

PROJECT CASE STUDY

Sun Trail SUP Concept and Typical Section

PROJECT LOCATION

St. Johns County Sun Trail, St. A1A/ Beach Blvd from SR A1A to Pope Road, St. Augustine, FL

CONTEXT

The Florida Department of Transportation (District 2) is engaged in the review of proposed Shared Use Path (SUP) concept and typical section for the St. Johns County Sun Trail. This trail is proposed along the east side of A1A/ Beach Blvd from SR A1A to Pope Road. FM No. 447061-1.

In the existing condition, both direction of travel includes a 5-ft sidewalk and 4-ft shoulder (unmarked but used for bicycle lanes).

In the proposed typical section, the 5-ft sidewalk is set to remain on the west side of the road. On the east side of the road, the sidewalk is replaced with a 12-ft SUP. With the addition of the SUP, the on-street bicycle lanes are not included in the proposed typical section.

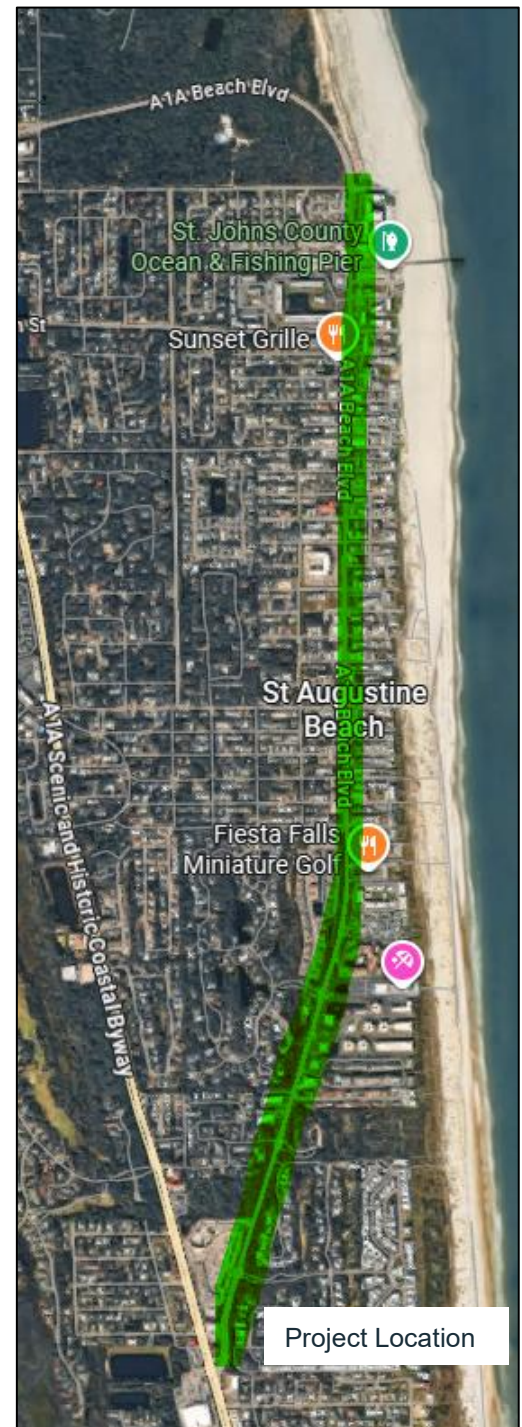
CASE STUDY PURPOSE

The Department has received comments regarding the feasibility and safety of the proposed typical section shared use path concept. Some of the comments are concerned with the SUP design and impacts it might have on local charm and general safety.

The Department has requested that AtkinsRéalis review the latest typical section and provide comments regarding the design, safety, and predicted crash impacts associated with the concept.

KEY FINDINGS

- Based on the context classification and speed limit of this segment this SUP may fall into the design designations for an **Urban Side Path**. This designation provides more lenient clear zone and separation criteria.
- Removing the bicycle lanes from the roadway is estimated to reduce bicycle crashes by 36%.
- Changes to the roadway typical section is **estimated to reduce vehicle crashes**.
- Concept, as provided, does not meet all FDOT design criteria for SUP or Urban Side Path. Suggestion is to **increase the separation between the roadway back of curb and edge of SUP** to at least 2-ft, but preferences is to maximize this distance within the ROW.



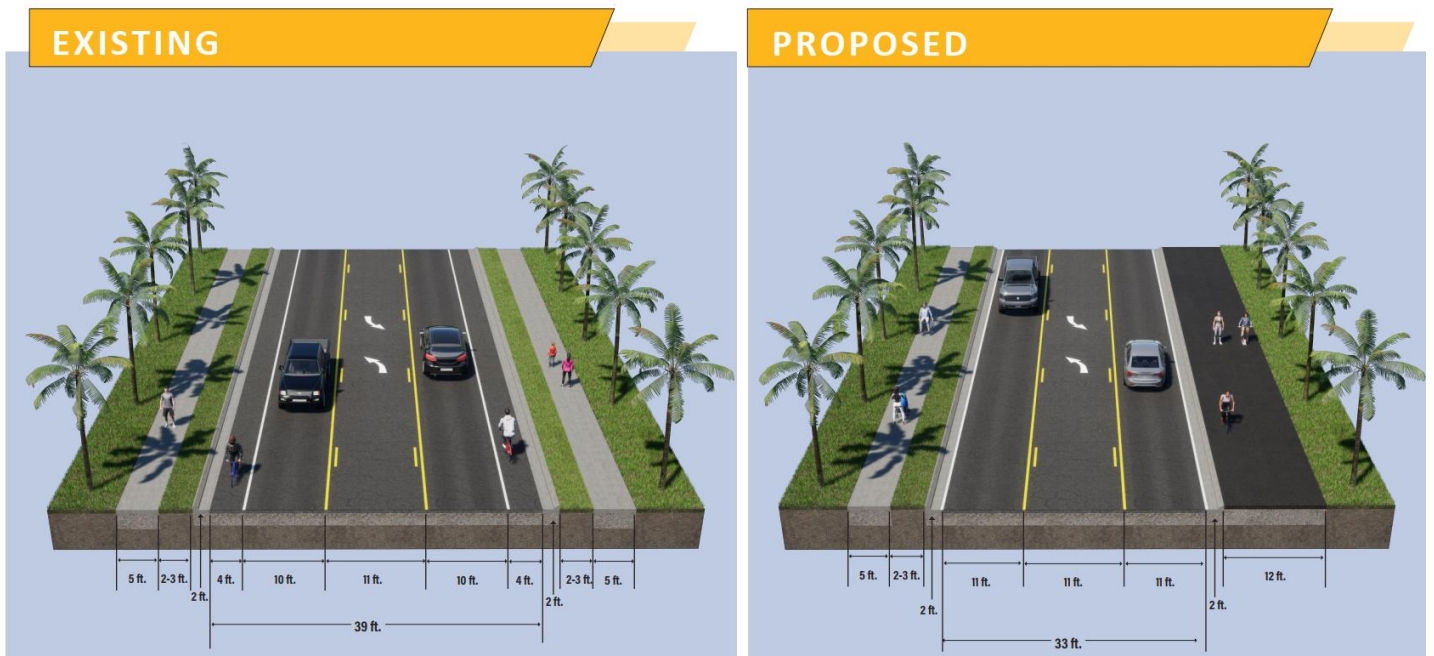
SERVICES PROVIDED

- Review of FDOT FDM criteria for trail and path design
- Provide qualitative and quantitative review of concept
- Review historical crashes, specifically multimodal crash types
- Reference the Highway Safety Manual for typical section impacts
- Summarize key findings and design suggestions

SUMMARY OF TYPICAL SECTIONS

- **Existing Roadway**
 - Speed limit 30 mph
 - Context Class in area varies between C2T, C3, and C4
 - AADT = 8,000
 - 10-ft travel lanes
 - 5-ft sidewalk and 4-ft shoulder (used as a bicycle lane) in each direction of travel
- **Proposed concept**
 - Includes a **12-ft SUP directly touching the back of curb on the south side of the roadway**, replaces existing 5-ft sidewalk on east side.
 - Eliminates on-street bicycle lanes, which also served as a shoulder.
 - Increases the travel lanes from 10-ft to 11-ft

Figure 1 - Typical Section Proposed



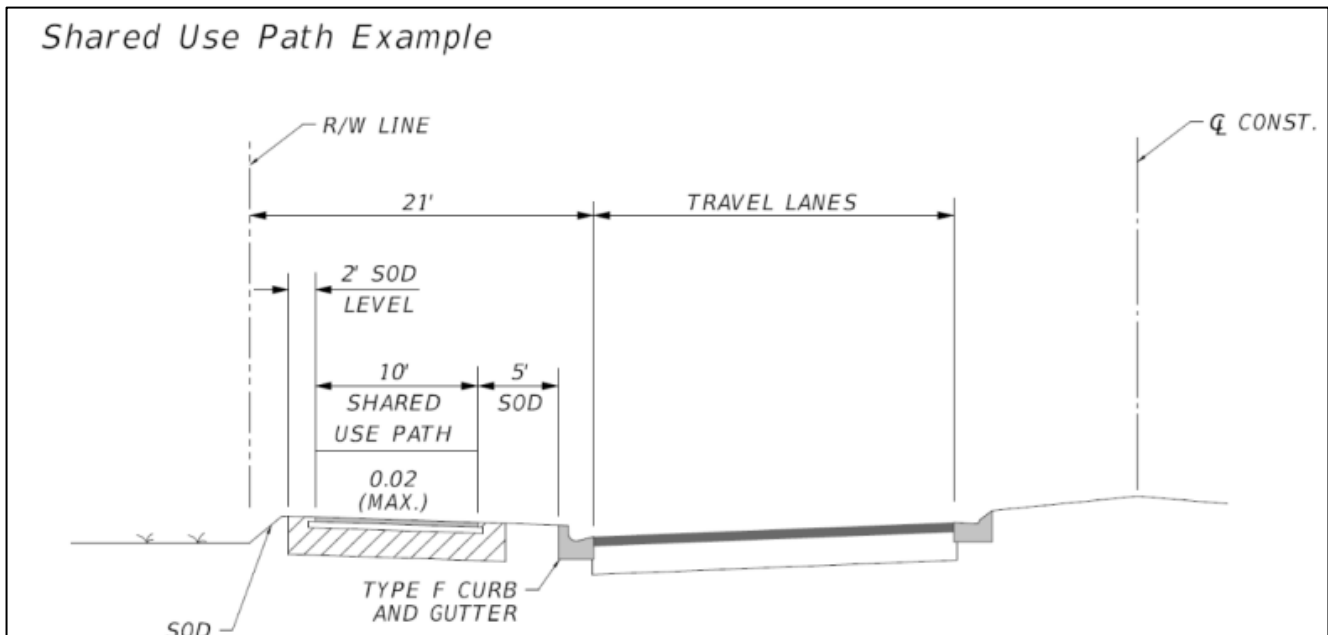
CRITERIA REVIEW - SHARED USE PATH VS URBAN SIDE PATH

This section provides notes from the FDOT FDM chapter 224 on Shared Use Paths.

- **Comparison of Proposed Concept to FDM 224-Shared Use Paths**
 - **Separation** – For SUP on curbed roadways, the **edge of the path is to be at least 5-ft from the face of the curb** (FDM 224.12)
 - **Design Concern: Proposed SUP is flush with curb.** If concept uses SUP, increase separation by 5-ft. (See Figure 1 for example of typical section)

- **Applicability of the Urban Side Path**
 - **Context Classification:** An Urban Side Path is a category of SUP that may be used in **C2T, C4, C5, and C6** context classifications where the design speed of the adjacent roadway is 35 mph or less.
 - **The project location can be classified as either C2T or C4**
 - Urban Side Path Notes from FDM 224
 - The Urban Side Path users and motorists in adjacent travel lanes will be traveling more slowly in C2T, C4, C5, and C6 context classifications, compared to the rural and suburban locations of conventional shared use paths. In addition, because they are associated with curbed roadways, Urban Side Paths will be vertically separated from the roadway, further distinguishing them from conventional shared use paths. The slower travel speeds and vertical separation allow the use of design criteria differing from a standard shared use path. The slower travel speeds are due to speed management concepts inherent to the urban environment (e.g., enclosure, engagement, and deflection).
 - **Separation** - For Urban Side Paths, place as close to the R/W line as possible, **but no closer than 2 feet from the back of curb.**
 - **Design Concern: Proposed SUP is flush with curb.** If Urban Side Path, increase separation by 2-ft.

Figure 2 – FDM Typical Section of SUP



Source: FDOT FDM

HISTORICAL CRASH REVIEW

Crashes were downloaded using Signal4 for a period between January 1, 2021 and April 1, 2026. Pedestrian and bicycle crashes were reviewed for location, severity, and to identify crash details that lead to the event. A map of the pedestrian and bicycle crashes is provided as an appendix.

- **A summary of the crash data is as follows:**

- All Crashes
 - Frequency: 93 total crashes
 - Crash Severity: no fatal crashes, 6 incapacitating injury crashes, 15 injury crashes, 72 PDO crashes
 - Notable Crash Types: Rear End (43), Left-turn (15), Off-road (8), Angle (7), Bike/Ped (10)
- Pedestrian Crashes
 - 1 pedestrian crash, which resulted in an incapacitating injury
- Bicycle Crashes
 - 9 bicycle crashes
 - Crash Severity: 1 incapacitating crash, 6 injury crashes, 2 no injury crashes
 - Location: 7 of 9 bicycle crashes occurred north of 13th street
 - Direction: 4 of 9 bicycle crashes on beach side (east), and 5 on west side
 - Details: 4 of 9 crashes the bicycle user was found at fault

- **Crash Location:** The table below provides location of bicycle at the time of the crash and which party was found to be at fault. There were 4 crashes where the bicycle was on the roadway/bicycle lanes. In 3 of those 4 crashes the bicycle was found at fault for not properly yielding or for traveling in the wrong direction.

Table 1 – Summary of Bicycle Crash Locations

Bicycle on Roadway	
Vehicle at Fault	1
Bicycle at Fault	3
Bicycle on Sidewalk or Crosswalk	
Vehicle at Fault	2
Bicycle at Fault	1
No Fault	2

QUALITATIVE REVIEW

A qualitative review of the proposed concept and typical section includes notes based primarily on engineering judgement and planning experiences.

▪ **Benefits of Concept**

- Removes bicycles from roadway, thus reducing roadway conflicts and increasing user comfort. Example: vehicles not yielding to bicycles in the bike lanes or bicycle/vehicle sideswipes.
- Consolidates bicycle traffic to east side of roadway in a more distinguishable and separated facility. This improves user expectancy and bicycle behavior predictability.
- Providing a shared use path provides more opportunity for additional warning and signing of where bicycles will be crossing driveways.
- Removal of bicycle lanes from roadway provides opportunity to increase travel lane width for advanced bicyclists who still choose to use the roadway.
- Does not reduce multimodal accessibility. Still provides bicycle and pedestrian access to existing properties and land uses.
- Maintains existing sidewalk on the west side for pedestrians.
- Completes key segment in the planned Florida SUN Trail network and East Coast Greenway, adding to long-distance continuity with a regional and statewide impact
- Increased width provided by the shared use path allows for:
 - Safer passing between bicycles leading to fewer conflicts
 - A broader range of users including children and families, recreational riders, and older adults
 - Better accommodation for micromobility (e-bikes, scooters)
 - Overall, a major safety and comfort upgrade for all roadway users

▪ **Negatives of Concept**

- Eliminates roadway shoulder.
- Shared path is proposed adjacent to the roadway with no buffer, which puts pedestrians and recreational riders closer to traffic than existing design does. However, a 12-ft path allows for greater maneuverability and operating space which could compensate for some of the lack of buffer. This could be resolved to decreasing the path width to 10-ft with a 2-ft buffer to the curb in constrained areas.
- May increase bicycle crossings from west side of road to east to reach the SUP.
- The SUP concept shows closures in vehicular access for some side street locations east of roadway.

Overall, while the proposed shared use path is closer to the roadway edge in some locations, its substantially greater width, decrease of high-speed vehicle conflict opportunities, and function as part of the Florida SUN Trail, the shared use path provides safety and usability benefits that exceed those of the existing narrow on-road bike lanes.

QUANTITATIVE REVIEW

A quantitative review of the impacts associated with the proposed concept and typical section was performed based on principals of the Highway Safety Manual using published Crash Modification Factors (CMFs).

CMF Research:

The following CMFs were identified for the changes to the typical section, both for the roadway changes and multimodal facilities. There is no known CMF specific to removing a bicycle lane and adding it to a shared use path. In place of a specific CMF multiple CMF were referenced to model similar conditions.

- **Roadway Typical Section CMF**

- Increase Lane Width 1-ft: **CMF 0.77** for vehicles and bikes, (ID 9246)
- Decrease lane width from 11-ft to 10-ft: CMF 1.27 for all crashes (ID 8167). This is the opposite change of what is proposed with this typical, but provides guidance that 11-ft lane may result in less crashes than 10-ft lanes.. Applying the inverse of this CMF results in a value of approximately 0.79, which is consistent with CMF ID 9246.
- Decrease shoulder from 4-ft to 0-ft: **CMF 1.007** for all crash types (ID 3012) or based on using the FDOT HSM worksheets comparing both typical sections this results in a calculated CMF of 1.05

- **SUP lateral distance from Roadway CMF**

- It is unclear from industry research what the crash impacts are from a SUP without a separation from the travel way. There is no known specific CMF for this condition.

- **Decrease lane Bicycle Lanes CMF**

- Convert traditional bike lane to separated bicycle lane with vertical element: **CMF 0.64** for bicycle/vehicle crashes, (ID 11301). See Table 2.
- **FHWA Study** - Convert traditional bike lanes to a separated lane with low-cost flexible delineators can reduce bicycle-vehicle crashes by up to 53 percent: **CMF 0.47**
 - https://www.fhwa.dot.gov/innovation/innovator/issue101/page_02.html#:~:text=The%20recent%20update%20to%20the,bike%20lanes%20throughout%20the%20city.

- Table 2 – Summary of Bicycle Lane CMFs

Significance Level	Before Condition	After Condition	CMF	Standard Error
0.01	Traditional bicycle lane	SBL with flexible posts	0.498	0.173
0.01	Flush buffered bicycle lane	SBL with flexible posts	0.441	0.297
0.01	Traditional or flush buffered bicycle lane	SBL with flexible posts	0.468	0.267
0.05	Traditional bicycle lane	SBL with blend of flexible posts and other vertical elements	0.640	0.203
0.05	Flush buffered bicycle lane	SBL with blend of flexible posts and other vertical elements	0.567	0.253
0.05	Traditional or flush buffered bicycle lane	SBL with blend of flexible posts and other vertical elements	0.602	0.212

Source: <https://highways.dot.gov/media/33856>

REVIEW SUMMARY - EXISTING CONCEPT

Based on the review of the existing concept the following commentary is provided. Overall, while the proposed shared use path is closer to the roadway edge in some locations, its substantially greater width, decrease of high-speed vehicle conflict opportunities, and function as part of the Florida SUN Trail, the shared use path provides safety and usability benefits that exceed those of the existing narrow on-road bike lanes.

Qualitatively the proposed concept converts a physically separated sidewalk to a path with no separation with the roadway. This increased the opportunity for inexperienced users to travel off the sidewalk and directly into the roadway. In the existing condition the physical separation between the edge of vehicle travel lanes and the sidewalk is 6 feet, and in the proposed this is reduced to 2 feet.

Quantitatively, it is determined that crash risks cannot be fairly quantified using industry practices. Given there is already bicycle and pedestrian facilities present along the corridor, reconfiguring the bicycle lanes and sidewalks is not providing new travel paths that were not previously provided. Given this is a recreational community, it is assumed that bicycles will still use the sidewalk on the west side of the road, meaning installing the SUP is not expected to consolidate all bicycle conflicts to one facility. However, the multimodal usage is predicted to increase with better connectivity to adjacent SUN trail networks. Removing the bicycle lanes from the roadway has a documented crash reduction factor, however it's only applicable if the bicycle lanes are then separated horizontally and vertically. In the proposed typical section, the SUP is flush with the edge of roadway

In summary, it is recommended that the SUP be reimagined with a lateral separation of at least 2-ft from the edge of the travel lanes. This provides physical and visual separation between vehicle and bicycle/pedestrian modes of travel.

KEY FINDINGS & DESIGN SUGGESTIONS

- Constructing the shared use path completes key segment in the planned Florida SUN Trail network and East Coast Greenway, adding to long-distance continuity that will have a regional and statewide impact.
- Based on the corridor's context classification and speed limit, the proposed facility is evaluated as an Urban Side Path in accordance with FDOT FDM Chapter 224, and the associated Urban Side Path design criteria govern the assessment of the proposed typical section. This designation provides more lenient clear zone and separation criteria.
- As currently proposed, the concept does not meet all FDOT design criteria for an SUP or Urban Side Path. The typical section should be revised to provide a minimum 2-ft separation between the back of curb and the edge of the shared use path, consistent with FDM Chapter 224, with greater separation provided where right-of-way allows.

PREDICTIVE CRASH ANALYSIS OF REVISED CONCEPT:

Based on the review of the proposed typical it was determined there is no known predictive methodology for analyzing the proposed typical. In response, it was determined to perform predictive analysis with a typical section that meets standard spacing between roadway and shared use path facilities.

This **quantitative review below assumes that the SUP design will be revised to incorporate separation between the back of curb and the edge of the SUP**. The FDM criteria requires at least a 2-ft separation between the two.

- **Bike-Ped Crashes Predicted Crashes**
 - Design – Remove traditional bicycle lane and install with vertical separation on SUP
 - Crash Modification Factor:- CMF of 0.64
 - Impact: **Potential to reduce vehicle-bicycle crashes by 36% crashes.**

- **Non Bike-Ped Crash Types Predicted Crashes**
 - Design - Increase lane width and reduce shoulder.
 - Crash Modification Factor: A combined CMF of $0.77 \times 1.05 = \text{CMF} = 0.81$.
 - **Impact: Potential to reduce vehicle crashes by 19%.**

Key Findings of Predictive Analysis for Revised Typical Section (increased separation between road and SUP)

- Removing the bicycle lanes from the roadway and adding a vertically separated facility is estimated reduce bicycle crashes by 36%.
- Changes to the roadway typical section is estimated to reduce vehicle crashes while increasing safety and access to a variety of travel modes and users to the facility.

STUDY CONTACT

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407-806-4233




Unless stated otherwise assume crash was occurred in daylight on dry surface conditions

Crash Types	
	Bicycle
	Pedestrian
	Head-On
	Angle
	Animal
	Left-Turn
	Off-Road
	Right-Turn
	Rollover
	Rear-End
	Sideswipe

Crash Severity	
Fatal	Serious Injury
Abbreviations	
FTY	- Failure To Yield
FDI	- Failure to Decelerate at Intersection
TFFC	- Too Fast For Conditions

SR-A1A (Beach Blvd) from SR-A1A to Pope Rd - Ped and Bike Crash Summary


 Sheet No.
 1

System: St Johns County
Data Date: 1/1/21-4/24/26
Drawn By: AtkinsRéalis (AS)
Drawn Date: 4/27/26



Crash Types	
	Bicycle
	Pedestrian
	Left-Turn
	Head-On
	Angle
	Animal
	Rollover
	Off-Road
	Rear-End
	Right-Turn
	Sideswipe

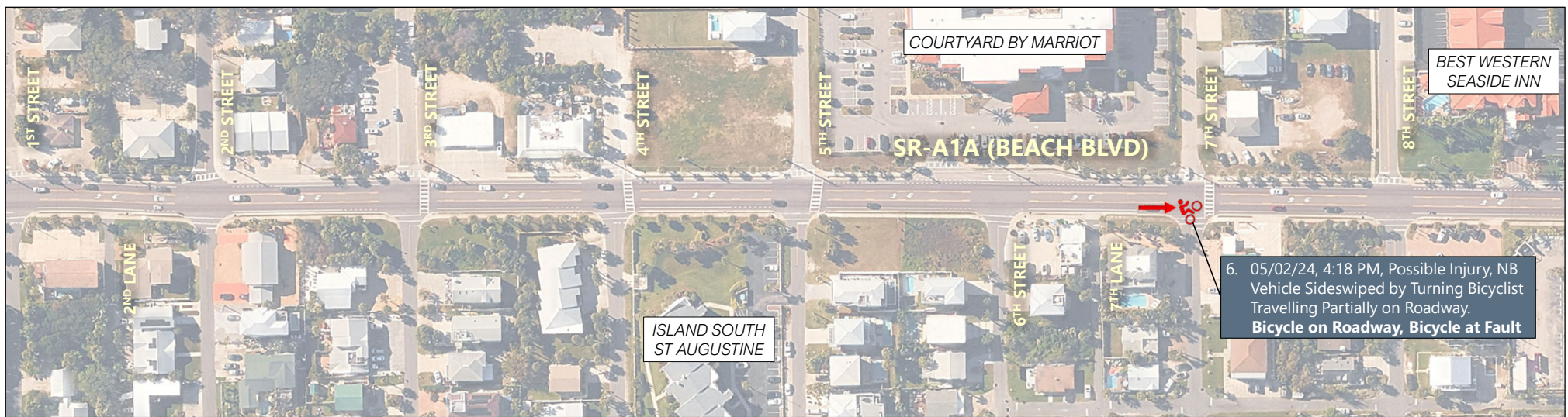
Crash Severity	
Fatal	Serious Injury

Abbreviations
 FTY - Failure To Yield
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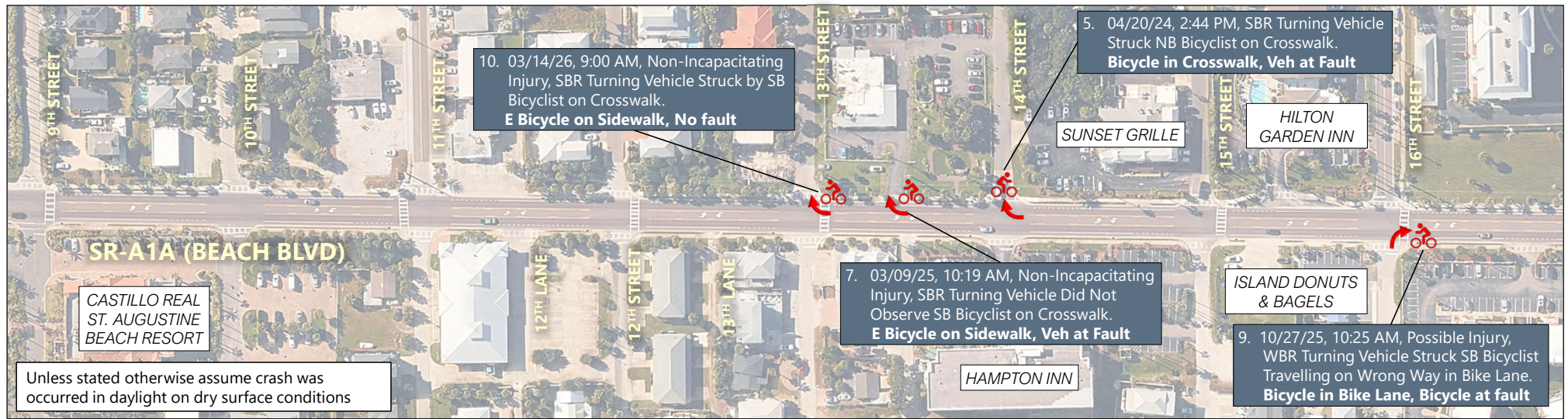
SR-A1A (Beach Blvd) from SR-A1A to Pope Rd - Ped and Bike Crash Summary

Sheet No.
2

System: St Johns County
Data Date: 1/1/21-4/24/26
Drawn By: AtkinsRéalis (AS)
Drawn Date: 4/27/26



6. 05/02/24, 4:18 PM, Possible Injury, NB Vehicle Sideswiped by Turning Bicyclist Travelling Partially on Roadway.
Bicycle on Roadway, Bicycle at Fault



10. 03/14/26, 9:00 AM, Non-Incapacitating Injury, SBR Turning Vehicle Struck by SB Bicyclist on Crosswalk.
E Bicycle on Sidewalk, No fault

5. 04/20/24, 2:44 PM, SBR Turning Vehicle Struck NB Bicyclist on Crosswalk.
Bicycle in Crosswalk, Veh at Fault

7. 03/09/25, 10:19 AM, Non-Incapacitating Injury, SBR Turning Vehicle Did Not Observe SB Bicyclist on Crosswalk.
E Bicycle on Sidewalk, Veh at Fault

9. 10/27/25, 10:25 AM, Possible Injury, WBR Turning Vehicle Struck SB Bicyclist Travelling on Wrong Way in Bike Lane.
Bicycle in Bike Lane, Bicycle at fault

Unless stated otherwise assume crash was occurred in daylight on dry surface conditions

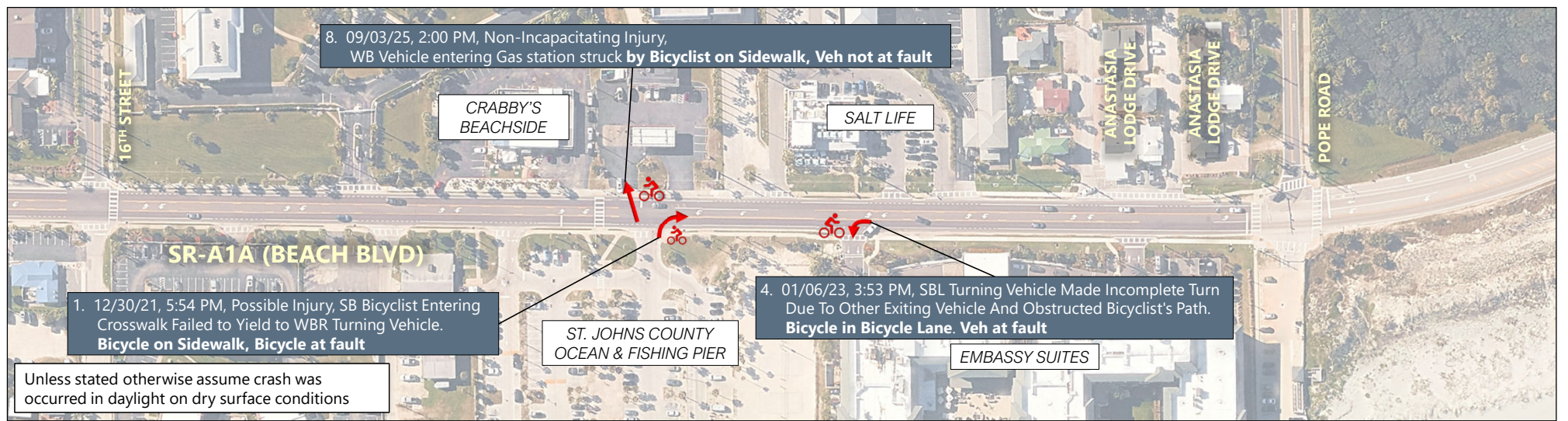
Crash Types			
	Bicycle		Animal
	Pedestrian		Rollover
	Head-On		Rear-End
	Angle		Sideswipe
	Left-Turn		Off-Road
	Right-Turn		

Crash Severity	
Fatal	Serious Injury

Abbreviations
 FTY - Failure To Yield
 FDI - Failure to Decelerate at Intersection
 TFFC - Too Fast For Conditions

SR-A1A (Beach Blvd) from SR-A1A to Pope Rd - Ped and Bike Crash Summary

	System: St Johns County
	Data Date: 1/1/21-4/24/26
	Drawn By: AtkinsRéalis (AS)
	Drawn Date: 4/27/26
Sheet No. 3	



Unless stated otherwise assume crash was occurred in daylight on dry surface conditions

Crash Type	Ped/Bike Related Crashes (Mapped)
Pedestrian	1
Bicyclist	9

Crash Types

- Bicycle
- Pedestrian
- Head-On
- Angle
- Animal
- Left-Turn
- Off-Road
- Right-Turn
- Rollover
- Rear-End
- Sideswipe

Crash Severity
Fatal **Serious Injury**

Abbreviations
 FTY - Failure To Yield
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SR-A1A (Beach Blvd) from SR-A1A to Pope Rd - Ped and Bike Crash Summary

Sheet No.
4

System: St Johns County

Data Date: 1/1/21-4/24/26

Drawn By: AtkinsRéalis (AS)

Drawn Date: 4/27/26