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SALISBURY/WICOMICO Metropolitan Planning Organization

EXISTING CONDITIONS AND SIGNAL NEEDS STUDY MEMORANDUM

March 11, 2021

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Project: Eastern Shore Drive and E Carroll Street Signal Warrants – Schedule A

Introduction

The purpose of the Schedule A portion of this project is to determine whether there is a need for upgrades at the intersection of Eastern Shore Drive and E Carroll Street in Salisbury, MD to improve safety and operations based on existing conditions and planned changes to the intersection and surrounding area. The purpose of the Schedule B portion of this project is to evaluate alternatives for the intersection of Eastern Shore Drive and E Carroll Street at the conclusion of the Schedule A. This study was prepared in cooperation with the United States Department of Transportation, Federal Highway Administration, and Federal Transit Administration.

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Study Area

The study area for this project includes the four study intersections listed below and shown in Figure 1.

1. US-13B (Salisbury Boulevard) and E Carroll Street
2. Eastern Shore Drive and E Carroll Street
3. Snow Hill Road and E Carroll Street
4. Snow Hill Road and Race Street

Figure 1: Study Area

The study area is located in the City of Salisbury, MD, south of Salisbury Parkway (US 50B). West of Salisbury Boulevard (US 13B) is the campus of the Peninsula Regional Medical Center, a major employer in the area. A project expected to include landscaping and bicycle facilities on Carroll Street west of Salisbury Boulevard is currently in design and scheduled for construction in FY 2022. Eastern Shore Drive parallels Salisbury Boulevard until it merges into S Division Street at College Avenue approximately one mile south of E Carroll Street, near Salisbury University. Both Salisbury Boulevard and Eastern Shore Drive have two travel lanes in each direction with left-turn lanes. Salisbury Boulevard is classified as an Urban Other Principal Arterial and a commercial corridor that provides continuous north-south access through Salisbury. Although there is some commercial development along Eastern Shore Drive, it is also is adjacent to single family neighborhoods to the east. Sidewalks have been infilled along the length of the Eastern Shore Drive corridor.

Within the study area, E Carroll Street primarily includes one eastbound travel lane and two westbound travel lanes. There is a westbound right-turn lane with a large, sweeping radius that is yield controlled turning onto Eastern Shore Drive. The right-most westbound lane turns into a right-turn lane at Salisbury Boulevard. Eastern Shore Drive has two northbound left-turn lanes onto E Carroll Street, both stop controlled, as well as a northbound right-turn lane. The northern leg of the intersection, which is slightly offset from the southern leg, is designated as Pond Street but traffic volumes on this approach are negligible. On the eastern side of the study area, E Carroll Street splits to intersection Snow Hill Road at two locations. The northern intersection is signalized intersection and the southern intersection leads onto Race Street and is stop controlled for E Carroll Street and Race Street. While E Carroll Street includes some sidewalks, there are gaps in the sidewalk on both the north and south sides of E Carroll Street and there are no crosswalks at the intersections.

The focus of this project is on the potential upgrades to intersection 2 but upgrades at that intersection may impact this entire segment of E Carroll Street and therefore intersection 1, 3, and 4 are included in the analysis.

Literature Review

Toole Design reviewed previous corridor studies and approved development plans relevant to the study area. The purpose of this review was to identify planned changes to roadway geometry or intersection geometry and potential sources of additional vehicle trips. A summary of the reviewed studies is provided below.

Eastern Shore Drive Corridor Study

Prepared by Davis, Bowen & Friedel, Inc., 2016

The Eastern Shore Drive Corridor Study analyzed five intersections along Eastern Shore Drive from E Carroll Street to E College Avenue, along with six other adjacent intersections. The study conducted capacity analysis at these intersections using weekday peak traffic volumes from 2014, along with two future scenarios in 2024 and 2034. The study recommended a 5 lane to 3 lane road diet along Eastern Shore Drive between South Boulevard and Elmwood Street and proposed utilizing the additional width to develop bike lane connections. The study also concluded that the intersection of Eastern Shore Drive and E Carroll Street may benefit from a traffic signal.

Eastern Shore Drive Vision Plan

Prepared by Hord Coplan Macht, 2019

The Eastern Shore Drive Vision Plan presented a concept for the reconstruction of Eastern Shore Drive with the goal of improving safety and comfort for bicyclists and pedestrians. The proposed concept also incorporated solutions to improve landscaping along the corridor and mitigate stormwater impacts. Two alternatives were proposed for the intersection of E Carroll Street and Eastern Shore Drive. Both alternatives propose a lane reduction along Eastern Shore Drive to one lane in each direction, and the construction of a raised, landscaped median featuring a two-way separated bike lane. The first alternative proposes replacing the intersection with a roundabout, and the second alternative proposed constructing a three-legged T intersection with an additional northbound left-turn lane.

Traffic Safety and Operation Study: US 13 Business from East Carroll Street to Broad Street/Church Street

Prepared by Century Engineering, Inc., 2019

The Traffic Safety and Operation Study analyzed corridor operations and crash history along several blocks of US 13 Business. The study conducted capacity analysis at four intersections during AM and PM weekday peak hours using traffic volumes collected in 2018. The study concluded that signals along US 13 Business should be updated to meet increased traffic volume demands and potentially implement a midday signal system timing. At the intersection with E Carroll Street, the study proposed upgrading pedestrian curb ramps to shorten pedestrian crossing distances.

Analysis of Carroll Street Cycle Track

Prepared by Alta, 2020

The memorandum prepared by Alta assesses the safety implications of two alternatives for a proposed separated bike lane on E Carroll Street between Mill Street and Eastern Shore Drive. The two alternatives were one-way separated bike lanes on either side or a two-way bike lane on the north side. The study concluded that the two-way bike lane results in fewer conflict points along the corridor and results in more intuitive connections to other planned two-way bike facilities in the area, including the two-way bike lane proposed on Eastern Shore Drive in the Eastern Shore Drive Vision Plan. The study also recommended that if a roundabout is implemented at the intersection of E Carroll Street and Eastern Shore Drive, pedestrian hybrid beacons or pedestrian signals be implemented at crosswalks on all roundabout legs.

Data Collection

Turning Movement Counts & Tube Counts

Toole Design coordinated with Quality Counts, LLC to collect turning movement counts using video data collection. Turning movement counts were collected at the intersections listed below.

1. Eastern Shore Drive and E Carroll Street
2. Snow Hill Road and E Carroll Street
3. Snow Hill Road and Race Street

Turning movement counts at Eastern Shore Drive and E Carroll Street were collected for a 12-hour period from 7:00AM – 7:00PM on Thursday October 29, 2020. Turning movement counts at both intersections with Snow Hill Road were collected from 7:00AM – 9:00AM and 4:00PM – 6:00PM on Thursday October 29, 2020. Raw count data is provided electronically with this memo and includes the volumes per 15-minute period for all vehicles, heavy vehicles, pedestrians, and bicycles by each movement at the intersections. The raw count data for all vehicles hourly by approach for the location of E Carroll Street east of Eastern Shore Drive is summarized in Table 1.

Table 1: E Carroll Street east of Eastern Shore Drive Raw Counts

Hour	E Carroll Street	
	Eastbound	Westbound
7:00AM – 8:00AM	163	205
8:00AM – 9:00AM	176	222
9:00AM – 10:00AM	194	189
10:00AM – 11:00AM	246	217
11:00AM – 12:00PM	204	198
12:00PM – 1:00PM	265	221
1:00PM – 2:00PM	236	231
2:00PM – 3:00PM	249	202
3:00PM – 4:00PM	264	239
4:00PM – 5:00PM	333	239
5:00PM – 6:00PM	264	212
6:00PM – 7:00PM	180	162

Count data for the intersection of US-13B and E Carroll Street was obtained from the US 13 Business (Salisbury Boulevard) East Carroll Street to Broad Street/East Church Street Traffic Safety and Operation Study. This count data was collected on Wednesday October 24, 2018. No adjustments were made to this count data for use in this study.

Adjustments to Data due to COVID-19

In order to account for typical daily, monthly, and seasonal variations, as well as traffic impacts due to COVID-19 for the newly collected turning movement counts, Toole Design used the MD SHA Traffic Trends Report and historic AADT counts to adjust the turning movement counts to represent typical, pre COVID-19 conditions.

Based on yearly count data collected throughout Maryland, MDOT calculates factors to convert 24-hour traffic counts to AADT based on the context, type of street, month, and day of the week the count was collected. Based on counts collected in an urban area on an “Other” street type and on a Thursday in October, the counts should

be adjusted by 0.87 to convert to AADT (i.e. an average daily volume normalized over the year). These factors are provided in Attachment A.

MDOT also collects AADT counts and estimates the existing AADTs based on current or historic counts at locations across the state. Until new counts are collected, the AADT is estimated based on the historic growth or decline in volumes from previously collected counts. AADT counts and estimates exist for E Carroll Street east of Eastern Shore Drive. The most recent count at this location was collected in July 2017 and is provided in Attachment A. A comparison of the collected 12-hour TMCs and MDOT adjusted 12-hour count is provided in Table 2.

Table 2: E Carroll Street east of Eastern Shore Drive Count Adjustment

Location	Raw 12-hour count	With 0.87 seasonal adjustment	MDOT adjusted 12-hour count	Percent difference	Total Adjustment
E Carroll Street east of Eastern Shore Drive	5,311	4,621	7,295	+58%	**1.37**

The historic AADT estimates on E Carroll Street have remained relatively consistent over the past years. After applying the seasonal adjustment, the MDOT AADT on E Carroll Street is 58% higher than the collected AADT.

Beyond the seasonal adjustment factor, this comparison is being performed to determine COVID-19 related impacts on the traffic patterns at the intersection. The AADT method does not account for changes in individual turning movements, particularly for eastbound right-turns that are not captured at the AADT location. While acknowledging these limitations to this method, it is recommended to apply the 0.87 seasonal adjustment followed by a factor of 1.58 to account for the lower traffic volumes that are likely due to COVID-19. This results in a total adjustment of 1.37. A summary of the adjusted counts is given in Table 3.

Table 3: E Carroll Street east of Eastern Shore Drive Adjusted Counts

Hour	E Carroll Street	
	Eastbound	Westbound
7:00AM – 8:00AM	224	282
8:00AM – 9:00AM	242	305
9:00AM – 10:00AM	267	260
10:00AM – 11:00AM	338	298
11:00AM – 12:00PM	280	272
12:00PM – 1:00PM	364	304
1:00PM – 2:00PM	324	318
2:00PM – 3:00PM	342	278
3:00PM – 4:00PM	363	329
4:00PM – 5:00PM	458	329
5:00PM – 6:00PM	363	291
6:00PM – 7:00PM	247	223

Signal Timings

Signal timing data for the intersection of US-13B and E Carroll Street was obtained from the US 13 Business (Salisbury Boulevard) East Carroll Street to Broad Street/East Church Street Traffic Safety and Operation Study. Signal timing data for the intersection of Snow Hill Road was collected by City of Salisbury staff on December 1, 2020 and December 2, 2020 and confirmed during the field visit on February 17, 2021.

Crash Data

Historical crash data was obtained for the intersections listed below:

1. US-13B and E Carroll Street
2. Eastern Shore Drive and E Carroll Street
3. Snow Hill Road and E Carroll Street
4. Snow Hill Road and Race Street

This data included all reported crashes between varying date ranges for each intersection. Crash data for all four intersections included reports collected between March 1, 2015 and May 31, 2020, so crashes reported outside of this date range were excluded from analysis. Data included crash date, time of day, light conditions, weather conditions, severity, crash type, and the directions of the colliding vehicles.

Field Observations

Field observations were conducted on February 17, 2021 between 8 AM and 4:30 PM. Volumes during the AM peak hour were lower than both midday and the PM period, which is consistent with the volume data available.

Very few pedestrians or bicycles were observed along the study corridor, with approximately eight total over the course of the day's observations. Of those pedestrians observed, three people chose to cross E. Carroll Drive midblock between Salisbury Boulevard and Eastern Shore Drive at the location of the gore for the eastbound right-turn lane, indicating a desire for a crossing to the east of Salisbury Boulevard. An existing sidewalk gap on the north side of E Carroll Street can be seen in Figure 2.

Drivers approaching the stop control on Eastern Shore Drive at E. Carroll tended to favor the right-hand lane, with multiple observations of queues of three or more vehicles in the right most left-turn lane and no vehicles in the left-most lane. This queue can be seen in Figure 3. Drivers in that right-most lane then generally favored the right-hand lane on E. Carroll to make a right on Salisbury Boulevard. Generally, drivers using the left-most lane drove more aggressively and were observed not making a full stop. This behavior led to two observed situations where a driver on E. Carroll Street had to stop or slow to avoid a conflict with a northbound left-turn driver who proceeded without stopping for a conflicting vehicle.

Drivers making the eastbound right from E Carroll to Eastern Shore Drive were observed making the maneuver with no observable decrease in speed, and with limited checking for possible southbound conflicts; however no near misses were observed. This area is a barrier for pedestrians as no accessible facilities are provided to access this corner, and driver speeds while making the right are high. The sight lines for this movement can be seen in Figure 4.

During the AM peak period observations, generally traffic volumes appeared to be well within capacity for the intersections, and queueing was minimal with the maximum observed queue of 3 cars northbound on Eastern Shore Drive at E. Carroll Street. Highest observed queue was on E. Carroll Street approaching Salisbury Boulevard, which extended approximately 150 feet. Vehicular volumes and queues increased during the mid-day and PM periods, with several observations of spillback queues from Salisbury Boulevard along E. Carroll blocking the intersection at Eastern Shore Drive. During these spillback events the queue northbound on Eastern Shore Drive reached eight to ten vehicles. The long queues and spillbacks were not observed to last longer than one to two light cycles on Salisbury Boulevard, as the Westbound queue on E. Carroll Street was able to clear in a single cycle, then creating space for the northbound queue on Eastern Shore Drive to also clear.

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Figure 2: Sidewalk gap on north side of E Carroll Street

Figure 3: Northbound queue on Eastern Shore Drive

Figure 4: Sight lines from eastbound right-turn onto Eastern Shore Drive

Methodology

Signal Warrant Analysis

A signal warrant analysis was conducted for the intersection of Eastern Shore Drive and E Carroll Street based on the requirements in the Manual on Uniform Traffic Control Devices (MUTCD). The warrants were reviewed using traffic volumes adjusted per the process described above. Warrants 1, 2, 4 (Eight-Hour Vehicular Volume, Four-Hour Vehicular Volume, and Pedestrian Volume) and Warrant 7 (Crash Experience) were applied at the intersection. Warrant 3, Peak Hour Volume, shall be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time, and therefore was not relevant at this intersection. Warrants 5, 6, 8 and 9 (School Crossing, Coordinated Signal System, Roadway Network, and Intersection near a Grade Crossing) were also not relevant for this intersection.

The vehicular volume-based warrants were evaluated with a right-turn reduction applied for the northbound right-turns and eastbound right-turns. The purpose of right-turn reduction factors is to remove all or a portion of the right-turning vehicles from the volume if the movement enters the street with minimal conflict. The process from NCHRP 457 was used and determined that the northbound right-turn volume should be removed from the calculations. The signal warrant analysis therefore is primarily checking for the conflict between the northbound left-turn movement and the major street. The eastbound right-turn from E Carroll Street does not conflict with the northbound left-turn movement and therefore was also reduced from the major street volume. The approach volumes used to analyze the signal warrants are shown in Table 4. These volumes account for the 1.37 seasonal and COVID-19 adjustment factor described above.

Table 4: Signal Warrant Analysis Traffic Volumes

Hour		Major Street		Minor Street	
Begin	End	Eastbound	Westbound	Northbound	Southbound
7:00 AM	8:00 AM	115	281	242	7
8:00 AM	9:00 AM	132	304	211	7
9:00 AM	10:00 AM	149	259	206	18
10:00 AM	11:00 AM	169	297	247	8
11:00 AM	12:00 PM	169	271	277	4
12:00 PM	1:00 PM	206	303	267	5
1:00 PM	2:00 PM	162	316	282	11
2:00 PM	3:00 PM	174	277	270	7
3:00 PM	4:00 PM	216	327	314	10
4:00 PM	5:00 PM	286	327	293	8
5:00 PM	6:00 PM	232	290	304	14
6:00 PM	7:00 PM	155	222	264	15

The signal warrant analysis was performed for two lanes on the minor street and both one and two lanes on the major street since E. Carroll Drive has one eastbound lane and two westbound lanes.

When analyzed with the volume reductions and both major street lane scenarios, of Warrants 1 and 2, neither warrant is met. Table 5 shows the existing volumes compared to the eight-hour vehicle volume threshold. Table 6 shows the existing volumes compared to the four-hour vehicle volume threshold.

Table 5: Eight-Hour Vehicle Volume Signal Warrant Hours Met

Condition A Warrant Threshold				Condition B Warrant Threshold				Hour	VPH on the major street	VPH on the minor street	Warrant Met (100% A or B, or 80% A or B)
VPH on the major street		VPH on the minor street		VPH on the major street		VPH on the minor street					
100%	80%	100%	80%	100%	80%	100%	80%				
600	480	200	160	900	720	100	80	7:00-8:00 AM	396	242	None
								8:00-9:00 AM	436	211	80% - A
								9:00-10:00 AM	408	206	80% - A
								10:00-11:00 AM	466	247	80% - A
								11:00-12:00 PM	440	277	80% - A
								12:00-1:00 PM	508	267	100% & 80% - A
								1:00-2:00 PM	478	282	80% - A
								2:00-3:00 PM	451	270	80% - A
								3:00-4:00 PM	544	314	100% & 80% - A
								4:00-5:00 PM	614	293	100% & 80% - A 80% - B
								5:00-6:00 PM	522	304	100% & 80% - A
								6:00-7:00 PM	377	264	None

Table 6: Four-Hour Vehicle Volume Signal Warrant Hours Met

Hour	VPH on the major street (Total of both approaches)	VPH on the minor street	VPH on the minor street Warrant Threshold		Warrant Met
			One lane on the major street	Two lanes on the major street	
7:00-8:00 AM	396	242	390	520	No
8:00-9:00 AM	436	211	368	491	No
9:00-10:00 AM	408	206	383	511	No
10:00-11:00 AM	466	247	353	470	No
11:00-12:00 PM	440	277	366	488	No
12:00-1:00 PM	508	267	331	442	No
1:00-2:00 PM	478	282	346	462	No
2:00-3:00 PM	451	270	360	481	No
3:00-4:00 PM	544	314	314	418	Yes – one lane
4:00-5:00 PM	614	293	281	375	Yes – one lane
5:00-6:00 PM	522	304	324	433	No
6:00-7:00 PM	377	264	401	534	No

The pedestrian volume criteria include pedestrian four-hour volume thresholds as well as a pedestrian peak hour volume threshold. The specific thresholds are based on the vehicles per hour on the major street but the pedestrian four-hour volume thresholds require a minimum of 107 pedestrians crossing the major street per hour and the pedestrian peak hour volume thresholds require a minimum of 133 pedestrians crossing the major street per hour. The pedestrian volumes at the intersection are significantly below these thresholds and therefore the pedestrian volume warrant is not met.

Based on the traffic control and alignment of the intersection, crashes involving the northbound left-turn or northbound through movement were determined to be correctable by a traffic control signal. When the crash data was evaluated against the criterial for Warrant 7, Crash Experience, the crash data indicates that five or more crashes occurred in a given 12-month period that would be correctable by a traffic control signal and the 80% volume threshold is met for 10 hours. Therefore, because crash experience warrant is met, a traffic signal at this location is warranted. A summary of the applicable warrants is given in Table 7.

Table 7: 2020 Signal Warrant Analysis

Warrant Met?	One lane on the major street with right-turn reductions	Two lanes on the major street with right-turn reductions
Warrant 1, Eight-Hour Vehicular Volume	No (Four hours met)	No (One hour met)
Warrant 2, Four-Hour Vehicular Volume	No (Two hours met)	No (Zero hours met)
Warrant 4, Pedestrian Volume	No (Zero hours met)	No (Zero hours met)
Warrant 7, Crash Experience	Met (Greater than five reported crashes susceptible to correction by a traffic control signal in 12-month period and 80% criteria for Condition A or Condition B met for 8 hours – 80% Condition A met for 10 hours)	

Synchro Analysis

Toole Design used Synchro traffic analysis software to conduct an analysis including an assessment of existing traffic operations during AM and PM peak hours at the study intersections along E Carroll Street. Toole Design developed Synchro models using the COVID-19 adjusted traffic volumes for the current year (2019) for AM and PM Peaks. The four intersections listed below were included in the Synchro models.

1. US-13B (Salisbury Boulevard) and E Carroll Street
2. Eastern Shore Drive and E Carroll Street
3. Snow Hill Road and E Carroll Street
4. Snow Hill Road and Race Street

Definition of Performance Measures

Intersection Delay – Delay is the average amount of time, in seconds, that it takes a vehicle passing through an intersection beyond what would be experienced in a free-flow condition.

Level of Services (LOS) – Vehicular Level of Service (LOS) is a qualitative measure of traffic congestion based on the average delay for a motorist. LOS A defines minimum traffic delay and is an indication that there is underutilized roadway capacity during the peak hour. LOS F represents high levels of traffic delay. The table below, excerpted from the Highway Capacity Manual, provides LOS criteria for signalized intersections.

Table 8: Level of Service Relationship with Control Delay

Level of Service	Signalized Intersection Control Delay (seconds)
A	0 to 10
B	> 10 to 20
C	> 20 to 35
D	> 35 to 55
E	> 55 to 80
F	> 80

One weakness of using vehicular level of service as a primary measure of traffic operations is that the use of a letter grade scale implies that “A” is the best condition. LOS A or B means that there is excess vehicle capacity, which can have negative consequences like speeding, endangering people walking or biking. There are no national standards for LOS, and cities or states have discretion to adopt LOS targets that reflect their unique constraints and their tolerance for traffic congestion.

Volume-to-Capacity (v/c) Ratio – A volume-to-capacity ratio quantifies the degree to which a phase’s capacity is utilized by a lane group at a signalized intersection.

50th and 95th Percentile Queues – The 95th-percentile queue is defined to be the queue length (in vehicles) that has only a 5-percent probability of being exceeded. It is a useful parameter for determining the appropriate length of turn pockets, but it is not typical of what an average driver would experience. The 50th-percentile queue is the queue length on a typical cycle.

Existing Conditions Results

The capacity analysis results are tabulated in Table 9 and discussed below, with the analysis worksheets for all conditions provided in Attachment B.

Table 9: Capacity Analysis Results

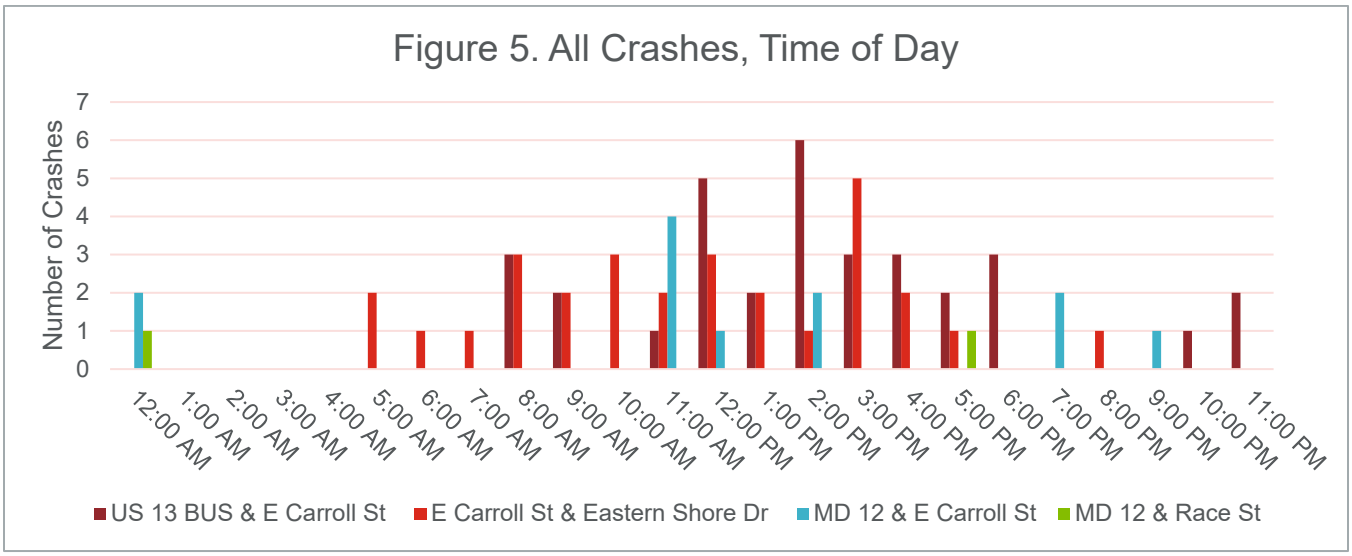
Intersection	Movement	AM Peak				PM Peak			
		V/C	Delay (sec)	LOS	Queues ($50^{th}/95^{th}$) (feet)	V/C	Delay (sec)	LOS	Queues ($50^{th}/95^{th}$) (feet)
Salisbury Boulevard & E Carroll Street	Eastbound Left	0.45	37.1	D	81 / 125	0.58	51.2	D	137 / 198
	Eastbound Thru/Right	0.28	35.8	D	90 / 119	0.38	48.6	D	152 / 191
	Westbound Left	0.18	48.9	D	22 / 49	0.21	64.1	E	25 / 56
	Westbound Thru	0.69	59.5	E	155 / 225	0.70	76.3	E	162 / 237
	Westbound Right	0.15	48.4	D	0 / 69	0.18	63.4	E	0 / 89
	Northbound Left	0.19	15.5	B	20 / 44	0.24	16.8	B	24 / 47
	Northbound Thru/Right	0.47	23.4	C	240 / 347	0.60	27.5	C	420 / 600
	Southbound Left	0.56	14.9	B	83 / 142	0.69	23.9	C	98 / 173
	Southbound Thru/Right	0.51	20.3	C	265 / 375	0.57	21.8	C	393 / 516
	Overall	**0.59**	**28.0**	**C**	**- / -**	**0.69**	**33.7**	**C**	**- / -**
Eastern Shore Drive / Pond Street & E Carroll Street	Eastbound Left/Thru	0.00	0.1	A	- / 0	0.01	0.4	A	- / 1
	Eastbound Right	0.15	0.0	A	- / 0	0.19	0.0	A	- / 0
	Westbound Left	0.10	7.8	A	- / 9	0.15	8.3	A	- / 13
	Westbound Thru/Right	0.09	0.0	A	- / 0	0.07	0.0	A	- / 0
	Westbound Right	0.04	0.0	A	- / 0	0.03	0.0	A	- / 0
	Northbound Left	0.49	23.8	C	- / 66	0.91	78.9	F	- / 197
	Northbound Left/Thru	0.25	17.8	C	- / 24	0.46	31.3	D	- / 56
	Northbound Right	0.16	9.9	A	- / 14	0.29	11.7	B	- / 30
	Southbound Left/Thru/Right	0.02	12.2	B	- / 1	0.01	8.8	A	- / 1
	Overall	**-**	**7.3**	**A**	**- / -**	**-**	**16.5**	**B**	**- / -**
Snow Hill Road & E Carroll Street	Eastbound Left/Right	0.58	22.3	C	47 / 90	0.77	32.2	C	74 / 135
	Northbound Left	0.37	5.7	A	27 / 57	0.27	6.0	A	19 / 41
	Northbound Thru/Right	0.30	5.1	A	45 / 86	0.30	5.2	A	53 / 97
	Southbound Thru	0.53	14.1	B	89 / 154	0.65	16.4	B	135 / #268
	Southbound Right	0.13	11.5	B	0 / 32	0.12	11.4	B	0 / 39
	Overall	**0.53**	**10.9**	**B**	**- / -**	**0.64**	**14.5**	**B**	**- / -**
Snow Hill Road & Race Street	Eastbound Right	0.19	11.5	B	- / 18	0.36	14.0	B	- / 41
	Westbound Right	0.02	12.1	B	- / 2	0.01	11.2	B	- / 1
	Northbound Thru	0.31	0.0	A	- / 0	0.27	0.0	A	- / 0
	Southbound Left/Thru	0.01	0.2	A	- / 0	0.00	0.1	A	- / 0
	Southwestbound Left	0.00	0.0	A	- / 0	0.03	23.4	C	- / 0
	Overall	**-**	**1.7**	**A**	**- / -**	**-**	**2.8**	**A**	**- / -**

The existing conditions results presented in the table above will be used to develop alternatives during Schedule B of this project.

According to the Synchro results, during both peaks the westbound approach of E Carroll Street at Salisbury Boulevard operated at LOS D or E but even the 95th percentile queues do not reach Eastern Shore Drive. The northbound left-turn from Eastern Shore Drive onto E Carroll Street, which is stop controlled, operates with LOS C during the AM peak and F during the PM peak. All movements at Snow Hill Road at E Carroll Street and Snow Hill Road at Race Street operate at LOS C or better during both peaks.

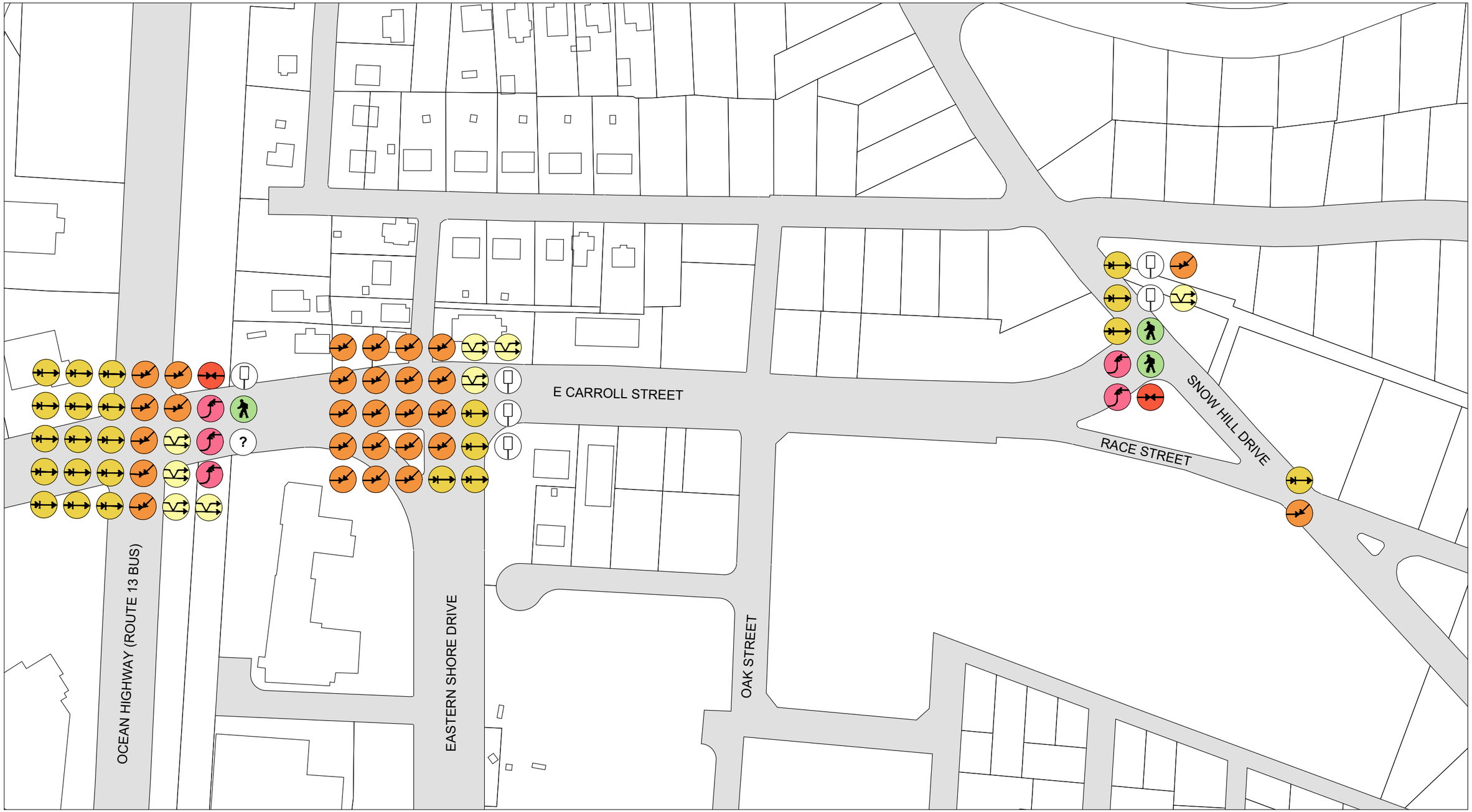
Crash Analysis

76 total crashes were observed in the study area between March 1, 2015 and May 31, 2020. Most (60/76) of these crashes occurred during daylight. Approximately two-thirds (50/76) of these crashes occurred in dry conditions. Approximately two-thirds (50/76) of these crashes occurred between 8 a.m. and 4 p.m., with the highest crash rates falling between noon and 4 p.m. Figure 5 illustrates the number of crashes which occur throughout the day.



A summary of crashes at each intersection is presented in Figure 6. The most crashes occurred at the intersection of US-13B and E Carroll Street (33), followed by E Carroll Street and Eastern Shore Drive (29). The two most common crash types were angle crashes (28/76) and rear-end crashes (23/76). 33 crashes resulted in at least one injured person. Figure 7 illustrates the number of injury crashes versus property damage crashes across the entire study area.

Because crash reports collected during 2015 and 2020 were not collected during the whole year, seasonal crash trends were assessed using only data from 2016-2019. During this period, the greatest number of crashes per month, averaged over 4 years, occurred during October (15 crashes/year) and November (16.5 crashes/year). Increased crash rates were also observed in December (12 crashes/year) and June (10.5 crashes/year). Figure 8 illustrates the average number of crashes per month at each intersection.

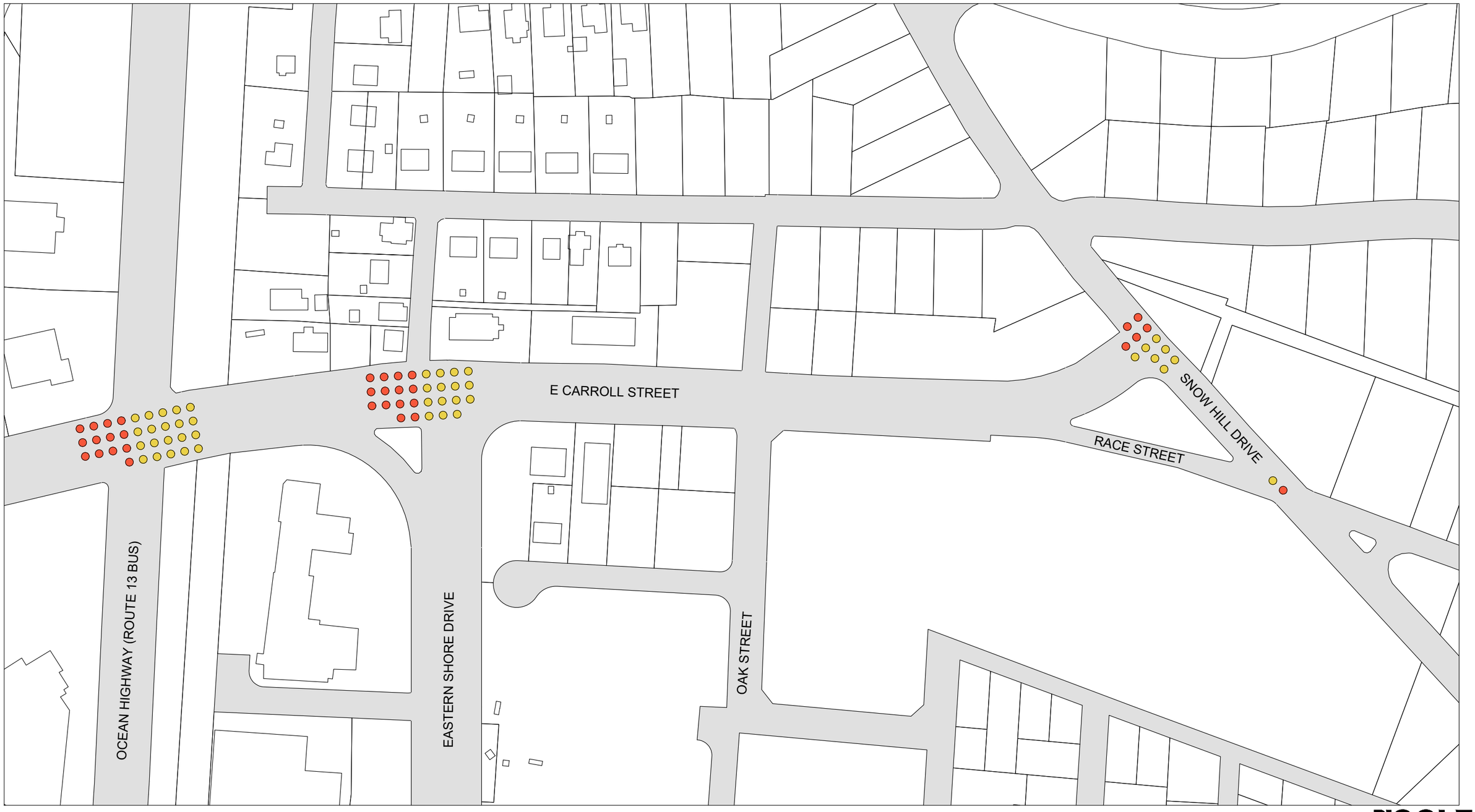


TOOLE DESIGN

LEGEND

- Opposite Direction
- Rear End
- Sideswipe
- Fixed Object
- Angle
- Left Turn
- Pedestrian
- Type Unknown

EASTERN SHORE DRIVE AT E. CARROLL STREET
CRASH DIAGRAMS
TYPE OF CRASH

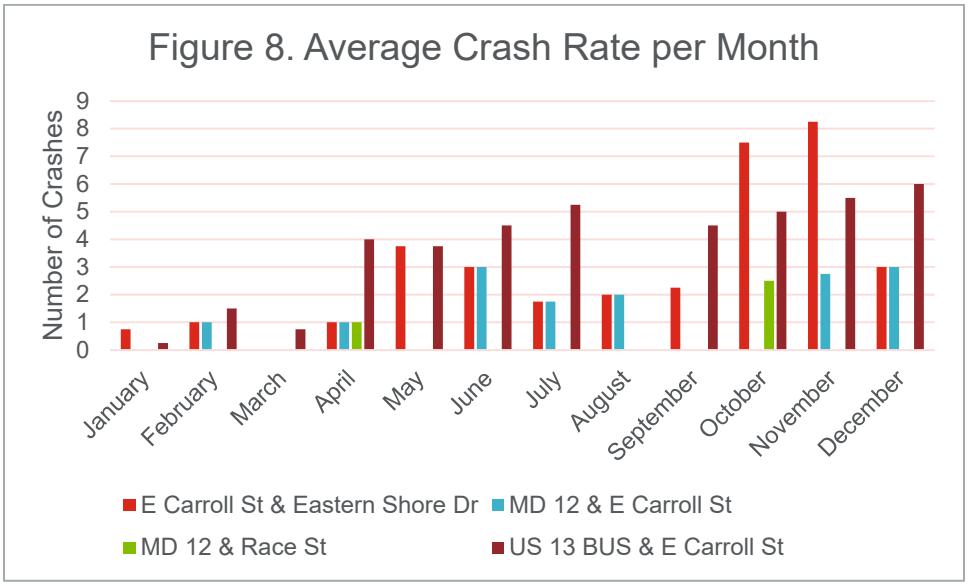


TOOLE DESIGN

LEGEND

- Injury
- Property Damage Only

EASTERN SHORE DRIVE AT E. CARROLL STREET
CRASH DIAGRAMS
CRASH SEVERITY



E Carroll Street and Eastern Shore Drive

29 crashes were recorded at E Carroll Street and Eastern Shore Drive. Most crashes occurred between 8 a.m. and 5 p.m. Angle crashes were the most common (19/29) crash type. Nine angle crashes involved a northbound left-turning vehicle. Six angle crashes were between a northbound through vehicle and an eastbound through vehicle. While almost half of the angle crashes recorded did not list a probable cause, nine angle crashes listed either failure to give full attention or failure to yield right-of-way as probable causes. The installation of a traffic signal or roundabout may decrease the rate of angle crashes.

14 crashes at this intersection resulted in at least one injured person, and almost all (12/14) of these crashes were identified as angle crashes. The two most common vehicle movements resulting in an injury were eastbound through (nine) and northbound left (six).

Recommendations

The results presented in this memo will be used to inform the alternatives developed in Schedule B. Based on the signal warrant analysis, a traffic signal will be further investigated in the alternatives developed in Schedule B. Additionally, attention will be given to the westbound movement on E Carroll Street at Salisbury Boulevard to ensure delays will not impact adjacent intersections. Additionally, the northbound movement on Eastern Shore Drive at E Carroll Street will be reviewed closely from a crash and capacity perspective to improve operations for the overall intersection. Recommendations will also seek to improve pedestrian crossings at E. Carroll Street at Eastern Shore Drive to provide the missing connections at that location, and integrate the future planned bicycle facilities.

Attachment A

Traffic Volume Adjustments due to COVID-19

		2019 Factors to convert 24 Hr traffic counts to AADT														
		URBAN								RURAL						
		Sun	Mon	Tue	Wed	Thu	Fri	Sat		Sun	Mon	Tue	Wed	Thu	Fri	Sat
INTERSTATE	Jan	1.34	1.03	1.04	1.02	1.01	0.97	1.21	Jan	1.14	1.35	1.39	1.47	1.34	1.06	1.33
	Feb	1.32	1.04	0.99	1	0.97	0.94	1.12	Feb	1.13	1.28	1.35	1.38	1.2	0.92	1.37
	Mar	1.2	1	0.98	0.97	0.95	0.93	1.05	Mar	0.92	1.19	1.27	1.23	1.12	0.88	1.15
	Apr	1.15	0.99	0.96	0.95	0.93	0.93	1.01	Apr	0.9	1.14	1.2	1.19	1.04	0.84	1.05
	May	1.18	0.97	0.95	0.95	0.93	0.9	1	May	0.84	1.02	1.13	1.11	0.97	0.76	0.98
	Jun	1.13	0.97	0.95	0.94	0.93	0.9	0.98	Jun	0.72	0.96	1.07	1.02	0.88	0.71	0.82
	Jul	1.14	0.97	0.95	0.94	0.93	0.89	1	Jul	0.63	0.92	1.04	1	0.86	0.74	0.76
	Aug	1.13	0.97	0.96	0.96	0.92	0.9	1	Aug	0.68	0.9	1.04	1.02	0.85	0.69	0.75
	Sep	1.16	0.99	0.97	0.96	0.94	0.91	1.02	Sep	0.81	1.07	1.19	1.15	0.99	0.77	1.02
	Oct	1.17	0.99	0.97	0.96	0.94	0.91	1	Oct	0.72	1.06	1.18	1.18	0.98	0.74	0.95
	Nov	1.24	1	0.99	0.98	0.96	0.93	1.05	Nov	0.97	1.13	1.31	1.23	1.09	0.83	1.08
	Dec	1.25	1.04	1	0.98	0.97	0.94	1.07	Dec	1.07	1.26	1.28	1.28	1.1	0.94	1.26
		Sun	Mon	Tue	Wed	Thu	Fri	Sat		Sun	Mon	Tue	Wed	Thu	Fri	Sat
ARTERIALS	Jan	1.45	1.02	1.01	0.99	1	0.94	1.25	Jan	1.61	1.1	1.12	1.09	1.08	1	1.38
	Feb	1.43	1.02	0.97	0.97	0.94	0.91	1.16	Feb	1.56	1.11	1.05	1.06	1.03	0.96	1.3
	Mar	1.29	0.99	0.97	0.95	0.93	0.91	1.12	Mar	1.32	1.06	1.04	1.03	1	0.94	1.19
	Apr	1.25	0.96	0.94	0.93	0.91	0.91	1.06	Apr	1.21	1.02	0.99	0.98	0.93	0.91	1.06
	May	1.28	0.95	0.94	0.92	0.92	0.87	1.07	May	1.14	0.99	0.97	0.95	0.91	0.83	1.01
	Jun	1.23	0.96	0.94	0.93	0.92	0.87	1.05	Jun	0.98	0.91	0.94	0.92	0.87	0.79	0.89
	Jul	1.25	0.96	0.94	0.94	0.92	0.88	1.07	Jul	0.98	0.9	0.93	0.91	0.87	0.78	0.86
	Aug	1.23	0.96	0.96	0.94	0.92	0.89	1.06	Aug	0.95	0.91	0.94	0.91	0.86	0.78	0.85
	Sep	1.27	0.96	0.95	0.93	0.92	0.87	1.06	Sep	1.11	0.97	0.97	0.95	0.91	0.84	0.99
	Oct	1.27	0.97	0.95	0.94	0.92	0.88	1.07	Oct	1.22	1.01	1	0.99	0.94	0.86	1.05
	Nov	1.35	0.97	0.96	0.95	0.94	0.89	1.11	Nov	1.4	1.03	1.03	1.02	0.99	0.93	1.18
	Dec	1.34	1.02	0.97	0.95	0.93	0.91	1.1	Dec	1.41	1.08	1.05	1.02	0.99	0.95	1.19
		Sun	Mon	Tue	Wed	Thu	Fri	Sat		Sun	Mon	Tue	Wed	Thu	Fri	Sat
OTHERS	Jan	1.56	0.98	0.98	0.96	0.93	0.91	1.37	Jan	1.58	1.14	1.07	1.06	1.07	0.97	1.32
	Feb	1.59	1	0.94	0.95	0.93	0.89	1.35	Feb	1.62	1.1	1.03	1.04	1.01	0.96	1.29
	Mar	1.49	0.98	0.94	0.93	0.93	0.89	1.27	Mar	1.42	1.05	1.01	0.98	0.97	0.92	1.18
	Apr	1.4	0.94	0.91	0.89	0.88	0.88	1.2	Apr	1.27	1	0.94	0.94	0.92	0.92	1.06
	May	1.52	0.92	0.89	0.88	0.88	0.84	1.22	May	1.22	0.98	0.93	0.9	0.9	0.84	0.98
	Jun	1.38	0.94	0.9	0.89	0.91	0.88	1.17	Jun	1.12	0.95	0.93	0.92	0.91	0.81	0.92
	Jul	1.41	0.95	**0.93**	**0.92**	0.9	0.9	1.24	Jul	1.14	0.97	0.92	0.92	0.91	0.85	0.96
	Aug	1.41	0.95	0.93	0.93	0.92	0.91	1.19	Aug	1.12	0.97	0.95	0.93	0.89	0.84	0.94
	Sep	1.33	0.92	0.91	0.9	0.89	0.86	1.11	Sep	1.2	0.97	0.93	0.92	0.89	0.84	0.98
	Oct	1.5	0.9	0.9	0.87	**0.87**	0.81	0.97	Oct	1.26	0.99	0.95	0.94	0.89	0.83	0.98
	Nov	1.46	0.93	0.92	0.9	0.9	0.85	1.2	Nov	1.4	0.99	0.96	0.96	0.94	0.86	1.1
	Dec	1.41	1	0.96	0.9	0.91	0.89	1.29	Dec	1.43	1.07	1	0.95	0.94	0.95	1.14

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

Maryland Department of Transportation State Highway Administration Data Services Engineering Division
Volume Detail Report

Location ID: S2011220605

Location: E CARROLL ST Between Eastern Shore Dr & Oak St

Date Range: 07/11/2017 **to** 07/12/2017

Week Of: 07/09/2017 Direction:EastBound

Beginning Hour	07/09 Sun	07/10 Mon	07/11 Tue	07/12 Wed	07/13 Thu	07/14 Fri	07/15 Sat	DAILY AVG	WEEKDAY AVG	WEEKEND AVG
0:00	0	0	36	44	0	0	0	40	40	0
1:00	0	0	28	31	0	0	0	30	30	0
2:00	0	0	22	27	0	0	0	25	25	0
3:00	0	0	19	19	0	0	0	19	19	0
4:00	0	0	24	24	0	0	0	24	24	0
5:00	0	0	67	63	0	0	0	65	65	0
6:00	0	0	126	120	0	0	0	123	123	0
7:00	0	0	247	238	0	0	0	243	243	0
8:00	0	0	305	302	0	0	0	304	304	0
9:00	0	0	309	294	0	0	0	302	302	0
10:00	0	0	336	347	0	0	0	342	342	0
11:00	0	0	328	365	0	0	0	347	347	0
12:00	0	0	431	389	0	0	0	410	410	0
13:00	0	0	352	384	0	0	0	368	368	0
14:00	0	0	370	385	0	0	0	378	378	0
15:00	0	0	397	417	0	0	0	407	407	0
16:00	0	0	441	446	0	0	0	444	444	0
17:00	0	0	464	417	0	0	0	441	441	0
18:00	0	0	280	270	0	0	0	275	275	0
19:00	0	0	200	199	0	0	0	200	200	0
20:00	0	0	172	138	0	0	0	155	155	0
21:00	0	0	133	129	0	0	0	131	131	0
22:00	0	0	82	92	0	0	0	87	87	0
23:00	0	0	62	69	0	0	0	66	66	0
TOTAL	**0**	**0**	**5231**	**5209**	**0**	**0**	**0**	**5220**	**5220**	0
AM Peak Hour	**0**	**0**	**12**	**12**	**0**	**0**	**0**			
6PM-12PM Volume	**0**	**0**	**431**	**389**	**0**	**0**	**0**			
PM Peak Hour	**0**	**0**	**17**	**16**	**0**	**0**	**0**			
PM Peak Volume	**0**	**0**	**464**	**446**	**0**	**0**	**0**			

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

Maryland Department of Transportation State Highway Administration Data Services Engineering Division
Volume Detail Report

Location ID: S2011220605

Location: E CARROLL ST Between Eastern Shore Dr & Oak St

Date Range: 07/11/2017 **to** 07/12/2017

Week Of: 07/09/2017 Direction:WestBound

Beginning Hour	07/09 Sun	07/10 Mon	07/11 Tue	07/12 Wed	07/13 Thu	07/14 Fri	07/15 Sat	DAILY AVG	WEEKDAY AVG	WEEKEND AVG
0:00	0	0	16	32	0	0	0	24	24	0
1:00	0	0	21	12	0	0	0	17	17	0
2:00	0	0	29	23	0	0	0	26	26	0
3:00	0	0	16	44	0	0	0	30	30	0
4:00	0	0	46	37	0	0	0	42	42	0
5:00	0	0	73	73	0	0	0	73	73	0
6:00	0	0	183	181	0	0	0	182	182	0
7:00	0	0	291	302	0	0	0	297	297	0
8:00	0	0	315	342	0	0	0	329	329	0
9:00	0	0	294	299	0	0	0	297	297	0
10:00	0	0	270	280	0	0	0	275	275	0
11:00	0	0	285	303	0	0	0	294	294	0
12:00	0	0	326	331	0	0	0	329	329	0
13:00	0	0	349	312	0	0	0	331	331	0
14:00	0	0	306	313	0	0	0	310	310	0
15:00	0	0	334	298	0	0	0	316	316	0
16:00	0	0	330	324	0	0	0	327	327	0
17:00	0	0	315	287	0	0	0	301	301	0
18:00	0	0	205	232	0	0	0	219	219	0
19:00	0	0	216	159	0	0	0	188	188	0
20:00	0	0	160	159	0	0	0	160	160	0
21:00	0	0	110	132	0	0	0	121	121	0
22:00	0	0	76	77	0	0	0	77	77	0
23:00	0	0	49	53	0	0	0	51	51	0
TOTAL	**0**	**0**	**4615**	**4605**	**0**	**0**	**0**	**4610**	**4610**	0
AM Peak Hour	**0**	**0**	**12**	**8**	**0**	**0**	**0**			
6PM-12PM Volume	**0**	**0**	**326**	**342**	**0**	**0**	**0**			
PM Peak Hour	**0**	**0**	**13**	**12**	**0**	**0**	**0**			
PM Peak Volume	**0**	**0**	**349**	**331**	**0**	**0**	**0**			

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

Maryland Department of Transportation State Highway Administration Data Services Engineering Division
Volume Detail Report

Location ID: S2011220605

Location: E CARROLL ST Between Eastern Shore Dr & Oak St

Date Range: 07/11/2017 **to** 07/12/2017

***** Summary Of Total Report *****

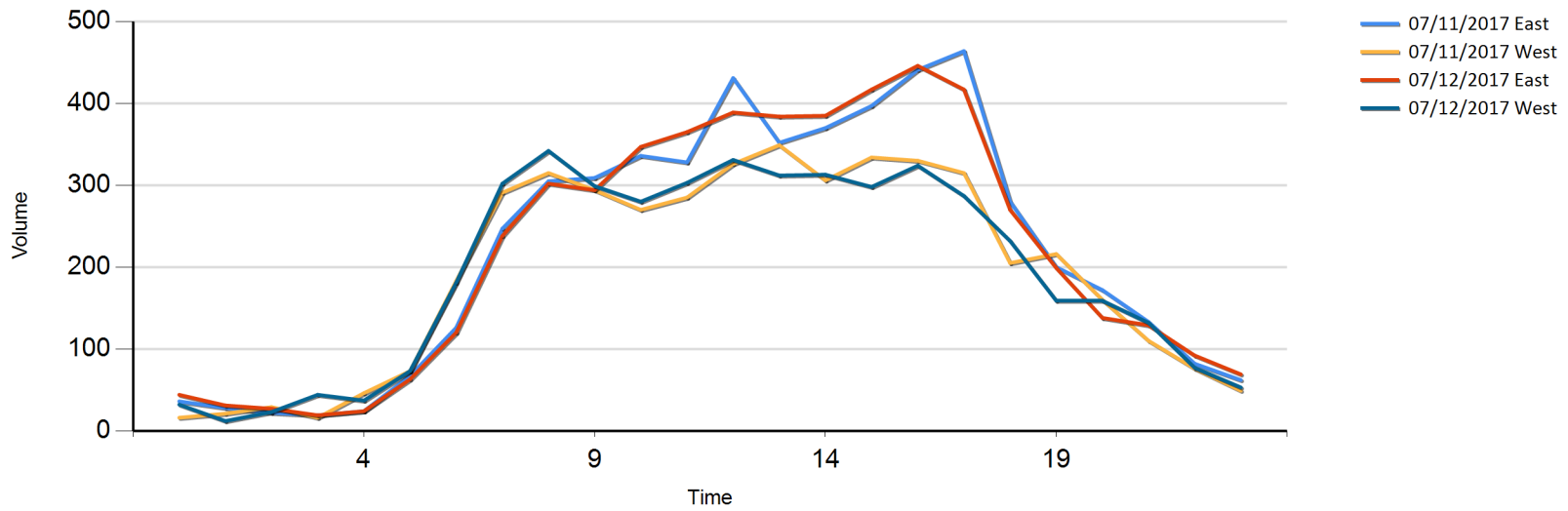
Beginning Hour	SUN	MON	TUE	WED	THU	FRI	SAT	DAILY AVG	WEEKDAY AVG	WEEKEND AVG
0:00	0	0	52	76	0	0	0	64	64	0
1:00	0	0	49	43	0	0	0	46	46	0
2:00	0	0	51	50	0	0	0	51	51	0
3:00	0	0	35	63	0	0	0	49	49	0
4:00	0	0	70	61	0	0	0	66	66	0
5:00	0	0	140	136	0	0	0	138	138	0
6:00	0	0	309	301	0	0	0	305	305	0
7:00	0	0	538	540	0	0	0	539	539	0
8:00	0	0	620	644	0	0	0	632	632	0
9:00	0	0	603	593	0	0	0	598	598	0
10:00	0	0	606	627	0	0	0	617	617	0
11:00	0	0	613	668	0	0	0	641	641	0
12:00	0	0	757	720	0	0	0	739	739	0
13:00	0	0	701	696	0	0	0	699	699	0
14:00	0	0	676	698	0	0	0	687	687	0
15:00	0	0	731	715	0	0	0	723	723	0
16:00	0	0	771	770	0	0	0	771	771	0
17:00	0	0	779	704	0	0	0	742	742	0
18:00	0	0	485	502	0	0	0	494	494	0
19:00	0	0	416	358	0	0	0	387	387	0
20:00	0	0	332	297	0	0	0	315	315	0
21:00	0	0	243	261	0	0	0	252	252	0
22:00	0	0	158	169	0	0	0	164	164	0
23:00	0	0	111	122	0	0	0	117	117	0
TOTAL	**0**	**0**	**9846**	**9814**	**0**	**0**	**0**	**9830**	**9830**	0
AM Peak Hour	**0**	**0**	**12**	**12**	**0**	**0**	**0**			
6PM-12PM Volume	**0**	**0**	**757**	**720**	**0**	**0**	**0**			
PM Peak Hour	**0**	**0**	**17**	**16**	**0**	**0**	**0**			
PM Peak Volume	**0**	**0**	**779**	**770**	**0**	**0**	**0**			

Maryland Department of Transportation State Highway Administration Data Services Engineering Division
Volume Detail Report

Location ID: S2011220605

Location: E CARROLL ST Between Eastern Shore Dr & Oak St

Date Range: 07/11/2017 **to** 07/12/2017



Attachment B

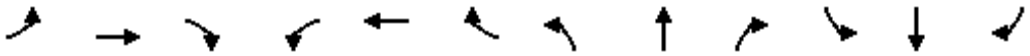
Synchro Analysis Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	224	44	27	179	211	57	731	19	216	741	131
Future Volume (vph)	121	224	44	27	179	211	57	731	19	216	741	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	200		0	300		0	225		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		594			378			688			605	
Travel Time (s)		13.5			8.6			13.4			11.8	
Confl. Peds. (#/hr)	1		1	1		1	6		5	5		6
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Shared Lane Traffic (%)												
Lane Group Flow (vph)	130	288	0	29	192	227	61	806	0	232	938	0
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Detector Phase	7	4		8	8	8	1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	8.0		8.0	8.0	8.0	5.0	20.0		5.0	20.0	
Minimum Split (s)	10.0	14.0		14.0	14.0	14.0	10.0	26.0		10.0	26.0	
Total Split (s)	20.0	52.0		32.0	32.0	32.0	22.0	56.0		22.0	56.0	
Total Split (%)	15.4%	40.0%		24.6%	24.6%	24.6%	16.9%	43.1%		16.9%	43.1%	
Yellow Time (s)	3.5	4.0		4.0	4.0	4.0	3.5	4.0		3.5	4.0	
All-Red Time (s)	1.5	2.0		2.0	2.0	2.0	1.5	1.5		1.5	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	6.0		6.0	6.0	6.0	5.0	5.5		5.0	5.5	
Lead/Lag	Lead			Lag	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	None	C-Max		None	C-Max	
v/c Ratio	0.44	0.28		0.18	0.69	0.53	0.19	0.47		0.56	0.50	
Control Delay	37.7	32.8		48.6	64.4	10.5	13.2	25.4		17.3	21.6	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	37.7	32.8		48.6	64.4	10.5	13.2	25.4		17.3	21.6	
Queue Length 50th (ft)	81	90		22	155	0	20	240		83	265	
Queue Length 95th (ft)	125	119		49	225	69	44	347		142	375	
Internal Link Dist (ft)		514			298			608			525	
Turn Bay Length (ft)	300			200			300			225		
Base Capacity (vph)	312	1230		213	372	492	457	1704		456	1862	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.42	0.23		0.14	0.52	0.46	0.13	0.47		0.51	0.50	

Intersection Summary	
Area Type:	Other
Cycle Length: 130	

Actuated Cycle Length: 130
Offset: 120 (92%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

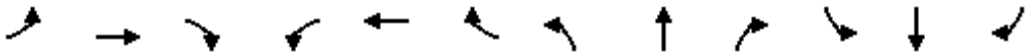
Splits and Phases: 1: Salisbury Blvd & E Carroll St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	224	44	27	179	211	57	731	19	216	741	131
Future Volume (vph)	121	224	44	27	179	211	57	731	19	216	741	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		6.0	6.0	6.0	5.0	5.5		5.0	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3442		1763	1863	1556	1770	3523		1770	3421	
Flt Permitted	0.32	1.00		0.58	1.00	1.00	0.25	1.00		0.24	1.00	
Satd. Flow (perm)	596	3442		1068	1863	1556	471	3523		455	3421	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	130	241	47	29	192	227	61	786	20	232	797	141
RTOR Reduction (vph)	0	13	0	0	0	193	0	1	0	0	8	0
Lane Group Flow (vph)	130	275	0	29	192	34	61	805	0	232	930	0
Confl. Peds. (#/hr)	1		1	1		1	6		5	5		6
Confl. Bikes (#/hr)			1									
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)	37.7	37.7		19.5	19.5	19.5	69.2	62.9		80.8	69.5	
Effective Green, g (s)	37.7	37.7		19.5	19.5	19.5	69.2	62.9		80.8	69.5	
Actuated g/C Ratio	0.29	0.29		0.15	0.15	0.15	0.53	0.48		0.62	0.53	
Clearance Time (s)	5.0	6.0		6.0	6.0	6.0	5.0	5.5		5.0	5.5	
Vehicle Extension (s)	3.0	3.5		3.5	3.5	3.5	3.0	6.0		3.0	6.0	
Lane Grp Cap (vph)	292	998		160	279	233	313	1704		413	1828	
v/s Ratio Prot	c0.05	0.08			c0.10		0.01	0.23		c0.06	0.27	
v/s Ratio Perm	0.08			0.03		0.02	0.09			c0.29		
v/c Ratio	0.45	0.28		0.18	0.69	0.15	0.19	0.47		0.56	0.51	
Uniform Delay, d1	36.0	35.6		48.3	52.4	48.0	15.2	22.4		13.2	19.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	0.2		0.6	7.2	0.3	0.3	0.9		1.7	1.0	
Delay (s)	37.1	35.8		48.9	59.5	48.4	15.5	23.4		14.9	20.3	
Level of Service	D	D		D	E	D	B	C		B	C	
Approach Delay (s)		36.2			53.2			22.8			19.3	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	28.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	129	227	138	204	0	253	0	130	0	4	5
Future Volume (vph)	1	129	227	138	204	0	253	0	130	0	4	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	150		0	300		0	0		0
Storage Lanes	0		1	1		0	1		1	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		30			30			30			25	
Link Distance (ft)		378			732			637			232	
Travel Time (s)		8.6			16.6			14.5			6.3	
Confl. Peds. (#/hr)							3					3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	100%	2%	2%	2%	1%	0%	1%	0%	3%	0%	0%	25%
Shared Lane Traffic (%)							50%					
Lane Group Flow (vph)	0	141	247	150	222	0	137	138	141	0	9	0
Sign Control		Free			Free			Stop			Stop	

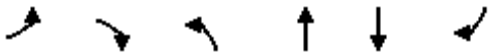
Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	129	227	138	204	0	253	0	130	0	4	5
Future Volume (Veh/h)	1	129	227	138	204	0	253	0	130	0	4	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	140	247	150	222	0	275	0	141	0	4	5
Pedestrians		3										
Lane Width (ft)		12.0										
Walking Speed (ft/s)		3.5										
Percent Blockage		0										
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		378			937							
pX, platoon unblocked												
vC, conflicting volume	222			140			563	664	140	664	664	114
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	222			140			563	664	140	664	664	114
tC, single (s)	6.1			4.1			7.5	6.5	7.0	7.5	6.5	7.4
tC, 2 stage (s)												
tF (s)	3.2			2.2			3.5	4.0	3.3	3.5	4.0	3.5
p0 queue free %	100			90			26	100	84	100	99	99
cM capacity (veh/h)	851			1441			371	343	879	270	343	846

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	NB 3	SB 1
Volume Total	141	247	150	148	74	183	92	141	9
Volume Left	1	0	150	0	0	183	92	0	0
Volume Right	0	247	0	0	0	0	0	141	5
cSH	851	1700	1441	1700	1700	371	371	879	512
Volume to Capacity	0.00	0.15	0.10	0.09	0.04	0.49	0.25	0.16	0.02
Queue Length 95th (ft)	0	0	9	0	0	66	24	14	1
Control Delay (s)	0.1	0.0	7.8	0.0	0.0	23.8	17.8	9.9	12.2
Lane LOS	A		A			C	C	A	B
Approach Delay (s)	0.0		3.1			17.8			12.2
Approach LOS						C			B

Intersection Summary				
Average Delay	7.3			
Intersection Capacity Utilization	38.2%	ICU Level of Service		A
Analysis Period (min)	15			

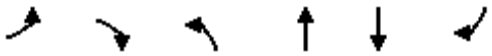


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	136	1	177	271	270	177
Future Volume (vph)	136	1	177	271	270	177
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	150			175
Storage Lanes	1	0	0			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			30	30	
Link Distance (ft)	205			204	657	
Travel Time (s)	4.7			4.6	14.9	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	3%	0%	2%	4%	4%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	165	0	213	327	325	213
Turn Type	Prot		pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases			2			6
Detector Phase	4		5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0		10.0	10.0	10.0	10.0
Minimum Split (s)	16.0		16.0	16.0	16.0	16.0
Total Split (s)	20.0		16.0	40.0	24.0	24.0
Total Split (%)	33.3%		26.7%	66.7%	40.0%	40.0%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0		6.0	6.0	6.0	6.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None		None	None	None	None
v/c Ratio	0.26		0.26	0.27	0.42	0.27
Control Delay	20.8		6.6	6.7	18.6	4.0
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	20.8		6.6	6.7	18.6	4.0
Queue Length 50th (ft)	47		27	45	89	0
Queue Length 95th (ft)	90		57	86	154	32
Internal Link Dist (ft)	125			124	577	
Turn Bay Length (ft)			150			175
Base Capacity (vph)	663		835	1266	842	844
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.25		0.26	0.26	0.39	0.25

Intersection Summary	
Area Type:	Other
Cycle Length: 60	
Actuated Cycle Length: 47.6	

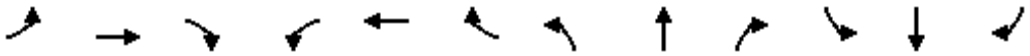
Natural Cycle: 50
Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Snow Hill Rd & E Carroll St



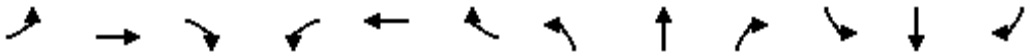
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	136	1	177	271	270	177
Future Volume (vph)	136	1	177	271	270	177
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	6.0	6.0	6.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	0.95		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1756		1770	1827	1827	1583
Flt Permitted	0.95		0.38	1.00	1.00	1.00
Satd. Flow (perm)	1756		715	1827	1827	1583
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	164	1	213	327	325	213
RTOR Reduction (vph)	0	0	0	0	0	141
Lane Group Flow (vph)	165	0	213	327	325	72
Heavy Vehicles (%)	3%	0%	2%	4%	4%	2%
Turn Type	Prot		pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases			2			6
Actuated Green, G (s)	8.0		29.6	29.6	16.7	16.7
Effective Green, g (s)	8.0		29.6	29.6	16.7	16.7
Actuated g/C Ratio	0.16		0.60	0.60	0.34	0.34
Clearance Time (s)	6.0		6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	283		573	1090	615	532
v/s Ratio Prot	c0.09		0.05	c0.18	c0.18	
v/s Ratio Perm			0.17			0.05
v/c Ratio	0.58		0.37	0.30	0.53	0.13
Uniform Delay, d1	19.3		5.2	4.9	13.3	11.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	3.0		0.4	0.2	0.8	0.1
Delay (s)	22.3		5.7	5.1	14.1	11.5
Level of Service	C		A	A	B	B
Approach Delay (s)	22.3			5.3	13.1	
Approach LOS	C			A	B	

Intersection Summary			
HCM 2000 Control Delay	10.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	49.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	47.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	3	107	0	0	10	0	443	0	5	278	0
Future Volume (vph)	1	3	107	0	0	10	0	443	0	5	278	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		329			181			184			204	
Travel Time (s)		7.5			4.1			4.2			4.6	
Confl. Peds. (#/hr)	3		15	15		3			3	3		
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	2%	2%	9%	2%	2%	14%	2%	2%	2%	4%	4%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	5	129	0	0	12	0	534	0	0	341	0
Sign Control		Stop			Stop			Free			Free	

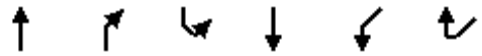
Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	3	107	0	0	10	0	443	0	5	278	0
Future Volume (Veh/h)	1	3	107	0	0	10	0	443	0	5	278	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	1	4	129	0	0	12	0	534	0	6	335	0
Pedestrians					3			15			3	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					3.5			3.5			3.5	
Percent Blockage					0			1			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											204	
pX, platoon unblocked	0.86	0.86	0.86	0.86	0.86		0.86					
vC, conflicting volume	896	884	350	1030	884	540	335			537		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	795	781	158	952	781	540	141			537		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	99	82	100	100	98	100			99		
cM capacity (veh/h)	253	277	734	163	277	516	1236			1018		

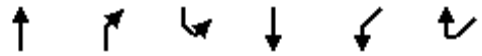
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	134	12	534	341
Volume Left	1	0	0	6
Volume Right	129	12	0	0
cSH	690	516	1700	1018
Volume to Capacity	0.19	0.02	0.31	0.01
Queue Length 95th (ft)	18	2	0	0
Control Delay (s)	11.5	12.1	0.0	0.2
Lane LOS	B	B		A
Approach Delay (s)	11.5	12.1	0.0	0.2
Approach LOS	B	B		

Intersection Summary				
Average Delay	1.7			
Intersection Capacity Utilization	Err%	ICU Level of Service	H	
Analysis Period (min)	15			



Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	443	1	0	385	0	0
Future Volume (vph)	443	1	0	385	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	30			30	30	
Link Distance (ft)	241			184	74	
Travel Time (s)	5.5			4.2	1.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	483	0	0	418	0	0
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	



Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	443	1	0	385	0	0
Future Volume (Veh/h)	443	1	0	385	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	482	1	0	418	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				388		
pX, platoon unblocked					0.88	
vC, conflicting volume			483		900	482
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			483		822	482
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1080		304	584

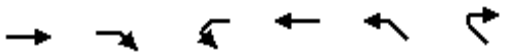
Direction, Lane #	NB 1	SB 1	SW 1
Volume Total	483	418	0
Volume Left	0	0	0
Volume Right	1	0	0
cSH	1700	1700	1700
Volume to Capacity	0.28	0.25	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	26.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	8	0	0	10	0	1
Future Volume (vph)	8	0	0	10	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	30			30	30	
Link Distance (ft)	181			276	74	
Travel Time (s)	4.1			6.3	1.7	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Shared Lane Traffic (%)						
Lane Group Flow (vph)	10	0	0	12	0	1
Sign Control	Free			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

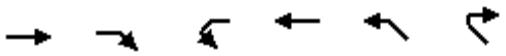
Intersection Sign configuration not allowed in HCM analysis.



Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	137	111	0	354	0	0
Future Volume (vph)	137	111	0	354	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		425	0		0	0
Storage Lanes		1	0		0	0
Taper Length (ft)			25		25	
Link Speed (mph)	30			30	30	
Link Distance (ft)	732			205	329	
Travel Time (s)	16.6			4.7	7.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	149	121	0	385	0	0
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

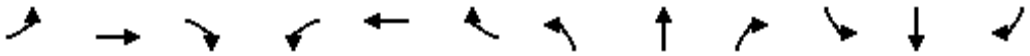
Control Type: Unsignalized



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	137	111	0	354	0	0
Future Volume (Veh/h)	137	111	0	354	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	149	121	0	385	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	1110			205		
pX, platoon unblocked						
vC, conflicting volume			270		534	149
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			270		534	149
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1293		507	898

Direction, Lane #	EB 1	EB 2	WB 1
Volume Total	149	121	385
Volume Left	0	0	0
Volume Right	0	121	0
cSH	1700	1700	1700
Volume to Capacity	0.09	0.07	0.23
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			
Approach Delay (s)	0.0		0.0
Approach LOS			

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	22.0%	ICU Level of Service	A
Analysis Period (min)	15		

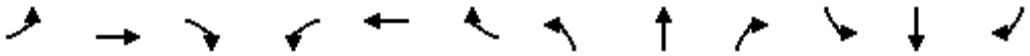


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	158	278	68	25	154	268	63	1027	35	229	1016	93
Future Volume (vph)	158	278	68	25	154	268	63	1027	35	229	1016	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	200		0	300		0	225		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		594			378			688			605	
Travel Time (s)		13.5			8.6			13.4			11.8	
Confl. Peds. (#/hr)	2		1	1		2	7		4	4		7
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	165	361	0	26	160	279	66	1106	0	239	1155	0
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Detector Phase	7	4		8	8	8	1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	8.0		8.0	8.0	8.0	5.0	20.0		5.0	20.0	
Minimum Split (s)	10.0	14.0		14.0	14.0	14.0	10.0	26.0		10.0	26.0	
Total Split (s)	24.0	56.0		32.0	32.0	32.0	32.0	72.0		32.0	72.0	
Total Split (%)	15.0%	35.0%		20.0%	20.0%	20.0%	20.0%	45.0%		20.0%	45.0%	
Yellow Time (s)	3.5	4.0		4.0	4.0	4.0	3.5	4.0		3.5	4.0	
All-Red Time (s)	1.5	2.0		2.0	2.0	2.0	1.5	1.5		1.5	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	6.0		6.0	6.0	6.0	5.0	5.5		5.0	5.5	
Lead/Lag	Lead			Lag	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	None	C-Max		None	C-Max	
v/c Ratio	0.57	0.39		0.21	0.70	0.64	0.24	0.60		0.68	0.57	
Control Delay	53.9	45.9		65.0	82.4	13.4	14.0	30.0		23.5	23.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	53.9	45.9		65.0	82.4	13.4	14.0	30.0		23.5	23.1	
Queue Length 50th (ft)	137	152		25	162	0	24	420		95	393	
Queue Length 95th (ft)	198	191		56	237	89	47	600		173	516	
Internal Link Dist (ft)		514			298			608			525	
Turn Bay Length (ft)	300			200			300			225		
Base Capacity (vph)	300	1082		161	302	484	473	1854		442	2030	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.55	0.33		0.16	0.53	0.58	0.14	0.60		0.54	0.57	

Intersection Summary	
Area Type:	Other
Cycle Length: 160	

Actuated Cycle Length: 160
Offset: 14 (9%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

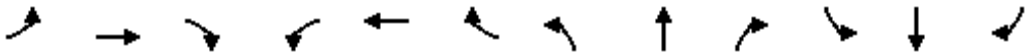
Splits and Phases: 1: Salisbury Blvd & E Carroll St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	158	278	68	25	154	268	63	1027	35	229	1016	93
Future Volume (vph)	158	278	68	25	154	268	63	1027	35	229	1016	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		6.0	6.0	6.0	5.0	5.5		5.0	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3422		1762	1863	1543	1770	3517		1770	3466	
Flt Permitted	0.32	1.00		0.54	1.00	1.00	0.19	1.00		0.15	1.00	
Satd. Flow (perm)	597	3422		995	1863	1543	354	3517		288	3466	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	165	290	71	26	160	279	66	1070	36	239	1058	97
RTOR Reduction (vph)	0	15	0	0	0	244	0	1	0	0	3	0
Lane Group Flow (vph)	165	346	0	26	160	35	66	1105	0	239	1152	0
Confl. Peds. (#/hr)	2		1	1		2	7		4	4		7
Confl. Bikes (#/hr)			1									
Turn Type	pm+pt	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)	42.2	42.2		19.8	19.8	19.8	92.0	84.3		106.3	93.6	
Effective Green, g (s)	42.2	42.2		19.8	19.8	19.8	92.0	84.3		106.3	93.6	
Actuated g/C Ratio	0.26	0.26		0.12	0.12	0.12	0.58	0.53		0.66	0.58	
Clearance Time (s)	5.0	6.0		6.0	6.0	6.0	5.0	5.5		5.0	5.5	
Vehicle Extension (s)	3.0	3.5		3.5	3.5	3.5	3.0	6.0		3.0	6.0	
Lane Grp Cap (vph)	285	902		123	230	190	271	1853		348	2027	
v/s Ratio Prot	c0.06	0.10			c0.09		0.01	0.31		c0.07	0.33	
v/s Ratio Perm	0.09			0.03		0.02	0.13			c0.38		
v/c Ratio	0.58	0.38		0.21	0.70	0.18	0.24	0.60		0.69	0.57	
Uniform Delay, d1	48.4	48.3		63.1	67.2	62.8	16.3	26.1		18.3	20.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.8	0.3		1.0	9.1	0.5	0.5	1.4		5.5	1.2	
Delay (s)	51.2	48.6		64.1	76.3	63.4	16.8	27.5		23.9	21.8	
Level of Service	D	D		E	E	E	B	C		C	C	
Approach Delay (s)		49.4			67.9			26.9			22.2	
Approach LOS		D			E			C			C	

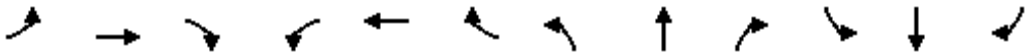
Intersection Summary			
HCM 2000 Control Delay	33.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	259	292	174	156	0	304	1	197	0	0	7
Future Volume (vph)	12	259	292	174	156	0	304	1	197	0	0	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	150		0	300		0	0		0
Storage Lanes	0		1	1		0	1		1	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		30			30			30			25	
Link Distance (ft)		378			732			637			232	
Travel Time (s)		8.6			16.6			14.5			6.3	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	1%	1%	2%	1%	0%	1%	0%	1%	0%	0%	0%
Shared Lane Traffic (%)							50%					
Lane Group Flow (vph)	0	301	324	193	173	0	169	170	219	0	8	0
Sign Control		Free			Free			Stop			Stop	

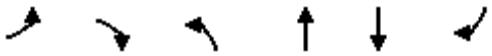
Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	259	292	174	156	0	304	1	197	0	0	7
Future Volume (Veh/h)	12	259	292	174	156	0	304	1	197	0	0	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	13	288	324	193	173	0	338	1	219	0	0	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		378			937							
pX, platoon unblocked				0.93			0.93	0.93	0.93	0.93	0.93	
vC, conflicting volume	173			288			794	873	288	874	873	86
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	173			199			743	827	199	828	827	86
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			85			0	100	71	100	100	99
cM capacity (veh/h)	1416			1277			248	242	756	155	242	961

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	NB 3	SB 1
Volume Total	301	324	193	115	58	225	114	219	8
Volume Left	13	0	193	0	0	225	113	0	0
Volume Right	0	324	0	0	0	0	0	219	8
cSH	1416	1700	1277	1700	1700	248	248	756	961
Volume to Capacity	0.01	0.19	0.15	0.07	0.03	0.91	0.46	0.29	0.01
Queue Length 95th (ft)	1	0	13	0	0	197	56	30	1
Control Delay (s)	0.4	0.0	8.3	0.0	0.0	78.9	31.3	11.7	8.8
Lane LOS	A		A			F	D	B	A
Approach Delay (s)	0.2		4.4			42.8			8.8
Approach LOS						E			A

Intersection Summary				
Average Delay	16.5			
Intersection Capacity Utilization	49.0%	ICU Level of Service		A
Analysis Period (min)	15			

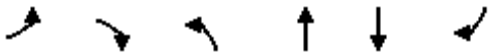


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	222	3	130	325	419	190
Future Volume (vph)	222	3	130	325	419	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	150			175
Storage Lanes	1	0	0			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			30	30	
Link Distance (ft)	205			204	657	
Travel Time (s)	4.7			4.6	14.9	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	1%	0%	1%	1%	1%	1%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	232	0	134	335	432	196
Turn Type	Prot		pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases			2			6
Detector Phase	4		5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0		10.0	10.0	10.0	10.0
Minimum Split (s)	16.0		16.0	16.0	16.0	16.0
Total Split (s)	20.0		16.0	40.0	24.0	24.0
Total Split (%)	33.3%		26.7%	66.7%	40.0%	40.0%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0		6.0	6.0	6.0	6.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None		None	None	None	None
v/c Ratio	0.35		0.17	0.27	0.52	0.24
Control Delay	21.7		6.5	6.9	21.4	4.0
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	21.7		6.5	6.9	21.4	4.0
Queue Length 50th (ft)	74		19	53	135	0
Queue Length 95th (ft)	135		41	97	#268	39
Internal Link Dist (ft)	125			124	577	
Turn Bay Length (ft)			150			175
Base Capacity (vph)	657		778	1254	841	823
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.35		0.17	0.27	0.51	0.24

Intersection Summary	
Area Type:	Other
Cycle Length: 60	
Actuated Cycle Length: 49.9	

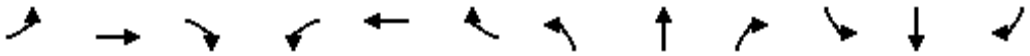
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Snow Hill Rd & E Carroll St



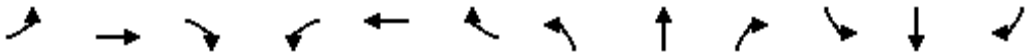
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	222	3	130	325	419	190
Future Volume (vph)	222	3	130	325	419	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	6.0	6.0	6.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	0.95		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1790		1787	1881	1881	1599
Flt Permitted	0.95		0.29	1.00	1.00	1.00
Satd. Flow (perm)	1790		543	1881	1881	1599
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	229	3	134	335	432	196
RTOR Reduction (vph)	1	0	0	0	0	127
Lane Group Flow (vph)	231	0	134	335	432	69
Heavy Vehicles (%)	1%	0%	1%	1%	1%	1%
Turn Type	Prot		pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases			2			6
Actuated Green, G (s)	8.7		31.1	31.1	18.3	18.3
Effective Green, g (s)	8.7		31.1	31.1	18.3	18.3
Actuated g/C Ratio	0.17		0.60	0.60	0.35	0.35
Clearance Time (s)	6.0		6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	300		489	1129	664	564
v/s Ratio Prot	c0.13		0.04	c0.18	c0.23	
v/s Ratio Perm			0.13			0.04
v/c Ratio	0.77		0.27	0.30	0.65	0.12
Uniform Delay, d1	20.6		5.7	5.0	14.1	11.3
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	11.6		0.3	0.1	2.3	0.1
Delay (s)	32.2		6.0	5.2	16.4	11.4
Level of Service	C		A	A	B	B
Approach Delay (s)	32.2			5.4	14.8	
Approach LOS	C			A	B	

Intersection Summary			
HCM 2000 Control Delay	14.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	51.8	Sum of lost time (s)	18.0
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	4	206	0	0	5	0	438	0	3	434	0
Future Volume (vph)	4	4	206	0	0	5	0	438	0	3	434	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		329			181			184			204	
Travel Time (s)		7.5			4.1			4.2			4.6	
Confl. Peds. (#/hr)	3		10	10		3			8	8		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	1%	2%	2%	0%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	8	217	0	0	5	0	461	0	0	460	0
Sign Control		Stop			Stop			Free			Free	

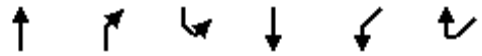
Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	4	206	0	0	5	0	438	0	3	434	0
Future Volume (Veh/h)	4	4	206	0	0	5	0	438	0	3	434	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	4	217	0	0	5	0	461	0	3	457	0
Pedestrians					8			10			3	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					3.5			3.5			3.5	
Percent Blockage					1			1			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											204	
pX, platoon unblocked	0.80	0.80	0.80	0.80	0.80		0.80					
vC, conflicting volume	932	932	467	1161	932	472	457			469		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	791	791	211	1077	791	472	198			469		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	98	67	100	100	99	100			100		
cM capacity (veh/h)	242	255	660	102	255	590	1101			1084		

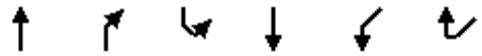
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	225	5	461	460
Volume Left	4	0	0	3
Volume Right	217	5	0	0
cSH	623	590	1700	1084
Volume to Capacity	0.36	0.01	0.27	0.00
Queue Length 95th (ft)	41	1	0	0
Control Delay (s)	14.0	11.2	0.0	0.1
Lane LOS	B	B		A
Approach Delay (s)	14.0	11.2	0.0	0.1
Approach LOS	B	B		

Intersection Summary				
Average Delay	2.8			
Intersection Capacity Utilization	Err%	ICU Level of Service	H	
Analysis Period (min)	15			



Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	438	3	0	640	7	0
Future Volume (vph)	438	3	0	640	7	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	30			30	30	
Link Distance (ft)	241			184	74	
Travel Time (s)	5.5			4.2	1.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	464	0	0	674	7	0
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	



Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	438	3	0	640	7	0
Future Volume (Veh/h)	438	3	0	640	7	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	461	3	0	674	7	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				388		
pX, platoon unblocked					0.80	
vC, conflicting volume			464		1136	462
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			464		1046	462
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	100
cM capacity (veh/h)			1097		203	599

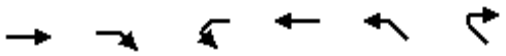
Direction, Lane #	NB 1	SB 1	SW 1
Volume Total	464	674	7
Volume Left	0	0	7
Volume Right	3	0	0
cSH	1700	1700	203
Volume to Capacity	0.27	0.40	0.03
Queue Length 95th (ft)	0	0	3
Control Delay (s)	0.0	0.0	23.4
Lane LOS			C
Approach Delay (s)	0.0	0.0	23.4
Approach LOS			C

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	43.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	7	0	7	5	0	3
Future Volume (vph)	7	0	7	5	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	30			30	30	
Link Distance (ft)	181			276	74	
Travel Time (s)	4.1			6.3	1.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	7	0	0	12	0	3
Sign Control	Free			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

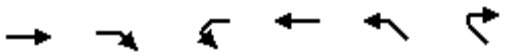
Intersection Sign configuration not allowed in HCM analysis.



Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	225	214	0	320	0	0
Future Volume (vph)	225	214	0	320	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		425	0		0	0
Storage Lanes		1	0		0	0
Taper Length (ft)			25		25	
Link Speed (mph)	30			30	30	
Link Distance (ft)	732			205	329	
Travel Time (s)	16.6			4.7	7.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	245	233	0	348	0	0
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	225	214	0	320	0	0
Future Volume (Veh/h)	225	214	0	320	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	245	233	0	348	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	1110			205		
pX, platoon unblocked						
vC, conflicting volume			478		593	245
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			478		593	245
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1084		468	794

Direction, Lane #	EB 1	EB 2	WB 1
Volume Total	245	233	348
Volume Left	0	0	0
Volume Right	0	233	0
cSH	1700	1700	1700
Volume to Capacity	0.14	0.14	0.20
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			
Approach Delay (s)	0.0		0.0
Approach LOS			

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	20.2%	ICU Level of Service	A
Analysis Period (min)	15		