To:	Sunshine Trakas Charleston County	From:	Bret Gillis, PE Stantec Consulting Services Inc
File:	171001995	Date:	December 20, 2022

Reference: US 17/Savannah Highway – Left-Turn Phase Evaluations

INTRODUCTION

The purpose of this memorandum is to evaluate left-turning movements at the study intersections for potential protected-permitted phasing. This evaluation is performed in response to public comments requesting their consideration. This memorandum discusses the intersections evaluated, analysis methodology, and a results summary. It is based on intersection turning movement counts collected in October 2022.

The intersections reviewed in this analysis include:

1. US 17/Savannah Highway & Dupont Road/Stinson Drive; and
2. US 17/Savannah Highway & Wappoo Road.

The movements reviewed in this analysis include all left-turns at the intersection of US 17/Savannah Highway & Dupont Road/Stinson Drive and the northbound and southbound left-turns from Wappoo Road on to US 17/Savannah Highway.

Based upon the latest guidance from SCDOT, four criteria should be reviewed when evaluating the need for adding a left-turn phase. The criteria include minimum left-turn volume, cross product of opposing and left-turn volumes, accident history, and left-turn queues at the end of green.

METHODOLOGY

Existing 2022 conditions were analyzed to determine if the considered movements at the study intersections warrant a left-turn phase. Existing 2022 weekday AM and PM peak hour traffic counts collected on October 11, 2022, were considered in the analysis. Collected traffic volumes were used to determine the cross product of opposing and left-turn volumes. Raw traffic volumes are documented in **Attachment A**.

Per *Section 3.1.1* of SCDOT's *Traffic Signal Design Guidelines 2021*, one or more of the following criteria should be met to consider a protected/permissive left-turn phase:

1. The cross-product of the same one hour volumes for the left-turn traffic and the opposing through traffic divided by the number of lanes for the opposing through movement is greater than or equal to 50,000;
2. The left-turn volume exceeds 125 vehicles per hour;
3. Correctable crashes equal or exceed 4 crashes in one year or 6 crashes in two years; and
4. More than 2 left-turn vehicles per cycle still waiting at the end of green.

Note that these are the minimum criteria for left-turn phasing to be considered. Having one criterion met does not mean that a left-turn phase should necessarily be installed, but rather that it should be considered. Also, these criteria apply to individual left-turn movements (e.g., four correctable crashes in one year for one left-turn movement).

Worksheets documenting the analysis of criteria are included in **Attachment B**.

Reference: **US 17/Savannah Highway – Left-Turn Phase Evaluations**

Crash Data

Crash data was previously collected for a five-year period from 2013 to 2017. The data is based on reporting from the Department of Public Safety. **Attachment C** shows the total crashes per 0.05 mile segment for this section of US 17/Savannah Highway.

The data provided does not include cardinal direction or exact locations. However, it does provide crash type and US 17/Savannah Highway mile post. It shows 15 total right angle crashes at the US 17/Savannah Highway & Dupont Road/Stinson Drive intersection and total 17 total right angle crashes at the US 17/Savannah Highway & Wappoo Road intersection. These are total crashes over a 5-year period for all 12 vehicular movements combined. None of the left-turn movements meet the crash data criteria.

Field Observations

To analyze the left-turn delay, PM peak hour queues were observed at both study intersections on Thursday, December 1, 2022. The study intersections were observed for at least 15 cycles each between 7 AM to 8:30 AM and 3 PM to 5 PM to see if more than 2 vehicles had to wait for the next green signal to complete the left-turn. A consistent pattern of more than 2 vehicles waiting would indicate a potential need for left-turn phasing.

For all considered left-turn movements for the study at the intersection of US 17/Savannah Highway & Dupont Road/Stinson Drive, only two observed cycles had more than 2 vehicles waiting to turn left at the end of green. Therefore, the left-turn delay criteria was not satisfied for the observed peak periods at the intersection of US 17/Savannah Highway & Dupont Road/Stinson Drive. However, a consistent pattern of more than 2 left-turning vehicles waiting for the next green signal was observed during both AM and PM peak hours at the US 17/Savannah Highway & Wappoo Road intersection. Field observation notes are included in **Attachment D**.

The southbound (Dupont Road) approach at the intersection of US 17/Savannah Highway & Dupont Road/Stinson Drive has a shared left-through-right lane, while the northbound (Stinson Drive) approach has a left-turn lane and a shared through-right lane. As the southbound left-turning vehicles enter the intersection and wait to yield to the northbound through traffic, it was observed that the southbound through vehicles go around the vehicle waiting to turn left. This creates possible risk of collision between the southbound through and northbound left-turning traffic as the northbound left-turning traffic along Stinson Drive does not get a clear vision of the southbound through vehicles going around the vehicle waiting to turn left. However, this issue is projected to resolve with the proposed improvements which involve modifying the southbound (Dupont Road) approach to have a left-turn lane and a shared through-right lane.

The results of the analysis are summarized in **Table 1** for each considered movement for the each considered left-turn phase criteria.

Reference: **US 17/Savannah Highway – Left-Turn Phase Evaluations**

Table 1 – Left-Turn Evaluation Results Summary

Intersection	Left-turn Movement	Criteria							
		Cross Product		Minimum Volume		Crashes		Left-Turn Delay	
		AM	PM	AM	PM	AM	PM	AM	PM
US 17/Savannah Highway & Dupont Road/Stinson Drive	Northbound	✘	✘	✘	✘	✘	✘	✘	✘
US 17/Savannah Highway & Dupont Road/Stinson Drive	Southbound	✘	✘	✘	✘	✘	✘	✘	✘
US 17/Savannah Highway & Dupont Road/Stinson Drive	Eastbound	✘	✘	✘	✘	✘	✘	✘	✘
US 17/Savannah Highway & Dupont Road/Stinson Drive	Westbound	✘	✘	✘	✘	✘	✘	✘	✘
US 17/Savannah Highway & Wappoo Road	Northbound	✘	✘	✘	✘	✘	✘	✓	✓
US 17/Savannah Highway & Wappoo Road	Southbound	✘	✘	✘	✘	✘	✘	✓	✓

✓ - *criteria satisfied,* ✘ - *criteria not satisfied.*

As shown in **Table 1**, only the northbound and southbound left-turn movements at the US 17/Savannah Highway & Wappoo Road intersection meet the left-turn delay criteria for provision of a left-turn phase at the study intersections. However, since the other three criteria are not met and the cross product is considerably lower than the threshold, other factors must be considered next.

INTERSECTION ANALYSIS

Field observations suggested that moving green time from the US 17/Savannah Highway mainline to the Wappoo Road approaches could reduce the queue lengths and delays along Wappoo Road. To verify if increments to the Wappoo Road split time would reduce the left-turn queues and delay, simulations were performed using *SimTraffic*. Maintaining the existing cycle length, split time for US 17/Savannah Highway (phases 2 & 6) was reduced by 10 seconds and added to the split time for Wappoo Road (phases 4 & 8). Multiple simulation runs suggest that with the modified timings at the intersection of US 17/Savannah Highway & Wappoo Road, the northbound and southbound left-turn delay and queues would be significantly reduced. *Synchro* analysis results also suggest that the aforementioned modification to the signal timings does not degrade the overall intersection level of service. Therefore, it is recommended to modify the existing signal timings by reducing the split time for US 17/Savannah Highway through movement (phases 2 & 6) by 10 seconds, to be added to the split time for Wappoo Road (phases 4 & 8). The *Synchro* LOS results (worksheets included in **Attachment E**) for the existing timing settings and proposed modifications are shown in **Table 2**.

It should be noted that the intersection of US 17/Savannah Highway & Wappoo Road was also analyzed in *Synchro* with left-turn phasing for the Wappoo Road approaches. The results of the analysis projected an increase in the overall intersection delay with added left-turn phasing. While addition of left-turn phasing for the Wappoo Road approaches is projected to increase the overall intersection delay, aforementioned signal timing modifications are projected to significantly reduce the left-turn queues and delay without degrading the overall intersection level of service.

Reference: **US 17/Savannah Highway – Left-Turn Phase Evaluations**

Table 2 – Synchro Intersection LOS Summary

Intersection	2022 Existing Timings LOS/Delay (sec)		Proposed (Modified) Timings LOS/Delay (sec)	
	AM	PM	AM	PM
US 17/Savannah Highway & Wappoo Road	B/19.3	B/19.8	B/19.3	B/18.5

CONCLUSIONS

Based on review of the volume-based and correctable crash criteria for addition of a protected-permitted left-turn phase and field queue observations, following recommendations are made:

- No additional left-turn phases to be implemented at the study intersection of US 17/Savannah Highway & Dupont Road/Stinson Drive; and
- Modify the existing signal timings at the study intersection of US 17/Savannah Highway & Wappoo Road by reducing the split time for US 17/Savannah Highway through movement (phases 2 & 6) by 10 seconds, to be added to the split time for Wappoo Road (phases 4 & 8).

CLOSING

Please do not hesitate to contact me should you have any questions regarding the evaluation and recommendations summarized in this memorandum.

Stantec Consulting Services Inc.

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ATTACHMENT A – RAW TRAFFIC COUNTS

SHORT COUNTS, LLC

735 Maryland St
Columbia, SC 29201

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File Name : US 17 @ Dupont-Stinson Dr
Site Code :
Start Date : 10/11/2022
Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles - Buses

	Dupont Rd Southbound				US 17 Westbound				Stinson Dr Northbound				US 17 Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00	4	1	0	0	2	168	3	0	20	9	23	0	2	487	5	0	724
07:15	4	13	0	0	2	240	10	0	22	13	28	0	2	466	2	0	802
07:30	6	12	1	0	8	292	7	0	30	16	33	0	5	401	2	0	813
07:45	5	7	5	1	11	296	8	0	15	25	28	0	1	435	5	0	842
Total	19	33	6	1	23	996	28	0	87	63	112	0	10	1789	14	0	3181
08:00	11	12	5	0	1	276	14	0	14	13	22	0	6	416	0	0	790
08:15	15	10	2	0	10	313	21	0	28	16	20	0	4	366	3	0	808
08:30	6	4	7	1	1	263	18	0	27	13	29	0	1	452	0	0	822
08:45	10	10	5	0	2	289	20	1	23	18	27	0	3	414	0	0	822
Total	42	36	19	1	14	1141	73	1	92	60	98	0	14	1648	3	0	3242
16:00	13	9	4	1	9	440	23	0	22	13	11	0	1	283	2	0	831
16:15	16	11	9	0	7	468	19	1	16	12	6	0	2	324	4	0	895
16:30	13	10	11	2	10	418	17	0	21	8	24	0	9	293	3	0	839
16:45	17	15	9	0	8	459	16	0	16	9	16	0	4	271	2	0	842
Total	59	45	33	3	34	1785	75	1	75	42	57	0	16	1171	11	0	3407
17:00	7	8	6	4	17	470	11	1	17	11	13	0	5	274	5	0	849
17:15	17	13	4	0	6	452	11	0	27	17	21	0	4	272	1	0	845
17:30	7	10	11	0	14	457	18	0	21	13	14	0	3	274	2	0	844
17:45	16	19	3	0	21	481	11	0	19	11	12	0	4	227	7	0	831
Total	47	50	24	4	58	1860	51	1	84	52	60	0	16	1047	15	0	3369
Grand Total	167	164	82	9	129	5782	227	3	338	217	327	0	56	5655	43	0	13199
Apprch %	39.6	38.9	19.4	2.1	2.1	94.2	3.7	0	38.3	24.6	37.1	0	1	98.3	0.7	0	
Total %	1.3	1.2	0.6	0.1	1	43.8	1.7	0	2.6	1.6	2.5	0	0.4	42.8	0.3	0	
Passenger Vehicles	163	158	80	9	127	5686	225	3	334	217	327	0	55	5546	43	0	12973
% Passenger Vehicles	97.6	96.3	97.6	100	98.4	98.3	99.1	100	98.8	100	100	0	98.2	98.1	100	0	98.3
Heavy Vehicles	4	4	1	0	2	72	2	0	0	0	0	0	1	92	0	0	178
% Heavy Vehicles	2.4	2.4	1.2	0	1.6	1.2	0.9	0	0	0	0	0	1.8	1.6	0	0	1.3
Buses	0	2	1	0	0	24	0	0	4	0	0	0	0	17	0	0	48
% Buses	0	1.2	1.2	0	0	0.4	0	0	1.2	0	0	0	0	0.3	0	0	0.4

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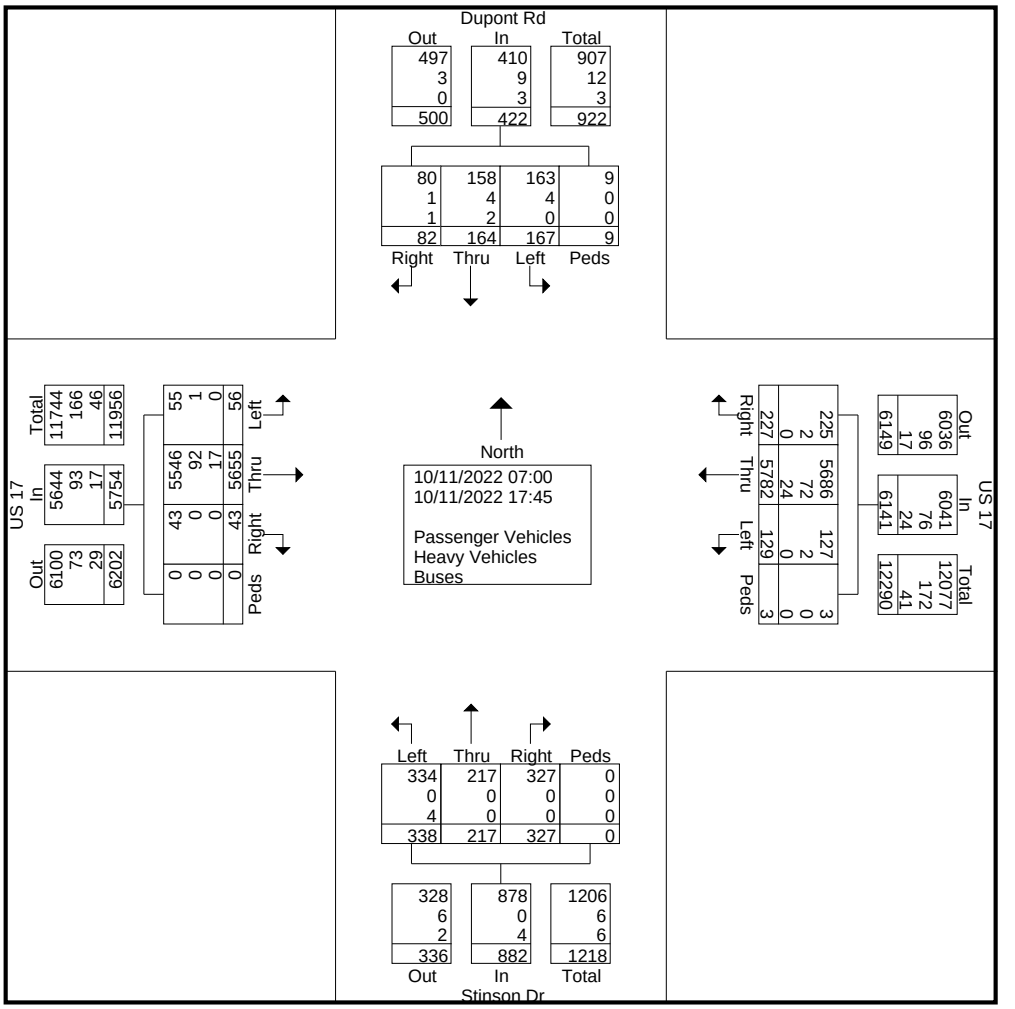
File Name : US 17 @ Dupont-Stinson Dr
Site Code :
Start Date : 10/11/2022
Page No : 2



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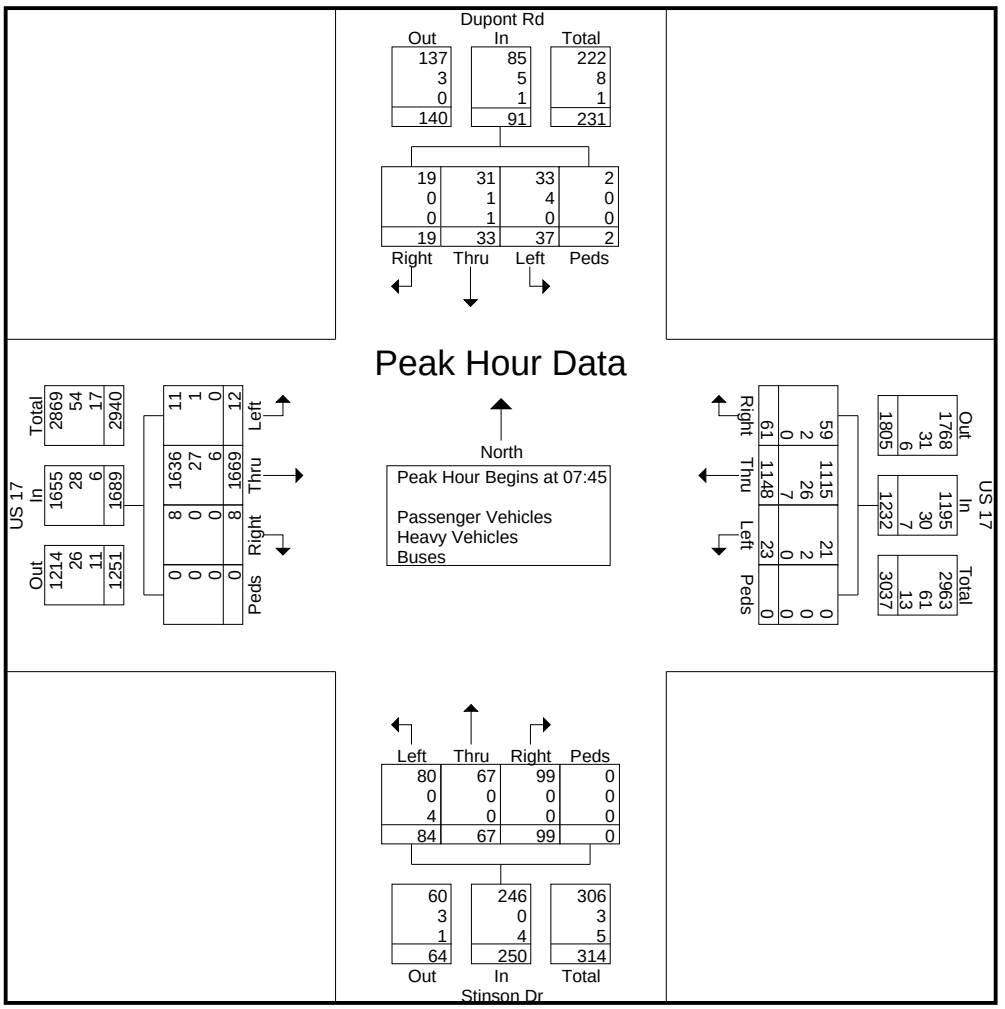
	Dupont Rd Southbound					US 17 Westbound					Stinson Dr Northbound					US 17 Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45																					
07:45	5	7	5	**1**	18	**11**	296	8	0	315	15	**25**	28	0	68	1	435	**5**	0	441	**842**
08:00	11	**12**	5	0	**28**	1	276	14	0	291	14	13	22	0	49	**6**	416	0	0	422	790
08:15	**15**	10	2	0	27	10	**313**	**21**	0	**344**	**28**	16	20	0	64	4	366	3	0	373	808
08:30	6	4	**7**	1	18	1	263	18	0	282	27	13	**29**	0	**69**	1	**452**	0	0	**453**	822
Total Volume	37	33	19	2	91	23	1148	61	0	1232	84	67	99	0	250	12	1669	8	0	1689	3262
% App. Total	40.7	36.3	20.9	2.2		1.9	93.2	5	0		33.6	26.8	39.6	0		0.7	98.8	0.5	0		
PHF	.617	.688	.679	.500	.813	.523	.917	.726	.000	.895	.750	.670	.853	.000	.906	.500	.923	.400	.000	.932	.969
Passenger Vehicles	33	31	19	2	85	21	1115										1636				
% Passenger Vehicles	89.2	93.9	100	100	93.4	91.3	97.1	96.7	0	97.0	95.2	100	100	0	98.4	91.7	98.0	100	0	98.0	97.5
Heavy Vehicles	4	1	0	0	5	2	26	2	0	30	0	0	0	0	0	1	27	0	0	28	63
% Heavy Vehicles	10.8	3.0	0	0	5.5	8.7	2.3	3.3	0	2.4	0	0	0	0	0	8.3	1.6	0	0	1.7	1.9
Buses	0	1	0	0	1	0	7	0	0	7	4	0	0	0	4	0	6	0	0	6	18
% Buses	0	3.0	0	0	1.1	0	0.6	0	0	0.6	4.8	0	0	0	1.6	0	0.4	0	0	0.4	0.6



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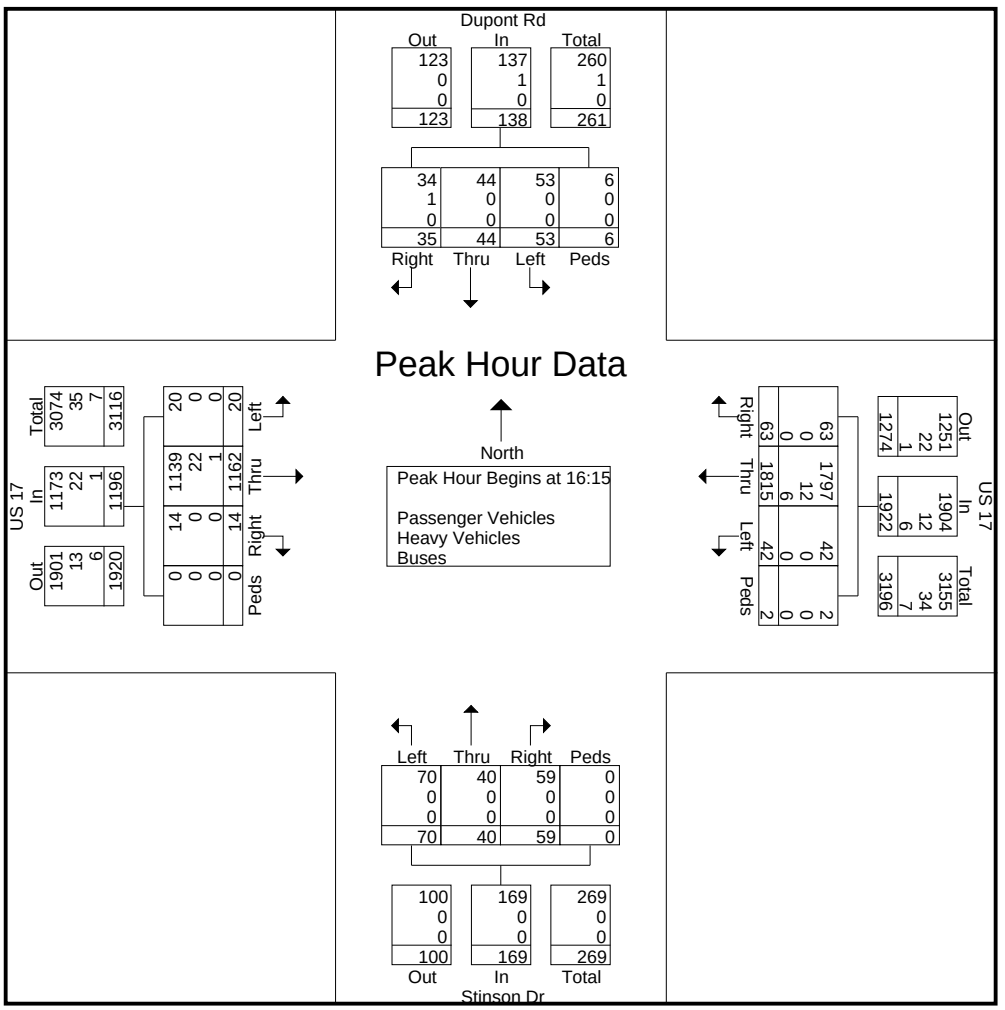
	Dupont Rd Southbound					US 17 Westbound					Stinson Dr Northbound					US 17 Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:15																					
16:15	16	11	9	0	36	7	468	**19**	**1**	495	16	**12**	6	0	34	2	**324**	4	0	**330**	**895**
16:30	13	10	**11**	2	36	10	418	17	0	445	**21**	8	**24**	0	**53**	**9**	293	3	0	305	839
16:45	**17**	**15**	9	0	**41**	8	459	16	0	483	16	9	16	0	41	4	271	2	0	277	842
17:00	7	8	6	**4**	25	**17**	**470**	11	1	**499**	17	11	13	0	41	5	274	**5**	0	284	849
Total Volume	53	44	35	6	138	42	1815	63	2	1922	70	40	59	0	169	20	1162	14	0	1196	3425
% App. Total	38.4	31.9	25.4	4.3		2.2	94.4	3.3	0.1		41.4	23.7	34.9	0		1.7	97.2	1.2	0		
PHF	.779	.733	.795	.375	.841	.618	.965	.829	.500	.963	.833	.833	.615	.000	.797	.556	.897	.700	.000	.906	.957
Passenger Vehicles	53	44	34	6	137	42	1797										1139				
% Passenger Vehicles	100	100	97.1	100	99.3	100	99.0	100	100	99.1	100	100	100	0	100	100	98.0	100	0	98.1	98.8
Heavy Vehicles	0	0	1	0	1	0	12	0	0	12	0	0	0	0	0	0	22	0	0	22	35
% Heavy Vehicles	0	0	2.9	0	0.7	0	0.7	0	0	0.6	0	0	0	0	0	0	1.9	0	0	1.8	1.0
Buses	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	1	0	0	1	7
% Buses	0	0	0	0	0	0	0.3	0	0	0.3	0	0	0	0	0	0	0.1	0	0	0.1	0.2



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Groups Printed- Passenger Vehicles - Heavy Vehicles - Buses

	Wappoo Rd Southbound				US 17 Westbound				Wappoo Rd Northbound				US 17 Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00	14	11	15	0	5	125	27	0	24	24	21	0	45	479	11	0	801
07:15	20	14	33	0	11	199	32	0	18	21	35	0	32	464	12	0	891
07:30	26	18	62	0	21	230	29	0	20	22	35	0	29	415	17	4	928
07:45	30	26	41	0	11	217	22	0	27	22	22	0	22	405	16	1	862
Total	90	69	151	0	48	771	110	0	89	89	113	0	128	1763	56	5	3482
08:00	17	37	23	0	26	226	34	0	22	26	24	0	28	405	25	1	894
08:15	23	22	21	0	13	284	40	0	32	39	18	1	27	418	17	1	956
08:30	30	22	23	1	14	226	30	0	26	21	14	2	42	441	14	1	907
08:45	31	19	24	0	21	243	41	0	26	25	28	0	42	399	8	1	908
Total	101	100	91	1	74	979	145	0	106	111	84	3	139	1663	64	4	3665
16:00	22	26	43	0	17	397	31	0	15	15	21	0	12	271	22	1	893
16:15	23	31	24	0	27	418	46	0	14	14	14	1	18	318	21	1	970
16:30	20	29	26	0	20	419	38	0	23	24	18	1	26	288	23	1	956
16:45	24	30	48	3	18	404	34	0	18	16	15	0	23	269	23	1	926
Total	89	116	141	3	82	1638	149	0	70	69	68	2	79	1146	89	4	3745
17:00	19	20	58	5	16	405	36	0	24	25	15	1	20	299	13	2	958
17:15	25	19	33	0	12	406	52	0	21	25	11	0	24	284	18	0	930
17:30	35	19	46	0	25	398	45	0	23	11	15	0	27	247	27	0	918
17:45	18	22	31	0	25	442	50	0	22	14	18	2	15	245	18	0	922
Total	97	80	168	5	78	1651	183	0	90	75	59	3	86	1075	76	2	3728
Grand Total	377	365	551	9	282	5039	587	0	355	344	324	8	432	5647	285	15	14620
Apprch %	29	28	42.3	0.7	4.8	85.3	9.9	0	34.4	33.4	31.4	0.8	6.8	88.5	4.5	0.2	
Total %	2.6	2.5	3.8	0.1	1.9	34.5	4	0	2.4	2.4	2.2	0.1	3	38.6	1.9	0.1	
Passenger Vehicles	371	356	543	9	276	4966	577	0	349	341	323	8	425	5561	284	15	14404
% Passenger Vehicles	98.4	97.5	98.5	100	97.9	98.6	98.3	0	98.3	99.1	99.7	100	98.4	98.5	99.6	100	98.5
Heavy Vehicles	5	5	5	0	4	58	8	0	5	3	1	0	5	74	1	0	174
% Heavy Vehicles	1.3	1.4	0.9	0	1.4	1.2	1.4	0	1.4	0.9	0.3	0	1.2	1.3	0.4	0	1.2
Buses	1	4	3	0	2	15	2	0	1	0	0	0	2	12	0	0	42
% Buses	0.3	1.1	0.5	0	0.7	0.3	0.3	0	0.3	0	0	0	0.5	0.2	0	0	0.3

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File Name : US 17 @ Wappoo Rd
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Start Date : 10/11/2022
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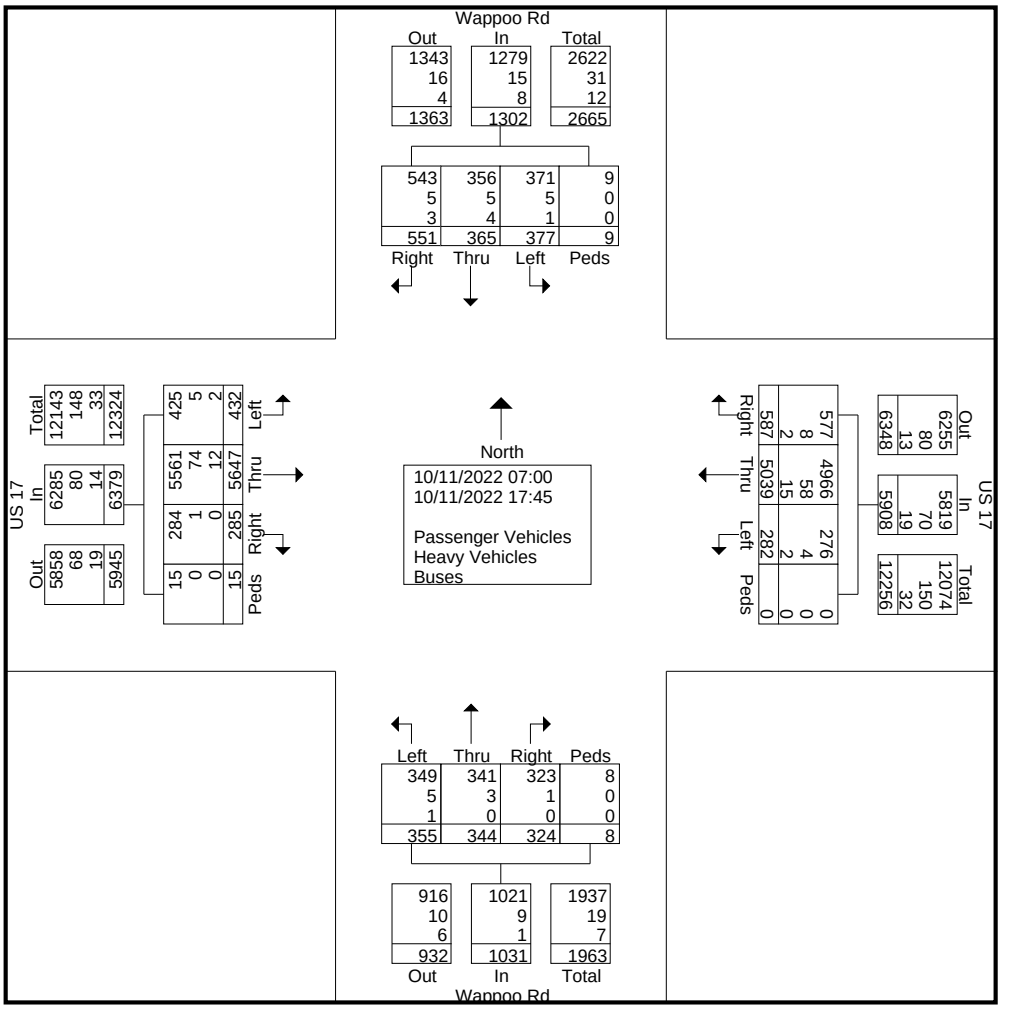

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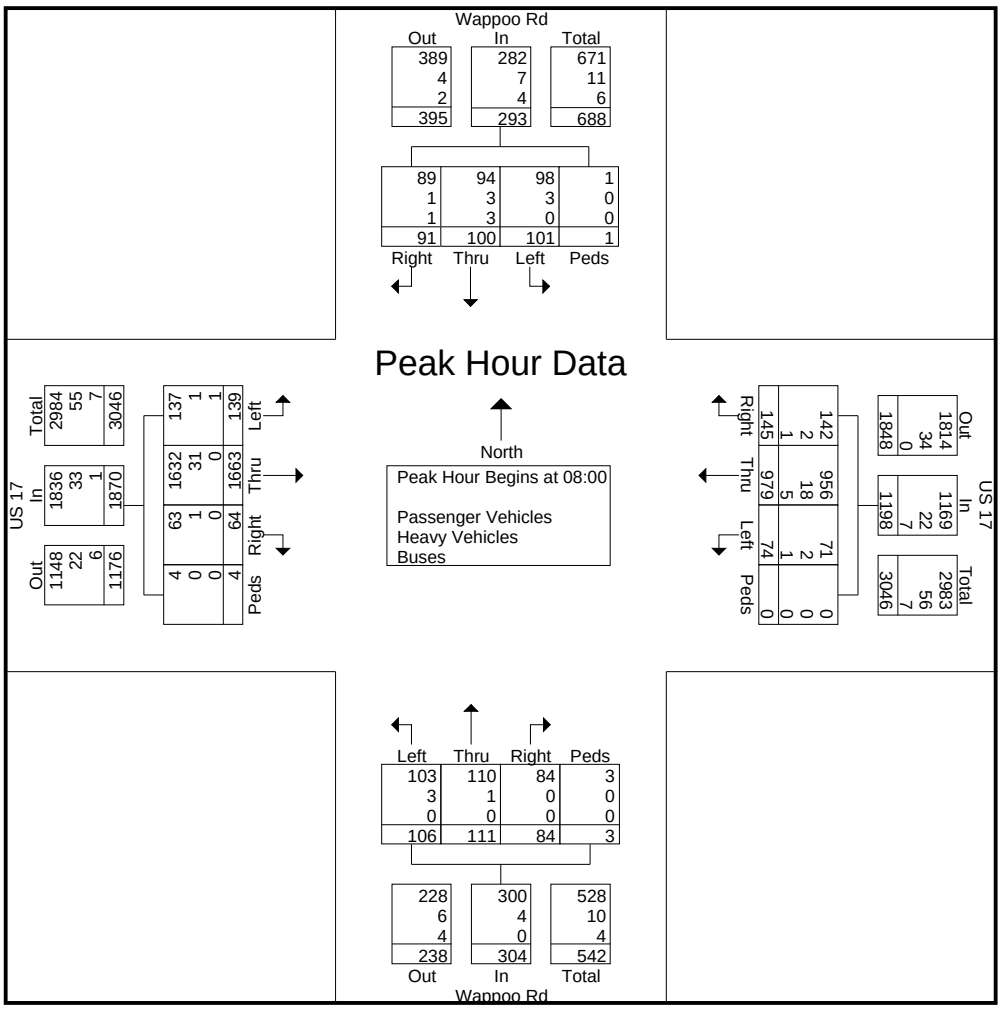
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00																					
08:00	17	**37**	23	0	**77**	**26**	226	34	0	286	22	26	24	0	72	28	405	**25**	**1**	459	894
08:15	23	22	21	0	66	13	**284**	40	0	**337**	**32**	**39**	18	1	**90**	27	418	17	1	463	**956**
08:30	30	22	23	**1**	76	14	226	30	0	270	26	21	14	**2**	63	**42**	**441**	14	1	**498**	907
08:45	**31**	19	**24**	0	74	21	243	**41**	0	305	26	25	**28**	0	79	42	399	8	1	450	908
Total Volume	101	100	91	1	293	74	979	145	0	1198	106	111	84	3	304	139	1663	64	4	1870	3665
% App. Total	34.5	34.1	31.1	0.3		6.2	81.7	12.1	0		34.9	36.5	27.6	1		7.4	88.9	3.4	0.2		
PHF	.815	.676	.948	.250	.951	.712	.862	.884	.000	.889	.828	.712	.750	.375	.844	.827	.943	.640	1.00	.939	.958
Passenger Vehicles	98	94	89	1	282	71	956	142	0	1169	103	110	84	3	300	137	1632				
% Passenger Vehicles	97.0	94.0	97.8	100	96.2	95.9	97.7	97.9	0	97.6	97.2	99.1	100	100	98.7	98.6	98.1	98.4	100	98.2	97.9
Heavy Vehicles	3	3	1	0	7	2	18	2	0	22	3	1	0	0	4	1	31	1	0	33	66
% Heavy Vehicles	3.0	3.0	1.1	0	2.4	2.7	1.8	1.4	0	1.8	2.8	0.9	0	0	1.3	0.7	1.9	1.6	0	1.8	1.8
Buses	0	3	1	0	4	1	5	1	0	7	0	0	0	0	0	1	0	0	0	1	12
% Buses	0	3.0	1.1	0	1.4	1.4	0.5	0.7	0	0.6	0	0	0	0	0	0.7	0	0	0	0.1	0.3

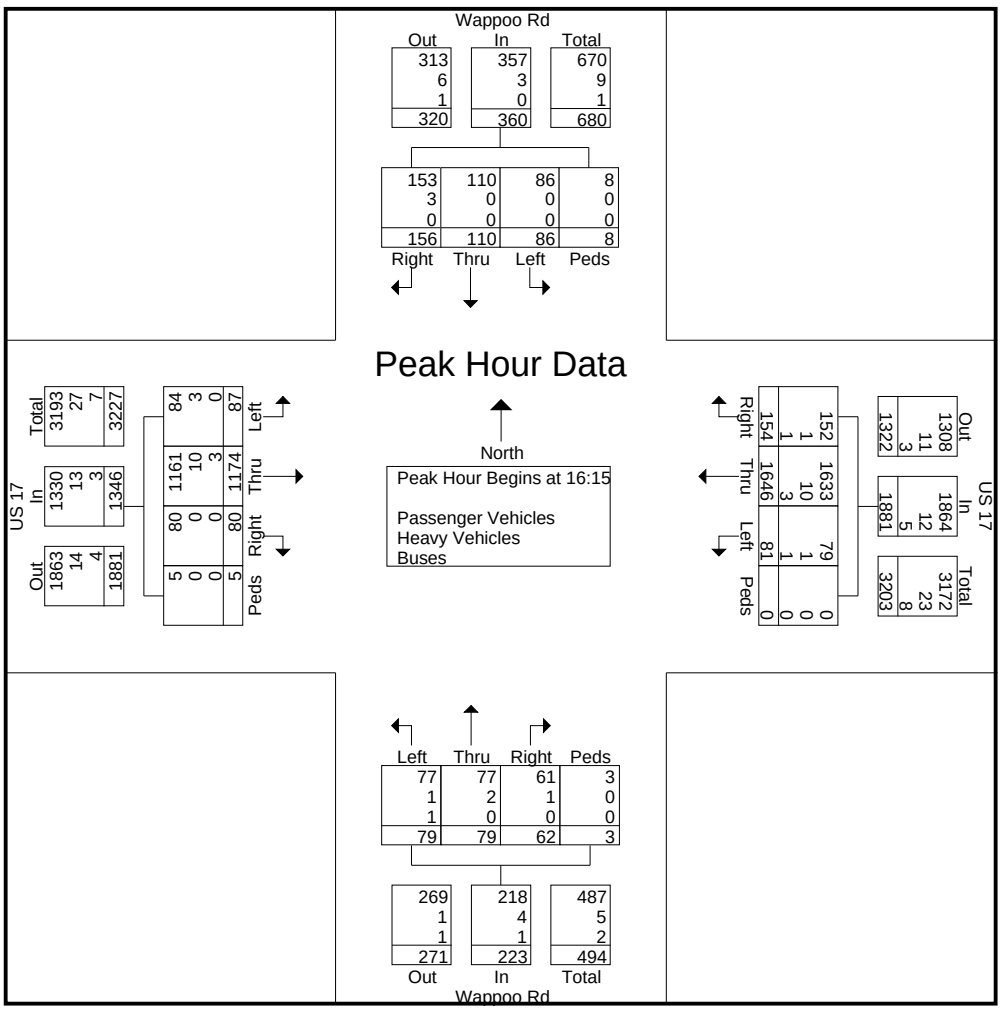


SHORT COUNTS, LLC

735 Maryland St
Columbia, SC 29201
We can't say we're the Best, but you Can!

File Name : US 17 @ Wappoo Rd
Site Code :
Start Date : 10/11/2022
Page No : 4

	Wappoo Rd Southbound					US 17 Westbound					Wappoo Rd Northbound					US 17 Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:15																					
16:15	23	**31**	24	0	78	**27**	418	**46**	0	**491**	14	14	14	**1**	43	18	**318**	21	1	**358**	**970**
16:30	20	29	26	0	75	20	**419**	38	0	477	23	24	**18**	1	**66**	**26**	288	**23**	1	338	956
16:45	**24**	30	48	3	**105**	18	404	34	0	456	18	16	15	0	49	23	269	23	1	316	926
17:00	19	20	**58**	**5**	102	16	405	36	0	457	**24**	**25**	15	1	65	20	299	13	**2**	334	958
Total Volume	86	110	156	8	360	81	1646	154	0	1881	79	79	62	3	223	87	1174	80	5	1346	3810
% App. Total	23.9	30.6	43.3	2.2		4.3	87.5	8.2	0		35.4	35.4	27.8	1.3		6.5	87.2	5.9	0.4		
PHF	.896	.887	.672	.400	.857	.750	.982	.837	.000	.958	.823	.790	.861	.750	.845	.837	.923	.870	.625	.940	.982
Passenger Vehicles	86	110	153	8	357	79	1633										1161				
% Passenger Vehicles	100	100	98.1	100	99.2	97.5	99.2	98.7	0	99.1	97.5	97.5	98.4	100	97.8	96.6	98.9	100	100	98.8	98.9
Heavy Vehicles	0	0	3	0	3	1	10	1	0	12	1	2	1	0	4	3	10	0	0	13	32
% Heavy Vehicles	0	0	1.9	0	0.8	1.2	0.6	0.6	0	0.6	1.3	2.5	1.6	0	1.8	3.4	0.9	0	0	1.0	0.8
Buses	0	0	0	0	0	1	3	1	0	5	1	0	0	0	1	0	3	0	0	3	9
% Buses	0	0	0	0	0	1.2	0.2	0.6	0	0.3	1.3	0	0	0	0.4	0	0.3	0	0	0.2	0.2



ATTACHMENT B – CRITERIA ANALYSIS WORKSHEETS

Left Turn Analysis
SCDOT - District Traffic Engineering

Intersection:	Dupont Road/Stinson Dr & US 17	Street:	US 17
Count Date:	10/11/2022	Left-turn Movement:	Eastbound
Counted By:	All Traffic Data	Number Opposing Lanes:	2

Speed Limit or 85th Percentile of Opposing Traffic?	45
Is the current left turn Protected/Permitted? (Y/N)	N

Count Data (Peak Hour)

Time	Left Turn Volume	Opp Thru Volume	Cycle Length	Max Green	Cross Product	Left Turns Per Cycle
7:00 AM	10	996	170	30	4980	0.5
8:00 AM	14	1141	170	30	7987	0.7
4:00 PM	16	1785	170	23	14280	0.8
5:00PM	16	1860	170	23	14880	0.8
Average	14	1446	67	40	10532	0.7
Peak Hour	92	36	170	30	3312	4.3
Peak Time	4:00 PM					

Accident History

Year	Total Angle Crashes
2013	
2014	
2015	15
2016	
2017	

Guidelines for Left Turn Phase Installation

Summary of Guidelines	Guideline Met?	Hours/Years
Minimum Left-turn Volume	No	***
Minimum Cross Product of Opposing and Left-turns	No	***
Accident History Analysis	No	***
More Than 2 Vehicles Waiting to Turn Left at the End of Green	No	***

Minimum Left Turn Volume								*Criteria= 125*
Begin				*Percent Satisfied*				
Time	7:00	8:00	11:00AM	12:00	16:00	5:00PM	Average	Peak Hour
	8%	11%	N/A	N/A	13%	13%	11%	74%
Total Hours Met		0						

Minimum Cross Product of Opposing Through and Left Turns								*Criteria= 100000*
Begin				*Percent Satisfied*				
Time	7:00	8:00	11:00AM	12:00	16:00	5:00PM	Average	Peak Hour
	5%	8%	N/A	N/A	14%	15%	11%	3%
Total Hours Met		0						

Accident History Analysis			*Criteria=4/1yr,6/2yrs*		
Year	2013	2014	2015	2016	2017
Min. Met?	No	No	No	No	No
Total Years Met		0			

This report does not constitute a recommendation, other factors and criteria should be considered.

Left Turn Analysis
SCDOT - District Traffic Engineering

Intersection:	Dupont Road/Stinson Dr & US 17	Street:	US 17
Count Date:	10/11/2022	Left-turn Movement:	Westbound
Counted By:	All Traffic Data	Number Opposing Lanes:	2

Speed Limit or 85th Percentile of Opposing Traffic?	45
Is the current left turn Protected/Permitted? (Y/N)	N

Count Data (Peak Hour)

Time	Left Turn Volume	Opp Thru Volume	Cycle Length	Max Green	Cross Product	Left Turns Per Cycle
7:00 AM	23	1789	170	30	20574	1.1
8:00 AM	14	1648	170	30	11536	0.7
4:00 PM	34	1171	170	23	19907	1.6
5:00PM	58	1047	170	23	30363	2.7
Average	32	1414	67	40	20595	1.5
Peak Hour	92	36	170	30	3312	4.3
Peak Time	4:00 PM					

Accident History

Year	Total Angle Crashes
2013	
2014	
2015	15
2016	
2017	

Guidelines for Left Turn Phase Installation

Summary of Guidelines	Guideline Met?	Hours/Years
Minimum Left-turn Volume	No	***
Minimum Cross Product of Opposing and Left-turns	No	***
Accident History Analysis	No	***
More Than 2 Vehicles Waiting to Turn Left at the End of Green	No	***

Minimum Left Turn Volume								*Criteria= 125*
Begin				*Percent Satisfied*				
Time	7:00	8:00	11:00AM	12:00	16:00	5:00PM	Average	Peak Hour
	18%	11%	N/A	N/A	27%	46%	26%	74%
Total Hours Met		0						

Minimum Cross Product of Opposing Through and Left Turns								*Criteria= 100000*
Begin				*Percent Satisfied*				
Time	7:00	8:00	11:00AM	12:00	16:00	5:00PM	Average	Peak Hour
	21%	12%	N/A	N/A	20%	30%	21%	3%
Total Hours Met		0						

Accident History Analysis			*Criteria=4/1yr,6/2yrs*		
Year	2013	2014	2015	2016	2017
Min. Met?	No	No	No	No	No
Total Years Met		0			

This report does not constitute a recommendation, other factors and criteria should be considered.

Left Turn Analysis
SCDOT - District Traffic Engineering

Intersection:	Dupont Road/Stinson Dr & US 17	Street:	Stinson Rd
Count Date:	10/11/2022	Left-turn Movement:	Northbound
Counted By:	All Traffic Data	Number Opposing Lanes:	1

Speed Limit or 85th Percentile of Opposing Traffic?	35
Is the current left turn Protected/Permitted? (Y/N)	N

Count Data (Peak Hour)

Time	Left Turn Volume	Opp Thru Volume	Cycle Length	Max Green	Cross Product	Left Turns Per Cycle
7:00 AM	89	69	170	30	6141	4.2
8:00 AM	106	100	170	30	10600	5.0
4:00 PM	70	116	170	23	8120	3.3
5:00PM	90	80	170	23	7200	4.3
Average	89	91	67	40	8015	4.2
Peak Hour	106	100	170	30	10600	5.0
Peak Time	8:00 AM					

Accident History

Year	Total Angle Crashes
2013	
2014	
2015	15
2016	
2017	

Guidelines for Left Turn Phase Installation

Summary of Guidelines	Guideline Met?	Hours/Years
Minimum Left-turn Volume	No	***
Minimum Cross Product of Opposing and Left-turns	No	***
Accident History Analysis	No	***
More Than 2 Vehicles Waiting to Turn Left at the End of Green	No	***

Minimum Left Turn Volume								*Criteria= 125*
Begin				*Percent Satisfied*				
Time	7:00	8:00	11:00AM	12:00	16:00	5:00PM	Average	Peak Hour
	71%	85%	N/A	N/A	56%	72%	71%	85%
Total Hours Met		0						

Minimum Cross Product of Opposing Through and Left Turns								*Criteria= 50000*
Begin				*Percent Satisfied*				
Time	7:00	8:00	11:00AM	12:00	16:00	5:00PM	Average	Peak Hour
	12%	21%	N/A	N/A	16%	14%	16%	21%
Total Hours Met		0						

Accident History Analysis			*Criteria=4/1yr,6/2yrs*		
Year	2013	2014	2015	2016	2017
Min. Met?	No	No	No	No	No
Total Years Met		0			

This report does not constitute a recommendation, other factors and criteria should be considered.

Left Turn Analysis
SCDOT - District Traffic Engineering

Intersection:	Dupont Road/Stinson Dr & US 17	Street:	Dupont Rd
Count Date:	10/11/2022	Left-turn Movement:	Southbound
Counted By:	All Traffic Data	Number Opposing Lanes:	1

Speed Limit or 85th Percentile of Opposing Traffic?	35
Is the current left turn Protected/Permitted? (Y/N)	N

Count Data (Peak Hour)

Time	Left Turn Volume	Opp Thru Volume	Cycle Length	Max Green	Cross Product	Left Turns Per Cycle
7:00 AM	19	63	185	30	1197	1.0
8:00 AM	42	60	185	30	2520	2.2
4:00 PM	59	42	170	35	2478	2.8
5:00PM	47	52	170	35	2444	2.2
Average	42	54	67	40	2160	2.0
Peak Hour	92	36	170	30	3312	4.3
Peak Time	8:00 AM					

Accident History

Year	Total Angle Crashes
2013	
2014	
2015	15
2016	
2017	

Guidelines for Left Turn Phase Installation

Summary of Guidelines	Guideline Met?	Hours/Years
Minimum Left-turn Volume	No	***
Minimum Cross Product of Opposing and Left-turns	No	***
Accident History Analysis	No	***
More Than 2 Vehicles Waiting to Turn Left at the End of Green	No	***

Minimum Left Turn Volume								*Criteria= 125*
Begin				*Percent Satisfied*				
Time	7:00	8:00	11:00AM	12:00	16:00	5:00PM	Average	Peak Hour
	15%	34%	N/A	N/A	47%	38%	33%	74%
Total Hours Met		0						

Minimum Cross Product of Opposing Through and Left Turns								*Criteria= 50000*
Begin				*Percent Satisfied*				
Time	7:00	8:00	11:00AM	12:00	16:00	5:00PM	Average	Peak Hour
	2%	5%	N/A	N/A	5%	5%	4%	7%
Total Hours Met		0						

Accident History Analysis			*Criteria=4/1yr,6/2yrs*		
Year	2013	2014	2015	2016	2017
Min. Met?	No	No	No	No	No
Total Years Met		0			

This report does not constitute a recommendation, other factors and criteria should be considered.

Left Turn Analysis
SCDOT - District Traffic Engineering

Intersection:	Wappoo Road & US 17	Street:	Wappoo Road
Count Date:	10/11/2022	Left-turn Movement:	Northbound
Counted By:	All Traffic Data	Number Opposing Lanes:	1

Speed Limit or 85th Percentile of Opposing Traffic?	35
Is the current left turn Protected/Permitted? (Y/N)	N

Count Data (Peak Hour)

Time	Left Turn Volume	Opp Thru Volume	Cycle Length	Max Green	Cross Product	Left Turns Per Cycle
7:00 AM	89	69	170	30	6141	4.2
8:00 AM	106	100	170	30	10600	5.0
4:00 PM	70	116	170	23	8120	3.3
5:00PM	90	80	170	23	7200	4.3
Average	89	91	67	40	8015	4.2
Peak Hour	106	100	170	30	10600	5.0
Peak Time	8:00 AM					

Accident History

Year	Total Angle Crashes
2013	
2014	
2015	17
2016	
2017	

Guidelines for Left Turn Phase Installation

Summary of Guidelines	Guideline Met?	Hours/Years
Minimum Left-turn Volume	No	***
Minimum Cross Product of Opposing and Left-turns	No	***
Accident History Analysis	No	***
More Than 2 Vehicles Waiting to Turn Left at the End of Green	Yes	7:45-8:30 AM & 3-4 PM

Minimum Left Turn Volume							*Criteria= 125*	
Begin				*Percent Satisfied*				
Time	7:00	8:00	11:00AM	12:00	16:00	5:00PM	Average	Peak Hour
	71%	85%	N/A	N/A	56%	72%	71%	85%
Total Hours Met		0						

Minimum Cross Product of Opposing Through and Left Turns							*Criteria= 50000*	
Begin				*Percent Satisfied*				
Time	7:00	8:00	11:00AM	12:00	16:00	5:00PM	Average	Peak Hour
	12%	21%	N/A	N/A	16%	14%	16%	21%
Total Hours Met		0						

Accident History Analysis			*Criteria=4/1yr,6/2yrs*		
Year	2013	2014	2015	2016	2017
Min. Met?	No	No	No	No	No
Total Years Met		0			

This report does not constitute a recommendation, other factors and criteria should be considered.

Left Turn Analysis
SCDOT - District Traffic Engineering

Intersection:	Wappoo Road & US 17	Street:	Wappoo Road
Count Date:	10/11/2022	Left-turn Movement:	Southbound
Counted By:	All Traffic Data	Number Opposing Lanes:	1

Speed Limit or 85th Percentile of Opposing Traffic?	35
Is the current left turn Protected/Permitted? (Y/N)	N

Count Data (Peak Hour)

Time	Left Turn Volume	Opp Thru Volume	Cycle Length	Max Green	Cross Product	Left Turns Per Cycle
7:00 AM	90	89	170	30	8010	4.3
8:00 AM	101	111	170	30	11211	4.8
4:00 PM	89	69	170	23	6141	4.2
5:00PM	97	75	170	23	7275	4.6
Average	94	86	67	40	8159	4.5
Peak Hour	101	111	170	30	11211	4.8
Peak Time	8:00 AM					

Accident History

Year	Total Angle Crashes
2013	
2014	
2015	17
2016	
2017	

Guidelines for Left Turn Phase Installation

Summary of Guidelines	Guideline Met?	Hours/Years
Minimum Left-turn Volume	No	***
Minimum Cross Product of Opposing and Left-turns	No	***
Accident History Analysis	No	***
More Than 2 Vehicles Waiting to Turn Left at the End of Green	Yes	7:45-8:30 AM & 3-4 PM

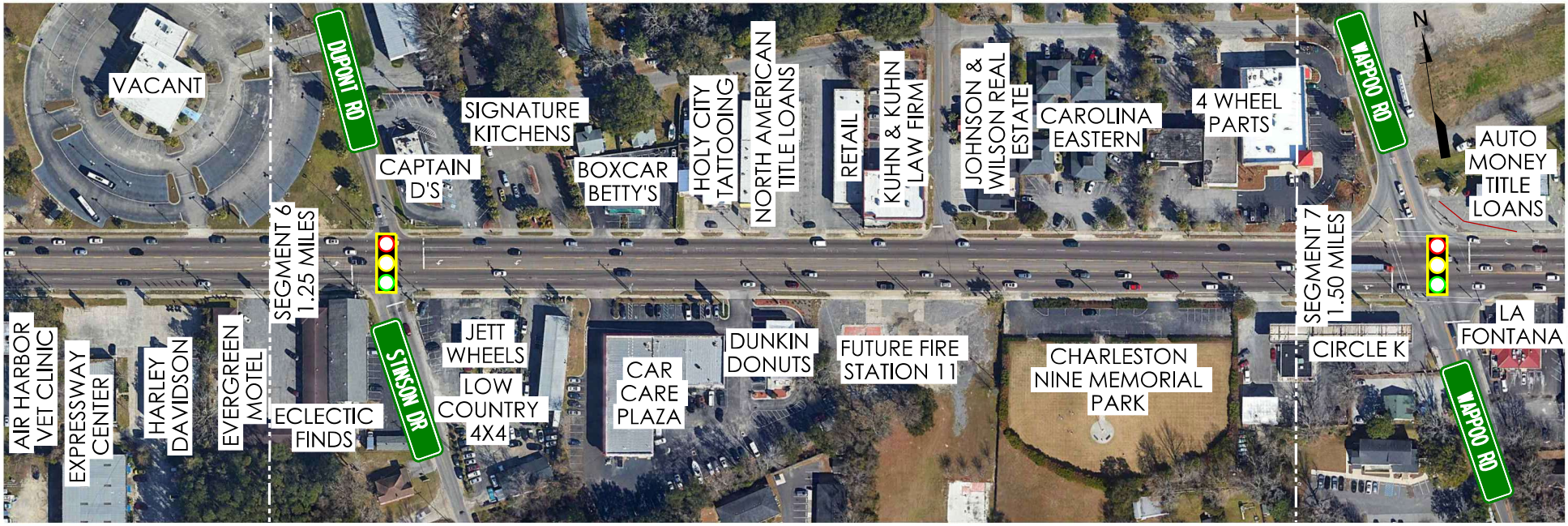
Minimum Left Turn Volume							*Criteria= 125*	
Begin				*Percent Satisfied*				
Time	7:00	8:00	11:00AM	12:00	16:00	5:00PM	Average	Peak Hour
	72%	81%	N/A	N/A	71%	78%	75%	81%
Total Hours Met		0						

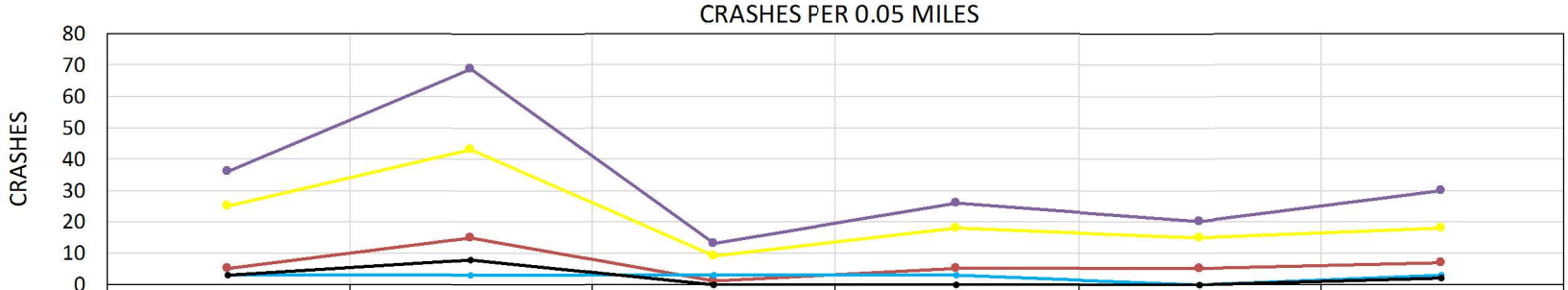
Minimum Cross Product of Opposing Through and Left Turns							*Criteria= 50000*	
Begin				*Percent Satisfied*				
Time	7:00	8:00	11:00AM	12:00	16:00	5:00PM	Average	Peak Hour
	16%	22%	N/A	N/A	12%	15%	16%	22%
Total Hours Met		0						

Accident History Analysis			*Criteria=4/1yr,6/2yrs*		
Year	2013	2014	2015	2016	2017
Min. Met?	No	No	No	No	No
Total Years Met		0			

This report does not constitute a recommendation, other factors and criteria should be considered.

ATTACHMENT C – CRASH HISTORY





	1.25	1.30	1.35	1.40	1.45	1.50
TOTAL	36	69	13	26	20	30
REAR END	25	43	9	18	15	18
ANGLE	5	15	1	5	5	7
SIDESWIPE	3	3	3	3	0	3
OTHER	3	8	0	0	0	2

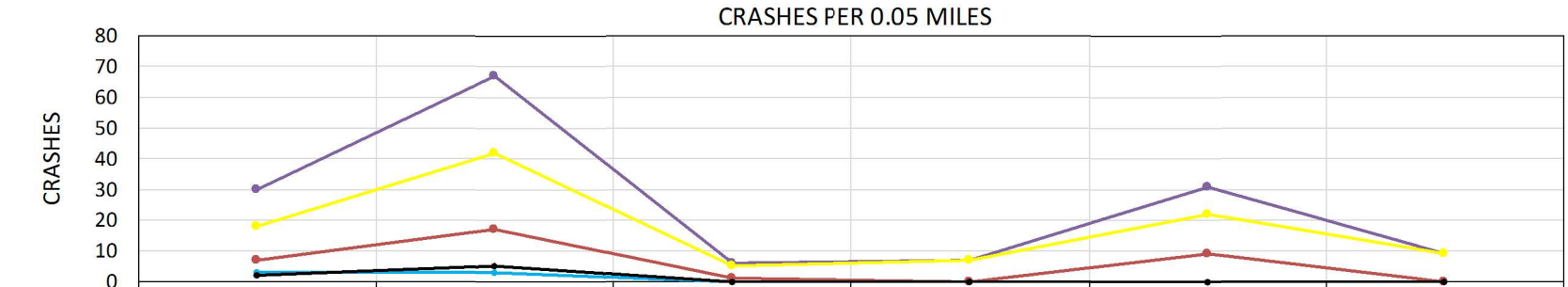
TYPE

REAR END: 102
ANGLE: 33
SIDESWIPE: 11
HEAD ON: 6
NO COLLISION W/ MTR VEH: 6
OTHER: 0

SEVERITY

PDO: 119
INJURY: 39
FATAL: 0

FIGURE 6
SEGMENT 6
SCALE: 1"=200'
SHEET 6 OF 15



	1.50	1.55	1.60	1.65	1.70	1.75
TOTAL	30	67	6	7	31	9
REAR END	18	42	5	7	22	9
ANGLE	7	17	1	0	9	0
SIDESWIPE	3	3	0	0	0	0
OTHER	2	5	0	0	0	0

TYPE

REAR END: 96
ANGLE: 31
SIDESWIPE: 6
HEAD ON: 3
NO COLLISION W/ MTR VEH: 3
OTHER: 0

SEVERITY

PDO: 111
INJURY: 28
FATAL: 0

FIGURE 7
SEGMENT 7
SCALE: 1"=200'
SHEET 7 OF 15

ATTACHMENT D – FIELD OBSERVATIONS

Left Turn Phase Warrant Study
Intersection US 17 & Stinson Dr/Dupont Rd

Date 12/1/2022

Time 7:00 AM
Analyst PC

# Vehicles waiting to turn left at the end of green				
Cycle #	Approach			
	Stinson Dr	Dupont Rd	US 17 EB	US 17 WB
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	2	0	0	0
10	0	6 (2 left)	0	0
11	4	3 (2 left)	0	0
12	0	2 (1 left)	0	0
13	0	2	0	0
14	0	3	0	0
15	0	2	0	0

Left Turn Phase Warrant Study
Intersection US 17 & Wappoo Rd

Date 12/1/2022

Time 7:45 AM
Analyst PC

# Vehicles waiting to turn left at the end of green				
Cycle #	Approach			
	Wappoo Rd NB	Wappoo Rd SB	US 17 EB	US 17 WB
1	0	2		
2	0	0		
3	0	0		
4	0	0		
5	4	2		
6	4	2		
7	6	0		
8	4	4		
9	3	3		
10	2	5		
11	3	0		
12	2	3		
13	3	3		
14	0	5		
15	0	3		

Left Turn Phase Warrant Study
Intersection US 17 & Wappoo Rd

Date 12/1/2022 Time 3 PM
Analyst PC

# Vehicles waiting to turn left at the end of green				
Cycle #	Approach			
	Wappoo Rd NB	Wappoo Rd SB	US 17 EB	US 17 WB
1	1	2	0	0
2	3	2	0	0
3	0	5		
4	0	0		
5	0	0		
6	0	3		
7	0	5		
8	4	10		
9	0	10+		
10	4	7+		
11	1	7+		
12	2	10		
13	3	8		
14	2	8		
15	4	8		
16	3	4		
17	3	5		

Left Turn Phase Warrant Study
Intersection US 17 & Stinson Dr/Dupont Rd

Date 12/1/2022 Time 4:00 PM
Analyst PC

# Vehicles waiting to turn left at the end of green				
Cycle #	Approach			
	Stinson Dr	Dupont Rd	US 17 EB	US 17 WB
1	0	0	0	0
2	0	2	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0

ATTACHMENT E – SYNCHRO WORKSHEETS

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	139	1663	64	1	74	979	145	106	111	84	101	100
Future Volume (veh/h)	139	1663	64	1	74	979	145	106	111	84	101	100
Initial Q (Qb), veh	0	0	0		0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No				No			No			No
Adj Sat Flow, veh/h/ln	1909	1909	1909		1856	1870	1870	1856	1870	1870	1856	1856
Adj Flow Rate, veh/h	148	1769	68		83	1100	163	126	132	100	106	105
Peak Hour Factor	0.94	0.94	0.94		0.89	0.89	0.89	0.84	0.84	0.84	0.95	0.95
Percent Heavy Veh, %	2	2	2		3	2	2	3	2	2	3	3
Cap, veh/h	321	2210	85		251	2150	959	273	224	170	165	421
Arrive On Green	0.10	1.00	1.00		0.03	0.61	0.61	0.23	0.23	0.22	0.23	0.23
Sat Flow, veh/h	1818	3562	136		1767	3554	1585	1279	988	748	1139	1856
Grp Volume(v), veh/h	148	896	941		83	1100	163	126	0	232	106	105
Grp Sat Flow(s),veh/h/ln	1818	1814	1885		1767	1777	1585	1279	0	1736	1139	1856
Q Serve(g_s), s	5.5	0.0	0.0		3.0	30.1	7.7	15.2	0.0	20.3	15.6	7.9
Cycle Q Clear(g_c), s	5.5	0.0	0.0		3.0	30.1	7.7	23.1	0.0	20.3	35.9	7.9
Prop In Lane	1.00		0.07		1.00		1.00	1.00		0.43	1.00	
Lane Grp Cap(c), veh/h	321	1125	1169		251	2150	959	273	0	394	165	421
V/C Ratio(X)	0.46	0.80	0.80		0.33	0.51	0.17	0.46	0.00	0.59	0.64	0.25
Avail Cap(c_a), veh/h	382	1125	1169		298	2150	959	288	0	414	178	442
HCM Platoon Ratio	2.00	2.00	2.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00		1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.3	0.0	0.0		11.7	19.2	14.8	63.3	0.0	58.8	74.7	53.9
Incr Delay (d2), s/veh	0.8	5.9	5.9		0.6	0.9	0.4	1.2	0.0	2.0	6.9	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	1.8	1.9		1.2	12.3	2.8	5.1	0.0	9.2	4.9	3.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.1	5.9	5.9		12.3	20.1	15.2	64.6	0.0	60.8	81.6	54.2
LnGrp LOS	B	A	A		B	C	B	E	A	E	F	D
Approach Vol, veh/h		1985				1346			358			211
Approach Delay, s/veh		6.6				19.0			62.1			68.0
Approach LOS		A				B			E			E

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	12.5	112.5		45.0	15.1	109.9		45.0				
Change Period (Y+Rc), s	7.5	7.5		7.0	7.5	7.5		7.0				
Max Green Setting (Gmax), s	9.5	98.5		40.0	13.3	94.7		40.0				
Max Q Clear Time (g_c+I1), s	5.0	2.0		25.1	7.5	32.1		37.9				
Green Ext Time (p_c), s	0.0	43.4		1.5	0.1	16.7		0.2				

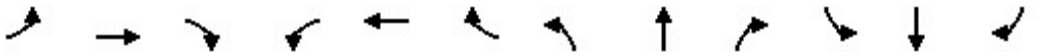
Intersection Summary			
HCM 6th Ctrl Delay		19.3	
HCM 6th LOS		B	

Notes

User approved ignoring U-Turning movement.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	91
Future Volume (veh/h)	91
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1870
Adj Flow Rate, veh/h	0
Peak Hour Factor	0.95
Percent Heavy Veh, %	2
Cap, veh/h	
Arrive On Green	0.00
Sat Flow, veh/h	0
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	0
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	0.00
Lane Grp Cap(c), veh/h	
V/C Ratio(X)	
Avail Cap(c_a), veh/h	
HCM Platoon Ratio	1.00
Upstream Filter(I)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	
Approach Vol, veh/h	A
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	87	1174	80	81	1646	154	79	79	62	86	110	156
Future Volume (veh/h)	87	1174	80	81	1646	154	79	79	62	86	110	156
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1894	1909	1909	1870	1870	1870	1870	1856	1870	1870	1870	1870
Adj Flow Rate, veh/h	93	1249	85	84	1715	160	93	93	73	100	128	0
Peak Hour Factor	0.94	0.94	0.94	0.96	0.96	0.96	0.85	0.85	0.85	0.86	0.86	0.86
Percent Heavy Veh, %	3	2	2	2	2	2	2	3	2	2	2	2
Cap, veh/h	204	2287	155	387	2352	1049	240	117	92	203	234	
Arrive On Green	0.09	1.00	1.00	0.04	0.66	0.66	0.07	0.12	0.11	0.07	0.13	0.00
Sat Flow, veh/h	1804	3447	234	1781	3554	1585	1781	963	756	1781	1870	0
Grp Volume(v), veh/h	93	656	678	84	1715	160	93	0	166	100	128	0
Grp Sat Flow(s),veh/h/ln	1804	1814	1867	1781	1777	1585	1781	0	1719	1781	1870	0
Q Serve(g_s), s	2.8	0.0	0.0	2.5	53.6	6.5	7.6	0.0	16.0	8.2	10.9	0.0
Cycle Q Clear(g_c), s	2.8	0.0	0.0	2.5	53.6	6.5	7.6	0.0	16.0	8.2	10.9	0.0
Prop In Lane	1.00		0.13	1.00		1.00	1.00		0.44	1.00		0.00
Lane Grp Cap(c), veh/h	204	1203	1239	387	2352	1049	240	0	209	203	234	
V/C Ratio(X)	0.45	0.55	0.55	0.22	0.73	0.15	0.39	0.00	0.79	0.49	0.55	
Avail Cap(c_a), veh/h	234	1203	1239	408	2352	1049	250	0	354	207	385	
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	20.1	0.0	0.0	7.9	18.8	10.8	59.3	0.0	73.0	59.4	69.8	0.0
Incr Delay (d2), s/veh	1.2	1.8	1.7	0.2	2.0	0.3	1.0	0.0	6.7	1.9	2.0	0.0
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	1.6	0.6	0.6	0.9	21.2	2.4	3.5	0.0	7.5	3.8	5.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.3	1.8	1.7	8.1	20.8	11.1	60.3	0.0	79.7	61.3	71.8	0.0
LnGrp LOS	C	A	A	A	C	B	E	A	E	E	E	
Approach Vol, veh/h		1427			1959			259			228	A
Approach Delay, s/veh		3.0			19.5			72.7			67.2	
Approach LOS		A			B			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.9	117.8	14.6	25.7	12.2	117.5	14.0	26.3
Change Period (Y+Rc), s	7.5	7.5	4.5	7.0	7.5	7.5	4.5	7.0
Max Green Setting (Gmax), s	6.5	93.5	10.5	33.0	7.5	92.5	10.5	33.0
Max Q Clear Time (g_c+I1), s	4.5	2.0	10.2	18.0	4.8	55.6	9.6	12.9
Green Ext Time (p_c), s	0.0	20.1	0.0	0.7	0.0	25.0	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	19.8
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	139	1663	64	1	74	979	145	106	111	84	101	100
Future Volume (veh/h)	139	1663	64	1	74	979	145	106	111	84	101	100
Initial Q (Qb), veh	0	0	0		0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No				No			No			No
Adj Sat Flow, veh/h/ln	1909	1909	1909		1856	1870	1870	1856	1870	1870	1856	1856
Adj Flow Rate, veh/h	148	1769	68		83	1100	163	126	132	100	106	105
Peak Hour Factor	0.94	0.94	0.94		0.89	0.89	0.89	0.84	0.84	0.84	0.95	0.95
Percent Heavy Veh, %	2	2	2		3	2	2	3	2	2	3	3
Cap, veh/h	319	2201	84		250	2141	955	276	226	171	168	425
Arrive On Green	0.10	1.00	1.00		0.03	0.60	0.60	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1818	3562	136		1767	3554	1585	1279	988	748	1139	1856
Grp Volume(v), veh/h	148	896	941		83	1100	163	126	0	232	106	105
Grp Sat Flow(s),veh/h/ln	1818	1814	1885		1767	1777	1585	1279	0	1736	1139	1856
Q Serve(g_s), s	5.5	0.0	0.0		3.1	30.3	7.7	15.2	0.0	20.2	15.5	7.9
Cycle Q Clear(g_c), s	5.5	0.0	0.0		3.1	30.3	7.7	23.0	0.0	20.2	35.8	7.9
Prop In Lane	1.00		0.07		1.00		1.00	1.00		0.43	1.00	
Lane Grp Cap(c), veh/h	319	1121	1165		250	2141	955	276	0	398	168	425
V/C Ratio(X)	0.46	0.80	0.81		0.33	0.51	0.17	0.46	0.00	0.58	0.63	0.25
Avail Cap(c_a), veh/h	380	1121	1165		297	2141	955	363	0	516	245	551
HCM Platoon Ratio	2.00	2.00	2.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00		1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.5	0.0	0.0		11.9	19.5	15.0	62.9	0.0	58.4	74.2	53.5
Incr Delay (d2), s/veh	0.8	6.0	6.1		0.6	0.9	0.4	1.2	0.0	1.4	3.9	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	1.9	2.0		1.2	12.4	2.9	5.0	0.0	9.1	4.7	3.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.3	6.0	6.1		12.5	20.3	15.4	64.1	0.0	59.8	78.1	53.8
LnGrp LOS	B	A	A		B	C	B	E	A	E	E	D
Approach Vol, veh/h		1985				1346			358			211
Approach Delay, s/veh		6.7				19.3			61.3			66.0
Approach LOS		A				B			E			E

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	12.5	112.0		45.5	15.1	109.4		45.5				
Change Period (Y+Rc), s	7.5	7.5		7.0	7.5	7.5		7.0				
Max Green Setting (Gmax), s	9.5	88.5		50.0	13.3	84.7		50.0				
Max Q Clear Time (g_c+I1), s	5.1	2.0		25.0	7.5	32.3		37.8				
Green Ext Time (p_c), s	0.0	41.6		1.8	0.1	16.1		0.7				

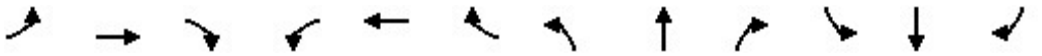
Intersection Summary			
HCM 6th Ctrl Delay		19.3	
HCM 6th LOS		B	

Notes

User approved ignoring U-Turning movement.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	91
Future Volume (veh/h)	91
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1870
Adj Flow Rate, veh/h	0
Peak Hour Factor	0.95
Percent Heavy Veh, %	2
Cap, veh/h	
Arrive On Green	0.00
Sat Flow, veh/h	0
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	0
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	0.00
Lane Grp Cap(c), veh/h	
V/C Ratio(X)	
Avail Cap(c_a), veh/h	
HCM Platoon Ratio	1.00
Upstream Filter(I)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	
Approach Vol, veh/h	A
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	87	1174	80	81	1646	154	79	79	62	86	110	156
Future Volume (veh/h)	87	1174	80	81	1646	154	79	79	62	86	110	156
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1894	1909	1909	1870	1870	1870	1870	1856	1870	1870	1870	1870
Adj Flow Rate, veh/h	93	1249	85	84	1715	160	93	93	73	100	128	0
Peak Hour Factor	0.94	0.94	0.94	0.96	0.96	0.96	0.85	0.85	0.85	0.86	0.86	0.86
Percent Heavy Veh, %	3	2	2	2	2	2	2	3	2	2	2	2
Cap, veh/h	209	2331	158	391	2397	1069	214	188	148	175	365	
Arrive On Green	0.08	1.00	1.00	0.04	0.67	0.67	0.20	0.20	0.18	0.20	0.20	0.00
Sat Flow, veh/h	1804	3447	234	1781	3554	1585	1262	963	756	1220	1870	0
Grp Volume(v), veh/h	93	656	678	84	1715	160	93	0	166	100	128	0
Grp Sat Flow(s),veh/h/ln	1804	1814	1867	1781	1777	1585	1262	0	1719	1220	1870	0
Q Serve(g_s), s	2.6	0.0	0.0	2.4	51.6	6.2	11.7	0.0	14.7	13.5	10.0	0.0
Cycle Q Clear(g_c), s	2.6	0.0	0.0	2.4	51.6	6.2	21.7	0.0	14.7	28.2	10.0	0.0
Prop In Lane	1.00		0.13	1.00		1.00	1.00		0.44	1.00		0.00
Lane Grp Cap(c), veh/h	209	1227	1263	391	2397	1069	214	0	336	175	365	
V/C Ratio(X)	0.44	0.54	0.54	0.21	0.72	0.15	0.43	0.00	0.49	0.57	0.35	
Avail Cap(c_a), veh/h	240	1227	1263	409	2397	1069	379	0	560	335	610	
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	18.6	0.0	0.0	7.3	17.4	10.0	68.5	0.0	61.3	73.5	59.1	0.0
Incr Delay (d2), s/veh	1.1	1.7	1.6	0.2	1.9	0.3	1.4	0.0	1.1	2.9	0.6	0.0
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	1.6	0.6	0.6	0.9	20.2	2.2	3.9	0.0	6.6	4.4	4.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.7	1.7	1.6	7.5	19.3	10.3	69.9	0.0	62.5	76.4	59.7	0.0
LnGrp LOS	B	A	A	A	B	B	E	A	E	E	E	
Approach Vol, veh/h		1427			1959			259			228	A
Approach Delay, s/veh		2.8			18.0			65.1			67.0	
Approach LOS		A			B			E			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.8	120.0		38.2	12.1	119.7		38.2				
Change Period (Y+Rc), s	7.5	7.5		7.0	7.5	7.5		7.0				
Max Green Setting (Gmax), s	6.1	88.5		53.4	7.5	87.1		53.4				
Max Q Clear Time (g_c+I1), s	4.4	2.0		23.7	4.6	53.6		30.2				
Green Ext Time (p_c), s	0.0	20.0		1.3	0.0	23.4		1.0				

Intersection Summary			
HCM 6th Ctrl Delay		18.5	
HCM 6th LOS		B	

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.