CONCEPTUAL DESIGN REPORT

BEAUFORT HIGH SCHOOL ACCESS ROAD

Submitted to:
Beaufort County
December 2019

SOUTH CAROLINA
REGISTERED PROFESSIONAL ENGINEER
NO. 30811
MATTHEW J WOLNIAK
11/13/2020

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INTRODUCTION

Beaufort County requested a Conceptual Design Report on the three alternatives for relocating access to Beaufort High School, which is located off US 21 Business. The purpose of the relocation is to improve accessibility, operations and safety along US 21 Business, while addressing future development along the corridor.

In order to evaluate the alternatives, traffic data was collected including turning movement counts, pedestrian and bicycle counts, crash data, spot speeds, roadway geometrics including lane configurations, peak period field observations and previous studies completed in the area. Analysis was conducted for existing 2019 and 2040 traffic volumes. Detailed traffic analysis can be seen in The Traffic Study Report included in **Appendix B**.

STUDY AREA LOCATION AND CHARACTERISTICS

Beaufort High School is located off US 21 Business (Sea Island Parkway) in the Hazel Farm and Lady's Island area of the county. Currently, access to the Beaufort High School is from the south at Youmans Drive or from the north at the signalized intersection of US 21 Business and Geechie Road.

The study area is shown in Figure 1 and is bounded by the following roadways:

- US 21 Business to the north
- Meridian Road to the west
- Youmans Drive to the south and east

The following roadways are part of the study area:

US 21 Business runs primarily in the east/west direction and is a three-lane roadway including one lane in each direction with a two-way center turn lane, sidewalks and dedicated bike lanes on both north and south sides. The speed limit on US 21 Business is 40 mph. The land use adjacent to the roadway is mainly commercial with numerous access points. The only signalized intersection within the study area is at Geechie Road/High School driveway.

Meridian Road is a two-lane roadway, which runs in the north/south direction and provides access to various residential properties. The speed limit is 35 mph. There are no sidewalks and bicyclist can use the travel lanes as indicated by the "Share the Road" signs. The shoulder width is minimal.

Geechie Road is a narrow two-lane roadway running in the north/south direction between US 21 Business and Carolyn Drive. The roadway is discontinuous for approximately 600 feet between the High School and Red Oak Drive. The roadway widens out to two northbound lanes at the intersection of US 21 Business. The southern section is either not paved or the pavement is in very poor condition. There is no posted speed limit.

Sunset Boulevard is the only roadway located on the north side of the study area, on the opposite side of the school. Opposite of Sunset Boulevard on US 21 Business is Lady's Island Center commercial area on

the south side of the intersection. Sunset Boulevard is a two-lane roadway, which runs in the north/south direction. There is a shared use path on west side of the roadway. The posted speed is 35 mph and the roadway has numerous residential access points.

Youmans Drive is a two-lane road wide with no shoulders and runs in the northeast/southwest direction. The speed limit is 30 mph. The roadway connects Meridian Road to the southwest and US 21 Business to the northeast. It doglegs for approximately 100 feet at Geechie Road. The High School and residential properties directly access the roadway.

US 21 BUSINESS
(SEA ISLAND PKWY)
HARBORVIEW CIR
HARBORVIEW CIR
GEECHIE RD
SUNSET BLVD
Beaufort High School
SCHOOL ENT
MERIDIAN RD
YOUMANS DR
US 21 BUSINESS
(SEA ISLAND PKWY)
BACK ENTRANCE TO SCHOOL
YOUMANS DR
YOUMANS DR
CAROLYN DR
BEAUFORT HIGH SCHOOL REALIGNMENT
STUDY AREA MAP
SCALE: N.T.S.
FIGURE1
7/2019

BUILD ALTERNATIVES

Three alternatives were developed for the Beaufort High School access relocation. The alternatives are displayed in **Appendix A** and described below. Each alternative removed the existing traffic signal from the intersection of US 21 Business and Geechie Road and relocated it to two of the other three studied intersections along US 21 Business. The intersection was then reconfigured as right-in / right-out into and out from Geechie Road. Also, the southbound approach at US 21 Business and Sunset Boulevard was assumed to contain a left turn lane, a right turn lane and a thru-lane which is proposed as part of a separate project. The northbound approach was changed to contain a right turn lane and a left-thru lane. Northbound Meridian Road at US 21 Business was reconfigured to a right turn lane and a left-thru lane. A left turn lane was restriped for US 21 Business westbound at Sunset Boulevard. Besides these changes, the study area will be modified for each alternative as follows:

Alternative 1:

- Build a two-lane roadway, Geechie Road, to connect the intersection of Youmans Drive and the school's back entrance to the school's main entrance. At this four-way intersection of Geechie Road / Youmans Drive, and the school's back access, construct a single lane roundabout.
- Install a signal at the US 21 Business intersection and Youmans Drive. Change the lane configuration for Youmans Drive northbound at US 21 Business to a right turn lane and left-thru lane.
- At the intersection of Meridian Road and Youmans Drive, add a southbound left turn lane at Meridian.
- The addition of the signal at Youmans and US 21 Business will make the Beaufort Memorial Hospital medical office's driveway a de-facto extension of Sunset Boulevard, which will increase traffic volume. The final design of Alternate #1 must include measures to mitigate this anticipated traffic increase. These yet to be designed mitigation measures are accounted for as a contingency in the cost estimate for this alternative #1.

The proposed signal at the Meridian Road and US 21 Business intersection is not recommended for construction until the design year 2040, therefore is not included in the construction cost estimate for this Alternative #1 in **Appendix C.**

Alternative 2:

- Build a two-lane roadway (with a third center lane for emergency vehicle use only ingress and egress) to connect the school's main entrance to the intersection of Meridian Road and Harborview Circle.
- At the intersection of the new access roadway and Meridian Road, add a southbound left turn lane at Meridian Road.
- Install a signal at the intersection of Meridian Road and US 21 Business.
- Install a signal at Sunset Boulevard and US 21 Business.

Alternative 3:

- Connect the school's main entrance to the Sunset Boulevard and US 21 Business intersection with a two-lane roadway through the Lady's Island commercial shopping center.
- Install a signal at the Sunset Boulevard and US 21 Business intersection.

The proposed signal at Meridian Road and US 21 Business intersection is not recommended for construction until the design year 2040, therefore is not included in the construction cost estimate for this Alternative #3 in **Appendix C**.

CAPACITY AND LEVEL OF SERVICE

The intersections were evaluated using output from traffic software Synchro 10. The models of the study area created in the software were developed to show the results of different alternatives. **Tables 1-3** show delay and Level of Service (LOS) for the worst approach at unsignalized intersections, and intersection-wide delay for signalized intersections. Additional information on this analysis is included in **Appendix B**.

2019 Existing:

- All the intersections operate at LOS 'D' or better during all time periods except for US 21 Business at Youmans Drive during the school peak hour, which operates at LOS 'F'.

2040 No Build:

- The unsignalized intersections along US 21 Business have major decreases in LOS compared to year 2019 for all time periods and many operate at LOS E or worse.
- Intersection delays and LOS for school peak hour are the worst among the time periods analyzed due to the high school peak volumes.

Alternative 1:

- In 2019, all the intersections operate at LOS 'C' or better during the day except for Youmans Drive at the school entrance during school peak hour, which operates at LOS of 'F'. Similarly, in 2040, this intersection operates at LOS of 'F' during AM and school peak hour.
- In 2040, the unsignalized intersection of US 21 Business and Sunset Boulevard operates at LOS 'F' for all time periods. The two intersections of US 21 Business with Meridian Road and Geechie Road operate at LOS ratings 'C', 'D' and 'E' for school AM and PM peak hour, respectively. The LOS for US 21 Business at Youmans Drive operates at LOS 'C' during AM peak hour, LOS 'F' during school peak hour and LOS 'D' during PM peak hour.

Alternative 2:

- In 2019, all the intersections operate at LOS 'A' to 'D' during the day except for US 21 Business at Youmans Drive during school peak periods, which operates at LOS 'F'. This intersection operates at LOS F in 2040 during all time periods.
- In 2040, the three intersections of US 21 Business with Meridian Road, Geechie Road and Sunset Boulevard go through a decrease of LOS from AM to school peak and then increase from school to PM peak hour.

Alternative 3:

- In 2019, all the intersections operate at LOS 'A' to 'D' during the day with the exception of US 21 Business at Youmans Drive during school peak hour, which operates at LOS 'F'.
- Similar to Alternative 1 in 2040, the two intersections of US 21 Business with Meridian Road and US21 Business with Geechie Road operate at LOS ratings 'C', 'D' and 'E' for AM, school and PM peak hour, respectively.
- Though signalized, the intersection of US 21 Business and Sunset Boulevard operates at LOS 'F' in 2040 during school and PM peak hours. This is due to the high traffic volume that this intersection attracts during these hours.

Summary:

- Alternative 3 causes fewer intersections to operate at LOS 'E' and 'F' in AM and school peak hours but causes more intersections to operate at LOS 'E' and 'F' in PM peak hour. This is due to the higher eastbound traffic on US 21 Business during PM peak, which prevents northbound traffic on the side streets to make a right turn.
- Improvements at school entrance are considered for Alternative 1, which operates at LOS 'F' during AM and School peak hour.
- During all time periods, except for the school entrance delays in Alternative 1, the intersections which are not located on US 21 Business operate at LOS 'C' or better.

Please note that additional traffic analysis data can be found in the Traffic Study included in **Appendix B**.

Table 1. Delay (sec/veh) and LOS for AM peak hour – Signalized intersections shown in gray

AM Peak Hour									
Intersection	Year	No Build		Alt 1		Alt 2		Alt 3	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
US 21 Bus & Meridian Rd/Marina Dwy	2019	25.3	D	12.8	B	12.1	B	10.5	B
US 21 Bus & Geechie Rd		10.3	B	13.1	B	13.6	B	13.1	B
US 21 Bus & Driveway/Sunset Blvd		32.2	D	22.6	C	14.7	B	17.3	B
US 21 Bus & Youmans Dr/Driveway		21	C	14.8	B	21.1	C	21	C
Youmans Dr & School Ent. & Geechie Rd		11.8	B	20.2	C	12.1	B	11.8	B
Carolyn Dr & Youmans Dr		11.2	B	12.4	B	11.3	B	11.2	B
Meridian Rd & Youmans Dr		10.1	B	10.9	B	10.2	B	10.1	B
Meridian Rd & Harborview Cir		9.2	A	9.9	A	14.4	B	9.2	A
US 21 Bus & Meridian Rd/Marina Dwy	2040	60.9	F	21.3	C	33.4	C	29.1	C
US 21 Bus & Geechie Rd		52.6	D	18.4	C	19.7	C	18.4	C
US 21 Bus & Driveway/Sunset Blvd		>200	F	>200	F	36.6	D	46.5	D
US 21 Bus & Youmans Dr/Driveway		39.7	E	24.5	C	>200	F	>200	F
Youmans Dr & School Ent. & Geechie Rd		15.1	C	69	F	16.3	C	15.1	C
Carolyn Dr & Youmans Dr		12.3	B	14.5	B	12.6	B	12.3	B
Meridian Rd & Youmans Dr		11	B	12.5	B	11.2	B	11	B
Meridian Rd & Harborview Cir		9.1	A	9.9	A	12	B	9.1	A

Table 2. Delay (sec/veh) and LOS for school peak hour – Signalized intersections shown in gray

School Peak Hour									
Intersection	Year	No Build		Alt 1		Alt 2		Alt 3	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
US 21 Bus & Meridian Rd/Marina Dwy	2019	22	C	17	B	22.4	C	11.3	B
US 21 Bus & Geechie Rd		22	C	16.5	C	19.1	C	15.8	C
US 21 Bus & Driveway/Sunset Blvd		33	D	22.3	C	13.1	B	23.2	C
US 21 Bus & Youmans Dr/Driveway		>200	F	20.3	C	>200	F	139.8	F
Youmans Dr & School Ent. & Geechie Rd		10.1	B	55	F	10.1	B	10.1	B
Carolyn Dr & Youmans Dr		11.1	B	13.1	B	11.3	B	11.1	B
Meridian Rd & Youmans Dr		10.1	B	10.4	B	10.2	B	10.1	B
Meridian Rd & Harborview Cir		9	A	9.2	A	10.6	B	9	A
US 21 Bus & Meridian Rd/Marina Dwy	2040	>200	F	48.2	D	84.8	F	44.8	D
US 21 Bus & Geechie Rd		124.4	F	30.8	D	40.5	E	30.8	D
US 21 Bus & Driveway/Sunset Blvd		>200	F	>200	F	60.5	E	99.6	F
US 21 Bus & Youmans Dr/Driveway		>200	F	81.2	F	>200	F	>200	F
Youmans Dr & School Ent. & Geechie Rd		12.2	B	>200	F	12.7	B	12.2	B
Carolyn Dr & Youmans Dr		12.2	B	15.7	C	12.5	B	12.2	B
Meridian Rd & Youmans Dr		11.3	B	12.6	B	11.5	B	11.3	B
Meridian Rd & Harborview Cir		9.3	A	9.6	A	18.2	C	9.3	A

Table 3. Delay (sec/veh) and LOS for PM peak hour – Signalized intersections shown in gray

PM Peak Hour									
Intersection	Year	No Build		Alt 1		Alt 2		Alt 3	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
US 21 Bus & Meridian Rd/Marina Dwy	2019	25	C	16.2	B	16.8	B	10.9	B
US 21 Bus & Geechie Rd		13.2	B	19.7	C	19.5	C	18.5	C
US 21 Bus & Driveway/Sunset Blvd		25.1	D	23	C	11.5	B	15	B
US 21 Bus & Youmans Dr/Driveway		26.9	D	13.2	B	27.4	D	26.2	D
Youmans Dr & School Ent. & Geechie Rd		8.3	A	9.2	A	8.3	A	8.3	A
Carolyn Dr & Youmans Dr		10	A	10.2	B	10	A	10	A
Meridian Rd & Youmans Dr		9.8	A	10.2	B	9.9	A	9.8	A
Meridian Rd & Harborview Cir		9.8	A	9.8	A	12.4	B	9.8	A
US 21 Bus & Meridian Rd/Marina Dwy	2040	103.9	F	66.3	E	81.4	F	61.6	E
US 21 Bus & Geechie Rd		69.5	E	35.6	E	39.9	E	35.6	E
US 21 Bus & Driveway/Sunset Blvd		>200	F	>200	F	28.5	C	85.2	F
US 21 Bus & Youmans Dr/Driveway		>200	F	41.9	D	>200	F	>200	F
Youmans Dr & School Ent. & Geechie Rd		8.7	A	10.1	A	8.8	A	8.7	A
Carolyn Dr & Youmans Dr		10.4	B	10.8	B	10.5	B	10.4	B
Meridian Rd & Youmans Dr		10.8	B	11.1	B	10.9	B	10.8	B
Meridian Rd & Harborview Cir		9.9	A	10.3	B	12.4	B	9.9	A

SUMMARY TABLES

Below are summary tables of the three proposed alternatives for comparison purposes. Additional information on the line items included in the table can be seen in the attached Appendices.

Impacts and Pricing Summary Table

	Potential Impacts to Natural Resources (acres)*	Area to be Acquired (acres)	Residential Properties Impacted	Commercial Properties Impacted	Right-of-Way Cost ($)	Construction Cost ($)	Total Cost ($)
Alternative 1	0.7	2.13	4	6	$778,600	$2,737,000	$3,515,600
Alternative 2	1.6	1.82	2	1	$432,100	$2,334,500	$2,766,600
Alternative 3	0	1.13	0	5	$827,600 ($1,834,700)^	$2,012,500	$2,840,100 ($3,847,200)^

*Accounts for areas of green space and woods. Please note that wetlands, streams and buffer areas have not been determined at this time.
^Higher cost for Alternative 3 accounts for potential need to acquire specific parcels in their entirety. Additional information in **Appendix D**.

Traffic Ranking Summary Table

	Overall Traffic Operation Issue	Relative Ranking from a Traffic Standpoint (out of 10)	Reason for Ranking
Alternative 1	Sea Island Parkway is congested during all time periods analyzed. Without widening of the roadway traffic operations will be congested along the entire study area.	6.0	Signal at Yeomans Dr can be tied into to provide access to the residential developments to the north. Shorter distance motorists accessing the school on Sea Island Parkway. Will increase traffic on Yeomans Dr. Operations overall relatively the same as Alternative 2.
Alternative 2		5.5	Will increase traffic through the congested segment of Sea Island Parkway. Requires signal at Meridian Rd immediately. Increases traffic on Meridian Rd. Slightly worse operations versus the Alternative 3.
Alternative 3		6.5	With signal at Sunset Blvd. both residential development to the north and school traffic will have access at a signalized intersection. Very slightly better operations.

FINAL THOUGHTS AND NEXT STEPS

Below is a list of some final thoughts that were discussed at the November 12, 2019 meeting as well as some of the next steps that may need to be taken:

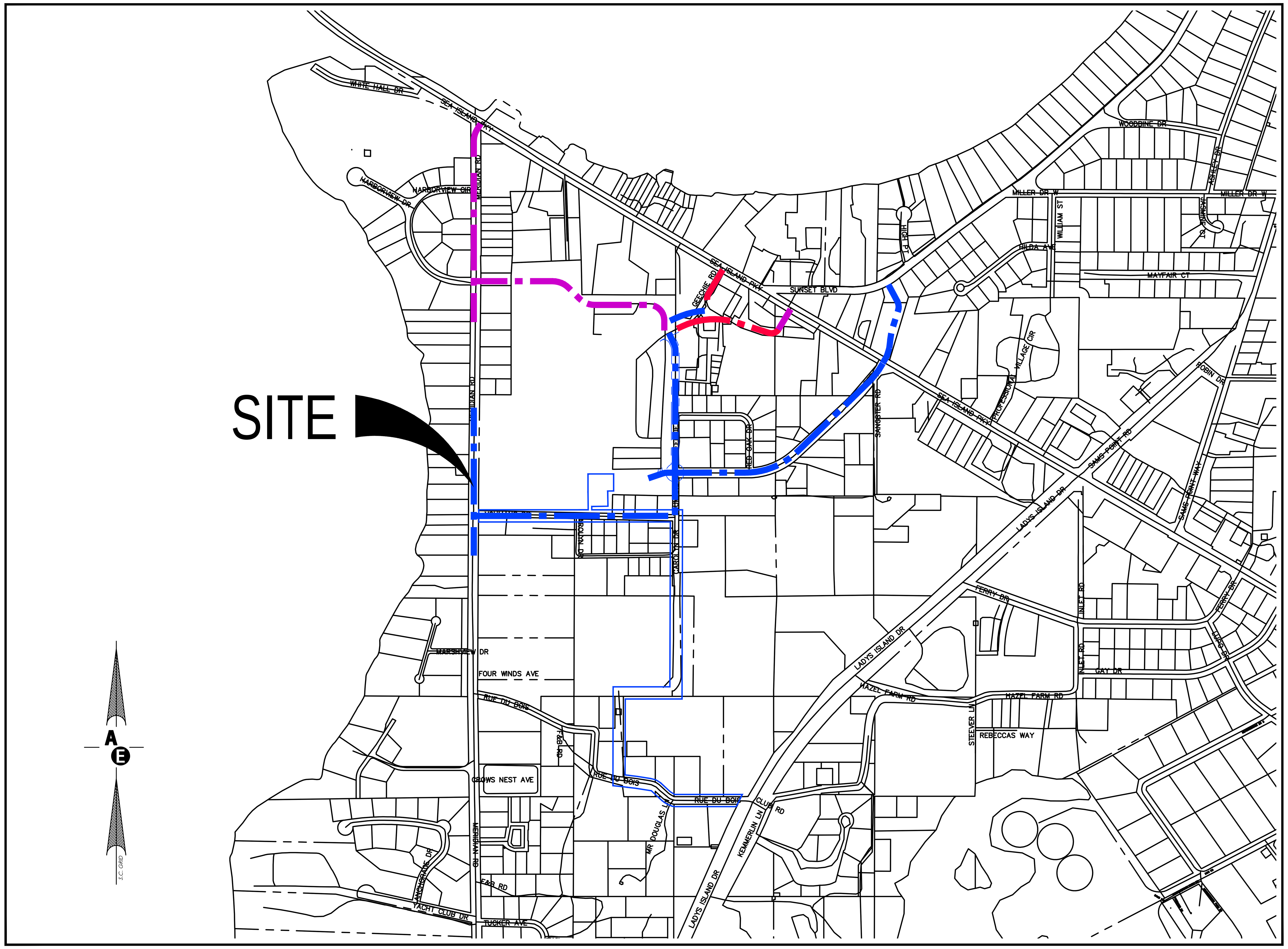
- Right-of-way and construction costs are preliminary and scalable to each alternate for comparison purposes. All costs included in the sections above are expected to change as the design process progresses further.
- A public meeting will need to be held by Beaufort County to discuss the potential design alternatives and help determine the best approach moving forward. Please note that Alternative 3 is the suggested alternate based on receiving the highest ranking from a traffic standpoint, but this may change as public input and other information becomes known as the process evolves.
- Beaufort County must consider the installation of sidewalks as a part of the design as this was not included in the analysis of the three alternatives.
- There were discussions where had on potentially adding a roundabout on SC-802 for school access instead of providing access from US-21, but this was not considered during this analysis as the focus was on access to the school from US-21. Beaufort County will need to determine if they would like to pursue this option further.

APPENDIX A
SITE DEVELOPMENT PLAN

SITE DEVELOPMENT PLAN

FOR

BEAUFORT HIGH SCHOOL ACCESS ALTERNATIVES
U.S. HWY. 21 (SEA ISLAND PARKWAY)
LADY'S ISLAND
BEAUFORT COUNTY, SOUTH CAROLINA



VICINITY MAP

NOT TO SCALE

DATUM: NGVD29 VERTICAL / NAD83 HORZ.

N.P.D.E.S. DISTURBED AREA = 0.0 ACRES

3 DAYS BEFORE DIGGING IN SOUTH CAROLINA
CALL 1-888-721-7877
PALMETTO UTILITY PROTECTION SERVICE

APPROXIMATE LOCATION OF SITE:

LONGITUDE: 00°–00'–00"
LATITUDE: 00°–00'–00"

DEVELOPER NAME:

BEAUFORT COUNTY
2266 BOUNDARY STREET
BEAUFORT, SC 29901
843–255–2700

PROJECT DATA INFORMATION:

BEAUFORT HIGH SCHOOL ACCESS ALTERNATIVES
DISTRICT #: ––––
MAP #:––
PARCEL #: –––– –––
PROJECT ZONING: ––––
ZONING BOUNDARIES: ––––
FEMA FLOOD ZONE: ––––

PHONE #:		PERMIT#:
B.J.W.S.A.	843.987.9250	––––––––––
D.H.E.C.	843.522.3345	––––––––––
O.C.R.M.	843.744.5898	––––––––––
S.C.D.O.T.	843.524.7255	––––––––––
S.C.E.&G.	843.525.7712	––––––––––
PAL. ELEC.	843.208.5512	––––––––––

APPROVED FOR CONSTRUCTION

BY: ______________________ / /
DATE

Andrews Engineering & Surveying
2712 Bull Street Suite A
Beaufort, SC 29902
843.379.2222
Fax 843.379.2223

SOUTH CAROLINA ANDREWS ENGINEERING CO. NO. C00008 CERTIFICATE OF AUTHORIZATION

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INDEX OF DRAWINGS

SHEET #	*DESCRIPTION*
	TITLE
1	ALTERNATIVE 1 PLAN
2	ALTERNATIVE 2 PLAN
3	ALTERNATIVE 3 PLAN
4	APPROXIMATE RIGHT OF WAY ACQUISITION PLAN
5	MERIDIAN RD. SIGNAL AND GEECHIE RD. RI/RO
6	GEECHIE RD. TO YOUMANS DR. CONNECTION AND YOUMANS DR. SIGNAL
7	MERIDIAN RD. AND YOUMANS DR. INTERSECTION
8	SEPARATE BUS ROUTE FROM PARENT/STUDENT DROP OFF AREA
9	MERIDIAN RD. AND NEW SCHOOL ACCESS RD. INTERSECTION
10	SUNSET BLVD. AND GEECHIE RD.
11	TYPICAL ROAD SECTIONS
12	TYPICAL ROAD SECTIONS

DRAWING RELEASED FOR:

☑	PLAN REVIEW	10 / 16 / 2019
☐	PERMIT DRAWINGS	____/____/_____
☐	CONSTRUCTION DRAWINGS	____/____/_____
☐	BID SET	____/____/_____
☐	RECORD DRAWINGS	____/____/_____
☐	OTHER: ______________	____/____/_____

PLAN REVISIONS

NO.	DESCRIPTION:	DATE:	BY:
1	–	–	–
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4	–	–	–
5	–	–	–
6	–	–	–
7	–	–	–
8	–	–	–

PROPOSED LANE CONFIGURATION
ALTERNATIVE 1
YOUMANS DRIVE

* REMOVE SIGNAL AND CONVERT GEECHIE ROAD TO R-IN/R-OUT
* IMPROVE GEECHIE ROAD TO YOUMANS DRIVE
* ADD TRAFFIC SIGNAL AND RIGHT TURN LANE AT YOUMANS DRIVE AND SEA ISLAND PARKWAY
* BEAUFORT MEMORIAL EXISTING THRU ACCESS TO BE ADDRESSED
* ADD LEFT TURN LANE AT MERIDIAN ROAD AND YOUMANS DRIVE

WHITEHALL DEVELOPMENT AGREEMENT

REMOVE SIGNAL AT GEECHIE ROAD AND CONVERT TO RIGHT-IN/RIGHT-OUT (ALL 3 ALTERNATIVES)

SEA ISLAND PARKWAY

SUNSET BLVD.

BEAUFORT MEMORIAL ACCESS

ADD SIGNAL AT YOUMANS DRIVE + US 21 (ALTERNATIVE 1)

MERIDIAN ROAD 66' R/W

BUS DROP OFF AREA

GEECHIE ROAD 80' R/W

YOUMANS DRIVE 66' R/W

ADD LEFT TURN LANE ON MERIDIAN ROAD AT YOUMANS ROAD INTERSECTION (ALTERNATIVE 1)

YOUMANS DRIVE 40' R/W

IMPROVE GEECHIE ROAD, ADD TRAFFIC CIRCLE (ALTERNATIVE 1)

R/W RESTRICTIONS PROHIBIT WIDENING YOUMANS DRIVE. RESURFACE THE EXISTING 21' WIDE ROAD AND REGRADE DRAINAGE SWALES. (ALTERNATIVE 1)

BUS ACCESS ROUTE (SEE SHT. 8 of 12)

CAROLYN DRIVE

GRAPHIC SCALE
200 0 100 200 400 800
(IN FEET)
1 inch = 200 ft.

© 2017

F:\Projects\2019\2019 Projects\190009 Beaufort High Access Road\DWG\190009_mst BHS Access.dwg

PRELIMINARY / NOT FOR CONSTRUCTION

PLAN REVISIONS

NO.	DESCRIPTION:	DATE:	BY:
1	-	-	-
2	-	-	-
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Fax 843.379.2223

Preliminary Site Plan
For
Beaufort High Access
U.S. Hwy. 21
Lady's Island
Beaufort County, SC

Alternative 1
Plan

Date Drawn:	03/01/19
Last Revised:	10/16/19
Drawn By:	R. Crosby
Engineer:	S. Andrews

SHEET #: 1 of 12

JOB: 190009

PROPOSED LANE CONFIGURATION
ALTERNATIVE 2
MERIDIAN ROAD

* ADD SIGNAL AND RIGHT TURN LANE AT MERIDIAN ROAD AND SEA ISLAND PARKWAY

* REMOVE SIGNAL AND CONVERT GEECHIE ROAD TO R-IN/R-OUT

* BUILD ROAD THRU BCSD TO ACCESS MERIDIAN ROAD ADD LEFT TURN ON MERIDIAN ROAD

* ADD TRAFFIC SIGNAL AT SUNSET BLVD.

ADD SIGNAL AND RIGHT TURN LANE ALTERNATIVE 2

WHITEHALL DEVELOPMENT AGREEMENT

REMOVE SIGNAL AT GEECHIE ROAD AND CONVERT TO RIGHT-IN/RIGHT-OUT (ALL 3 ALTERNATIVES)

ADD SIGNAL AT SUNSET BLVD. (ALTERNATIVES 2 + 3)

SEA ISLAND PARKWAY

SUNSET BLVD.

ADD LEFT TURN LANE ON MERIDIAN ROAD AT SCHOOL ACCESS ROAD (ALTERNATIVE 2)

MERIDIAN ROAD 66' R/W

BUS DROP OFF AREA

GEECHIE ROAD 66' R/W

YOUMANS DRIVE 66' R/W

YOUMANS DRIVE 40' R/W

CAROLYN DRIVE

BEAUFORT MEMORIAL ACCESS

GRAPHIC SCALE
200 0 100 200 400 800
(IN FEET)
1 inch = 200 ft.

© 2017

F:\Projects\2019\2019 Projects\190009 Beaufort High Access Road\DWG\190009_mst BHS Access.dwg

PRELIMINARY / NOT FOR CONSTRUCTION

PLAN REVISIONS

NO.	DESCRIPTION:	DATE:	BY:
1	-	-	-
2	-	-	-
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843.379.2222
Fax 843.379.2223
& Surveying

Preliminary Site Plan
For
Beaufort High Access
U.S. Hwy. 21
Lady's Island
Beaufort County, SC

Alternative 2
Plan

Date Drawn:	03/01/19
Last Revised:	10/16/19
Drawn By:	R. Crosby
Engineer:	S. Andrews

SHEET #:
2 of 12

JOB: 190009

PROPOSED LANE CONFIGURATION
ALTERNATIVE 3
SUNSET BLVD.

* REMOVE SIGNAL AND CONVERT GEECHIE ROAD TO R-IN/R-OUT

* BUILD ROAD THRU LADY'S ISLAND SHOPPING CENTER TO ACCESS INTERSECTION AT SUNSET BLVD.

* ADD TRAFFIC SIGNAL AT SUNSET BLVD.

WHITEHALL DEVELOPMENT AGREEMENT

REMOVE SIGNAL AT GEECHIE ROAD AND CONVERT TO RIGHT-IN/RIGHT-OUT (ALL 3 ALTERNATIVES)

ADD SIGNAL AT SUNSET BLVD. (ALTERNATIVES 2 + 3)

SEA ISLAND PARKWAY

SUNSET BLVD.

MERIDIAN ROAD 66' R/W

BUS DROP OFF AREA

GEECHIE ROAD 30' R/W

YOUMANS DRIVE 66' R/W

YOUMANS DRIVE 40' R/W

CAROLYN DRIVE

BEAUFORT MEMORIAL ACCESS

GRAPHIC SCALE
200 0 100 200 400 800
(IN FEET)
1 inch = 200 ft.

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PLAN REVISIONS

NO.	DESCRIPTION:	DATE:	BY:
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SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER STEVEN WADE ANDREWS NO. 12860

SOUTH CAROLINA ANDREWS ENGINEERING CO. No. C00008 CERTIFICATE OF AUTHORIZATION

Andrews Engineering
& Surveying
2712 Bull Street Suite A
Beaufort, SC 29902
843.379.2222
Fax: 843.379.2223

Preliminary Site Plan
For
Beaufort High Access
U.S. Hwy. 21
Lady's Island
Beaufort County, SC

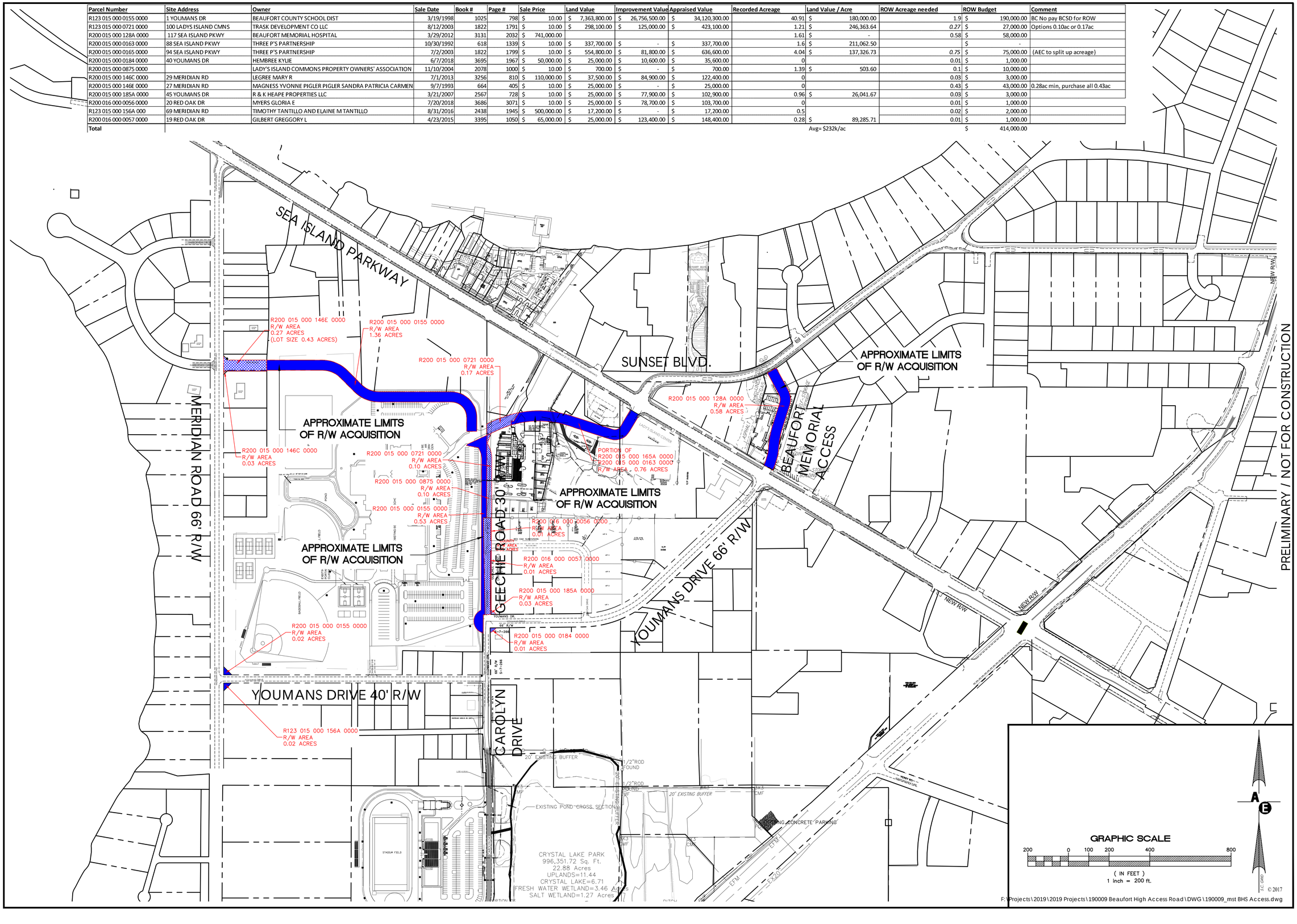
Alternative 3
Plan

Date Drawn:	03/01/19
Last Revised:	10/16/19
Drawn By:	R. Crosby
Engineer:	S. Andrews

SHEET #: 3 of 12

JOB: 190009

Parcel Number	Site Address	Owner	Sale Date	Book #	Page #	Sale Price	Land Value	Improvement Value	Appraised Value	Recorded Acreage	Land Value / Acre	ROW Acreage needed	ROW Budget	Comment
R123 015 000 0155 0000	1 YOUMANS DR	BEAUFORT COUNTY SCHOOL DIST	3/19/1998	1025	798	$ 10.00	$ 7,363,800.00	$ 26,756,500.00	$ 34,120,300.00	40.91	$ 180,000.00	1.9	$ 190,000.00	BC No pay BCSD for ROW
R123 015 000 0721 0000	100 LADYS ISLAND CMNS	TRASK DEVELOPMENT CO LLC	8/12/2003	1822	1791	$ 10.00	$ 298,100.00	$ 125,000.00	$ 423,100.00	1.21	$ 246,363.64	0.27	$ 27,000.00	Options 0.10ac or 0.17ac
R200 015 000 128A 0000	117 SEA ISLAND PKWY	BEAUFORT MEMORIAL HOSPITAL	3/29/2012	3131	2032	$ 741,000.00				1.61	$ -	0.58	$ 58,000.00	
R200 015 000 0163 0000	88 SEA ISLAND PKWY	THREE P'S PARTNERSHIP	10/30/1992	618	1339	$ 10.00	$ 337,700.00	$ -	$ 337,700.00	1.6	$ 211,062.50		$ -	
R200 015 000 0165 0000	94 SEA ISLAND PKWY	THREE P'S PARTNERSHIP	7/2/2003	1822	1799	$ 10.00	$ 554,800.00	$ 81,800.00	$ 636,600.00	4.04	$ 137,326.73	0.75	$ 75,000.00	(AEC to split up acreage)
R200 015 000 0184 0000	40 YOUMANS DR	HEMBREE KYLIE	6/7/2018	3695	1967	$ 50,000.00	$ 25,000.00	$ 10,600.00	$ 35,600.00	0		0.01	$ 1,000.00	
R200 015 000 0875 0000		LADY'S ISLAND COMMONS PROPERTY OWNERS' ASSOCIATION	11/10/2004	2078	1000	$ 10.00	$ 700.00	$ -	$ 700.00	1.39	$ 503.60	0.1	$ 10,000.00	
R200 015 000 146C 0000	29 MERIDIAN RD	LEGREE MARY R	7/1/2013	3256	810	$ 110,000.00	$ 37,500.00	$ 84,900.00	$ 122,400.00	0		0.03	$ 3,000.00	
R200 015 000 146E 0000	27 MERIDIAN RD	MAGNESS YVONNE PIGLER PIGLER SANDRA PATRICIA CARMEN	9/7/1993	664	405	$ 10.00	$ 25,000.00	$ -	$ 25,000.00	0		0.43	$ 43,000.00	0.28ac min, purchase all 0.43ac
R200 015 000 185A 0000	45 YOUMANS DR	R & K HEAPE PROPERTIES LLC	3/21/2007	2567	728	$ 10.00	$ 25,000.00	$ 77,900.00	$ 102,900.00	0.96	$ 26,041.67	0.03	$ 3,000.00	
R200 016 000 0056 0000	20 RED OAK DR	MYERS GLORIA E	7/20/2018	3686	3071	$ 10.00	$ 25,000.00	$ 78,700.00	$ 103,700.00	0		0.01	$ 1,000.00	
R123 015 000 156A 000	69 MERIDIAN RD	TIMOTHY TANTILLO AND ELAINE M TANTILLO	8/31/2016	2438	1945	$ 500,000.00	$ 17,200.00	$ -	$ 17,200.00	0.5		0.02	$ 2,000.00	
R200 016 000 0057 0000	19 RED OAK DR	GILBERT GREGGORY L	4/23/2015	3395	1050	$ 65,000.00	$ 25,000.00	$ 123,400.00	$ 148,400.00	0.28	$ 89,285.71	0.01	$ 1,000.00	
Total											Avg= $232k/ac		$ 414,000.00	



PLAN REVISIONS

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SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER STEVEN WADE SNYDER NO. 12860

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Andrews Engineering & Surveying
2712 Bull Street Suite A
Beaufort, SC 29902
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Fax 843.379.2223

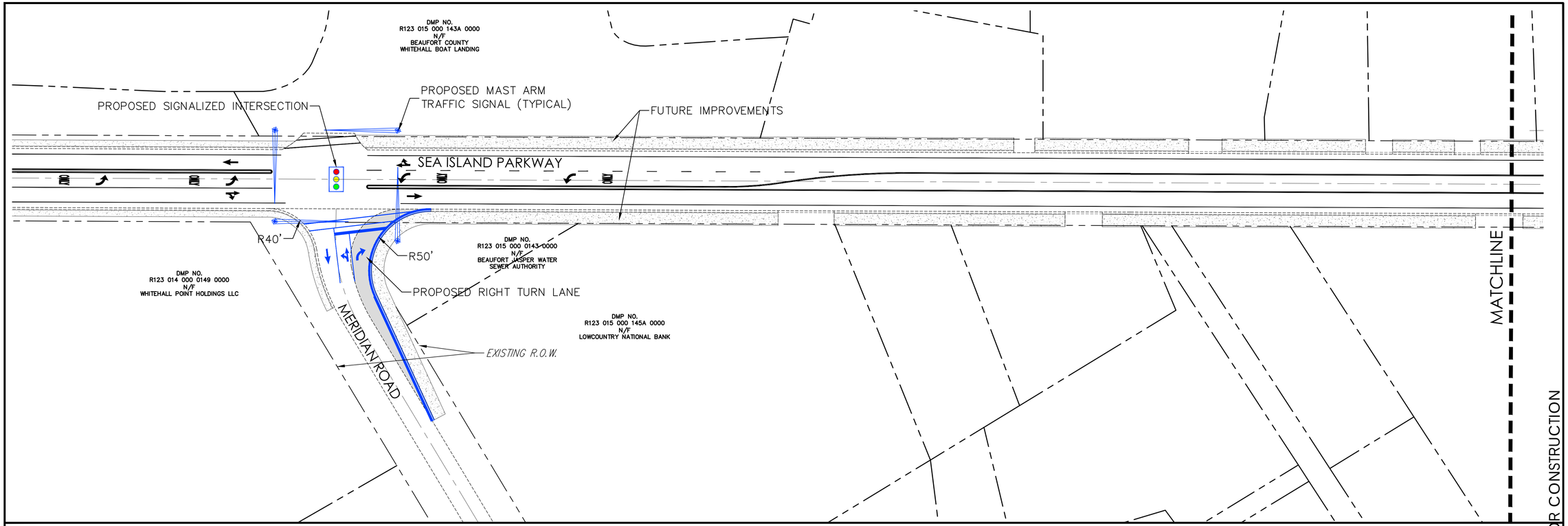
Preliminary Site Plan
For
Beaufort High Access
U.S. Hwy. 21
Lady's Island
Beaufort County, SC

Approximate
Right of Way
Acquisition
Plan

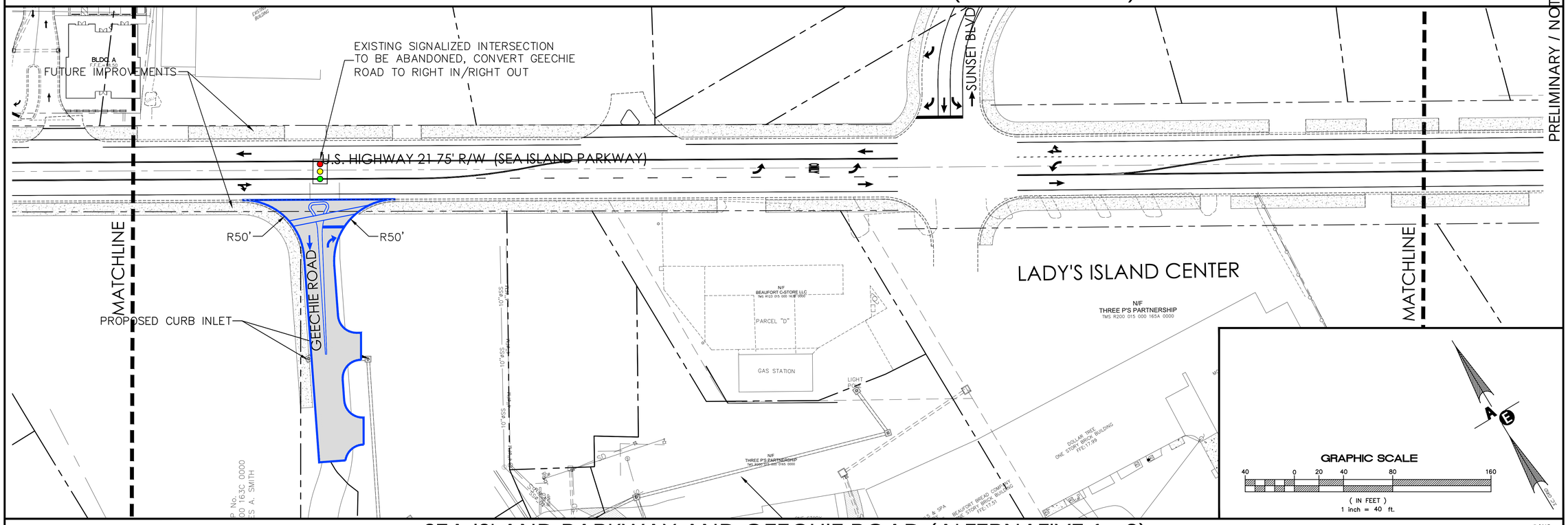
Date Drawn:	03/01/19
Last Revised:	10/16/19
Drawn By:	R. Crosby
Engineer:	S. Andrews

SHEET #: 4 of 12

JOB: 190009



SEA ISLAND PARKWAY AND MERIDIAN ROAD (ALTERNATIVE 2)



SEA ISLAND PARKWAY AND GEECHIE ROAD (ALTERNATIVE 1 - 3)

PRELIMINARY / NOT FOR CONSTRUCTION

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SOUTH CAROLINA ★ ANDREWS ENGINEERING CO. No. C00008 ★ CERTIFICATE OF AUTHORIZATION

Andrews Engineering & Surveying
2712 Bull Street Suite A
Beaufort, SC 29902
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Fax 843.379.2223

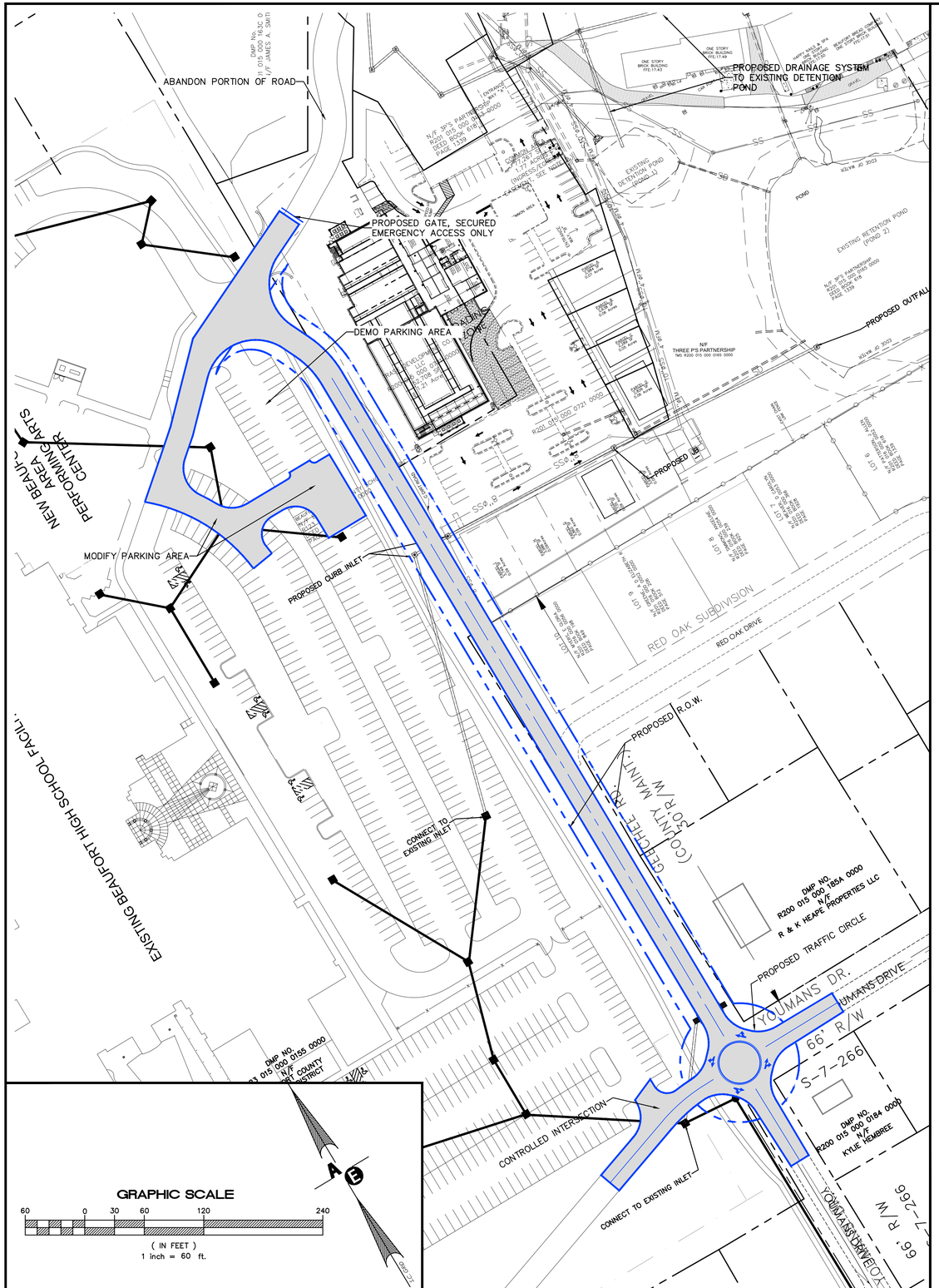
Preliminary Site Plan
For
Beaufort High Access
U.S. Hwy. 21
Lady's Island
Beaufort County, SC

Meridian Road Signal
and Geechie Road
Right-in/Right-out

Date Drawn:	03/01/19
Last Revised:	10/16/19
Drawn By:	R. Crosby
Engineer:	S. Andrews

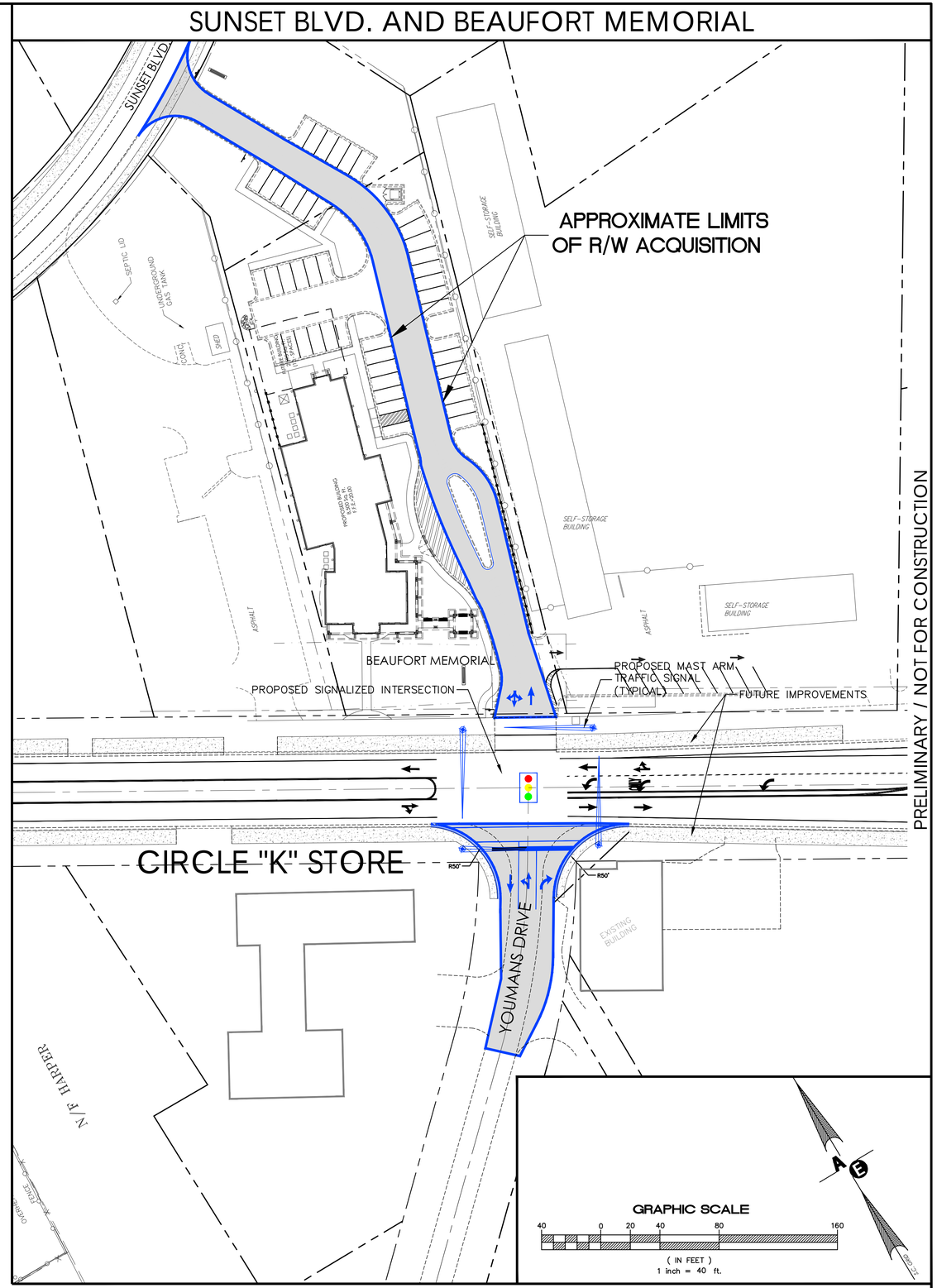
SHEET #:
5
of 12

JOB: 190009



GEECHIE ROAD TO YOUMANS DRIVE

SUNSET BLVD. AND BEAUFORT MEMORIAL



SEA ISLAND PARKWAY AND YOUMANS DRIVE

PRELIMINARY / NOT FOR CONSTRUCTION

PLAN REVISIONS

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Preliminary Site Plan
For
Beaufort High Access Rd.
U.S. Hwy. 21
Lady's Island
Beaufort County, SC

Geechie Road To Youmans Dr. Connection and Youmans Dr. Signal

Date Drawn:	03/01/19
Last Revised:	10/16/19
Drawn By:	R. Crosby
Engineer:	S. Andrews

SHEET #: 6 of 12

JOB: 190009

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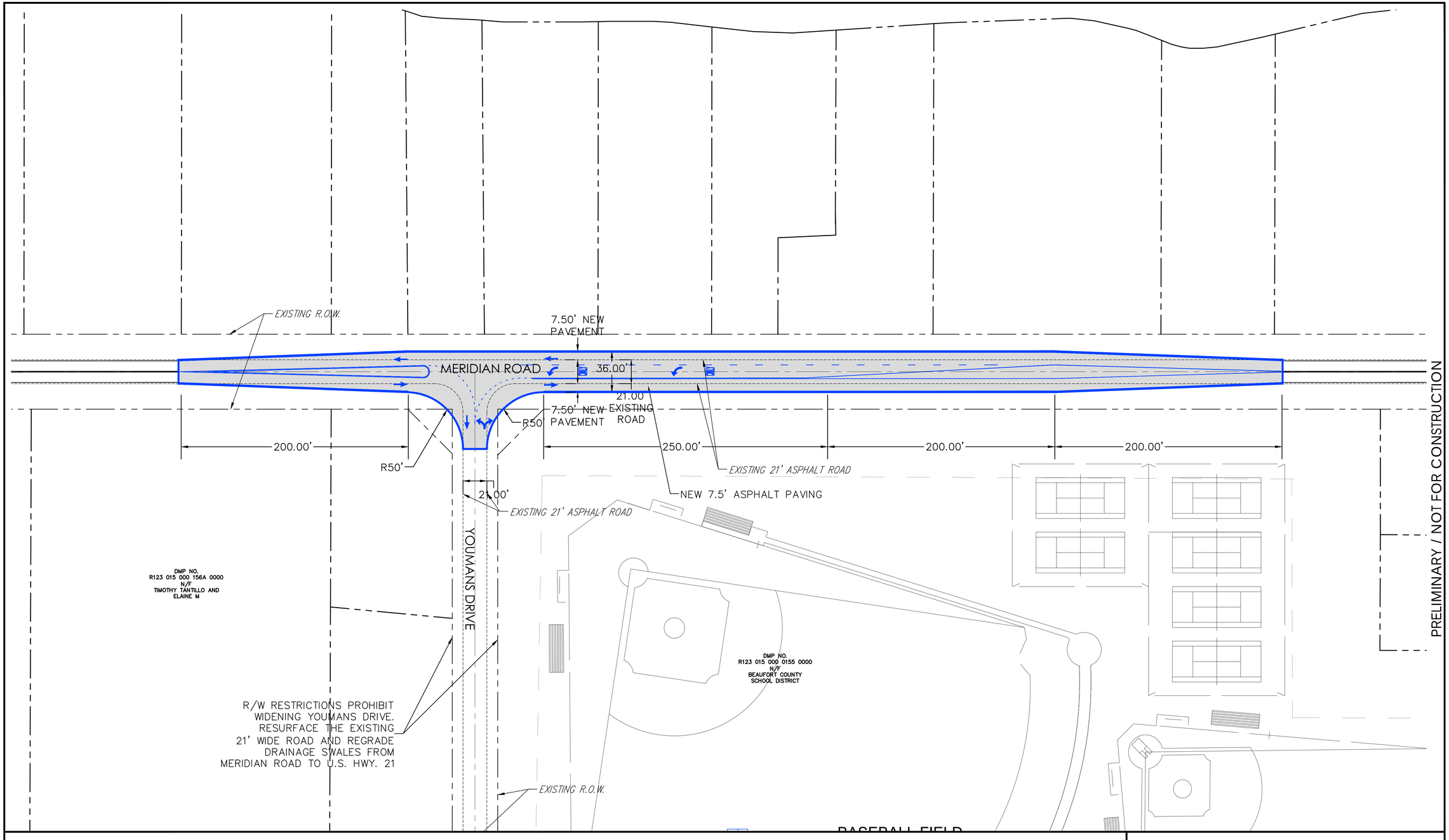

MERIDIAN ROAD AND YOUMANS DRIVE

S.C. GRID

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

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PLAN REVISIONS

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Fax 843.379.2223

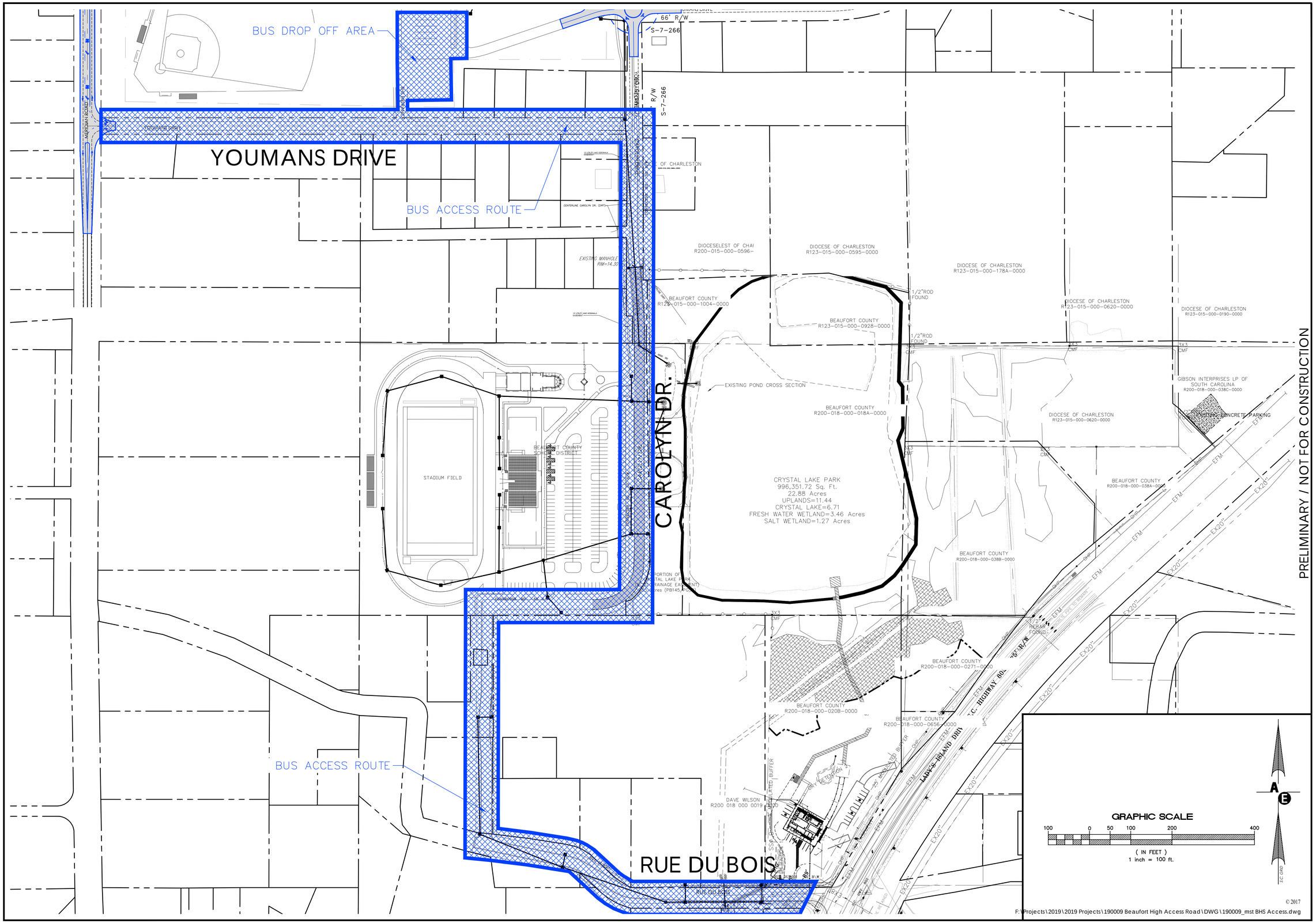
Preliminary Site Plan
For
Beaufort High Access Rd.
U.S. Hwy. 21
Lady's Island
Beaufort County, SC

Meridian Road and Youmans Drive Intersection

Date Drawn:	03/01/19
Last Revised:	10/16/19
Drawn By:	R. Crosby
Engineer:	S. Andrews

SHEET #: 7 of 12

JOB: 190009



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Andrews Engineering & Surveying
2712 Bull Street Suite A
Beaufort, SC 29902
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Fax 843.379.2223

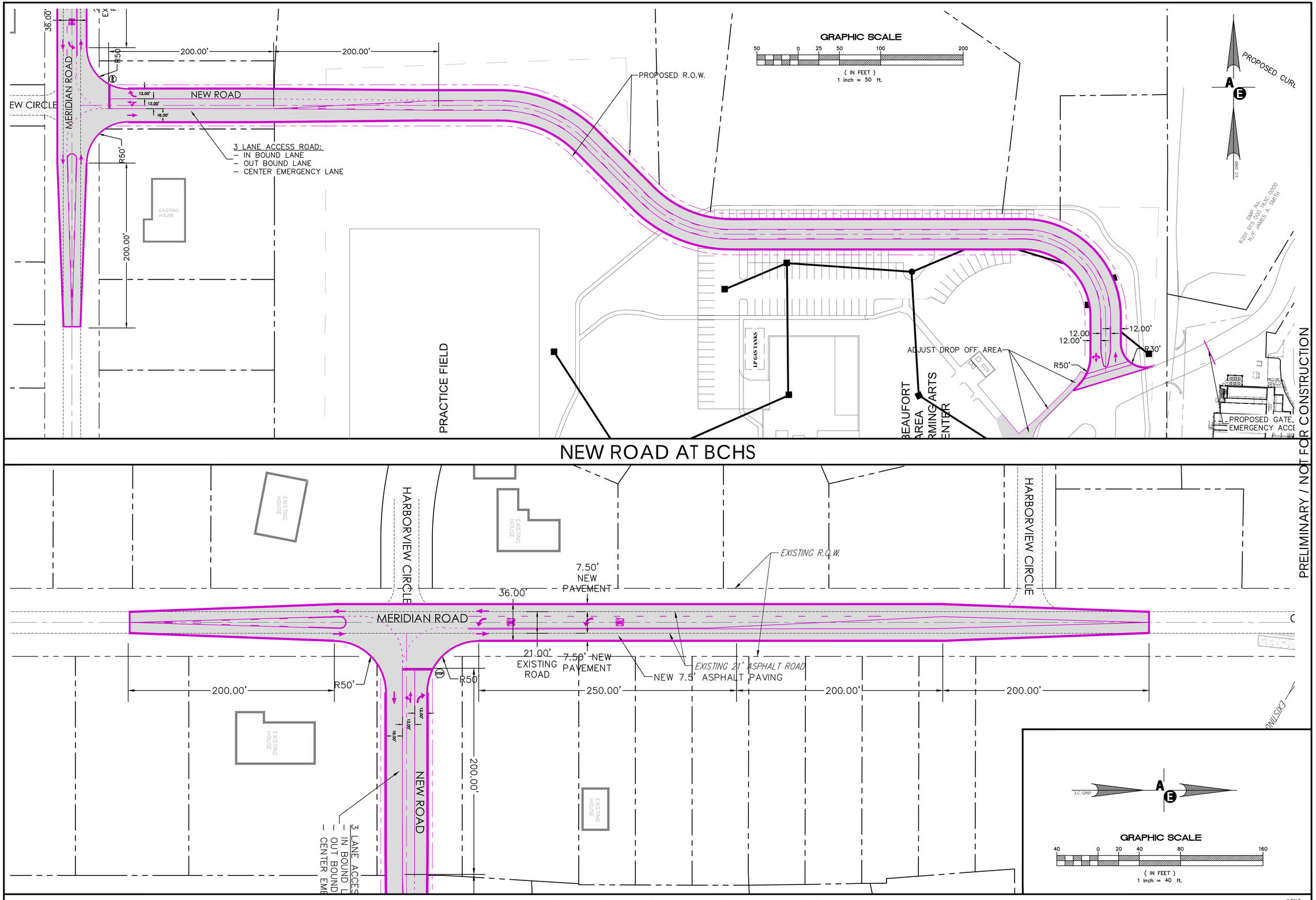
Preliminary Site Plan
For
Beaufort High Access Rd.
U.S. Hwy. 21
Lady's Island
Beaufort County, SC

Separate Bus Route
From Parent/Student
Drop Off Area

Date Drawn:	03/01/19
Last Revised:	10/16/19
Drawn By:	R. Crosby
Engineer:	S. Andrews

SHEET #:
8
of 12

JOB: 190009



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843.379.2222
Fax 843.379.2223

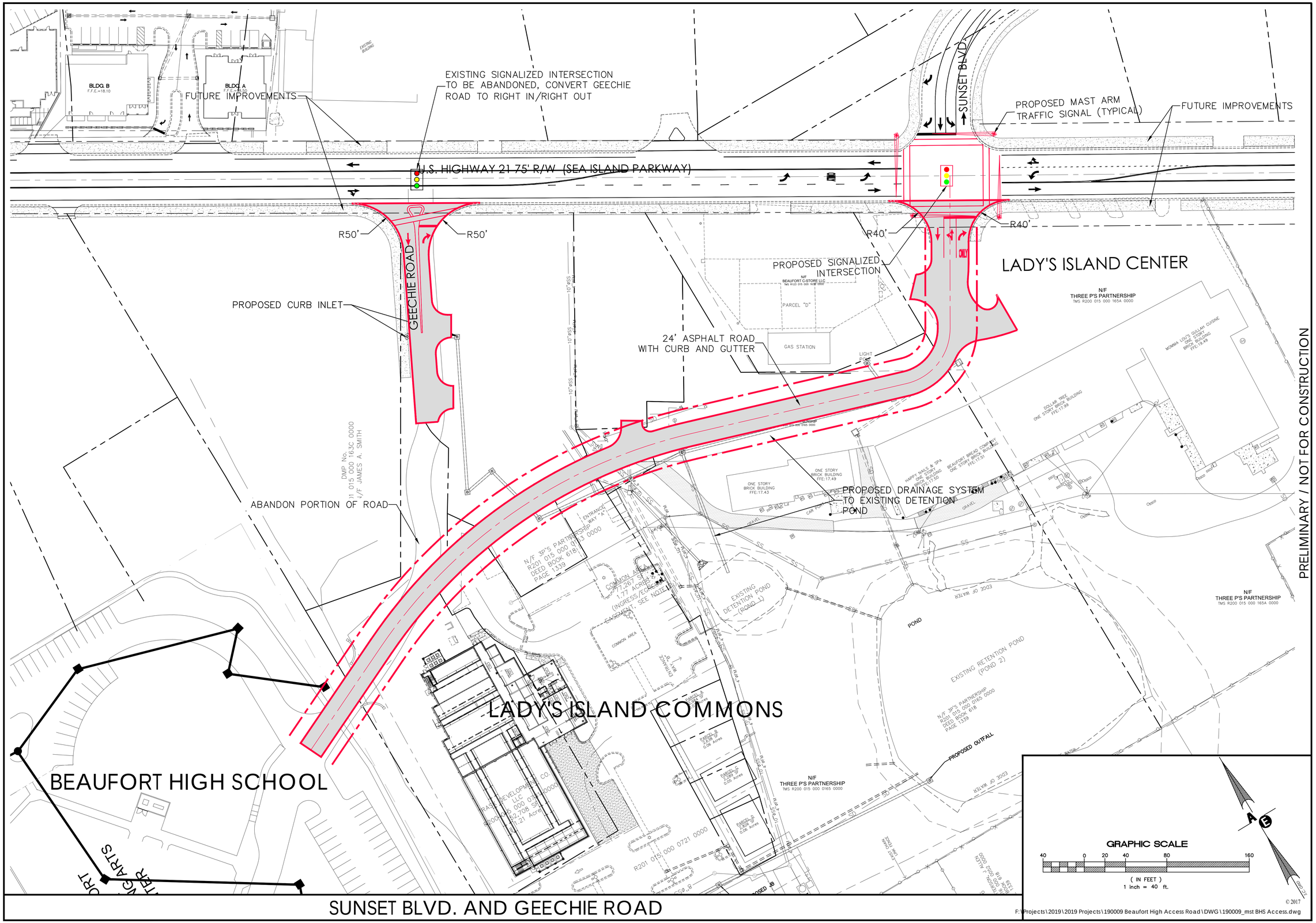
Preliminary Site Plan
For
Beaufort High Access
U.S. Hwy. 21
Lady's Island
Beaufort County, SC

Meridian Road and
New School Access
Road Intersection

Date Drawn:	03/01/19
Last Revised:	10/16/19
Drawn By:	R. Crosby
Engineer:	S. Andrews

SHEET #:
9
of 12

JOB: 190009



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SUNSET BLVD. AND GEECHIE ROAD

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Andrews Engineering & Surveying
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Beaufort, SC 29902
843.379.2222
Fax 843.379.2223

Preliminary Site Plan
For
Beaufort High Access
U.S. Hwy. 21
Lady's Island
Beaufort County, SC

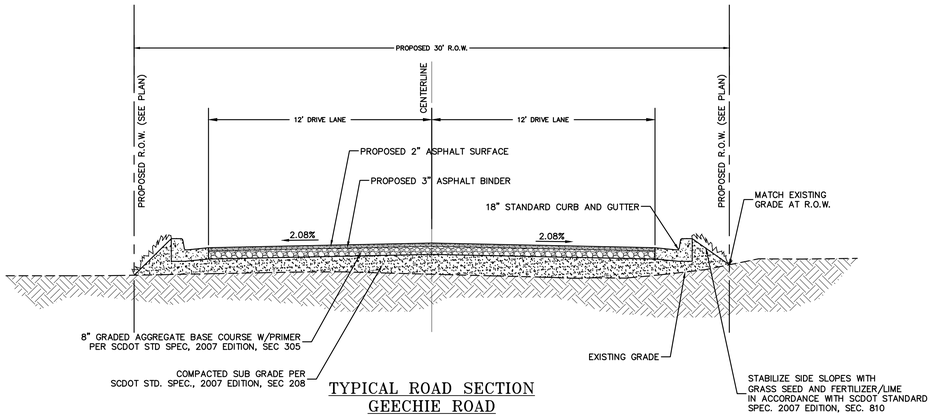
Sunset Blvd.
and
Geechie Road

Date Drawn:	03/01/19
Last Revised:	10/16/19
Drawn By:	R. Crosby
Engineer:	S. Andrews

SHEET #:
10
of 12

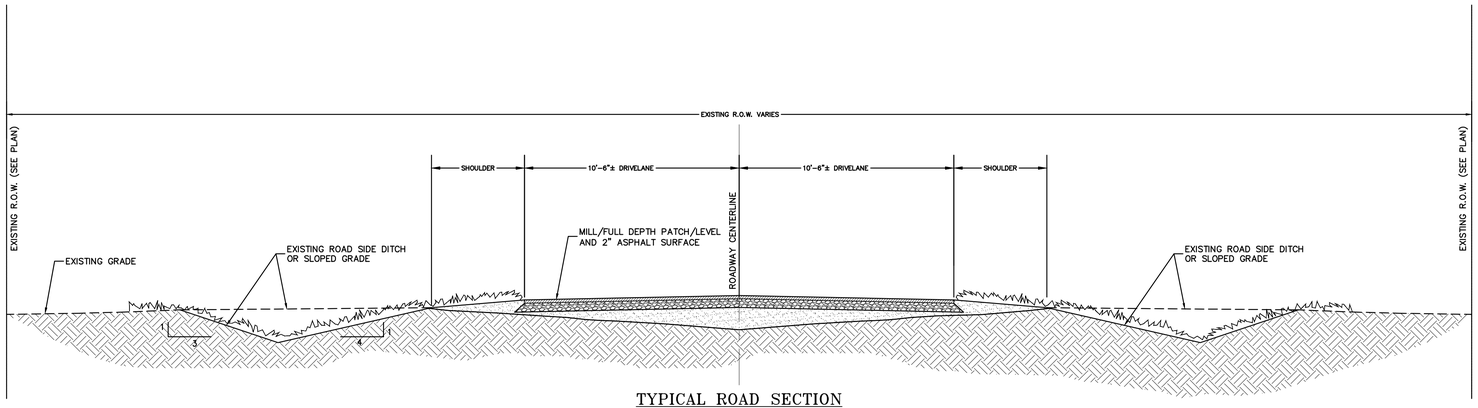
JOB: 190009

DRAINAGE NOTE:
STORM RUNOFF COLLECTED
IN CURB INLETS AND PIPED
TO EXISTING STORM POND.



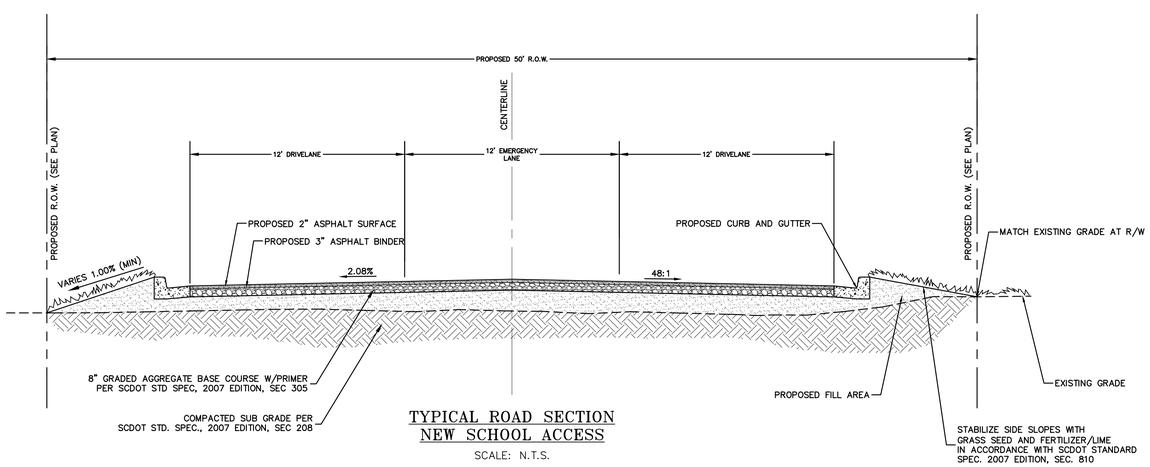
TYPICAL ROAD SECTION
GEECHIE ROAD
SCALE: N.T.S.

DRAINAGE NOTE:
STORM RUNOFF COLLECTED
IN EXISTING ROAD
SIDE DITCHES.

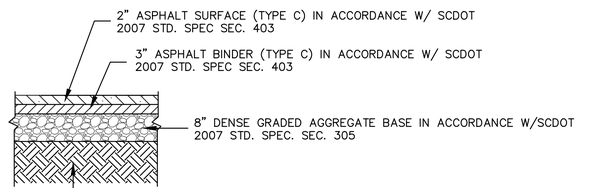


TYPICAL ROAD SECTION
YOUMANS DRIVE
SCALE: N.T.S.

DRAINAGE NOTE:
STORM RUNOFF COLLECTED
IN CURB INLETS AND PIPED
TO EXISTING STORMWATER POND.



TYPICAL ROAD SECTION
NEW SCHOOL ACCESS
SCALE: N.T.S.



HEAVY DUTY ASPHALT PAVING DETAIL
N.T.S

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PLAN REVISIONS

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SOUTH CAROLINA PROFESSIONAL ENGINEER
REGISTERED
STEVEN WADE SNYDER
NO. 12860

SOUTH CAROLINA
ANDREWS ENGINEERING CO.
No. C00008
CERTIFICATE OF AUTHORIZATION

Andrews Engineering & Surveying
2712 Bull Street Suite A
Beaufort, SC 29902
843.379.2222
Fax 843.379.2223

Preliminary Site Plan
For
Beaufort High Access
U.S. Hwy. 21
Lady's Island
Beaufort County, SC

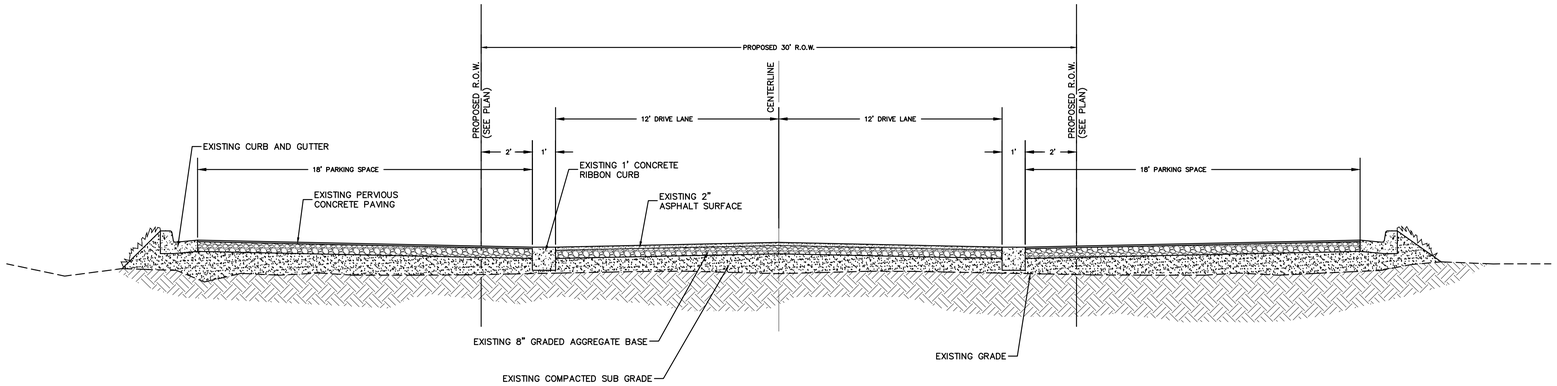
Typical Road Sections

Date Drawn:	03/01/19
Last Revised:	10/16/19
Drawn By:	R. Crosby
Engineer:	S. Andrews

SHEET #: 11 of 12

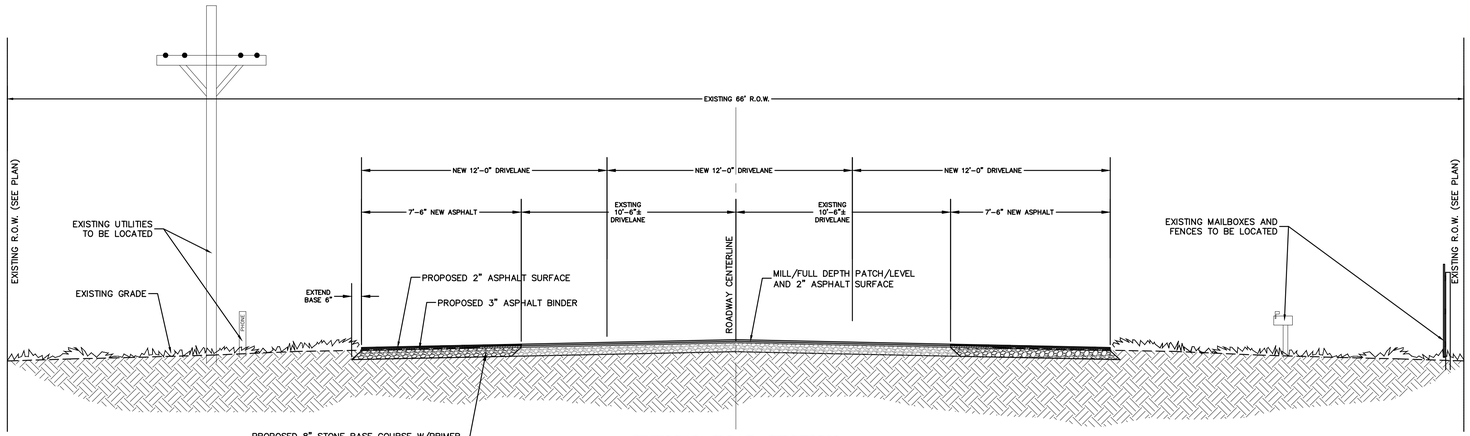
JOB: 190009

DRAINAGE NOTE:
STORM RUNOFF COLLECTED IN EXISTING US HWY. 21 STORM SYSTEM.



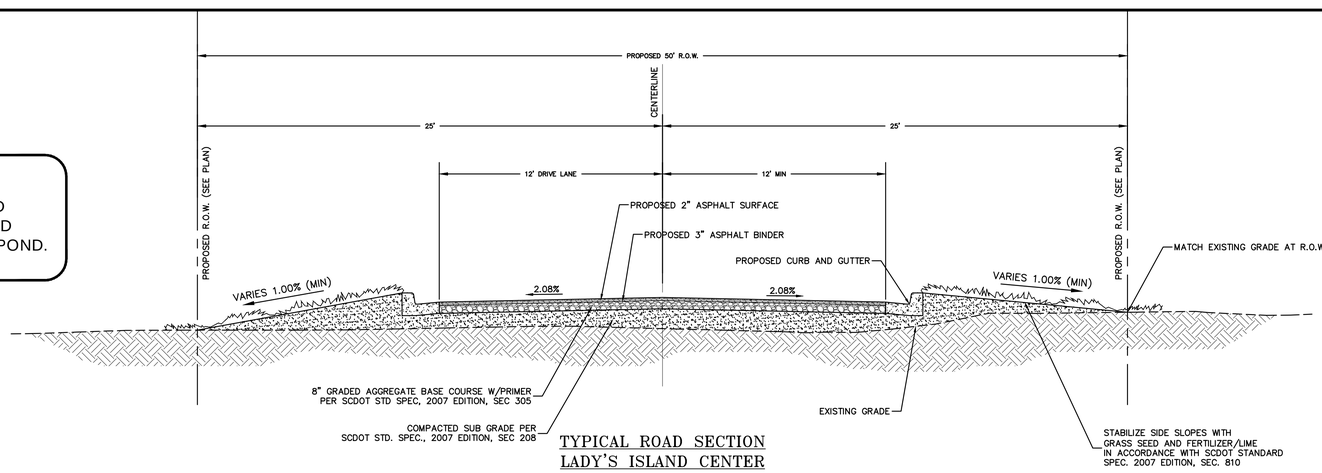
TYPICAL ROAD SECTION
BEAUFORT MEMORIAL HOSPITAL
LADY'S ISLAND EXISTING ACCESS
SCALE: N.T.S.

DRAINAGE NOTE:
STORM RUNOFF COLLECTED IN EXISTING ROAD SIDE DITCHES.

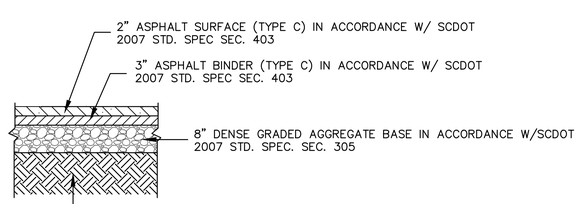


TYPICAL ROAD SECTION
MERIDIAN ROAD TURN LANE
SCALE: N.T.S.

DRAINAGE NOTE:
STORM RUNOFF COLLECTED WITH CURB INLETS AND PIPED TO EXISTING STORMWATER POND.



TYPICAL ROAD SECTION
LADY'S ISLAND CENTER
SCALE: N.T.S.



HEAVY DUTY ASPHALT PAVING DETAIL
N.T.S

PRELIMINARY / NOT FOR CONSTRUCTION

PLAN REVISIONS

NO.	DESCRIPTION:	DATE:	BY:
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2	-	-	-
3	-	-	-
4	-	-	-
5	-	-	-
6	-	-	-
7	-	-	-
8	-	-	-

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SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER STEVEN WADE ANDREWS NO. 12860

SOUTH CAROLINA ANDREWS ENGINEERING CO. No. C00008 CERTIFICATE OF AUTHORIZATION

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843.379.2222
Fax 843.379.2223

Preliminary Site Plan
For
Beaufort High Access
U.S. Hwy. 21
Lady's Island
Beaufort County, SC

Typical Road Sections

Date Drawn:	03/01/19
Last Revised:	10/16/19
Drawn By:	R. Crosby
Engineer:	S. Andrews

SHEET #: 12 of 12

JOB: 190009

© 2017

F:\Projects\2019\2019 Projects\190009 Beaufort High Access Road\DWG\190009_mst BHS Access.dwg

APPENDIX B
TRAFFIC STUDY

TECHNICAL REPORT

BEAUFORT HIGH SCHOOL ACCESS ROAD TRAFFIC STUDY

Submitted to:
Beaufort County
November 1, 2019

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I) INTRODUCTION

Beaufort County requested a traffic study to evaluate three alternatives for relocating access to Beaufort High School, which is located off US 21 Business (Sea Island Parkway). The purpose of the relocation is to improve accessibility, operations and safety along US 21 Business, while addressing future development along the corridor.

In order to evaluate the alternatives, traffic data was collected including turning movement counts, pedestrian and bicycle counts, crash data, spot speeds, roadway geometrics including lane configurations, peak period field observations and previous studies completed in the area. Analysis was conducted for existing 2019 and 2040 traffic volumes. These volumes were reassigned for the three alternatives and traffic analysis was conducted using the Highway Capacity Manual output from Synchro. SimTraffic was utilized for queuing analysis. SIDRA INTERSECTION was used for roundabout analysis.

II) STUDY AREA LOCATION AND CHARACTERISTICS

Beaufort High School is located off US 21 Business (Sea Island Parkway) in the Hazel Farm and Lady's Island area of the County. Currently, access to the Beaufort High School is from the south at Youmans Drive or from the north at the signalized intersection of US 21 Business and Geechie Road.

The study area is shown in Figure 1 and is bounded by the following roadways:

- US 21 Business to the north
- Meridian Road to the west
- Youmans Drive to the south and east

The following roadways are part of the study area:

US 21 Business runs primarily in the east/west direction and is a three-lane roadway including one lane in each direction with a two-way center turn lane, sidewalks and dedicated bike lanes on both north and south sides. The speed limit on US 21 Business is 40 mph. The land use adjacent to the roadway is mainly commercial with numerous access points. The only signalized intersection within the study area is at Geechie Road/Beaufort High School driveway.

Meridian Road is a two-lane roadway, which runs in the north/south direction and provides access to various residential properties. The speed limit is 35 mph. There are no sidewalks and bicyclists can use the travel lanes as indicated by the "Share the Road" signs. The shoulder width is minimal.

Geechie Road is a narrow two-lane roadway running in the north/south direction between US 21 Business and Carolyn Drive. The roadway is discontinuous for approximately 600 feet between Beaufort High School and Red Oak Drive. The roadway widens out to two northbound lanes at the intersection of US 21 Business. The southern section is either not paved or the pavement is in very poor condition. There is no posted speed limit.

Sunset Boulevard is the only roadway located on the north side of the study area just east of Geechie Road. Opposite of Sunset Boulevard on US 21 Business is Lady's Island Center commercial area on the south side of the intersection. Sunset Boulevard is a two-lane roadway, which runs in the north/south direction. There is a shared use path on west side of the roadway. The posted speed is 35 mph and the roadway has numerous residential access points.

Youmans Drive is two lanes wide with no shoulders and runs in the northeast/southwest direction. The speed limit is 30 mph. The roadway connects Meridian Road to the southwest and US 21 Business to the northeast. It doglegs for approximately 100 feet at Geechie Road. The Beaufort High School and residential properties directly access the roadway.

US 21 BUSINESS
(SEA ISLAND PKWY)
HARBORVIEW CIR
HARBORVIEW CIR
GEECHIE RD
SUNSET BLVD
Beaufort High School
SCHOOL ENT
MERIDIAN RD
YOUMANS DR
US 21 BUSINESS
(SEA ISLAND PKWY)
BACK ENTRANCE TO SCHOOL
YOUMANS DR
YOUMANS DR
CAROLYN DR
BEAUFORT HIGH SCHOOL REALIGNMENT
STUDY AREA MAP
SCALE: N.T.S.
FIGURE1
7/2019

III) TRAFFIC DATA COLLECTION

Turning movement counts were conducted in May 2019 between the hours of 6:00 AM and 7:00 PM, Counts were performed at the following key study area intersections:

- US 21 Business at Meridian Road
- US 21 Business at Geechie Road
- US 21 Business at Sunset Boulevard
- US 21 Business at Youmans Drive
- Youmans Drive at Meridian Road
- Youmans Drive at Geechie Road
- Youmans Drive at Geechie Road/Carolyn Drive
- Meridian Road at Harborview Circle

Traffic count data is located in the Appendix A.

IV) EXISTING TRAFFIC VOLUMES

The overall corridor AM, school and PM peak hour turning movement counts were balanced for the study area and are shown on Figure 2. The following is a summary of this data:

Meridian Road: Along Meridian Road in the AM peak hour, traffic volumes were equal with both northbound/southbound directions having less than 100 vehicles. Traffic volumes were slightly higher southbound, with the range of volumes from 100-115 vehicles in the Beaufort High School dismissal peak hour. In the PM peak hour, the peak direction was southbound with a little less than 110 motorists. Approximately 80 motorists were driving in the northbound direction.

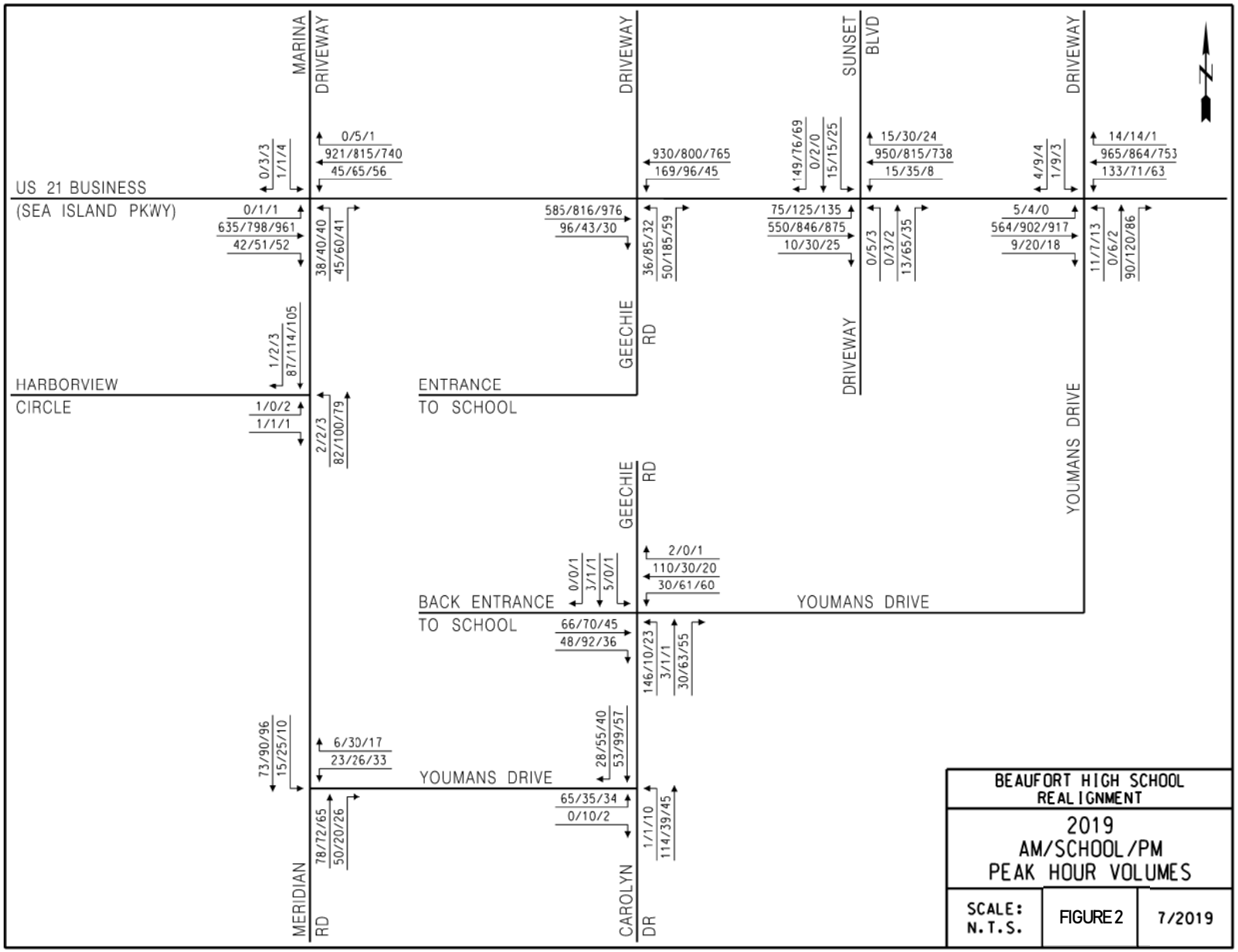
Geechie Road: In the AM peak hour, southbound traffic totals approximately 265 vehicles with 86 motorists exiting Beaufort High School. Seven (7) pedestrians were counted crossing US 21 Business at the intersection of US 21 Business on Geechie Road. In the school dismissal peak hour, approximately 270 motorists were leaving Beaufort High School and 140 were entering. Traffic exiting the school (91 vehicles) was slightly higher than motorists entering (75 vehicles) during the PM peak hour. A total of three pedestrians were crossing US 21 Business during school peak period while no pedestrians were counted during PM peak hour.

Sunset Boulevard: The directional distribution is 65% southbound with a total volume of 255 vehicles in the AM peak hour. Approximately 155 motorists headed northbound and 90 motorists headed southbound during the peak hour of Beaufort High School. In the PM peak hour, the volumes were higher for northbound, with 160 vehicles, while southbound had 95 vehicles. Few pedestrians were counted crossing US 21 Business during all peak periods.

Youmans Drive: Volumes near US 21 Business were between 100 and 150 vehicles per hour in both northbound/southbound directions with larger volumes headed southbound during AM peak hour. Volumes near Meridian Road were lower with 30-65 vehicles per hour and northbound being the peak direction. In the school dismissal peak hour, the northbound movement had the highest volume at US 21 Business with approximately 135 vehicles. Near Meridian Road, the total volume was approximately 100 vehicles with a 55/45 split. At US 21 Business, there were a total of approximately 180 vehicles with 55% in the

northbound direction during the PM peak hour. There were less than 100 vehicles combined in both directions on Youmans Drive at Meridian Road.

US 21 Business: US 21 Business is a highly travelled roadway. There is between 900 and 1,100 motorists travelling westbound in the AM peak hour and 550 to 700 eastbound. The Beaufort High School dismissal peak hour volumes are fairly well balanced along US 21 Business with about 800 to 900 vehicles per hour in both directions. The PM peak hour has a higher eastbound volume with 900 to 1,050 motorists versus approximately 800 in the westbound direction.



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8/9/2019

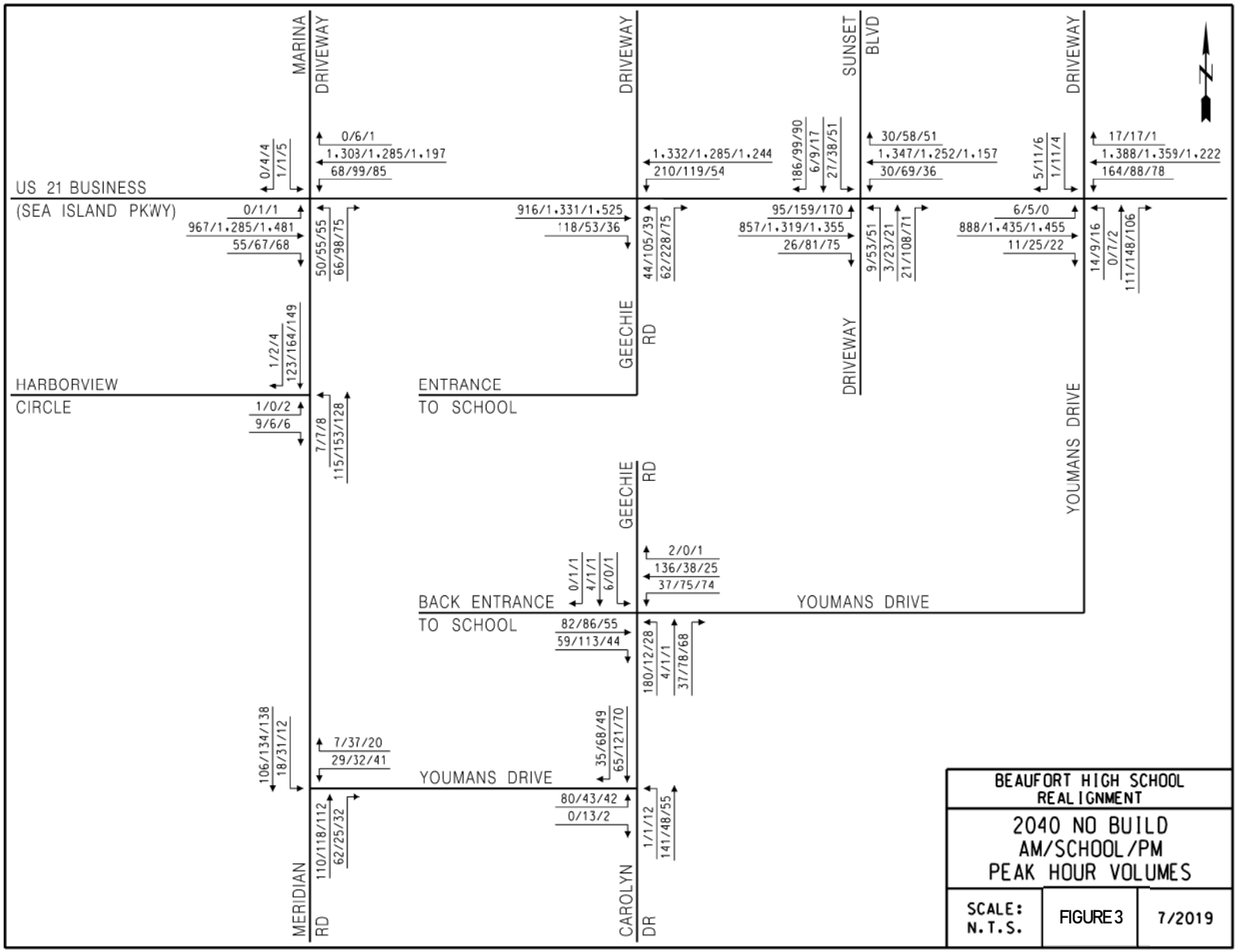
V) YEAR 2040 NO BUILD VOLUMES

According to a study by Stantec (2017)[1], historic tube counts collected by SCDOT from 2008 – 2015 and tube counts collected by Stantec in 2016 along US 21 Business (Sea Island Parkway) showed that traffic volumes increased at a rate of 1.54% compounded annually over the past ten years. Considering the local roads along with US 21 and US 21 Business, the study used a growth rate of 1.0% compounded annually to project future traffic volumes for the entire study area. This same growth was used for this study along with the following proposed developments:

- Walmart
- Taco Bell
- Harris Teeter
- The Village at Oyster Bluff
- Marina Village
- Lady's Island Shopping Center redevelopment
- White Hall Plantation

The year 2040 No Build volumes were developed for the study area and are shown on Figure 3.

[1] Stantec. (2017). *Lady's Island Corridor Study.*



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VI) CRASH DATA

Crash data for US 21 Business from SC-802 to Bay Street was obtained from the South Carolina Department of Public Safety. There have been numerous crashes along US 21 Business in this area. Most of these crashes were rear end collisions. For the purpose of this study, our analysis concentrated on the four main intersections in the study area. These intersections are US 21 Business and Meridian Road (S-36), US 21 Business and Geechie Road, US 21 Business and Sunset Boulevard (S-186), and US 21 Business and Youmans Drive (S-266). The intersection of US 21 Business and Geechie Road is the main entrance into the Beaufort High School and is controlled by a stop and go traffic signal. The crash data obtained was from January 1, 2016 until December 31, 2018.

Tables 1-4 summarize the crash data for each intersection for the three-year period. Collision diagram for only intersection related crashes is shown on Figure 4.

Table 1. Crashes from 2016-2018 at US 21 Business and Meridian Road

Type of Crash	Number of Crashes	Comments
Right Angle	1	
Rear End	5	Most likely caused by queues along this route during peak travel times.
Sideswipe	0	
Parked	0	
Pedestrian	0	
Backing	0	
Fixed Object	0	

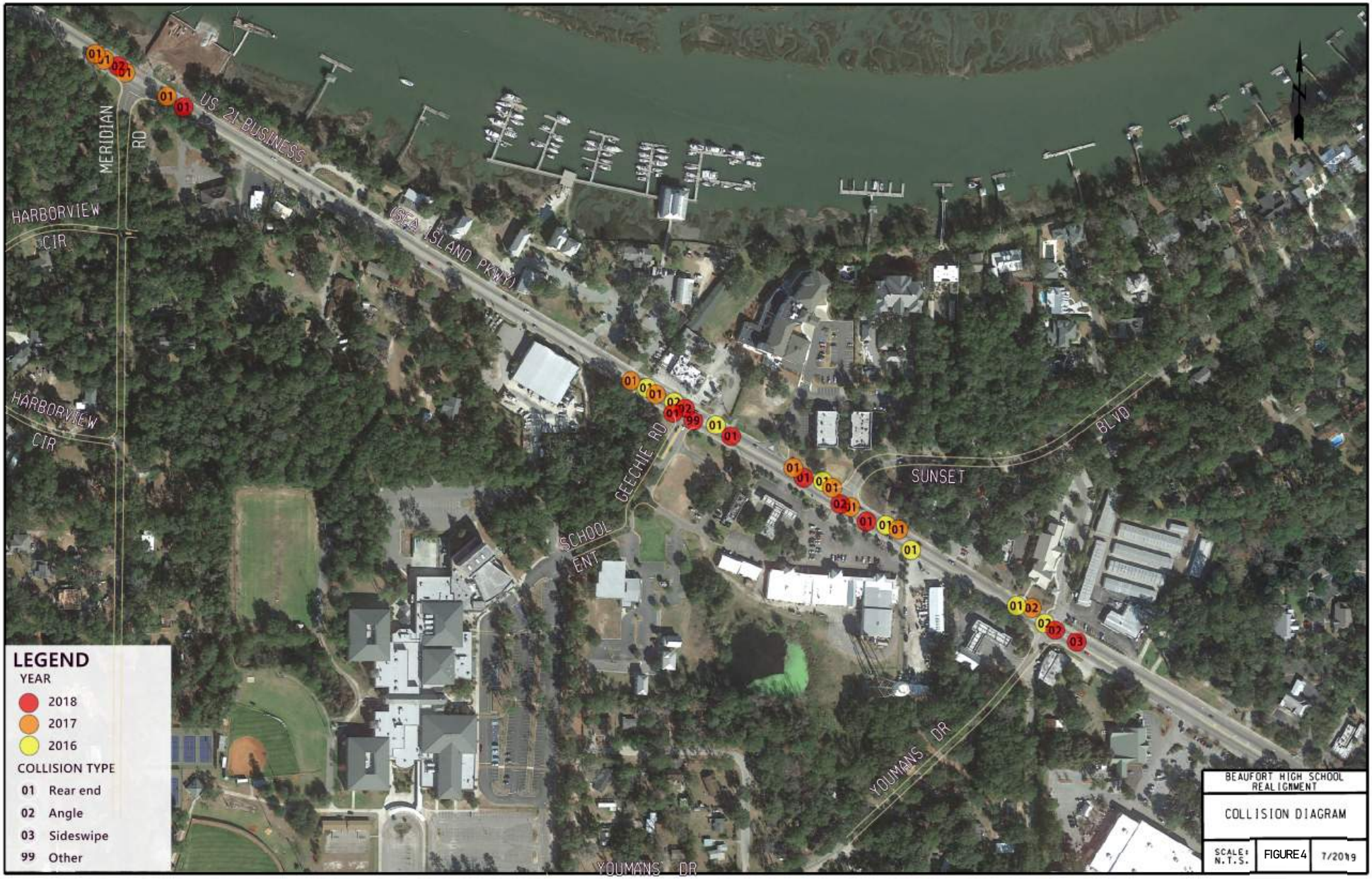
Table 2. Crashes from 2016-2018 at US 21 Business and Geechie Road

Type of Crash	Number of Crashes	Comments
Right Angle	2	
Rear End	6	Most likely caused by queues along this route during peak travel times.
Sideswipe	0	
Parked	0	
Pedestrian	0	
Backing	0	
Other	1	

Table 3. Crashes from 2016-2018 at US 21 Business and Sunset Boulevard		
Type of Crash	Number of Crashes	Comments
Right Angle	1	
Rear End	9	Most likely caused by queues along this route during peak travel times.
Sideswipe	0	
Parked	0	
Pedestrian	0	
Backing	0	
Fixed Object	0	

Table 4. Crashes from 2016-2018 at US 21 Business and Youmans Drive		
Type of Crash	Number of Crashes	Comments
Right Angle	3	
Rear End	1	
Sideswipe	1	
Parked	0	
Pedestrian	0	
Backing	0	
Fixed Object	0	

The removal of the traffic signal at the main entrance to the Beaufort High School/Geechie Road and the installation of a signal on US 21 Business at either Meridian Road, Sunset Boulevard, or Youmans Drive should not be detrimental to the safety along this corridor. The installation of a signal at any of these locations may provide some additional gaps in traffic along the corridor to make for easier ingress and egress to and from US 21 Business. Also, installation of a traffic signal helps to reduce crash severity for conflicting movements, but, on the other hand, will increase the probability of rear end crashes. This will allow a controlled crossing for pedestrian and bicyclists.


MERIDIAN RD
US 21 BUSINESS
(SEA ISLAND PKWY)
HARBORVIEW CIR
HARBORVIEW CIR
GEECHIE RD
SCHOOL ENT
SUNSET BLVD
YOUMANS DR
YOUMANS DR
LEGEND
YEAR
2018
2017
2016
COLLISION TYPE
01 Rear end
02 Angle
03 Sideswipe
99 Other
BEAUFORT HIGH SCHOOL REALIGNMENT
COLLISION DIAGRAM
SCALE: N.T.S.
FIGURE 4
7/2019

VII) FIELD OBSERVATIONS

Field observations were performed at the study intersections during the AM and PM periods as well as the dismissal period from the Beaufort High School.

General

- The speed limit on US 21 Business is 40 mph with an average free flow speed of approximately 48 mph in either direction during off peak periods.
- Several left-turning motorists from all stop-controlled intersections along both directions of US 21 Business utilized the center turn lane to merge into the through lane.

AM Peak Period

- Motorists on US 21 Business westbound experience slow rolling queues from the signal at Bay Street over the Woods Memorial Bridge through the Geechie Road signal. When the signal at Geechie Road was red for US 21 Business motorists, the queues extended back as far as the Lady's Island Drive intersection. A maximum of nine vehicles were in the westbound left turn lane to turn onto the school entrance, of which all cleared in one cycle.
- Approximately eight vehicles are queued at any one time along US 21 Business eastbound at Geechie Road. These right turns slow traffic since they are turning from a shared right-thru lane.
- School buses access the school through the rear entrance via Youmans Drive
- Queues on the southbound approach of Sunset Boulevard were approximately six vehicles. Motorists take up to about one minute to execute a left turn onto US 21 Business. Right turns were accomplished with minimal delays.
- There were approximately five vehicles queued at the Meridian Road northbound approach. Left turns experience up to 1 minute of delay to access US 21 Business. Sometimes motorists that are queued from over the bridge will allow Meridian Road motorists to access the US 21 Business mainline through courtesy gaps. Right turning motorists access US 21 Business with minimal delay.
- Almost 15% of the motorists on US 21 Business were destined to Beaufort High School.

School Dismissal Peak Period

- No operational issues were observed at the signalized intersection of US 21 Business and Geechie Road.
- The northbound approach from the school experiences up to approximately 13 vehicles queued at any one time. All vehicles clear in one cycle.
- Approximately 20 vehicles were queued on the eastbound approach and eight vehicles queued on the westbound approach during the red phase along US 21 Business at Geechie Road intersection.

PM Peak Period

- Congestion occurs along US 21 Business during the PM peak period. Long rolling queues were observed in the eastbound direction from the signalized intersection with Geechie Road, backing through Meridian Road. Queues in the westbound direction extend through Youmans Drive.
- A maximum of five vehicles were queued on northbound Meridian Road at US 21 Business. Left turning motorists experienced up to one and half minute of delay to access US 21 Business westbound. Right turning motorists experienced minimal delay to access US 21 Business eastbound. When long queues occurred during the red phase at Geechie Road signal, queued motorists would allow for courtesy gaps for right and left turning motorists from Meridian Road to access US 21 Business.
- A maximum of seven vehicles were queued on the southbound Sunset Boulevard. Left turning motorists experienced delay up to a minute to execute the movement. Right turning motorists easily accessed US 21 Business with little delay.

VIII) BUILD ALTERNATIVES

Three alternatives were developed for the Beaufort High School access relocation. The alternatives are displayed on Figures 5-7 and described below. Each alternative removed the existing traffic signal from the intersection of US 21 Business and Geechie Road. The intersection was then reconfigured to a right in right out to from Geechie Road. Also, the southbound approach at US 21 Business and Sunset Boulevard was changed to a left turn lane, right turn lane and a thru lane as part of proposed improvements by others. The lane configuration was modified from Lady's Island Center to a right and a through/left lane.

Alternative #1:

- Build a two-lane roadway, Geechie Road, to connect the intersection of Youmans Drive and the school's back entrance to the school's main entrance. At this four-way intersection of Geechie, Youmans, and the school's back access construct a single lane roundabout.
- Install a signal at the US 21 Business intersection and Youmans Drive. Change the lane configuration for Youmans Drive northbound at US 21 Business to a right turn lane and left-thru lane.
- At the intersection of Meridian and Youmans Drive add a south bound left turn lane in Meridian.
- The addition of the signal at Youmans and US 21 Business will make the Beaufort Memorial Hospital medical office's driveway a de facto extension of Sunset Boulevard, which will increase traffic volume. The final design of Alternate #1 must include measures to mitigate this anticipated traffic increase. These yet to be designed mitigation measures are accounted for as a contingency in the cost estimate for this alternative #1.

The proposed signal at the Meridian Road and US 21 Business intersection meets warrants but is not recommended for construction until the design year 2040, therefore is not included in the construction cost estimate for this Alternative #1.

Alternative #2:

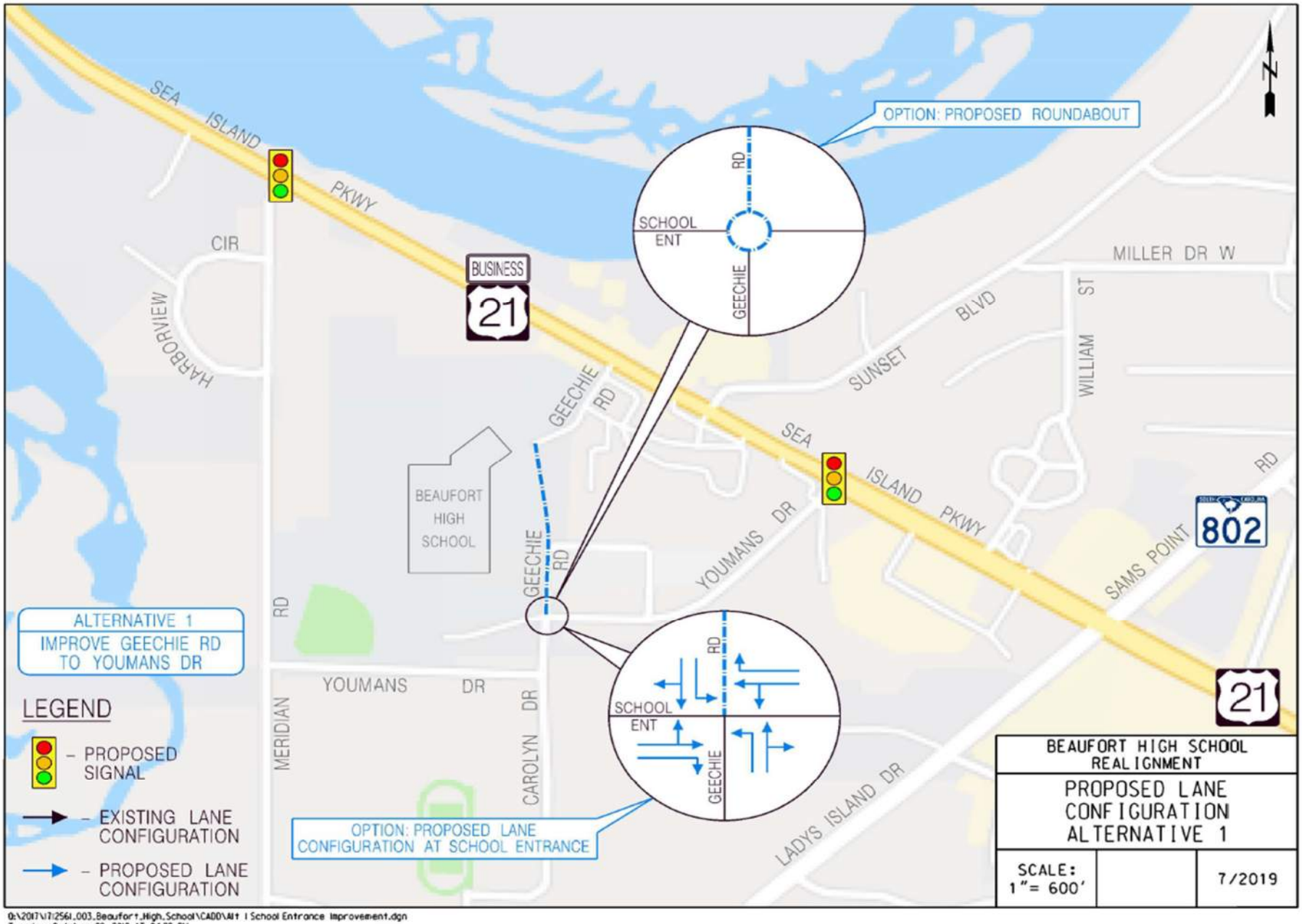
- Build a two-lane roadway (with a third center lane for emergency vehicle use only ingress and egress) to connect the school's main entrance to the intersection of Meridian Road and Harborview Circle.
- At the intersection of the new access roadway and Meridian add a south bound left turn lane in Meridian.
- Install a signal at the intersection of Meridian Road and US 21 Business.
- Install a signal at Sunset Boulevard and US 21 Business.

Alternative #3:

- Connect the school's main entrance to the Sunset Boulevard and US 21 Business intersection with a two-lane roadway through the Lady's Island commercial shopping center.
- Install a signal at the Sunset Boulevard and US 21 Business intersection.

The proposed signal at Meridian Road and US 21 Business intersection meets warrants but is not recommended for construction until the design year 2040, therefore is not included in the construction cost estimate for this Alternative #3.

Year 2019 and 2040 volumes were developed for each alternative. These volumes are displayed on Figures 8-13.



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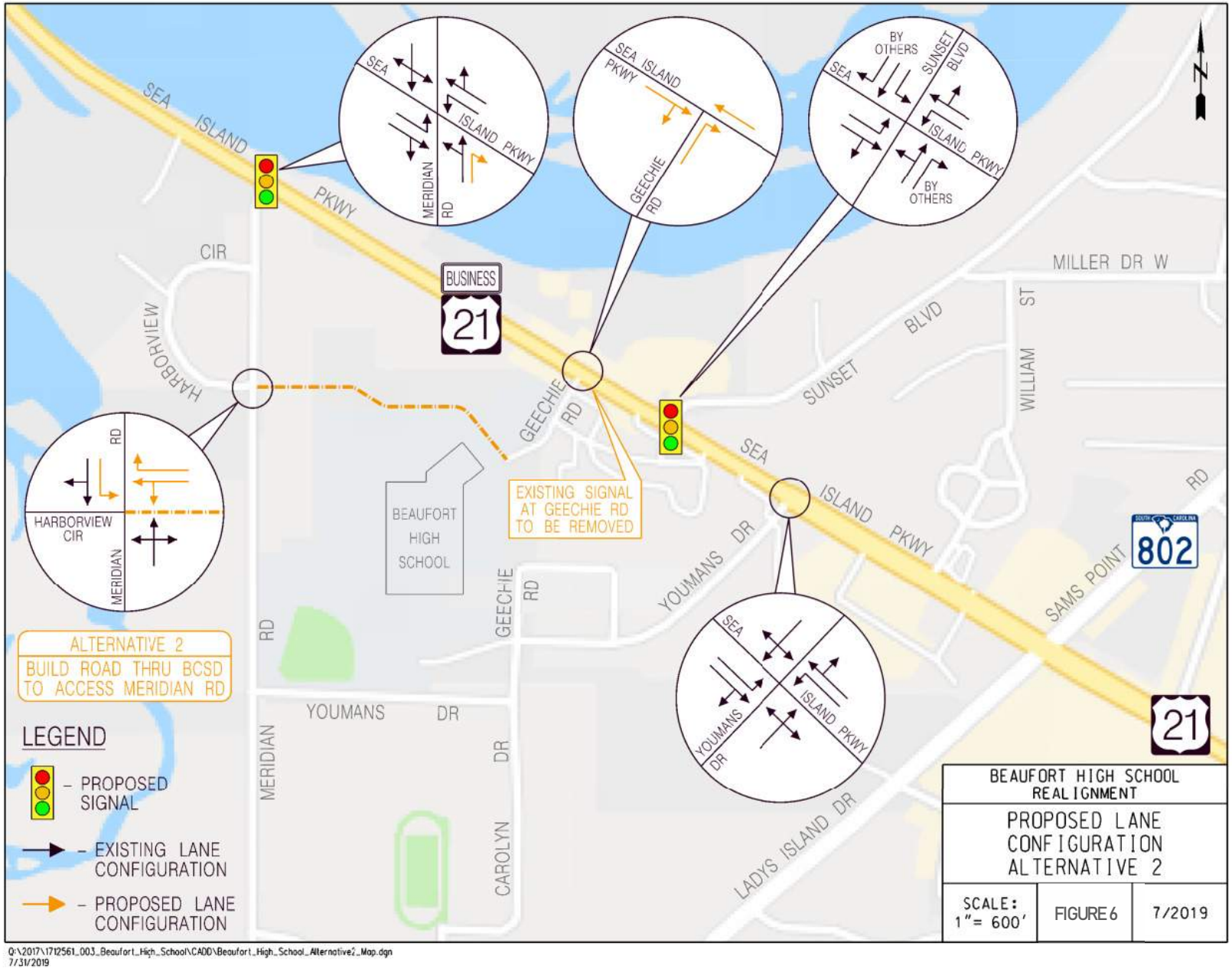
SEA ISLAND PKWY
CIR
HARBORVIEW
BUSINESS
21
MILLER DR W
BLVD
SUNSET
WILLIAM ST
GEECHIE RD
EXISTING SIGNAL AT GEECHIE RD TO BE REMOVED
BEAUFORT HIGH SCHOOL
YOUMANS DR
SAMS POINT RD
802
MERIDIAN RD
CAROLYN DR
LADYS ISLAND DR
HARBORVIEW CIR
ALTERNATIVE 2
BUILD ROAD THRU BCSD TO ACCESS MERIDIAN RD
LEGEND
- PROPOSED SIGNAL
- EXISTING LANE CONFIGURATION
- PROPOSED LANE CONFIGURATION
BY OTHERS
BEAUFORT HIGH SCHOOL REALIGNMENT
PROPOSED LANE CONFIGURATION ALTERNATIVE 2
SCALE: 1"= 600'
FIGURE 6
7/2019
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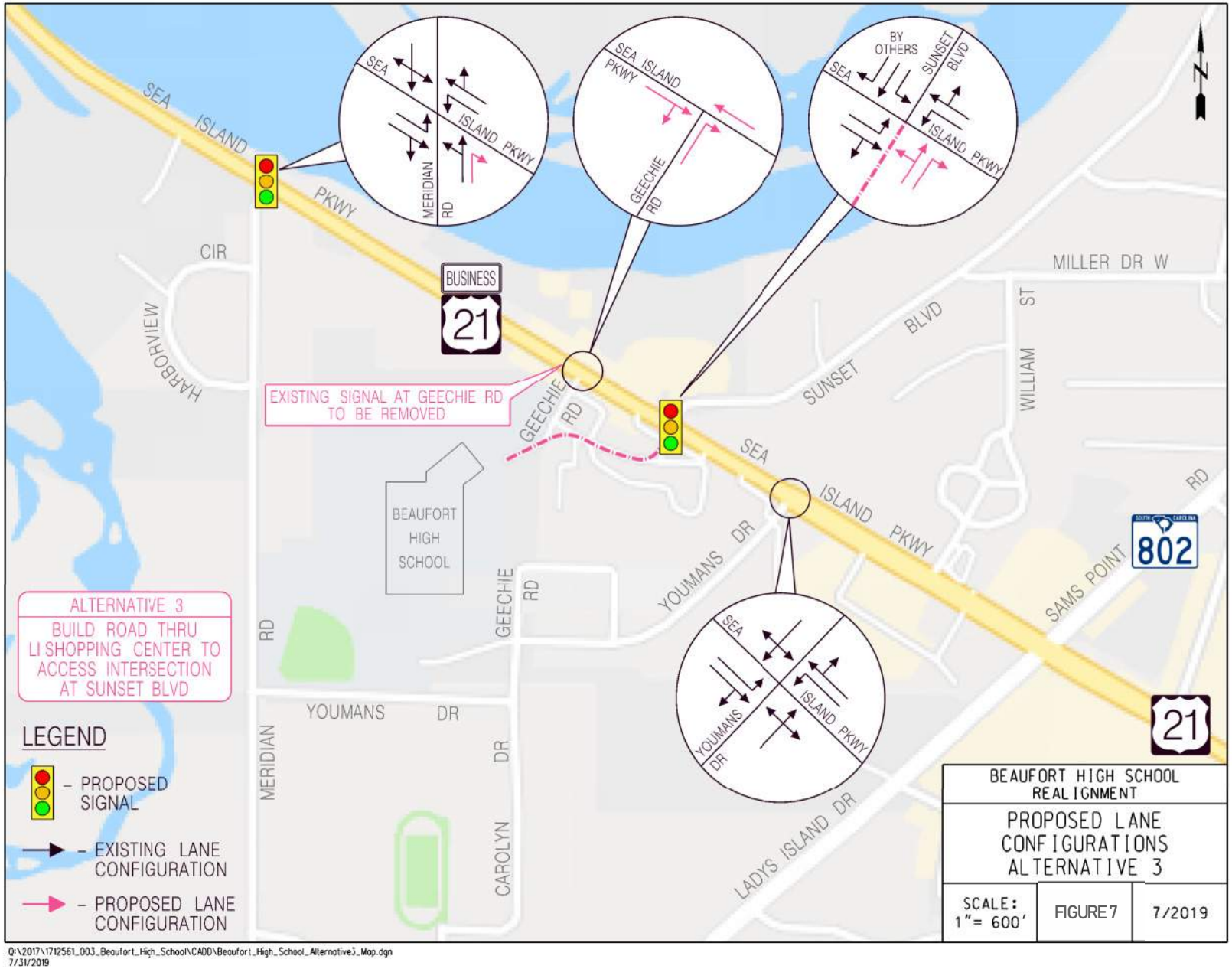
7/31/2019


SEA ISLAND PKWY
SEA
ISLAND PKWY
MERIDIAN RD
SEA ISLAND PKWY
GEECHIE RD
BY OTHERS
SUNSET BLVD
SEA
ISLAND PKWY
CIR
HARBORVIEW
BUSINESS
21
MILLER DR W
SUNSET BLVD
WILLIAM ST
EXISTING SIGNAL AT GEECHIE RD TO BE REMOVED
GEECHIE RD
SEA ISLAND PKWY
BEAUFORT HIGH SCHOOL
YOUMANS DR
SAMS POINT RD
802
ALTERNATIVE 3
BUILD ROAD THRU LI SHOPPING CENTER TO ACCESS INTERSECTION AT SUNSET BLVD
GEECHIE RD
MERIDIAN RD
YOUMANS DR
CAROLYN DR
SEA
ISLAND PKWY
YOUMANS DR
LADYS ISLAND DR
21
LEGEND
– PROPOSED SIGNAL
– EXISTING LANE CONFIGURATION
– PROPOSED LANE CONFIGURATION
BEAUFORT HIGH SCHOOL REALIGNMENT
PROPOSED LANE CONFIGURATIONS ALTERNATIVE 3
SCALE: 1"= 600'
FIGURE 7
7/2019
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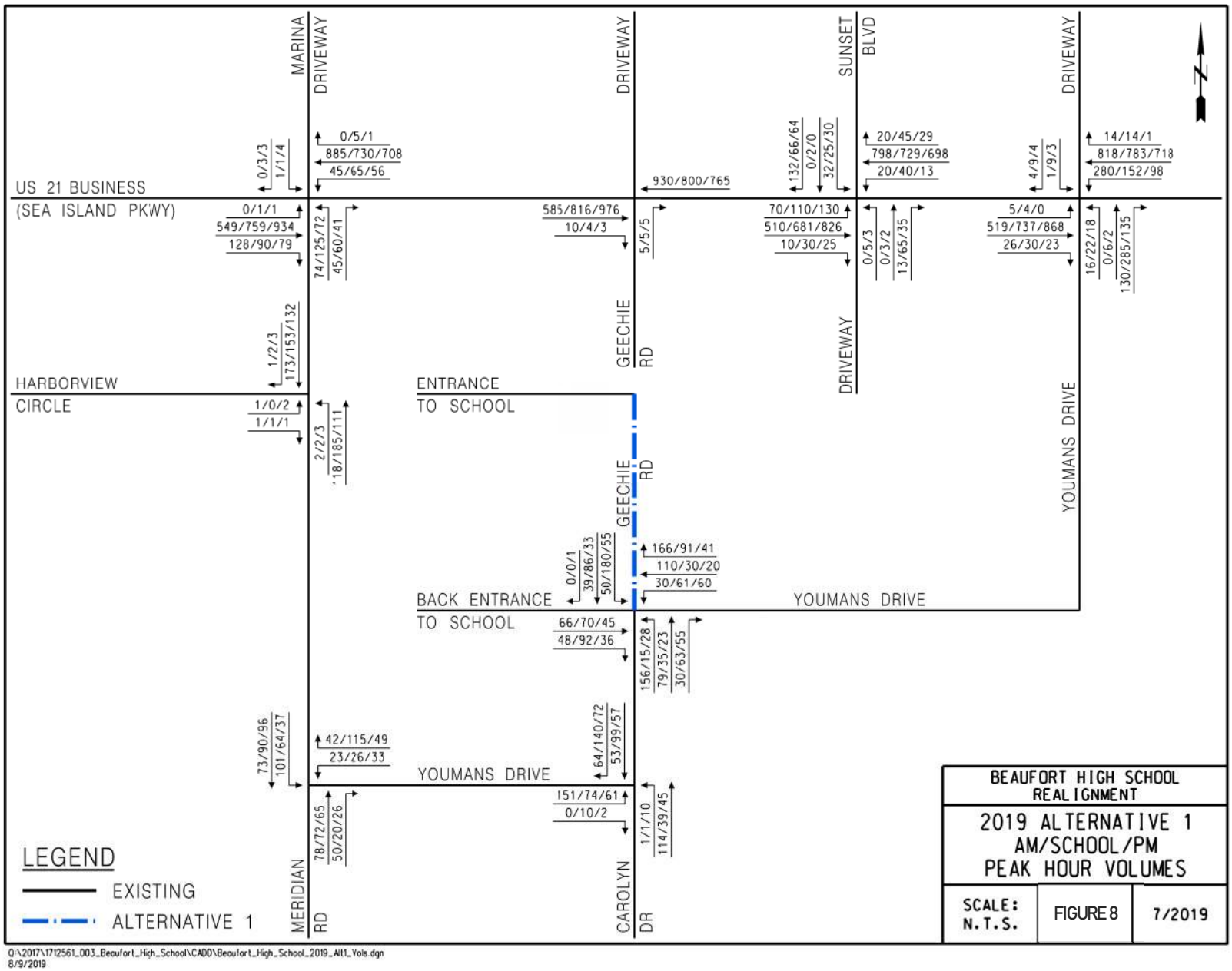
7/31/2019


US 21 BUSINESS
(SEA ISLAND PKWY)
HARBORVIEW
CIRCLE
MARINA
DRIVEWAY
GEECHIE
RD
DRIVEWAY
SUNSET
BLVD
DRIVEWAY
YOUMANS DRIVE
ENTRANCE
TO SCHOOL
BACK ENTRANCE
TO SCHOOL
YOUMANS DRIVE
YOUMANS DRIVE
MERIDIAN
RD
CAROLYN
DR
0/3/3
1/1/4
0/5/1
885/730/708
45/65/56
930/800/765
132/66/64
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20/45/29
798/729/698
20/40/13
4/9/4
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14/14/1
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66/70/45
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53/99/57
151/74/61
0/10/2
1/1/10
114/39/45
78/72/65
50/20/26
LEGEND
EXISTING
ALTERNATIVE 1
BEAUFORT HIGH SCHOOL
REALIGNMENT
2019 ALTERNATIVE 1
AM/SCHOOL/PM
PEAK HOUR VOLUMES
SCALE:
N.T.S.
FIGURE 8
7/2019
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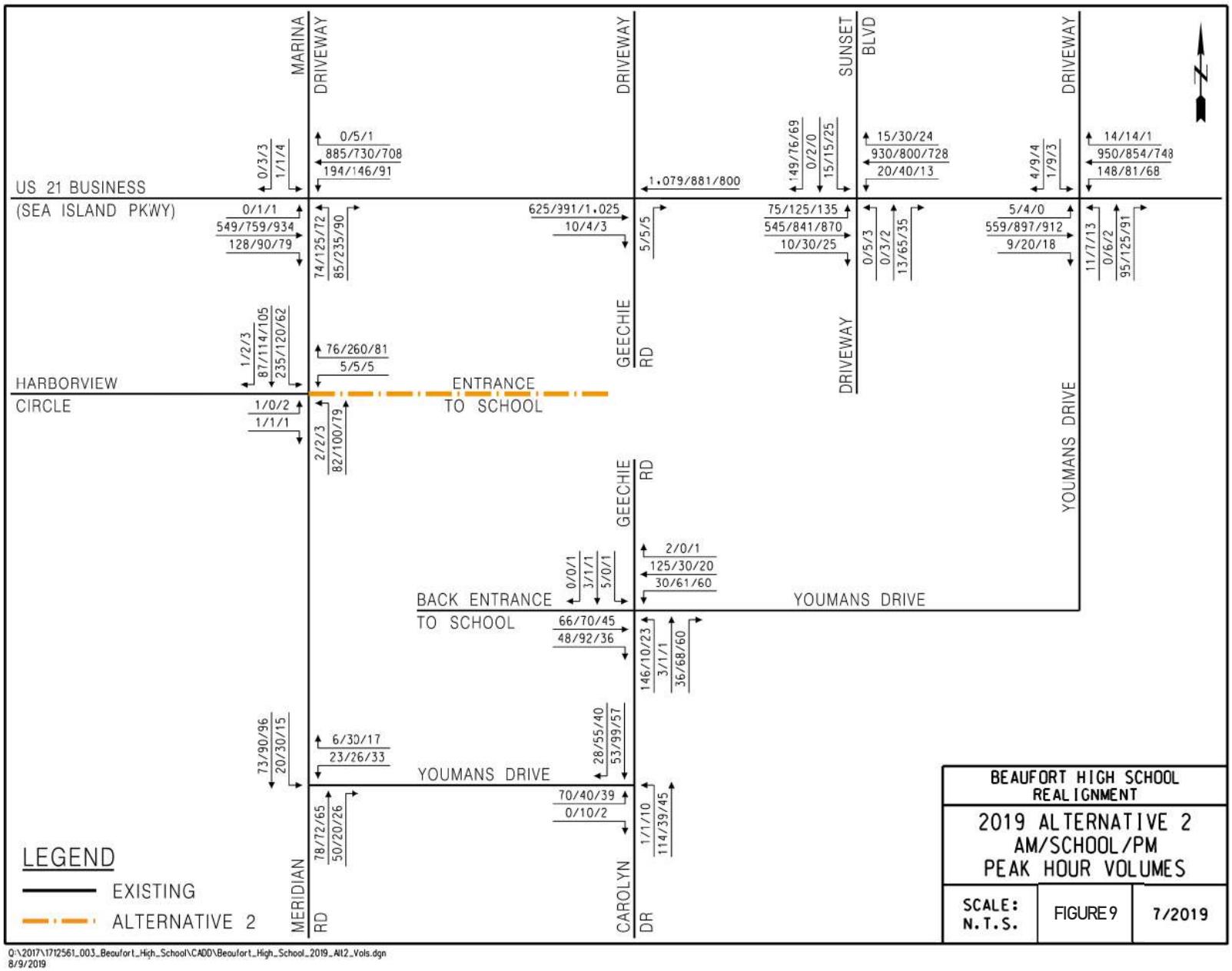
8/9/2019



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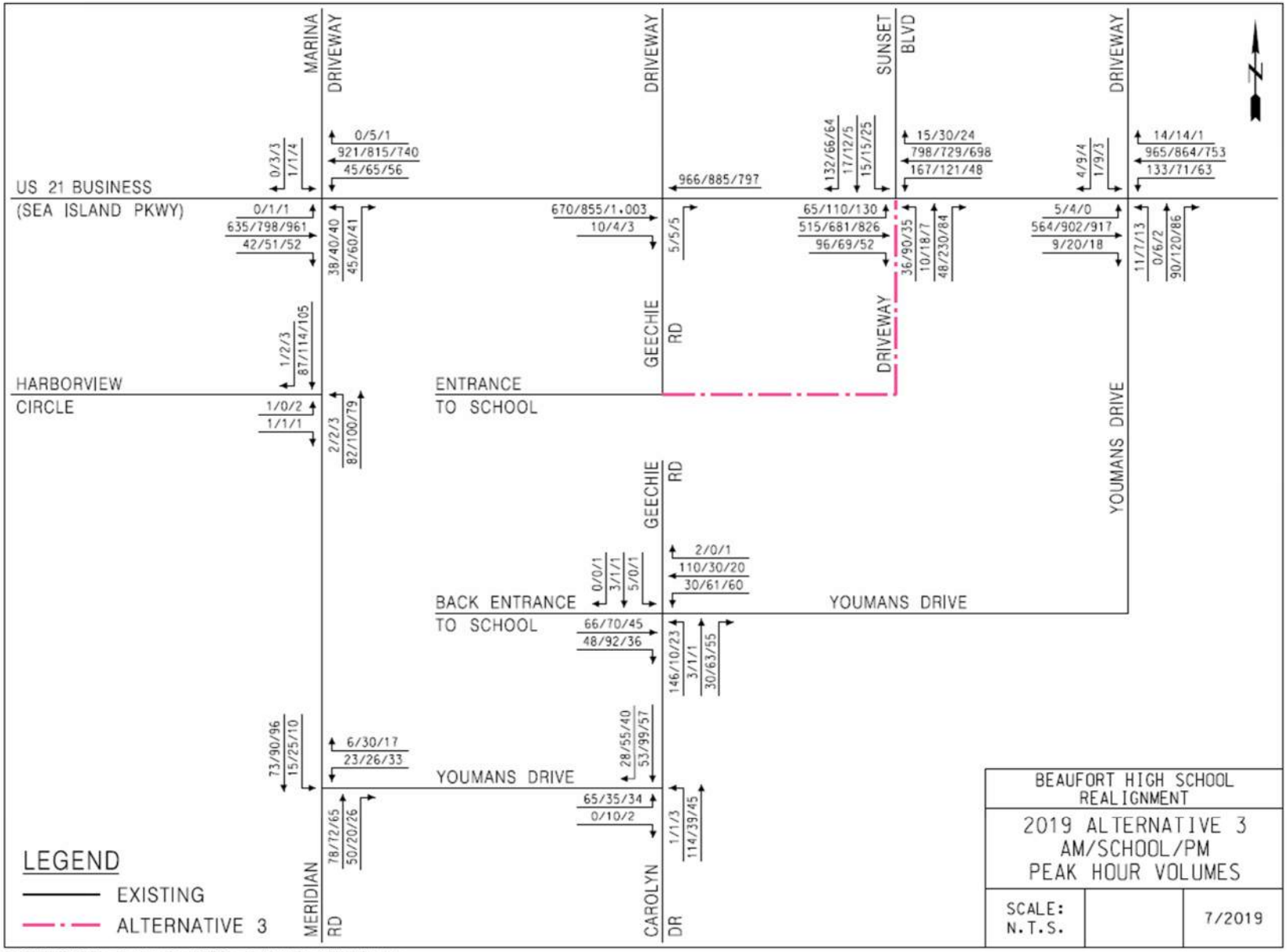

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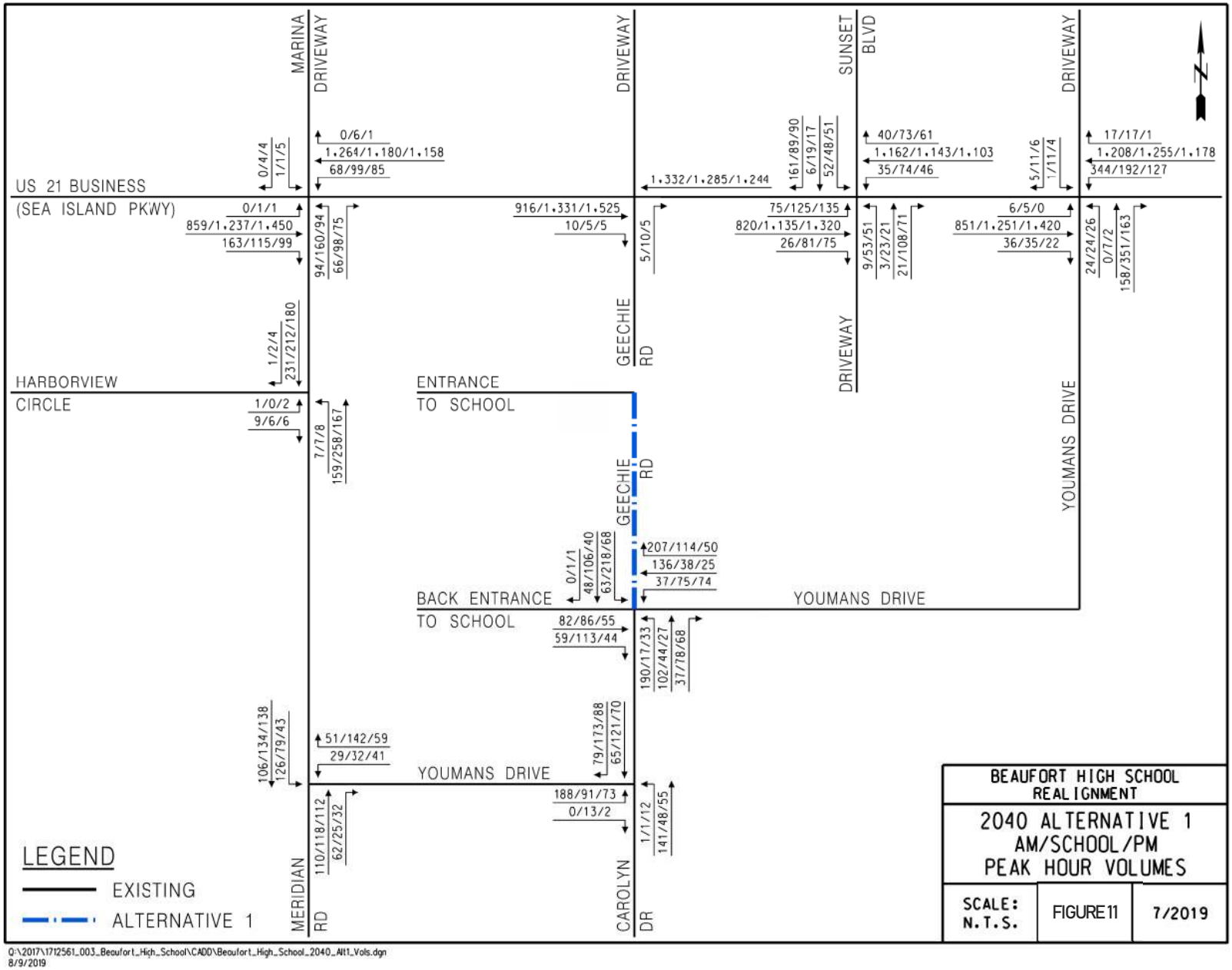

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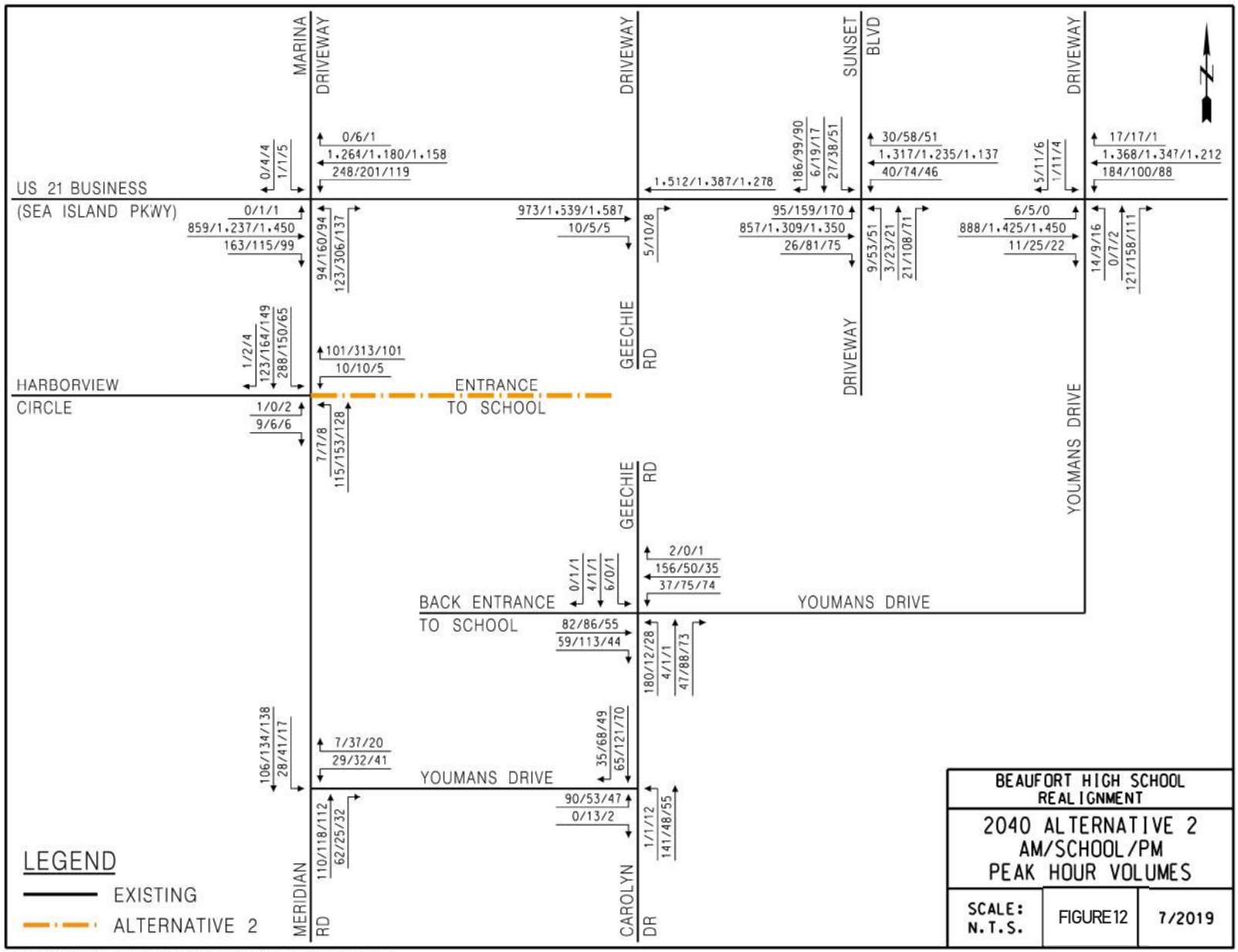
MARINA DRIVEWAY
DRIVEWAY
SUNSET BLVD
DRIVEWAY
US 21 BUSINESS
(SEA ISLAND PKWY)
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0/6/1
1,264/1,180/1,158
248/201/119
1,512/1,387/1,278
186/99/90
6/19/17
27/38/51
30/58/51
1,317/1,235/1,137
40/74/46
5/11/6
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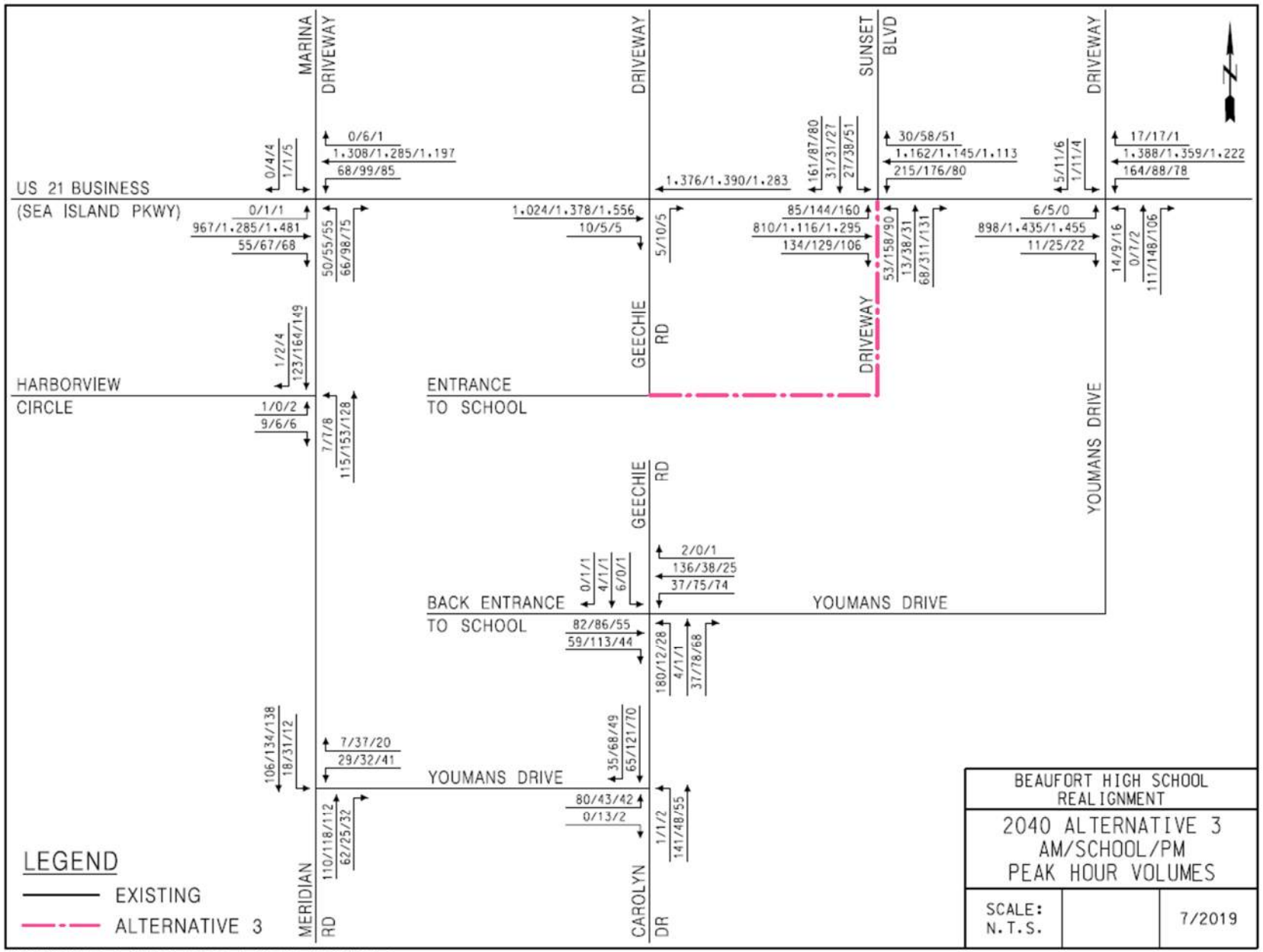
163/115/99
94/160/94
123/306/137
973/1,539/1,587
10/5/5
5/10/8
95/159/170
857/1,309/1,350
26/81/75
9/53/51
3/23/21
21/108/71
6/5/0
888/1,425/1,450
11/25/22
14/9/16
0/7/2
121/158/111
GEECHIE RD
DRIVEWAY
YOUMANS DRIVE
1/2/4
123/164/149
288/150/65
101/313/101
10/10/5
HARBORVIEW
CIRCLE
ENTRANCE
TO SCHOOL
1/0/2
9/6/6
7/7/8
115/153/128
GEECHIE RD
2/0/1
156/50/35
37/75/74
0/1/1
4/1/1
6/0/1
BACK ENTRANCE
TO SCHOOL
YOUMANS DRIVE
82/86/55
59/113/44
180/12/28
4/1/1
47/88/73
106/134/138
28/41/17
7/37/20
29/32/41
35/68/49
65/121/70
YOUMANS DRIVE
90/53/47
0/13/2
1/1/12
141/48/55
MERIDIAN RD
110/118/112
62/25/32
CAROLYN DR
LEGEND
EXISTING
ALTERNATIVE 2
BEAUFORT HIGH SCHOOL
REALIGNMENT
2040 ALTERNATIVE 2
AM/SCHOOL/PM
PEAK HOUR VOLUMES
SCALE:
N.T.S.
FIGURE12
7/2019
Q:\2017\1712561_003_Beaufort_High_School\CADD\Beaufort_High_School_2040_Alt2_Vols.dgn
8/9/2019



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Wednesday, October 30, 2019 AT 03:16 PM

IX) SIGNAL WARRANT ANALYSIS

Traffic signal warrant analyses were performed for US 21 Business intersections with Meridian Road, Sunset Boulevard, and Youmans Drive. Each intersection was analyzed for each alternative with year 2019 and 2040 traffic. The criteria used for the signal analyses was based on the 2009 edition of the Federal Highway Administration's Manual on Uniform Traffic Control Devices (MUTCD).

Often in a signal warrant analysis, the right turning motorists from the side streets are not always considered since a right turning motorist can often make their maneuver without the benefit of a stop and go traffic signal. However, in this analysis, all right turn motorists were included because of the lack of adequate storage lanes on the side streets and the high volume of traffic on US 21 Business, which can make it difficult for a right turn motorist to make their turn during peak traffic conditions.

Results of the analyses are summarized in Tables 5-7 and are presented in detail in Appendix B. In each alternative, two of the three warranted signals were chosen for installation. This assumption is based on the following reasons: first, it is logical for drivers to reroute and use other intersections based on the intersections' performance. Second, the installation of three traffic signals will increase delay along US 21 Business. Also, the coordination of the two selected signals with the traffic signals further east and west on US 21 Business would allow right turns on the unsignalized intersection during gaps.

Signals considered

- Alternative 1: US 21 Business & Meridian Road + US 21 Business & Youmans Drive
- Alternative 2: US 21 Business & Meridian Road + US 21 Business & Sunset Boulevard
- Alternative 3: US 21 Business & Meridian Road + US 21 Business & Sunset Boulevard

Table 5. Signal warrant summary for US 21 Business & Meridian Road

Year	Alt #	Warrant Met?	Warrant 1	Warrant 2	Warrant 3
2019	1	Yes	Condition A is met for 9 hours; Condition B for 13 hours	Met for 12 hours	Met for 12 hours
	2	Yes	Condition A is met for 8 hours; Condition B for 12 hours	Met for 12 hours	Met for 12 hours
	3	Yes	Condition A is met for 0 hours; Condition B for 12 hours	Met for 11 hours	Met for 6 hours
2040	1	Yes	Condition A is met for 12 hours; Condition B for 13 hours	Met for 13 hours	Met for 12 hours
	2	Yes	Condition A is met for 12 hours; Condition B for 13 hours	Met for 13 hours	Met for 12 hours
	3	Yes	Condition A is met for 7 hours; Condition B for 12 hours	Met for 12 hours	Met for 12 hours

Note in 2019 signal warrants would not be met if a northbound right turn lane was constructed on Meridian Road.

Table 6. Signal warrant summary for **US 21 Business & Sunset Boulevard**					
Year	Alt #	Warrant Met?	Warrant 1	Warrant 2	Warrant 3
2019	1	Yes	Condition A is not met; Condition B is met for 10 hours	Met for 10 hours	Met for 6 hours
	2	Yes	Condition A is not met; Condition B is met for 10 hours	Met for 10 hours	Met for 4 hours
	3	Yes	Condition A is not met; Condition B is met for 12 hours	Met for 12 hours	Met for 11 hours
2040	1	Yes	Condition A is met for 9 hours; Condition B for 12 hours	Met for 12 hours	Met for 11 hours
	2	Yes	Condition A is met for 9 hours; Condition B for 13 hours	Met for 12 hours	Met for 11 hours
	3	Yes	Condition A is met for 11 hours; Condition B for 13 hours	Met for 13 hours	Met for 12 hours

Table 7. Signal warrant summary for **US 21 Business & Youmans Drive**					
Year	Alt #	Warrant Met?	Warrant 1	Warrant 2	Warrant 3
2019	1	Yes	Condition A is not met; Condition B is met for 10 hours	Met for 9 hours	Met for 9 hours
	2	Yes	Condition A is not met; Condition B is met for 9 hours	Met for 8 hours	Met for 6 hours
	3	Yes	Condition A is not met; Condition B is met for 9 hours	Met for 7 hours	Met for 5 hours
2040	1	Yes	Condition A is met for 8 hours; Condition B for 11 hours	Met for 10 hours	Met for 9 hours
	2	Yes	Condition A is not met; Condition B is met for 11 hours	Met for 10 hours	Met for 8 hours
	3	Yes	Condition A is not met; Condition B is met for 10 hours	Met for 9 hours	Met for 7 hours

X) ALTERNATIVE TRAFFIC ANALYSIS

The intersections were evaluated using HCM 2000 output from Synchro 10. Synchro models of the study area were developed to show the results of different alternatives. Tables 8-10 show delay and Level of Service (LOS) for the worst approach at unsignalized intersections, and intersection wide delay for signalized intersections.

2019 Existing

- All the intersections operate at LOS D or better during all time periods except for US 21 Business at Youmans Drive during school peak period, which operates at LOS F.

2040 No Build

- The unsignalized intersections along US 21 Business have major decrease in LOS compared to year 2019 for all time periods and several operate at LOS E or worse.

- Intersection delays and LOS for school peak hour are the worst among other time periods due to the high school peak volumes.
- The major operational issue is the volume of traffic along US 21 Business.

Alternative 1

- In 2019, all the intersections operate at LOS C or better during the day except for Youmans Drive at school entrance during school peak hour, which operates at LOS E. Similarly, in 2040, this intersection operates at LOS F during AM and school peak hours.
- In 2040, the unsignalized intersection of US 21 Business and Sunset Boulevard operates at LOS F for all time periods. The intersections of US 21 Business with Meridian Road and US 21 Business at Geechie Road operates at LOS C, D and E for AM, school and PM peak periods, respectively. The intersection of US 21 Business at Youmans Drive operates at LOS C during AM, LOS E during school peak and goes to LOS D during PM peak hour.

Alternative 2

- In 2019, all the intersections operate at LOS A to D during the day except for US 21 Business at Youmans Drive during school peak period, which operates at LOS F. This intersection operates at LOS F in 2040 during all time periods.
- In 2040, the three intersections of US 21 Business with Meridian Road, Geechie Road and Sunset Boulevard operate at LOS D or better during the AM peak hour, and LOS E during school peak. During PM peak, US 21 Business and Meridian Road operate at LOS F, Geechie Road operates at LOS E and Sunset Boulevard operates at LOS C.

Alternative 3

- In 2019, all the intersections operate at LOS A to D during the day with the exception of US 21 Business at Youmans Drive during school peak period, which operates at LOS F.
- The intersection of US 21 Business with Meridian Road operates at LOS B, C and D, while US 21 Business Geechie Road operates at LOS C, D and E for AM, school and PM peak periods, respectively.
- Though signalized, the intersection of US 21 Business and Sunset Boulevard operates at LOS F in 2040 during school and PM peak hours. This is due to the high traffic volume that this intersection attracts during these hours.

Summary

- Alternative 3 causes fewer intersections to operate at LOS E and F in AM and school peak hours but causes more intersections to operate at LOS E and F in PM peak hour. This is due to the higher eastbound traffic on US 21 Business during PM peak, which prevents northbound traffic on the side streets to make a right turn.
- Improvements at school entrance are considered for Alternative 1, which operates at LOS F during AM and School peak periods and are presented later in this report.
- During all time periods, except for the school entrance delays in Alternative 1, the intersections which are not located on US 21 Business operate at LOS C or better.

Table 8. Delay (sec/veh) and LOS for AM peak hour – Signalized intersections shown in gray

AM Peak Hour									
Intersection	Year	No Build		Alt 1		Alt 2		Alt 3	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
US 21 Bus & Meridian Rd/Marina Dwy	2019	25.3	D	12.8	B	12.1	B	7.7	A
US 21 Bus & Geechie Rd		10.3	B	13.1	B	13.6	B	14.2	B
US 21 Bus & Driveway/Sunset Blvd		32.2	D	22.6	C	14.7	B	12.8	B
US 21 Bus & Youmans Dr/Driveway		21.0	C	14.8	B	21.1	C	21.0	C
Youmans Dr & School Ent. & Geechie Rd		11.8	B	20.2	C	12.1	B	11.8	B
Carolyn Dr & Youmans Dr		11.2	B	12.4	B	11.3	B	11.2	B
Meridian Rd & Youmans Dr		10.1	B	10.9	B	10.2	B	10.1	B
Meridian Rd & Harborview Cir		9.2	A	9.9	A	14.4	B	9.2	A
US 21 Bus & Meridian Rd/Marina Dwy	2040	60.9	F	21.3	C	33.4	C	13.4	B
US 21 Bus & Geechie Rd		52.6	D	18.4	C	19.7	C	20.9	C
US 21 Bus & Driveway/Sunset Blvd		>200	F	>200	F	36.6	D	42.4	D
US 21 Bus & Youmans Dr/Driveway		39.7	E	24.5	C	>200	F	>200	F
Youmans Dr & School Ent. & Geechie Rd		15.1	C	69	F	16.3	C	15.1	C
Carolyn Dr & Youmans Dr		12.3	B	14.5	B	12.6	B	12.3	B
Meridian Rd & Youmans Dr		11.0	B	12.5	B	11.2	B	11.0	B
Meridian Rd & Harborview Cir		9.1	A	9.9	A	12.0	B	9.1	A

Table 9. Delay (sec/veh) and LOS for School Peak Hour – Signalized intersections shown in gray

School Peak Hour									
Intersection	Year	No Build		Alt 1		Alt 2		Alt 3	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
US 21 Bus & Meridian Rd/Marina Dwy	2019	22.0	C	18.1	B	22.4	C	8.8	A
US 21 Bus & Geechie Rd		22.0	C	16.5	C	19.1	C	16.5	C
US 21 Bus & Driveway/Sunset Blvd		33.0	D	22.3	C	13.1	B	18.7	B
US 21 Bus & Youmans Dr/Driveway		>200	F	12.6	B	>200	F	123.2	F
Youmans Dr & School Ent. & Geechie Rd		10.1	B	48.4	E	10.1	B	10.1	B
Carolyn Dr & Youmans Dr		11.1	B	13.1	B	11.3	B	11.1	B
Meridian Rd & Youmans Dr		10.1	B	10.4	B	10.2	B	10.1	B
Meridian Rd & Harborview Cir		9.0	A	9.2	A	10.6	B	9.0	A
US 21 Bus & Meridian Rd/Marina Dwy	2040	>200	F	52.1	D	76.2	E	25.8	C
US 21 Bus & Geechie Rd		124.4	F	30.8	D	40.5	E	33	D
US 21 Bus & Driveway/Sunset Blvd		>200	F	>200	F	59	E	107.8	F
US 21 Bus & Youmans Dr/Driveway		>200	F	60.9	E	>200	F	>200	F
Youmans Dr & School Ent. & Geechie Rd		12.2	B	188.9	F	12.7	B	12.2	B
Carolyn Dr & Youmans Dr		12.2	B	15.7	C	12.5	B	12.2	B
Meridian Rd & Youmans Dr		11.3	B	12.6	B	11.5	B	11.3	B
Meridian Rd & Harborview Cir		9.3	A	9.6	A	18.2	C	9.3	A

Table 10. Delay (sec/veh) and LOS for PM peak hour – Signalized intersections shown in gray

PM Peak Hour									
Intersection	Year	No Build		Alt 1		Alt 2		Alt 3	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
US 21 Bus & Meridian Rd/Marina Dwy	2019	25.0	C	16.2	B	16.8	B	9.3	A
US 21 Bus & Geechie Rd		13.2	B	19.7	C	19.5	C	19	C
US 21 Bus & Driveway/Sunset Blvd		25.1	D	23.0	C	11.5	B	10.1	B
US 21 Bus & Youmans Dr/Driveway		26.9	D	13.2	B	27.4	D	25.8	D
Youmans Dr & School Ent. & Geechie Rd		8.3	A	9.2	A	8.3	A	8.3	A
Carolyn Dr & Youmans Dr		10.0	A	10.2	B	10.0	A	10.0	A
Meridian Rd & Youmans Dr		9.8	A	10.2	B	9.9	A	9.8	A
Meridian Rd & Harborview Cir		9.8	A	9.8	A	12.4	B	9.8	A
US 21 Bus & Meridian Rd/Marina Dwy	2040	103.9	F	66.3	E	81.4	F	48.5	D
US 21 Bus & Geechie Rd		69.5	E	35.6	E	39.9	E	37.1	E
US 21 Bus & Driveway/Sunset Blvd		>200	F	>200	F	28.5	C	83.8	F
US 21 Bus & Youmans Dr/Driveway		>200	F	41.9	D	>200	F	>200	F
Youmans Dr & School Ent. & Geechie Rd		8.7	A	10.1	A	8.8	A	8.7	A
Carolyn Dr & Youmans Dr		10.4	B	10.8	B	10.5	B	10.4	B
Meridian Rd & Youmans Dr		10.8	B	11.1	B	10.9	B	10.8	B
Meridian Rd & Harborview Cir		9.9	A	10.3	B	12.4	B	9.9	A

XI) TURN LANE QUEUE LENGTH

The 95th percentile turn lane queue results are summarized below and presented in Tables 11-13. The results are provided for modified intersections (e.g. widened, with new lane configurations) in each alternative.

Alternative 1

- In 2019 scenarios, no backups occur in the turn lanes, but the mainline queues are substantial. The queue lengths remain reasonably constant during the day for the turn lanes.
- In 2040 scenarios, southbound turn lane queues along Sunset Boulevard backs up onto the thru lane. The northbound right turn traffic at US 21 Business and Youmans Drive spills back to the main roadway.

Alternative 2

- No backups occur in the turn lanes and the queue lengths remain reasonably constant during the day in 2019.

- During the school peak hour, the northbound right turn queue at US 21 Business and Meridian Road backs up through the intersection of Meridian Road and Harborview Circle, causing further backup to the westbound traffic. The westbound left turning traffic at US 21 Business and Sunset Boulevard spills back to the main roadway in 2040.

Alternative 3

- The 2019 westbound left turning traffic at US 21 Business and Sunset Boulevard spills back to the main roadway.
- The eastbound left turn traffic at US 21 Business and Sunset Boulevard spills back during PM and school peak hours in 2040. The northbound right turn queue also extends through the turn lane at this intersection during school peak hour.

Table 11. 95th percentile turn lane queuing (ft.) – Alternative 1

Intersection	Approach	Direction	2019			2040		
			AM	School	PM	AM	School	PM
US 21 Bus & Meridian Rd/Marina Dwy	EB	Left	0	5	41	0	0	5
	WB	Left	41	61	60	73	106	135
	NB	Right	56	73	63	82	153	115
US 21 Bus & Geechie Rd	NB	Right	28	26	28	20	31	24
US 21 Bus & Driveway/Sunset Blvd	EB	Left	49	74	64	94	150	166
	WB	Left	28	46	31	37	83	75
	NB	Right	37	72	49	28	365	298
	SB	Left	65	56	61	886	819	775
	SB	Right	86	62	51	851	312	131
US 21 Bus & Youmans Dr/Driveway	EB	Left	44	19	0	28	11	0
	WB	Left	163	105	70	318	276	165
	NB	Right	83	248	116	135	487	201

Table 12. 95th percentile turn lane queuing (ft.) – Alternative 2

Intersection	Approach	Direction	2019			2040		
			AM	School	PM	AM	School	PM
US 21 Bus & Meridian Rd/Marina Dwy	EB	Left	0	5	0	0	5	5
	WB	Left	146	139	83	291	263	164
	NB	Right	74	234	107	138	801	173
US 21 Bus & Geechie Rd	NB	Right	28	28	23	18	38	17
US 21 Bus & Driveway/Sunset Blvd	EB	Left	106	94	89	133	298	224
	WB	Left	56	60	28	74	264	182
	NB	Right	31	79	47	51	147	80
	SB	Left	46	42	70	61	90	129
	SB	Right	123	69	72	277	142	128
Meridian Rd & Harborview Cir	WB	Right	58	75	48	46	755	46
	SB	Left	44	40	13	76	56	28

Table 13. 95th percentile turn lane queuing (ft.) – Alternative 3

Intersection	Approach	Direction	2019			2040		
			AM	School	PM	AM	School	PM
US 21 Bus & Meridian Rd/Marina Dwy	EB	Left	0	3	20	0	3	20
	WB	Left	33	45	51	69	94	113
	NB	Right	52	68	65	75	144	121
US 21 Bus & Geechie Rd	NB	Right	29	24	26	24	90	64
US 21 Bus & Driveway/Sunset Blvd	EB	Left	59	85	97	244	407	348
	WB	Left	129	125	75	240	231	185
	NB	Right	47	174	71	85	358	179
	SB	Left	47	39	70	70	84	92
	SB	Right	110	60	125	180	113	101

RED Queue exceeds available link/storage length, causing blockage.

XII) ALTERNATIVE 1 MODIFICATIONS

As shown in Table 9, the intersection of Youmans Drive and Beaufort High School Entrance operates unacceptably during AM and school peak hours. To address this issue, installation of a roundabout or additional turn lanes (Figure 14) were considered for this intersection. Results of the two analyses are shown in Table 14.

By evaluating the LOS and degree of saturation, a roundabout operates acceptably at this location. Additional turn lanes could also be considered; however, the intersection would operate at LOS E during the school peak hour. It should be noted that the delays at this intersection are due to the surge in traffic volumes from the school dismissal (i.e. low peak hour factor), and the congestion is expected to last for about 15 minutes.

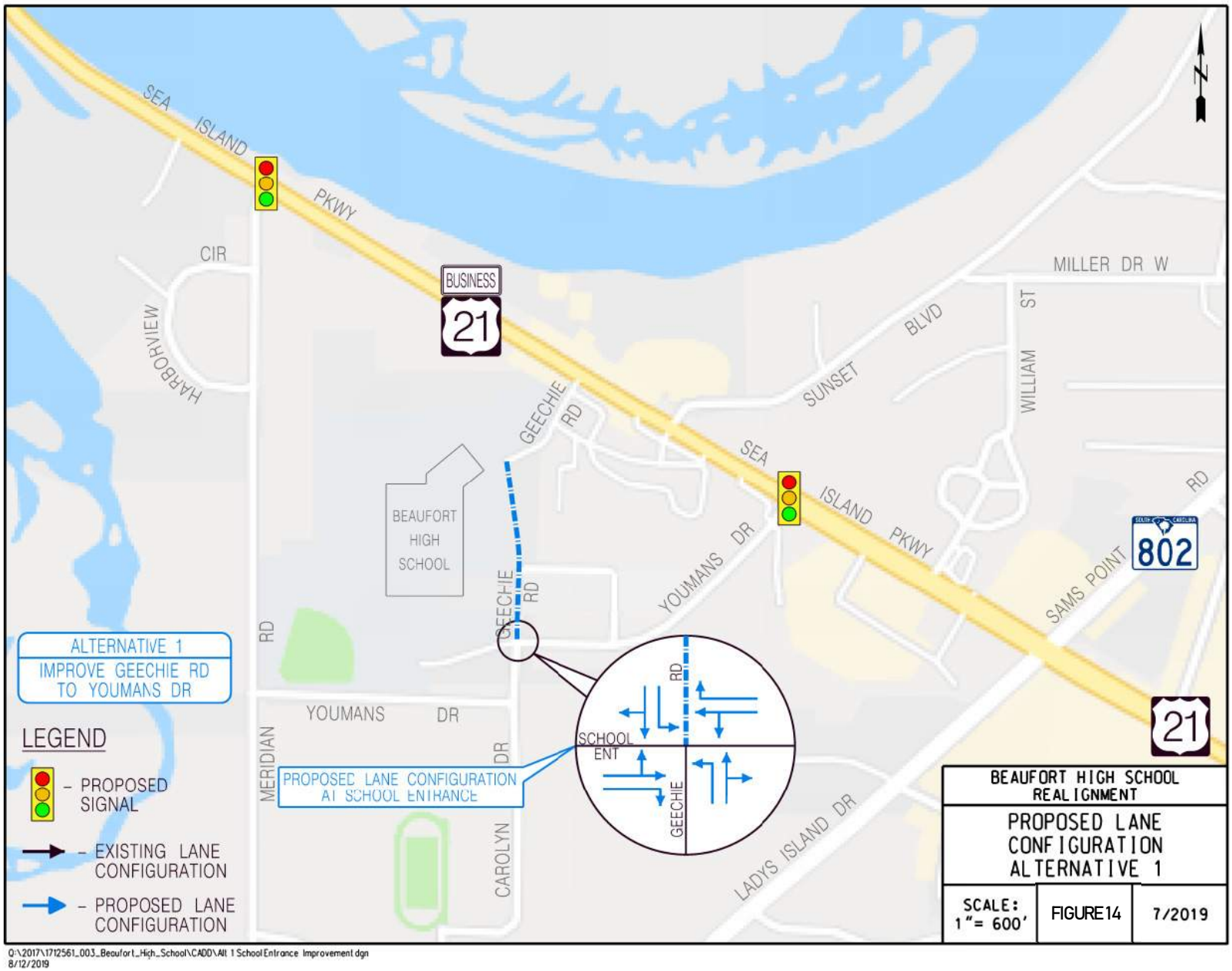

SEA ISLAND PKWY
CIR
HARBORVIEW
BUSINESS
21
GEECHIE RD
BEAUFORT HIGH SCHOOL
SUNSET BLVD
MILLER DR W
WILLIAM ST
SEA ISLAND PKWY
YOUMANS DR
SAMS POINT RD
802
21
MERIDIAN RD
YOUMANS DR
CAROLYN DR
LADYS ISLAND DR
SCHOOL ENT
GEECHIE RD
ALTERNATIVE 1
IMPROVE GEECHIE RD TO YOUMANS DR
PROPOSED LANE CONFIGURATION AT SCHOOL ENTRANCE
LEGEND
- PROPOSED SIGNAL
- EXISTING LANE CONFIGURATION
- PROPOSED LANE CONFIGURATION
N
BEAUFORT HIGH SCHOOL REALIGNMENT
PROPOSED LANE CONFIGURATION ALTERNATIVE 1
SCALE: 1"= 600'
FIGURE14
7/2019
Q:\2017\1712561_003_Beaufort_High_School\CADD\Alt 1 School Entrance Improvement.dgn
8/12/2019

Table 14. Roundabout and Lane Configuration Modification

Roundabout at						
Location	AM			School		
	Delay	LOS	Deg. Of Saturation (v/c)	Delay	LOS	Deg. Of Saturation (v/c)
2040 Alt 1 Youmans Dr & School Ent. & Geechie Rd	10.1	B	0.64	10.8	B	0.60
Lane Configuration Modification						
2040 Alt 1 Youmans Dr & School Ent. & Geechie Rd	15.7	C		36.1	E	

XIII) ALTERNATIVE 3 ROUNDABOUT

For Alternative 3, installation of a roundabout was considered at the intersection of US 21 Business and Sunset Boulevard as a replacement for the traffic signal. The roundabout was modeled using SIDRA INTERSECTION 8 and the results are shown in table 15.

A roundabout at US 21 Business and Sunset Boulevard would fail during every time period and is not recommended as a replacement. Roundabouts are not recommended where the degree of saturation is greater than 0.85.

Table 15. Roundabout analysis for Alternative 3; US 21 Business at Sunset Blvd.

Roundabout Location	AM			School			PM		
	Delay	LOS	Deg. Of Saturation (v/c)	Delay	LOS	Deg. Of Saturation (v/c)	Delay	LOS	Deg. Of Saturation (v/c)
2019 Alt 3 - US 21 Bus & Driveway/Sunset Blvd	19.2	C	0.89	24.8	C	0.92	15.9	C	0.82
2040 Alt 3 - US 21 Bus & Driveway/Sunset Blvd	105.7	F	1.34	208.2	F	1.54	144.5	F	1.37

XIV) SUMMARY OF FINDINGS

Alternative 1

Advantages

- Youmans Drive is the easternmost intersection on US 21 Business to access Beaufort High School. It would reduce traffic along US 21 Business westbound in the AM peak hour at a more easterly point. This would be beneficial since westbound US 21 Business traffic in the morning often backs up (slow rolling queues) from Bay Street through the existing signal at Geechie Road.

- This alternative divides the school traffic. Traffic from the west would potentially use Meridian Road to access the school and traffic from the east would use Youmans Drive. However, increasing the left turn volume from Meridian Road would increase delay at its intersection with US 21 Business.
- Eliminates the signal at Geechie Road.
- Installing a traffic signal at Youmans Drive would provide some gaps in westbound US 21 Business traffic to turn left onto Sunset Boulevard.

Disadvantages

- The intersections of Sunset Boulevard and Youmans Drive with US 21 Business are approximately 700 feet apart and installing signals at both intersections can cause some operational concerns. Therefore, a signal is not recommended at Sunset Boulevard.
- A right turn lane on the Meridian Road at US 21 Business northbound approach would be beneficial. The intersection should be signalized.
- This alternative increases the number of left-turning motorists from Meridian Road. They already have over a minute delay during the AM peak hour. This results in the need for a traffic signal at Meridian Road.
- School buses use Youmans Drive to access the school. This would mix bus traffic with parent/student traffic unless another bus route could be used.
- The increase in traffic on Youmans Drive would lead to needed improvements (widening, pavement markings, etc.) on the road. Also, it may lead to some resistance from the neighborhood. It is recommended to widen Youmans Drive to 24 feet. The minimum widening for the roadway would be 22 feet (2x11 ft. lanes). The roadway will operate under the condition of mixed traffic (school buses and student/parent vehicles).

Alternative 2

Advantages

- With this alternative the school traffic is split between multiple entrances. Traffic from the west would probably use Meridian Road to access the school and traffic from the east would use Youmans Drive.
- The distance between Meridian Road and Sunset Boulevard is great enough that if a signal is placed at Sunset Boulevard, it should not create operational concerns.
- The White Hall Plantation study recommended a signal at US 21 Business and Meridian Road.
- Eliminates the signal at Geechie Road.

Disadvantages

- Westbound US 21 Business school traffic would probably stay on US 21 Business longer during the AM rolling queues to make a left at Meridian Road to get to the school. Westbound US 21 Business morning traffic would back up quicker through this intersection than the others since it is closer to Bay Street.
- Cost to construct a connection from Meridian Road to the school parking lot.

- The Meridian Road approach at US 21 Business would need to be widened to create a left-thru lane and a right turn lane and the intersection should be signalized.
- The increase in volume of southbound left turning motorists on Meridian Road onto the new school driveway would need a left turn lane to be constructed.

Alternative 3

Advantages

- The existing eastbound US 21 Business left turning volume is already high at Sunset Boulevard. The left turning volume is especially high during the PM peak hour. Placing a signal at Sunset Boulevard would benefit the westbound US 21 Business left turn traffic onto the school, the traffic exiting the school, and the high existing eastbound US 21 Business left turn traffic onto Sunset Boulevard. Southbound Sunset Boulevard traffic at this intersection is mostly consisted of right turn motorists but is fairly high.
- The sunset Boulevard intersection is the only intersection of the three that has a high volume from the north approach (it serves the subdivision on the north side of US 21 Business), so it benefits the Beaufort High School and the subdivision.
- A signal at Sunset Boulevard would also create gaps for westbound US 21 Business traffic that may want to turn left onto Youmans Drive to get to the school.
- A signal at Sunset Boulevard would also create some gaps in traffic for right turning motorists exiting Youmans Drive.
- Eliminates the signal at Geechie Road.

Disadvantages

- The shopping center approach would have to be reconfigured, which could be expensive.
- The new access road to Beaufort High School may attract motorists to the shopping center, close to the intersection of US 21 Business, which could create some safety concerns. Queuing will also be an issue for motorists to access the Shopping Center entrances.
- A right turn lane should be added on Meridian Road northbound at US 21 Business and the intersection should be signalized by the year 2040.

APPENDIX A

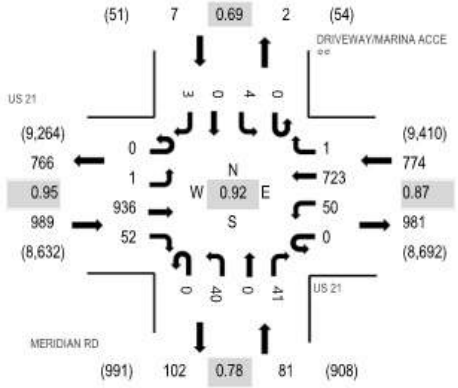
Traffic Count Data

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

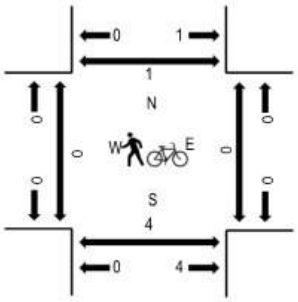
Location: 1 MERIDIAN RD & US 21 AM
Date and Start Time: Tuesday, May 7, 2019
Peak Hour: 04:45 PM - 05:45 PM
Peak 15-Minutes: 05:00 PM - 05:15 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	US 21 Eastbound				US 21 Westbound				MERIDIAN RD Northbound				DRIVEWAY/MARINA ACCESS Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
6:00 AM	0	0	20	3	0	1	77	0	0	3	0	1	0	0	0	0	105	694	0	0	0	0
6:15 AM	0	0	38	1	0	2	85	0	0	4	0	1	0	0	0	0	131	891	0	0	0	0
6:30 AM	0	0	25	4	0	8	141	0	0	7	0	3	0	0	0	0	188	1,118	0	0	1	0
6:45 AM	0	0	90	7	0	3	165	0	0	2	0	3	0	0	0	0	270	1,378	0	0	0	0
7:00 AM	0	0	96	9	0	5	179	0	0	9	0	4	0	0	0	0	302	1,597	0	0	1	0
7:15 AM	0	1	96	2	0	7	237	0	0	7	0	8	0	0	0	0	358	1,695	0	0	0	2
7:30 AM	0	0	175	3	0	8	243	0	0	11	0	8	0	0	0	0	448	1,723	0	0	0	1
7:45 AM	0	0	160	12	0	16	278	0	0	11	0	11	0	1	0	0	489	1,640	0	0	2	0
8:00 AM	0	0	141	11	0	13	216	0	0	8	0	11	0	0	0	0	400	1,524	0	0	4	0
8:15 AM	0	0	159	16	0	6	182	0	0	8	0	15	0	0	0	0	386	1,367	0	0	1	0
8:30 AM	0	0	127	17	0	11	171	1	0	13	0	25	0	0	0	0	365	1,343	1	0	0	1
8:45 AM	0	0	137	15	0	5	197	0	0	7	0	12	0	0	0	0	373	1,345	0	0	0	0
9:00 AM	0	0	87	4	0	16	119	2	0	4	0	10	0	1	0	0	243	1,320	0	0	0	0
9:15 AM	0	0	153	9	0	10	174	0	0	8	0	8	0	0	0	0	362	1,393	0	0	0	1
9:30 AM	0	0	146	8	0	12	182	0	0	9	0	9	0	1	0	0	367	1,338	1	0	0	0
9:45 AM	0	0	127	1	0	10	189	0	0	11	1	9	0	0	0	0	348	1,311	1	0	0	0
10:00 AM	0	0	112	8	0	9	167	1	0	9	0	8	0	0	0	2	316	1,305	0	0	0	0
10:15 AM	0	1	147	7	0	6	131	0	0	7	0	7	0	0	0	1	307	1,321	0	0	0	0
10:30 AM	0	1	139	4	0	10	168	0	0	6	0	11	0	1	0	0	340	1,343	0	0	0	0
10:45 AM	0	1	134	11	0	11	163	0	0	10	0	11	0	0	0	1	342	1,334	0	0	0	0
11:00 AM	0	0	136	10	0	15	160	2	0	1	0	8	0	0	0	0	332	1,386	0	0	0	0
11:15 AM	0	1	136	4	1	6	165	3	0	7	0	6	0	0	0	0	329		0	0	0	0
11:30 AM	0	0	151	7	0	13	142	2	0	6	0	5	0	3	1	1	331		0	0	0	1
11:45 AM	0	0	162	10	0	8	190	0	0	9	0	14	0	1	0	0	394		0	0	0	2
12:00 PM	0	0	151	10	0	10	147	1	0	5	0	15	0	0	0	1	340	1,469	0	0	0	0
12:15 PM	0	1	149	8	0	10	171	0	0	7	0	11	0	1	1	0	359	1,504	0	0	0	0
12:30 PM	0	0	158	7	1	9	181	0	0	7	0	14	0	0	0	0	377	1,521	0	0	0	0
12:45 PM	0	0	179	8	1	13	174	1	0	10	0	7	0	0	0	0	393	1,508	0	0	0	0
1:00 PM	0	0	165	10	0	13	157	3	0	12	0	13	0	0	1	1	375	1,462	0	0	0	0
1:15 PM	0	0	173	6	1	14	164	1	0	6	0	9	0	2	0	0	376	1,495	0	0	0	2
1:30 PM	0	0	175	8	0	12	150	1	0	5	0	11	0	1	0	1	364	1,513	0	0	2	0
1:45 PM	0	0	160	8	0	11	149	1	0	6	0	12	0	0	0	0	347	1,525	0	0	0	0
2:00 PM	0	1	184	10	0	14	186	0	0	7	0	6	0	0	0	0	408	1,596	0	0	0	0
2:15 PM	0	1	193	6	0	6	167	0	0	7	0	13	0	1	0	0	394	1,613	0	0	0	0
2:30 PM	0	0	184	8	0	14	158	1	0	4	0	7	0	0	0	0	376	1,661	0	0	0	0

2:45 PM	0	0	180	10	0	13	195	1	0	9	0	9	0	0	0	1	418	1,760	0	0	0	0
3:00 PM	0	1	189	10	0	11	190	0	0	6	0	15	0	0	1	2	425	1,765	0	0	0	0
3:15 PM	0	1	202	9	0	7	197	1	0	12	0	13	0	0	0	0	442	1,754	0	0	0	0
3:30 PM	0	0	237	13	0	10	185	2	0	5	0	19	0	1	0	3	475	1,751	0	0	1	0
3:45 PM	0	0	164	15	0	16	195	0	0	15	0	18	0	0	0	0	423	1,708	0	0	0	0
4:00 PM	0	0	180	14	0	20	185	0	0	8	0	7	0	0	0	0	414	1,725	0	0	0	0
4:15 PM	0	0	222	12	0	11	173	3	0	9	0	8	0	0	0	1	439	1,814	0	0	0	0
4:30 PM	0	1	216	7	0	13	168	2	0	11	0	12	0	0	0	2	432	1,842	1	0	0	2
4:45 PM	0	0	214	12	0	9	179	0	0	12	0	11	0	3	0	0	440	1,851	0	0	1	0
5:00 PM	0	0	247	19	0	13	197	1	0	14	0	12	0	0	0	0	503	1,812	0	0	0	0
5:15 PM	0	0	239	14	0	16	179	0	0	7	0	9	0	0	0	3	467	1,674	0	0	0	0
5:30 PM	0	1	236	7	0	12	168	0	0	7	0	9	0	1	0	0	441	1,540	0	0	2	1
5:45 PM	0	2	229	18	0	9	128	3	0	4	0	5	0	2	0	1	401	1,417	0	0	0	0
6:00 PM	0	0	182	8	0	8	144	0	0	11	0	8	0	3	0	1	365	1,346	0	0	0	1
6:15 PM	0	0	166	5	0	9	134	2	0	10	1	6	0	0	0	0	333		0	0	0	0
6:30 PM	0	0	154	9	0	6	136	2	0	3	0	7	0	1	0	0	318		0	0	0	0
6:45 PM	0	0	141	1	0	12	159	0	0	9	1	6	0	1	0	0	330		0	0	1	0

Peak Rolling Hour Flow Rates

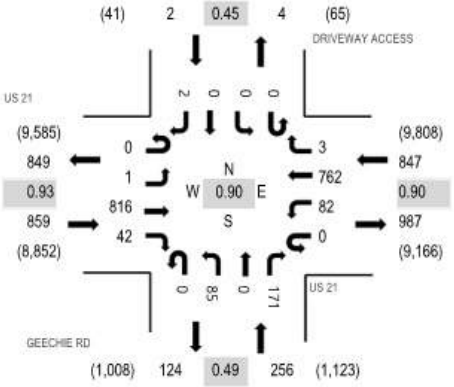
	Eastbound				Westbound				Northbound				Southbound				
Vehicle Type	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total
Articulated Trucks	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Lights	0	1	928	52	0	49	720	1	0	40	0	41	0	4	0	3	1,839
Mediums	0	0	6	0	0	1	3	0	0	0	0	0	0	0	0	0	10
Total	0	1	936	52	0	50	723	1	0	40	0	41	0	4	0	3	1,851

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

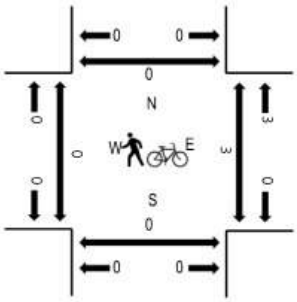
Location: 2 GEECHIE RD & US 21 AM
Date and Start Time: Tuesday, May 7, 2019
Peak Hour: 03:15 PM - 04:15 PM
Peak 15-Minutes: 03:45 PM - 04:00 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	US 21 Eastbound				US 21 Westbound				GEECHIE RD Northbound				DRIVEWAY ACCESS Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
6:00 AM	0	1	21	0	0	1	75	0	0	0	0	2	0	0	0	0	100	675	0	0	0	0
6:15 AM	0	0	37	0	0	1	90	0	0	2	0	1	0	0	0	0	131	876	0	0	0	0
6:30 AM	0	0	27	2	0	1	149	0	0	0	0	0	0	0	0	0	179	1,117	0	0	1	0
6:45 AM	0	0	84	3	1	6	165	2	0	1	0	3	0	0	0	0	265	1,394	0	0	0	0
7:00 AM	0	0	95	6	0	7	188	0	0	2	0	2	0	1	0	0	301	1,610	0	0	0	0
7:15 AM	0	0	100	6	0	14	243	0	0	3	0	6	0	0	0	0	372	1,766	0	0	1	2
7:30 AM	0	0	160	15	0	18	253	0	0	5	1	4	0	0	0	0	456	1,833	1	0	0	2
7:45 AM	0	0	146	16	0	22	282	0	0	5	0	6	0	1	0	3	481	1,837	0	3	0	7
8:00 AM	0	0	134	29	0	46	217	0	0	12	0	17	0	0	0	2	457	1,730	0	3	0	2
8:15 AM	0	1	134	33	0	57	175	0	0	14	1	23	0	1	0	0	439	1,526	0	0	0	0
8:30 AM	0	0	130	33	0	66	164	0	0	20	0	47	0	0	0	0	460	1,468	0	0	0	1
8:45 AM	0	0	131	4	0	15	194	0	0	12	0	18	0	0	0	0	374	1,368	0	0	0	0
9:00 AM	0	0	83	2	0	8	144	0	0	5	0	10	0	0	0	1	253	1,350	0	1	0	0
9:15 AM	0	0	175	5	0	4	173	1	0	7	0	11	0	2	0	3	381	1,421	0	0	0	0
9:30 AM	0	1	140	6	0	13	191	0	0	4	0	5	0	0	0	0	360	1,362	0	0	0	0
9:45 AM	0	2	140	10	0	1	194	1	0	2	0	3	0	1	0	2	356	1,359	0	0	0	0
10:00 AM	0	0	119	7	0	8	171	0	0	7	0	11	0	0	0	1	324	1,347	0	0	0	0
10:15 AM	0	1	153	4	0	8	131	1	0	10	0	14	0	0	0	0	322	1,367	0	0	0	0
10:30 AM	0	1	150	4	0	7	174	1	0	7	0	11	0	1	0	1	357	1,388	0	0	0	2
10:45 AM	0	0	151	7	0	7	162	0	0	9	0	7	0	1	0	0	344	1,371	0	0	0	0
11:00 AM	0	1	132	6	0	12	174	1	0	9	0	8	0	0	1	0	344	1,453	0	0	0	0
11:15 AM	0	0	139	6	0	6	177	2	0	4	0	9	0	0	0	0	343		0	0	0	0
11:30 AM	0	0	147	9	0	11	161	0	0	7	0	5	0	0	0	0	340		0	1	0	1
11:45 AM	0	2	174	6	0	8	186	1	0	16	0	32	0	0	0	1	426		0	0	0	2
12:00 PM	0	2	162	5	0	7	149	5	0	6	1	16	0	0	0	0	353	1,534	0	0	0	4
12:15 PM	0	2	164	5	0	3	184	1	0	2	1	14	0	2	0	0	378	1,558	0	0	0	7
12:30 PM	0	1	179	7	0	18	186	1	0	6	0	9	0	0	0	0	407	1,556	0	0	0	0
12:45 PM	0	1	182	4	0	6	185	2	0	6	0	9	0	1	0	0	396	1,546	0	0	0	6
1:00 PM	0	3	173	7	0	5	177	3	0	1	0	7	0	0	0	1	377	1,518	0	0	0	1
1:15 PM	0	0	186	7	0	4	167	0	0	3	0	9	0	0	0	0	376	1,560	0	1	0	1
1:30 PM	0	0	192	5	0	11	159	2	0	7	0	20	0	1	0	0	397	1,593	0	0	0	1
1:45 PM	0	0	163	6	0	12	171	1	0	6	0	8	0	0	0	1	368	1,588	0	1	0	2
2:00 PM	0	0	194	2	0	9	192	2	0	9	0	11	0	0	0	0	419	1,643	0	0	0	0
2:15 PM	0	1	209	8	0	7	169	1	0	5	0	7	0	2	0	0	409	1,656	0	0	0	1
2:30 PM	0	0	192	5	0	4	173	1	0	6	0	10	0	1	0	0	392	1,713	0	0	0	0

2:45 PM	0	0	200	3	0	5	205	0	0	5	0	5	0	0	0	0	423	1,801	0	0	0	2
3:00 PM	0	0	198	8	0	9	198	2	0	5	0	11	0	0	0	1	432	1,922	0	0	0	0
3:15 PM	0	0	222	7	0	13	200	1	0	7	0	16	0	0	0	0	466	1,964	0	0	0	0
3:30 PM	0	0	219	23	0	21	195	1	0	6	0	14	0	0	0	1	480	1,950	0	0	0	0
3:45 PM	0	1	182	6	0	30	186	1	0	45	0	92	0	0	0	1	544	1,924	0	2	0	0
4:00 PM	0	0	193	6	0	18	181	0	0	27	0	49	0	0	0	0	474	1,839	0	1	0	0
4:15 PM	0	1	224	8	0	11	174	0	0	11	0	22	0	0	0	1	452	1,848	0	1	0	0
4:30 PM	0	2	236	2	0	8	180	0	0	11	0	14	0	1	0	0	454	1,864	0	0	0	0
4:45 PM	0	0	229	7	0	10	191	0	0	6	0	15	0	0	0	1	459	1,896	0	0	0	0
5:00 PM	0	0	246	5	0	4	202	0	0	10	0	15	0	0	0	1	483	1,834	0	0	0	0
5:15 PM	0	1	243	4	0	8	202	0	0	3	0	6	0	0	0	1	468	1,711	0	0	2	0
5:30 PM	0	0	258	13	0	14	169	1	0	13	0	18	0	0	0	0	486	1,593	0	0	0	0
5:45 PM	0	0	227	2	0	6	135	0	0	7	0	20	0	0	0	0	397	1,418	0	0	0	0
6:00 PM	0	0	191	3	0	5	145	0	0	9	0	6	0	1	0	0	360	1,369	0	2	0	3
6:15 PM	0	1	163	8	0	5	150	0	0	5	0	18	0	0	0	0	350		0	0	0	0
6:30 PM	0	0	154	5	0	10	130	0	0	7	0	5	0	0	0	0	311		0	0	0	0
6:45 PM	0	0	151	2	0	5	169	0	0	8	0	13	0	0	0	0	348		0	0	0	0

Peak Rolling Hour Flow Rates

	Eastbound				Westbound				Northbound				Southbound				
Vehicle Type	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total
Articulated Trucks	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
Lights	0	1	803	41	0	82	749	3	0	83	0	170	0	0	0	2	1,934
Mediums	0	0	13	1	0	0	11	0	0	2	0	1	0	0	0	0	28
Total	0	1	816	42	0	82	762	3	0	85	0	171	0	0	0	2	1,964

All Traffic Data Services Inc.

(303) 216-2439
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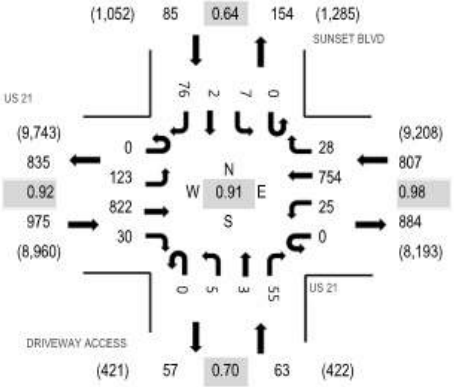
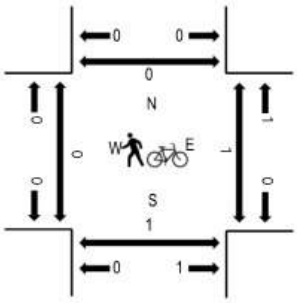
Location: 3 DRIVEWAY ACCESS & US 21 AM
Date and Start Time: Tuesday, May 7, 2019
Peak Hour: 03:15 PM - 04:15 PM
Peak 15-Minutes: 03:45 PM - 04:00 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	US 21 Eastbound				US 21 Westbound				DRIVEWAY ACCESS Northbound				SUNSET BLVD Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
6:00 AM	0	1	22	0	0	0	68	0	0	0	0	0	0	0	0	8	99	679	0	0	0	0
6:15 AM	0	5	30	0	0	2	86	0	0	0	0	0	0	0	0	5	128	873	0	0	1	0
6:30 AM	0	2	24	1	0	0	135	1	0	0	0	4	0	0	0	18	185	1,122	0	0	0	0
6:45 AM	0	13	72	0	0	1	160	1	0	1	0	1	0	0	0	18	267	1,367	0	0	0	0
7:00 AM	0	5	88	0	0	0	175	1	0	0	0	4	0	1	0	19	293	1,567	0	0	0	0
7:15 AM	0	16	89	0	0	3	233	4	0	1	0	3	0	0	0	28	377	1,700	0	0	1	0
7:30 AM	0	18	135	0	0	4	232	2	0	0	0	3	0	2	0	34	430	1,734	0	0	0	0
7:45 AM	0	17	137	3	0	2	241	2	0	0	0	1	0	3	0	61	467	1,722	0	0	0	0
8:00 AM	0	19	128	3	0	4	236	2	0	0	0	3	0	6	0	25	426	1,633	0	0	0	0
8:15 AM	0	17	134	2	0	5	211	3	0	0	0	6	0	4	0	29	411	1,468	0	0	0	0
8:30 AM	0	16	153	2	0	3	199	4	0	1	0	6	0	4	1	29	418	1,438	1	0	0	0
8:45 AM	0	17	124	5	0	4	201	6	1	0	0	7	0	1	0	12	378	1,387	0	0	0	0
9:00 AM	0	14	68	4	0	3	141	3	0	0	0	6	0	4	0	18	261	1,365	0	0	0	0
9:15 AM	0	12	168	4	0	3	167	4	0	0	0	5	0	4	0	14	381	1,425	0	0	1	0
9:30 AM	0	10	125	6	0	6	188	4	0	3	0	6	0	2	0	17	367	1,362	0	0	0	0
9:45 AM	0	17	119	3	0	3	179	5	0	2	1	10	0	0	1	16	356	1,358	0	0	1	0
10:00 AM	0	7	112	4	0	2	166	8	0	1	0	5	0	5	1	10	321	1,357	0	0	0	0
10:15 AM	0	13	141	6	0	3	130	5	0	2	0	6	0	1	1	10	318	1,380	0	0	0	0
10:30 AM	0	13	138	8	0	6	170	4	0	2	0	7	0	5	0	10	363	1,426	0	0	0	0
10:45 AM	0	13	139	7	0	5	163	2	0	1	0	12	0	3	1	9	355	1,402	0	0	1	0
11:00 AM	0	8	129	4	0	4	176	5	0	1	0	2	0	1	0	14	344	1,469	0	1	0	0
11:15 AM	0	11	130	3	0	6	162	15	0	1	1	11	0	4	2	18	364		0	1	0	0
11:30 AM	0	14	133	5	0	4	148	6	0	3	0	6	0	4	1	15	339		0	0	2	0
11:45 AM	0	26	175	5	0	3	174	7	0	0	1	5	0	6	0	20	422		0	0	0	0
12:00 PM	0	20	150	4	0	5	137	4	0	4	0	5	0	7	0	16	352	1,536	0	0	0	0
12:15 PM	0	16	162	3	0	3	176	4	0	3	1	6	0	4	1	14	393	1,568	0	0	0	0
12:30 PM	0	25	156	3	0	3	184	4	0	2	0	5	0	3	0	18	403	1,564	0	0	0	0
12:45 PM	0	15	159	6	0	4	167	6	0	3	0	9	0	3	0	16	388	1,559	0	0	0	0
1:00 PM	0	19	154	8	0	5	163	7	0	0	2	5	0	2	1	18	384	1,538	0	0	0	1
1:15 PM	1	16	175	3	0	5	153	7	0	0	1	8	0	2	1	17	389	1,565	0	0	0	0
1:30 PM	0	16	194	3	0	7	151	2	0	2	0	5	0	2	0	16	398	1,585	0	0	0	0
1:45 PM	0	17	145	5	0	1	170	3	0	1	1	6	0	1	1	16	367	1,578	2	0	1	0
2:00 PM	0	27	166	2	0	3	173	5	0	2	0	10	0	2	1	20	411	1,641	0	0	0	0
2:15 PM	0	21	194	6	0	1	158	2	0	1	1	7	0	2	0	16	409	1,648	0	2	1	2
2:30 PM	0	20	170	8	0	2	162	4	0	0	0	9	0	2	0	14	391	1,710	0	0	0	0

2:45 PM	0	20	173	6	0	3	185	9	0	2	1	9	0	2	1	19	430	1,774	0	0	0	0
3:00 PM	0	24	169	3	0	4	189	4	0	1	0	7	0	3	0	14	418	1,872	0	0	0	0
3:15 PM	0	13	209	11	0	7	200	7	0	0	0	10	0	1	0	13	471	1,930	0	0	0	0
3:30 PM	0	30	192	3	0	2	178	6	0	3	1	4	0	3	1	32	455	1,905	0	0	0	0
3:45 PM	0	41	223	8	0	11	199	7	0	1	1	19	0	2	1	15	528	1,899	0	0	0	0
4:00 PM	0	39	198	8	0	5	177	8	0	1	1	22	0	1	0	16	476	1,837	0	1	1	0
4:15 PM	0	48	187	7	0	5	159	9	0	1	1	9	0	2	0	18	446	1,840	0	0	0	0
4:30 PM	0	33	203	7	0	4	160	9	0	2	0	9	0	2	0	20	449	1,848	0	1	0	0
4:45 PM	0	34	202	1	0	2	185	9	0	1	1	9	0	2	0	20	466	1,853	0	0	0	0
5:00 PM	0	34	219	4	0	2	184	6	0	1	0	9	0	4	0	16	479	1,796	0	0	1	0
5:15 PM	0	33	199	5	0	3	179	3	0	1	1	8	0	4	0	18	454	1,673	0	0	3	0
5:30 PM	0	28	222	8	0	1	166	4	0	0	0	9	0	1	0	15	454	1,561	0	0	1	0
5:45 PM	0	30	204	8	0	5	129	7	0	2	0	9	0	2	0	13	409	1,418	0	0	0	0
6:00 PM	0	29	158	5	0	2	132	8	0	1	1	8	0	2	0	10	356	1,352	0	0	0	0
6:15 PM	0	23	145	6	0	5	143	5	0	0	0	3	0	3	0	9	342		0	0	0	0
6:30 PM	0	23	138	3	0	3	125	2	0	2	1	3	0	4	0	7	311		0	0	0	0
6:45 PM	0	21	137	5	0	1	155	3	0	0	0	6	0	2	0	13	343		0	0	0	0

Peak Rolling Hour Flow Rates

	Eastbound				Westbound				Northbound				Southbound				
Vehicle Type	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lights	0	121	812	30	0	25	743	27	0	5	3	55	0	7	2	74	1,904
Mediums	0	2	10	0	0	0	11	1	0	0	0	0	0	0	0	2	26
Total	0	123	822	30	0	25	754	28	0	5	3	55	0	7	2	76	1,930

All Traffic Data Services Inc.

(303) 216-2439
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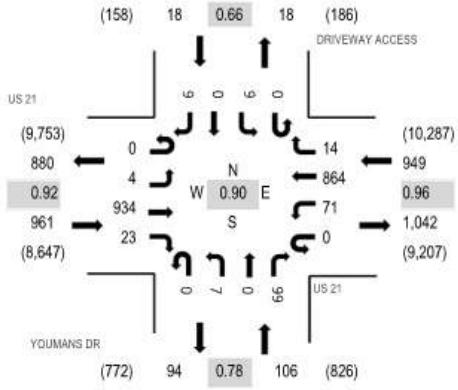
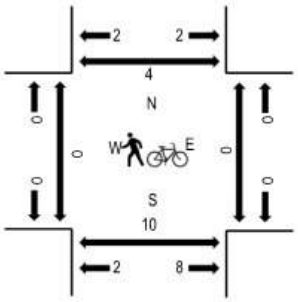
Location: 4 YOUMANS DR & US 21 AM
Date and Start Time: Tuesday, May 7, 2019
Peak Hour: 03:15 PM - 04:15 PM
Peak 15-Minutes: 03:45 PM - 04:00 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	US 21 Eastbound				US 21 Westbound				YOUMANS DR Northbound				DRIVEWAY ACCESS Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
6:00 AM	0	0	23	0	0	7	66	0	0	4	0	2	0	0	0	0	102	647	0	1	0	0
6:15 AM	0	0	36	0	0	4	84	0	0	0	0	2	0	0	0	0	126	841	0	0	1	0
6:30 AM	0	0	28	1	0	7	132	0	0	2	0	6	0	0	0	0	176	1,077	0	0	0	0
6:45 AM	0	0	70	3	0	4	160	0	0	0	0	6	0	0	0	0	243	1,308	0	0	0	0
7:00 AM	0	0	93	0	0	14	174	1	0	0	0	13	0	1	0	0	296	1,517	0	0	0	0
7:15 AM	0	1	94	0	0	14	237	1	0	2	0	13	0	0	0	0	362	1,662	2	0	1	2
7:30 AM	0	0	135	3	0	11	237	2	0	1	0	18	0	0	0	0	407	1,766	0	0	0	0
7:45 AM	0	1	131	2	0	33	258	5	0	2	0	17	0	1	0	2	452	1,819	0	0	0	0
8:00 AM	0	1	129	2	0	33	241	1	0	3	0	30	0	0	0	1	441	1,739	0	0	0	2
8:15 AM	0	2	143	2	0	56	229	3	0	5	0	25	0	0	0	1	466	1,556	0	0	0	0
8:30 AM	0	1	152	3	0	51	218	3	0	1	0	29	0	0	0	2	460	1,464	0	0	0	0
8:45 AM	0	3	124	1	0	8	215	3	0	6	0	8	0	3	0	1	372	1,373	0	0	0	0
9:00 AM	0	1	81	1	0	6	155	1	0	0	0	5	0	5	1	2	258	1,358	0	1	0	0
9:15 AM	0	2	174	1	0	3	172	6	0	0	0	11	0	3	0	2	374	1,442	0	0	0	0
9:30 AM	0	2	134	5	0	6	203	2	0	2	0	12	0	0	0	3	369	1,394	1	0	0	3
9:45 AM	0	1	133	2	0	3	197	8	0	0	0	8	0	1	0	4	357	1,400	0	0	1	0
10:00 AM	0	1	133	4	0	3	187	3	0	1	1	4	0	4	0	1	342	1,418	0	0	0	0
10:15 AM	0	0	156	1	0	3	153	1	0	4	0	4	0	0	0	4	326	1,431	0	0	0	1
10:30 AM	0	1	160	1	0	8	195	2	0	2	0	4	0	1	0	1	375	1,466	0	0	0	2
10:45 AM	0	3	160	4	0	11	181	1	0	1	0	11	0	1	0	2	375	1,426	1	0	0	0
11:00 AM	0	4	147	0	0	8	182	4	0	3	0	3	0	1	0	3	355	1,466	0	0	0	1
11:15 AM	0	3	149	1	0	2	191	5	0	2	0	6	0	0	0	2	361		0	0	1	0
11:30 AM	0	1	147	3	0	5	163	0	0	0	0	10	0	2	0	4	335		0	0	2	0
11:45 AM	0	0	195	4	0	3	193	2	0	4	0	10	0	0	0	4	415		1	0	0	0
12:00 PM	0	1	160	7	0	12	154	5	0	2	0	7	0	5	1	0	354	1,552	0	0	0	0
12:15 PM	0	3	174	3	0	10	187	3	0	1	0	13	0	4	0	3	401	1,558	0	0	0	0
12:30 PM	0	1	167	2	0	5	192	6	0	5	0	11	0	1	0	3	393	1,553	0	0	0	0
12:45 PM	0	1	183	3	0	5	195	6	0	2	0	5	0	3	0	1	404	1,574	0	0	0	0
1:00 PM	0	0	167	3	0	5	174	3	0	2	0	6	0	0	0	0	360	1,536	1	0	1	0
1:15 PM	0	1	182	5	0	8	181	4	0	1	0	10	0	2	0	2	396	1,573	0	0	1	1
1:30 PM	0	4	198	1	1	7	171	4	0	4	0	18	0	3	0	3	414	1,582	0	0	0	2
1:45 PM	0	3	157	3	1	4	186	3	0	0	0	5	0	2	0	2	366	1,568	0	0	0	0
2:00 PM	0	0	178	6	0	8	190	4	0	0	0	7	0	1	0	3	397	1,632	1	0	0	0
2:15 PM	0	2	213	2	0	7	166	1	0	2	0	9	0	2	0	1	405	1,681	1	0	0	0
2:30 PM	0	1	185	5	0	8	178	6	0	3	0	11	0	2	0	1	400	1,770	0	0	0	0

2:45 PM	0	1	196	3	0	9	199	4	0	2	0	12	0	2	0	2	430	1,823	0	0	0	0
3:00 PM	0	0	184	3	0	9	203	3	0	7	0	32	0	2	1	2	446	1,959	0	0	0	0
3:15 PM	0	0	225	7	0	18	221	6	0	1	0	12	0	2	0	2	494	2,034	0	0	0	1
3:30 PM	0	0	200	5	0	10	210	2	0	5	0	15	0	5	0	1	453	2,000	0	0	2	0
3:45 PM	0	0	261	8	0	21	234	4	0	1	0	33	0	1	0	3	566	2,004	0	0	4	1
4:00 PM	0	4	248	3	0	22	199	2	0	0	0	39	0	1	0	3	521	1,897	0	0	4	0
4:15 PM	0	3	226	3	0	16	179	4	0	6	0	18	0	2	1	2	460	1,854	0	0	1	3
4:30 PM	0	3	223	7	0	8	186	0	0	6	0	18	0	3	0	3	457	1,845	0	0	0	1
4:45 PM	0	0	211	7	0	16	200	1	0	6	0	15	0	1	0	2	459	1,848	0	0	0	0
5:00 PM	0	0	247	4	0	11	193	0	0	2	1	17	0	2	0	1	478	1,809	0	0	1	1
5:15 PM	0	0	223	1	0	23	187	0	0	2	0	15	0	0	0	0	451	1,685	0	0	2	0
5:30 PM	0	0	236	6	0	13	173	0	0	3	1	27	0	0	0	1	460	1,574	0	0	2	0
5:45 PM	0	0	230	6	0	10	144	0	0	7	0	22	0	0	0	1	420	1,430	0	0	1	0
6:00 PM	0	0	173	2	0	12	152	1	0	0	0	14	0	0	0	0	354	1,388	1	0	1	1
6:15 PM	0	1	156	0	0	11	152	0	0	0	0	17	0	0	0	3	340		0	0	0	0
6:30 PM	0	0	146	4	0	8	143	0	0	2	0	12	0	1	0	0	316		0	0	0	0
6:45 PM	0	0	158	3	0	13	175	0	0	5	0	24	0	0	0	0	378		0	0	0	0

Peak Rolling Hour Flow Rates

	Eastbound				Westbound				Northbound				Southbound				
Vehicle Type	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total
Articulated Trucks	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	2
Lights	0	4	927	23	0	58	853	13	0	7	0	94	0	9	0	9	1,997
Mediums	0	0	6	0	0	13	11	1	0	0	0	4	0	0	0	0	35
Total	0	4	934	23	0	71	864	14	0	7	0	99	0	9	0	9	2,034

All Traffic Data Services Inc.

(303) 216-2439
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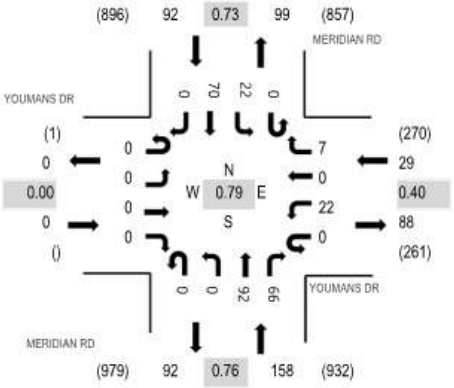
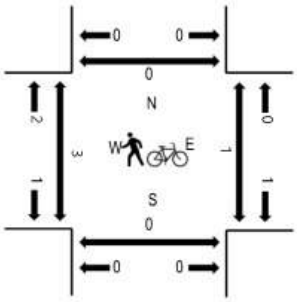
Location: 5 MERIDIAN RD & YOUMANS DR AM
Date and Start Time: Tuesday, May 7, 2019
Peak Hour: 07:45 AM - 08:45 AM
Peak 15-Minutes: 08:30 AM - 08:45 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	YOUMANS DR Eastbound				YOUMANS DR Westbound				MERIDIAN RD Northbound				MERIDIAN RD Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
6:00 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	0	8	59	0	0	0	0
6:15 AM	0	0	0	0	0	1	0	0	0	0	4	0	0	0	2	0	7	78	0	0	0	0
6:30 AM	0	0	0	0	0	0	0	0	0	0	11	1	0	0	12	0	24	96	0	0	0	0
6:45 AM	0	0	0	0	0	5	0	1	0	0	3	1	0	0	10	0	20	110	0	0	0	0
7:00 AM	0	0	0	0	0	1	0	1	0	0	11	2	0	1	11	0	27	152	0	0	0	0
7:15 AM	0	0	0	0	0	3	0	1	0	0	12	3	0	0	6	0	25	179	0	0	0	0
7:30 AM	0	0	0	0	0	4	0	2	0	0	17	4	0	2	9	0	38	229	0	0	0	0
7:45 AM	0	0	0	0	0	3	0	2	0	0	17	12	0	3	25	0	62	279	0	1	0	0
8:00 AM	0	0	0	0	0	3	0	1	0	0	21	11	0	2	16	0	54	254	2	0	0	0
8:15 AM	0	0	0	0	0	7	0	1	0	0	22	23	0	7	15	0	75	236	1	0	0	0
8:30 AM	0	0	0	0	0	9	0	3	0	0	32	20	0	10	14	0	88	189	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	1	0	0	18	1	0	0	17	0	37	130	0	0	0	0
9:00 AM	0	0	0	0	0	2	0	2	0	0	9	2	0	2	19	0	36	125	0	1	0	0
9:15 AM	0	0	0	0	0	0	0	1	0	0	10	3	0	1	13	0	28	121	0	0	0	0
9:30 AM	0	0	0	0	0	0	0	1	0	0	13	2	0	0	13	0	29	118	0	0	0	0
9:45 AM	0	0	0	0	0	0	0	0	0	0	21	0	0	1	10	0	32	123	0	0	0	0
10:00 AM	0	0	0	0	0	3	0	3	0	0	10	0	0	0	16	0	32	135	0	0	0	0
10:15 AM	0	0	0	0	0	1	0	0	0	0	14	0	0	1	9	0	25	131	0	1	0	0
10:30 AM	0	0	0	0	0	1	0	1	0	0	16	0	0	0	16	0	34	127	0	1	0	0
10:45 AM	0	0	0	0	0	0	0	3	0	0	18	0	0	3	20	0	44	127	0	0	0	0
11:00 AM	0	0	0	0	0	1	0	1	0	0	9	0	0	2	15	0	28	127	0	0	0	0
11:15 AM	0	0	0	0	0	1	0	1	0	0	9	1	0	0	9	0	21		1	0	0	0
11:30 AM	0	0	0	0	0	2	0	0	0	0	13	2	0	0	17	0	34		2	0	0	0
11:45 AM	0	0	0	0	0	3	0	1	0	0	17	2	0	0	21	0	44		0	0	0	0
12:00 PM	0	0	0	0	0	5	0	1	0	0	15	0	0	1	17	0	39	143	0	0	0	0
12:15 PM	0	0	0	0	0	3	0	0	0	0	14	2	0	1	12	0	32	150	0	0	0	0
12:30 PM	0	0	0	0	0	2	0	0	0	0	17	2	0	2	18	0	41	158	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	3	0	0	13	1	0	1	13	0	31	153	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0	21	3	0	1	21	0	46	157	0	0	0	0
1:15 PM	0	0	0	0	0	3	0	1	0	0	16	4	0	0	16	0	40	151	0	0	0	0
1:30 PM	0	0	0	0	0	0	0	2	0	0	16	1	0	0	17	0	36	139	0	0	0	0
1:45 PM	0	0	0	0	0	2	0	0	0	0	17	1	0	0	15	0	35	145	0	0	0	0
2:00 PM	0	0	0	0	0	4	0	2	0	0	11	1	0	0	22	0	40	157	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	18	0	0	0	10	0	28	173	0	0	0	0
2:30 PM	0	0	0	0	0	7	0	2	0	0	15	0	0	1	17	0	42	191	0	0	0	0

2:45 PM	0	0	0	0	0	1	0	1	0	0	18	3	0	2	22	0	47	198	0	0	0	0
3:00 PM	0	0	0	0	0	9	0	1	0	0	21	3	0	1	21	0	56	239	0	0	0	0
3:15 PM	0	0	0	0	0	3	0	2	0	0	23	1	0	1	16	0	46	248	0	0	0	0
3:30 PM	0	0	0	0	0	1	0	3	0	0	19	5	0	7	14	0	49	250	0	0	0	0
3:45 PM	0	0	0	0	0	22	0	18	0	0	14	7	0	8	19	0	88	247	0	0	0	0
4:00 PM	0	0	0	0	0	9	0	4	0	0	16	7	0	4	25	0	65	205	0	0	0	0
4:15 PM	0	0	0	0	0	4	0	3	0	0	12	3	0	4	22	0	48	203	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	4	0	0	21	3	0	0	18	0	46	208	0	0	0	0
4:45 PM	0	0	0	0	0	8	0	5	0	0	12	3	0	2	16	0	46	205	0	0	0	0
5:00 PM	0	0	0	0	1	4	0	2	0	0	17	3	0	3	33	0	63	204	0	0	0	0
5:15 PM	0	0	0	0	0	6	1	1	0	0	16	4	0	3	22	0	53	184	0	0	0	0
5:30 PM	0	0	0	0	0	5	0	3	0	0	9	5	0	1	20	0	43	170	0	0	1	0
5:45 PM	0	0	0	0	0	6	0	3	0	0	7	6	0	7	16	0	45	154	0	0	0	0
6:00 PM	0	0	0	0	0	7	0	2	0	0	16	3	0	0	15	0	43	141	0	0	0	0
6:15 PM	0	0	0	0	0	5	0	3	0	0	15	3	0	1	12	0	39		0	0	0	0
6:30 PM	0	0	0	0	0	2	0	0	0	0	9	5	0	1	10	0	27		0	0	0	0
6:45 PM	0	0	0	0	0	3	0	4	0	0	11	3	0	1	10	0	32		0	0	0	0

Peak Rolling Hour Flow Rates

	Eastbound				Westbound				Northbound				Southbound				
Vehicle Type	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lights	0	0	0	0	0	22	0	7	0	0	90	64	0	22	67	0	272
Mediums	0	0	0	0	0	0	0	0	0	0	2	2	0	0	3	0	7
Total	0	0	0	0	0	22	0	7	0	0	92	66	0	22	70	0	279

All Traffic Data Services Inc.

(303) 216-2439
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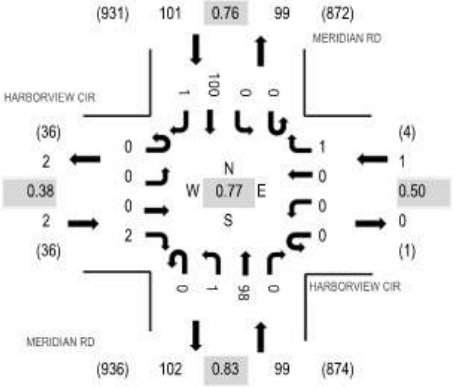
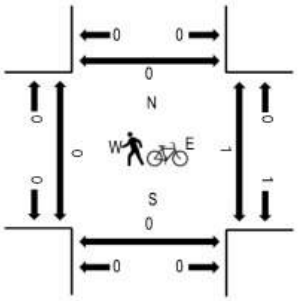
Location: 6 MERIDIAN RD & HARBORVIEW CIR AM
Date and Start Time: Tuesday, May 7, 2019
Peak Hour: 07:45 AM - 08:45 AM
Peak 15-Minutes: 08:30 AM - 08:45 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	HARBORVIEW CIR Eastbound				HARBORVIEW CIR Westbound				MERIDIAN RD Northbound				MERIDIAN RD Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
6:00 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	5	0	9	54	0	0	0	0
6:15 AM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	3	0	8	71	0	0	0	0
6:30 AM	0	0	0	0	0	0	0	0	0	0	9	0	0	0	12	0	21	86	0	0	0	0
6:45 AM	0	0	0	1	0	0	0	0	0	0	5	0	0	0	10	0	16	98	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0	0	0	13	0	0	0	13	0	26	132	1	0	0	0
7:15 AM	0	1	0	0	0	0	0	0	0	0	14	0	0	0	8	0	23	146	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	1	21	0	0	0	11	0	33	170	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	1	0	1	17	0	0	0	31	0	50	203	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	21	0	0	0	19	0	40	192	0	1	0	0
8:15 AM	0	0	0	1	0	0	0	0	0	0	23	0	0	0	23	0	47	190	0	0	0	0
8:30 AM	0	0	0	1	0	0	0	0	0	0	37	0	0	0	27	1	66	170	0	0	0	0
8:45 AM	0	1	0	0	0	0	0	0	0	0	20	0	0	0	18	0	39	136	0	0	0	0
9:00 AM	0	0	0	1	0	0	0	0	0	0	15	0	0	0	22	0	38	129	0	1	0	0
9:15 AM	0	0	0	0	0	0	0	0	0	2	10	0	0	0	15	0	27	122	0	0	0	0
9:30 AM	0	1	0	0	0	0	0	0	1	0	14	0	0	0	16	0	32	122	0	0	0	0
9:45 AM	0	1	0	0	0	0	0	0	0	1	20	0	0	0	10	0	32	124	0	0	0	0
10:00 AM	0	1	0	0	0	0	0	0	0	0	13	0	0	0	17	0	31	137	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	16	0	0	0	11	0	27	139	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	17	0	0	0	17	0	34	135	0	0	0	0
10:45 AM	0	1	0	0	0	0	0	0	0	0	21	0	0	0	22	1	45	133	0	0	0	0
11:00 AM	0	0	0	1	0	0	0	0	0	1	10	0	0	0	20	1	33	133	0	0	0	0
11:15 AM	0	1	0	1	0	0	0	0	0	1	11	0	0	0	8	1	23		1	0	0	0
11:30 AM	0	1	0	1	0	0	0	0	0	0	10	0	0	0	20	0	32		0	1	0	0
11:45 AM	0	1	0	0	0	0	0	0	0	1	23	0	0	0	20	0	45		0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	1	16	0	0	0	18	0	35	136	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	1	14	0	0	0	16	0	31	142	0	0	0	0
12:30 PM	0	1	0	1	0	0	0	0	0	2	15	0	0	0	14	1	34	143	0	0	0	0
12:45 PM	0	0	0	1	0	0	0	0	0	0	18	0	0	0	16	1	36	145	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0	20	0	0	0	21	0	41	144	0	0	0	0
1:15 PM	0	0	0	0	0	1	0	0	0	0	16	0	0	0	15	0	32	141	0	0	0	0
1:30 PM	0	2	0	2	0	0	0	0	0	0	16	0	0	0	16	0	36	136	0	0	0	0
1:45 PM	0	1	0	0	0	0	0	1	0	0	15	0	0	0	18	0	35	136	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0	0	0	14	0	0	0	24	0	38	147	0	0	0	0
2:15 PM	0	1	0	0	0	0	0	0	0	0	19	0	0	0	7	0	27	157	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0	0	0	15	0	0	0	21	0	36	171	0	0	0	0

2:45 PM	0	0	0	1	0	0	0	0	0	3	18	0	0	1	21	2	46	181	0	0	0	0
3:00 PM	0	0	0	1	0	0	0	0	0	0	25	0	0	0	20	2	48	194	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0	0	1	24	0	0	0	16	0	41	195	0	0	0	0
3:30 PM	0	0	0	1	0	0	0	0	0	0	22	0	0	0	23	0	46	192	0	0	0	0
3:45 PM	0	1	0	0	0	0	0	0	0	0	31	0	0	0	26	1	59	192	0	0	0	0
4:00 PM	0	0	0	0	0	0	0	0	0	0	18	0	0	0	30	1	49	168	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	1	0	13	0	0	0	24	0	38	178	0	0	0	0
4:30 PM	0	3	0	1	0	0	0	0	0	0	24	0	0	0	18	0	46	183	0	0	0	0
4:45 PM	0	0	0	1	0	0	0	0	0	2	15	0	0	0	17	0	35	167	0	0	0	0
5:00 PM	1	0	0	0	0	0	0	0	0	0	23	0	0	0	35	0	59	170	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	1	14	0	0	0	28	0	43	144	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	12	0	0	0	17	1	30	129	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	1	0	0	11	0	0	0	26	0	38	119	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0	0	0	18	0	0	0	15	0	33	109	0	0	0	0
6:15 PM	0	0	0	0	0	0	0	0	0	0	17	0	0	0	11	0	28		0	0	0	0
6:30 PM	0	0	0	0	0	0	0	0	0	0	7	0	0	0	12	1	20		0	0	0	0
6:45 PM	0	0	0	1	0	0	0	0	0	2	12	0	0	0	13	0	28		0	0	0	0

Peak Rolling Hour Flow Rates

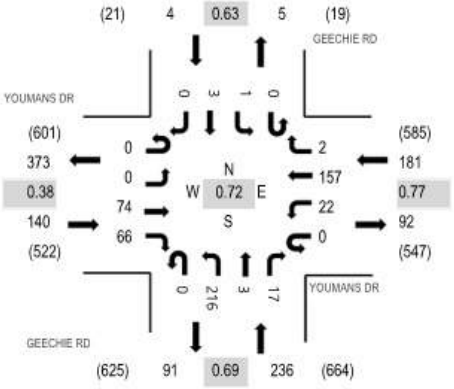
	Eastbound				Westbound				Northbound				Southbound				
Vehicle Type	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lights	0	0	0	2	0	0	0	1	0	1	97	0	0	0	97	1	199
Mediums	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	4
Total	0	0	0	2	0	0	0	1	0	1	98	0	0	0	100	1	203

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

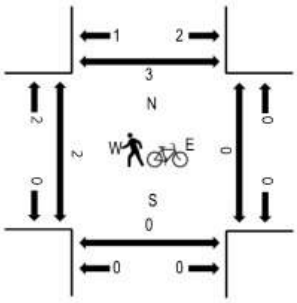
Location: 7 GEECHIE RD & YOUMANS DR AM
Date and Start Time: Tuesday, May 7, 2019
Peak Hour: 07:45 AM - 08:45 AM
Peak 15-Minutes: 08:30 AM - 08:45 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	YOUMANS DR Eastbound				YOUMANS DR Westbound				GEECHIE RD Northbound				GEECHIE RD Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
6:00 AM	0	0	0	1	0	2	0	0	0	0	0	2	0	0	1	0	6	43	0	0	0	0
6:15 AM	0	0	0	0	0	2	1	0	0	0	0	1	0	0	0	0	4	58	0	0	0	0
6:30 AM	0	0	2	0	0	5	1	0	0	0	0	6	0	0	0	0	14	83	0	0	0	0
6:45 AM	0	0	0	3	0	3	0	0	0	5	1	6	0	0	1	0	19	114	0	0	0	0
7:00 AM	0	0	1	3	0	3	5	0	0	6	0	2	0	1	0	0	21	178	0	0	0	0
7:15 AM	0	0	3	5	0	4	5	0	0	7	0	5	0	0	0	0	29	262	0	0	1	0
7:30 AM	0	0	4	6	0	9	3	0	0	13	0	9	0	1	0	0	45	411	0	0	0	0
7:45 AM	0	0	8	6	0	6	23	0	0	32	1	5	0	1	1	0	83	561	1	0	0	0
8:00 AM	0	0	22	15	0	2	33	0	0	29	1	2	0	0	1	0	105	495	1	0	0	2
8:15 AM	0	0	18	21	0	8	49	1	0	72	1	7	0	0	1	0	178	399	0	0	0	0
8:30 AM	0	0	26	24	0	6	52	1	0	83	0	3	0	0	0	0	195	229	0	0	0	1
8:45 AM	0	0	4	2	0	3	2	1	0	3	0	2	0	0	0	0	17	49	0	0	0	0
9:00 AM	0	0	0	0	0	3	0	0	0	0	0	3	0	1	2	0	9	44	2	0	0	2
9:15 AM	0	0	0	1	0	1	0	0	0	1	0	5	0	0	0	0	8	43	2	0	0	2
9:30 AM	0	0	1	1	0	3	0	0	0	2	0	8	0	0	0	0	15	43	0	0	0	0
9:45 AM	0	0	0	0	0	5	1	0	0	1	0	5	0	0	0	0	12	36	0	0	0	0
10:00 AM	0	0	1	0	0	6	0	0	0	0	0	1	0	0	0	0	8	35	0	0	0	1
10:15 AM	0	0	0	1	0	2	0	0	1	0	0	4	0	0	0	0	8	35	0	0	0	0
10:30 AM	0	0	0	0	0	4	0	0	0	1	0	3	0	0	0	0	8	33	0	0	0	0
10:45 AM	0	0	0	1	0	6	0	0	0	0	0	4	0	0	0	0	11	32	0	0	0	0
11:00 AM	0	0	1	0	0	5	0	0	0	1	1	0	0	0	0	0	8	33	0	0	0	0
11:15 AM	0	0	0	0	0	1	0	0	0	1	0	3	0	0	1	0	6		0	0	0	0
11:30 AM	0	0	0	0	0	3	0	0	0	0	0	4	0	0	0	0	7		0	0	0	0
11:45 AM	0	0	0	1	0	6	0	0	0	0	0	5	0	0	0	0	12		0	0	0	0
12:00 PM	0	0	0	1	0	15	0	0	0	0	0	5	0	0	1	0	22	55	0	0	0	0
12:15 PM	0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	7	42	0	0	0	0
12:30 PM	0	0	0	2	1	6	0	0	0	0	0	8	0	0	0	0	17	43	0	0	0	0
12:45 PM	0	0	0	0	0	6	0	0	0	0	0	3	0	0	0	0	9	40	0	0	0	0
1:00 PM	0	0	0	0	0	2	0	0	0	0	0	7	0	0	0	0	9	43	0	0	0	0
1:15 PM	0	0	0	0	0	6	0	0	0	0	0	2	0	0	0	0	8	52	0	0	0	0
1:30 PM	0	0	1	0	0	3	0	0	0	1	0	9	0	0	0	0	14	48	1	0	0	0
1:45 PM	0	0	0	0	0	7	0	0	0	1	0	3	0	0	1	0	12	53	0	0	0	0
2:00 PM	0	0	0	0	0	8	2	0	0	0	2	6	0	0	0	0	18	52	0	0	0	0
2:15 PM	0	0	2	0	0	1	1	0	0	0	0	0	0	0	0	0	4	55	0	0	0	0
2:30 PM	0	1	1	1	0	5	2	0	0	1	0	8	0	0	0	0	19	84	0	0	0	0

2:45 PM	0	0	1	0	0	4	0	0	0	2	0	4	0	0	0	0	11	107	0	0	0	0
3:00 PM	0	0	0	0	0	11	0	0	0	0	0	9	0	0	1	0	21	268	0	0	0	0
3:15 PM	0	0	0	2	1	18	2	0	0	2	0	8	0	0	0	0	33	324	0	0	0	0
3:30 PM	0	0	7	4	0	7	8	0	0	5	0	11	0	0	0	0	42	343	0	0	0	0
3:45 PM	0	0	48	69	0	24	8	0	0	8	0	13	0	0	1	1	172	334	0	1	0	6
4:00 PM	0	0	15	16	0	12	12	0	0	9	1	12	0	0	0	0	77	197	0	0	0	0
4:15 PM	0	0	5	13	0	10	6	0	0	7	1	9	0	1	0	0	52	165	0	2	1	0
4:30 PM	0	0	1	3	0	10	1	1	0	3	1	13	0	0	0	0	33	151	0	0	0	0
4:45 PM	0	0	3	8	0	10	3	0	0	4	0	7	0	0	0	0	35	190	0	0	0	0
5:00 PM	0	0	7	5	0	14	2	0	0	2	0	13	0	0	1	1	45	205	2	0	0	2
5:15 PM	0	0	1	6	0	9	8	0	0	9	1	4	0	0	0	0	38	194	1	0	0	0
5:30 PM	0	0	14	17	0	10	6	1	0	12	0	12	0	0	0	0	72	199	2	0	0	0
5:45 PM	0	0	10	10	0	8	3	0	0	7	2	10	0	0	0	0	50	152	0	0	0	0
6:00 PM	0	0	2	4	0	9	2	0	0	7	0	9	0	0	1	0	34	144	1	0	0	0
6:15 PM	0	0	9	14	0	4	2	0	0	9	0	5	0	0	0	0	43		0	0	0	0
6:30 PM	0	0	6	3	0	5	1	0	0	4	0	6	0	0	0	0	25		1	2	0	0
6:45 PM	0	0	18	10	0	5	3	0	0	2	0	4	0	0	0	0	42		0	0	0	0

Peak Rolling Hour Flow Rates

	Eastbound				Westbound				Northbound				Southbound				
Vehicle Type	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lights	0	0	61	65	0	22	146	2	0	210	3	17	0	1	3	0	530
Mediums	0	0	13	1	0	0	11	0	0	6	0	0	0	0	0	0	31
Total	0	0	74	66	0	22	157	2	0	216	3	17	0	1	3	0	561

All Traffic Data Services Inc.

(303) 216-2439
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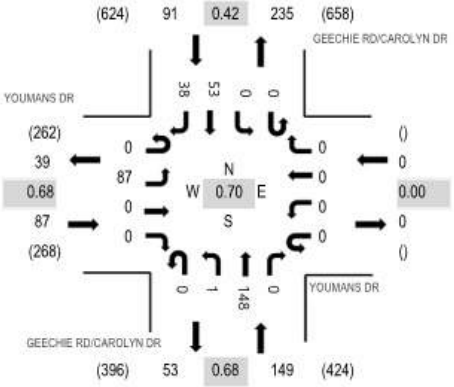
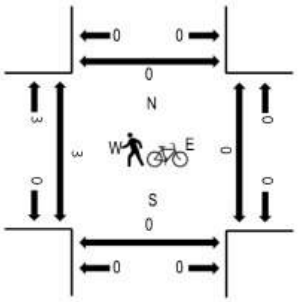
Location: 8 GEECHIE RD/CAROLYN DR & YOUMANS DR AM
Date and Start Time: Tuesday, May 7, 2019
Peak Hour: 07:45 AM - 08:45 AM
Peak 15-Minutes: 08:30 AM - 08:45 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	YOUMANS DR Eastbound				YOUMANS DR Westbound				GEECHIE RD/CAROLYN DR Northbound				GEECHIE RD/CAROLYN DR Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
6:00 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	1	6	40	0	0	0	0
6:15 AM	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	1	4	49	0	0	0	0
6:30 AM	0	2	0	0	0	0	0	0	0	0	4	0	0	0	4	0	10	66	0	0	0	0
6:45 AM	0	1	0	0	0	0	0	0	0	0	11	0	0	0	2	6	20	93	0	0	0	0
7:00 AM	0	3	0	0	0	0	0	0	0	0	6	0	0	0	5	1	15	124	0	0	0	0
7:15 AM	0	3	0	0	0	0	0	0	0	1	8	0	0	0	5	4	21	157	1	1	0	0
7:30 AM	0	6	0	0	0	0	0	0	0	0	16	0	0	0	10	5	37	247	0	0	0	0
7:45 AM	0	16	0	0	0	0	0	0	0	1	21	0	0	0	9	4	51	327	1	0	0	0
8:00 AM	0	13	0	0	0	0	0	0	0	0	17	0	0	0	12	6	48	286	0	0	0	0
8:15 AM	0	26	0	0	0	0	0	0	0	0	55	0	0	0	17	13	111	249	1	0	0	0
8:30 AM	0	32	0	0	0	0	0	0	0	0	55	0	0	0	15	15	117	146	0	0	0	0
8:45 AM	0	1	0	0	0	0	0	0	0	0	4	0	0	0	4	1	10	45	0	0	0	0
9:00 AM	0	1	0	3	0	0	0	0	0	0	2	0	0	0	2	3	11	46	2	0	0	0
9:15 AM	0	4	0	0	0	0	0	0	0	0	2	0	0	0	1	1	8	43	2	0	0	0
9:30 AM	0	3	0	1	0	0	0	0	0	1	7	0	0	0	3	1	16	45	0	0	0	0
9:45 AM	0	2	0	0	0	0	0	0	0	0	4	0	0	0	2	3	11	37	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	4	8	38	0	0	0	0
10:15 AM	0	3	0	0	0	0	0	0	0	1	2	0	0	0	3	1	10	39	0	0	0	0
10:30 AM	0	1	0	0	0	0	0	0	0	0	3	0	0	0	3	1	8	35	0	0	0	0
10:45 AM	0	1	0	0	0	0	0	0	0	0	4	0	0	0	2	5	12	34	0	0	0	0
11:00 AM	0	0	0	2	0	0	0	0	0	0	2	0	0	0	4	1	9	36	0	0	0	0
11:15 AM	0	1	0	0	0	0	0	0	0	0	3	0	0	0	2	0	6		0	0	0	0
11:30 AM	0	2	0	0	0	0	0	0	0	0	2	0	0	0	2	1	7		0	0	0	0
11:45 AM	1	3	0	1	0	0	0	0	0	0	2	0	0	0	3	4	14		0	0	0	0
12:00 PM	1	2	0	0	0	0	0	0	0	1	2	0	0	0	8	9	23	52	0	0	0	0
12:15 PM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	3	1	6	39	0	0	0	0
12:30 PM	0	4	0	0	0	0	0	0	0	0	3	0	0	0	4	3	14	41	0	0	0	0
12:45 PM	0	1	0	0	0	0	0	0	0	0	2	0	0	0	3	3	9	41	1	0	0	0
1:00 PM	0	5	0	1	0	0	0	0	0	0	1	0	1	0	2	0	10	43	0	0	0	0
1:15 PM	0	2	0	0	0	0	0	0	0	0	1	0	0	0	2	3	8	48	0	0	0	0
1:30 PM	0	7	0	0	0	0	0	0	0	0	3	0	0	0	2	2	14	41	0	0	0	0
1:45 PM	0	1	0	0	0	0	0	0	0	0	3	0	0	0	2	5	11	43	0	0	0	0
2:00 PM	0	3	0	0	0	0	0	0	0	0	4	0	0	0	2	6	15	42	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	48	0	0	0	0
2:30 PM	0	4	0	0	0	0	0	0	0	1	5	0	0	0	1	5	16	76	0	0	0	0

2:45 PM	0	3	0	0	0	0	0	0	0	0	3	0	0	0	2	2	10	88	0	0	0	0
3:00 PM	0	7	0	0	0	0	0	0	0	0	2	0	0	0	4	8	21	195	0	0	0	0
3:15 PM	0	3	0	0	0	0	0	0	0	0	7	0	0	0	10	9	29	228	0	0	0	0
3:30 PM	0	5	0	0	0	0	0	0	0	1	11	0	0	0	7	4	28	238	0	0	0	0
3:45 PM	0	10	0	2	0	0	0	0	0	0	10	0	0	0	63	32	117	241	2	0	0	0
4:00 PM	0	12	0	2	0	0	0	0	0	0	11	0	0	0	19	10	54	152	0	0	0	0
4:15 PM	0	6	0	0	0	0	0	0	0	0	10	0	0	0	17	6	39	135	5	0	0	1
4:30 PM	0	5	0	0	0	0	0	0	0	2	11	0	0	0	11	2	31	123	1	0	0	0
4:45 PM	0	3	0	0	0	0	0	0	0	1	7	0	0	0	10	7	28	147	0	0	0	0
5:00 PM	0	3	0	1	0	0	0	0	0	1	12	0	0	0	16	4	37	159	0	0	0	0
5:15 PM	0	4	0	0	0	0	0	0	0	0	9	0	0	0	8	6	27	156	3	0	0	0
5:30 PM	0	7	0	1	0	0	0	0	0	1	17	0	0	0	23	6	55	161	3	0	0	0
5:45 PM	0	9	0	1	0	0	0	0	0	0	12	0	0	0	11	7	40	124	0	0	0	0
6:00 PM	0	5	0	1	0	0	0	0	0	2	12	0	0	0	8	6	34	103	4	0	0	0
6:15 PM	0	3	0	0	0	0	0	0	0	1	10	0	0	0	10	8	32		3	0	0	0
6:30 PM	0	5	0	0	0	0	0	0	0	0	5	0	0	0	7	1	18		2	0	0	0
6:45 PM	0	4	0	0	0	0	0	0	0	0	1	0	0	0	7	7	19		2	0	0	2

Peak Rolling Hour Flow Rates

	Eastbound				Westbound				Northbound				Southbound				
Vehicle Type	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lights	0	85	0	0	0	0	0	0	0	1	144	0	0	0	52	38	320
Mediums	0	2	0	0	0	0	0	0	0	0	4	0	0	0	1	0	7
Total	0	87	0	0	0	0	0	0	0	1	148	0	0	0	53	38	327

APPENDIX B

Signal Warrant Study

US 21 BUSINESS (SEA ISLAND PARKWAY) AND MERIDIAN ROAD – 2019 ALT 1

MUTCD Signal Warrant 1: Eight-Hour Vehicular Volumes

US 21 Business & Meridian Road – 2019 Alt 1

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A - Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	**1**	500	400	**350**	**280**	150	120	**105**	**84**
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Condition B - Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	**1**	750	600	**525**	**420**	75	60	**53**	**42**
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

[a] Basic minimum hourly volume.

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.

[c] May be used when the major street speed exceeds 70 km/h (40 mph) or in an isolated community with a population of less than 10,000.

Evaluation of 70% Criteria for Either Condition A or Condition B:

Evaluation of Condition A:

Hour	Major Volume (350 req'd)	Minor Volume (105 req'd)	Meets Warrant?
6:00-7:00	661	40	No
7:00-8:00	**1475**	**105**	**Yes**
8:00-9:00	**1444**	**134**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (525 req'd)	Minor Volume (53 req'd)	Meets Warrant?
6:15-7:15	**848**	**55**	**Yes**
7:15-8:15	**1565**	**110**	**Yes**
8:15-9:15	**1287**	**125**	**Yes**

9:15-10:15	**1275**	**108**	**Yes**
10:15-11:15	1227	84	No
11:30-12:30	**1325**	**112**	**Yes**
12:30-13:30	**1429**	**155**	**Yes**
13:30-14:30	**1433**	**121**	**Yes**
14:30-15:30	**1572**	**142**	**Yes**
15:30-16:30	**1671**	**157**	**Yes**
16:30-17:30	**1762**	**124**	**Yes**
17:30-18:30	1479	87	No
18:30-19:30	622	35	No
19:30-20:30	0	0	No

9 hours met - Condition A is Met

9:15-10:15	**1275**	**108**	**Yes**
10:15-11:15	**1227**	**84**	**Yes**
11:15-12:15	**1286**	**99**	**Yes**
12:15-13:15	**1410**	**160**	**Yes**
13:15-14:15	**1424**	**114**	**Yes**
14:15-15:15	**1526**	**126**	**Yes**
15:15-16:15	**1659**	**184**	**Yes**
16:15-17:15	**1733**	**126**	**Yes**
17:15-18:15	**1615**	**84**	**Yes**
18:15-19:15	**938**	**60**	**Yes**
19:15-20:15	0	0	No
20:15-21:15	0	0	No

13 hours met - Condition B is Met

Warrant 1 is Met

Evaluation of 56% Criteria for Both Condition A & Condition B:

Evaluation of Condition A:

Hour	Major Volume (280 req'd)	Minor Volume (84 req'd)	Meets Warrant?
6:00-7:00	661	40	No
7:00-8:00	**1475**	**105**	**Yes**
8:00-9:00	**1444**	**134**	**Yes**
9:00-10:00	**1203**	**100**	**Yes**
10:00-11:00	**1200**	**100**	**Yes**
11:15-12:15	**1286**	**99**	**Yes**
12:15-13:15	**1410**	**160**	**Yes**
13:15-14:15	**1424**	**114**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (420 req'd)	Minor Volume (42 req'd)	Meets Warrant?
6:15-7:15	**848**	**55**	**Yes**
7:15-8:15	**1565**	**110**	**Yes**
8:15-9:15	**1287**	**125**	**Yes**
9:15-10:15	**1275**	**108**	**Yes**
10:15-11:15	**1227**	**84**	**Yes**
11:15-12:15	**1286**	**99**	**Yes**
12:15-13:15	**1410**	**160**	**Yes**
13:15-14:15	**1424**	**114**	**Yes**

14:15-15:15	**1526**	**126**	**Yes**
15:15-16:15	**1659**	**184**	**Yes**
16:15-17:15	**1733**	**126**	**Yes**
17:15-18:15	**1615**	**84**	**Yes**
18:15-19:15	938	60	No
19:15-20:15	0	0	No
20:15-21:15	0	0	No

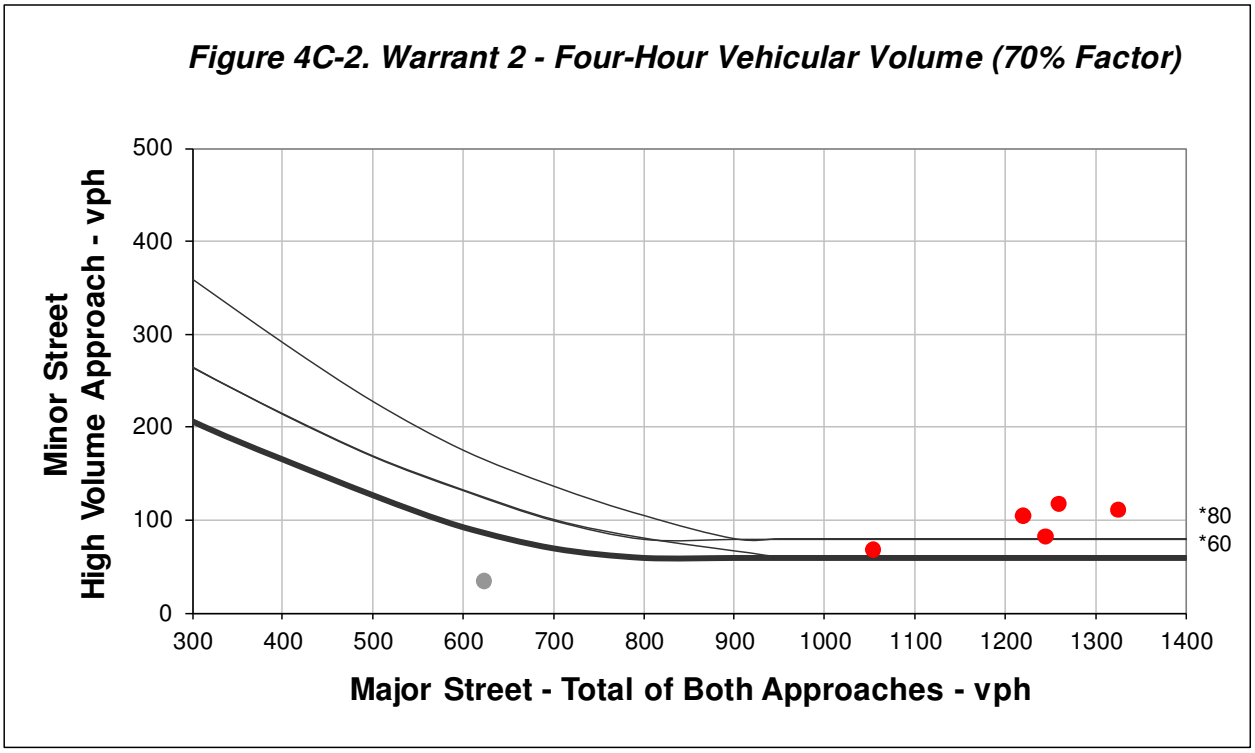
11 hours met - Condition A is Met

14:15-15:15	**1526**	**126**	**Yes**
15:15-16:15	**1659**	**184**	**Yes**
16:15-17:15	**1733**	**126**	**Yes**
17:15-18:15	**1615**	**84**	**Yes**
18:15-19:15	**938**	**60**	**Yes**
19:15-20:15	0	0	No
20:15-21:15	0	0	No

13 hours met - Condition B is Met

MUTCD Signal Warrant 2: Four-Hour Volumes

US 21 Business & Meridian Road – 2019 Alt 1



*Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

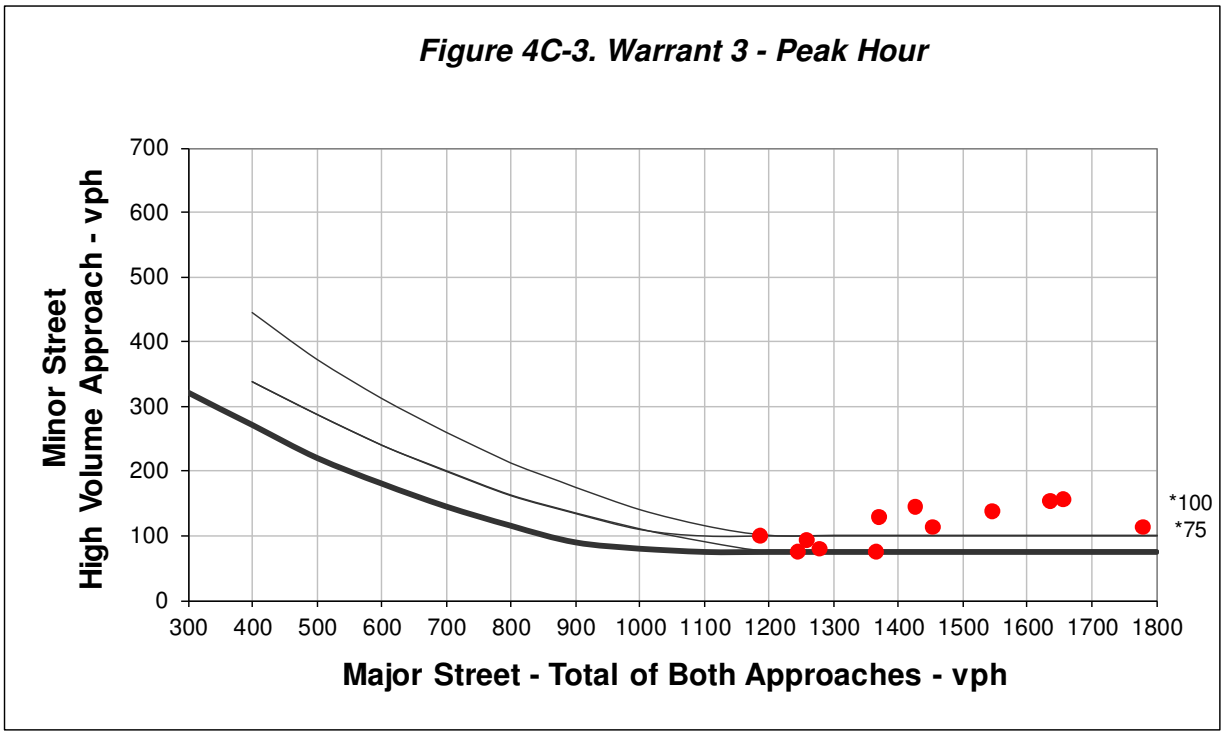
Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:30 - 7:30	1053	68	60	**Yes**
7:30 - 8:30	1607	119	60	**Yes**
8:30 - 9:30	1258	118	60	**Yes**
9:30 - 10:30	1219	105	60	**Yes**
10:30 - 11:30	1243	83	60	**Yes**
11:30 - 12:30	1325	112	60	**Yes**
12:30 - 13:30	1429	155	60	**Yes**
13:30 - 14:30	1433	121	60	**Yes**
14:30 - 15:30	1572	142	60	**Yes**
15:30 - 16:30	1671	157	60	**Yes**
16:30 - 17:30	1762	124	60	**Yes**
17:30 - 18:30	1479	87	60	**Yes**
18:30 - 19:30	622	35	88	No
19:30 - 20:30	0	0		No

Total Number of Hours Met = 12

Warrant 2 is Met

MUTCD Signal Warrant 3, Condition B: Peak Hour Volume

US 21 Business & Meridian Road – 2019 Alt 1



*Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:45 - 7:45	1277	80	75	**Yes**
7:45 - 8:45	1545	140	75	**Yes**
8:45 - 9:45	1257	95	75	**Yes**
9:45 - 10:45	1185	101	75	**Yes**
10:45 - 11:45	1243	77	75	**Yes**
11:45 - 12:45	1369	131	75	**Yes**
12:45 - 13:45	1426	145	75	**Yes**
13:45 - 14:45	1451	115	75	**Yes**
14:45 - 15:45	1654	156	75	**Yes**
15:45 - 16:45	1634	155	75	**Yes**
16:45 - 17:45	1778	114	75	**Yes**
17:45 - 18:45	1364	77	75	**Yes**
18:45 - 19:45	0	0	314	No
19:45 - 20:45	0	0		No

Total Number of Hours Met = 12

Warrant 3, Condition B is Met

This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

MUTCD Signal Warrant Analysis: US 21 Business & Meridian Road – 2019 Alt 1

	MUTCD Warrant Number & Name	Description	Met?
1	Eight-Hour Vehicular Volume	The volumes of traffic on the major and minor streets meet specified minimum amounts for at least 8 hours of an average weekday. Either of two sets of minimum criteria may be used.	Yes
2	Four-Hour Vehicular Volume	For any four hours of an average day, the points representing major and minor street volumes plot above a specified curve.	Yes
3	Peak Hour	For at least one hour of an average day, minor street traffic exceeds a minimum volume and suffers at least a specified amount of total delay, or the points representing major and minor street volumes plot above a specified curve. This warrant only applies to unusual cases involving large traffic generators.	Yes, but only if this is an unusual case
4	Pedestrian Volume	The volume of pedestrian traffic crossing a major street at an intersection or mid-block location must meet minimum values for either a single hour or any four hours of an average weekday.	No
5	School Crossing	The frequency and adequacy of gaps in the traffic stream must not otherwise be sufficient for the number of children crossing.	No
6	Coordinated Signal System	Signalized control is required to maintain proper grouping of vehicles in a coordinated, progressive signal system.	No
7	Crash Experience	Five or more reported crashes of type susceptible to control by a traffic signal have occurred at the location within a 12-month period. Other less restrictive remedies and enforcement have failed to reduce accidents. Either Warrant 1 or Warrant 2 is at least 80% met. A signal will not seriously disrupt traffic flow.	6 reported crashes near intersection in 3 years. 1 angle/5 rear-ends.
8	Roadway Network	An intersection of two major routes has either high five-year projected peak-hour traffic volumes or high volumes for at least five hours on an average Saturday and/or Sunday.	No

US 21 BUSINESS (SEA ISLAND PARKWAY) AND MERIDIAN ROAD – 2019 ALT 2

MUTCD Signal Warrant 1: Eight-Hour Vehicular Volumes

US 21 Business & Meridian Road – 2019 Alt 2

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A - Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	**2 or more**	500	400	**350**	**280**	200	160	**140**	**112**

Condition B - Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	**2 or more**	750	600	**525**	**420**	100	80	**70**	**56**

[a] Basic minimum hourly volume.

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.

[c] May be used when the major street speed exceeds 70 km/h (40 mph) or in an isolated community with a population of less than 10,000.

Evaluation of 70% Criteria for Either Condition A or Condition B:

Evaluation of Condition A:

Hour	Major Volume (350 req'd)	Minor Volume (140 req'd)	Meets Warrant?
6:00-7:00	711	48	No
7:15-8:15	**1718**	**144**	**Yes**
8:15-9:15	**1419**	**180**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (525 req'd)	Minor Volume (70 req'd)	Meets Warrant?
6:30-7:30	**1135**	**85**	**Yes**
7:30-8:30	**1756**	**159**	**Yes**
8:30-9:30	**1404**	**167**	**Yes**

9:15-10:15	1418	138	No
10:15-11:15	1373	117	No
11:15-12:15	**1398**	**160**	**Yes**
12:15-13:15	**1493**	**281**	**Yes**
13:15-14:15	**1517**	**217**	**Yes**
14:15-15:15	**1607**	**244**	**Yes**
15:15-16:15	**1755**	**336**	**Yes**
16:15-17:15	**1765**	**177**	**Yes**
17:15-18:15	1647	122	No
18:15-19:15	957	82	No
19:15-20:15	0	0	No
20:15-21:15	0	0	No

8 hours met - Condition A is Met

9:30-10:30	**1348**	**134**	**Yes**
10:30-11:30	**1389**	**115**	**Yes**
11:30-12:30	**1434**	**198**	**Yes**
12:30-13:30	**1519**	**271**	**Yes**
13:30-14:30	**1512**	**234**	**Yes**
14:30-15:30	**1655**	**260**	**Yes**
15:30-16:30	**1762**	**284**	**Yes**
16:30-17:30	**1797**	**176**	**Yes**
17:30-18:30	**1506**	**121**	**Yes**
18:30-19:30	635	50	No
19:30-20:30	0	0	No

12 hours met - Condition B is Met

Warrant 1 is Met

Evaluation of 56% Criteria for Both Condition A & Condition B:

Evaluation of Condition A:

Hour	Major Volume (280 req'd)	Minor Volume (112 req'd)	Meets Warrant?
6:00-7:00	711	48	No
7:00-8:00	**1601**	**133**	**Yes**
8:00-9:00	**1566**	**190**	**Yes**
9:00-10:00	**1369**	**132**	**Yes**
10:00-11:00	**1326**	**133**	**Yes**
11:15-12:15	**1398**	**160**	**Yes**
12:15-13:15	**1493**	**281**	**Yes**
13:15-14:15	**1517**	**217**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (420 req'd)	Minor Volume (56 req'd)	Meets Warrant?
6:15-7:15	**912**	**66**	**Yes**
7:15-8:15	**1718**	**144**	**Yes**
8:15-9:15	**1419**	**180**	**Yes**
9:15-10:15	**1418**	**138**	**Yes**
10:15-11:15	**1373**	**117**	**Yes**
11:15-12:15	**1398**	**160**	**Yes**
12:15-13:15	**1493**	**281**	**Yes**
13:15-14:15	**1517**	**217**	**Yes**

14:15-15:15	**1607**	**244**	**Yes**
15:15-16:15	**1755**	**336**	**Yes**
16:15-17:15	**1765**	**177**	**Yes**
17:15-18:15	**1647**	**122**	**Yes**
18:15-19:15	957	82	No
19:15-20:15	0	0	No
20:15-21:15	0	0	No

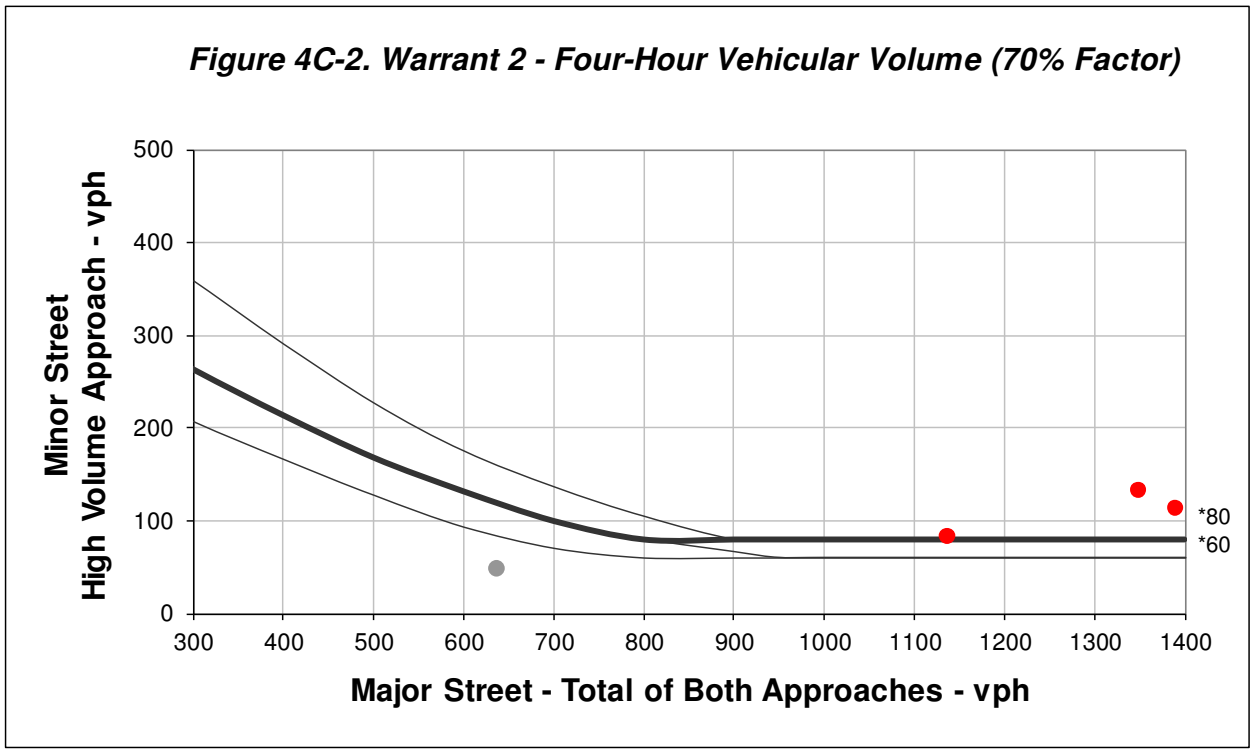
11 hours met - Condition A is Met

14:15-15:15	**1607**	**244**	**Yes**
15:15-16:15	**1755**	**336**	**Yes**
16:15-17:15	**1765**	**177**	**Yes**
17:15-18:15	**1647**	**122**	**Yes**
18:15-19:15	**957**	**82**	**Yes**
19:15-20:15	0	0	No
20:15-21:15	0	0	No

13 hours met - Condition B is Met

MUTCD Signal Warrant 2: Four-Hour Volumes

US 21 Business & Meridian Road – 2019 Alt 2



*Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

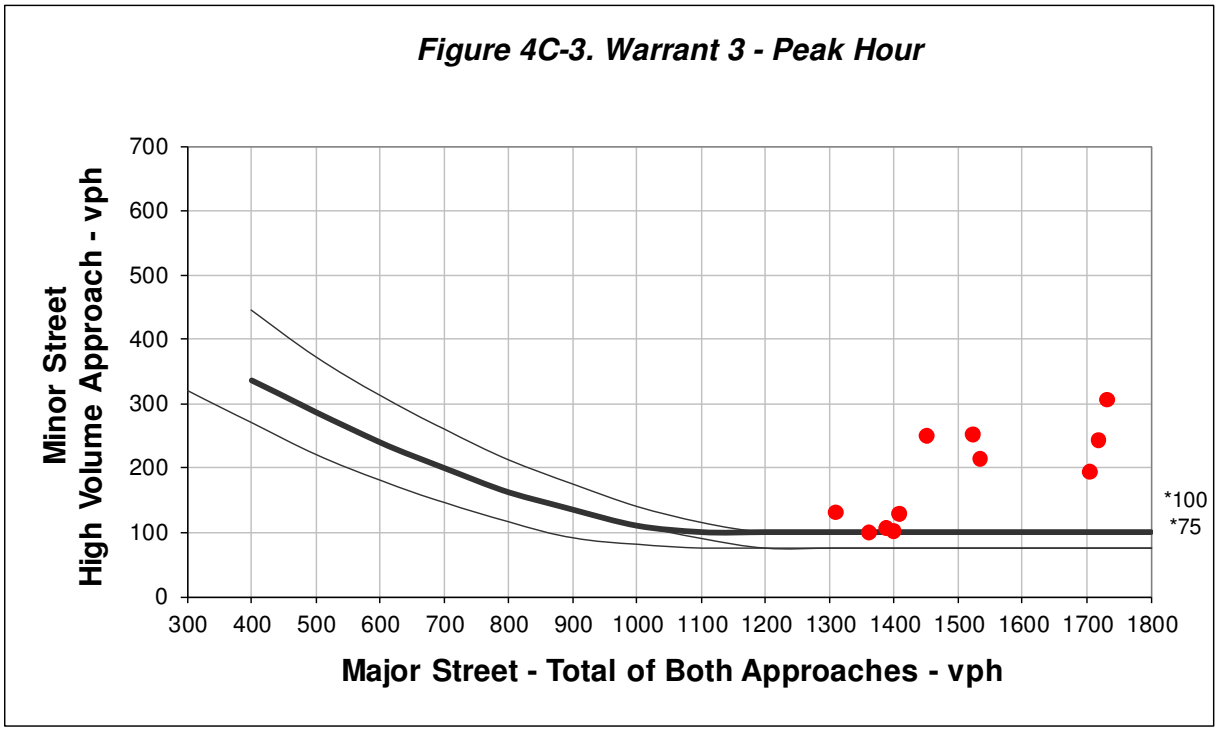
Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:30 - 7:30	1135	85	80	**Yes**
7:30 - 8:30	1756	159	80	**Yes**
8:30 - 9:30	1404	167	80	**Yes**
9:30 - 10:30	1348	134	80	**Yes**
10:30 - 11:30	1389	115	80	**Yes**
11:30 - 12:30	1434	198	80	**Yes**
12:30 - 13:30	1519	271	80	**Yes**
13:30 - 14:30	1512	234	80	**Yes**
14:30 - 15:30	1655	260	80	**Yes**
15:30 - 16:30	1762	284	80	**Yes**
16:30 - 17:30	1797	176	80	**Yes**
17:30 - 18:30	1506	121	80	**Yes**
18:30 - 19:30	635	50	121	No
19:30 - 20:30	0	0		No

Total Number of Hours Met = 12

Warrant 2 is Met

MUTCD Signal Warrant 3, Condition B: Peak Hour Volume

US 21 Business & Meridian Road – 2019 Alt 2



*Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:45 - 7:45	1359	101	100	**Yes**
7:45 - 8:45	1704	195	100	**Yes**
8:45 - 9:45	1406	130	100	**Yes**
9:45 - 10:45	1308	132	100	**Yes**
10:45 - 11:45	1399	103	100	**Yes**
11:45 - 12:45	1450	251	100	**Yes**
12:45 - 13:45	1521	253	100	**Yes**
13:45 - 14:45	1533	216	100	**Yes**
14:45 - 15:45	1730	307	100	**Yes**
15:45 - 16:45	1716	245	100	**Yes**
16:45 - 17:45	1813	163	100	**Yes**
17:45 - 18:45	1386	108	100	**Yes**
18:45 - 19:45	0	0		No
19:45 - 20:45	0	0		No

Total Number of Hours Met = 12

Warrant 3, Condition B is Met

This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

MUTCD Signal Warrant Analysis: US 21 Business & Meridian Road – 2019 Alt 2

	MUTCD Warrant Number & Name	Description	Met?
1	Eight-Hour Vehicular Volume	The volumes of traffic on the major and minor streets meet specified minimum amounts for at least 8 hours of an average weekday. Either of two sets of minimum criteria may be used.	Yes
2	Four-Hour Vehicular Volume	For any four hours of an average day, the points representing major and minor street volumes plot above a specified curve.	Yes
3	Peak Hour	For at least one hour of an average day, minor street traffic exceeds a minimum volume and suffers at least a specified amount of total delay, or the points representing major and minor street volumes plot above a specified curve. This warrant only applies to unusual cases involving large traffic generators.	Yes, but only if this is an unusual case
4	Pedestrian Volume	The volume of pedestrian traffic crossing a major street at an intersection or mid-block location must meet minimum values for either a single hour or any four hours of an average weekday.	No
5	School Crossing	The frequency and adequacy of gaps in the traffic stream must not otherwise be sufficient for the number of children crossing.	No
6	Coordinated Signal System	Signalized control is required to maintain proper grouping of vehicles in a coordinated, progressive signal system.	No
7	Crash Experience	Five or more reported crashes of type susceptible to control by a traffic signal have occurred at the location within a 12-month period. Other less restrictive remedies and enforcement have failed to reduce accidents. Either Warrant 1 or Warrant 2 is at least 80% met. A signal will not seriously disrupt traffic flow.	6 reported crashes near intersection in 3 years. 1 angle/5 rear-ends.
8	Roadway Network	An intersection of two major routes has either high five-year projected peak-hour traffic volumes or high volumes for at least five hours on an average Saturday and/or Sunday.	No

US 21 BUSINESS (SEA ISLAND PARKWAY) AND MERIDIAN ROAD – 2019 ALT 3

MUTCD Signal Warrant 1: Eight-Hour Vehicular Volumes

US 21 Business & Meridian Road – 2019 Alt 3

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A - Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	**1**	500	400	**350**	**280**	150	120	**105**	**84**
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Condition B - Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	**1**	750	600	**525**	**420**	75	60	**53**	**42**
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

[a] Basic minimum hourly volume.

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.

[c] May be used when the major street speed exceeds 70 km/h (40 mph) or in an isolated community with a population of less than 10,000.

Evaluation of 70% Criteria for Either Condition A or Condition B:

Evaluation of Condition A:

Hour	Major Volume (350 req'd)	Minor Volume (105 req'd)	Meets Warrant?
6:00-7:00	670	24	No
7:00-8:00	1531	69	No
8:00-9:00	1427	99	No

Evaluation of Condition B:

Hour	Major Volume (525 req'd)	Minor Volume (53 req'd)	Meets Warrant?
6:00-7:00	670	24	No
7:00-8:00	**1531**	**69**	**Yes**
8:00-9:00	**1427**	**99**	**Yes**

9:00-10:00	1251	69	No	**9:00-10:00**	**1251**	**69**	**Yes**
10:00-11:00	1232	69	No	**10:00-11:00**	**1232**	**69**	**Yes**
11:00-12:00	1325	56	No	**11:00-12:00**	**1325**	**56**	**Yes**
12:00-13:00	1460	74	No	**12:00-13:00**	**1460**	**74**	**Yes**
13:00-14:00	1456	71	No	**13:00-14:00**	**1456**	**71**	**Yes**
14:00-15:00	1609	60	No	**14:00-15:00**	**1609**	**60**	**Yes**
15:00-16:00	1736	101	No	**15:00-16:00**	**1736**	**101**	**Yes**
16:00-17:00	1699	78	No	**16:00-17:00**	**1699**	**78**	**Yes**
17:00-18:00	1785	67	No	**17:00-18:00**	**1785**	**67**	**Yes**
18:00-19:00	1312	62	No	**18:00-19:00**	**1312**	**62**	**Yes**
19:00-20:00	0	0	No	19:00-20:00	0	0	No
20:00-21:00	0	0	No	20:00-21:00	0	0	No

0 hours met - Condition A is Not Met

12 hours met - Condition B is Met

Warrant 1 is Met

Evaluation of 56% Criteria for Both Condition A & Condition B:

Evaluation of Condition A:

Hour	Major Volume (280 req'd)	Minor Volume (84 req'd)	Meets Warrant?
6:00-7:00	670	24	No
7:45-8:45	**1541**	**102**	**Yes**
8:45-9:45	1278	67	No
9:45-10:45	1238	69	No
10:45-11:45	1276	54	No
11:45-12:45	1435	79	No
12:45-13:45	1505	72	No
13:45-14:45	1535	60	No

Evaluation of Condition B:

Hour	Major Volume (420 req'd)	Minor Volume (42 req'd)	Meets Warrant?
6:30-7:30	**1076**	**43**	**Yes**
7:30-8:30	**1643**	**83**	**Yes**
8:30-9:30	**1257**	**87**	**Yes**
9:30-10:30	**1265**	**70**	**Yes**
10:30-11:30	**1282**	**60**	**Yes**
11:30-12:30	**1379**	**70**	**Yes**
12:30-13:30	**1513**	**77**	**Yes**
13:30-14:30	**1514**	**64**	**Yes**

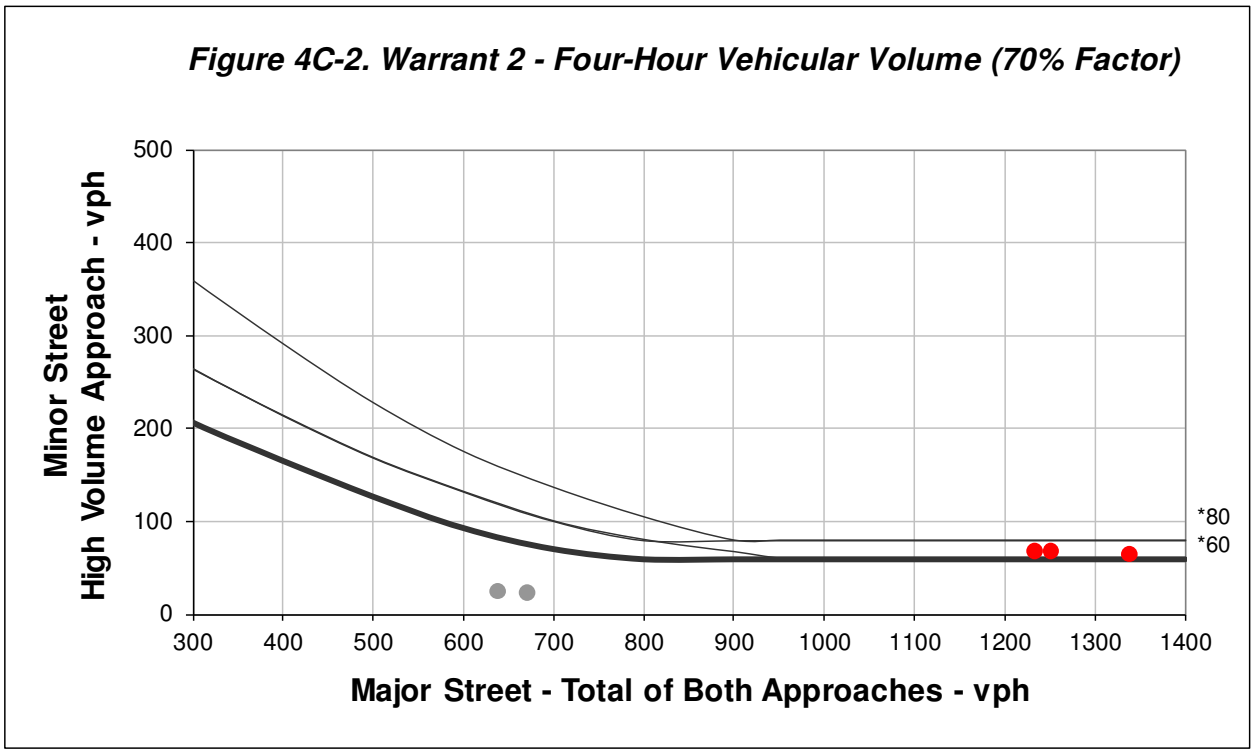
14:45-15:45	**1744**	**85**	**Yes**	**14:30-15:30**	**1661**	**73**	**Yes**
15:45-16:45	**1686**	**88**	**Yes**	**15:30-16:30**	**1735**	**88**	**Yes**
16:45-17:45	1811	81	No	**16:30-17:30**	**1795**	**88**	**Yes**
17:45-18:45	1389	55	No	**17:30-18:30**	**1509**	**61**	**Yes**
18:45-19:45	322	16	No	18:30-19:30	637	26	No
19:45-20:45	0	0	No	19:30-20:30	0	0	No

3 hours met - Condition A is Not Met

12 hours met - Condition B is Met

MUTCD Signal Warrant 2: Four-Hour Volumes

US 21 Business & Meridian Road – 2019 Alt 3



*Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

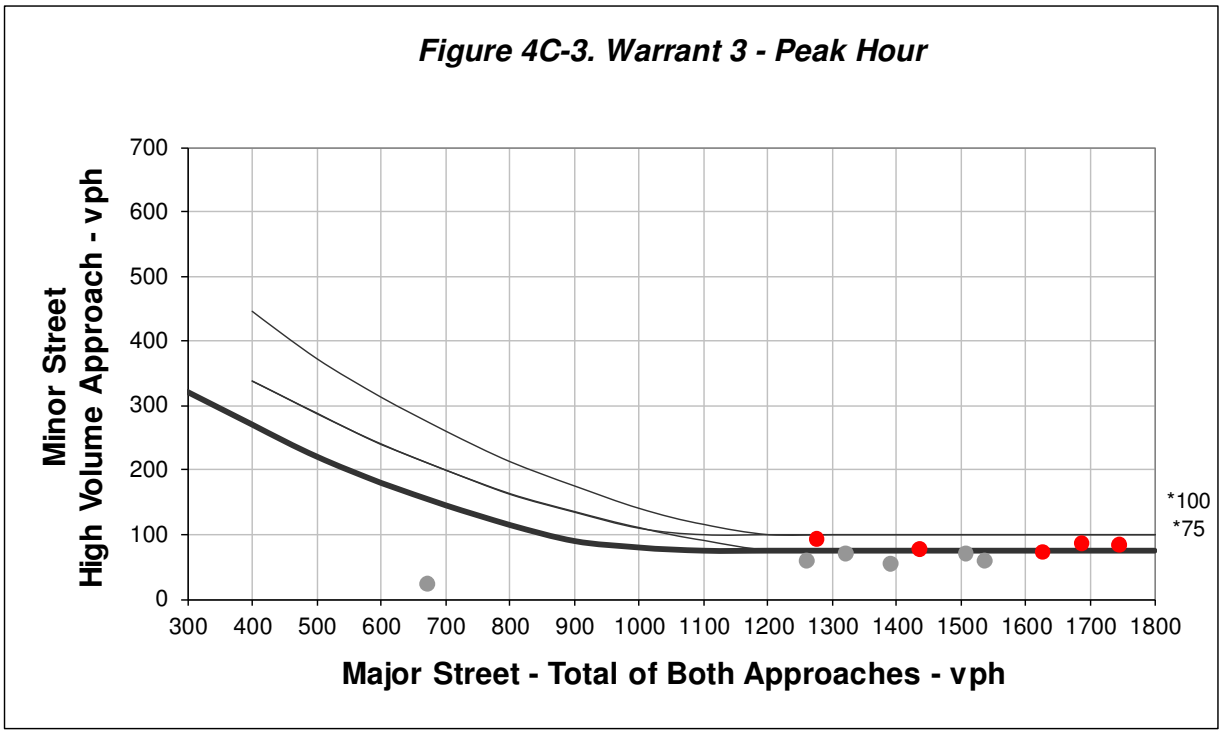
Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:00 - 7:00	670	24	77	No
7:00 - 8:00	1531	69	60	**Yes**
8:00 - 9:00	1427	99	60	**Yes**
9:00 - 10:00	1251	69	60	**Yes**
10:00 - 11:00	1232	69	60	**Yes**
11:15 - 12:15	1337	66	60	**Yes**
12:15 - 13:15	1492	80	60	**Yes**
13:30 - 14:30	1514	64	60	**Yes**
14:30 - 15:30	1661	73	60	**Yes**
15:30 - 16:30	1735	88	60	**Yes**
16:30 - 17:30	1795	88	60	**Yes**
17:30 - 18:30	1509	61	60	**Yes**
18:30 - 19:30	637	26	85	No
19:30 - 20:30	0	0		No

Total Number of Hours Met = 11

Warrant 2 is Met

MUTCD Signal Warrant 3, Condition B: Peak Hour Volume

US 21 Business & Meridian Road – 2019 Alt 3



*Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:00 - 7:00	670	24	156	No
7:15 - 8:15	1624	75	75	**Yes**
8:15 - 9:15	1274	94	75	**Yes**
9:15 - 10:15	1319	72	75	No
10:15 - 11:15	1259	61	75	No
11:45 - 12:45	1435	79	75	**Yes**
12:45 - 13:45	1505	72	75	No
13:45 - 14:45	1535	60	75	No
14:45 - 15:45	1744	85	75	**Yes**
15:45 - 16:45	1686	88	75	**Yes**
16:45 - 17:45	1811	81	75	**Yes**
17:45 - 18:45	1389	55	75	No
18:45 - 19:45	0	0	309	No
19:45 - 20:45	0	0		No

Total Number of Hours Met = 6

Warrant 3, Condition B is Met

This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

MUTCD Signal Warrant Analysis: US 21 Business & Meridian Road – 2019 Alt 3

	MUTCD Warrant Number & Name	Description	Met?
1	Eight-Hour Vehicular Volume	The volumes of traffic on the major and minor streets meet specified minimum amounts for at least 8 hours of an average weekday. Either of two sets of minimum criteria may be used.	Yes
2	Four-Hour Vehicular Volume	For any four hours of an average day, the points representing major and minor street volumes plot above a specified curve.	Yes
3	Peak Hour	For at least one hour of an average day, minor street traffic exceeds a minimum volume and suffers at least a specified amount of total delay, or the points representing major and minor street volumes plot above a specified curve. This warrant only applies to unusual cases involving large traffic generators.	Yes, but only if this is an unusual case
4	Pedestrian Volume	The volume of pedestrian traffic crossing a major street at an intersection or mid-block location must meet minimum values for either a single hour or any four hours of an average weekday.	No
5	School Crossing	The frequency and adequacy of gaps in the traffic stream must not otherwise be sufficient for the number of children crossing.	No
6	Coordinated Signal System	Signalized control is required to maintain proper grouping of vehicles in a coordinated, progressive signal system.	No
7	Crash Experience	Five or more reported crashes of type susceptible to control by a traffic signal have occurred at the location within a 12-month period. Other less restrictive remedies and enforcement have failed to reduce accidents. Either Warrant 1 or Warrant 2 is at least 80% met. A signal will not seriously disrupt traffic flow.	6 reported crashes near intersection in 3 years. 1 angle/5 rear-ends.
8	Roadway Network	An intersection of two major routes has either high five-year projected peak-hour traffic volumes or high volumes for at least five hours on an average Saturday and/or Sunday.	No

US 21 BUSINESS (SEA ISLAND PARKWAY) AND MERIDIAN ROAD – 2040 ALT 1

MUTCD Signal Warrant 1: Eight-Hour Vehicular Volumes

US 21 Business & Meridian Road – 2040 Alt 1

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A - Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	**1**	500	400	**350**	**280**	150	120	**105**	**84**
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Condition B - Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	**1**	750	600	**525**	**420**	75	60	**53**	**42**
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

[a] Basic minimum hourly volume.

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.

[c] May be used when the major street speed exceeds 70 km/h (40 mph) or in an isolated community with a population of less than 10,000.

Evaluation of 70% Criteria for Either Condition A or Condition B:

Evaluation of Condition A:

Hour	Major Volume (350 req'd)	Minor Volume (105 req'd)	Meets Warrant?
6:45-7:45	**1872**	**105**	**Yes**
7:45-8:45	**2249**	**190**	**Yes**
8:45-9:45	**1843**	**127**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (525 req'd)	Minor Volume (53 req'd)	Meets Warrant?
6:15-7:15	**1232**	**69**	**Yes**
7:15-8:15	**2294**	**147**	**Yes**
8:15-9:15	**1875**	**171**	**Yes**

9:45-10:45	**1748**	**133**	**Yes**
11:00-12:00	**1890**	**105**	**Yes**
12:00-13:00	**2212**	**193**	**Yes**
13:00-14:00	**2210**	**191**	**Yes**
14:00-15:00	**2439**	**167**	**Yes**
15:00-16:00	**2639**	**259**	**Yes**
16:00-17:00	**2609**	**176**	**Yes**
17:00-18:00	**2752**	**137**	**Yes**
18:00-19:00	**2022**	**128**	**Yes**
19:00-20:00	0	0	No
20:00-21:00	0	0	No

12 hours met - Condition A is Met

9:15-10:15	**1875**	**142**	**Yes**
10:15-11:15	**1803**	**113**	**Yes**
11:15-12:15	**1932**	**135**	**Yes**
12:15-13:15	**2261**	**220**	**Yes**
13:15-14:15	**2280**	**158**	**Yes**
14:15-15:15	**2446**	**177**	**Yes**
15:15-16:15	**2647**	**256**	**Yes**
16:15-17:15	**2722**	**186**	**Yes**
17:15-18:15	**2535**	**122**	**Yes**
18:15-19:15	**1481**	**88**	**Yes**
19:15-20:15	0	0	No
20:15-21:15	0	0	No

13 hours met - Condition B is Met

Warrant 1 is Met

Evaluation of 56% Criteria for Both Condition A & Condition B:

Evaluation of Condition A:

Hour	Major Volume (280 req'd)	Minor Volume (84 req'd)	Meets Warrant?
6:30-7:30	**1533**	**87**	**Yes**
7:30-8:30	**2354**	**160**	**Yes**
8:30-9:30	**1836**	**161**	**Yes**
9:30-10:30	**1794**	**137**	**Yes**
10:30-11:30	**1827**	**112**	**Yes**
11:30-12:30	**2032**	**155**	**Yes**
12:30-13:30	**2292**	**213**	**Yes**
13:30-14:30	**2297**	**168**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (420 req'd)	Minor Volume (42 req'd)	Meets Warrant?
6:00-7:00	**960**	**49**	**Yes**
7:00-8:00	**2161**	**139**	**Yes**
8:00-9:00	**2102**	**182**	**Yes**
9:00-10:00	**1772**	**133**	**Yes**
10:00-11:00	**1762**	**133**	**Yes**
11:00-12:00	**1890**	**105**	**Yes**
12:00-13:00	**2212**	**193**	**Yes**
13:00-14:00	**2210**	**191**	**Yes**

14:30-15:30	**2517**	**199**	**Yes**
15:30-16:30	**2653**	**220**	**Yes**
16:30-17:30	**2768**	**183**	**Yes**
17:30-18:30	**2323**	**125**	**Yes**
18:30-19:30	982	53	No
19:30-20:30	0	0	No

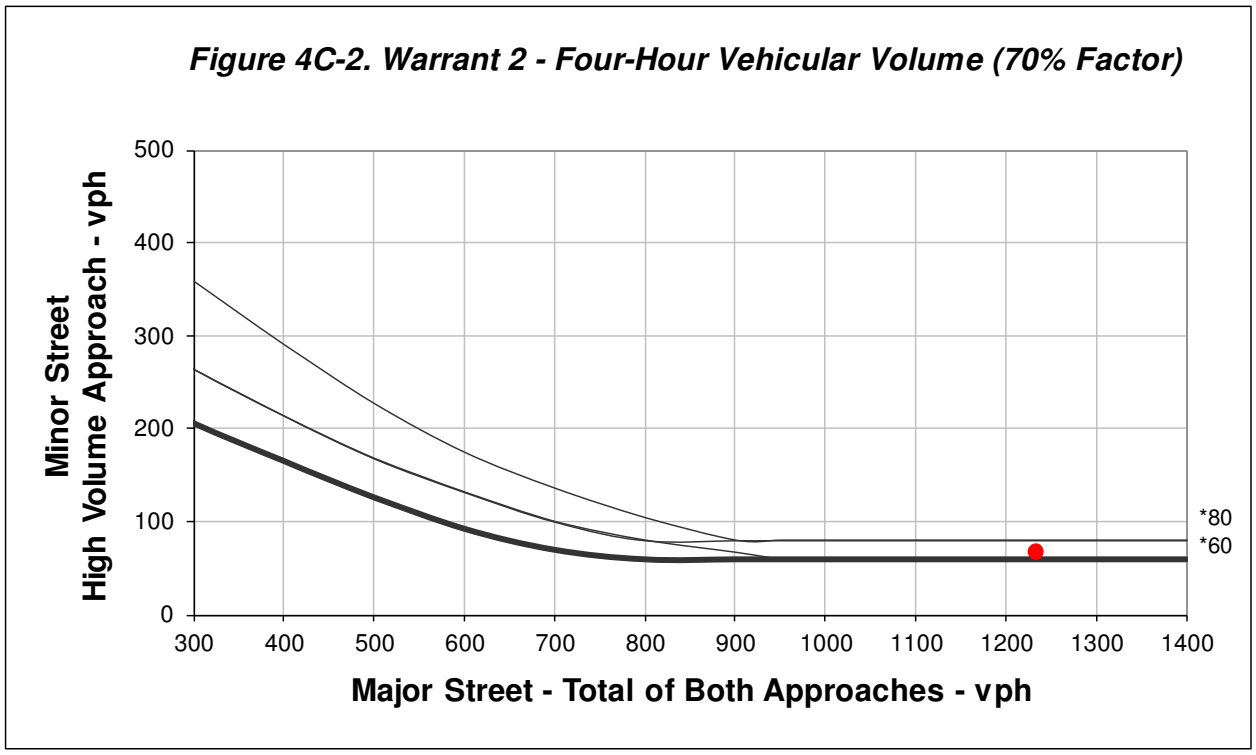
12 hours met - Condition A is Met

14:00-15:00	**2439**	**167**	**Yes**
15:00-16:00	**2639**	**259**	**Yes**
16:00-17:00	**2609**	**176**	**Yes**
17:00-18:00	**2752**	**137**	**Yes**
18:00-19:00	**2022**	**128**	**Yes**
19:00-20:00	0	0	No
20:00-21:00	0	0	No

13 hours met - Condition B is Met

MUTCD Signal Warrant 2: Four-Hour Volumes

US 21 Business & Meridian Road – 2040 Alt 1



*Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:15 - 7:15	1232	69	60	**Yes**
7:15 - 8:15	2294	147	60	**Yes**
8:15 - 9:15	1875	171	60	**Yes**
9:15 - 10:15	1875	142	60	**Yes**
10:15 - 11:15	1803	113	60	**Yes**
11:15 - 12:15	1932	135	60	**Yes**
12:15 - 13:15	2261	220	60	**Yes**
13:15 - 14:15	2280	158	60	**Yes**
14:15 - 15:15	2446	177	60	**Yes**
15:15 - 16:15	2647	256	60	**Yes**
16:15 - 17:15	2722	186	60	**Yes**
17:15 - 18:15	2535	122	60	**Yes**
18:15 - 19:15	1481	88	60	**Yes**
19:15 - 20:15	0	0		No
20:15 - 21:15	0	0		No

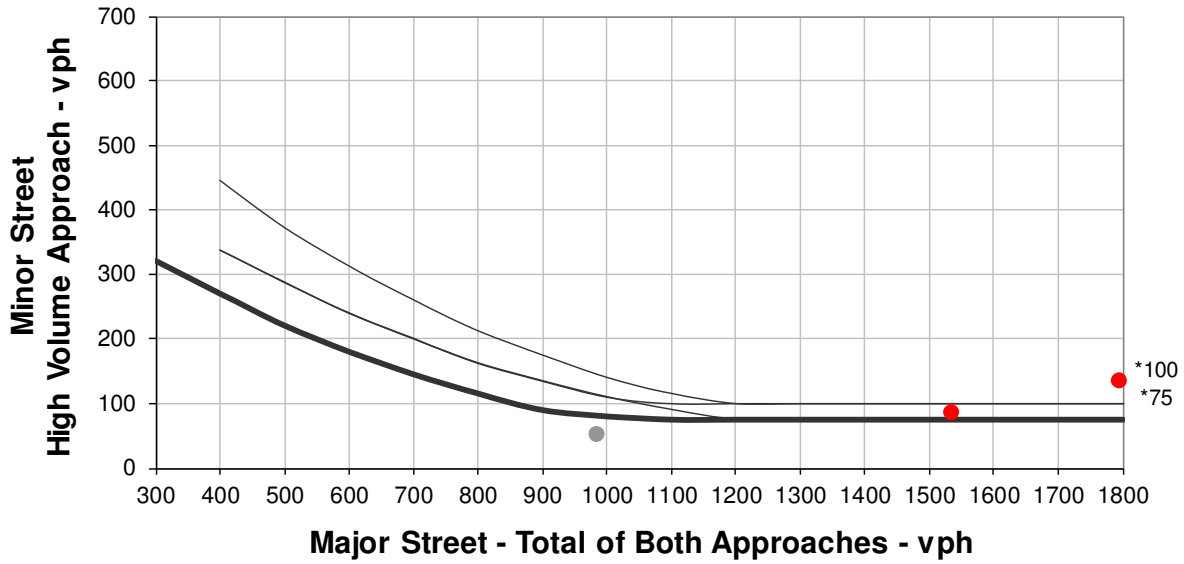
Total Number of Hours Met = 13

Warrant 2 is Met

MUTCD Signal Warrant 3, Condition B: Peak Hour Volume

US 21 Business & Meridian Road – 2040 Alt 1

Figure 4C-3. Warrant 3 - Peak Hour



*Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:30 - 7:30	1533	87	75	**Yes**
7:30 - 8:30	2354	160	75	**Yes**
8:30 - 9:30	1836	161	75	**Yes**
9:30 - 10:30	1794	137	75	**Yes**
10:30 - 11:30	1827	112	75	**Yes**
11:30 - 12:30	2032	155	75	**Yes**
12:30 - 13:30	2292	213	75	**Yes**
13:30 - 14:30	2297	168	75	**Yes**
14:30 - 15:30	2517	199	75	**Yes**
15:30 - 16:30	2653	220	75	**Yes**
16:30 - 17:30	2768	183	75	**Yes**
17:30 - 18:30	2323	125	75	**Yes**
18:30 - 19:30	982	53	82	No
19:30 - 20:30	0	0		No

Total Number of Hours Met = 12

Warrant 3, Condition B is Met

This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

MUTCD Signal Warrant Analysis: US 21 Business & Meridian Road – 2040 Alt 1

	MUTCD Warrant Number & Name	Description	Met?
1	Eight-Hour Vehicular Volume	The volumes of traffic on the major and minor streets meet specified minimum amounts for at least 8 hours of an average weekday. Either of two sets of minimum criteria may be used.	Yes
2	Four-Hour Vehicular Volume	For any four hours of an average day, the points representing major and minor street volumes plot above a specified curve.	Yes
3	Peak Hour	For at least one hour of an average day, minor street traffic exceeds a minimum volume and suffers at least a specified amount of total delay, or the points representing major and minor street volumes plot above a specified curve. This warrant only applies to unusual cases involving large traffic generators.	Yes, but only if this is an unusual case
4	Pedestrian Volume	The volume of pedestrian traffic crossing a major street at an intersection or mid-block location must meet minimum values for either a single hour or any four hours of an average weekday.	No
5	School Crossing	The frequency and adequacy of gaps in the traffic stream must not otherwise be sufficient for the number of children crossing.	No
6	Coordinated Signal System	Signalized control is required to maintain proper grouping of vehicles in a coordinated, progressive signal system.	No
7	Crash Experience	Five or more reported crashes of type susceptible to control by a traffic signal have occurred at the location within a 12-month period. Other less restrictive remedies and enforcement have failed to reduce accidents. Either Warrant 1 or Warrant 2 is at least 80% met. A signal will not seriously disrupt traffic flow.	6 reported crashes near intersection in 3 years. 1 angle/5 rear-ends.
8	Roadway Network	An intersection of two major routes has either high five-year projected peak-hour traffic volumes or high volumes for at least five hours on an average Saturday and/or Sunday.	No

US 21 BUSINESS (SEA ISLAND PARKWAY) AND MERIDIAN ROAD – 2040 ALT 2

MUTCD Signal Warrant 1: Eight-Hour Vehicular Volumes

US 21 Business & Meridian Road – 2040 Alt 2

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A - Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	**2 or more**	500	400	**350**	**280**	200	160	**140**	**112**

Condition B - Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	**2 or more**	750	600	**525**	**420**	100	80	**70**	**56**

[a] Basic minimum hourly volume.

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.

[c] May be used when the major street speed exceeds 70 km/h (40 mph) or in an isolated community with a population of less than 10,000.

Evaluation of 70% Criteria for Either Condition A or Condition B:

Evaluation of Condition A:

Hour	Major Volume (350 req'd)	Minor Volume (140 req'd)	Meets Warrant?
6:00-7:00	1018	61	No
7:00-8:00	**2311**	**178**	**Yes**
8:00-9:00	**2249**	**261**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (525 req'd)	Minor Volume (70 req'd)	Meets Warrant?
6:15-7:15	**1307**	**84**	**Yes**
7:15-8:15	**2477**	**195**	**Yes**
8:15-9:15	**2035**	**248**	**Yes**

9:00-10:00	**1973**	**179**	**Yes**	**9:15-10:15**	**2047**	**186**	**Yes**
10:00-11:00	**1914**	**180**	**Yes**	**10:15-11:15**	**1980**	**160**	**Yes**
11:00-12:00	**2066**	**146**	**Yes**	**11:15-12:15**	**2068**	**214**	**Yes**
12:00-13:00	**2308**	**343**	**Yes**	**12:15-13:15**	**2363**	**363**	**Yes**
13:00-14:00	**2324**	**333**	**Yes**	**13:15-14:15**	**2397**	**278**	**Yes**
14:00-15:00	**2545**	**277**	**Yes**	**14:15-15:15**	**2545**	**316**	**Yes**
15:00-16:00	**2740**	**466**	**Yes**	**15:15-16:15**	**2769**	**437**	**Yes**
16:00-17:00	**2678**	**246**	**Yes**	**16:15-17:15**	**2754**	**252**	**Yes**
17:00-18:00	**2787**	**191**	**Yes**	**17:15-18:15**	**2567**	**171**	**Yes**
18:00-19:00	**2047**	**169**	**Yes**	**18:15-19:15**	**1500**	**116**	**Yes**
19:00-20:00	0	0	No	19:15-20:15	0	0	No
20:00-21:00	0	0	No	20:15-21:15	0	0	No

12 hours met - Condition A is Met

13 hours met - Condition B is Met

Warrant 1 is Met

Evaluation of 56% Criteria for Both Condition A & Condition B:

Evaluation of Condition A:

Hour	Major Volume (280 req'd)	Minor Volume (112 req'd)	Meets Warrant?
6:45-7:45	**1967**	**134**	**Yes**
7:45-8:45	**2442**	**268**	**Yes**
8:45-9:45	**2023**	**176**	**Yes**
9:45-10:45	**1896**	**178**	**Yes**
10:45-11:45	**2013**	**141**	**Yes**
11:45-12:45	**2245**	**328**	**Yes**
12:45-13:45	**2401**	**327**	**Yes**
13:45-14:45	**2430**	**278**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (420 req'd)	Minor Volume (56 req'd)	Meets Warrant?
6:00-7:00	**1018**	**61**	**Yes**
7:00-8:00	**2311**	**178**	**Yes**
8:00-9:00	**2249**	**261**	**Yes**
9:00-10:00	**1973**	**179**	**Yes**
10:00-11:00	**1914**	**180**	**Yes**
11:00-12:00	**2066**	**146**	**Yes**
12:00-13:00	**2308**	**343**	**Yes**
13:00-14:00	**2324**	**333**	**Yes**

14:45-15:45	**2740**	**398**	**Yes**
15:45-16:45	**2681**	**329**	**Yes**
16:45-17:45	**2830**	**230**	**Yes**
17:45-18:45	**2162**	**153**	**Yes**
18:45-19:45	505	42	No
19:45-20:45	0	0	No

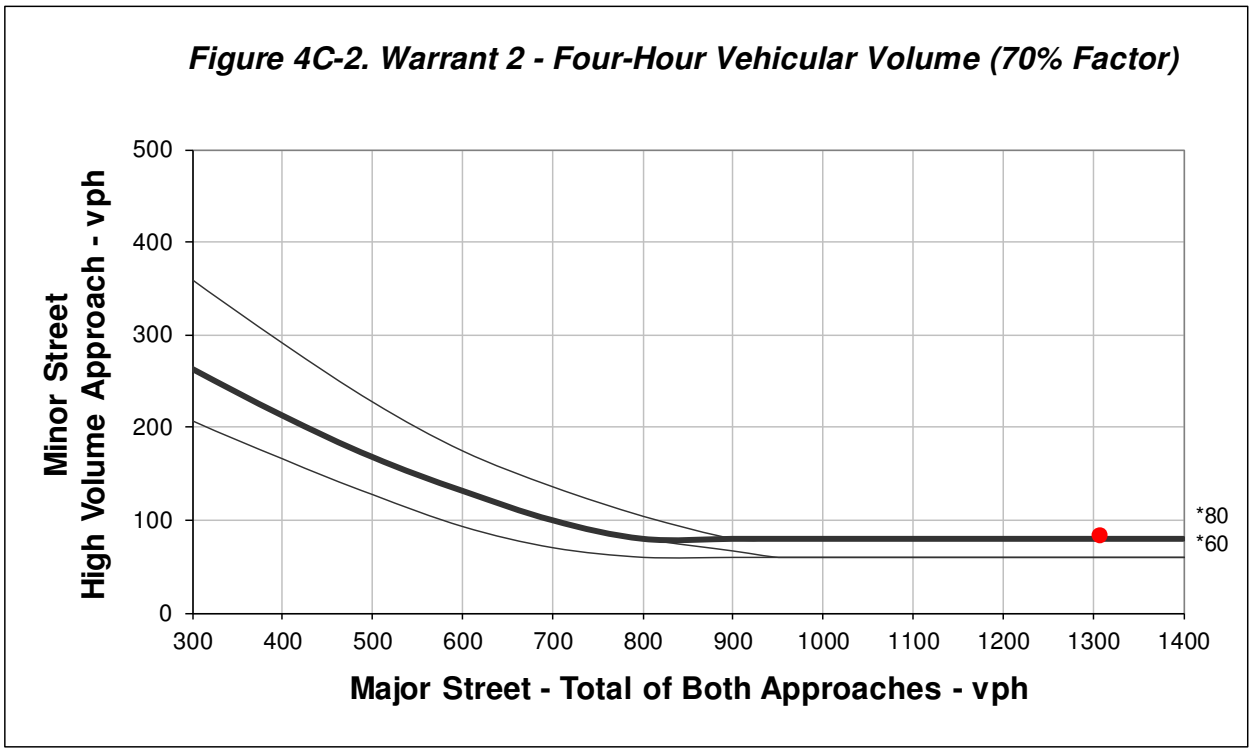
12 hours met - Condition A is Met

14:00-15:00	**2545**	**277**	**Yes**
15:00-16:00	**2740**	**466**	**Yes**
16:00-17:00	**2678**	**246**	**Yes**
17:00-18:00	**2787**	**191**	**Yes**
18:00-19:00	**2047**	**169**	**Yes**
19:00-20:00	0	0	No
20:00-21:00	0	0	No

13 hours met - Condition B is Met

MUTCD Signal Warrant 2: Four-Hour Volumes

US 21 Business & Meridian Road – 2040 Alt 2



*Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

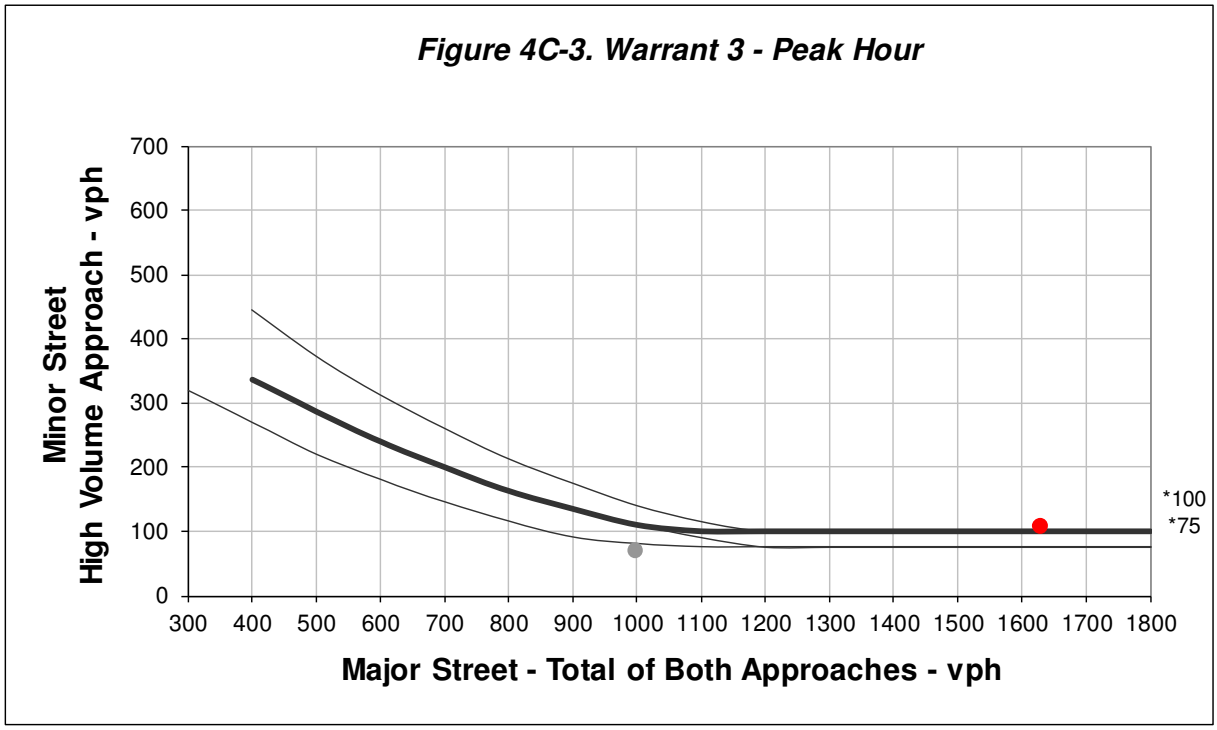
Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:15 - 7:15	1307	84	80	**Yes**
7:15 - 8:15	2477	195	80	**Yes**
8:15 - 9:15	2035	248	80	**Yes**
9:15 - 10:15	2047	186	80	**Yes**
10:15 - 11:15	1980	160	80	**Yes**
11:15 - 12:15	2068	214	80	**Yes**
12:15 - 13:15	2363	363	80	**Yes**
13:15 - 14:15	2397	278	80	**Yes**
14:15 - 15:15	2545	316	80	**Yes**
15:15 - 16:15	2769	437	80	**Yes**
16:15 - 17:15	2754	252	80	**Yes**
17:15 - 18:15	2567	171	80	**Yes**
18:15 - 19:15	1500	116	80	**Yes**
19:15 - 20:15	0	0		No
20:15 - 21:15	0	0		No

Total Number of Hours Met = 13

Warrant 2 is Met

MUTCD Signal Warrant 3, Condition B: Peak Hour Volume

US 21 Business & Meridian Road – 2040 Alt 2



*Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:30 - 7:30	1628	110	100	**Yes**
7:30 - 8:30	2534	217	100	**Yes**
8:30 - 9:30	2012	229	100	**Yes**
9:30 - 10:30	1950	180	100	**Yes**
10:30 - 11:30	2004	157	100	**Yes**
11:30 - 12:30	2165	262	100	**Yes**
12:30 - 13:30	2403	349	100	**Yes**
13:30 - 14:30	2395	301	100	**Yes**
14:30 - 15:30	2619	338	100	**Yes**
15:30 - 16:30	2767	373	100	**Yes**
16:30 - 17:30	2803	250	100	**Yes**
17:30 - 18:30	2350	169	100	**Yes**
18:30 - 19:30	995	72	111	No
19:30 - 20:30	0	0		No

Total Number of Hours Met = 12

Warrant 3, Condition B is Met

This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

MUTCD Signal Warrant Analysis: US 21 Business & Meridian Road – 2040 Alt 2

	MUTCD Warrant Number & Name	Description	Met?
1	Eight-Hour Vehicular Volume	The volumes of traffic on the major and minor streets meet specified minimum amounts for at least 8 hours of an average weekday. Either of two sets of minimum criteria may be used.	Yes
2	Four-Hour Vehicular Volume	For any four hours of an average day, the points representing major and minor street volumes plot above a specified curve.	Yes
3	Peak Hour	For at least one hour of an average day, minor street traffic exceeds a minimum volume and suffers at least a specified amount of total delay, or the points representing major and minor street volumes plot above a specified curve. This warrant only applies to unusual cases involving large traffic generators.	Yes, but only if this is an unusual case
4	Pedestrian Volume	The volume of pedestrian traffic crossing a major street at an intersection or mid-block location must meet minimum values for either a single hour or any four hours of an average weekday.	No.
5	School Crossing	The frequency and adequacy of gaps in the traffic stream must not otherwise be sufficient for the number of children crossing.	No.
6	Coordinated Signal System	Signalized control is required to maintain proper grouping of vehicles in a coordinated, progressive signal system.	No
7	Crash Experience	Five or more reported crashes of type susceptible to control by a traffic signal have occurred at the location within a 12-month period. Other less restrictive remedies and enforcement have failed to reduce accidents. Either Warrant 1 or Warrant 2 is at least 80% met. A signal will not seriously disrupt traffic flow.	6 reported crashes near intersection in 3 years. 1 angle/5 rear-ends.
8	Roadway Network	An intersection of two major routes has either high five-year projected peak-hour traffic volumes or high volumes for at least five hours on an average Saturday and/or Sunday.	No

US 21 BUSINESS (SEA ISLAND PARKWAY) AND MERIDIAN ROAD – 2040 ALT 3

MUTCD Signal Warrant 1: Eight-Hour Vehicular Volumes

US 21 Business & Meridian Road – 2040 Alt 3

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A - Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	**1**	500	400	**350**	**280**	150	120	**105**	**84**
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Condition B - Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	**1**	750	600	**525**	**420**	75	60	**53**	**42**
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

[a] Basic minimum hourly volume.

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.

[c] May be used when the major street speed exceeds 70 km/h (40 mph) or in an isolated community with a population of less than 10,000.

Evaluation of 70% Criteria for Either Condition A or Condition B:

Evaluation of Condition A:

Hour	Major Volume (350 req'd)	Minor Volume (105 req'd)	Meets Warrant?
6:00-7:00	972	31	No
7:30-8:30	**2398**	**116**	**Yes**
8:30-9:30	**1835**	**124**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (525 req'd)	Minor Volume (53 req'd)	Meets Warrant?
6:30-7:30	**1562**	**59**	**Yes**
7:30-8:30	**2398**	**116**	**Yes**
8:30-9:30	**1835**	**124**	**Yes**

9:30-10:30	1852	96	No
10:30-11:30	1875	84	No
11:30-12:30	**2100**	**105**	**Yes**
12:30-13:30	**2396**	**116**	**Yes**
14:15-15:15	**2556**	**106**	**Yes**
15:15-16:15	**2748**	**145**	**Yes**
16:15-17:15	**2759**	**142**	**Yes**
17:15-18:15	2567	96	No
18:15-19:15	1509	68	No
19:15-20:15	0	0	No
20:15-21:15	0	0	No

7 hours met - Condition A is Not Met

9:30-10:30	**1852**	**96**	**Yes**
10:30-11:30	**1875**	**84**	**Yes**
11:30-12:30	**2100**	**105**	**Yes**
12:30-13:30	**2396**	**116**	**Yes**
13:30-14:30	**2398**	**100**	**Yes**
14:30-15:30	**2629**	**113**	**Yes**
15:30-16:30	**2732**	**135**	**Yes**
16:30-17:30	**2804**	**141**	**Yes**
17:30-18:30	**2357**	**96**	**Yes**
18:30-19:30	1000	42	No
19:30-20:30	0	0	No

12 hours met - Condition B is Met

Warrant 1 is Met

Evaluation of 56% Criteria for Both Condition A & Condition B:

Evaluation of Condition A:

Hour	Major Volume (280 req'd)	Minor Volume (84 req'd)	Meets Warrant?
6:00-7:00	972	31	No
7:00-8:00	**2229**	**95**	**Yes**
8:00-9:00	**2081**	**141**	**Yes**
9:00-10:00	**1831**	**96**	**Yes**
10:00-11:00	**1804**	**96**	**Yes**
11:15-12:15	**1997**	**96**	**Yes**
12:15-13:15	**2360**	**120**	**Yes**
13:15-14:15	**2380**	**93**	**Yes**
14:15-15:15	**2556**	**106**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (420 req'd)	Minor Volume (42 req'd)	Meets Warrant?
6:15-7:15	**1247**	**44**	**Yes**
7:15-8:15	**2365**	**104**	**Yes**
8:15-9:15	**1857**	**134**	**Yes**
9:15-10:15	**1932**	**100**	**Yes**
10:15-11:15	**1844**	**85**	**Yes**
11:15-12:15	**1997**	**96**	**Yes**
12:15-13:15	**2360**	**120**	**Yes**
13:15-14:15	**2380**	**93**	**Yes**
14:15-15:15	**2556**	**106**	**Yes**

15:15-16:15	**2748**	**145**	**Yes**
16:15-17:15	**2759**	**142**	**Yes**
17:15-18:15	**2567**	**96**	**Yes**
18:15-19:15	1509	68	No
19:15-20:15	0	0	No
20:15-21:15	0	0	No

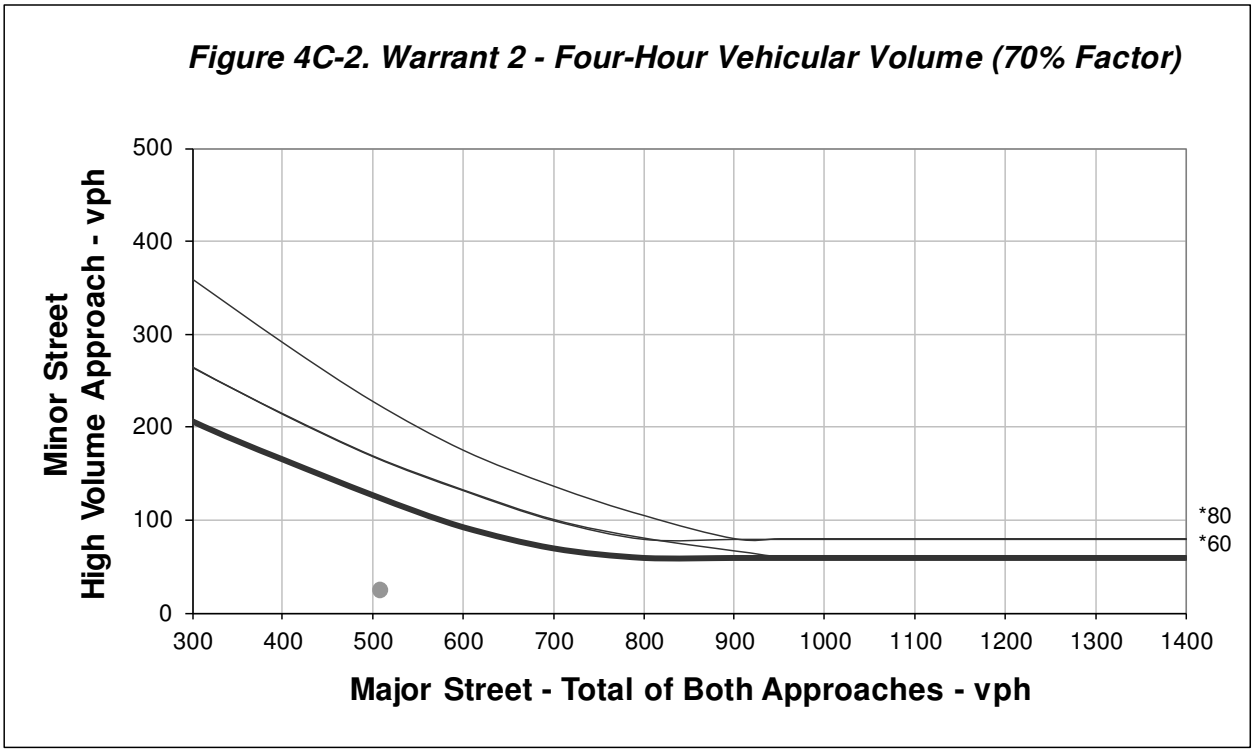
11 hours met - Condition A is Met

15:15-16:15	**2748**	**145**	**Yes**
16:15-17:15	**2759**	**142**	**Yes**
17:15-18:15	**2567**	**96**	**Yes**
18:15-19:15	**1509**	**68**	**Yes**
19:15-20:15	0	0	No
20:15-21:15	0	0	No

13 hours met - Condition B is Met

MUTCD Signal Warrant 2: Four-Hour Volumes

US 21 Business & Meridian Road – 2040 Alt 3



*Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

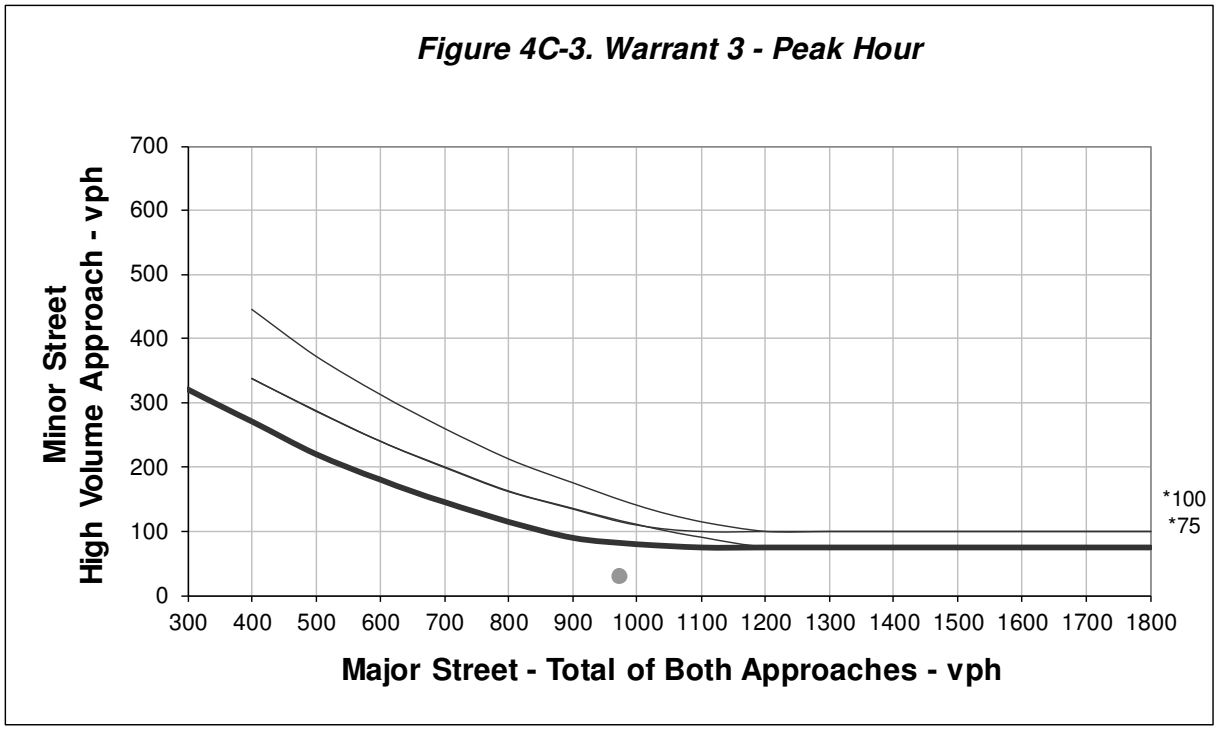
Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:45 - 7:45	1934	72	60	**Yes**
7:45 - 8:45	2245	144	60	**Yes**
8:45 - 9:45	1869	95	60	**Yes**
9:45 - 10:45	1815	95	60	**Yes**
10:45 - 11:45	1866	75	60	**Yes**
11:45 - 12:45	2226	121	60	**Yes**
12:45 - 13:45	2381	109	60	**Yes**
13:45 - 14:45	2432	93	60	**Yes**
14:45 - 15:45	2761	132	60	**Yes**
15:45 - 16:45	2645	136	60	**Yes**
16:45 - 17:45	2831	130	60	**Yes**
17:45 - 18:45	2169	87	60	**Yes**
18:45 - 19:45	507	25	125	No
19:45 - 20:45	0	0		No

Total Number of Hours Met = 12

Warrant 2 is Met

MUTCD Signal Warrant 3, Condition B: Peak Hour Volume

US 21 Business & Meridian Road – 2040 Alt 3



*Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:00 - 7:00	972	31	83	No
7:00 - 8:00	2229	95	75	**Yes**
8:00 - 9:00	2081	141	75	**Yes**
9:00 - 10:00	1831	96	75	**Yes**
10:00 - 11:00	1804	96	75	**Yes**
11:00 - 12:00	1941	79	75	**Yes**
12:00 - 13:00	2309	113	75	**Yes**
13:00 - 14:00	2303	111	75	**Yes**
14:00 - 15:00	2549	93	75	**Yes**
15:00 - 16:00	2746	154	75	**Yes**
16:00 - 17:00	2661	124	75	**Yes**
17:00 - 18:00	2783	108	75	**Yes**
18:00 - 19:00	2058	97	75	**Yes**
19:00 - 20:00	0	0		No
20:00 - 21:00	0	0		No

Total Number of Hours Met = 12

Warrant 3, Condition B is Met

This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

MUTCD Signal Warrant Analysis: US 21 Business & Meridian Road – 2040 Alt 3

	MUTCD Warrant Number & Name	Description	Met?
1	Eight-Hour Vehicular Volume	The volumes of traffic on the major and minor streets meet specified minimum amounts for at least 8 hours of an average weekday. Either of two sets of minimum criteria may be used.	Yes
2	Four-Hour Vehicular Volume	For any four hours of an average day, the points representing major and minor street volumes plot above a specified curve.	Yes
3	Peak Hour	For at least one hour of an average day, minor street traffic exceeds a minimum volume and suffers at least a specified amount of total delay, or the points representing major and minor street volumes plot above a specified curve. This warrant only applies to unusual cases involving large traffic generators.	Yes, but only if this is an unusual case
4	Pedestrian Volume	The volume of pedestrian traffic crossing a major street at an intersection or mid-block location must meet minimum values for either a single hour or any four hours of an average weekday.	No
5	School Crossing	The frequency and adequacy of gaps in the traffic stream must not otherwise be sufficient for the number of children crossing.	No
6	Coordinated Signal System	Signalized control is required to maintain proper grouping of vehicles in a coordinated, progressive signal system.	No
7	Crash Experience	Five or more reported crashes of type susceptible to control by a traffic signal have occurred at the location within a 12-month period. Other less restrictive remedies and enforcement have failed to reduce accidents. Either Warrant 1 or Warrant 2 is at least 80% met. A signal will not seriously disrupt traffic flow.	6 reported crashes near intersection in 3 years. 1 angle/5 rear-ends.
8	Roadway Network	An intersection of two major routes has either high five-year projected peak-hour traffic volumes or high volumes for at least five hours on an average Saturday and/or Sunday.	No

US 21 BUSINESS (SEA ISLAND PARKWAY) AND SUNSET BOULEVARD – 2019 ALT 1

MUTCD Signal Warrant 1: Eight-Hour Vehicular Volumes

US 21 Business & Sunset Boulevard – 2019 Alt 1

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A - Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	**2 or more**	500	400	**350**	**280**	200	160	**140**	**112**

Condition B - Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	**2 or more**	750	600	**525**	**420**	100	80	**70**	**56**

[a] Basic minimum hourly volume.

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.

[c] May be used when the major street speed exceeds 70 km/h (40 mph) or in an isolated community with a population of less than 10,000.

Evaluation of 70% Criteria for Either Condition A or Condition B:

Evaluation of Condition A:

Hour	Major Volume (350 req'd)	Minor Volume (140 req'd)	Meets Warrant?
6:00-7:00	562	43	No
7:15-8:15	**1399**	**154**	**Yes**
8:15-9:15	1246	109	No
9:15-10:15	1240	76	No

Evaluation of Condition B:

Hour	Major Volume (525 req'd)	Minor Volume (70 req'd)	Meets Warrant?
6:30-7:30	**927**	**76**	**Yes**
7:30-8:30	**1429**	**164**	**Yes**
8:30-9:30	**1236**	**95**	**Yes**
9:30-10:30	1189	67	No

10:15-11:15	1207	61	No
11:15-12:15	1246	121	No
12:15-13:15	1334	104	No
13:15-14:15	1322	88	No
14:15-15:15	1400	88	No
15:15-16:15	1635	94	No
16:15-17:15	1673	97	No
17:15-18:15	1563	76	No
18:15-19:15	940	51	No
19:15-20:15	0	0	No
20:15-21:15	0	0	No

1 hours met - Condition A is Not Met

10:30-11:30	**1213**	**76**	**Yes**
11:30-12:30	**1288**	**122**	**Yes**
12:30-13:30	**1331**	**99**	**Yes**
13:30-14:30	**1337**	**86**	**Yes**
14:30-15:30	**1467**	**82**	**Yes**
15:30-16:30	**1605**	**102**	**Yes**
16:30-17:30	**1711**	**102**	**Yes**
17:30-18:30	1472	64	No
18:30-19:30	612	35	No
19:30-20:30	0	0	No

10 hours met - Condition B is Met

Warrant 1 is Met

Evaluation of 56% Criteria for Both Condition A & Condition B:

Evaluation of Condition A:

Hour	Major Volume (280 req'd)	Minor Volume (112 req'd)	Meets Warrant?
6:00-7:00	562	43	No
7:00-8:00	**1283**	**138**	**Yes**
8:00-9:00	**1388**	**119**	**Yes**
9:00-10:00	1173	80	No
10:00-11:00	1185	68	No
11:15-12:15	**1246**	**121**	**Yes**
12:15-13:15	1334	104	No
13:15-14:15	1322	88	No
14:15-15:15	1400	88	No

Evaluation of Condition B:

Hour	Major Volume (420 req'd)	Minor Volume (56 req'd)	Meets Warrant?
6:30-7:30	**927**	**76**	**Yes**
7:30-8:30	**1429**	**164**	**Yes**
8:30-9:30	**1236**	**95**	**Yes**
9:30-10:30	**1189**	**67**	**Yes**
10:30-11:30	**1213**	**76**	**Yes**
11:30-12:30	**1288**	**122**	**Yes**
12:30-13:30	**1331**	**99**	**Yes**
13:30-14:30	**1337**	**86**	**Yes**
14:30-15:30	**1467**	**82**	**Yes**

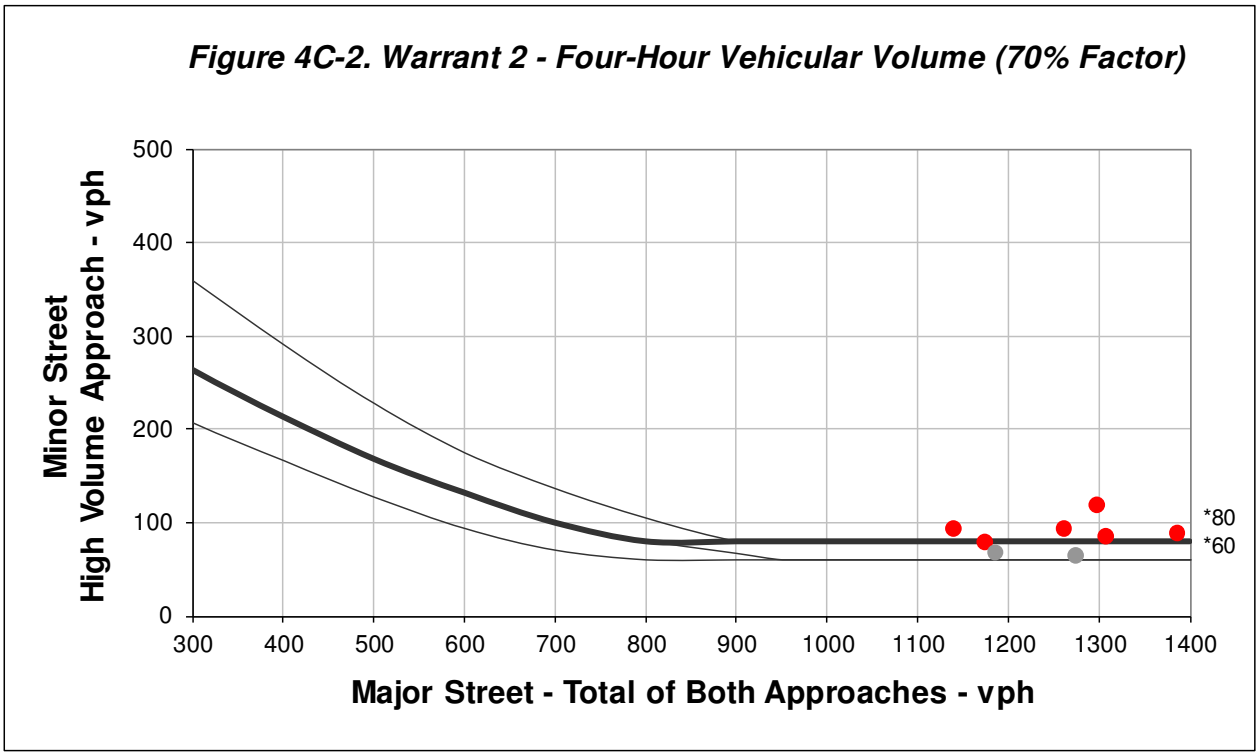
15:15-16:15	1635	94	No	**15:30-16:30**	**1605**	**102**	**Yes**
16:15-17:15	1673	97	No	**16:30-17:30**	**1711**	**102**	**Yes**
17:15-18:15	1563	76	No	**17:30-18:30**	**1472**	**64**	**Yes**
18:15-19:15	940	51	No	18:30-19:30	612	35	No
19:15-20:15	0	0	No	19:30-20:30	0	0	No
20:15-21:15	0	0	No				

3 hours met - Condition A is Not Met

12 hours met - Condition B is Met

MUTCD Signal Warrant 2: Four-Hour Volumes

US 21 Business & Sunset Boulevard – 2019 Alt 1



*Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

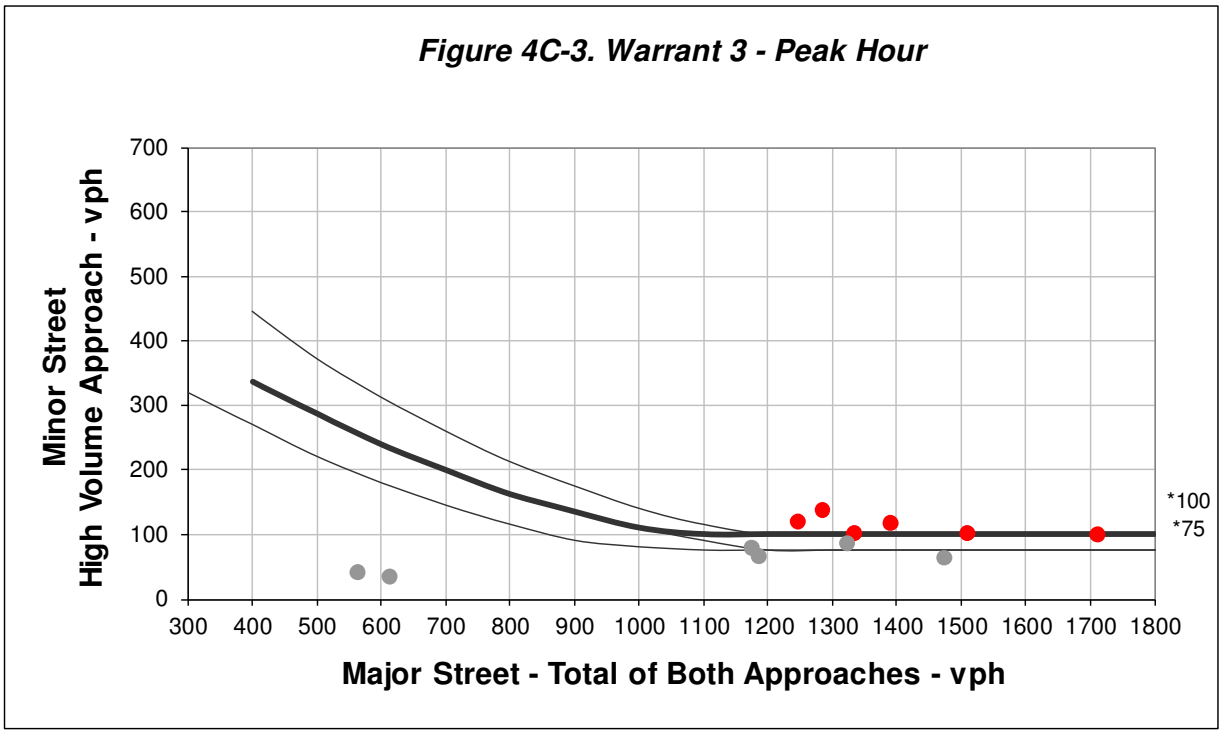
Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:45 - 7:45	1139	94	80	**Yes**
7:45 - 8:45	1422	166	80	**Yes**
9:00 - 10:00	1173	80	80	**Yes**
10:00 - 11:00	1185	68	80	No
11:00 - 12:00	1260	95	80	**Yes**
12:00 - 13:00	1297	120	80	**Yes**
13:00 - 14:00	1307	87	80	**Yes**
14:00 - 15:00	1385	90	80	**Yes**
15:00 - 16:00	1595	99	80	**Yes**
16:00 - 17:00	1626	89	80	**Yes**
17:00 - 18:00	1675	88	80	**Yes**
18:00 - 19:00	1274	65	80	No
19:00 - 20:00	0	0		No
20:00 - 21:00	0	0		No

Total Number of Hours Met = 10

Warrant 2 is Met

MUTCD Signal Warrant 3, Condition B: Peak Hour Volume

US 21 Business & Sunset Boulevard – 2019 Alt 1



*Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:00 - 7:00	562	43	258	No
7:00 - 8:00	1283	138	100	**Yes**
8:00 - 9:00	1388	119	100	**Yes**
9:00 - 10:00	1173	80	100	No
10:00 - 11:00	1185	68	100	No
11:15 - 12:15	1246	121	100	**Yes**
12:15 - 13:15	1334	104	100	**Yes**
13:15 - 14:15	1322	88	100	No
14:45 - 15:45	1509	103	100	**Yes**
16:30 - 17:30	1711	102	100	**Yes**
17:30 - 18:30	1472	64	100	No
18:30 - 19:30	612	35	235	No
19:30 - 20:30	0	0		No

Total Number of Hours Met = 6

Warrant 3, Condition B is Met

This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

MUTCD Signal Warrant Analysis: US 21 Business & Sunset Boulevard – 2019 Alt 1

	MUTCD Warrant Number & Name	Description	Met?
1	Eight-Hour Vehicular Volume	The volumes of traffic on the major and minor streets meet specified minimum amounts for at least 8 hours of an average weekday. Either of two sets of minimum criteria may be used.	Yes
2	Four-Hour Vehicular Volume	For any four hours of an average day, the points representing major and minor street volumes plot above a specified curve.	Yes
3	Peak Hour	For at least one hour of an average day, minor street traffic exceeds a minimum volume and suffers at least a specified amount of total delay, or the points representing major and minor street volumes plot above a specified curve. This warrant only applies to unusual cases involving large traffic generators.	Yes, but only if this is an unusual case
4	Pedestrian Volume	The volume of pedestrian traffic crossing a major street at an intersection or mid-block location must meet minimum values for either a single hour or any four hours of an average weekday.	No
5	School Crossing	The frequency and adequacy of gaps in the traffic stream must not otherwise be sufficient for the number of children crossing.	No
6	Coordinated Signal System	Signalized control is required to maintain proper grouping of vehicles in a coordinated, progressive signal system.	No
7	Crash Experience	Five or more reported crashes of type susceptible to control by a traffic signal have occurred at the location within a 12-month period. Other less restrictive remedies and enforcement have failed to reduce accidents. Either Warrant 1 or Warrant 2 is at least 80% met. A signal will not seriously disrupt traffic flow.	10 reported crashes near the intersection in 3 years. 1 angle/9 rear-ends.
8	Roadway Network	An intersection of two major routes has either high five-year projected peak-hour traffic volumes or high volumes for at least five hours on an average Saturday and/or Sunday.	No

US 21 BUSINESS (SEA ISLAND PARKWAY) AND SUNSET BOULEVARD – 2019 ALT 2

MUTCD Signal Warrant 1: Eight-Hour Vehicular Volumes

US 21 Business & Sunset Boulevard – 2019 Alt 2

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A - Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	**2 or more**	500	400	**350**	**280**	200	160	**140**	**112**

Condition B - Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	**2 or more**	750	600	**525**	**420**	100	80	**70**	**56**

[a] Basic minimum hourly volume.

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.

[c] May be used when the major street speed exceeds 70 km/h (40 mph) or in an isolated community with a population of less than 10,000.

Evaluation of 70% Criteria for Either Condition A or Condition B:

Evaluation of Condition A:

Hour	Major Volume (350 req'd)	Minor Volume (140 req'd)	Meets Warrant?
6:00-7:00	638	49	No
7:00-8:00	**1440**	**148**	**Yes**
8:00-9:00	1541	111	No

Evaluation of Condition B:

Hour	Major Volume (525 req'd)	Minor Volume (70 req'd)	Meets Warrant?
6:30-7:30	**1048**	**84**	**Yes**
7:30-8:30	**1597**	**164**	**Yes**
8:30-9:30	**1369**	**87**	**Yes**

9:00-10:00	1301	76	No	9:30-10:30	1309	64	No
10:00-11:00	1304	56	No	**10:45-11:45**	**1323**	**72**	**Yes**
11:00-12:00	1386	85	No	**11:45-12:45**	**1511**	**103**	**Yes**
12:00-13:00	1481	99	No	**12:45-13:45**	**1514**	**87**	**Yes**
13:00-14:00	1495	84	No	**13:45-14:45**	**1527**	**82**	**Yes**
14:00-15:00	1586	87	No	**14:45-15:45**	**1721**	**98**	**Yes**
15:00-16:00	1822	94	No	**15:45-16:45**	**1840**	**85**	**Yes**
16:00-17:00	1773	90	No	**16:45-17:45**	**1797**	**94**	**Yes**
17:00-18:00	1751	87	No	17:45-18:45	1397	65	No
18:00-19:00	1329	65	No	18:45-19:45	334	18	No
19:00-20:00	0	0	No	19:45-20:45	0	0	No
20:00-21:00	0	0	No				

1 hours met - Condition A is Not Met

10 hours met - Condition B is Met

Warrant 1 is Met

Evaluation of 56% Criteria for Both Condition A & Condition B:

Evaluation of Condition A:

Hour	Major Volume (280 req'd)	Minor Volume (112 req'd)	Meets Warrant?
6:00-7:00	638	49	No
7:00-8:00	**1440**	**148**	**Yes**
8:00-9:00	1541	111	No
9:00-10:00	1301	76	No
10:00-11:00	1304	56	No
11:00-12:00	1386	85	No
12:00-13:00	1481	99	No
13:00-14:00	1495	84	No

Evaluation of Condition B:

Hour	Major Volume (420 req'd)	Minor Volume (56 req'd)	Meets Warrant?
6:15-7:15	**820**	**61**	**Yes**
7:15-8:15	**1568**	**159**	**Yes**
8:15-9:15	**1382**	**102**	**Yes**
9:15-10:15	**1369**	**70**	**Yes**
10:30-11:30	**1343**	**67**	**Yes**
11:30-12:30	**1441**	**99**	**Yes**
12:30-13:30	**1516**	**91**	**Yes**
13:30-14:30	**1536**	**84**	**Yes**

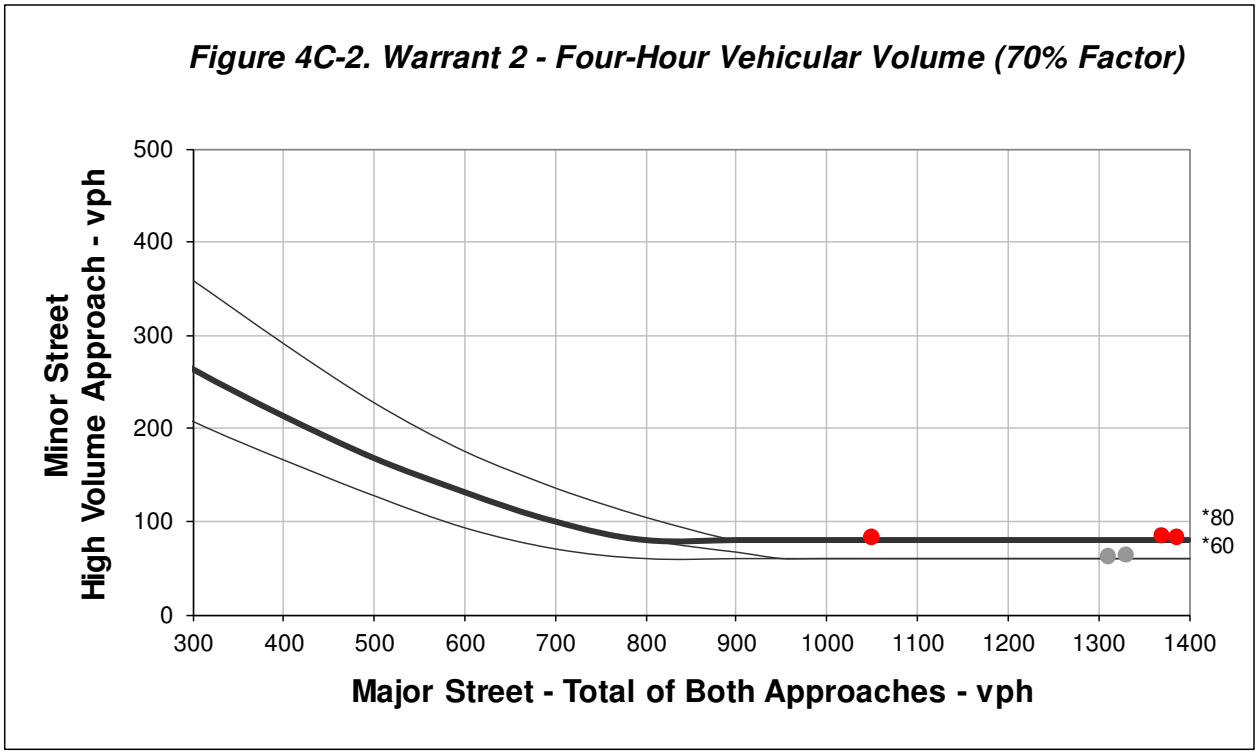
14:00-15:00	1586	87	No	**14:30-15:30**	**1675**	**77**	**Yes**
15:00-16:00	1822	94	No	**15:30-16:30**	**1832**	**99**	**Yes**
16:00-17:00	1773	90	No	**16:30-17:30**	**1788**	**102**	**Yes**
17:00-18:00	1751	87	No	**17:30-18:30**	**1535**	**66**	**Yes**
18:00-19:00	1329	65	No	18:30-19:30	640	34	No
19:00-20:00	0	0	No	19:30-20:30	0	0	No
20:00-21:00	0	0	No				

1 hours met - Condition A is Not Met

12 hours met - Condition B is Met

MUTCD Signal Warrant 2: Four-Hour Volumes

US 21 Business & Sunset Boulevard – 2019 Alt 2



*Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:30 - 7:30	1048	84	80	**Yes**
7:30 - 8:30	1597	164	80	**Yes**
8:30 - 9:30	1369	87	80	**Yes**
9:30 - 10:30	1309	64	80	No
11:00 - 12:00	1386	85	80	**Yes**
12:00 - 13:00	1481	99	80	**Yes**
13:00 - 14:00	1495	84	80	**Yes**
14:00 - 15:00	1586	87	80	**Yes**
15:00 - 16:00	1822	94	80	**Yes**
16:00 - 17:00	1773	90	80	**Yes**
17:00 - 18:00	1751	87	80	**Yes**
18:00 - 19:00	1329	65	80	No
19:00 - 20:00	0	0		No
20:00 - 21:00	0	0		No

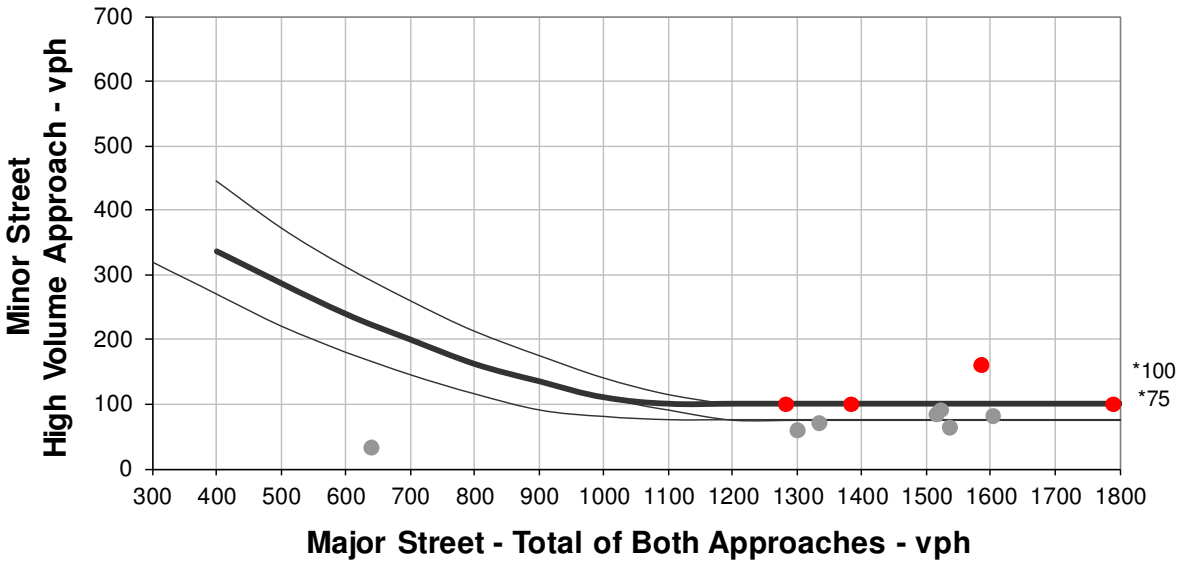
Total Number of Hours Met = 10

Warrant 2 is Met

MUTCD Signal Warrant 3, Condition B: Peak Hour Volume

US 21 Business & Sunset Boulevard – 2019 Alt 2

Figure 4C-3. Warrant 3 - Peak Hour



*Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:45 - 7:45	1281	102	100	**Yes**
7:45 - 8:45	1584	162	100	**Yes**
8:45 - 9:45	1333	72	100	No
9:45 - 10:45	1300	60	100	No
11:15 - 12:15	1383	100	100	**Yes**
12:15 - 13:15	1521	92	100	No
13:15 - 14:15	1515	86	100	No
14:15 - 15:15	1603	82	100	No
15:15 - 16:15	1867	92	100	No
16:30 - 17:30	1788	102	100	**Yes**
17:30 - 18:30	1535	66	100	No
18:30 - 19:30	640	34	224	No
19:30 - 20:30	0	0		No

Total Number of Hours Met = 4

Warrant 3, Condition B is Met

This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

MUTCD Signal Warrant Analysis: US 21 Business & Sunset Boulevard – 2019 Alt 2

	MUTCD Warrant Number & Name	Description	Met?
1	Eight-Hour Vehicular Volume	The volumes of traffic on the major and minor streets meet specified minimum amounts for at least 8 hours of an average weekday. Either of two sets of minimum criteria may be used.	Yes
2	Four-Hour Vehicular Volume	For any four hours of an average day, the points representing major and minor street volumes plot above a specified curve.	Yes
3	Peak Hour	For at least one hour of an average day, minor street traffic exceeds a minimum volume and suffers at least a specified amount of total delay, or the points representing major and minor street volumes plot above a specified curve. This warrant only applies to unusual cases involving large traffic generators.	Yes, but only if this is an unusual case
4	Pedestrian Volume	The volume of pedestrian traffic crossing a major street at an intersection or mid-block location must meet minimum values for either a single hour or any four hours of an average weekday.	No
5	School Crossing	The frequency and adequacy of gaps in the traffic stream must not otherwise be sufficient for the number of children crossing.	No
6	Coordinated Signal System	Signalized control is required to maintain proper grouping of vehicles in a coordinated, progressive signal system.	No
7	Crash Experience	Five or more reported crashes of type susceptible to control by a traffic signal have occurred at the location within a 12-month period. Other less restrictive remedies and enforcement have failed to reduce accidents. Either Warrant 1 or Warrant 2 is at least 80% met. A signal will not seriously disrupt traffic flow.	10 reported crashes near the intersection in 3 years. 1 angle/9 rear-ends.
8	Roadway Network	An intersection of two major routes has either high five-year projected peak-hour traffic volumes or high volumes for at least five hours on an average Saturday and/or Sunday.	No

US 21 BUSINESS (SEA ISLAND PARKWAY) AND SUNSET BOULEVARD – 2019 ALT 3

MUTCD Signal Warrant 1: Eight-Hour Vehicular Volumes

US 21 Business & Sunset Boulevard – 2019 Alt 3

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A - Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	**2 or more**	500	400	**350**	**280**	200	160	**140**	**112**

Condition B - Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	**2 or more**	750	600	**525**	**420**	100	80	**70**	**56**

[a] Basic minimum hourly volume.

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.

[c] May be used when the major street speed exceeds 70 km/h (40 mph) or in an isolated community with a population of less than 10,000.

Evaluation of 70% Criteria for Either Condition A or Condition B:

Evaluation of Condition A:

Hour	Major Volume (350 req'd)	Minor Volume (140 req'd)	Meets Warrant?
6:00-7:00	590	43	No
7:00-8:00	**1368**	**140**	**Yes**
8:00-9:00	1537	109	No

Evaluation of Condition B:

Hour	Major Volume (525 req'd)	Minor Volume (70 req'd)	Meets Warrant?
6:30-7:30	**965**	**75**	**Yes**
7:30-8:30	**1570**	**163**	**Yes**
8:30-9:30	**1357**	**89**	**Yes**

9:00-10:00	1314	105	No
10:00-11:00	1331	116	No
11:15-12:15	**1380**	**180**	**Yes**
12:15-13:15	**1373**	**267**	**Yes**
13:15-14:15	**1366**	**223**	**Yes**
14:15-15:15	**1424**	**218**	**Yes**
15:15-16:15	**1702**	**338**	**Yes**
16:15-17:15	**1715**	**180**	**Yes**
17:15-18:15	1606	138	No
18:15-19:15	975	57	No
19:15-20:15	0	0	No
20:15-21:15	0	0	No

7 hours met - Condition A is Not Met

9:30-10:30	**1314**	**108**	**Yes**
10:30-11:30	**1414**	**124**	**Yes**
11:30-12:30	**1371**	**222**	**Yes**
12:30-13:30	**1375**	**221**	**Yes**
13:30-14:30	**1370**	**237**	**Yes**
14:30-15:30	**1509**	**207**	**Yes**
15:30-16:30	**1664**	**358**	**Yes**
16:30-17:30	**1753**	**153**	**Yes**
17:30-18:30	**1523**	**110**	**Yes**
18:30-19:30	627	50	No
19:30-20:30	0	0	No

12 hours met - Condition B is Met

Warrant 1 is Met

Evaluation of 56% Criteria for Both Condition A & Condition B:

Evaluation of Condition A:

Hour	Major Volume (280 req'd)	Minor Volume (112 req'd)	Meets Warrant?
6:00-7:00	590	43	No
7:00-8:00	**1368**	**140**	**Yes**
8:00-9:00	1537	109	No
9:00-10:00	1314	105	No
10:00-11:00	**1331**	**116**	**Yes**
11:15-12:15	**1380**	**180**	**Yes**
12:15-13:15	**1373**	**267**	**Yes**
13:15-14:15	**1366**	**223**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (420 req'd)	Minor Volume (56 req'd)	Meets Warrant?
6:30-7:30	**965**	**75**	**Yes**
7:30-8:30	**1570**	**163**	**Yes**
8:30-9:30	**1357**	**89**	**Yes**
9:30-10:30	**1314**	**108**	**Yes**
10:30-11:30	**1414**	**124**	**Yes**
11:30-12:30	**1371**	**222**	**Yes**
12:30-13:30	**1375**	**221**	**Yes**
13:30-14:30	**1370**	**237**	**Yes**

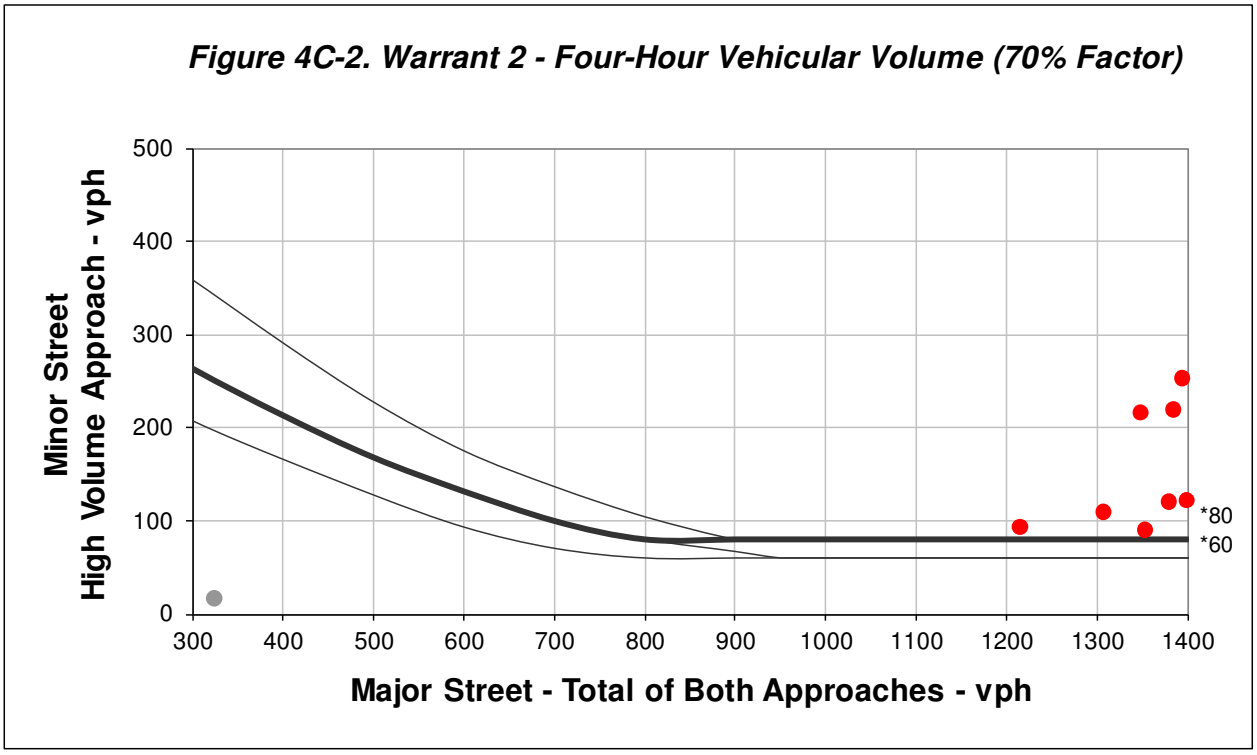
14:15-15:15	**1424**	**218**	**Yes**	**14:30-15:30**	**1509**	**207**	**Yes**
15:15-16:15	**1702**	**338**	**Yes**	**15:30-16:30**	**1664**	**358**	**Yes**
16:15-17:15	**1715**	**180**	**Yes**	**16:30-17:30**	**1753**	**153**	**Yes**
17:15-18:15	**1606**	**138**	**Yes**	**17:30-18:30**	**1523**	**110**	**Yes**
18:15-19:15	975	57	No	18:30-19:30	627	50	No
19:15-20:15	0	0	No	19:30-20:30	0	0	No
20:15-21:15	0	0	No				

9 hours met - Condition A is Met

12 hours met - Condition B is Met

MUTCD Signal Warrant 2: Four-Hour Volumes

US 21 Business & Sunset Boulevard – 2019 Alt 3



*Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

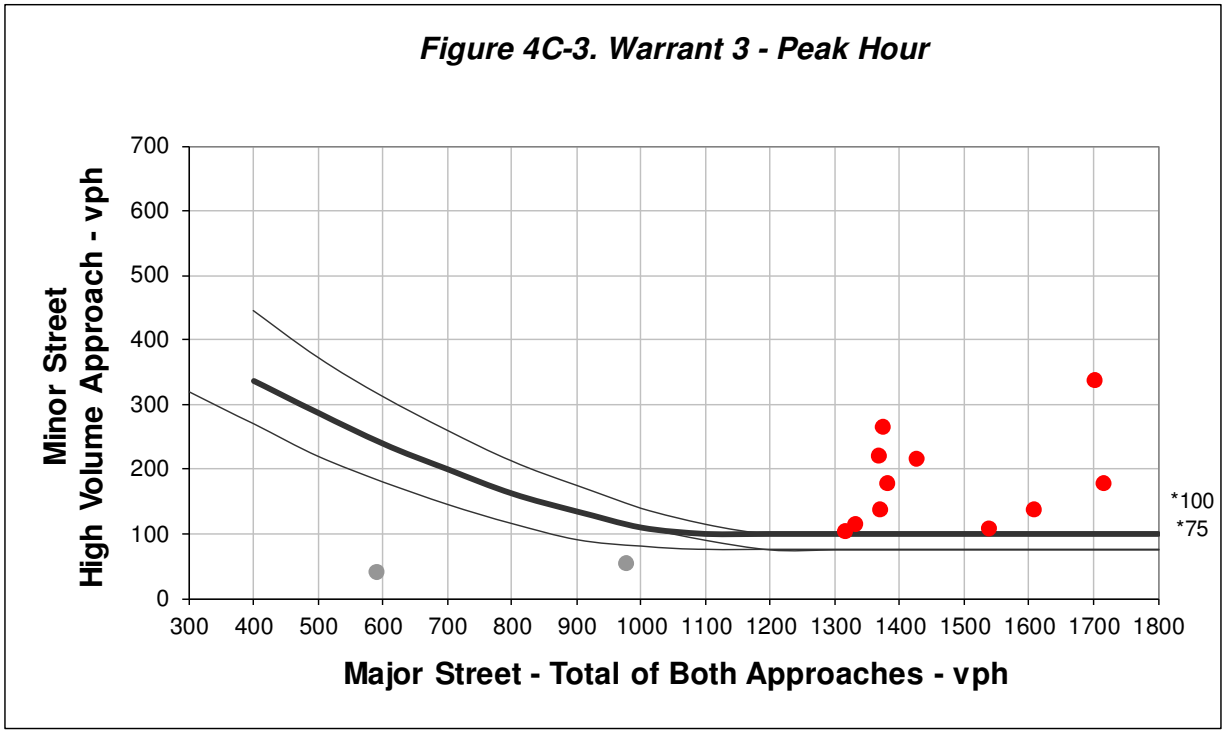
Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:45 - 7:45	1215	95	80	**Yes**
7:45 - 8:45	1553	158	80	**Yes**
8:45 - 9:45	1352	91	80	**Yes**
9:45 - 10:45	1307	111	80	**Yes**
10:45 - 11:45	1378	121	80	**Yes**
11:45 - 12:45	1393	254	80	**Yes**
12:45 - 13:45	1383	221	80	**Yes**
13:45 - 14:45	1347	218	80	**Yes**
14:45 - 15:45	1549	246	80	**Yes**
15:45 - 16:45	1719	327	80	**Yes**
16:45 - 17:45	1750	129	80	**Yes**
17:45 - 18:45	1398	123	80	**Yes**
18:45 - 19:45	323	17	252	No
19:45 - 20:45	0	0		No

Total Number of Hours Met = 12

Warrant 2 is Met

MUTCD Signal Warrant 3, Condition B: Peak Hour Volume

US 21 Business & Sunset Boulevard – 2019 Alt 3



*Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:00 - 7:00	590	43	245	No
7:00 - 8:00	1368	140	100	**Yes**
8:00 - 9:00	1537	109	100	**Yes**
9:00 - 10:00	1314	105	100	**Yes**
10:00 - 11:00	1331	116	100	**Yes**
11:15 - 12:15	1380	180	100	**Yes**
12:15 - 13:15	1373	267	100	**Yes**
13:15 - 14:15	1366	223	100	**Yes**
14:15 - 15:15	1424	218	100	**Yes**
15:15 - 16:15	1702	338	100	**Yes**
16:15 - 17:15	1715	180	100	**Yes**
17:15 - 18:15	1606	138	100	**Yes**
18:15 - 19:15	975	57	116	No
19:15 - 20:15	0	0		No
20:15 - 21:15	0	0		No

Total Number of Hours Met = 11

Warrant 3, Condition B is Met

This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

MUTCD Signal Warrant Analysis: US 21 Business & Sunset Boulevard – 2019 Alt 3

	MUTCD Warrant Number & Name	Description	Met?
1	Eight-Hour Vehicular Volume	The volumes of traffic on the major and minor streets meet specified minimum amounts for at least 8 hours of an average weekday. Either of two sets of minimum criteria may be used.	Yes
2	Four-Hour Vehicular Volume	For any four hours of an average day, the points representing major and minor street volumes plot above a specified curve.	Yes
3	Peak Hour	For at least one hour of an average day, minor street traffic exceeds a minimum volume and suffers at least a specified amount of total delay, or the points representing major and minor street volumes plot above a specified curve. This warrant only applies to unusual cases involving large traffic generators.	Yes, but only if this is an unusual case
4	Pedestrian Volume	The volume of pedestrian traffic crossing a major street at an intersection or mid-block location must meet minimum values for either a single hour or any four hours of an average weekday.	No
5	School Crossing	The frequency and adequacy of gaps in the traffic stream must not otherwise be sufficient for the number of children crossing.	No
6	Coordinated Signal System	Signalized control is required to maintain proper grouping of vehicles in a coordinated, progressive signal system.	No
7	Crash Experience	Five or more reported crashes of type susceptible to control by a traffic signal have occurred at the location within a 12-month period. Other less restrictive remedies and enforcement have failed to reduce accidents. Either Warrant 1 or Warrant 2 is at least 80% met. A signal will not seriously disrupt traffic flow.	10 reported crashes near the intersection in 3 years. 1 angle/9 rear-ends.
8	Roadway Network	An intersection of two major routes has either high five-year projected peak-hour traffic volumes or high volumes for at least five hours on an average Saturday and/or Sunday.	No

US 21 BUSINESS (SEA ISLAND PARKWAY) AND SUNSET BOULEVARD – 2040 ALT 1

MUTCD Signal Warrant 1: Eight-Hour Vehicular Volumes

US 21 Business & Sunset Boulevard – 2040 Alt 1

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A - Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	**2 or more**	500	400	**350**	**280**	200	160	**140**	**112**

Condition B - Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	**2 or more**	750	600	**525**	**420**	100	80	**70**	**56**

[a] Basic minimum hourly volume.

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.

[c] May be used when the major street speed exceeds 70 km/h (40 mph) or in an isolated community with a population of less than 10,000.

Evaluation of 70% Criteria for Either Condition A or Condition B:

Evaluation of Condition A:

Hour	Major Volume (350 req'd)	Minor Volume (140 req'd)	Meets Warrant?
6:00-7:00	842	52	No
7:00-8:00	**1947**	**178**	**Yes**
8:00-9:00	**2135**	**159**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (525 req'd)	Minor Volume (70 req'd)	Meets Warrant?
6:30-7:30	**1398**	**92**	**Yes**
7:30-8:30	**2179**	**221**	**Yes**
8:30-9:30	**1918**	**124**	**Yes**

9:00-10:00	1824	105	No
10:00-11:00	1851	93	No
11:15-12:15	**1965**	**177**	**Yes**
12:15-13:15	**2168**	**181**	**Yes**
13:15-14:15	**2146**	**160**	**Yes**
14:15-15:15	**2278**	**146**	**Yes**
15:15-16:15	**2667**	**186**	**Yes**
16:15-17:15	**2711**	**170**	**Yes**
17:15-18:15	**2554**	**158**	**Yes**
18:15-19:15	1539	80	No
19:15-20:15	0	0	No
20:15-21:15	0	0	No

9 hours met - Condition A is Met

9:30-10:30	**1858**	**87**	**Yes**
10:30-11:30	**1880**	**102**	**Yes**
11:30-12:30	**2058**	**196**	**Yes**
12:30-13:30	**2165**	**171**	**Yes**
13:30-14:30	**2169**	**149**	**Yes**
14:30-15:30	**2397**	**135**	**Yes**
15:30-16:30	**2607**	**203**	**Yes**
16:30-17:30	**2771**	**177**	**Yes**
17:30-18:30	**2422**	**120**	**Yes**
18:30-19:30	993	63	No
19:30-20:30	0	0	No

12 hours met - Condition B is Met

Warrant 1 is Met

Evaluation of 56% Criteria for Both Condition A & Condition B:

Evaluation of Condition A:

Hour	Major Volume (280 req'd)	Minor Volume (112 req'd)	Meets Warrant?
6:45-7:45	**1722**	**119**	**Yes**
7:45-8:45	**2176**	**221**	**Yes**
8:45-9:45	1873	103	No
9:45-10:45	1841	90	No
11:00-12:00	**1964**	**127**	**Yes**
12:00-13:00	**2105**	**204**	**Yes**
13:00-14:00	**2133**	**158**	**Yes**
14:00-15:00	**2250**	**156**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (420 req'd)	Minor Volume (56 req'd)	Meets Warrant?
6:15-7:15	**1088**	**67**	**Yes**
7:15-8:15	**2128**	**204**	**Yes**
8:15-9:15	**1922**	**142**	**Yes**
9:15-10:15	**1935**	**101**	**Yes**
10:15-11:15	**1881**	**82**	**Yes**
11:15-12:15	**1965**	**177**	**Yes**
12:15-13:15	**2168**	**181**	**Yes**
13:15-14:15	**2146**	**160**	**Yes**

15:00-16:00	**2599**	**169**	**Yes**
16:00-17:00	**2642**	**197**	**Yes**
17:00-18:00	**2727**	**149**	**Yes**
18:00-19:00	**2084**	**113**	**Yes**
19:00-20:00	0	0	No
20:00-21:00	0	0	No

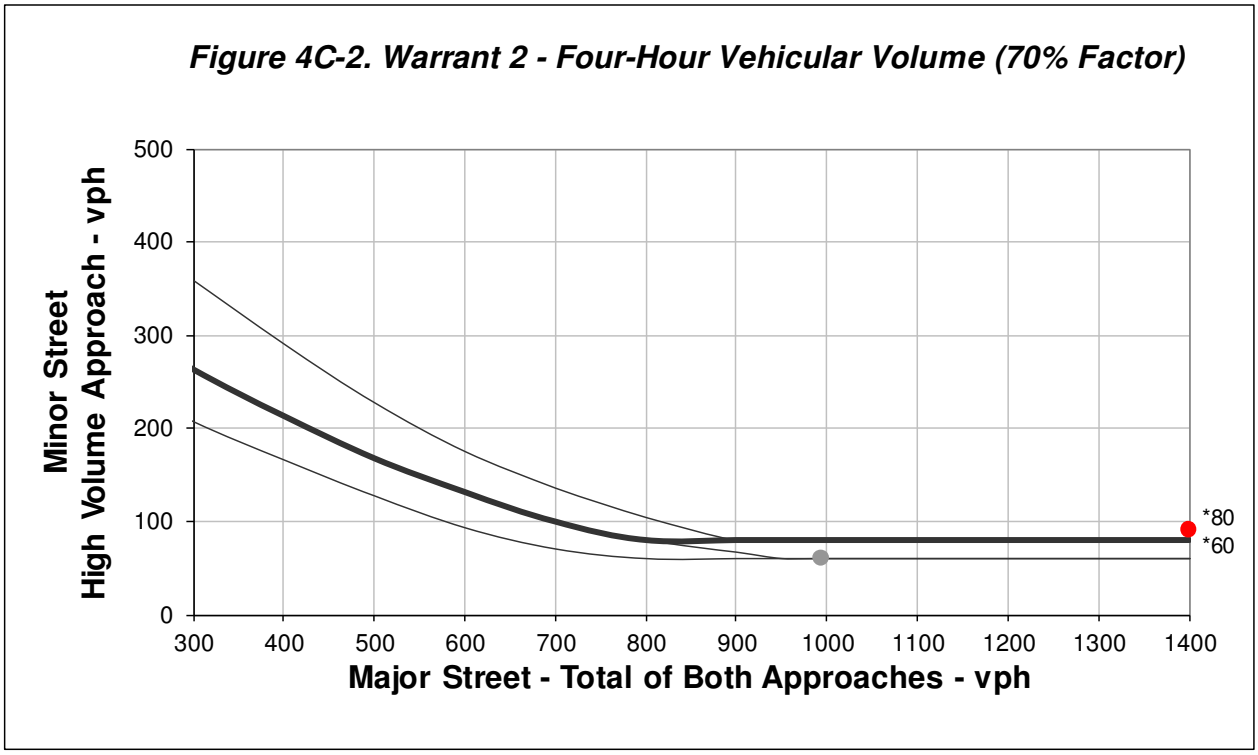
10 hours met - Condition A is Met

14:15-15:15	**2278**	**146**	**Yes**
15:15-16:15	**2667**	**186**	**Yes**
16:15-17:15	**2711**	**170**	**Yes**
17:15-18:15	**2554**	**158**	**Yes**
18:15-19:15	**1539**	**80**	**Yes**
19:15-20:15	0	0	No
20:15-21:15	0	0	No

13 hours met - Condition B is Met

MUTCD Signal Warrant 2: Four-Hour Volumes

US 21 Business & Sunset Boulevard – 2040 Alt 1



*Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:30 - 7:30	1398	92	80	**Yes**
7:30 - 8:30	2179	221	80	**Yes**
8:30 - 9:30	1918	124	80	**Yes**
9:30 - 10:30	1858	87	80	**Yes**
10:30 - 11:30	1880	102	80	**Yes**
11:30 - 12:30	2058	196	80	**Yes**
12:30 - 13:30	2165	171	80	**Yes**
13:30 - 14:30	2169	149	80	**Yes**
14:30 - 15:30	2397	135	80	**Yes**
15:30 - 16:30	2607	203	80	**Yes**
16:30 - 17:30	2771	177	80	**Yes**
17:30 - 18:30	2422	120	80	**Yes**
18:30 - 19:30	993	63	80	No
19:30 - 20:30	0	0		No

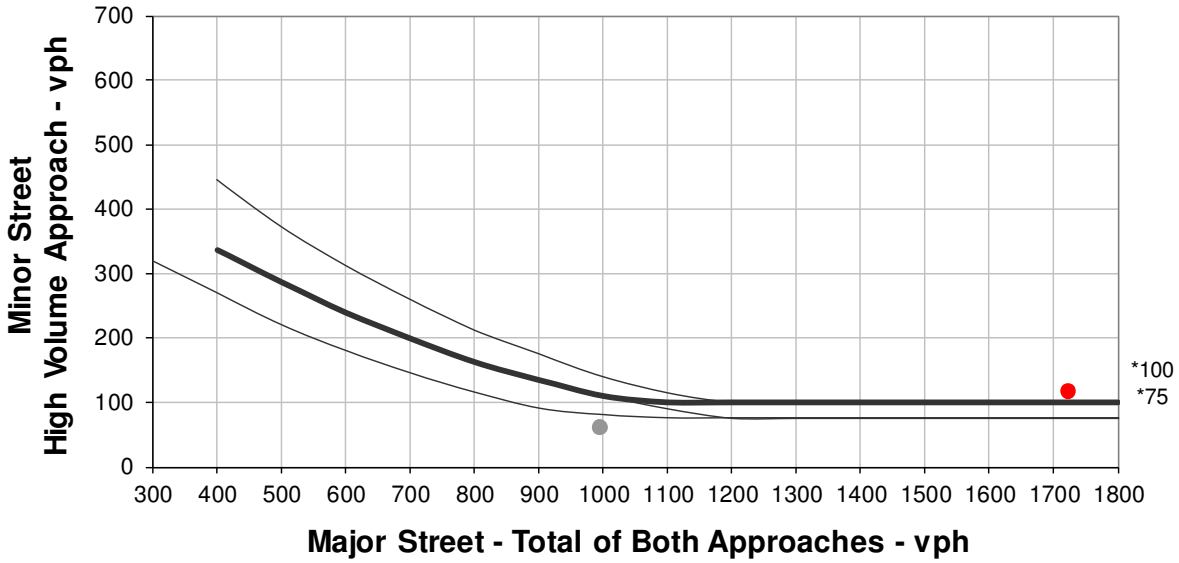
Total Number of Hours Met = 12

Warrant 2 is Met

MUTCD Signal Warrant 3, Condition B: Peak Hour Volume

US 21 Business & Sunset Boulevard – 2040 Alt 1

Figure 4C-3. Warrant 3 - Peak Hour



*Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:45 - 7:45	1722	119	100	**Yes**
7:45 - 8:45	2176	221	100	**Yes**
8:45 - 9:45	1873	103	100	**Yes**
10:30 - 11:30	1880	102	100	**Yes**
11:30 - 12:30	2058	196	100	**Yes**
12:30 - 13:30	2165	171	100	**Yes**
13:30 - 14:30	2169	149	100	**Yes**
14:30 - 15:30	2397	135	100	**Yes**
15:30 - 16:30	2607	203	100	**Yes**
16:30 - 17:30	2771	177	100	**Yes**
17:30 - 18:30	2422	120	100	**Yes**
18:30 - 19:30	993	63	112	No
19:30 - 20:30	0	0		No

Total Number of Hours Met = 11

Warrant 3, Condition B is Met

This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

MUTCD Signal Warrant Analysis: US 21 Business & Sunset Boulevard – 2040 Alt 1

	MUTCD Warrant Number & Name	Description	Met?
1	Eight-Hour Vehicular Volume	The volumes of traffic on the major and minor streets meet specified minimum amounts for at least 8 hours of an average weekday. Either of two sets of minimum criteria may be used.	Yes
2	Four-Hour Vehicular Volume	For any four hours of an average day, the points representing major and minor street volumes plot above a specified curve.	Yes
3	Peak Hour	For at least one hour of an average day, minor street traffic exceeds a minimum volume and suffers at least a specified amount of total delay, or the points representing major and minor street volumes plot above a specified curve. This warrant only applies to unusual cases involving large traffic generators.	Yes, but only if this is an unusual case
4	Pedestrian Volume	The volume of pedestrian traffic crossing a major street at an intersection or mid-block location must meet minimum values for either a single hour or any four hours of an average weekday.	No
5	School Crossing	The frequency and adequacy of gaps in the traffic stream must not otherwise be sufficient for the number of children crossing.	No
6	Coordinated Signal System	Signalized control is required to maintain proper grouping of vehicles in a coordinated, progressive signal system.	No
7	Crash Experience	Five or more reported crashes of type susceptible to control by a traffic signal have occurred at the location within a 12-month period. Other less restrictive remedies and enforcement have failed to reduce accidents. Either Warrant 1 or Warrant 2 is at least 80% met. A signal will not seriously disrupt traffic flow.	10 reported crashes near the intersection in 3 years. 1 angle/9 rear-ends.
8	Roadway Network	An intersection of two major routes has either high five-year projected peak-hour traffic volumes or high volumes for at least five hours on an average Saturday and/or Sunday.	No

US 21 BUSINESS (SEA ISLAND PARKWAY) AND SUNSET BOULEVARD – 2040 ALT 2

MUTCD Signal Warrant 1: Eight-Hour Vehicular Volumes

US 21 Business & Sunset Boulevard – 2040 Alt 2

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A - Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	**2 or more**	500	400	**350**	**280**	200	160	**140**	**112**

Condition B - Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	**2 or more**	750	600	**525**	**420**	100	80	**70**	**56**

[a] Basic minimum hourly volume.

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.

[c] May be used when the major street speed exceeds 70 km/h (40 mph) or in an isolated community with a population of less than 10,000.

Evaluation of 70% Criteria for Either Condition A or Condition B:

Evaluation of Condition A:

Hour	Major Volume (350 req'd)	Minor Volume (140 req'd)	Meets Warrant?
6:00-7:00	925	60	No
7:00-8:00	**2123**	**192**	**Yes**
8:00-9:00	**2306**	**150**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (525 req'd)	Minor Volume (70 req'd)	Meets Warrant?
6:15-7:15	**1194**	**76**	**Yes**
7:15-8:15	**2317**	**210**	**Yes**
8:15-9:15	**2072**	**135**	**Yes**

9:00-10:00	1961	99	No
10:00-11:00	1977	75	No
11:15-12:15	**2115**	**152**	**Yes**
12:15-13:15	**2376**	**171**	**Yes**
13:15-14:15	**2363**	**158**	**Yes**
14:15-15:15	**2503**	**141**	**Yes**
15:15-16:15	**2920**	**186**	**Yes**
16:15-17:15	**2804**	**170**	**Yes**
17:15-18:15	**2600**	**158**	**Yes**
18:15-19:15	1571	80	No
19:15-20:15	0	0	No
20:15-21:15	0	0	No

9 hours met - Condition A is Met

9:15-10:15	**2073**	**92**	**Yes**
10:15-11:15	**2015**	**72**	**Yes**
11:15-12:15	**2115**	**152**	**Yes**
12:15-13:15	**2376**	**171**	**Yes**
13:15-14:15	**2363**	**158**	**Yes**
14:15-15:15	**2503**	**141**	**Yes**
15:15-16:15	**2920**	**186**	**Yes**
16:15-17:15	**2804**	**170**	**Yes**
17:15-18:15	**2600**	**158**	**Yes**
18:15-19:15	**1571**	**80**	**Yes**
19:15-20:15	0	0	No
20:15-21:15	0	0	No

13 hours met - Condition B is Met

Warrant 1 is Met

Evaluation of 56% Criteria for Both Condition A & Condition B:

Evaluation of Condition A:

Hour	Major Volume (280 req'd)	Minor Volume (112 req'd)	Meets Warrant?
6:45-7:45	**1881**	**131**	**Yes**
7:45-8:45	**2357**	**216**	**Yes**
8:45-9:45	2015	95	No
9:45-10:45	1965	79	No
11:00-12:00	**2103**	**113**	**Yes**
12:00-13:00	**2311**	**187**	**Yes**
13:00-14:00	**2344**	**156**	**Yes**
14:00-15:00	**2473**	**154**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (420 req'd)	Minor Volume (56 req'd)	Meets Warrant?
6:00-7:00	**925**	**60**	**Yes**
7:00-8:00	**2123**	**192**	**Yes**
8:00-9:00	**2306**	**150**	**Yes**
9:00-10:00	**1961**	**99**	**Yes**
10:00-11:00	**1977**	**75**	**Yes**
11:00-12:00	**2103**	**113**	**Yes**
12:00-13:00	**2311**	**187**	**Yes**
13:00-14:00	**2344**	**156**	**Yes**

15:00-16:00	**2849**	**165**	**Yes**
16:00-17:00	**2781**	**197**	**Yes**
17:00-18:00	**2779**	**149**	**Yes**
18:00-19:00	**2124**	**113**	**Yes**
19:00-20:00	0	0	No
20:00-21:00	0	0	No

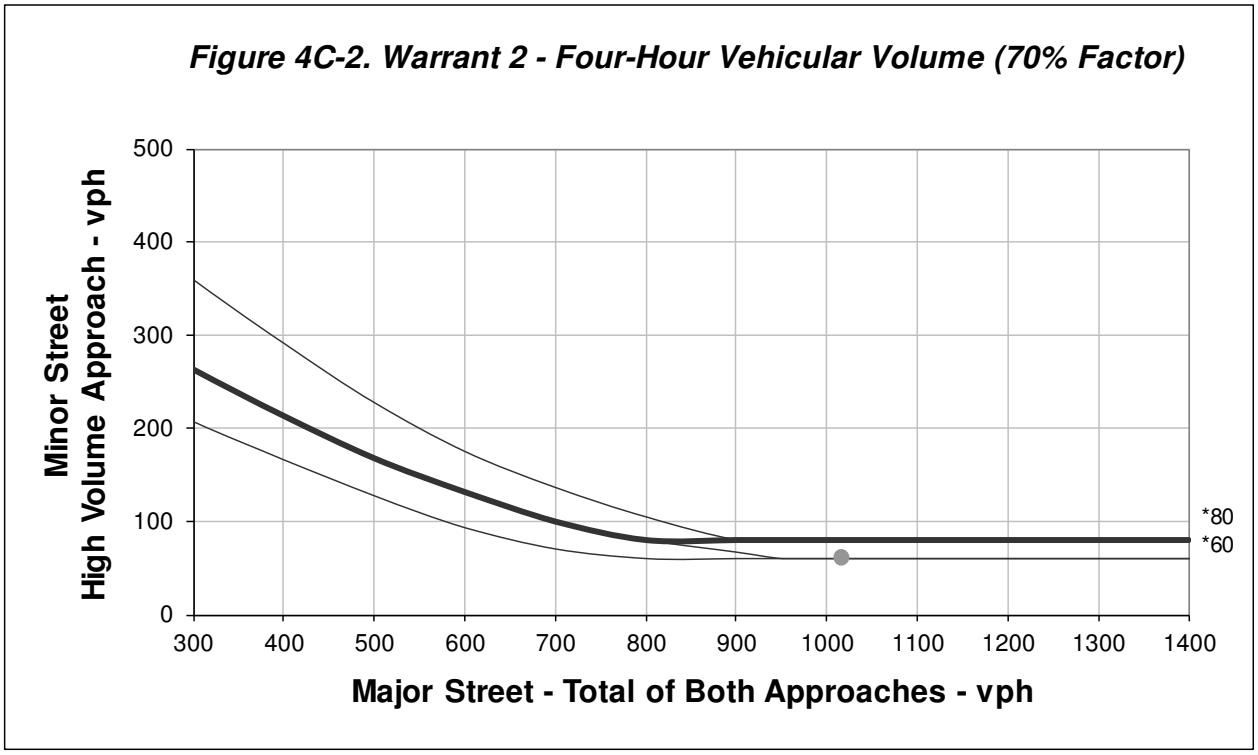
10 hours met - Condition A is Met

14:00-15:00	**2473**	**154**	**Yes**
15:00-16:00	**2849**	**165**	**Yes**
16:00-17:00	**2781**	**197**	**Yes**
17:00-18:00	**2779**	**149**	**Yes**
18:00-19:00	**2124**	**113**	**Yes**
19:00-20:00	0	0	No
20:00-21:00	0	0	No

13 hours met - Condition B is Met

MUTCD Signal Warrant 2: Four-Hour Volumes

US 21 Business & Sunset Boulevard – 2040 Alt 2



*Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:30 - 7:30	1531	105	80	**Yes**
7:30 - 8:30	2367	220	80	**Yes**
8:30 - 9:30	2063	114	80	**Yes**
9:30 - 10:30	1986	83	80	**Yes**
10:30 - 11:30	2025	88	80	**Yes**
11:30 - 12:30	2224	170	80	**Yes**
12:30 - 13:30	2372	165	80	**Yes**
13:30 - 14:30	2392	147	80	**Yes**
14:30 - 15:30	2629	131	80	**Yes**
15:30 - 16:30	2850	203	80	**Yes**
16:30 - 17:30	2822	177	80	**Yes**
17:30 - 18:30	2464	120	80	**Yes**
18:30 - 19:30	1015	63	80	No
19:30 - 20:30	0	0		No

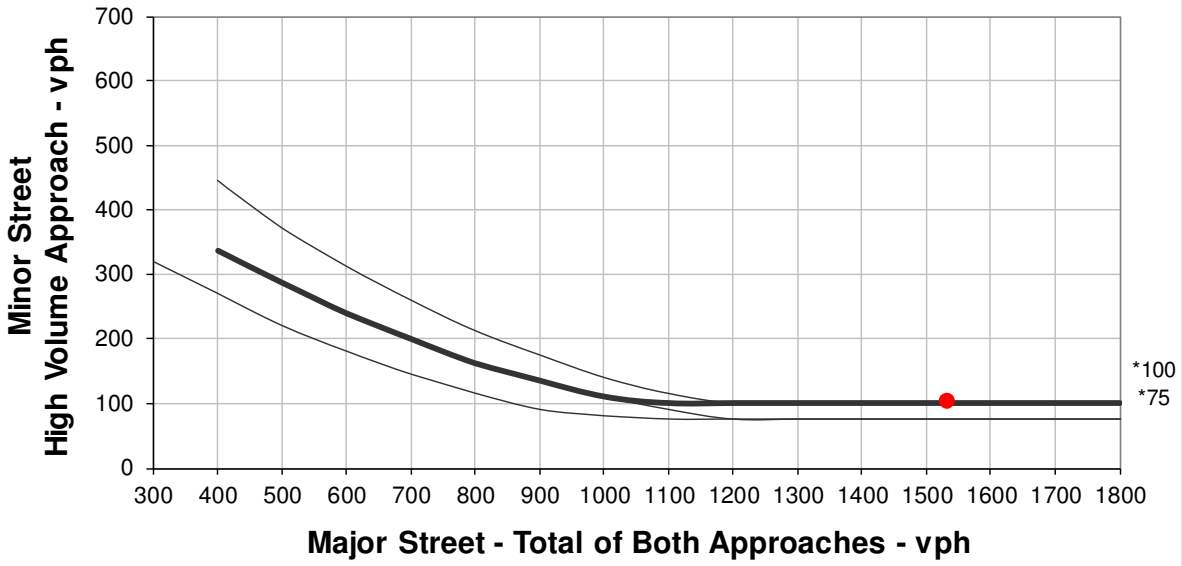
Total Number of Hours Met = 12

Warrant 2 is Met

MUTCD Signal Warrant 3, Condition B: Peak Hour Volume

US 21 Business & Sunset Boulevard – 2040 Alt 2

Figure 4C-3. Warrant 3 - Peak Hour



*Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:30 - 7:30	1531	105	100	**Yes**
7:30 - 8:30	2367	220	100	**Yes**
8:30 - 9:30	2063	114	100	**Yes**
9:30 - 10:30	1986	83	100	No
11:00 - 12:00	2103	113	100	**Yes**
12:00 - 13:00	2311	187	100	**Yes**
13:00 - 14:00	2344	156	100	**Yes**
14:00 - 15:00	2473	154	100	**Yes**
15:00 - 16:00	2849	165	100	**Yes**
16:00 - 17:00	2781	197	100	**Yes**
17:00 - 18:00	2779	149	100	**Yes**
18:00 - 19:00	2124	113	100	**Yes**
19:00 - 20:00	0	0		No
20:00 - 21:00	0	0		No

Total Number of Hours Met = 11

Warrant 3, Condition B is Met

This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

MUTCD Signal Warrant Analysis: US 21 Business & Sunset Boulevard – 2040 Alt 2

	MUTCD Warrant Number & Name	Description	Met?
1	Eight-Hour Vehicular Volume	The volumes of traffic on the major and minor streets meet specified minimum amounts for at least 8 hours of an average weekday. Either of two sets of minimum criteria may be used.	Yes
2	Four-Hour Vehicular Volume	For any four hours of an average day, the points representing major and minor street volumes plot above a specified curve.	Yes
3	Peak Hour	For at least one hour of an average day, minor street traffic exceeds a minimum volume and suffers at least a specified amount of total delay, or the points representing major and minor street volumes plot above a specified curve. This warrant only applies to unusual cases involving large traffic generators.	Yes, but only if this is an unusual case
4	Pedestrian Volume	The volume of pedestrian traffic crossing a major street at an intersection or mid-block location must meet minimum values for either a single hour or any four hours of an average weekday.	No
5	School Crossing	The frequency and adequacy of gaps in the traffic stream must not otherwise be sufficient for the number of children crossing.	No
6	Coordinated Signal System	Signalized control is required to maintain proper grouping of vehicles in a coordinated, progressive signal system.	No
7	Crash Experience	Five or more reported crashes of type susceptible to control by a traffic signal have occurred at the location within a 12-month period. Other less restrictive remedies and enforcement have failed to reduce accidents. Either Warrant 1 or Warrant 2 is at least 80% met. A signal will not seriously disrupt traffic flow.	10 reported crashes near the intersection in 3 years. 1 angle/9 rear-ends.
8	Roadway Network	An intersection of two major routes has either high five-year projected peak-hour traffic volumes or high volumes for at least five hours on an average Saturday and/or Sunday.	No

US 21 BUSINESS (SEA ISLAND PARKWAY) AND SUNSET BOULEVARD – 2040 ALT 3

MUTCD Signal Warrant 1: Eight-Hour Vehicular Volumes

US 21 Business & Sunset Boulevard – 2040 Alt 3

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A - Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	**2 or more**	500	400	**350**	**280**	200	160	**140**	**112**

Condition B - Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	**2 or more**	750	600	**525**	**420**	100	80	**70**	**56**

[a] Basic minimum hourly volume.

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.

[c] May be used when the major street speed exceeds 70 km/h (40 mph) or in an isolated community with a population of less than 10,000.

Evaluation of 70% Criteria for Either Condition A or Condition B:

Evaluation of Condition A:

Hour	Major Volume (350 req'd)	Minor Volume (140 req'd)	Meets Warrant?
6:00-7:00	869	52	No
7:00-8:00	**2030**	**181**	**Yes**
8:00-9:00	**2291**	**148**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (525 req'd)	Minor Volume (70 req'd)	Meets Warrant?
6:30-7:30	**1427**	**91**	**Yes**
7:30-8:30	**2330**	**220**	**Yes**
8:30-9:30	**2039**	**126**	**Yes**

9:00-10:00	**1972**	**146**	**Yes**
10:00-11:00	**2010**	**163**	**Yes**
11:15-12:15	**2103**	**276**	**Yes**
12:15-13:15	**2196**	**434**	**Yes**
13:15-14:15	**2180**	**350**	**Yes**
14:15-15:15	**2284**	**336**	**Yes**
15:15-16:15	**2722**	**509**	**Yes**
16:15-17:15	**2719**	**334**	**Yes**
17:15-18:15	**2567**	**280**	**Yes**
18:15-19:15	1563	121	No
19:15-20:15	0	0	No
20:15-21:15	0	0	No

11 hours met - Condition A is Met

9:30-10:30	**1989**	**149**	**Yes**
10:30-11:30	**2106**	**174**	**Yes**
11:30-12:30	**2133**	**358**	**Yes**
12:30-13:30	**2200**	**350**	**Yes**
13:30-14:30	**2189**	**377**	**Yes**
14:30-15:30	**2425**	**308**	**Yes**
15:30-16:30	**2649**	**548**	**Yes**
16:30-17:30	**2779**	**314**	**Yes**
17:30-18:30	**2445**	**215**	**Yes**
18:30-19:30	**1001**	**110**	**Yes**
19:30-20:30	0	0	No

13 hours met - Condition B is Met

Warrant 1 is Met

Evaluation of 56% Criteria for Both Condition A & Condition B:

Evaluation of Condition A:

Hour	Major Volume (280 req'd)	Minor Volume (112 req'd)	Meets Warrant?
6:45-7:45	**1796**	**121**	**Yes**
7:45-8:45	**2312**	**210**	**Yes**
8:45-9:45	**2032**	**128**	**Yes**
9:45-10:45	**1971**	**154**	**Yes**
10:45-11:45	**2066**	**169**	**Yes**
11:45-12:45	**2189**	**416**	**Yes**
12:45-13:45	**2216**	**350**	**Yes**
13:45-14:45	**2160**	**336**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (420 req'd)	Minor Volume (56 req'd)	Meets Warrant?
6:15-7:15	**1112**	**66**	**Yes**
7:15-8:15	**2256**	**204**	**Yes**
8:15-9:15	**2067**	**147**	**Yes**
9:15-10:15	**2066**	**142**	**Yes**
10:15-11:15	**2067**	**147**	**Yes**
11:15-12:15	**2103**	**276**	**Yes**
12:15-13:15	**2196**	**434**	**Yes**
13:15-14:15	**2180**	**350**	**Yes**

14:45-15:45	**2481**	**388**	**Yes**
15:45-16:45	**2741**	**511**	**Yes**
16:45-17:45	**2774**	**254**	**Yes**
17:45-18:45	**2242**	**268**	**Yes**
18:45-19:45	517	24	No
19:45-20:45	0	0	No

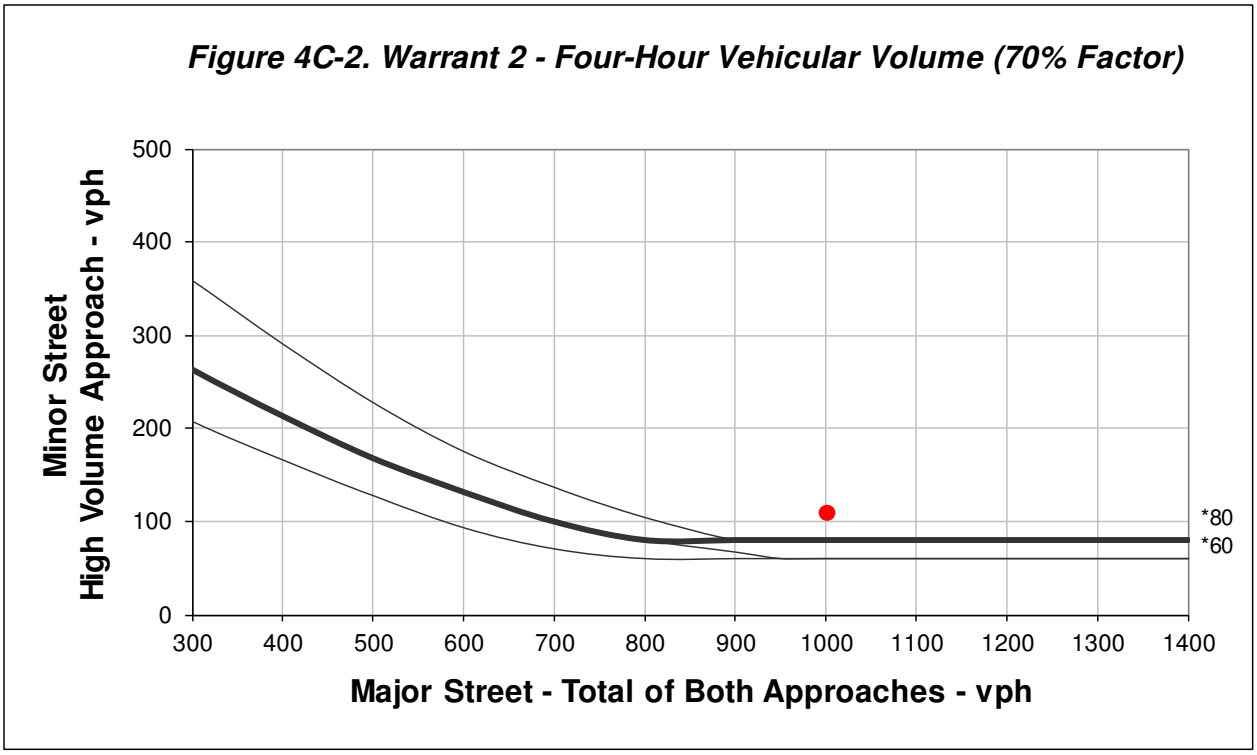
12 hours met - Condition A is Met

14:15-15:15	**2284**	**336**	**Yes**
15:15-16:15	**2722**	**509**	**Yes**
16:15-17:15	**2719**	**334**	**Yes**
17:15-18:15	**2567**	**280**	**Yes**
18:15-19:15	**1563**	**121**	**Yes**
19:15-20:15	0	0	No
20:15-21:15	0	0	No

13 hours met - Condition B is Met

MUTCD Signal Warrant 2: Four-Hour Volumes

US 21 Business & Sunset Boulevard – 2040 Alt 3



*Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

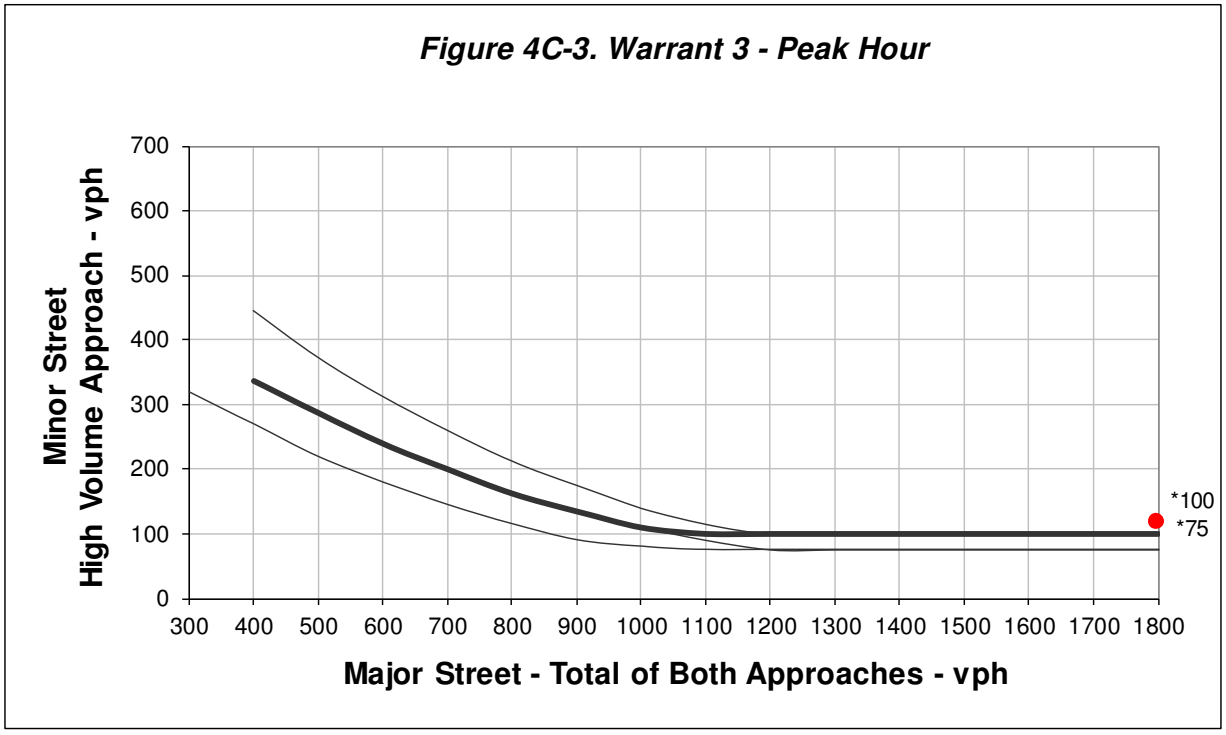
Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:30 - 7:30	1427	91	80	**Yes**
7:30 - 8:30	2330	220	80	**Yes**
8:30 - 9:30	2039	126	80	**Yes**
9:30 - 10:30	1989	149	80	**Yes**
10:30 - 11:30	2106	174	80	**Yes**
11:30 - 12:30	2133	358	80	**Yes**
12:30 - 13:30	2200	350	80	**Yes**
13:30 - 14:30	2189	377	80	**Yes**
14:30 - 15:30	2425	308	80	**Yes**
15:30 - 16:30	2649	548	80	**Yes**
16:30 - 17:30	2779	314	80	**Yes**
17:30 - 18:30	2445	215	80	**Yes**
18:30 - 19:30	1001	110	80	**Yes**
19:30 - 20:30	0	0		No

Total Number of Hours Met = 13

Warrant 2 is Met

MUTCD Signal Warrant 3, Condition B: Peak Hour Volume

US 21 Business & Sunset Boulevard – 2040 Alt 3



*Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:45 - 7:45	1796	121	100	**Yes**
7:45 - 8:45	2312	210	100	**Yes**
8:45 - 9:45	2032	128	100	**Yes**
9:45 - 10:45	1971	154	100	**Yes**
10:45 - 11:45	2066	169	100	**Yes**
11:45 - 12:45	2189	416	100	**Yes**
12:45 - 13:45	2216	350	100	**Yes**
13:45 - 14:45	2160	336	100	**Yes**
14:45 - 15:45	2481	388	100	**Yes**
15:45 - 16:45	2741	511	100	**Yes**
16:45 - 17:45	2774	254	100	**Yes**
17:45 - 18:45	2242	268	100	**Yes**
18:45 - 19:45	0	0	279	No
19:45 - 20:45	0	0		No

Total Number of Hours Met = 12

Warrant 3, Condition B is Met

This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

MUTCD Signal Warrant Analysis: US 21 Business & Sunset Boulevard – 2040 Alt 3

	MUTCD Warrant Number & Name	Description	Met?
1	Eight-Hour Vehicular Volume	The volumes of traffic on the major and minor streets meet specified minimum amounts for at least 8 hours of an average weekday. Either of two sets of minimum criteria may be used.	Yes
2	Four-Hour Vehicular Volume	For any four hours of an average day, the points representing major and minor street volumes plot above a specified curve.	Yes
3	Peak Hour	For at least one hour of an average day, minor street traffic exceeds a minimum volume and suffers at least a specified amount of total delay, or the points representing major and minor street volumes plot above a specified curve. This warrant only applies to unusual cases involving large traffic generators.	Yes, but only if this is an unusual case
4	Pedestrian Volume	The volume of pedestrian traffic crossing a major street at an intersection or mid-block location must meet minimum values for either a single hour or any four hours of an average weekday.	No
5	School Crossing	The frequency and adequacy of gaps in the traffic stream must not otherwise be sufficient for the number of children crossing.	No
6	Coordinated Signal System	Signalized control is required to maintain proper grouping of vehicles in a coordinated, progressive signal system.	No
7	Crash Experience	Five or more reported crashes of type susceptible to control by a traffic signal have occurred at the location within a 12-month period. Other less restrictive remedies and enforcement have failed to reduce accidents. Either Warrant 1 or Warrant 2 is at least 80% met. A signal will not seriously disrupt traffic flow.	10 reported crashes near the intersection in 3 years. 1 angle/9 rear-ends.
8	Roadway Network	An intersection of two major routes has either high five-year projected peak-hour traffic volumes or high volumes for at least five hours on an average Saturday and/or Sunday.	No

US 21 BUSINESS (SEA ISLAND PARKWAY) AND YOUMANS DRIVE – 2019 ALT 1

MUTCD Signal Warrant 1: Eight-Hour Vehicular Volumes

US 21 Business & Youmans Drive – 2019 Alt 1

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A - Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	**2 or more**	500	400	**350**	**280**	200	160	**140**	**112**

Condition B - Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	**2 or more**	750	600	**525**	**420**	100	80	**70**	**56**

[a] Basic minimum hourly volume.

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.

[c] May be used when the major street speed exceeds 70 km/h (40 mph) or in an isolated community with a population of less than 10,000.

Evaluation of 70% Criteria for Either Condition A or Condition B:

Evaluation of Condition A:

Hour	Major Volume (350 req'd)	Minor Volume (140 req'd)	Meets Warrant?
6:00-7:00	576	30	No
7:45-8:45	**1665**	**145**	**Yes**
8:45-9:45	1212	56	No
9:45-10:45	1252	35	No

Evaluation of Condition B:

Hour	Major Volume (525 req'd)	Minor Volume (70 req'd)	Meets Warrant?
6:00-7:00	576	30	No
7:00-8:00	**1352**	**86**	**Yes**
8:00-9:00	**1578**	**138**	**Yes**
9:00-10:00	1204	48	No

10:45-11:45	1275	47	No
11:45-12:45	1340	132	No
12:45-13:45	**1322**	**140**	**Yes**
14:15-15:15	**1395**	**228**	**Yes**
15:15-16:15	**1720**	**315**	**Yes**
16:15-17:15	**1664**	**182**	**Yes**
17:15-18:15	**1553**	**159**	**Yes**
18:15-19:15	943	106	No
19:15-20:15	0	0	No
20:15-21:15	0	0	No

6 hours met - Condition A is Not Met

10:00-11:00	1276	40	No
11:30-12:30	**1310**	**97**	**Yes**
12:30-13:30	**1314**	**123**	**Yes**
13:30-14:30	**1327**	**131**	**Yes**
14:30-15:30	**1488**	**236**	**Yes**
15:30-16:30	**1674**	**346**	**Yes**
16:30-17:30	**1704**	**141**	**Yes**
17:30-18:30	**1438**	**160**	**Yes**
18:30-19:30	**632**	**75**	**Yes**
19:30-20:30	0	0	No

10 hours met - Condition B is Met

Warrant 1 is Met

Evaluation of 56% Criteria for Both Condition A & Condition B:

Evaluation of Condition A:

Hour	Major Volume (280 req'd)	Minor Volume (112 req'd)	Meets Warrant?
6:00-7:00	576	30	No
7:15-8:15	**1481**	**112**	**Yes**
8:15-9:15	1413	101	No
9:15-10:15	1288	49	No
10:15-11:15	1284	41	No
11:45-12:45	**1340**	**132**	**Yes**
12:45-13:45	**1322**	**140**	**Yes**
14:00-15:00	**1382**	**134**	**Yes**
15:00-16:00	**1642**	**315**	**Yes**
16:00-17:00	**1657**	**261**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (420 req'd)	Minor Volume (56 req'd)	Meets Warrant?
6:30-7:30	**952**	**56**	**Yes**
7:30-8:30	**1598**	**131**	**Yes**
8:30-9:30	**1308**	**76**	**Yes**
9:30-10:30	1245	45	No
11:15-12:15	**1293**	**68**	**Yes**
12:15-13:15	**1314**	**131**	**Yes**
13:15-14:15	**1325**	**131**	**Yes**
14:15-15:15	**1395**	**228**	**Yes**
15:15-16:15	**1720**	**315**	**Yes**
16:15-17:15	**1664**	**182**	**Yes**

17:00-18:00	**1661**	**169**	**Yes**	**17:15-18:15**	**1553**	**159**	**Yes**
18:00-19:00	**1275**	**131**	**Yes**	**18:15-19:15**	**943**	**106**	**Yes**
19:00-20:00	0	0	No	19:15-20:15	0	0	No
20:00-21:00	0	0	No	20:15-21:15	0	0	No

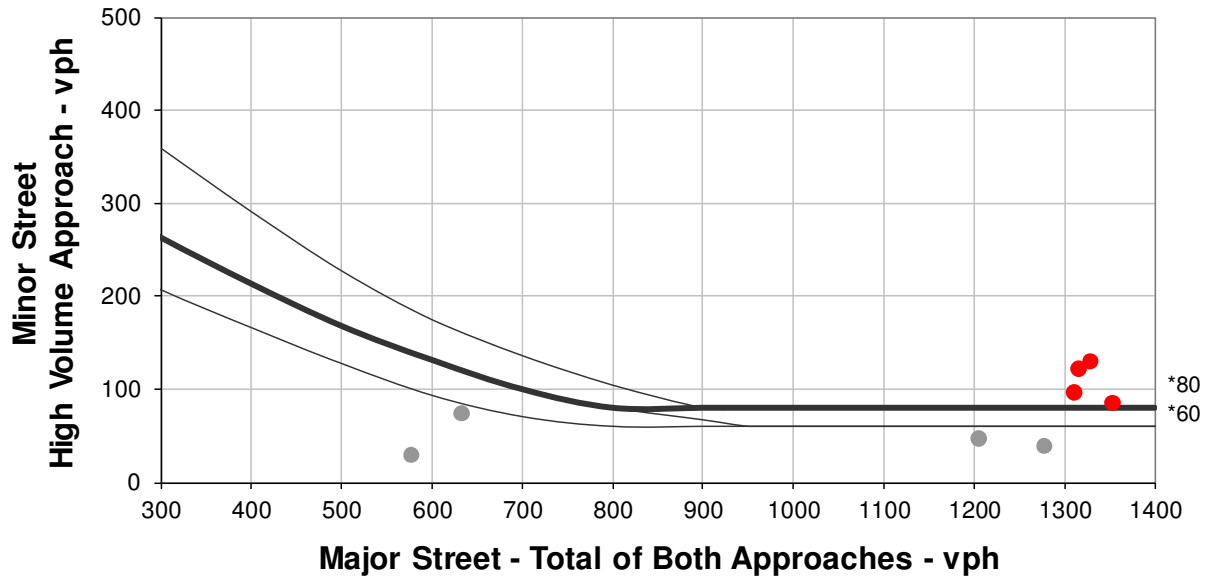
8 hours met - Condition A is Met

11 hours met - Condition B is Met

MUTCD Signal Warrant 2: Four-Hour Volumes

US 21 Business & Youmans Drive – 2019 Alt 1

Figure 4C-2. Warrant 2 - Four-Hour Vehicular Volume (70% Factor)



*Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

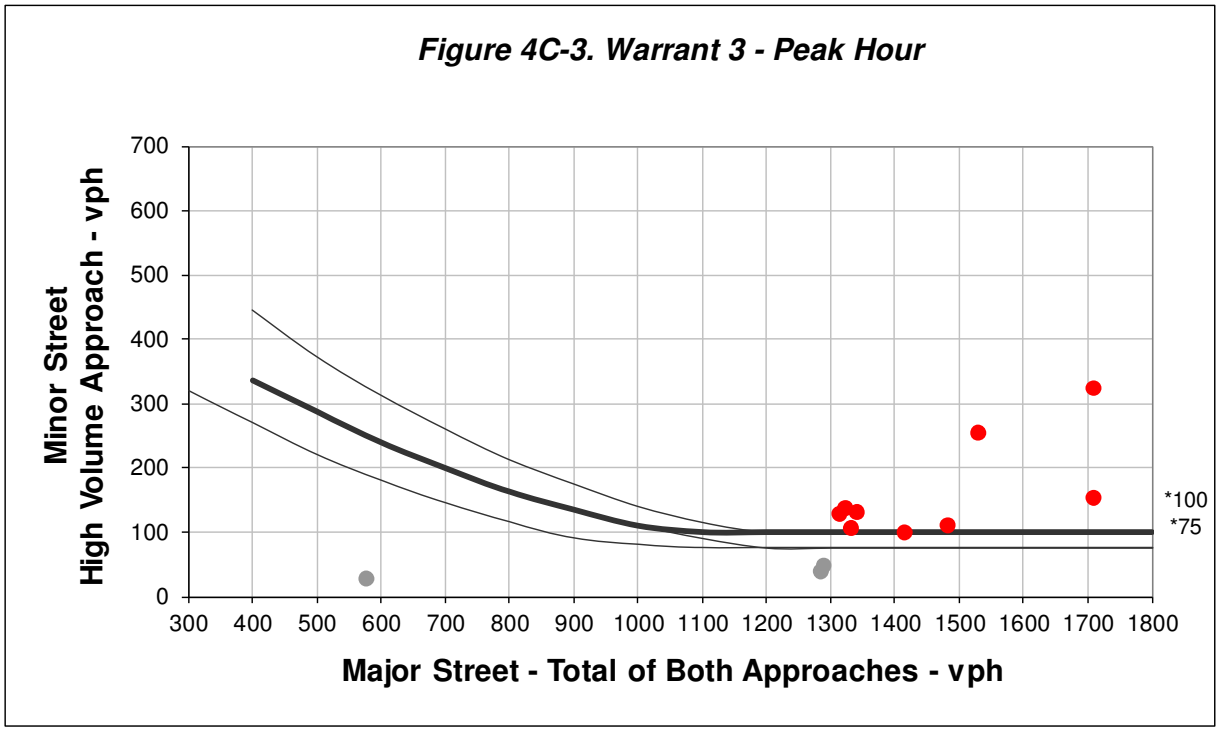
Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:00 - 7:00	576	30	141	No
7:00 - 8:00	1352	86	80	**Yes**
8:00 - 9:00	1578	138	80	**Yes**
9:00 - 10:00	1204	48	80	No
10:00 - 11:00	1276	40	80	No
11:30 - 12:30	1310	97	80	**Yes**
12:30 - 13:30	1314	123	80	**Yes**
13:30 - 14:30	1327	131	80	**Yes**
14:30 - 15:30	1488	236	80	**Yes**
15:30 - 16:30	1674	346	80	**Yes**
16:30 - 17:30	1704	141	80	**Yes**
17:30 - 18:30	1438	160	80	**Yes**
18:30 - 19:30	632	75	122	No
19:30 - 20:30	0	0		No

Total Number of Hours Met = 9

Warrant 2 is Met

MUTCD Signal Warrant 3, Condition B: Peak Hour Volume

US 21 Business & Youmans Drive – 2019 Alt 1



*Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:00 - 7:00	576	30	251	No
7:15 - 8:15	1481	112	100	**Yes**
8:15 - 9:15	1413	101	100	**Yes**
9:15 - 10:15	1288	49	100	No
10:15 - 11:15	1284	41	100	No
11:45 - 12:45	1340	132	100	**Yes**
12:45 - 13:45	1322	140	100	**Yes**
13:45 - 14:45	1330	107	100	**Yes**
14:45 - 15:45	1528	256	100	**Yes**
15:45 - 16:45	1708	326	100	**Yes**
16:45 - 17:45	1708	154	100	**Yes**
17:45 - 18:45	1313	131	100	**Yes**
18:45 - 19:45	0	0		No
19:45 - 20:45	0	0		No

Total Number of Hours Met = 9

Warrant 3, Condition B is Met

This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

MUTCD Signal Warrant Analysis: US 21 Business & Youmans Drive – 2019 Alt 1

	MUTCD Warrant Number & Name	Description	Met?
1	Eight-Hour Vehicular Volume	The volumes of traffic on the major and minor streets meet specified minimum amounts for at least 8 hours of an average weekday. Either of two sets of minimum criteria may be used.	Yes
2	Four-Hour Vehicular Volume	For any four hours of an average day, the points representing major and minor street volumes plot above a specified curve.	Yes
3	Peak Hour	For at least one hour of an average day, minor street traffic exceeds a minimum volume and suffers at least a specified amount of total delay, or the points representing major and minor street volumes plot above a specified curve. This warrant only applies to unusual cases involving large traffic generators.	Yes, but only if this is an unusual case
4	Pedestrian Volume	The volume of pedestrian traffic crossing a major street at an intersection or mid-block location must meet minimum values for either a single hour or any four hours of an average weekday.	No
5	School Crossing	The frequency and adequacy of gaps in the traffic stream must not otherwise be sufficient for the number of children crossing.	No
6	Coordinated Signal System	Signalized control is required to maintain proper grouping of vehicles in a coordinated, progressive signal system.	No
7	Crash Experience	Five or more reported crashes of type susceptible to control by a traffic signal have occurred at the location within a 12-month period. Other less restrictive remedies and enforcement have failed to reduce accidents. Either Warrant 1 or Warrant 2 is at least 80% met. A signal will not seriously disrupt traffic flow.	5 reported crashes near intersection in 3 years. 3 angles/1 rear-end/1 sideswipe.
8	Roadway Network	An intersection of two major routes has either high five-year projected peak-hour traffic volumes or high volumes for at least five hours on an average Saturday and/or Sunday.	No

US 21 BUSINESS (SEA ISLAND PARKWAY) AND YOUMANS DRIVE – 2019 ALT 2

MUTCD Signal Warrant 1: Eight-Hour Vehicular Volumes

US 21 Business & Youmans Drive – 2019 Alt 2

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A - Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	**1**	500	400	**350**	**280**	150	120	**105**	**84**
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Condition B - Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	**1**	750	600	**525**	**420**	75	60	**53**	**42**
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

[a] Basic minimum hourly volume.

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.

[c] May be used when the major street speed exceeds 70 km/h (40 mph) or in an isolated community with a population of less than 10,000.

Evaluation of 70% Criteria for Either Condition A or Condition B:

Evaluation of Condition A:

Hour	Major Volume (350 req'd)	Minor Volume (105 req'd)	Meets Warrant?
6:00-7:00	624	22	No
7:45-8:45	**1686**	**106**	**Yes**
8:45-9:45	1318	42	No
9:45-10:45	1367	28	No

Evaluation of Condition B:

Hour	Major Volume (525 req'd)	Minor Volume (53 req'd)	Meets Warrant?
6:00-7:00	624	22	No
7:00-8:00	**1446**	**62**	**Yes**
8:00-9:00	**1614**	**102**	**Yes**
9:00-10:00	1310	36	No

10:45-11:45	1381	34	No
11:45-12:45	1469	60	No
12:45-13:45	1477	59	No
13:45-14:45	1482	45	No
14:45-15:45	**1681**	**108**	**Yes**
15:45-16:45	**1834**	**153**	**Yes**
16:45-17:45	**1749**	**105**	**Yes**
17:45-18:45	1347	89	No
18:45-19:45	348	34	No
19:45-20:45	0	0	No

4 hours met - Condition A is Not Met

10:00-11:00	1379	31	No
11:45-12:45	**1469**	**60**	**Yes**
12:45-13:45	**1477**	**59**	**Yes**
14:00-15:00	**1536**	**56**	**Yes**
15:00-16:00	**1795**	**136**	**Yes**
16:00-17:00	**1751**	**132**	**Yes**
17:00-18:00	**1704**	**115**	**Yes**
18:00-19:00	**1306**	**89**	**Yes**
19:00-20:00	0	0	No
20:00-21:00	0	0	No

9 hours met - Condition B is Met

Warrant 1 is Met

Evaluation of 56% Criteria for Both Condition A & Condition B:

Evaluation of Condition A:

Hour	Major Volume (280 req'd)	Minor Volume (84 req'd)	Meets Warrant?
6:00-7:00	624	22	No
7:30-8:30	**1651**	**96**	**Yes**
8:30-9:30	1388	57	No
9:30-10:30	1352	35	No
10:30-11:30	1430	31	No
11:30-12:30	1424	50	No
12:30-13:30	1466	51	No
14:15-15:15	**1553**	**94**	**Yes**
15:15-16:15	**1870**	**140**	**Yes**
16:15-17:15	**1736**	**105**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (420 req'd)	Minor Volume (42 req'd)	Meets Warrant?
6:45-7:45	**1256**	**50**	**Yes**
7:45-8:45	**1686**	**106**	**Yes**
8:45-9:45	**1318**	**42**	**Yes**
9:45-10:45	1367	28	No
11:30-12:30	**1424**	**50**	**Yes**
12:30-13:30	**1466**	**51**	**Yes**
13:30-14:30	**1484**	**55**	**Yes**
14:30-15:30	**1638**	**99**	**Yes**
15:30-16:30	**1825**	**151**	**Yes**
16:30-17:30	**1748**	**96**	**Yes**

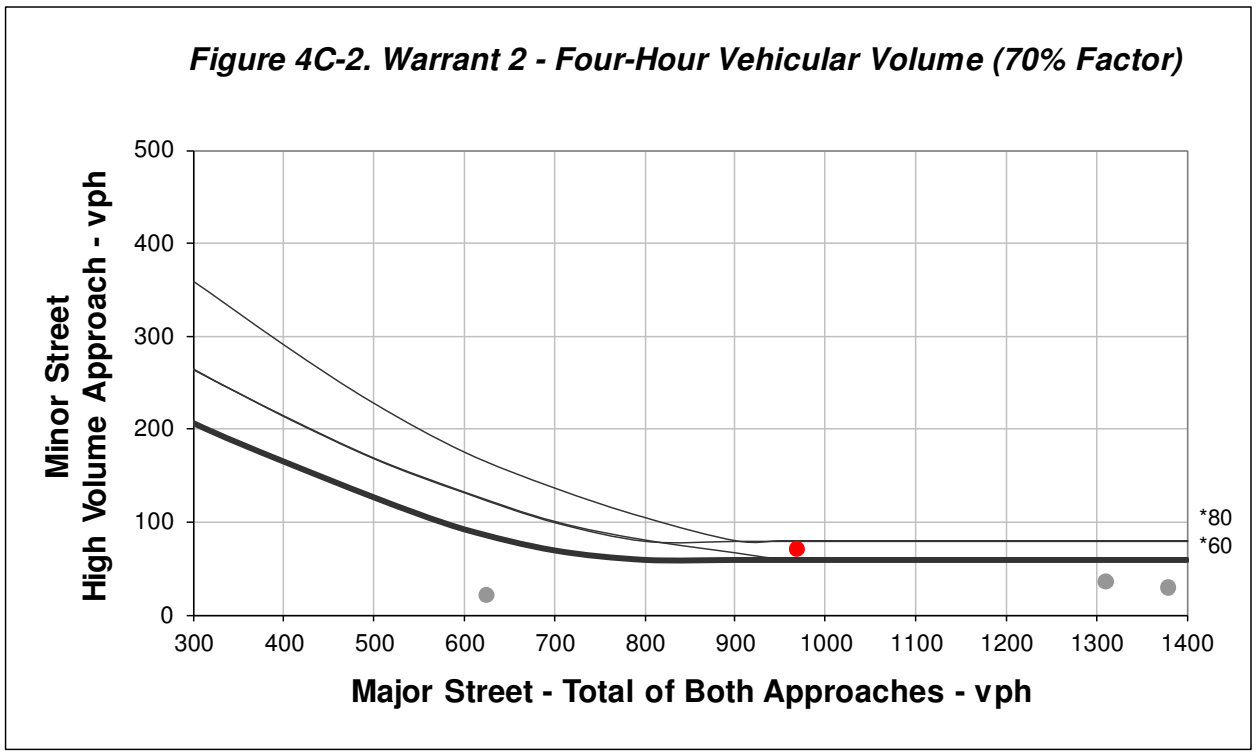
17:15-18:15	**1589**	**108**	**Yes**	**17:30-18:30**	**1474**	**109**	**Yes**
18:15-19:15	967	72	No	**18:30-19:30**	**648**	**51**	**Yes**
19:15-20:15	0	0	No	19:30-20:30	0	0	No
20:15-21:15	0	0	No				

5 hours met - Condition A is Not Met

11 hours met - Condition B is Met

MUTCD Signal Warrant 2: Four-Hour Volumes

US 21 Business & Youmans Drive – 2019 Alt 2



*Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

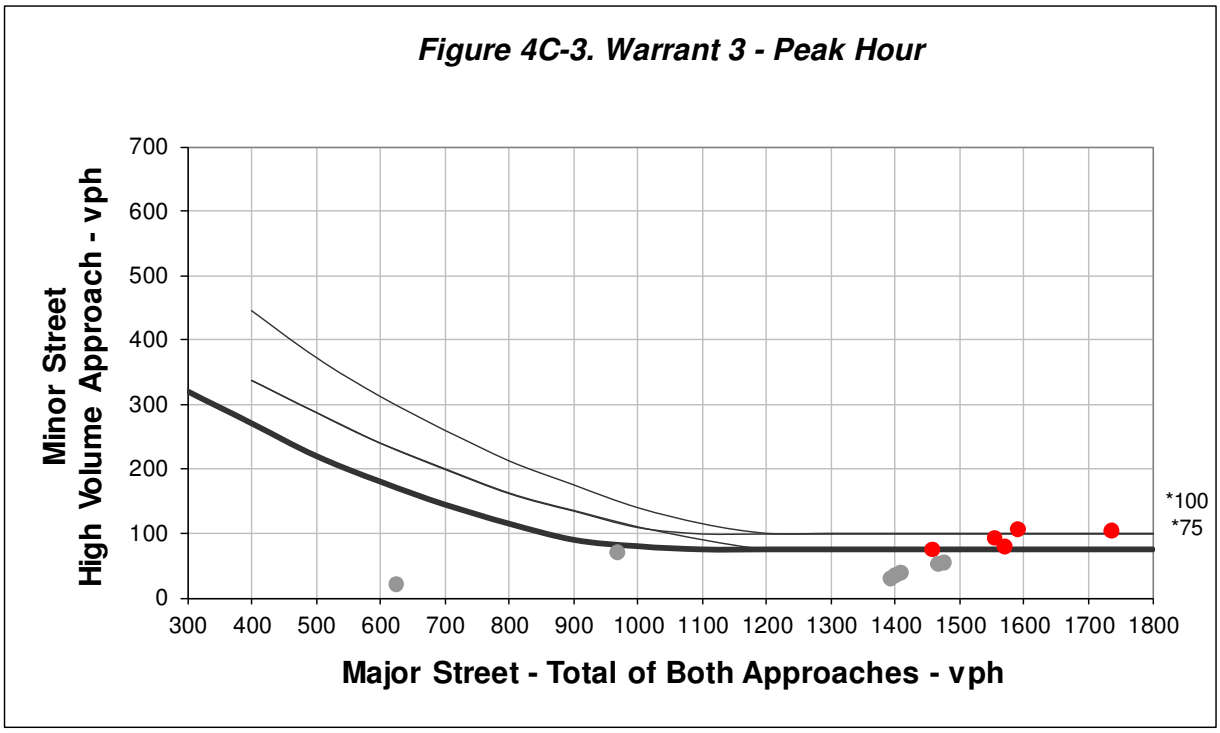
Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:00 - 7:00	624	22	88	No
7:00 - 8:00	1446	62	60	**Yes**
8:00 - 9:00	1614	102	60	**Yes**
9:00 - 10:00	1310	36	60	No
10:00 - 11:00	1379	31	60	No
11:45 - 12:45	1469	60	60	**Yes**
12:45 - 13:45	1477	59	60	No
14:15 - 15:15	1553	94	60	**Yes**
15:15 - 16:15	1870	140	60	**Yes**
16:15 - 17:15	1736	105	60	**Yes**
17:15 - 18:15	1589	108	60	**Yes**
18:15 - 19:15	967	72	60	**Yes**
19:15 - 20:15	0	0		No
20:15 - 21:15	0	0		No

Total Number of Hours Met = 8

Warrant 2 is Met

MUTCD Signal Warrant 3, Condition B: Peak Hour Volume

US 21 Business & Youmans Drive – 2019 Alt 2



*Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:00 - 7:00	624	22	172	No
7:15 - 8:15	1568	81	75	**Yes**
8:15 - 9:15	1456	76	75	**Yes**
9:15 - 10:15	1398	37	75	No
10:15 - 11:15	1392	31	75	No
11:15 - 12:15	1406	41	75	No
12:15 - 13:15	1466	54	75	No
13:15 - 14:15	1474	56	75	No
14:15 - 15:15	1553	94	75	**Yes**
15:15 - 16:15	1870	140	75	**Yes**
16:15 - 17:15	1736	105	75	**Yes**
17:15 - 18:15	1589	108	75	**Yes**
18:15 - 19:15	967	72	83	No
19:15 - 20:15	0	0		No
20:15 - 21:15	0	0		No

Total Number of Hours Met = 6

Warrant 3, Condition B is Met

This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

MUTCD Signal Warrant Analysis: US 21 Business & Youmans Drive – 2019 Alt 2

	MUTCD Warrant Number & Name	Description	Met?
1	Eight-Hour Vehicular Volume	The volumes of traffic on the major and minor streets meet specified minimum amounts for at least 8 hours of an average weekday. Either of two sets of minimum criteria may be used.	Yes
2	Four-Hour Vehicular Volume	For any four hours of an average day, the points representing major and minor street volumes plot above a specified curve.	Yes
3	Peak Hour	For at least one hour of an average day, minor street traffic exceeds a minimum volume and suffers at least a specified amount of total delay, or the points representing major and minor street volumes plot above a specified curve. This warrant only applies to unusual cases involving large traffic generators.	Yes, but only if this is an unusual case
4	Pedestrian Volume	The volume of pedestrian traffic crossing a major street at an intersection or mid-block location must meet minimum values for either a single hour or any four hours of an average weekday.	No
5	School Crossing	The frequency and adequacy of gaps in the traffic stream must not otherwise be sufficient for the number of children crossing.	No
6	Coordinated Signal System	Signalized control is required to maintain proper grouping of vehicles in a coordinated, progressive signal system.	No
7	Crash Experience	Five or more reported crashes of type susceptible to control by a traffic signal have occurred at the location within a 12-month period. Other less restrictive remedies and enforcement have failed to reduce accidents. Either Warrant 1 or Warrant 2 is at least 80% met. A signal will not seriously disrupt traffic flow.	5 reported crashes near intersection in 3 years. 3 angles/1 rear-end/1 sideswipe.
8	Roadway Network	An intersection of two major routes has either high five-year projected peak-hour traffic volumes or high volumes for at least five hours on an average Saturday and/or Sunday.	No

US 21 BUSINESS (SEA ISLAND PARKWAY) AND YOUMANS DRIVE – 2019 ALT 3

MUTCD Signal Warrant 1: Eight-Hour Vehicular Volumes

US 21 Business & Youmans Drive – 2019 Alt 3

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A - Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	**1**	500	400	**350**	**280**	150	120	**105**	**84**
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Condition B - Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	**1**	750	600	**525**	**420**	75	60	**53**	**42**
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

[a] Basic minimum hourly volume.

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.

[c] May be used when the major street speed exceeds 70 km/h (40 mph) or in an isolated community with a population of less than 10,000.

Evaluation of 70% Criteria for Either Condition A or Condition B:

Evaluation of Condition A:

Hour	Major Volume (350 req'd)	Minor Volume (105 req'd)	Meets Warrant?
6:00-7:00	630	20	No
7:00-8:00	1456	60	No
8:00-9:00	1618	97	No
9:00-10:00	1322	34	No

Evaluation of Condition B:

Hour	Major Volume (525 req'd)	Minor Volume (53 req'd)	Meets Warrant?
6:00-7:00	630	20	No
7:00-8:00	**1456**	**60**	**Yes**
8:00-9:00	**1618**	**97**	**Yes**
9:00-10:00	1322	34	No

10:00-11:00	1390	31	No
11:00-12:00	1435	35	No
12:00-13:00	1461	53	No
13:00-14:00	1449	54	No
14:45-15:45	**1688**	**106**	**Yes**
15:45-16:45	**1838**	**147**	**Yes**
17:00-18:00	**1707**	**109**	**Yes**
18:00-19:00	1310	85	No
19:00-20:00	0	0	No
20:00-21:00	0	0	No

3 hours met - Condition A is Not Met

10:00-11:00	1390	31	No
11:45-12:45	**1478**	**58**	**Yes**
12:45-13:45	**1485**	**56**	**Yes**
14:00-15:00	**1544**	**54**	**Yes**
15:00-16:00	**1801**	**132**	**Yes**
16:00-17:00	**1755**	**127**	**Yes**
17:00-18:00	**1707**	**109**	**Yes**
18:00-19:00	**1310**	**85**	**Yes**
19:00-20:00	0	0	No
20:00-21:00	0	0	No

9 hours met - Condition B is Met

Warrant 1 is Met

Evaluation of 56% Criteria for Both Condition A & Condition B:

Evaluation of Condition A:

Hour	Major Volume (280 req'd)	Minor Volume (84 req'd)	Meets Warrant?
6:00-7:00	630	20	No
7:30-8:30	**1659**	**91**	**Yes**
8:30-9:30	1395	54	No
9:30-10:30	1364	34	No
10:30-11:30	1443	30	No
11:30-12:30	1434	49	No
12:30-13:30	1474	48	No
14:15-15:15	**1561**	**92**	**Yes**
15:15-16:15	**1875**	**135**	**Yes**
16:15-17:15	**1740**	**101**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (420 req'd)	Minor Volume (42 req'd)	Meets Warrant?
6:45-7:45	**1266**	**48**	**Yes**
7:45-8:45	**1689**	**101**	**Yes**
8:45-9:45	1330	40	No
9:45-10:45	1378	27	No
11:30-12:30	**1434**	**49**	**Yes**
12:30-13:30	**1474**	**48**	**Yes**
13:30-14:30	**1492**	**53**	**Yes**
14:30-15:30	**1645**	**97**	**Yes**
15:30-16:30	**1830**	**145**	**Yes**
16:30-17:30	**1751**	**92**	**Yes**

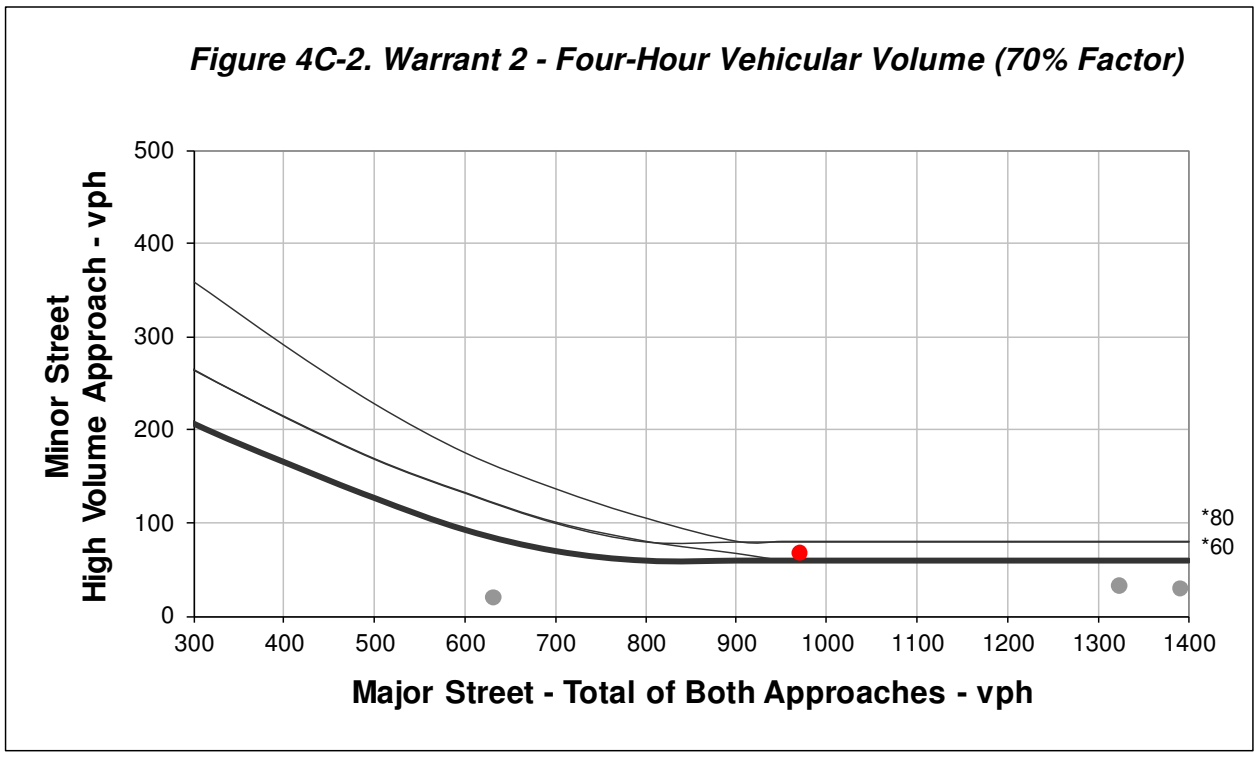
17:15-18:15	**1592**	**102**	**Yes**	**17:30-18:30**	**1478**	**103**	**Yes**
18:15-19:15	970	69	No	**18:30-19:30**	**650**	**49**	**Yes**
19:15-20:15	0	0	No	19:30-20:30	0	0	No
20:15-21:15	0	0	No				

5 hours met - Condition A is Not Met

10 hours met - Condition B is Met

MUTCD Signal Warrant 2: Four-Hour Volumes

US 21 Business & Youmans Drive – 2019 Alt 3



*Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

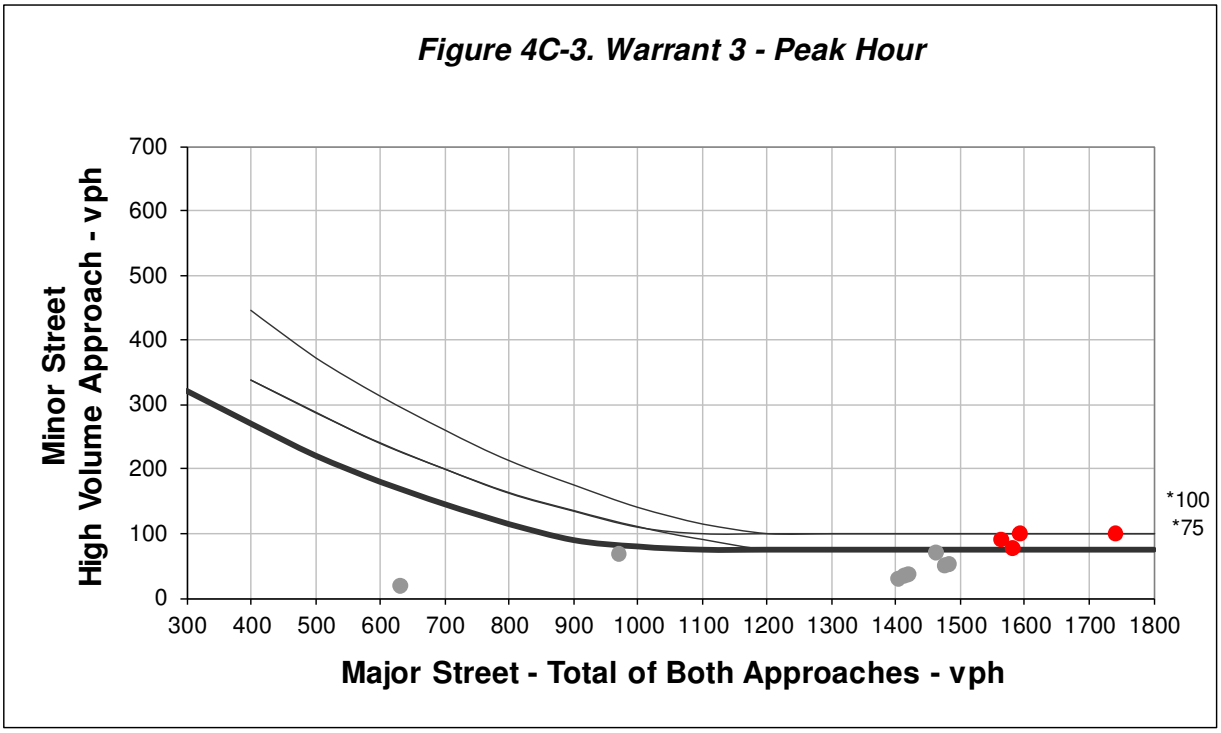
Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:00 - 7:00	630	20	86	No
7:00 - 8:00	1456	60	60	**Yes**
8:00 - 9:00	1618	97	60	**Yes**
9:00 - 10:00	1322	34	60	No
10:00 - 11:00	1390	31	60	No
11:00 - 12:00	1435	35	60	No
12:00 - 13:00	1461	53	60	No
13:00 - 14:00	1449	54	60	No
14:15 - 15:15	1561	92	60	**Yes**
15:15 - 16:15	1875	135	60	**Yes**
16:15 - 17:15	1740	101	60	**Yes**
17:15 - 18:15	1592	102	60	**Yes**
18:15 - 19:15	970	69	60	**Yes**
19:15 - 20:15	0	0		No
20:15 - 21:15	0	0		No

Total Number of Hours Met = 7

Warrant 2 is Met

MUTCD Signal Warrant 3, Condition B: Peak Hour Volume

US 21 Business & Youmans Drive – 2019 Alt 3



*Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:00 - 7:00	630	20	170	No
7:15 - 8:15	1579	78	75	**Yes**
8:15 - 9:15	1460	71	75	No
9:15 - 10:15	1411	36	75	No
10:15 - 11:15	1403	31	75	No
11:15 - 12:15	1418	39	75	No
12:15 - 13:15	1474	52	75	No
13:15 - 14:15	1482	53	75	No
14:15 - 15:15	1561	92	75	**Yes**
15:15 - 16:15	1875	135	75	**Yes**
16:15 - 17:15	1740	101	75	**Yes**
17:15 - 18:15	1592	102	75	**Yes**
18:15 - 19:15	970	69	83	No
19:15 - 20:15	0	0		No
20:15 - 21:15	0	0		No

Total Number of Hours Met = 5

Warrant 3, Condition B is Met

This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

MUTCD Signal Warrant Analysis: US 21 Business & Youmans Drive – 2019 Alt 3

	MUTCD Warrant Number & Name	Description	Met?
1	Eight-Hour Vehicular Volume	The volumes of traffic on the major and minor streets meet specified minimum amounts for at least 8 hours of an average weekday. Either of two sets of minimum criteria may be used.	Yes
2	Four-Hour Vehicular Volume	For any four hours of an average day, the points representing major and minor street volumes plot above a specified curve.	Yes
3	Peak Hour	For at least one hour of an average day, minor street traffic exceeds a minimum volume and suffers at least a specified amount of total delay, or the points representing major and minor street volumes plot above a specified curve. This warrant only applies to unusual cases involving large traffic generators.	Yes, but only if this is an unusual case
4	Pedestrian Volume	The volume of pedestrian traffic crossing a major street at an intersection or mid-block location must meet minimum values for either a single hour or any four hours of an average weekday.	No
5	School Crossing	The frequency and adequacy of gaps in the traffic stream must not otherwise be sufficient for the number of children crossing.	No
6	Coordinated Signal System	Signalized control is required to maintain proper grouping of vehicles in a coordinated, progressive signal system.	No
7	Crash Experience	Five or more reported crashes of type susceptible to control by a traffic signal have occurred at the location within a 12-month period. Other less restrictive remedies and enforcement have failed to reduce accidents. Either Warrant 1 or Warrant 2 is at least 80% met. A signal will not seriously disrupt traffic flow.	5 reported crashes near intersection in 3 years. 3 angles/1 rear-end/1 sideswipe.
8	Roadway Network	An intersection of two major routes has either high five-year projected peak-hour traffic volumes or high volumes for at least five hours on an average Saturday and/or Sunday.	No

US 21 BUSINESS (SEA ISLAND PARKWAY) AND YOUMANS DRIVE – 2040 ALT 1

MUTCD Signal Warrant 1: Eight-Hour Vehicular Volumes

US 21 Business & Youmans Drive – 2040 Alt 1

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A - Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	**2 or more**	500	400	**350**	**280**	200	160	**140**	**112**

Condition B - Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	**2 or more**	750	600	**525**	**420**	100	80	**70**	**56**

[a] Basic minimum hourly volume.

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.

[c] May be used when the major street speed exceeds 70 km/h (40 mph) or in an isolated community with a population of less than 10,000.

Evaluation of 70% Criteria for Either Condition A or Condition B:

Evaluation of Condition A:

Hour	Major Volume (350 req'd)	Minor Volume (140 req'd)	Meets Warrant?
6:00-7:00	863	37	No
7:30-8:30	**2376**	**165**	**Yes**
8:30-9:30	1966	98	No
9:30-10:30	1897	60	No

Evaluation of Condition B:

Hour	Major Volume (525 req'd)	Minor Volume (70 req'd)	Meets Warrant?
6:45-7:45	**1747**	**83**	**Yes**
7:45-8:45	**2459**	**182**	**Yes**
8:45-9:45	**1838**	**74**	**Yes**
9:45-10:45	1914	47	No

10:30-11:30	2008	54	No	**11:15-12:15**	**2004**	**86**	**Yes**
11:45-12:45	**2130**	**161**	**Yes**	**12:15-13:15**	**2126**	**157**	**Yes**
12:45-13:45	**2141**	**168**	**Yes**	**13:15-14:15**	**2140**	**158**	**Yes**
14:00-15:00	**2234**	**163**	**Yes**	**14:15-15:15**	**2257**	**274**	**Yes**
15:00-16:00	**2636**	**378**	**Yes**	**15:15-16:15**	**2755**	**382**	**Yes**
16:00-17:00	**2640**	**320**	**Yes**	**16:15-17:15**	**2651**	**222**	**Yes**
17:00-18:00	**2629**	**207**	**Yes**	**17:15-18:15**	**2450**	**196**	**Yes**
18:00-19:00	**2021**	**161**	**Yes**	**18:15-19:15**	**1497**	**130**	**Yes**
19:00-20:00	0	0	No	19:15-20:15	0	0	No
20:00-21:00	0	0	No	20:15-21:15	0	0	No

8 hours met - Condition A is Met

11 hours met - Condition B is Met

Warrant 1 is Met

Evaluation of 56% Criteria for Both Condition A & Condition B:

Evaluation of Condition A:

Hour	Major Volume (280 req'd)	Minor Volume (112 req'd)	Meets Warrant?
6:00-7:00	863	37	No
7:15-8:15	**2216**	**139**	**Yes**
8:15-9:15	**2096**	**131**	**Yes**
9:15-10:15	1958	62	No
10:15-11:15	1963	56	No
11:30-12:30	**2058**	**122**	**Yes**
12:30-13:30	**2125**	**146**	**Yes**
13:30-14:30	**2149**	**159**	**Yes**
14:30-15:30	**2394**	**283**	**Yes**
15:30-16:30	**2686**	**418**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (420 req'd)	Minor Volume (56 req'd)	Meets Warrant?
6:30-7:30	**1430**	**66**	**Yes**
7:30-8:30	**2376**	**165**	**Yes**
8:30-9:30	**1966**	**98**	**Yes**
9:30-10:30	**1897**	**60**	**Yes**
10:45-11:45	**1946**	**60**	**Yes**
11:45-12:45	**2130**	**161**	**Yes**
12:45-13:45	**2141**	**168**	**Yes**
13:45-14:45	**2150**	**131**	**Yes**
14:45-15:45	**2459**	**306**	**Yes**
15:45-16:45	**2734**	**397**	**Yes**

16:30-17:30	**2698**	**175**	**Yes**	**16:45-17:45**	**2699**	**190**	**Yes**
17:30-18:30	**2277**	**196**	**Yes**	**17:45-18:45**	**2083**	**160**	**Yes**
18:30-19:30	1003	93	No	**18:45-19:45**	**538**	**63**	**Yes**
19:30-20:30	0	0	No	19:45-20:45	0	0	No

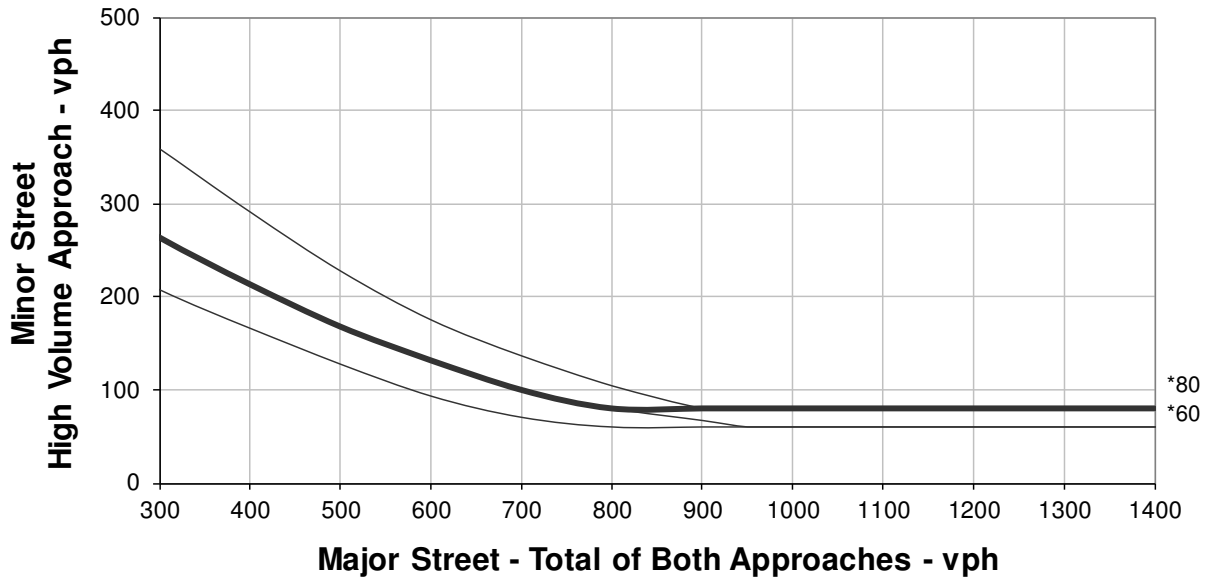
9 hours met - Condition A is Met

13 hours met - Condition B is Met

MUTCD Signal Warrant 2: Four-Hour Volumes

US 21 Business & Youmans Drive – 2040 Alt 1

Figure 4C-2. Warrant 2 - Four-Hour Vehicular Volume (70% Factor)



*Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:45 - 7:45	1747	83	80	**Yes**
7:45 - 8:45	2459	182	80	**Yes**
8:45 - 9:45	1838	74	80	No
9:45 - 10:45	1914	47	80	No
11:15 - 12:15	2004	86	80	**Yes**
12:15 - 13:15	2126	157	80	**Yes**
13:15 - 14:15	2140	158	80	**Yes**
14:15 - 15:15	2257	274	80	**Yes**
15:15 - 16:15	2755	382	80	**Yes**
16:15 - 17:15	2651	222	80	**Yes**
17:15 - 18:15	2450	196	80	**Yes**
18:15 - 19:15	1497	130	80	**Yes**
19:15 - 20:15	0	0		No
20:15 - 21:15	0	0		No

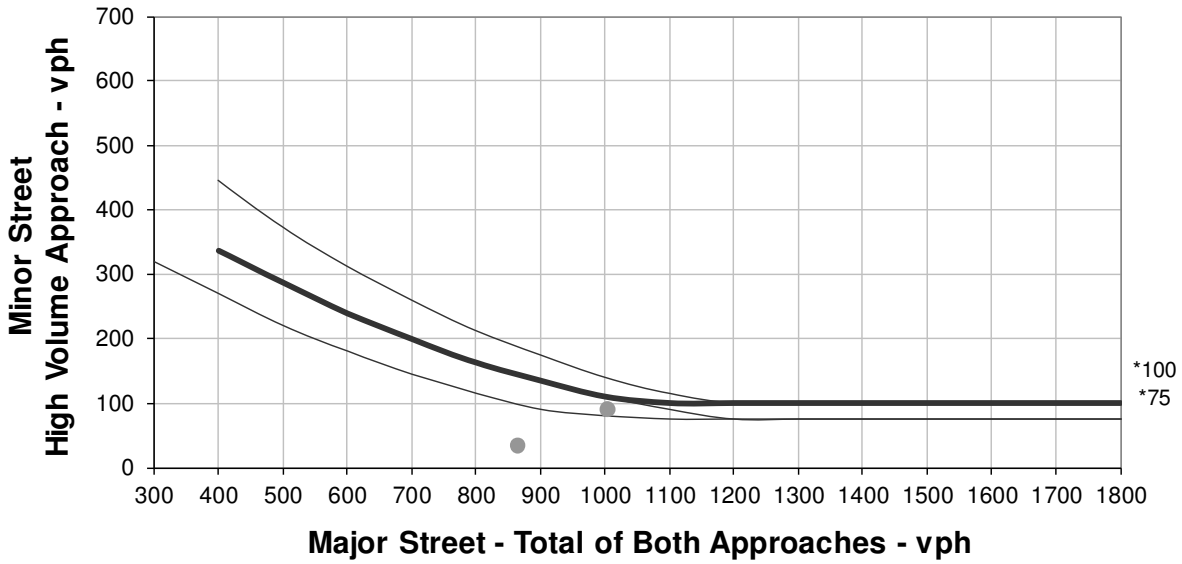
Total Number of Hours Met = 10

Warrant 2 is Met

MUTCD Signal Warrant 3, Condition B: Peak Hour Volume

US 21 Business & Youmans Drive – 2040 Alt 1

Figure 4C-3. Warrant 3 - Peak Hour



*Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:00 - 7:00	863	37	145	No
7:00 - 8:00	2028	105	100	**Yes**
8:00 - 9:00	2338	177	100	**Yes**
9:00 - 10:00	1828	61	100	No
10:00 - 11:00	1951	53	100	No
11:30 - 12:30	2058	122	100	**Yes**
12:30 - 13:30	2125	146	100	**Yes**
13:30 - 14:30	2149	159	100	**Yes**
14:30 - 15:30	2394	283	100	**Yes**
15:30 - 16:30	2686	418	100	**Yes**
16:30 - 17:30	2698	175	100	**Yes**
17:30 - 18:30	2277	196	100	**Yes**
18:30 - 19:30	1003	93	110	No
19:30 - 20:30	0	0		No

Total Number of Hours Met = 9

Warrant 3, Condition B is Met

This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

MUTCD Signal Warrant Analysis: US 21 Business & Youmans Drive – 2040 Alt 1

	MUTCD Warrant Number & Name	Description	Met?
1	Eight-Hour Vehicular Volume	The volumes of traffic on the major and minor streets meet specified minimum amounts for at least 8 hours of an average weekday. Either of two sets of minimum criteria may be used.	Yes
2	Four-Hour Vehicular Volume	For any four hours of an average day, the points representing major and minor street volumes plot above a specified curve.	Yes
3	Peak Hour	For at least one hour of an average day, minor street traffic exceeds a minimum volume and suffers at least a specified amount of total delay, or the points representing major and minor street volumes plot above a specified curve. This warrant only applies to unusual cases involving large traffic generators.	Yes, but only if this is an unusual case
4	Pedestrian Volume	The volume of pedestrian traffic crossing a major street at an intersection or mid-block location must meet minimum values for either a single hour or any four hours of an average weekday.	No
5	School Crossing	The frequency and adequacy of gaps in the traffic stream must not otherwise be sufficient for the number of children crossing.	No
6	Coordinated Signal System	Signalized control is required to maintain proper grouping of vehicles in a coordinated, progressive signal system.	No
7	Crash Experience	Five or more reported crashes of type susceptible to control by a traffic signal have occurred at the location within a 12-month period. Other less restrictive remedies and enforcement have failed to reduce accidents. Either Warrant 1 or Warrant 2 is at least 80% met. A signal will not seriously disrupt traffic flow.	5 reported crashes near intersection in 3 years. 3 angles/1 rear-end/1 sideswipe.
8	Roadway Network	An intersection of two major routes has either high five-year projected peak-hour traffic volumes or high volumes for at least five hours on an average Saturday and/or Sunday.	No

US 21 BUSINESS (SEA ISLAND PARKWAY) AND YOUMANS DRIVE – 2040 ALT 2

MUTCD Signal Warrant 1: Eight-Hour Vehicular Volumes

US 21 Business & Youmans Drive – 2040 Alt 2

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A - Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	**1**	500	400	**350**	**280**	150	120	**105**	**84**
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Condition B - Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	**1**	750	600	**525**	**420**	75	60	**53**	**42**
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

[a] Basic minimum hourly volume.

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.

[c] May be used when the major street speed exceeds 70 km/h (40 mph) or in an isolated community with a population of less than 10,000.

Evaluation of 70% Criteria for Either Condition A or Condition B:

Evaluation of Condition A:

Hour	Major Volume (350 req'd)	Minor Volume (105 req'd)	Meets Warrant?
6:00-7:00	916	26	No
7:15-8:15	**2309**	**105**	**Yes**
8:15-9:15	2138	96	No
9:15-10:15	2076	47	No

Evaluation of Condition B:

Hour	Major Volume (525 req'd)	Minor Volume (53 req'd)	Meets Warrant?
6:45-7:45	**1854**	**65**	**Yes**
7:45-8:45	**2471**	**135**	**Yes**
8:45-9:45	**1955**	**54**	**Yes**
9:45-10:45	2038	35	No

10:15-11:15	2082	40	No
11:15-12:15	2124	52	No
12:15-13:15	2292	68	No
13:15-14:15	2306	70	No
14:15-15:15	**2431**	**117**	**Yes**
15:15-16:15	**2917**	**174**	**Yes**
16:15-17:15	**2744**	**129**	**Yes**
17:15-18:15	**2519**	**134**	**Yes**
18:15-19:15	1539	89	No
19:15-20:15	0	0	No
20:15-21:15	0	0	No

5 hours met - Condition A is Not Met

11:30-12:30	**2178**	**64**	**Yes**
12:30-13:30	**2292**	**63**	**Yes**
13:30-14:30	**2325**	**69**	**Yes**
14:30-15:30	**2559**	**123**	**Yes**
15:30-16:30	**2848**	**188**	**Yes**
16:30-17:30	**2772**	**118**	**Yes**
17:30-18:30	**2340**	**135**	**Yes**
18:30-19:30	**1031**	**63**	**Yes**
19:30-20:30	0	0	No

11 hours met - Condition B is Met

Warrant 1 is Met

Evaluation of 56% Criteria for Both Condition A & Condition B:

Evaluation of Condition A:

Hour	Major Volume (280 req'd)	Minor Volume (84 req'd)	Meets Warrant?
6:00-7:00	916	26	No
7:15-8:15	**2309**	**105**	**Yes**
8:15-9:15	**2138**	**96**	**Yes**
9:15-10:15	2076	47	No
10:15-11:15	2082	40	No
11:15-12:15	2124	52	No
12:15-13:15	2292	68	No
13:15-14:15	2306	70	No
14:15-15:15	**2431**	**117**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (420 req'd)	Minor Volume (42 req'd)	Meets Warrant?
6:30-7:30	**1521**	**52**	**Yes**
7:30-8:30	**2427**	**122**	**Yes**
8:30-9:30	**2051**	**73**	**Yes**
9:30-10:30	**2011**	**44**	**Yes**
10:45-11:45	**2061**	**44**	**Yes**
11:45-12:45	**2269**	**76**	**Yes**
12:45-13:45	**2311**	**73**	**Yes**
13:45-14:45	**2319**	**56**	**Yes**
14:45-15:45	**2628**	**134**	**Yes**

15:15-16:15	**2917**	**174**	**Yes**	**15:45-16:45**	**2870**	**190**	**Yes**
16:15-17:15	**2744**	**129**	**Yes**	**16:45-17:45**	**2773**	**130**	**Yes**
17:15-18:15	**2519**	**134**	**Yes**	**17:45-18:45**	**2141**	**109**	**Yes**
18:15-19:15	**1539**	**89**	**Yes**	**18:45-19:45**	**554**	**43**	**Yes**
19:15-20:15	0	0	No	19:45-20:45	0	0	No
20:15-21:15	0	0	No				

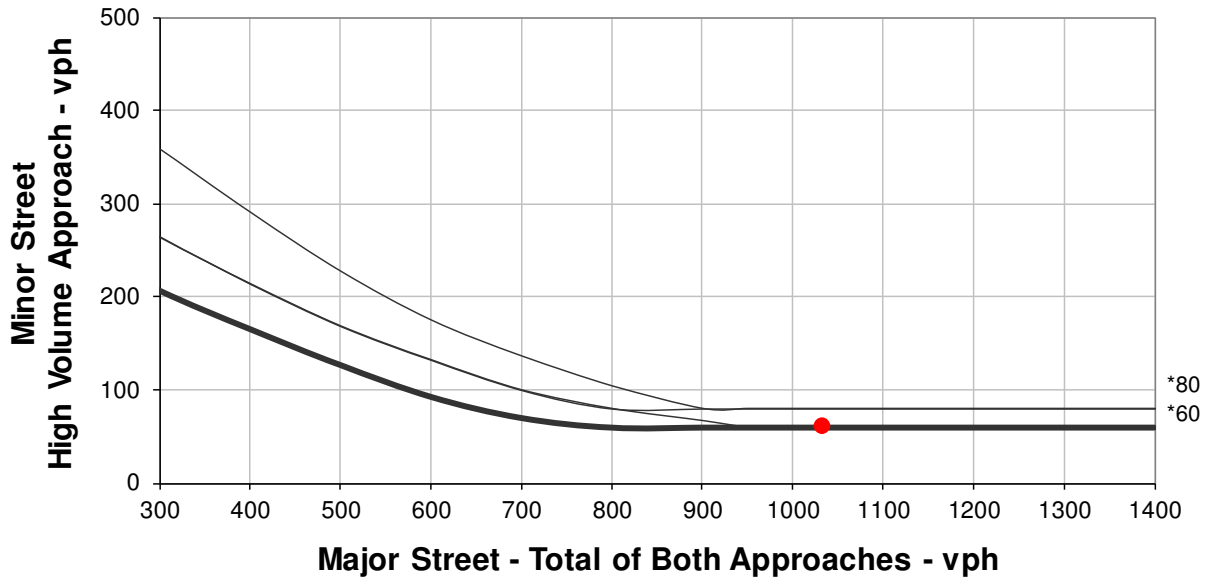
7 hours met - Condition A is Not Met

13 hours met - Condition B is Met

MUTCD Signal Warrant 2: Four-Hour Volumes

US 21 Business & Youmans Drive – 2040 Alt 2

Figure 4C-2. Warrant 2 - Four-Hour Vehicular Volume (70% Factor)



*Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

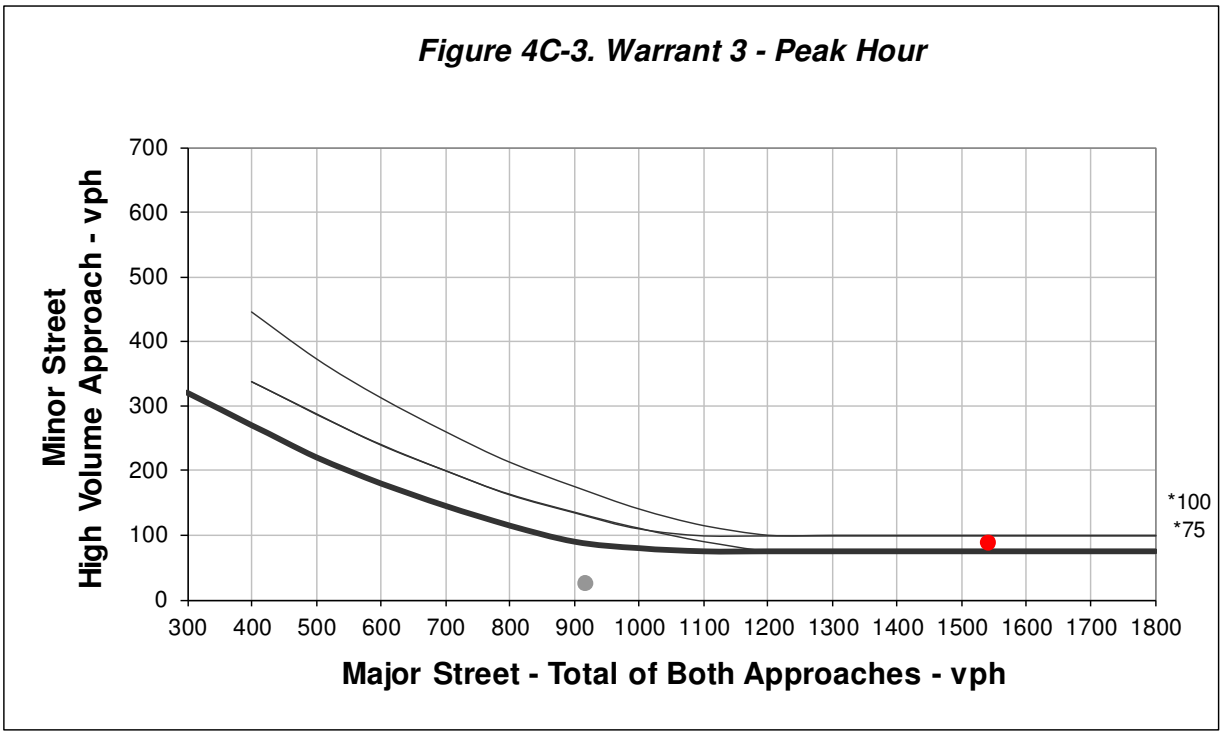
Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:45 - 7:45	1854	65	60	**Yes**
7:45 - 8:45	2471	135	60	**Yes**
8:45 - 9:45	1955	54	60	No
9:45 - 10:45	2038	35	60	No
11:30 - 12:30	2178	64	60	**Yes**
12:30 - 13:30	2292	63	60	**Yes**
13:30 - 14:30	2325	69	60	**Yes**
14:30 - 15:30	2559	123	60	**Yes**
15:30 - 16:30	2848	188	60	**Yes**
16:30 - 17:30	2772	118	60	**Yes**
17:30 - 18:30	2340	135	60	**Yes**
18:30 - 19:30	1031	63	60	**Yes**
19:30 - 20:30	0	0		No

Total Number of Hours Met = 10

Warrant 2 is Met

MUTCD Signal Warrant 3, Condition B: Peak Hour Volume

US 21 Business & Youmans Drive – 2040 Alt 2



*Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:00 - 7:00	916	26	88	No
7:00 - 8:00	2132	81	75	**Yes**
8:00 - 9:00	2369	130	75	**Yes**
9:00 - 10:00	1944	46	75	No
10:00 - 11:00	2061	39	75	No
11:45 - 12:45	2269	76	75	**Yes**
12:45 - 13:45	2311	73	75	No
14:15 - 15:15	2431	117	75	**Yes**
15:15 - 16:15	2917	174	75	**Yes**
16:15 - 17:15	2744	129	75	**Yes**
17:15 - 18:15	2519	134	75	**Yes**
18:15 - 19:15	1539	89	75	**Yes**
19:15 - 20:15	0	0		No
20:15 - 21:15	0	0		No

Total Number of Hours Met = 8

Warrant 3, Condition B is Met

This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

MUTCD Signal Warrant Analysis: US 21 Business & Youmans Drive – 2040 Alt 2

	MUTCD Warrant Number & Name	Description	Met?
1	Eight-Hour Vehicular Volume	The volumes of traffic on the major and minor streets meet specified minimum amounts for at least 8 hours of an average weekday. Either of two sets of minimum criteria may be used.	Yes
2	Four-Hour Vehicular Volume	For any four hours of an average day, the points representing major and minor street volumes plot above a specified curve.	Yes
3	Peak Hour	For at least one hour of an average day, minor street traffic exceeds a minimum volume and suffers at least a specified amount of total delay, or the points representing major and minor street volumes plot above a specified curve. This warrant only applies to unusual cases involving large traffic generators.	Yes, but only if this is an unusual case
4	Pedestrian Volume	The volume of pedestrian traffic crossing a major street at an intersection or mid-block location must meet minimum values for either a single hour or any four hours of an average weekday.	No
5	School Crossing	The frequency and adequacy of gaps in the traffic stream must not otherwise be sufficient for the number of children crossing.	No
6	Coordinated Signal System	Signalized control is required to maintain proper grouping of vehicles in a coordinated, progressive signal system.	No
7	Crash Experience	Five or more reported crashes of type susceptible to control by a traffic signal have occurred at the location within a 12-month period. Other less restrictive remedies and enforcement have failed to reduce accidents. Either Warrant 1 or Warrant 2 is at least 80% met. A signal will not seriously disrupt traffic flow.	5 reported crashes near intersection in 3 years. 3 angles/1 rear-end/1 sideswipe.
8	Roadway Network	An intersection of two major routes has either high five-year projected peak-hour traffic volumes or high volumes for at least five hours on an average Saturday and/or Sunday.	No

US 21 BUSINESS (SEA ISLAND PARKWAY) AND YOUMANS DRIVE – 2040 ALT 3

MUTCD Signal Warrant 1: Eight-Hour Vehicular Volumes

US 21 Business & Youmans Drive – 2040 Alt 3

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A - Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	**1**	500	400	**350**	**280**	150	120	**105**	**84**
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Condition B - Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	**1**	750	600	**525**	**420**	75	60	**53**	**42**
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

[a] Basic minimum hourly volume.

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.

[c] May be used when the major street speed exceeds 70 km/h (40 mph) or in an isolated community with a population of less than 10,000.

Evaluation of 70% Criteria for Either Condition A or Condition B:

Evaluation of Condition A:

Hour	Major Volume (350 req'd)	Minor Volume (105 req'd)	Meets Warrant?
6:00-7:00	927	26	No
7:30-8:30	**2431**	**113**	**Yes**
8:30-9:30	2062	67	No
9:30-10:30	2028	40	No

Evaluation of Condition B:

Hour	Major Volume (525 req'd)	Minor Volume (53 req'd)	Meets Warrant?
6:45-7:45	**1865**	**59**	**Yes**
7:45-8:45	**2471**	**125**	**Yes**
8:45-9:45	1971	50	No
9:45-10:45	2054	31	No

10:30-11:30	2145	37	No
11:30-12:30	2189	59	No
12:30-13:30	2309	58	No
14:15-15:15	**2443**	**110**	**Yes**
15:15-16:15	**2927**	**163**	**Yes**
16:15-17:15	**2753**	**122**	**Yes**
17:15-18:15	**2521**	**126**	**Yes**
18:15-19:15	1544	83	No
19:15-20:15	0	0	No
20:15-21:15	0	0	No

5 hours met - Condition A is Not Met

11:30-12:30	**2189**	**59**	**Yes**
12:30-13:30	**2309**	**58**	**Yes**
13:30-14:30	**2339**	**64**	**Yes**
14:30-15:30	**2571**	**116**	**Yes**
15:30-16:30	**2857**	**176**	**Yes**
16:30-17:30	**2778**	**111**	**Yes**
17:30-18:30	**2345**	**127**	**Yes**
18:30-19:30	**1034**	**59**	**Yes**
19:30-20:30	0	0	No

10 hours met - Condition B is Met

Warrant 1 is Met

Evaluation of 56% Criteria for Both Condition A & Condition B:

Evaluation of Condition A:

Hour	Major Volume (280 req'd)	Minor Volume (84 req'd)	Meets Warrant?
6:00-7:00	927	26	No
7:15-8:15	**2318**	**97**	**Yes**
8:15-9:15	**2143**	**88**	**Yes**
9:15-10:15	2093	43	No
10:15-11:15	2094	36	No
11:15-12:15	2137	49	No
12:15-13:15	2306	62	No
13:15-14:15	2322	65	No
14:15-15:15	**2443**	**110**	**Yes**
15:15-16:15	**2927**	**163**	**Yes**

Evaluation of Condition B:

Hour	Major Volume (420 req'd)	Minor Volume (42 req'd)	Meets Warrant?
6:30-7:30	**1532**	**48**	**Yes**
7:30-8:30	**2431**	**113**	**Yes**
8:30-9:30	**2062**	**67**	**Yes**
9:30-10:30	2028	40	No
11:00-12:00	**2138**	**44**	**Yes**
12:00-13:00	**2281**	**63**	**Yes**
13:00-14:00	**2271**	**66**	**Yes**
14:00-15:00	**2418**	**64**	**Yes**
15:00-16:00	**2815**	**159**	**Yes**
16:00-17:00	**2760**	**155**	**Yes**

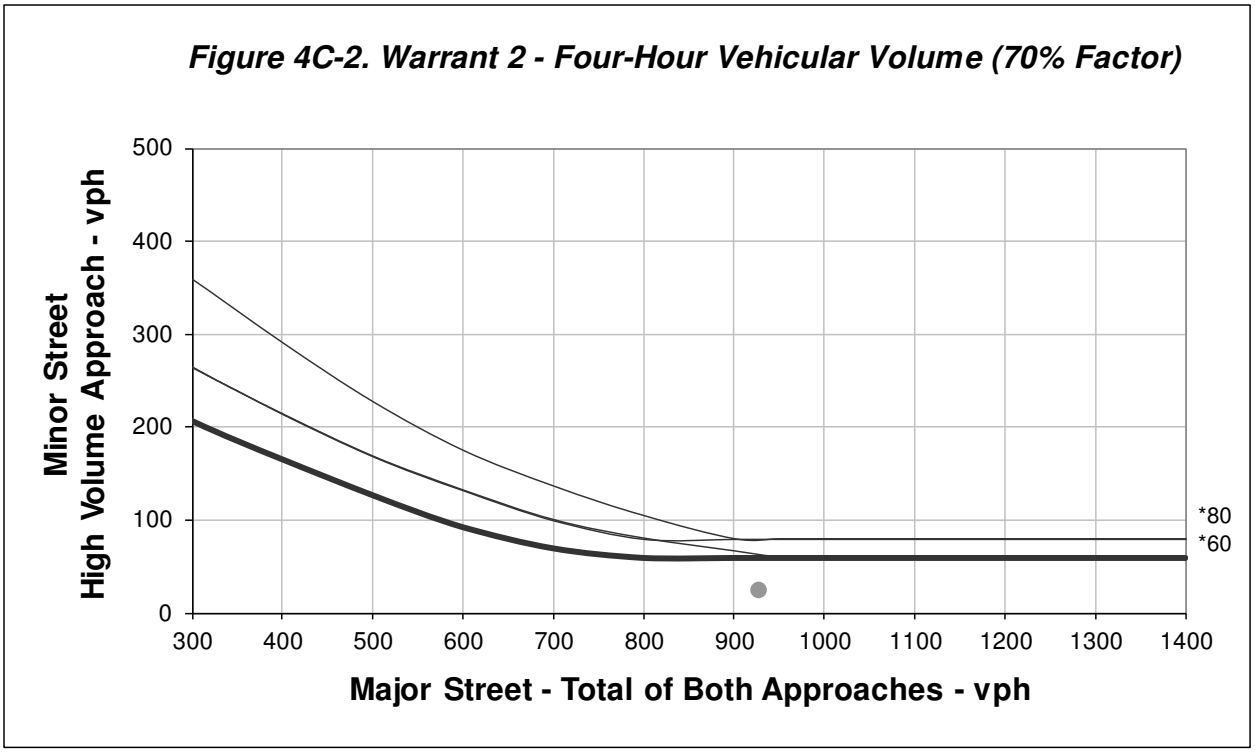
16:15-17:15	**2753**	**122**	**Yes**	**17:00-18:00**	**2706**	**133**	**Yes**
17:15-18:15	**2521**	**126**	**Yes**	**18:00-19:00**	**2083**	**103**	**Yes**
18:15-19:15	1544	83	No	19:00-20:00	0	0	No
19:15-20:15	0	0	No	20:00-21:00	0	0	No
20:15-21:15	0	0	No				

6 hours met - Condition A is Not Met

11 hours met - Condition B is Met

MUTCD Signal Warrant 2: Four-Hour Volumes

US 21 Business & Youmans Drive – 2040 Alt 3



*Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

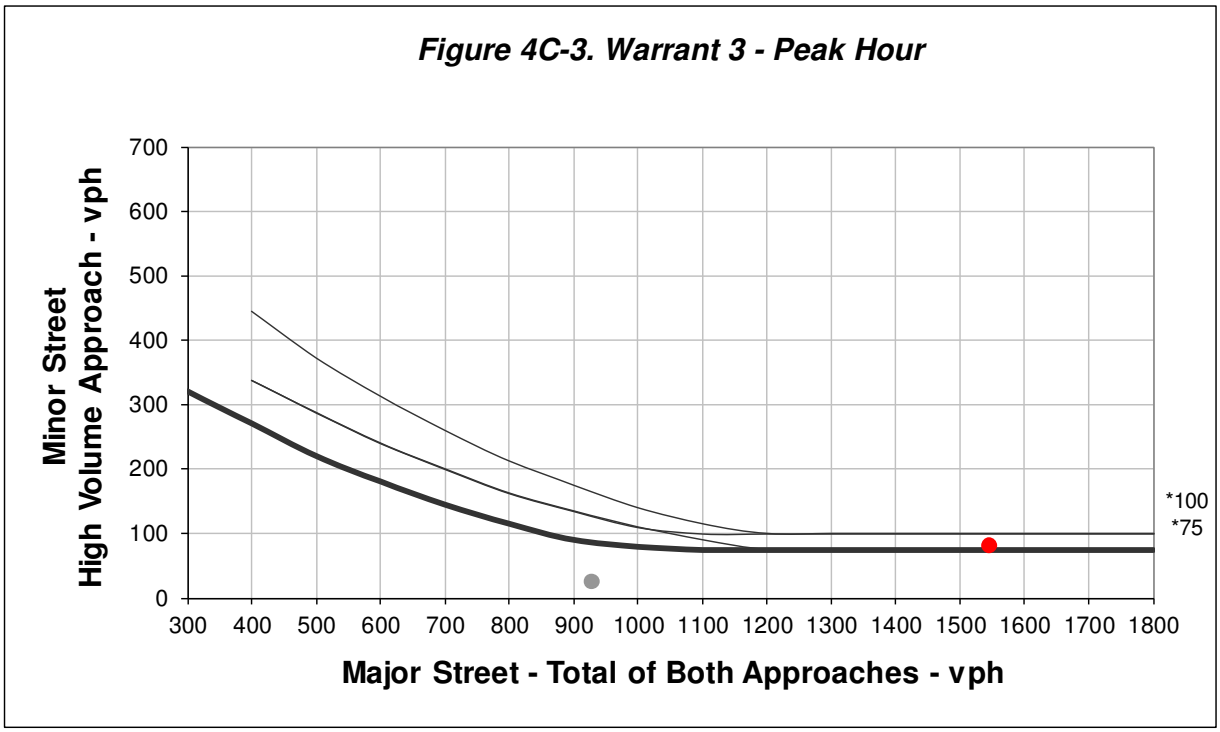
Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:00 - 7:00	927	26	60	No
7:00 - 8:00	2141	74	60	**Yes**
8:00 - 9:00	2371	120	60	**Yes**
9:00 - 10:00	1960	42	60	No
10:00 - 11:00	2075	35	60	No
11:45 - 12:45	2281	70	60	**Yes**
12:45 - 13:45	2327	68	60	**Yes**
14:00 - 15:00	2418	64	60	**Yes**
15:00 - 16:00	2815	159	60	**Yes**
16:00 - 17:00	2760	155	60	**Yes**
17:00 - 18:00	2706	133	60	**Yes**
18:00 - 19:00	2083	103	60	**Yes**
19:00 - 20:00	0	0		No
20:00 - 21:00	0	0		No

Total Number of Hours Met = 9

Warrant 2 is Met

MUTCD Signal Warrant 3, Condition B: Peak Hour Volume

US 21 Business & Youmans Drive – 2040 Alt 3



*Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

Hour	Major Street Total of Both Approaches	Minor Street High Volume Approach	Required Minor Street High Volume Approach	Meets Warrant?
6:00 - 7:00	927	26	87	No
7:15 - 8:15	2318	97	75	**Yes**
8:15 - 9:15	2143	88	75	**Yes**
9:15 - 10:15	2093	43	75	No
10:15 - 11:15	2094	36	75	No
11:15 - 12:15	2137	49	75	No
12:15 - 13:15	2306	62	75	No
13:15 - 14:15	2322	65	75	No
14:15 - 15:15	2443	110	75	**Yes**
15:15 - 16:15	2927	163	75	**Yes**
16:15 - 17:15	2753	122	75	**Yes**
17:15 - 18:15	2521	126	75	**Yes**
18:15 - 19:15	1544	83	75	**Yes**
19:15 - 20:15	0	0		No
20:15 - 21:15	0	0		No

Total Number of Hours Met = 7

Warrant 3, Condition B is Met

This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

MUTCD Signal Warrant Analysis: US 21 Business & Youmans Drive – 2040 Alt 3

	MUTCD Warrant Number & Name	Description	Met?
1	Eight-Hour Vehicular Volume	The volumes of traffic on the major and minor streets meet specified minimum amounts for at least 8 hours of an average weekday. Either of two sets of minimum criteria may be used.	Yes
2	Four-Hour Vehicular Volume	For any four hours of an average day, the points representing major and minor street volumes plot above a specified curve.	Yes
3	Peak Hour	For at least one hour of an average day, minor street traffic exceeds a minimum volume and suffers at least a specified amount of total delay, or the points representing major and minor street volumes plot above a specified curve. This warrant only applies to unusual cases involving large traffic generators.	Yes, but only if this is an unusual case
4	Pedestrian Volume	The volume of pedestrian traffic crossing a major street at an intersection or mid-block location must meet minimum values for either a single hour or any four hours of an average weekday.	No
5	School Crossing	The frequency and adequacy of gaps in the traffic stream must not otherwise be sufficient for the number of children crossing.	No
6	Coordinated Signal System	Signalized control is required to maintain proper grouping of vehicles in a coordinated, progressive signal system.	No
7	Crash Experience	Five or more reported crashes of type susceptible to control by a traffic signal have occurred at the location within a 12-month period. Other less restrictive remedies and enforcement have failed to reduce accidents. Either Warrant 1 or Warrant 2 is at least 80% met. A signal will not seriously disrupt traffic flow.	5 reported crashes near intersection in 3 years. 3 angles/1 rear-end/1 sideswipe.
8	Roadway Network	An intersection of two major routes has either high five-year projected peak-hour traffic volumes or high volumes for at least five hours on an average Saturday and/or Sunday.	No

APPENDIX C
CONSTRUCTION ESTIMATE

Andrews Engineering & Surveying

2712 Bull Street, Suite A
Beaufort, SC 29902

CONCEPTUAL CONSTRUCTION COST ESTIMATES FOR THE 3 ALTERNATIVES TO RELOCATE THE BEAUFORT HIGH SCHOOL ACCESS TO US 21 BUSINESS

THE COST ESTIMATES DO NOT INCLUDE RIGHT-OF-WAY ACQUISITION COST

Date: September 23, 2019; Rev #1 Oct 17, 2019

Project No.: 190009

Alternate #1: Youmans Drive

Item	Scope of Work	Budget
1	Add Right Turn Lane on Meridian	$ 100,000
2	Remove Signal Geechie & US 21. Convert Geechie Rt In/Out	$ 100,000
3	Signalize Youmans & US 21. Add Right Turn Lane on Youmans	$ 500,000
4	Left Turn Lane Meridian & Youmans	$ 100,000
5	Overlay Youmans & Striping	$ 250,000
6	Geechie Improvements & Traffic Circle	$ 200,000
7	Drainage Improvements	$ 350,000
8	BMH Access Driveway Mitigation	$ 100,000
9	SUBTOTAL	$ 1,700,000
10	CONTINGENCY 40%	$ 680,000
11	SURVEYING, ENGINEERING & PERMITTING (15%)	$ 357,000
12	**TOTAL BUDGET ALTERNATE #1**	**$ 2,737,000**

Alternate #2: Meridian Road

Item	Scope of Work	Budget
1	Signalize Meridian & US 21. Add Right Turn Lane on Meridian	$ 500,000
2	Remove Signal Geechie & US 21. Convert Geechie Rt In/Out	$ 100,000
3	Signalize Sunset & US 21	$ 500,000
4	Road Through BCSD from Meridian to BHS Entrance	$ 350,000
5	SUBTOTAL	$ 1,450,000
6	CONTINGENCY 40%	$ 580,000
7	SURVEYING, ENGINEERING & PERMITTING (15%)	$ 304,500
8	**TOTAL BUDGET ALTERNATE #2**	**$ 2,334,500**

Alternate #3: Sunset Blvd

Item	Scope of Work	Budget
1	Add Right Turn Lane on Meridian	$ 100,000
2	Remove Signal Geechie & US 21. Convert Geechie Rt In/Out	$ 100,000
3	Signalize Sunset & US 21	$ 500,000
4	Road with Drainage Through Shopping Center	$ 550,000
5	SUBTOTAL	$ 1,250,000
6	CONTINGENCY 40%	$ 500,000
7	SURVEYING, ENGINEERING & PERMITTING (15%)	$ 262,500
8	**TOTAL BUDGET ALTERNATE #3**	**$ 2,012,500**

Rev#1	a) 40% Contingency, b) Include 40% Contingency in calculation of Engr Fee, c) Increase construction costs to account for higher end signal mast arm and longer time anticipated before construction begins.

APPENDIX D
RIGHT-OF-WAY ESTIMATE

SCOPE OF WORK – Beaufort High Access, U. S. Highway 21, Lady's Island Beaufort County SC Feasibility Study

This Feasibility Study is made relying on available online resources including, Google Maps, Google Earth, Beaufort County GIS Mapping Site, Beaufort County Property Max Database, and Preliminary Site Plan for Beaufort High Access by Andrews Engineering. None of the subject sites has been personally inspected. Visual analysis of the subject sites is based on aerial photography provided by Google Maps, Google Earth and Preliminary Site Plan for Beaufort High Access by Andrews Engineering. Individual Parcel information for the subject sites was based on information included in Beaufort County GIS Mapping Site, Beaufort County Property Max Database, and Preliminary Site Plan for Beaufort High Access by Andrews Engineering and is presumed accurate. Value ranges for the various property types are established based on tax assessments in Beaufort County Property Max Database and are presumed accurate. All dollar totals have been rounded to the next one hundred dollars. The proposed project area or the individual sites have not been personally inspected. This Feasibility Study is not an appraisal

Alternative 1 Youmans Drive

Trask Development Company LLC

PIN Numbers: R123 015 000 0721 0000

Address: 100 Lady's Island Commons

Land Area: 1.21 acres

Improvements: 10,000 square foot 1 story Class s former Cinema and associated on sites

Use: Commercial

Acquisition: .10 Ac @$239,000 per acre	$23,900.00
Title (1 Parcel @ $1,000)	1,000.00
Appraisal	2,500.00
Environmentals	5,000.00
Total	$32,400.00

Lady's Island Commons Property Owner's Association, Inc.

Pin Number: R200 015 000 0875 0000

Address: N/A

Land Area: 1.39 Acre

Improvements: None

Use: Common Area

Acquisition: .10 Ac @ $228,000 per acre	$22,800.00
Title (1 Parcel @ $1,000)	1,000.00
Appraisal	2,500.00
Environmental	5,000.00
Total	$31,300.00

Alternative 1 Youmans Drive

Gloria E. Myers

PIN Numbers: R200 016 000 0056 0000

20 Red Oak Drive

Land Area: .25 acres

Improvements: 900 square foot one story residence

Use: Residential

Acquisition: .01 Acre @ $100,000 per acre	$1,000.00
Titles (1 Parcels @ $1,000 each)	1,000.00
Appraisal	2,500.00
Environmentals	5,000.00
Total	$9,500.00

Greggory L. & Catia Gilbert

PIN Numbers: R200 016 000 0057 0000

19 Red oak Drive

Land Area: .25 acres

Improvements: 1,530 square foot 1 story residence and associated on sites

Use: Residential

Acquisition: .01 acre @ $100,000 per acre	$1,000.00
Titles (1 Parcels @ $1,000 each)	1,000.00
Appraisal	2,500.00
Environmentals	5,000.00
Total	$9,500.00

Alternative 1 Youmans Drive

Kylie Hembree

PIN Numbers: R200 015 000 0184 0000

40 Youmans Drive

Land Area: .25 acre

Improvements: 576 square foot 1 story residence and associated on sites

Use: Residential

.01 acre @$100,000 per acre	$1,000.00
Titles (1 Parcels @ $1,000 each)	1,000.00
Appraisal	2,500.00
Environmentals	5,000.00
Total	$9,500.00

R & K Heape Properties LLC

PIN Numbers: R200 015 000 185A 0000

45 Youmans Drive

Land Area: .96 acre

Improvements: 1,040 square foot 1 story residence and associated on sites

Use: Residential

.03 acre @$26,100 per acre	$ 800.00
Titles (1 Parcels @ $1,000 each)	1,000.00
Appraisal	2,500.00
Environmentals	5,000.00
Total	$9,300.00

Alternate 1 Youmans Drive

Timothy Tantillo & Elaine M. Jtros

PIN Numbers: R200 015 000 156A 0000

69 Meridian Road

Land Area: .50 acre

Improvements: None

Use: Residential

.02 acre @$34,400 per acre	$ 700.00
Titles (1 Parcels @ $1,000 each)	1,000.00
Appraisal	2,500.00
Environmentals	5,000.00
Total	$9,200.00

Beaufort County School District

PIN Numbers: R200 015 000 0155 0000

1 Youmans Drive

Land Area: 40.91 acres

Improvements: School

Use: Institutional

.55 acre @$180,000 per acre	$ 99,000.00
Titles (1 Parcels @ $1,000 each)	1,000.00
Appraisal	5,000.00
Environmentals	5,000.00
Total	$110,000.00

Alternate 1 Youmans Drive

Beaufort County School District (Bus Turn Around)

PIN Numbers: R200 015 000 0155 0000

1 Youmans Drive

Land Area: 40.91 acres

Improvements: School

Use: Institutional

.72 acre @$180,000 per acre	$129,600.00
Titles (1 Parcels @ $1,000 each)	1,000.00
Appraisal	5,000.00
Environmentals	5,000.00
Total	$140,600.00

Beaufort Memorial Hospital

Pin Number: R200 015 000 128A 0000

Address: 117 Sea Island Parkway

Land Area: 1.61 Acres

Improvements: 8,451 square foot Class C hospital

Use: Medical Office

Acquisition: .58 Ac @ $276,800 per acre	$160, 600.00
Title (1 Parcel @ $1,000)	1,000.00
Appraisal	5,000.00
Environmental	5,000.00
Total	$171,600.00

Alternate 1 Youmans Drive

Total (All Parcels)	$536,900.00
Contingencies* (45%)	$241,700.00
Total Acquisition Costs	$778,600.00

Assumptions:

Unit values have been based on the current property tax assessments.

Beaufort Memorial Hospital will suffer no loss of parking as indicated on Plan Sheet 6 of 12 on the site plan dated 10-16-2019.

Unit value for the Lady's Island Commons Property Owner's Association has been based on the mean commercial value in the tax assessments.

Access to all properties will be maintained throughout construction.

Calculation of the bus turn around area is based on Sheet 1 of 12 of the site plan dated 10-16-2019.

*Contingencies include administrative settlements, settlement cost, title insurance labor and administrative overhead. Additionally, contingencies have been estimated at 45% because the tax assessed values appear low.

Alternative 2 Meridian Road

Beaufort County School District

PIN Numbers: R200 015 000 0155 0000

1 Youmans Drive

Land Area: 40.91 acres

Improvements: School

Use: Institutional

1.36 acre @$180,000 per acre	$244,800.00
Titles (1 Parcels @ $1,000 each)	1,000.00
Appraisal	5,000.00
Environmentals	5,000.00
Total	$255,800.00

Yvonne Magness & Sandra Pigler

PIN Numbers: R200 015 000 146E 0000

Address: 27 Meridian Road

Land Area: .43 acres

Improvements: None

Use: Residential

Acquisition: .43 Ac @$64,102 per acre	$25,000.00
Title (1 Parcel @ $1,000)	1,000.00
Appraisal	2,500.00
Environmentals	5,000.00
Total	$33,500.00

Alternate 2 Meridian Road

Mary R. Legree

Pin Number: R200 015 000 146C 0000

Address: 26 Meridian Road

Land Area: .80 Acres

Improvements: 725 square foot One story residence

Use: Residential

Acquisition: .03 Ac @ $45,180 per acre	$ 200.00
Title (1 Parcel @ $1,000)	1,000.00
Appraisal	2,500.00
Environmental	5,000.00
Total	$ 8,700.00

Total (All Parcels)	$298,000.00
Contingencies* (45%)	$134,100.00
Total Acquisition Costs	$432,100.00

Assumptions:

Unit values have been based on the current property tax assessments.

27 Meridian is considered an entire acquisition.

Access to all properties will be maintained throughout construction and there will be no interruption of business operations.

*Contingencies include administrative settlements, settlement cost, title insurance labor and administrative overhead. Additionally, contingencies have been estimated at 45% because the tax assessed values appear low.

Alternative 3 Sunset Boulevard

Three P's Partnership

PIN Numbers: R200 015 000 165A 0000

Address: 102 Sea Island Parkway

Land Area: 2.95 acres

Improvements: 33,268 square foot 1 story Class C shopping center and associated on sites

Use: Commercial

Acquisition: .16 Ac @$277,500 per acre	$ 44,400.00
Severed Land: .10 Ac @ $277,500 per acre	27,800.00
Damages for loss of parking $379,200 x 35%	132,800.00
Title (1 Parcel @ $1,000)	1,000.00
Appraisal	5,000.00
Environmentals	5,000.00
Total	$216,000.00

Three P's Partnership

PIN Numbers: R200 015 000 0165 0000

Address: 94 Sea Island Parkway

Land Area: 4.04 acres

Improvements: 8,400 square foot 1 story Class C shopping center and associated on sites

Use: Commercial

Acquisition: .50 Ac @$134,900 per acre	$ 67,500.00
Severed Land: .18 Ac @ $134,900 per acre	24,300.00
Damages for loss of parking $81,800 x 40%	32,800.00
Title (1 Parcel @ $1,000)	1,000.00
Appraisal	5,000.00
Environmentals	5,000.00
Total	$135,600.00

Alternative 3 Sunset Boulevard

Three P's Partnership

PIN Numbers: R200 015 000 0163 0000	
Address: 88 Sea Island Parkway	
Land Area: 1.6 acres	
Improvements: None	
Use: Commercial	
Acquisition: .26 Ac @$211,100 per acre	$ 54,900.00
Severed Land: .16 Ac @ $211,100 per acre	33,800.00
Title (1 Parcel @ $1,000)	1,000.00
Appraisal	2,500.00
Environmentals	5,000.00
Total	$ 97,200.00

Lady's Island Commons Property Owner's Association, Inc.

Pin Number: R200 015 000 0875 0000	
Address: N/A	
Land Area: 1.39 Acre	
Improvements: None	
Use: Common Area	
Acquisition: .04 Ac @ $228,000 per acre	$ 9,200.00
Title (1 Parcel @ $1,000)	1,000.00
Appraisal	2,500.00
Environmental	5,000.00
Total	$17,700.00

Alternative 3 Sunset Boulevard

Trask Development Company LLC

PIN Numbers: R123 015 000 0721 0000

Address: 100 Lady's Island Commons

Land Area: 1.21 acres

Improvements: 10,000 square foot 1 story Class s former Cinema and associated on sites

Use: Commercial

Acquisition: .17 Ac @$239,000 per acre	$ 40,700.00
Severed Land: .23 Ac @ $239,000 per acre	55,000.00
Title (1 Parcel @ $1,000)	1,000.00
Appraisal	2,500.00
Environmentals	5,000.00
Total	$104,200.00

Total (All Parcels)	$570,700.00
Contingencies* (45%)	$256,900.00
Total Acquisition Costs	$827,600.00

Assumptions:

Severed land has been calculated based on Plan Sheet 10 of 12 in the Preliminary Site Plan for Beaufort High Access dated 10-16-2019.

Parking loss has been estimated at the Lady's Island Center by Google Earth Aerial Images. Damages have been estimated based on a percentage of the assessed value of the improvements. Parcel R200 015 000 165A 0000, 102 Sea Island Parkway, is estimated to lose 20 of 56 spaces or 35% of the parking. Parcel R200 015 000 0165 0000, 94 Sea Island Parkway, is estimated to lose 9 of 22 spaces or 40%. If the project requires these parcels to be acquired in their entirety the estimate would be $1,834,700 (Assessed Value) plus relocation costs which will be substantial. Right of way clearance time for this acquisition would be 24 to 36 months minimum.

Unit values have been based on the current property tax assessments.

Unit value for the Lady's Island Commons Property Owner's Association has been based on the mean commercial value in the tax assessments.

Access to all properties will be maintained throughout construction.

*Contingencies include administrative settlements, settlement cost, title insurance, labor and administrative overhead. Additionally, contingencies have been estimated at 45% because the tax assessed values appear low.