

BUCKHOLZ TRAFFIC 3585 KORI ROAD JACKSONVILLE, FLORIDA 32257 (904) 886-2171 jwbuckholz@aol.com

February 17, 2021

Memphis, Tennessee 38119

Re: Sea Island Road / Frederica Road Intersection - Traffic Engineering Evaluation

Dear Recipient:

As requested, I have reviewed the April 2016 Final St. Simons Island Traffic Study by Pond and Company and the recommended roundabout design for the Frederica Road/Sea Island Road intersection. I have also reviewed the November 2020 Draft Final Report - St. Simons Island Area Sector Study completed for BATS (Brunswick Area Transportation Study) by CDM Smith. In addition, Buckholz Traffic personnel completed pre-virus weekday AM and PM peak period manual turning movement counts at the following Sea Island Road cross streets during March of 2020: Frederica Road, Market Street, and Stable Street. The count data is included in Attachment A with a graphical summary provided as Figure 1.

Pond projected traffic at the Sea Island Road/Frederica Road intersection for the weekday AM peak hour, PM peak hour, and midday peak hour for both May and July of 2035. The July traffic volumes were generally higher than the May volumes in 2035 so only the July volumes were included in our analysis. Also, the midday traffic volumes were generally similar to the PM peak volumes so only the AM and PM peak hour volumes were included. The growth factor derived from the Pond traffic volumes is about 1.20 (representing a 20% overall increase or about 1% per year) and this factor was applied to our counts to obtain projected 203 5 traffic volumes at the Sea Island Road/Market Street intersection and the Sea Island Road/Stable Street intersection (see Figure 2).

A review of Table B1 in Attachment B, which is derived from 2019 GDOT (Georgia Department of Transportation) traffic volume graphs that are also included in Attachment B, suggests that March is the highest volume traffic month on the island.

Using these traffic volumes, the following analyses have been completed:

A March 2020 weekday AM and PM peak hour capacity analyses for the existing Sea Island corridor from Frederica Road to Market Street using the operational methodology of the signalized intersection module discussed in Chapter 18 of the latest (sixth) edition of the <u>Highway Capacity Manual</u>. Provided in Attachment C are the existing traffic signal timings (dated 1/19/16) that were used in this analysis. The

signalized intersection capacity analysis calculations are provided in Attachment D with the results summarized in Table 1.

- B. July 2035 weekday AM and PM peak hour capacity analyses for the existing Sea Island corridor from Frederica Road to Market Street using the operational methodology of the signalized intersection module discussed in Chapter 18 of the latest (sixth) edition of the Highway Capacity Manual. Optimized coordinated timings were used in the analysis. The signalized intersection capacity analysis calculations are provided in Attachment E with the results included in Table 1.
- C. July 2035 weekday AM and PM peak hour capacity analyses for the Sea Island Road/Frederica Road intersection assuming the installation of a roundabout and using the latest version (4.2) of GDOT's Roundabout Analysis Procedure. The roundabout analysis calculations are provided in Attachment F with the results summarized in Table 2. In Attachment G are the roundabout calculations provided in the Pond report with the results summarized in Table 3. The Pond calculations use an older version (2.1) of the GDOT software that produces slightly different results and which do not provide a level of service result for the entire roundabout. All roundabout analyses use the same basic lane configuration proposed by Pond which is provided in Attachment H.

A review of the top half of Table 1 shows that the existing signalized intersections along this stretch of Sea Island Road currently operate in an acceptable manner, even with timings that are less than optimal (although the side street approach lanes at Market Street experience high delay during the weekday PM peak hour due to these inefficient timings). A review of the bottom half of Table 1 indicates that, if properly coordinated with optimized timings, these intersections will operate in an acceptable manner in 2035 although the overall intersection level of service will deteriorate somewhat with the increasing traffic volumes. This is the case with the existing lane configuration and signal phasing; there is no pressing need to provide a second left turn lane on the west approach of the Sea Island Road/Frederica Road intersection as suggested in the Pond report.

A review of Table 2 indicates that a roundabout would function in an acceptable manner during the weekday AM peak hour but that, during the PM peak hour, it would operate at an unacceptable level of service F with extremely long queues (27 vehicles) on the westbound approach and a volume-to-capacity ratio on that approach of much more than one (1.31). The Table in Appendix E of the Pond report mistakenly provides a roundabout level of service of E during the July 2035 weekday PM peak hour. The fact that an overall roundabout level of service is provided at all in the Pond report is curious since the GDOT roundabout software was not capable of providing this information prior to the release of the current version - which did not occur until December of 2019.

It should be noted that our roundabout analysis assumes the construction of a "standard" size roundabout with reasonably sized medians on the various legs. There is no need from a capacity and level of service standpoint for the expansive medians and large islands that are part of the Pond roundabout design contained in Attachment H. Nor is there any need to skew the roundabout eastward as is shown in that design.

Based on these analyses and my review of the reports, I offer the following additional comments:

1. 2035 is the design year for the Pond study, which is quite a ways into the future for a study of this type. Long-range studies with a 20-year time horizon are usually reserved for large metropolitan areas to answer big-ticket questions such as "Do we need a new bridge?" or "Do we need a beltway around the city?" Using a 20-year time horizon to make decisions on individual intersections is, in

my professional opinion, a mistake that could easily result in over-building. A 10 year time horizon (2025) would be much more practical.

- 2. The growth factor used in the study to project 2035 traffic volumes at the Frederica Road/Sea Island Road intersection is about 1.2 which represents 20% growth over the 20-year time horizon or about 1% per year in annual growth. The BATS report uses a 17% population growth rate and a 20% jobs growth rate between 2015 and 2045 an even slower growth rate than in the POND report. A review of the traffic volumes contained in Table B2 of Attachment B shows that traffic volumes near this intersection have stagnated since 2015, a trend that has occurred in many areas of the US. Aging baby boomers, the reluctance of millennials to drive as much as their parents, the trend of working at home spurred on by the virus, and other demographic/economic trends have reduce vehicle miles of travel in many areas and there is no reason to think that this trend will change. Also, with autonomous vehicles making their way onto our streets vehicles that will make more efficient use of our existing road system planning for continued traffic growth may no longer be the smartest thing to do.
- 3. Using one growth factor for the entire intersection is less than desirable. By going into the area wide model one should be able to determine a growth factor for each movement at the intersection. Applying growth factors by movement would produce a better set of future traffic volumes for intersection design which will result in a better solution.
- 4. Although roundabouts do have certain safety and aesthetic advantages in comparison to traffic signals, a major disadvantage of roundabouts is that you cannot adjust signal timing to clear queues on a particular approach. When you approach capacity at a roundabout, bad traffic operations occur (long queues, long wait times) and these items are not controllable.
- 5. The savings in maintenance and energy costs associated with a multilane roundabout as compared to a traffic signal comes nowhere close to making up the huge difference in initial capital cost. Traffic signal timings can be optimized for well less than \$20,000 and this is peanuts compared to a \$4,000,000 cost for construction of the proposed roundabout. Even a multilane roundabout with a smaller footprint at this location would probably cost \$500,000 which is still a lot of money.
- 6. American drivers have become fairly accustomed to negotiating single lane roundabouts but multilane roundabout are less prevalent and, contrary to drivers in Europe and Asia, many American drivers are not familiar with their use. The end result is that the circulating lanes of these multilane roundabouts are not efficiently used here in the US and the calculated capacities may not be achieved resulting in longer than expected queues and increased delay.
- 7. Roundabouts generally reduce the severity of crashes at an intersection as compared to a signalized intersection. However, the accident analysis for both Frederica Road and Sea Island Road contained in Appendix C of the Pond Report shows that the current accident rate along both of these roadways is substantially lower than the state average. There's apparently not much of an accident problem to solve.

- 8. Whether or not a roundabout is preferable to a traffic signal for pedestrians is a matter of both design and opinion. A traffic signal can be designed with signalized pedestrian crossings and pedestrian refuge medians and islands, as well as other pro-pedestrian features such as leading pedestrian intervals and pedestrian-activated NO TURN signs. A roundabout, however, requires pedestrians to make all road crossings without any form of vehicular control although the pedestrian does have the advantage of crossing only one direction of vehicular travel at a time.
- 9. The "BATS" study raises the possibility of a new northern causeway connection between St. Simons Island and the mainland sometime in the future. If this occurs then traffic volumes at the Sea Island Road/Frederica Road intersection can be expected to drop. The roundabout could end up being overdesigned for future conditions.

A prudent course of action would be to simply retime the existing traffic signals and repeat this retiming every 5 years or so. If traffic volumes increase at a rate that exceeds what is expected then there may come a point where lane additions need to be made at the Sea Island Road/Frederica Road intersection. The addition of a second west approach left turn lane (and associated northbound receiving lane) could be a potential future improvement of considerable benefit. The provision of an exclusive right turn lane on the west approach of this intersection might also be of future benefit.

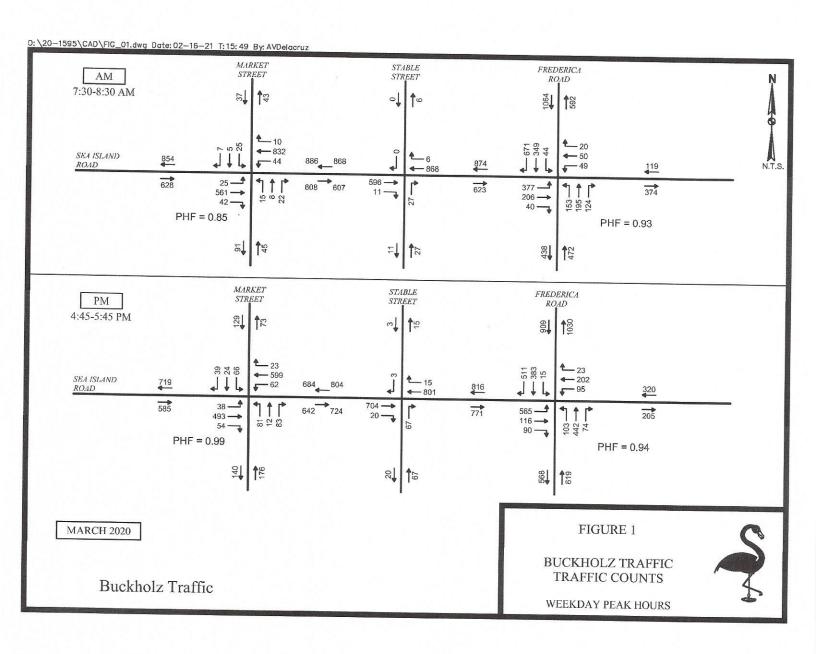
If you have any questions or comments concerning my evaluation, please contact me.

Sincerely,

39705

Digitally signed by Jeffrey W. Buckholz
DN: cm=Jeffrey W. Buckholz,
o=BUCKHOLZ TRAFFIC
ENGINEERING, ou,
email=jwbuckholz@aol.co
m, c=US
Date: 2021.02.17 18:06:15

Jeffrey W. Buckholz, PhD, P.E., PTOE Principal and Chief Traffic Engineer



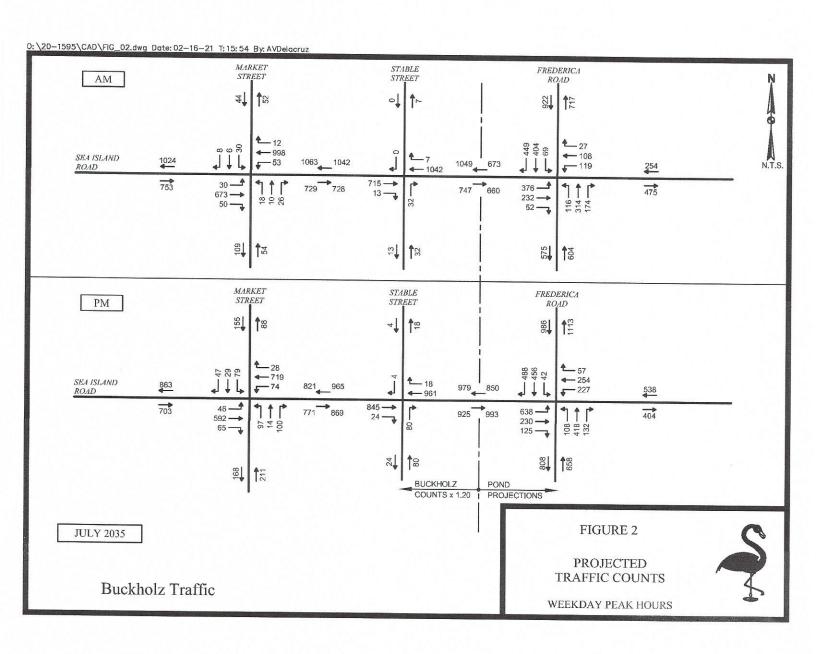


TABLE II
SUMMARY OF SIGNALIZED INTERSECTION CAPACITY RESULTS
SEA ISLAND ROAD CORRIDOR

AT EDEDEDICA DO LO			EXISTING (2020) CONDI	TIONS				
AT FREDERICA ROAD	Highest v/c Ratio	Highest Queue Storage Ratio	Worst Movement Delay & LOS	Intersection Delay & LOS	Cycle Length			
AM PEAK HOUR	0.79 EBLT	0.75 SBRT	WBT 40.2 sec/veh LOS D	22.7 sec/veh LOS C	90 sec			
PM PEAK HOUR	0.93 EBLT	0.87 EBLT	WBT 43.0 sec/veh LOS D	28.6 sec/veh LOS C	89 sec			
AT MADIZET GEDENM			EXISTING (2020) CONDI					
AT MARKET STREET	Highest v/c Ratio	Highest Queue Storage Ratio	Worst Movement Delay & LOS	Intersection Delay & LOS	Cycle Length			
AM PEAK HOUR	0.83 WBT	0.24 NBLT	NBLT 29.6 sec/veh LOS C	12.9 sec/veh LOS B	62 sec			
PM PEAK HOUR	0.89 SBT	2.41 NBLT	SBT 90.8 sec/veh LOS F	25.0 sec/veh LOS C	75 sec			

AT EDEDEDICA DOAD		JULY 2035	CONDITIONS - WITH OPT	TIMIZED TIMINGS	
AT FREDERICA ROAD	Highest v/c Ratio	Highest Queue Storage Ratio	Worst Movement Delay & LOS	Intersection Delay & LOS	Cycle Length (Coordinated)
AM PEAK HOUR	0.76 EBT	0.98 EBLT	SBT 54.4 sec/veh LOS D	37.9 sec/veh LOS D	160 sec
PM PEAK HOUR	0.85 SBT	1.20 EBLT 103 WBLT	WBT 63.7 sec/veh LOS E	46.1 sec/veh LOS D	160 sec
AT MADIZET CEDUTE		JULY 2035	CONDITIONS - WITH OPT	TMIZED TIMINGS	140 150 150
AT MARKET STREET	Highest v/c Ratio	Highest Queue Storage Ratio	Worst Movement Delay & LOS	Intersection Delay & LOS	Cycle Length (Coordinated)
AM PEAK HOUR	0.86 EBT	0.57 NBLT	WBT 45.1 sec/veh LOS D	42.0 sec/veh LOS D	160 sec
PM PEAK HOUR	0.85 WBT	3.11 NBLT	WBT 52.5 sec/veh LOS D	43.5 sec/veh LOS D	160 sec

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TABLE 2 ROUNDABOUT CAPACITY RESULTS

SEA ISLAND ROAD / FREDERICA ROAD JULY 2035 CONDITIONS

BUCKHOLZ TRAFFIC CALCULATIONS (VERSION 4.2) HCM SIXTH EDITION MODEL

WEEKDAY AM PEAK HOUR	LOS	Delay	v/c Ratio	95th % Queue (vehicles)
INTERSECTION	В	13.1 sec/veh		
Northbound Left/Thru	В	13.5 sec/veh	0.50	2.8
Northbound Thru/Right	В	12.6 sec/veh	0.51	3.0
Southbound Left/Thru	В	13.1 sec/veh	0.59	4.0
Southbound Right Turn By-Pass	A	8.3 sec/veh	0.46	2.6
Eastbound Left Turn	В	12.6 sec/veh	0.52	3.2
Eastbound Left/Thru/Right	В	11.2 sec/veh	0.46	2.5
Westbound Approach	C	15.9 sec/veh	0.57	3.6

WEEKDAY PM PEAK HOUR	LOS	Delay	v/c Ratio	95th % Queue (vehicles)
INTERSECTION	F	55.9 sec/veh		
Northbound Left/Thru	С	22.4 sec/veh	0.67	5.0
Northbound Thru/Right	C	19.5 sec/veh	0.65	4.8
Southbound Left/Thru	D	25.0 sec/veh	0.77	7.6
Southbound Right Turn By-Pass	A	9.8 sec/veh	0.51	3.0
Eastbound Left Turn	D	29.0 sec/veh	0.82	8.9
Eastbound Left/Thru/Right	С	21.9 sec/veh	0.73	11.44
Westbound Approach	F	3.0 min/veh	1.31	26.9

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TABLE 3 ROUNDABOUT CAPACITY RESULTS

SEA ISLAND ROAD / FREDERICA ROAD JULY 2035 CONDITIONS

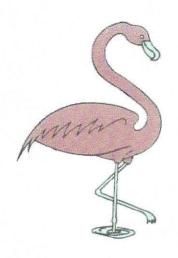
POND CALCULATIONS (VERSION 2.1) HCM 2010 MODEL

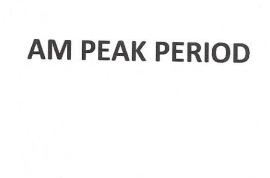
WEEKDAY AM PEAK HOUR	LOS	Delay	v/c Ratio	95th % Queue (vehicles)
INTERSECTION	NOT	AVAILABLE		
Northbound Left/Thru	В	14.6 sec/veh	0.53	3.1
Northbound Thru/Right	C	15.5 sec/veh	0.57	3.7
Southbound Left/Thru	В	14.7 sec/veh	0.62	4.5
Southbound Right Turn By-Pass	В	10.7 sec/veh	0.52	3.1
Eastbound Left Turn	С	23.5 sec/veh	0.70	5.6
Eastbound Left/Thru/Right	С	19.4 sec/veh	0.62	4.3
Westbound Approach	С	19.1 sec/veh	0.62	4.4

WEEKDAY PM PEAK HOUR	LOS	Delay	v/c Ratio	95th % Queue (vehicles)
INTERSECTION	NOT	AVAILABLE		
Northbound Left/Thru	С	23.0 sec/veh	0.67	5.2
Northbound Thru/Right	C	23.9 sec/veh	0.71	5.8
Southbound Left/Thru	C	23.7 sec/veh	0.76	7.2
Southbound Right Turn By-Pass	В	14.3 sec/veh	0.62	4.5
Eastbound Left Turn	F	100.7 sec/veh	11	18:
Eastbound Left/Thru/Right	F	64.7 sec/veh	0.98	13.3
Westbound Approach	F	3.0 min/veh	1.35	28.4

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ATTACHMENT A





DAY: THURSDAY
DATE: 03/12/20
WEATHER: CLEAR & DRY

BEGIN TIME (MILITARY):06:30 Hrs

JW BUCKHOLZ TRAFFIC ENGINEERING INC MANUAL TURNING MOVEMENT COUNTS SEA ISLAND ROAD @ MARKET STREET GLYNN COUNTY, GEORGIA

Site Code : 11111111 Start Date: 03/12/20 File I.D. : 20159506 Page : 1

AUTOMOBILES, COMMERCIAL VEHICLES

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DAY: THURSDAY

DATE: 03/12/20

WEATHER: CLEAR & DRY

BEGIN TIME (MILITARY):06:30 Hrs

GLYNN COUNTY, GEORGIA

AUTOMOBILES

Site Code : 11111111 Start Date: 03/12/20 File I.D. : 20159506

Page : 1

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DAY: THURSDAY DATE: 03/12/20

WEATHER: CLEAR & DRY

BEGIN TIME (MILITARY):06:30 Hrs

JW BUCKHOLZ TRAFFIC ENGINEERING INC MANUAL TURNING MOVEMENT COUNTS SEA ISLAND ROAD @ MARKET STREET GLYNN COUNTY, GEORGIA

Site Code : 11111111 Start Date: 03/12/20

File I.D. : 20159506 Page : 1

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BEGIN TIME (MILITARY):06:30 Hrs

JW BUCKHOLZ TRAFFIC ENGINEERING INC MANUAL TURNING MOVEMENT COUNTS FREDERICA ROAD @ SEA ISLAND ROAD GLYNN COUNTY, GEORGIA

Site Code : 22223333 Start Date: 03/11/20 File I.D. : 20159504 Page : 1

AUTOMOBILES, COMMERCIAL VEHICLES

	FREDERI From No)		SEA ISL		D		FREDERI)		SEA ISI	AND ROA	AD		
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07:15	7	56	135	0 1	9	- 5	5	0 1	18	41	21	0			4	0 [338
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08:00	18	95	169	0.]	15	14	4	0 [39	39		0	87	33	2	0.1	584
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DAY: WEDNESDAY DATE: 03/11/20

WEATHER: CLEAR & DRY

BEGIN TIME (MILITARY):06:30 Hrs

JW BUCKHOLZ TRAFFIC ENGINEERING INC MANUAL TURNING MOVEMENT COUNTS FREDERICA ROAD @ SEA ISLAND ROAD GLYNN COUNTY, GEORGIA

Site Code : 22223333 Start Date: 03/11/20 File I.D. : 20159504

Page : 1

AUTOMOBILES

	FREDERIC From No:		i		SEA ISLA From Eas		.D		FREDERI		2			SLAND RO	AD]	
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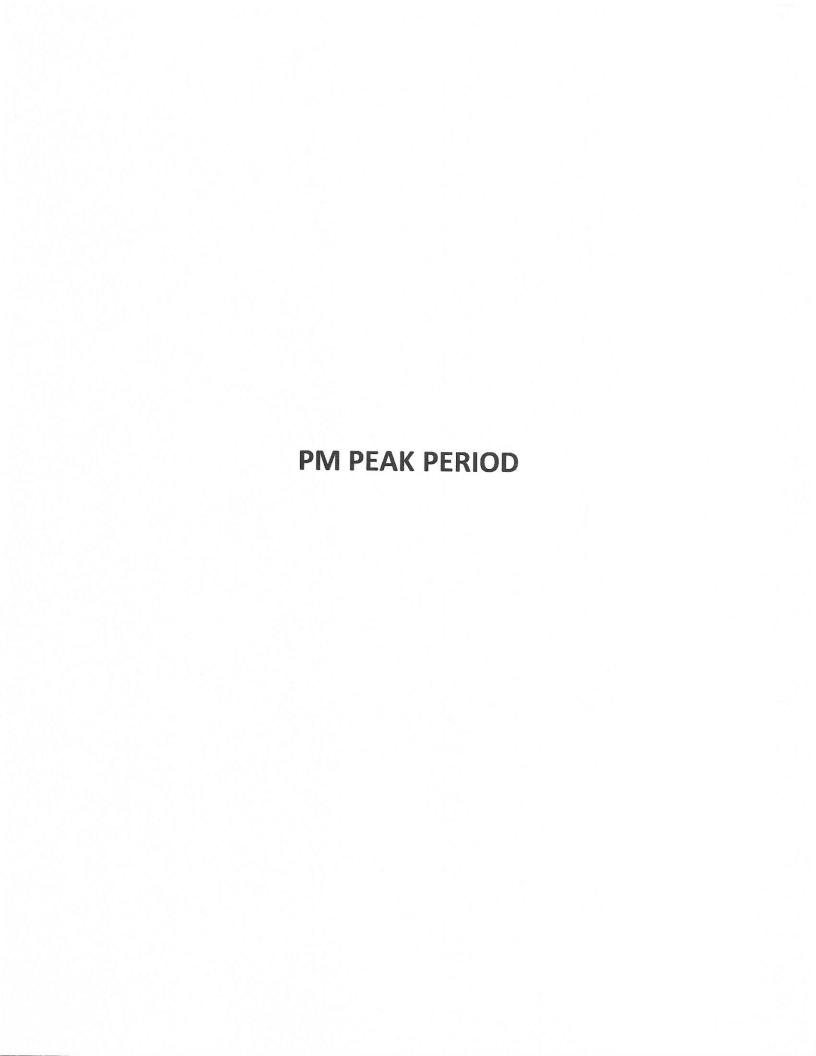
BEGIN TIME (MILITARY):06:30 Hrs

JW BUCKHOLZ TRAFFIC ENGINEERING INC MANUAL TURNING MOVEMENT COUNTS FREDERICA ROAD @ SEA ISLAND ROAD GLYNN COUNTY, GEORGIA

Site Code : 22223333 Start Date: 03/11/20 File I.D. : 20159504 Page : 1

PEDESTRIAN & BICYCLE

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JW BUCKHOLZ TRAFFIC ENGINEERING INC MANUAL TURNING MOVEMENT COUNTS SEA ISLAND ROAD @ MARKET STREET GLYNN COUNTY, GEORGIA

Site Code : 77668844 Start Date: 03/11/20 File I.D. : 20159505 Page : 1

BEGIN TIME (MILITARY):15:30 Hrs

AUTOMOBILES, COMMERCIAL VEHICLES

1	MARKET S	STREET		1	SEA ISL	AND ROA	D	1	MARKET S	TREET		1	ana wa-	9 AVE			
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BEGIN TIME (MILITARY):15:30 Hrs

JW BUCKHOLZ TRAFFIC ENGINEERING INC
MANUAL TURNING MOVEMENT COUNTS
SEA ISLAND ROAD @ MARKET STREET
GLYNN COUNTY, GEORGIA

Site Code : 77668844 Start Date: 03/11/20 File I.D. : 20159505

Page : 1

AUTOMOBILES

	ARKET S			I	SEA ISL	AND ROA	D		MARKET :	STREET			SEA IS	LAND RO	AD	1	
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				İ									1000			1	
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17:00	13	4	8	0 1	12	168	9	0	25	3	22	0	1 11	135	16	0 (42
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					******				~==	2000							
TOTAL	158	49	83	0	163	1565	59	0	191	34	184	0	78	1317	142	0	402
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BEGIN TIME (MILITARY):15:30 Hrs

20 CAR & DRY

JW BUCKHOLZ TRAFFIC ENGINEERING INC MANUAL TURNING MOVEMENT COUNTS SEA ISLAND ROAD @ MARKET STREET GLYNN COUNTY, GEORGIA

Site Code : 77668844 Start Date: 03/11/20 File I.D. : 20159505 Page : 1

PEDESTRIAN & BICYCLE

	rom No	STREET			SEA ISLA From Eas		AL)		MARKET S				SEA ISLA From Wes		MD.		1	
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DAY: TUESDAY

DATE: 03/10/20 WEATHER: CLEAR & DRY

BEGIN TIME (MILITARY):15:30 Hrs

JW BUCKHOLZ TRAFFIC ENGINEERING INC MANUAL TURNING MOVEMENT COUNTS FREDERICA ROAD @ SEA ISLAND ROAD GLYNN COUNTY, GEORGIA

Site Code : 77777777 Start Date: 03/10/20

File I.D. : 20159503 Page : 1

AUTOMOBILES, COMMERCIAL VEHICLES

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DAY: TUESDAY DATE: 03/10/20

WEATHER: CLEAR & DRY

BEGIN TIME (MILITARY):15:30 Hrs

JW BUCKHOLZ TRAFFIC ENGINEERING INC MANUAL TURNING MOVEMENT COUNTS FREDERICA ROAD @ SEA ISLAND ROAD GLYNN COUNTY, GEORGIA

Site Code : 77777777 Start Date: 03/10/20

Pile I.D. : 20159503

Page : 1

AUTOMOBILES

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JW BUCKHOLZ TRAFFIC ENGINEERING INC MANUAL TURNING MOVEMENT COUNTS FREDERICA ROAD @ SEA ISLAND ROAD

GLYNN COUNTY, GEORGIA

Site Code : 77777777 Start Date: 03/10/20

File I.D. : 20159503

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BEGIN TIME (MILITARY):15:30 Hrs

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WEATHER: CLEAR & DRY

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DAY: TUESDAY DATE: 03/10/20

WEATHER: CLEAR & DRY

BEGIN TIME (MILITARY):15:30 Hrs

JW BUCKHOLZ TRAFFIC ENGINEERING INC MANUAL TURNING MOVEMENT COUNTS SEA ISLAND ROAD @ STABLE STREET GLYNN COUNTY, GEORGIA

Site Code : 66666666 Start Date: 03/10/20

Pile I.D. : 20159501 Page : 1

ACTOMOBILES, COMMERCIAL VEHICLES

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