RIVER TO SEA TPO
Transportation Planning Organization
VISION - PLAN - IMPLEMENT

SR/CR A1A PEDESTRIAN SAFETY & MOBILITY STUDY

PEDESTRIAN / BICYCLE SAFETY REVIEW

Focus Area F / Kathy Drive to Wisteria Drive (Ormond-By-The-Sea)

Prepared for:
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May 2017

SR/CR A1A
Pedestrian Safety & Mobility Study

Pedestrian/Bicycle Safety Review Report for
SR A1A from Kathy Drive to Wisteria Drive
(Ormond-by-the-Sea)

Section Number: 79080000
Mile Post: 10.585-11.306
Volusia County

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Project Title: Focus Area F Pedestrian/Bicycle Safety Field Review

Field Review Dates: August 31st and September 1st, 2016 (daytime/nighttime reviews and follow up meeting)

Participants:
Travis Hills – Kittelson & Associates, Inc. – Team Leader
Stephan Harris – River to Sea Transportation Planning Organization
Chad Lingenfelter – Florida Department of Transportation, District 5
Joan Carter – Florida Department of Transportation, District 5
Jon Cheney – Volusia County (August 31st only)
Sergeant Thomas Tatum – Volusia County Sheriff (August 31st only)
Michael Eagle – Kittelson & Associates, Inc.

Project Characteristics:
Field Review Type: Pedestrian, Bicycle, Existing Road
Adjacent Land Use: Urban, Residential, Condominiums
Posted Speed Limit: 45 miles per hour (MPH) along the length of the study corridor
Opposite Flow Separation: None
Service Function: Urban Principal Arterial – Other
Terrain: Flat
Climatic Conditions: Overcast

Figure 1 – Focus Area F Study Corridor

Background

Volusia County is ranked in Florida's top 10 counties for pedestrian injuries and fatalities. Pedestrians and bicyclists are identified as Vulnerable Road Users in the Florida Strategic Highway Safety Plan (SHSP). The goal of the SR/CR A1A Pedestrian Safety & Mobility Study is to generate a list of suggested improvements at high pedestrian/bicycle crash locations to address the growing need for pedestrian/bicycle safety along SR A1A in Volusia and Flagler Counties. SR A1A from Kathy Drive to Wisteria Drive (**Figure 1**), a 0.75 mile corridor in Ormond-by-the-Sea, was identified as one of these high crash locations. In order to suggest improvements along this high crash corridor, the crash history was evaluated and a field review was conducted. The methodology for selecting high crash corridors is explained in the SR A1A Pedestrian Safety and Mobility Study Final Report. This report will be available

on the River to Sea TPO's website upon the completion of the study: http://www.r2ctpo.org/bicycle-pedestrian-program/overview/.

The pedestrian/bicycle safety review process involves multi-disciplinary representatives from various stakeholders, potentially including representatives from transportation planning, traffic operations, roadway design, safety, and law enforcement. Pedestrian/bicycle safety reviews are conducted to identify potential safety issues and provide improvement suggestions in a team collaborative environment. This pedestrian/bicycle safety review was commissioned by the Florida Department of Transportation (FDOT) District Five in coordination with the River to Sea Transportation Planning Organization (R2CTPO) to develop short-term, near-term, and long-term suggestions to improve pedestrian and bicyclist safety within the study limits. This safety review is limited in scope and should not be construed as a comprehensive safety study; nor is it a formal Road Safety Audit. It is intended to identify potential operational and safety related improvements related to pedestrians and bicyclists to be considered by FDOT staff, R2CTPO staff, and partner agencies (i.e. Volusia County, Votran, local law enforcement). Some improvements presented in this report may be implemented in the short-term while other suggested safety improvements may be considered for future study. Each suggestion identified in this study is classified into one of three categories:

- Short-Term Maintenance – it is anticipated that issues identified for maintenance may be addressed by public agency staff on a short timeframe and at a relatively low cost.
- Near-Term Improvement – activities that may be incorporated into an upcoming construction project in the area, including 3R milling and resurfacing projects.
- Long-Term Improvement – activities that may be incorporated into upcoming construction projects and may need to be programmed for funding as separate projects.

The field review was conducted on Wednesday August 31st, 2016. The team met in the morning at the R2CTPO office to discuss the study corridor and crash history. After lunch, the study team drove the entire corridor twice, south to north then north to south, to gain an understanding of the facility characteristics from a driver's perspective. The team walked the length of sidewalk along the west side of the roadway (no sidewalks present on east side). The team reassembled in the evening, after sunset, to make observations in nighttime conditions. A follow-up debrief meeting was held at the R2CTPO office the following morning (September 1st) to discuss the corridor's issues and potential improvements identified by the team. Study corridor characteristics are reviewed below:

- Kathy Drive to Wisteria Drive – 0.75 miles.
- Two-lane, undivided cross section along the length of the study corridor with no passing zones throughout the corridor.
- The posted speed along the study corridor is 45 MPH.
- There are no signalized intersections along the study limits.
- One unsignalized crosswalk with old special emphasis markings is located on the south leg of Ocean Breeze Circle intersection. This crosswalk leads to a dune crossing to the beach.
- No sidewalk is present along the east side of the corridor. Continuous sidewalk is present along the west side of the corridor between Spanish Waters Drive and Wisteria Drive. At longer driveways, the sidewalk changes from concrete to an asphalt paved surface.
- No marked bike lanes are provided along the length of the study corridor, but a three to four foot paved shoulder is provided on the west side of the roadway. No paved shoulder is provided

on the east side of the roadway except at locations where a dune crossing is present (this paved area is mainly for vehicles).
- Ten (10) public or private beach accesses are provided along the length of the study corridor.
- Votran, Volusia County's public transit system, route #1 serves SR A1A within the study limits with one hour headways. This route has both northbound and southbound bus stops within the corridor limits and the bus stops have recently been upgraded.
- Overhead street lighting with turtle shielding is present intermittently along the west side of the roadway.
- The corridor has experienced an average AADT of 15,500 over the last six years (2009-2014).

Crash History (2009 – 2014)

Six (6) years of available pedestrian and bicycle related crash data, 2009 to 2014, were utilized for the SR A1A crash analysis. Crash data was obtained from two sources: 1. The FDOT Crash Analysis Reporting System (CARS) database from 2009 to 2014 and 2. The Signal Four Analytics database was maintained by University of Florida from 2009 to 2014. The crashes from the Signal Four database supplemented the CARS data along SR A1A.

Seven (7) pedestrian or bicycle-related crashes were reported over the five-year study period, 71 percent of which involved pedestrians (5). Of the seven (7) pedestrian and bicycle crashes, there was one (1) fatal crash (14 percent) and six (6) injury crashes (86 percent) during the study period. The one fatal pedestrian crash is summarized below:

- Crash Number 81998820
    - On August 21, 2011 at 9:06 PM a crash involving a pedestrian occurred approximately 25 feet south of the intersection of SR A1A and Wisteria Drive under dark lighting conditions. The pedestrian was walking eastbound across SR A1A and failed to yield right of way to a northbound vehicle. The intersection was not lit and there was no marked crosswalk across SR A1A. The pedestrian had a blood alcohol content (BAC) of 0.37. He was transported to the hospital where he was later pronounced deceased.

Crash diagrams were created along the corridor to summarize the pedestrian/bicycle-related crash history. The crash diagrams are included in **Appendix A**. The pedestrian/bicycle crash data was also summarized by the crash metrics displayed in the charts in **Appendix A**. A summary of these metrics is provided below:

- Four (4) of the seven (7) crashes (57 percent) occurred in dark lighting conditions, and the majority (86 percent) occurred under dry roadway conditions.
- Six (6) of the seven (7) crashes (86 percent) occurred Wednesday through Friday.
- Forty-three percent of the crashes (3 crashes) occurred after 9:00 PM.
- Two (2) of the seven (7) crashes (29 percent) were alcohol related.
- Three of the pedestrians/bicyclists involved in crashes were under the age of 24. Three of the drivers involved in crashes were also under the age of 24.
- One (1) of the two (2) bicycle crashes occurred with the bicyclist riding on the sidewalk against the flow of traffic being struck by a vehicle pulling out from a minor street.
- Six (6) of the crashes (86 percent) occurred when the pedestrian/bicyclist attempted to cross SR A1A. In all six (6) of those crashes, the vehicle had the right-of-way.

  - Two (2) of these crashes involved alcohol, one (1) of which resulted in a fatality.
- Six (6) of the pedestrians and bicyclists were not from the local area based upon their provided zip codes.
- Three (3) crashes occurred at the unsignalized intersection of Wisteria Drive:
  - Two were pedestrians attempting to cross SR A1A and the other was a bicyclist crossing Wisteria Drive traveling against the flow of traffic.
  - One pedestrian crash resulted in a fatality and the other two crashes resulted in injuries.

FIELD REVIEW FINDINGS

Location: Corridor-Wide

Issue #1: Lack of Bicycle Facilities

Figure 2

Figure 3

Figure 4

Description of Issue:
The study team observed a lack of formal bicycle facilities along SR A1A within the project limits. On the east side of the roadway nearest the dune, no shoulder is present except at beach access points (**Figure** 2). The study team observed buildup of sand at these locations, which may not be suitable for bicycles to traverse.

On the west side of the roadway, an approximate 4'-5' shoulder is present along the length of the study limits (**Figure 3**). The study team observed bicyclists riding off the roadway either on the sidewalk or within paved driveways on the west side of SR A1A (**Figure 4**). Two bicycle crashes occurred during the crash analysis period with one bicyclist crossing SR A1A and one being struck at a driveway while traveling on the sidewalk against the flow of traffic.

Suggestions for Improvement:
The team discussed the consideration for widening SR A1A to install buffered bicycle lanes. Due to potential impacts to the dunes and the fact that the eight-foot sidewalk on the west side of SR A1A is designated as part of the Florida Shared-Use Nonmotorized (SUN) Trail network, buffered bicycle lanes were not suggested for this section of SR A1A.

In lieu of buffered bicycle lanes, consider reconstructing the sidewalk on the west side of the roadway to be a 10'-12' wide shared-use path as a long term improvement. With the relatively high speeds (posted speed limit of 45 MPH), the study team observed most bicyclists utilizing the sidewalk. In order to accommodate the bicycle and pedestrian traffic in the area, a wider shared-use path would serve both of those non-automobile modes. To help illuminate pedestrians/bicyclists utilizing the path, low level bollards with lights could be installed along the length of the study area, or at a minimum at unsignalized intersections. These low level bollard lights could be designed so they cannot be seen from the beach, thus reducing the risk of turtles being drawn to the roadway. Because the current sidewalk is approximately 5' to 30' from the edge of pavement, at unsignalized intersections the path can be brought closer to SR A1A so turning vehicles can better see pedestrians crossing the side street.

Location: Corridor-Wide

Issue #2: Beach Parking Area

Figure 5

Figure 6

Description of Issue:
Currently there are no designated beach parking lots along the study corridor, but there is a location near Spanish Waters Drive where beach patrons can park along the east side of SR A1A. Beach patrons park in the designated area (shown in **Figure 5** and **Figure 6**) or park along the west side of SR A1A in areas not having parking restrictions. This leads to beachgoers parking at random locations along the corridor and creates variability in pedestrian crossing locations along SR A1A.

Suggestions for Improvement:
Consider converting the vacant parcel on the northwest corner of SR A1A and Spanish Waters Drive to a beach access parking lot (**Figure 7**). As discussed later in **Issue #3: Mid-Block Crossings**, a mid-block crossing is suggested at this location to accommodate pedestrians crossing SR A1A to the beach access point. This mid-block crossing could be constructed in conjunction with the beach parking lot in order to concentrate pedestrian crossings at a specific location. If an off-street beach parking area is constructed, consider installing NO PARKING (R8-3a) signs along the west side of SR A1A to encourage beachgoers to park in the designated beach parking area.

Source: Google Earth 2016

Figure 7

Location: Corridor-Wide

Issue #3: Mid-Block Crossings

Figure 8

Figure 9

Figure 10

Description of Issue:
In addition to numerous private beach access points, three public beach access points are located along the study corridor at Kathy Drive, Ocean Breeze Circle, and Sunrise Avenue. The Kathy Drive and Ocean Breeze Circle locations are shown in **Figure 8** and **Figure 9**, respectively. Four of the five pedestrian crashes occurred with a pedestrian crossing SR A1A at or near a beach access point with one occurring near Kathy Drive, one near Berkeley Road, and two near Wisteria Drive. Even though the roadway is only two lanes wide, the 45 MPH speed limit may make it difficult for pedestrians to judge gaps when attempting to cross the roadway (**Figure 10**).

Suggestions for Improvement:
The study team discussed potential crosswalk locations along the corridor and considered evaluating the following locations for new crosswalks or improvements to existing features:

- Sunrise Avenue;
- Kathy Drive;
- Spanish Waters Drive (consider if the vacant parcel on the northwest corner is converted to be a beach parking area); and
- Ocean Breeze Circle (existing crosswalk).

The team discussed a tiered approach to mid-block crossing implementation:

Tier 1

- Conduct a mid-block crossing study per Section 3.8 of the FDOT *Traffic Engineering Manual (TEM)* to evaluate if a crosswalk is warranted based upon existing demands.
- If warranted, stripe the crosswalk with special emphasis crosswalk markings consistent with sheet 13 of the FDOT Design Index 17346.
- If warranted, install advanced pedestrian warning signage (W11-2 and W16-9P) consistent with sheet 13 of the FDOT Design Index 17346 to indicate a pedestrian crossing is ahead.
- Install crosswalk specific lighting.
    - Directional lighting oriented towards the crosswalk could be provided on the east side; or
    - LED lighting could turn on when the traffic control device is activated and could turn off when the traffic control device is not active.

Tier 2

- Provide a minimum six-foot wide median refuge island with a minimum length of 90 feet for pedestrians.
    - The roadway would have to be widened to fit the refuge island between the northbound and southbound lanes but this impact could be minimized by reducing the travel lanes to be 11' wide.
- Consider replacing the standard yellow background pedestrian warning signs with those having the fluorescent yellow-green background with Type 11 sheeting.

Tier 3

- Due to high speeds along SR A1A (45 MPH), install an active warning device. The following active traffic control devices could be considered based on a mid-block crossing study:
    - Rectangular Rapid Flashing Beacons (RRFBs);
    - Pedestrian Hybrid Beacon; or
    - Pedestrian Traffic Signal.

A higher tier could be implemented if the desired performance (crash mitigation/reduction and/or vehicle yield compliance) was not obtained with the current tier suggestions.

Location: Corridor-Wide

Issue #4: Minor Street Intersections

Figure 11

Figure 12

Figure 13

Description of Issue:
Along the corridor, the unsignalized minor street approaches did not include marked crosswalks or detectable warning surfaces (**Figure 11** and **Figure 12**). The study team also noted faded stop bars and double yellow striping on minor street approaches along the corridor (**Figure 13**).

Suggestions for Improvement:
Consider emphasizing the pedestrian realm across minor stop-controlled intersection approaches by adding crosswalk markings (standard or special emphasis to be determined on a case-by-case basis) as shown on sheet 12 of FDOT Design Standard Index 17346.

Consider installing detectable warning surfaces at public roadway, minor street intersections (i.e. non-driveways) along the corridor per FDOT Design Standard Index 304. Also consider restriping minor street stop bars and double yellow lines as shown on sheet 7 of FDOT Design Standard Index 17346 to emphasize where the vehicle needs to stop before making their turning movement.

Location: Corridor-Wide

Issue #5: Signage

Figure 14

Figure 15

Figure 16

Description of Issue:

The street signs along the corridor had a varying letter heights, multiple street names listed, and lacked retro reflectivity, as displayed in **Figure 14**, **Figure 15**, and **Figure 16**. At Sunrise Avenue (**Figure 15**), street signage is provided for nine different streets. This is difficult for drivers to read and can be a

distraction. Conflicts may occur at night if a vehicle is driving slowly trying to find a specific street and a following vehicle gets impatient and decides to pass them. If a pedestrian is attempting to cross the roadway at the same time, the passing driver may not see the pedestrian causing a pedestrian related crash.

Suggestions for Improvement:
In the near term, consider replacing street name signage (**D3-1**) with new retro-reflective signs using applicable font size following the guidance provided in section 2D-43 of the 2009 *Manual on Uniform Traffic Control Devices (MUTCD)*. Table 2D-2 specifies 6" letter height on post mounted street signs at intersections along two-lane roadways. The excess signage at the Sunrise Avenue intersection should be removed to only show the street connecting to SR A1A (Sunrise Avenue).

Also in the near term consider a signage study/plan for the study corridor to evaluate the amount of signage, applicability, retro-reflectivity, and location along the study corridor. This signage study/plan should include replacing the older signs with signs meeting current standards.

Location: Corridor-Wide

Issue #6: Lighting

Figure 17

Figure 18

Figure 19

Description of Issue:

The beach along the study corridor is a destination for sea turtle nesting. The sea turtle nesting season is from May 1 to October 31. **Figure 17** displays 270 degree turtle shielding on an overhead light to minimize light emittance. The reduced lighting conditions can make it difficult for drivers to see pedestrians or bicyclists at night, especially those wearing dark clothing. **Figure 18** illustrates the lighting

levels the safety team observed during the night field review. **Figure 19** displays the lighting area from an overhead light with 270 degree turtle shielding. Of the four non-daylight crashes, two occurred during turtle season (May through October).

Suggestions for Improvement:
The following are considerations for lighting along the corridor:

- Consider conducting field measurements of existing lighting levels to evaluate lighting uniformity levels and add lighting where necessary. Consider light poles on the east side that are angled westerly away from the beach. These light poles cast their light to the west and illuminate the roadway as needed. The light bulb is not seen by the turtles due to the angle and orientation of the light fixture.
- Consider implementing a lighting plan for the time the sea turtle nesting season is not active as roadway lighting levels should not be reduced at this time.
- Consider conducting a lighting justification study along unlit portions of the corridor to determine if additional lighting is justified.
- Consider implementation of pedestrian-level lighting, with less visibility from the beach, to supplement areas where street lighting is not able to provide adequate illumination as discussed in **Issue #1: Lack of Bicycle Facilities**.
- As a long-term consideration, upgrade to an adaptive roadway lighting system along the corridor. Lighting levels could be programmed to be reduced during the sea turtle nesting season and increased to normal levels outside of the nesting season. This could be coupled with replacing the current high pressure sodium lighting with LED lighting.

Location: Corridor-Wide

Issue #7: Minor Street Sight Distance

Figure 20

Figure 21

Description of Issue:

The study team observed the stop bars at the minor streets to be set back 20' to 25' from the edge of the travel lane, as displayed on **Figure 20**. The stop bar is set back due to the location of the sidewalk which creates sight distance issues for vehicles turning from the minor street. The sight distance was observed to be restricted by landscaping along SR A1A. Because the sight distance is restricted, vehicles were seen driving through the stop bar and stopping near the roadway often on the unmarked crosswalk (**Figure 21**). This creates a conflict with pedestrians and bicyclists who may be attempting to cross the minor street as a vehicle is pulling out to make a turn onto SR A1A.

Suggestions for Improvement:

Consider moving the stop bars to be the minimum of 4' away from the marked crosswalks discussed in **Issue #4: Minor Street Intersections**, per sheet 7 of FDOT Design Standard Index 17346. A curb and gutter could also be constructed along the radius return of the intersections and the sidewalk could be moved closer to SR A1A. This allows both the sidewalk and crosswalk to be moved closer to SR A1A, potentially reducing some of the existing sight distance issues.

Location: Corridor-Wide

Issue #8: Vegetation Maintenance at Beach Access Points

Figure 22

Figure 23

Description of Issue:
There were several locations along the east side of the corridor having high hedges and bushes encroaching onto the shoulder/travel lane. This was especially apparent at the entrances to beach access points (shown in **Figure 22** and **Figure 23**). It is very difficult for drivers to see pedestrians standing on the side of the road when they are attempting to cross from the east side to the west side (leaving the beach access point). The study team also observed that as a pedestrian, the landscaping restricted sight distance along SR A1A. This creates a potential hazard for beach patrons leaving the beach access points.

Suggestions for Improvement:
Coordinate with FDOT maintenance to trim the obstructions and encourage regular landscape maintenance.

Location: Between Kathy Drive and Spanish Waters Drive

Issue #9: Sidewalk Enhancements

Figure 24

Figure 25

Figure 26

Description of Issue:

The study team observed a striped sidewalk area on the west side of SR A1A between Kathy Drive and Spanish Waters Drive, as displayed in **Figure 24** and **Figure 25**. The pavement markings are beginning to fade and in some cases are no longer present due to some patch work. As shown in **Figure 26**, the markings terminate on the southeast corner of the intersection of Spanish Waters Drive and SR A1A. A paved surface is provided adjacent to the asphalt, but a worn trail through the grass was observed. This worn trail is directly across from the sidewalk on the northwest corner of the intersection.

Suggestions for Improvement:
In the near term, consider restriping the pavement markings delineating the sidewalk. Consider adding new sidewalk in the worn trail area to create a more direct route to the sidewalk in the northwest corner.

As a long term improvement, consider removing the existing asphalt surface to create a shared-use path consistent with the suggestion included in **Issue #1: Lack of Bicycle Facilities**. In addition, consideration could be given to providing a curb and gutter at the edge of the sidewalk or shared-use path as a long-term improvement. The adjacent pavement area between the curb and gutter and southbound travel lane could be utilized as parallel parking with several parking stalls.

Location: Spanish Waters Drive Intersection

Issue #10: Steep Curb Ramp

Figure 27

Figure 28

Description of Issue:
When walking along the corridor, the study team observed a steep curb ramp on the northwest corner of Spanish Waters Drive, as illustrated in **Figure 27** and **Figure 28**. The sidewalk slope exceeds the American's with Disabilities Act (ADA) maximum slope threshold of 1:12 and people using a wheelchair may have difficulty traversing the sidewalk at this location.

Suggestions for Improvement:
Consider reconstructing the curb ramp on the northwest corner to meet ADA standards. This should be done in conjunction with potential sidewalk improvements included in **Issue #9: Sidewalk Enhancements** or potential curb and gutter improvements as part of **Issue #7: Minor Street Sight Distance**.

Location: Spanish Waters Drive Intersection

Issue #11: Excess Pavement

Figure 29

Figure 30

Description of Issue:
Figure 29 and **Figure 30** illustrate excess pavement just north of the Spanish Waters Drive intersection. This excess pavement is striped to serve as a deceleration taper for southbound right-turning vehicles. The pavement markings create a potential conflict area for bicyclists riding on the shoulder and vehicles attempting to make a southbound right-turn maneuver at the intersection.

Suggestions for Improvement:
Consider conducting an eight-hour traffic count at the intersection to understand the number of southbound right-turning movements. Vehicular crash history should also be reviewed at this location. Should traffic demand volumes or vehicular crash history suggest a right-turn lane is needed at this location, consideration could be given to formalize the right-turn lane and provide bicycle lane keyhole markings between the through and right-turn lane.

If vehicular crash history and traffic counts do not suggest a right-turn lane is needed, consider removing the striping from the shoulder which creates the de-facto right-turn lane and consider removing the excess pavement to provide a consistently wide shoulder to eliminate the potential conflict area.

Location: Approximately 300' North of Spanish Waters Drive

Issue #12: Exposed Drainage Inlet

Figure 31

Figure 32

Description of Issue:
The study team observed an exposed drainage inlet between the sidewalk and the southbound travel lane. There is a drop off from the edge of the sidewalk to the bottom of the drainage inlet structure as displayed in **Figure 31** and **Figure 32**. This creates a potential hazard for pedestrians or bicyclist to fall into the structure.

Suggestions for Improvement:
Due to the drop/steep slope between the sidewalk and drainage inlet consider reviewing this location based on FDOT Plans Preparation Manual (PPM) Figure 8.8.1 to possibly install a railing. If railing is needed, install the railing just off the east edge of the sidewalk to prevent pedestrians/bicyclists from falling off the sidewalk into the drainage ditch area.

Location: Approximately 500' North of Spanish Waters Drive

Issue #13: Broken Sidewalk Trip Hazard

Figure 33

Figure 34

Description of Issue:
The study team observed a section of broken sidewalk approximately 500 feet north of the Spanish Waters Drive intersection. The sidewalk appears to have been fixed once, but has broken again (shown in **Figure 33** and **Figure 34**. The broken sidewalk presents a potential trip hazard for sidewalk users and restricts the effective width of the sidewalk.

Suggestions for Improvement:
Consider reconstructing the sidewalk panels to replace the broken sidewalk and remove the potential trip hazard.

Location: Ocean Breeze Circle Intersection

Issue #14: Existing Crosswalk Enhancements

Source: Google Earth 2016

Figure 35

Figure 36

Figure 37

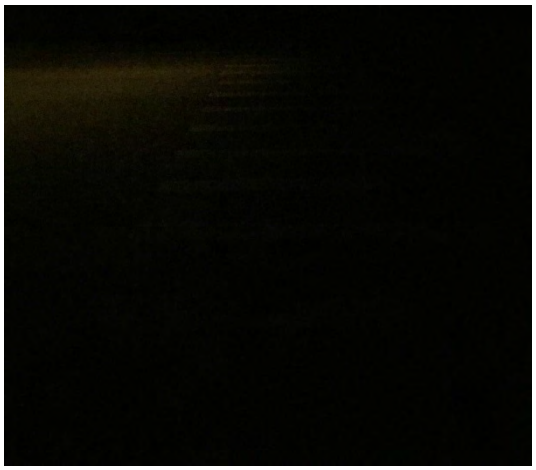


Figure 38

Figure 39

Description of Issue:
There is one existing unsignalized, marked crosswalk along the corridor on the south leg of the SR A1A at Ocean Breeze Circle intersection (location shown in **Figure 35**). The crosswalk is striped with old special emphasis crosswalk markings and has pedestrian warning signs (W11-2) with downward arrows (W16-7P) at the crosswalk (**Figure 36** and **Figure 37**). No advanced warning signs are present on either of the approaches to the crossing. The crosswalk location does not include a paved surface leading to the crosswalk, curb ramps, or detectable warning surfaces (**Figure 37**).

Lighting is not present at the crosswalk (**Figure 38**). **Figure 39** depicts the crosswalk with the flash setting used on the camera. As shown in the figures, it is difficult to see the crosswalk (and any pedestrians/bicyclists utilizing the crosswalk) at night due to the lighting and limited retroreflectivity of the signage and crosswalk markings.

Based upon the historical crash data, there were no pedestrian or bicycle crashes at this location during the crash analysis period. There was one pedestrian crash and one bicycle crash that occurred within 750 feet to the north and south of the crosswalk, respectively. Both crashes occurred during daylight conditions.

Suggestions for Improvement:
The following considerations are for this specific location because a marked crosswalk already exists. The following suggestions are meant to coincide with the tiered approach to crosswalk treatments as discussed in **Issue #3: Mid-Block Crossings**.

Tier 1

- Consider relocating the crosswalk approximately 15 feet south to correspond with the public beach access point. Restripe the crosswalk with special emphasis crosswalk markings consistent with sheet 13 of the FDOT Design Index 17346.
- Consider constructing a curb and gutter along the northwest and southwest intersection radii and tightening the curb radius on the southwest corner of the intersection. This will reduce the crossing distance for pedestrians and bicyclists at the crossing location. As part of this construction of curb ramps and landing pads on either side of the crosswalk should be considered.

- Consider installing advanced pedestrian warning signage (W11-2 and W16-9P) consistent with sheet 13 of the FDOT Design Index 17346 to indicate a pedestrian crossing is ahead.
- Consider installing crosswalk specific lighting.
    - Directional lighting oriented towards the crosswalk could be provided on the east side; or
    - LED lighting could turn on when the traffic control device is activated and could turn off when the traffic control device is not active.

Implementation of Tier 2 and Tier 3 suggestions included as part of **Issue #3: Mid-Block Crossings** could be considered if the desired performance (crash mitigation/reduction and/or vehicle yield compliance) was not obtained from the Tier 1 suggestions.

Location: Seascape Condominiums – Approximately 100' North of Ocean Breeze Circle

Issue #15: Sight Distance

Figure 40

Figure 41

Description of Issue:
The existing concrete wall on the southwest corner of the driveway (**Figure 40** and **Figure 41**) creates conflict between vehicles and pedestrians/bicyclists. The wall restricts the driver's ability to see pedestrians or bicyclists heading northbound on the sidewalk as the driver attempts to turn onto SR A1A.

Suggestions for Improvement:
Consider reviewing the available sight distance at this location. Should additional sight distance be needed, consideration could be given to installing curb and gutter on the turn radii and reconstructing the sidewalk with a shift away from the driveway towards SR A1A. This improvement could be done in accordance with the suggestions described in **Issue #7: Minor Street Sight Distance**. This moves the sight lines for drivers and improves their ability to see pedestrians and/or bicyclists using the sidewalk.

Location: Between Sunrise Avenue and Briggs Avenue

Issue #16: Drainage

Figure 42

Figure 43

Description of Issue:
The study team observed water ponding along the sidewalk on the west side of SR A1A between Sunrise Avenue and Briggs Avenue. Examples of the issue are illustrated in **Figure 42** and **Figure 43**. This poses an issue to pedestrians and bicyclists traveling along the sidewalk where they are forced to go around the water closer to the travel lanes.

Suggestions for Improvement:
Consider constructing a valley gutter per sheet 1 of the FDOT Design Standard Index 300 between the sidewalk and the edge of roadway to convey water to the nearest drainage ditch.

As a long-term improvement, consider constructing an underground drainage system in this area to convey water off of SR A1A and the sidewalk to reduce the potential for ponding in this area.

Location: Briggs Avenue Intersection

Issue #17: Transit Stop Bench

Figure 44

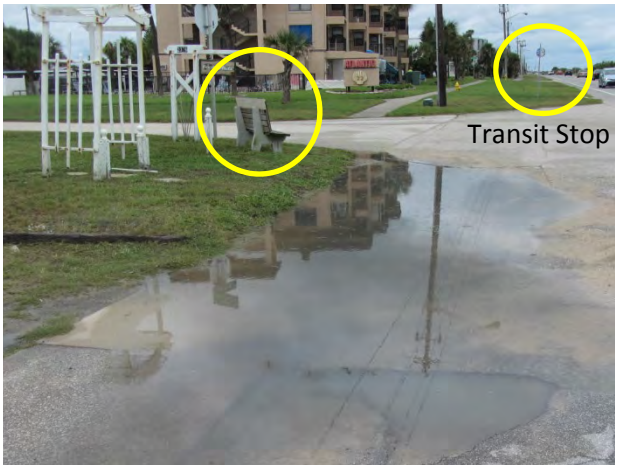


Figure 45

Description of Issue:
The study team observed a transit stop bench on the southwest corner of the intersection of Briggs Avenue (**Figure 44**). Votran has recently upgraded the transit facilities along the study corridor and the new bus stop is located on the northwest corner of the intersection (**Figure 45**). Transit riders wishing to sit on the bench while waiting for the bus are not waiting at the actual transit stop and could be overlooked by the bus driver.

Suggestions for Improvement:
Consider coordinating with Votran to relocate the transit stop bench to the new bus stop location.

Location: Kangaroo Express Gas Station

Issue #18: Driveway Drainage and Pedestrian Facility Delineation

Figure 46

Figure 47

Description of Issue:
The driveway to the gas station is relatively wide (approximately 50 feet) as illustrated in **Figure 46** and **Figure 47**. The concrete sidewalk ends at the edges of the driveway and is replaced by the asphalt driveway. Because the sidewalk ends, there is not a distinct delineation between the driveway and where the sidewalk should be. Vehicles were observed pulling out of the driveway and stopping prior to traveling on SR A1A but not stopping where the sidewalk was located. This creates a conflict with non-motorists traveling along the driveway.

The study team also observed water ponding along the length of the driveway. The extent of the water ponding is illustrated in **Figure 46** and **Figure 47**. Currently this section of the asphalt driveway is the low point. This poses an issue to pedestrians and bicyclists traveling along the sidewalk where they are forced to go around the pools closer to the travel lanes or within the gas station parking lot.

Suggestions for Improvement:
Consider removing the existing asphalt pavement across the driveway and constructing a sidewalk at a slightly higher elevation. In conjunction with the sidewalk construction, construct a valley gutter. The valley gutter would then serve as the new low point for water to travel to and would convey water to the nearest drainage ditch. Consider constructing the valley gutter consistent with details per sheet 1 of the FDOT Design Standard Index 300. As a long-term improvement, consider constructing an underground system in this area to convey water off of SR A1A and the sidewalk to reduce the potential for ponding along the driveway.

The construction of a sidewalk would provide a distinction between the driveway and the pedestrian realm. In addition to the sidewalk, consider striping a stop bar and to emphasize where the vehicle needs to stop before making their turning movement onto SR A1A.

Summary of Suggestions

This pedestrian/bicycle safety review considers operational and safety related issues for pedestrians and bicyclists on SR A1A from Kathy Drive and Wisteria Drive. This study was commissioned by the Florida Department of Transportation (FDOT) District Five in coordination with the River to Sea Transportation Planning Organization (R2CTPO) to develop suggestions to improve the safety of pedestrians and bicyclists within the study limits. Each suggestion identified in this study is classified into one of three categories:

- Short-Term Maintenance – it is anticipated that issues identified for maintenance may be addressed by public agency staff on a short timeframe and at a relatively low cost.
- Near-Term Improvement – activities that may be incorporated into an upcoming construction project in the area, including 3R milling and resurfacing projects.
- Long-Term Improvement – activities that may be incorporated into upcoming construction projects and may need to be programmed for funding as separate projects.

The following Short-Term Maintenance suggestion should be prioritized for implementation before the other suggestions identified in this report:

- Issue #8: Vegetation Maintenance at Beach Access Points on page 18
- Issue #10: Steep Curb Ramp on page 21
- Issue #13: Broken Sidewalk Trip Hazard on page 24

The following tables summarize the suggestions of this study by priority (maintenance, near-term, or long-term).

Location	Issue Number	Issue	Suggestion
SHORT-TERM MAINTENANCE			
Corridor Wide	4	Minor Street Intersections	Consider emphasizing the pedestrian realm across minor stop controlled intersection approaches by adding crosswalk markings (standard or special emphasis to be determined on a case-by-case basis) as shown on sheet 9 of FDOT Design Standard Index 17346. Consider installing detectable warning surfaces at public roadway, minor street intersections along the corridor per FDOT Design Standard Index 304. Also consider restriping minor street stop bars and double yellow lines as shown on sheets 2 and 4 of FDOT Design Standard Index 17346 to emphasize where the vehicle needs to stop before making their turning movement.
Corridor Wide	7	Minor Street Sight Distance	Consider moving the stop bars to be the minimum of 4' away from the marked crosswalks discussed in Issue #4: Minor Street Intersections, per sheets 2 and 4 of FDOT Design Standard Index 17346. A curb and gutter could also be constructed along the radius return of the intersections and the sidewalk could be moved closer to SR A1A. This allows both the sidewalk and crosswalk to be moved closer to SR A1A, potentially reducing some of the existing sight distance issues.
Corridor Wide	8	Vegetation Maintenance at Beach Access Points	Coordinate with FDOT maintenance to trim the obstructions and encourage regular landscape maintenance.
Approximately 500' North of Spanish Waters Drive	13	Broken Sidewalk Trip Hazard	Consider reconstructing the sidewalk panels to replace the broken sidewalk and remove the potential trip hazard.
Briggs Avenue Intersection	17	Transit Stop Bench	Consider coordinating with Votran to relocate the transit stop bench to the new bus stop location.
Kangaroo Express Gas Station	18	Driveway Drainage and Pedestrian Facility Delineation	In addition to the sidewalk, consider striping a stop bar and to emphasize where the vehicle needs to stop before making their turning movement onto SR A1A.

Location	Issue Number	Issue	Suggestion
NEAR-TERM IMPROVEMENT			
Corridor Wide	2	Beach Parking Area	Consider converting the vacant parcel on the northwest corner of SR A1A and Spanish Waters Drive to a beach access parking lot (Figure 7). If an off-street beach parking area is constructed, consider installing NO PARKING (R8-3a) signs along the west side of SR A1A to encourage beachgoers to park in the designated beach parking area.
Corridor Wide	3	Mid-Block Crossings	The study team discussed potential crosswalk locations along the corridor and considered evaluating the following locations for crosswalks or updates to existing features: • Sunrise Avenue; • Kathy Drive; • Spanish Waters Drive (consider if the vacant parcel on the northwest corner is converted to be a beach parking area); and • Ocean Breeze Circle (existing crosswalk). The team discussed a tiered approach to implementation. **Tier 1** • Conduct a mid-block crossing study per Section 3.8 of the FDOT Traffic Engineering Manual (TEM) to evaluate if a crosswalk is warranted based upon existing demands. • Stripe the crosswalk with special emphasis crosswalk markings consistent with sheet 10 of the FDOT Design Index 17346. • Install advanced pedestrian warning signage (W11-2 and W16-9P) consistent with sheet 10 of the FDOT Design Index 17346 to indicate a pedestrian crossing is ahead. • Install crosswalk specific lighting. o Directional lighting oriented towards the crosswalk could be provided on the east side; or o LED lighting could turn on when the traffic control device is activated and could turn off when the traffic control device is not active. **Tier 2** • Provide a minimum six-foot wide median refuge island with a minimum length of 90 feet for pedestrians. o The roadway would have to be widened to fit the refuge island between the northbound and southbound lanes but this impact could be minimized by reducing the travel lanes to be 11' wide. • Consider replacing the standard yellow background pedestrian warning signs with those having the fluorescent yellow-green background with Type 11 sheeting. **Tier 3** • Due to high speeds along SR A1A (45 MPH), install an active warning device. The following active traffic control devices could be considered based on a mid-block crossing study: o Rectangular Rapid Flashing Beacons (RRFBs); o Pedestrian Hybrid Beacon; or o Pedestrian Traffic Signal. A higher tier could be implemented if the desired performance (crash mitigation/reduction and/or vehicle yield compliance) was not obtained with the current tier suggestions.

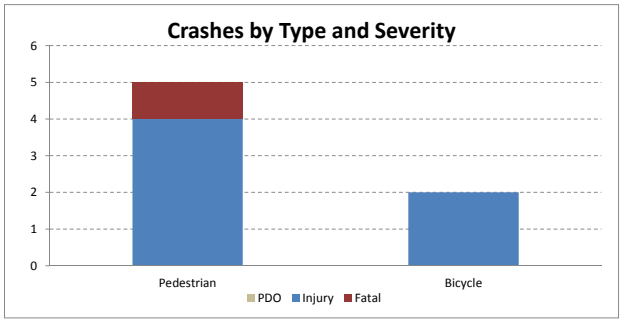
Location	Issue Number	Issue	Suggestion
NEAR-TERM IMPROVEMENT			
Corridor Wide	5	Signage	Consider replacing street name signage (D3-1) with new retro-reflective signs using applicable font size following the guidance provided in section 2D-43 of the 2009 Manual on Uniform Traffic Control Devices (MUTCD). Table 2D-2 specifies 6" letter height on post mounted street signs at intersections along two-lane roadways. The excess signage at the Sunrise Avenue intersection should be removed to only show the street connecting to SR A1A (Sunrise Avenue). Consider a signage study/plan for the study corridor to evaluate the amount of signage, applicability, retro-reflectivity, and location along the study corridor. This signage study/plan should include replacing the older signs with signs meeting current standards.
Corridor Wide	6	Lighting	The following are considerations for lighting along the corridor: • Consider conducting field measurements of existing lighting levels to evaluate lighting uniformity levels and add lighting where necessary. Consider light poles on the east side that are angled westerly away from the beach. These light poles cast their light to the west and illuminate the roadway as needed. The light bulb is not seen by the turtles due to the angle and orientation of the light fixture. • Consider implementing a lighting plan for the time the sea turtle nesting season is not active as roadway lighting levels should not be reduced at this time. • Consider conducting a lighting justification study along unlit portions of the corridor to determine if additional lighting is justified. • Consider implementation of pedestrian-level lighting, with less visibility from the beach, to supplement areas where street lighting is not able to provide adequate illumination as discussed in Issue 1: Lack of Bicycle Facilities.
Between Kathy Drive and Spanish Waters Drive	9	Sidewalk Enhancements	Consider restriping the pavement markings delineating the sidewalk. Consider adding new sidewalk in the worn trail area to create a more direct route to the sidewalk in the northwest corner.
Spanish Waters Drive Intersection	10	Steep Curb Ramp	Consider reconstructing the curb ramp on the northwest corner to meet ADA standards. This should be done in conjunction with potential sidewalk improvements included in Issue #10: Sidewalk Formalization or potential curb and gutter improvements as part of Issue #8: Minor Street Sight Distance.
Spanish Waters Drive Intersection	11	Excess Pavement	Consider conducting an eight-hour traffic count at the intersection to understand the number of southbound right-turning movements. Vehicular crash history should also be reviewed at this location. Should traffic demand volumes or vehicular crash history suggest a right-turn lane is needed at this location, consideration could be given to formalize the right-turn lane and provide bicycle lane keyhole markings between the through and right-turn lane. If vehicular crash history and traffic counts do not suggest a right-turn lane is needed, consider removing the striping from the shoulder which creates the de-facto right-turn lane and consider removing the excess pavement to provide a consistently wide shoulder to eliminate the potential conflict area.
Approximately 300' North of Spanish Waters Drive	12	Exposed Drainage Inlet	Due to the drop/steep slope between the sidewalk and drainage inlet consider reviewing this location based on FDOT Plans Preparation Manual (PPM) Figure 8.8.1 to possibly install a railing. If railing is needed, install the railing just off the east edge of the sidewalk to prevent pedestrians/bicyclists from falling off the sidewalk into the drainage ditch area.

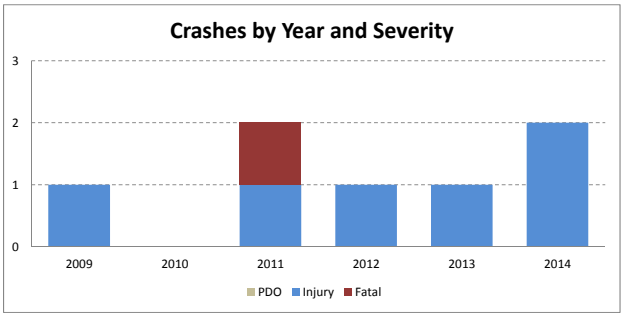
Location	Issue Number	Issue	Suggestion
NEAR-TERM IMPROVEMENT			
Ocean Breeze Circle Intersection	14	Existing Crosswalk Enhancements	The following considerations are for this specific location because a marked crosswalk already exists. The following suggestions are meant to coincide with the tiered approach to crosswalk treatments as discussed in Issue #3: Mid-Block Crossings. • Consider relocating the crosswalk approximately 15 feet south to correspond with the public beach access point. Restripe the crosswalk with special emphasis crosswalk markings consistent with sheet 10 of the FDOT Design Index 17346. • Consider constructing a curb and gutter along the northwest and southwest intersection radii and tightening the curb radius on the southwest corner of the intersection. This will reduce the crossing distance for pedestrians and bicyclists at the crossing location. As part of this construction of curb ramps and landing pads on either side of the crosswalk should be considered. • Consider installing advanced pedestrian warning signage (W11-2 and W16-9P) consistent with sheet 10 of the FDOT Design Index 17346 to indicate a pedestrian crossing is ahead. • Consider installing crosswalk specific lighting. o Directional lighting oriented towards the crosswalk could be provided on the east side; or o LED lighting could turn on when the traffic control device is activated and could turn off when the traffic control device is not active. Implementation of Tier 2 and Tier 3 suggestions included as part of Issue #3: Mid-Block Crossings could be considered if the desired performance (crash mitigation/reduction and/or vehicle yield compliance) was not obtained from the Tier 1 suggestions.
Seascape Condominiums - Approximately 100' North of Ocean Breeze Circle	15	Sight Distance	Consider reviewing the available sight distance at this location. Should additional sight distance be needed, consideration could be given to installing curb and gutter on the turn radii and reconstructing the sidewalk with a shift away from the driveway towards SR A1A. This improvement could be done in accordance with the suggestions described in Issue #7: Minor Street Sight Distance. This moves the sight lines for drivers and improves their ability to see pedestrians and/or bicyclists using the sidewalk.
Between Sunrise Avenue and Briggs Avenue	16	Drainage	Consider constructing a valley gutter per sheet 1 of the FDOT Design Standard Index 300 between the sidewalk and the edge of roadway to convey water to the nearest drainage ditch.
Kangaroo Express Gas Station	18	Driveway Drainage and Pedestrian Facility Delineation	Consider removing the existing asphalt pavement across the driveway and constructing a sidewalk at a slightly higher elevation. In conjunction with the sidewalk construction, construct a valley gutter. The valley gutter would then serve as the new low point for water to travel to and would convey water to the nearest drainage ditch. Consider constructing the valley gutter consistent with details per sheet 1 of the FDOT Design Standard Index 300.

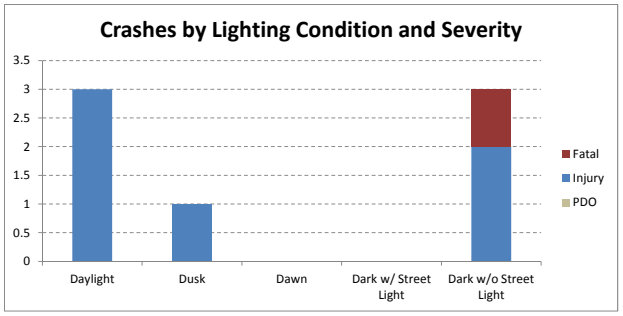
Location	Issue Number	Issue	Suggestion
LONG-TERM IMPROVEMENT			
Corridor Wide	1	Lack of Bicycle Facilities	Consider reconstructing the sidewalk on the west side of the roadway to be a 10'-12' wide shared-use path. In order to accommodate the bicycle and pedestrian traffic in the area, a wider multi-use path would serve both of those non-automobile modes.
Corridor Wide	6	Lighting	Consider upgrading to an adaptive roadway lighting system along the corridor. Lighting levels could be programmed to be reduced during the sea turtle nesting season and increased to normal levels outside of the nesting season. This could be coupled with replacing the current high pressure sodium lighting with LED lighting.
Between Kathy Drive and Spanish Waters Drive	9	Sidewalk Enhancements	Consider removing the existing asphalt surface to create a shared use path consistent with the suggestion included in Issue #1: Lack of Bicycle Facilities. In addition, consideration could be given to providing a curb and gutter at the edge of the sidewalk or shared-use path as a long term improvement. The adjacent pavement area between the curb and gutter and southbound travel lane could be utilized as parallel parking with several parking stalls.
Between Sunrise Avenue and Briggs Avenue	16	Drainage	Consider constructing an underground drainage system in this area to convey water off of SR A1A and the sidewalk to reduce the potential for ponding in this area.
Kangaroo Express Gas Station	18	Driveway Drainage and Pedestrian Facility Delineation	Consider constructing an underground drainage system in this area to convey water off of SR A1A and the sidewalk to reduce the potential for ponding in this area.

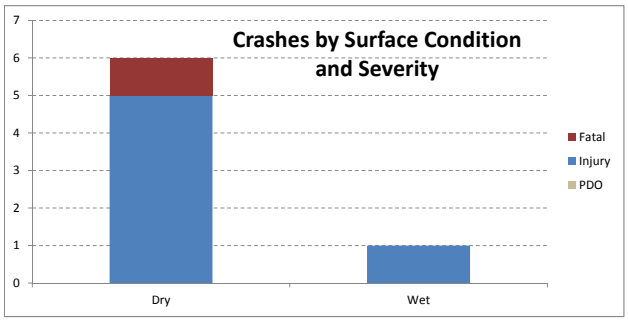
Appendix A – Crash Analysis Reference Materials

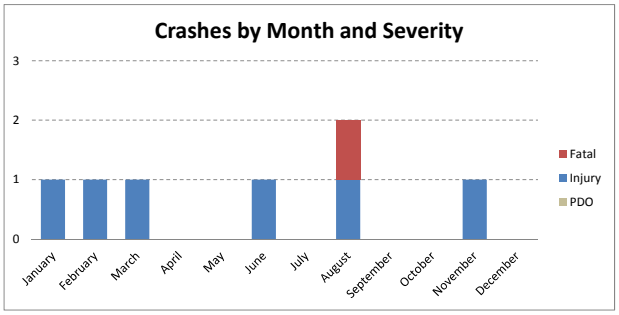
CRASH ANALYSIS - Focus Area F - Ormond-by-the-Sea from Kathy Dr. to Wisteria Dr.

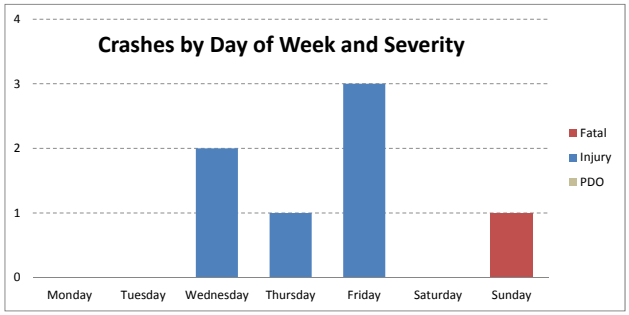


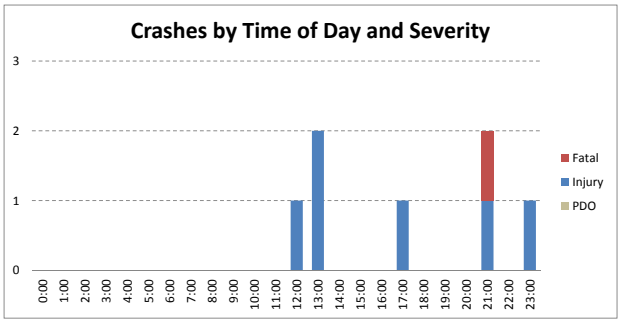


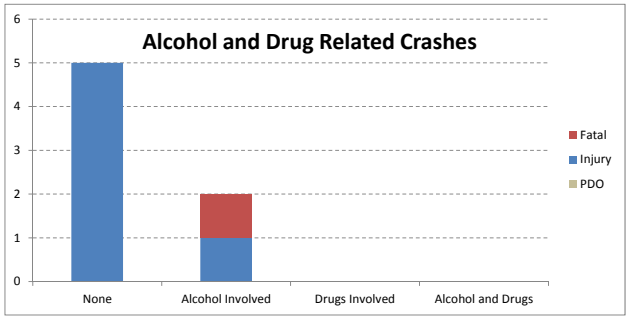




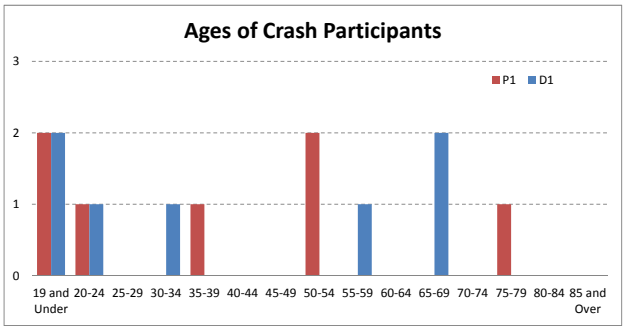


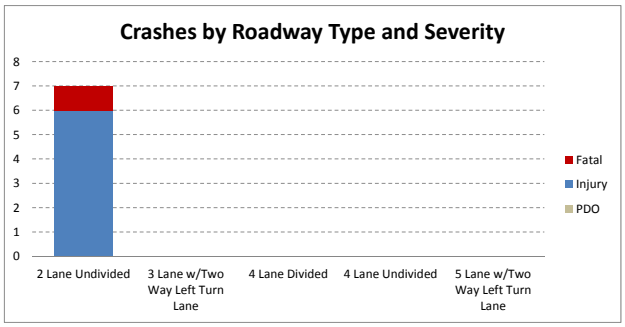


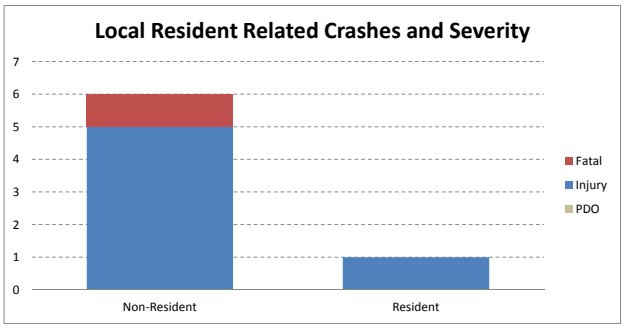




CRASH ANALYSIS - Focus Area F - Ormond-by-the-Sea from Kathy Dr. to Wisteria Dr.







SR/CR A1A Pedestrian Safety & Mobility Study
Collision Diagram (2009 – 2014)
Location F: Sunset Blvd. to Kathy Dr.

Figure **1**

SR/CR A1A Pedestrian Safety & Mobility Study
Collision Diagram (2009 – 2014)
Location F: Kathy Dr. to Spanish Waters Dr.

Figure **2**

SR/CR A1A Pedestrian Safety & Mobility Study
Collision Diagram (2009 – 2014)
Location F: Spanish Waters Dr. to Ocean Breeze Cir.

Figure **3**

SR/CR A1A Pedestrian Safety & Mobility Study
Collision Diagram (2009 – 2014)
Location F: Ocean Breeze Cir. To Sunrise Ave.

Figure **4**

SR/CR A1A Pedestrian Safety & Mobility Study
Collision Diagram (2009 – 2014)
Location F: Sunrise Ave. to Briggs Dr.

Figure **5**

SR/CR A1A Pedestrian Safety & Mobility Study
Collision Diagram (2009 – 2014)
Location F: Briggs Dr. to Wisteria Dr.

Figure **6**