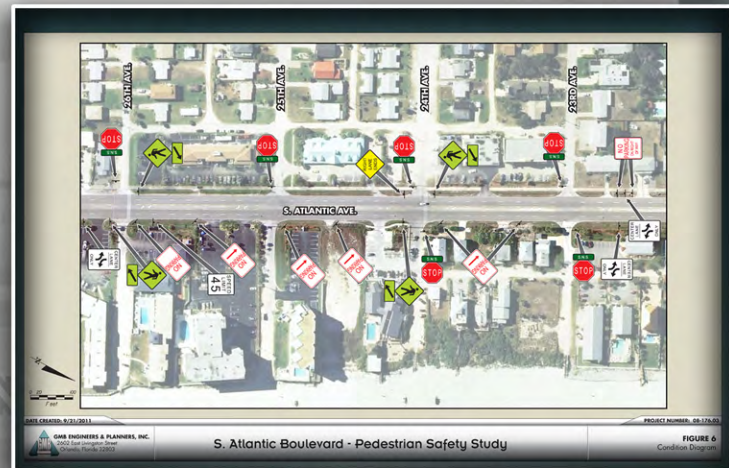




# Pedestrian Safety Study

For South Atlantic Avenue (CR AIA)  
From New Smyrna Beach City Limits to 3rd Avenue

January, 2012



Prepared for:  
Volusia TPO  
Daytona Beach, FL

Prepared by:  
GMB Engineers & Planners, Inc.  
Orlando, FL





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For South Atlantic Avenue (CR A1A)

From New Smyrna Beach City Limits to 3<sup>rd</sup> Avenue

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Prepared for:

**Volusia Transportation Planning Organization (VTPO)**

Daytona Beach, FL

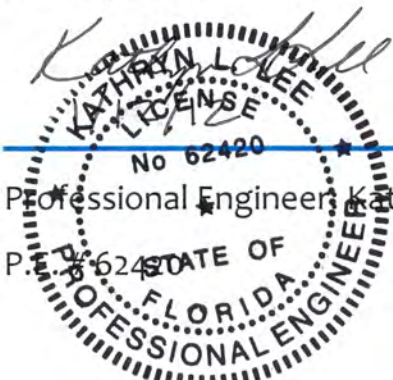
Prepared by:

**GMB Engineers & Planners, Inc.**

Orlando, FL

January 2012

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Professional Engineer Kathryn L. Lee  
P.E. No. 62420  
STATE OF FLORIDA  
PROFESSIONAL ENGINEER

## Table of Contents

<b>1</b>	<b>EXECUTIVE SUMMARY .....</b>	<b>1</b>
<b>2</b>	<b>INTRODUCTION.....</b>	<b>4</b>
<b>3</b>	<b>EXISTING CONDITIONS .....</b>	<b>5</b>
3.1	CORRIDOR DESCRIPTION.....	5
3.2	PEDESTRIAN AND BICYCLE ANALYSIS .....	20
3.3	CRASH ANALYSIS .....	25
3.4	VEHICLE GAP SIZE ANALYSIS.....	40
3.5	LOS AND AADT .....	42
<b>4</b>	<b>QUALITATIVE ASSESSMENT.....</b>	<b>44</b>
<b>5</b>	<b>BENEFICIAL MEASURES .....</b>	<b>47</b>
	<b>APPENDIX.....</b>	<b>68</b>

## Index of Tables

TABLE 1: COMPARISON OF BENEFICIAL MEASURES.....	2
TABLE 2: SUMMARY OF CROSSWALK MEASURES.....	3
TABLE 3: MARKED CROSSWALK INVENTORY .....	8
TABLE 4: CRASH SUMMARY .....	27
TABLE 5: GAP SUMMARY FOR S. ATLANTIC AVENUE AT 20TH AVENUE .....	41
TABLE 6: 85TH PERCENTILE SPEED AND 10 MPH PACE.....	45

## Index of Figures

FIGURE 1: LOCATION MAP.....	7
FIGURE 2-A: EXISTING CONDITION DIAGRAM .....	9
FIGURE 2-B: EXISTING CONDITION DIAGRAM.....	10
FIGURE 2-C: EXISTING CONDITION DIAGRAM.....	11
FIGURE 2-D: EXISTING CONDITION DIAGRAM .....	12
FIGURE 2-E: EXISTING CONDITION DIAGRAM.....	13
FIGURE 2-F: EXISTING CONDITION DIAGRAM.....	14
FIGURE 2-G: EXISTING CONDITION DIAGRAM.....	15
FIGURE 2-H: EXISTING CONDITION DIAGRAM .....	16
FIGURE 2-I: EXISTING CONDITION DIAGRAM .....	17
FIGURE 2-J: EXISTING CONDITION DIAGRAM .....	18
FIGURE 2-K: EXISTING CONDITION DIAGRAM .....	19
FIGURE 3: 8-HOUR PEDESTRIAN/BIKE VOLUMES.....	22
FIGURE 4: 4-HR PEDESTRIAN/BIKE VOLUMES CROSSING S. ATLANTIC AVE. ....	23
FIGURE 5: PEAK 1-HOUR PEDESTRIAN/BIKE VOLUMES CROSSING S. ATLANTIC AVE. ....	24
FIGURE 6: 42-MONTH CRASH ANALYSIS.....	28
FIGURE 7-A: CRASH DIAGRAM.....	29
FIGURE 7-B: CRASH DIAGRAM.....	30
FIGURE 7-C: CRASH DIAGRAM.....	31
FIGURE 7-D: CRASH DIAGRAM.....	32



FIGURE 7-E: CRASH DIAGRAM .....	33
FIGURE 7-F: CRASH DIAGRAM .....	34
FIGURE 7-G: CRASH DIAGRAM .....	35
FIGURE 7-H: CRASH DIAGRAM .....	36
FIGURE 7-I: CRASH DIAGRAM .....	37
FIGURE 7-J: CRASH DIAGRAM .....	38
FIGURE 7-K: CRASH DIAGRAM .....	39
FIGURE 8: AADT AND LOS COMPARISON FOR S. ATLANTIC AVE. ....	43
FIGURE 9: EXISTING CROSS SECTIONS .....	51
FIGURE 10: PROPOSED CROSS SECTIONS WITH 4' PAVED SHOULDERS.....	52
FIGURE 11: PROPOSED CROSS SECTIONS WITH 5' PAVED SHOULDERS.....	53
FIGURE 12: RECTANGULAR RAPID WARNING FLASHING BEACON WITH PEDESTRIAN CROSSING WARNING SIGNS .....	55
FIGURE 13: PEDESTRIAN CROSSING FLAG IN USE .....	58
FIGURE 14 MEDIAN REFUGE ISLAND .....	59
FIGURE 15: CONCEPTUAL MEDIAND REFUGE ISLAND ON S. ATLANTIC AVENUE .....	60
FIGURE 16: ADVANCE YIELD MARKINGS WITH SIGNS .....	62

# 1 EXECUTIVE SUMMARY

GMB Engineers & Planners has performed a Pedestrian Safety Study for S. Atlantic Avenue from the New Smyrna Beach city limits to 3<sup>rd</sup> Avenue in Volusia County, Florida. Within the study limits, S. Atlantic Avenue is a two-lane undivided roadway with a bi-directional left turn lane and a posted speed limit of 45 mph between the City Limits and 27<sup>th</sup> Avenue, a four-lane undivided roadway with a bi-directional left turn lane and a posted speed limit of 45 mph from 27<sup>th</sup> Avenue to 7<sup>th</sup> Avenue, and a four-lane undivided roadway with a bi-directional left turn lane and a posted speed limit of 40 mph from 7<sup>th</sup> Avenue to 3<sup>rd</sup> Avenue. The purpose of the Study is to evaluate the corridor and determine what measures could be taken to improve pedestrian and bicyclist safety within it. Numerous beneficial measures are identified in the report, but it should be noted that these are suggestions only, and it should be incumbent on the City of New Smyrna Beach and Volusia County to reach a consensus of how the road should be classified and determine which measures would be the most beneficial to the community as a whole. Based on the results of pedestrian and vehicular volumes, crash analysis and observations in the field, the following Comparison of Beneficial Measures and Summary of Crosswalk Measures are presented for consideration:

**TABLE 1: COMPARISON OF BENEFICIAL MEASURES**

<b>MEASURE</b>		<b>INCREASES PED SAFETY</b>	<b>INCREASES BIKE SAFETY</b>	<b>DECREASES VEHICULAR SPEED</b>	<b>APPROXIMATE COST</b>
1	Consider installing continuous bicycle facilities along S. Atlantic Avenue				
	a) 4' Paved Shoulders	N	Y	N	\$136k
	b) 5' Paved Shoulders	N	Y	P	\$400k
2	Consider installing sidewalk along east side of S. Atlantic Ave. between 27 <sup>th</sup> Avenue and 7 <sup>th</sup> Avenue	Y	N	N	\$150K
3	Consider installing RRFBS (Rectangular Rapid Flashing Beacons) at Oyster Quay, 24 <sup>th</sup> Avenue, 7 <sup>th</sup> Avenue, 18 <sup>th</sup> Avenue & 12 <sup>th</sup> Avenue	Y	P	P	\$10K/intersection \$50K Total
4	Consider supplying pedestrian flags. Can be used at all non-signalized crosswalks. Good candidates are 26 <sup>th</sup> Avenue, 20 <sup>th</sup> Avenue, 15 <sup>th</sup> Avenue, 8 <sup>th</sup> Avenue	Y	N	N	\$3.00/flag
5	Consider installing median refuge islands at mid-block crosswalks south of Sea Woods Boulevard and south of Bahama Drive <sup>1</sup>	Y	Y	Y	\$4,000/island
6	Consider installing advance yield markings with signs. Can be used at all crosswalks without existing or proposed active treatments. Good candidates are 26 <sup>th</sup> Avenue, 20 <sup>th</sup> Avenue, 15 <sup>th</sup> Avenue, 8 <sup>th</sup> Avenue and 6 <sup>th</sup> Avenue/7 <sup>th</sup> Avenue mid-block crossing	Y	Y	N	\$1,500/intersection
7	Consider installing on-street parking along S. Atlantic Avenue	P	P	Y	\$400K

Y=Yes, N=No, P=Possibly

<sup>1</sup>Consideration should be given to having an Access Management Study completed to determine the necessity of providing full access along the corridor and left turns into and out of the side streets.



**TABLE 2: SUMMARY OF CROSSWALK MEASURES**

LOCATION	CROSSWALK TYPE	TRAFFIC CONTROL	CROSSING NUMBER OF LANES	POSTED SPEED LIMIT (MPH)	PED CROSSING SIGNS (W11-2)	LIGHTING	CROSSWALK SPACING (FT)	CUMMULATIVE CROSSWALK SPACING (FT)	POTENTIAL MEASURE
Beginning of Project	N/A	N/A	3	45	No	No	-	-	-
S of Sea Woods Blvd	Mid Block	None	3	45	Yes	No	1,345	1,345	Ped Refuge Island
Oyster Quay	Intersection	None	3	45	Yes	Yes	1,125	2,470	RRFB
Mathews Ave	Intersection	Ped Signal	3	45	Yes	Yes	1,105	3,575	None
S. of Bahama Dr.	Mid Block	None	3	45	Yes	No	560	4,135	Ped Refuge Island
27th Ave	Intersection	Signal	5	45	No	Yes	250	6,685	None
26th Ave	Intersection	None	5	45	Yes	Yes	360	7,045	Flag/Yield Marking
24th Ave	Intersection	None	5	45	Yes	Yes	705	7,750	RRFB
20th Ave	Intersection	None	5	45	Yes	Yes	1,400	9,150	Flag/Yield Marking
18th Ave	Intersection	None	5	45	Yes	Yes	700	9,850	RRFB
15th Ave	Intersection	None	5	45	Yes	Yes	1,050	10,900	Flag/Yield Marking
12th Ave	None	None	5	45	No	Yes	1,040	11,940	RRFB
8th Ave	Intersection	None	5	45	Yes	Yes	2,450	14,390	Flag/Yield Marking
7th Ave	Intersection	None	5	40	No	Yes	360	14,750	RRFB
6th Ave & 7th Ave	Mid Block	None	5	40	Yes	Yes	145	14,895	Yield Markings
3rd Ave	Intersection	Signal	5	40	No	Yes	1,235	16,130	None

13,830

Total =	2.62	miles
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## 2 INTRODUCTION

GMB Engineers & Planners was retained to perform a Pedestrian Safety Study along S. Atlantic Avenue (CR A1A) from New Smyrna Beach city limits to 3<sup>rd</sup> Avenue. The purpose of the study is to evaluate existing pedestrian crosswalks and determine if additional countermeasures are needed to facilitate a safe and convenient pedestrian crossing of S. Atlantic Avenue (CR A1A). The Study was prompted by citizen concerns about crossing S. Atlantic Avenue during the busy summer and holiday seasons with the heavy vehicular volumes and excessive speeds. The study includes traffic data, corridor diagrams, a sign inventory, collision analysis and diagrams, and recommendations. The analysis methods used in conducting this study are consistent with those explained in the latest Manual on Uniform Traffic Control Devices (MUTCD), the Florida Department of Transportation (FDOT) Plans Preparation Manual (PPM), the Traffic Engineering Manual (TEM) and the FDOT Manual on Uniform Traffic Studies (MUTS).

## 3 EXISTING CONDITIONS

### 3.1 CORRIDOR DESCRIPTION

S. Atlantic Avenue is a north-south roadway which extends from the Canaveral National Seashore up to SR 44 in New Smyrna Beach. The project corridor is located within the city limits of New Smyrna Beach and is approximately 2.86 miles in length, extending north from the New Smyrna Beach City Limits to 3<sup>rd</sup> Avenue. S. Atlantic Avenue is functionally classified as an Urban Arterial and is the maintenance responsibility of Volusia County. The study limits are illustrated in the Project Location Map provided as Figure 1.

From the New Smyrna Beach city limits (begin project limits) to 27<sup>th</sup> Avenue, S. Atlantic Avenue has open swale drainage, and is a three-lane roadway with a center two-way left turn lane (TWLTL) and 4' paved shoulders. From 27<sup>th</sup> Avenue to 7<sup>th</sup> Avenue, S. Atlantic Avenue is a 5-lane roadway with a center TWLTL and no paved shoulders, and from 7<sup>th</sup> Avenue to 3<sup>rd</sup> Avenue (end project limits), S. Atlantic Avenue has curb and gutter and is a 5-lane roadway with a center TWLTL and 4' paved shoulders. The surrounding land use within the study limits is primarily condominiums, scattered single family homes and light commercial properties along the east side of S. Atlantic Avenue. The west side of S. Atlantic Avenue accommodates primarily residential with occasional condominiums and light commercial properties. The posted speed limit along the study corridor is 45 mph from the beginning of the project to just north of 7<sup>th</sup> Avenue, and 40 mph from just north of 7<sup>th</sup> Avenue to the end of the project.

Going south to north, 5' sidewalks are provided along both sides of S. Atlantic Avenue from the beginning of the project to 27<sup>th</sup> Avenue (1.27 miles). From 27<sup>th</sup> Avenue to 7<sup>th</sup> Avenue (1.33 miles), an 8' sidewalk is provided only along the west side of the road. From 7<sup>th</sup> Avenue to the end of the project (0.26 miles), 5' sidewalks are provided again along both sides of the road.

The corridor provides lighting for pedestrians except at the mid-block crossings south of Sea Woods Boulevard and south of Bahama Drive. Luminaires are arm mounted randomly to some of the utility poles which mostly run along the east side of the corridor behind the sidewalk from the beginning of the project to 7<sup>th</sup> Avenue. From there, lighting arms are staggered uniformly from 7<sup>th</sup> Avenue to the end of the study corridor at 3<sup>rd</sup> Avenue.



Fourteen marked pedestrian crosswalks (including 3<sup>rd</sup> Avenue) are provided along the corridor. Three of these crosswalks are mid-block and the remaining eleven are at intersections. The S. Atlantic Avenue crossings at Mathews Avenue, 27<sup>th</sup> Avenue and 3<sup>rd</sup> Avenue are signalized and the remaining intersection crosswalks are stop controlled on the side streets. Pedestrian crosswalk warning signs (W11-2) supplemented by down diagonal arrow plaques (W16-7) are provided at all crosswalks except 27<sup>th</sup> Avenue and 7<sup>th</sup> Avenue, where instead, the pedestrian warning sign is supplemented by an “Ahead” (W-16-9p) plaque, warning drivers in advance of the crosswalk. 3<sup>rd</sup> Avenue does not have any pedestrian crosswalk warning signs on either approach. Additionally, in-street pedestrian crosswalk signs (R1-6) are provided at the 20<sup>th</sup> Avenue crossing. From the beginning of the project up to the midblock crossing south of Bahama Dr., the crosswalks span across 3 lanes of traffic, while the remaining crosswalks starting from 27<sup>th</sup> Avenue through the end of the project at 3<sup>rd</sup> Avenue span across 5 lanes. Table 3 provides a crosswalk inventory for the corridor and Figures 2-A through 2-K depict the existing conditions within the study corridor.



DATE CREATED: 10/4/2011

PROJECT NUMBER: 08-176.03



**GMB ENGINEERS & PLANNERS, INC.**  
2602 East Livingston Street  
Orlando, Florida 32803

## S. Atlantic Avenue Pedestrian Safety Study

**FIGURE 1**  
Project Location Map

**TABLE 3: MARKED CROSSWALK INVENTORY**

LOCATION	CROSSWALK TYPE	TRAFFIC CONTROL	CROSSING NUMBER OF LANES	POSTED SPEED LIMIT (MPH)	PED CROSSING SIGNS (W11-2)	LIGHTING	CROSSWALK SPACING (FT)	CUMMULATIVE CROSSWALK SPACING (FT)
Beginning of Project	N/A	N/A	3	45	No	No	-	-
S of Sea Woods Blvd	Mid Block	None	3	45	Yes	No	1,345	1,345
Oyster Quay	Intersection	None	3	45	Yes	Yes	1,125	2,470
Mathews Ave	Intersection	Ped Signal	3	45	Yes	Yes	1,105	3,575
S. of Bahama Dr.	Mid Block	None	3	45	Yes	No	560	4,135
27th Ave	Intersection	Signal	5	45	No	Yes	250	6,685
26th Ave	Intersection	None	5	45	Yes	Yes	360	7,045
24th Ave	Intersection	None	5	45	Yes	Yes	705	7,750
20th Ave	Intersection	None	5	45	Yes	Yes	1,400	9,150
18th Ave	Intersection	None	5	45	Yes	Yes	700	9,850
15th Ave	Intersection	None	5	45	Yes	Yes	1,050	10,900
12th Ave	None	None	5	45	No	Yes	1,040	11,940
8th Ave	Intersection	None	5	45	Yes	Yes	2,450	14,390
7th Ave	Intersection	None	5	40	No	Yes	360	14,750
6th Ave & 7th Ave	Mid Block	None	5	40	Yes	Yes	145	14,895
3rd Ave	Intersection	Signal	5	40	No	Yes	1,235	16,130

13,830

<b>Total =</b>	<b>2.62</b>	<b>miles</b>
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DATE CREATED: 9/14/2011

PROJECT NUMBER: 08-176.03

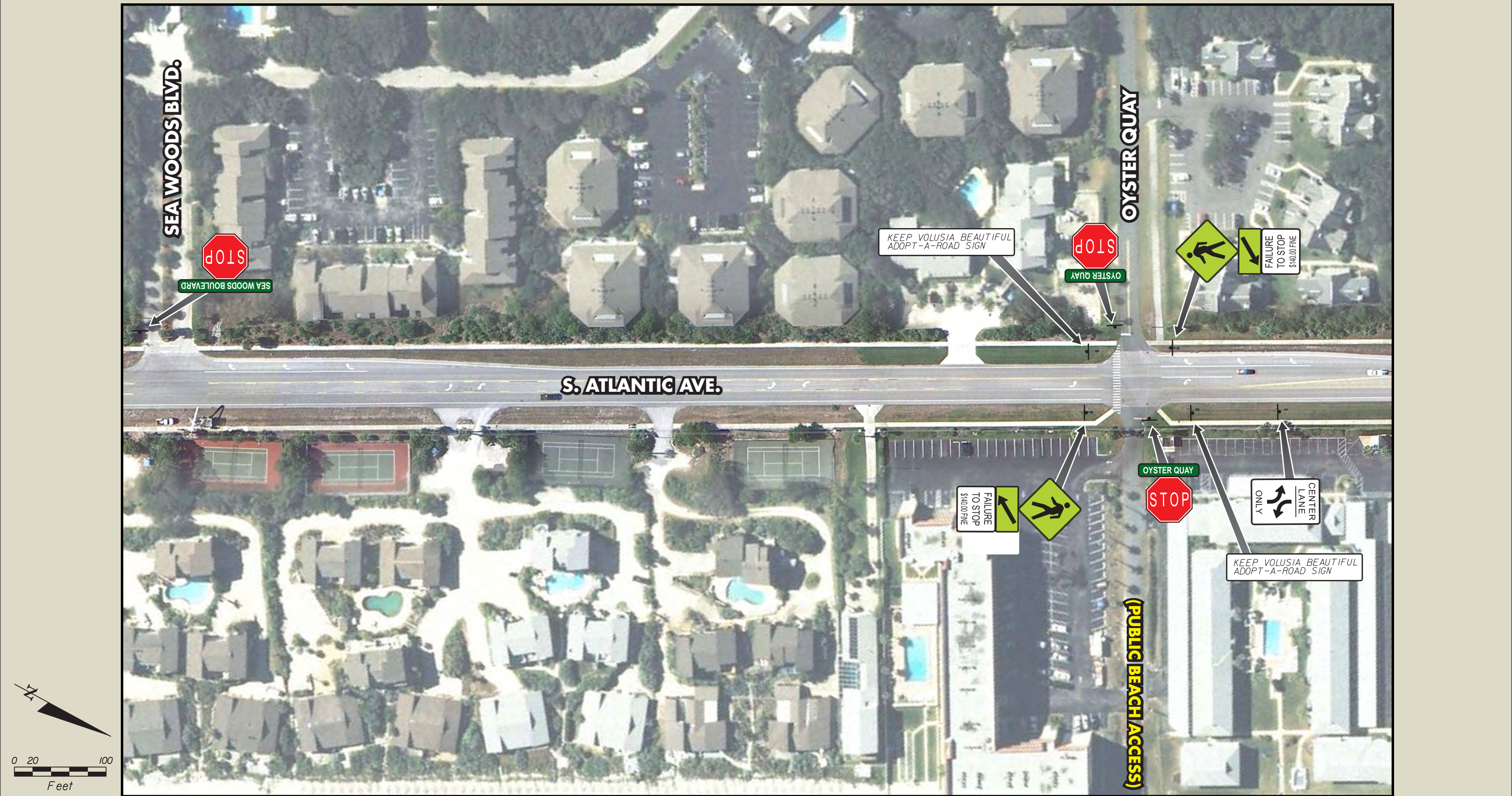


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Orlando, Florida 32803

## S. Atlantic Avenue - Pedestrian Safety Study

**FIGURE 2-A**  
Condition Diagram





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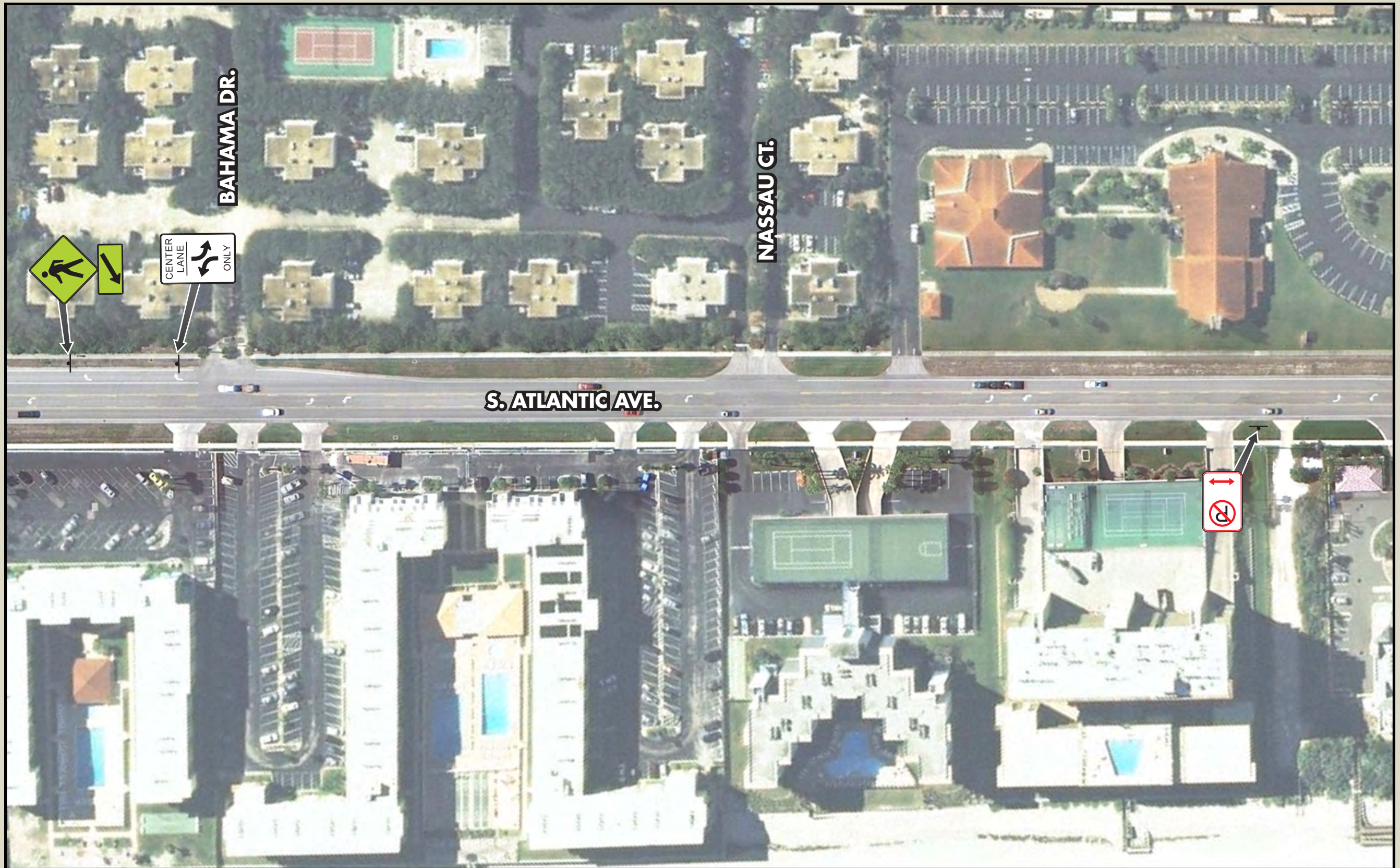




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PROJECT NUMBER: 08-176.03





DATE CREATED: 9/16/2011

PROJECT NUMBER: 08-176.03

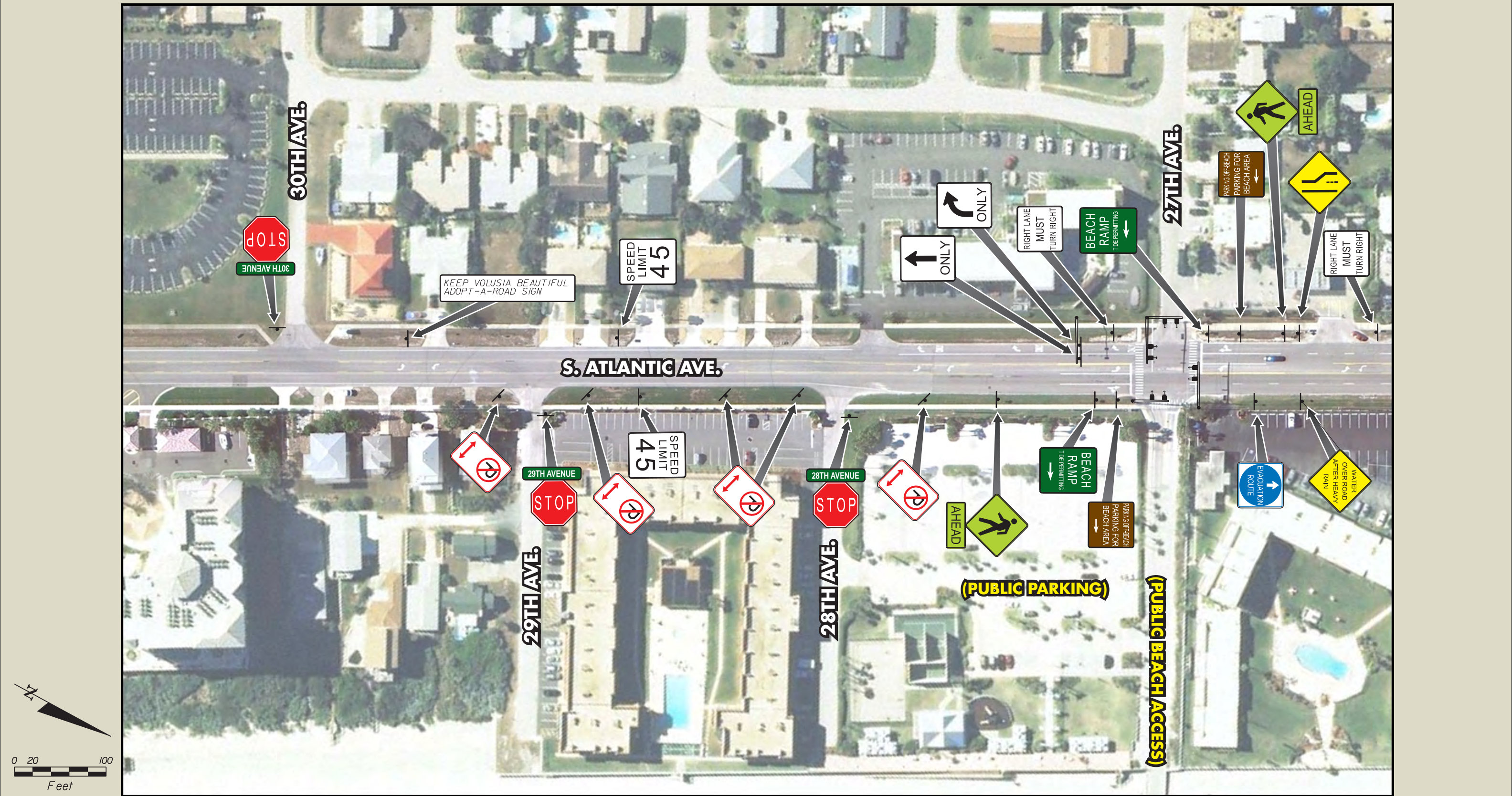


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2602 East Livingston Street  
Orlando, Florida 32803

## S. Atlantic Avenue - Pedestrian Safety Study

**FIGURE 2-D**  
Condition Diagram





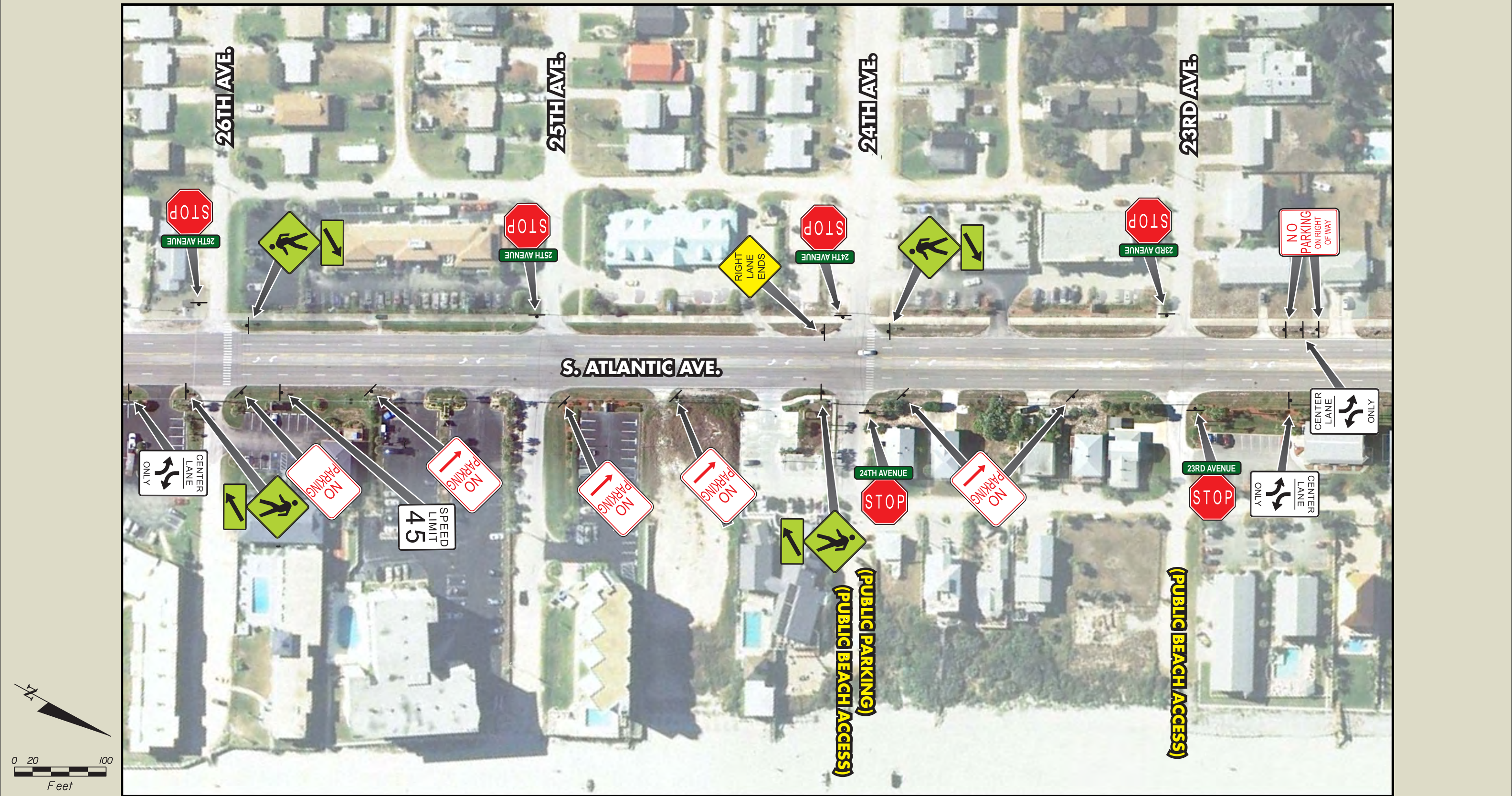
DATE CREATED: 9/16/2011

PROJECT NUMBER: 08-176.03

# S. Atlantic Avenue - Pedestrian Safety Study

**FIGURE 2-E**  
 Condition Diagram





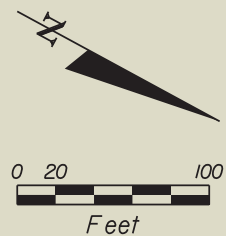
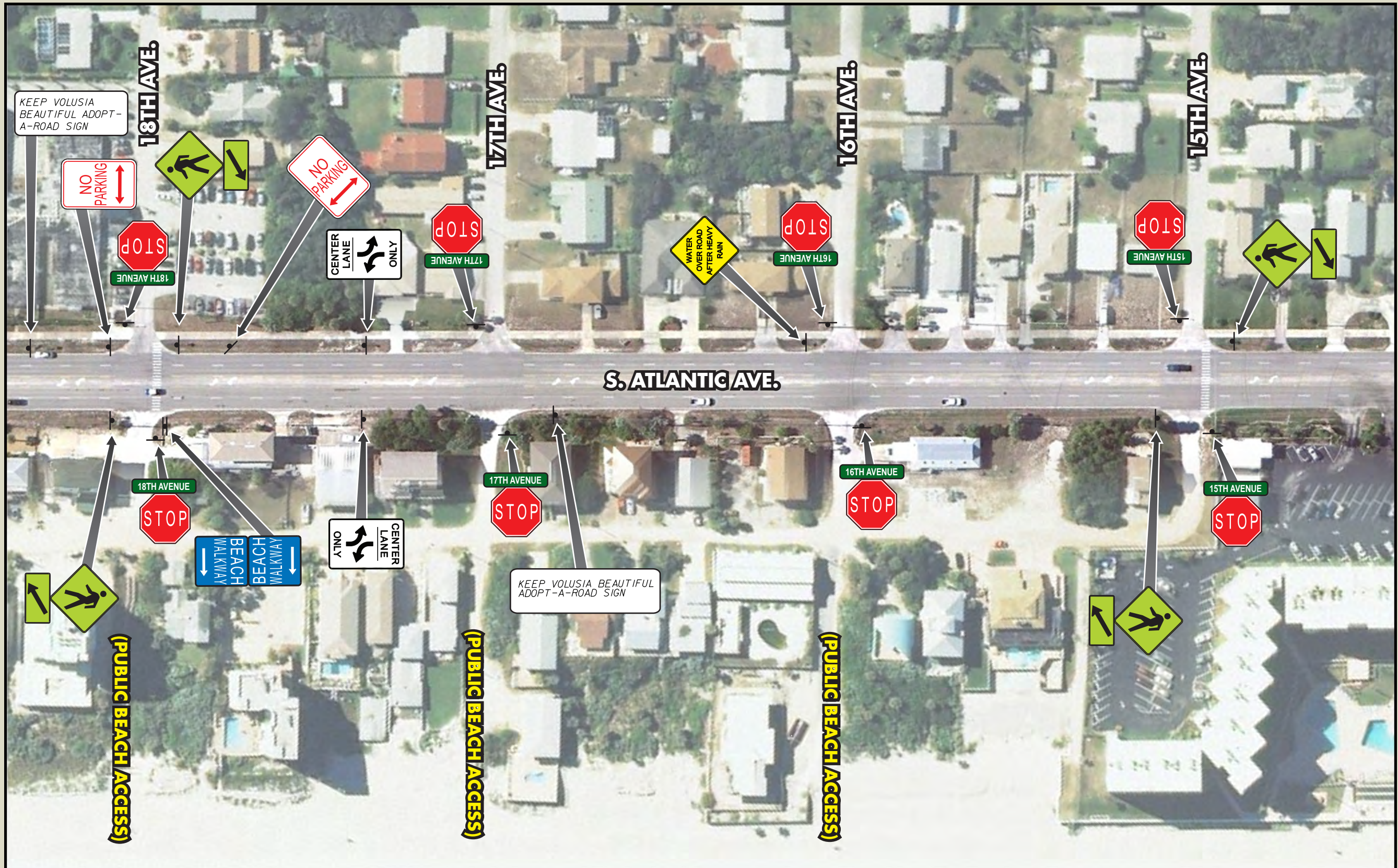




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PROJECT NUMBER: 08-176.03

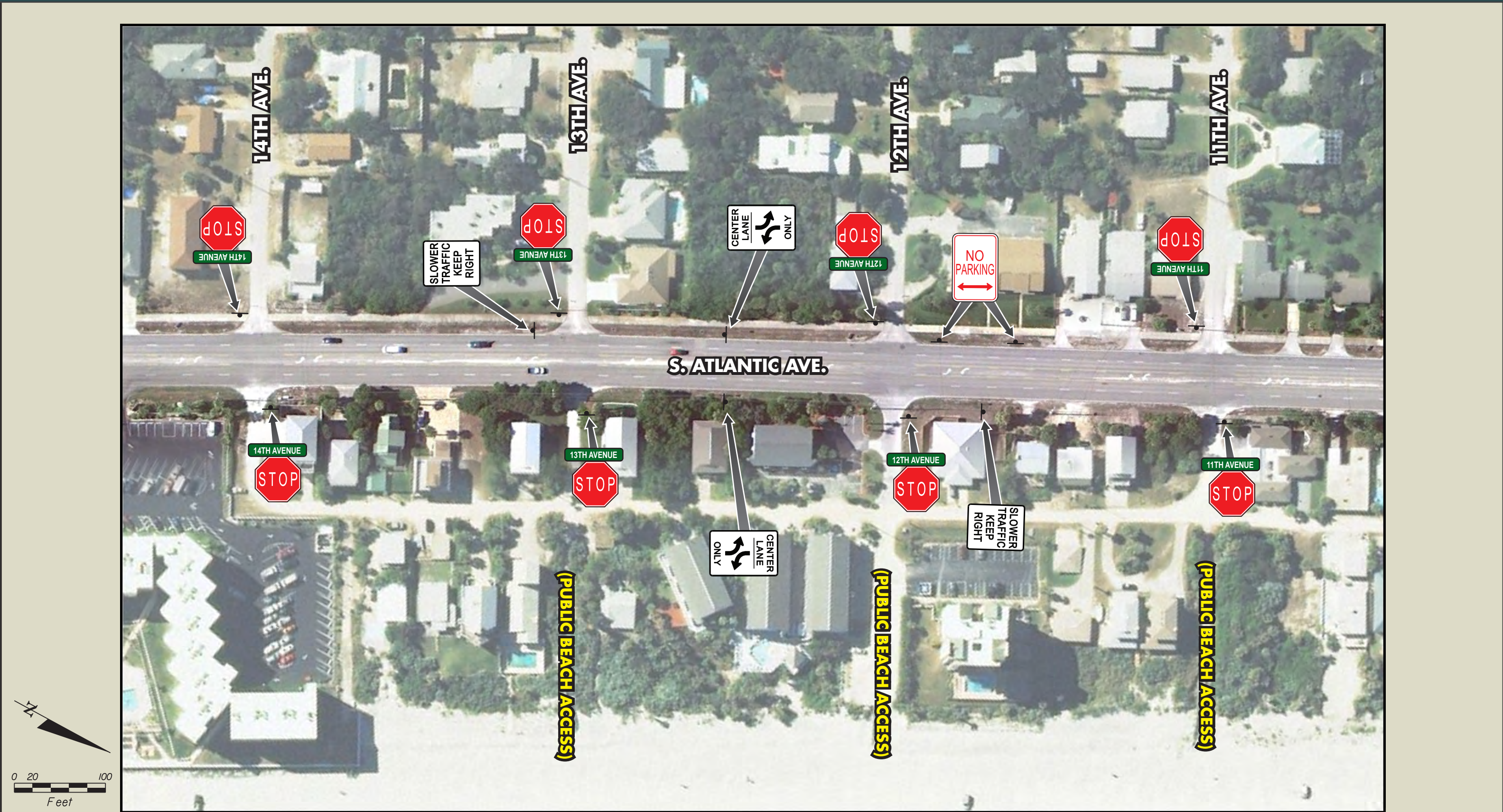




DATE CREATED: 9/22/2011

PROJECT NUMBER: 08-176.03





DATE CREATED: 9/22/2011

PROJECT NUMBER: 08-176.03

## S. Atlantic Avenue - Pedestrian Safety Study

**FIGURE 2-I**  
Condition Diagram

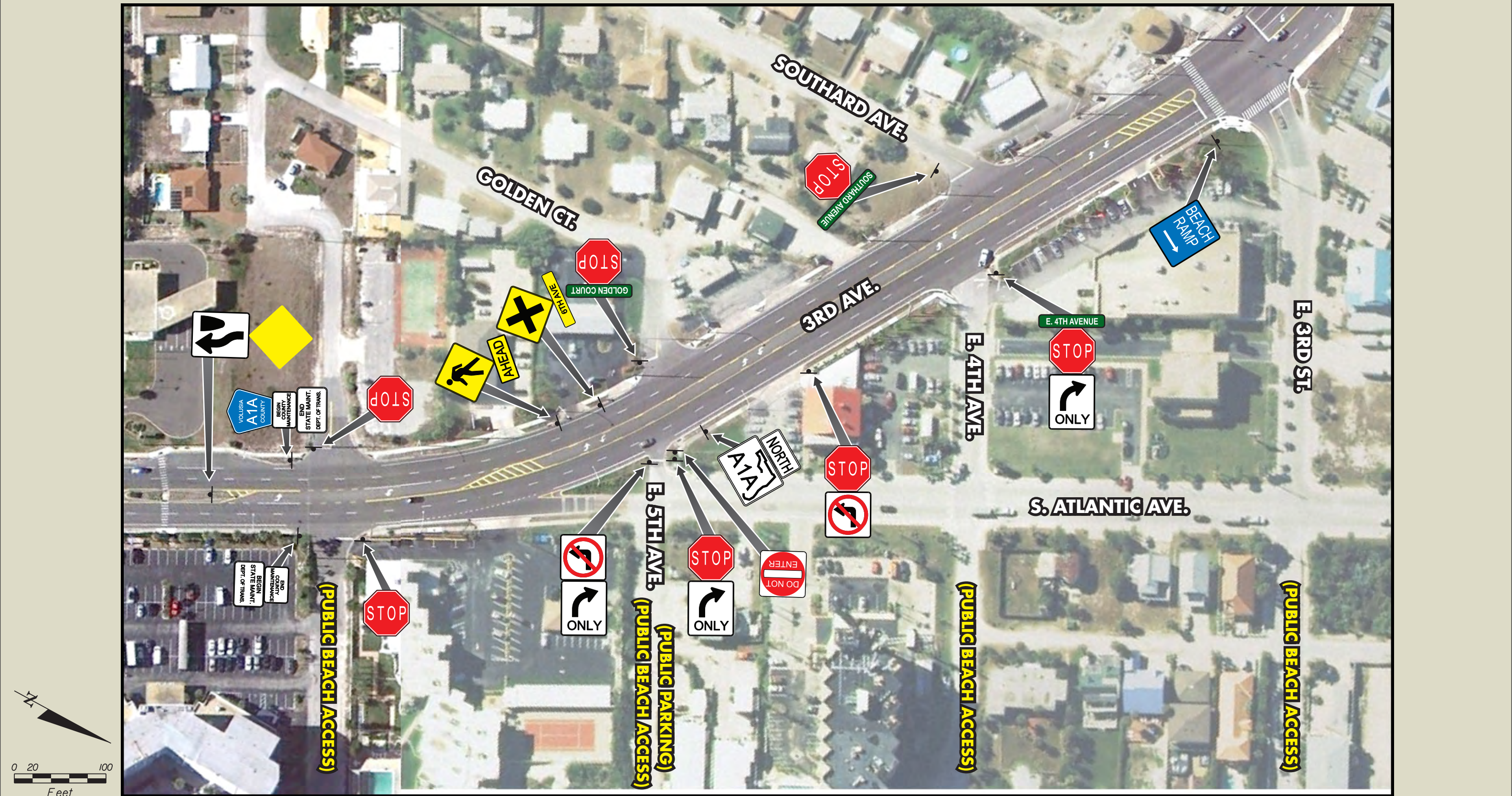




DATE CREATED: 9/22/2011

PROJECT NUMBER: 08-176.03





DATE CREATED: 9/22/2011

PROJECT NUMBER: 08-176.03

## S. Atlantic Avenue - Pedestrian Safety Study

**FIGURE 2-K**  
 Condition Diagram



### 3.2 PEDESTRIAN AND BICYCLE ANALYSIS

Pedestrian and bicycle counts were collected for S. Atlantic Avenue at the following locations:

- Mid-block between 6<sup>th</sup> Ave. and 7<sup>th</sup> Ave.
- 7<sup>th</sup> Avenue
- 8<sup>th</sup> Avenue
- 9<sup>th</sup> Avenue (unmarked crosswalk)
- 12<sup>th</sup> Avenue (unmarked crosswalk)
- 15<sup>th</sup> Avenue
- 18<sup>th</sup> Avenue
- 20<sup>th</sup> Avenue
- 24<sup>th</sup> Avenue
- 26<sup>th</sup> Avenue
- 27<sup>th</sup> Avenue
- Mid-block south of Bahama Dr.
- Matthews Avenue
- Oyster Quay
- Mid-block south of Sea Woods Blvd.

The intersections at 9<sup>th</sup> Avenue and 12<sup>th</sup> Avenue were selected for analysis by the City of New Smyrna Beach and the remaining intersections were selected by Volusia TPO. All of the locations are at marked crosswalks except for 9<sup>th</sup> Avenue and 12<sup>th</sup> Avenue. Based on the approval from Volusia TPO, Volusia County and the City of New Smyrna Beach, 8-hour pedestrian and bicycle counts were collected from 10 am to 1 pm and from 2 pm to 7 pm on September 3<sup>rd</sup> and 4<sup>th</sup>, 2011 (Labor Day Weekend). The weather conditions were warm and sunny and conducive to beach-going. The data provided for 18<sup>th</sup> Avenue and 20<sup>th</sup> Avenue was collected as part of a separate report completed for Volusia County. Of the total volumes collected, 55% were pedestrians and the remaining 45% were bicyclists.

For the purposes of this study, the collected volumes were broken down to focus only on pedestrians and bicyclists crossing S. Atlantic Avenue. Figures 3, 4 and 5 depict the 8-Hour Pedestrian and Bike Volumes, the Peak 4-Hour Pedestrian and Bike Volumes and the Peak 1-Hour Pedestrian and Bike Volumes, respectively. In locations where marked crosswalks are acceptable, the report “Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations” published by the Federal Highway Administration (FHWA) recommends 20 pedestrian crossings per peak hour as the threshold volume where higher priority should be placed on their use. The mid-block pedestrian crosswalk criteria, provided in Section 3.8 of the TEM also uses 20 pph for the 1-hour peak, but includes a 4-hour peak as well, which is 60 pph. The pedestrian counts show that the peak 1-hour and peak 4-hour criteria for mid-block crosswalks are not met at any of the mid-block crosswalks. It should be noted that the TEM bases demand on three consecutive days of data collection and includes pedestrian volumes observed crossing the roadway outside the crosswalk at or within the vicinity of the study location, or at an adjacent intersection. The

pedestrian volumes collected for the study are for one day only. For non mid-block crosswalks, the threshold for higher priority is met at Matthews Avenue, 27<sup>th</sup> Avenue and 24<sup>th</sup> Avenue. The higher volumes observed at Matthews Avenue are likely attributable to Food Lion on the west side of S. Atlantic Avenue, which offers free and virtually unlimited parking that beachgoers can take advantage of. The higher volumes at 27<sup>th</sup> Avenue can likely be attributed to the interaction between the large public beach parking lot in the southeast corner of the intersection and the 7-Eleven in the northwest corner of the intersection, and the higher volumes observed at 24<sup>th</sup> Avenue are likely attributable to a public and valet parking lot on the west side of S. Atlantic Avenue which provides parking for a beach access point and a popular waterfront bar on the east side of S. Atlantic Avenue. The criteria is also considered met at Oyster Quay, 26<sup>th</sup> Avenue and 7<sup>th</sup> Avenue since the peak volumes at these locations, 19 pedestrians per hour (pph), 16 pph and 17 pph, respectively, are very close to the threshold value, and could easily surpass it on a different count day. Details of the pedestrian/bicycle data are included in the Appendix.



FIGURE 3: 8-HOUR PEDESTRIAN/BIKE VOLUMES

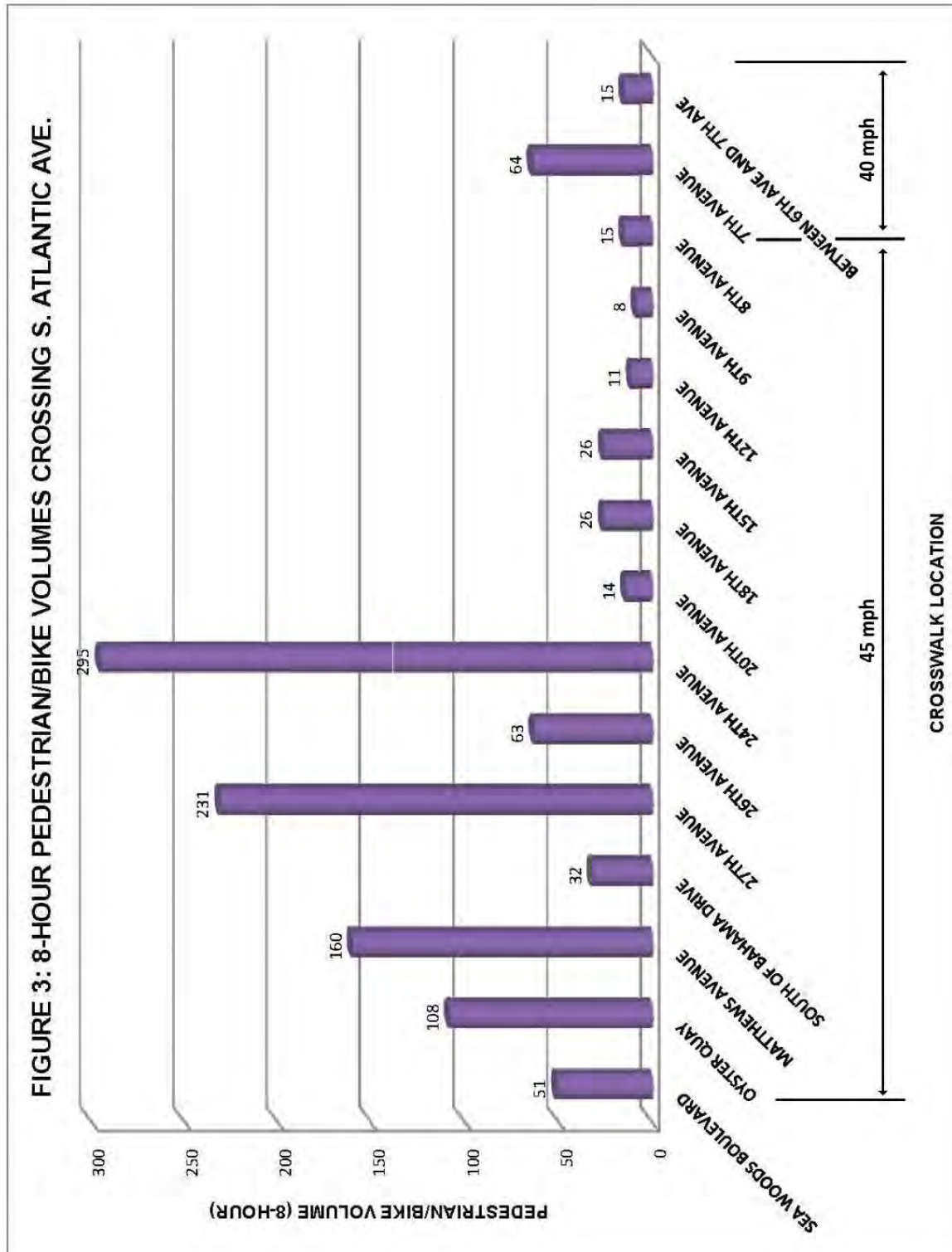


FIGURE 4: 4-HR PEDESTRIAN/BIKE VOLUMES CROSSING S. ATLANTIC AVE.

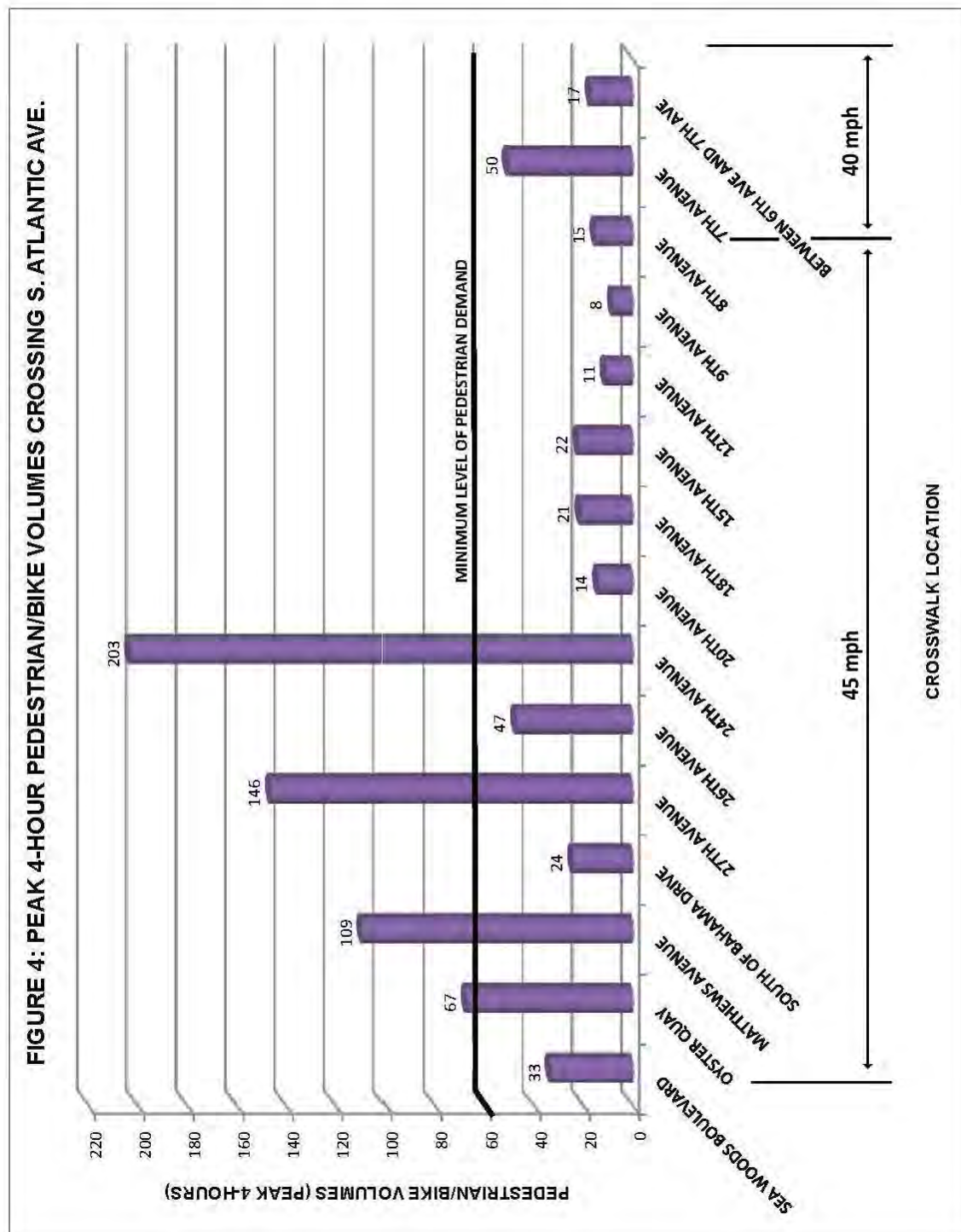
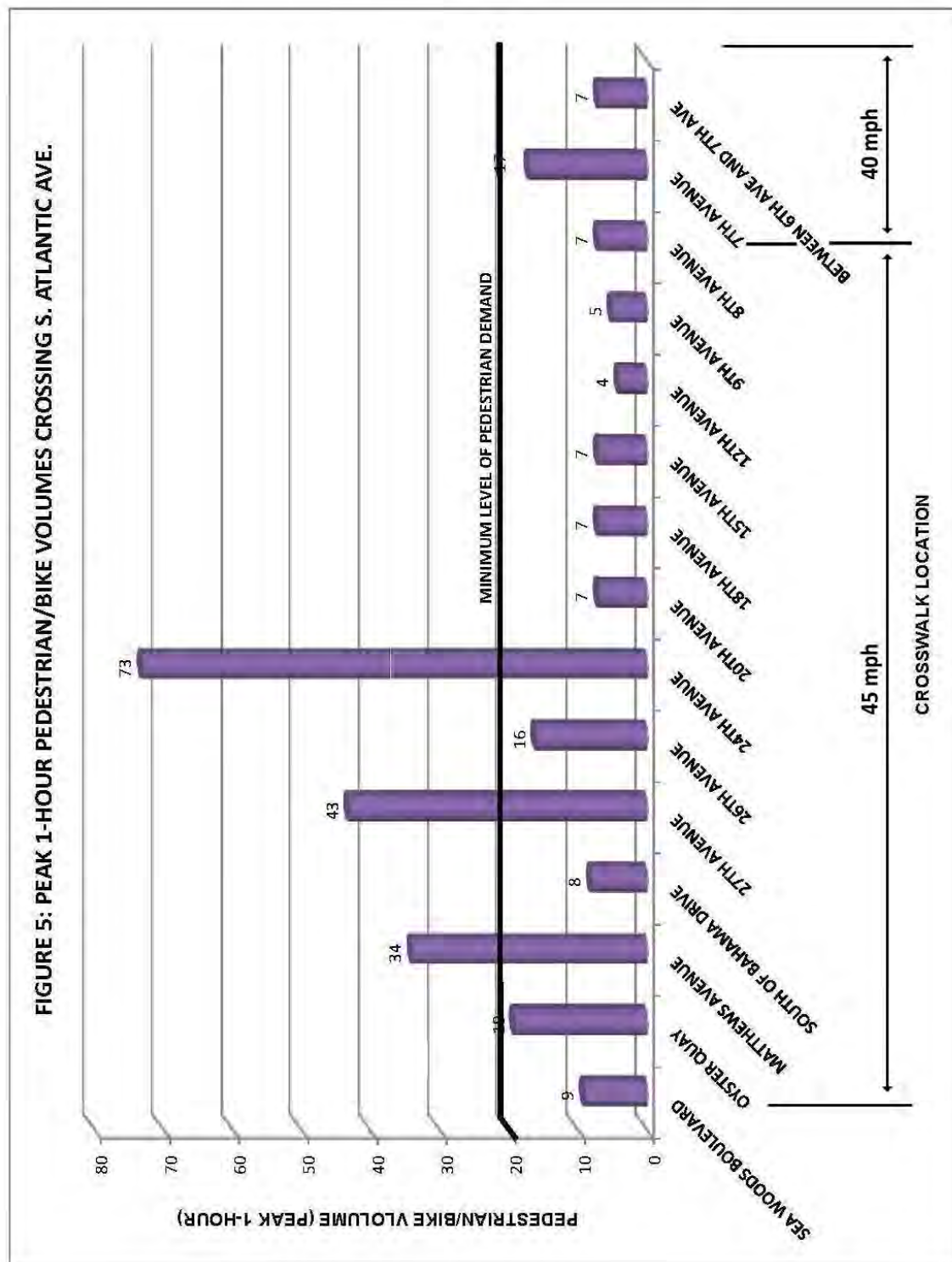


FIGURE 5: PEAK 1-HOUR PEDESTRIAN/BIKE VOLUMES CROSSING S. ATLANTIC AVE.



### 3.3 CRASH ANALYSIS

Based on long and short form crash reports obtained from the Volusia County Traffic Engineering Department, a total of sixty-six crashes occurred within the study corridor during the crash period between October 3, 2007 and April 30, 2011 (42 months). Of these sixty-six crashes, there were seventeen “left turn” crashes, fifteen “rear end” crashes, twelve “side-swipe” crashes, eight “angle” crashes, five “Fixed-object” crashes, three “lost control” crashes, three “backed into” crashes, one “right turn” crash, one “head on” crash and one “hit pedestrian” crash. The property damage for these sixty-six crashes was estimated at \$316,925. There were nineteen crashes resulting in injuries, and one fatality was recorded. The fatality was non-pedestrian or bicycle related and occurred when a vehicle pulled out of 4<sup>th</sup> Avenue into the path of oncoming traffic. Fifty-three of the crashes occurred during daylight hours of which forty-nine were under dry, and four were under wet, pavement conditions. The remaining thirteen crashes occurred during night hours of which ten were under dry, and three were under wet, pavement conditions. Twenty-four drivers were cited with “Careless Driving”, twenty-one with “Failed to Yield Right of Way”, six with Driving Under the Influence (“DUI”), five with “Pedestrians Crossing Roadway”, three with “Improper Lane Change”, three with “Improper Backing Up”, two with “Disregard Signal”, one with “Improper Turn”, and one with “No Improper Driving” (where a crash occurred; however the driver was not found to be at fault).

Nine of the sixty-six crashes involved pedestrians or bikes in one way or another. Five of these crashes are identified with the contributing cause of “Pedestrian Crossing Roadway” and the remaining four crashes are identified with the designation of “PED” or “BIKE”. In the five crashes with the contributing cause of “Pedestrian Crossing Roadway”, pedestrians were in the roadway, and rear-end crashes occurred when the lead vehicle slowed or stopped for the pedestrian, but the following car did not stop in time. In all five of these crashes, the pedestrians were uninjured. Four of these crashes occurred at marked crosswalks; three at the 24<sup>th</sup> Avenue crossing and one at the Oyster Quay crossing. The remaining crash was reported along S. Atlantic Avenue at an unmarked location about 100 feet north of 14<sup>th</sup> Avenue. The four crashes designated “PED” or “BIKE” directly involved pedestrians or bikes in the crash itself. In this case, three of these crashes involved bikes and one involved a pedestrian. Three of the crashes occurred as the cyclists or pedestrian was traveling along S. Atlantic Avenue. The fourth crash occurred when a cyclist cut across

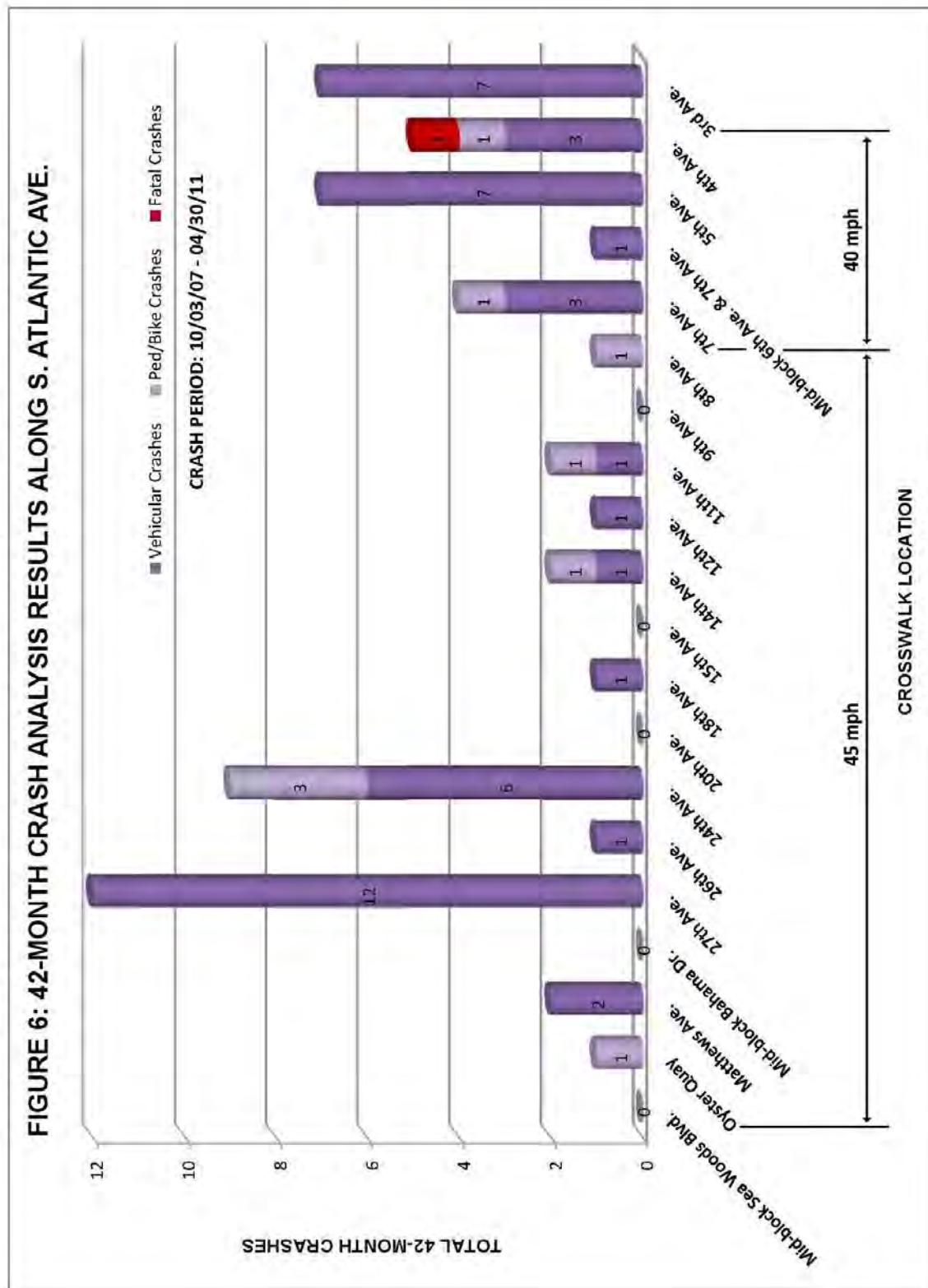
the street and was struck by an oncoming vehicle. Three of the four crashes resulted in injury to the pedestrian or cyclist but there were no fatalities.

Table 4 provides a detailed crash summary for the project corridor. Figure 6 provides a graphical representation of the crash analysis results. The graph only includes the marked crosswalk locations and other notable crash locations within the corridor. It does not encompass every crash noted in the Crash Summary. Crash Diagrams have also been provided in Figures 7-A through 7-K to depict the distribution of the crashes within the corridor.



CRASH SUMMARY																
SECTION:																
MAJOR ROUTE: S. ATLANTIC AVE.						COUNTY: VOLUSIA										
INTERSECTING ROUTE: 3RD AVE. TO NEW SMYRNA BEACH CITY LIMITS						CITY: NEW SYMRNA BEACH										
STUDY PERIOD: 3-Oct-07						TO 30-Apr-11						ENGINEER: JNK				
CRASH REF. NO.	DATE	DAY	TIME	DOB	AGE	PED /BIKE / MOTORCYCLE	ALCOHOLD RUGS	CRASH TYPE	FATAL	INJURY	PROPERTY DAMAGE	DAY/ NIGHT	WET/ DRY	CONTRIBUTING CAUSE		
1	10/3/2007	Wednesday	9:37 PM	3/4/1986	22	MOTORCYCLE	NO	LOST CONTROL	0	1	\$1,000	NIGHT	WET	NO IMPROPER DRIVING		
2	10/14/2007	Sunday	7:49 PM	12/13/1962	45	VEHICLE	YES	LEFT TURN	0	1	\$4,000	NIGHT	DRY	DUI		
3	12/11/2007	Tuesday	6:43 PM	3/21/1963	45	VEHICLE	YES	FIXED OBJECT	0	0	\$2,000	NIGHT	DRY	DUI		
4	1/1/2008	Tuesday	7:53 PM	11/28/1948	59	BIKE	NO	ANGLE	0	1	\$900	NIGHT	DRY	FTYRW		
5	1/23/2008	Wednesday	8:38 AM	10/15/1964	43	VEHICLE	NO	SIDE SWIPE	0	0	\$1,000	DAY	WET	IMPROPER LANE CHANGE		
6	2/5/2008	Tuesday	4:02 PM	2/6/1920	88	VEHICLE	NO	REAR END	0	0	\$2,300	DAY	DRY	CARELESS DRIVING		
7	2/28/2008	Thursday	1:04 PM	11/14/1957	50	VEHICLE	NO	FIXED OBJECT	0	0	\$4,500	DAY	DRY	CARELESS DRIVING		
8	2/18/2008	Monday	8:46 AM	3/7/1956	52	VEHICLE	NO	ANGLE	0	1	\$6,000	DAY	DRY	FTYRW		
9	2/20/2008	Wednesday	3:42 PM	7/13/1930	78	VEHICLE	NO	LEFT TURN	1	1	\$16,000	DAY	DRY	FTYRW		
10	3/3/2008	Monday	7:54 AM	7/16/1934	74	VEHICLE	NO	LEFT TURN	0	0	\$5,000	DAY	DRY	FTYRW		
11	3/5/2008	Wednesday	5:08 PM	7/25/1977	31	VEHICLE	NO	REAR END	0	0	\$3,000	DAY	DRY	PED CROSSING ROADWAY		
12	3/14/2008	Friday	12:25 AM	5/21/1988	20	VEHICLE	NO	ANGLE	0	0	\$9,000	NIGHT	DRY	FTYRW		
13	3/16/2008	Sunday	2:08 PM	1/6/1945	63	VEHICLE	NO	LEFT TURN	0	0	\$6,000	DAY	DRY	FTYRW		
14	3/19/2008	Wednesday	12:24 PM	10/22/1930	77	VEHICLE	NO	BACKED INTO	0	0	\$500	DAY	DRY	IMPROPER BACKING UP		
15	3/19/2008	Wednesday	5:09 PM	11/11/1953	54	VEHICLE	NO	RIGHT TURN	0	0	\$6,000	DAY	DRY	DISREGARDED SIGNAL		
16	3/28/2008	Friday	6:03 PM	2/19/2021	13	VEHICLE	NO	SIDE SWIPE	0	0	\$100	NIGHT	DRY	CARELESS DRIVING		
17	4/3/2008	Thursday	1:52 PM	8/22/1947	61	VEHICLE	NO	LEFT TURN	0	0	\$10,100	DAY	WET	FTYRW		
18	4/4/2008	Friday	5:09 PM	7/29/1937	71	VEHICLE	NO	REAR END	0	0	\$2,000	DAY	DRY	PED CROSSING ROADWAY		
19	5/3/2008	Saturday	12:59 PM	6/4/1990	18	VEHICLE	NO	SIDE SWIPE	0	0	\$1,500	DAY	DRY	CARELESS DRIVING		
20	5/6/2008	Tuesday	7:43 AM	2/1/1937	71	VEHICLE	NO	REAR END	0	3	\$8,000	DAY	DRY	CARELESS DRIVING		
21	5/25/2008	Sunday	12:54 PM	7/20/1966	42	VEHICLE	NO	LEFT TURN	0	0	\$3,000	DAY	DRY	FTYRW		
22	6/14/2008	Saturday	2:17 PM	10/12/1941	67	VEHICLE	NO	REAR END	0	0	\$6,000	DAY	DRY	PED CROSSING ROADWAY		
23	9/28/2008	Sunday	3:33 PM	4/9/1986	22	VEHICLE	NO	LEFT TURN	0	0	\$3,000	DAY	DRY	FTYRW		
24	11/14/2008	Friday	8:27 PM	11/5/1959	49	VEHICLE	NO	REAR END	0	0	\$1,300	NIGHT	DRY	CARELESS DRIVING		
25	1/22/2009	Thursday	1:52 PM	7/31/1930	78	VEHICLE	NO	SIDE SWIPE	0	0	\$3,000	DAY	DRY	CARELESS DRIVING		
26	2/10/2009	Tuesday	4:43 PM	12/30/1954	54	VEHICLE	NO	REAR END	0	0	\$1,000	DAY	DRY	CARELESS DRIVING		
27	2/19/2009	Thursday	10:31 AM	9/6/1963	45	VEHICLE	NO	SIDE SWIPE	0	0	\$1,800	DAY	DRY	IMPROPER LANE CHANGE		
28	3/10/2009	Tuesday	6:45 PM	UNKNOWN	UNKNOWN	VEHICLE	NO	SIDE SWIPE	0	0	\$1,000	DAY	DRY	FTYRW		
29	4/13/2009	Monday	5:04 PM	1/15/1962	47	VEHICLE	NO	LEFT TURN	0	0	\$3,200	DAY	DRY	FTYRW		
30	4/11/2009	Saturday	3:21 PM	6/25/1962	47	VEHICLE	NO	LOST CONTROL	0	1	\$22,000	DAY	DRY	CARELESS DRIVING		
31	5/2/2009	Saturday	1:45 PM	4/7/1942	67	VEHICLE	NO	ANGLE	0	0	\$4,000	DAY	DRY	FTYRW		
32	6/13/2009	Saturday	5:15 PM	9/25/1970	39	VEHICLE	NO	BACKED INTO	0	0	\$300	DAY	WET	IMPROPER BACKING UP		
33	7/6/2009	Monday	9:10 AM	9/30/1989	20	VEHICLE	NO	REAR END	0	0	\$10,000	DAY	DRY	CARELESS DRIVING		
34	7/21/2009	Tuesday	8:54 AM	8/5/1992	17	VEHICLE	NO	REAR END	0	1	\$9,500	DAY	DRY	PED CROSSING ROADWAY		
35	8/2/2009	Sunday	2:44 PM	8/8/1988	21	VEHICLE	NO	SIDE SWIPE	0	0	\$3,000	DAY	DRY	CARELESS DRIVING		
36	8/6/2009	Thursday	11:13 PM	5/13/1970	39	VEHICLE	NO	LEFT TURN	0	0	\$2,500	NIGHT	WET	FTYRW		
37	8/6/2009	Thursday	5:12 PM	UNKNOWN	UNKNOWN	VEHICLE	YES	FIXED OBJECT	0	0	\$1,500	DAY	DRY	DUI		
38	8/8/2009	Saturday	9:57 AM	10/6/1954	55	VEHICLE	NO	LEFT TURN	0	0	\$750	DAY	DRY	FTYRW		
39	8/19/2009	Wednesday	7:13 PM	9/6/1972	37	VEHICLE	YES	ANGLE	0	0	\$30,000	NIGHT	DRY	DUI		
40	9/22/2009	Tuesday	11:55 AM	11/17/1950	59	VEHICLE	NO	LEFT TURN	0	0	\$7,000	DAY	DRY	FTYRW		
41	11/21/2009	Saturday	10:19 AM	7/1/1952	57	BIKE	NO	SIDE SWIPE	0	1	\$900	DAY	DRY	CARELESS DRIVING		
42	11/30/2009	Monday	8:19 AM	1/3/1941	69	VEHICLE	NO	REAR END	0	1	\$2,000	DAY	DRY	CARELESS DRIVING		
43	12/13/2009	Sunday	5:16 PM	6/2/1984	26	VEHICLE	NO	ANGLE	0	1	\$10,000	DAY	DRY	FTYRW		
44	2/24/2010	Wednesday	1:18 PM	9/15/1945	64	VEHICLE	NO	BACKED INTO	0	0	\$1,000	DAY	DRY	IMPROPER BACKING UP		
45	2/24/2010	Wednesday	7:39 PM	12/13/1975	34	VEHICLE	NO	LEFT TURN	0	0	\$10,000	NIGHT	WET	DIREGARD SIGNAL		
46	3/12/2010	Friday	9:18 AM	UNKNOWN	UNKNOWN	VEHICLE	NO	ANGLE	0	0	\$1,500	DAY	WET	CARELESS DRIVING		
47	3/27/2010	Saturday	8:03 PM	9/13/1967	43	VEHICLE	YES	HEAD ON	0	1	\$10,000	NIGHT	DRY	DUI		
48	3/29/2010	Monday	2:56 PM	5/26/1993	17	VEHICLE	NO	SIDE SWIPE	0	0	\$3,000	DAY	DRY	CARELESS DRIVING		
49	4/2/2010	Friday	8:03 PM	UNKNOWN	UNKNOWN	PED	NO	HIT PEDESTRIAN	0	1	\$0	NIGHT	DRY	CARELESS DRIVING		
50	4/3/2010	Saturday	11:19 AM	5/17/1968	42	VEHICLE	NO	SIDE SWIPE	0	0	\$500	DAY	DRY	CARELESS DRIVING		
51	4/5/2010	Monday	6:40 PM	6/26/1986	24	VEHICLE	NO	LEFT TURN	0	0	\$7,000	DAY	DRY	IMPROPER TURN		
52	4/10/2010	Saturday	4:26 PM	2/22/1950	60	VEHICLE	NO	REAR END	0	2	\$20,000	DAY	DRY	PED CROSSING ROADWAY		
53	5/1/2010	Saturday	8:17 PM	6/26/1945	65	VEHICLE	NO	LEFT TURN	0	0	\$3,000	DAY	DRY	FTYRW		
54	5/8/2010	Saturday	5:41 PM	7/31/1983	27	VEHICLE	NO	REAR END	0	1	\$5,500	DAY	DRY	CARELESS DRIVING		
55	5/11/2010	Tuesday	4:42 PM	10/22/1929	81	VEHICLE	NO	SIDE SWIPE	0	0	\$700	DAY	DRY	IMPROPER LANE CHANGE		
56	5/24/2010	Monday	3:16 PM	11/30/1930	79	VEHICLE	NO	REAR END	0	0	\$2,000	DAY	DRY	CARELESS DRIVING		
57	5/26/2010	Wednesday	8:01 AM	3/12/1968	42	VEHICLE	NO	REAR END	0	0	\$900	DAY	DRY	CARELESS DRIVING		
58	5/30/2010	Sunday	1:30 AM	2/22/1990	20	VEHICLE	NO	REAR END	0	0	\$50	DAY	DRY	CARELESS DRIVING		
59	6/28/2010	Monday	2:59 PM	1/21/1988	22	BIKE	NO	ANGLE	0	0	\$125	DAY	DRY	FTYRW		
60	7/5/2010	Monday	3:35 AM	7/8/1962	48	VEHICLE	YES	FIXED OBJECT	0	0	\$9,000	NIGHT	DRY	DUI		
61	7/9/2010	Friday	3:40 PM	1/21/2027	17	VEHICLE	NO	LEFT TURN	0	1	\$6,500	DAY	DRY	FTYRW		
62	7/9/2010	Friday	4:36 PM	11/13/1979	31	VEHICLE	NO	LEFT TURN	0	2	\$8,800	DAY	DRY	FTYRW		
63	7/10/2010	Saturday	6:00 PM	8/23/1993	17	VEHICLE	NO	SIDE SWIPE	0	1	\$10,000	DAY	DRY	CARELESS DRIVING		
64	8/17/2010	Tuesday	4:49 PM	1/11/1959	52	MOTORCYCLE	NO	LOST CONTROL	0	0	\$500	DAY	DRY	CARELESS DRIVING		
65	9/2/2010	Thursday	11:55 AM	9/11/1949	61	VEHICLE	NO	LEFT TURN	0	1	\$1,000	DAY	DRY	FTYRW		
66	9/14/2010	Tuesday	1:33 PM	8/11/1967	43	VEHICLE	NO	FIXED OBJECT	0	0	\$200	DAY	DRY	CARELESS DRIVING		
Total		Saturday			0				1	23	\$316,925					
						CRASH TYPE										
TOTAL CRASHES	FATAL CRASHES	INJURY CRASHES	TOTAL INJURIES	PROP. DAMAGE	PED /BIKE / MOTORCYCLE	ANGLE	LEFT TURN	RIGHT TURN	REAR END	SIDESWIPE	HEAD ON	BACKED INTO	HIT FIXED OBJECT	LOST CONTROL	OVER TURNED	HIT PEDESTRIAN
66	1	19	23	65	6	8	17	1	15	12	1	3	5	3	0	1
	2%	29%	NA	98%	9%	12%	26%	2%	23%	18%	2%	5%	8%	5%	0%	2%
						CONTRIBUTING CAUSE										
ONE VEHICLE	LIGHTING CONDITION		ROAD CONDITION		NO IMPROPER DRIVING	CARELESS DRIVING	F TYRW	IMPROPER LANE CHANGE	IMPROPER TURN	DISREGARDED SIGNAL	DUI	IMPROPER BACKING UP	DISREGARDED STOP SIGN	PED CROSSING ROADWAY	OTHER	
	DAY	NIGHT	DRY	WET												
0	53	13	59	7	1	24	21	3	1	1	6	3	0	5	0	
0%	80%	20%	89%	11%	2%	36%	32%	5%	2%	2%	9%	5%	0%	8%	0%	

FIGURE 6: 42-MONTH CRASH ANALYSIS







DATE CREATED: 9/14/2011

PROJECT NUMBER: 08-176.03



**GMB ENGINEERS & PLANNERS, INC.**  
2602 East Livingston Street  
Orlando, Florida 32803

## S. Atlantic Avenue - Pedestrian Safety Study

**FIGURE 7-A**  
Crash Diagram  
(October 3, 2007 to April 30, 2011)



SEA WOODS BLVD.

OYSTER QUAY

S. ATLANTIC AVE.

52

LEGEND



Collision w/Pedestrian



Fatality



Fixed Object



Rear End Crash



Left Turn Crash



Crash Number



Head - On Crash



Side Swipe



Out of Control



Overturned Vehicle



Angle Crash



Back Into Crash



Right Turn Crash



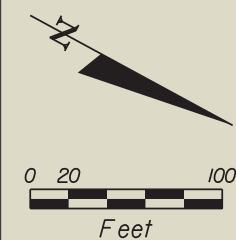
Median Crash



Collision w/Bicycle



Ped/Bike Related



DATE CREATED: 9/14/2011

PROJECT NUMBER: 08-176.03



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## S. Atlantic Avenue - Pedestrian Safety Study

**FIGURE 7-B**

Crash Diagram  
(October 3, 2007 to April 30, 2011)





DATE CREATED: 9/16/2011

PROJECT NUMBER: 08-176.03

# S. Atlantic Avenue - Pedestrian Safety Study

**FIGURE 7-C**  
 Crash Diagram  
 (October 3, 2007 to April 30, 2011)





DATE CREATED: 9/16/2011

PROJECT NUMBER: 08-176.03



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## S. Atlantic Avenue - Pedestrian Safety Study

**FIGURE 7-D**  
Crash Diagram  
(October 3, 2007 to April 30, 2011)





DATE CREATED: 9/16/2011

PROJECT NUMBER: 08-176.03

# S. Atlantic Avenue - Pedestrian Safety Study

**FIGURE 7-E**  
 Crash Diagram  
 (October 3, 2007 to April 30, 2011)





DATE CREATED: 9/21/2011

PROJECT NUMBER: 08-176.03

# S. Atlantic Avenue - Pedestrian Safety Study

**FIGURE 7-F**  
 Crash Diagram  
 (October 3, 2007 to April 30, 2011)





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PROJECT NUMBER: 08-176.03

# S. Atlantic Avenue - Pedestrian Safety Study

**FIGURE 7-G**  
 Crash Diagram  
 (October 3, 2007 to April 30, 2011)





DATE CREATED: 9/22/2011

PROJECT NUMBER: 08-176.03

# S. Atlantic Avenue - Pedestrian Safety Study

**FIGURE 7-H**  
Crash Diagram  
(October 3, 2007 to April 30, 2011)





DATE CREATED: 9/22/2011

PROJECT NUMBER: 08-176.03

# S. Atlantic Avenue - Pedestrian Safety Study

**FIGURE 7-I**  
 Crash Diagram  
 (October 3, 2007 to April 30, 2011)





DATE CREATED: 9/22/2011

PROJECT NUMBER: 08-176.03

# S. Atlantic Avenue - Pedestrian Safety Study

**FIGURE 7-J**  
 Crash Diagram  
 (October 3, 2007 to April 30, 2011)





DATE CREATED: 9/22/2011

PROJECT NUMBER: 08-176.03

# S. Atlantic Avenue - Pedestrian Safety Study

**FIGURE 7-K**  
 Crash Diagram  
 (October 3, 2007 to April 30, 2011)



### 3.4 VEHICLE GAP SIZE ANALYSIS

A vehicle gap size analysis was conducted near the intersection of S. Atlantic Avenue and 20<sup>th</sup> Avenue. The total width of S. Atlantic Avenue at 20<sup>th</sup> Avenue is approximately 60 feet, and pedestrians would have to walk a distance of 30 feet to cross either the northbound or southbound direction on S. Atlantic Avenue. If pedestrians were assumed to take refuge in the continuous left-turn lane while crossing S. Atlantic Avenue at 20<sup>th</sup> Avenue, a minimum gap of approximately 15 seconds is required for each direction. However, if pedestrians were assumed to cross S. Atlantic Avenue in one stretch, a minimum gap of 27 seconds is required.

The minimum gap is calculated based on a walking speed of 2.5 feet per second and distances of 30 feet and 60' using the below Formula.

**Formula to calculate minimum gap**

$$G = (w/s) + t$$

**where:        G = Minimum Gap**

**w = width of the crosswalk**

**s = walking speed. 2.5 feet per second assuming elderly pedestrians**

**t = startup time usually 3 seconds**

A summary of gaps greater than or equal to the minimum gap times for individual directions and the combined directions at the study intersection are provided in Table 5.



**TABLE 5: GAP SUMMARY FOR S. ATLANTIC AVENUE AT 20TH AVENUE**

Time Period	Total Gaps >= 15 Seconds		Total Gaps >= 27 Seconds
	Northbound	Southbound	Combined
10:00 - 11:00 AM	41	26	0
11:00 - 12:00 AM	43	20	0
12:00 - 1:00 PM	31	19	0
1:00 - 2:00 PM	18	14	0
2:00 - 3:00 PM	16	22	0
3:00 - 4:00 PM	19	47	0
4:00 - 5:00 PM	18	45	0
5:00 - 6:00 PM	23	53	0

Based on the Gap Size Study results, it is evident that pedestrians would have enough gaps to cross one direction at a time, but not both the directions in one stretch.



### **3.5 Annual Average Daily Traffic (AADT) and Level of Service (LOS)**

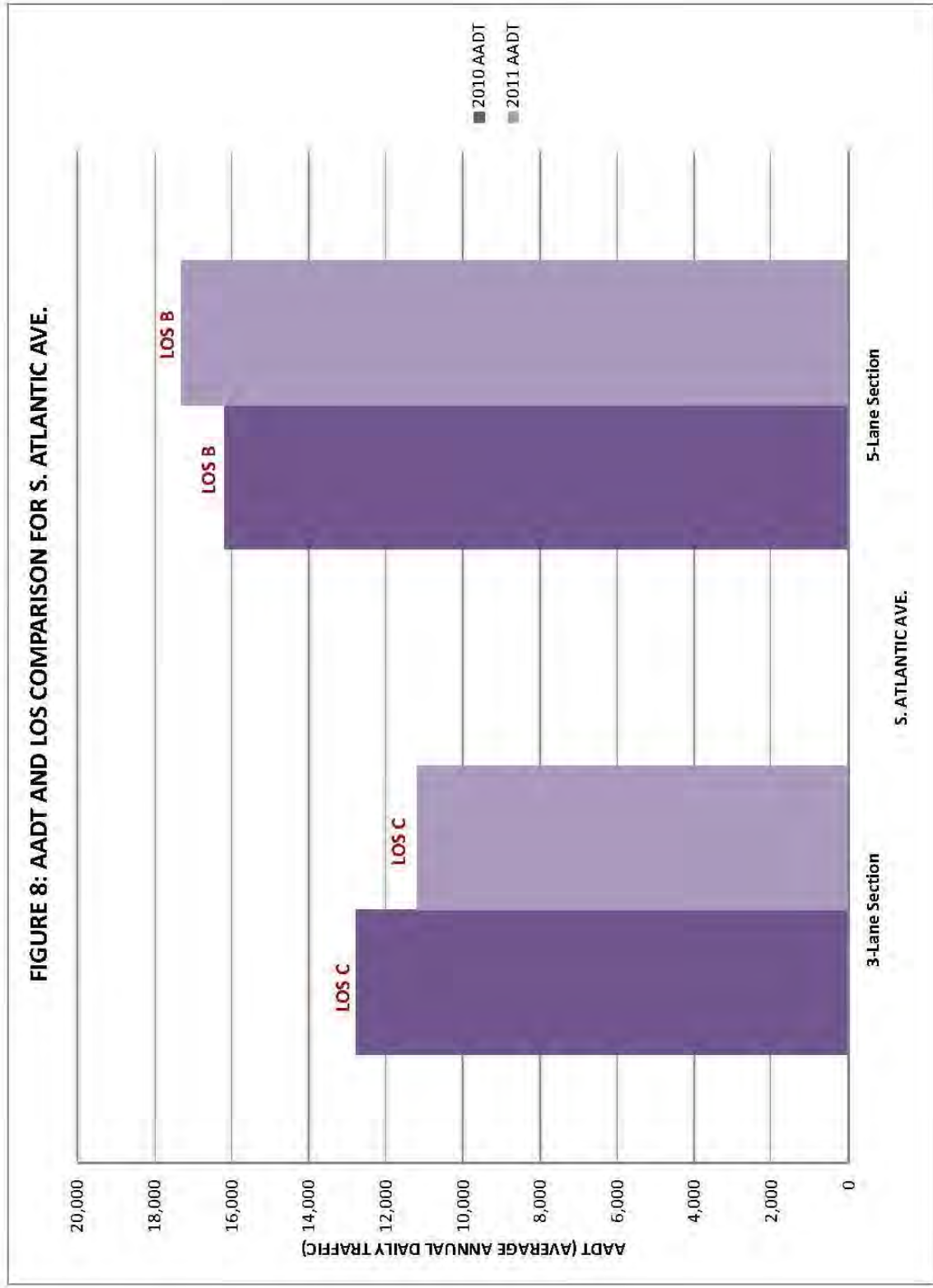
The AADT in 2010 for S. Atlantic Avenue from 6<sup>th</sup> Avenue to 27<sup>th</sup> Avenue (5-lane section) was approximately 16,200, which corresponds to LOS B. From 27<sup>th</sup> Avenue to the City limit (3-lane section), the 2010 AADT was 12,790, which corresponds to LOS C. From the 2011 seven day traffic counts provided by Volusia County, the AADT (maximum of the 7 days) for the 5-lane section is 17,300 which corresponds to LOS B, and 11,200 for the 3-lane section, which corresponds to LOS C.

The 2011 peak hour peak direction (NB) volume for the 5-lane section is 653 (maximum of the 7 days) which corresponds to LOS B, and the volume for the off peak direction (SB) is 648, which corresponds to LOS B. Similarly, the 2011 peak hour peak direction (NB) volume for the 3-lane section is 489 (maximum of the 7 days), which corresponds to LOS C, and the volume for the off peak direction (SB) is 363, which corresponds to LOS B.

Based on the comparison of the 2011 daily and peak hour peak direction volumes with the respective service volumes, S. Atlantic Avenue is found to operate well within the adopted LOS standard “E”. A graphical comparison of the AADT and LOS are provided in Figure 8.



FIGURE 8: AADT AND LOS COMPARISON FOR S. ATLANTIC AVE.





## 4 QUALITATIVE ASSESSMENT

A qualitative assessment (QA) based on field observations of the traffic, pedestrian and bicycle flow conditions occurring within the study corridor was performed by a registered professional engineer on a weekend during the peak pedestrian hours. The purpose of the qualitative assessment was to evaluate prevailing operating conditions and vehicular and pedestrian flow patterns, and identify areas where improvements would be potentially beneficial for safety and efficiency reasons. The following observations were noted:

- Sidewalks are not continuous within the project limits. There are 5' sidewalks along both sides of the roadway from the City limits to 27<sup>th</sup> Avenue and from 7<sup>th</sup> Avenue to 3<sup>rd</sup> Avenue, and there is an 8' sidewalk along the west side of S. Atlantic Avenue from 27<sup>th</sup> Avenue to 7<sup>th</sup> Avenue, but there is no sidewalk on the east side of S. Atlantic Avenue between 27<sup>th</sup> Avenue and 7<sup>th</sup> Avenue.
- Horizontal curve between 5<sup>th</sup> Avenue and 6<sup>th</sup> Avenue makes it difficult to see mid-block crosswalk between 6<sup>th</sup> Avenue and 7<sup>th</sup> Avenue. The existing stopping sight distance observed in the field is approximately 410', which exceeds the PPM (FDOT's Plans Preparation Manual) minimum stopping sight distance of 305' at the posted speed limit and 360' at an assumed design speed of 45 mph.
- The weather conditions on the day of the QA were sunny and warm, however there was evidence that it must have rained the previous night. Ponding was observed in the road at the intersections along the east side of S. Atlantic Avenue, primarily from 27<sup>th</sup> Avenue, north. Since there is no sidewalk or ramps along the east side of S. Atlantic Avenue from 27<sup>th</sup> Avenue to 7<sup>th</sup> Avenue, the marked crosswalks across S. Atlantic Avenue guide pedestrians into the side street, and often right into the ponded water.
- There are paved shoulders that can be used as undesignated bicycle facilities from the City limits to 27<sup>th</sup> Avenue and from 7<sup>th</sup> Avenue to 3<sup>rd</sup> Avenue. There are no paved shoulders between 27<sup>th</sup> Avenue and 7<sup>th</sup> Avenue. Within this section, bicyclists either share the roadway, or make their way to the wide sidewalk running along the west side of S. Atlantic Avenue. There appears to be significant bicycle traffic along S. Atlantic Avenue and the parallel County multi-use path along Saxon Drive, which parallels S. Atlantic Avenue. This observation was corroborated with the data collected in the field, which indicated that 45% of the total pedestrian/bicycle volumes recorded was bicycles.



- During the QA, several runs were made northbound and southbound through the corridor, traveling at the posted speed limit. In general, it appears that the running speed of the traffic is higher than the posted speed limit. A Speed Zone Analysis was performed by GMB to determine the 85<sup>th</sup> percentile speeds. The results of the analysis are listed in the table below and are included in the Appendix.

**TABLE 6: 85TH PERCENTILE SPEED AND 10 MPH PACE**

Study Segment	85 <sup>th</sup> Percentile Speed (mph)		10 MPH Pace (mph)	
	NB	SB	NB	SB
NSB City Limits to 27 <sup>th</sup> Avenue (3-lane section)	<b>50</b>	<b>50</b>	<b>42-51</b>	<b>43-52</b>
27 <sup>th</sup> Avenue to 3 <sup>rd</sup> Avenue (5-lane section)	<b>48</b>	<b>48</b>	<b>40-49</b>	<b>40-49</b>

- From 27<sup>th</sup> Avenue, north, S. Atlantic Avenue is 5 lanes wide and varies in width from 56' to 71'. The crosswalks across S. Atlantic Avenue are unsignalized with the exception of Matthews Avenue, 27<sup>th</sup> Avenue and 3<sup>rd</sup> Avenue. There are no pedestrian refuges in the median with the exception of the mid-block crossing between 6<sup>th</sup> Avenue and 7<sup>th</sup> Avenue, and while the center bi-directional left turn lane can be used as a mid-way stopping point, the pedestrian would remain exposed in the turn lane until traffic cleared enough to complete the crossing. From observations in the field, it appears to be difficult to cross S. Atlantic Avenue within the five-lane section. The results of the vehicle gap size study bear out this observation. Based on a walking speed of 2.5' per second, the crossing time is 27 seconds. Given that there were no available gaps 27 seconds or longer, during the peak hours, it would not be possible to cross S. Atlantic Avenue without taking refuge in the bi-directional turn lane or running across the road.
- There are three midblock crosswalks within the project. Two are located in the 45 mph speed zone; one is south of Sea Woods Boulevard and the other is south of Bahama Drive. The third mid-block crosswalk is between 6<sup>th</sup> and 7<sup>th</sup> Avenue and is located in a 40 mph speed zone. None of the mid-block crosswalks are signalized. Based on the TEM, 40 mph is the maximum posted speed limit for an unsignalized mid-block crosswalk. In addition, the TEM specifies a minimum block length of 660'. The block length between 6<sup>th</sup> and 7<sup>th</sup> Avenue is approximately 350'. Based on the



criteria established in section 8.3 of the TEM, the minimum level of pedestrian demand for a mid-block crosswalk is 20 pedestrians during any hour or 60 pedestrians during any four hours of the day. The pedestrian crossing volumes collected in the field indicate that none of these mid-block crosswalks meet the minimum levels of pedestrian demand.

- There are 14 marked crosswalk locations within the 2.86 mile project corridor, which means that, on average, there is a marked crosswalk roughly every 1,000'. Crosswalk design guidelines discourage excessive and closely spaced marked crosswalks citing that, with overuse, drivers tend to disrespect them and so they become commonplace and lose their impact.
- The volume of trucks within the corridor did not appear to be substantial. The 7-day classification data provided by the Volusia County was used to calculate the percentage of trucks mixed in the flow of traffic. The data showed that the heaviest day of truck use occurred on a Friday and the daily percentage of trucks was 2.02%.
- Currently 27<sup>th</sup> Avenue is controlled with a full traffic signal with 4-way special emphasis pedestrian crosswalks, and uses advance pedestrian crossing warning signs to emphasize the crosswalks. No modifications are suggested for this intersection other than the installation of near pedestrian crossing warning signs adjacent to the crosswalks across S. Atlantic Avenue.
- The Matthews Avenue crosswalk is controlled with a pedestrian traffic signal which stops traffic on S. Atlantic Avenue when activated. A special emphasis crosswalk across the north leg of the intersection and near pedestrian crossing warning signs alert vehicular traffic of the designated pedestrian crossing. Based on MUTCD Warrant #4 Pedestrian Volume, the need for a pedestrian traffic signal shall only be considered when pedestrian volumes are of sufficient level to satisfy the criteria set forth by that warrant. The minimum threshold pedestrian volumes are 75 pedestrians per hour (pph) for each of any four hours of the day or 93 pph for the peak hour. The pedestrian volumes recorded at Matthews Avenue do not satisfy these criteria.



## 5 BENEFICIAL MEASURES

The purpose of this report is to identify measures that would minimize the potential for pedestrian/vehicle conflicts and that would facilitate pedestrian crossings while improving the overall safety of the study corridor. The beneficial measures identified below are suggestions only, and it should be incumbent on the City of New Smyrna Beach and Volusia County to reach a consensus of how the road should be classified, and determine which measures would be the most beneficial to the community as a whole. Based on analysis of the collected data and conditions observed in the field during the QA, the following measures have been evaluated and are presented for consideration:

### 1) Install continuous bicycle facilities along S. Atlantic Avenue.

Currently 4' paved shoulders extend along both sides of S. Atlantic Avenue from the New Smyrna Beach city limits to 27<sup>th</sup> Avenue and from 7<sup>th</sup> Avenue to the northern project limits at 3<sup>rd</sup> Avenue. The 1.3 mile segment between 27<sup>th</sup> Avenue and 7<sup>th</sup> does not have paved shoulders (see Figure 9). Florida Statutes and the FDOT PPM both emphasize the desirability of bicycle facilities, particularly in or within 1 mile of an urban area, which the study corridor qualifies as. There were 3 bike related crashes recorded in the past 42 months and, of the total pedestrian/bicycle volumes collected for the study, 45% consisted of bicycles, so there is an obvious need for a separate bicycle facility within the corridor. The standard bike lane width for new construction and Resurfacing, Restoration and Rehabilitation (RRR) projects is 5'; however existing 4' shoulders on RRR projects can be maintained and used as bicycle facilities. Currently, just over half of the project corridor has existing 4' shoulders, and the remainder of the corridor has no paved shoulders, which puts the corridor in a gray zone regarding which criteria to use. For this reason, both criteria were evaluated to determine their impact on the corridor.

- **4' Paved Shoulders:** The PPM specifies 5' for paved shoulders used as bicycle facilities; but also states that existing 4' paved shoulders can be retained on Resurfacing, Restoration and Rehabilitation (RRR) projects. Since the roadway section requiring paved shoulders is tying into roadway sections with existing 4' shoulders on both ends, the argument can be made that it would be consistent to utilize 4' paved shoulder in this section as well. With 4' paved shoulders, the lane widths and cross sections along the project corridor could remain unchanged except for the segment between 27<sup>th</sup> Avenue and 7<sup>th</sup>



Avenue, which would need to have paved shoulders installed along both sides of S. Atlantic Avenue (see figure 10). Since the corridor is in an urban area, bike lane pavement markings could be applied to the shoulders to indicate their preferential use by bicyclists.

The construction cost to install 4' paved shoulders between 27<sup>th</sup> Avenue and 7<sup>th</sup> Avenue would be approximately \$135,825. While this is a very nonintrusive and cost effective approach, there are constraints within this segment that may make it impractical. Chief among these constraints is the open swale drainage system which, after heavy rains, already exhibits that it is likely at, or near, its maximum capacity. Right of way within the corridor is limited, and there would be little room to relocate or expand the current drainage system if the road was widened to include paved shoulders. A closed drainage system (i.e., curb and gutter) would allow for 4' shoulders; however, the costs associated with installing a closed drainage system would be significantly higher, and creates the additional problem of where to store the collected water. This measure requires further analysis by a drainage expert to determine its feasibility.

The primary function of this measure is to facilitate safe bicycle passage through the corridor by providing a place for bicyclists to ride where they are not in conflict with vehicular traffic. This measure will not increase pedestrian safety or aid in decreasing vehicular travel speeds.

<b>Measure 1: Install Continuous Bicycle Facilities Along S. Atlantic Avenue</b>	
<b>4' Paved Shoulders</b>	
<b>PROS</b>	<b>CONS</b>
Facilitates bicycle safety by providing a continuous paved shoulder that can be used as a bike facility	Paved shoulders will need to be installed from 27 <sup>th</sup> Avenue to 7 <sup>th</sup> Avenue
Can be installed without impact to existing lane width and lane configuration	Possible impacts to drainage system with addition of paved shoulders
No impact to NB or SB vehicular capacity	
Minimal Cost	
<b>Approximate Construction Cost: \$135,825</b>	



- **5' Paved Shoulders:** With 5' paved shoulders, the existing edges of pavement could be maintained and the lanes could be modified so that 5' designated bike lanes could be marked along both sides of S. Atlantic Avenue (see Figure 11). In order to accommodate the addition of two 5' bike lanes without widening the road, and thus avoiding the drainage issues described in the previous section, the lanes between 27<sup>th</sup> Avenue and 7<sup>th</sup> Avenue would need to be reduced from 5 lanes to 4 lanes. The roadway would need to be milled and resurfaced from the City limits to 7<sup>th</sup> Avenue to eradicate the old pavement markings, and new pavement markings applied with the revised lane widths. Hydro-blasting, grinding out and painting over of existing markings could also be considered as a means to remove the existing conflicting pavement markings, but these methods are not very effective at removing all signs of the old markings and can result in an unaesthetic, or even unsafe, final product.

Since northbound S. Atlantic Avenue serves as an emergency evacuation route and southbound S. Atlantic Avenue already reduces down to a 3-lane section at 27<sup>th</sup> Avenue which eventually dead ends into Seashore Park, it is logical for the lane reduction to occur in the southbound direction. It is also logical to assume that if the lanes are reduced, the density of traffic in that lane will increase as well, so to confirm the feasibility of this recommendation, the peak hourly volume within this segment for the southbound direction was determined using the 2011 7-day traffic data provided by Volusia County. The current LOS with 2 southbound lanes is LOS B. The calculated peak hourly volume came to 648 vph, which corresponds to a LOS D for 1 southbound lane. This is still above the minimum adopted LOS standard "E". In addition, Saxon Drive, which runs parallel to S. Atlantic Avenue, can also be used by the southbound traffic, if necessary. The truck percentage is also low, so reducing the lane width should not have an adverse affect. As the density of the lane increases, the number and length of gaps for pedestrian crossings will decrease; however since vehicular speeds should be slower, and the effective crossing distance will be narrower, it is not expected that pedestrian safety will be diminished with this measure. The lane drop itself would occur between 3<sup>rd</sup> Avenue and the beginning of the curve and could be accomplished either by merging the right lane into the left lane or signing and marking the right lane as "Right Lane Must Turn Right" into one of the side streets within that segment.



Since there are many sensitive issues that need to be considered before a lane can be closed, it should be incumbent upon the City of New Smyrna Beach and Volusia County to reach a consensus of the type of facility they want to provide for the community, and to coordinate on the feasibility of modifying the existing roadway geometry.

The approximate construction cost of implementing this measure is \$400,000. The primary function of this measure is to facilitating safe bicycle passage through the corridor by providing a place for bicyclists to ride where they are not in conflict with vehicular traffic. This measure could aid in decreasing vehicular travel speeds since reducing the number of lanes and narrowing lane widths are accepted methods used in traffic calming, where physical measures are used to alter driver behavior and consequently slow traffic. As a consequence of slower speeds, pedestrian safety will be positively influenced as well.

<b>Measure 1: Install Continuous Bicycle Facilities Along S. Atlantic Avenue</b>	
<b>5' Paved Shoulders</b>	
<b>PROS</b>	<b>CONS</b>
Facilitates bicycle safety by providing dedicated bike lanes	Impacts SB vehicular capacity with reduction to one lane SB
Can be installed without widening S. Atlantic Avenue	More costly since entire corridor will need to be milled and resurfaced
No impact to NB vehicular capacity	
SB capacity affected but still within acceptable levels	
May lower 85 <sup>th</sup> percentile travel speeds and increase pedestrian safety	
Does not incur additional drainage issues	
<b>Approximate Construction Cost: \$400,000</b>	



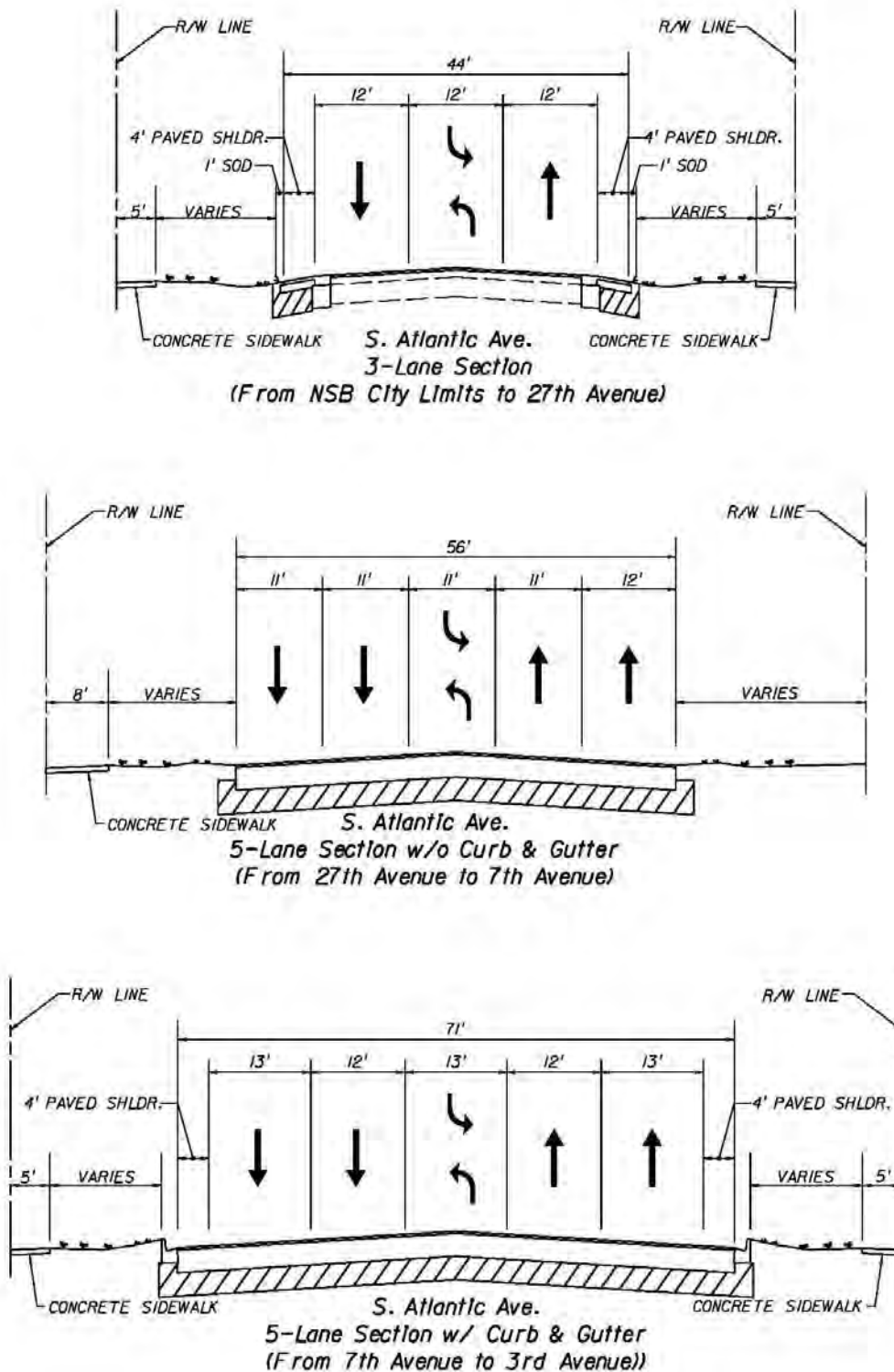
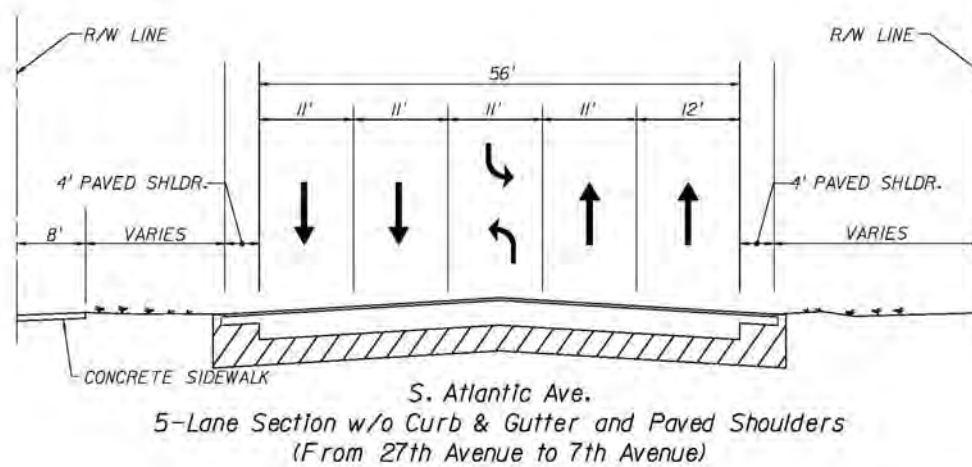


FIGURE 9: EXISTING CROSS SECTIONS



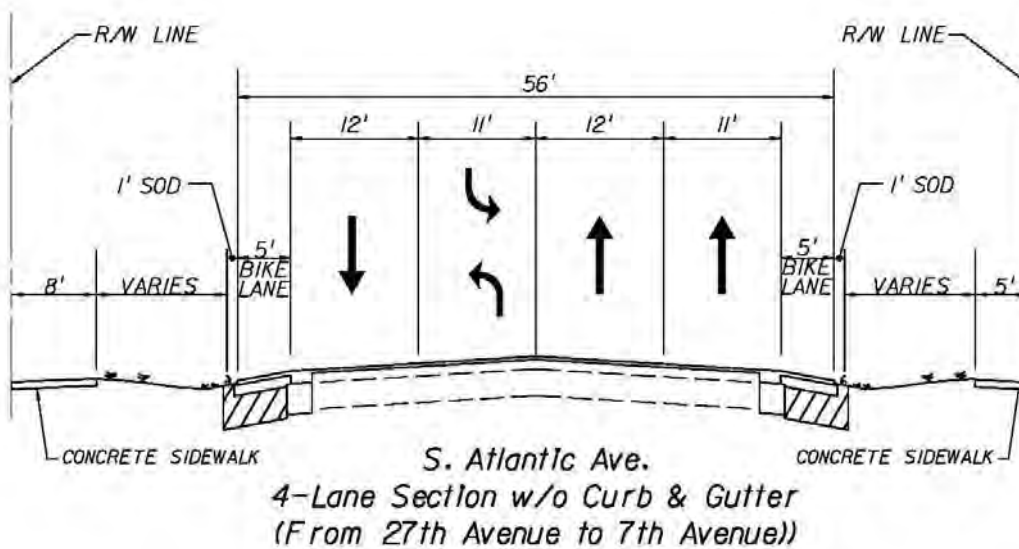
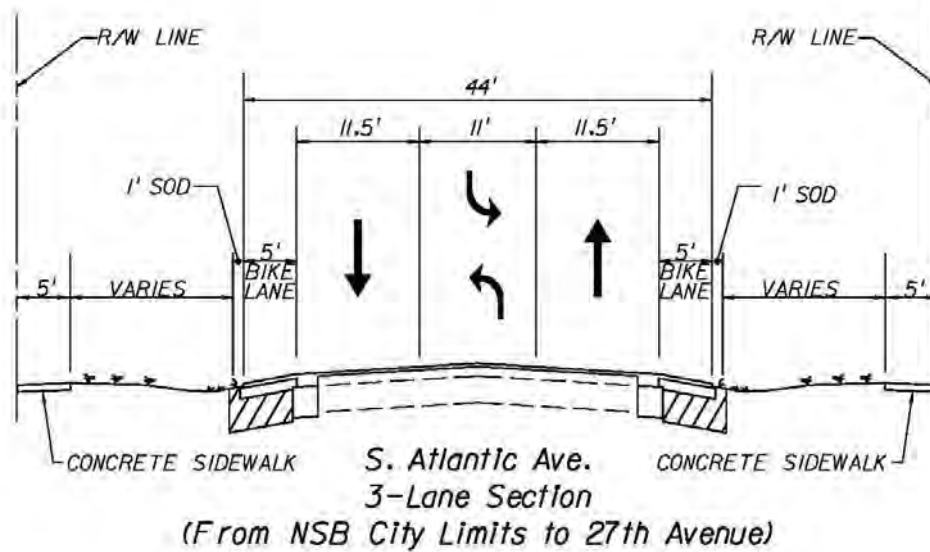
*From NSB City Limits to 27<sup>th</sup> Avenue, the typical section remains as existing.*



*From 7<sup>th</sup> Avenue to 3<sup>rd</sup> Avenue, the typical section remains as existing.*

FIGURE 10: PROPOSED CROSS SECTIONS WITH 4' PAVED SHOULDERS





*From 7<sup>th</sup> Avenue to 3<sup>d</sup> Avenue, the typical section remains as existing.*

FIGURE 11: PROPOSED CROSS SECTIONS WITH 5' PAVED SHOULDERS



## 2) Install sidewalk along the east side of S. Atlantic Avenue between 27<sup>th</sup> Avenue and 7<sup>th</sup> Avenue.

Sidewalks currently exist along both sides of S. Atlantic Avenue from the City limits to 27<sup>th</sup> Avenue and from 7<sup>th</sup> Avenue to 3<sup>rd</sup> Avenue, and along the west side of S. Atlantic Avenue between 27<sup>th</sup> Avenue and 7<sup>th</sup> Avenue; however there is no sidewalk along the east side of the road within this last segment. It is the recommendation of the PPM that sidewalk be installed along both sides of the roadway in or within one mile of an urban area, and completing this segment of sidewalk would provide a continuous network and provide connectivity between local residential and commercial areas within the corridor.

The sidewalk can be installed for an approximate cost of \$150,000. As previously mentioned in Measure #1, the drainage situation and limited right-of-way may present constraints that would make installation of the sidewalk in this location not feasible.

The primary function of this measure is to facilitate safe pedestrian passage through the corridor by providing a continuous sidewalk system where pedestrians can walk and not be in conflict with vehicular traffic. It is difficult to estimate the actual benefits vs. the costs of installing the sidewalk, because it is not known how many pedestrians would use it, although an estimate could be made by collecting representative sample pedestrian volumes to the north and south of the segment in question. This measure will not increase bicycle safety or aid in decreasing vehicular travel speeds.

<b>Measure 2: Install Sidewalk Along The East Side Of S. Atlantic Avenue</b> <b>27<sup>th</sup> Avenue To 7<sup>th</sup> Avenue</b>	
<b>PROS</b>	<b>CONS</b>
Facilitates pedestrian safety by providing a continuous sidewalk system throughout the corridor	Possible impacts to drainage system with addition of sidewalk
Would provide connectivity between local residential and commercial areas	Difficult to quantify benefits vs. costs
Minimal cost	
<b>Approximate Construction Cost: \$150,000</b>	



### 3) Install Rectangular Rapid Flashing Beacons (RRFBs)

The pedestrian volumes collected in the field identified six intersections where pedestrian demand was significantly higher than the other intersections within the corridor. These intersections include Oyster Quay, Matthews Avenue, 26<sup>th</sup> Avenue, 27<sup>th</sup> Avenue, 24<sup>th</sup> Avenue and 7<sup>th</sup> Avenue. Currently 27<sup>th</sup> Avenue is controlled with a full traffic signal and the Matthews Avenue crosswalk is controlled with a pedestrian traffic signal, so they would not be considered candidates for RRFBs.

RRFBs are enhanced pedestrian crossing warning signs installed adjacent to the crosswalk. The assembly consists of a post mounted pedestrian warning sign with downward diagonal arrow plaque and a RRFB unit. They are pedestrian activated and, once activated; they emit rapid bursts of alternating light to warn motorists that pedestrians are crossing the roadway. The RRFBs are warning devices and not regulatory, however their compliance rates exceed 80%, so they are very effective.



FIGURE 12: RECTANGULAR RAPID WARNING BEACON WITH PEDESTRIAN CROSSING WARNING SIGNS

(Source: <http://www.spotdevices.com/index.html>)

Oyster Quay, 26<sup>th</sup> Avenue, 24<sup>th</sup> Avenue and 7<sup>th</sup> Avenue are currently equipped with special emphasis crosswalks and near pedestrian crossing warning signs to alert vehicular traffic of the designated pedestrian crossings. Five of the nine bike/pedestrian related crashes occurred at these four intersections. The pedestrian volumes indicate that these are higher demand intersections (relative to the remainder of the corridor), but demand is not high enough to warrant pedestrian signals. RRFBs accompanied with advance pedestrian



crossing warning signs would emphasize the crosswalks at these locations and improve pedestrian safety. Therefore, consideration should be given to installing RRFBs at Oyster Quay, 24<sup>th</sup> Avenue and 7<sup>th</sup> Avenue. 26<sup>th</sup> Avenue is not considered a good candidate for the installation of RRFBs because of its close proximity to 27<sup>th</sup> Avenue and 24<sup>th</sup> Avenue.

In conjunction with using pedestrian volumes to determine optimal locations for the installation of RRFBs, the spacing of the remaining crosswalks was also evaluated to ensure that crossings are provided at somewhat evenly spaced intervals within the corridor so that pedestrians will not experience significant out-of-direction travel if they wanted to use an enhanced crossing. Beach access was also considered when determining the optimal locations, although if the sidewalk is installed as described in Measure #2, the beach access points become less of a factor. For the purposes of providing evenly spaced enhanced crossing points, and access to the east side of S. Atlantic Avenue, the existing crosswalk at 18<sup>th</sup> Avenue and a new crosswalk at the intersection of 12<sup>th</sup> Avenue are considered good candidates for the installation of RRFBs.

The approximate construction cost associated with the installation of RRFBs at Oyster Quay, 24<sup>th</sup> Avenue, 7<sup>th</sup> Avenue, 18<sup>th</sup> Avenue and 12<sup>th</sup> Avenue is \$50,000. The primary function of this measure is to facilitating safe pedestrian passage across S. Atlantic Avenue. This measure will also increase safety for bicyclists crossing at these locations. This measure will have some impact on vehicular travel speed through the corridor because motorists will be stopping and starting at somewhat regular intervals; however the frequency of their stopping and starting is based on pedestrian demand, and if no pedestrians are present, then motorists can proceed through the corridor unimpeded; in which case the RRFBs would have no impact on vehicular travel speeds.



<b>Measure 3: Install Rectangular Rapid Flashing Beacons (RRFBs)</b>	
<b>PROS</b>	<b>CONS</b>
Facilitates pedestrian and bicycle safety by providing a high emphasis crosswalk	If too highly concentrated, the RRFBs could lose their effectiveness
Minimal cost	Flashing beacons could be annoying to residents along S. Atlantic Avenue
	Adds to the sign and light clutter within the corridor
<b>Approximate Construction Cost: \$50,000 (\$10,000/intersection)</b>	



#### 4) Supply Pedestrian Flags

Pedestrian flags are bright orange colored "self-serve" flags that are intended to make pedestrians more visible when they are using a crosswalk. The flags can be supplied at any of the crosswalks and intersections within the corridor; although placing them at crossings with signals or RRFBs could be considered overkill. The flags are simple to use; a bin of flags is provided on either side of the crosswalk. When pedestrians want to cross, they pick a flag from the bin, make the crossing with the flag extended, and then deposit the flag in the bin on the opposite side of the road.



FIGURE 13: PEDESTRIAN CROSSING FLAG IN USE

(Source: Hudson Falls, NY)

The primary function of this measure is to facilitating safe pedestrian passage across S. Atlantic Avenue. Bicyclists would not likely use the flags because of the awkwardness of driving one-handed while carrying the flag. This measure will not aid in decreasing vehicular travel speeds.

Measure 4: Supply Pedestrian Flags	
PROS	CONS
Facilitates pedestrian safety by providing emphasis to the pedestrian in the crosswalk	Encouraging pedestrians to use the flags
Minimal cost	High maintenance requiring constant monitoring to replacing stolen or lost flags
Approximate Cost: \$3.00 per flag plus cost of bins	

## 5) Install Median Refuge Islands

As defined by Walkinginfo.org, median refuge islands “are raised islands placed in the center of the street at intersections or midblock to help protect crossing pedestrians from motor vehicles. Center crossing islands allow pedestrians to deal with only one direction of traffic at a time, and they enable them to stop partway across the street and wait for an adequate gap in traffic before crossing the second half of the street”. Median refuge islands have been proven to significantly decrease the percentage of pedestrian crashes, primarily because they reduce conflict between vehicles and pedestrians, provide additional emphasis for crosswalks and reduce exposure time for pedestrians. In addition, the presence of median refuge islands tends to slow vehicular traffic.



FIGURE 14 MEDIAN REFUGE ISLAND

(Source: [http://safety.fhwa.dot.gov/intersection/resources/fhwasa06016/chap\\_6.htm](http://safety.fhwa.dot.gov/intersection/resources/fhwasa06016/chap_6.htm))

The feasibility of installing median refuge islands was analyzed as part of this report. Median refuge islands are required to be a minimum of 6' wide, per ADA (Americans with Disability Act) design criteria. Based on the existing and proposed cross sections shown in Measure #1, Figures 9-11, there would be sufficient roadway width to install median refuge islands at the locations with mid-block crosswalks, which include the crosswalk south of Sea



Woods Blvd. and the crosswalk south of Bahama Dr. The existing mid-block crosswalk between 6<sup>th</sup> Avenue and 7<sup>th</sup> Avenue already has a median refuge island.

It would not be feasible to install median refuge islands at the marked intersection crosswalks as they are currently configured. As shown in the figure below, installation of median refuge islands at these locations would a) impede the side street through movement b) impede left turning vehicles out of the side street and c) eliminate the dedicated left turn lane from the mainline. The crosswalk placement shown below is typical to all of the intersections with marked crosswalks.

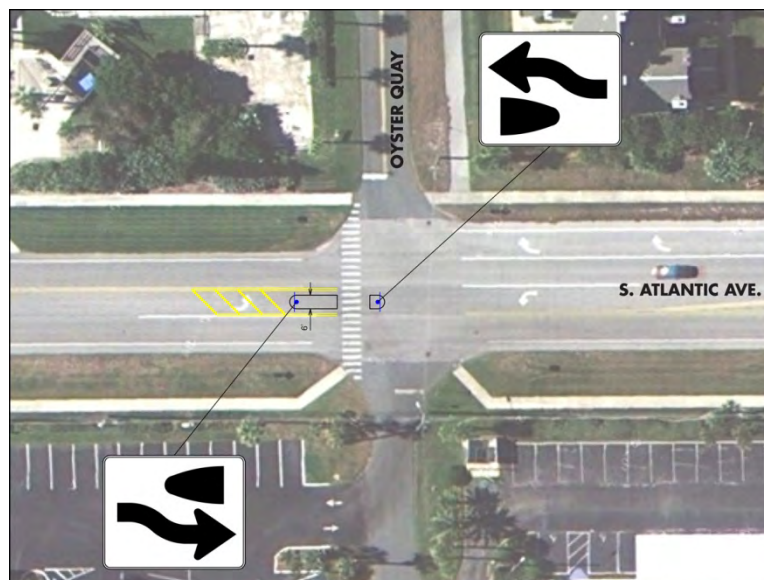


FIGURE 15: CONCEPTUAL MEDIAND REFUGE ISLAND ON S. ATLANTIC AVENUE

In order to be able to install median refuge islands at these locations, the crosswalks would need to be moved further back from the intersections so that the islands could be built without obstructing traffic. New ramps and sidewalk would need to be constructed to reach the new crosswalk locations. The median refuge islands could not be built without sacrificing the exclusive left turn lanes at the intersections, and even if lane modifications are made as described in Measure #1, the refuge islands could not be fit in without widening the road or sacrificing either the bike lane or the exclusive left turn lane.

Although the corridor is not currently configured to accommodate median refuge islands at anywhere but the mid-block crosswalks, median refuge islands can provide a substantial

benefit to pedestrian safety. Consideration should be given to having an Access Management Study completed to determine the necessity of providing full access along the corridor and left turns into and out of the side streets. If some of these movements can be eliminated, it would become more feasible to install median refuge islands.

The primary function of this measure is to facilitating safe pedestrian passage across S. Atlantic Avenue. Bicyclists would also benefit from the median refuge islands, and it is expected that this measure will aid in decreasing vehicular travel speeds.

<b>Measure 5: Install Median Refuge Islands</b>	
<b>PROS</b>	<b>CONS</b>
Facilitates pedestrian safety by providing refuge to pedestrians crossing S. Atlantic Avenue	Not feasible for intersection crosswalks
Allows pedestrians/bicyclists to deal with only one direction of traffic at a time	Introduces fixed objects into the roadway which may result in increased vehicular crashes
Tends to reduce vehicle travel speeds	
Highlight pedestrian crossings	
Can be installed without road widening	
Minimal cost	
<b>Approximate Construction Cost: \$4,000 per island</b>	



## 6) Install Advance Yield Markings with Signs

Advance yield pavement markings and signs are applied as shown in the figure below.

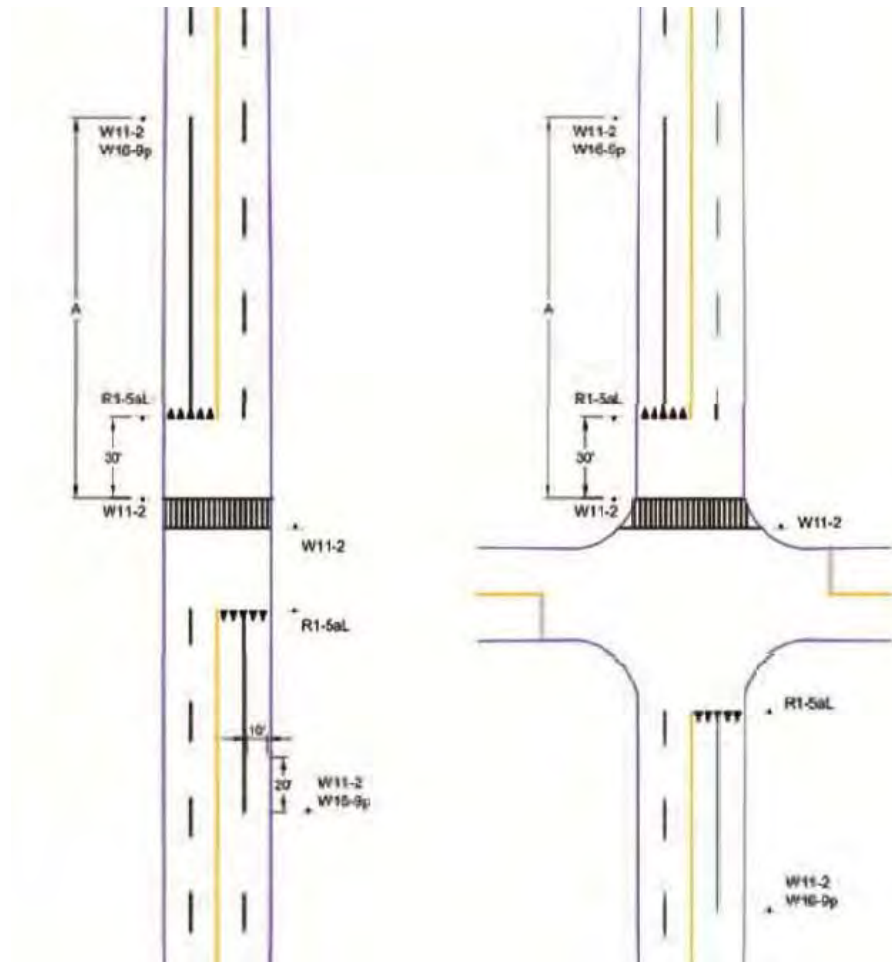


FIGURE 16: ADVANCE YIELD MARKINGS WITH SIGNS

(Source Best Foot Forward Report)

Advance yield pavement markings and associated “Yield Here to Pedestrians” signs are used to provide strong emphasis that vehicular traffic is required, by law, to yield to pedestrians/bicyclists in the crosswalk. Advance yield pavement markings can be used on single lane or multilane approaches, but should not be used where other active treatments are being used or proposed; therefore 26<sup>th</sup> Avenue, 20<sup>th</sup> Avenue, 15<sup>th</sup> Avenue and 8<sup>th</sup> Avenue

are good candidates for this measure. In addition, since it is situated on a curve, the mid-block crossing between 6<sup>th</sup> and 7<sup>th</sup> Avenue could benefit from this measure as the signs and markings would provide additional emphasis and advance warning of the crossing. The crosswalks at these locations could easily be retrofit for this measure since they are already equipped with marked crosswalks and at-crosswalk pedestrian crossing warning signs and downward pointing diagonal arrows, so only the associated pavement markings and advance signing need to be added.

The primary function of this measure is to facilitating safe pedestrian and bicycle passage across S. Atlantic Avenue. It is not expected that this measure will aid in decreasing vehicular travel speeds.

<b>Measure 6: Install Advance Yield Markings with Signs</b>	
<b>PROS</b>	<b>CONS</b>
Facilitates pedestrian and bicycle safety by providing emphasis to the crosswalk	Does not slow vehicular travel speeds
Minimal cost	
<b>Approximate Construction Cost: \$1,500 per intersection</b>	



## **7) Install Additional Marked Crosswalks at Intersections**

A generator to this report was the concern expressed by citizens regarding crossing S. Atlantic Avenue during the busy summer and holiday seasons with the heavy vehicular volumes and excessive speeds, and several requests were made for new marked crosswalks along S. Atlantic Avenue.

The marked crosswalk is used to enhance pedestrian safety by making the crosswalk more visible to drivers and to provide safe guidance to the pedestrians using them. However marked crosswalks should not be considered the answer to all pedestrian safety problems. The installation of marked crosswalks could, in fact, have the reverse affect if pedestrians become complacent in thinking that they are “protected” by a crosswalk and become less cognizant of their surroundings. In addition, if there are too many crosswalks and warning signs in too close of proximity to each other, drivers tend to “tune them out” and they become ineffective. The FDOT PPM provides the guidance that marked crosswalks on an uncontrolled leg of an intersection should not be used where the speed limit exceeds 40 mph and where the roadway is four or more lanes wide, without a raised median or crossing island, and has an ADT of  $\geq 12,000$ , unless supplemented by other treatments such as those described in the previous measures. These criteria restrict the option of installing marked crosswalks from 27<sup>th</sup> Avenue to 7<sup>th</sup> Avenue, which is the segment of S. Atlantic Avenue most in need of pedestrian safety measures. Although the existing configuration of the corridor precludes the installation of marked crosswalks at this time, this report presents several safety measures and geometric modifications that can be implemented to improve pedestrian and bicycle safety, which may allay concerns about not having marked crosswalks.

## **8) Install On-Street Parking**

One measurable method of slowing vehicular travel speeds is to install on-street parking along a facility. In conjunction with slower speeds comes a reduction in the number and severity of crashes. Since the study corridor is located within a beach-front community where parking is usually at a premium, the addition of parking along the corridor is appealing. On-street parking also benefits activity centers and businesses and helps create an atmosphere that encourages more biking and walking, contributing to a healthier, busier downtown

### **5-Lane Section:**

In order to install parking along S. Atlantic Avenue from 27<sup>th</sup> Avenue to 3<sup>rd</sup> Avenue, either the roadway would need to be widened to maintain the existing lane configuration and also accommodate parking spaces, or the number of travel lanes would need to be reduced and/or narrowed. There are numerous cross sections that can be developed for this scenario. In one option, the outside through lanes could be replaced with parking spaces; transforming the existing 5-lane with center two-way left turn lane (TWLTL) cross section into a 3-lane with center TWLTL cross section. Alternate configurations could include removing the center TWLTL to form a 4-lane undivided roadway with a parking lane replacing the previous outside northbound through lane, or removing the inside southbound through lane to form one lane southbound, a center TWLTL, two lanes northbound and a parking lane in the previous outside northbound through lane. 4' bicycle facilities can be accommodated in each of these alternatives; however for the last two alternatives, the lane widths would need to be reduced to 10', which is only allowed if the design speed is less than 40 mph.

### **3-Lane Section:**

Parking along the 3-lane with center TWLTL roadway segment, which extends from the City Limits, north to 27<sup>th</sup> Avenue, could only be accommodated by eliminating the center TWLTL or widening the road, either of which could accommodate bicycle facilities.



A consequence to modifying the cross sections as described above is that any lane reduction would have a negative impact on the capacity of the roadway. This is a prime concern since the study corridor is also an emergency evacuation route, although in times of emergency, the parking lanes could be used as through lanes.

On-street parking also creates some conflict between bicyclists and opening of car doors. Therefore, if bike lanes are implemented along with on-street parking, care should be taken to provide as wide of a buffer zone as feasible. The primary function of this measure is to decrease vehicular travel speeds, which will make the roadway safer for pedestrians and bicyclists.

<b>Measure 8: Install On-Street Parking</b>	
<b>PROS</b>	<b>CONS</b>
Slows vehicular travel speeds	May require road widening
Increases pedestrian, bicycle and vehicular safety	May require reduction in through lanes
Encourages more biking and walking	Could create conflict between the opening of car doors and bicyclists
Encourages a healthier business district	Potentially costly since it would require milling and resurfacing S. Atlantic Avenue
<b>Approximate Construction Cost: \$400,000</b>	

## 9) Reduce Vehicular Travel Speed

Higher vehicular travel speeds are strongly associated with both a higher probability of vehicular or pedestrian related crash occurrence and more serious resulting injuries. Thus, it is desirable to reduce vehicular travel speed to increase safety. Vehicular speeds can be reduced by traffic calming measures, some of which have been described in the previous measures.

Reducing vehicular travel speed should not be confused with reducing the speed limit, because the two are largely independent of one another. Drivers tend to choose a speed based on their reaction the surrounding environment, and unreasonably low speed limits are largely ignored by the majority of motorists. There are numerous factors that influence driver reaction including lane width, time of day, speed of other vehicles, familiarity with the road, vehicle parking and traffic volume, to name a few.

The FDOT manual *Speed Zoning for Highways, Roads and Streets in Florida* states that “it is common engineering knowledge that about 85% of drivers travel at reasonably safe speeds for the various roadway conditions encountered, regardless of the speed limit signs”. Thus, the 85<sup>th</sup> percentile speed, along with the 10 mph pace, are the prime determinants in establishing a reasonable speed limit. The 85<sup>th</sup> percentile speed is defined as the speed at or below which 85% of observed free-flowing vehicles are traveling, and the 10 mph pace is the 10 mph range in which the majority of the vehicles are observed traveling. Based on the Speed Zoning manual, the posted speed should not differ from the 85<sup>th</sup> percentile speed or the upper limit of the 10 mph pace by more than 3 mph, and it shall not be less than 8 mph. A Speed Zone Analysis, which determines the 85<sup>th</sup> percentile speed and the 10 mph pace, was conducted for the corridor as part of this Study. The results are provided in Table 6.

Based on the values listed in the table above, the posted speed limit of 45 mph is appropriate for the roadway in its current configuration, and a reduction of the speed limit cannot be supported. However, if any of the measures described in this Study are implemented, a follow-up Speed Zone Analysis could be performed to determine if the 85<sup>th</sup> percentile speed and 10 mph pace has dropped, in which case, the Board of County Commissioners are entitled, by FL Statute 316.189, to amend the posted speed limit.



## **APPENDIX**

**Appendix A - Corridor Photographs**

**Appendix B - Traffic Data**

**Appendix C - Design Criteria**

**Appendix D - Review Comments and Correspondence**

## APPENDIX A

### CORRIDOR PHOTOGRAPHS



## S. Atlantic Avenue from City Limits to 27<sup>th</sup> Avenue



Facing south S. Atlantic Avenue



Facing north along S. Atlantic Avenue

### **S. Atlantic Avenue between 27<sup>th</sup> Avenue and 7<sup>th</sup> Avenue**



Facing south along S. Atlantic Avenue



Facing north along S. Atlantic Avenue



### S. Atlantic Avenue from Ave 7<sup>th</sup> Avenue to 3<sup>rd</sup> Avenue



Facing south along S. Atlantic Avenue



Facing north along S. Atlantic Avenue

### S. Atlantic Avenue Midblock Crosswalk



Facing north along S. Atlantic Avenue south of Sea Woods Blvd.



Facing west on S. Atlantic Avenue north of 7<sup>th</sup> Avenue



## S. Atlantic Avenue at 27<sup>th</sup> Avenue



Facing south along S. Atlantic Avenue



Facing north along S. Atlantic Avenue at 27<sup>th</sup> Avenue

### **S. Atlantic Avenue at Matthews Avenue**



Facing south along S. Atlantic Avenue



Facing north along S. Atlantic Avenue



## APPENDIX B

### TRAFFIC DATA



GMB ENGINEERS & PLANNERS, INC.

Additional Notes & Observations:

Name: Josh Date: 09/03/11

Project: 08-176.03 | New Smyrna Beach Ped Stud

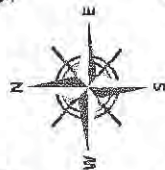
NB/SB: A1A EB/WB: 7th Ave

Hour

10:00a (1) 11:00 (2) 12:00p (3) 2:00p (4) 3:00p (5) 4:00p (6) 5:00p (7) 6:00p (8)

Eastbound		Westbound	

Southbound		Northbound	



Southbound Northbound

Eastbound		Westbound	

10:00a (1) 11:00 (2) 12:00p (3) 2:00p (4) 3:00p (5) 4:00p (6) 5:00p (7) 6:00p (8)

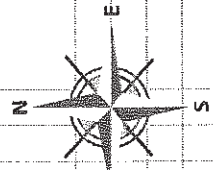
Hour

Bicycle & Pedestrian Movement Summary | 8 Hour Summary

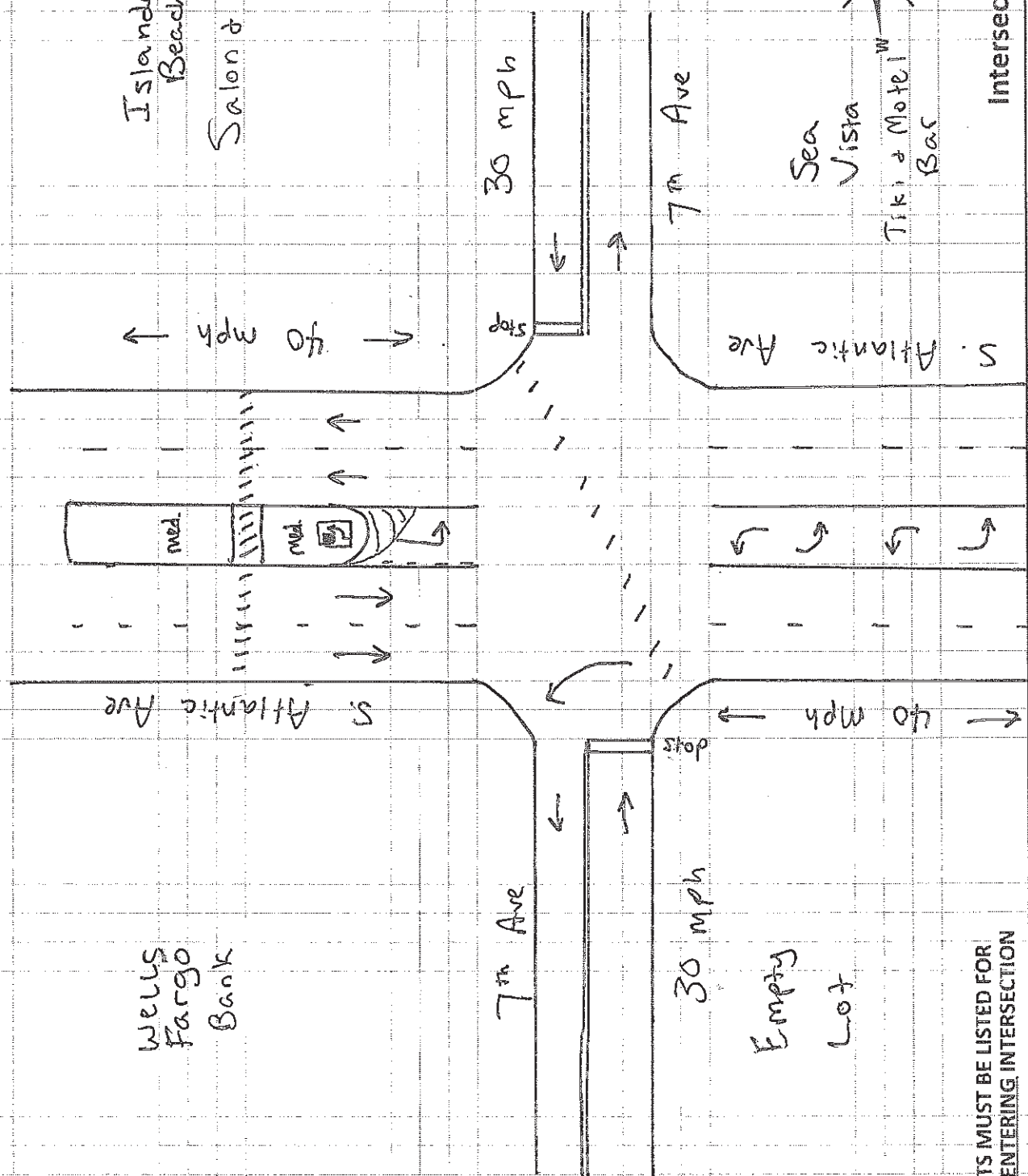


Islander Beach Salon & Spa

B E A C H



Intersection Sketch



\*SPEED LIMITS MUST BE LISTED FOR TRAFFIC ENTERING INTERSECTION



GMB ENGINEERS & PLANNERS, INC.

Additional Notes & Observations:

Date: 09/03/11

Project: 08-176.03

Name: bsl





N

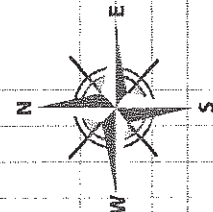
Islander Beach  
Resort

E

40mph

S

Wells forgo W



Intersection Sketch

\*SPEED LIMITS MUST BE LISTED FOR  
FOR TRAFFIC ENTERING INTERSECTION



GMB ENGINEERS & PLANNERS, INC.

Additional Notes & Observations:

Date: 09/3/11

Project: 08-176.03

Name: NSB Peds Study



Additional Notes & Observations:

Name: Diego / Austin Date: 9/4/11

Project: 08-176.03 | New Smyrna Ped Study

NB/SB: A1A EB/WB: 9th Ave

Hour

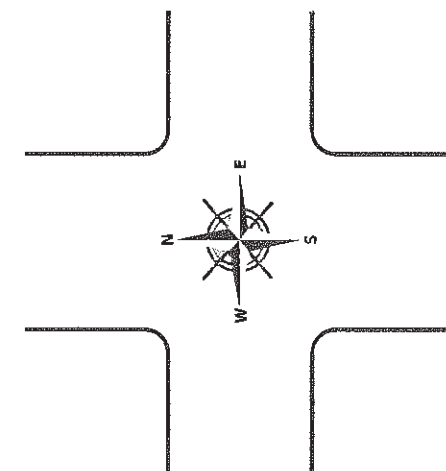
10:00a (1) 11:00a (2) 12:00p (3) 2:00p (4) 3:00p (5) 4:00p (6) 5:00p (7) 6:00p (8)

Eastbound		Westbound	

Hour  
(1) 10:00a  
(2) 11:00a  
(3) 12:00p  
(4) 2:00p  
(5) 3:00p  
(6) 4:00p  
(7) 5:00p  
(8) 6:00p

Southbound		Northbound	

Southbound		Northbound	

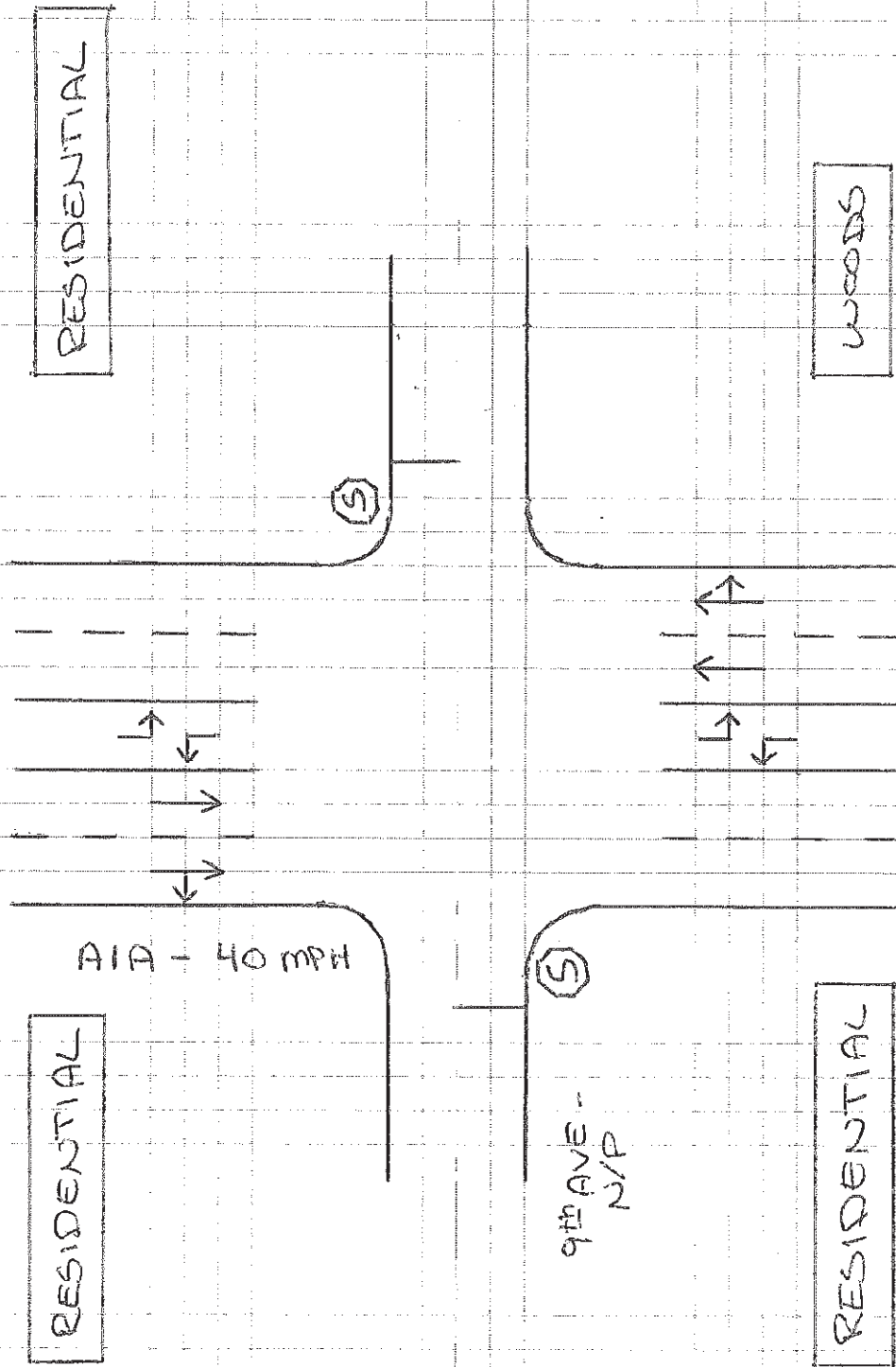
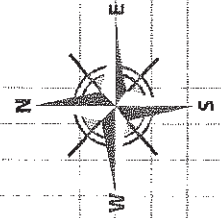


Eastbound		Westbound	

10:00a (1) 11:00a (2) 12:00p (3) 2:00p (4) 3:00p (5) 4:00p (6) 5:00p (7) 6:00p (8)

Hour





\*SPEED LIMITS MUST BE LISTED FOR  
FOR TRAFFIC ENTERING INTERSECTION



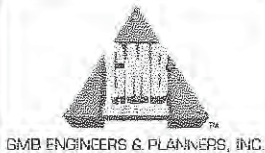
GMB ENGINEERS & PLANNERS, INC.

Additional Notes & Observations:

Date: 9/4/11

Project: 08-17603

Name: Justin



GMB ENGINEERS & PLANNERS, INC.

Additional Notes & Observations:

















Name: Adam Burnett Date: 9/7/11

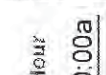
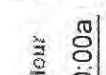


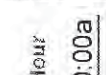
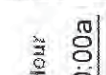


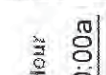
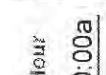


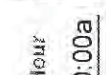
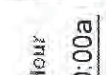


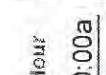
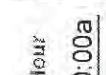


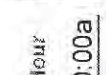
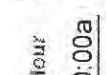


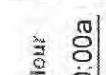
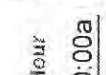


Project: 08-176.03 | New Smyrna Beach Ped Stud

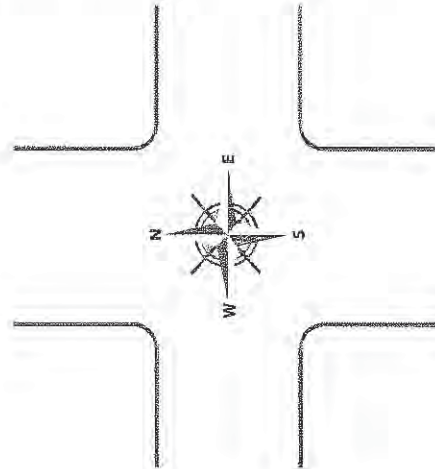
NB/SB: A1A EB/WB: S of Sea Wood





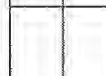
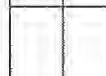








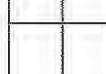
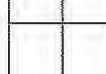
Hour

10:00a (1) 11:00 (2) 12:00p (3) 2:00p (4) 3:00p (5) 4:00p (6) 5:00p (7) 6:00p (8)

Eastbound	
	
	
	
	
	
	
	
	

Southbound		Northbound	
			
			
			
			
			
			
			



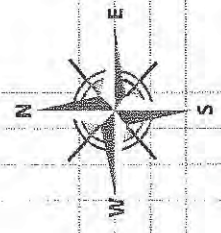
Eastbound	
	
	
	
	
	
	
	
	

10:00a (1) 11:00 (2) 12:00p (3) 2:00p (4) 3:00p (5) 4:00p (6) 5:00p (7) 6:00p (8)

Hour



Intersection Sketch



APARTMENTS

BEACH

AIA - 45 MPH

RESIDENTIAL

MEDIAN

SEAWOODS BLVD  
20 MPH

RESIDENTIAL

\*SPEED LIMITS MUST BE LISTED FOR TRAFFIC ENTERING INTERSECTION



GMB ENGINEERS & PLANNERS, INC.

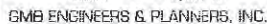
Additional Notes & Observations:

Date: 9/4/11

Project: 08-176.03

Name: Justin



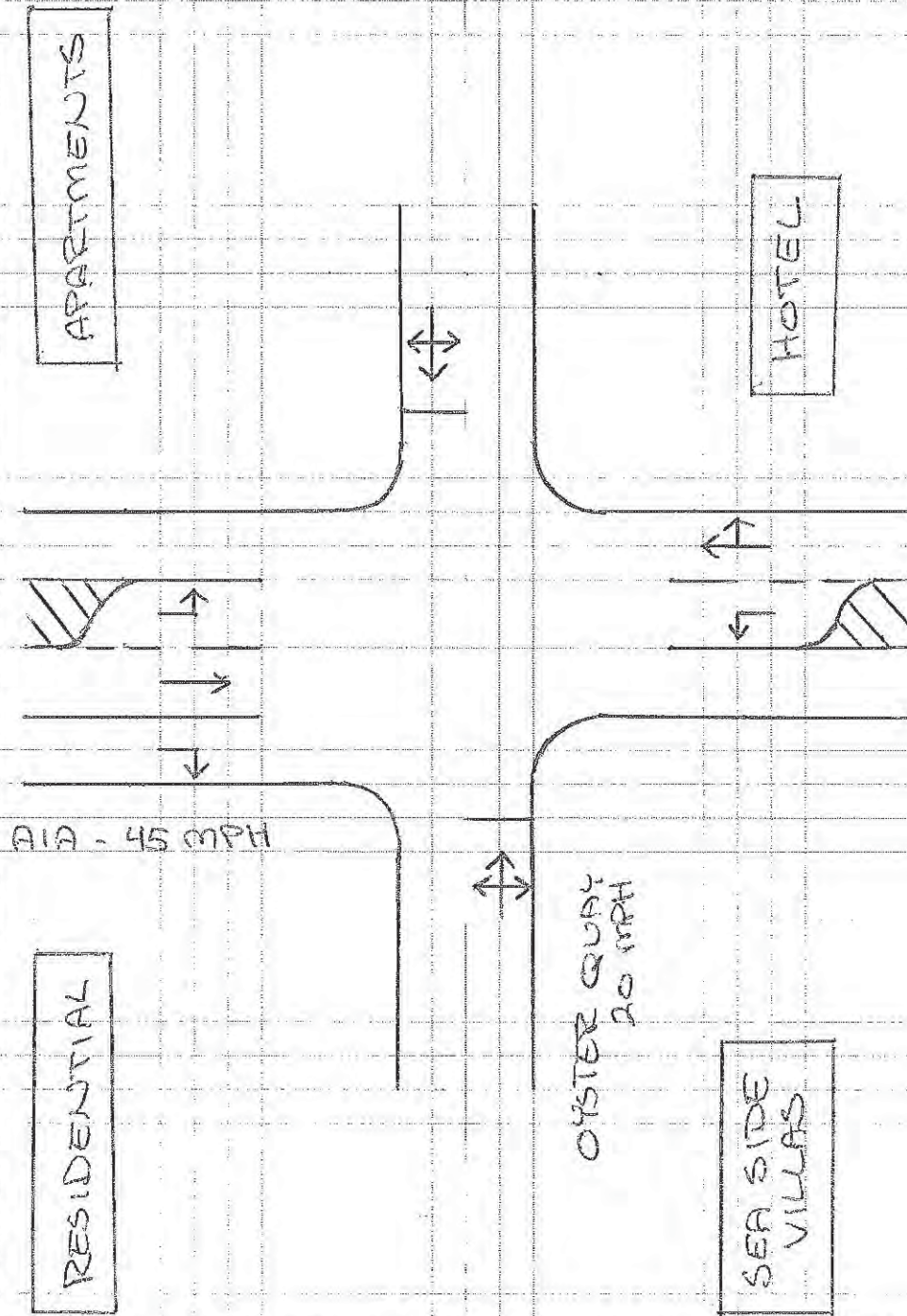
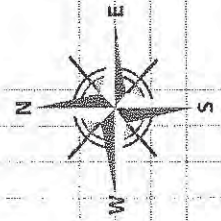


NB/SB: A1A                      EB/WB: Oyster Quay

Bicycle & Pedestrian Movement Summary | 8 Hour Summary



Intersection Sketch



\*SPEED LIMITS MUST BE LISTED FOR  
FOR TRAFFIC ENTERING INTERSECTION



GMB ENGINEERS & PLANNERS, INC.

Additional Notes & Observations:

Date: 9/4/11

Project: AS-176-03

Name: Justin





GMB ENGINEERS & PLANNERS, INC.

Additional Notes & Observations:

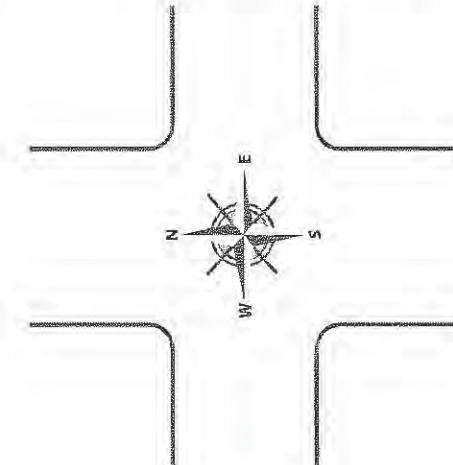
Name: Adam Burnett Date: 9/4/11  
 Project: 08-176.03 | New Smyrna Beach Ped Stud  
 NB/SB: A1A EB/WB: Matthews Ave

Hour

10:00a (1) 11:00 (2) 12:00p (3) 2:00p (4) 3:00p (5) 4:00p (6) 5:00p (7) 6:00p (8)

Eastbound		Westbound	

Southbound		Northbound	



Southbound

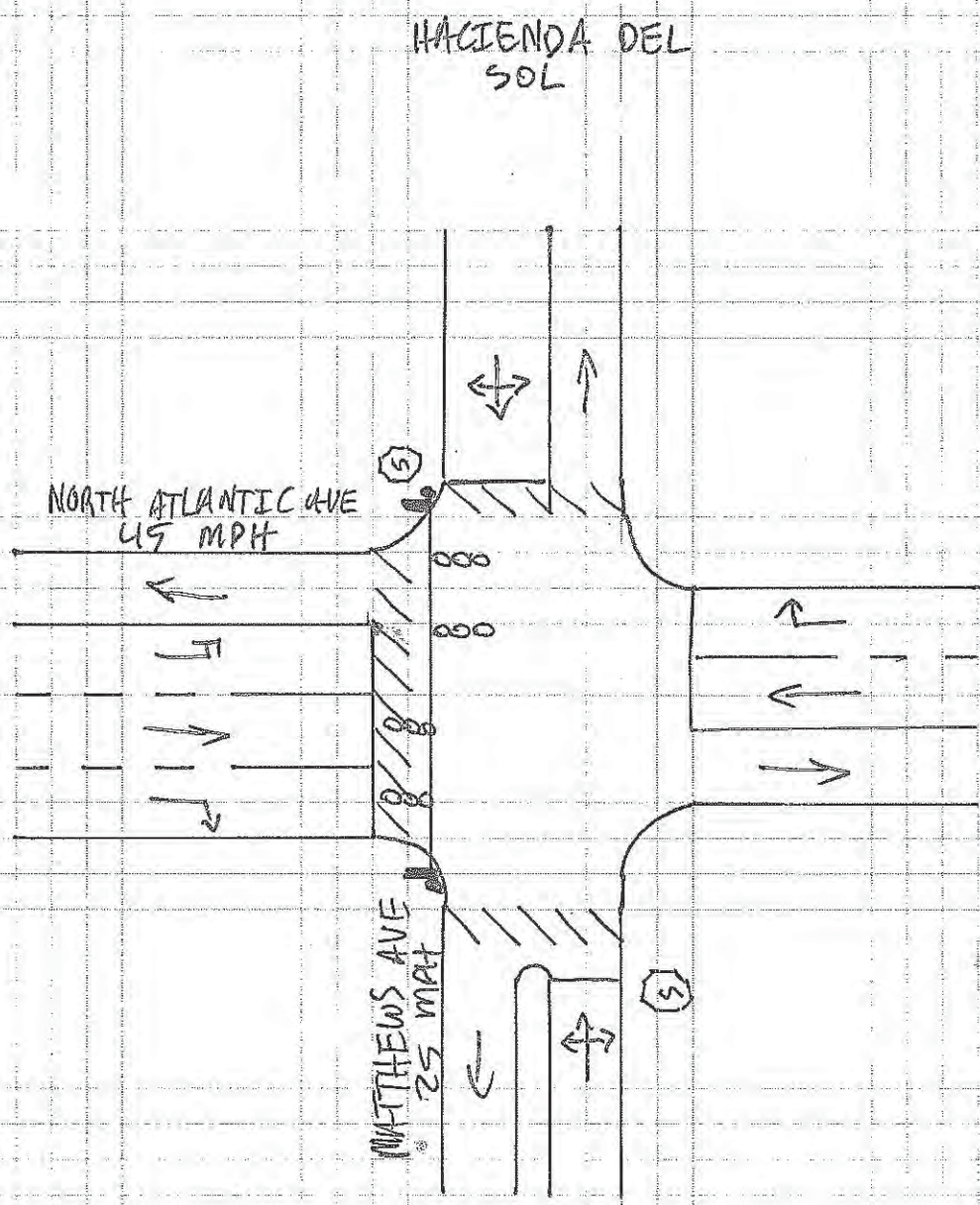
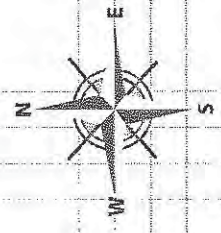
Northbound

Eastbound		Westbound	

10:00a (1) 11:00 (2) 12:00p (3) 2:00p (4) 3:00p (5) 4:00p (6) 5:00p (7) 6:00p (8)

Hour





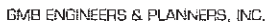
\*SPEED LIMITS MUST BE LISTED FOR TRAFFIC ENTERING INTERSECTION



GMB ENGINEERS & PLANNERS, INC.

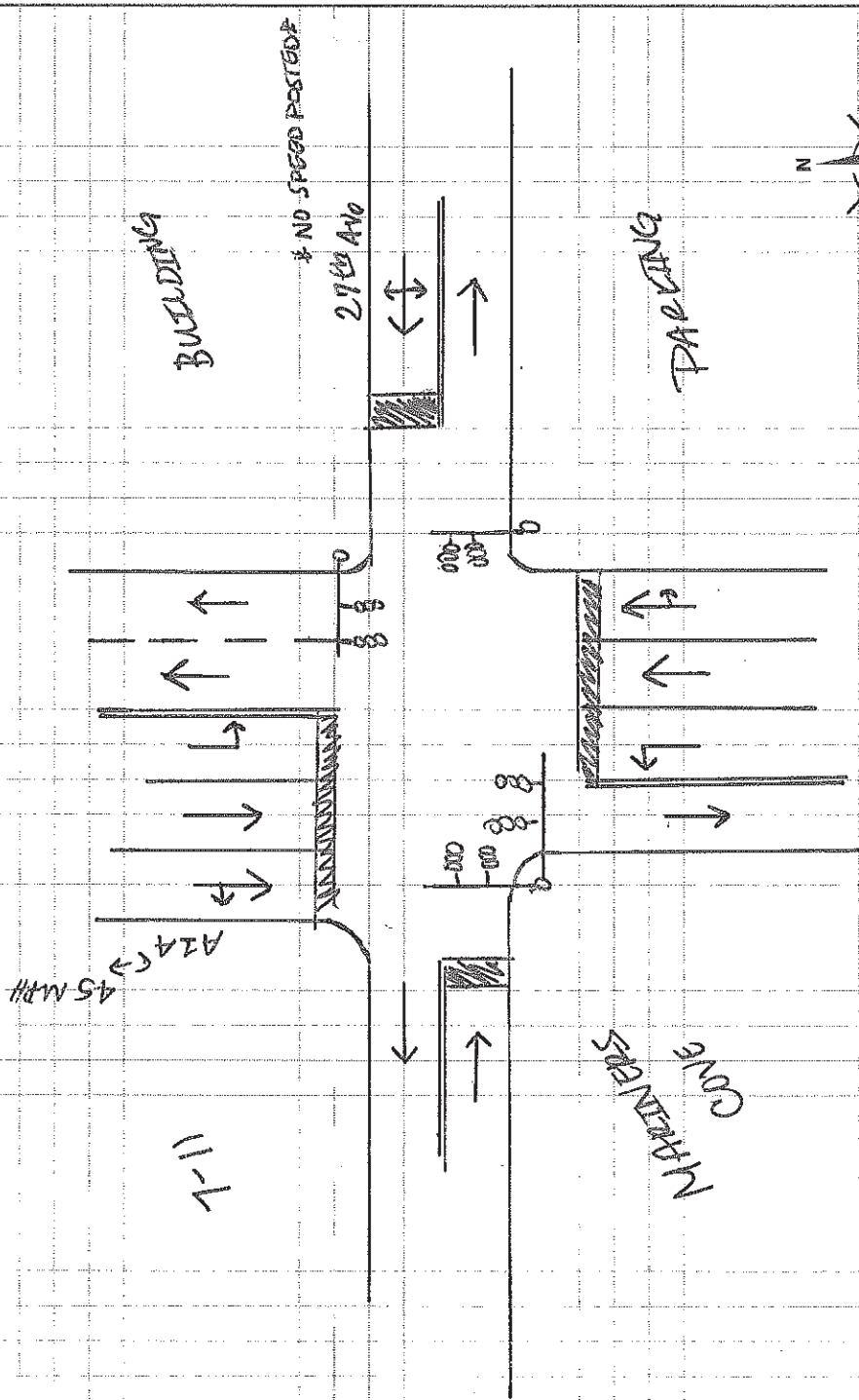
Additional Notes & Observations:

Date: 9/4/11  
 Project: 08-176.01  
 Name: Adam Burnett



NB/SB: A1A EB/WB: 27th Ave





Intersection Sketch

\*SPEED LIMITS MUST BE LISTED FOR TRAFFIC ENTERING INTERSECTION



GMB ENGINEERS & PLANNERS, INC.

Additional Notes & Observations:

Date: 9-3-11  
 Project: 08-176.03  
 Name: ROD





















Additional Notes & Observations:

































Name: Adam Burnett Date: 9/6/11  
 Project: 08-176.03 | New Smyrna Beach Ped Stud  
 NB/SB: A1A EB/WB: 26th Ave

Hour

10:00a (1) 11:00 (2) 12:00p (3) 2:00p (4) 3:00p (5) 4:00p (6) 5:00p (7) 6:00p (8)

Eastbound	
	
	
	
	
	
	
	
	
	

Westbound

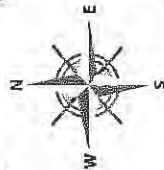
Southbound		Northbound	
			
			
			
			
			
			
			
			

Hour

(1) 10:00a (2) 11:00 (3) 12:00p (4) 2:00p (5) 3:00p (6) 4:00p (7) 5:00p (8) 6:00p

Southbound

Northbound



Eastbound

Westbound

10:00a (1) 11:00 (2) 12:00p (3) 2:00p (4) 3:00p (5) 4:00p (6) 5:00p (7) 6:00p (8)

Hour

Bicycle & Pedestrian Movement Summary | 8 Hour Summary



N

45 MPH  
A2A

FLA2A

COASTAL  
WATER  
INN

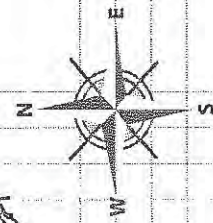
26th AVE



CHATEAU  
THE  
BUG SEA



ICE  
CAMP



Intersection Sketch

\*SPEED LIMITS MUST BE LISTED FOR  
FOR TRAFFIC ENTERING INTERSECTION



GMB ENGINEERS & PLANNERS, INC.

Additional Notes & Observations:

Date: 9-3-11

Project: 08-176.03

Name: ROD



GMB ENGINEERS & PLANNERS, INC.

Additional Notes & Observations:

Name: Josh Date: 09/07/2011

Project: 08-176.03 | New Smyrna Beach Ped Stud

NB/SB: A1A EB/WB: 24th Ave

Hour

10:00a (1) 11:00 (2) 12:00p (3) 2:00p (4) 3:00p (5) 4:00p (6) 5:00p (7) 6:00p (8)

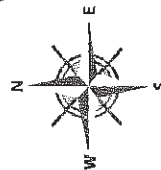
Eastbound		Westbound	

Southbound		Northbound	

Hour  
(1) 10:00a (2) 11:00 (3) 12:00p (4) 2:00p (5) 3:00p (6) 4:00p (7) 5:00p (8) 6:00p

Southbound

Northbound



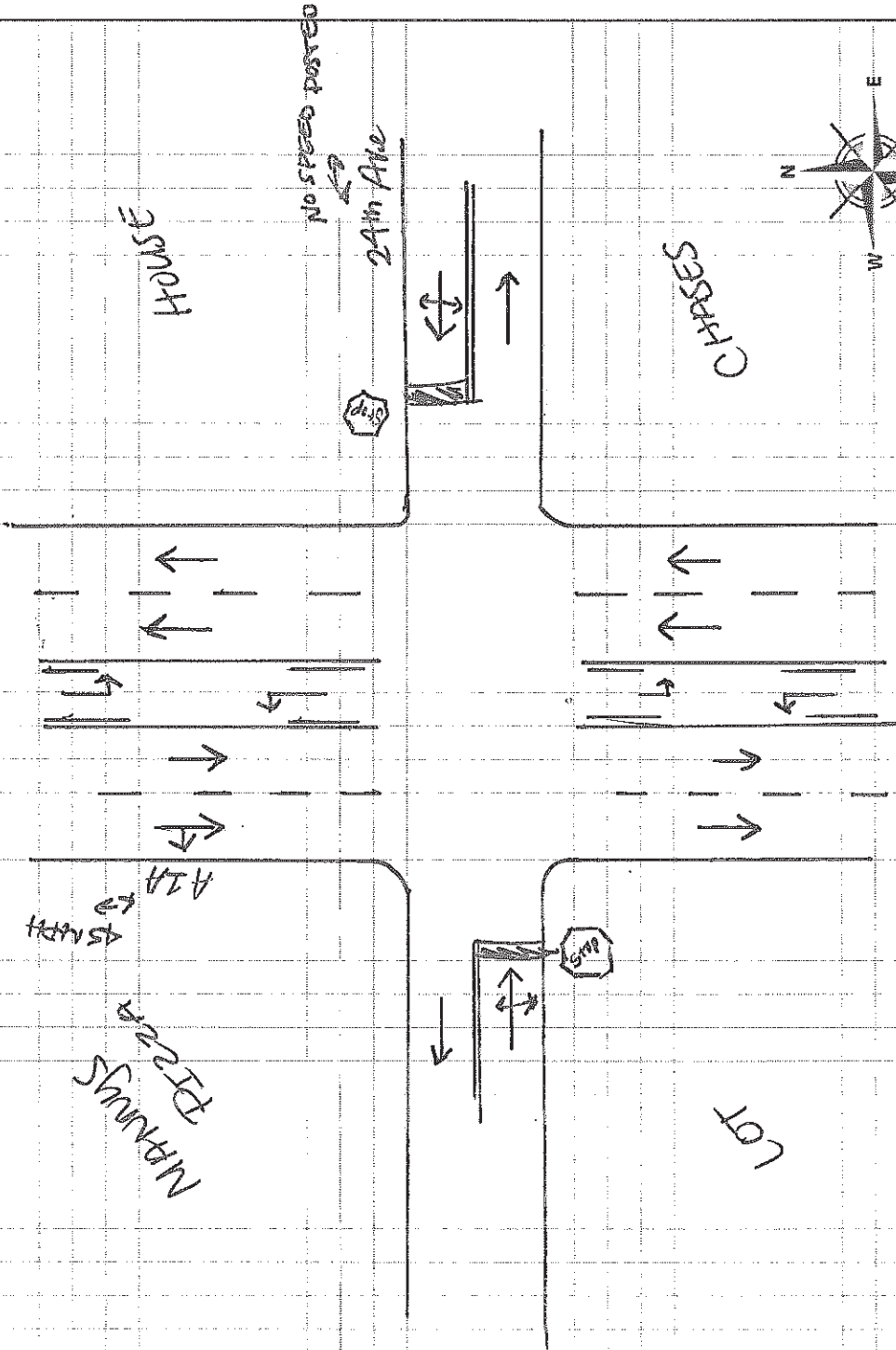
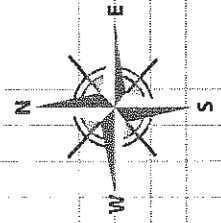
Eastbound		Westbound	

10:00a (1) 11:00 (2) 12:00p (3) 2:00p (4) 3:00p (5) 4:00p (6) 5:00p (7) 6:00p (8)

Hour



Intersection Sketch



\*SPEED LIMITS MUST BE LISTED FOR TRAFFIC ENTERING INTERSECTION



GMB ENGINEERS & PLANNERS, INC.

Additional Notes & Observations:

Date: 9-3-11

Project: 08-176-03

Name: ROD



GMB ENGINEERS & PLANNERS, INC.

Additional Notes & Observations:

Name: DIEGO























Date: 9-3-11

Project: 08-176.03 | New Smyrna Beach Ped Stud

































































NB/SB: A1A EB/WB: 15th Ave

Hour

10:00a (1) 11:00 (2) 12:00p (3) 2:00p (4) 3:00p (5) 4:00p (6) 5:00p (7) 6:00p (8)

Eastbound	
	
	
	
	
	
	
	
	
	
	
	

Westbound

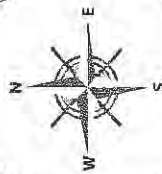
Southbound		Northbound	
			
			
			
			
			
			
			
			
			
			
			
			
			
			
			
			

Hour

(1) 10:00a (2) 11:00 (3) 12:00p (4) 2:00p (5) 3:00p (6) 4:00p (7) 5:00p (8) 6:00p

Southbound

Northbound



Eastbound

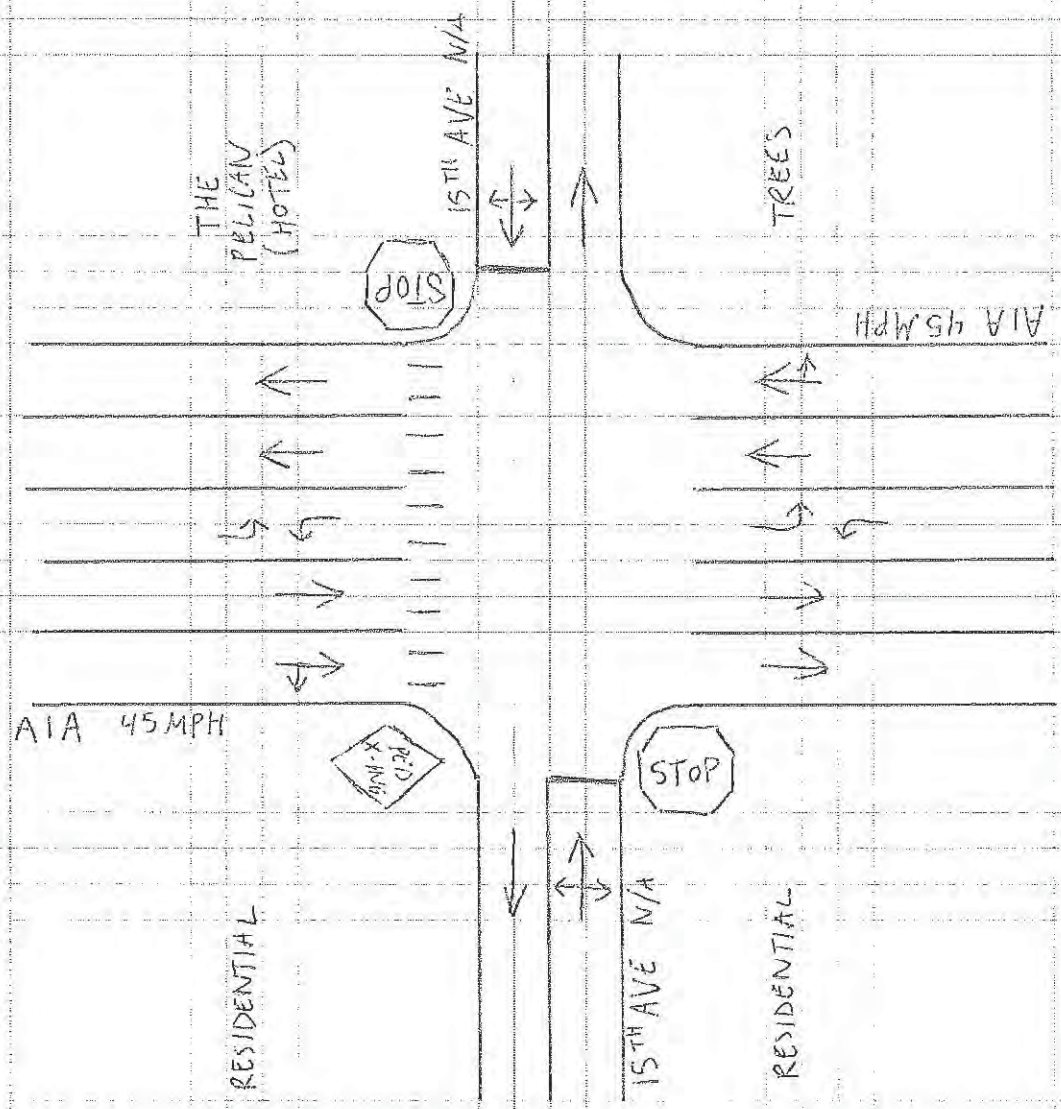
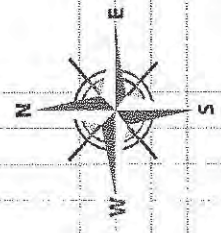
Westbound

10:00a (1) 11:00 (2) 12:00p (3) 2:00p (4) 3:00p (5) 4:00p (6) 5:00p (7) 6:00p (8)

Hour



Intersection Sketch



\*SPEED LIMITS MUST BE LISTED FOR  
FOR TRAFFIC ENTERING INTERSECTION



GMB ENGINEERS & PLANNERS, INC.

Additional Notes & Observations:

Date: 9-3-11

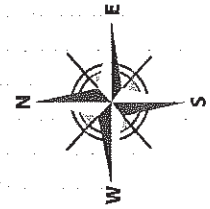
Project: 08-176.03

Name: DIEGO

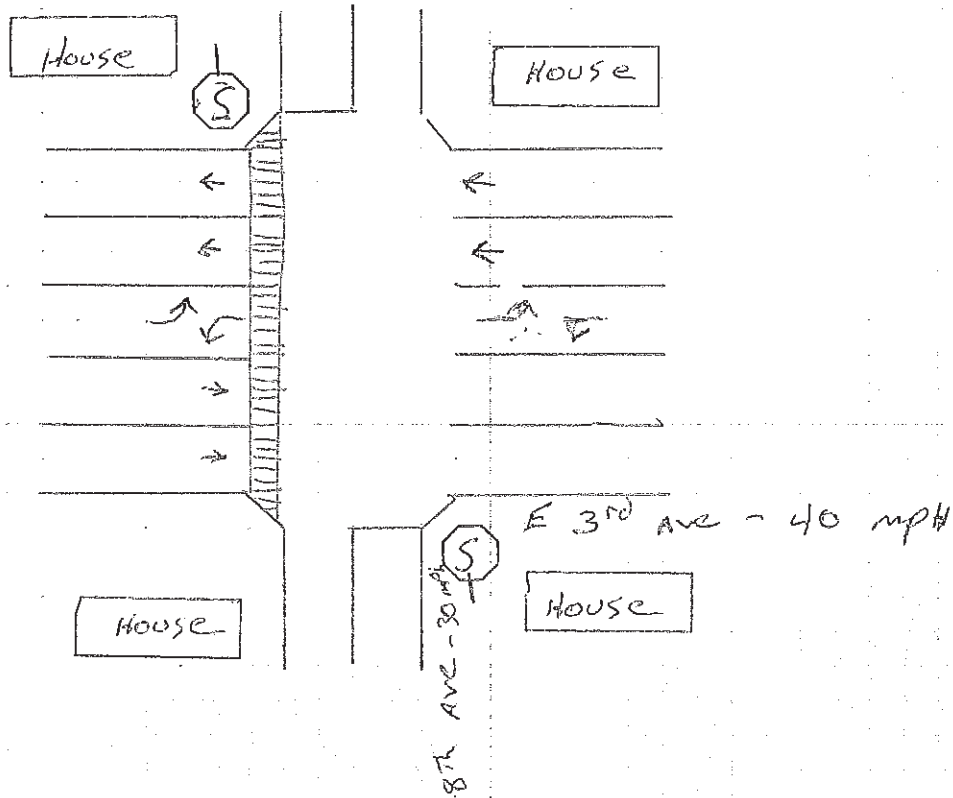




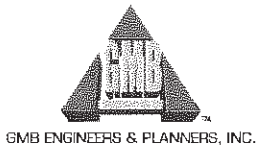




Intersection Sketch



\*SPEED LIMITS MUST BE LISTED FOR TRAFFIC ENTERING INTERSECTION



Additional Notes & Observations:

Date: sept 4 2011  
Project: 08-176.03  
Name: Gary

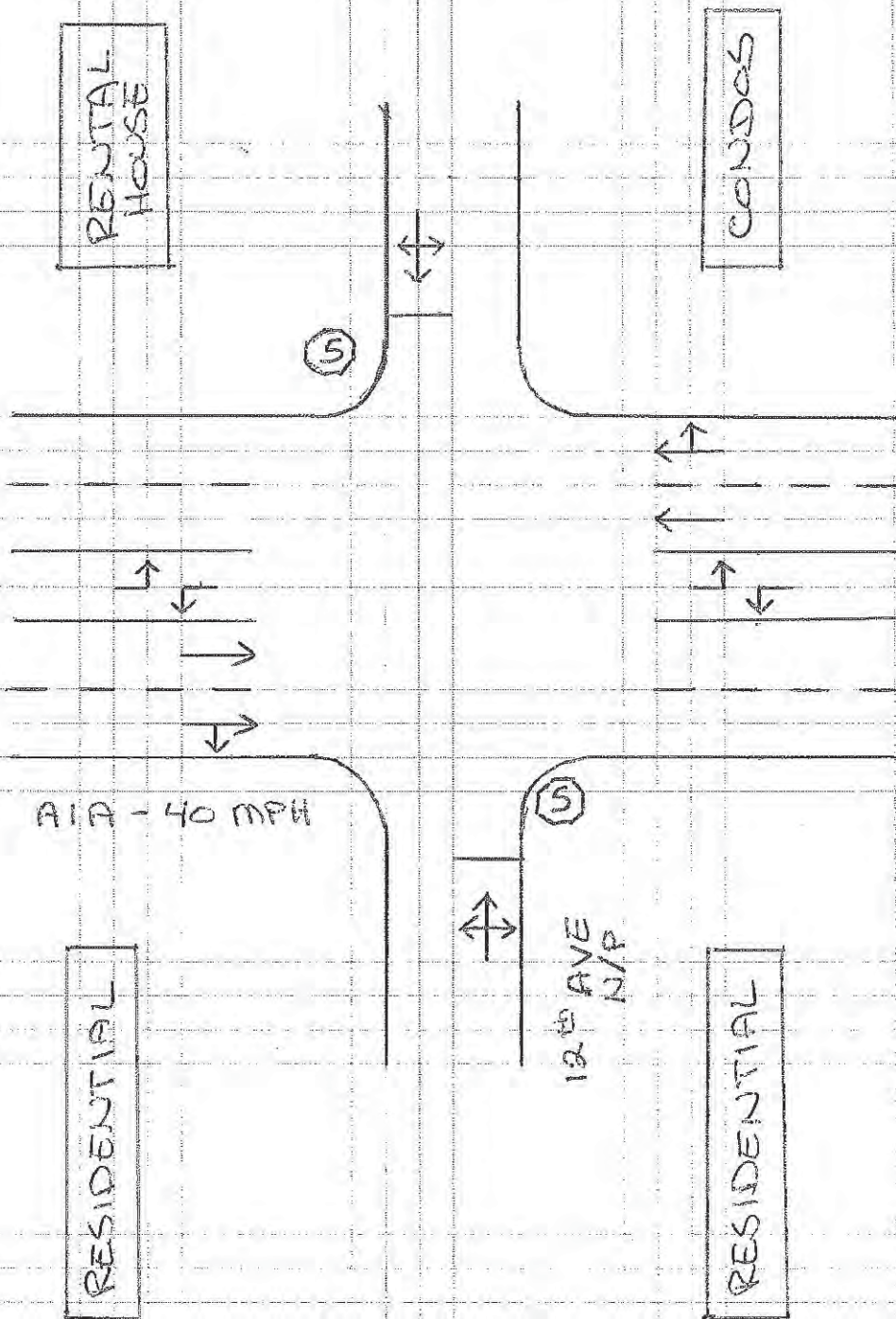
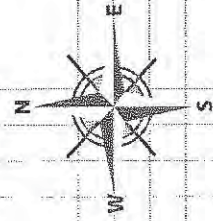


NB/SB: A1A EB/WB: 12th Ave

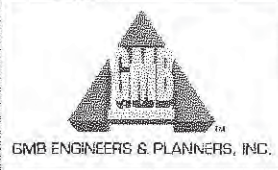
Bicycle & Pedestrian Movement Summary | 8 Hour Summary



Intersection Sketch



\*SPEED LIMITS MUST BE LISTED FOR TRAFFIC ENTERING INTERSECTION



Additional Notes & Observations:

Date: 9/4/11  
 Project: 08-176-03  
 Name: Justin

TRAFFIC COUNT DATA				
PROJECT	Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave			
LOCATION CODE	Day 1			
COUNT LOCATION	ATLANTIC AV NORTH OF OYSTER (3 Lane Section)			
GMB PROJECT NO.	08-176.03			
TYPE OF COUNT:				
24 HOUR APPROACH VOLUME COUNT				
TIME OF COUNT:				
	Start Date	11-Aug-11	Start Time	12:00 AM
	End Date	12-Aug-11	End Time	12:00 AM
VOLUMES:				
	ADT	8,789	PEAK HOUR	689
			PEAK END TIME	6:15 PM
			PEAK NB/EB MOVEMENT	348
			PEAK SB/WB MOVEMENT	341
MEASURED TRAVEL CHARACTERISTICS:				
"Peak to Daily Ratio"				
	K=	7.84%	D=	50.5%
	T daily=	1.23%		



## HOURLY DISTRIBUTION OF TRAFFIC VOLUMES

<b>PROJECT</b>	Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave
<b>LOCATION CODE</b>	Day 1
<b>COUNT LOCATION</b>	ATLANTIC AV NORTH OF OYSTER (3 Lane Section)
<b>GMB PROJECT NO.</b>	08-176.03

HOURLY END AT	HOURLY VOLUME DIRECTION (NB/EB)	HOURLY VOLUME DIRECTION (SB/WB)	TOTAL VOLUMES BOTH DIRECTIONS	DISTRIBUTION PERCENT DIRECTION (NB/EB)	DISTRIBUTION PERCENT DIRECTION (SB/WB)	TOTAL PERCENT BOTH DIRECTIONS
01:00 AM	19	58	77	0.43%	1.32%	0.88%
02:00 AM	10	33	43	0.23%	0.75%	0.49%
03:00 AM	6	10	16	0.14%	0.23%	0.18%
04:00 AM	9	7	16	0.21%	0.16%	0.18%
05:00 AM	13	7	20	0.30%	0.16%	0.23%
06:00 AM	20	9	29	0.46%	0.20%	0.33%
07:00 AM	58	23	81	1.32%	0.52%	0.92%
08:00 AM	134	57	191	3.06%	1.29%	2.17%
09:00 AM	260	125	385	5.94%	2.84%	4.38%
10:00 AM	298	207	505	6.80%	4.69%	5.75%
11:00 AM	270	250	520	6.16%	5.67%	5.92%
12:00 PM	261	283	544	5.96%	6.42%	6.19%
01:00 PM	322	329	651	7.35%	7.46%	7.41%
02:00 PM	301	287	588	6.87%	6.51%	6.69%
03:00 PM	301	305	606	6.87%	6.92%	6.89%
04:00 PM	303	324	627	6.92%	7.35%	7.13%
05:00 PM	336	296	632	7.67%	6.71%	7.19%
06:00 PM	325	340	665	7.42%	7.71%	7.57%
07:00 PM	325	310	635	7.42%	7.03%	7.22%
08:00 PM	290	295	585	6.62%	6.69%	6.66%
09:00 PM	235	302	537	5.37%	6.85%	6.11%
10:00 PM	142	270	412	3.24%	6.12%	4.69%
11:00 PM	88	181	269	2.01%	4.11%	3.06%
12:00 AM	54	101	155	1.23%	2.29%	1.76%
<b>TOTALS</b>	<b>4,380</b>	<b>4,409</b>	<b>8,789</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>

# **CLASSIFICATION COUNT DATA**

**PROJECT** Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave  
**LOCATION CODE** Day 1  
**COUNT LOCATION** ATLANTIC AV NORTH OF OYSTER (3 Lane Section)  
**GMB PROJECT NO.** 08-176.03

Vehicle Classification	Traffic Volume		Average Daily Statistics	
	NB/EB	SB/WB	Total	Percentages
Class 1	11	13	24	0.27%
Class 2	3,382	3,486	6,868	78.14%
Class 3	932	857	1,789	20.35%
Class 4	1	0	1	0.01%
Class 5	31	32	63	0.72%
Class 6	2	1	3	0.03%
Class 7	0	0	0	0.00%
Class 8	20	18	38	0.43%
Class 9	1	0	1	0.01%
Class 10	0	0	0	0.00%
Class 11	0	2	2	0.02%
Class 12	0	0	0	0.00%
Class 13	0	0	0	0.00%
Class 14	0	0	0	0.00%
Class 15	0	0	0	0.00%
<b>Totals</b>	<b>4,380</b>	<b>4,409</b>	<b>8,789</b>	<b>100.00%</b>



# TRAFFIC COUNT DATA

PROJECT Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave  
LOCATION CODE Day 2  
COUNT LOCATION ATLANTIC AV NORTH OF OYSTER (3 Lane Section)  
GMB PROJECT NO. 08-176.03

TYPE OF COUNT: 24 HOUR APPROACH VOLUME COUNT

TIME OF COUNT:

Start Date	12-Aug-11	Start Time	12:00 AM
End Date	13-Aug-11	End Time	12:00 AM

VOLUMES:

ADT	9,750	PEAK HOUR	752
		PEAK END TIME	7:00 PM
		PEAK NB/EB MOVEMENT	363
		PEAK SB/WB MOVEMENT	389

MEASURED TRAVEL CHARACTERISTICS:

"Peak to Daily Ratio"

K=	7.71%	D=	51.7%
T daily=	1.42%		

## HOURLY DISTRIBUTION OF TRAFFIC VOLUMES

<b>PROJECT</b>	Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave
<b>LOCATION CODE</b>	Day 2
<b>COUNT LOCATION</b>	ATLANTIC AV NORTH OF OYSTER (3 Lane Section)
<b>GMB PROJECT NO.</b>	08-176.03

HOURLY END AT	HOURLY VOLUME DIRECTION (NB/EB)	HOURLY VOLUME DIRECTION (SB/WB)	TOTAL VOLUMES BOTH DIRECTIONS	DISTRIBUTION PERCENT DIRECTION (NB/EB)	DISTRIBUTION PERCENT DIRECTION (SB/WB)	TOTAL PERCENT BOTH DIRECTIONS
01:00 AM	15	45	60	0.31%	0.90%	0.62%
02:00 AM	16	14	30	0.33%	0.28%	0.31%
03:00 AM	6	18	24	0.13%	0.36%	0.25%
04:00 AM	7	6	13	0.15%	0.12%	0.13%
05:00 AM	10	5	15	0.21%	0.10%	0.15%
06:00 AM	16	6	22	0.33%	0.12%	0.23%
07:00 AM	64	25	89	1.34%	0.50%	0.91%
08:00 AM	124	58	182	2.60%	1.17%	1.87%
09:00 AM	247	134	381	5.17%	2.69%	3.91%
10:00 AM	287	218	505	6.01%	4.38%	5.18%
11:00 AM	310	291	601	6.49%	5.85%	6.16%
12:00 PM	323	310	633	6.76%	6.23%	6.49%
01:00 PM	348	344	692	7.28%	6.92%	7.10%
02:00 PM	349	345	694	7.31%	6.94%	7.12%
03:00 PM	375	342	717	7.85%	6.88%	7.35%
04:00 PM	367	324	691	7.68%	6.52%	7.09%
05:00 PM	338	334	672	7.08%	6.72%	6.89%
06:00 PM	286	407	693	5.99%	8.18%	7.11%
07:00 PM	363	389	752	7.60%	7.82%	7.71%
08:00 PM	330	371	701	6.91%	7.46%	7.19%
09:00 PM	250	332	582	5.23%	6.68%	5.97%
10:00 PM	172	306	478	3.60%	6.15%	4.90%
11:00 PM	95	228	323	1.99%	4.58%	3.31%
12:00 AM	79	121	200	1.65%	2.43%	2.05%
<b>TOTALS</b>	<b>4,777</b>	<b>4,973</b>	<b>9,750</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>



# **CLASSIFICATION COUNT DATA**

**PROJECT** Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave  
**LOCATION CODE** Day 2  
**COUNT LOCATION** ATLANTIC AV NORTH OF OYSTER (3 Lane Section)  
**GMB PROJECT NO.** 08-176.03

Vehicle Classification	Traffic Volume		Average Daily Statistics	
	NB/EB	SB/WB	Total	Percentages
Class 1	9	12	21	0.22%
Class 2	3,705	3,955	7,660	78.56%
Class 3	991	940	1,931	19.81%
Class 4	2	0	2	0.02%
Class 5	34	30	64	0.66%
Class 6	2	1	3	0.03%
Class 7	0	0	0	0.00%
Class 8	33	31	64	0.66%
Class 9	0	1	1	0.01%
Class 10	0	0	0	0.00%
Class 11	1	3	4	0.04%
Class 12	0	0	0	0.00%
Class 13	0	0	0	0.00%
Class 14	0	0	0	0.00%
Class 15	0	0	0	0.00%
<b>Totals</b>	<b>4,777</b>	<b>4,973</b>	<b>9,750</b>	<b>100.00%</b>

TRAFFIC COUNT DATA				
PROJECT		Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave		
LOCATION CODE		Day 3		
COUNT LOCATION		ATLANTIC AV NORTH OF OYSTER (3 Lane Section)		
GMB PROJECT NO.		08-176.03		
TYPE OF COUNT:		24 HOUR APPROACH VOLUME COUNT		
TIME OF COUNT:				
	Start Date	13-Aug-11	Start Time	12:00 AM
	End Date	14-Aug-11	End Time	12:00 AM
VOLUMES:				
	ADT	10,812	PEAK HOUR	852
			PEAK END TIME	7:00 PM
			PEAK NB/EB MOVEMENT	489
			PEAK SB/WB MOVEMENT	363
MEASURED TRAVEL CHARACTERISTICS:				
"Peak to Daily Ratio"				
	K=	7.88%	D=	57.4%
	T daily=	0.95%		



## HOURLY DISTRIBUTION OF TRAFFIC VOLUMES

<b>PROJECT</b>	Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave
<b>LOCATION CODE</b>	Day 3
<b>COUNT LOCATION</b>	ATLANTIC AV NORTH OF OYSTER (3 Lane Section)
<b>GMB PROJECT NO.</b>	08-176.03

HOURLY END AT	HOURLY VOLUME DIRECTION (NB/EB)	HOURLY VOLUME DIRECTION (SB/WB)	TOTAL VOLUMES BOTH DIRECTIONS	DISTRIBUTION PERCENT DIRECTION (NB/EB)	DISTRIBUTION PERCENT DIRECTION (SB/WB)	TOTAL PERCENT BOTH DIRECTIONS
01:00 AM	43	59	102	0.79%	1.09%	0.94%
02:00 AM	15	40	55	0.28%	0.74%	0.51%
03:00 AM	12	22	34	0.22%	0.41%	0.31%
04:00 AM	7	10	17	0.13%	0.19%	0.16%
05:00 AM	9	7	16	0.17%	0.13%	0.15%
06:00 AM	21	5	26	0.39%	0.09%	0.24%
07:00 AM	53	38	91	0.98%	0.70%	0.84%
08:00 AM	101	60	161	1.86%	1.11%	1.49%
09:00 AM	228	120	348	4.21%	2.23%	3.22%
10:00 AM	319	241	560	5.89%	4.47%	5.18%
11:00 AM	416	349	765	7.68%	6.47%	7.08%
12:00 PM	348	425	773	6.42%	7.88%	7.15%
01:00 PM	348	438	786	6.42%	8.12%	7.27%
02:00 PM	385	448	833	7.10%	8.31%	7.70%
03:00 PM	352	419	771	6.49%	7.77%	7.13%
04:00 PM	379	379	758	6.99%	7.03%	7.01%
05:00 PM	408	333	741	7.53%	6.18%	6.85%
06:00 PM	408	396	804	7.53%	7.34%	7.44%
07:00 PM	489	363	852	9.02%	6.73%	7.88%
08:00 PM	453	373	826	8.36%	6.92%	7.64%
09:00 PM	272	301	573	5.02%	5.58%	5.30%
10:00 PM	189	265	454	3.49%	4.91%	4.20%
11:00 PM	93	177	270	1.72%	3.28%	2.50%
12:00 AM	72	124	196	1.33%	2.30%	1.81%
<b>TOTALS</b>	<b>5,420</b>	<b>5,392</b>	<b>10,812</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>

# **CLASSIFICATION COUNT DATA**

**PROJECT** Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave  
**LOCATION CODE** Day 3  
**COUNT LOCATION** ATLANTIC AV NORTH OF OYSTER (3 Lane Section)  
**GMB PROJECT NO.** 08-176.03

Vehicle Classification	Traffic Volume		Average Daily Statistics	
	NB/EB	SB/WB	Total	Percentages
Class 1	15	12	27	0.25%
Class 2	4,373	4,435	8,808	81.47%
Class 3	980	894	1,874	17.33%
Class 4	1	2	3	0.03%
Class 5	21	17	38	0.35%
Class 6	0	1	1	0.01%
Class 7	0	1	1	0.01%
Class 8	29	29	58	0.54%
Class 9	0	0	0	0.00%
Class 10	0	0	0	0.00%
Class 11	1	1	2	0.02%
Class 12	0	0	0	0.00%
Class 13	0	0	0	0.00%
Class 14	0	0	0	0.00%
Class 15	0	0	0	0.00%
<b>Totals</b>	<b>5,420</b>	<b>5,392</b>	<b>10,812</b>	<b>100.00%</b>



# TRAFFIC COUNT DATA

PROJECT Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave  
LOCATION CODE Day 4  
COUNT LOCATION ATLANTIC AV NORTH OF OYSTER (3 Lane Section)  
GMB PROJECT NO. 08-176.03

TYPE OF COUNT: 24 HOUR APPROACH VOLUME COUNT

TIME OF COUNT:

Start Date	14-Aug-11	Start Time	12:00 AM
End Date	15-Aug-11	End Time	12:00 AM

VOLUMES:

ADT	8,961	PEAK HOUR	861
		PEAK END TIME	4:15 PM
		PEAK NB/EB MOVEMENT	533
		PEAK SB/WB MOVEMENT	328

MEASURED TRAVEL CHARACTERISTICS:

"Peak to Daily Ratio"

K=	9.61%	D=	61.9%
T daily=	0.77%		

## HOURLY DISTRIBUTION OF TRAFFIC VOLUMES

<b>PROJECT</b>	Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave
<b>LOCATION CODE</b>	Day 4
<b>COUNT LOCATION</b>	ATLANTIC AV NORTH OF OYSTER (3 Lane Section)
<b>GMB PROJECT NO.</b>	08-176.03

HOURLY END AT	HOURLY VOLUME DIRECTION (NB/EB)	HOURLY VOLUME DIRECTION (SB/WB)	TOTAL VOLUMES BOTH DIRECTIONS	DISTRIBUTION PERCENT DIRECTION (NB/EB)	DISTRIBUTION PERCENT DIRECTION (SB/WB)	TOTAL PERCENT BOTH DIRECTIONS
01:00 AM	39	58	97	0.83%	1.37%	1.08%
02:00 AM	29	44	73	0.61%	1.04%	0.81%
03:00 AM	19	37	56	0.40%	0.87%	0.62%
04:00 AM	7	13	20	0.15%	0.31%	0.22%
05:00 AM	9	5	14	0.19%	0.12%	0.16%
06:00 AM	14	10	24	0.30%	0.24%	0.27%
07:00 AM	30	27	57	0.63%	0.64%	0.64%
08:00 AM	72	54	126	1.52%	1.28%	1.41%
09:00 AM	154	102	256	3.26%	2.41%	2.86%
10:00 AM	315	205	520	6.66%	4.84%	5.80%
11:00 AM	288	272	560	6.09%	6.42%	6.25%
12:00 PM	357	316	673	7.55%	7.46%	7.51%
01:00 PM	317	400	717	6.71%	9.45%	8.00%
02:00 PM	367	370	737	7.76%	8.74%	8.22%
03:00 PM	397	399	796	8.40%	9.42%	8.88%
04:00 PM	483	345	828	10.22%	8.15%	9.24%
05:00 PM	420	250	670	8.89%	5.90%	7.48%
06:00 PM	303	274	577	6.41%	6.47%	6.44%
07:00 PM	374	276	650	7.91%	6.52%	7.25%
08:00 PM	248	219	467	5.25%	5.17%	5.21%
09:00 PM	222	219	441	4.70%	5.17%	4.92%
10:00 PM	151	180	331	3.19%	4.25%	3.69%
11:00 PM	76	110	186	1.61%	2.60%	2.08%
12:00 AM	36	49	85	0.76%	1.16%	0.95%
<b>TOTALS</b>	<b>4,727</b>	<b>4,234</b>	<b>8,961</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>



### CLASSIFICATION COUNT DATA

**PROJECT** Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave  
**LOCATION CODE** Day 4  
**COUNT LOCATION** ATLANTIC AV NORTH OF OYSTER (3 Lane Section)  
**GMB PROJECT NO.** 08-176.03

Vehicle Classification	Traffic Volume		Average Daily Statistics	
	NB/EB	SB/WB	Total	Percentages
Class 1	9	16	25	0.28%
Class 2	3,861	3,551	7,412	82.71%
Class 3	817	638	1,455	16.24%
Class 4	0	1	1	0.01%
Class 5	11	6	17	0.19%
Class 6	0	0	0	0.00%
Class 7	0	1	1	0.01%
Class 8	25	20	45	0.50%
Class 9	1	0	1	0.01%
Class 10	0	0	0	0.00%
Class 11	3	1	4	0.04%
Class 12	0	0	0	0.00%
Class 13	0	0	0	0.00%
Class 14	0	0	0	0.00%
Class 15	0	0	0	0.00%
<b>Totals</b>	<b>4,727</b>	<b>4,234</b>	<b>8,961</b>	<b>100.00%</b>

TRAFFIC COUNT DATA				
PROJECT		Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave		
LOCATION CODE		Day 5		
COUNT LOCATION		ATLANTIC AV NORTH OF OYSTER (3 Lane Section)		
GMB PROJECT NO.		08-176.03		
TYPE OF COUNT:		24 HOUR APPROACH VOLUME COUNT		
TIME OF COUNT:				
	Start Date	15-Aug-11	Start Time	12:00 AM
	End Date	16-Aug-11	End Time	12:00 AM
VOLUMES:				
	ADT	7,591	PEAK HOUR	624
			PEAK END TIME	1:00 PM
			PEAK NB/EB MOVEMENT	303
			PEAK SB/WB MOVEMENT	321
MEASURED TRAVEL CHARACTERISTICS:				
"Peak to Daily Ratio"				
	K=	8.22%	D=	51.4%
	T daily=	1.25%		



## HOURLY DISTRIBUTION OF TRAFFIC VOLUMES

<b>PROJECT</b>	Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave
<b>LOCATION CODE</b>	Day 5
<b>COUNT LOCATION</b>	ATLANTIC AV NORTH OF OYSTER (3 Lane Section)
<b>GMB PROJECT NO.</b>	08-176.03

HOURLY END AT	HOURLY VOLUME DIRECTION (NB/EB)	HOURLY VOLUME DIRECTION (SB/WB)	TOTAL VOLUMES BOTH DIRECTIONS	DISTRIBUTION PERCENT DIRECTION (NB/EB)	DISTRIBUTION PERCENT DIRECTION (SB/WB)	TOTAL PERCENT BOTH DIRECTIONS
01:00 AM	8	31	39	0.21%	0.83%	0.51%
02:00 AM	10	10	20	0.26%	0.27%	0.26%
03:00 AM	5	16	21	0.13%	0.43%	0.28%
04:00 AM	2	2	4	0.05%	0.05%	0.05%
05:00 AM	13	7	20	0.34%	0.19%	0.26%
06:00 AM	23	5	28	0.59%	0.13%	0.37%
07:00 AM	63	17	80	1.63%	0.46%	1.05%
08:00 AM	132	50	182	3.41%	1.35%	2.40%
09:00 AM	243	110	353	6.27%	2.96%	4.65%
10:00 AM	294	191	485	7.59%	5.14%	6.39%
11:00 AM	278	254	532	7.17%	6.84%	7.01%
12:00 PM	275	281	556	7.10%	7.56%	7.32%
01:00 PM	303	321	624	7.82%	8.64%	8.22%
02:00 PM	282	236	518	7.28%	6.35%	6.82%
03:00 PM	300	266	566	7.74%	7.16%	7.46%
04:00 PM	311	277	588	8.03%	7.45%	7.75%
05:00 PM	263	250	513	6.79%	6.73%	6.76%
06:00 PM	253	288	541	6.53%	7.75%	7.13%
07:00 PM	252	279	531	6.50%	7.51%	7.00%
08:00 PM	223	258	481	5.75%	6.94%	6.34%
09:00 PM	155	199	354	4.00%	5.36%	4.66%
10:00 PM	93	179	272	2.40%	4.82%	3.58%
11:00 PM	65	127	192	1.68%	3.42%	2.53%
12:00 AM	29	62	91	0.75%	1.67%	1.20%
<b>TOTALS</b>	<b>3,875</b>	<b>3,716</b>	<b>7,591</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>

# **CLASSIFICATION COUNT DATA**

**PROJECT** Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave  
**LOCATION CODE** Day 5  
**COUNT LOCATION** ATLANTIC AV NORTH OF OYSTER (3 Lane Section)  
**GMB PROJECT NO.** 08-176.03

Vehicle Classification	Traffic Volume		Average Daily Statistics	
	NB/EB	SB/WB	Total	Percentages
Class 1	3	8	11	0.14%
Class 2	3,005	2,941	5,946	78.33%
Class 3	818	721	1,539	20.27%
Class 4	0	2	2	0.03%
Class 5	30	27	57	0.75%
Class 6	1	1	2	0.03%
Class 7	1	0	1	0.01%
Class 8	17	15	32	0.42%
Class 9	0	1	1	0.01%
Class 10	0	0	0	0.00%
Class 11	0	0	0	0.00%
Class 12	0	0	0	0.00%
Class 13	0	0	0	0.00%
Class 14	0	0	0	0.00%
Class 15	0	0	0	0.00%
<b>Totals</b>	<b>3,875</b>	<b>3,716</b>	<b>7,591</b>	<b>100.00%</b>



TRAFFIC COUNT DATA				
PROJECT	Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave			
LOCATION CODE	Day 6			
COUNT LOCATION	ATLANTIC AV NORTH OF OYSTER (3 Lane Section)			
GMB PROJECT NO.	08-176.03			
TYPE OF COUNT:				
24 HOUR APPROACH VOLUME COUNT				
TIME OF COUNT:				
	Start Date	16-Aug-11	Start Time	12:00 AM
	End Date	17-Aug-11	End Time	12:00 AM
VOLUMES:				
	ADT	7,339	PEAK HOUR	597
			PEAK END TIME	2:45 PM
			PEAK NB/EB MOVEMENT	327
			PEAK SB/WB MOVEMENT	270
MEASURED TRAVEL CHARACTERISTICS:				
"Peak to Daily Ratio"				
	K=	8.13%	D=	54.8%
	T daily=	1.51%		

## HOURLY DISTRIBUTION OF TRAFFIC VOLUMES

<b>PROJECT</b>	Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave
<b>LOCATION CODE</b>	Day 6
<b>COUNT LOCATION</b>	ATLANTIC AV NORTH OF OYSTER (3 Lane Section)
<b>GMB PROJECT NO.</b>	08-176.03

HOURLY END AT	HOURLY VOLUME DIRECTION (NB/EB)	HOURLY VOLUME DIRECTION (SB/WB)	TOTAL VOLUMES BOTH DIRECTIONS	DISTRIBUTION PERCENT DIRECTION (NB/EB)	DISTRIBUTION PERCENT DIRECTION (SB/WB)	TOTAL PERCENT BOTH DIRECTIONS
01:00 AM	18	22	40	0.49%	0.61%	0.55%
02:00 AM	13	11	24	0.35%	0.30%	0.33%
03:00 AM	3	6	9	0.08%	0.17%	0.12%
04:00 AM	4	5	9	0.11%	0.14%	0.12%
05:00 AM	5	7	12	0.13%	0.19%	0.16%
06:00 AM	9	2	11	0.24%	0.06%	0.15%
07:00 AM	61	21	82	1.65%	0.58%	1.12%
08:00 AM	155	57	212	4.18%	1.57%	2.89%
09:00 AM	233	116	349	6.29%	3.19%	4.76%
10:00 AM	230	170	400	6.21%	4.68%	5.45%
11:00 AM	278	224	502	7.50%	6.16%	6.84%
12:00 PM	266	290	556	7.18%	7.98%	7.58%
01:00 PM	276	310	586	7.45%	8.53%	7.98%
02:00 PM	280	260	540	7.56%	7.15%	7.36%
03:00 PM	307	267	574	8.29%	7.35%	7.82%
04:00 PM	281	262	543	7.58%	7.21%	7.40%
05:00 PM	252	245	497	6.80%	6.74%	6.77%
06:00 PM	257	277	534	6.94%	7.62%	7.28%
07:00 PM	261	270	531	7.04%	7.43%	7.24%
08:00 PM	197	250	447	5.32%	6.88%	6.09%
09:00 PM	150	213	363	4.05%	5.86%	4.95%
10:00 PM	91	166	257	2.46%	4.57%	3.50%
11:00 PM	55	117	172	1.48%	3.22%	2.34%
12:00 AM	23	66	89	0.62%	1.82%	1.21%
<b>TOTALS</b>	<b>3,705</b>	<b>3,634</b>	<b>7,339</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>



# **CLASSIFICATION COUNT DATA**

**PROJECT** Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave  
**LOCATION CODE** Day 6  
**COUNT LOCATION** ATLANTIC AV NORTH OF OYSTER (3 Lane Section)  
**GMB PROJECT NO.** 08-176.03

Vehicle Classification	Traffic Volume		Average Daily Statistics	
	NB/EB	SB/WB	Total	Percentages
Class 1	6	13	19	0.26%
Class 2	2,801	2,806	5,607	76.40%
Class 3	836	766	1,602	21.83%
Class 4	2	0	2	0.03%
Class 5	41	25	66	0.90%
Class 6	0	2	2	0.03%
Class 7	0	0	0	0.00%
Class 8	19	21	40	0.55%
Class 9	0	1	1	0.01%
Class 10	0	0	0	0.00%
Class 11	0	0	0	0.00%
Class 12	0	0	0	0.00%
Class 13	0	0	0	0.00%
Class 14	0	0	0	0.00%
Class 15	0	0	0	0.00%
<b>Totals</b>	<b>3,705</b>	<b>3,634</b>	<b>7,339</b>	<b>100.00%</b>

TRAFFIC COUNT DATA				
PROJECT		Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave		
LOCATION CODE		Day 7		
COUNT LOCATION		ATLANTIC AV NORTH OF OYSTER (3 Lane Section)		
GMB PROJECT NO.		08-176.03		
TYPE OF COUNT:				
24 HOUR APPROACH VOLUME COUNT				
TIME OF COUNT:				
Start Date		17-Aug-11	Start Time	12:00 AM
End Date		18-Aug-11	End Time	12:00 AM
VOLUMES:				
ADT		7,460	PEAK HOUR	636
			PEAK END TIME	1:15 PM
			PEAK NB/EB MOVEMENT	334
			PEAK SB/WB MOVEMENT	302
MEASURED TRAVEL CHARACTERISTICS:				
"Peak to Daily Ratio"				
K=		8.53%	D=	52.5%
T daily=		1.68%		



## HOURLY DISTRIBUTION OF TRAFFIC VOLUMES

<b>PROJECT</b>	Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave
<b>LOCATION CODE</b>	Day 7
<b>COUNT LOCATION</b>	ATLANTIC AV NORTH OF OYSTER (3 Lane Section)
<b>GMB PROJECT NO.</b>	08-176.03

HOURLY END AT	HOURLY VOLUME DIRECTION (NB/EB)	HOURLY VOLUME DIRECTION (SB/WB)	TOTAL VOLUMES BOTH DIRECTIONS	DISTRIBUTION PERCENT DIRECTION (NB/EB)	DISTRIBUTION PERCENT DIRECTION (SB/WB)	TOTAL PERCENT BOTH DIRECTIONS
01:00 AM	17	33	50	0.45%	0.89%	0.67%
02:00 AM	11	25	36	0.29%	0.67%	0.48%
03:00 AM	4	10	14	0.11%	0.27%	0.19%
04:00 AM	7	6	13	0.19%	0.16%	0.17%
05:00 AM	6	3	9	0.16%	0.08%	0.12%
06:00 AM	16	4	20	0.43%	0.11%	0.27%
07:00 AM	62	16	78	1.65%	0.43%	1.05%
08:00 AM	145	48	193	3.87%	1.29%	2.59%
09:00 AM	234	126	360	6.24%	3.39%	4.83%
10:00 AM	256	190	446	6.83%	5.12%	5.98%
11:00 AM	262	236	498	6.99%	6.36%	6.68%
12:00 PM	268	247	515	7.15%	6.65%	6.90%
01:00 PM	311	306	617	8.30%	8.24%	8.27%
02:00 PM	294	275	569	7.84%	7.41%	7.63%
03:00 PM	291	285	576	7.76%	7.68%	7.72%
04:00 PM	266	255	521	7.10%	6.87%	6.98%
05:00 PM	281	265	546	7.50%	7.14%	7.32%
06:00 PM	247	284	531	6.59%	7.65%	7.12%
07:00 PM	251	267	518	6.70%	7.19%	6.94%
08:00 PM	194	269	463	5.18%	7.25%	6.21%
09:00 PM	128	204	332	3.42%	5.50%	4.45%
10:00 PM	97	164	261	2.59%	4.42%	3.50%
11:00 PM	74	128	202	1.97%	3.45%	2.71%
12:00 AM	26	66	92	0.69%	1.78%	1.23%
<b>TOTALS</b>	<b>3,748</b>	<b>3,712</b>	<b>7,460</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>

# **CLASSIFICATION COUNT DATA**

**PROJECT** Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave  
**LOCATION CODE** Day 7  
**COUNT LOCATION** ATLANTIC AV NORTH OF OYSTER (3 Lane Section)  
**GMB PROJECT NO.** 08-176.03

Vehicle Classification	Traffic Volume		Average Daily Statistics	
	NB/EB	SB/WB	Total	Percentages
Class 1	3	10	13	0.17%
Class 2	2,861	2,918	5,779	77.47%
Class 3	816	727	1,543	20.68%
Class 4	7	5	12	0.16%
Class 5	37	29	66	0.88%
Class 6	1	1	2	0.03%
Class 7	0	0	0	0.00%
Class 8	21	18	39	0.52%
Class 9	0	0	0	0.00%
Class 10	0	0	0	0.00%
Class 11	2	4	6	0.08%
Class 12	0	0	0	0.00%
Class 13	0	0	0	0.00%
Class 14	0	0	0	0.00%
Class 15	0	0	0	0.00%
<b>Totals</b>	<b>3,748</b>	<b>3,712</b>	<b>7,460</b>	<b>100.00%</b>



TRAFFIC COUNT DATA				
PROJECT	Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave			
LOCATION CODE	Day 1			
COUNT LOCATION	ATLANTIC AV NORTH OF 18TH AV (5 Lane Section)			
GMB PROJECT NO.	08-176.03			
TYPE OF COUNT:				
24 HOUR APPROACH VOLUME COUNT				
TIME OF COUNT:				
	Start Date	11-Aug-11	Start Time	12:00 AM
	End Date	12-Aug-11	End Time	12:00 AM
VOLUMES:				
	ADT	13,893	PEAK HOUR	1,066
			PEAK END TIME	12:45 PM
			PEAK NB/EB MOVEMENT	503
			PEAK SB/WB MOVEMENT	563
MEASURED TRAVEL CHARACTERISTICS:				
"Peak to Daily Ratio"				
	K=	7.67%	D=	52.8%
	T daily=	1.97%		

## HOURLY DISTRIBUTION OF TRAFFIC VOLUMES

<b>PROJECT</b>	Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave
<b>LOCATION CODE</b>	Day 1
<b>COUNT LOCATION</b>	ATLANTIC AV NORTH OF 18TH AV (5 Lane Section)
<b>GMB PROJECT NO.</b>	08-176.03

HOURLY END AT	HOURLY VOLUME DIRECTION (NB/EB)	HOURLY VOLUME DIRECTION (SB/WB)	TOTAL VOLUMES BOTH DIRECTIONS	DISTRIBUTION PERCENT DIRECTION (NB/EB)	DISTRIBUTION PERCENT DIRECTION (SB/WB)	TOTAL PERCENT BOTH DIRECTIONS
01:00 AM	23	53	76	0.34%	0.75%	0.55%
02:00 AM	27	24	51	0.40%	0.34%	0.37%
03:00 AM	7	18	25	0.10%	0.25%	0.18%
04:00 AM	19	17	36	0.28%	0.24%	0.26%
05:00 AM	26	19	45	0.38%	0.27%	0.32%
06:00 AM	58	37	95	0.85%	0.52%	0.68%
07:00 AM	127	103	230	1.87%	1.45%	1.66%
08:00 AM	277	208	485	4.07%	2.94%	3.49%
09:00 AM	389	292	681	5.71%	4.12%	4.90%
10:00 AM	395	416	811	5.80%	5.87%	5.84%
11:00 AM	414	484	898	6.08%	6.83%	6.46%
12:00 PM	436	521	957	6.40%	7.35%	6.89%
01:00 PM	534	532	1,066	7.84%	7.51%	7.67%
02:00 PM	486	498	984	7.14%	7.03%	7.08%
03:00 PM	494	496	990	7.26%	7.00%	7.13%
04:00 PM	529	509	1,038	7.77%	7.18%	7.47%
05:00 PM	498	460	958	7.31%	6.49%	6.90%
06:00 PM	536	504	1,040	7.87%	7.11%	7.49%
07:00 PM	410	480	890	6.02%	6.77%	6.41%
08:00 PM	395	425	820	5.80%	6.00%	5.90%
09:00 PM	323	410	733	4.74%	5.79%	5.28%
10:00 PM	214	304	518	3.14%	4.29%	3.73%
11:00 PM	119	178	297	1.75%	2.51%	2.14%
12:00 AM	72	97	169	1.06%	1.37%	1.22%
<b>TOTALS</b>	<b>6,808</b>	<b>7,085</b>	<b>13,893</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>



### CLASSIFICATION COUNT DATA

**PROJECT** Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave  
**LOCATION CODE** Day 1  
**COUNT LOCATION** ATLANTIC AV NORTH OF 18TH AV (5 Lane Section)  
**GMB PROJECT NO.** 08-176.03

Vehicle Classification	Traffic Volume		Average Daily Statistics	
	NB/EB	SB/WB	Total	Percentages
Class 1	14	13	27	0.19%
Class 2	5,178	5,550	10,728	77.22%
Class 3	1,473	1,392	2,865	20.62%
Class 4	2	6	8	0.06%
Class 5	68	53	121	0.87%
Class 6	13	12	25	0.18%
Class 7	0	1	1	0.01%
Class 8	34	40	74	0.53%
Class 9	5	6	11	0.08%
Class 10	0	0	0	0.00%
Class 11	19	5	24	0.17%
Class 12	0	5	5	0.04%
Class 13	2	2	4	0.03%
Class 14	0	0	0	0.00%
Class 15	0	0	0	0.00%
<b>Totals</b>	<b>6,808</b>	<b>7,085</b>	<b>13,893</b>	<b>100.00%</b>

TRAFFIC COUNT DATA				
PROJECT	Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave			
LOCATION CODE	Day 2			
COUNT LOCATION	ATLANTIC AV NORTH OF 18TH AV (5 Lane Section)			
GMB PROJECT NO.	08-176.03			
TYPE OF COUNT:				
24 HOUR APPROACH VOLUME COUNT				
TIME OF COUNT:				
	Start Date	12-Aug-11	Start Time	12:00 AM
	End Date	13-Aug-11	End Time	12:00 AM
VOLUMES:				
	ADT	15,221	PEAK HOUR	1,185
			PEAK END TIME	2:30 PM
			PEAK NB/EB MOVEMENT	597
			PEAK SB/WB MOVEMENT	588
MEASURED TRAVEL CHARACTERISTICS:				
"Peak to Daily Ratio"				
	K=	7.79%	D=	50.4%
	T daily=	2.02%		



## HOURLY DISTRIBUTION OF TRAFFIC VOLUMES

<b>PROJECT</b>	Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave
<b>LOCATION CODE</b>	Day 2
<b>COUNT LOCATION</b>	ATLANTIC AV NORTH OF 18TH AV (5 Lane Section)
<b>GMB PROJECT NO.</b>	08-176.03

HOURLY END AT	HOURLY VOLUME DIRECTION (NB/EB)	HOURLY VOLUME DIRECTION (SB/WB)	TOTAL VOLUMES BOTH DIRECTIONS	DISTRIBUTION PERCENT DIRECTION (NB/EB)	DISTRIBUTION PERCENT DIRECTION (SB/WB)	TOTAL PERCENT BOTH DIRECTIONS
01:00 AM	22	32	54	0.30%	0.40%	0.35%
02:00 AM	15	22	37	0.21%	0.28%	0.24%
03:00 AM	12	14	26	0.16%	0.18%	0.17%
04:00 AM	11	8	19	0.15%	0.10%	0.12%
05:00 AM	17	11	28	0.23%	0.14%	0.18%
06:00 AM	51	37	88	0.70%	0.47%	0.58%
07:00 AM	123	100	223	1.68%	1.26%	1.47%
08:00 AM	272	226	498	3.72%	2.86%	3.27%
09:00 AM	386	312	698	5.28%	3.95%	4.59%
10:00 AM	433	433	866	5.92%	5.48%	5.69%
11:00 AM	462	534	996	6.32%	6.75%	6.54%
12:00 PM	502	567	1,069	6.86%	7.17%	7.02%
01:00 PM	535	586	1,121	7.31%	7.41%	7.36%
02:00 PM	549	567	1,116	7.51%	7.17%	7.33%
03:00 PM	564	558	1,122	7.71%	7.06%	7.37%
04:00 PM	583	557	1,140	7.97%	7.04%	7.49%
05:00 PM	546	534	1,080	7.47%	6.75%	7.10%
06:00 PM	511	601	1,112	6.99%	7.60%	7.31%
07:00 PM	509	528	1,037	6.96%	6.68%	6.81%
08:00 PM	417	511	928	5.70%	6.46%	6.10%
09:00 PM	335	463	798	4.58%	5.86%	5.24%
10:00 PM	202	349	551	2.76%	4.41%	3.62%
11:00 PM	163	254	417	2.23%	3.21%	2.74%
12:00 AM	94	103	197	1.29%	1.30%	1.29%
<b>TOTALS</b>	<b>7,314</b>	<b>7,907</b>	<b>15,221</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>

# **CLASSIFICATION COUNT DATA**

**PROJECT** Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave  
**LOCATION CODE** Day 2  
**COUNT LOCATION** ATLANTIC AV NORTH OF 18TH AV (5 Lane Section)  
**GMB PROJECT NO.** 08-176.03

Vehicle Classification	Traffic Volume		Average Daily Statistics	
	NB/EB	SB/WB	Total	Percentages
Class 1	24	23	47	0.31%
Class 2	5,603	6,248	11,851	77.86%
Class 3	1,529	1,487	3,016	19.81%
Class 4	5	6	11	0.07%
Class 5	58	48	106	0.70%
Class 6	11	13	24	0.16%
Class 7	1	4	5	0.03%
Class 8	52	50	102	0.67%
Class 9	7	15	22	0.14%
Class 10	0	0	0	0.00%
Class 11	19	11	30	0.20%
Class 12	1	1	2	0.01%
Class 13	4	1	5	0.03%
Class 14	0	0	0	0.00%
Class 15	0	0	0	0.00%
<b>Totals</b>	<b>7,314</b>	<b>7,907</b>	<b>15,221</b>	<b>100.00%</b>



TRAFFIC COUNT DATA				
PROJECT		Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave		
LOCATION CODE		Day 3		
COUNT LOCATION		ATLANTIC AV NORTH OF 18TH AV (5 Lane Section)		
GMB PROJECT NO.		08-176.03		
TYPE OF COUNT:				
24 HOUR APPROACH VOLUME COUNT				
TIME OF COUNT:				
Start Date		13-Aug-11	Start Time	12:00 AM
End Date		14-Aug-11	End Time	12:00 AM
VOLUMES:				
ADT		16,639	PEAK HOUR	1,301
			PEAK END TIME	4:00 PM
			PEAK NB/EB MOVEMENT	653
			PEAK SB/WB MOVEMENT	648
MEASURED TRAVEL CHARACTERISTICS:				
"Peak to Daily Ratio"				
K=		7.82%	D=	50.2%
T daily=		1.54%		

## HOURLY DISTRIBUTION OF TRAFFIC VOLUMES

<b>PROJECT</b>	Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave
<b>LOCATION CODE</b>	Day 3
<b>COUNT LOCATION</b>	ATLANTIC AV NORTH OF 18TH AV (5 Lane Section)
<b>GMB PROJECT NO.</b>	08-176.03

HOURLY END AT	HOURLY VOLUME DIRECTION (NB/EB)	HOURLY VOLUME DIRECTION (SB/WB)	TOTAL VOLUMES BOTH DIRECTIONS	DISTRIBUTION PERCENT DIRECTION (NB/EB)	DISTRIBUTION PERCENT DIRECTION (SB/WB)	TOTAL PERCENT BOTH DIRECTIONS
01:00 AM	67	75	142	0.82%	0.89%	0.85%
02:00 AM	26	47	73	0.32%	0.56%	0.44%
03:00 AM	21	31	52	0.26%	0.37%	0.31%
04:00 AM	18	17	35	0.22%	0.20%	0.21%
05:00 AM	27	10	37	0.33%	0.12%	0.22%
06:00 AM	49	54	103	0.60%	0.64%	0.62%
07:00 AM	106	103	209	1.29%	1.22%	1.26%
08:00 AM	204	161	365	2.49%	1.91%	2.19%
09:00 AM	369	322	691	4.51%	3.81%	4.15%
10:00 AM	517	512	1,029	6.31%	6.06%	6.18%
11:00 AM	509	672	1,181	6.21%	7.95%	7.10%
12:00 PM	513	752	1,265	6.26%	8.90%	7.60%
01:00 PM	515	751	1,266	6.29%	8.89%	7.61%
02:00 PM	536	655	1,191	6.54%	7.75%	7.16%
03:00 PM	621	614	1,235	7.58%	7.27%	7.42%
04:00 PM	653	648	1,301	7.97%	7.67%	7.82%
05:00 PM	719	531	1,250	8.78%	6.28%	7.51%
06:00 PM	721	517	1,238	8.80%	6.12%	7.44%
07:00 PM	687	517	1,204	8.39%	6.12%	7.24%
08:00 PM	507	445	952	6.19%	5.27%	5.72%
09:00 PM	345	381	726	4.21%	4.51%	4.36%
10:00 PM	203	288	491	2.48%	3.41%	2.95%
11:00 PM	174	219	393	2.12%	2.59%	2.36%
12:00 AM	83	127	210	1.01%	1.50%	1.26%
<b>TOTALS</b>	<b>8,190</b>	<b>8,449</b>	<b>16,639</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>



### CLASSIFICATION COUNT DATA

**PROJECT** Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave  
**LOCATION CODE** Day 3  
**COUNT LOCATION** ATLANTIC AV NORTH OF 18TH AV (5 Lane Section)  
**GMB PROJECT NO.** 08-176.03

Vehicle Classification	Traffic Volume		Average Daily Statistics	
	NB/EB	SB/WB	Total	Percentages
Class 1	27	31	58	0.35%
Class 2	6,478	6,828	13,306	79.97%
Class 3	1,553	1,465	3,018	18.14%
Class 4	7	3	10	0.06%
Class 5	39	24	63	0.38%
Class 6	14	20	34	0.20%
Class 7	1	2	3	0.02%
Class 8	39	44	83	0.50%
Class 9	5	13	18	0.11%
Class 10	0	0	0	0.00%
Class 11	19	10	29	0.17%
Class 12	5	5	10	0.06%
Class 13	3	4	7	0.04%
Class 14	0	0	0	0.00%
Class 15	0	0	0	0.00%
<b>Totals</b>	<b>8,190</b>	<b>8,449</b>	<b>16,639</b>	<b>100.00%</b>

TRAFFIC COUNT DATA				
PROJECT		Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave		
LOCATION CODE		Day 4		
COUNT LOCATION		ATLANTIC AV NORTH OF 18TH AV (5 Lane Section)		
GMB PROJECT NO.		08-176.03		
TYPE OF COUNT:				
24 HOUR APPROACH VOLUME COUNT				
TIME OF COUNT:				
Start Date		14-Aug-11	Start Time	12:00 AM
End Date		15-Aug-11	End Time	12:00 AM
VOLUMES:				
ADT		13,853	PEAK HOUR	1,398
			PEAK END TIME	3:30 PM
			PEAK NB/EB MOVEMENT	894
			PEAK SB/WB MOVEMENT	504
MEASURED TRAVEL CHARACTERISTICS:				
"Peak to Daily Ratio"				
K=		10.09%	D=	63.9%
T daily=		1.20%		



# **HOURLY DISTRIBUTION OF TRAFFIC VOLUMES**

**PROJECT** Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave  
**LOCATION CODE** Day 4  
**COUNT LOCATION** ATLANTIC AV NORTH OF 18TH AV (5 Lane Section)  
**GMB PROJECT NO.** 08-176.03

HOURLY END AT	HOURLY VOLUME DIRECTION (NB/EB)	HOURLY VOLUME DIRECTION (SB/WB)	TOTAL VOLUMES BOTH DIRECTIONS	DISTRIBUTION PERCENT DIRECTION (NB/EB)	DISTRIBUTION PERCENT DIRECTION (SB/WB)	TOTAL PERCENT BOTH DIRECTIONS
01:00 AM	67	73	140	0.93%	1.10%	1.01%
02:00 AM	32	52	84	0.44%	0.78%	0.61%
03:00 AM	22	31	53	0.31%	0.47%	0.38%
04:00 AM	18	16	34	0.25%	0.24%	0.25%
05:00 AM	12	15	27	0.17%	0.23%	0.19%
06:00 AM	41	38	79	0.57%	0.57%	0.57%
07:00 AM	65	87	152	0.90%	1.31%	1.10%
08:00 AM	139	121	260	1.93%	1.82%	1.88%
09:00 AM	242	309	551	3.36%	4.64%	3.98%
10:00 AM	468	390	858	6.51%	5.86%	6.19%
11:00 AM	475	613	1,088	6.60%	9.21%	7.85%
12:00 PM	514	633	1,147	7.14%	9.51%	8.28%
01:00 PM	546	631	1,177	7.59%	9.48%	8.50%
02:00 PM	586	598	1,184	8.15%	8.98%	8.55%
03:00 PM	720	544	1,264	10.01%	8.17%	9.12%
04:00 PM	818	438	1,256	11.37%	6.58%	9.07%
05:00 PM	513	402	915	7.13%	6.04%	6.61%
06:00 PM	545	371	916	7.58%	5.57%	6.61%
07:00 PM	466	351	817	6.48%	5.27%	5.90%
08:00 PM	314	309	623	4.36%	4.64%	4.50%
09:00 PM	297	274	571	4.13%	4.11%	4.12%
10:00 PM	133	199	332	1.85%	2.99%	2.40%
11:00 PM	116	106	222	1.61%	1.59%	1.60%
12:00 AM	45	58	103	0.63%	0.87%	0.74%
<b>TOTALS</b>	<b>7,194</b>	<b>6,659</b>	<b>13,853</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>

### CLASSIFICATION COUNT DATA

**PROJECT** Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave  
**LOCATION CODE** Day 4  
**COUNT LOCATION** ATLANTIC AV NORTH OF 18TH AV (5 Lane Section)  
**GMB PROJECT NO.** 08-176.03

Vehicle Classification	Traffic Volume		Average Daily Statistics	
	NB/EB	SB/WB	Total	Percentages
Class 1	23	27	50	0.36%
Class 2	5,789	5,503	11,292	81.51%
Class 3	1,289	1,056	2,345	16.93%
Class 4	3	6	9	0.06%
Class 5	17	16	33	0.24%
Class 6	7	7	14	0.10%
Class 7	2	0	2	0.01%
Class 8	41	23	64	0.46%
Class 9	5	6	11	0.08%
Class 10	1	0	1	0.01%
Class 11	13	10	23	0.17%
Class 12	2	2	4	0.03%
Class 13	2	3	5	0.04%
Class 14	0	0	0	0.00%
Class 15	0	0	0	0.00%
<b>Totals</b>	<b>7,194</b>	<b>6,659</b>	<b>13,853</b>	<b>100.00%</b>



TRAFFIC COUNT DATA				
PROJECT		Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave		
LOCATION CODE		Day 5		
COUNT LOCATION		ATLANTIC AV NORTH OF 18TH AV (5 Lane Section)		
GMB PROJECT NO.		08-176.03		
TYPE OF COUNT:				
24 HOUR APPROACH VOLUME COUNT				
TIME OF COUNT:				
Start Date		15-Aug-11	Start Time	12:00 AM
End Date		16-Aug-11	End Time	12:00 AM
VOLUMES:				
ADT		12,050	PEAK HOUR	969
			PEAK END TIME	12:00 PM
			PEAK NB/EB MOVEMENT	450
			PEAK SB/WB MOVEMENT	519
MEASURED TRAVEL CHARACTERISTICS:				
"Peak to Daily Ratio"				
K=		8.04%	D=	53.6%
T daily=		1.65%		

## HOURLY DISTRIBUTION OF TRAFFIC VOLUMES

<b>PROJECT</b>	Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave
<b>LOCATION CODE</b>	Day 5
<b>COUNT LOCATION</b>	ATLANTIC AV NORTH OF 18TH AV (5 Lane Section)
<b>GMB PROJECT NO.</b>	08-176.03

HOURLY END AT	HOURLY VOLUME DIRECTION (NB/EB)	HOURLY VOLUME DIRECTION (SB/WB)	TOTAL VOLUMES BOTH DIRECTIONS	DISTRIBUTION PERCENT DIRECTION (NB/EB)	DISTRIBUTION PERCENT DIRECTION (SB/WB)	TOTAL PERCENT BOTH DIRECTIONS
01:00 AM	20	23	43	0.33%	0.38%	0.36%
02:00 AM	16	20	36	0.27%	0.33%	0.30%
03:00 AM	8	13	21	0.13%	0.22%	0.17%
04:00 AM	14	14	28	0.23%	0.23%	0.23%
05:00 AM	28	9	37	0.46%	0.15%	0.31%
06:00 AM	52	36	88	0.86%	0.60%	0.73%
07:00 AM	151	87	238	2.51%	1.44%	1.98%
08:00 AM	254	204	458	4.22%	3.39%	3.80%
09:00 AM	395	307	702	6.56%	5.09%	5.83%
10:00 AM	401	356	757	6.66%	5.91%	6.28%
11:00 AM	387	469	856	6.42%	7.78%	7.10%
12:00 PM	450	519	969	7.47%	8.61%	8.04%
01:00 PM	458	460	918	7.60%	7.63%	7.62%
02:00 PM	456	439	895	7.57%	7.29%	7.43%
03:00 PM	483	428	911	8.02%	7.10%	7.56%
04:00 PM	459	407	866	7.62%	6.75%	7.19%
05:00 PM	441	389	830	7.32%	6.46%	6.89%
06:00 PM	439	420	859	7.29%	6.97%	7.13%
07:00 PM	342	401	743	5.68%	6.65%	6.17%
08:00 PM	258	306	564	4.28%	5.08%	4.68%
09:00 PM	224	280	504	3.72%	4.65%	4.18%
10:00 PM	138	219	357	2.29%	3.63%	2.96%
11:00 PM	83	151	234	1.38%	2.51%	1.94%
12:00 AM	67	69	136	1.11%	1.15%	1.13%
<b>TOTALS</b>	<b>6,024</b>	<b>6,026</b>	<b>12,050</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>



# **CLASSIFICATION COUNT DATA**

**PROJECT** Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave  
**LOCATION CODE** Day 5  
**COUNT LOCATION** ATLANTIC AV NORTH OF 18TH AV (5 Lane Section)  
**GMB PROJECT NO.** 08-176.03

Vehicle Classification	Traffic Volume		Average Daily Statistics	
	NB/EB	SB/WB	Total	Percentages
Class 1	17	19	36	0.30%
Class 2	4,683	4,739	9,422	78.19%
Class 3	1,226	1,167	2,393	19.86%
Class 4	2	2	4	0.03%
Class 5	45	40	85	0.71%
Class 6	2	6	8	0.07%
Class 7	3	2	5	0.04%
Class 8	28	30	58	0.48%
Class 9	6	9	15	0.12%
Class 10	1	0	1	0.01%
Class 11	10	8	18	0.15%
Class 12	0	1	1	0.01%
Class 13	1	3	4	0.03%
Class 14	0	0	0	0.00%
Class 15	0	0	0	0.00%
<b>Totals</b>	<b>6,024</b>	<b>6,026</b>	<b>12,050</b>	<b>100.00%</b>

TRAFFIC COUNT DATA				
PROJECT	Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave			
LOCATION CODE	Day 6			
COUNT LOCATION	ATLANTIC AV NORTH OF 18TH AV (5 Lane Section)			
GMB PROJECT NO.	08-176.03			
TYPE OF COUNT:				
24 HOUR APPROACH VOLUME COUNT				
TIME OF COUNT:				
	Start Date	16-Aug-11	Start Time	12:00 AM
	End Date	17-Aug-11	End Time	12:00 AM
VOLUMES:				
	ADT	11,801	PEAK HOUR	924
			PEAK END TIME	1:30 PM
			PEAK NB/EB MOVEMENT	449
			PEAK SB/WB MOVEMENT	475
MEASURED TRAVEL CHARACTERISTICS:				
"Peak to Daily Ratio"				
	K=	7.83%	D=	51.4%
	T daily=	1.77%		



## HOURLY DISTRIBUTION OF TRAFFIC VOLUMES

<b>PROJECT</b>	Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave
<b>LOCATION CODE</b>	Day 6
<b>COUNT LOCATION</b>	ATLANTIC AV NORTH OF 18TH AV (5 Lane Section)
<b>GMB PROJECT NO.</b>	08-176.03

HOURLY END AT	HOURLY VOLUME DIRECTION (NB/EB)	HOURLY VOLUME DIRECTION (SB/WB)	TOTAL VOLUMES BOTH DIRECTIONS	DISTRIBUTION PERCENT DIRECTION (NB/EB)	DISTRIBUTION PERCENT DIRECTION (SB/WB)	TOTAL PERCENT BOTH DIRECTIONS
01:00 AM	37	29	66	0.64%	0.48%	0.56%
02:00 AM	16	13	29	0.28%	0.22%	0.25%
03:00 AM	8	17	25	0.14%	0.28%	0.21%
04:00 AM	7	17	24	0.12%	0.28%	0.20%
05:00 AM	16	7	23	0.28%	0.12%	0.19%
06:00 AM	49	30	79	0.84%	0.50%	0.67%
07:00 AM	149	108	257	2.57%	1.80%	2.18%
08:00 AM	281	216	497	4.84%	3.60%	4.21%
09:00 AM	319	276	595	5.50%	4.60%	5.04%
10:00 AM	366	375	741	6.31%	6.25%	6.28%
11:00 AM	402	441	843	6.93%	7.35%	7.14%
12:00 PM	402	489	891	6.93%	8.15%	7.55%
01:00 PM	448	436	884	7.72%	7.27%	7.49%
02:00 PM	471	440	911	8.12%	7.33%	7.72%
03:00 PM	468	433	901	8.07%	7.22%	7.63%
04:00 PM	463	413	876	7.98%	6.88%	7.42%
05:00 PM	383	400	783	6.60%	6.67%	6.64%
06:00 PM	425	431	856	7.33%	7.18%	7.25%
07:00 PM	354	369	723	6.10%	6.15%	6.13%
08:00 PM	265	343	608	4.57%	5.72%	5.15%
09:00 PM	225	275	500	3.88%	4.58%	4.24%
10:00 PM	140	219	359	2.41%	3.65%	3.04%
11:00 PM	64	153	217	1.10%	2.55%	1.84%
12:00 AM	44	69	113	0.76%	1.15%	0.96%
<b>TOTALS</b>	<b>5,802</b>	<b>5,999</b>	<b>11,801</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>

### CLASSIFICATION COUNT DATA

**PROJECT** Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave  
**LOCATION CODE** Day 6  
**COUNT LOCATION** ATLANTIC AV NORTH OF 18TH AV (5 Lane Section)  
**GMB PROJECT NO.** 08-176.03

Vehicle Classification	Traffic Volume		Average Daily Statistics	
	NB/EB	SB/WB	Total	Percentages
Class 1	20	20	40	0.34%
Class 2	4,392	4,667	9,059	76.76%
Class 3	1,279	1,214	2,493	21.13%
Class 4	3	2	5	0.04%
Class 5	48	36	84	0.71%
Class 6	8	7	15	0.13%
Class 7	0	1	1	0.01%
Class 8	34	42	76	0.64%
Class 9	3	4	7	0.06%
Class 10	0	0	0	0.00%
Class 11	15	4	19	0.16%
Class 12	0	1	1	0.01%
Class 13	0	1	1	0.01%
Class 14	0	0	0	0.00%
Class 15	0	0	0	0.00%
<b>Totals</b>	<b>5,802</b>	<b>5,999</b>	<b>11,801</b>	<b>100.00%</b>

TRAFFIC COUNT DATA				
PROJECT	Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave			
LOCATION CODE	Day 7			
COUNT LOCATION	ATLANTIC AV NORTH OF 18TH AV (5 Lane Section)			
GMB PROJECT NO.	08-176.03			
TYPE OF COUNT:				
24 HOUR APPROACH VOLUME COUNT				
TIME OF COUNT:				
	Start Date	17-Aug-11	Start Time	12:00 AM
	End Date	18-Aug-11	End Time	12:00 AM
VOLUMES:				
	ADT	12,142	PEAK HOUR	1,011
			PEAK END TIME	12:30 PM
			PEAK NB/EB MOVEMENT	462
			PEAK SB/WB MOVEMENT	549
MEASURED TRAVEL CHARACTERISTICS:				
"Peak to Daily Ratio"				
	K=	8.33%	D=	54.3%
	T daily=	1.89%		



# HOURLY DISTRIBUTION OF TRAFFIC VOLUMES

PROJECT Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave  
LOCATION CODE Day 7  
COUNT LOCATION ATLANTIC AV NORTH OF 18TH AV (5 Lane Section)  
GMB PROJECT NO. 08-176.03

HOURLY END AT	HOURLY VOLUME DIRECTION (NB/EB)	HOURLY VOLUME DIRECTION (SB/WB)	TOTAL VOLUMES BOTH DIRECTIONS	DISTRIBUTION PERCENT DIRECTION (NB/EB)	DISTRIBUTION PERCENT DIRECTION (SB/WB)	TOTAL PERCENT BOTH DIRECTIONS
01:00 AM	35	39	74	0.59%	0.63%	0.61%
02:00 AM	23	27	50	0.38%	0.44%	0.41%
03:00 AM	7	12	19	0.12%	0.19%	0.16%
04:00 AM	10	7	17	0.17%	0.11%	0.14%
05:00 AM	20	12	32	0.33%	0.19%	0.26%
06:00 AM	42	30	72	0.70%	0.49%	0.59%
07:00 AM	144	109	253	2.41%	1.77%	2.08%
08:00 AM	274	213	487	4.58%	3.46%	4.01%
09:00 AM	364	292	656	6.09%	4.74%	5.40%
10:00 AM	368	372	740	6.15%	6.04%	6.09%
11:00 AM	407	431	838	6.80%	7.00%	6.90%
12:00 PM	429	526	955	7.17%	8.54%	7.87%
01:00 PM	475	492	967	7.94%	7.99%	7.96%
02:00 PM	477	451	928	7.98%	7.32%	7.64%
03:00 PM	498	439	937	8.33%	7.13%	7.72%
04:00 PM	470	406	876	7.86%	6.59%	7.21%
05:00 PM	410	442	852	6.86%	7.17%	7.02%
06:00 PM	455	431	886	7.61%	7.00%	7.30%
07:00 PM	332	413	745	5.55%	6.70%	6.14%
08:00 PM	253	287	540	4.23%	4.66%	4.45%
09:00 PM	206	291	497	3.44%	4.72%	4.09%
10:00 PM	139	211	350	2.32%	3.42%	2.88%
11:00 PM	95	154	249	1.59%	2.50%	2.05%
12:00 AM	48	74	122	0.80%	1.20%	1.00%
TOTALS	5,981	6,161	12,142	100.00%	100.00%	100.00%

### CLASSIFICATION COUNT DATA

**PROJECT** Pedestrian Safety Study for CR A1A from New Smyrna Beach City Limits to 3rd Ave  
**LOCATION CODE** Day 7  
**COUNT LOCATION** ATLANTIC AV NORTH OF 18TH AV (5 Lane Section)  
**GMB PROJECT NO.** 08-176.03

Vehicle Classification	Traffic Volume		Average Daily Statistics	
	NB/EB	SB/WB	Total	Percentages
Class 1	13	21	34	0.28%
Class 2	4,552	4,811	9,363	77.11%
Class 3	1,297	1,219	2,516	20.72%
Class 4	3	8	11	0.09%
Class 5	66	41	107	0.88%
Class 6	3	10	13	0.11%
Class 7	2	0	2	0.02%
Class 8	27	35	62	0.51%
Class 9	6	7	13	0.11%
Class 10	0	0	0	0.00%
Class 11	9	9	18	0.15%
Class 12	1	0	1	0.01%
Class 13	2	0	2	0.02%
Class 14	0	0	0	0.00%
Class 15	0	0	0	0.00%
<b>Totals</b>	<b>5,981</b>	<b>6,161</b>	<b>12,142</b>	<b>100.00%</b>

# Vehicle Spot Speed Study

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
VEHICLE SPOT SPEED STUDY

FORM 750-010-03  
TRAFFIC ENGINEERING  
10/99

LOCATION ID: 08-176.03	SECTION:
LOCATION: South Atlantic Ave/ Seawoods	MP:
POSTED SPEED (mph): 45	COUNTY: Volusia
DATE: 15-Nov-11	PAVEMENT CONDITION: GOOD
OBSERVER: J.N.K	TIME FROM: 11:22 TIME TO: 12:40
REMARKS:	

NUMBER OF VEHICLES: <a href="#">Northbound</a>													SPEED	NUMBER OF VEHICLES: <a href="#">Southbound</a>													BOTH DIRECT											
CUM TOTAL	TOTAL	20	15					10					5					MPH	5					10					15					20	TOTAL	CUM TOTAL	TOTAL	CUM TOTAL
101	0														65													0	101	0	202							
101	1														64													0	101	1	202							
100	0														63													0	101	0	201							
100	0														62													0	101	0	201							
100	0														61	1												1	101	1	201							
100	0														60													0	100	0	200							
100	0														59	1												1	100	1	200							
100	0														58													0	99	0	199							
100	0														57													0	99	0	199							
100	0														56													0	99	0	199							
100	0														55													0	99	0	199							
100	2														54	1	1											2	99	4	199							
98	2														53	1												1	97	3	195							
96	2														52	1	1	1	1									4	96	6	192							
94	4														51	1	1	1										3	92	7	186							
90	6														50	1	1	1	1	1	1	1	1	1	1			9	89	15	179							
84	9														49	1	1	1	1	1	1	1	1	1	1			9	80	18	164							
75	12														48	1	1	1	1	1	1	1	1	1	1			9	71	21	146							
63	12														47	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						
51	7														46	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						
44	8														45	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						
36	9														44	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						
27	9														43	1	1	1	1									4	15	13	42							
18	7														42	1	1	1										3	11	10	29							
11	3														41	1	1	1										2	8	5	19							
8	4														40	1	1	1										2	6	6	14							
4	2														39	1												1	4	3	8							
2	0														38	1	1											2	3	2	5							
2	1														37													0	1	1	3							
1	1														36	1												1	1	2	2							
0	0														35													0	0	0	0							
0	0														34													0	0	0	0							
0	0														33													0	0	0	0							
0	0														32													0	0	0	0							
0	0														31													0	0	0	0							
0	0														30													0	0	0	0							
0	0														29													0	0	0	0							
0	0														28													0	0	0	0							
0	0														27													0	0	0	0							
0	0														26													0	0	0	0							
0	0														25													0	0	0	0							
0	0														24													0	0	0	0							
0	0														23													0	0	0	0							
101		TOTALS														TOTALS														101		202						

SPEED DATA SUMMARY	Northbound	Southbound	BOTH DIRECTIONS	ENGINEE J.N.K.
85TH PERCENTILE SPEED	50.0	50.0		DATE: 11/15/2011
10 MPH PACE	42.0 - 51.0	43.0 - 52.0		

SPEED DATA SUMMARY	(1) North	(2) South
MEDIAN	46	47
AVERAGE	46	47
85TH PERCENTILE	50	50
15TH PERCENTILE	42	44
10 mph PACE	42	51



# Vehicle Spot Speed Study

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
VEHICLE SPOT SPEED STUDY

FORM 750-010-03  
TRAFFIC ENGINEERING  
10/99

LOCATION ID: 01-176.03	SECTION:
LOCATION: South Atlantic Ave/ 22nd Ave	MP:
POSTED SPEED (mph): 45	COUNTY: Volusia
DATE: 15-Nov-11	PAVEMENT CONDITION: GOOD
OBSERVER: J.N.K	TIME FROM: 12:50 TIME TO: 1:46
REMARKS:	

NUMBER OF VEHICLES: <a href="#">Northbound</a>													SPEED	NUMBER OF VEHICLES: <a href="#">Southbound</a>													BOTH DIRECTIONS			
CUM TOTAL	TOTAL	20	15	10	5	MPH	5	10	15	20	TOTAL	CUM TOTAL	TOTAL	TOTAL	CUM TOTAL															
100	0					65						0	102	0	202															
100	0					64						0	102	0	202															
100	0					63						0	102	0	202															
100	0					62						0	102	0	202															
100	0					61						0	102	0	202															
100	0					60						0	102	0	202															
100	0					59						0	102	0	202															
100	0					58						0	102	0	202															
100	0					57						0	102	0	202															
100	0					56	1					1	102	1	202															
100	1					55						0	101	1	201															
99	0					54						0	101	0	200															
99	0					53	1	1				2	101	2	200															
99	3					52						0	99	3	198															
96	2					51	1					1	99	3	195															
94	0					50	1	1	1			3	98	3	192															
94	6					49	1	1	1	1	1	6	95	12	189															
88	9					48	1	1	1	1	1	5	89	14	177															
79	4					47	1	1	1	1	1	6	84	10	163															
75	12					46	1	1	1	1	1	9	78	21	153															
63	10					45	1	1	1	1	1	10	69	20	132															
53	5					44	1	1	1	1	1	9	59	14	112															
48	10					43	1	1	1	1	1	9	50	19	98															
38	12					42	1	1	1	1	1	9	41	21	79															
26	7					41	1	1	1	1	1	5	32	12	58															
19	9					40	1	1	1	1	1	10	27	19	46															
10	2					39	1	1	1	1	1	6	17	8	27															
8	1					38	1					1	11	2	19															
7	1					37	1	1	1			3	10	4	17															
6	3					36	1	1	1			3	7	6	13															
3	1					35	1					1	4	2	7															
2	1					34						0	3	1	5															
1	1					33						0	3	1	4															
0	0					32	1	1				2	3	2	3															
0	0					31	1					1	1	1	1															
0	0					30						0	0	0	0															
0	0					29						0	0	0	0															
0	0					28						0	0	0	0															
0	0					27						0	0	0	0															
0	0					26						0	0	0	0															
0	0					25						0	0	0	0															
0	0					24						0	0	0	0															
0	0					23						0	0	0	0															
100		TOTALS						TOTALS					102			202														

SPEED DATA SUMMARY	Northbound	Southbound	BOTH DIRECTIONS	ENGINEE J.N.K.
85TH PERCENTILE SPEED	48.0	48.0		DATE: 11/15/2011
10 MPH PACE	40.0 - 49.0	40.0 - 49.0		

SPEED DATA SUMMARY	(1) North	(2) South
MEDIAN	44	44
AVERAGE	44	43
85TH PERCENTILE	48	48
15TH PERCENTILE	40	39
10 mph PACE	40	49

## APPENDIX C

### DESIGN CRITERIA

any of the following conditions exist:

1. Where posted speeds are greater than 40 mph.
2. On a roadway with 4 or more lanes without a raised median or raised traffic island that has an ADT of 12,000 or greater.
3. On a roadway with 4 or more lanes with a raised median or raised traffic island that has or is projected to have (within 5 years) an ADT of 15,000 or greater.

Roundabouts present a unique challenge for the design of pedestrian crossings. In a roundabout, the crosswalk markings should comply with the **MUTCD, FHWA's Roundabouts: An Informational Guide** and the **FDOT Traffic Engineering Manual**.

### 8.3.3.2 Midblock Crosswalks

Midblock crosswalks can be used to supplement the pedestrian crossing needs in an area between intersections. This can provide pedestrians with a more direct route to their destination. When used, midblock crosswalks should be illuminated, marked and signed in accordance with the **MUTCD, Traffic Engineering Manual (Section 3.8)** and **Index 17346, Design Standards**. Pedestrian-activated, signalized midblock crosswalks may be appropriate at some locations, but the locations must meet the warrants established in the **MUTCD**.

In addition to the requirements in **Section 8.3.3.1**, the following conditions also apply:

1. Midblock crosswalks should not be located where the spacing between adjacent intersections is less than 660 feet
2. Midblock crosswalks should not be located where the distance from the crosswalk to the nearest intersection (or crossing location) is less than 300 feet
3. Midblock crosswalks shall not be provided where the crossing distance exceeds 60 feet (unless a median or a crossing island is provided)
4. Midblock crosswalks shall not be provided where the sight distance for both the pedestrian and motorist is not adequate (stopping sight distance per **Table 2.7.1**)
5. Midblock crosswalks shall not be located where the ADA cross slope and grade criteria along the crosswalk cannot be met (per **Section 8.3.2**).

An engineering study is required before a marked midblock crosswalk is installed at an uncontrolled location. This study shall examine such factors as sight distance for pedestrians and vehicles (stopping sight distance), traffic volume, turning volumes near



proposed crosswalk location, roadway width, presence of a median, lighting, landscaping, drainage, traffic speed, adjacent land use (pedestrian generators / destinations), pedestrian volume and existing crossing patterns. Midblock crosswalks should only be used in areas where the need truly exists, and the engineering study will help to determine if an uncontrolled midblock crosswalk is a viable option. Refer to the Department's ***Manual on Uniform Traffic Studies (MUTS)***.

If any problem areas are identified that would preclude the placement of a justified midblock crosswalk, additional features must be included in the design to remedy those problem areas before a midblock crosswalk can be placed at that location. Features like overhead signing can help alert motorists and be used to light the crossing. Curb extensions or bulb-outs can improve sight distance and decrease the crossing distance. Adjustment of the profile on the roadway crossing may be required to improve the cross slope of the crosswalk.

## Section 3.8

### MID-BLOCK PEDESTRIAN CROSSWALKS

#### 3.8.1 PURPOSE

To establish criteria for the installation and operation of mid-block pedestrian crosswalks on the State Highway System.

#### 3.8.2 GENERAL

- (1) Mid-block crosswalks are intended to improve pedestrian connectivity and reduce instances of pedestrians crossing at random, unpredictable locations – which can create confusion and add risk to themselves and other road users. Mid-block pedestrian crosswalks may be an appropriate tool to safely accommodate pedestrians at locations where there is a documented pedestrian demand and the spacing to the nearest intersection crossing location would result in significant out-of direction travel for pedestrians.
- (2) Mid-block crosswalks that are well located and thoughtfully designed can serve as a mechanism for improving pedestrian connections, community walkability, and pedestrian safety. However, they are not suitable for all locations and careful evaluation must be undertaken regarding expected levels of pedestrian crossing demand, safety characteristics of the crossing location, and design considerations for the crossing control type.

#### 3.8.3 DEFINITIONS

- (1) **Marked crosswalk.** Any portion of a roadway at an intersection or elsewhere distinctly indicated for pedestrian crossing by lines or other markings on the surface. Marked crosswalks serve to highlight the right-of-way where motorists can expect pedestrians to cross and designate a stopping or yielding location.
- (2) **Mid-block location.** Any location proposed for a marked crosswalk on a roadway with an uncontrolled approach.
- (3) **Pedestrian attractor.** A residential, commercial, office, recreational, or other land use that is expected to be an end destination for pedestrian trips during a particular time of day.

- (4) **Pedestrian generator.** A residential, commercial, office, recreational or any other land use that serves as the starting point for a pedestrian trip during a particular time of day.
- (5) **Pedestrian Hybrid Beacon.** An experimental pedestrian actuated traffic control device that provides a dark indication to motorists until activated by a pedestrian at which time a solid red indication is provided to motorists to direct them to stop. The solid red indication advances to a flashing red indication that allows motorists to proceed with caution once a pedestrian is clear.
- (6) **Rectangular Rapid Flashing Beacon.** An experimental form of flashing beacon that uses rectangular-shaped high-intensity LED-based indications to supplement standard pedestrian crossing signs at uncontrolled crossing locations. The beacon flashes rapidly in a “flickering” flash pattern.
- (7) **Two-stage marked mid-block crosswalk.** A marked crosswalk that is designed to require pedestrians to cross each half of the street independently, with the median serving as a refuge area for pedestrians to wait before completing the crossing.

#### 3.8.4 PROCEDURE

- (1) Any marked crosswalk proposed for an uncontrolled location on the State Highway System shall be reviewed and approved by the appropriate District Traffic Operations Engineer prior to installation.
- (2) A request from a local maintaining agency or other interested party shall be submitted to the appropriate District Traffic Operations Engineer.
- (3) If the District Traffic Operations Engineer’s review of available information supports the installation of a mid-block pedestrian crosswalk based upon the criteria outlined in **Section 3.8.5**, then a full engineering study may be conducted.
- (4) The criteria referenced in **Section 3.8.5**, as documented in an engineering study, shall be met as a condition for approval of a marked crosswalk at an uncontrolled location. Within the engineering study, the following information shall also be documented:
  - (a) Document field data to demonstrate the need for a crosswalk based upon minimum pedestrian volumes and availability of any alternative crossing locations that satisfy the criteria described in **Section 3.8.5**. The [Department’s Manual on Uniform Traffic Studies \(MUTS\)](#) provides additional information on obtaining Pedestrian Group Size and Vehicle



Gap Size field data for use in making assessments of opportunities for safe crossings at uncontrolled locations.

- (b) Document potential links between pedestrian generators and attractors. This information is required for establishing the mid-block crossing location or to confirm existing pedestrian crossing patterns.
  - (c) Document all safety considerations with respect to stopping sight distances, illumination levels, proximity to intersection conflict areas, and roadway speed thresholds as described in **Section 3.8.5(5)** that can be satisfied at the proposed location.
  - (d) Document the proposed crossing location and corresponding signing, marking, and signal treatments (if applicable). A schematic layout should be provided over aerial photography or survey to show locations of signs, markings, and other treatments in proximity to existing traffic control devices.
  - (e) Document any pedestrian-vehicle crash history within the vicinity of the proposed mid-block crosswalk that has occurred based upon a minimum three years of data.
- (5) If the evaluation results in a decision not to consider the installation of a mid-block crosswalk, the District Traffic Operations Engineer shall document the reasons and advise the requestor of the findings. Meeting the minimum criteria outlined in this section does not guarantee approval of a request.
- (6) Prior to the approval of a mid-block pedestrian crossing, coordination is necessary between the appropriate District Traffic Operations Office and local agencies to determine responsibilities for maintenance.

### **3.8.5 INSTALLATION CRITERIA AND CONSIDERATIONS**

- (1) Placement of mid-block crosswalks should be based upon an identified need and not used indiscriminately. Important factors that should be considered when evaluating the need for a mid-block crosswalk include:
- (a) Proximity to significant generators
  - (b) Pedestrian demand
  - (c) Pedestrian-vehicle crash history
  - (d) Distance between crossing locations

- (2) To be considered for a mid-block pedestrian crosswalk, a mid-block location shall meet all the criteria in **Sections 3.8.5(3) and 3.8.5(4)**. The only exception to this criterion is within a school zone, where there is no minimum pedestrian volume for a school crossing.
- (3) Minimum Levels of Pedestrian Demand
- (a) Any location under consideration for a possible mid-block crosswalk should exhibit (1) a well defined spatial pattern of pedestrian generators, attractors, and flow (across a roadway) between them or (2) a well defined pattern of existing pedestrian crossings. Generators and attractors should be identified over an aerial photograph to illustrate potential pedestrian routes in relation to any proposed mid-block crosswalk location.
  - (b) Sufficient demand should exist that meets or exceeds the thresholds for three consecutive days of data collection. Data collection should be based upon pedestrian volumes observed crossing the roadway outside a crosswalk at or in the vicinity of the proposed location, or at an adjacent (nearby) intersection.
    - Minimum of 20 pedestrians during an hour (any four consecutive 15-minute periods).
    - Minimum of 60 pedestrians during any 4 hours of the day, not necessarily consecutive hours.
- (4) Minimum Location Characteristics
- (a) A minimum vehicular volume of 2,000 Average Daily Traffic (ADT) along the roadway segment.
  - (b) Minimum distance to nearest alternative crossing location is 300 feet per the [Department's Plans Preparation Manual, Vol. 1, Section 8.3.3.1](#). An alternative pedestrian crossing location may be considered to be any controlled location with a STOP sign, traffic signal, or a grade-separated pedestrian bridge or tunnel that accommodates pedestrian movement across the subject roadway.
  - (c) If the proposed location is between intersections, the minimum block length is 660 feet. Mid-block crosswalks should not be located where the spacing between adjacent intersections is less than 660 feet per the [Department's Plans Preparation Manual, Vol. 1, Section 8.3.3.1](#).

- (d) The proposed location must be outside the influence area of adjacent signalized intersections, including the limits of the auxiliary turn lanes. Where an adjacent intersection is signalized, the ends of standing queues should be observed not to extend to the proposed location.
- (e) Maximum posted speed of 40 mph for an unsignalized crossing location and up to 55 mph with application of a pedestrian signal or pedestrian hybrid beacon.

#### (5) Safety Considerations

For any proposed mid-block crosswalk, the location must be conducive to providing a minimum level of pedestrian safety. The following conditions should be satisfied under existing conditions or, if not, should be achieved in conjunction with any implementation of the proposed marked crosswalk:

- (a) The location for a mid-block crosswalk must provide adequate stopping sight distance. The [Department's Plans Preparation Manual, Vol. 1, Section 2.7](#) provides additional information for identifying appropriate stopping sight distance. To provide adequate sight distance, parking restrictions in the vicinity of the marked mid-block crosswalk may be required. Other optional treatments, including curb extensions, may also be considered for improving sight distance and reducing pedestrian crossing distance.
- (b) If sidewalks connecting the crosswalk to established pedestrian generators and attractors are not already present, they should be provided. The [Department's Plans Preparation Manual, Vol. 1, Section 8.3.1](#) provides additional sidewalk design considerations.
- (c) Adequate illumination should be provided for any marked mid-block crosswalk.
- (d) If not already present, a raised median or refuge island is recommended for consideration. Where physical constraints prevent the accommodation of a median refuge, documentation of the roadway and safety conditions shall be required and this information should be taken into consideration in identifying whether the location is appropriate for a mid-block crosswalk. Median refuge areas must meet minimum dimensions and design requirements of the Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG). ADAAG requirements for accessibility must also be followed in the construction of the pedestrian crossing. This includes maximum slopes, ramp designs, and use of truncated dome detectable warning surfaces (at the ramps and within a



median refuge area). Refer to the [\*\*Department's Design Standards, Index No. 304.\*\*](#)

- For volumes greater than 12,000 ADT or where crossing distances exceed 60 feet, a refuge island or raised median is required unless controlled by a pedestrian signal or pedestrian hybrid beacon.
- (e) Consideration should be given to the location of nearby bus stops when locating a proposed pedestrian crossing. Bus stops provided on the far side of the mid-block crossing are preferred.

### **3.8.6 MID-BLOCK PEDESTRIAN CROSSING TREATMENTS**

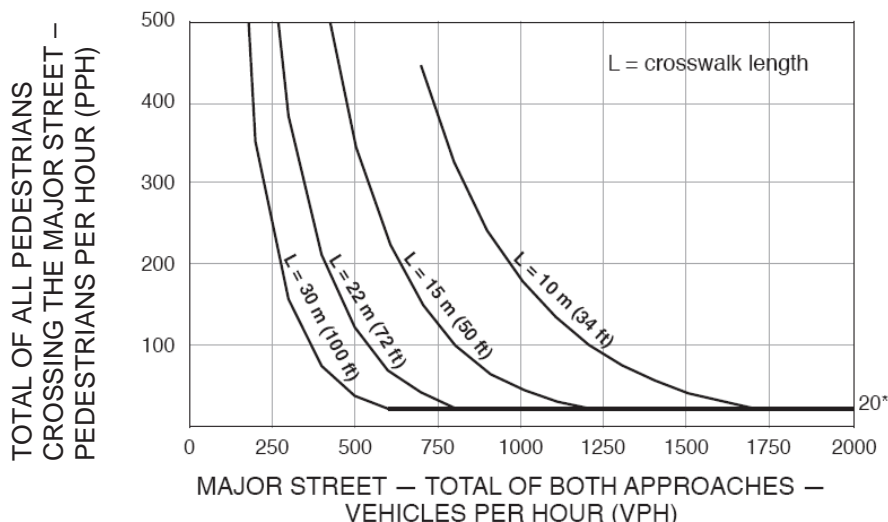
- (1) For all mid-block crosswalks, a 10-foot wide Special Emphasis Crosswalk markings shall be used, as shown in the [\*\*Department's Design Standards, Index No. 17346.\*\*](#)
- (2) For many situations, a marked crosswalk alone may not be sufficient. Adding a crosswalk alone will not make crossings safer, nor will they necessarily result in more vehicles stopping for pedestrians. Other facility enhancements should be considered in conjunction with a marked crosswalk such as curb extensions, raised crosswalks, speed reduction treatments, additional signing and marking, flashing beacons, or signalized control. The [\*\*Department's Design Standards, Index No. 17346\*\*](#) provides four possible configurations of treatments for mid-block crossings. Additional guidance on the application of selected signing, marking, and control treatments is provided through the remainder of this section. Additional treatments, not included in this section, may also be appropriate depending upon the individual site characteristics.
- (3) For locations with sufficiently high pedestrian volume (where signal warrants are met), consideration may be given to providing a pedestrian bridge or tunnel in lieu of an at-grade marked mid-block crossing. For further information, refer to the [\*\*Florida Pedestrian Facilities Planning and Design Handbook.\*\*](#)
- (4) Pedestrian Traffic Control Signal
  - (a) When pedestrian volumes are of a sufficient level to meet signal warrants, a pedestrian traffic control signal may be installed to serve this demand. Applicable pedestrian signal warrants and installation guidelines are identified in [\*\*Section 4C.05 of the MUTCD.\*\*](#) Considerations for a pedestrian traffic control signal at a mid-block location should include availability of adequate gaps for pedestrians to cross the roadway. In some cases a pedestrian signal may not be needed at the study location if adjacent coordinated traffic control signals consistently provided gaps of

adequate length for pedestrians to cross the roadway. The [Department's MUTS](#) provides additional guidance on conducting Pedestrian Group Size and Vehicle Gap Size studies.

- (b) For locations where signalized control is selected for the pedestrian crossing, additional coordination for the crossing location is required with the District Access Management Committee and the District Traffic Operations Engineer.
  - (c) For six-lane roadways or crossing distances exceeding 80 feet, a two-stage pedestrian crossing should be considered where the proposed crossing will be controlled by a warranted pedestrian signal. A two-stage pedestrian crossing may have a lesser impact to vehicle delay (compared to a single crossing) since the signal serves each direction independently while the median serves as a refuge area for pedestrians to wait prior to completing their crossing.
- (5) Pedestrian Hybrid Beacon
- (a) A possible alternative to the pedestrian traffic signal is the "Pedestrian Hybrid Beacon". **Requests for experimentation approval must be submitted by the Department's Traffic Engineering and Operations Office to FHWA and approval received prior to use.** The Pedestrian Hybrid Beacon provides an initial solid red indication to drivers followed by a flashing red to allow vehicles to proceed with caution once pedestrians are clear. The proposed Chapter 4 of the next edition of the **MUTCD** provides volume warrants and additional guidance on the use of Pedestrian Hybrid Beacon where pedestrian volumes do not meet the warrants for a pedestrian traffic signal under [Section 4C.05 of the MUTCD](#).
  - (c) **Figures 3.8.1 and 3.8.2** represent the Pedestrian Hybrid Beacon warrants proposed for the **2010 MUTCD**. For a major street, the posted or the 85th-percentile speed is used to select the appropriate graph: 35 mph or less (**Figure 3.8.1**), or greater than 35 mph (**Figure 3.8.2**). The need for a Pedestrian Hybrid Beacon could be considered if the engineering study finds that the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding total of all pedestrians crossing the major street for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve for the length of the crosswalk (measured in feet). For roadway widths that do not correspond to a particular line, the width should be interpolated from the plotted lines. If the pedestrian volume conditions do not meet warrants for

either a pedestrian signal or a Pedestrian Hybrid Beacon, then refer to other treatments within **Section 3.8.6** (such as supplemental beacons).

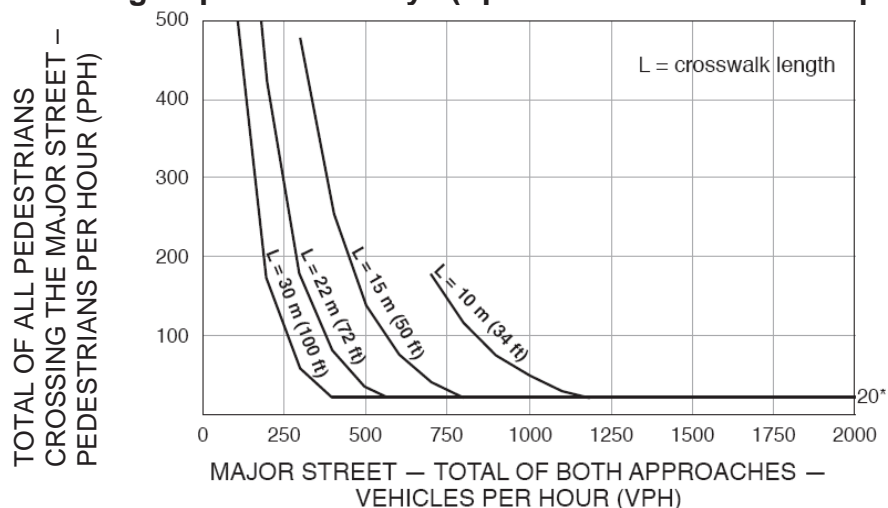
**Figure 3.8.1. - Guidelines for the Installation of Pedestrian Hybrid Beacon on Low-Speed Roadways (Speeds of 35 mph or less)\*\***



\* Note: 20 pph applies as the lower threshold volume.

\*\*Figure Note: Figure 3.8.1 is provided as it currently appears in the Notice of Proposed Amendment issued by FHWA for proposed changes to be included in the next edition of the MUTCD.

**Figure 3.8.2. - Guidelines for the Installation of Pedestrian Hybrid Beacon on High-Speed Roadways (Speeds of more than 35 mph)\*\***



\* Note: 20 pph applies as the lower threshold volume.

\*\*Figure Note: Figure 3.8.2 is provided as it currently appears in the Notice of Proposed Amendment issued by FHWA for proposed changes to be included in the next edition of the MUTCD.



## (6) Supplemental Beacons

For locations where signals are not warranted, supplemental beacons may be considered to provide additional emphasis of the cross-walk and the presence of pedestrians. Two options are currently available for use: standard flashing yellow warning beacons and Rectangular Rapid Flashing beacons.

### (a) Flashing Yellow Warning Beacons

- The use of flashing yellow warning beacons may provide additional emphasis of the crossing location by supplementing the appropriate mid-block crossing warning or regulatory signs where pedestrian signals are not warranted. When used, beacons shall meet the requirements of [Chapter 4K of the MUTCD](#). Any flashing yellow warning beacons installed at a new crosswalk at an uncontrolled location must use pedestrian actuation, as to elicit a more effective response from motorists than continuously flashing beacons.
- Beacons may be configured either overhead or side mounted; however, the preferred configuration is a side, post-mounting to avoid drivers confusing the beacons for a flashing traffic signal.
  - When post mounted, a configuration of two vertically aligned warning beacons is recommended. These beacons should be operated in an alternating flash pattern.
  - When beacons are overhead mounted, an internally illuminated pedestrian crossing sign should be used in conjunction with the beacons.

### (b) Rectangular Rapid Flashing Beacons

- Experimentation in St. Petersburg, Florida has found promising results from the use of Rectangular Rapid Flashing Beacons, used in conjunction with standard pedestrian signs. FHWA has provided interim approval of this treatment. **The use of this device will require review and approval by the Department's Traffic Engineering and Operations Office and FHWA prior to implementation.**
- The rectangular beacons are provided in pairs below the PEDESTRIAN CROSSING warning sign (**W11-2**) and operate in a "wig-wag" pattern upon activation by the pedestrian. When used, the beacons must be pedestrian activated, using approved

detectors (such as pushbuttons or passive detection devices) that meet ADA requirements for accessibility. An example of the rectangular rapid flashing beacon treatment is shown in **Figure 3.8.3**. Detailed conditions of use, including sign/beacon assembly, dimensions and placement, and flashing rates are provided in the July 16, 2008 interim approval memorandum by FHWA.

**Figure 3.8.3. Rectangular Rapid Flashing Beacons**



\*These supplemental devices have been installed in limited locations. They may not be suitable for locations with different conditions than those tested.

**(7) In-Roadway Lighting**

- (a)** [Section 4L.02 of the MUTCD, In-Roadway Pedestrian Warning Lighted at Crosswalks](#) establishes federal standards by which lighted (illuminated) pedestrian crosswalk edge lines can be installed and operated. Additional guidance and support are provided in [Section 4L.02 of the MUTCD](#) which may be used for the installation and operation of lighted in-roadway pedestrian crosswalks. These additional provisions may be reviewed and considered on a lighted pedestrian walkway.
- (b)** In-roadway warning lights shall not be used where YIELD or STOP signs, or traffic signals are present.

**(8) Supplemental Signing and Markings**

- (a)** To provide additional emphasis of the requirement to stop for pedestrians in the crosswalk, a stop (or yield) line and associated STOP HERE FOR (YIELD HERE TO) PEDESTRIANS (**R1-5 series**) sign may be used. This treatment is not to be used in combination with other active treatments such as the Pedestrian Hybrid Beacon or Rectangular Rapid Flashing Beacons assembly.

- If used, the stop (or yield) line shall be placed 40 ft in advance of the midblock crosswalk. [Section 3B.16 and Figure 3B-15 of the MUTCD](#) shall be used for specifications. For placement of the stop (or yield) line, refer to the [Department's Design Standards, Index No. 17346](#). Where a stop (yield) line is used, parking should be prohibited in the area between the stop (yield) line and the crosswalk.
  - If a stop (or yield) line is provided, the corresponding STOP HERE FOR (YIELD HERE TO) PEDESTRIANS (**R1-5 series**) sign shall be provided. The [Department's Design Standards, Index No. 17346](#) illustrates the placement of these signs. [Section 2B.11 of the MUTCD](#) provides additional guidance on the placement of the R1-5 series sign. At locations where the **R1-5 series** sign is used in advance of the crosswalk, the PEDESTRIAN CROSSING warning sign (**W11-2**) shall not be post mounted at the crosswalk location; however the W11-2 sign may be mounted overhead at the crosswalk location.
  - An ADVANCE PEDESTRIAN CROSSING warning sign (**W11-2**) with supplemental AHEAD plaque shall be used in combination with the **R1-5 series** sign. The [Department's Design Standards, Index No. 17346](#) shall be used for mounting locations of advance **W11-2** signs as related to approach speeds.
- (b) IN-STREET PEDESTRIAN CROSSING sign (**R1-6 or R1-6a**) may be used on low speed roadways to remind road users of laws regarding right-of-way at an unsignalized pedestrian crosswalk. An IN-STREET PEDESTRIAN CROSSING sign should not be placed in advance of a crosswalk to educate road users about the State law prior to reaching the crosswalk, nor should it be installed as an educational display along the highway that is not near any crosswalk. Additional information is provided in [Section 2B.12 of the MUTCD](#).
- If used, the IN-STREET PEDESTRIAN CROSSING signs shall be placed in the roadway at the crosswalk location on the center line, on a lane line, or on a median island. The IN-STREET PEDESTRIAN CROSSING sign shall not be post-mounted on the left-hand or right-hand side of the roadway.

### 3.8.7 SELECTION GUIDANCE FOR ADDITIONAL TREATMENTS

- (1) The treatment to be provided at a particular location should be selected in consideration of pedestrian volumes and crossing difficulty:



- (a) For a high volume of crossing pedestrians, signal control is usually appropriate, provided an **MUTCD** signal warrant is satisfied.
  - (b) For locations that meet the criteria for identified under **Section 3.8.5**, but do not have sufficient pedestrian volume to meet **MUTCD** signal warrants, decisions about which additional treatment elements to include (if any) should be made with reference to the recommended treatments in **Table 3.8.6**.
- (2) **Table 3.8.4** was developed to help clarify the recommended treatments for varying roadway conditions – especially for the range of moderate pedestrian volumes where many options exist. **Table 3.8.4** presents the recommended signing, marking, and control treatments for varying levels of roadway cross-section, posted speed, and vehicular volume.
- (a) Where the table indicates that a pedestrian signal or Pedestrian Hybrid Beacon should be considered, the pedestrian volumes must first meet the applicable warrants from the [Section 4C.05 of the MUTCD](#) or **Figures 3.8.1 or 3.8.2**. The guidance shown in **Table 3.8.4** does not replace the obligation to meet the requirements of the **MUTCD**.
  - (b) Two basic categories of treatments are shown in **Table 3.8.4**. These include signs (with corresponding markings) and activated devices. The treatments are grouped such that the appropriate signs and markings are used together. For instance, STOP HERE FOR PEDESTRIANS signs (**R1-5 series**) are accompanied by a Stop line (Note: if a yield condition is used, a YIELD HERE TO PEDESTRIANS sign (**R1-5 series**) would be paired with a Yield line) as illustrated in the [Department's Design Standards, Index No. 17346](#).
  - (c) For the specific combination of volume, cross-section, and speed in each column – the set of recommended treatments are identified with a ✓ and alternative optional treatments are shown as **01, 02, or 03**. Blank cells indicate treatments that would not be utilized in combination with the identified recommended treatments. Treatment recommendations identified in the table represent guidance and do not replace engineering judgment.

**Table 3.8.4. Mid-block Crossing Treatment Guidance**

Lanes	Low Volume Roads Roadway Volume ≥ 2,000 ADT and ≤ 6,700 ADT (650 vph)						Medium-Volume Roads Roadway Volume > 6,700 ADT (650 vph) and ≤ 12,000 ADT (1,150 vph)						High-Volume Roads Roadway Volume > 12,000 ADT (1,150 vph)					
	2 – Lanes			4 – Lanes			2 – Lanes			4 – Lanes			2 – Lanes			4 – Lanes or more (with raised median)		
	≤30 mph	35-40 mph	≥45-55 mph	≤30 mph	35-40 mph	≥45-55 mph	≤30 mph	35-40 mph	≥45-55 mph	≤30 mph	35-40 mph	≥45-55 mph	≤30 mph	35-40 mph	≥45-55 mph	≤30 mph	35-40 mph	≥45-55 mph
Posted Speed	✓	✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓
Special Emphasis Crosswalk	✓	✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓
Side Mounted Pedestrian Xing Sign (W11-2) w/ Down Arrow (W16-7p) at crosswalk	✓		✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓
Advance Pedestrian Xing Sign (W11-2) with "Ahead" Plaque (W16-9p)		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓
In-Street "YIELD to Pedestrians" (R1-6) or "STOP for Pedestrians" (R1-6a) sign.	O	O		O			O	O					O					
"Yield Here To Pedestrians" Sign (R1-5 or R1-5a) with Yield Line marking <b>Or</b> "Stop Here for Pedestrians" Sign (R1-5b or R1-5c) with Stop Line marking		✓			✓			✓			✓			✓				
Rectangular Rapid Flashing Beacons (RRFB) Assembly		O1		O1	✓			O1		O1	✓			✓				
In-Roadway Lighting		O2		O2	O2			O2		O2	O2			O2	O2			
Pedestrian Hybrid Beacon or Traffic Signal (Based upon applicable warrants) with Stop Line marking			✓					O3	✓					O3	✓		✓	✓
Choose 1 Treatment Only																		

**Notes:**

✓ = Recommended treatment

O = Optional

O1 = Optional treatment. May be used with adequate justification. If used, the R1-5 series sign shall be omitted. Shall not be used in combination with In-Roadway Lighting, a Pedestrian Hybrid Beacon, or Traffic Signal.

O2 = Optional Treatment. May be used with adequate justification. Shall not be used in combination with RRFB Assembly or flashing beacons, a Pedestrian Hybrid Beacon, or Traffic Signal.

O3 = Optional if a signal warrant (as described in MUTCD Chapter 4C) or a Pedestrian Hybrid Beacon warrants (as described in section 3.8.6.2 of this document) is satisfied. If a signal or Pedestrian Hybrid Beacon is used, stop lines shall be provided. Shall not be used in combination with flashing beacons, RRFB, or in-roadway lighting. Where a pedestrian Hybrid Beacon is used the W11-2 sign should be replaced with a sign that reads "Crosswalk Stop Here on Red".

## **APPENDIX D**

### **REVIEW COMMENTS AND CORRESPONDANCE**



**From:** Robert Keeth [RKeeth@volusiatpo.org]  
**Sent:** Tuesday, November 01, 2011 3:41 PM  
**To:** Babuji Ambikapathy  
**Cc:** Rajashekar Pemmanaboina; Kathy Lee  
**Subject:** S. Atlantic Av Pedestrian Study

Good afternoon, Babuji.

I've completed my review of the S. Atlantic Avenue Pedestrian Safety Study, and have a fairly extensive list of concerns, below. After you've had a chance to consider them, can you meet with me and Karl Welzenbach to discuss them. Perhaps we can resolve most of these before engaging the broader pool of stakeholders.

1. Given that the study concluded "it is difficult for pedestrians to cross the 5-lane section of S. Atlantic Avenue without taking refuge in the bi-directional turn lane or running across the road" and that you are recommended the removal of 7 existing crosswalks, leaving only 8 enhanced crosswalks throughout this 2.86 mile corridor (on average, 1 every 4/10 mile), how do your recommendations address the study objective to facilitate safe and convenient pedestrian crossing of S. Atlantic Avenue?

2. The study scope included the following provision:

*"Based on the field assessments, the Consultant will identify measures that would minimize the potential for pedestrian/vehicle conflicts and that would facilitate pedestrian crossings while improving the overall safety of the study corridor. For this purpose, the Consultant shall consider, among other measures, the possibility of implementing one or more of following: 1) adding raised medians/pedestrian refuges, 2) reducing through-lane width and 3) reducing the posted speed limit. Recognizing that a thorough assessment of these three measures would require a much more detailed and expensive effort than is reasonable for this study, the Consultant will assess their benefits and costs in general terms based on findings from comparable studies/projects and professional judgment.*

On page 48 and 49 you address the benefits of reducing lane width including "slowing traffic without having to physically lower the speed limit". But the study did not address the feasibility/desirability of actually lowering the posted speed limit and/or providing raised medians/pedestrian refuges. Please include an assessment of the benefits and costs of these measures as called for in the scope.

3. Pg 1, list item #1 – Please note in regard to your recommendation to add continuous bicycle facilities along S. Atlantic Av that, of the two alternatives (paved shoulders or designated bicycle lanes with elimination of one travel lane), the paved shoulders alternative will most likely require substantial drainage improvements including expansion of existing stormwater retention areas. Please also note that this second alternative will require further study by a drainage expert to determine the cost and feasibility of making this improvement.
4. For each existing crosswalk proposed to be eliminated, please note the distance to nearest remaining crosswalk in each direction.
5. Pg 4, paragraph 2 – You note that S. Atlantic Avenue is "classified" as a "rural" two-lane two-way roadway. Yet it is functionally classified as an "urban" collector. Are you using the term "rural" here to refer to the road design type (e.g. rural road section – with swale drainage and no curb)?
6. Pg 4 – Please note that S. Atlantic Avenue is Volusia County's maintenance responsibility.
7. Pg 7, Table 2 – Please add a column listing distance from the preceding crosswalk and another listing cumulative distance. This information is critical in understanding convenience for pedestrians.

8. Pg 19, last paragraph – I’m not comforted by your statement that “[t]he minimum levels of pedestrian demand [for mid-block crosswalks] cited in FDOT’s Traffic Engineering Manual, Section 3.8: Mid-block Pedestrian Crosswalks are frequently applied to unsignalized intersection crosswalks as well...” I don’t believe FDOT says this. I’m particularly wary of this statement if it will be used as sole or primary justification for removing a marked crosswalk at an intersection. You noted in the same paragraph that FHWA views the threshold only for the purpose of assigning priority. The decision to remove any crosswalk should consider other factors including potential demand as influenced by distance to nearest alternative crossings and proximity to significant pedestrian origins and destinations.
9. Pg 22, Figure 4 and pg 23, Figure 5 – please include a note explaining that the bold, horizontal line across the graph represents FDOT’s minimum pedestrian demand (count) threshold for mid-block crossings only. Also note that demand should be based on three consecutive days of data collection and include pedestrian volumes observed crossing the roadway outside a crosswalk at or in the vicinity of the proposed location, or at an adjacent (nearby) intersection. (FDOT’s Traffic Engineering Manual, Section 3.8, January 2010).
10. Pg 40, Gap Size Analysis – I question whether it is appropriate to report gaps based on consideration of one-way traffic flows. Section 8.2 (3) in FDOT’s Manual on Uniform Traffic Studies provides that “[f]or divided roadways with sufficient median width for storage to accommodate two separate crossings, gap size should be determined for each direction of vehicular travel.” By implication, for divided roadways that do not have sufficient median width for storage to accommodate two separate crossings, gap size should be determined for both directions of travel. The essential consideration is whether the bi-directional or two-way center turn lane should be recognized as a “median” that will provide a pedestrian refuge. The term “median” is not defined in this document; however, FHWA’s report, Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations (FHWA Publication Number HRT-04-100, Sept. 2005, pg 63.) provides that a two-way center turn lane is not considered a median and a raised median or crossing island must be at least 4 ft wide and 6 ft long to serve adequately as a refuge area for pedestrians (see Table 11, pg 54).

Having made that point, I must acknowledge and agree with the finding you reported on page 45, 2<sup>nd</sup> bullet paragraph:

“From observations in the field, it appears to be difficult to cross S. Atlantic Avenue within the five-lane section. The results of the vehicle gap size study bear out this observation. Based on a walking speed of 2.5’ per second, the crossing time is 27 seconds. Given that there were no available gaps 27 seconds or longer, during the peak hours, it would not be possible to cross S. Atlantic Avenue without taking refuge in the bi-directional turn lane or running across the road.”

11. Pg 44 second bullet paragraph, second sentence – Please revise as follows:

“The existing stopping sight distance observed in the field is approximately 410’, which exceeds the PPM [FDOT’s Plans Preparation Manual] minimum stopping sight distance of 305’ at the posted speed limit and 360’ at an assumed design speed of 45 mph.”

Adding the word “minimum” and the minimum sight stopping distance for the posted speed limit helps clarify the point that the existing mid-block crosswalk does satisfy the referenced sight-stopping distance requirement.

In the last sentence of this 1<sup>st</sup> bullet paragraph, the claim that motorists may find it difficult to stop in time may be a bit misleading. Even at the assumed design speed of 45 mph (which is higher than the 40 mph posted speed limit), the actual sight-stopping distance exceeds the minimum requirement by nearly 14%.

Please let me know when you will be available to meet with us.

Thanks, Babuji.

Bob



**Robert Keeth, Senior Planner**

**Volusia Transportation Planning Organization (VTPO)**

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Volusia County  
Traffic Engineering

Project Name: CR A1A Pedestrian Safety Study  
Subject: Volusia TPO  
Date: November 23, 2011

No.	Analysis Comments
1	Introduction, page 3: Please explain what prompted the study. Is it a City beautification project? Did residents complaints? Crashes?
2	Figure 3, page 21: It would be helpful to the reader if the study stated why the spike in pedestrian & bicycle activity is currently occurring in select locations (Oyster Quay, Matthews Avenue, 27th Ave, and 24th Ave). Is there a particular draw? Off-beach parking, shopping, restaurants on the west side?
3	Existing Conditions, page 4: The third paragraph contains errors with tense agreement.
4	Pedestrian and Bicycle Analysis, page 19: While Labor Day weekend usually has a high volume of traffic on the beach, it is also after the school year has started and may have a lower traffic volume then would occur during the peak summer season.
5	Page 24, 1st paragraph (last sentence): Please explain what is meant by "No Improper Driving."
6	LOS and AADT, page 42: Volusia County 2010 traffic counts are available.
7	Page 53: It would be helpful to the reader if the study included a drawing or picture of a RRFB, with arrows pointing to the alternating light patterns similar to law enforcement flashers.
8	Please explain what S.N.S. means at the Stop signs in Figures 2-B to 2-K?
9	Recommendations: Please consider including a map of all the recommended changes. This will be really helpful for presentation purposes. Given the political attention this issue and study is receiving, we anticipate a full presentation to at least the TPO committees/board.
10	Recommendations (Paved Shoulders and Sidewalk Installation): Please consider that CR A1A is an Evacuation Route, and the reduction of lanes may be an issue.
11	Recommendations (Reduce the number of marked crosswalks within the corridor): Consideration should be given to have less blocks between crosswalks. The recommendation has between 4 and 6 blocks between crosswalks. Is it possible to reconfigure the location of crosswalks to have 4 blocks between them?



Volusia County  
Traffic Engineering

12	Please discuss how “naked streets” are really safer. Have there been any examples of where a crosswalk(s) was removed in Florida and crash rates dropped? If we remove the crosswalks, will people cross S Atlantic where ever they want---midblock or at an intersection?
13	Page 1, Executive Summary: Improvements #1 and #2 need further analysis to determine their feasibility. For example, is there available ROW to install the sidewalk on the east side of South Atlantic Ave? Also please verify the RRFBs can be installed on higher speed roads.
14	Page 1, #5: Please add the following to the end of the sentence: due to current low traffic counts and criteria propagated by the MUTCD and Florida DOT.
15	Page 2, Table 1: Please add a column for speed limit.
16	Page 3: Please add “FDOT” when referencing MUTS. Also add the following after CR A1A on the fifth line: “concerns have been raised by residents trying to cross South Atlantic Ave during the busy summer and holiday seasons with the heavy volumes of traffic and excessive speeds.”
17	Page 4, 2 <sup>nd</sup> paragraph: Please reference South Atlantic Ave as a county thoroughfare arterial/collector.
18	Page 4, 3 <sup>rd</sup> paragraph: Add “Going north to south, a” prior to beginning of paragraph. Please include mileage information between crosswalks in the 3 <sup>rd</sup> paragraph.
19	Page 19 comments: Please document which additional locations the city requested to be studied. Please underline the following for emphasis: 6 <sup>th</sup> line starting with “recommends” and 10 <sup>th</sup> line starting with “The TEM.”
20	Figures 3-6: Please show/distinguish on graph where the posted speed limit is 45 mph and where it is 40 mph. Also, the colors seem to be washed out in Figure 6.
21	Page 20: 1 <sup>st</sup> paragraph: Please replace “warranted” with “recommended.”
22	Page 24, 1 <sup>st</sup> paragraph: Please underline “one ‘hit pedestrian’ crash” for emphasis.
23	On the crash diagrams, please highlight those 9 crashes shown in graphic and discussed in the report where “ped xing roadway” contributed. Otherwise, only one pedestrian crash was shown on diagram.
24	Page 42 Please use 2010 AADTs. Also, please delete the second to last sentence in paragraph 3. This really cannot be determined since the area has a lot of condos, especially with the poor economic situation. Perhaps try to look at the 10 year trend before coming to a conclusion.



Volusia County  
Traffic Engineering

25	Page 44, last bullet: Please delete the section about risk to the bicyclist. Additionally, identify where the bicycle traffic is located – in the roadway or along the multi-use path? Also, please add the following to the end of the sentence in the second to last line: “or the parallel city/county multi-use path along Saxon Drive, which parallels South Atlantic Ave.
26	Page 45: First full bullet: please verify our program should have calculated the 85 <sup>th</sup> percentile and 10 mph pace speed. Also, last full bullet, please underline for emphasis the statement starting with “marked crosswalk roughly.”
27	Page 52, Section: Remove mid-block crosswalks: Please verify this treatment is recommended on 45 mph or greater roadways.
28	General and also on page 54: Please use the word “shall” when citing the MUTCD.
29	Page 55: Add the following to the first sentence: “or removed during the upcoming county resurfacing project.”
30	Appendix, General: Please verify all of the speed data in the tables since they appear to be vehicle classification counts. If you need County Speed Analysis forms, please contact our office since our report should include the 85 percentile and the 10 mph pace speed.
31	Appendix, General: Also include in the Appendix: 1) MUTCD section related to crosswalk warrants and 2) Florida DOT guidelines/procedures related to warrants for mid-block crosswalk.
32	Corridor Photographs, page 57: Note that on 11/2011 the Volusia TPO BPAC Subcommittee had a presentation/update on this study. Also, there was a City Commission Workshop on 11/8 regarding the NSB Sidewalk master plan. Karl Welzenbach gave the update on the this study and there were no questions from City Commission.
33	Appendix, Speed Traffic Count Data (all tables): Please include vehicle classification count data.





# City of New Smyrna Beach

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November 7, 2011

Robert Keeth, Senior Planner  
Volusia County Transportation Planning Organization  
2570 West International Speedway Boulevard  
Suite 100  
Daytona Beach, FL 32114-8145

**RE: CITY COMMENTS ON DRAFT SOUTH ATLANTIC PEDESTRIAN SAFETY STUDY**

Dear Mr. Keeth:

City staff has reviewed the draft *Pedestrian Safety Study for County Road A1A* and has the following comments:

1. **Recommendation #1:** Planning staff would recommend the designated bicycle lanes along the entire corridor.
2. **Recommendation #3:** Planning staff does not support removing mid-block crosswalks, or reducing the number of existing marked crosswalks.
3. **Recommendation #4:** Planning staff does not support removing the pedestrian traffic signal at Matthews Avenue, which appears to get 100% compliance and replacing it with a non-regulatory signal that only has 80% compliance.
4. The gap study was conducted at East 20<sup>th</sup> Avenue, which has not experienced any crashes over the 42-month period analyzed in the draft study. Staff would recommend that additional gap studies be conducted at the following intersections:
  - a. East 24<sup>th</sup> Avenue
  - b. East 14<sup>th</sup> Avenue
  - c. Oyster Quay
5. It would appear that rather than eliminating existing crosswalks, the center bi-directional turn lane should be replaced with a raised (landscaped) median.
6. If the section from 27<sup>th</sup> to 7<sup>th</sup> be two lanes as well, there would be additional area for drainage, a five-foot sidewalk on the east side of the road and two five-foot wide bicycle lanes. During evacuations, South Atlantic Avenue could be used for northbound traffic only. Saxon Drive would provide a southbound alternative.
7. In addition to retaining mid-block crossing at Sea Woods Boulevard and Bahama Drive, lighting should also be added.
8. Additionally, if the crossing south of Bahama Drive is retained, crosswalk markings should be added.
9. Page 3, Line 4: Please change "need" to "needed."

CITY COMMENTS ON DRAFT SOUTH ATLANTIC PEDESTRIAN SAFETY STUDY  
NOVEMBER 7, 2011  
PAGE 2

10. Page 3, Line 5: Please change "date" to "data".
11. Page 4, 3<sup>rd</sup> Paragraph:
  - a. Please change "5' Sidewalk" to "5' sidewalks" in the first sentence.
  - b. Please add "an" before "8' sidewalk".
  - c. On the 3<sup>rd</sup> line, please change "5' sidewalk is" to "5' sidewalks are".
- 12.

Staff appreciates the opportunity to comment on the draft report and looks forward to working with TPO and Volusia County staff to finalize this report. Please feel free to contact me with any questions you may have or if you require additional information. I may be reached at (386) 424-2134 or via email ([ghenrikson@cityofnsb.com](mailto:ghenrikson@cityofnsb.com)).

Sincerely,

Gail Henrikson, AICP  
Planning Manager

Cc: Khalid Resheidat, Assistant City Manager/Public Works Director  
Kyle Fegley, City Engineer  
Jon Cheney, Volusia County Traffic Engineering  
Jake Sachs, NSB Appointee, Volusia County TPO CAC

## **CITIZEN COMMENTS**

### **Comment via Online Form Submittal: Request for Service dated 10/13/2011 from Patrick Nappi, 13<sup>th</sup> Avenue Citizen:**

As a year round resident of NSB living on E 13th Avenue I have noticed several older residents, including myself, having a difficult and dangerous time trying to cross South Atlantic due to the increased vehicle traffic and their tendency to go faster than the posted speed. It would help greatly if the street department would paint some white crosswalk lines at this intersection. This would make it safer for the older residents living in the area that have to cross South Atlantic to enjoy their evening walks at the beach. This would also be a relatively inexpensive way to assist in reducing excessive speeds on beachside, an increasing safety issue. Thank you for considering our request for a crossing on E 13th Avenue.

### **Comment via email dated 11/1/2011 from Steve Sheriff, Citizen:**

Would someone please advise me as to the status of the latest "study" being done? Mr. Cowling is correct that I have been asking for a pedestrian crosswalk on A1A [at 11<sup>th</sup> Avenue] for OVER 2 years. The first time I inquired I was told a "study" was being done at that time. The person even asked if I would like to be copied on the results. I said yes of course but have not received even a peep from anyone. There are crosswalks from 27th back to 15th then a large void of none until 8th I believe. This is, at least not consistent and it can get scary trying to cross that road. I look forward to hearing some news on this issue.

### **Comment via email dated 10/25/2011 from Jake Sachs, CAC for New Smyrna Beach:**

After making a presentation today at the VTPO board meeting, I was told that you may be one of the authorities that may make decisions regarding pedestrian safety on South Atlantic Avenue in New Smyrna Beach. As a citizen observer, I can only say that doing away with existing marked crosswalks will seriously hinder pedestrian safety. The GMB study has some good findings and observations though their assertion that "naked streets" are safer is only a preliminary study. The shared spaces approach to me seems risky and dangerous. Unsignalized crosswalks are not recommended when speed limit exceeds 40 miles per hour. Please slow the speed limit to 40mph on the 5 lane portion from 7<sup>th</sup> Avenue to 27th Avenue. Please do not delete existing crosswalks. If any should be deleted between 6th and 8th Avenues, it should be 7th Ave, because sight stopping distances for vehicles and pedestrians are too narrow. Due to the large sweeping curve of the road, there is a very large blind spot on the west side of Atlantic Avenue. The 7th Avenue crosswalk is on a diagonal and takes longer to cross. It also intersects a left turn lane which heads eastbound onto 7th Avenue. A very dangerous mix. It is a shame to lose the very crosswalk on 8th Avenue that I was trying to improve. Help us make the situation safe and correct for all. Maybe we should take a step back and just resurface and brighten up the original existing markings to improve pedestrian safety. I can't see how destroying any current crosswalk helps anyone.



**Synopsis of telephone conversation between Kathryn Lee (GMB) and Commander Bill Drossman (City of New Smyrna Beach Police Department) on 12/22/2011:**

On 12/22/2011, I called Commander Drossman to ask if the police department observed any "hot spots" within the subject corridor that exhibited unusually high pedestrian, bicycle or operational safety issues. His response was that the only issues that they are getting complaints about are vehicles traveling at excessive speeds and vehicles not stopping for pedestrians. The complaints are cyclical and seem to coincide with the "Snowbird" schedule. They are not aware of any unusually problematic crash areas or crash types within the subject corridor.