

## ROAD SAFETY AUDIT REPORT

### SR-5/SR-A1A/US-1 (BROADWAY AVENUE) FROM 45<sup>TH</sup> STREET TO 59<sup>TH</sup> STREET

#### Palm Beach County, Florida

Section Number: 93 020 000

Mile Posts: 11.429 To 12.127

Safety Review FM No. 429650-2-32-01

Task Work Order No. 79

Prepared for:

Florida Department of Transportation, District 4

Prepared by:

Tindale Oliver



August 2019



## Engineers Certification

---

I, W.T Bowman, P.E. #69132, certify that I currently hold an active Professional Engineers License in the State of Florida and am competent through education or experience to provide engineering services in the civil and traffic engineering disciplines contained in this plan, print, specification, or report.

I further certify that this Road Safety Audit (RSA) was prepared by me or under my responsible charge as defined in Chapter 61G15-18.001 F.A.C. and that all statements, conclusions and recommendations made herein are true and correct to the best of my knowledge and ability.

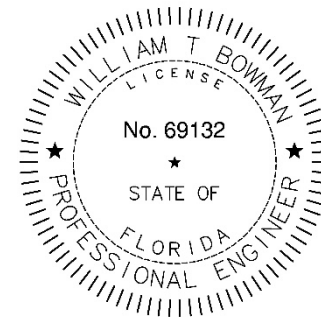
Study Roadway: SR-5/SR-A1A/US-1 (Broadway Avenue)  
From: 45<sup>th</sup> Street  
To: 59<sup>th</sup> Street

Section No: 93 020 000  
Project Mile Post: 11.429 to 12.127

Project Location: Palm Beach County, Florida

This item has been electronically signed and sealed by W. T. Bowman, P.E. on August 23, 2018 using a digital signature.

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.



## Table of Contents

---

Introduction .....	1
Road Safety Audit Process .....	3
Road Safety Audit Purpose .....	3
Road Safety Audit Team Members.....	3
Road Safety Audit Findings .....	4
Study Location .....	4
Key Observations .....	7
Previous Studies.....	7
Crash Data Analysis .....	8
Pedestrian and Bicycle Crashes.....	10
Road Safety Audit Findings Summary .....	13
Responses to Recommendations Summary.....	14
Road Safety Audit Findings Details.....	15

Table 1: Estimated Average Ridership, October 2018 .....	5
Table 2: Crash Summary by Type (2014–2016) .....	8
Table 3: Crash Summary (2014–2016) .....	8
Table 4 Fatal Crash Summary .....	9
Table 5 Incapacitating Crash Summary .....	9
Table 6: Pedestrian-Bicycle Crash Statistics (2014–2016).....	10

Figure 1: Project Location.....	1
Figure 2: Study Area.....	2
Figure 3: Existing Conditions Diagram .....	6
Figure 4: Pedestrian-Bicycle Crash Locations .....	11

Appendix A: Stakeholders Email List

Appendix B: Proposed Zones for Pedestrian Mid-block Crossing Installation

Appendix C: Pre-SRC Meeting Notes



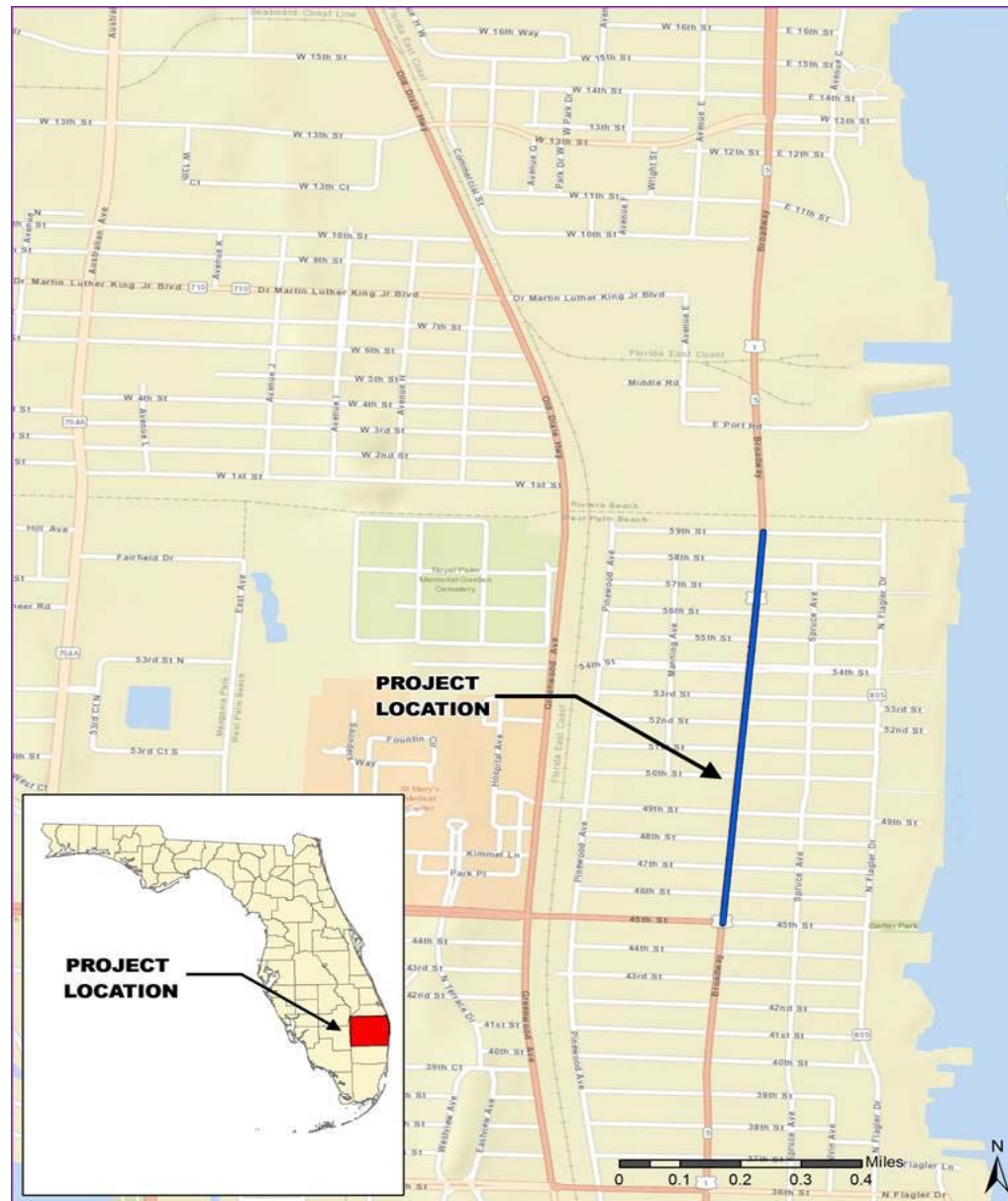


Figure 1: Project Location





Figure 2: Study Area

# Findings

## Road Safety Audit Process

The Federal Highway Administration's (FHWA) Safety Office has established the Roadway Safety Audit (RSA) process as a way to further enhance the overall safety performance of roadways for all users. An RSA is the formal safety performance examination of an existing or future road or intersection by an independent, multidisciplinary team that qualitatively estimates and reports on potential road safety issues and identifies opportunities for improvements in engineering, education, enforcement, and emergency response to improve safety for all road-users.

The goal of an RSA is to provide a low-cost, proactive approach to safety that considers all road users and identifies opportunities to enhance safety and reduce the number and severity of crashes.

A typical RSA consists of the following steps:

1. Identify project or road in service to be audited.
2. Select RSA team.
3. Conduct pre-audit meeting to review project information.
4. Perform field observations under various conditions.
5. Conduct audit analysis and prepare report of findings.
6. Present audit findings to Project Owner/Design Team.
7. Project Owner/Design Team prepares formal response.
8. Incorporate findings into project when appropriate.

## Road Safety Audit Purpose

This RSA was conducted along SR-5/SR-A1A/US-1 (Broadway Street) from 45<sup>th</sup> Street to 59<sup>th</sup> Street in the City of West Palm Beach, Palm Beach County, Florida. Field review was conducted in February 2019, and observations date and time were as follows:

- RSA Team – field observation on February 28, 2019 (10:00 AM–12:00 PM)

The RSA was requested by City of West Palm Beach Vision Zero Coordinator. The safety of the roadway for all transportation users was reviewed; however, the focus of this RSA is crash patterns and driver/pedestrian behavior within the study area, specifically reviewing midblock crossings. This RSA was conducted to:

- Evaluate pedestrian and bicycle activity along the corridor.
- Identify high conflict areas between pedestrians/bicycles and vehicles.
- Evaluate roadway and roadside features, design elements, and local conditions (street parking, sidewalk and bike lane conditions, night visibility, adjacent land uses, etc.) that would increase the likelihood and severity of crashes.
- Review firsthand the interaction of the various design elements with each other and the surrounding road network.
- Observe how roadway users are interacting with the roadway facility and other roadway users.
- Determine if the needs of all roadway users have been adequately and safely met.
- Explore emerging operational trends and/or safety issues at the location.

The objective of this RSA was to answer the following questions:

- What environmental, design, and behavioral elements present potential safety concerns for pedestrians and bicyclists at this location; to what extent, and under what circumstances?
- What engineering, education, and enforcement opportunities exist to eliminate or mitigate identified safety concerns?

## Road Safety Audit Team Members

Tindale Oliver conducted pre-audit coordination with stakeholders to familiarize and engage potential partners on the RSA process and outcomes and to provide participants with an opportunity to exchange information and ideas and ask questions. In addition to the core RSA team, stakeholders in the



## Findings

audit included representatives from the City of West Palm Beach, Palm Beach County, the Palm Beach Transportation Planning Agency (TPA) and FDOT District 4

Specific participants were as follows (email addresses provided in **Appendix A**). Those who attended the field reviews are shown in **bold**.

### Core Road Safety Audit Team Members:

- **W.T. Bowman, P.E.**, Tindale Oliver
- **Abel Espino, E.I.**, Tindale Oliver

### Other Contributing Road Safety Audit Stakeholders:

- **Tara Applebaum**, Vision Zero Coordinator, City of West Palm Beach
- **Khanh Uyen Dang, P.E.**, City Traffic Engineer, City of West Palm Beach
- **Lt. Roy Bevell**, Police Department, City of West Palm Beach
- **Melissa Ackert**, Assistant Director of Traffic Engineering, Palm Beach County
- **Nicolas Hernandez**, TPA Ped-Bike Coordinator, West Palm Beach
- **Adalberto Acuna**, Traffic Safety Program Specialist, FDOT D4
- **Silvana Alvarez**, P.E. Trainee, FDOT D4
- **Michael Miller**, FDOT D4
- **Larry Wallace**, Bike/Ped/Complete Streets Coordinator, FDOT D4
- Thomas Miller, Traffic Operations, FDOT D4

## Road Safety Audit Findings

The RSA Findings Summary lists the location, observation overview, Recommendations, and responsible agency for each observation.

Observations are sorted geographically from south to north or west to east following mile-post convention. Observations and corresponding recommendations are assigned one of three levels of effort categories—Low, Medium, and High:

- “Low” improvements consist of basic improvements such as signs and pavement markings that can generally be done with in-house maintenance forces.
- “Medium” improvements are more involved and can typically be done by pushbutton forces.
- “High” improvements are the most involved in scope, may require right-of-way and public involvement, and typically will require a work program project to complete.

Observations are also assigned one of three time frame categories—Short-Term, Mid-Term, and Long-Term.

- “Short-term” recommendations can take weeks to implement.
- “Mid-term” recommendations can take months to implement.
- “Long-term” recommendations can take years to implement.

The observations and corresponding recommendations are grouped into spot observations:

- Spot observations relate to one issue at a single location.
- Corridor-wide observations relate to a recurring issue throughout study area.

## Study Location

SR-5/SR-A1A/US-1 (Broadway Avenue) is a four-lane divided roadway that runs north-south. A two-way left-turn (TWLT) center lane is provided for most of the corridor. The posted speed limit is 35 miles per hour (mph).

Signalized intersections within the study limits are at:

- 45<sup>th</sup> Street MP: 11.429
- 49<sup>th</sup> Street (emergency signal only) MP: 11.625
- 54<sup>th</sup> Street MP: 11.891

Sidewalks and street lighting are present on both sides of SR-5/SR-A1A/US-1 (Broadway Avenue). Pedestrian lighting is also provided on both sides.

## Findings

Land use in the vicinity of study area is mostly residential and small business.

Within the study limits and along SR-5/SR-A1A/US-1 (Broadway Avenue) are 5 bus stops in the northbound direction and 5 bus stops in the southbound direction. **Table 1** presents average ridership for the month of October 2018, based on the latest available transit data provided by Palm Tran.

*Table 1: Estimated Average Ridership, October 2018*

Bus Stop Activity	Northbound	Southbound
Boarding	485	864
Alighting	826	485
<b>Total</b>	<b>1,311</b>	<b>1,349</b>

Based on the traffic information from FDOT's Florida Traffic Online Web Application, this section of SR-5/SR-A1A/US-1 (Broadway Avenue) has the following 2017 Annual Average Daily Traffic (AADT):

- 23,500 AADT (PTMS-935090: SR-5/SR-A1A/US-1 (Broadway Avenue) – north of 49th Street, MP 11.666)

An existing conditions diagram of study corridor is shown in **Figure 4**.



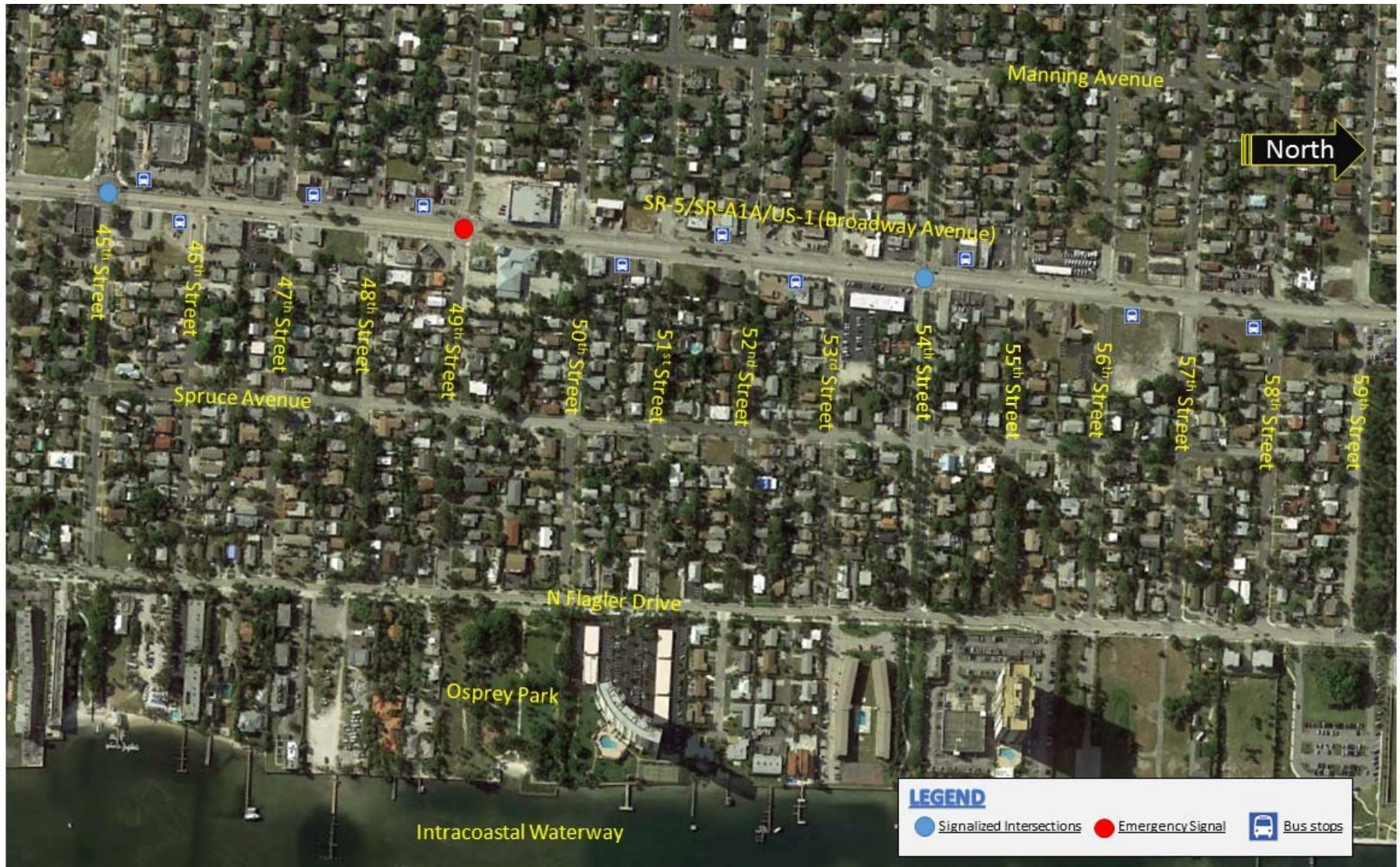


Figure 3: Existing Conditions Diagram



# Findings

## Key Observations

Observations and recommendations are summarized in the RSA Findings Summary. Key general observations that resulted from this review and stakeholder coordination include the following:

- Corridor experiences high pedestrian activity and crossings. Pedestrian groups often include adults with children.
- Pedestrian features (signs and markings) appear to be insufficient along corridor considering observed pedestrian activity.
- Detectable warning surfaces are substandard, and ADA compliance is not consistent throughout study corridor.
- Stakeholders mentioned the following:
  - Vehicular traffic exceeding the posted speed limits throughout the corridor.
  - Only two protected crossings in the entire corridor at 45<sup>th</sup> Street and 54<sup>th</sup> Street.
  - Existing emergency signal at 49<sup>th</sup> Street could be turned into a pedestrian signal/emergency signal or a full signal to provide a protected pedestrian crossing.
  - Demographics of the area generate high pedestrian, bicycle, and transit rider activity. Low car ownership in the area.
  - Review of existing cross-section to include reduce travel lanes to provide bike lanes or shared-use path. In general, create a more comfortable environment for pedestrians.

## Previous Studies

The US-1 Multimodal Corridor Study was conducted in 2017 by the Palm Beach Transportation Planning Agency (TPA). This study explored lane repurposing along the study segment to improve the mobility of all modes of transportation with special focus on pedestrians, bicyclists, and public transit. Details of the proposed recommendations from this multimodal study are included in plan views Section 4 available at <https://www.palmbeachtpa.org/US1>.



## Findings

### Crash Data Analysis

Crash data from January 2014 to December 2016 were extracted from the State Crash Analysis Reporting System (CARS) and Tindale Oliver's Crash Data Management System (CDMS) along SR-5/SR-A1A/US-1 (Broadway Avenue) from 45<sup>th</sup> Street to 59<sup>th</sup> Street. Crash data were reviewed to identify any crash patterns that could be addressed as part of the RSA recommendations. A total of 159 crashes were documented, with predominance of rear-end crashes (56, 35%), followed by angles, (26, 16%) and sideswipes (21, 13%).

**Table 2** shows the overall number of crashes per study year.

*Table 2: Crash Summary by Type (2014–2016)*

SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street		Years			3-Year Total	Severe Crashes	Mean Crashes	%
		2014	2015	2016				
Crash Type	Angle	3	8	15	26	1	8.7	16.4%
	Bike	0	1	2	3	0	1	1.9%
	Pedestrian	2	4	4	10	4	3.3	6.3%
	Rear-end	18	15	23	56	1	18.7	35.2%
	Head-on	0	1	1	2	0	0.7	1.3%
	Left-turn	4	5	5	14	1	4.7	8.8%
	Hit Fixed Object	2	2	2	6	0	2	3.8%
	Right-turn	1	1	1	3	0	1	1.9%
	Sideswipe	2	9	10	21	1	7	13.2%
	Single Vehicle	0	3	0	3	0	1	1.9%
	Backed into	2	3	2	7	0	2.3	4.4%
	Parked Vehicle	2	2	3	7	0	2.3	4.4%
	Other	1	0	0	1	0	0.3	0.6%
	<b>Total</b>	<b>37</b>	<b>54</b>	<b>68</b>	<b>159</b>	<b>8</b>	<b>53.0</b>	<b>100%</b>

**Table 3** shows crash statistics by lighting conditions, surface conditions, and severity.

*Table 3: Crash Summary (2014–2016)*

SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street		Years			3-Year Total	Severe Crashes	Mean Crashes	%
		2014	2015	2016				
Injury Severity	Fatal	1	1	0	2	-	0.7	1.3%
	Incapacitating	2	3	1	6	-	2	3.8%
	Non Incapacitating	3	3	5	11	-	3.7	6.9%
	Possible Injury	4	10	10	24	-	8	15.1%
	None	27	37	52	116	-	38.7	73.0%
	<b>Total</b>	<b>37</b>	<b>54</b>	<b>68</b>	<b>159</b>		<b>53.0</b>	<b>100%</b>
Lighting Condition	Daylight	22	38	46	106	2	35.3	66.7%
	Dawn	1	0	0	1	0	0.3	0.6%
	Dusk	4	2	3	9	1	3	5.7%
	Dark-Lighted	10	14	19	43	5	14.3	27.0%
	<b>Total</b>	<b>37</b>	<b>54</b>	<b>68</b>	<b>159</b>	<b>8</b>	<b>53.0</b>	<b>100%</b>
Surface Conditions	Dry	21	47	62	130	7	43.3	81.8%
	Wet	5	7	6	18	1	6	11.3%
	Unknown	11	0	0	11	0	3.7	6.9%
	<b>Total</b>	<b>37</b>	<b>54</b>	<b>68</b>	<b>159</b>	<b>8</b>	<b>53.0</b>	<b>100%</b>

As shown in **Table 2 and 3**, the total number of crashes increased over the study period. There were 53 crashes during dark/dusk/dawn lighting conditions (33%), which is higher than the five-year districtwide average of 31 percent for nighttime crashes. Crashes during wet pavement conditions totaled 18 (11%), which is below five-year districtwide average of 19 percent.

Based on the crash severity, of the total 159 crashes, 6 (4%) were incapacitating and 2 (1%) were fatalities. **Table 4** summarizes details of fatal crashes along the corridor. **Table 5** presents statistic summary of incapacitating crashes.

Table 4 Fatal Crash Summary

HWMV Report Number	Date	Location	Day, Time, Lighting	Crash Type	Summary
84820856	8/12/2014	At SR-55/SR-A1A/US-1 (Broadway Avenue) and 50th Street	Tuesday, 03:33 AM, Dark-Lighted	Rear-end	Vehicles 1 (V1) and 2 (V2) traveling southbound. V1 at a high speed rate collided with rear of V2 cause both vehicles to loose control and hit light poles on the west side of the road. Driver of V2 was killed by impact with lighting pole.
85767518	3/6/2015	At SR-55/SR-A1A/US-1 (Broadway Avenue) and 48th Street	Friday, 08:37 PM, Dark-Lighted	Pedestrian	Vehicle 1 (V1) traveling northbound in the outside lane. Pedestrian crossing westbound from northeast corner of intersection. Pedestrian crossed the outside lane in front of a vehicle that stopped for her. Pedestrian continued to the inside lane and stepped into the path of V1. Driver of V1 could not avoid hitting pedestrian who was pronounced dead at trauma center.

Table 5 Incapacitating Crash Summary

SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street		Years			3-Year Total	Mean Crashes	%
		2014	2015	2016			
Crash Type	Angle	1	0	0	1	0.3	16.7%
	Pedestrian	1	2	0	3	1	50.0%
	Left-turn	0	0	1	1	0.3	16.7%
	Sideswipe	0	1	0	1	0.3	16.7%
	Total	2	3	1	6	2.0	100%
Lighting Condition	Daylight	0	2	0	2	0.7	33.3%
	Dusk	1	0	0	1	0.3	16.7%
	Dark-Lighted	1	1	1	3	1	50.0%
	Total	2	3	1	6	2.0	100%
Surface Conditions	Dry	2	2	1	5	1.7	83.3%
	Wet	0	1	0	1	0.3	16.7%
	Total	2	3	1	6	2.0	100%



## Findings

### Pedestrian and Bicycle Crashes

Special emphasis was made on the analysis of pedestrian and bicycle crashes as the primary focus of this RSA study. **Table 6** shows pedestrian and bicycle crash summary per study year.

**Table 6: Pedestrian-Bicycle Crash Statistics (2014–2016)**

SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street		Years			3-Year Total	Severe Crashes	Mean Crashes	%
		2014	2015	2016				
Crash Type	Bike	0	1	2	3	0	1	23.1%
	Pedestrian	2	4	4	10	4	3.3	76.9%
	<b>Total</b>	<b>2</b>	<b>5</b>	<b>6</b>	<b>13</b>	<b>4</b>	<b>4.3</b>	<b>100%</b>
Injury Severity	Fatal	0	1	0	1	-	0.3	7.7%
	Incapacitating	1	2	0	3	-	1	23.1%
	Non Incapacitating	0	1	3	4	-	1.3	30.8%
	Possible Injury	1	1	2	4	-	1.3	30.8%
	None	0	0	1	1	-	0.3	7.7%
	<b>Total</b>	<b>2</b>	<b>5</b>	<b>6</b>	<b>13</b>		<b>4.3</b>	<b>100%</b>
Lighting Condition	Daylight	0	2	1	3	1	1	23.1%
	Dawn	0	0	0	0	0	0	0.0%
	Dusk	0	0	2	2	0	0.7	15.4%
	Dark-Lighted	2	3	3	8	3	2.7	61.5%
	<b>Total</b>	<b>2</b>	<b>5</b>	<b>6</b>	<b>13</b>	<b>4</b>	<b>4.3</b>	<b>100%</b>
Surface Conditions	Dry	1	4	5	10	3	3.3	76.9%
	Wet	1	1	1	3	1	1	23.1%
	Unknown	0	0	0	0	0	0	0.0%
	<b>Total</b>	<b>2</b>	<b>5</b>	<b>6</b>	<b>13</b>	<b>4</b>	<b>4.3</b>	<b>100%</b>

As shown in **Table 5**, there were 13 pedestrian/bicycle crashes distributed at different locations along the selected segment, one resulting in a fatality and three resulting in incapacitating crashes.

A review of pedestrian/bicycle crash data revealed the following:

- According to crash locations, 11 of 13 crashes occurred between 45<sup>th</sup>

Street and 48<sup>th</sup> Street.

- Descriptions of crashes indicated that the majority involved pedestrians crossing SR-5/SR-A1A/US-1 (Broadway Avenue) at mid-block or unmarked crosswalk areas near intersections.
- A total of 10 of 13 pedestrian/bicycle crashes occurred during periods of restricted lighting conditions.

Pedestrian and bicycle crash locations are presented in **Figure 4**.



Figure 4: Pedestrian-Bicycle Crash Locations





Figure 4: Pedestrian-Bicycle Crash Locations (cont.)

## Road Safety Audit Findings Summary

ID	Location Description:	Corridorwide Observation Overview:	Recommendations:	Assigned to:
C01	SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street	High pedestrian activity and pedestrian crossings	Evaluate new cross-section and lane repurposing	FDOT, TPA, City
C02	SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street	High pedestrian activity and pedestrian crossings	Conduct mid-block crossing study	FDOT
C03	SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street	High pedestrian activity and pedestrian crossings	Review installation of refuge islands	FDOT
C04	SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street	Speeding	Conduct a speed study	FDOT
C05	SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street	Crashes during nighttime periods	Conduct study to evaluate street lighting	FDOT/City
C06	SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street	Pedestrian ramps and detectable warning surfaces not to standard	Upgrade pedestrian ramps to current standard	FDOT Maintenance
C07	SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street	Drop curb leading to no driveway, old unused driveways	Review access management along corridor	FDOT

ID	Location Description:	Spot Observation Overview:	Recommendations:	Assigned to:
01	SR-5/SR-A1A/US-1 (Broadway Avenue) at 49th Street	Existing Emergency Signal	Convert emergency only signal to pedestrian actuated signal/emergency signal	FDOT
02	SR-5/SR-A1A/US-1 (Broadway Avenue) at 54th Street	Standard crosswalk markings	Upgrade to Special Emphasis Crosswalk markings	FDOT
03	SR-5/SR-A1A/US-1 (Broadway Avenue) at 54th Street	Pedestrian push button signs not to standard	Upgrade pedestrian push button signs to current standard	FDOT
04	SR-5/SR-A1A/US-1 (Broadway Avenue) at 54th Street and at 45th Street	Lack of pedestrian signs at intersections	Install pedestrian signs	FDOT



## Responses to Recommendations Summary

ID	Location Description:	Corridorwide Recommendation:	Responses to Recommendations:
C01	SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street	Evaluate new cross-section and lane repurposing	Study to be coordinated by City of West Palm Beach with TPA and FDOT Planning Department.
C02	SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street	Conduct mid-block crossing study	FDOT to initiate 3-day crossing counts: <ul style="list-style-type: none"> <li>- Zone 1 between 46th Street and 48th Street</li> <li>- Zone 2 between 50th Street and 52nd Street</li> <li>- Zone 3 between 56th Street and 58th Street</li> </ul> Counts to be presented on aerial showing actual crossing locations. Note number of children, older adults, and persons with disabilities.
C03	SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street	Review installation of refuge islands	Evaluated with results of recommendation C02.
C04	SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street	Conduct speed study	FDOT to initiate speed studies in vicinities of 48th, 52nd, and 57th Streets.
C05	SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street	Conduct study to evaluate street lighting	FDOT to initiate a lighting study from 45th Street to 59th Street. Coordinate with the City on type of lighting features needed as City may request decorative.
C06	SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street	Upgrade pedestrian ramps to current standard	FDOT Traffic Operations to coordinate with Maintenance.
C07	SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street	Review access management along corridor	FDOT to initiate review of necessity of unused drop curbs.

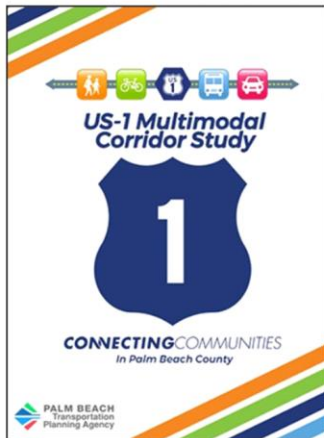
ID	Location Description:	Spot Recommendation:	Responses to Recommendations:
01	SR-5/SR-A1A/US-1 (Broadway Avenue) at 49th Street	Convert emergency-only signal to pedestrian actuated signal/emergency signal	FDOT to investigate feasibility of retrofitting existing emergency signal with typical signal heads and pedestrian signals to convert location to a fully-signalized intersection.
02	SR-5/SR-A1A/US-1 (Broadway Avenue) at 54th Street	Upgrade to Special Emphasis Crosswalk markings	FDOT to install special emphasis markings on asphalt surface only. Restripe crosswalk borders along areas with pavers.
03	SR-5/SR-A1A/US-1 (Broadway Avenue) at 54th Street	Upgrade pedestrian push button signs to current standard	FDOT to upgrade pedestrian push buttons at 45th Street and 54th Street.
04	SR-5/SR-A1A/US-1 (Broadway Avenue) at 54th Street and at 45th Street	Install ground-mounted pedestrian signs R10-15	FDOT to install ground-mounted pedestrian signs R10-15.

## Road Safety Audit Findings Details - Corridorwide Observations

ID	Location Description:	Corridorwide Observation Overview:	Recommendations:
<b>C01</b>	SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street	High pedestrian activity and pedestrian crossings	Evaluate new cross-section and lane repurposing



Example of proposed improvement plans from US-1 Multimodal Corridor Study.



### Corridorwide Observation Details:

Corridor experiences high pedestrian activity and mid-block crossings, including significant presence of children. Land use in area is mostly residential with small neighborhood business mainly located along SR-5/SR-A1A/US-1 (Broadway Avenue). High percentage of residents move through area by walking or bicycling.

City of West Palm Beach is currently proposing complete street improvements with lane elimination on SR-5/SR-A1A/US-1 (Broadway Avenue) from 25th Street to 42nd Street. Additionally, US-1 Multimodal Corridor Study conducted by Palm Beach TPA is proposing lane repurposing along study area. Extensive public outreach has been conducted by City of West Palm Beach and Palm Beach TPA concerning lane repurposing and multimodal use of this corridor.

### Recommendation Details:

Conduct study to review cross-section, existing ROW, and feasibility of lane elimination along study corridor to create more walkable environment within a multimodal projected facility.

Sample cross-sections could include:

- 7' buffered bike lanes with 11' travel lanes and 10' TWLT center lane alternating with refuge islands.
- Wide sidewalk for shared use path with 11' travel lanes, 10' TWLT center lane alternating with refuge islands and on-street parking.

Study to be coordinated by the City of West Palm Beach with TPA and FDOT Planning Department.

<b>Agency:</b>	<b>Improvement Type:</b>
FDOT, TPA, City	Study
<b>Time Frame:</b>	<b>EEE:</b>
Long Term	Engineering
<b>Level of Effort:</b>	<b>Comment:</b>
High	

ID	Location Description:	Corridorwide Observation Overview:	Recommendations:
C02	SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street	High pedestrian activity and pedestrian crossings	Conduct mid-block crossing study
		Corridorwide Observation Details:	
		Corridor experiences high pedestrian activity and mid-block crossings, including significant presence of children. Land use in area is mostly residential with small neighborhood business mainly located along SR-5/SR-A1A/US-1 (Broadway Avenue). High percentage of residents move through area by walking or bicycling.	
		Pedestrians were constantly observed staging in center lane while crossing SR-5/SR-A1A/US-1 (Broadway Avenue) due to absence of sufficient vehicular gaps.	
		Study corridor has only two existing protected crossings in a 3,700-foot stretch of roadway. Existing protected crossings are located at 45th Street and 54th Street.	
		Recommendation Details:	
		Evaluate feasibility of increasing presence of protected mid-block crossings along study area with installation of Rectangular Rapid Flashing Beacons (RRFB). Protected mid-block crossings will encourage pedestrians to use marked crosswalk and reduce number of unprotected mid-block crossings and will encourage vehicles to yield to crossing pedestrians and draw attention to sporadic crossings outside designated areas, also reducing speeding along R-5/SR-A1A/US-1 (Broadway Avenue).	
		Preliminary review and observations throughout the corridor suggest the following candidate zones for installation of protected mid-block crossing:	
		<ul style="list-style-type: none"> <li>- Zone 1: Between 46th Street and 48th Street</li> <li>- Zone 2: Between 50th Street and 52nd Street</li> <li>- Zone 3: Between 56th Street and 58th Street</li> </ul>	
		Guidance for purpose and requirements for installation of RRFB are provided in TEM Chapter 3, Section 3.8. Proposed zones figure is included in Appendix B.	
		Agency:	Improvement Type:
		FDOT	Study, Construction, Pedestrian
		Time Frame:	EEE:
		Mid Term	Engineering
		Level of Effort:	Comment:
		Medium	Best Practice



Pedestrians staging in TWLT center lane.



Example of mid-block crossing with RRFB and lighting.  
Excerpt from TEM Figure 3.8-2.

ID	Location Description:	Corridorwide Observation Overview:	Recommendations:
C03	SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street	High pedestrian activity and pedestrian crossings	Review installation of refuge islands



Group of pedestrians staging in TWLT center lane while crossing mid-block.



Pedestrian waiting to cross at an unmarked location at 46<sup>th</sup> Street. Looking east.

#### Corridorwide Observation Details:

Corridor experiences high pedestrian activity and mid-block crossings, including significant presence of children. Land use in area is mostly residential with small neighborhood business mainly located along SR-5/SR-A1A/US-1 (Broadway Avenue). High percentage of residents move through area by walking or bicycling.

Pedestrians were constantly observed staging in center lane while crossing SR-5/SR-A1A/US-1 (Broadway Avenue) due to absence of sufficient vehicular gaps.

#### Recommendation Details:

Evaluate installation of refuge islands in existing TWLT center lane outside existing or proposed designated pedestrian crossing locations. Review access management in corridor and evaluate current utilized access points. Consider locations near bus stops when feasible.

Refuge island will provide safer staging areas for sporadic mid-block pedestrians crossings and will discourage speeding among drivers and use of TWLT center lane to occasionally avoid through lanes traffic.

Evaluate with results of recommendation C02.

Agency:	Improvement Type:
FDOT	Construction, Pedestrian
Time Frame:	EEE:
Mid Term	Engineering
Level of Effort:	Comment:
Medium	



ID	Location Description:	Corridorwide Observation Overview:	Recommendations:
C04	SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street	Speeding	Conduct a speed study



Pested speed limit along corridor is 35 mph.



Example of speed feedback sign arrangements.

#### Corridorwide Observation Details:

Although not measured, vehicles appear to travel above posted speed limit during free-flow traffic conditions.

Stakeholders expressed concern about speeding and pedestrian activity in corridor.

#### Recommendation Details:

Conduct speed study. If study indicates significant speeding, review for countermeasures (i.e. speed feedback signs) to help reduce vehicular speeds. Consider extending this recommendation to section of SR-5/SR-A1A/US-1 (Broadway Avenue) from 25th Street to 45th street.

Agency:	Improvement Type:
FDOT	Study
Time Frame:	EEE:
Short Term	Engineering
Level of Effort:	Comment:
Low	Best Practice

ID	Location Description:	Corridorwide Observation Overview:	Recommendations:
C05	SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street	Crashes during nighttime periods	Conduct study to evaluate street lighting



Existing street lighting with pedestrian level lighting along study corridor.



Detail of existing lighting assemblies within study corridor.

#### Corridorwide Observation Details:

Stakeholders concerned about existing old lighting infrastructure and high level of pedestrian activity during nighttime hours.

Crash data revealed a higher than District-wide average of crashes occurring during nighttime periods at 33%. In addition, 10 out of 13 pedestrian/bicycle crashes were documented during nighttime hours.

#### Recommendation Details:

Conduct lighting study and evaluate feasibility of upgrading existing lighting to LED. Lighting evaluation must consider high pedestrian activity in area.

Coordinate with the City on type of lighting features needed as the City may suggest decorative.

Agency:	Improvement Type:
FDOT/City	Study, Pedestrian
Time Frame:	EEE:
Short Term	Engineering
Level of Effort:	Comment:
Low	

ID	Location Description:	Corridorwide Observation Overview:	Recommendations:
C06	SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street	Pedestrian ramps and detectable warning surfaces not to standard	Upgrade pedestrian ramps to current standard



Typical curb ramp with substandard detectable warning surface along corridor.



Substandard detectable warning surface at 52<sup>nd</sup> Street. Looking north.

#### Corridorwide Observation Details:

Pedestrian ramps and detectable warning surfaces at several locations throughout corridor do not meet current FDOT standards.

#### Recommendation Details:

Upgrade pedestrian ramps and detectable warning surfaces to current FDOT standards.

Guidance for detectable warning surface and sidewalk curb ramps design criteria is provided in FDOT Standard Plans Index 522-002.

<b>Agency:</b>	<b>Improvement Type:</b>
FDOT Maintenance	Construction, Pedestrian
<b>Time Frame:</b>	<b>EEE:</b>
Short Term	Engineering
<b>Level of Effort:</b>	<b>Comment:</b>
Medium	Best Practice

ID	Location Description:	Corridorwide Observation Overview:	Recommendations:
C07	SR-5/SR-A1A/US-1 (Broadway Avenue) from 45th Street to 59th Street	Drop curb leading to no driveway, old unused driveways	Review access management along corridor



Drop curb/driveway leading to undeveloped parcel.



Drop curb with no access/driveway related.

#### Corridorwide Observation Details:

Some driveways along the corridor appear to be not in use by any current business. Also, drop curbs can cause unsafe and uncomfortable conditions for bicyclists and other non-motorized roadway users, especially pedestrians with disabilities.



#### Recommendation Details:

Conduct detailed study of existing access management utilization along corridor. Evaluate feasibility of reducing driveway density and closing unused drop curbs along sidewalks (reconstruct to accommodate level sidewalk).

Agency:	Improvement Type:
FDOT	Study/Access Management
Time Frame:	EEE:
Short Term	Engineering
Level of Effort:	Comment:
Low	Best Practice



Road Safety Audit Findings Details - Spot Observations

ID	Location Description:	Spot Observation Overview:	Recommendations:
01	SR-5/SR-A1A/US-1 (Broadway Avenue) at 49th Street	Existing Emergency Signal	Convert emergency only signal to pedestrian actuated signal/emergency signal
		<div>Spot Observation Details:</div> <p>Existing signal at this location functions only as emergency signal. This signal could potentially work as pedestrian actuated signal/emergency signal providing a protected pedestrian crossing. Closest pedestrian designated crossings are located 1,070 feet to south at 45th Street and 1,370 feet to north at 54th Street.</p> <p>High pedestrian crossing activity observed in area.</p> <div>Recommendation Details:</div> <p>Evaluate feasibility of retrofitting existing emergency signal to a pedestrian actuated signal/emergency signal. During evaluation process, a full signal installation will be considered.</p>	
<div></div> <div>Existing emergency Signal at 49<sup>th</sup> Street. Looking East.</div>			
<div></div> <div>Existing emergency Signal at 49<sup>th</sup> Street. Looking South.</div>		<div>Agency:</div> <div>FDOT</div> <div>Improvement Type:</div> <div>Signal, Pedestrian</div> <div>Time Frame:</div> <div>Mid Term</div> <div>EEE:</div> <div>Engineering</div> <div>Level of Effort:</div> <div>Medium</div> <div>Comment:</div>	

ID	Location Description:	Spot Observation Overview:	Recommendations:
02	SR-5/SR-A1A/US-1 (Broadway Avenue) at 54th Street	Standard crosswalk markings	Upgrade to Special Emphasis Crosswalk markings



South leg crosswalk markings at 54<sup>th</sup> Street.  
Looking north.



North leg crosswalk markings at 54<sup>th</sup> Street.  
Looking north.

#### Spot Observation Details:

Crosswalk markings on north and south legs of this intersection are standard type and in poor condition.

#### Recommendation Details:

Retrofit crosswalk markings to Special Emphasis on north and south legs. Restripe crosswalk borders along areas with pavers on east and west legs.

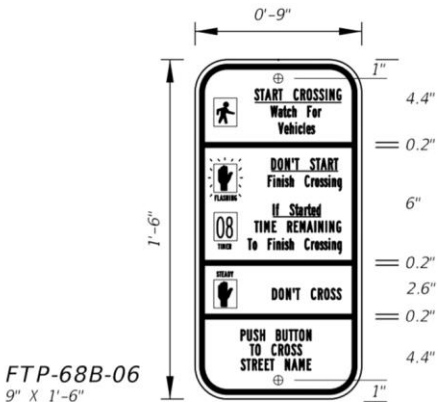
Details of Special Emphasis markings are included in FDOT Standard Plans Index 711-001.

Agency:	Improvement Type:
FDOT	Markings, Pedestrian
Time Frame:	EEE:
Short Term	Engineering
Level of Effort:	Comment:
Low	Best Practice

ID	Location Description:	Spot Observation Overview:	Recommendations:
03	SR-5/SR-A1A/US-1 (Broadway Avenue) at 54th Street	Pedestrian push button signs not to standard	Upgrade pedestrian push button signs to current standard



Substandard pedestrian push button sign at 54<sup>th</sup> Street. Southwest quadrant.



Example of push button sign.  
Excerpt from FDOT Standard Plans, Index 700-102.

Spot Observation Details:



Pedestrian push button signs at different location along corridor do not meet current FDOT standard.

Recommendation Details:

Replace and upgrade pedestrian push button signs.  
Current standard pedestrian push button signs are depicted in FDOT Standard Plans Index 700-102.

Review installing signs in Spanish and English as this area has a high Spanish speaking population.

Agency:	Improvement Type:
FDOT	Signs, Pedestrian
Time Frame:	EEE:
Mid Term	Engineering
Level of Effort:	Comment:
Medium	

ID	Location Description:	Spot Observation Overview:	Recommendations:												
04	SR-5/SR-A1A/US-1 (Broadway Avenue) at 54th Street and at 45th Street	Lack of pedestrian signs at intersections	Install pedestrian signs												
<div><p>R10-15</p></div> <div>Recommended pedestrian signs.</div> <div><p>Northbound approach at 54 Street. Looking north.</p></div>		<div>Spot Observation Details:</div> <p>No pedestrian signs are provided at the two intersections within study area.</p> <p>High pedestrian activity observed at these locations.</p> <p>Crash data showed two crashes involving turning vehicles and bicyclists in crosswalk at 45th Street.</p> <div>Recommendation Details:</div> <p>Install ground-mounted pedestrian signs (R10-15) to warn drivers of pedestrian presence while performing turning movements.</p> <table><tr><td>Agency:</td><td>Improvement Type:</td></tr><tr><td>FDOT</td><td>Signs, Pedestrian</td></tr><tr><td>Time Frame:</td><td>EEE:</td></tr><tr><td>Short Term</td><td>Engineering</td></tr><tr><td>Level of Effort:</td><td>Comment:</td></tr><tr><td>Low</td><td>Best Practice</td></tr></table>		Agency:	Improvement Type:	FDOT	Signs, Pedestrian	Time Frame:	EEE:	Short Term	Engineering	Level of Effort:	Comment:	Low	Best Practice
Agency:	Improvement Type:														
FDOT	Signs, Pedestrian														
Time Frame:	EEE:														
Short Term	Engineering														
Level of Effort:	Comment:														
Low	Best Practice														



---

## Appendix A

### Stakeholders Email List

**Contacts List**

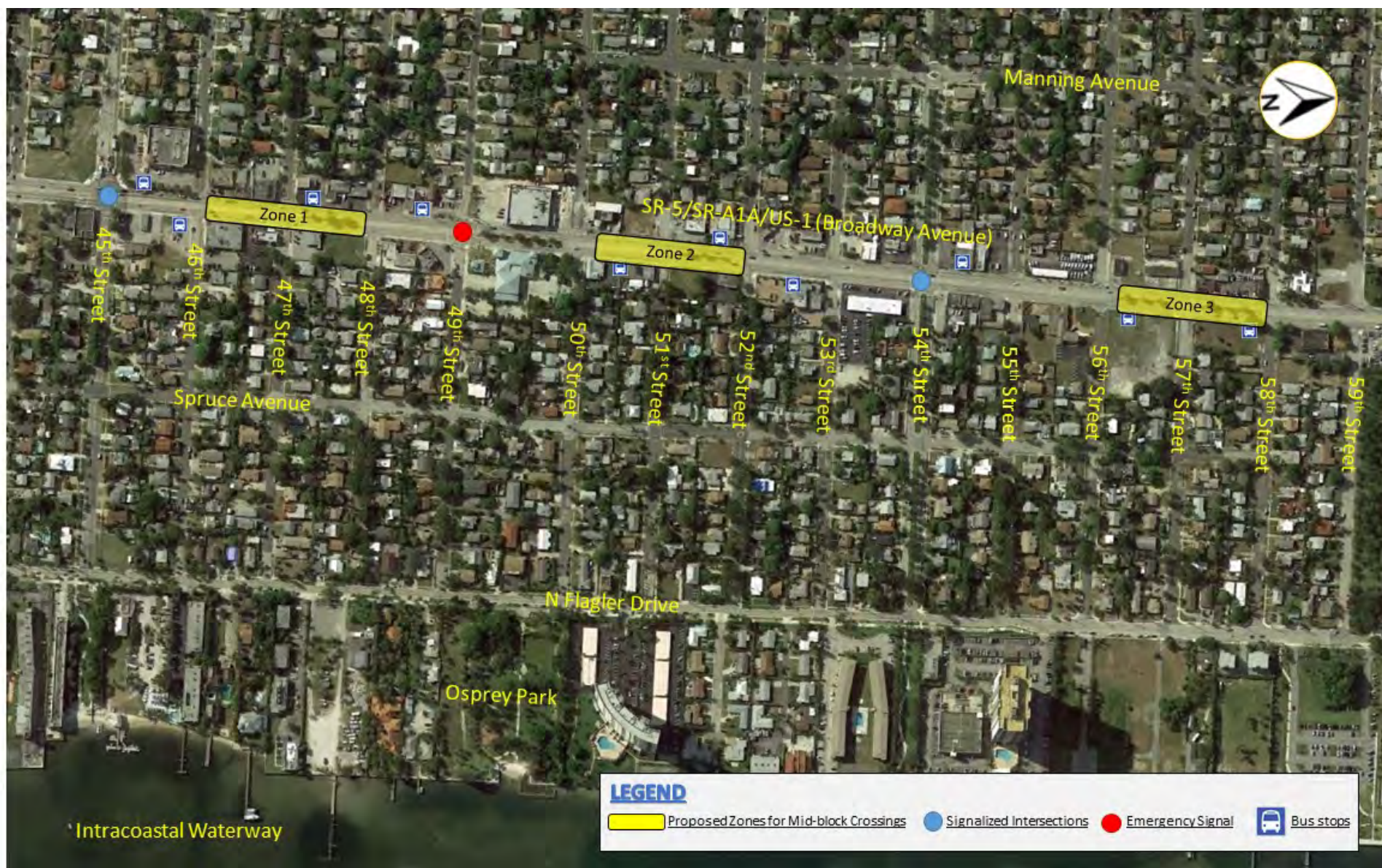
Tom Miller	FDOT, Traffic Operations	<a href="mailto:thomas.miller@dot.state.fl.us">thomas.miller@dot.state.fl.us</a>
Alberto Acuna	FDOT, Traffic Operations	<a href="mailto:Adalberto.Acuna@dot.state.fl.us">Adalberto.Acuna@dot.state.fl.us</a>
Shantia Ware	FDOT, Traffic Operations	<a href="mailto:shantia.ware@dot.state.fl.us">shantia.ware@dot.state.fl.us</a>
Larry Wallace (FDOT OMD)	FDOT	<a href="mailto:larry.wallace@dot.state.fl.us">larry.wallace@dot.state.fl.us</a>
Nicholas Hernandez	Palm Beach TPA, Pedestrian & Bicycle Lead Planner	<a href="mailto:NHernandez@palmbeachtpa.org">NHernandez@palmbeachtpa.org</a>
Melissa Ackert	Palm Beach County, Assistant Director of Traffic Engineering	<a href="mailto:mackert@pbcgov.org">mackert@pbcgov.org</a>
Fadi Nassar	Palm Beach County	<a href="mailto:FNassar@pbcgov.org">FNassar@pbcgov.org</a>
Peter Bieniek	City of West Palm Beach, Director of Public Works	<a href="mailto:publicworks@wpb.org">publicworks@wpb.org</a>
Roberto Travieso	City of West Palm Beach, Public Works Superintendent	<a href="mailto:rtravieso@wpb.org">rtravieso@wpb.org</a>
Kevin Volbrecht P.E.	City of West Palm Beach, Director of Engineering Services	<a href="mailto:kvolbrecht@wpb.org">kvolbrecht@wpb.org</a>
Khanh Uyen Dang P.E.	City of West Palm Beach, City Traffic Engineer	<a href="mailto:kudang@wpb.org">kudang@wpb.org</a>
Tara Applebaum	City of West Palm Beach, Vision Zero Coordinator	<a href="mailto:tapplebaum@wpb.org">tapplebaum@wpb.org</a>
Lieutenant Roy Bevell	City of West Palm Beach , Police Department	
W.T. Bowman P.E.	Tindale Oliver	<a href="mailto:WBowman@tindaleoliver.com">WBowman@tindaleoliver.com</a>
Abel Espino	Tindale Oliver	<a href="mailto:Aespino@tindaleoliver.com">Aespino@tindaleoliver.com</a>

---

## Appendix B

### Proposed Zones for Pedestrian Mid-block Crossing Installation





---

## Appendix C

### Pre-SRC Meeting Notes

## Abel Espino

---

**From:** W.T. Bowman  
**Sent:** Wednesday, July 03, 2019 9:28 AM  
**To:** Xie, Yujing; Miller, Thomas  
**Cc:** Abel Espino  
**Subject:** RE: Broadway Avenue RSA: Meeting Notes

Also,

Please add an 8-hour vehicle and pedestrian count at 49<sup>th</sup> to perform a signal warrant analysis. The pedestrian count should extend from 48<sup>th</sup> to 50<sup>th</sup>.

Sorry I forgot that.

WT

W. T. Bowman, P.E., RSP1  
SOUTHEAST FLORIDA REGIONAL MANAGER  
954.641.5680, ext. 1285



---

**From:** Xie, Yujing <Yujing.Xie@dot.state.fl.us>  
**Sent:** Wednesday, July 3, 2019 9:24 AM  
**To:** W.T. Bowman <W Bowman@tindaleoliver.com>; Miller, Thomas <Thomas.Miller@dot.state.fl.us>  
**Cc:** Abel Espino <AEspino@tindaleoliver.com>  
**Subject:** Re: Broadway Avenue RSA: Meeting Notes

Tom, pls brief Mark the recommendation before WT finalizing the report. Thank you.

Get [Outlook for iOS](#)

---

**From:** W.T. Bowman <[wbowman@tindaleoliver.com](mailto:wbowman@tindaleoliver.com)>  
**Sent:** Wednesday, July 3, 2019 9:02 AM  
**To:** Xie, Yujing; Miller, Thomas  
**Cc:** Espino, Abel  
**Subject:** RE: Broadway Avenue RSA: Meeting Notes

**EXTERNAL SENDER:** Use caution with links and attachments.

Forgot the map. See below

W. T. Bowman, P.E., RSP1  
SOUTHEAST FLORIDA REGIONAL MANAGER  
954.641.5680, ext. 1285



**From:** W.T. Bowman

**Sent:** Wednesday, July 3, 2019 8:56 AM

**To:** Yujing Tracey Xie, P.E. <[Yujing.Xie@dot.state.fl.us](mailto:Yujing.Xie@dot.state.fl.us)>; Miller, Thomas <[Thomas.Miller@dot.state.fl.us](mailto:Thomas.Miller@dot.state.fl.us)>

**Cc:** Abel Espino <[AEspino@tindaleoliver.com](mailto:AEspino@tindaleoliver.com)>

**Subject:** Broadway Avenue RSA: Meeting Notes

Tracey and Tom,

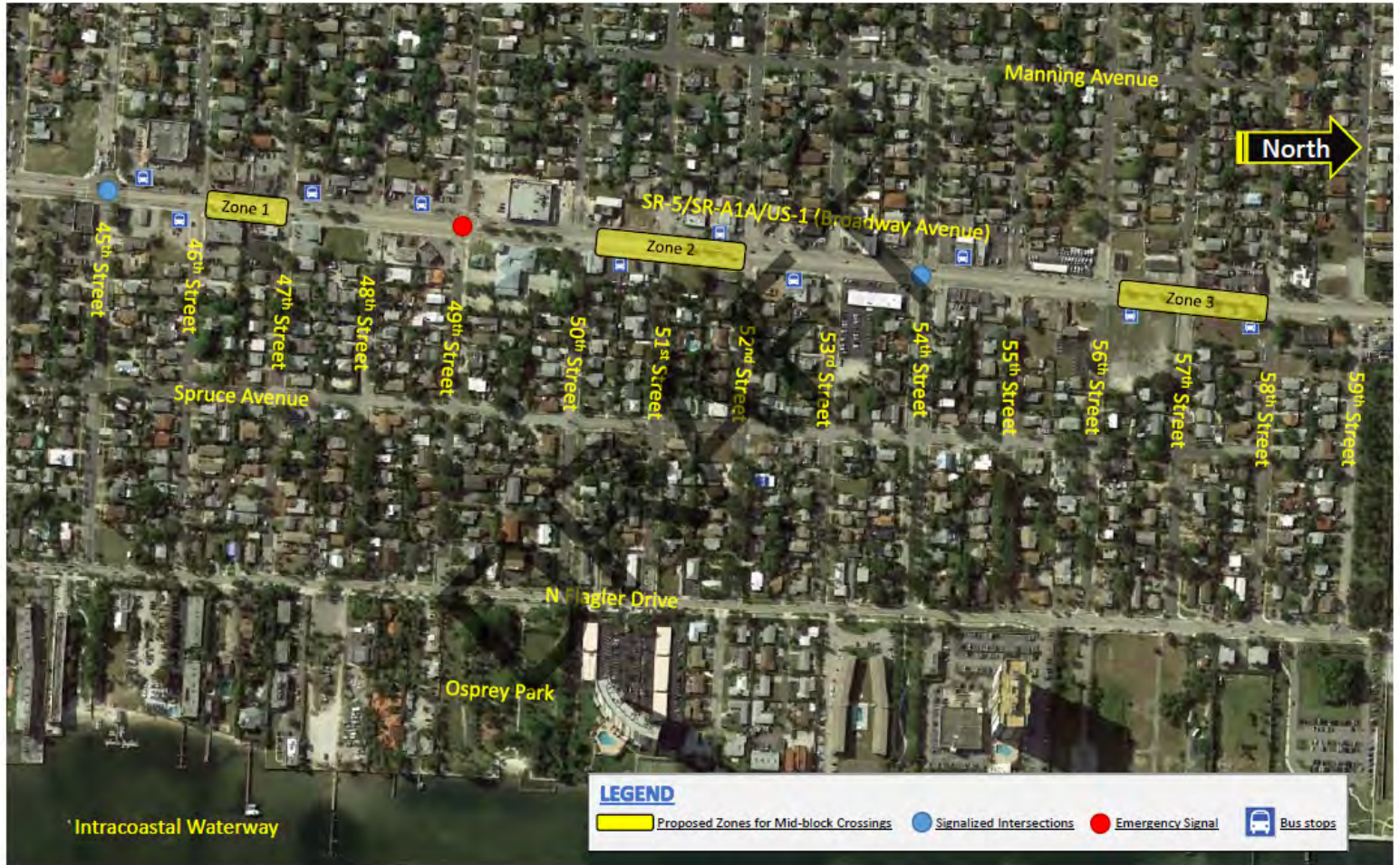
Yesterday's meeting was attended by Tara Applebaum (VZ coordinator) and Lt. Bevell. From FDOT, we had Tracey, Tom, David, and (I didn't get PE Trainee's name, was it Silvia). I did send Tara the draft report as you requested.

If you have nothing to add, beyond these notes, we will finalize the report. Any further action or comments would be documented separately, but not included in this study.

- As Lt. Bevell mentioned, and we mention in the report, this area has low car ownership so walking and biking are the primary mode of travel for a significant amount of the population.
- Lt. Bevell requested RRFB, which will be part of the midblock crossing study
- Lt. Bevell requested in-road lights. We explained that if we determine midblock crossings are warranted, we will coordinate with the City on enhanced treatments
- The lane elimination project is mentioned in our study. Our study will be updated to indicate that initiating would be the responsibility of the TPA, City, and Planning office and is in our report for information only.
- I will make clear in the report that enhancement to striping is mainline only or where there are no pavers. At paver locations, we could enhance the borders only.
- In the field, not in the report, we think the push button at 45<sup>th</sup> (north leg crossing) is malfunctioning. I can send someone to confirm or you can send maintenance to check
- The recommendation for R10-15 signs will be for ground mounted
- An educational component was mentioned but will not be in the report. I can put in the report as the responsibility of Vision Zero, the City, and the TPA.

Per our meeting yesterday, here is what I would suggest:

- Initiate 3-day crossing counts:
  - Zone 1 between 46<sup>th</sup> and 48<sup>th</sup> (one block north of what the image shows)
  - Zone 2 between 50<sup>th</sup> and 52<sup>nd</sup>
  - Zone 3 between 56<sup>th</sup> and 58<sup>th</sup>
  - I would like the counts to be presented on an aerial showing the actual location of the crossings and note the number of children and elderly/disabled. I can send a sample if needed.
- Initiate a lighting study from 45<sup>th</sup> to 59<sup>th</sup>.
  - Note, this study would only document existing. Before actually developing recommendations, I would recommend the City and FDOT and your lighting team meet to discuss the "desired" lighting style as it is likely to be decorative.
- Initiate a speed study in the vicinity of 48<sup>th</sup>, in the vicinity of 52<sup>nd</sup>, in the vicinity of 57<sup>th</sup>
- We could do a review of drop curbs that are at vacant parcels if you like. This would not take much time, but would be separate from the RSA report



W. T.

**W. T. Bowman, P.E., RSP1**

SOUTHEAST FLORIDA REGIONAL MANAGER

ASSOCIATE DIRECTOR OF TRANSPORTATION ENGINEERING AND SAFETY

**Fort Lauderdale**

6301 NW 5<sup>th</sup> Way, Suite 2700

Fort Lauderdale, FL 33309

(954) 641-5680 ext. 1285

[wbowman@tindaleoliver.com](mailto:wbowman@tindaleoliver.com)

[www.tindaleoliver.com](http://www.tindaleoliver.com)



*The information contained in this e-mail and all attachments is confidential and intended only for the use of the recipient. It is not intended for transmission to, or receipt by, any unauthorized person. If you are not the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you are not the intended recipient, please relay to the sender that you have received this communication in error, then delete the e-mail and any attachments. Thank you.*