
Road Safety Review

SC 170 (Okatie Highway) Beaufort County, SC



November 6, 2018

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1.0 Introduction

1.1 Objective

The objective of this road safety review is to identify existing potential safety hazards that exist throughout the corridor and to provide recommendations for improvements. The improvements recommended include short-term improvements, such as signing and pavement markings, and long-term improvements, such as median construction and interparcel access.

1.2 Background

The section of SC 170 selected for the road safety review was based on Beaufort County's familiarity with the corridor and concerns from citizens related to the number of crashes and "near-misses" observed in the area. The section reviewed begins at the interchange with US 278 and continues north to Palmer Grace Boulevard. The segment is approximately 0.6-mile in length. The figures below provide an overview of the corridor location. Beaufort County, the City of Hardeeville, and SCDOT collaborated on the review and recommendations provided in this report.

Figure 1 – Location Map

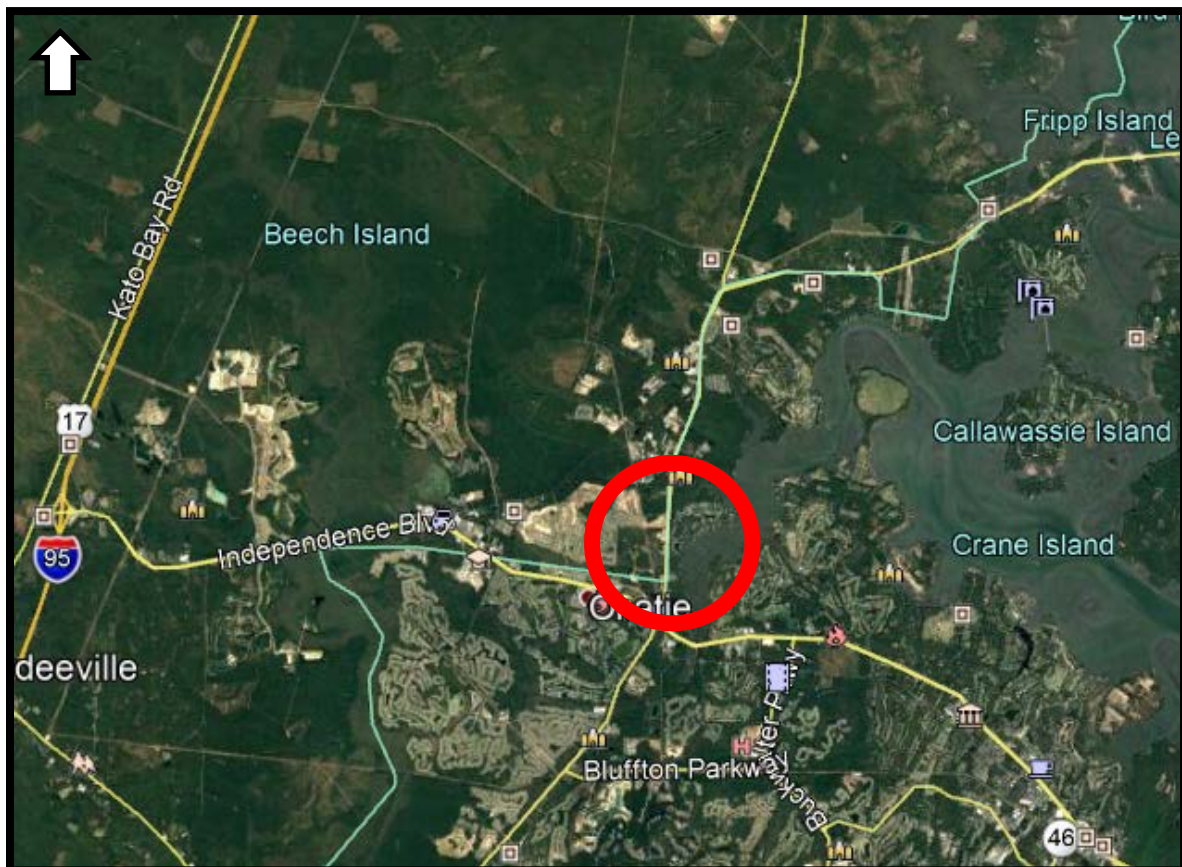
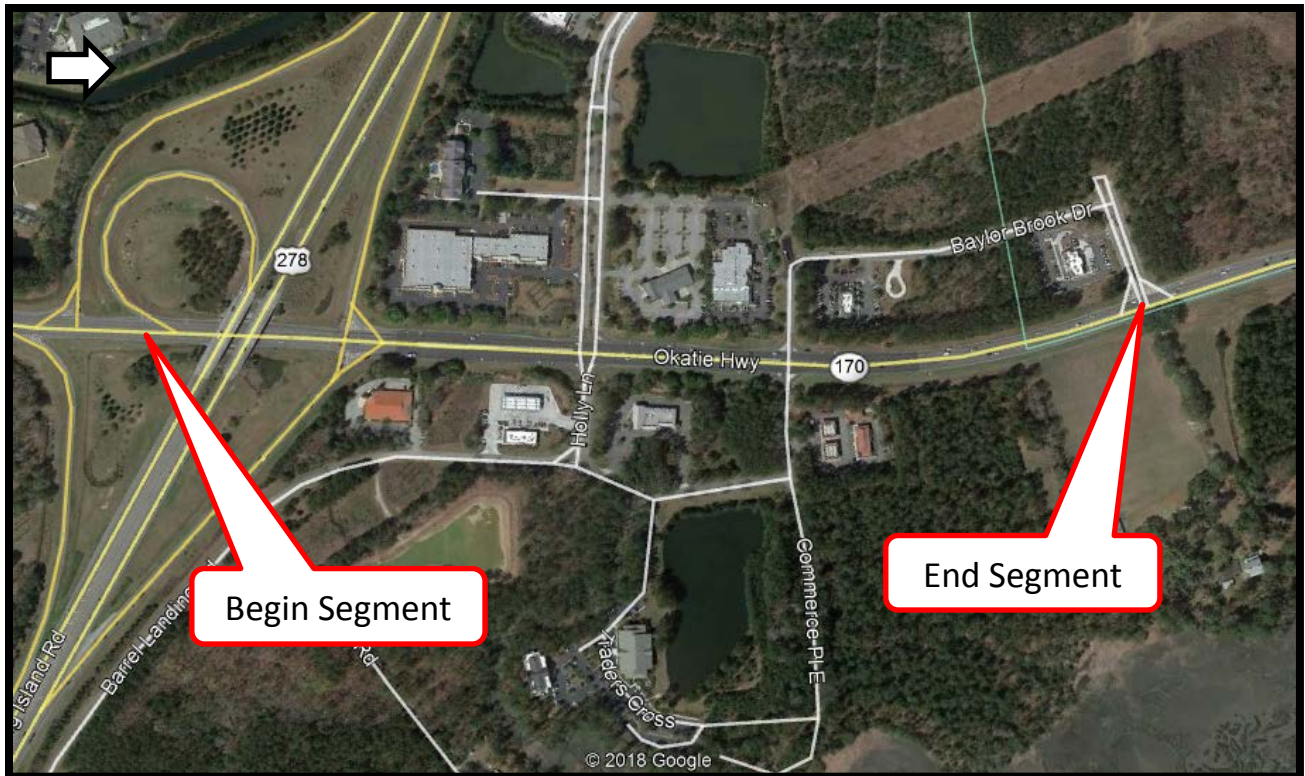


Figure 2 – Corridor Limits



The segment under review is commercial in nature with limited access to SC 170. Development is increasing in the area, and there is a great deal of development potential. The roadway cross section is a five-lane section with raised concrete medians between some intersections. The concrete medians do not restrict access to any driveways, as there are no driveways located between intersections on this segment. Due to the commercial nature of the area, traffic volumes are heavy throughout the day; however, commuter patterns exist on the corridor that increases congestion during peak times. Commuters primarily travel south on SC 170 to access US 278 East toward Bluffton in the morning, and then travel the reverse pattern during the evening peak.

The speed limit on this section of SC 170 is 45 mph. The speed limit to the north of the segment was recently reduced from 55 mph to 50 mph. South of US 278, SC 170 was widened from a two-lane section to a four-lane divided section, with that project being mostly completed in 2016. The speed limit on the widened section was recently reviewed and it was determined to be raised from 45 mph to 50 mph. Therefore, the road segment in question for this safety review is posted at 45 mph and bounded by 50-mph sections on each end.

2.0 Corridor Data Review

2.1 Traffic Volume Data

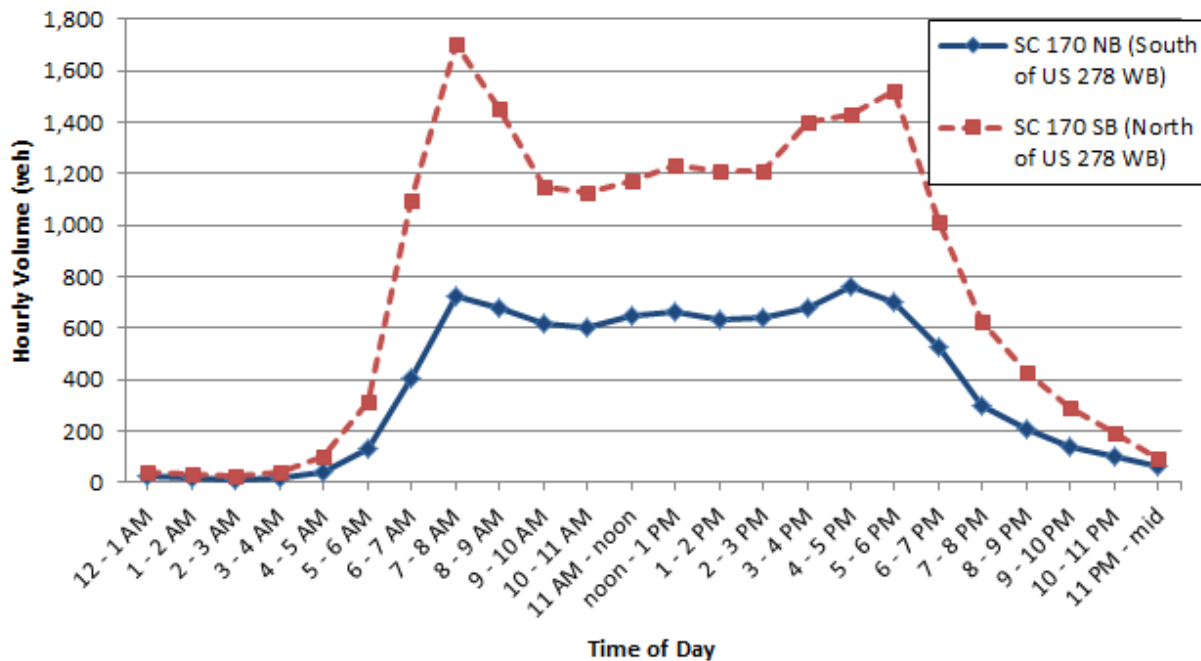
The nearest SCDOT count station on SC 170 is located between the intersections with SC 462 and Argent Boulevard, approximately three miles north of the review segment. The AADT data at this count station is provided in the below table. A review of the AADT data indicates constant growth occurred between 2012 and 2016, for a total of 24 percent growth over five years.

Table 1 – AADT Count Data (Station 167)

2012	2013	2014	2015	2016
24,300	25,800	27,700	29,200	30,100

Beaufort County maintains the traffic signal at US 278 West & SC 170, and has automatic traffic count recorders built in to the detection system at that intersection. Traffic volume data was collected on weekdays between Monday, February 12 and Friday, March 2, 2018 using these automatic counters. A summary of the hourly traffic volume averages along SC 170 at this location is shown in the figure below. Because the traffic counters are located on the approaches to the intersection, the difference in northbound and southbound volumes is significant. This is due to the interchange configuration. Southbound SC 170 traffic uses a loop ramp to access US 278 East, but when that traffic returns to SC 170 from US 278 West, it enters the intersection at the traffic signal. Therefore, this traffic is not accounted for in the detection located on the SC 170 approaches to the intersection.

Figure 3 – SC 170 Hourly Volume Data



Beaufort County collected turning movement count data on March 21, 2018 at the intersection of SC 170 & Holly Lane/Okatie Center Boulevard and on April 17, 2018 at the intersection of SC 170 & Commerce Place East/West. These traffic volumes are discussed later in this report as part of a signal warrant review.

2.2 Crash Data

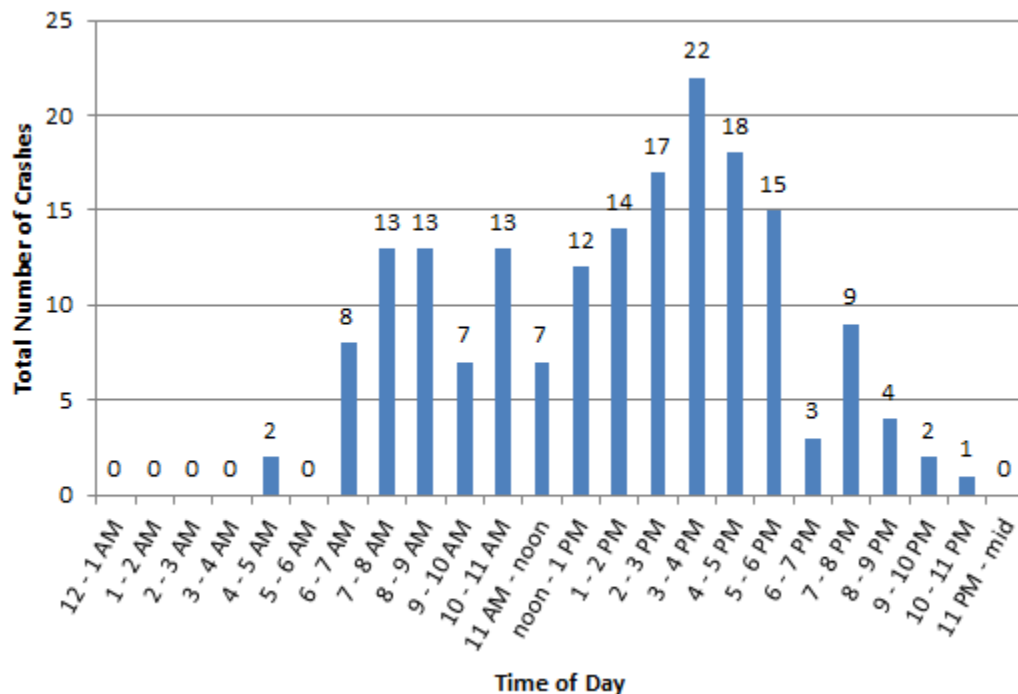
Crash data was collected by SCDOT for the time period between January 1, 2014 and September 30, 2017. The crash data is summarized in the table and figure below. A crash diagram is provided in the report Appendix.

Table 2 – Crash Summary Table

<i>Year</i>	<i>Type</i>	<i>Severity</i>	<i>Time of Day</i>
2014: 50	Angle: 63	PDO: 134	Day: 158
2015: 49	Rear-end: 89	Injury: 46	Night: 22
2016: 41	Sideswipe: 25	Fatality: 0	
2017*: 40	Non-vehicle: 0		
	Other: 3		

*2017 data ends September 30, 2017

Figure 4 – SC 170 Crashes by Time of Day



As seen in the above crash summary table and graph, the majority of crashes occurred during daylight hours. The highest amount of crashes occurred between 3:00 and 4:00 PM. Of the 180 total recorded crashes, the most common type was rear-end crashes and the second most frequent type was angle crashes. There were no fatalities recorded, but 46 crashes resulted in injuries. For

the years of data reviewed, at least 40 crashes have occurred per year. The data for the year 2017 revealed 40 crashes occurred; however, this data only covers the time period until September 30, 2017.

Upon review of the crash diagram, 68 of the 180 crashes occurred near the intersection of SC 170 & Holly Lane/Okatie Center Boulevard. However, a revision to the intersection geometry has resulted in a reduction in crashes, as discussed in the next section of this report. Additionally, 65 of the 89 rear-end crashes occurred in the southbound direction along SC 170. This may be attributable to queueing that occurs at the traffic signals on the corridor.

2.3 Recent and Planned Improvements

A convenience store was recently constructed in the southeast quadrant of SC 170 & Holly Lane. As part of that development, a raised median was constructed along Holly Lane to the intersection with SC 170 that restricts left turns and through movements from Holly Lane onto SC 170. This intersection was previously full access and is now $\frac{3}{4}$ -access due to this improvement. It is estimated that this revision was completed in early 2017, and it is noted that the crash data reflects zero angle crashes in 2017 involving vehicles entering SC 170 from Holly Lane.

The entire roadway segment was resurfaced during the SC 170 widening project that occurred south of US 278. Therefore, it was noted that pavement markings and raised pavement markers are generally in good condition.

3.0 Findings and Recommendations

3.1 Positive Findings

The following were identified as positive measures and features that are already in place within the study area that enhance road safety:

- Due to recent resurfacing, the roadway is in good condition.
- A raised median is installed between US 278 West & Holly Lane/Okatie Center Boulevard, and between Holly Lane/Okatie Center Boulevard & Commerce Place East/West.
- Left- and right-turn lanes are present at each intersection.
- Interconnectivity exists between parcels and through connecting roadways.
- While the area is moderately developed, it is not completely built out, leaving the ability to encourage further interparcel access and access management.
- The approach of Holly Lane to SC 170 has been converted to $\frac{3}{4}$ -access. The approaches of Commerce Place East/West are $\frac{3}{4}$ -access.
- Signal heads at US 278 have retroreflective backplates.

3.2 Potential Corridor Improvements

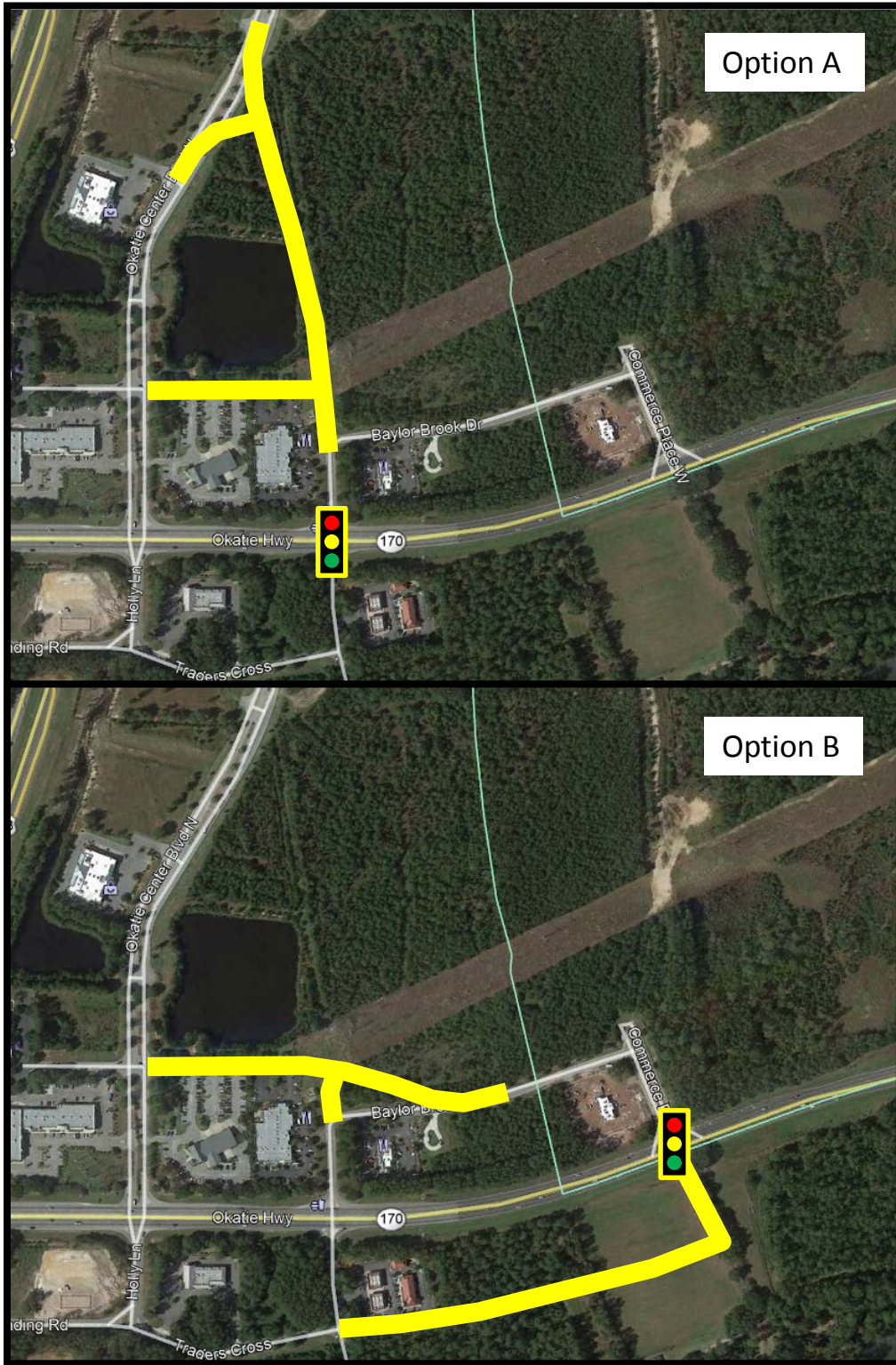
Several improvements apply to multiple locations on the corridor. For clarity on specific recommendations related to intersections, they will be addressed in the next section of this report. Additionally, there are some recommendations that will provide benefit to the corridor as a whole. Short-term improvements include the following:

- Repaint faces of all medians and islands which separate direction of travel with yellow median face paint.
- Reinstall retroreflective raised pavement markers (RRPMs) on median noses per SCDOT standard drawings.

As development continues, signalization of at least one additional intersection will eventually be justified. The intersection of SC 170 & Holly Lane/Okatie Center Boulevard is not a candidate for signalization due to the close spacing to the signalized intersection with US 278 West. The spacing of less than 800 feet is less than the minimum requirement from the *Access and Roadside Management Standards (ARMS) Manual*, which is 1,320 feet. Therefore, the candidates for signalization are Commerce Place East/West or Palmer Grace Drive.

Commerce Place East/West is located 1,400 feet north of US 278 West, and Palmer Grace Drive is located 2,550 feet north of US 278 West. Through prior coordination with the City of Hardeeville it is understood that the development on the west side of SC 170, known as Okatie Crossing, has conceptually proposed a traffic signal at the intersection of SC 170 & Palmer Grace Drive, though this location has not been formally approved at this time. Commerce Place East/West and Palmer Grace Drive are not sufficiently spaced to allow signalization of both intersections. To maximize the benefit of a traffic signal, additional interparcel connectivity is recommended. Several options for roadway connections and signal locations are shown Figure 5.

Figure 5 – Possible Traffic Signal Locations



As shown in the above figure, both options would involve the construction of additional roadways for interparcel connections, and each option has advantages and disadvantages, some of which are listed in the table below.

Table 3 – Signal Options Summary

	<i>Advantages</i>	<i>Disadvantages</i>
<i>Option A</i>	<ul style="list-style-type: none"> • More likely to be warranted in an earlier year • Initial roadway connections can be made quickly, while additional roadway connections can be made through development attrition 	<ul style="list-style-type: none"> • Signal spacing will only meet the minimum spacing requirement • Requires revision to conceptual development plan
<i>Option B</i>	<ul style="list-style-type: none"> • Signal spacing will be nearly ½-mile • Compliant with current conceptual development plan 	<ul style="list-style-type: none"> • Roadway connections needed on east side of SC 170 may be difficult to achieve • Location would be less convenient for drivers accessing current development

Beaufort County collected turning movement count data on March 21, 2018 at the intersection of SC 170 & Holly Lane/Okatie Center Boulevard and on April 17, 2018 at the intersection of SC 170 & Commerce Place East/West. These traffic volumes were used in a signal warrant review, which is discussed in a later section of this report.

Environmental conditions, such as the presence of wetlands, are unknown at this time. The road network required for either option presented could be impacted based upon such conditions.

It is recommended that a master access plan be agreed upon by local government agencies, to include a location for potential signalization, when warranted. Regardless of signal location and installation date, access management along the corridor would provide a safety improvement.

3.3 Potential Intersection Improvements

Several specific intersection improvements were noted at intersections along the corridor. The field observations are noted, with potential improvements, in the list below.

SC 170 & US 278 East

- Route markers for the right-turn lane onto US 278 East use advance turn arrow plaques, which are inconsistent with the directional sign for Hilton Head Island.
 - Replace arrow plaques with diagonal arrow plaques to match the actual condition and the directional sign.



SC 170 & US 278 West

- A directional and route marker assembly is located across the intersection from the US 278 East off ramp in a location blocked by vehicles queued at the traffic signal.
 - Relocate assembly to the off ramp.
- On southbound SC 170, route markers for US 278 West are placed in advance of the US 278 West ramp, but no advance signs are present for US 278 East. Beaufort County noted that some drivers enter the turn lane for US 278 West and then merge back into the through lane, not realizing that the two ramps are separate.
 - Provide an advance turn route marker assembly to clarify drivers must travel through the signal to access the US 278 East entrance ramp.
- During peaks, lane utilization heavily favors the right lane due to US 278 access on the right. There are long queues on SC 170 as a result.
 - Review current signal timings to determine if adjustments will reduce queues without significantly impacting the off ramp.
- The right turn from the US 278 West off ramp to SC 170 is an added lane, but some drivers yield to SC 170 traffic.
 - Extend a solid white line approximately 100 feet from the channelizing gore along SC 170.
 - Revise the pavement markings for the gore to better fit the natural driving radius.
 - Remove the existing yield sign located in the channelizing island.
 - Remove the no left turn (R3-2) sign located on the right shoulder of the off ramp.
 - Replace the existing added lane sign (W4-3) to match the lane configuration from the ramp approach (W4-6). Relocate the existing added lane sign (W4-3) to SC 170 in advance of the merge in the channelizing island.
 - Correct the hatching pavement markings in the channelizing island to be chevron markings.
 - Repair/widen shoulder in radius where potholes are forming.
- Sign clutter can be further reduced.
 - In addition to signing revisions listed above, combine I-95, hospital, and US 278 West signs along SC 170 northbound into one sign assembly.



SC 170 & Holly Lane/Okatie Center Boulevard

- Improved signing will provide better clarity for drivers with less sign clutter
 - Relocate sign assembly for Beaufort guide sign, share the road sign, and penalty for littering sign



on SC 170 northbound from the near side of Holly Lane to the far side of Holly Lane.

- Replace the existing right lane must turn right (R3-7) narrow sign on SC 170 northbound with the standard size sign. Install a second sign in advance of the lane drop at Holly Lane.
- Install a yield sign for the northbound channelized right turn from SC 170 onto Holly Lane.
- Increase the size of the existing stop sign at the Okatie Center Boulevard exit to 36" due to the multilane approach.
- Improved pavement markings will enhance intersection control.
 - Add white mini skip lines across Holly Lane and Okatie Center Boulevard approaches along SC 170.
 - Add stop bar and right-turn arrow on Holly Lane approach to SC 170.
 - Extend stop bar across entire Okatie Center Boulevard approach, and add left- and right-turn arrows on exit lanes. Install white lane line between exit lanes.
 - Install white yield bar across channelized right turn from SC 170 northbound onto Holly Lane.
 - Add white chevron pavement markings in channelizing island for right turn from SC 170 southbound onto Okatie Center Boulevard.
 - Install white edgelines on the third side of right-turn channelizing islands for right turns from SC 170.



SC 170 & Commerce Place East/West

- Some pavement markings were not replaced in the recent resurfacing project. Additionally, improved pavement markings will provide better clarity for drivers.
 - Install white mini skip lines across Commerce Place approaches along SC 170.
 - Install a receiving white arrow pavement marking on entrance lanes to reinforce ¾-access driveways.
 - Install white edgelines on the third side of right-turn channelizing islands for right turns from SC 170.
 - Add right-turn arrows on Commerce Place exit lanes.
 - Extend centerline that was not replaced after resurfacing.
 - Add white yield bars across channelized right-turn lanes entering and exiting SC 170.
 - Replace white broken lane lines with white solid lines for the storage length for both right-turn lanes from SC 170.
- Improved signing will enhance intersection control.
 - Install yield signs for channelized right turns from SC 170 onto Commerce Place.
 - Install keep right signs (R4-7) in island noses exiting Commerce Place onto SC 170 to reinforce the right-turn exit only.

- Relocate yield sign on Commerce Place West approach closer to yield point.
- Remove 45 mph speed limit sign on southbound SC 170 currently located on a US 278 junction sign assembly.

4.0 Signal Warrant Analysis

4.1 Existing Conditions Review

As previously discussed, options for a corridor management plan to identify a traffic signal location were reviewed. Two alternatives for signal locations were presented in an earlier section of this report; however, only option A was further reviewed using current traffic count data. This is due to option B being less likely to warrant a traffic signal in the near term.

Beaufort County collected turning movement count data on March 21, 2018 at the intersection of SC 170 & Holly Lane/Okatie Center Boulevard and on April 17, 2018 at the intersection of SC 170 & Commerce Place East/West. Turning movement counts consisted of six hours of data collection: 7:00-9:00 AM, 12:00-2:00 PM, and 4:00-6:00 PM. These existing traffic counts are provided in the Appendix; however, no existing conditions traffic signal warrant was conducted for the intersection of SC 170 & Commerce Place East/West. This is due to Commerce Place East/West being currently configured as $\frac{3}{4}$ -access intersection. Therefore, there are no left turns exiting the side street approaches to the intersection.

4.2 Future Conditions Review

Because current development is primarily located in the vicinity of the intersection of SC 170 & Holly Lane/Okatie Center Boulevard, it is assumed that few trips would be diverted to a traffic signal located to the north at SC 170 & Commerce Place East/West under current intersection configuration. Therefore, the signal warrant analysis was conducted considering a revision to the intersection of SC 170 & Holly Lane/Okatie Center Boulevard that would convert the intersection to right-in/right-out. Under this scenario, all left-turn traffic entering and exiting Holly Lane/Okatie Center Boulevard would be diverted to the future signal at Commerce Place East/West.

Currently, traffic at these intersections likely originates primarily from US 278 and areas to the south. Therefore, exiting traffic predominantly consists of right turns even though the Okatie Center Boulevard approach to SC 170 is full access. This trend is assumed to continue even after diversion to the future signal location. Due to the high volume of right turns and relatively low volume of left turns, 50% of right-turning traffic was excluded from the signal warrant analysis. Additionally, the 70% reduced volume thresholds were considered due to the current speed limit exceeding 40 mph on SC 170.

Considering these elements, Signal Warrants 1 and 2 were reviewed. For Warrant 1 (Eight-Hour Vehicular Volume), zero hours were met in condition A, three hours were met in condition B, and zero hours were met in the combination of condition A and B. Therefore, Warrant 1 is not

satisfied. For Warrant 2 (Four-Hour Vehicular Volume), two hours were met. Therefore, Warrant 2 is not satisfied.

Signal Warrants 1 and 2 are not met based upon revising the intersection of SC 170 & Holly Lane/Okatie Center Boulevard to right-in/right-out and diverting traffic to the intersection of SC 170 & Commerce Place East/West. However, as development increases in the area, it is likely that signal volume warrants will be met at an additional intersection such as SC 170 & Commerce Place East/West or SC 170 & Palmer Grace Drive.

Not included in this evaluation is the diversion of traffic to the signalized intersection based on the traffic signal providing enhanced access and improved safety for vehicles turning left onto SC 170. This includes traffic that may be turning right and making a U-turn at another point in the system or traffic using Okatie Center Boulevard to access US 278 directly. While this traffic would be difficult to quantify, it is noted that providing a traffic signal at the optimum location will attract additional traffic.

As discussed in an earlier section of this report, the future signal location will depend upon development and road connections which are made. The installation of a traffic signal may be installed as part of a corridor project to include interconnectivity as proposed or it may be required to be installed by a development generating an amount of traffic to justify a new traffic signal. Any new traffic signal must be approved by SCDOT.

5.0 Summary and Responsible Parties

5.1 Safety Review Summary

The 0.6-mile segment of SC 170 between US 278 and Palmer Grace Boulevard was selected for a road safety review based on Beaufort County's familiarity with the corridor and concerns from citizens related to the number of crashes and "near-misses" observed in the area. The nearby SCDOT traffic count station indicates that this section of SC 170 carries over 30,000 vehicles per day. A review of the AADT data indicates constant growth occurred between 2012 and 2016, for a total of 24 percent growth over five years. A review of the crash history revealed the majority of crashes occurred during daylight hours. The highest amount of crashes occurred between 3:00 and 4:00 PM. There were no fatalities recorded; however, 46 crashes resulted in injuries.

Several positive findings were noted during the on-site field visit; however, numerous recommendations were developed that may improve the crash rate on this segment of roadway. Many recommendations include low-cost improvements such as signing and marking improvements. There are also long term improvements that should be considered, such as increasing connectivity between adjacent parcels and identifying a location for a potential future traffic signal, when warranted.

A traffic signal warrant analysis was conducted to determine if a new traffic signal would be warranted if traffic were diverted to the new signal. The results of the analysis indicate a traffic

signal is not currently justified, but that as development and connectivity increases, an additional traffic signal is likely to be warranted.

5.2 Responsible Parties

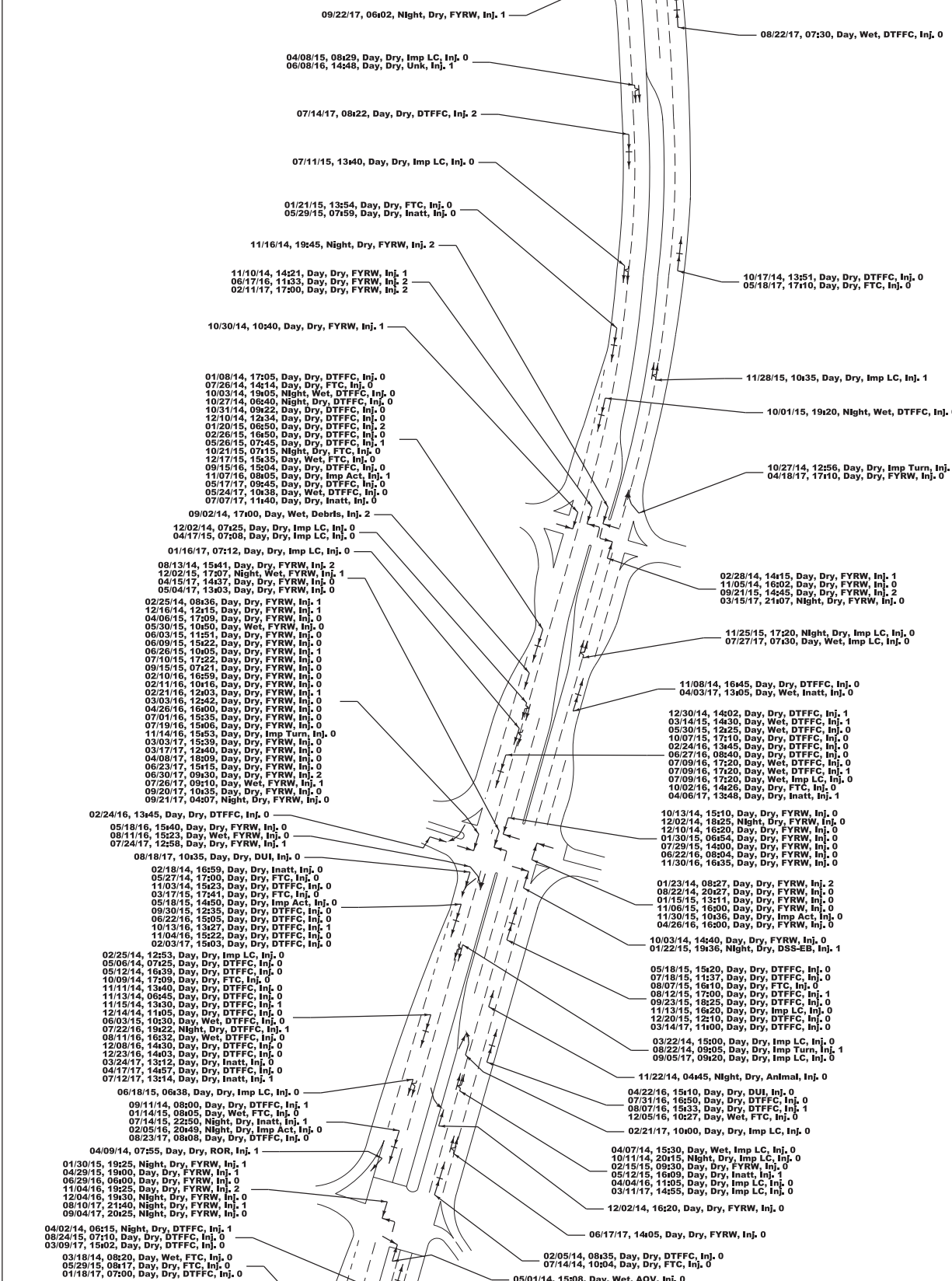
To summarize and clarify the responsible parties for the proposed improvements, recommendations are summarized in the table below. The timeframe for the proposed improvements is also estimated. For the purposes of this report, short term improvements are expected to be completed within one year and long term improvements are expected to take at least one year to complete. Long term improvements may also be revised over time based on development trends and funding opportunities.

Table 4 – Recommendations and Responsible Parties

<i>Recommendation</i>	<i>Responsible Party</i>	<i>Estimated Timeframe</i>
Repaint median faces and install RRPMS	SCDOT	Short term
Define master access plan, to include potential future signal location	Beaufort County, Hardeeville, SCDOT	Long term
Construct interparcel connections	Beaufort County, Hardeeville, Developers	Long term
Install traffic signal, when warranted	To Be Determined	Long term
Revise signing and pavement markings along segment of SC 170 as recommended	SCDOT	Short term
Review signal timings at SC 170 & US 278 West	Beaufort County	Short term
Repair/widen shoulder for right turn from US 278 West off ramp to SC 170	SCDOT	Long term

Appendix

SC 170 (MPT 7.2)
AADT: 30,100



LEGEND
 DSS - Disregarded Sign or Signal
 Inatt. - Inattention
 DTFFC - Driving Too Fast for Conditions
 FYRW - Failure to Yield Right of Way
 ROR - Ran off Road
 FTC - Followed Too Closely
 AOV - Aggressive Operation of Vehicle
 SAC - Swerving to Avoid Object
 DUI - Under the Influence
 Imp LC - Improper Lane Change
 RA = Right Angle
 RE = Rear End
 SS = Side Swipe
 HO = Head On
 OC = Out of Control
 N/A = Hit Animal
 OTH = Other

SC 170 (MPT 6.6)
AADT: 30,100

YR	2014	2015	2016	2017	Total
RA	16	16	16	15	63
RE	25	27	20	17	89
SS	6	6	5	8	25
HO	0	0	0	0	0
OC	1	0	0	0	1
N/A	0	0	0	0	0
OTH	2	0	0	0	2
Total	50	49	41	40	180

Total = 180
 AADT = 30,100
 Years = 3.75
 01/01/14 - 09/30/17
 CR = 7,282
 SI = 11,003

PDO - 134
 Inj. 1 - 35
 Inj. 2 - 11
 Inj. 3 - 0
 Fatal - 0

SCDOT TRAFFIC ENGINEERING
 DIVISION
 COLUMBIA, S.C.
 TRAFFIC SAFETY PROGRAM

SUBJECT TITLE: **Collision Diagram**
 SPECIFIC LOCATION: **SC 170 (MPT 6.6 - 7.2)**

CITY	Bluffton	COUNTY	Beaufort
DRAWN BY	JCB	DATE	02/13/18
SCALE	None	PAGE	1 of 1

Beaufort County Traffic Engineering

2266 Boundary St
Beaufort, SC 29902
843-255-2940

Laura Matney
SC 170 & Barrel Landing Road
Sunny

File Name : SC 170 Barrel Landing Rd
Site Code : 08762467
Start Date : 3/21/2018
Page No : 1

Groups Printed- Unshifted - Bank 1

Start Time	From North				SC 170 From East				Barrel Landing Road From South				SC 170 From West				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	U-Turn	Right	Thru	Left	Peds	Right	Thru	Left	U-Turn	
07:00 AM	5	0	0	0	2	430	1	0	14	0	0	0	20	279	0	0	751
07:15 AM	4	0	0	0	3	464	1	0	24	0	0	0	21	346	2	0	865
07:30 AM	3	0	0	0	3	490	4	0	15	0	0	0	18	407	0	0	940
07:45 AM	1	0	0	0	3	454	4	0	26	0	0	0	20	333	8	1	850
Total	13	0	0	0	11	1838	10	0	79	0	0	0	79	1365	10	1	3406
08:00 AM	2	0	0	0	4	459	5	0	13	0	0	0	30	313	2	0	828
08:15 AM	0	0	0	0	9	421	4	0	24	0	1	0	20	306	3	0	788
08:30 AM	6	0	1	0	4	331	4	0	14	0	0	0	25	282	6	0	673
08:45 AM	6	0	1	0	11	361	3	0	21	0	1	1	26	305	11	0	747
Total	14	0	2	0	28	1572	16	0	72	0	2	1	101	1206	22	0	3036
*** BREAK ***																	
12:00 PM	14	0	1	0	12	306	3	0	24	0	1	0	23	258	13	0	655
12:15 PM	15	1	1	0	4	341	10	2	25	0	0	0	29	308	13	0	749
12:30 PM	10	0	2	0	8	369	7	2	26	0	0	0	19	291	10	1	745
12:45 PM	10	4	9	0	14	292	15	1	19	0	0	0	23	276	10	0	673
Total	49	5	13	0	38	1308	35	5	94	0	1	0	94	1133	46	1	2822
01:00 PM	18	0	7	0	9	330	7	1	20	0	0	0	19	288	3	1	703
01:15 PM	19	1	3	0	9	317	8	2	18	0	0	0	29	298	10	0	714
01:30 PM	22	0	1	0	8	337	5	1	26	0	0	0	23	281	6	0	710
01:45 PM	10	0	4	0	10	339	1	0	19	0	0	0	26	306	8	0	723
Total	69	1	15	0	36	1323	21	4	83	0	0	0	97	1173	27	1	2850
*** BREAK ***																	
04:00 PM	8	0	2	0	10	344	4	0	15	0	0	0	25	423	10	0	841
04:15 PM	3	0	1	0	9	387	4	0	25	0	0	0	31	427	7	1	895
04:30 PM	12	1	4	0	11	404	3	0	20	0	0	0	27	399	6	0	887
04:45 PM	6	0	0	0	9	446	0	0	24	0	1	0	25	429	4	0	944
Total	29	1	7	0	39	1581	11	0	84	0	1	0	108	1678	27	1	3567
05:00 PM	4	0	1	0	11	464	0	0	29	0	0	0	19	457	4	0	989
05:15 PM	0	0	0	0	8	499	4	0	31	0	0	0	24	483	6	0	1055
05:30 PM	3	1	4	0	8	432	6	0	19	0	0	0	22	471	6	0	972
05:45 PM	8	0	0	0	7	409	2	0	17	0	0	0	18	411	3	0	875
Total	15	1	5	0	34	1804	12	0	96	0	0	0	83	1822	19	0	3891
Grand Total	189	8	42	0	186	9426	105	9	508	0	4	1	562	8377	151	4	19572
Apprch %	79.1	3.3	17.6	0	1.9	96.9	1.1	0.1	99	0	0.8	0.2	6.2	92.1	1.7	0	
Total %	1	0	0.2	0	1	48.2	0.5	0	2.6	0	0	0	2.9	42.8	0.8	0	
Unshifted	189	8	42	0	186	9426	105	9	508	0	4	1	562	8377	151	4	19572
% Unshifted	100	100	100	0	100	100	100	100	100	0	100	100	100	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

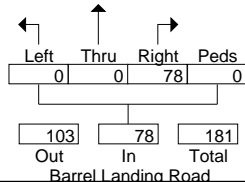
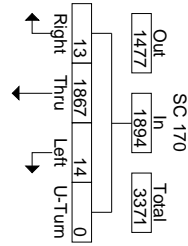
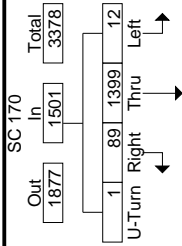
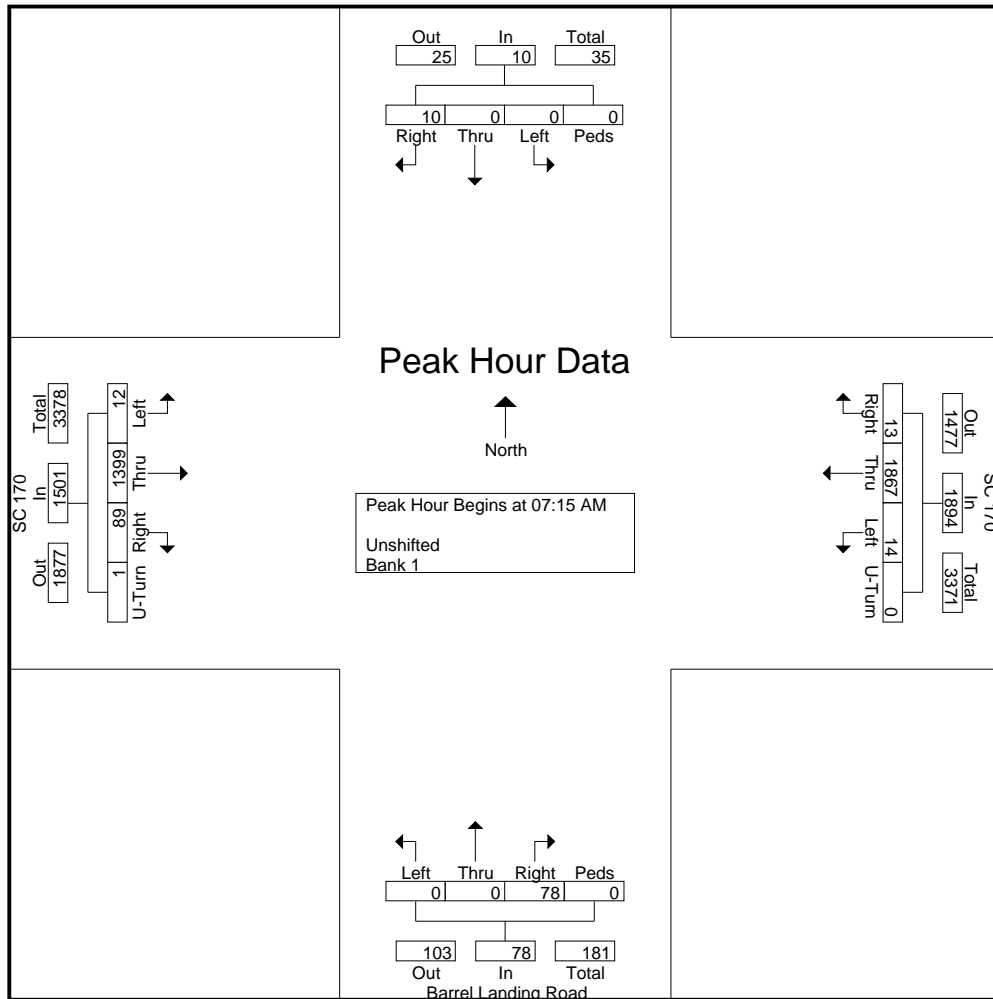
Beaufort County Traffic Engineering

2266 Boundary St
Beaufort, SC 29902
843-255-2940

Laura Matney
SC 170 & Barrel Landing Road
Sunny

File Name : SC 170 Barrel Landing Rd
Site Code : 08762467
Start Date : 3/21/2018
Page No : 2

Start Time	From North					SC 170 From East					Barrel Landing Road From South					SC 170 From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	4	0	0	0	4	3	464	1	0	468	24	0	0	0	24	21	346	2	0	369	865
07:30 AM	3	0	0	0	3	3	490	4	0	497	15	0	0	0	15	18	407	0	0	425	940
07:45 AM	1	0	0	0	1	3	454	4	0	461	26	0	0	0	26	20	333	8	1	362	850
08:00 AM	2	0	0	0	2	4	459	5	0	468	13	0	0	0	13	30	313	2	0	345	828
Total Volume	10	0	0	0	10	13	1867	14	0	1894	78	0	0	0	78	89	1399	12	1	1501	3483
% App. Total	100	0	0	0		0.7	98.6	0.7	0		100	0	0	0		5.9	93.2	0.8	0.1		
PHF	.625	.000	.000	.000	.625	.813	.953	.700	.000	.953	.750	.000	.000	.000	.750	.742	.859	.375	.250	.883	.926



Beaufort County Traffic Engineering

2266 Boundary St
Beaufort, SC 29902
843-255-2940

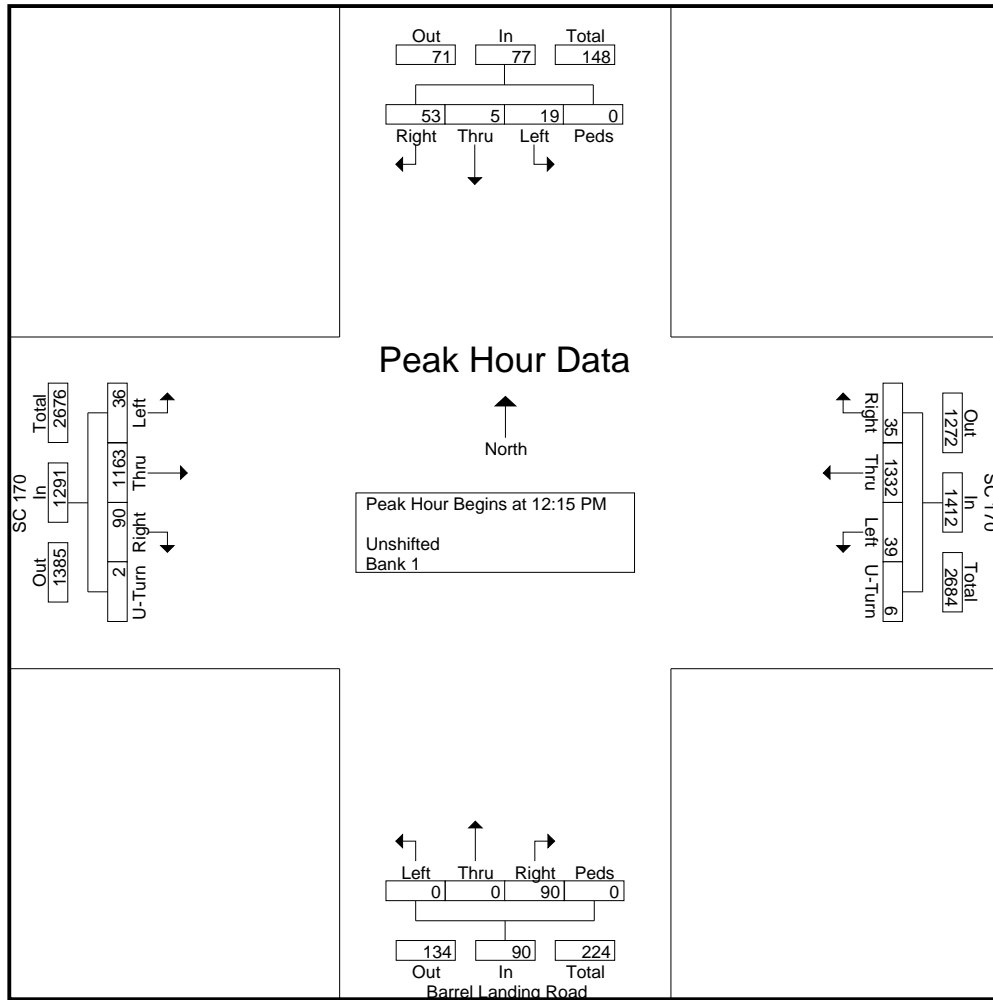
Laura Matney
SC 170 & Barrel Landing Road
Sunny

File Name : SC 170 Barrel Landing Rd
Site Code : 08762467
Start Date : 3/21/2018
Page No : 3

Start Time	From North					SC 170 From East					Barrel Landing Road From South					SC 170 From West					Int. Total
	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	U-Turn	App. Total	Right	Thr u	Left	Peds	App. Total	Right	Thr u	Left	U-Turn	App. Total	
12:15 PM	15	1	1	0	17	4	341	10	2	357	25	0	0	0	25	29	308	13	0	350	749
12:30 PM	10	0	2	0	12	8	369	7	2	386	26	0	0	0	26	19	291	10	1	321	745
12:45 PM	10	4	9	0	23	14	292	15	1	322	19	0	0	0	19	23	276	10	0	309	673
01:00 PM	18	0	7	0	25	9	330	7	1	347	20	0	0	0	20	19	288	3	1	311	703
Total Volume	53	5	19	0	77	35	1332	39	6	1412	90	0	0	0	90	90	1163	36	2	1291	2870
% App. Total	68.8	6.5	24.7	0		2.5	94.3	2.8	0.4		100	0	0	0		7	90.1	2.8	0.2		
PHF	.736	.313	.528	.000	.770	.625	.902	.650	.750	.915	.865	.000	.000	.000	.865	.776	.944	.692	.500	.922	.958

Peak Hour Analysis From 10:00 AM to 02:00 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 12:15 PM



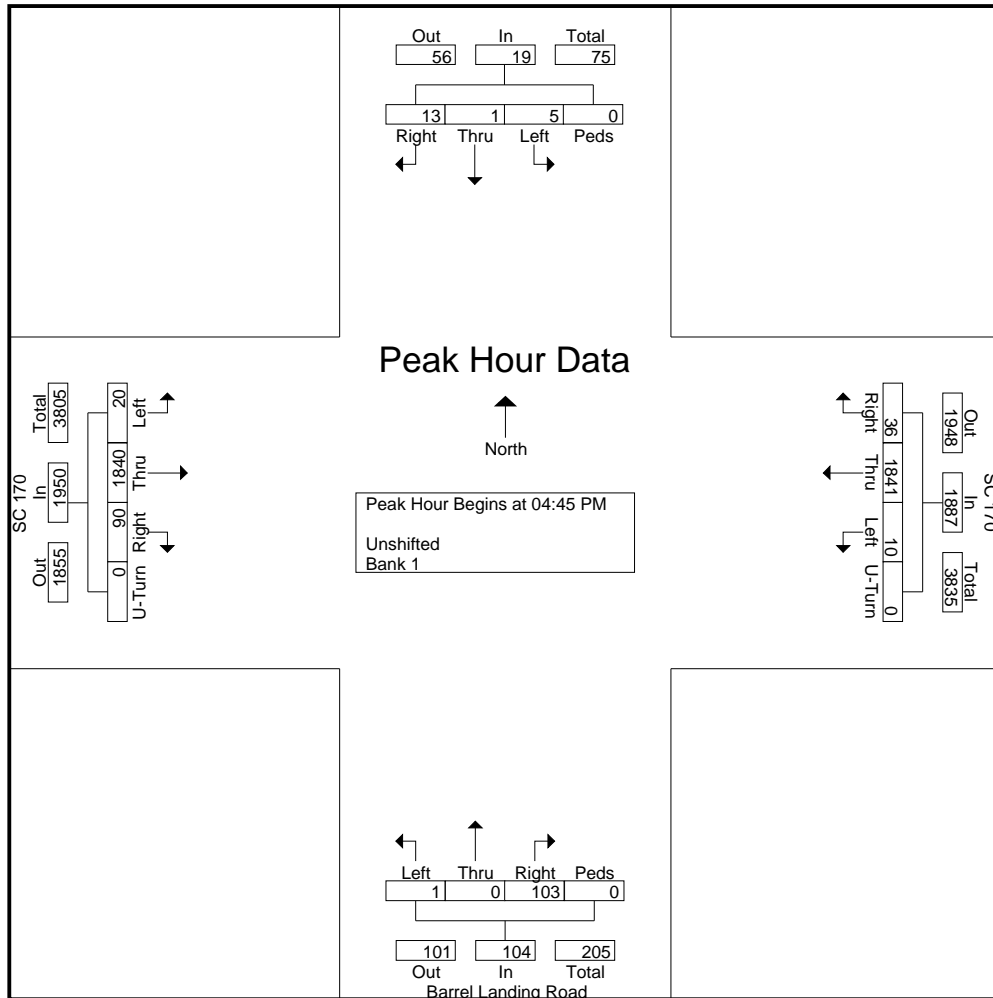
Beaufort County Traffic Engineering

2266 Boundary St
Beaufort, SC 29902
843-255-2940

Laura Matney
SC 170 & Barrel Landing Road
Sunny

File Name : SC 170 Barrel Landing Rd
Site Code : 08762467
Start Date : 3/21/2018
Page No : 4

Start Time	From North					SC 170 From East					Barrel Landing Road From South					SC 170 From West					Int. Total
	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	U-Turn	App. Total	Right	Thr u	Left	Peds	App. Total	Right	Thr u	Left	U-Turn	App. Total	
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	6	0	0	0	6	9	446	0	0	455	24	0	1	0	25	25	429	4	0	458	944
05:00 PM	4	0	1	0	5	11	464	0	0	475	29	0	0	0	29	19	457	4	0	480	989
05:15 PM	0	0	0	0	0	8	499	4	0	511	31	0	0	0	31	24	483	6	0	513	1055
05:30 PM	3	1	4	0	8	8	432	6	0	446	19	0	0	0	19	22	471	6	0	499	972
Total Volume	13	1	5	0	19	36	1841	10	0	1887	103	0	1	0	104	90	1840	20	0	1950	3960
% App. Total	68.4	5.3	26.3	0		1.9	97.6	0.5	0		99	0	1	0		4.6	94.4	1	0		
PHF	.542	.250	.313	.000	.594	.818	.922	.417	.000	.923	.831	.000	.250	.000	.839	.900	.952	.833	.000	.950	.938



Beaufort County Traffic Engineering

2266 Boundary St
Beaufort, SC 29902

843-255-2940

File Name : SC 170 Commerce Road 4-17-18

Site Code : 00000001

Start Date : 4/17/2018

Page No : 1

Laura Matney
Commerce Place/SC 170
SC 170 Safety Study
Sunny

Groups Printed- Unshifted - Bank 1

Start Time	Commerce PI W From North				SC 170 From East				Commerce PI E From South				SC 170 From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	0	0	0	0	0	429	4	0	15	0	0	0	11	263	1	2	725
07:15 AM	1	0	0	0	0	416	8	0	25	0	0	0	7	384	6	3	850
07:30 AM	1	0	0	0	0	460	7	0	21	0	0	0	14	381	2	1	887
07:45 AM	3	0	0	0	1	473	1	0	23	0	0	0	14	338	4	1	858
Total	5	0	0	0	1	1778	20	0	84	0	0	0	46	1366	13	7	3320
08:00 AM	4	0	0	0	2	425	9	0	25	0	0	0	9	301	4	4	783
08:15 AM	0	0	0	0	2	372	6	0	18	0	0	0	2	258	6	3	667
08:30 AM	2	0	0	0	1	314	6	0	18	0	0	0	2	248	6	1	598
08:45 AM	1	0	0	0	6	302	6	0	8	0	0	0	2	246	6	1	578
Total	7	0	0	0	11	1413	27	0	69	0	0	0	15	1053	22	9	2626
*** BREAK ***																	
12:00 PM	21	0	0	0	13	260	5	0	16	0	1	0	4	246	34	5	605
12:15 PM	33	0	0	0	20	300	11	0	19	0	0	0	4	230	30	5	652
12:30 PM	33	0	0	0	19	320	9	0	26	0	0	0	9	248	27	1	692
12:45 PM	39	0	0	0	9	293	2	0	21	0	0	0	8	244	22	3	641
Total	126	0	0	0	61	1173	27	0	82	0	1	0	25	968	113	14	2590
01:00 PM	36	0	0	0	18	310	4	0	21	0	0	0	10	253	29	3	684
01:15 PM	34	0	0	0	6	287	9	0	24	0	0	0	7	295	19	5	686
01:30 PM	21	0	0	0	5	276	5	0	16	0	0	0	7	261	21	3	615
01:45 PM	24	0	0	0	5	310	5	0	18	0	0	0	12	265	18	5	662
Total	115	0	0	0	34	1183	23	0	79	0	0	0	36	1074	87	16	2647
*** BREAK ***																	
04:00 PM	11	0	0	0	1	345	3	0	18	0	0	0	11	360	16	3	768
04:15 PM	16	0	0	0	9	399	1	0	25	0	0	0	19	396	14	6	885
04:30 PM	14	0	0	0	5	400	6	0	31	0	0	0	11	433	15	4	919
04:45 PM	13	0	0	0	5	393	7	0	30	0	0	0	16	380	7	8	859
Total	54	0	0	0	20	1537	17	0	104	0	0	0	57	1569	52	21	3431
05:00 PM	12	0	0	0	11	434	5	0	33	0	0	0	17	424	14	5	955
05:15 PM	8	0	0	0	5	427	7	0	30	0	0	0	18	439	10	4	948
05:30 PM	8	0	0	0	9	419	6	0	30	0	0	0	9	382	13	0	876
05:45 PM	13	0	0	0	2	343	2	0	20	0	0	0	18	366	10	4	778
Total	41	0	0	0	27	1623	20	0	113	0	0	0	62	1611	47	13	3557
Grand Total	348	0	0	0	154	8707	134	0	531	0	1	0	241	7641	334	80	18171
Apprch %	100	0	0	0	1.7	96.8	1.5	0	99.8	0	0.2	0	2.9	92.1	4	1	
Total %	1.9	0	0	0	0.8	47.9	0.7	0	2.9	0	0	0	1.3	42.1	1.8	0.4	
Unshifted	348	0	0	0	154	8707	134	0	531	0	1	0	241	7641	334	80	18171
% Unshifted	100	0	0	0	100	100	100	0	100	0	100	0	100	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

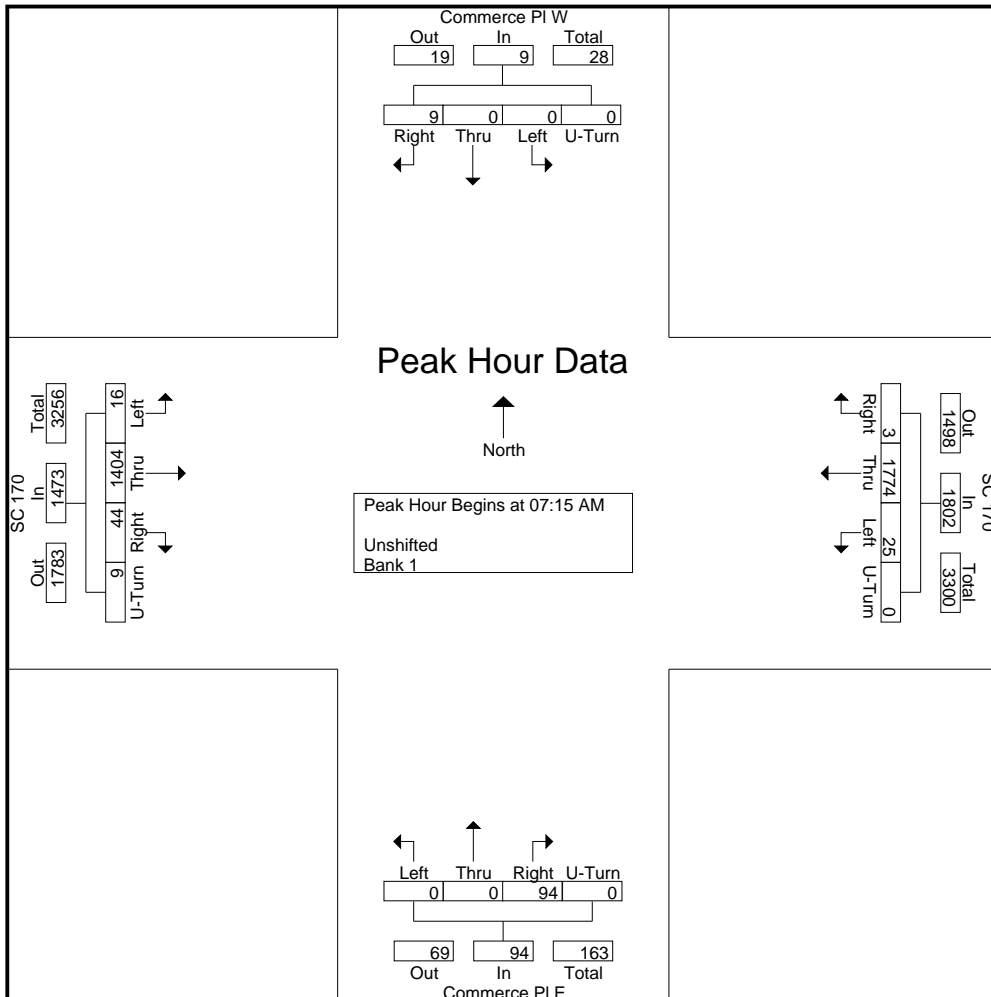
Beaufort County Traffic Engineering

2266 Boundary St
Beaufort, SC 29902
843-255-2940

File Name : SC 170 Commerce Road 4-17-18
Site Code : 00000001
Start Date : 4/17/2018
Page No : 2

Laura Matney
Commerce Place/SC 170
SC 170 Safety Study
Sunny

Start Time	Commerce PI W From North					SC 170 From East					Commerce PI E From South					SC 170 From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	1	0	0	0	1	0	416	8	0	424	25	0	0	0	25	7	384	6	3	400	850
07:30 AM	1	0	0	0	1	0	460	7	0	467	21	0	0	0	21	14	381	2	1	398	887
07:45 AM	3	0	0	0	3	1	473	1	0	475	23	0	0	0	23	14	338	4	1	357	858
08:00 AM	4	0	0	0	4	2	425	9	0	436	25	0	0	0	25	9	301	4	4	318	783
Total Volume	9	0	0	0	9	3	1774	25	0	1802	94	0	0	0	94	44	1404	16	9	1473	3378
% App. Total	100	0	0	0		0.2	98.4	1.4	0		100	0	0	0		3	95.3	1.1	0.6		
PHF	.563	.000	.000	.000	.563	.375	.938	.694	.000	.948	.940	.000	.000	.000	.940	.786	.914	.667	.563	.921	.952



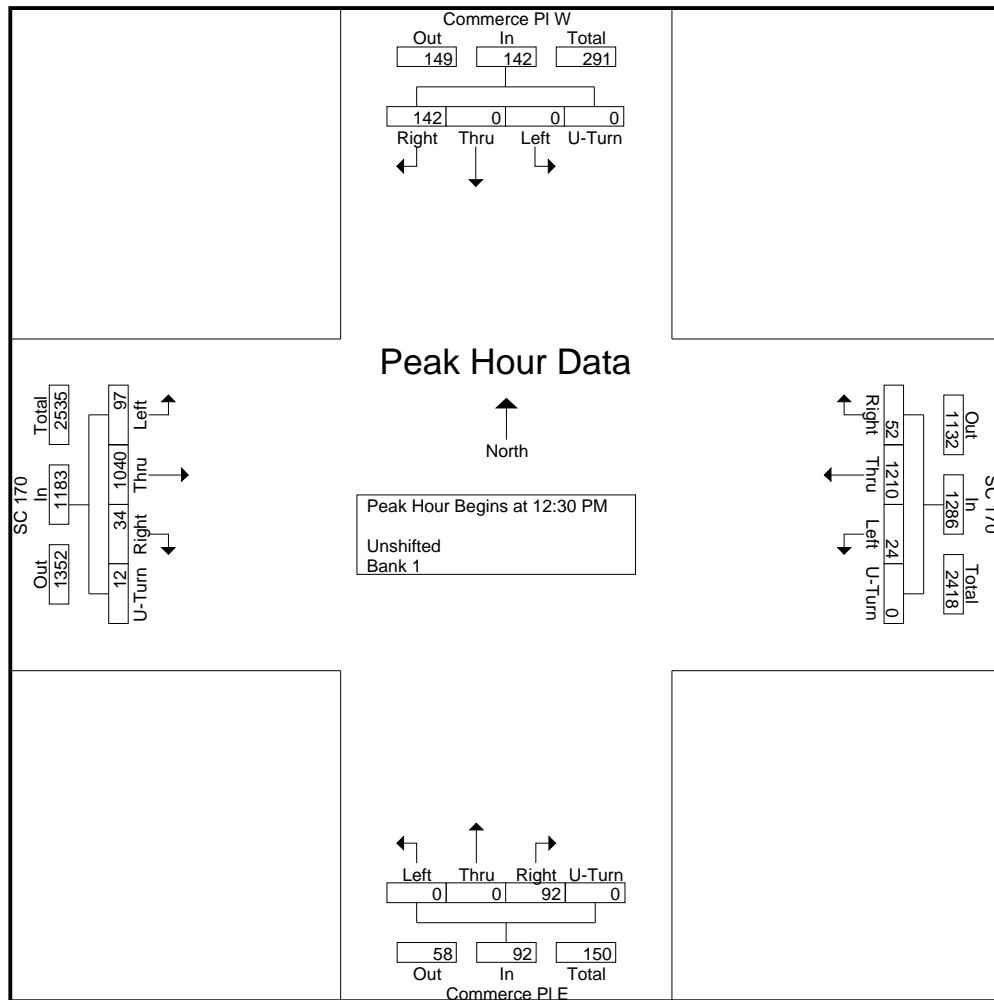
Beaufort County Traffic Engineering

2266 Boundary St
Beaufort, SC 29902
843-255-2940

File Name : SC 170 Commerce Road 4-17-18
Site Code : 00000001
Start Date : 4/17/2018
Page No : 3

Laura Matney
Commerce Place/SC 170
SC 170 Safety Study
Sunny

Start Time	Commerce PI W From North					SC 170 From East					Commerce PI E From South					SC 170 From West					Int. Total
	Rig ht	Thr u	Left	U-Turn	App. Total	Right	Thr u	Left	U-Turn	App. Total	Right	Thr u	Left	U-Turn	App. Total	Right	Thr u	Left	U-Turn	App. Total	
Peak Hour Analysis From 10:00 AM to 02:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:30 PM																					
12:30 PM	33	0	0	0	33	19	320	9	0	348	26	0	0	0	26	9	248	27	1	285	692
12:45 PM	39	0	0	0	39	9	293	2	0	304	21	0	0	0	21	8	244	22	3	277	641
01:00 PM	36	0	0	0	36	18	310	4	0	332	21	0	0	0	21	10	253	29	3	295	684
01:15 PM	34	0	0	0	34	6	287	9	0	302	24	0	0	0	24	7	295	19	5	326	686
Total Volume	142	0	0	0	142	52	1210	24	0	1286	92	0	0	0	92	34	1040	97	12	1183	2703
% App. Total	100	0	0	0		4	94.1	1.9	0		100	0	0	0		2.9	87.9	8.2	1		
PHF	.910	.000	.000	.000	.910	.684	.945	.667	.000	.924	.885	.000	.000	.000	.885	.850	.881	.836	.600	.907	.977



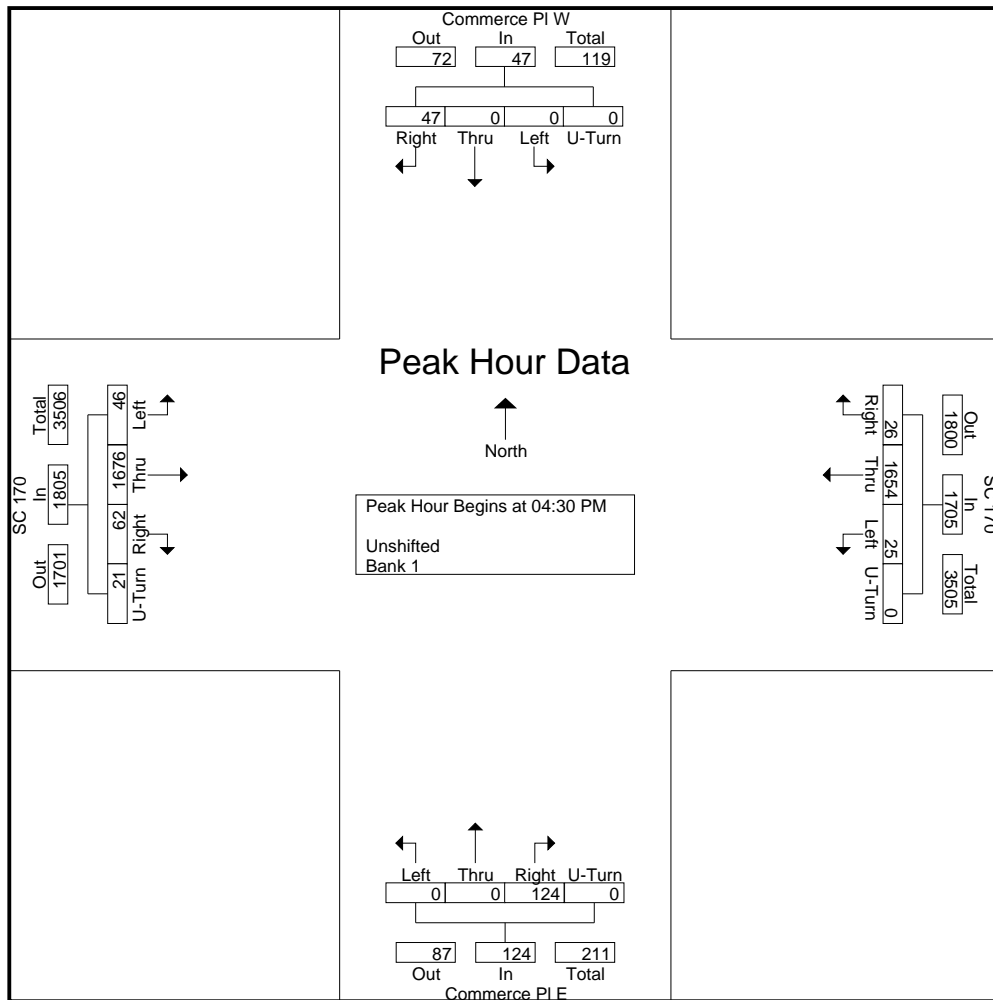
Beaufort County Traffic Engineering

2266 Boundary St
Beaufort, SC 29902
843-255-2940

File Name : SC 170 Commerce Road 4-17-18
Site Code : 00000001
Start Date : 4/17/2018
Page No : 4

Laura Matney
Commerce Place/SC 170
SC 170 Safety Study
Sunny

Start Time	Commerce PI W From North					SC 170 From East					Commerce PI E From South					SC 170 From West					Int. Total
	Rig ht	Thr u	Left	U-Turn	App. Total	Right	Thr u	Left	U-Turn	App. Total	Right	Thr u	Left	U-Turn	App. Total	Right	Thr u	Left	U-Turn	App. Total	
Peak Hour Analysis From 02:45 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	14	0	0	0	14	5	400	6	0	411	31	0	0	0	31	11	433	15	4	463	919
04:45 PM	13	0	0	0	13	5	393	7	0	405	30	0	0	0	30	16	380	7	8	411	859
05:00 PM	12	0	0	0	12	11	434	5	0	450	33	0	0	0	33	17	424	14	5	460	955
05:15 PM	8	0	0	0	8	5	427	7	0	439	30	0	0	0	30	18	439	10	4	471	948
Total Volume	47	0	0	0	47	26	1654	25	0	1705	124	0	0	0	124	62	1676	46	21	1805	3681
% App. Total	100	0	0	0		1.5	97	1.5	0		100	0	0	0		3.4	92.9	2.5	1.2		
PHF	.839	.000	.000	.000	.839	.591	.953	.893	.000	.947	.939	.000	.000	.000	.939	.861	.954	.767	.656	.958	.964



Scenario A-1: Okatie/Holly maintain current access → 1/3 left turns diverted to signal

Scenario A-2: Okatie/Holly revise to RLP0 → all lefts diverted

Beaufort County Traffic Engineering

2266 Boundary St
Beaufort, SC 29902
843-255-2940

File Name : SC 170 Commerce Road 4-17-18
Site Code : 00000001
Start Date : 4/17/2018
Page No : 1

Laura Matney
Commerce Place/SC 170
SC 170 Safety Study
Sunny

Groups Printed- Unshifted - Bank 1

Start Time	Commerce PI W From North <i>EB</i>				SC 170 From East <i>SB</i>				Commerce PI E From South <i>WB</i>				SC 170 From West <i>NB</i>				Int. Total		
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn			
07:00 AM	0	0	0	0	0	429	<i>4</i>	<i>5</i>	0	15	0	0	0	11	263	<i>1</i>	<i>1</i>	2	725
07:15 AM	1	0	0	0	0	416	<i>8</i>	<i>9</i>	0	25	0	0	0	7	384	<i>6</i>	<i>7</i>	3	850
07:30 AM	1	0	0	0	0	460	<i>7</i>	<i>11</i>	0	21	0	0	0	14	381	<i>2</i>	<i>2</i>	1	887
07:45 AM	3	0	0	0	1	473	<i>1</i>	<i>5</i>	0	23	0	0	0	14	338	<i>4</i>	<i>7</i>	1	858
Total	5	0	0	0	1	1778	20	0	0	84	0	0	0	46	1366	13	7	3320	
08:00 AM	4	0	0	0	2	425	<i>8</i>	<i>11</i>	0	25	0	0	0	9	301	<i>4</i>	<i>5</i>	4	783
08:15 AM	0	0	0	0	2	372	<i>6</i>	<i>7</i>	0	18	0	0	0	2	258	<i>6</i>	<i>7</i>	3	667
08:30 AM	2	0	<i>0</i>	0	1	314	<i>6</i>	<i>7</i>	0	18	0	0	0	2	248	<i>6</i>	<i>8</i>	1	598
08:45 AM	1	0	<i>0</i>	0	6	302	<i>6</i>	<i>7</i>	0	8	0	0	0	2	246	<i>6</i>	<i>10</i>	1	578
Total	7	0	0	0	11	1413	27	0	0	69	0	0	0	15	1053	22	9	2626	
*** BREAK ***																			
12:00 PM	21	0	<i>0</i>	0	13	260	<i>5</i>	<i>6</i>	0	16	0	1	0	4	246	<i>3</i>	<i>4</i>	5	605
12:15 PM	33	0	<i>0</i>	0	20	300	<i>1</i>	<i>14</i>	0	19	0	0	0	4	230	<i>3</i>	<i>4</i>	5	652
12:30 PM	33	0	<i>0</i>	0	19	320	<i>9</i>	<i>11</i>	0	26	0	0	0	9	248	<i>2</i>	<i>3</i>	1	692
12:45 PM	39	0	<i>0</i>	0	9	293	<i>2</i>	<i>7</i>	0	21	0	0	0	8	244	<i>2</i>	<i>2</i>	3	641
Total	126	0	0	0	61	1173	27	0	0	82	0	1	0	25	968	113	14	2590	
01:00 PM	36	0	<i>0</i>	0	18	310	<i>4</i>	<i>6</i>	0	21	0	0	0	10	253	<i>2</i>	<i>3</i>	3	684
01:15 PM	34	0	<i>0</i>	0	6	287	<i>9</i>	<i>12</i>	0	24	0	0	0	7	295	<i>1</i>	<i>2</i>	5	686
01:30 PM	21	0	<i>0</i>	0	5	276	<i>5</i>	<i>7</i>	0	16	0	0	0	7	261	<i>2</i>	<i>2</i>	3	615
01:45 PM	24	0	<i>0</i>	0	5	310	<i>5</i>	<i>6</i>	0	18	0	0	0	12	265	<i>1</i>	<i>2</i>	5	662
Total	115	0	0	0	34	1183	23	0	0	79	0	0	0	36	1074	87	16	2647	
*** BREAK ***																			
04:00 PM	11	0	<i>0</i>	0	1	345	<i>3</i>	<i>4</i>	0	18	0	0	0	11	360	<i>1</i>	<i>2</i>	3	768
04:15 PM	16	0	<i>0</i>	0	9	399	<i>1</i>	<i>2</i>	0	25	0	0	0	19	396	<i>1</i>	<i>6</i>	6	885
04:30 PM	14	0	<i>0</i>	0	5	400	<i>6</i>	<i>7</i>	0	31	0	0	0	11	433	<i>1</i>	<i>7</i>	4	919
04:45 PM	13	0	<i>0</i>	0	5	393	<i>7</i>	<i>7</i>	0	30	0	0	0	16	380	<i>7</i>	<i>8</i>	8	859
Total	54	0	0	0	20	1537	17	0	0	104	0	0	0	57	1569	52	21	3431	
05:00 PM	12	0	<i>0</i>	0	11	434	<i>5</i>	<i>5</i>	0	33	0	0	0	17	424	<i>1</i>	<i>5</i>	5	955
05:15 PM	8	0	<i>0</i>	0	5	427	<i>7</i>	<i>8</i>	0	30	0	0	0	18	439	<i>1</i>	<i>2</i>	4	948
05:30 PM	8	0	<i>0</i>	0	9	419	<i>6</i>	<i>8</i>	0	30	0	0	0	9	382	<i>1</i>	<i>5</i>	0	876
05:45 PM	13	0	<i>0</i>	0	2	343	<i>2</i>	<i>3</i>	0	20	0	0	0	18	366	<i>1</i>	<i>1</i>	4	778
Total	41	0	0	0	27	1623	20	0	0	113	0	0	0	62	1611	47	13	3557	
Grand Total	348	0	0	0	154	8707	134	0	0	531	0	1	0	241	7641	334	80	18171	
Apprch %	100	0	0	0	1.7	96.8	1.5	0	0	99.8	0	0.2	0	2.9	92.1	4	1	0	
Total %	1.9	0	0	0	0.8	47.9	0.7	0	0	2.9	0	0	0	1.3	42.1	1.8	0.4	0	
Unshifted	348	0	0	0	154	8707	134	0	0	531	0	1	0	241	7641	334	80	18171	
% Unshifted	100	0	0	0	100	100	100	0	0	100	0	100	0	100	100	100	100	100	
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

SIGNAL WARRANT ANALYSIS

SC 170 AT Commerce Place

Date: 4/17/2018

Minor Street Volume, percent of total = 5.1%
 Percent of Left Turns from Minor Street = 4.6%
 Percent of Right Turns from Minor Street = 95.4%
 Percent of Minor Street Right Turns to Remove from Warrant Analysis = 50%
 WARRANT BASIS = 70%

Warrant No. 1 - Vehicular Volume is not met

Condition A - Minimum Vehicular Volume is not met

Average Major Street % of Warrant 2911.2 / 420 = 693%	Average Minor Street % of Warrant 45.1 / 105 = 43%
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Hourly percent of warrant

	7:00 - 8:00	8:00 - 9:00	12:00 - 13:00	13:00 - 14:00	16:00 - 17:00	17:00 - 18:00
Major St.	772%	614%	583%	592%	783%	815%
Minor St.	44%	33%	72%	69%	50%	54%

Condition B - Interruption to Continuous Traffic is not met

Average Major Street % of Warrant 2911.2 / 630 = 462%	Average Minor Street % of Warrant 45.1 / 53 = 86%
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Hourly percent of warrant

	7:00 - 8:00	8:00 - 9:00	12:00 - 13:00	13:00 - 14:00	16:00 - 17:00	17:00 - 18:00
Major St.	515%	409%	389%	394%	522%	543%
Minor St.	88%	66%	145%	138%	99%	108%

80% Combination of Conditions A & B is not applicable

Warrant No. 2 - Four Hour Vehicular Volume is not met

Hourly percent of warrant

	7:00 - 8:00	8:00 - 9:00	12:00 - 13:00	13:00 - 14:00	16:00 - 17:00	17:00 - 18:00
Minor St.	77%	58%	127%	121%	87%	94%