274
1715 - 1730	4	296	56	0	356	206	489	10	1	706	51	13	6	0	70	54	1	100	0	155	1287
1730 - 1745	5	300	47	0	352	158	435	28	1	622	60	8	7	0	75	62	1	109	0	172	1221
1745 - 1800	2	280	58	0	340	119	401	23	0	543	36	6	4	0	46	52	3	96	0	151	1080
Hourly Total	13	1148	212	0	**1373**	639	1779	100	2	**2520**	269	42	31	0	**342**	224	11	392	0	**627**	**4862**
Grand Total	22	2316	423	1	**2762**	1330	3451	255	7	**5043**	607	105	75	0	**787**	428	28	792	1	**1249**	**9841**
Approach %	0.80	83.85	15.31	0.04	-	26.37	68.43	5.06	0.14	-	77.13	13.34	9.53	0.00	-	34.27	2.24	63.41	0.08	-	
Intersection %	0.22	23.53	4.30	0.01	28.07	13.51	35.07	2.59	0.07	51.24	6.17	1.07	0.76	0.00	8.00	4.35	0.28	8.05	0.01	12.69	
PHF	0.69	0.94	0.94	0.25	**0.94**	0.86	0.90	0.71	0.38	**0.92**	0.73	0.69	0.68	0.00	**0.72**	0.93	0.63	0.90	0.25	**0.94**	**0.98**

Classified Turn Movement Count || All vehicles

Marr Traffic DATA COLLECTION
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Preston Highway, KY

Site 2 of 3
KY-61 Preston Hwy (South)
KY-61 Preston Hwy (North)
Old Preston Hwy
Local Rd

Date
Tuesday, April 13, 2021

Weather
Cloudy
61°F

Lat/Long
38.096348°, -85.670213°

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

	Northbound					Southbound					Eastbound					Westbound					
	KY-61 Preston Hwy (South)					KY-61 Preston Hwy (North)					Old Preston Hwy					Local Rd					
	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Int
TIME	2.1	2.2	2.3	2.4	Total	2.5	2.6	2.7	2.8	Total	2.9	2.10	2.11	2.12	Total	2.13	2.14	2.15	2.16	Total	Total
0700 - 0715	5	314	0	0	319	0	100	52	0	152	23	0	2	0	25	0	0	0	0	0	496
0715 - 0730	0	331	0	0	331	0	147	65	0	212	22	0	2	0	24	0	0	0	0	0	567
0730 - 0745	4	398	1	0	403	0	175	33	0	208	19	0	3	0	22	1	0	0	0	1	634
0745 - 0800	4	299	1	1	305	0	199	32	0	231	14	0	7	0	21	0	0	1	0	1	558
Hourly Total	13	1342	2	1	**1358**	0	621	182	0	**803**	78	0	14	0	**92**	1	0	1	0	**2**	**2255**
0800 - 0815	0	287	1	1	289	0	200	22	1	223	12	0	3	0	15	0	0	0	0	0	527
0815 - 0830	2	257	0	0	259	1	167	14	0	182	9	0	0	0	9	0	0	0	0	0	450
0830 - 0845	0	283	0	0	283	1	198	13	0	212	20	0	3	0	23	0	0	0	0	0	518
0845 - 0900	2	279	1	0	282	0	234	16	0	250	11	0	1	1	13	0	0	0	0	0	545
Hourly Total	4	1106	2	1	**1113**	2	799	65	1	**867**	52	0	7	1	**60**	0	0	0	0	**0**	**2040**
Grand Total	17	2448	4	2	**2471**	2	1420	247	1	**1670**	130	0	21	1	**152**	1	0	1	0	**2**	**4295**
Approach %	0.69	99.07	0.16	0.08	-	0.12	85.03	14.79	0.06	-	85.53	0.00	13.82	0.66	-	50.00	0.00	50.00	0.00	-	
Intersection %	0.40	57.00	0.09	0.05	57.53	0.05	33.06	5.75	0.02	38.88	3.03	0.00	0.49	0.02	3.54	0.02	0.00	0.02	0.00	0.05	
PHF	0.50	0.83	0.75	0.50	**0.82**	0.00	0.90	0.58	0.25	**0.95**	0.76	0.00	0.54	0.00	**0.85**	0.25	0.00	0.25	0.00	**0.50**	**0.90**

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

	Northbound					Southbound					Eastbound					Westbound					
	KY-61 Preston Hwy (South)					KY-61 Preston Hwy (North)					Old Preston Hwy					Local Rd					
	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Int
TIME	2.1	2.2	2.3	2.4	Total	2.5	2.6	2.7	2.8	Total	2.9	2.10	2.11	2.12	Total	2.13	2.14	2.15	2.16	Total	Total
1600 - 1615	0	295	2	0	297	0	391	32	0	423	67	0	15	0	82	1	1	1	0	3	805
1615 - 1630	6	289	2	0	297	1	467	29	0	497	36	0	16	0	52	0	0	3	0	3	849
1630 - 1645	1	310	0	0	311	0	424	33	2	459	62	0	17	0	79	0	0	1	0	1	850
1645 - 1700	1	325	1	0	327	0	445	45	0	490	44	0	13	0	57	1	0	1	0	2	876
Hourly Total	8	1219	5	0	**1232**	1	1727	139	2	**1869**	209	0	61	0	**270**	2	1	6	0	**9**	**3380**
1700 - 1715	3	286	0	0	289	0	464	35	0	499	43	0	12	0	55	1	0	2	0	3	846
1715 - 1730	3	296	1	2	302	0	481	39	0	520	45	0	13	0	58	1	0	1	0	2	882
1730 - 1745	7	315	0	0	322	0	477	36	0	513	52	0	10	0	62	0	0	0	0	0	897
1745 - 1800	7	297	0	1	305	0	397	41	0	438	35	0	3	0	38	0	0	0	0	0	781
Hourly Total	20	1194	1	3	**1218**	0	1819	151	0	**1970**	175	0	38	0	**213**	2	0	3	0	**5**	**3406**
Grand Total	28	2413	6	3	**2450**	1	3546	290	2	**3839**	384	0	99	0	**483**	4	1	9	0	**14**	**6786**
Approach %	1.14	98.49	0.24	0.12	-	0.03	92.37	7.55	0.05	-	79.50	0.00	20.50	0.00	-	28.57	7.14	64.29	0.00	-	
Intersection %	0.41	35.56	0.09	0.04	36.10	0.01	52.25	4.27	0.03	56.57	5.66	0.00	1.46	0.00	7.12	0.06	0.01	0.13	0.00	0.21	
PHF	0.50	0.94	0.50	0.25	**0.95**	0.00	0.97	0.86	0.00	**0.97**	0.88	0.00	0.92	0.00	**0.94**	0.75	0.00	0.50	0.00	**0.58**	**0.98**

Classified Turn Movement Count || All vehicles

Marr Traffic DATA COLLECTION
www.marrtraffic.com

Preston Highway, KY

Site 3 of 3
KY-61 N Preston Hwy
KY-61 Preston Hwy
Mud Ln
Mt. Washington Rd

Date
Tuesday, April 13, 2021

Weather
Cloudy
61°F

Lat/Long
38.092809°, -85.669177°

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

	Northbound					Southbound					Eastbound					Westbound					
	KY-61 N Preston Hwy					KY-61 Preston Hwy					Mud Ln					Mt. Washington Rd					
	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Int
TIME	3.1	3.2	3.3	3.4	Total	3.5	3.6	3.7	3.8	Total	3.9	3.10	3.11	3.12	Total	3.13	3.14	3.15	3.16	Total	Total
0700 - 0715	11	148	5	0	164	18	53	29	0	100	68	9	0	0	77	7	18	100	0	125	466
0715 - 0730	13	165	8	0	186	34	73	46	0	153	79	7	7	0	93	9	14	93	0	116	548
0730 - 0745	4	203	6	0	213	30	96	40	0	166	95	9	7	0	111	8	17	96	0	121	611
0745 - 0800	6	176	13	0	195	40	113	60	0	213	56	8	2	0	66	7	8	73	0	88	562
Hourly Total	34	692	32	0	**758**	122	335	175	0	**632**	298	33	16	0	**347**	31	57	362	0	**450**	**2187**
0800 - 0815	6	141	7	0	154	37	113	53	0	203	60	8	6	0	74	19	19	87	0	125	556
0815 - 0830	6	133	12	0	151	31	95	41	0	167	46	16	3	0	65	6	17	82	0	105	488
0830 - 0845	7	147	17	0	171	19	113	52	0	184	69	6	8	0	83	12	20	73	0	105	543
0845 - 0900	3	147	8	0	158	39	138	53	0	230	61	10	3	0	74	15	20	63	0	98	560
Hourly Total	22	568	44	0	**634**	126	459	199	0	**784**	236	40	20	0	**296**	52	76	305	0	**433**	**2147**
Grand Total	56	1260	76	0	**1392**	248	794	374	0	**1416**	534	73	36	0	**643**	83	133	667	0	**883**	**4334**
Approach %	4.02	90.52	5.46	0.00	-	17.51	56.07	26.41	0.00	-	83.05	11.35	5.60	0.00	-	9.40	15.06	75.54	0.00	-	
Intersection %	1.29	29.07	1.75	0.00	32.12	5.72	18.32	8.63	0.00	32.67	12.32	1.68	0.83	0.00	14.84	1.92	3.07	15.39	0.00	20.37	
PHF	0.56	0.84	0.65	0.00	**0.88**	0.88	0.87	0.83	0.00	**0.86**	0.76	0.89	0.79	0.00	**0.77**	0.57	0.76	0.91	0.00	**0.90**	**0.93**

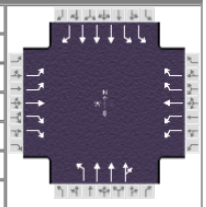
1600 - 1800 (Weekday 2h Session) (13-04-2021)
All vehicles

	Northbound					Southbound					Eastbound					Westbound					
	KY-61 N Preston Hwy					KY-61 Preston Hwy					Mud Ln					Mt. Washington Rd					
	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Int
TIME	3.1	3.2	3.3	3.4	Total	3.5	3.6	3.7	3.8	Total	3.9	3.10	3.11	3.12	Total	3.13	3.14	3.15	3.16	Total	Total
1600 - 1615	5	153	23	0	181	101	197	87	0	385	65	46	13	0	124	24	30	72	0	126	816
1615 - 1630	12	161	27	0	200	119	269	123	0	511	71	40	19	0	130	14	28	62	0	104	945
1630 - 1645	18	196	34	0	248	95	232	123	0	450	74	32	10	0	116	21	32	62	1	116	930
1645 - 1700	9	205	31	0	245	100	242	116	0	458	50	46	19	0	115	17	33	59	0	109	927
Hourly Total	44	715	115	0	**874**	415	940	449	0	**1804**	260	164	61	0	**485**	76	123	255	1	**455**	**3618**
1700 - 1715	11	163	22	0	196	97	244	120	0	461	73	47	15	0	135	18	32	63	0	113	905
1715 - 1730	13	177	25	0	215	108	261	126	0	495	63	51	15	0	129	15	27	61	0	103	942
1730 - 1745	15	173	20	0	208	106	260	127	0	493	82	37	16	0	135	20	35	68	0	123	959
1745 - 1800	12	159	28	0	199	100	193	121	0	414	71	51	12	0	134	14	46	69	0	129	876
Hourly Total	51	672	95	0	**818**	411	958	494	0	**1863**	289	186	58	0	**533**	67	140	261	0	**468**	**3682**
Grand Total	95	1387	210	0	**1692**	826	1898	943	0	**3667**	549	350	119	0	**1018**	143	263	516	1	**923**	**7300**
Approach %	5.61	81.97	12.41	0.00	-	22.53	51.76	25.72	0.00	-	53.93	34.38	11.69	0.00	-	15.49	28.49	55.90	0.11	-	
Intersection %	1.30	19.00	2.88	0.00	23.18	11.32	26.00	12.92	0.00	50.23	7.52	4.79	1.63	0.00	13.95	1.96	3.60	7.07	0.01	12.64	
PHF	0.80	0.88	0.79	0.00	**0.88**	0.95	0.96	0.96	0.00	**0.96**	0.82	0.89	0.86	0.00	**0.95**	0.88	0.91	0.92	0.00	**0.91**	**0.97**

HCS Reports

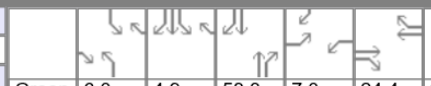
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.91
Urban Street	Preston Highway	Analysis Year	2021	Analysis Period	1> 7:15
Intersection	Cooper Chapel Road	File Name	AM 21 Preston.xus		
Project Description	Stern				

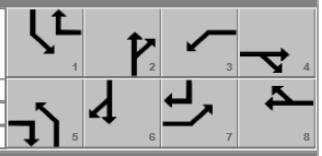


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	85	4	5	78	49	418	28	1267	65	201	792	454

Signal Information			
Cycle, s	125.7	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.0	4.9	58.3	7.0	24.4	0.0
Yellow	3.5	0.0	4.3	3.5	3.6	0.0
Red	3.0	0.0	1.9	3.0	2.4	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	13.5	30.4	13.5	30.4	12.5	64.5	17.4	69.3
Change Period, (*Y+R c*), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.8	5.1	5.8	3.0	4.9	4.0	4.9
Queue Clearance Time (*g s*), s	5.5	2.2	5.1	19.7	4.1	25.7	10.0	15.3
Green Extension Time (*g e*), s	0.7	4.2	0.4	4.6	0.0	32.6	0.8	34.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	0.00	0.03	0.00	0.01	0.00	0.21	0.00	0.17

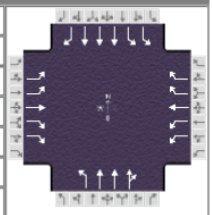
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	93	4	5	86	54	459	30	964	469	221	870	169
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1647	1900	1425	1675	1900	1403	1753	1856	1807	1689	1658	1585
Queue Service Time (*g s*), s	3.5	0.2	0.2	3.1	3.0	17.7	2.1	23.7	23.7	8.0	13.3	6.6
Cycle Queue Clearance Time (*g c*), s	3.5	0.2	0.2	3.1	3.0	17.7	2.1	23.7	23.7	8.0	13.3	6.6
Green Ratio (*g/C*)	0.06	0.19	0.24	0.06	0.19	0.28	0.05	0.46	0.46	0.09	0.50	0.56
Capacity (*c*), veh/h	183	368	688	186	368	786	84	1721	838	292	2499	885
Volume-to-Capacity Ratio (*X*)	0.509	0.012	0.008	0.460	0.146	0.584	0.360	0.560	0.560	0.756	0.348	0.191
Back of Queue (*Q*), ft/ln (95 th percentile)	73.4	5.1	2.9	65	63.9	258.3	42.8	371	356.9	163.1	218.2	102.5
Back of Queue (*Q*), veh/ln (95 th percentile)	2.8	0.2	0.1	2.5	2.6	10.2	1.7	14.5	14.3	6.3	8.4	4.0
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	0.30	0.22	0.51
Uniform Delay (*d 1*), s/veh	57.7	41.0	36.3	57.6	42.1	39.0	58.0	24.4	24.4	56.2	18.9	13.7
Incremental Delay (*d 2*), s/veh	3.7	0.0	0.0	2.4	0.3	1.1	0.8	0.3	0.7	4.0	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	0.0	0.0	0.0
Control Delay (*d*), s/veh	61.4	41.0	36.3	60.0	42.4	40.1	58.8	24.8	25.1	60.1	19.0	13.9
Level of Service (LOS)	E	D	D	E	D	D	E	C	C	E	B	B
Approach Delay, s/veh / LOS	59.2	E		43.1	D		25.6	C		25.5	C	
Intersection Delay, s/veh / LOS	29.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.60	C	3.28	C	2.57	C	2.42	B
Bicycle LOS Score / LOS	0.66	A	1.48	A	1.31	A	1.18	A

 HCS™ Streets Version 7.9.5 Generated: 6/4/2021 12:24:26 PM

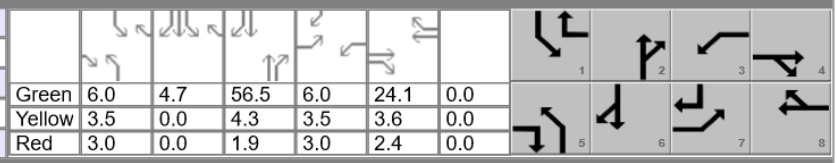
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.91
Urban Street	Preston Highway	Analysis Year	2022 No Build	Analysis Period	1> 7:15
Intersection	Cooper Chapel Road	File Name	AM 22 NB Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	85	4	5	78	49	420	28	1273	65	202	796	456

Signal Information			
Cycle, s	122.4	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.0	4.7	56.5	6.0	24.1	0.0	
Yellow	3.5	0.0	4.3	3.5	3.6	0.0	
Red	3.0	0.0	1.9	3.0	2.4	0.0	

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	12.6	30.1	12.5	30.0	12.5	62.7	17.2	67.4
Change Period, ($Y+R_c$), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.8	5.1	5.8	3.0	4.9	4.0	4.9
Queue Clearance Time (g_s), s	5.4	2.2	5.1	19.3	4.0	25.3	9.9	15.1
Green Extension Time (g_e), s	0.7	4.3	0.4	4.6	0.0	31.1	0.8	32.9
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	0.00	0.03	0.00	0.01	0.00	0.27	0.00	0.21

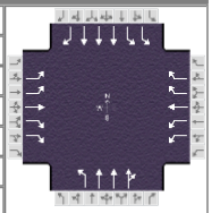
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	93	4	5	86	54	462	30	967	471	222	875	171
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1647	1900	1425	1675	1900	1403	1753	1856	1807	1689	1658	1585
Queue Service Time (g_s), s	3.4	0.2	0.2	3.1	2.9	17.3	2.0	23.3	23.3	7.9	13.1	6.7
Cycle Queue Clearance Time (g_c), s	3.4	0.2	0.2	3.1	2.9	17.3	2.0	23.3	23.3	7.9	13.1	6.7
Green Ratio (*g/C*)	0.05	0.20	0.25	0.05	0.20	0.28	0.05	0.46	0.46	0.09	0.50	0.55
Capacity (*c*), veh/h	164	374	700	164	372	795	86	1712	834	295	2486	871
Volume-to-Capacity Ratio (*X*)	0.569	0.012	0.008	0.523	0.145	0.581	0.351	0.565	0.565	0.752	0.352	0.197
Back of Queue (*Q*), ft/ln (95 th percentile)	73	4.9	2.8	64.4	61.9	252.2	41.4	364.5	350.8	159	215.3	103
Back of Queue (*Q*), veh/ln (95 th percentile)	2.7	0.2	0.1	2.5	2.5	9.9	1.6	14.2	14.0	6.1	8.3	4.1
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	0.29	0.22	0.51
Uniform Delay (d_1), s/veh	56.9	39.6	34.9	56.9	40.8	37.7	56.4	24.1	24.1	54.6	18.6	13.9
Incremental Delay (d_2), s/veh	5.2	0.0	0.0	3.5	0.3	1.1	0.8	0.3	0.7	3.9	0.1	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	0.0	0.0
Control Delay (*d*), s/veh	62.2	39.7	34.9	60.4	41.1	38.8	57.1	24.4	24.8	58.5	18.7	14.1
Level of Service (LOS)	E	D	C	E	D	D	E	C	C	E	B	B
Approach Delay, s/veh / LOS	59.8	E		42.1	D		25.2	C		25.1	C	
Intersection Delay, s/veh / LOS	29.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.60	C	3.28	C	2.57	C	2.42	B
Bicycle LOS Score / LOS	0.66	A	1.48	A	1.31	A	1.19	A

 HCS™ Streets Version 7.9.5 Generated: 6/4/2021 1:08:16 PM

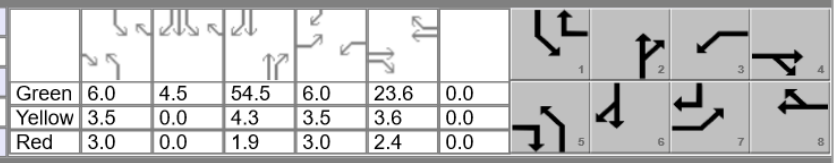
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 7, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.91
Urban Street	Preston Highway	Analysis Year	2022 Build	Analysis Period	1> 7:15
Intersection	Cooper Chapel Road	File Name	AM 22 B Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	85	4	5	92	49	420	28	1286	78	202	810	456

Signal Information			
Cycle, s	119.9	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



	EB			WB			NB			SB		
Green	6.0	4.5		54.5	6.0	23.6	0.0					
Yellow	3.5	0.0		4.3	3.5	3.6	0.0					
Red	3.0	0.0		1.9	3.0	2.4	0.0					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	12.5	29.6	12.5	29.6	12.5	60.7	17.0	65.2
Change Period, ($Y+R_c$), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.8	5.1	5.8	3.0	4.9	4.0	4.9
Queue Clearance Time (g_s), s	5.3	2.2	5.5	18.9	3.9	23.9	9.7	15.3
Green Extension Time (g_e), s	0.7	4.3	0.5	4.6	0.0	30.5	0.8	31.9
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	0.00	0.03	0.00	0.00	0.00	0.24	0.00	0.20

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	93	4	5	101	54	462	28	931	451	222	890	171
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1647	1900	1425	1675	1900	1403	1753	1856	1799	1689	1658	1585
Queue Service Time (g_s), s	3.3	0.2	0.2	3.5	2.8	16.9	1.9	21.9	21.9	7.7	13.3	6.7
Cycle Queue Clearance Time (g_c), s	3.3	0.2	0.2	3.5	2.8	16.9	1.9	21.9	21.9	7.7	13.3	6.7
Green Ratio (*g/C*)	0.05	0.20	0.25	0.05	0.20	0.28	0.05	0.45	0.45	0.09	0.49	0.54
Capacity (*c*), veh/h	166	374	704	168	374	800	88	1688	818	297	2451	861
Volume-to-Capacity Ratio (*X*)	0.563	0.012	0.008	0.601	0.144	0.577	0.324	0.552	0.552	0.747	0.363	0.199
Back of Queue (*Q*), ft/ln (95 th percentile)	71.2	4.8	2.7	75.4	60.3	247	38.1	345.7	331.5	155.1	217.1	102.1
Back of Queue (*Q*), veh/ln (95 th percentile)	2.7	0.2	0.1	2.9	2.4	9.7	1.5	13.5	13.3	6.0	8.3	4.0
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	0.28	0.22	0.51
Uniform Delay (d_1), s/veh	55.7	38.8	34.1	55.8	39.8	36.7	55.1	23.8	23.8	53.4	18.8	14.0
Incremental Delay (d_2), s/veh	5.1	0.0	0.0	4.6	0.3	1.1	0.7	0.3	0.7	3.7	0.1	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	0.0	0.0
Control Delay (*d*), s/veh	60.8	38.8	34.1	60.5	40.1	37.8	55.7	24.2	24.5	57.2	18.9	14.2
Level of Service (LOS)	E	D	C	E	D	D	E	C	C	E	B	B
Approach Delay, s/veh / LOS	58.4	E		41.7	D		24.9	C		24.9	C	
Intersection Delay, s/veh / LOS	29.0						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.60	C	3.28	C	2.57	C	2.42	B
Bicycle LOS Score / LOS	0.66	A	1.50	B	1.33	A	1.19	A

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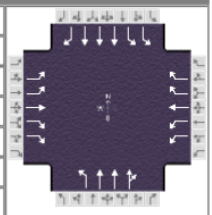
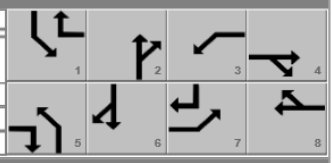
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.91
Urban Street	Preston Highway	Analysis Year	2032 No Build	Analysis Period	1> 7:15
Intersection	Cooper Chapel Road	File Name	AM 32 NB Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	89	4	5	82	52	441	29	1338	68	212	837	479

Signal Information			
Cycle, s	130.8	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.0	5.7		61.1	6.0	0.5	26.2					
Yellow	3.5	0.0		4.3	3.5	0.0	3.6					
Red	3.0	0.0		1.9	3.0	0.0	2.4					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	13.0	32.8	12.5	32.2	12.5	67.3	18.2	73.0
Change Period, ($Y+R_c$), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.8	5.1	5.8	3.0	4.9	4.0	4.9
Queue Clearance Time (g_s), s	5.8	2.2	5.5	21.4	4.2	27.9	10.8	16.5
Green Extension Time (g_e), s	0.7	4.5	0.4	4.8	0.0	33.2	0.8	35.8
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	0.00	0.03	0.00	0.01	0.00	0.34	0.00	0.28

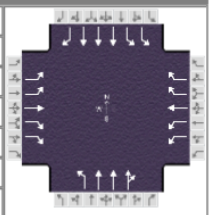
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	98	4	5	90	57	485	31	1004	489	233	920	197
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1647	1900	1425	1675	1900	1403	1753	1856	1807	1689	1658	1585
Queue Service Time (g_s), s	3.8	0.2	0.2	3.5	3.2	19.4	2.2	25.9	25.9	8.8	14.5	8.1
Cycle Queue Clearance Time (g_c), s	3.8	0.2	0.2	3.5	3.2	19.4	2.2	25.9	25.9	8.8	14.5	8.1
Green Ratio (*g/C*)	0.05	0.20	0.25	0.05	0.20	0.29	0.05	0.47	0.47	0.09	0.51	0.56
Capacity (*c*), veh/h	165	389	714	154	381	814	80	1734	845	302	2542	889
Volume-to-Capacity Ratio (*X*)	0.593	0.011	0.008	0.587	0.150	0.595	0.383	0.579	0.579	0.771	0.362	0.221
Back of Queue (*Q*), ft/ln (95 th percentile)	82.1	5.2	3	73.8	70.2	278.3	45.9	403	387.8	179.9	236	126.9
Back of Queue (*Q*), veh/ln (95 th percentile)	3.1	0.2	0.1	2.8	2.8	11.0	1.8	15.7	15.5	6.9	9.1	5.0
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	0.33	0.24	0.63
Uniform Delay (d_1), s/veh	60.9	41.5	36.8	61.2	43.1	39.9	60.6	25.5	25.5	58.3	19.2	14.4
Incremental Delay (d_2), s/veh	5.7	0.0	0.0	4.8	0.3	1.2	0.9	0.4	0.7	4.2	0.1	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	0.0	0.0
Control Delay (*d*), s/veh	66.6	41.5	36.8	66.0	43.4	41.0	61.6	25.8	26.2	62.4	19.3	14.6
Level of Service (LOS)	E	D	D	E	D	D	E	C	C	E	B	B
Approach Delay, s/veh / LOS	64.1	E		44.8	D		26.7	C		26.1	C	
Intersection Delay, s/veh / LOS	30.7						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.60	C	3.28	C	2.57	C	2.42	B
Bicycle LOS Score / LOS	0.67	A	1.53	B	1.35	A	1.23	A

 HCS™ Streets Version 7.9.5 Generated: 6/4/2021 1:29:07 PM

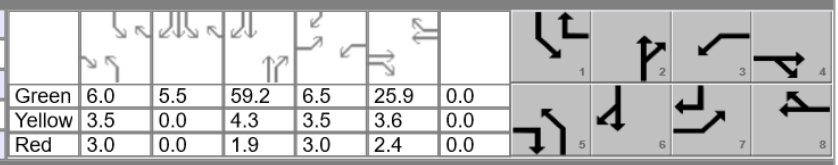
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 7, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.91
Urban Street	Preston Highway	Analysis Year	2032 Build	Analysis Period	1> 7:15
Intersection	Cooper Chapel Road	File Name	AM 32 B Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	89	4	5	96	52	441	29	1351	81	212	851	479

Signal Information			
Cycle, s	128.3	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.0	5.5	59.2	6.5	25.9	0.0
Yellow	3.5	0.0	4.3	3.5	3.6	0.0
Red	3.0	0.0	1.9	3.0	2.4	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	13.0	31.9	13.0	31.9	12.5	65.4	18.0	71.0
Change Period, (*Y+R c*), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.8	5.1	5.8	3.0	4.9	4.0	4.9
Queue Clearance Time (*g s*), s	5.7	2.2	6.0	21.0	4.1	26.5	10.7	16.7
Green Extension Time (*g e*), s	0.7	4.5	0.5	4.8	0.0	32.7	0.8	34.8
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	0.00	0.03	0.00	0.01	0.00	0.31	0.00	0.26

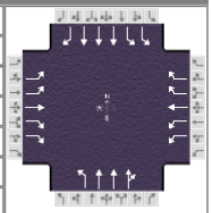
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	98	4	5	105	57	485	29	969	470	233	935	197
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1647	1900	1425	1675	1900	1403	1753	1856	1799	1689	1658	1585
Queue Service Time (*g s*), s	3.7	0.2	0.2	4.0	3.2	19.0	2.1	24.5	24.5	8.7	14.7	8.1
Cycle Queue Clearance Time (*g c*), s	3.7	0.2	0.2	4.0	3.2	19.0	2.1	24.5	24.5	8.7	14.7	8.1
Green Ratio (*g/C*)	0.05	0.20	0.25	0.05	0.20	0.29	0.05	0.46	0.46	0.09	0.50	0.56
Capacity (*c*), veh/h	166	383	708	169	383	819	82	1713	831	304	2512	880
Volume-to-Capacity Ratio (*X*)	0.588	0.011	0.008	0.625	0.149	0.592	0.356	0.566	0.566	0.766	0.372	0.223
Back of Queue (*Q*), ft/ln (95 th percentile)	80.4	5.1	3	84.8	68.7	273.1	42.5	383.5	367.6	176	238.5	125.9
Back of Queue (*Q*), veh/ln (95 th percentile)	3.0	0.2	0.1	3.2	2.7	10.8	1.6	15.0	14.7	6.8	9.2	5.0
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	0.32	0.24	0.63
Uniform Delay (*d 1*), s/veh	59.7	41.0	36.4	59.8	42.2	39.0	59.4	25.2	25.2	57.1	19.4	14.5
Incremental Delay (*d 2*), s/veh	5.6	0.0	0.0	5.1	0.3	1.1	0.8	0.3	0.7	4.0	0.1	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	0.0	0.0
Control Delay (*d*), s/veh	65.3	41.0	36.4	64.9	42.5	40.1	60.2	25.6	25.9	61.2	19.5	14.7
Level of Service (LOS)	E	D	D	E	D	D	E	C	C	E	B	B
Approach Delay, s/veh / LOS	62.8	E		44.3	D		26.4	C		25.9	C	
Intersection Delay, s/veh / LOS	30.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.60	C	3.28	C	2.57	C	2.42	B
Bicycle LOS Score / LOS	0.67	A	1.56	B	1.37	A	1.24	A

 HCS™ Streets Version 7.9.5 Generated: 10/7/2021 2:21:27 PM

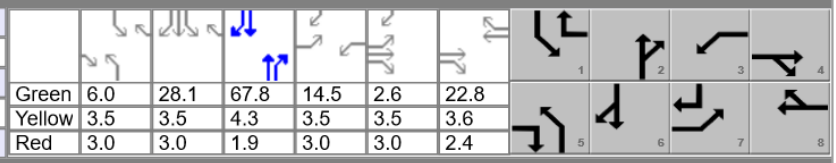
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2021	Analysis Period	1> 4:45
Intersection	Cooper Chapel Rd	File Name	PM 21 Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	354	61	46	210	15	358	12	1178	214	707	1768	110

Signal Information			
Cycle, s	180.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.0	28.1	67.8	14.5	2.6	22.8						
Yellow	3.5	3.5	4.3	3.5	3.5	3.6						
Red	3.0	3.0	1.9	3.0	3.0	2.4						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	30.1	38.0	21.0	28.8	12.5	74.0	47.1	108.6
Change Period, (*Y+R* $_c$), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.7	5.1	5.7	3.0	0.0	4.0	0.0
Queue Clearance Time (*g* $_s$), s	20.9	7.0	13.1	19.3	3.3		38.1	
Green Extension Time (*g* $_e$), s	2.7	4.2	1.3	3.5	0.0	0.0	2.4	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	0.00	0.00	0.00	0.04	0.00		0.09	

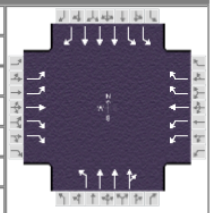
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	361	62	47	214	15	365	12	947	435	721	1804	112
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1675	1900	1425	1702	1900	1414	1697	1885	1733	1743	1698	1409
Queue Service Time (*g* $_s$), s	18.9	5.0	2.4	11.1	1.3	17.3	1.3	38.6	38.2	36.1	29.2	2.7
Cycle Queue Clearance Time (*g* $_c$), s	18.9	5.0	2.4	11.1	1.3	17.3	1.3	38.6	38.2	36.1	29.2	2.7
Green Ratio (*g/C*)	0.13	0.18	0.21	0.08	0.13	0.35	0.03	0.38	0.38	0.23	0.57	0.70
Capacity (*c*), veh/h	439	337	601	274	241	996	57	1420	653	805	2898	986
Volume-to-Capacity Ratio (*X*)	0.823	0.184	0.078	0.783	0.063	0.367	0.211	0.667	0.667	0.896	0.623	0.114
Back of Queue (*Q*), ft/ln (95 th percentile)	350.2	111.7	39.3	227.6	28.7	257.3	26.9	635.5	592.1	593.2	330.7	40.7
Back of Queue (*Q*), veh/ln (95 th percentile)	13.4	4.5	1.6	8.8	1.1	10.2	1.0	25.2	23.7	23.5	13.0	1.4
Queue Storage Ratio (*RQ*) (95 th percentile)	0.78	0.25	0.31	0.57	0.05	0.74	0.06	0.53	0.50	1.08	0.33	0.20
Uniform Delay (*d* $_1$), s/veh	76.2	62.9	57.0	81.2	69.2	43.4	87.5	49.7	48.5	67.1	12.9	4.8
Incremental Delay (*d* $_2$), s/veh	6.5	0.4	0.1	6.7	0.2	0.4	0.6	2.2	4.8	9.4	1.0	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	0.0	0.0
Control Delay (*d*), s/veh	82.7	63.3	57.1	87.9	69.3	43.7	88.1	51.9	53.3	76.5	13.9	5.0
Level of Service (LOS)	F	E	E	F	E	D	F	D	D	E	B	A
Approach Delay, s/veh / LOS	77.6	E		60.3	E		52.7	D		30.7	C	
Intersection Delay, s/veh / LOS	44.5						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.62	C	2.88	C	2.59	C	2.42	B
Bicycle LOS Score / LOS	1.26	A	1.47	A	1.28	A	1.94	B

 HCS™ Streets Version 7.9.5 Generated: 6/4/2021 2:44:56 PM

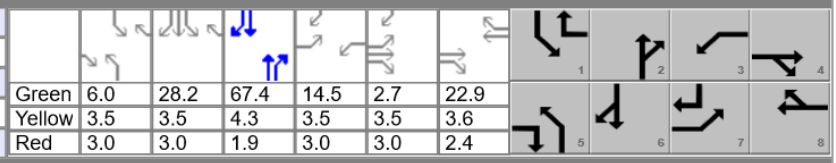
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2022 No Build	Analysis Period	1> 4:45
Intersection	Cooper Chapel	File Name	PM 22 NB Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	356	61	46	211	15	360	12	1184	215	711	1777	111

Signal Information			
Cycle, s	180.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.0	28.2	67.4	14.5	2.7	22.9
Yellow	3.5	3.5	4.3	3.5	3.5	3.6
Red	3.0	3.0	1.9	3.0	3.0	2.4

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	30.2	38.1	21.0	28.9	12.5	73.6	47.2	108.4
Change Period, (*Y+R* $_c$), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.7	5.1	5.7	3.0	0.0	4.0	0.0
Queue Clearance Time (*g* $_s$), s	21.0	7.0	13.2	19.4	3.3		38.3	
Green Extension Time (*g* $_e$), s	2.7	4.2	1.3	3.5	0.0	0.0	2.4	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	0.00	0.00	0.00	0.04	0.00		0.10	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	363	62	47	215	15	367	12	951	437	726	1813	113
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1675	1900	1425	1702	1900	1414	1697	1885	1733	1743	1698	1409
Queue Service Time (*g* $_s$), s	19.0	5.0	2.4	11.2	1.3	17.4	1.3	39.0	38.6	36.3	29.6	2.7
Cycle Queue Clearance Time (*g* $_c$), s	19.0	5.0	2.4	11.2	1.3	17.4	1.3	39.0	38.6	36.3	29.6	2.7
Green Ratio (*g/C*)	0.13	0.18	0.21	0.08	0.13	0.35	0.03	0.37	0.37	0.23	0.57	0.70
Capacity (*c*), veh/h	441	339	603	275	242	1000	57	1413	649	809	2892	986
Volume-to-Capacity Ratio (*X*)	0.824	0.184	0.078	0.784	0.063	0.367	0.211	0.674	0.674	0.897	0.627	0.115
Back of Queue (*Q*), ft/ln (95 th percentile)	351.6	111.6	39.2	228.4	28.7	258	26.9	642.8	599	597	335.8	41.4
Back of Queue (*Q*), veh/ln (95 th percentile)	13.4	4.5	1.6	8.9	1.1	10.2	1.0	25.5	24.0	23.7	13.2	1.5
Queue Storage Ratio (*RQ*) (95 th percentile)	0.78	0.25	0.31	0.57	0.05	0.74	0.06	0.54	0.50	1.09	0.34	0.21
Uniform Delay (*d* $_1$), s/veh	76.1	62.8	56.9	81.2	69.1	43.2	87.5	50.3	49.2	67.0	13.1	4.8
Incremental Delay (*d* $_2$), s/veh	6.5	0.4	0.1	6.6	0.2	0.4	0.6	2.3	5.0	9.6	1.0	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	0.0	0.0
Control Delay (*d*), s/veh	82.6	63.2	56.9	87.8	69.3	43.6	88.1	52.6	54.1	76.7	14.1	5.0
Level of Service (LOS)	F	E	E	F	E	D	F	D	D	E	B	A
Approach Delay, s/veh / LOS	77.5	E		60.2	E		53.4	D		30.8	C	
Intersection Delay, s/veh / LOS	44.7						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.62	C	2.88	C	2.59	C	2.42	B
Bicycle LOS Score / LOS	1.27	A	1.47	A	1.28	A	1.95	B

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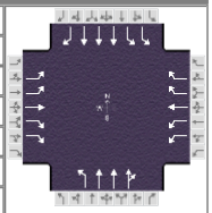
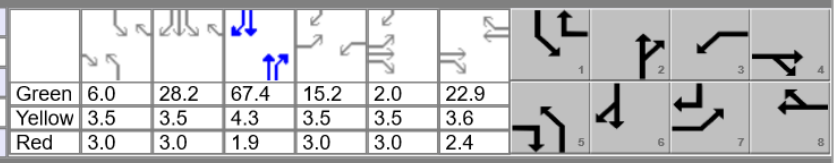
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 7, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2022 Build	Analysis Period	1> 4:45
Intersection	Cooper Chapel	File Name	PM 22 B Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	356	61	46	223	15	360	12	1196	227	711	1789	111

Signal Information			
Cycle, s	180.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.0	28.2	67.4	15.2	2.0	22.9		
Yellow	3.5	3.5	4.3	3.5	3.5	3.6		
Red	3.0	3.0	1.9	3.0	3.0	2.4		

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	30.2	37.4	21.7	28.9	12.5	73.6	47.2	108.4
Change Period, (*Y+R c*), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.7	5.1	5.7	3.0	0.0	4.0	0.0
Queue Clearance Time (*g s*), s	21.0	7.0	13.8	19.4	3.2		38.3	
Green Extension Time (*g e*), s	2.7	4.2	1.4	3.5	0.0	0.0	2.4	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	0.00	0.00	0.00	0.04	0.00		0.10	

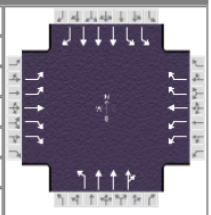
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	363	62	47	228	15	367	12	948	434	726	1826	113
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1675	1900	1425	1702	1900	1414	1697	1885	1727	1743	1698	1409
Queue Service Time (*g s*), s	19.0	5.0	2.4	11.8	1.3	17.4	1.2	29.4	27.8	36.3	30.0	2.7
Cycle Queue Clearance Time (*g c*), s	19.0	5.0	2.4	11.8	1.3	17.4	1.2	29.4	27.8	36.3	30.0	2.7
Green Ratio (*g/C*)	0.13	0.17	0.21	0.08	0.13	0.35	0.03	0.37	0.37	0.23	0.57	0.70
Capacity (*c*), veh/h	441	331	592	288	242	1000	57	1413	647	809	2892	986
Volume-to-Capacity Ratio (*X*)	0.824	0.188	0.079	0.790	0.063	0.367	0.206	0.671	0.671	0.897	0.631	0.115
Back of Queue (*Q*), ft/ln (95 th percentile)	351.6	112.2	39.5	238.4	28.7	258	26.1	371.9	315.4	597	339.9	41.4
Back of Queue (*Q*), veh/ln (95 th percentile)	13.4	4.5	1.6	9.2	1.1	10.2	1.0	14.8	12.6	23.7	13.4	1.5
Queue Storage Ratio (*RQ*) (95 th percentile)	0.78	0.25	0.32	0.60	0.05	0.74	0.06	0.31	0.26	1.09	0.34	0.21
Uniform Delay (*d 1*), s/veh	76.1	63.4	57.4	80.8	69.1	43.2	87.4	26.9	24.1	67.0	13.1	4.8
Incremental Delay (*d 2*), s/veh	6.5	0.4	0.1	6.6	0.2	0.4	0.4	1.6	3.4	9.6	1.1	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	0.0	0.0
Control Delay (*d*), s/veh	82.6	63.8	57.5	87.4	69.3	43.6	87.8	28.5	27.5	76.7	14.2	5.0
Level of Service (LOS)	F	E	E	F	E	D	F	C	C	E	B	A
Approach Delay, s/veh / LOS	77.7	E		60.6	E		28.7	C		30.8	C	
Intersection Delay, s/veh / LOS	38.1						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.62	C	2.88	C	2.59	C	2.42	B
Bicycle LOS Score / LOS	1.27	A	1.49	A	1.29	A	1.95	B

 HCS™ Streets Version 7.9.5 Generated: 10/7/2021 2:13:01 PM

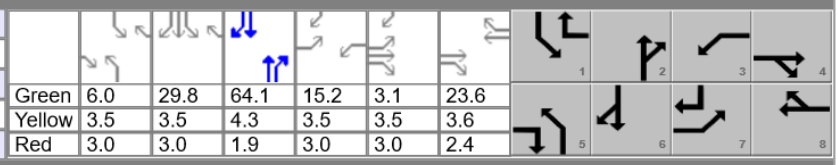
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2032 No Build	Analysis Period	1> 4:45
Intersection	Cooper Chapel	File Name	PM 32 NB Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	374	64	48	222	16	378	13	1245	226	747	1868	117

Signal Information			
Cycle, s	180.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.0	29.8	64.1	15.2	3.1	23.6
Yellow	3.5	3.5	4.3	3.5	3.5	3.6
Red	3.0	3.0	1.9	3.0	3.0	2.4

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	31.3	39.2	21.7	29.6	12.5	70.3	48.8	106.6
Change Period, ($Y+R_c$), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.7	5.1	5.7	3.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	22.0	7.2	13.7	20.0	3.4		40.2	
Green Extension Time (g_e), s	2.8	4.5	1.4	3.6	0.0	0.0	2.0	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	0.01	0.00	0.00	0.07	0.00		0.36	

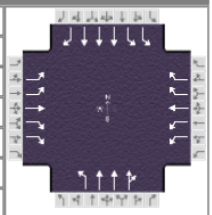
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	382	65	49	227	16	386	13	997	458	762	1906	119
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1675	1900	1425	1702	1900	1414	1697	1885	1733	1743	1698	1409
Queue Service Time (g_s), s	20.0	5.2	2.5	11.7	1.4	18.0	1.4	42.4	42.1	38.2	34.4	3.0
Cycle Queue Clearance Time (g_c), s	20.0	5.2	2.5	11.7	1.4	18.0	1.4	42.4	42.1	38.2	34.4	3.0
Green Ratio (*g/C*)	0.14	0.18	0.22	0.08	0.13	0.37	0.03	0.36	0.36	0.24	0.56	0.70
Capacity (*c*), veh/h	461	351	621	287	249	1036	57	1343	617	839	2842	980
Volume-to-Capacity Ratio (*X*)	0.828	0.186	0.079	0.789	0.065	0.372	0.227	0.742	0.742	0.909	0.671	0.122
Back of Queue (*Q*), ft/ln (95 th percentile)	365.7	116.2	40.6	237.6	30.4	265.3	29.1	693.9	651.2	630	390.9	45.8
Back of Queue (*Q*), veh/ln (95 th percentile)	14.0	4.6	1.6	9.2	1.2	10.5	1.1	27.5	26.0	25.0	15.4	1.6
Queue Storage Ratio (*RQ*) (95 th percentile)	0.81	0.26	0.32	0.59	0.06	0.76	0.07	0.58	0.55	1.15	0.39	0.23
Uniform Delay (d_1), s/veh	75.5	62.0	56.0	80.8	68.5	41.9	87.6	53.5	52.4	66.4	14.6	5.1
Incremental Delay (d_2), s/veh	6.4	0.4	0.1	6.6	0.2	0.4	0.7	3.3	7.0	11.7	1.3	0.3
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	0.0	0.0
Control Delay (*d*), s/veh	82.0	62.3	56.1	87.4	68.7	42.2	88.3	56.8	59.4	78.1	15.9	5.4
Level of Service (LOS)	F	E	E	F	E	D	F	E	E	E	B	A
Approach Delay, s/veh / LOS	76.8	E		59.2	E		57.9	E		32.5	C	
Intersection Delay, s/veh / LOS	46.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.62	C	2.88	C	2.60	C	2.43	B
Bicycle LOS Score / LOS	1.31	A	1.52	B	1.32	A	2.02	B

 HCS™ Streets Version 7.9.5 Generated: 6/4/2021 3:05:17 PM

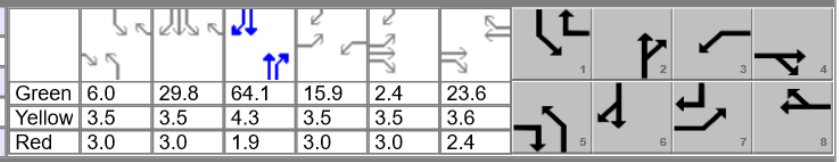
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 7, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2032 Build	Analysis Period	1> 4:45
Intersection	Cooper Chapel	File Name	PM 32 B Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	374	64	48	234	16	378	13	1257	238	747	1880	117

Signal Information			
Cycle, s	180.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.0	29.8	64.1	15.9	2.4	23.6
Yellow	3.5	3.5	4.3	3.5	3.5	3.6
Red	3.0	3.0	1.9	3.0	3.0	2.4

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	2.0	3.0	2.0	4.0	2.0	3.0
Phase Duration, s	31.3	38.5	22.4	29.6	12.5	70.3	48.8	106.6
Change Period, ($Y+R_c$), s	6.5	6.0	6.5	6.0	6.5	6.2	6.5	6.2
Max Allow Headway (*MAH*), s	5.6	5.7	5.1	5.7	3.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	22.0	7.2	14.4	20.0	3.3		40.2	
Green Extension Time (g_e), s	2.8	4.5	1.5	3.6	0.0	0.0	2.0	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	0.01	0.00	0.00	0.07	0.00		0.36	

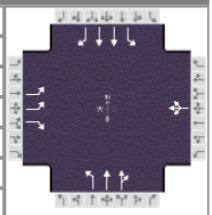
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	382	65	49	239	16	386	13	990	454	762	1918	119
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1675	1900	1425	1702	1900	1414	1697	1885	1728	1743	1698	1409
Queue Service Time (g_s), s	20.0	5.2	2.5	12.4	1.4	18.0	1.3	33.6	32.2	38.2	34.9	3.0
Cycle Queue Clearance Time (g_c), s	20.0	5.2	2.5	12.4	1.4	18.0	1.3	33.6	32.2	38.2	34.9	3.0
Green Ratio (*g/C*)	0.14	0.18	0.21	0.09	0.13	0.37	0.03	0.36	0.36	0.24	0.56	0.70
Capacity (*c*), veh/h	461	343	610	300	249	1036	57	1343	615	839	2842	980
Volume-to-Capacity Ratio (*X*)	0.828	0.190	0.080	0.795	0.065	0.372	0.222	0.737	0.737	0.909	0.675	0.122
Back of Queue (*Q*), ft/ln (95 th percentile)	365.7	116.8	40.8	247.4	30.4	265.3	28.2	415.7	356.1	630	395.4	45.8
Back of Queue (*Q*), veh/ln (95 th percentile)	14.0	4.7	1.6	9.6	1.2	10.5	1.1	16.5	14.2	25.0	15.6	1.6
Queue Storage Ratio (*RQ*) (95 th percentile)	0.81	0.26	0.33	0.62	0.06	0.76	0.07	0.35	0.30	1.15	0.40	0.23
Uniform Delay (d_1), s/veh	75.5	62.6	56.6	80.5	68.5	41.9	87.5	29.4	26.5	66.4	14.7	5.1
Incremental Delay (d_2), s/veh	6.4	0.4	0.1	6.5	0.2	0.4	0.4	2.1	4.4	11.7	1.3	0.3
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	0.0	0.0
Control Delay (*d*), s/veh	82.0	63.0	56.7	86.9	68.7	42.2	87.9	31.5	31.0	78.1	16.0	5.4
Level of Service (LOS)	F	E	E	F	E	D	F	C	C	E	B	A
Approach Delay, s/veh / LOS	77.0	E		59.6	E		31.8	C		32.4	C	
Intersection Delay, s/veh / LOS	39.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.62	C	2.88	C	2.60	C	2.43	B
Bicycle LOS Score / LOS	1.31	A	1.54	B	1.33	A	2.03	B

 HCS™ Streets Version 7.9.5 Generated: 10/7/2021 2:30:40 PM

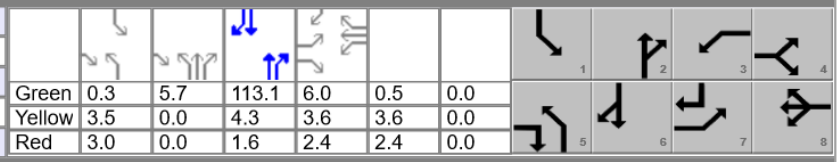
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Urban Street	Preston Highway	Analysis Year	2021	Analysis Period	1> 7:15
Intersection	Interchange Drive	File Name	AM 21 Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	67		15	1	0	1	10	1315	3	1	721	152

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	On



Green	0.3	5.7	113.1	6.0	0.5	0.0						
Yellow	3.5	0.0	4.3	3.6	3.6	0.0						
Red	3.0	0.0	1.6	2.4	2.4	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		12.0	2.0	4.0	2.0	3.0
Phase Duration, s		12.0		6.5	12.5	124.7	6.8	119.0
Change Period, ($Y+R_c$), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		3.1	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s				2.2	3.0		2.1	
Green Extension Time (g_e), s		0.0		0.0	0.0	0.0	0.0	0.0
Phase Call Probability				0.09	1.00		0.04	
Max Out Probability				0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	74		17		2		11	700	700	1	782	165
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1661		1359		1704		1527	1856	1854	1810	1724	1585
Queue Service Time (g_s), s	3.3		1.7		0.2		1.0	12.5	12.5	0.1	10.8	3.6
Cycle Queue Clearance Time (g_c), s	3.3		1.7		0.2		1.0	12.5	12.5	0.1	10.8	3.6
Green Ratio (*g/C*)	0.04		0.08		0.00		0.60	0.79	0.79	0.00	0.75	0.79
Capacity (*c*), veh/h	133		109		6		61	1470	1468	3	2599	1258
Volume-to-Capacity Ratio (*X*)	0.560		0.153		0.368		0.174	0.477	0.477	0.338	0.301	0.131
Back of Queue (*Q*), ft/ln (95 th percentile)	68.7		31.4		4.8		21.6	138.8	135.5	3.8	158.9	43.6
Back of Queue (*Q*), veh/ln (95 th percentile)	2.6		1.1		0.2		0.7	5.4	5.4	0.2	6.1	1.7
Queue Storage Ratio (*RQ*) (95 th percentile)	0.17		0.52		0.00		0.09	0.00	0.00	0.04	0.00	0.15
Uniform Delay (d_1), s/veh	70.7		64.3		74.6		71.7	2.8	2.8	74.8	5.9	3.6
Incremental Delay (d_2), s/veh	3.7		0.6		13.3		0.9	0.8	0.8	49.9	0.3	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
Control Delay (*d*), s/veh	74.4		64.9		87.9		72.6	3.6	3.6	124.7	6.2	3.8
Level of Service (LOS)	E		E		F		E	A	A	F	A	A
Approach Delay, s/veh / LOS	72.6		E	87.9		F	4.1		A	5.9		A
Intersection Delay, s/veh / LOS	7.4						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.33	B	2.49	B	1.62	B	2.05	B
Bicycle LOS Score / LOS		F	0.49	A	1.70	B	1.29	A

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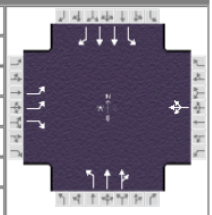
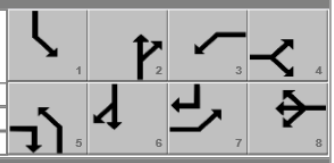
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Urban Street	Preston Highway	Analysis Year	2022 No Build	Analysis Period	1> 7:15
Intersection	Interchange Drive	File Name	AM 22 NB Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	67		15	1	0	1	10	1322	3	1	725	153

Signal Information			
Cycle, s	150.0	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	0.3	5.7	113.1	6.0	0.5	0.0	
Yellow	3.5	0.0	4.3	3.6	3.6	0.0	
Red	3.0	0.0	1.6	2.4	2.4	0.0	

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		12.0	2.0	4.0	2.0	3.0
Phase Duration, s		12.0		6.5	12.5	124.7	6.8	119.0
Change Period, (*Y+R c*), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		3.1	4.0	0.0	4.0	0.0
Queue Clearance Time (*g s*), s				2.2	3.0		2.1	
Green Extension Time (*g e*), s		0.0		0.0	0.0	0.0	0.0	0.0
Phase Call Probability				0.09	1.00		0.04	
Max Out Probability				0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	74		17		2		11	703	703	1	785	166
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1661		1359		1704		1527	1856	1854	1810	1724	1585
Queue Service Time (*g s*), s	3.3		1.7		0.2		1.0	12.6	12.6	0.1	10.9	3.6
Cycle Queue Clearance Time (*g c*), s	3.3		1.7		0.2		1.0	12.6	12.6	0.1	10.9	3.6
Green Ratio (*g/C*)	0.04		0.08		0.00		0.60	0.79	0.79	0.00	0.75	0.79
Capacity (*c*), veh/h	133		109		6		61	1470	1468	3	2599	1258
Volume-to-Capacity Ratio (*X*)	0.560		0.153		0.368		0.174	0.478	0.479	0.338	0.302	0.132
Back of Queue (*Q*), ft/ln (95 th percentile)	68.7		31.4		4.8		21.6	140	136.7	3.8	159.6	43.9
Back of Queue (*Q*), veh/ln (95 th percentile)	2.6		1.1		0.2		0.7	5.5	5.5	0.2	6.1	1.7
Queue Storage Ratio (*RQ*) (95 th percentile)	0.17		0.52		0.00		0.09	0.00	0.00	0.04	0.00	0.15
Uniform Delay (*d 1*), s/veh	70.7		64.3		74.6		71.7	2.8	2.8	74.8	5.9	3.6
Incremental Delay (*d 2*), s/veh	3.7		0.6		13.3		0.9	0.7	0.7	49.8	0.3	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
Control Delay (*d*), s/veh	74.4		64.9		87.9		72.6	3.6	3.6	124.5	6.2	3.8
Level of Service (LOS)	E		E		F		E	A	A	F	A	A
Approach Delay, s/veh / LOS	72.6		E	87.9		F	4.1		A	5.9		A
Intersection Delay, s/veh / LOS	7.4						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.33	B	2.49	B	1.62	B	2.05	B
Bicycle LOS Score / LOS		F	0.49	A	1.71	B	1.29	A

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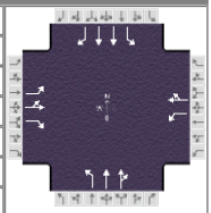
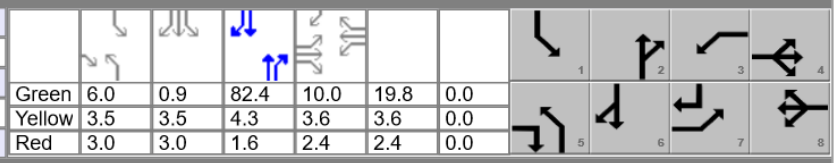
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 7, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Urban Street	Preston Highway	Analysis Year	2022 Build	Analysis Period	1> 7:15
Intersection	Interchange Drive	File Name	AM 22 B Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	57	24	15	190	13	1	10	1287	137	125	629	153

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.0	0.9		82.4	10.0	19.8	0.0					
Yellow	3.5	3.5		4.3	3.6	3.6	0.0					
Red	3.0	3.0		1.6	2.4	2.4	0.0					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		10.0	2.0	4.0	2.0	3.0
Phase Duration, s		16.0		25.8	12.5	88.3	19.9	95.7
Change Period, ($Y+R_c$), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		4.0	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s		7.4		19.2	3.0		13.0	
Green Extension Time (g_e), s		0.2		0.6	0.0	0.0	0.4	0.0
Phase Call Probability		1.00		1.00	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	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	63	27	17	211	16		11	758	739	135	681	166
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1711	1900	1359	1810	1876		1527	1856	1793	1810	1724	1585
Queue Service Time (g_s), s	5.4	2.0	1.7	17.2	1.1		1.0	40.0	40.0	11.0	14.8	5.9
Cycle Queue Clearance Time (g_c), s	5.4	2.0	1.7	17.2	1.1		1.0	40.0	40.0	11.0	14.8	5.9
Green Ratio (*g/C*)	0.07	0.07	0.11	0.13	0.13		0.04	0.55	0.55	0.09	0.60	0.67
Capacity (*c*), veh/h	114	127	145	239	248		61	1019	985	161	2063	1054
Volume-to-Capacity Ratio (*X*)	0.555	0.211	0.115	0.882	0.063		0.172	0.744	0.751	0.839	0.330	0.157
Back of Queue (*Q*), ft/ln (95 th percentile)	115.9	44	30.1	329.3	23.2		21.5	491.1	452.9	228.6	244.7	89.7
Back of Queue (*Q*), veh/ln (95 th percentile)	4.4	1.8	1.0	13.2	0.9		0.7	19.2	18.1	9.1	9.3	3.5
Queue Storage Ratio (*RQ*) (95 th percentile)	0.29	0.00	0.50	0.00	0.00		0.09	0.00	0.00	2.29	0.00	0.30
Uniform Delay (d_1), s/veh	67.8	66.3	60.6	63.9	56.9		72.4	17.5	16.8	67.3	15.1	9.4
Incremental Delay (d_2), s/veh	4.2	0.8	0.3	10.2	0.1		0.8	2.9	3.1	10.2	0.4	0.3
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	0.0
Control Delay (*d*), s/veh	72.0	67.1	60.9	74.1	57.1		73.2	20.5	19.9	77.5	15.5	9.7
Level of Service (LOS)	E	E	E	E	E		E	C	B	E	B	A
Approach Delay, s/veh / LOS	69.1	E		73.0	E		20.6	C		23.0	C	
Intersection Delay, s/veh / LOS	27.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.32	B	2.49	B	1.91	B	2.09	B
Bicycle LOS Score / LOS	0.66	A	0.86	A	1.80	B	1.32	A

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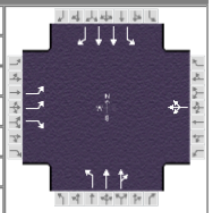
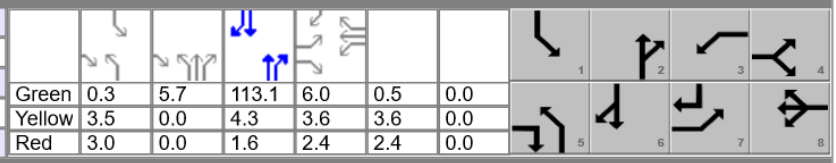
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Urban Street	Preston Highway	Analysis Year	2032 No Build	Analysis Period	1> 7:15
Intersection	Interchange Drive	File Name	AM 32 NB Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	70		16	1	0	1	11	1390	3	1	762	161

Signal Information			
Cycle, s	150.0	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	0.3	5.7	113.1	6.0	0.5	0.0	
Yellow	3.5	0.0	4.3	3.6	3.6	0.0	
Red	3.0	0.0	1.6	2.4	2.4	0.0	

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		12.0	2.0	4.0	2.0	3.0
Phase Duration, s		12.0		6.5	12.5	124.7	6.8	119.0
Change Period, (*Y+R c*), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		3.1	4.0	0.0	3.0	0.0
Queue Clearance Time (*g s*), s				2.2	3.1		2.1	
Green Extension Time (*g e*), s		0.0		0.0	0.0	0.0	0.0	0.0
Phase Call Probability				0.09	1.00		0.04	
Max Out Probability				0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	78		18		2		12	731	731	1	824	174
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1661		1359		1704		1527	1856	1854	1810	1724	1585
Queue Service Time (*g s*), s	3.5		1.8		0.2		1.1	13.6	13.6	0.1	11.6	3.8
Cycle Queue Clearance Time (*g c*), s	3.5		1.8		0.2		1.1	13.6	13.6	0.1	11.6	3.8
Green Ratio (*g/C*)	0.04		0.08		0.00		0.60	0.79	0.79	0.00	0.75	0.79
Capacity (*c*), veh/h	133		109		6		61	1470	1468	3	2599	1258
Volume-to-Capacity Ratio (*X*)	0.585		0.163		0.368		0.189	0.498	0.498	0.338	0.317	0.138
Back of Queue (*Q*), ft/ln (95 th percentile)	72		33.6		4.8		23.5	144	140.6	2.6	170.3	46.3
Back of Queue (*Q*), veh/ln (95 th percentile)	2.7		1.2		0.2		0.8	5.6	5.6	0.1	6.5	1.8
Queue Storage Ratio (*RQ*) (95 th percentile)	0.18		0.56		0.00		0.09	0.00	0.00	0.03	0.00	0.15
Uniform Delay (*d 1*), s/veh	70.8		64.3		74.6		71.8	2.9	2.9	74.8	6.0	3.6
Incremental Delay (*d 2*), s/veh	4.0		0.7		13.3		0.9	0.7	0.7	20.1	0.3	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
Control Delay (*d*), s/veh	74.8		65.0		87.9		72.7	3.7	3.7	94.8	6.3	3.8
Level of Service (LOS)	E		E		F		E	A	A	F	A	A
Approach Delay, s/veh / LOS	73.0		E	87.9		F	4.2		A	5.9		A
Intersection Delay, s/veh / LOS	7.5						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.33	B	2.49	B	1.62	B	2.05	B
Bicycle LOS Score / LOS		F	0.49	A	1.77	B	1.33	A

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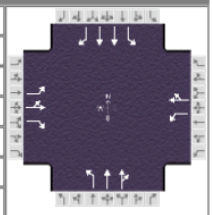
HCS7 Signalized Intersection Results Summary

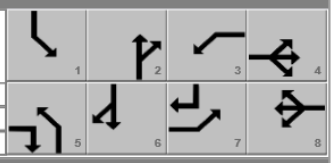
General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 7, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Urban Street	Preston Highway	Analysis Year	2032 Build	Analysis Period	1> 7:15
Intersection	Interchange Drive	File Name	AM 32 B Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	60	24	16	190	13	1	11	1355	137	125	666	161

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	6.0	0.9	82.4	10.0	19.8	0.0	
Yellow	3.5	3.5	4.3	3.6	3.6	0.0	
Red	3.0	3.0	1.6	2.4	2.4	0.0	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		10.0	2.0	4.0	2.0	3.0
Phase Duration, s		16.0		25.8	12.5	88.3	19.9	95.7
Change Period, (*Y+R c*), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		4.0	4.0	0.0	4.0	0.0
Queue Clearance Time (*g s*), s		7.7		19.2	3.1		13.0	
Green Extension Time (*g e*), s		0.2		0.6	0.0	0.0	0.4	0.0
Phase Call Probability		1.00		1.00	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	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	67	27	18	211	16		11	785	768	135	720	174
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1711	1900	1359	1810	1876		1527	1856	1796	1810	1724	1585
Queue Service Time (*g s*), s	5.7	2.0	1.8	17.2	1.1		1.1	43.9	44.3	11.0	15.9	6.2
Cycle Queue Clearance Time (*g c*), s	5.7	2.0	1.8	17.2	1.1		1.1	43.9	44.3	11.0	15.9	6.2
Green Ratio (*g/C*)	0.07	0.07	0.11	0.13	0.13		0.04	0.55	0.55	0.09	0.60	0.67
Capacity (*c*), veh/h	114	127	145	239	248		61	1019	986	161	2063	1054
Volume-to-Capacity Ratio (*X*)	0.584	0.211	0.123	0.882	0.063		0.187	0.770	0.779	0.839	0.349	0.165
Back of Queue (*Q*), ft/ln (95 th percentile)	122.8	44	32.2	329.3	23.2		23.4	536.6	503.8	228.2	259.2	95
Back of Queue (*Q*), veh/ln (95 th percentile)	4.7	1.8	1.1	13.2	0.9		0.8	21.0	20.2	9.1	9.9	3.7
Queue Storage Ratio (*RQ*) (95 th percentile)	0.31	0.00	0.54	0.00	0.00		0.09	0.00	0.00	2.28	0.00	0.32
Uniform Delay (*d 1*), s/veh	68.0	66.3	60.6	63.9	56.9		72.5	19.0	18.4	67.3	15.3	9.5
Incremental Delay (*d 2*), s/veh	4.7	0.8	0.4	10.2	0.1		0.8	3.0	3.2	10.2	0.4	0.3
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	0.0
Control Delay (*d*), s/veh	72.7	67.1	61.0	74.1	57.1		73.2	22.0	21.6	77.4	15.7	9.8
Level of Service (LOS)	E	E	E	E	E		E	C	C	E	B	A
Approach Delay, s/veh / LOS	69.5	E		73.0	E		22.2	C		22.8	C	
Intersection Delay, s/veh / LOS	28.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.32	B	2.49	B	1.91	B	2.09	B
Bicycle LOS Score / LOS	0.67	A	0.86	A	1.87	B	1.36	A

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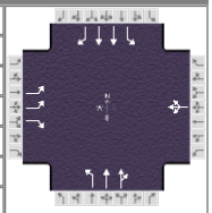
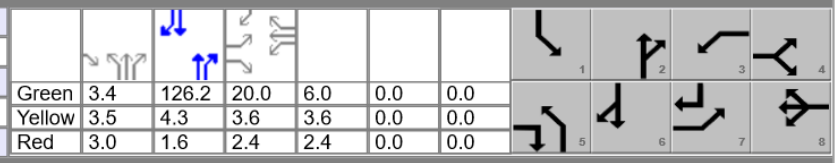
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2021	Analysis Period	1> 4:45
Intersection	Interchange Dr	File Name	PM 21 Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	184		48	3	0	4	16	1222	2	0	1867	155

Signal Information			
Cycle, s	180.0	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	3.4	126.2	20.0	6.0	0.0	0.0	
Yellow	3.5	4.3	3.6	3.6	0.0	0.0	
Red	3.0	1.6	2.4	2.4	0.0	0.0	

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		12.0	2.0	4.0	2.0	3.0
Phase Duration, s		26.0		12.0	9.9	142.0	0.0	132.1
Change Period, (*Y+R c*), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		3.1	4.0	0.0	0.0	0.0
Queue Clearance Time (*g s*), s				2.7	3.6			
Green Extension Time (*g e*), s		0.0		0.0	0.0	0.0	0.0	0.0
Phase Call Probability				1.00	0.56			
Max Out Probability				0.00	0.00			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	188		49		7		16	630	629	0	1846	153
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1757		1610		1690		1810	1885	1884	1810	1781	1598
Queue Service Time (*g s*), s	9.0		4.9		0.7		1.6	19.9	19.9	0.0	61.1	3.8
Cycle Queue Clearance Time (*g c*), s	9.0		4.9		0.7		1.6	19.9	19.9	0.0	61.1	3.8
Green Ratio (*g/C*)	0.11		0.13		0.03		0.65	0.76	0.76		0.70	0.81
Capacity (*c*), veh/h	390		209		56		34	1425	1425	1	2497	1298
Volume-to-Capacity Ratio (*X*)	0.481		0.234		0.127		0.486	0.442	0.442	0.000	0.739	0.118
Back of Queue (*Q*), ft/ln (95 th percentile)	183.7		91.7		14.6		37.6	268.5	266.1	0	788.8	48.1
Back of Queue (*Q*), veh/ln (95 th percentile)	7.3		3.7		0.6		1.5	10.7	10.6	0.0	31.1	1.9
Queue Storage Ratio (*RQ*) (95 th percentile)	0.46		1.53		0.00		0.15	0.00	0.00	0.00	0.00	0.16
Uniform Delay (*d 1*), s/veh	75.1		70.3		84.5		88.8	6.9	6.9	0.0	19.0	3.7
Incremental Delay (*d 2*), s/veh	0.9		0.6		0.4		7.5	0.7	0.7	0.0	1.5	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	76.0		70.9		84.8		96.3	7.6	7.6	0.0	20.5	3.8
Level of Service (LOS)	E		E		F		F	A	A		C	A
Approach Delay, s/veh / LOS	75.0	E		84.8	F		8.8	A		19.2	B	
Intersection Delay, s/veh / LOS	19.3						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.33	B	2.49	B	1.64	B	2.07	B
Bicycle LOS Score / LOS		F	0.50	A	1.53	B	2.19	B

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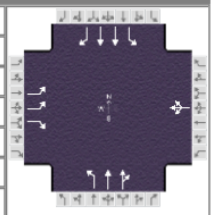
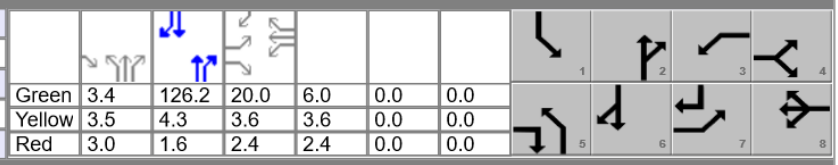
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2022 No Build	Analysis Period	1> 4:45
Intersection	Interchange Dr	File Name	PM 22 NB Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	185		48	3	0	4	16	1228	2	0	1876	156

Signal Information			
Cycle, s	180.0	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	3.4	126.2	20.0	6.0	0.0	0.0	
Yellow	3.5	4.3	3.6	3.6	0.0	0.0	
Red	3.0	1.6	2.4	2.4	0.0	0.0	

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		12.0	2.0	4.0	2.0	3.0
Phase Duration, s		26.0		12.0	9.9	142.0	0.0	132.1
Change Period, (*Y+R* $_c$), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		3.3	4.0	0.0	0.0	0.0
Queue Clearance Time (g_s), s				2.7	3.6			
Green Extension Time (g_e), s		0.0		0.0	0.0	0.0	0.0	0.0
Phase Call Probability				1.00	0.56			
Max Out Probability				0.00	0.00			

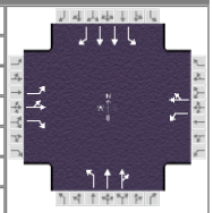
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	189		49		7		16	633	632	0	1855	154
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1757		1610		1690		1810	1885	1884	1810	1781	1598
Queue Service Time (g_s), s	9.1		4.9		0.7		1.6	19.9	19.9	0.0	61.7	3.8
Cycle Queue Clearance Time (g_c), s	9.1		4.9		0.7		1.6	19.9	19.9	0.0	61.7	3.8
Green Ratio (*g/C*)	0.11		0.13		0.03		0.65	0.76	0.76		0.70	0.81
Capacity (*c*), veh/h	390		209		56		34	1425	1425	1	2497	1298
Volume-to-Capacity Ratio (*X*)	0.483		0.234		0.127		0.486	0.444	0.444	0.000	0.743	0.119
Back of Queue (*Q*), ft/ln (95 th percentile)	184.7		91.7		14.9		37.5	266.6	264.3	0	795.8	48.5
Back of Queue (*Q*), veh/ln (95 th percentile)	7.4		3.7		0.6		1.5	10.6	10.6	0.0	31.3	1.9
Queue Storage Ratio (*RQ*) (95 th percentile)	0.46		1.53		0.00		0.15	0.00	0.00	0.00	0.00	0.16
Uniform Delay (d_1), s/veh	75.1		70.3		84.5		88.8	6.9	6.9	0.0	19.1	3.7
Incremental Delay (d_2), s/veh	0.9		0.6		0.4		7.5	0.7	0.7	0.0	1.5	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	76.1		70.9		84.8		96.3	7.6	7.6	0.0	20.6	3.8
Level of Service (LOS)	E		E		F		F	A	A		C	A
Approach Delay, s/veh / LOS	75.0	E		84.8	F		8.7	A		19.3	B	
Intersection Delay, s/veh / LOS	19.4						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.33	B	2.49	B	1.64	B	2.07	B
Bicycle LOS Score / LOS		F	0.50	A	1.54	B	2.20	B

 HCS™ Streets Version 7.9.5 Generated: 6/4/2021 2:53:07 PM

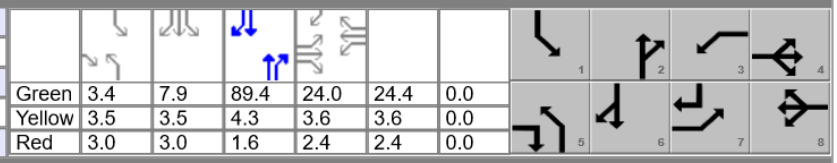
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 7, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2022 Build	Analysis Period	1> 4:45
Intersection	Interchange Dr	File Name	PM 22 B Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	169	28	48	221	12	4	16	1236	82	159	1741	156

Signal Information			
Cycle, s	180.0	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	3.4	7.9	89.4	24.0	24.4	0.0						
Yellow	3.5	3.5	4.3	3.6	3.6	0.0						
Red	3.0	3.0	1.6	2.4	2.4	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		10.0	2.0	4.0	2.0	3.0
Phase Duration, s		30.0		30.4	9.9	95.3	24.3	109.7
Change Period, ($Y+R_c$), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		3.0	4.0	0.0	3.0	0.0
Queue Clearance Time (g_s), s		18.4		24.1	3.6		17.6	
Green Extension Time (g_e), s		0.6		0.3	0.0	0.0	0.2	0.0
Phase Call Probability		1.00		1.00	0.56		1.00	
Max Out Probability		0.01		0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	172	29	49	226	16		16	684	671	157	1721	154
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1900	1610	1810	1818		1810	1885	1843	1810	1781	1598
Queue Service Time (g_s), s	16.4	2.4	4.8	22.1	1.4		1.6	47.9	47.0	15.6	69.5	4.5
Cycle Queue Clearance Time (g_c), s	16.4	2.4	4.8	22.1	1.4		1.6	47.9	47.0	15.6	69.5	4.5
Green Ratio (*g/C*)	0.13	0.13	0.15	0.14	0.14		0.02	0.50	0.50	0.10	0.58	0.71
Capacity (*c*), veh/h	241	253	245	246	247		34	936	915	179	2054	1134
Volume-to-Capacity Ratio (*X*)	0.715	0.113	0.200	0.918	0.066		0.486	0.731	0.733	0.879	0.838	0.136
Back of Queue (*Q*), ft/ln (95 th percentile)	315	52.2	88.9	427.2	29.4		36.9	675.8	634.3	306.4	905.4	64.7
Back of Queue (*Q*), veh/ln (95 th percentile)	12.6	2.1	3.6	17.1	1.2		1.5	26.8	25.4	12.3	35.6	2.6
Queue Storage Ratio (*RQ*) (95 th percentile)	0.79	0.00	1.48	0.00	0.00		0.15	0.00	0.00	3.06	0.00	0.22
Uniform Delay (d_1), s/veh	74.7	68.6	66.7	76.8	67.8		87.7	29.4	27.7	88.3	28.5	6.6
Incremental Delay (d_2), s/veh	6.4	0.2	0.4	20.0	0.0		6.9	3.3	3.4	8.6	3.2	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	0.0
Control Delay (*d*), s/veh	81.1	68.8	67.1	96.7	67.9		94.6	32.7	31.2	96.9	31.7	6.7
Level of Service (LOS)	F	E	E	F	E		F	C	C	F	C	A
Approach Delay, s/veh / LOS	77.0	E		94.8	F		32.7	C		34.8	C	
Intersection Delay, s/veh / LOS	40.5						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.33	B	2.49	B	1.92	B	2.10	B
Bicycle LOS Score / LOS	0.90	A	0.89	A	1.61	B	2.22	B

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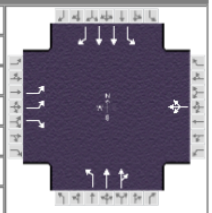
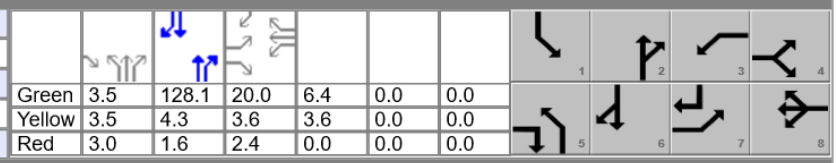
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2032 No Build	Analysis Period	1> 4:45
Intersection	Interchange Dr	File Name	PM 32 NB Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	194		50	3	0	4	17	1291	2	0	1972	164

Signal Information			
Cycle, s	180.0	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	3.5	128.1	20.0	6.4	0.0	0.0						
Yellow	3.5	4.3	3.6	3.6	0.0	0.0						
Red	3.0	1.6	2.4	0.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		12.0	2.0	4.0	2.0	3.0
Phase Duration, s		26.0		10.0	10.0	144.0	0.0	134.0
Change Period, (*Y+R c*), s		6.0		4.0	6.5	5.9	3.5	5.9
Max Allow Headway (*MAH*), s		4.0		3.3	4.0	0.0	0.0	0.0
Queue Clearance Time (*g s*), s				2.7	3.7			
Green Extension Time (*g e*), s		0.0		0.0	0.0	0.0	0.0	0.0
Phase Call Probability				1.00	0.58			
Max Out Probability				0.00	0.00			

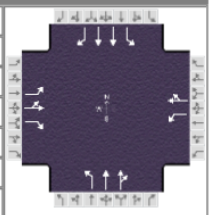
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	198		51		7		17	665	665	0	1948	162
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1757		1610		1690		1810	1885	1884	1810	1781	1598
Queue Service Time (*g s*), s	9.6		5.1		0.7		1.7	19.7	19.7	0.0	65.9	3.8
Cycle Queue Clearance Time (*g c*), s	9.6		5.1		0.7		1.7	19.7	19.7	0.0	65.9	3.8
Green Ratio (*g/C*)	0.11		0.13		0.03		0.65	0.77	0.77		0.71	0.82
Capacity (*c*), veh/h	390		210		56		35	1446	1446	1	2534	1314
Volume-to-Capacity Ratio (*X*)	0.507		0.243		0.127		0.497	0.460	0.460	0.000	0.769	0.123
Back of Queue (*Q*), ft/ln (95 th percentile)	193.2		95.6		14.9		39.6	250.6	248.4	0	832.3	47.6
Back of Queue (*Q*), veh/ln (95 th percentile)	7.7		3.8		0.6		1.6	9.9	9.9	0.0	32.8	1.9
Queue Storage Ratio (*RQ*) (95 th percentile)	0.48		1.59		0.00		0.16	0.00	0.00	0.00	0.00	0.16
Uniform Delay (*d 1*), s/veh	75.4		70.3		84.5		88.6	6.0	6.0	0.0	18.8	3.4
Incremental Delay (*d 2*), s/veh	1.0		0.6		0.4		7.0	0.7	0.7	0.0	1.6	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	76.4		70.9		84.8		95.7	6.7	6.7	0.0	20.4	3.5
Level of Service (LOS)	E		E		F		F	A	A		C	A
Approach Delay, s/veh / LOS	75.2	E		84.8	F		7.9	A		19.1	B	
Intersection Delay, s/veh / LOS	18.9						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.34	B	2.49	B	1.64	B	2.07	B
Bicycle LOS Score / LOS		F	0.50	A	1.59	B	2.29	B

 HCS™ Streets Version 7.9.5 Generated: 6/4/2021 3:05:17 PM

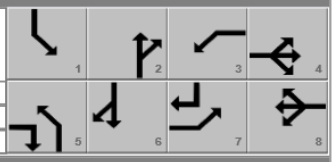
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 7, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2032 Build	Analysis Period	1> 4:45
Intersection	Interchange Dr	File Name	PM 32 B Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	178	28	50	221	12	4	17	1299	82	159	1837	164

Signal Information					EB			WB			NB			SB		
Cycle, s	180.0	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	3.5	7.8		88.4	25.0	24.4	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.5	3.5		4.3	3.6	3.6	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0		1.6	2.4	2.4	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		10.0	2.0	4.0	2.0	3.0
Phase Duration, s		31.0		30.4	10.0	94.3	24.3	108.6
Change Period, ($Y+R_c$), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		3.0	4.0	0.0	3.0	0.0
Queue Clearance Time (g_s), s		19.3		24.1	3.7		17.6	
Green Extension Time (g_e), s		0.6		0.3	0.0	0.0	0.2	0.0
Phase Call Probability		1.00		1.00	0.58		1.00	
Max Out Probability		0.03		0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	182	29	51	226	16		17	714	702	157	1814	162
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1900	1610	1810	1818		1810	1885	1845	1810	1781	1598
Queue Service Time (g_s), s	17.3	2.4	5.0	22.1	1.4		1.7	52.5	51.8	15.6	78.8	4.8
Cycle Queue Clearance Time (g_c), s	17.3	2.4	5.0	22.1	1.4		1.7	52.5	51.8	15.6	78.8	4.8
Green Ratio (*g/C*)	0.14	0.14	0.16	0.14	0.14		0.02	0.49	0.49	0.10	0.57	0.71
Capacity (*c*), veh/h	251	264	255	245	247		35	926	907	179	2032	1133
Volume-to-Capacity Ratio (*X*)	0.723	0.108	0.200	0.919	0.066		0.497	0.771	0.774	0.880	0.893	0.143
Back of Queue (*Q*), ft/ln (95 th percentile)	329.6	51.8	92	430.4	29.4		38.8	731.8	691.9	304.4	1019	67.9
Back of Queue (*Q*), veh/ln (95 th percentile)	13.2	2.1	3.7	17.2	1.2		1.6	29.0	27.7	12.2	40.1	2.7
Queue Storage Ratio (*RQ*) (95 th percentile)	0.82	0.00	1.53	0.00	0.00		0.16	0.00	0.00	3.04	0.00	0.23
Uniform Delay (d_1), s/veh	74.2	67.8	65.9	76.8	67.8		87.7	31.2	29.6	88.3	30.9	6.6
Incremental Delay (d_2), s/veh	7.2	0.2	0.4	21.5	0.0		6.5	3.8	4.0	9.5	4.6	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	0.0
Control Delay (*d*), s/veh	81.4	67.9	66.2	98.3	67.9		94.2	35.1	33.6	97.8	35.5	6.8
Level of Service (LOS)	F	E	E	F	E		F	D	C	F	D	A
Approach Delay, s/veh / LOS	77.0	E		96.2	F		35.0	D		37.9	D	
Intersection Delay, s/veh / LOS	42.9						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.33	B	2.49	B	1.92	B	2.10	B
Bicycle LOS Score / LOS	0.92	A	0.89	A	1.66	B	2.31	B

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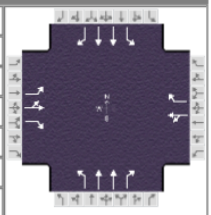
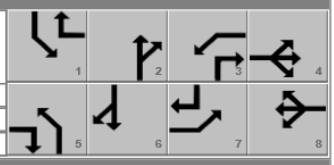
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.93
Urban Street	Preston Highway	Analysis Year	2021	Analysis Period	1> 7:15
Intersection	Mt Washington Rd	File Name	AM 21 Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	290	32	22	43	58	349	29	685	34	141	395	199

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.0	3.1	52.0	25.0	33.0	0.0
Yellow	3.5	3.5	4.3	3.6	3.6	0.0
Red	3.0	3.0	1.7	2.4	2.4	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	3.0	2.0	3.0
Phase Duration, s		31.0		39.0	12.5	58.0	22.1	67.5
Change Period, (*Y+R c*), s		6.0		6.0	6.5	6.0	6.5	6.0
Max Allow Headway (*MAH*), s		5.1		3.3	4.0	0.0	3.0	0.0
Queue Clearance Time (*g s*), s				33.5	4.5		15.4	
Green Extension Time (*g e*), s		0.0		0.0	0.0	0.0	0.2	0.0
Phase Call Probability				1.00	1.00		1.00	
Max Out Probability				1.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	172	175	24		109	375	31	737	37	153	430	216
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1795	1807	1610		1846	1585	1810	1752	1459	1697	1738	1522
Queue Service Time (*g s*), s	13.2	13.4	1.8		7.3	31.5	2.5	26.1	1.7	13.4	12.7	10.5
Cycle Queue Clearance Time (*g c*), s	13.2	13.4	1.8		7.3	31.5	2.5	26.1	1.7	13.4	12.7	10.5
Green Ratio (*g/C*)	0.17	0.17	0.21		0.22	0.32	0.04	0.35	0.57	0.10	0.41	0.58
Capacity (*c*), veh/h	299	301	333		406	513	72	1214	827	176	1425	878
Volume-to-Capacity Ratio (*X*)	0.573	0.580	0.071		0.267	0.732	0.431	0.607	0.044	0.872	0.301	0.247
Back of Queue (*Q*), ft/ln (95 th percentile)	259.1	267.4	32.8		154.6	479.8	55.3	434	27.5	260.1	235.3	173.9
Back of Queue (*Q*), veh/ln (95 th percentile)	10.3	10.4	1.3		6.1	18.9	2.2	16.8	1.0	9.8	9.0	6.6
Queue Storage Ratio (*RQ*) (95 th percentile)	1.04	0.89	0.16		0.77	0.00	0.26	0.00	0.20	0.36	0.00	0.99
Uniform Delay (*d 1*), s/veh	57.6	57.7	47.9		48.5	45.0	70.3	40.6	14.5	66.0	30.5	15.7
Incremental Delay (*d 2*), s/veh	2.5	2.5	0.1		0.1	4.7	4.0	2.3	0.1	5.0	0.5	0.6
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	0.0
Control Delay (*d*), s/veh	60.0	60.2	48.0		48.6	49.6	74.3	42.8	14.6	70.9	31.0	16.3
Level of Service (LOS)	E	E	D		D	D	E	D	B	E	C	B
Approach Delay, s/veh / LOS	59.3	E		49.4	D		42.8	D		34.7	C	
Intersection Delay, s/veh / LOS	43.9						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.46	B	2.49	B	1.94	B	2.12	B
Bicycle LOS Score / LOS	1.10	A	1.29	A	1.15	A	1.14	A

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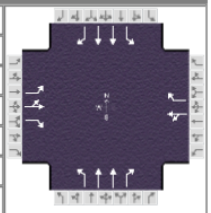
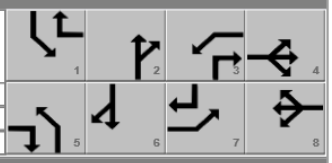
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.93
Urban Street	Preston Highway	Analysis Year	2022 No Build	Analysis Period	1> 7:15
Intersection	Mt Washington Rd	File Name	AM 22 NB Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	291	32	22	43	58	351	29	688	34	142	397	200

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.0	3.6		51.4	25.0	33.0	0.0					
Yellow	3.5	3.5		4.3	3.6	3.6	0.0					
Red	3.0	3.0		1.7	2.4	2.4	0.0					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	3.0	2.0	3.0
Phase Duration, s		31.0		39.0	12.5	57.4	22.6	67.5
Change Period, (*Y+R c*), s		6.0		6.0	6.5	6.0	6.5	6.0
Max Allow Headway (*MAH*), s		5.1		5.3	5.0	0.0	5.0	0.0
Queue Clearance Time (*g s*), s				33.5	4.5		15.4	
Green Extension Time (*g e*), s		0.0		0.0	0.0	0.0	0.7	0.0
Phase Call Probability				1.00	1.00		1.00	
Max Out Probability				1.00	0.01		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	172	175	24		109	377	31	740	37	154	431	217
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1795	1807	1610		1846	1585	1810	1752	1459	1697	1738	1522
Queue Service Time (*g s*), s	13.3	13.4	1.8		7.3	31.5	2.5	26.4	1.7	13.4	12.7	10.6
Cycle Queue Clearance Time (*g c*), s	13.3	13.4	1.8		7.3	31.5	2.5	26.4	1.7	13.4	12.7	10.6
Green Ratio (*g/C*)	0.17	0.17	0.21		0.22	0.33	0.04	0.34	0.56	0.11	0.41	0.58
Capacity (*c*), veh/h	299	301	333		406	519	72	1202	821	182	1425	878
Volume-to-Capacity Ratio (*X*)	0.575	0.582	0.071		0.267	0.728	0.431	0.616	0.045	0.848	0.303	0.247
Back of Queue (*Q*), ft/ln (95 th percentile)	259.8	268.2	32.8		156.5	484.8	56.8	438.9	27.8	277.2	235.8	174.5
Back of Queue (*Q*), veh/ln (95 th percentile)	10.3	10.5	1.3		6.2	19.1	2.3	17.0	1.0	10.4	9.1	6.6
Queue Storage Ratio (*RQ*) (95 th percentile)	1.04	0.89	0.16		0.78	0.00	0.26	0.00	0.20	0.38	0.00	1.00
Uniform Delay (*d 1*), s/veh	57.6	57.7	47.9		48.5	44.6	70.3	41.1	14.7	65.7	30.5	15.7
Incremental Delay (*d 2*), s/veh	2.5	2.5	0.1		0.5	5.5	5.7	2.4	0.1	13.7	0.5	0.6
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	0.0
Control Delay (*d*), s/veh	60.1	60.2	48.0		49.0	50.1	76.0	43.4	14.8	79.4	31.0	16.3
Level of Service (LOS)	E	E	D		D	D	E	D	B	E	C	B
Approach Delay, s/veh / LOS	59.4	E		49.9	D		43.4	D		36.3	D	
Intersection Delay, s/veh / LOS	44.8						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.46	B	2.49	B	1.94	B	2.12	B
Bicycle LOS Score / LOS	1.10	A	1.29	A	1.15	A	1.14	A

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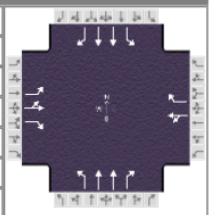
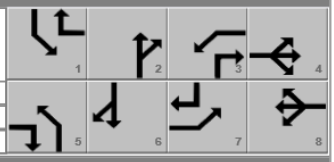
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 7, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.93
Urban Street	Preston Highway	Analysis Year	2022 Build	Analysis Period	1> 7:15
Intersection	Mt Washington Rd	File Name	AM 22 B Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	305	32	22	43	58	379	29	745	34	169	452	213

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.0	5.6	49.4	25.0	33.0	0.0						
Yellow	3.5	3.5	4.3	3.6	3.6	0.0						
Red	3.0	3.0	1.7	2.4	2.4	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	3.0	2.0	3.0
Phase Duration, s		31.0		39.0	12.5	55.4	24.6	67.5
Change Period, (*Y+R c*), s		6.0		6.0	6.5	6.0	6.5	6.0
Max Allow Headway (*MAH*), s		5.1		5.3	5.0	0.0	5.0	0.0
Queue Clearance Time (*g s*), s				35.0	4.5		17.2	
Green Extension Time (*g e*), s		0.0		0.0	0.0	0.0	0.9	0.0
Phase Call Probability				1.00	1.00		1.00	
Max Out Probability				1.00	0.01		0.00	

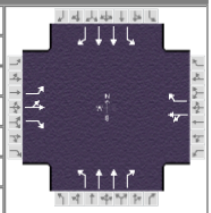
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	180	182	24		109	408	31	801	37	184	492	232
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1795	1807	1610		1846	1585	1810	1752	1459	1697	1738	1522
Queue Service Time (*g s*), s	14.0	14.0	1.8		7.3	33.0	2.5	29.8	1.7	15.2	15.0	10.2
Cycle Queue Clearance Time (*g c*), s	14.0	14.0	1.8		7.3	33.0	2.5	29.8	1.7	15.2	15.0	10.2
Green Ratio (*g/C*)	0.17	0.17	0.21		0.22	0.34	0.04	0.33	0.55	0.12	0.41	0.58
Capacity (*c*), veh/h	299	301	333		406	540	72	1155	802	204	1425	878
Volume-to-Capacity Ratio (*X*)	0.603	0.604	0.071		0.267	0.755	0.431	0.694	0.046	0.901	0.345	0.264
Back of Queue (*Q*), ft/ln (95 th percentile)	272.1	278.4	32.8		156.5	521.5	56.8	490.8	28.8	235.5	265.3	153.5
Back of Queue (*Q*), veh/ln (95 th percentile)	10.8	10.9	1.3		6.2	20.5	2.3	19.0	1.1	8.9	10.2	5.8
Queue Storage Ratio (*RQ*) (95 th percentile)	1.09	0.93	0.16		0.78	0.00	0.26	0.00	0.21	0.32	0.00	0.88
Uniform Delay (*d 1*), s/veh	57.9	57.9	47.9		48.5	43.9	70.3	43.7	15.6	43.4	31.5	13.5
Incremental Delay (*d 2*), s/veh	3.0	3.0	0.1		0.5	6.4	5.7	3.4	0.1	16.1	0.6	0.7
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	0.0
Control Delay (*d*), s/veh	60.9	60.9	48.0		49.0	50.3	76.0	47.1	15.7	59.5	32.1	14.1
Level of Service (LOS)	E	E	D		D	D	E	D	B	E	C	B
Approach Delay, s/veh / LOS	60.1	E		50.1	D		46.9	D		33.1	C	
Intersection Delay, s/veh / LOS	44.7						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.46	B	2.49	B	1.94	B	2.12	B
Bicycle LOS Score / LOS	1.12	A	1.34	A	1.20	A	1.23	A

 HCS™ Streets Version 7.9.5 Generated: 10/7/2021 2:05:04 PM

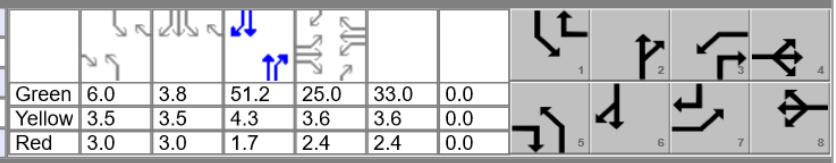
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.93
Urban Street	Preston Highway	Analysis Year	2032 No Build	Analysis Period	1> 7:15
Intersection	Mt Washington Rd	File Name	AM 32 NB Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	306	34	23	45	61	369	30	723	36	149	417	210

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.0	3.8		51.2	25.0	33.0	0.0					
Yellow	3.5	3.5		4.3	3.6	3.6	0.0					
Red	3.0	3.0		1.7	2.4	2.4	0.0					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	3.0	2.0	3.0
Phase Duration, s		31.0		39.0	12.5	57.2	22.8	67.5
Change Period, (*Y+R c*), s		6.0		6.0	6.5	6.0	6.5	6.0
Max Allow Headway (*MAH*), s		5.1		3.3	4.0	0.0	3.0	0.0
Queue Clearance Time (*g s*), s				35.0	4.6		16.1	
Green Extension Time (*g e*), s		0.0		0.0	0.0	0.0	0.2	0.0
Phase Call Probability				1.00	1.00		1.00	
Max Out Probability				1.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	181	185	25		114	397	32	777	39	162	453	228
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1795	1807	1610		1846	1585	1810	1752	1459	1697	1738	1522
Queue Service Time (*g s*), s	14.0	14.2	1.9		7.7	33.0	2.6	28.2	1.8	14.1	13.5	11.2
Cycle Queue Clearance Time (*g c*), s	14.0	14.2	1.9		7.7	33.0	2.6	28.2	1.8	14.1	13.5	11.2
Green Ratio (*g/C*)	0.17	0.17	0.21		0.22	0.33	0.04	0.34	0.56	0.11	0.41	0.58
Capacity (*c*), veh/h	299	301	333		406	521	72	1196	819	185	1425	878
Volume-to-Capacity Ratio (*X*)	0.605	0.613	0.074		0.281	0.761	0.446	0.650	0.047	0.877	0.318	0.260
Back of Queue (*Q*), ft/ln (95 th percentile)	272.9	282.5	34.3		162.7	511.3	57.3	465.1	29.6	272.3	247.1	186.5
Back of Queue (*Q*), veh/ln (95 th percentile)	10.8	11.0	1.4		6.5	20.1	2.3	18.0	1.1	10.2	9.5	7.1
Queue Storage Ratio (*RQ*) (95 th percentile)	1.09	0.94	0.17		0.81	0.00	0.27	0.00	0.21	0.38	0.00	1.07
Uniform Delay (*d 1*), s/veh	57.9	58.0	47.9		48.6	45.1	70.4	41.8	14.8	65.9	30.8	15.9
Incremental Delay (*d 2*), s/veh	3.1	3.2	0.1		0.1	5.9	4.2	2.7	0.1	4.9	0.6	0.7
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	0.0
Control Delay (*d*), s/veh	61.0	61.2	48.1		48.8	50.9	74.6	44.6	14.9	70.9	31.4	16.6
Level of Service (LOS)	E	E	D		D	D	E	D	B	E	C	B
Approach Delay, s/veh / LOS	60.3	E		50.5	D		44.4	D		34.9	C	
Intersection Delay, s/veh / LOS	44.9						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.46	B	2.49	B	1.94	B	2.12	B
Bicycle LOS Score / LOS	1.13	A	1.33	A	1.19	A	1.18	A

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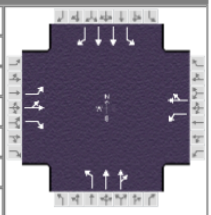
HCS7 Signalized Intersection Results Summary

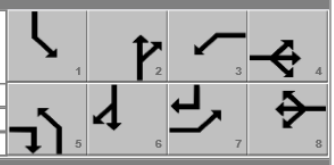
General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 7, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Urban Street	Preston Highway	Analysis Year	2032 Build	Analysis Period	1> 7:15
Intersection	Interchange Drive	File Name	AM 32 B Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	60	24	16	190	13	1	11	1355	137	125	666	161

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	6.0	0.9		82.4	10.0	19.8	0.0					
Yellow	3.5	3.5		4.3	3.6	3.6	0.0					
Red	3.0	3.0		1.6	2.4	2.4	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		10.0	2.0	4.0	2.0	3.0
Phase Duration, s		16.0		25.8	12.5	88.3	19.9	95.7
Change Period, (*Y+R c*), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		4.0	4.0	0.0	4.0	0.0
Queue Clearance Time (*g s*), s		7.7		19.2	3.1		13.0	
Green Extension Time (*g e*), s		0.2		0.6	0.0	0.0	0.4	0.0
Phase Call Probability		1.00		1.00	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	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	67	27	18	211	16		11	785	768	135	720	174
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1711	1900	1359	1810	1876		1527	1856	1796	1810	1724	1585
Queue Service Time (*g s*), s	5.7	2.0	1.8	17.2	1.1		1.1	43.9	44.3	11.0	15.9	6.2
Cycle Queue Clearance Time (*g c*), s	5.7	2.0	1.8	17.2	1.1		1.1	43.9	44.3	11.0	15.9	6.2
Green Ratio (*g/C*)	0.07	0.07	0.11	0.13	0.13		0.04	0.55	0.55	0.09	0.60	0.67
Capacity (*c*), veh/h	114	127	145	239	248		61	1019	986	161	2063	1054
Volume-to-Capacity Ratio (*X*)	0.584	0.211	0.123	0.882	0.063		0.187	0.770	0.779	0.839	0.349	0.165
Back of Queue (*Q*), ft/ln (95 th percentile)	122.8	44	32.2	329.3	23.2		23.4	536.6	503.8	228.2	259.2	95
Back of Queue (*Q*), veh/ln (95 th percentile)	4.7	1.8	1.1	13.2	0.9		0.8	21.0	20.2	9.1	9.9	3.7
Queue Storage Ratio (*RQ*) (95 th percentile)	0.31	0.00	0.54	0.00	0.00		0.09	0.00	0.00	2.28	0.00	0.32
Uniform Delay (*d 1*), s/veh	68.0	66.3	60.6	63.9	56.9		72.5	19.0	18.4	67.3	15.3	9.5
Incremental Delay (*d 2*), s/veh	4.7	0.8	0.4	10.2	0.1		0.8	3.0	3.2	10.2	0.4	0.3
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	0.0
Control Delay (*d*), s/veh	72.7	67.1	61.0	74.1	57.1		73.2	22.0	21.6	77.4	15.7	9.8
Level of Service (LOS)	E	E	E	E	E		E	C	C	E	B	A
Approach Delay, s/veh / LOS	69.5	E		73.0	E		22.2	C		22.8	C	
Intersection Delay, s/veh / LOS	28.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.32	B	2.49	B	1.91	B	2.09	B
Bicycle LOS Score / LOS	0.67	A	0.86	A	1.87	B	1.36	A

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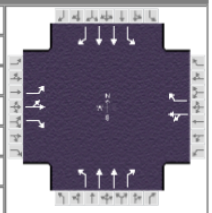
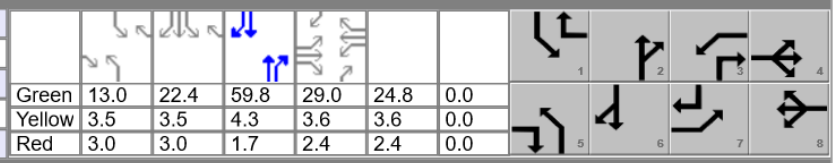
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.97
Urban Street	Preston Highway	Analysis Year	2021	Analysis Period	1> 4:45
Intersection	Mt Washington Rd	File Name	PM 21 Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	268	181	65	70	127	251	48	718	98	411	1007	489

Signal Information			
Cycle, s	180.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	On



Green	13.0	22.4	59.8	29.0	24.8	0.0			
Yellow	3.5	3.5	4.3	3.6	3.6	0.0			
Red	3.0	3.0	1.7	2.4	2.4	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	3.0	2.0	3.0
Phase Duration, s		35.0		30.8	19.5	65.8	48.4	94.7
Change Period, (*Y+R c*), s		6.0		6.0	6.5	6.0	6.5	6.0
Max Allow Headway (*MAH*), s		5.1		4.2	4.0	0.0	4.0	0.0
Queue Clearance Time (*g s*), s				23.9	6.7		41.7	
Green Extension Time (*g e*), s		0.0		0.9	0.1	0.0	0.2	0.0
Phase Call Probability				1.00	1.00		1.00	
Max Out Probability				0.71	0.00		1.00	

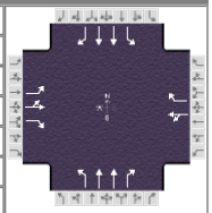
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	221	242	67		203	259	49	740	101	409	1002	487
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1795	1853	1610		1823	1598	1810	1795	1598	1795	1781	1572
Queue Service Time (*g s*), s	21.1	22.5	6.0		19.3	21.9	4.7	31.2	6.4	39.7	26.4	20.1
Cycle Queue Clearance Time (*g c*), s	21.1	22.5	6.0		19.3	21.9	4.7	31.2	6.4	39.7	26.4	20.1
Green Ratio (*g/C*)	0.17	0.17	0.24		0.14	0.38	0.07	0.33	0.47	0.24	0.49	0.65
Capacity (*c*), veh/h	299	309	376		261	592	131	1193	751	428	1755	1028
Volume-to-Capacity Ratio (*X*)	0.739	0.783	0.178		0.778	0.437	0.379	0.620	0.135	0.956	0.571	0.473
Back of Queue (*Q*), ft/ln (95 th percentile)	399.9	444	112.2		385.4	345.7	100.4	513.6	114.5	587.9	326.3	171.5
Back of Queue (*Q*), veh/ln (95 th percentile)	15.9	17.5	4.5		15.1	13.7	4.0	20.4	4.5	23.3	12.8	6.7
Queue Storage Ratio (*RQ*) (95 th percentile)	1.60	1.48	0.56		1.93	0.00	0.47	0.00	0.82	0.81	0.00	0.98
Uniform Delay (*d 1*), s/veh	71.3	71.9	55.2		74.4	42.6	79.6	50.5	27.0	50.5	18.8	8.3
Incremental Delay (*d 2*), s/veh	10.0	13.0	0.3		11.2	0.5	1.8	2.4	0.4	23.5	0.8	1.0
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	0.0
Control Delay (*d*), s/veh	81.3	84.9	55.5		85.6	43.1	81.4	52.9	27.3	74.0	19.6	9.2
Level of Service (LOS)	F	F	E		F	D	F	D	C	E	B	A
Approach Delay, s/veh / LOS	79.7	E		61.8	E		51.6	D		28.7	C	
Intersection Delay, s/veh / LOS	45.3						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.48	B	2.49	B	1.95	B	2.11	B
Bicycle LOS Score / LOS	1.36	A	1.25	A	1.22	A	2.11	B

 HCS™ Streets Version 7.9.5 Generated: 6/4/2021 2:44:56 PM

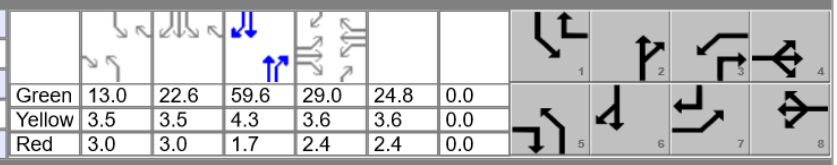
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.97
Urban Street	Preston Highway	Analysis Year	2022 No Build	Analysis Period	1> 4:45
Intersection	Mt Washington Rd	File Name	PM 22 NB Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	269	182	65	70	128	252	48	722	98	413	1012	491

Signal Information			
Cycle, s	180.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	On



Green	13.0	22.6		59.6	29.0	24.8	0.0					
Yellow	3.5	3.5		4.3	3.6	3.6	0.0					
Red	3.0	3.0		1.7	2.4	2.4	0.0					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	3.0	2.0	3.0
Phase Duration, s		35.0		30.8	19.5	65.6	48.6	94.7
Change Period, (*Y+R c*), s		6.0		6.0	6.5	6.0	6.5	6.0
Max Allow Headway (*MAH*), s		5.1		4.2	4.0	0.0	4.0	0.0
Queue Clearance Time (*g s*), s				24.0	6.7		41.9	
Green Extension Time (*g e*), s		0.0		0.9	0.1	0.0	0.1	0.0
Phase Call Probability				1.00	1.00		1.00	
Max Out Probability				0.73	0.00		1.00	

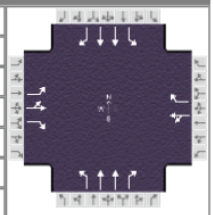
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	222	243	67		204	260	49	744	101	411	1007	489
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1795	1853	1610		1823	1598	1810	1795	1598	1795	1781	1572
Queue Service Time (*g s*), s	21.1	22.6	6.0		19.4	22.0	4.7	31.5	6.5	39.9	26.6	20.3
Cycle Queue Clearance Time (*g c*), s	21.1	22.6	6.0		19.4	22.0	4.7	31.5	6.5	39.9	26.6	20.3
Green Ratio (*g/C*)	0.17	0.17	0.24		0.14	0.38	0.07	0.33	0.47	0.24	0.49	0.65
Capacity (*c*), veh/h	299	309	376		262	594	131	1189	750	429	1754	1028
Volume-to-Capacity Ratio (*X*)	0.741	0.787	0.178		0.780	0.438	0.379	0.626	0.135	0.957	0.574	0.475
Back of Queue (*Q*), ft/ln (95 th percentile)	401.7	446.8	112.2		387.4	346.3	100.4	517.8	114.8	591	328.6	171.9
Back of Queue (*Q*), veh/ln (95 th percentile)	15.9	17.6	4.5		15.1	13.7	4.0	20.5	4.6	23.5	12.9	6.7
Queue Storage Ratio (*RQ*) (95 th percentile)	1.61	1.49	0.56		1.94	0.00	0.47	0.00	0.82	0.82	0.00	0.98
Uniform Delay (*d 1*), s/veh	71.3	71.9	55.2		74.3	42.4	79.6	50.8	27.1	50.5	18.8	8.3
Incremental Delay (*d 2*), s/veh	10.2	13.3	0.3		11.4	0.5	1.8	2.5	0.4	23.6	0.8	1.0
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	0.0
Control Delay (*d*), s/veh	81.5	85.3	55.5		85.8	43.0	81.4	53.3	27.4	74.1	19.6	9.3
Level of Service (LOS)	F	F	E		F	D	F	D	C	E	B	A
Approach Delay, s/veh / LOS	79.9	E		61.8	E		51.9	D		28.7	C	
Intersection Delay, s/veh / LOS	45.4						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.48	B	2.49	B	1.95	B	2.11	B
Bicycle LOS Score / LOS	1.37	A	1.25	A	1.23	A	2.12	B

 HCS™ Streets Version 7.9.5 Generated: 6/4/2021 2:53:07 PM

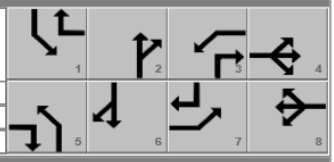
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 7, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.97
Urban Street	Preston Highway	Analysis Year	2022 Build	Analysis Period	1> 4:45
Intersection	Mt Washington Rd	File Name	PM 22 B Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	281	182	65	70	128	277	48	773	98	437	1062	503

Signal Information			
Cycle, s	180.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	On



Green	13.0	21.0	59.0	29.0	27.0	0.0
Yellow	3.5	3.5	4.3	3.6	3.6	0.0
Red	3.0	3.0	1.7	2.4	2.4	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	3.0	2.0	3.0
Phase Duration, s		35.0		33.0	19.5	65.0	47.0	92.5
Change Period, (*Y+R c*), s		6.0		6.0	6.5	6.0	6.5	6.0
Max Allow Headway (*MAH*), s		5.1		4.2	4.0	0.0	4.0	0.0
Queue Clearance Time (*g s*), s				26.5	6.7		43.5	
Green Extension Time (*g e*), s		0.0		0.5	0.0	0.0	0.0	0.0
Phase Call Probability				1.00	1.00		1.00	
Max Out Probability				1.00	0.00		1.00	

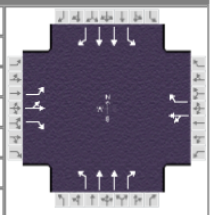
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	232	246	67		204	286	49	797	101	436	1058	501
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1795	1853	1610		1823	1598	1810	1795	1598	1795	1781	1572
Queue Service Time (*g s*), s	22.2	22.9	6.0		19.2	24.5	4.7	34.5	6.3	41.5	27.9	16.6
Cycle Queue Clearance Time (*g c*), s	22.2	22.9	6.0		19.2	24.5	4.7	34.5	6.3	41.5	27.9	16.6
Green Ratio (*g/C*)	0.17	0.17	0.24		0.16	0.38	0.07	0.33	0.48	0.23	0.48	0.64
Capacity (*c*), veh/h	299	309	376		284	599	131	1177	764	414	1711	1009
Volume-to-Capacity Ratio (*X*)	0.774	0.795	0.178		0.719	0.477	0.379	0.677	0.132	1.053	0.619	0.497
Back of Queue (*Q*), ft/ln (95 th percentile)	423.9	452.9	112.2		376.3	378.9	100.4	561.7	112.6	764.3	304.2	121.1
Back of Queue (*Q*), veh/ln (95 th percentile)	16.8	17.8	4.5		14.7	15.0	4.0	22.3	4.5	30.3	12.0	4.7
Queue Storage Ratio (*RQ*) (95 th percentile)	1.70	1.51	0.56		1.88	0.00	0.47	0.00	0.80	1.05	0.00	0.69
Uniform Delay (*d 1*), s/veh	71.8	72.1	55.2		72.2	42.8	79.6	52.3	26.2	70.9	17.8	5.5
Incremental Delay (*d 2*), s/veh	12.6	14.1	0.3		8.0	0.6	1.8	3.1	0.4	44.5	0.8	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	0.0
Control Delay (*d*), s/veh	84.4	86.1	55.5		80.2	43.4	81.4	55.4	26.5	115.3	18.6	6.2
Level of Service (LOS)	F	F	E		F	D	F	E	C	F	B	A
Approach Delay, s/veh / LOS	81.6	F		58.7	E		53.7	D		36.6	D	
Intersection Delay, s/veh / LOS	49.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.48	B	2.49	B	1.95	B	2.12	B
Bicycle LOS Score / LOS	1.39	A	1.30	A	1.27	A	2.19	B

 HCS™ Streets Version 7.9.5 Generated: 10/7/2021 2:13:01 PM

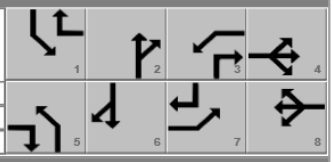
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jun 2, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.97
Urban Street	Preston Highway	Analysis Year	2032 No Build	Analysis Period	1> 4:45
Intersection	Mt Washington Rd	File Name	PM 32 NB Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	283	191	68	74	135	265	50	759	103	434	1064	516

Signal Information			
Cycle, s	180.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	On



Green	13.0	22.0	59.0	29.0	26.0	0.0
Yellow	3.5	3.5	4.3	3.6	3.6	0.0
Red	3.0	3.0	1.7	2.4	2.4	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	3.0	2.0	3.0
Phase Duration, s		35.0		32.0	19.5	65.0	48.0	93.5
Change Period, ($Y+R_c$), s		6.0		6.0	6.5	6.0	6.5	6.0
Max Allow Headway (*MAH*), s		5.1		4.2	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s				25.2	6.9		44.5	
Green Extension Time (g_e), s		0.0		0.7	0.1	0.0	0.0	0.0
Phase Call Probability				1.00	1.00		1.00	
Max Out Probability				1.00	0.00		1.00	

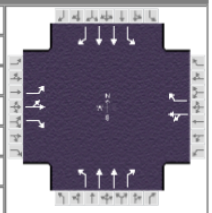
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	233	255	70		215	273	52	782	106	431	1058	513
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1795	1853	1610		1823	1598	1810	1795	1598	1795	1781	1572
Queue Service Time (g_s), s	22.4	24.0	6.3		20.5	23.2	4.9	33.7	6.8	42.5	30.3	23.5
Cycle Queue Clearance Time (g_c), s	22.4	24.0	6.3		20.5	23.2	4.9	33.7	6.8	42.5	30.3	23.5
Green Ratio (*g/C*)	0.17	0.17	0.24		0.15	0.38	0.07	0.33	0.47	0.24	0.49	0.65
Capacity (*c*), veh/h	299	309	376		273	599	131	1178	755	424	1732	1018
Volume-to-Capacity Ratio (*X*)	0.780	0.826	0.187		0.789	0.456	0.394	0.664	0.141	1.018	0.611	0.504
Back of Queue (*Q*), ft/ln (95 th percentile)	427.8	477	117.7		407.7	362.6	104.8	550.5	120.1	679.4	372.9	187.3
Back of Queue (*Q*), veh/ln (95 th percentile)	17.0	18.8	4.7		15.9	14.4	4.2	21.8	4.8	27.0	14.7	7.3
Queue Storage Ratio (*RQ*) (95 th percentile)	1.71	1.59	0.59		2.04	0.00	0.49	0.00	0.86	0.94	0.00	1.07
Uniform Delay (d_1), s/veh	71.8	72.5	55.3		73.8	42.5	79.7	52.0	26.8	53.1	20.7	9.4
Incremental Delay (d_2), s/veh	13.1	17.3	0.3		12.6	0.5	1.9	3.0	0.4	38.0	0.9	1.0
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	0.0
Control Delay (*d*), s/veh	84.9	89.7	55.6		86.4	43.0	81.7	54.9	27.2	91.1	21.6	10.4
Level of Service (LOS)	F	F	E		F	D	F	D	C	F	C	B
Approach Delay, s/veh / LOS	83.5	F		62.1	E		53.3	D		33.7	C	
Intersection Delay, s/veh / LOS	48.8						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.48	B	2.49	B	1.95	B	2.12	B
Bicycle LOS Score / LOS	1.41	A	1.29	A	1.26	A	2.20	B

 HCS™ Streets Version 7.9.5 Generated: 6/4/2021 3:05:17 PM

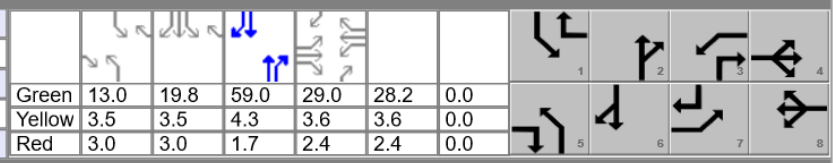
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 7, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.97
Urban Street	Preston Highway	Analysis Year	2032 Build	Analysis Period	1> 4:45
Intersection	Mt Washington Rd	File Name	PM 32 B Preston.xus		
Project Description	Stern				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	295	191	68	74	135	290	50	810	103	458	1114	528

Signal Information			
Cycle, s	180.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	On



Green	13.0	19.8	59.0	29.0	28.2	0.0						
Yellow	3.5	3.5	4.3	3.6	3.6	0.0						
Red	3.0	3.0	1.7	2.4	2.4	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	3.0	2.0	3.0
Phase Duration, s		35.0		34.2	19.5	65.0	45.8	91.3
Change Period, (*Y+R* $_c$), s		6.0		6.0	6.5	6.0	6.5	6.0
Max Allow Headway (*MAH*), s		5.1		4.2	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s				27.9	6.9		42.3	
Green Extension Time (g_e), s		0.0		0.3	0.0	0.0	0.0	0.0
Phase Call Probability				1.00	1.00		1.00	
Max Out Probability				1.00	0.01		1.00	

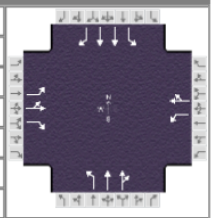
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	243	258	70		215	299	52	835	106	456	1109	526
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1795	1853	1610		1823	1598	1810	1795	1598	1795	1781	1572
Queue Service Time (g_s), s	23.5	24.2	6.3		20.2	25.9	4.9	36.7	6.6	40.3	30.4	18.8
Cycle Queue Clearance Time (g_c), s	23.5	24.2	6.3		20.2	25.9	4.9	36.7	6.6	40.3	30.4	18.8
Green Ratio (*g/C*)	0.17	0.17	0.24		0.16	0.38	0.07	0.33	0.48	0.22	0.47	0.64
Capacity (*c*), veh/h	299	309	376		295	599	131	1177	774	402	1688	999
Volume-to-Capacity Ratio (*X*)	0.813	0.835	0.187		0.729	0.499	0.394	0.710	0.137	1.134	0.657	0.526
Back of Queue (*Q*), ft/ln (95 th percentile)	451.7	483.6	117.7		395.6	397.1	104.8	593.4	117.1	859.1	311.1	119.9
Back of Queue (*Q*), veh/ln (95 th percentile)	17.9	19.0	4.7		15.5	15.8	4.2	23.5	4.6	34.1	12.2	4.7
Queue Storage Ratio (*RQ*) (95 th percentile)	1.81	1.61	0.59		1.98	0.00	0.49	0.00	0.84	1.19	0.00	0.69
Uniform Delay (d_1), s/veh	72.3	72.6	55.3		71.7	43.3	79.7	53.0	25.6	72.7	18.0	5.7
Incremental Delay (d_2), s/veh	16.3	18.2	0.3		8.9	0.6	1.9	3.6	0.4	71.5	0.7	0.7
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	0.0
Control Delay (*d*), s/veh	88.6	90.8	55.6		80.6	43.9	81.7	56.6	26.0	144.2	18.8	6.4
Level of Service (LOS)	F	F	E		F	D	F	E	C	F	B	A
Approach Delay, s/veh / LOS	85.5	F		59.3	E		54.7	D		43.0	D	
Intersection Delay, s/veh / LOS	53.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.48	B	2.49	B	1.95	B	2.12	B
Bicycle LOS Score / LOS	1.43	A	1.34	A	1.31	A	2.27	B

 HCS™ Streets Version 7.9.5 Generated: 10/7/2021 2:30:40 PM

HCS7 Signalized Intersection Results Summary

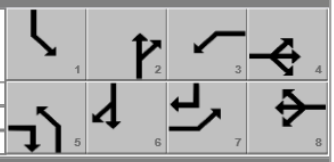
General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 7, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Urban Street	Preston Highway	Analysis Year	2032 Build	Analysis Period	1> 7:15
Intersection	Interchange Drive	File Name	AM 32 B Preston no riro.xus		
Project Description	Stern No Ri/ro				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	60	24	16	186	13	179	11	1243	249	125	666	161

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	6.0	0.8	79.7	10.0	22.6	0.0	
Yellow	3.5	3.5	4.3	3.6	3.6	0.0	
Red	3.0	3.0	1.6	2.4	2.4	0.0	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		10.0	2.0	4.0	2.0	3.0
Phase Duration, s		16.0		28.6	12.5	85.6	19.8	92.9
Change Period, ($Y+R_c$), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		4.1	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s		7.7		21.2	3.1		13.0	
Green Extension Time (g_e), s		0.2		1.3	0.0	0.0	0.4	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.00		0.00	0.00		0.00	

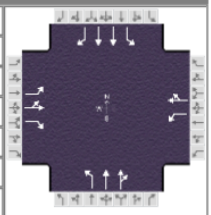
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	67	27	18	207	213		11	792	762	135	720	174
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1711	1900	1359	1810	1627		1527	1856	1748	1810	1724	1585
Queue Service Time (g_s), s	5.7	2.0	1.8	16.4	19.2		1.1	47.5	48.2	11.0	16.6	6.5
Cycle Queue Clearance Time (g_c), s	5.7	2.0	1.8	16.4	19.2		1.1	47.5	48.2	11.0	16.6	6.5
Green Ratio (*g/C*)	0.07	0.07	0.11	0.15	0.15		0.04	0.53	0.53	0.09	0.58	0.65
Capacity (*c*), veh/h	114	127	145	272	245		61	986	929	161	2001	1025
Volume-to-Capacity Ratio (*X*)	0.584	0.211	0.123	0.759	0.871		0.187	0.803	0.820	0.840	0.360	0.170
Back of Queue (*Q*), ft/ln (95 th percentile)	122.8	44	32.2	306.4	330.9		23.3	592.6	537	228.5	271.3	101.8
Back of Queue (*Q*), veh/ln (95 th percentile)	4.7	1.8	1.1	12.3	13.2		0.8	23.1	21.5	9.1	10.4	4.0
Queue Storage Ratio (*RQ*) (95 th percentile)	0.31	0.00	0.54	0.00	0.00		0.09	0.00	0.00	2.28	0.00	0.34
Uniform Delay (d_1), s/veh	68.0	66.3	60.6	61.1	62.3		72.3	21.3	20.0	67.3	16.7	10.5
Incremental Delay (d_2), s/veh	4.7	0.8	0.4	4.3	10.3		0.8	3.7	4.3	10.3	0.5	0.3
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	0.0
Control Delay (*d*), s/veh	72.7	67.1	61.0	65.4	72.6		73.0	25.0	24.3	77.5	17.2	10.8
Level of Service (LOS)	E	E	E	E	E		E	C	C	E	B	B
Approach Delay, s/veh / LOS	69.5	E		69.1	E		25.0	C		24.0	C	
Intersection Delay, s/veh / LOS	32.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.32	B	2.49	B	1.91	B	2.09	B
Bicycle LOS Score / LOS	0.67	A	1.18	A	1.87	B	1.36	A

 HCS™ Streets Version 7.9.5 Generated: 10/7/2021 2:36:47 PM

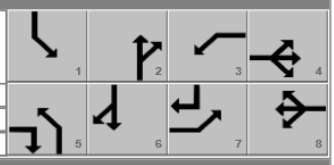
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 7, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.98
Urban Street	Preston Highway	Analysis Year	2032 Build	Analysis Period	1> 4:45
Intersection	Interchange Dr	File Name	PM 32 B Preston No riro.xus		
Project Description	Stern No ri/ro				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	178	28	50	221	12	124	17	1209	172	159	1837	164

Signal Information					EB			WB			NB		
Cycle, s	180.0	Reference Phase	2										
Offset, s	0	Reference Point	End	Green	3.5	7.8		88.2	25.0	24.6	0.0		
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.5	3.5		4.3	3.6	3.6	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0		1.6	2.4	2.4	0.0		



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		10.0	2.0	4.0	2.0	3.0
Phase Duration, s		31.0		30.6	10.0	94.1	24.3	108.4
Change Period, (*Y+R* $_c$), s		6.0		6.0	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.0		3.1	4.0	0.0	3.0	0.0
Queue Clearance Time (*g* $_s$), s		19.3		24.1	3.7		17.6	
Green Extension Time (*g* $_e$), s		0.6		0.5	0.0	0.0	0.2	0.0
Phase Call Probability		1.00		1.00	0.58		1.00	
Max Out Probability		0.03		0.01	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	182	29	51	226	139		17	720	695	157	1814	162
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1900	1610	1810	1632		1810	1885	1803	1810	1781	1598
Queue Service Time (*g* $_s$), s	17.3	2.4	5.0	22.1	14.4		1.7	54.0	52.6	15.6	79.0	4.8
Cycle Queue Clearance Time (*g* $_c$), s	17.3	2.4	5.0	22.1	14.4		1.7	54.0	52.6	15.6	79.0	4.8
Green Ratio (*g/C*)	0.14	0.14	0.16	0.14	0.14		0.02	0.49	0.49	0.10	0.57	0.71
Capacity (*c*), veh/h	251	264	255	247	223		35	924	884	178	2028	1132
Volume-to-Capacity Ratio (*X*)	0.723	0.108	0.200	0.912	0.622		0.497	0.780	0.787	0.880	0.895	0.143
Back of Queue (*Q*), ft/ln (95 th percentile)	329.6	51.8	92	428.3	251.8		38.8	758.9	680	304.8	1019.6	68
Back of Queue (*Q*), veh/ln (95 th percentile)	13.2	2.1	3.7	17.1	10.1		1.6	30.1	27.2	12.2	40.1	2.7
Queue Storage Ratio (*RQ*) (95 th percentile)	0.82	0.00	1.53	0.00	0.00		0.16	0.00	0.00	3.05	0.00	0.23
Uniform Delay (*d* $_1$), s/veh	74.2	67.8	65.9	76.6	73.3		87.6	32.5	28.9	88.3	31.0	6.6
Incremental Delay (*d* $_2$), s/veh	7.2	0.2	0.4	20.4	1.1		6.5	4.0	4.4	9.8	4.7	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	0.0
Control Delay (*d*), s/veh	81.4	67.9	66.2	97.1	74.4		94.1	36.5	33.2	98.1	35.6	6.8
Level of Service (LOS)	F	E	E	F	E		F	D	C	F	D	A
Approach Delay, s/veh / LOS	77.0	E		88.4	F		35.6	D		38.0	D	
Intersection Delay, s/veh / LOS	44.0						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.33	B	2.49	B	1.92	B	2.10	B
Bicycle LOS Score / LOS	0.92	A	1.09	A	1.66	B	2.31	B

 HCS™ Streets Version 7.9.5 Generated: 10/7/2021 2:42:47 PM