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

SR/CR A1A PEDESTRIAN SAFETY & MOBILITY STUDY

PEDESTRIAN / BICYCLE SAFETY REVIEW

Focus Area D / SR A1A from Plaza Boulevard to Rockefeller Drive (Daytona Beach/Ormond Beach)

Prepared for:
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October 2016

SR/CR A1A
Pedestrian Safety & Mobility Study

Pedestrian/Bicycle Safety Review Report for
Focus Area D: SR A1A from Plaza Boulevard to Rockefeller Drive (Daytona Beach/Ormond Beach)

Section Number: 79080000
Mile Post: 4.418 – 5.637
Volusia County

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

Field Review Dates: November 19th and 20th, 2015 (daytime/nighttime reviews and follow up meeting)

Participants:
Ryan Cunningham – Kittelson & Associates, Inc. – Team Leader
Stephan Harris – River to Sea Transportation Planning Organization
David Wallem – City of Daytona Beach
Mike Marcum – City of Daytona Beach
Rich Walton – City of Daytona Beach
Amy Boyd – City of Daytona Beach
John Noble – City of Ormond Beach
Shawn Finley – City of Ormond Beach
Chad Lingenfelter – Florida Department of Transportation, District 5
Joan Carter – Florida Department of Transportation, District 5
Officer Braun – Ormond Beach PD
Officer Kilker – Daytona Beach PD
John Cotton - VoTran
Michael Eagle – Kittelson & Associates, Inc.

Project Characteristics:
Field Review Type: Pedestrian, Bicycle, Existing Road
Adjacent Land Use: Urban, Commercial, Residential
Posted Speed Limit: 35 miles per hour (MPH) along the length of the study corridor
Opposite Flow Separation: Raised Grass Median from Plaza Boulevard to Milsap Road, Center Two-Way Left-Turn Lane (TWLTL) from Milsap Road to Rockefeller Drive
Service Function: Urban Principal Arterial
Terrain: Flat
Climatic Conditions: Intermittent sun and rain

Figure 1 – Focus Area D 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 recommended 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 Plaza Boulevard to Rockefeller Drive (**Figure 1**), a 1.22 mile corridor in Daytona Beach/Ormond Beach, was identified as one of these high crash locations. In order to recommend 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 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 R2CTPO staff and partner agencies (i.e. FDOT District Five (D5), Volusia County, Daytona Beach, Ormond Beach, 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 recommendation 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 Thursday, November 19, 2015. The team met in the morning at the Schnebly Recreation Center to discuss the study corridor and crash history. After lunch, the study team drove the entire corridor, south to north then north to south, to gain an understanding of the facility characteristics from a driver's perspective. The team was divided up to walk the length of sidewalk along both sides of the roadway. The team reassembled in the evening, after sunset, to make observations in nighttime conditions. A follow-up debrief meeting was held at the Schnebly Recreation Center the following morning (November 20th) to discuss the corridor's issues and potential improvements identified by the team. Study corridor characteristics are reviewed below:

- Plaza Boulevard to Rockefeller Drive – 1.22 miles
- Within the roadway study limits, SR A1A is under the jurisdiction of the City of Daytona Beach and the City of Ormond Beach. The jurisdiction sits approximately 450 feet south of Harvard Drive.
- Typical cross section as follows:
    - Four-lane, divided roadway from Plaza Boulevard to Milsap Road (0.72 miles)
        - One 12-foot inside travel lane and one 20-foot outside travel lane in each direction.
    - Five-lane roadway with a center two-way left-turn lane (TWLTL) from Milsap Road to Rockefeller Drive (0.5 miles)
        - Two 11-foot lanes in each direction.
- The posted speed along the study corridor limits is 35 MPH;
- Three (3) signalized intersections at Plaza Boulevard, Harvard Drive, and Cardinal Drive:
    - Plaza Boulevard
        - Old special emphasis crosswalk markings along the north, west, and south legs.
        - Includes countdown pedestrian signals on the north, west, and south legs.
    - Harvard Drive
        - Old special emphasis crosswalk markings along all four legs.
        - Includes countdown pedestrian signals on all four legs.

    - Cardinal Drive
        - Old special emphasis crosswalk markings along the north, east, and west legs.
        - Includes countdown pedestrian signals on the north, east, and west legs.
- There is a marked unsignalized mid-block crossing approximately 175 feet south of Milsap Road that provides crossing into the Andy Romano Beachfront Park;
    - The crosswalk is marked with special emphasis markings and is staggered (z-crossing) with a z-shaped pedestrian refuge island provided;
    - Pedestrian detectable warning surfaces are located at the edges of the roadway;
    - A Pedestrian Warning sign (W11-2) and downward arrow plaque (W16-7P) are present on the left and right side of each roadway approach;
    - Stop bars and Stop Here for Pedestrian (R1-5bL) signs are present on the left and right side of each roadway approach;
    - Crosswalk lighting is present on the east side of the crosswalk only;
- Continuous sidewalks along both sides of the roadway for the length of the study corridor;
- No bicycle lanes are provided along the length of the study corridor:
    - Wide outside lanes (approximately 20 feet) are present in the four-lane divided section.
    - Narrow (approximately 3 feet) paved shoulders are present in the five-lane section.
- Type F curb and gutter along the length of the study corridor;
- Seabreeze High School is located approximately 500 feet northwest of the intersection of SR A1A at Plaza Boulevard:
    - School hours: 7:30 AM – 2:45 PM;
    - Early release hours: 7:30 AM – 1:45 PM;
- VoTran, Volusia County's public transit system, serves SR A1A within the study limits with one hour headways;
    - Route 1
    - Route 8
    - Route 19
- Overhead street lighting is present along both sides of the study corridor:
    - Some lighting has shields
    - Some lighting was unshielded; and
- The study corridor has experienced an average AADT of 17,500 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 2013 and 2. The Signal Four Analytics database, maintained by University of Florida from 2009 to 2014. At the time of the analysis, the 2014 CARS data was not yet FDOT certified thus the reason for six years of crash data instead of the traditional five. The additional crashes from the Signal Four database supplemented the CARS data along SR A1A.

Sixteen (16) pedestrian or bicycle-related crashes were reported over the six-year study period, half involved pedestrians (8) and half involved bicyclists (8). Of the sixteen (16) pedestrian and bicycle crashes, there were fifteen (15) injury crashes (94 percent) and one (1) property-damage-only (PDO) crash (6 percent) during the study period. No fatal pedestrian or bicycle crashes were reported during the analysis period.

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, signalized intersection crashes, and locations with more than one crash, are provided below:

- Twenty-five percent of the crashes occurred in dark lighting conditions;
- The majority (96 percent) of crashes occurred under dry roadway conditions;
- Seventy-five percent of the crashes occurred from 2011-2013. Over this same time period, there was a slight decline in the Average Annual Daily Traffic (AADT) along the corridor. The corridor has experienced an average AADT of 17,500 over the six year analysis period;
- An average of two crashes occurred each day with the exception of Saturday, which experienced four (4) crashes;
- Thirteen (13) of the 16 crashes occurred between 6:00 AM and 6:00 PM;
- Four (4) of the pedestrians or bicyclists were not from the state of Florida based upon their provided zip codes;
- None of the reported crashes involved alcohol or drugs;
- The vehicle had the right-of-way in seven (7) of the eight (8) pedestrian crashes;
- The bicyclist had the right-of-way in five (5) of the eight (8) bicycle crashes;
- In five (5) of the pedestrian crashes (63 percent), the pedestrian was attempting to cross SR A1A at a mid-block location;
- In four (4) of the bicycle crashes (50 percent), the bicyclist was riding on the sidewalk against the flow of traffic and was struck at an unsignalized intersection/driveway crossing;
- Four (4) crashes occurred at the signalized intersection at Plaza Boulevard:
    - Two (2) pedestrian crashes
    - Two (2) bicycle crashes
- Two (2) crashes occurred near the unsignalized intersection of Benjamin Drive:
    - One mid-block pedestrian collision;
    - One (1) bicycle crash (riding against the flow of traffic on the sidewalk);
- Two (2) crashes occurred at the signalized intersection of Cardinal Drive:
    - 2 pedestrian crashes; and
- Three (3) crashes occurred near the unsignalized intersection of River Beach Drive:
    - Two (2) mid-block pedestrian collisions;
    - One (1) bicycle crash (riding against the flow of traffic on the sidewalk).

FIELD REVIEW FINDINGS

Location: Corridor-Wide

Issue #1: Four-Lane Divided Section

Figure 2

Figure 3

Description of Issue:
SR A1A is a four-lane divided cross section from Plaza Boulevard to Milsap Road. The outside lanes in the northbound and southbound directions are approximately 20-21 feet in width as illustrated in **Figure 2**. This outside width includes intermittent areas marked as parking or loading zones. **Figure 3** shows an example of a loading zone in the southbound outside lane to the south of Milsap Road. There are no marked bicycle lanes along SR A1A within this four-lane divided cross section.

Other than the markings for the parking/loading zones, there are no pavement markings defining the outside lane in this section. The combination of extra pavement width and a lack of pavement markings create an issue for bicyclists and drivers traveling along SR A1A. Without pavement markings, it is unclear who should be using the extra width, which creates conflicts between the road users. The study team observed drivers using the extra width as a de facto right-turn lane as well as bicyclists using the extra width as a bicycle lane (see **Figure 3**).

Suggestions for Improvement:
As mentioned previously, the outside lane is approximately 20-21 feet wide. If an 11-foot travel lane was defined as the outside travel lane, approximately 9-10 feet would remain. The study team discussed a variety of options to utilize and define the extra pavement width. The options discussed are summarized as follows:

- Consider formalizing right-turn lanes at key intersections/driveways; or
- Consider marking 7-foot buffered bike lanes with right-turn key holes.

Formalizing bicycle lanes and/or right-turn lanes within the extra pavement width could reduce confusion and conflicts of bicyclists and drivers. Providing a marked bicycle lane could also reduce the number of bicyclists choosing to travel on the sidewalks as 50 percent of the bicycle crashes (4 crashes) involved a bicyclist traveling against the flow of traffic on the sidewalk. Providing continuity of the bicycle facility north and south of the four-lane divided section should also be considered.

Location: Corridor-Wide

Issue #2: Five-Lane Undivided Section

Figure 4

Figure 5

Description of Issue:
A 12-foot center two-way left-turn lane (TWLTL) is provided along SR A1A from Milsap Road to Rockefeller Drive (illustrated in **Figure 4**). The center TWLTL ends approximately 0.35 miles north of the study limits (Rockefeller Drive) and changes back to a four-lane divided cross section. The center TWLTL is an area of potential conflict between pedestrians/bicyclist and vehicles as pedestrians were observed using the center TWLTL as a refuge to cross SR A1A as shown in **Figure 5**. Conflicts arise when drivers utilize the center TWLTL while pedestrians or bicyclists are using it as a crossing refuge.

Suggestions for Improvement:
Consider conducting a study to evaluate opportunities to install raised medians providing pedestrian refuge at select locations along the corridor. A raised center median would eliminate potential conflicts between vehicles and pedestrians or bicyclists at the point of refuge. Converting the existing five-lane cross section to a four-lane divided cross section would allow for corridor continuity between the segments to the north and south of the five-lane section. The raised medians could be implemented in phases:

- Near-term – Select locations with a raised median in the center TWLTL
- Long-term – Convert the road to a 4-lane divided cross section

Converting to a 4-lane divided cross section may require widening to the outside to provide a standard 22-foot median in order to accommodate U-turning traffic on SR A1A.

Location: Corridor-Wide

Issue #3: Bicycle Lanes

Figure 6

Figure 7

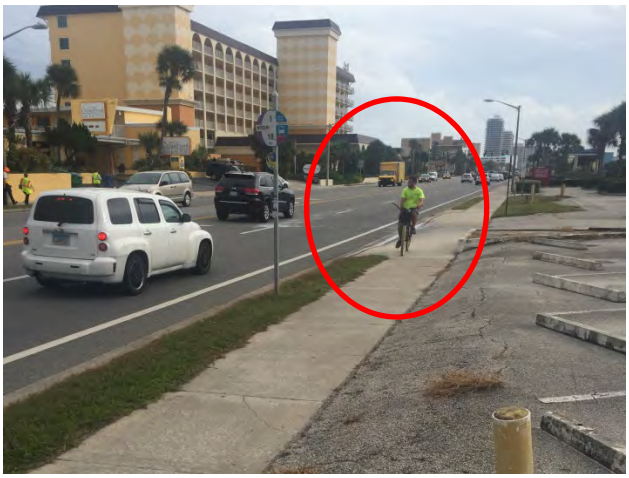


Figure 8

Figure 9

Description of Issue:
Half of the bicycle crashes involved bicyclists riding along the sidewalk and against the flow of traffic (example shown in **Figure 6** and **Figure 8**). In the field, some bicyclists were observed riding along the roadway, but most bicyclists were observed riding along the sidewalks. Examples of the observed bicycle activity are illustrated in **Figure 6** through **Figure 9**. As described in **Issue #1: Four-Lane Divided Section** and **Issue #2: Five-Lane Undivided Section**, marked bicycle lanes are not provided in either cross section. The bicycle crash history and observations from the field suggest that bicyclists prefer riding on the sidewalks rather than in the roadway alongside vehicles traveling around 35 mph.

Suggestions for Improvement:
Bicycle lanes could be added to the four-lane cross section described in **Issue #1**. As previously mentioned, the extra pavement in the northbound and southbound outside lanes could be marked with 7-foot buffered bicycle lanes without the need to impact the existing curb lines.

The five-lane section described in **Issue #2** includes a cross section of approximately 62 feet (four 11-foot travel lanes, one 12-foot center TWLTL, and two 3-foot paved shoulders). Section 8.4.1 of the FDOT *Plans Preparation Manual (PPM)* states that travel lanes shall be 11 feet with 7-foot buffered bike lanes along divided roadways ≤45 mph in or within one mile of an urban area. Based upon the existing pavement and without adjusting the existing curb line, there is not adequate width to accommodate buffered bike lanes in addition to the four 11-foot travel lanes and center TWLTL.

The following options were discussed by the safety review team:

- Consider narrowing lanes to allow for buffered bike lanes to provide continuity between the south and north sections
- Consider using shared lane markings (sharrows) in the outside lane for experienced riders
- Potential road diet as a long term solution to provide additional pavement to accommodate bicycles and other modes

Each of these options discussed has its pros and cons when considering safety and operations. For example, the existing travel lanes are 11 feet wide in the four-lane divided section. Buses or semi-trucks may not be adequately accommodated if the 11-foot lanes were narrowed further.

In 2014, the AADT along SR A1A to the north of Plaza Boulevard was 18,200, and the corridor has seen a historical high AADT of 27,500 (in 2002). The FDOT's Statewide Lane Elimination Guidance published in February 2014, references studies conducted by the Federal Highway Administration (FHWA) and suggests that four-lane roadways with an ADT of 20,000 or less may be good candidates for a road diet and those with ADTs higher than 20,000 should be evaluated for feasibility on a case-by-case basis. Feasibility is also less likely from an operational perspective if the peak hour volume is greater than 1,750 vehicles. The peak hour volume along SR A1A in 2014 was approaching this threshold (approximately 1,650 vehicles), which also suggests that reduced arterial LOS could be expected during the peak hour.

A study should be conducted to review if the lane elimination is feasible. The study should follow the Statewide Lane Elimination Guidance FDOT Central Office. While FDOT District 5 does not have a process for lane elimination review (outside of converting the lanes to dedicated transit facilities), District 4 and District 7 both have draft processes that are intended to give applicants as much information as early as possible to help them decide whether or not the lane elimination request is feasible. These draft processes could be utilized when reviewing this section SR A1A.

Location: Corridor-Wide

Issue #4: Crosswalk Markings

Figure 10

Figure 11

Figure 12

Figure 13

Description of Issue:
Marked crosswalks are not included along any of the minor street approaches at the unsignalized intersections throughout the corridor (see **Figure 10** and **Figure 11**). This was observed along both sides of the study corridor.

Crosswalk markings at the three signalized intersections are beginning to wear (illustrated in **Figure 12** and **Figure 13**).

Suggestions for Improvement:
Consider marking all minor street approaches at unsignalized intersections along the corridor during the next resurfacing project. Standard crosswalk markings as shown on sheet 9 of the FDOT Design Standard Index 17346 should be used for the unsignalized crossings. Special emphasis markings as shown on sheet 9 of Design Index 17346 should be used for the signalized crossings at the three signalized intersections included within the study limits.

Location: Corridor-Wide

Issue #5: Pedestrian Signage Consistency

Figure 14

Figure 15

Figure 16

Figure 17

Description of Issue:
The study review team observed a lack of consistency between the pedestrian crossing signage in use along the study corridor. Pedestrian crossing signage with the standard yellow background (shown in **Figure 14** was observed as well as signage with the fluorescent yellow-green background (illustrated in **Figure 15**). Section 2C.50 of the *Manual on Uniform Traffic Control Device (MUTCD)* provides guidance stating when a fluorescent yellow-green background is used, a systematic approach featuring one background color within a zone or area should be used. The mixing of standard yellow and fluorescent yellow-green backgrounds within a selected site area should be avoided.

In addition to a lack of consistency of pedestrian crossing signage, the study review team observed an inconsistency between the street names on push button signage and the existing street name signage. In some cases the push button signage directs pedestrians to cross SR A1A, but the existing street name signage present at the intersection states the local street name (Atlantic Avenue). With the close proximity to the beach, the corridor sees a significant amount of tourists that may not be familiar with

the state road and local road names, leading to confusion at the crossing.

Suggestions for Improvement:
Consider replacing the standard yellow background pedestrian warning signs with those having the fluorescent yellow-green background to provide consistent signage along the study limits. This will provide a consistent message to roadway users alerting them that pedestrians are crossing in the area. The following summarizes the locations and number of the standard yellow background pedestrian signage to be replaced:

- South of Harvard Drive (northbound direction)
  - One pedestrian warning sign (W11-2) and one diagonal downward pointing arrow plaque (W16-7P)
- Andy Romano Beachfront Park (northbound direction)
  - One pedestrian warning sign (W11-2)
- Ormond Shores Drive (northbound direction)
  - One pedestrian warning sign (W11-2)
- Approximately 150 feet north of River Beach Drive (southbound direction)
  - One pedestrian warning sign (W11-2)
- South of Rockefeller Drive (northbound direction)
  - One pedestrian warning sign (W11-2)

Consider providing consistent push button signage and street name signage at each of the signalized intersections along the corridor. This could eliminate confusion for pedestrians at these crossing locations.

Location: Corridor-Wide

Issue #6: Landscaping Maintenance

Figure 18

Figure 19

Figure 20

Figure 21

Description of Issue:
There were several locations along the corridor that had hedges, bushes, or trees have overgrown onto the sidewalks. Examples of some of these locations are shown in **Figure 18** and **Figure 19**. In some cases, the landscaping obstructs sight distance, while other locations include signage blocked by landscaping (shown in **Figure 20** and **Figure 21**). The signage is blocked on the east side of SR A1A at Ormond Shores Drive (**Figure 20**) and on the east side of SR A1A at River Beach Drive (**Figure 21**).

Suggestions for Improvement:
Coordinate with FDOT and local businesses/property owners to trim the obstructions and encourage better landscape maintenance.

Location: Corridor-Wide

Issue #7: Sidewalk Maintenance

Figure 22

Figure 23

Figure 24

Figure 25

Description of Issue:
There were instances where sand had washed onto the sidewalk, reducing the effective walking width of the sidewalk (shown in **Figure 22** and **Figure 23**). This was a very common occurrence on the east side walk as the beach is close by. There were also two locations where newspaper/magazine stands are located within the sidewalk. These locations were both on the west sidewalk along SR A1A just north of the McDonald's and south of Milsap Road. These are shown in **Figure 24** and **Figure 25**, respectively. The sidewalk is five feet wide along the corridor so the sand/debris and newspaper/magazine stands reduce the effective sidewalk width by 2 to 3 feet.

Suggestions for Improvement:
Consider cleaning the sidewalk to remove excess sand and debris and working with FDOT and/or local business/property owners to continue routine maintenance. Consider coordinating with the City of Daytona Beach and the City of Ormond Beach to either remove the newspaper/magazine stands or move them off the sidewalk so that the effective sidewalk width at those locations is not restricted.

Location: Corridor-Wide

Issue #8: Pedestrian Beach Access

Figure 26

Figure 27

Figure 28

Description of Issue:
There are multiple beach accesses on the east side of SR A1A including:

- North of Plaza Boulevard
- Harvard Drive
- Milsap Road
- Cardinal Drive
- River Beach Drive
- Rockefeller Drive

Many of these locations do not include pedestrian facilities as illustrated in **Figure 26** and **Figure 27**. The beach accesses often do not accommodate a way to cross SR A1A in the vicinity. The Cardinal Drive beach access includes sidewalks on the north side of the access and the Milsap Drive beach access includes sidewalks on the south side of the access as part of the Andy Romano Beachfront Park. Some of the beach accesses provide parking spaces, while others do not.

There is beach access signage along the corridor (example shown in **Figure 28**); however, the signage is often contradictory to the conditions. For example, the signage indicates that the beach ramp is open, but the beach access is gated off to vehicular traffic.

Suggestions for Improvement:
Consider installing new beach access signage for pedestrians/drivers as the existing signage is showing wear and does not display accurate information to the roadway users. Consider prioritizing the implementation of pedestrian facilities at strategic beach access locations. Emphasis on installing sidewalks at the beach locations with signalized or marked crosswalks across SR A1A could be considered. Locations with off beach parking nearby should also be emphasized as beach patrons will park their vehicles at an off beach parking lot before accessing the beach. Also consider pedestrian level lighting at the beach access locations.

Location: Corridor-Wide

Issue #9: Potential Mid-Block Crossings

Figure 29

Description of Issue:
There are no marked mid-block crosswalks from the north side of the Cardinal Drive intersection to the end of this study's limits at Rockefeller Drive (approximately 2,000 feet). This section of SR A1A is a five-lane section as described in **Issue #2: Five-Lane Undivided Section**. The next marked crosswalk to the north of Cardinal Drive is located at the SR 40 intersection, approximately 1.25 miles north. Without the provision of marked crosswalks at regular intervals, pedestrians cross SR A1A wherever it is convenient or desirable and they tend to utilize the center TWLTL or median for refuge. Three of the eight (38 percent) pedestrian crashes occurred outside of a marked crosswalk between Cardinal Drive and Rockefeller Drive.

Suggestions for Improvement:
The City of Ormond Beach has identified some potential locations along the SR A1A corridor where medians could be installed to provide a z-crossing median refuge for pedestrians along with marked mid-block crosswalks. **Figure 29** illustrates a potential location for a mid-block to the north of Rockefeller Drive that connects the off-beach parking lot to the beach access. The preliminary locations identified by the City are included in **Appendix B**. Specific mid-block locations identified for further consideration are summarized later in this document in **Issue #34: Marked Crosswalk at River Beach Drive** and **Issue #36: Potential Marked Crosswalk at Rockefeller Drive**.

The following could be done at select locations where a mid-block crossing is desired and warranted:

- 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.
- Consider an active warning device, such as Rapid Rectangular Flashing Beacons (RRFB), at the crosswalk. RRFBs may also be used on the advance crosswalk signs per FHWA's interim approval memorandum.
- Provide a median refuge island with a minimum length of 40 feet for pedestrians in the TWLTL.
- Install lighting on the crosswalk's east side.
    - Directional lighting oriented towards the crosswalk could be provided; or
    - Lighting could turn on when the RRFB is activated and flashing and could turn off when the flashers stop.
- Stripe the crosswalk with Special Emphasis Crosswalk markings consistent with sheet 10 of the FDOT Design Index 17346.

Location: Corridor-Wide

Issue #10: Transit Bus Stop Review

Figure 30

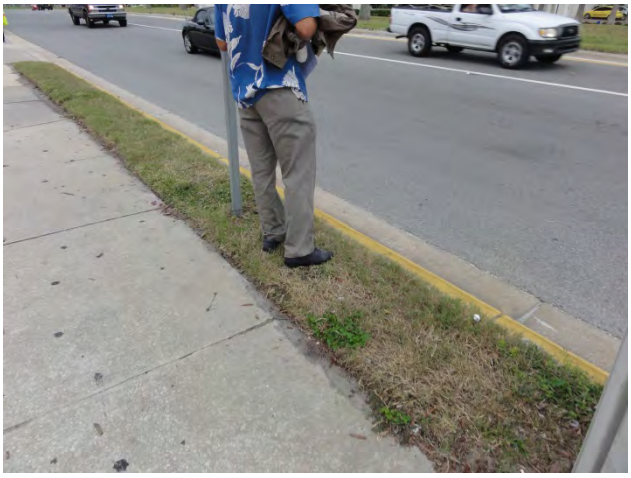


Figure 31

Description of Issue:
The study corridor is served by Volusia County's Public Transit System, VoTran, routes 1 (A1A North), 8 (Halifax), 18 (Intl Speedway), and 19 (Granada). An example of a bus stop sign is shown in **Figure 30**. Several stops are provided along the study corridor. At most stops an ADA-compliant boarding and alighting area is not provided (shown in **Figure 31**). The Public Rights-of-Way Accessibility Guidelines (PROWAG) states the following about boarding and alighting areas: *810.2.2 Dimensions – Bus boarding and alighting areas shall provide a clear length of 96 inches, measured perpendicular to the curb or vehicle roadway edge, and a clear width of 60 inches, measured parallel to the vehicle roadway. Public entities shall ensure that the construction of bus boarding and alighting areas comply with 810.2.2, to the extent the construction specifications are within their control*.

Suggestions for Improvement:
Consider coordinating a transit review of bus stops along the corridor. Items to evaluate should include:

- Boarding and alighting areas
- Bus stop locations with consideration to marked crosswalks to cross SR A1A
- ADA accessibility
- Illumination
- Sign visibility (daytime and nighttime)
- Trash can locations

Location: Corridor-Wide

Issue #11: Accessible Pedestrian Signals (APS)

Figure 32

Figure 33

Description of Issue:
Pedestrian countdown signals and pedestrian pushbuttons are provided at each signalized location. A variety of pedestrian pushbuttons along the corridor is shown in **Figure 32** and **Figure 33**. However, none of the signals are equipped with accessible pedestrian signals (APS). FDOT reported official requests have been made to install APS at the Plaza Boulevard and Harvard Drive intersections. Installing APS at the signalized intersections could improve crossing performance for visually impaired pedestrians.

Suggestions for Improvement:
Consider installing APS at the three signalized intersections during the next upgrade(s) to the signalized intersections. The signals at Harvard Drive and Cardinal Drive are planned to be upgraded from the existing strain pole/span wire configuration to mast arms. APS and pedestrian facilities upgrades should be considered as part of the signalization upgrades.

A new off beach public parking lot is planned to be built on the northwest corner of the Cardinal Drive intersection. The Harvard Drive and Cardinal Drive intersections provide signalized crossings to the beach access as described in **Issue #8: Pedestrian Beach Access**, and the beach patrons could benefit from the implementation of APS.

Location: Corridor-Wide

Issue #12: Sidewalks at Driveways

Figure 34

Figure 35

Figure 36

Description of Issue:
Three locations along the east side of the SR A1A corridor have abandoned driveway cuts:

- Near the Ocean Ritz (**Figure 34**)
- Near Benjamin Drive (**Figure 35**)
- Approximately 250 feet north of Wren Road (**Figure 36**)

At these locations, the cross-slope of the sidewalk exceeds the ADA threshold of two percent.

Suggestions for Improvement:
Consider rebuilding the abandoned driveways to provide a level surface and continuous curb. These improvements could be done during the roadway's next 3R project or as a sidewalk maintenance project.

Location: Corridor-Wide

Issue #13: Lighting

Figure 37

Figure 38

Figure 39

Description of Issue:
Daytona Beach and Ormond Beach are destinations for sea turtle nesting. Sea turtles are a protected species in Volusia County. Volusia County has developed a Beach Lighting Management Plan and issued a lighting ordinance to minimize light reaching the beach and potentially disrupting the sea turtle nesting. The sea turtle nesting season is from May 1 to October 31. **Figure 37** and **Figure 38** show measures put into place such as shutting lights off and using a shield to minimize light emittance.

Shutting off lights or using the barrier shields negatively impact the lighting conditions for the roadway users. Reducing the light can make it difficult for drivers to see pedestrians or bicyclists at night,

especially those wearing dark clothing. **Figure 39** illustrates the lighting levels the safety team observed. The safety study team observed the roadway lighting conditions at night and had the following observations:

- Inconsistent lighting levels along the corridor
- Some of the street lights were either off or not working properly
- Shields still block light on the roadway even though the study was conducted outside of the turtle season
- Intersection and ambient lighting helped illuminate the roadway at some locations

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

- Consider upgrading lighting at the signalized intersections to meet the requirements of section 7.3 in Volume 1 of the FDOT Plans Preparation Manual (PPM). This may require the existing lighting to be replaced.
- Replace or turn on all the lights on the corridor after the turtle nesting season ends.
- 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.
- As a long-term consideration, 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.

Location: Plaza Boulevard Intersection

Issue #14: Intersection Sight Distance

Description of Issue:
There is a bush in the median of the eastbound approach restricting sight distance looking northbound. In addition to the bush, there is a signal controller cabinet on the southwest corner restricting a driver's ability to see a pedestrian standing on the corner waiting to cross the south leg of the intersection.

Suggestions for Improvement:
Consider removing the bush to allow for adequate sight distance. Consider installing a Turning Vehicles Yield to Pedestrians sign (R10-15) on the span wire for the eastbound approach.

Location: Plaza Boulevard Intersection

Issue #15: Pedestrian Signage

Figure 40

Description of Issue:
The existing Yield to Pedestrians in Crosswalk signage is cracking and has limited retro-reflectivity. The sign is shown in **Figure 40**.

Suggestions for Improvement:
Consider upgrading the Yield to Pedestrians in Crosswalk sign to a Turning Vehicles Yield to Pedestrians sign (R10-15).

Location: Plaza Boulevard Intersection

Issue #16: Landscaping Maintenance

Figure 41

Description of Issue:
The landscaping in the center median of the southbound approach is encroaching into the pedestrian refuge island restricting the effective refuge width (illustrated in **Figure 41**).

Suggestions for Improvement:
Coordinate with FDOT to trim the bushes back to restore the full median refuge width.

Location: Plaza Boulevard Intersection

Issue #17: Curb Ramp

Figure 42

Description of Issue:
The curb ramp on the southwest corner of the intersection (shown in **Figure 42**) is uneven and could present difficulty for a wheelchair bound pedestrian to traverse and could also present a trip hazard. The depressed portion of the ramp is also missing a detectable warning surface.

Suggestions for Improvement:
Consider patching the curb ramp to remove the potential trip hazard by providing a level surface, and install a detectable warning surface.

Location: Plaza Boulevard Intersection

Issue #18: Pedestrian Facilities

Figure 43

Description of Issue:
The pedestrian push button on the northwest corner of the intersection is greater than the 10' maximum distance to the curb ramp (**Figure 43**), as defined in section 4E.08 of the *2009 MUTCD*.

Suggestions for Improvement:
Consider installing a separate push button pole on the northeast corner for the northern and eastern crosswalks less than 10' from the pedestrian ramp.

Location: Mid-Block between Plaza Boulevard and Harvard Drive

Issue #19: Water Meter Cover Trip Hazard

Figure 44

Description of Issue:
As shown in **Figure 44**, the safety review team encountered a water meter cover in the middle of the west side sidewalk. The metal cover is not flush with the sidewalk and could pose as a trip hazard.

Suggestions for Improvement:
Consider patching the concrete sidewalk and/or replacing the cover so that the two surfaces are flush.

Location: Harvard Drive Intersection

Issue #20: Intersection Sight Distance

Figure 45

Description of Issue:
The existing landscaping and the signal strain pole on the southeast corner restrict the available sight distance for a vehicle attempting a westbound right-turn (**Figure 45**). Vehicles have to pull past the stop bar and into the crosswalk to see past the pole and landscaping.

Suggestions for Improvement:
Consider trimming the landscaping back and consider conducting a sight distance evaluation to determine the available sight distance at the intersection. If adequate sight distance cannot be provided due to the strain pole, consider installing a No Turn on Red sign (R10-11 or R10-11a) to restrict right-turns on red.

Location: Harvard Drive Intersection

Issue #21: Detectable Warning Surface Maintenance

Figure 46

Figure 47

Description of Issue:
Sand and debris have built up on the detectable warning surfaces located on the northeast and southeast corners of the intersection (**Figure 46** and **Figure 47**, respectively).

Suggestions for Improvement:
Consider removing the excess sand and debris from the detectable warning surfaces.

Location: Harvard Drive Intersection

Issue #22: Sidewalk Connectivity

Figure 48

Description of Issue:
There are marked crosswalks to and from the northwest corner of the intersection. However, there is no sidewalk connection on the north side of Harvard Drive to connect to the existing curb ramp and western sidewalk (shown in **Figure 48**).

Suggestions for Improvement:
Consider constructing a sidewalk on the north side Harvard Drive to facilitate pedestrian connectivity to the sidewalks along SR A1A and the beach access on the east side of the intersection. This could be considered in addition to the basic ADA upgrades and APS implementation as part of the future intersection upgrade from strain wire to mast arms.

Location: Mid-Block between Harvard Drive and Cardinal Drive

Issue #23: Mid-Block Crossing at Andy Romano Beachfront Park

Figure 49

Figure 50

Description of Issue:
An unsignalized mid-block crossing with a z-shaped pedestrian refuge was installed south of Milsap Road to provide a direct connection to Andy Romano Beachfront Park in 2013 (illustrated in **Figure 49**). Rectangular Rapid Flashing Beacons (RRFBs) were not included as part of the upgrade. The safety review team noted the following observations at this location:

- No lighting provided on the west side of the crossing or z-shaped median refuge. An example of the lighting conditions associated with the crosswalk on the west side of SR A1A is shown in **Figure 50**.
- The northbound crosswalk is difficult to see from a driver's perspective as there is a slight vertical crest south of the crosswalk.
- There is low vehicular yield compliance at the crossing. The Ormond Beach Police Department conducted education and enforcement efforts at the crossing when it first opened.

Suggestions for Improvement:
The following could be considered at this location to address the yield compliance and lighting issues observed:

- Consider installing an active warning device, such as Rapid Rectangular Flashing Beacons (RRFB), at the crosswalk. RRFBs may also be installed on the advance crosswalk warning signs per FHWA's interim approval memorandum.
- Install lighting on the crosswalk's west side and in the refuge island.

Location: Mid-Block between Harvard Drive and Cardinal Drive

Issue #24: Sidewalk Hazard

Figure 51

Figure 52

Description of Issue:
A sprinkler was observed watering the sidewalk on the northeast corner of the Milsap Road intersection as shown in **Figure 51** and **Figure 52.** Pedestrians or bicyclists have to walk on the landscape buffer strip to avoid slipping on the sidewalk.

Suggestions for Improvement:
Coordinate with the property owner to adjust the sprinkler head so that it is not directed at the sidewalk.

Location: Mid-Block between Harvard Drive and Cardinal Drive

Issue #25: Benjamin Drive Intersection Sight Distance

Figure 53

Description of Issue:
The existing hedges on the southwest corner restrict the available sight distance for a vehicle attempting an eastbound left-turn (shown in **Figure 53**). Vehicles have to pull past the stop bar and into the effective crossing area used by pedestrians and bicyclists (no marked crosswalk present) to see past the landscaping.

Suggestions for Improvement:
Consider trimming the landscaping back and consider conducting a sight distance evaluation to determine the available sight distance at the intersection.

Location: Mid-Block between Harvard Drive and Cardinal Drive

Issue #26: Wren Road Missing Stop Sign and Detectable Warning Surface

Figure 54

Figure 55

Description of Issue:
No stop sign or street name signage is provided along the eastbound approach at the intersection of Wren Road. This is illustrated in **Figure 54**. Part of the detectable warning surface on the southwest corner shown in **Figure 55** is missing.

Suggestions for Improvement:
Consider installing a stop sign (R1-1) on the eastbound approach with appropriate street name signage. Consider replacing the detectable warning surface on the southwest corner of the intersection.

Location: Cardinal Drive Intersection

Issue #27: Pedestrian Facilities

Figure 56

Figure 57

Figure 58

Figure 59

Description of Issue:
The following issues related to pedestrian facilities were observed at the Cardinal Drive intersection:

- No crosswalk is provided on the south side of the intersection (**Figure 56**).
- The pedestrian push button on the southwest corner is greater than the 10' maximum distance to the curb ramp (**Figure 57**), as defined in section 4E.08 of the *2009 MUTCD*.
- As illustrated in **Figure 58**, a continuous flat surface surrounding the pedestrian push button is not provided on the northwest corner of the intersection. According to section 4E.08 of the *2009 MUTCD*, the push button should be located at a location unobstructed and adjacent to a level all-weather surface to provide access to a wheelchair.
- There is a utility box within the detectable warning surface on the southeast corner of the intersection. The utility box shown in **Figure 59** is not flush with the concrete curb ramp or detectable warning surface. This poses a potential trip hazard.

Suggestions for Improvement:
FDOT has identified this location for a signal upgrade which is planned to include a conversion from strain wire to mast arms, basic ADA upgrades, and implementation of APS. These upgrades would address the issues illustrated in **Figure 56** through **Figure 59**. It is likely that FDOT will conduct the signal design at this location.

Location: Cardinal Drive Intersection

Issue #28: Intersection Sight Distance

Figure 60

Description of Issue:
The existing landscaping and the signal strain pole on the southeast corner restrict the available sight distance for a vehicle attempting a westbound right-turn (**Figure 60**). Vehicles have to pull past the stop bar and into the crosswalk to see past the pole and landscaping.

Suggestions for Improvement:
Consider trimming the landscaping back and consider conducting a sight distance evaluation to determine the available sight distance at the intersection. If adequate sight distance cannot be provided due to the strain pole, consider installing a No Turn on Red sign (R10-11 or R10-11a) to restrict right-turns on red.

Location: Cardinal Drive Intersection

Issue #29: Beach Access

Figure 61

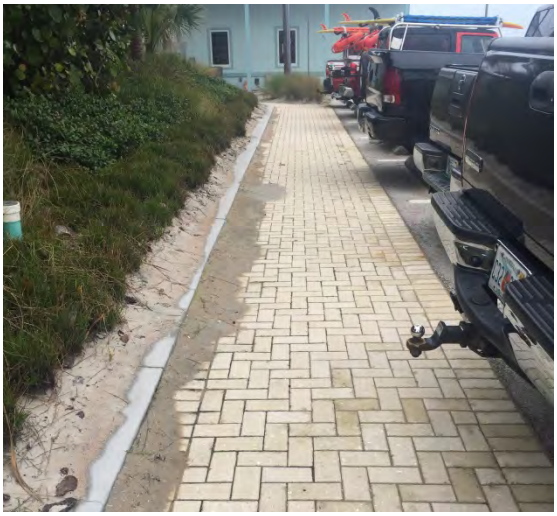


Figure 62

Figure 63

Description of Issue:
The east leg of the Cardinal Drive currently serves as a beach access. There is a sidewalk provided on the north side of the beach access as shown in **Figure 61** and **Figure 62**. No pedestrian facilities are provided on the south side of the beach access. There were no reported crashes on the south side of the intersection during the study period; however, one pedestrian crash occurred within the crosswalk on the north leg and another pedestrian crash occurred to the north of the marked crosswalk.

Parking is currently provided along both sides of the beach access. However, a new off beach public parking lot is planned to be constructed on the northwest corner of the intersection (location identified in **Figure 63**). Currently a gas station and two abandoned buildings exist within the parcel. The off beach public parking lot will be constructed where the two buildings are located with the gas station remaining in the short term until its lease terminates.

Suggestions for Improvement:
The following should be considered as part of the new off beach public parking lot and signal upgrades as mentioned in **Issue #27: Pedestrian Facilities**:

- Consider design of the parking lot to lead pedestrians out of the parking area toward the southern end or the southeast corner of the parking lot.
- Construct a sidewalk and connection on the north side of Cardinal Drive between the new public parking lot and the northwest corner of the intersection.
- Construct a sidewalk and connection on the south side of the beach access between the beach and the southeast corner of the intersection.
- Stripe a crosswalk with Special Emphasis marking on the south leg of the intersection consistent with sheet 9 of Design Index 17346, and install APS countdown pedestrian signals and pedestrian pushbuttons to serve the south crosswalk.
- Install accessible pedestrian signals (APS) on the remaining legs of the intersection.
- Rebuild the curb ramps to facilitate the new sidewalk connections.
- Install appropriate signage indicating the beach access and parking lot to beach patrons.

Location: Mid-Block between Cardinal Drive and River Beach Drive

Issue #30: Northshore Drive Intersection Sight Distance

Source: Google Street View

Figure 64

Description of Issue:
The existing hedges on the southwest corner restrict the available sight distance for a vehicle attempting an eastbound left-turn. Vehicles have to pull past the stop bar and into the effective crossing area used by pedestrians and bicyclists (no marked crosswalk present) to see past the landscaping.

Suggestions for Improvement:
Consider trimming the landscaping back and consider conducting a sight distance evaluation to determine the available sight distance at the intersection.

Location: Mid-Block between Cardinal Drive and River Beach Drive

Issue #31: Florida Avenue Intersection Sight Distance

Figure 65

Description of Issue:
A temporary for sale/lease sign is restricting the available sight distance along the eastbound approach of Florida Avenue, especially for vehicles making an eastbound left-turn or for sidewalk users approaching the southwest corner of the intersection (shown in **Figure 65**). Vehicles have to pull past the stop bar into the crosswalk area to see past the sign.

Suggestions for Improvement:
Consider coordinating with the property owner to relocate the sign so that it no longer restricts sight distance.

Location: River Beach Drive Intersection

Issue #32: Intersection Sight Distance

Figure 66

Description of Issue:
The existing hedges on the northwest corner restrict the available sight distance for eastbound vehicles and landscaping on the southeast corner (shown in **Figure 66**) restricts the available sight distance for westbound vehicles. Vehicles have to pull past the stop bar and into the effective crossing area used by pedestrians and bicyclists (no marked crosswalk present) to see past the landscaping.

Suggestions for Improvement:
Consider trimming the landscaping back and consider conducting a sight distance evaluation to determine the available sight distance at the intersection.

Location: River Beach Drive Intersection

Issue #33: Drainage

Figure 67

Figure 68

Description of Issue:
Water ponds onto the curb ramp and detectable warning surface on the north side of the eastbound River Beach Drive approach (northwest corner of the River Beach Drive intersection). This issue is displayed in **Figure 67** and **Figure 68**. This poses an issue to pedestrians, bicyclists, and vehicles as they cross the approach or make a southbound right-turn maneuver. There is a curb inlet around the corner, directly adjacent to the curb ramp; however, it appears that not all of the water is flowing to the inlet.

Suggestions for Improvement:
Consider evaluating the slope, drainage inlet size, drainage inlet locations, etc. near the issue to determine if modifications to the roadway or drainage inlets are necessary to properly remove storm water from the roadway.

Location: River Beach Drive Intersection

Issue #34: Marked Crosswalk at River Beach Drive

Figure 69

Figure 70

Description of Issue:
As mentioned in **Issue #8: Pedestrian Beach Access** and **Issue #9: Potential Mid-Block Crossings**, locations with beach access should be considered for a marked crosswalk. There are residential neighborhoods down River Beach Drive, west of SR A1A, and the beach serves as an attractive destination for pedestrians and bicyclists. No marked crosswalk is provided within the vicinity of the beach access and no pedestrian facilities are provided along the beach access (shown in **Figure 69** and **Figure 70**, respectively). The crash history indicates that there were two mid-block pedestrian crashes in the vicinity of this beach access.

Suggestions for Improvement:
The following could be considered at this location:

- Install pedestrian facilities along one or both sides of the beach access.
- 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 a mid-block crossing is warranted:
    - Install the crossing on the north side of the intersection due to existing left-turn lanes along SR A1A. Left-turn volume into the beach access is likely to be relatively small and comparably less than the northbound left-turn movement.
    - Consider an active warning device, such as Rapid Rectangular Flashing Beacons (RRFB), at the crosswalk. RRFBs may also be used on the advance crosswalk signs per FHWA's interim approval memorandum.
    - Provide a median refuge island for pedestrians in the TWLTL.
    - Install lighting on the crosswalk's west and east sides.
    - Stripe the crosswalk with Special Emphasis Crosswalk markings consistent with sheet 10 of the FDOT Design Index 17346.

Location: Mid-Block between River Beach Drive and Rockefeller Drive

Issue #35: Intersection Sight Distance

Figure 71

Description of Issue:
The existing hedges on the southwest corner restrict the available sight distance for eastbound vehicles attempting to make a left-turn movement (illustrated in **Figure 71**). Vehicles have to pull into the sidewalk to see past the landscaping.

Suggestions for Improvement:
Consider trimming the landscaping back and consider conducting a sight distance evaluation to determine the available sight distance at the intersection.

Location: Rockefeller Drive Intersection

Issue #36: Potential Marked Crosswalk at Rockefeller Drive

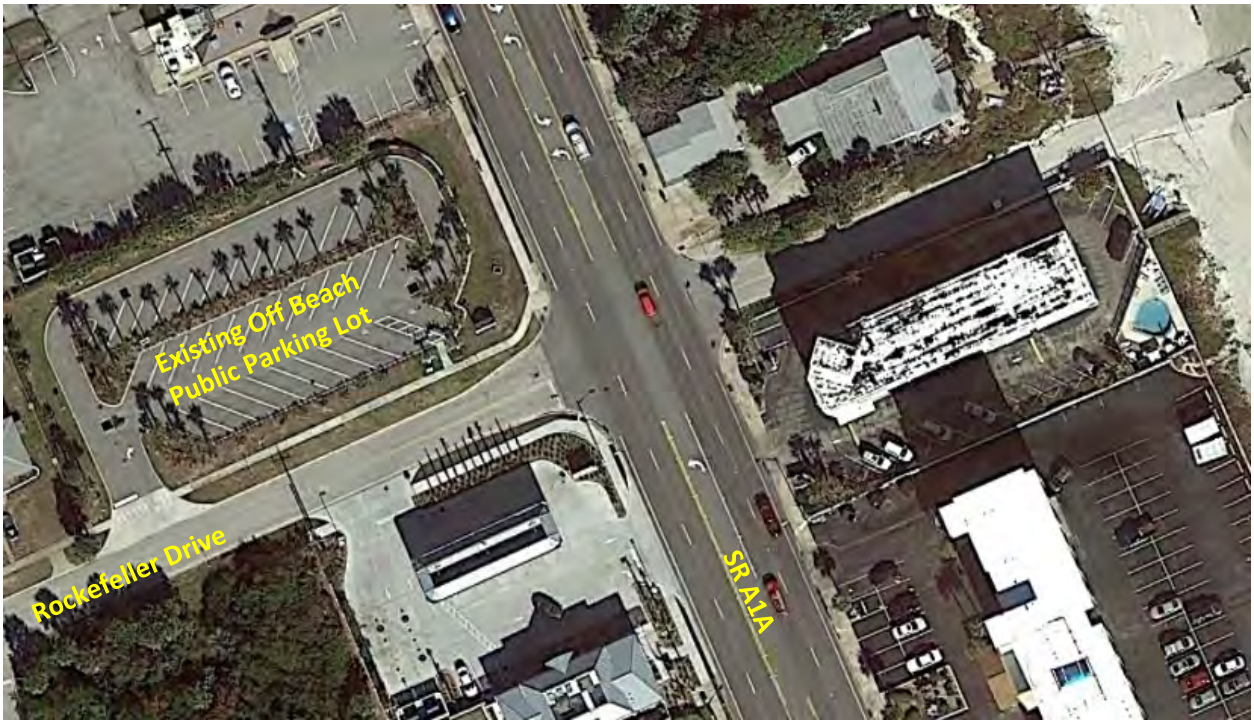


Figure 72

Figure 73

Figure 74

Description of Issue:

The east leg of the Rockefeller Drive intersection serves as a beach access. An off beach public parking lot is located on the northwest corner of the intersection (see **Figure 72**). This off beach public parking lot was constructed by Volusia County to facilitate the use of the beach access and a sidewalk is provided connecting to the sidewalk on the west side of SR A1A. However, no marked crosswalks are provided in the vicinity of the off beach parking lot and beach access. Similar to the majority of the beach accesses reviewed as part of this study, no pedestrian facilities are provided along either side of

the beach access (illustrated in **Figure 73**).

Suggestions for Improvement:
Similar to the issues identified in **Issue #34: Marked Crosswalk at River Beach Drive**, the following could be considered at this location:

- Install pedestrian facilities along one or both sides of beach access.
- 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 a mid-block crossing is warranted:
    - Install the crossing on the north side of the intersection due to existing left-turn lanes along SR A1A. Left-turn volume into the beach access is likely to be relatively small and comparably less than the northbound left-turn movement. **Figure 74** illustrates a potential landing location of a crosswalk on the east side of SR A1A.
    - Consider an active warning device, such as Rapid Rectangular Flashing Beacons (RRFB), at the crosswalk. RRFBs may also be used on the advance crosswalk signs per FHWA's interim approval memorandum.
    - Provide a median refuge island for pedestrians in the TWLTL.
    - Install lighting on the crosswalk's west and east sides.
    - Stripe the crosswalk with Special Emphasis Crosswalk markings consistent with sheet 10 of the FDOT Design Index 17346.

Location: Rockefeller Drive Intersection

Issue #37: Detectable Warning Surface

Figure 75

Description of Issue:
Part of the detectable warning surface on the northwest corner shown in **Figure 75** is missing.

Suggestions for Improvement:
Consider replacing the detectable warning surface on the northwest corner of the intersection.

Summary of Recommendations

This pedestrian/bicycle safety review considers operational and safety related issues for pedestrians and bicyclists on SR A1A from Plaza Boulevard to Rockefeller Drive. This study was commissioned by the R2CTPO to develop recommendations to improve the safety of pedestrians and bicyclists within the study limits. Each recommendation 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 suggestions should be prioritized for implementation before the other suggestions identified in this report:

- Issue #17: Curb Ramp on page 29
- Issue #19: Water Meter Cover Trip Hazard on page 31

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

Location	Issue Number	Issue	Suggestion
SHORT-TERM MAINTENANCE			
Corridor Wide	1	Four-Lane Divided Section	Consider formalizing right-turn lanes at key intersections/driveways. Consider marking 7-foot buffered bike lanes with right-turn key holes.
Corridor Wide	3	Bicycle Lanes	Consider marking 7-foot buffered bike lanes with right-turn key holes utilizing the extra pavement width in the existing 4-lane divided cross section.
Corridor Wide	4	Crosswalk Markings	Consider marking all minor street approaches at unsignalized intersections along the corridor during the next resurfacing project. Standard crosswalk markings as shown on sheet 9 of the FDOT Design Standard Index 17346 should be used for the unsignalized crossings. Special emphasis markings as shown on sheet 9 of Design Index 17346 should be used for the signalized crossings at the three signalized intersections included within the study limits.
Corridor Wide	5	Pedestrian Signage Consistency	Consider replacing the pedestrian warning signs with the standard yellow background to the fluorescent yellow-green background to provide consistent signage along the study limits. This will provide a consistent message to roadway users alerting them that pedestrians are crossing in the area. The following summarizes the locations and number of the standard yellow background pedestrian signage to be replaced: • South of Harvard Drive (northbound direction) o One pedestrian warning sign (W11-2) and one diagonal downward pointing arrow plaque (W16-7P) • Andy Romano Beachfront Park (northbound direction) o One pedestrian warning sign (W11-2) • Ormond Shores Drive (northbound direction) o One pedestrian warning sign (W11-2) • Approximately 150 feet north of River Beach Drive (southbound direction) o One pedestrian warning sign (W11-2) • South of Rockefeller Drive (northbound direction) o One pedestrian warning sign (W11-2) Consider providing consistent push button signage and street name signage at each of the signalized intersections along the corridor. This could eliminate confusion and reduce any unnecessary delay experienced by pedestrians at these locations.
Corridor Wide	6	Landscape Maintenance	Coordinate with FDOT and local businesses/property owners to trim the obstructions and encourage better landscape maintenance.
Corridor Wide	7	Sidewalk Maintenance	Consider cleaning the sidewalk to remove excess sand and debris and working with FDOT and/or local business/property owners to continue routine maintenance. Consider coordinating with the City of Daytona Beach and the City of Ormond Beach to either remove the newspaper/magazine stands or move them off the sidewalk so that the effective sidewalk width at those locations is not restricted.
Corridor Wide	13	Lighting	The following are considerations for lighting along the corridor: • Replace or turn on all the lights on the corridor after the turtle nesting season ends. • 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.
Plaza Boulevard Intersection	14	Intersection Sight Distance	Consider removing the bush to allow for adequate sight distance. Consider installing a Turning Vehicles Yield to Pedestrians sign (R10-15) on span wire for the eastbound approach in addition to the pedestrian signage on the post near the signal cabinet.
Plaza Boulevard Intersection	15	Pedestrian Signage	Consider upgrading the Yield to Pedestrians in Crosswalk sign to a Turning Vehicles Yield to Pedestrians sign (R10 15).
Plaza Boulevard Intersection	16	Landscaping Maintenance	Coordinate with FDOT to trim the bushes back to restore the full median refuge width.

Location	Issue Number	Issue	Suggestion
SHORT-TERM MAINTENANCE			
Plaza Boulevard Intersection	17	Curb Ramp	Consider patching the curb ramp to remove the potential trip hazard by providing a level surface, and install a detectable warning surface.
Plaza Boulevard to Harvard Drive	19	Water Meter Cover Trip Hazard	Consider patching the concrete sidewalk and/or replacing the cover so that the two surfaces are flush.
Harvard Drive Intersection	20	Intersection Sight Distance	Consider trimming the landscaping back and consider conducting a sight distance evaluation to determine the available sight distance at the intersection. If adequate sight distance cannot be provided due to the strain pole, consider installing a No Turn on Red sign (R10-11 or R10-11a) to restrict right-turns on red. This could be effective until mast arms and signal upgrades are implemented at this location.
Harvard Drive Intersection	21	Detectable Warning Surface Maintenance	Consider removing the excess sand and debris from the detectable warning surfaces.
Harvard Drive to Cardinal Drive	24	Sidewalk Hazard	Coordinate with the property owner to adjust the sprinkler head so that it is not directed at the sidewalk.
Benjamin Drive Intersection	25	Intersection Sight Distance	Consider trimming the landscaping back and consider conducting a sight distance evaluation to determine the available sight distance at the intersection.
Wren Road	26	Missing Stop Sign and Detectable Warning Surface	Consider installing a stop sign (R1-1) on the eastbound approach with appropriate street name signage. Consider replacing the detectable warning surface on the southwest corner of the intersection.
Cardinal Drive Intersection	28	Intersection Sight Distance	Consider trimming the landscaping back and consider conducting a sight distance evaluation to determine the available sight distance at the intersection. If adequate sight distance cannot be provided due to the strain pole, consider installing a No Turn on Red sign (R10-11 or R10-11a) to restrict right-turns on red. This could be effective until mast arms and signal upgrades are implemented at this location.
Northshore Drive Intersection	30	Intersection Sight Distance	Consider trimming the landscaping back and consider conducting a sight distance evaluation to determine the available sight distance at the intersection.
Florida Avenue Intersection	31	Intersection Sight Distance	Consider coordinating with the property owner to relocate the sign so that it no longer restricts sight distance.
River Beach Drive Intersection	32	Intersection Sight Distance	Consider trimming the landscaping back and consider conducting a sight distance evaluation to determine the available sight distance at the intersection.
River Beach Drive Intersection	33	Drainage	Consider evaluating the slope, drainage inlet size, drainage inlet locations, etc. near the issue to determine if modifications to the roadway or drainage inlets are necessary to properly remove storm water from the roadway.
River Beach Drive to Rockefeller Drive	35	Intersection Sight Distance	Consider trimming the landscaping back and consider conducting a sight distance evaluation to determine the available sight distance at the intersection.
Rockefeller Drive Intersection	37	Detectable Warning Surface	Consider replacing the detectable warning surface on the northwest corner of the intersection.

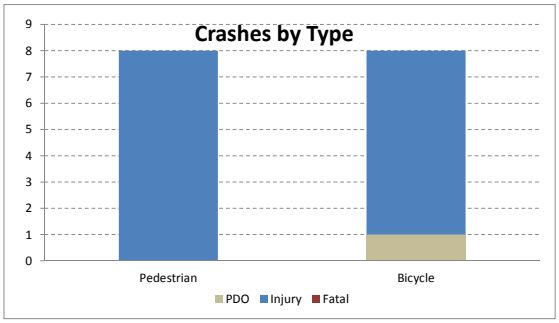
Location	Issue Number	Issue	Suggestion
NEAR-TERM IMPROVEMENT			
Corridor Wide	2	Five-Lane Section	Consider implementing raised medians in the center TWLTL in select locations.
Corridor Wide	8	Pedestrian Beach Access	Consider installing new beach access signage for pedestrians/drivers as the existing signage is showing wear and does not display accurate information to the roadway users. Consider prioritizing the implementation of pedestrian facilities at strategic beach access locations. Emphasis on installing sidewalks at the beach locations with signalized or marked crosswalks across SR A1A could be considered. Locations with off beach parking should also be emphasized as beach patrons will park their vehicles at an off beach parking lot before accessing the beach. Also consider pedestrian level lighting at the beach access locations.
Corridor Wide	9	Potential Mid-Block Crossings	The following could be done at select locations where a mid-block crossing is desired and warranted: • 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. • Consider an active warning device, such as Rapid Rectangular Flashing Beacons (RRFB), at the crosswalk. RRFBs may also be used on the advance crosswalk signs per FHWA's interim approval memorandum. • Provide a median refuge island for pedestrians in the TWLTL. • Install lighting on the crosswalk's west and east sides. • Stripe the crosswalk with Special Emphasis Crosswalk markings consistent with sheet 10 of the FDOT Design Index 17346.
Corridor Wide	10	Transit Bus Stop Review	Consider coordinating a transit review of bus stops along the corridor. Items to evaluate should include: • Boarding and alighting areas • Bus stop locations with consideration to marked crosswalks to cross SR A1A • ADA accessibility • Illumination • Sign visibility (daytime and nighttime) • Trash can locations
Corridor Wide	11	Accessible Pedestrian Signals (APS)	Consider installing APS at the three signalized intersections during the next upgrade(s) to the signalized intersections. The signals at Harvard Drive and Cardinal Drive are planned to be upgraded from the existing strain pole/span wire configuration to mast arms. APS and pedestrian facilities upgrades should be considered as part of the signalization upgrades.
Corridor Wide	12	Sidewalks at Driveways	Consider rebuilding the abandoned driveways to provide a level surface and continuous curb. These improvements could be done during the roadway's next 3R project.
Corridor Wide	13	Lighting	The following are considerations for lighting along the corridor: • Consider upgrading lighting at the signalized intersections to meet the requirements of section 7.3.2.2 in Volume 1 of the FDOT Plans Preparation Manual (PPM). This may require the existing lighting to be replaced. • 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.
Plaza Boulevard Intersection	18	Pedestrian Facilities	Consider installing a separate push button pole on the northeast corner for the northern and eastern crosswalks that is less than 10' from the pedestrian ramp.
Harvard Drive Intersection	22	Sidewalk Connectivity	Consider constructing a sidewalk on the north side Harvard Drive to facilitate pedestrian connectivity to the sidewalks along SR A1A and the beach access on the east side of the intersection. This could be considered in addition to the basic ADA upgrades and APS implementation as part of the future intersection upgrade from strain wire to mast arms.
Harvard Drive to Cardinal Drive	23	Mid-Block Crossing at Andy Romano Beachfront Park	The following could be considered at this location to address the yield compliance and lighting issues observed: • Consider installing an active warning device, such as Rapid Rectangular Flashing Beacons (RRFB), at the crosswalk. RRFBs may also be installed on the advance crosswalk warning signs per FHWA's interim approval memorandum. • Install lighting on the crosswalk's west side and in the refuge island.

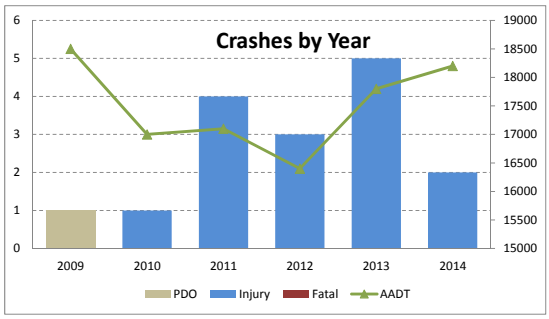
Location	Issue Number	Issue	Suggestion
NEAR-TERM IMPROVEMENT			
Cardinal Drive Intersection	27	Pedestrian Facilities	FDOT has identified this location for a signal upgrade which is planned to include a conversion from strain wire to mast arms, basic ADA upgrades, and implementation of APS.
Cardinal Drive Intersection	29	Beach Access	The following should be considered as part of the new off beach public parking lot and signal upgrades as mentioned in **Issue #28**: • Consider design of the parking lot to lead pedestrians out of the parking area toward the southern end or the southeast corner of the parking lot. • Construct a sidewalk and connection on the north side of Cardinal Drive between the new public parking lot and the northwest corner of the intersection. • Construct a sidewalk and connection on the south side of the beach access between the beach and the southeast corner of the intersection. • Stripe a crosswalk with Special Emphasis marking on the south leg of the intersection consistent with sheet 9 of Design Index 17346, and install a countdown pedestrian signal and pedestrian pushbuttons to serve the south crosswalk. • Rebuild the curb ramps to facilitate the new sidewalk connections. • Install appropriate signage indicating the beach access and parking lot to beach patrons.
River Beach Drive Intersection	34	Potential Marked Crosswalk	The following could be considered at this location: • Install pedestrian facilities along one or both sides of the beach access. • 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 a mid-block crossing is warranted: o Install the crossing on the north side of the intersection due to existing left-turn lanes along SR A1A. Left-turn volume into the beach access is likely to be relatively small and comparably less than the northbound left-turn movement. o Provide a median refuge island for pedestrians in the TWLTL. o Install lighting on the crosswalk's west and east sides. o Stripe the crosswalk with Special Emphasis Crosswalk markings consistent with sheet 10 of the FDOT Design Index 17346.
Rockefeller Drive Intersection	36	Potential Marked Crosswalk	The following could be considered at this location: • Install pedestrian facilities along one or both sides of beach access. • 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 a mid-block crossing is warranted: o Install the crossing on the north side of the intersection due to existing left-turn lanes along SR A1A. Left-turn volume into the beach access is likely to be relatively small and comparably less than the northbound left-turn movement. Figure 76 illustrates a potential landing location of a crosswalk on the east side of SR A1A. o Consider an active warning device, such as Rapid Rectangular Flashing Beacons (RRFB), at the crosswalk. RRFBs may also be used on the advance crosswalk signs per FHWA's interim approval memorandum. o Provide a median refuge island for pedestrians in the TWLTL. o Install lighting on the crosswalk's west and east sides. o Stripe the crosswalk with Special Emphasis Crosswalk markings consistent with sheet 10 of the FDOT Design Index 17346.

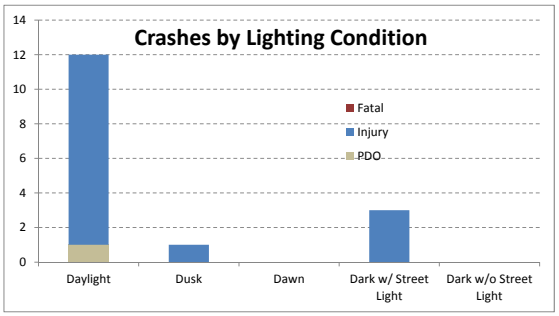
Location	Issue Number	Issue	Suggestion
LONG-TERM IMPROVEMENT			
Corridor Wide	2	Five-Lane Section	Consider converting the roadway to a 4-lane divided cross section.
Corridor Wide	3	Bicycle Lanes	Within the 5-lane section the following options could be considered: • Consider narrowing lanes to allow for buffered bike lanes to provide continuity between the south and north sections • Consider using shared lane markings (sharrows) in the outside lane for experienced riders • Potential road diet as a long term solution to provide additional pavement to accommodate bicycles and other modes
Corridor Wide	13	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.

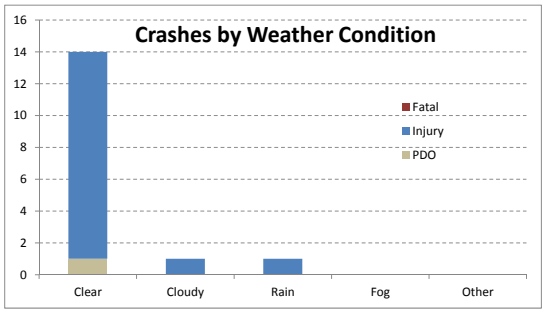
Appendix A – Collision Diagrams

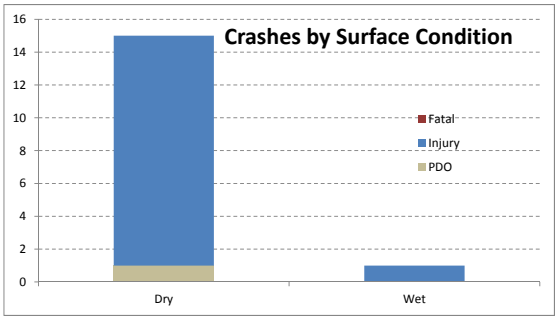
CRASH ANALYSIS - SR A1A from Plaza Blvd. to Rockefeller Dr.

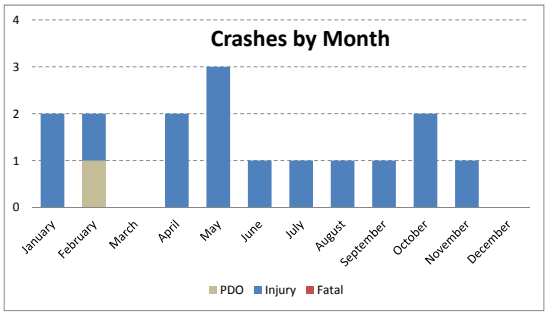


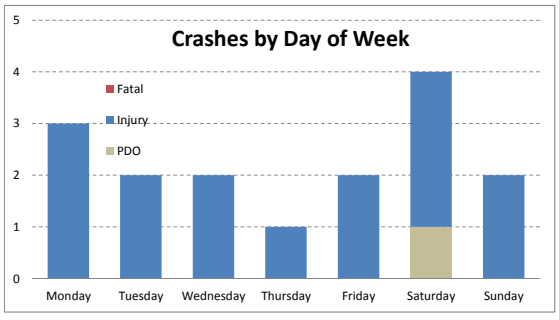


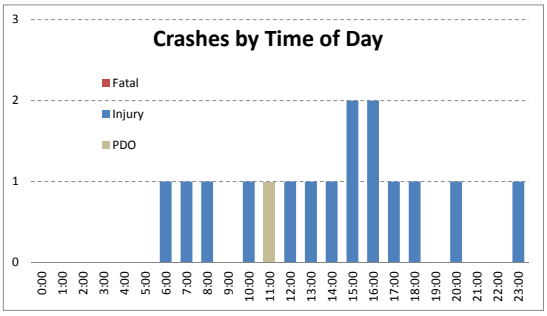


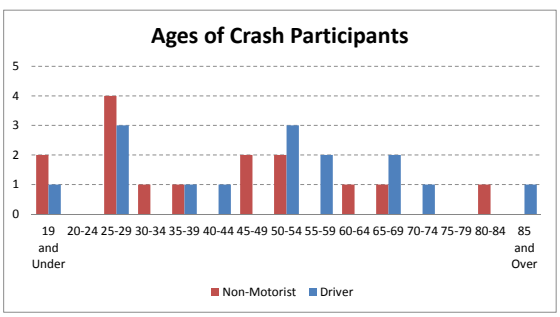


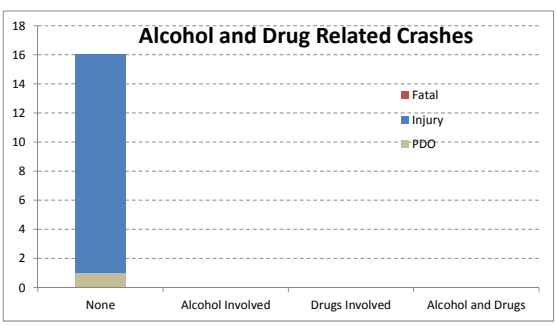


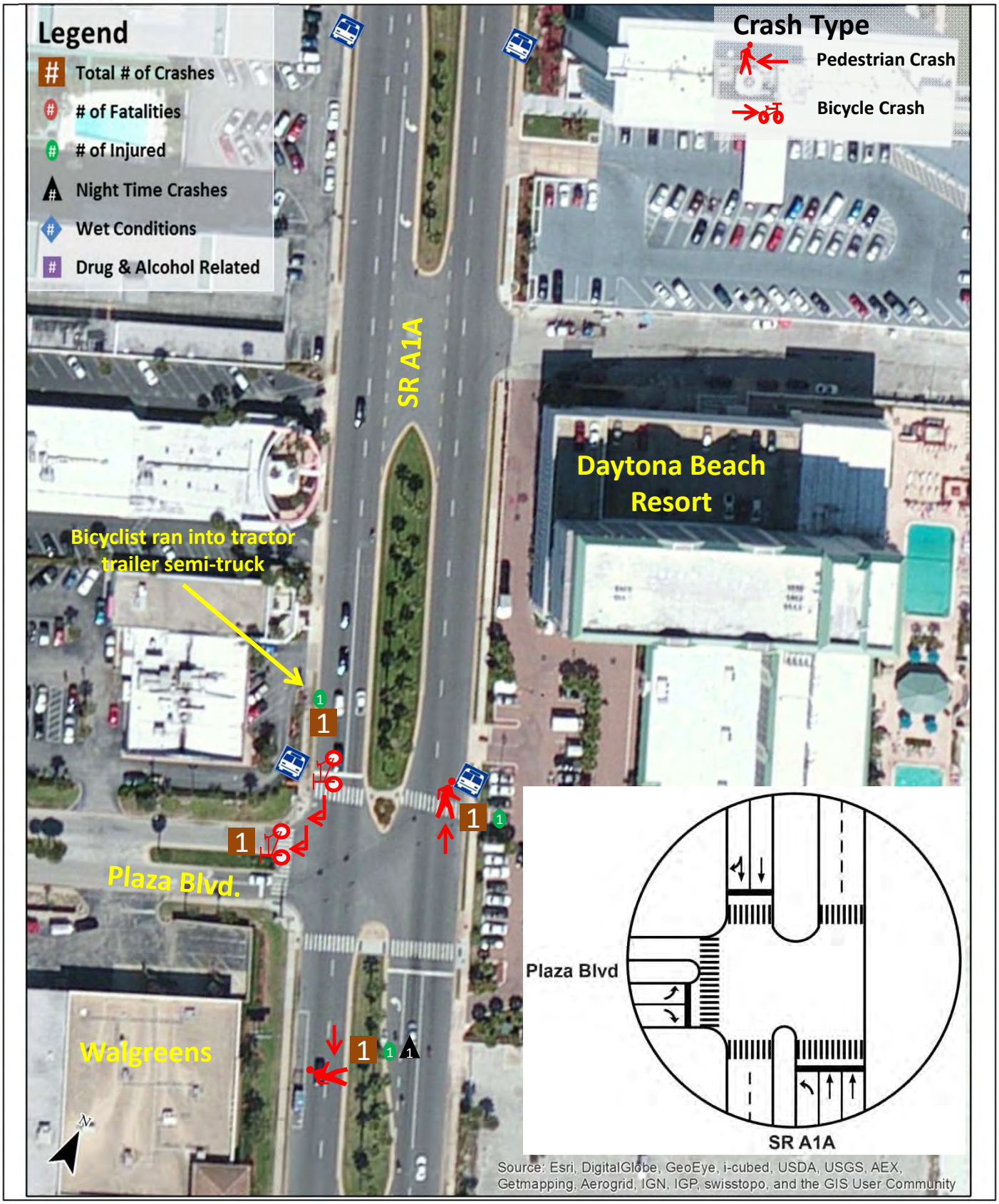










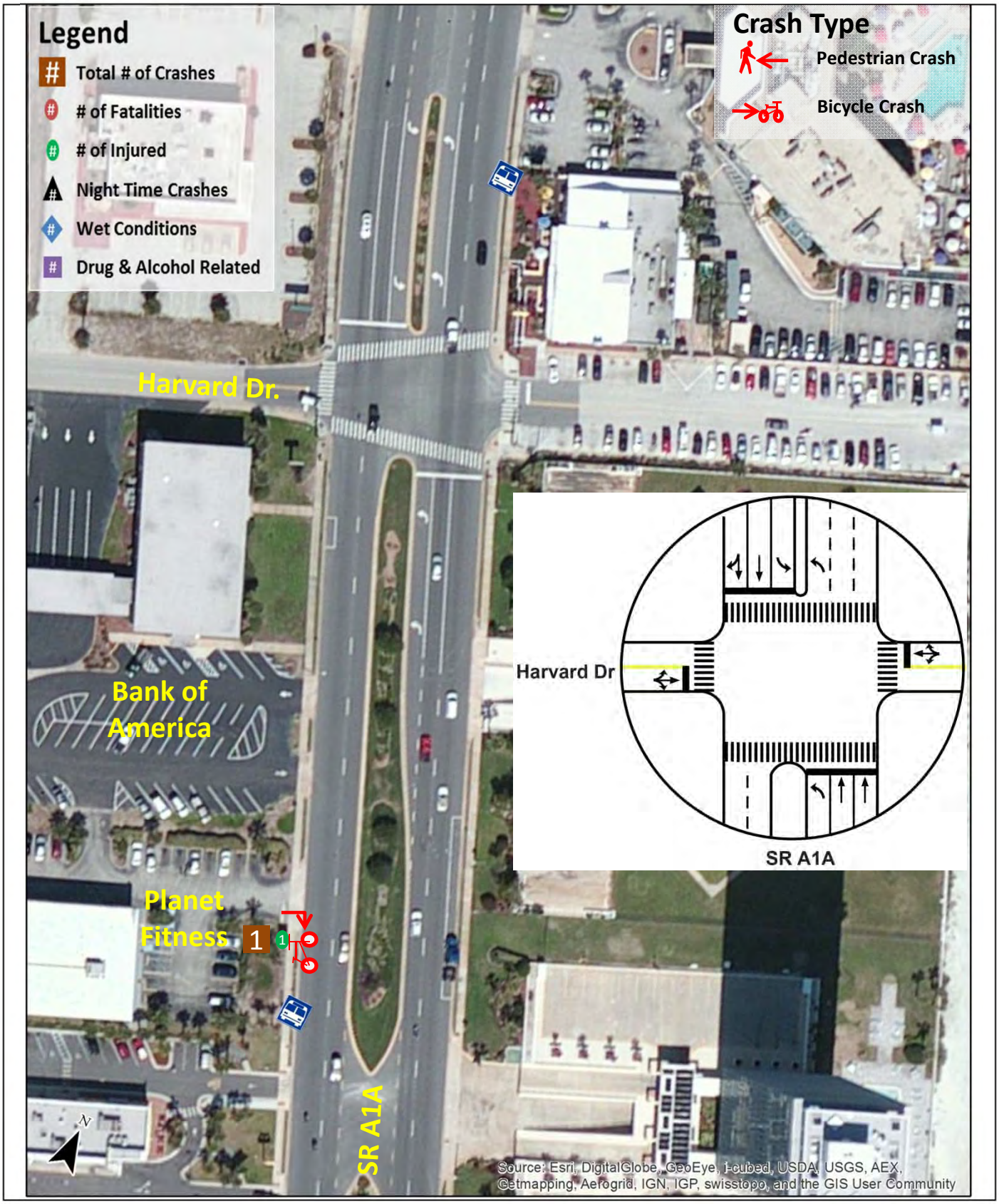


SR/CR A1A Pedestrian Safety & Mobility Study
Collision Diagram (2009 – 2014)
Focus Area D: Bellair Plaza Dwy. to Plaza Blvd.

Figure **1**

SR/CR A1A Pedestrian Safety & Mobility Study
Collision Diagram (2009 – 2014)
Focus Area D: Plaza Blvd. to McDonald's Dwy.

Figure **2**



SR/CR A1A Pedestrian Safety & Mobility Study
Collision Diagram (2009 – 2014)
Focus Area D: McDonald's Dwy. to Harvard Dr.

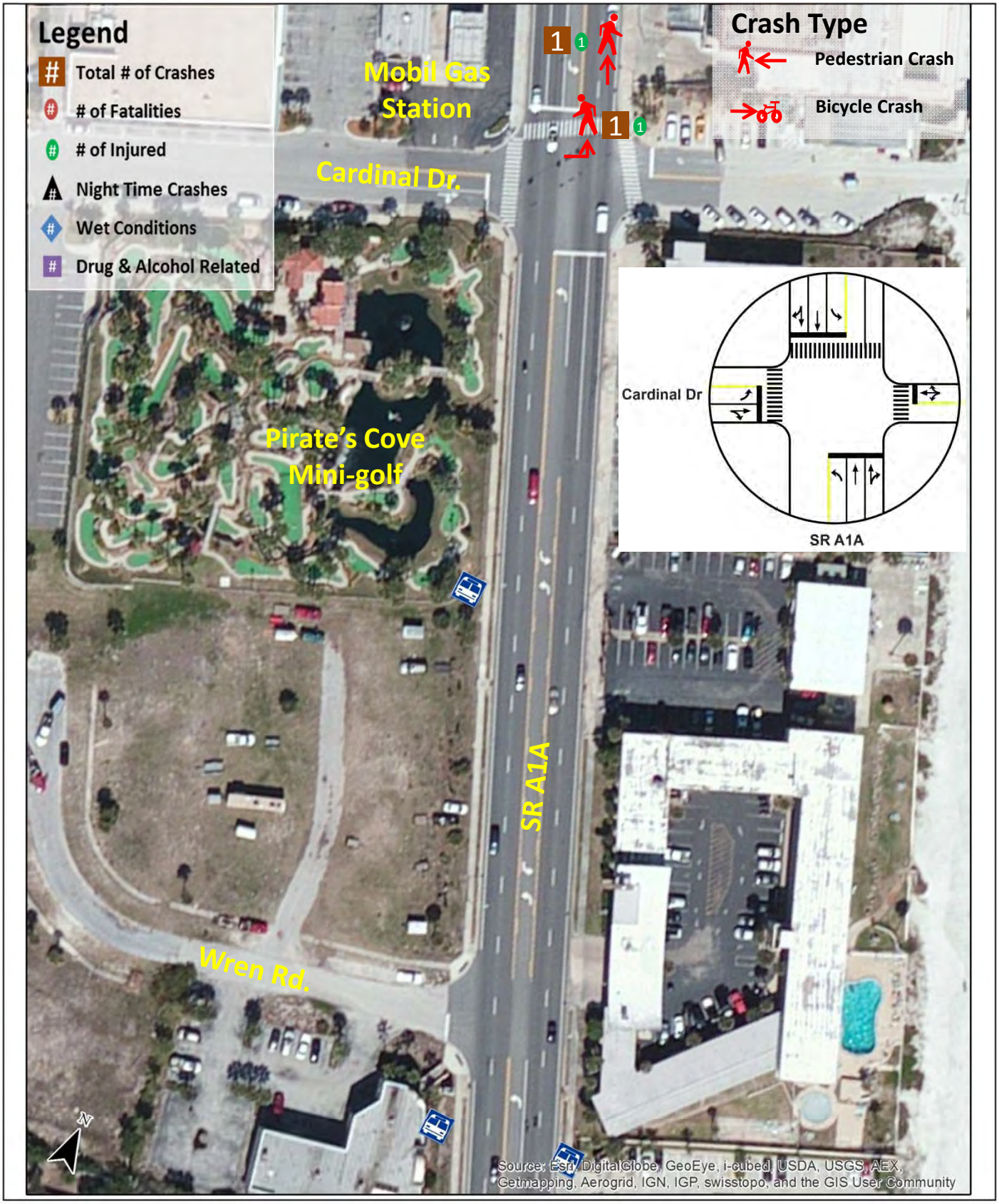
Figure **3**

SR/CR A1A Pedestrian Safety & Mobility Study
Collision Diagram (2009 – 2014)
Focus Area D: Harvard Dr. to Olive Garden Dwy.

Figure **4**

SR/CR A1A Pedestrian Safety & Mobility Study
Collision Diagram (2009 – 2014)
Focus Area D: Olive Garden Dwy. to Benjamin Dr.

Figure **5**



SR/CR A1A Pedestrian Safety & Mobility Study
Collision Diagram (2009 – 2014)
Focus Area D: Benjamin Dr. to Cardinal Dr.

Figure **6**

SR/CR A1A Pedestrian Safety & Mobility Study
Collision Diagram (2009 – 2014)
Focus Area D: Cardinal Dr. to Florida Ave.

Figure **7**

SR/CR A1A Pedestrian Safety & Mobility Study
Collision Diagram (2009 – 2014)
Focus Area D: Florida Ave. to River Beach Dr.

Figure **8**

SR/CR A1A Pedestrian Safety & Mobility Study
Collision Diagram (2009 – 2014)
Focus Area D: River Beach Dr. to Rockefeller Dr.

Figure **9**

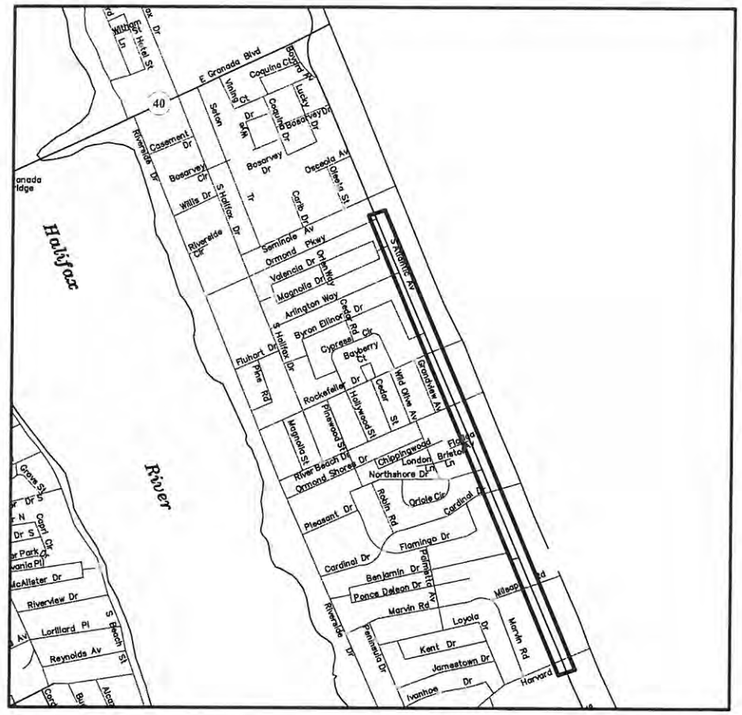
Appendix B – Potential Mid-Block Crosswalk Locations: City of Ormond Beach

CITY OF ORMOND BEACH

A1A SOUTH PENINSULA PEDESTRIAN AND TRAFFIC SAFETY MODIFICATIONS

BID NO. 2014-XX

= SITE LOCATION



SITE LOCATION MAP

MAYOR

ED KELLEY

COMMISSIONERS

JAMES STOWERS, ZONE 1

TROY KENT, ZONE 2

RICK BOEHM, ZONE 3

BILL PARTINGTON, ZONE 4

CITY MANAGER

JOYCE SHANAHAN

PREPARED BY THE ENGINEERING DIVISION

Ormond Parkway Valencia/Magnolia Arlington Way

Note: Median locations schematic, intended to show extent of proposed medians.
Final turn lane design and locations to be calculated and determined by FDOT during design.
Crosswalk locations approximate. Final locations to be determined by FDOT during design.

LEGEND

- Proposed Median Location
- Approximate Crosswalk Location

Rockefeller

River Beach

Note: Median locations schematic, intended to show extent of proposed medians.
Final turn lane design and locations to be calculated and determined by FDOT during design.
Crosswalk locations approximate. Final locations to be determined by FDOT during design.

Proposed Median Location

Approximate Crosswalk Location

River Beach

Cardinal

Note: Median locations schematic, intended to show extent of proposed medians.
Final turn lane design and locations to be calculated and determined by FDOT during design.
Crosswalk locations approximate. Final locations to be determined by FDOT during design.

Proposed Median Location

Approximate Crosswalk Location

2

Cardinal

Milsap

Note: Median locations schematic, intended to show extent of proposed medians.
Final turn lane design and locations to be calculated and determined by FDOT during design.
Crosswalk locations approximate. Final locations to be determined by FDOT during design.

Proposed Median Location

Approximate Crosswalk Location