

DISTRICT 4 ROAD SAFETY AUDIT REPORT

SR-704 (OKEECHOBEE BOULEVARD) FROM VISTA PARKWAY/DEALER CENTER TO STAFFORD AVENUE, EXCLUDES MILITARY TRAIL

SECTION: 93 280 000

MILE POST: 3.388 to 5.500; 5.600 to 5.850

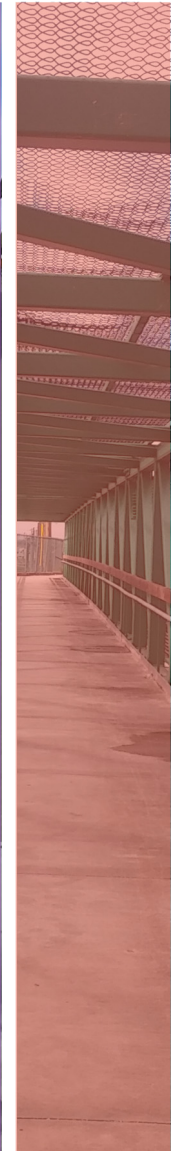
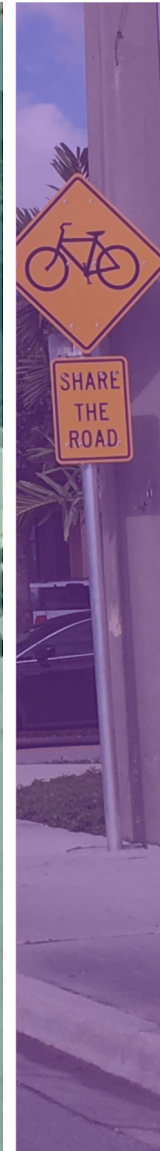
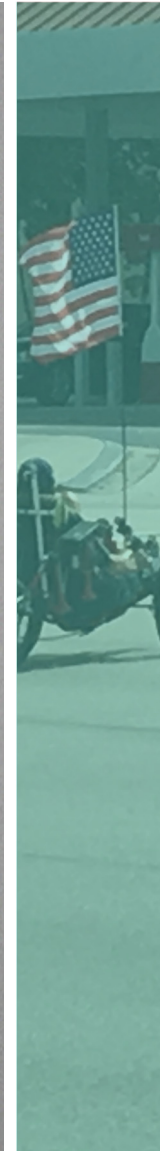
TASK WORK ORDER No. 29

CONTRACT No: C-9E65

FM No. 429650-2-32-01

PREPARED FOR:

FLORIDA DEPARTMENT OF TRANSPORTATION, DISTRICT 4



Engineer's Certification

I, Anthony D. Chaumont, P.E. #72473, 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-704 (Okeechobee Boulevard) from
Vista Parkway/Dealer Center to Stafford Avenue,
excludes Military Trail

Section No: 93 280 000

Project Limits: Milepost 3.388 to 5.500; 5.600 to 5.850

Project Location: West Palm Beach, Palm Beach County

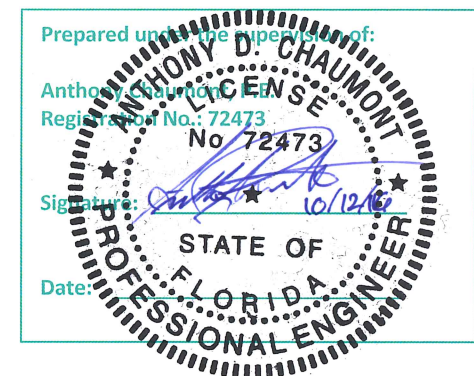


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Project Location

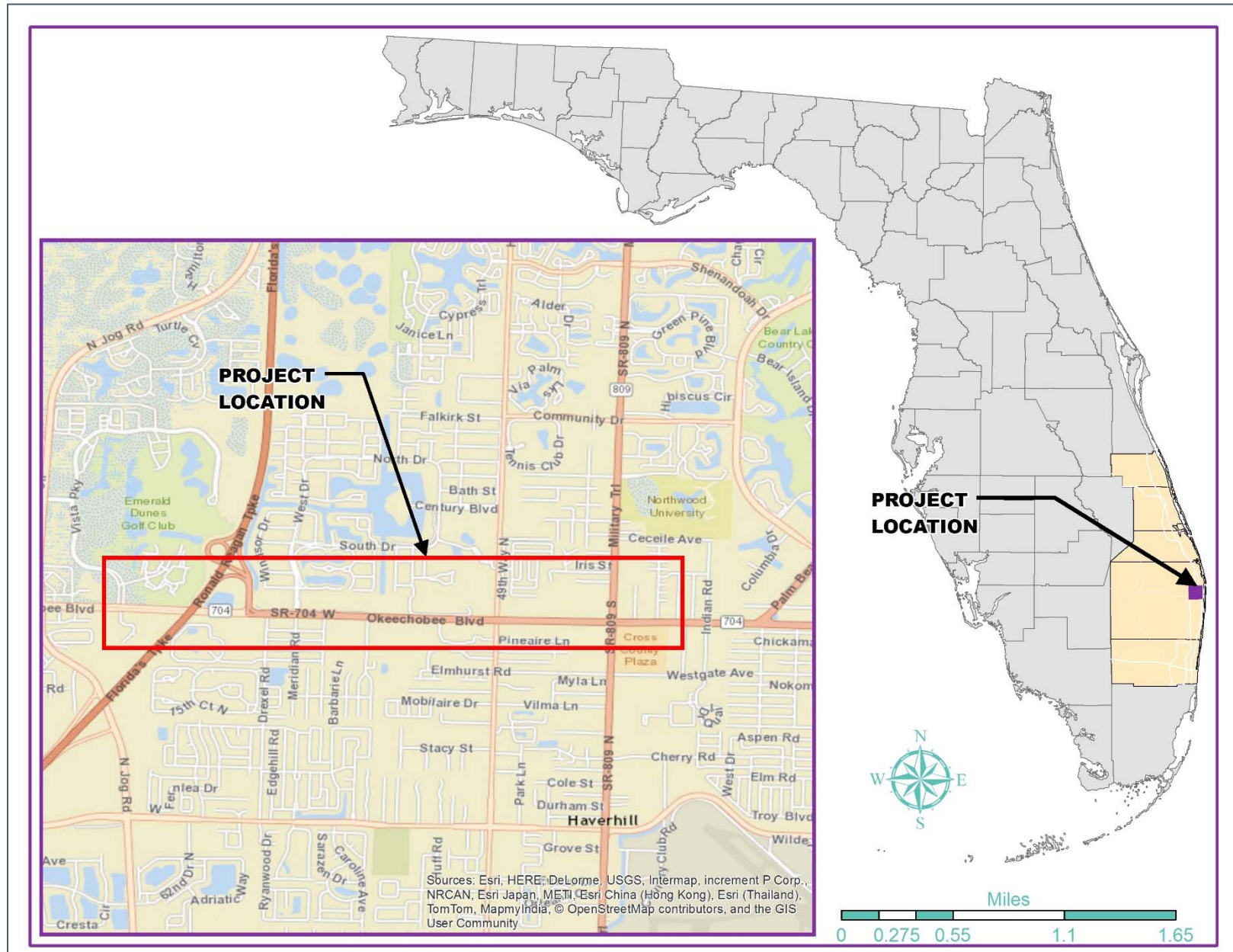


Figure 1: Location Map

Existing Conditions

Road Safety Audit Process

The Federal Highway Administration's (FHWA) Safety Office has established the Road Safety Audits (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. It 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 save money and time and reduce the number and severity of crashes. RSAs are 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 to focus on pedestrian/bicycle safety along SR-704 (Okeechobee Boulevard) from Vista Parkway/Dealer Center to Spafford Avenue, excluding Military Trail. The RSA was a request from Palm Beach County in response to two pedestrian crashes that occurred in a 24-hour period, including a fatality involving a high school student attempting to cross SR-704 (Okeechobee Boulevard).

In response, this RSA along SR-704 (Okeechobee Boulevard) was conducted to:

- Evaluate roadway and roadside features, design elements, and local conditions (glare, night visibility, adjacent land uses, etc.) that would increase the likelihood and severity of a pedestrian and bicycle 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 vulnerable road users have been adequately and safely met.
- Explore emerging operational trends and/or safety issues at that location.
- Focus on improvements that could enhance pedestrian and bicycle safety along the corridor and improve pedestrian and bicycle compliance with traffic control.

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

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

The RSA was conducted on the following days:

- Monday, February 1, 2016, from 10:45 PM to 11:15 PM
- Tuesday, February 2, 2016, from 9:30 AM to 6:00 PM; from 9:00 PM to 10:00 PM

Existing Conditions

Road Safety Audit Team Members and Stakeholder Coordination

Tindale Oliver conducted pre-audit coordination with stakeholders to familiarize and engage potential partners on the RSA process and outcomes and also to provide the participants with an opportunity to exchange information and ideas and to ask questions. In addition to the core RSA team, stakeholders in the audit included representatives from FDOT Traffic Operations, Palm Beach County Traffic Division, Palm Beach MPO, and Palm Tran.

Core Road Safety Audit Team Members

The core RSA members from Tindale Oliver include:

- Anthony Chaumont, P.E., Tindale Oliver
- Kevin Moderie, P.E., Tindale Oliver

Road Safety Audit Stakeholders

The stakeholders who joined the mid-day field review on February 2, 2016, included:

- Motasem Al-Turk, Ph.D., P.E, Palm Beach County Traffic Division, Palm Beach County Assistant Director
- Valerie Neilson, AICP, Palm Beach County MPO Transit Coordinator
- Francheska Taylor, Palm Beach County MPO Bike/Ped/TDM Coordinator
- Anielle Delgado, Palm Beach County MPO Planner I

Various stakeholders from meetings and other correspondence include:

- Maria E. Anaya de Yeats, E.I., FDOT District 4 Bike/Pedestrian Safety Program Specialist
- Yujing "Tracey" Xie, P.E., FDOT District 4 Safety Engineer
- Steve Anderson, AICP, Palm Tran Senior Planner
- Kyle Ventry, Lieutenant, Palm Beach County Fire Rescue

Long-Term Planning Improvements

During the RSA field review with the stakeholders, the MPO provided additional long-term suggestions for the corridor. These improvements are not typical of an RSA. However, these suggestions should be reviewed further when conducting future studies along the corridor:

- Signs were observed creating blind spots at driveways. Give prominence to safety, by encouraging the jurisdiction to reduce visual clutter by implementing stricter sign ordinances.
- Allow traffic to flow off the main system, SR-704 (Okeechobee Boulevard), to reach commercial buildings by constructing a connect slip (service) roads. This treatment would be similar to Palm Beach Lakes Boulevard north of the study corridor between Exchange Court and I-95.
- Encourage the jurisdiction to incentivize developers to create connectivity between parking lots and pursue infill development to improve density.
- Eliminate redundant driveways, as too many access points into plazas make for more conflict zones with pedestrians, bicycles, and vehicles.

Other key findings from correspondence with the remaining stakeholders include the following:

- Lieutenant Kyle Ventry stated that emergency vehicles use the frontage road on the north side of SR-704 (Okeechobee Boulevard) and recommended that it would save on response times if the road extended east to the fire station.

Existing Conditions

Study Corridor

The 2.5-mile study area of SR-704 (Okeechobee Boulevard) (Section 93280000) from Vista Parkway/Dealer Center (Milepost 3.355) to Spafford Avenue (Milepost 5.850), excluding Military Trail, is in unincorporated Palm Beach County. Average annual daily traffic (AADT) ranges from 55,000 (site 930696 at milepost 3.650) to 64,000 (site 937264 at milepost 5.266).

SR-704 (Okeechobee Boulevard) is an east-west 8-lane divided roadway with a speed limit of 50 miles per hour (mph) west of the study area to 700 feet east of Vista Parkway/Dealer Center and 45 mph east for the remainder of the corridor. SR-704 (Okeechobee Boulevard) has 6 signalized intersections and 1 emergency signal from Vista Parkway/Dealer Center to Spafford Avenue. The signalized intersections along the study corridor include:

- Vista Parkway/Dealer Center Milepost 3.388
- Turnpike Access/College Plaza Milepost 3.954

- West Drive/Meridian Road Milepost 4.164
- Fire Station #23 (*emergency signal*) Milepost 4.573
- Haverhill Road Milepost 5.053
- SR-809 (Military Trail) (*not considered*) Milepost 5.564
- Biscayne Boulevard/Cross County Plaza Milepost 5.764

The corridor has sidewalks and corridor street lighting on both sides of SR-704 (Okeechobee Boulevard). Figure 1 on page 1 shows the project location. Figure 2 is an overall aerial of the corridor.

Land Uses

Primarily land uses adjacent to SR-704 (Okeechobee Boulevard) include residential, office, and commercial, as shown in Figure 3. Commercial uses include car dealerships, banks, hotels, high-turnover and sit-down restaurants, shopping, etc.

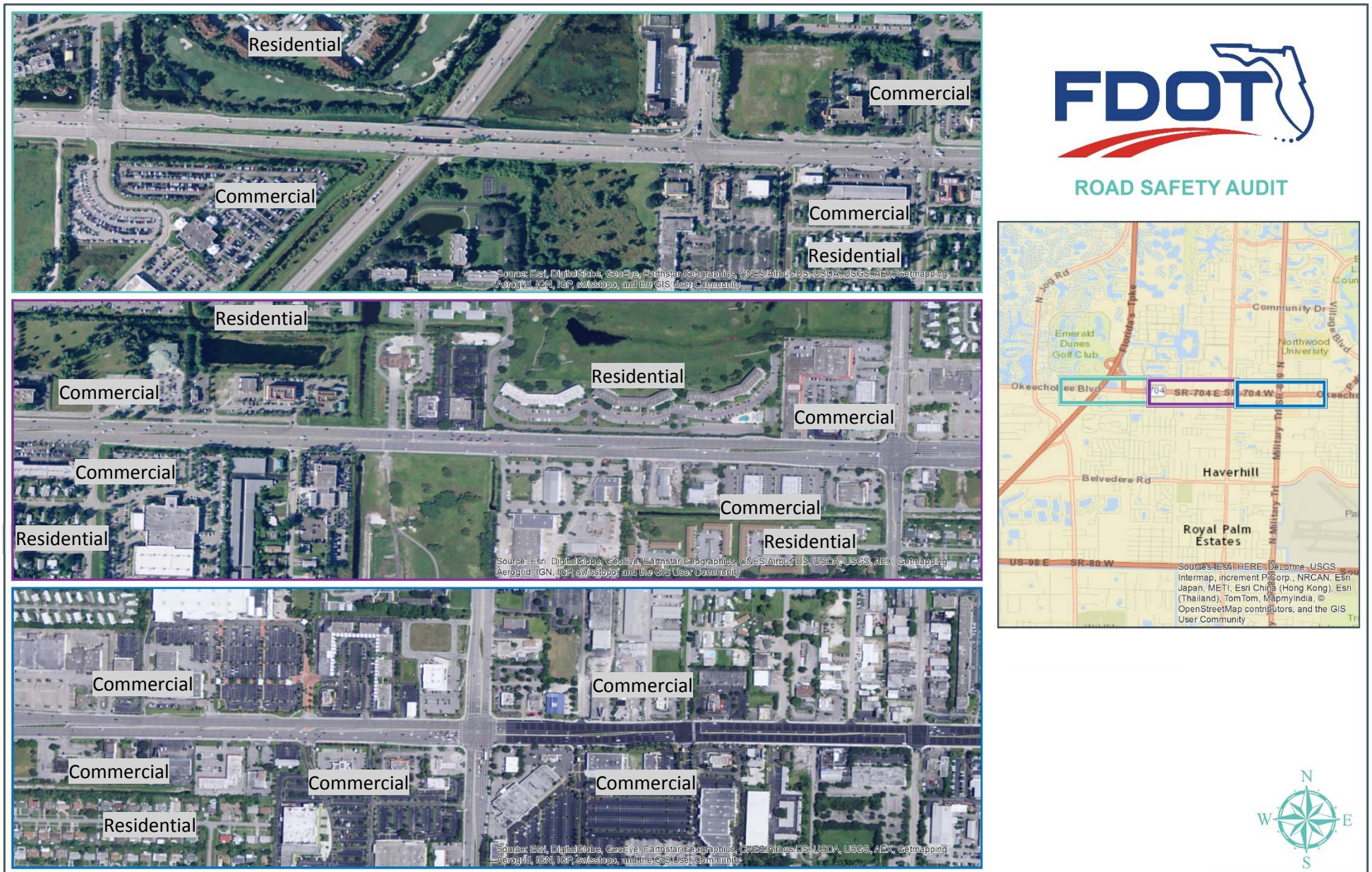


Figure 2: Aerial of SR-704 (Okeechobee Boulevard) from Vista Parkway/Dealer Center to Spafford Avenue

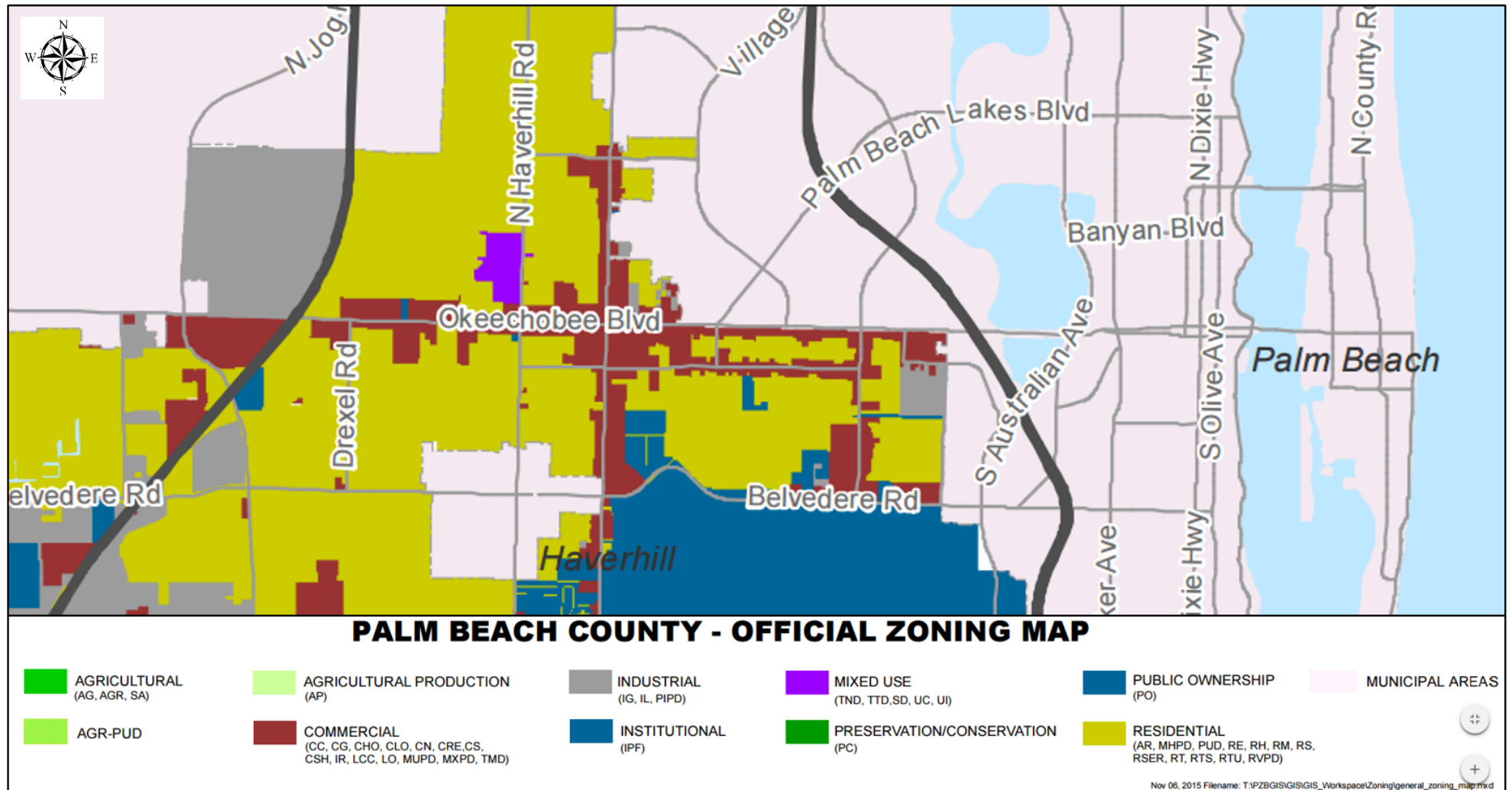


Figure 3: Primary Land Use Map

Existing Conditions

Bus Routes

There are 17 bus stops—9 eastbound and 8 westbound—along the corridor serving routes 3, 4, 33, 43, and 44. The bus routes are depicted in Figure 4.

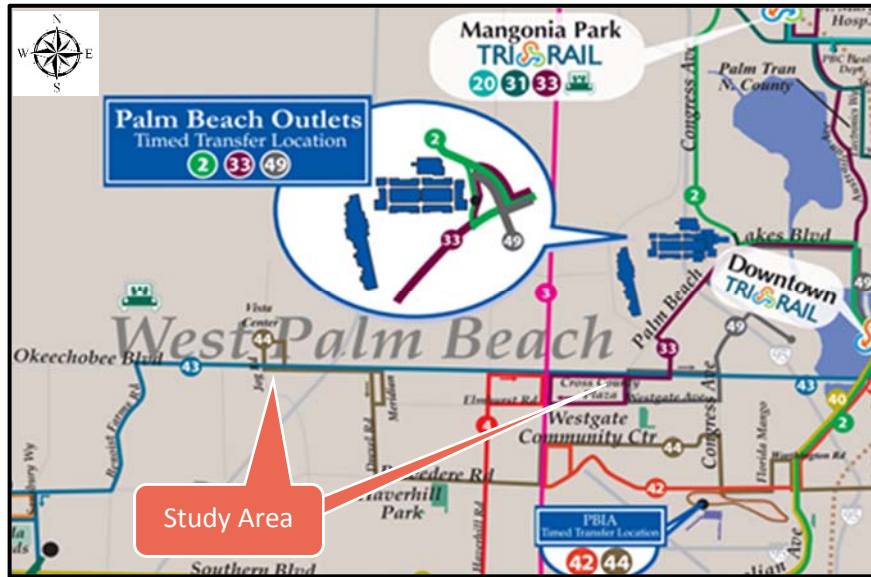


Figure 4: Bus Route Map

Vehicle Volume

Per the FDOT Synopsis Reports, SR-704 (Okeechobee Boulevard) has a range of 47,000–64,000 daily vehicles, with a median of approximately 58,000 daily vehicles. Table 1 summarizes the approach counts from the FDOT Synopsis Reports and the study intersections along the corridor. There are 6 signalized intersections along the corridor and 1 emergency signal for Fire Station #23. The left-turn and right-turn phasing for each signal along with the lane designations are depicted in Figure 5.

Table 1: Approach Volumes

Intersections Along SR-704 Corridor		MP Along SR-704	FDOT Synopsis Reports Along / Near Corridor						
Intersection	Intersection Control		Description	Site ID	AADT	Direction	Daily	AM Peak	PM Peak
		2.778	SR-704 - West of Study Area	937263	58,500	EB	29,425	1,568	3,196
						WB	31,122	3,575	1,963
Vista Parkway/Dealer Center	Signalized	3.388	N/A						
		3.650	SR-704 - West of Turnpike	930696	55,000	EB	29,590	2,875	2,015
						WB	27,700	1,656	2,502
Turnpike Access/College Plaza	Signalized	3.954	Turnpike Ramp - North of SR-704	970994	4,150	NB	N/A		
				970993	4,300	SB			
Drexel Road	Unsignalized	4.038	Drexel Road - South of SR-704	937332	9,400	NB	4,938	381	450
						SB	5,085	475	425
West Drive/Meridian Road	Signalized	4.164	N/A						
Citation Drive/Access Rad	Unsignalized	4.293	N/A						
		4.332	SR-704 - East of Citation Drive	930745	58,500	EB	29,847	2,747	1,967
						WB	30,304	1,477	2,972
Breezy Lane/Access Road	Unsignalized	4.473	N/A						
Fire Station #23	Emergency Signal	4.573	N/A						
Haverhill Road	Signalized	5.053	Haverhill Road - North of SR-704	937008	24,500	NB	12,559	902	1,137
						SB	13,238	919	1,031
		5.266	SR-704 - Just West of Lowe's	937264	64,000	EB	33,544	1,530	3,145
						WB	34,667	3,351	2,343
SR-809 (Military Trail) - NOT STUDIED IN THIS REPORT	Signalized	5.564	SR-809 - North of SR-704	930311	34,500	NB	18,203	1,179	1,534
						SB	18,524	1,055	1,441
			SR-809 - South of SR-704	930455	40,000	NB	21,664	1,287	1,639
						SB	20,462	1,020	1,656
		5.600	SR-704 - East of SR-809	930456	57,500	EB	30,922	2,879	1,786
						WB	29,400	1,489	1,988
Cross County Plaza/Biscayne Blvd	Signalized	5.764	N/A						
Spafford Avenue	Unsignalized	5.850	N/A						
		6.400	SR-704 - East of Study Area	935277	47,000	EB	24,782	1,276	2,340
						WB	25,878	2,289	1,823

AM and PM peak-hour turning movement counts were provided by Palm Beach County. On the following pages, Figure 6 and Figure 7 depict the peak hours for the 6 signalized intersections along the study area of SR-704 (Okeechobee Boulevard).

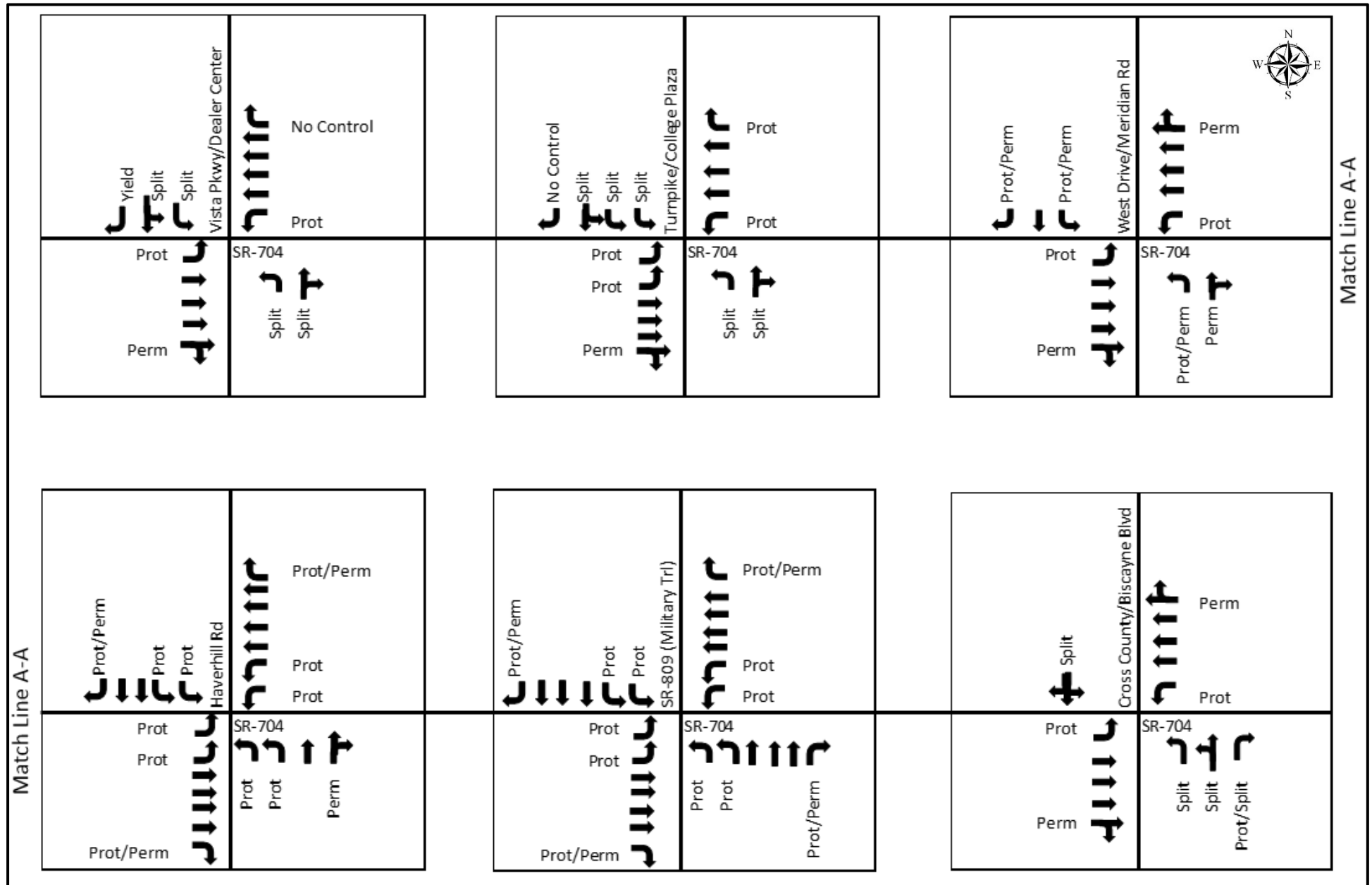


Figure 5: Signal Phasing for Left and Right Turns

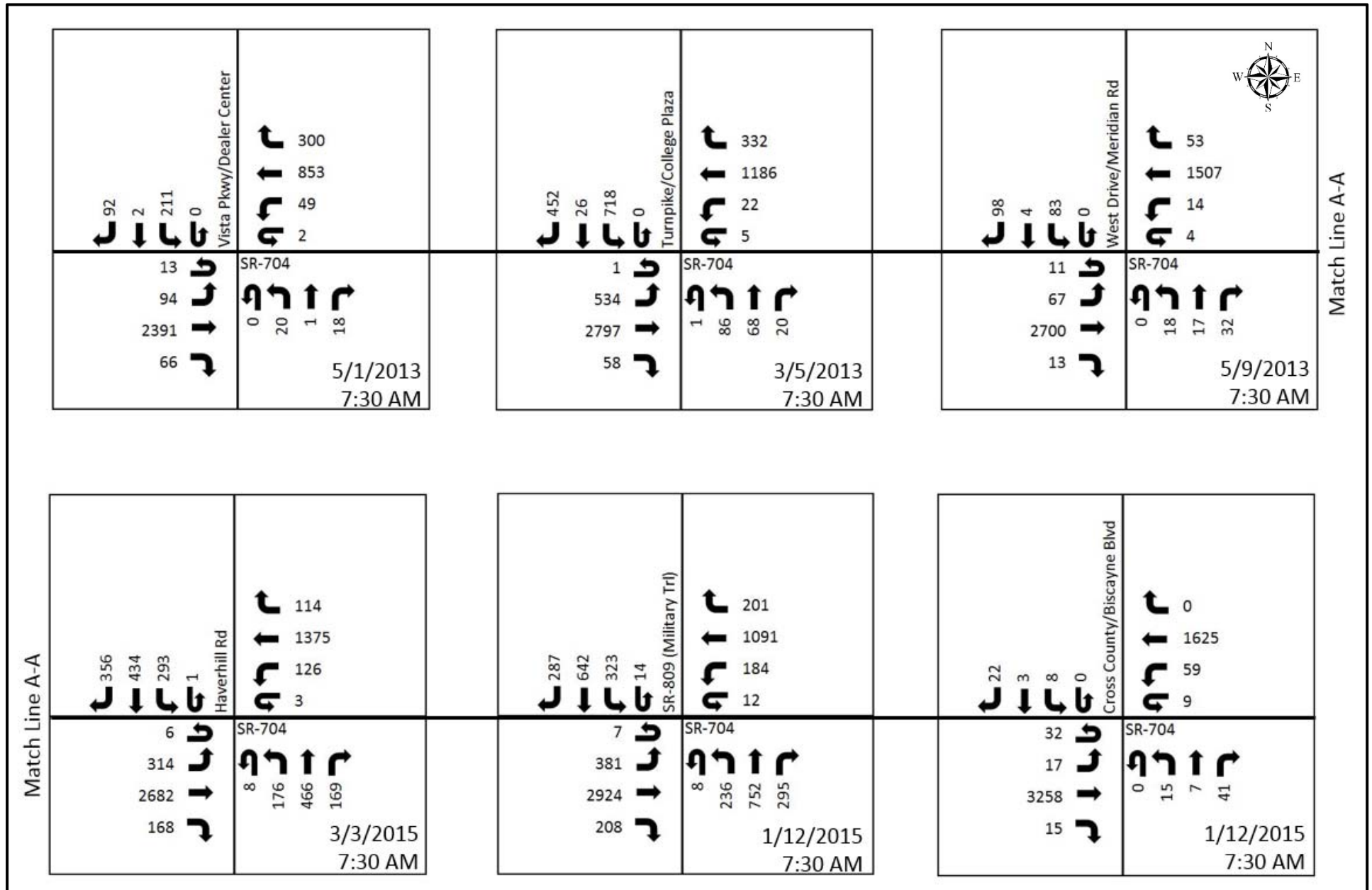


Figure 6: AM Peak Hour

Existing Conditions

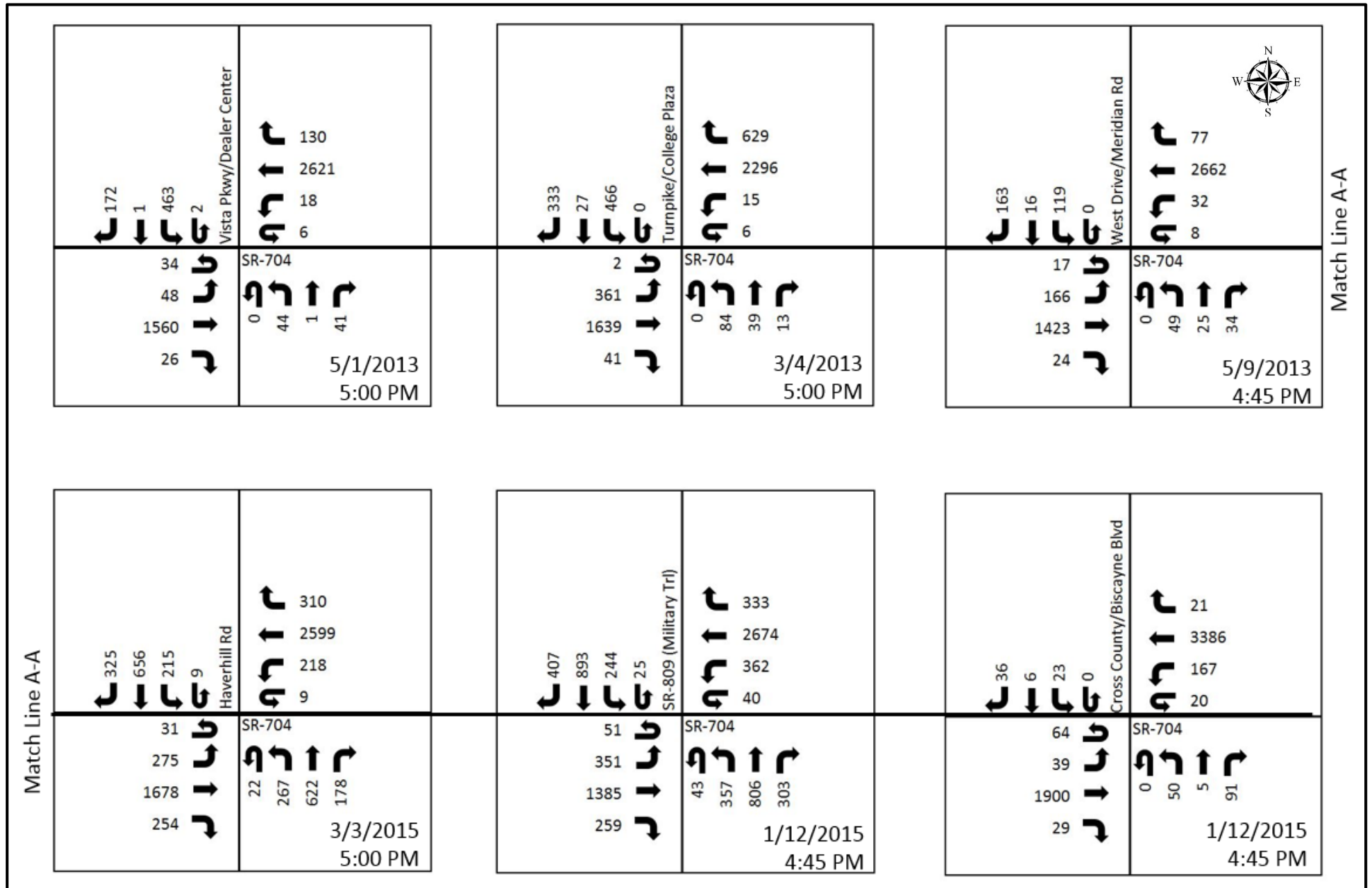


Figure 7: PM Peak Hour

Crash Data

Crash Data Analysis

Crash data from January 1, 2010, to December 31, 2014, extracted from the State's Crash Analysis Reporting System (CARS), were reviewed to identify potential crash patterns that could be addressed as part of the RSA recommendations.

During 2010–2014 analysis period, a total of 66 pedestrian and bicycle crashes occurred along SR-704 (Okeechobee Boulevard) from Vista Parkway/Dealer Center to Spafford Avenue. Table 2 provides the overall number of crashes for the pedestrian and bike crashes by their injury severity. As shown in Table 2 there were 31 pedestrian crashes and 35 bicycle crashes.

Table 2: Crash Distribution for Pedestrian and Bike Crashes

SR-704/Okeechobee Blvd		Number of Crashes					5 Year Total	Mean Crashes	%
		2010	2011	2012	2013	2014			
Crash Type	Bicycle	8	2	8	7	10	35	7	53%
	Pedestrian	5	5	7	10	4	31	6.2	47%
	Total	13	7	15	17	14	66	13.2	100%
Injury Severity	Fatal	2	1	0	1	3	7	1.4	11%
	Incapacitating	0	1	5	2	1	9	1.8	14%
	NonIncapacitating	5	1	1	2	1	10	2	15%
	PossibleInjury	5	2	4	7	5	23	4.6	35%
	None	1	2	5	5	4	17	3.4	26%
	Total	13	7	15	17	14	66	13.2	100%
Lighting Condition	Daylight	9	4	9	15	8	45	9	68%
	Dawn	0	0	0	0	0	0	0	0%
	Dusk	1	0	0	0	0	1	0.2	2%
	Dark-Lighted	3	2	6	1	6	18	3.6	27%
	Dark-Not Lighted	0	1	0	1	0	2	0.4	3%
	Total	13	7	15	17	14	66	13.2	100%
Surface Conditions	Dry	13	7	14	16	14	64	12.8	97%
	Wet	0	0	1	1	0	2	0.4	3%
	Total	13	7	15	17	14	66	13.2	100%

Table 3 provides crash severity and lighting and surface conditions for pedestrian crashes, and Table 4 summarizes bicycle crashes. Table 5

summarizes the 16 severe injury (fatal and incapacitating injury) crashes identified along the study area.

Table 3: Crash Distribution for Pedestrian Crashes

SR-704/Okeechobee Blvd		Number of Crashes					5 Year Total	Mean Crashes	%
		2010	2011	2012	2013	2014			
Injury Severity	Fatal	1	1	0	1	3	6	1.2	19%
	Incapacitating	0	1	4	1	0	6	1.2	19%
	NonIncapacitating	1	1	0	1	0	3	0.6	10%
	PossibleInjury	2	2	1	4	1	10	2	32%
	None	1	0	2	3	0	6	1.2	19%
	Total	5	5	7	10	4	31	6.2	100%
Lighting Condition	Daylight	4	2	3	9	2	20	4	65%
	Dawn	0	0	0	0	0	0	0	0%
	Dusk	0	0	0	0	0	0	0	0%
	Dark-Lighted	1	2	4	1	2	10	2	32%
	Dark-Not Lighted	0	1	0	0	0	1	0.2	3%
	Total	5	5	7	10	4	31	6.2	100%
Surface Conditions	Dry	5	5	7	10	4	31	6.2	100%
	Wet	0	0	0	0	0	0	0	0%
	Total	5	5	7	10	4	31	6.2	100%

Table 4: Crash Distribution for Bike Crashes

SR-704/Okeechobee Blvd		Number of Crashes					5 Year Total	Mean Crashes	%
		2010	2011	2012	2013	2014			
Injury Severity	Fatal	1	0	0	0	0	1	0.2	3%
	Incapacitating	0	0	1	1	1	3	0.6	9%
	NonIncapacitating	4	0	1	1	1	7	1.4	20%
	PossibleInjury	3	0	3	3	4	13	2.6	37%
	None	0	2	3	2	4	11	2.2	31%
	Total	8	2	8	7	10	35	7	100%
Lighting Condition	Daylight	5	2	6	6	6	25	5	71%
	Dawn	0	0	0	0	0	0	0	0%
	Dusk	1	0	0	0	0	1	0.2	3%
	Dark-Lighted	2	0	2	0	4	8	1.6	23%
	Dark-Not Lighted	0	0	0	1	0	1	0.2	3%
	Total	8	2	8	7	10	35	7	100%
Surface Conditions	Dry	8	2	7	6	10	33	6.6	94%
	Wet	0	0	1	1	0	2	0.4	6%
	Total	8	2	8	7	10	35	7	100%

Crash Data

Table 5: Fatal and Incapacitating Injury Pedestrian/Bicycle Crashes

Date	Time	Location	Vehicle Direction	Crash Type	Lighting	Weather	Fatal/ Incapacitating Injury	Surface Conditions	Reviewed?
6/23/2010	8:35 AM	Mid-block; 1,320 feet west of Military Trail	WB	Pedestrian	Daylight	Clear	Fatal	Dry	Pedestrian was crossing northbound and ran through traffic attempting to cross. A westbound vehicle attempted to avoid hitting the pedestrian but was unable to do so.
8/31/2010	8:34 PM	Western crosswalk of Military Trail	EB	Bicycle	Dark-Lighted	Clear	Fatal	Dry	An eastbound vehicle stopped on red and started to travel east on green. Concurrently, a bicyclist was travelling southbound on Military Trail along the crosswalk. As the vehicle was travelling eastbound, the vehicle struck the bicyclist in the crosswalk as the driver did not see the bicyclist due to the other lanes of traffic blocking his view.
4/2/2011	12:19 AM	Just east of eastern crosswalk of Haverhill Road	WB	Pedestrian	Dark-Lighted	Clear	Incapacitating	Dry	A southbound pedestrian was attempting to take his own life by walking southbound through traffic. A westbound vehicle did not see the pedestrian until last second and attempted to stop and avoid the collision but was unable to do so.
6/11/2011	10:35 PM	Just east of eastern crosswalk of Haverhill Road	EB	Pedestrian	Dark-Lighted	Clear	Fatal	Dry	A pedestrian was pan handling for money at the gas station near the intersection. The pedestrian then walked northbound just east of the crosswalk and was struck by an eastbound vehicle. The driver did know they hit the pedestrian and left the scene.
1/9/2012	6:35 PM	South crosswalk of Turnpike	WB	Pedestrian	Dark-Lighted	Clear	Incapacitating	Dry	A westbound vehicle was unable to avoid hitting a southbound pedestrian that ran in front of his vehicle.
1/19/2012	6:10 PM	Mid-block; north along Meridian Road intersection	NB	Pedestrian	Dark-Lighted	Clear	Incapacitating	Dry	An eastbound pedestrian was crossing mid-block and was struck by a northbound vehicle.
4/12/2012	6:45 PM	Mid-block; 80 feet west of Military Trail	WB	Pedestrian	Daylight	Cloudy	Incapacitating	Dry	A southbound pedestrian was crossing mid-block and was struck by a westbound vehicle.
7/14/2012	4:00 AM	Mid-block; 50 feet west of Spafford Avenue	WB	Pedestrian	Dark-Lighted	Clear	Incapacitating	Dry	A southbound pedestrian was crossing mid-block and was struck by a westbound vehicle.
9/16/2012	4:16 PM	West crosswalk of Haverhill Road	EB	Bicycle	Daylight	Clear	Incapacitating	Dry	An eastbound vehicle struck a northbound bicyclist within the crosswalk. The bicyclist was reported as not yielding to the vehicle.
1/22/2013	12:45 PM	Mid-block; 500 feet east of Military Trail	WB	Pedestrian	Daylight	Clear	Incapacitating	Dry	A pedestrian was running northbound and was struck by a westbound vehicle.
3/21/2013	8:01 PM	South crosswalk of Drexel Road	SB Left-turn	Bicycle	Dark-Not Lighted	Clear	Incapacitating	Dry	An eastbound bicyclist was struck by a southbound left-turning vehicle.
10/1/2013	7:42 PM	East crosswalk of Military Trail	SB Left-turn; WB U-turn	Pedestrian	Dark-Lighted	Clear	Fatal	Dry	A southbound pedestrian was not in the crosswalk and was struck by a southbound left turning vehicle. The pedestrian did not yield to the vehicle.
1/4/2014	8:42 AM	Eastern crosswalk of Meridian Road	WB	Pedestrian	Daylight	Clear	Fatal	Dry	A westbound vehicle noticed several other vehicles braking abruptly and decided to change lanes. As he continued westbound he noticed there was a man riding a power chair in the crosswalk travelling southbound. The westbound vehicle attempted to avoid the crash but was unable to do so.
6/7/2014	11:19 PM	Mid-block; 100 feet east of Military Trail	EB	Pedestrian	Dark-Lighted	Cloudy	Fatal	Dry	An eastbound vehicle struck a northbound pedestrian that was mid-block. Traffic was not stopping for the pedestrian and the vehicle and the vehicle that struck the pedestrian did not slow down or stop after hitting the pedestrian.
7/3/2014	9:47 PM	Mid-block; 300 feet west of Meridian Road	WB	Pedestrian	Dark-Lighted	Cloudy	Fatal	Dry	A westbound vehicle in the outside lane hit a northbound pedestrian that crossed in front of the path of the vehicle.
12/7/2014	7:15 PM	East crosswalk of Biscayne Boulevard	EB	Bicycle	Dark-Lighted	Cloudy	Incapacitating	Dry	A southbound bicyclist rode into the path of an eastbound vehicle. The bicyclist was reported as not yielding the vehicle.

Observations and Recommendations

A collision diagram of SR-704 (Okeechobee Boulevard) from Vista Parkway/Dealer Center to Spafford Avenue depicting the 66 pedestrian/bicycle crashes is included in Appendix A. The general locations of pedestrian and bicycle crashes are summarized in Table 6. Mid-block crashes in Table 6 include crashes that were not at a crosswalk and not along cross streets.

Table 6: Pedestrian and Bicycle Crashes by Location

Location			Crashes		
Intersection/Cross Street	Intersection Control/Segment	MP	Pedestrian	Bike	Total
Vista Parkway/Dealer Center	Signalized	3.388	1	0	1
Mid-block segment:	0.566 miles		0	0	0
Turnpike Access/College Plaza	Signalized	3.954	0	2	2
Mid-block segment:	0.084 miles		0	0	0
Drexel Road	Unsignalized	4.038	0	2	2
Mid-block segment:	0.126 miles		2	2	4
West Drive/Meridian Road	Signalized	4.164	3	1	4
Mid-block segment:	0.129 miles		0	0	0
Citation Drive/Access Rad	Unsignalized	4.293	0	3	3
Mid-block segment:	0.180 miles		1	0	1
Breezy Lane/Access Road	Unsignalized	4.473	1	0	1
Mid-block segment:	0.100 miles		0	0	0
Fire Station #23	Emergency Signal	4.573	0	0	0
Mid-block segment:	0.480 miles		2	2	4
Haverhill Road	Signalized	5.053	0	2	2
Mid-block segment:	0.511 miles		14	13	27
SR-809 (Military Trail)	Signalized	5.564	1	5	6
Mid-block segment:	0.200 miles		4	2	6
Cross County Plaza/Biscayne Blvd	Signalized	5.764	0	1	1
Mid-block segment:	0.086 miles		2	0	2
Spafford Avenue	Unsignalized	5.850	0	0	0
Total:			31	35	66

As shown in Table 6, 27 (41%) of crashes occurred between Haverhill Road and SR-809 (Military Trail). These 27 crashes along this segment occurred around the following locations:

- 5 pedestrian crashes just east of the crosswalk at Haverhill Road
- 1 mid-block pedestrian crash near Peppertree Plaza and Lowe's

- 2 pedestrian crashes and 4 bicycle crashes at the directional median at Lowe's driveway and Pine Trail Square.
- 3 pedestrian crashes and 2 bicycle crashes just west of the crosswalk at SR-809 (Military Trail)
- 2 pedestrian crashes and 7 bicycle crashes at various driveways
- 1 pedestrian crash within a parking lot

Observations and Recommendations

The study area of SR-704 (Okeechobee Boulevard) from Vista Parkway/Dealer Center to Spafford Avenue was observed on February 1 and 2, 2016. Key observations from field review include the following:

- Conflicts between pedestrians and right-turns
- Pedestrians walking/running during "DO NOT WALK" phase
- Short pedestrian crossing timings
- Bicyclists and pedestrians crossing midblock
- Bicyclists riding against traffic and along sidewalk

Pedestrian Observations and Recommendations

"USE CROSSWALK" Signs near Signals

The RSA team observed pedestrians crossing mid-block along SR-704 (Okeechobee Boulevard) throughout the study area. Although the crossings did not appear concentrated in any given location during field review, stakeholders identified the areas near Drexel Road and near Century Plaza Median Center (across from Lowe's). A number of crossings also were observed at signalized intersection influence areas.

There is an opportunity to reduce vehicle-pedestrian crashes corridorwide by encouraging pedestrians to use signalized crossings with **R9-3b ("USE CROSSWALK") signs installed at bus stops near signalized crossings and at crash locations near crosswalks**. Note that these signs already have been

Observations and Recommendations

installed at SR-809 (Military Trail) as part of a July 2015 pedestrian safety study.



Figure 8: R9-3b "USE CROSSWALK" Sign

The locations near protected crossings include:

- Bus stop 150 ft west of Vista Parkway
- Bus stop 150 ft east of Florida Turnpike
- Bus stops 240 ft west of Meridian Road/West Drive
- Median at Clinton Drive 640 ft east of Meridian Road/West Drive
- Bus stop 260 ft west of Haverhill Road
- Bus stop 350 ft east of Haverhill Road
- Median at Lowe's driveway 830 ft west of SR-809 (Military Trail)
- Bus stop 250 ft west of SR-809 (Military Trail)
- Bust stop 170 ft west of Biscayne Boulevard/Cross County Plaza

Pedestrian Warning Signs at Signals

Reinforce protected crossing locations by **installing W11-2 ("PEDESTRIAN CROSSING")** with supplemental **W16-9P ("AHEAD")** yellow signs and **W11-2 ("PEDESTRIAN CROSSING")** with supplemental **W16-7P (ARROW)** yellow signs on approach to each signalized crossing as a corridorwide treatment.

Note that these signs already have been installed at SR-809 (Military Trail) as part of a July 2015 pedestrian safety study.



Figure 9: W11-2 Sign



Figure 10: W16-9P Sign



Figure 11: W16-7P Sign



Figure 12: Pedestrian Crossing Sign at Military Trail

Due to the number of pedestrian crossings near signalized intersections, **install R10-15R(a) ("TURNING VEHICLES STOP FOR PEDESTRIANS")** on signalized intersection approaches.

Observations and Recommendations



Figure 13: R10-15 at Military Trail

The signalized approaches include:

- Vista Parkway/Dealer Center
- Turnpike Access/College Plaza (westbound)
- West Drive/Meridian Road
- Haverhill Road
- Biscayne Boulevard/Cross County Plaza

Note that these signs already have been installed at SR-809 (Military Trail) as part of a July 2015 pedestrian safety study.

New Pedestrian Features

The RSA team noted that three signalized intersections have protected crossings on three of four legs:

- East side of Vista Parkway/Dealer Center
- East side of Turnpike Access/College Plaza
- West side of Biscayne Boulevard/Cross County Plaza

As a long-term improvement, consider providing pedestrian features on the missing leg at these locations. Possible constructability issues that would need to be addressed include the guardrail on the south side of Vista Parkway/Dealer Center and the driveway/gutter along the north side of Cross County/Biscayne Boulevard. This improvement would also include installing curb ramps along with pedestrian crossing features.

Pedestrian Markings

Due to the number of pedestrian crashes near and around signalized intersections, **provide special emphasis crosswalk markings at all signalized crossings.**



Figure 14: Special Emphasis Crosswalks at West Drive

The signals that currently have standard crosswalks markings include:

- Vista Parkway/Dealer Center (3 legs)
- Haverhill Road (4 legs)

Channelized Pedestrian Crossings

There are a number of free-flow channelized right-turn lanes at signalized intersections without protected pedestrian crossings. Those locations include:

- Southbound and westbound at Vista Parkway/Dealer Center
- Southbound at Florida Turnpike Access/College Plaza



Figure 15: Pedestrian Crossing at Channelized Right Turn

Due to the number of pedestrian crossings identified at crosswalks corridorwide, **provide MUTCD R1-5b (“STOP HERE FOR PEDESTRIAN”) signs at channelized right turns** to increase driver yielding compliance at free-flow right-turn lanes.



Figure 16: R1-5b “STOP HERE FOR PEDESTRIAN” Sign

In the long term, conduct an operational analysis to determine the feasibility of providing a protected crossing at the signalized intersection crossings. Due to the high turning volume (452 in AM peak) at Florida Turnpike Access/College Plaza, dual right-turn lanes are likely required.

Pedestrian Signal Operation and Curb Ramps

The team noted that the time provided by countdown pedestrian heads was not adequate for crossing. Observed countdown timings for the “DO NOT WALK” phase are summarized in Table 7.

Table 7: Observed Countdown Times

Observed Countdown Times				
Intersection	Crosswalk			
	North	South	East	West
Vista Parkway / Dealer Center	28	16	NA	30
Turnpike Access / College Plaza	17	17	NA	33
West Drive / Meridian Road	27	18	34	33
Haverhill Road	25	25	32	32
SR-809 (Military Trail)	30	30	32	32
Biscayne Boulevard / Cross County Plaza	18	18	24	NA

It is recommended to modify or extend the countdown timings to be equal or greater than the calculated countdown times shown in Table 8.

Table 8: Calculated Countdown Times

Calculated Countdown Times				
Intersection	Crosswalk			
	North	South	East	West
Vista Parkway / Dealer Center	39	21	NA	39
Turnpike Access / College Plaza	25	26	NA	35
West Drive / Meridian Road	29	19	33	33
Haverhill Road	34	27	41	41
SR-809 (Military Trail)	36	36	43	40
Biscayne Boulevard / Cross County Plaza	14	23	34	NA



Figure 17: Countdown Pedestrian Indication

Evaluate signal timing and adjust walk clearance intervals as needed at all signalized intersection crossings.

At all pedestrian signals and curb ramps, the following should be verified during any future maintenance or RRR projects:

- Curb ramps direct pedestrians to the intended crosswalks and have contrasting detectable warning surfaces.
- Pushbuttons follow guidance from 4E.08 of the MUTCD: separate push buttons for each crosswalk, each faces parallel with the intended crosswalk, located on a flat 4-ft surface, 1.5–6 ft (max. 10 ft) from curb, 5-ft maximum from intended crosswalk; follow all other guidance from 4E.08 of the MUTCD.
- Add R10-3a through R10-3i (Pedestrian Crossing) signs where missing as one was observed missing at the northwest pedestrian signal of SR-704 Okeechobee Boulevard at SR-809 (Military Trail).

Rest in Walk

Pedestrians were observed arriving at signalized intersection while walking along SR-704 (Okeechobee Boulevard) after the countdown head displayed “DON’T WALK”; however, enough green time remained on the mainline for a pedestrian crossing. Pedestrians were seen pressing push buttons to cross the side street while all mainline signals were still green and proceeding to cross against the pedestrian indication.

Due to the number of pedestrian crashes at signalized intersections, **consider modifying the signal timings along the corridor to use the “rest in walk” feature for all minor street crossings**, which will help encourage pedestrians to use signalized crossings by maximizing the amount of “WALK” time displayed.

“Rest in walk” is used in vehicle-actuated systems with a variable-duration vehicular green phase. The vehicular phase is either “resting” (with no vehicles detected on conflicting phases) or being extended by approaching vehicles. During the “resting” phase, the parallel concurrent pedestrian phase remains in “WALK.” In the absence of a conflicting call, the “WALK” remains on indefinitely. It is only after a conflicting phase call is detected that the pedestrian change interval “DON’T WALK” phase (flashing orange hand) begins timing.

Signalized Right-Turn Lanes

Conflicts were observed between pedestrians crossing in crosswalks and right-turning vehicles. **Consider conducting a feasibility study of replacing the 5-section signal heads with a 3-section/4-section signal head that would display a solid red/flashing yellow arrow/flashing red arrow.** This improvement would allow for the continued use of a right-turn overlap with the left-turns. **A structural analysis is recommended as 5-section signal heads would be replaced with a 3-section for through lanes and 4-section signal head for right-turn lane. In addition, it is recommended to conduct an**

Observations and Recommendations

educational and enforcement campaign as this improvement is new to the area.

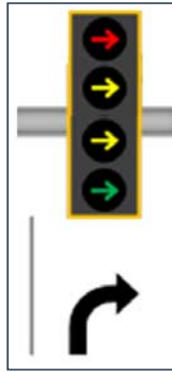


Figure 18: Right-turn Signal Control to be activated by Pedestrians

This improvement can be applied at the following locations that currently already have 5-section signal heads for the right-turn movements:

- Haverhill Road eastbound right-turn lane
- Haverhill Road westbound right-turn lane
- Haverhill Road southbound right-turn lane
- SR-809 (Military Trail) eastbound right-turn lane
- SR-809 (Military Trail) westbound right-turn lane
- SR-809 (Military Trail) northbound right-turn lane
- SR-809 (Military Trail) southbound right-turn lane
- Biscayne Boulevard northbound right-turn lane

Transit

There are 17 bus stops along SR-704 (Okeechobee Boulevard) from Vista Parkway/Dealer Center to Spafford Avenue. Of these, 8 have shelters, 4 have benches, and 5 have no bus features, and 6 stops have bus bays. The features at each bus stop are described in Table 9.

Coordinate with West Palm Beach County Transit (Palm Tran) to consider enhancing bus stops with a bus shelter or bench at bus stops that are missing these features.

Table 9: Bus Stop Features

	Direction	Location	Bus Bay	Features
1	Eastbound	At Vista Parkway	No	Shelter
2	Eastbound	70' east of Turnpike	No	Shelter
3	Eastbound	160' west of Meridian Road	Yes	Bench
4	Eastbound	380' west of Breezy Lane	No	Shelter
5	Eastbound	340' east of fire station	No	None
6	Eastbound	580' west of Haverhill Road	No	None
7	Eastbound	1,060' west of SR-809 (Military Trail)	No	Shelter
8	Eastbound	450' west of SR-809 (Military Trail)	No	None
9	Eastbound	230' west of Biscayne Boulevard	Yes	Shelter
10	Westbound	80' west of Biscayne Boulevard	No	Bench
11	Westbound	130' west of SR-809 (Military Trail)	No	Bench
12	Westbound	1,050' east of Haverhill Road	Yes	Shelter
13	Westbound	180' west of Haverhill Road	No	None
14	Westbound	670' west of Haverhill Road	Yes	Sign
15	Westbound	390' east of fire station	Yes	Bench
16	Westbound	440' west of Breezy Lane	No	Shelter
17	Westbound	160' west of Meridian Road	Yes	Shelter

Mid-block Crossings

Approximately 8 pedestrian/bicycle-related crashes occurred at mid-block in the vicinity of bus stops between 2010 and 2014. The busiest bus stop locations should be identified with Palm Tran's ridership numbers and **pedestrian counts should be conducted at these locations to analyze if there is a need for a mid-block crossing at the most used locations.**

As a long-term improvement for the corridor, **conduct a transit study to review locations that best meet the needs of transit users**, aligning bus stops to create pedestrian funneling for potential pedestrian mid-blocks and relocating bus stops upstream from signals.

Observations and Recommendations

Sight Distance at Driveways

Visibility was limited at driveways, as signs, bushes, and other objects obstruct the visibility of the sidewalk (see Figure 19).



Figure 19: Driveway Sight Obstructions

Ensure that signage, especially large commercial vacancy signs in vehicle sightlines, do not create blind spots when exiting driveways.

Bicycle Observations and Recommendations

Marked Bike Lanes

Marked bicycle lanes are located along SR-704 (Okeechobee Boulevard) from west of the corridor and ending at the Turnpike/College Plaza. The remainder of the corridor has 2–4-ft shoulders (with the exception of a 600-ft section along westbound traffic at the bridge just west of the Turnpike) and key-hole striping at driveways/cross-streets/right-turn lanes.



Figure 20: Existing Bike Lanes along West Side of Corridor

Bicyclists were observed using the pedestrian bridges over Florida's Turnpike as well as sidewalks along the corridor. Note that Palm Beach County does not have an ordinance prohibiting cycling along sidewalks.

Consider a study to determine if bike lanes are feasible throughout the corridor. This study should include the following:

- Reducing lane widths along the corridor for traffic calming and to provide for a bike lane.
- Capacity of SR-704 (Okeechobee Boulevard) to determine if it is feasible to modify the lanes to allow for buffered bike lanes.

Observations and Recommendations

Share the Road Signs

Most of the corridor has an 11-foot outside lane with a shoulder of 2–4 feet. The outside lane and shoulder width varies in width from 10–15 ft wide along the corridor. Per FDOT, 14-ft lanes or wider are wide enough to share between bicyclists and vehicles.

As a short-term improvement along the corridor **where the outside lane and shoulder is 14-ft or wider, consider installing W11-1 (“BICYCLIST WARNING”) and W16-1 (“SHARE THE ROAD”) signs.** Note that these signs already have been installed at SR-809 (Military Trail) as part of a July 2015 pedestrian safety study.

Westbound Overpass Bike Lane

The westbound bike lane narrows for approximately 600 ft along the SR-704 (Okeechobee Boulevard) overpass over Florida’s Turnpike (see Figure 21).

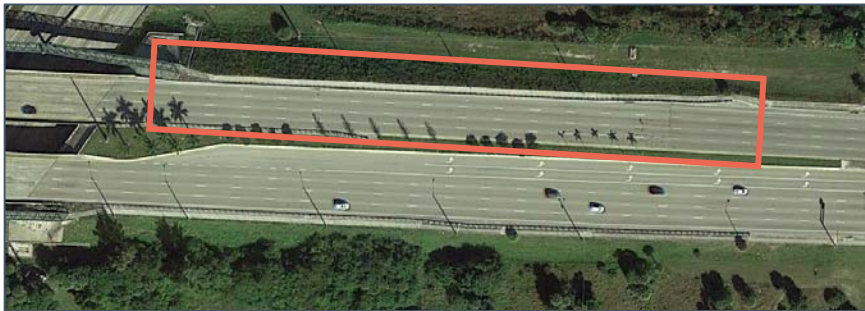


Figure 21: Westbound Overpass Approach Aerial

As shown in Figure 22, “SHARE THE ROAD” (W16-1P) signs currently are provided on the approach to the narrowed segment.

Per FDOT, 14-ft lanes or wider are wide enough to share between bicyclists and vehicles; this location has a 10-ft outside lane. It is recommended that the **“SHARE THE ROAD” sign be removed at this location.**

Per 9B.06 of the MUTCD, with the exception of limited-access roadways, every travel lane is also a bikeway. Bicyclists may legally take the lane without special signs or markings needed where travel lanes are too narrow for bicyclists and motor vehicles to operate side by side. **Consider providing R4-11 (“BICYCLISTS MAY USE FULL LANE”) signs.**



Figure 22: Westbound Approach to Overpass

Additionally, in the short-term, **provide a curb cut and ramp east of the guardrail to provide a choice for cyclists to cross along the pedestrian overpass in lieu of traversing along through lanes with vehicles. Consider striping a Bike Symbol on the ramp and providing R9-3/R9-3a (NO PEDESTRIAN CROSSING) signs to discourage pedestrians from using the ramp and leaving the sidewalk.** Note that typically fast-moving cyclists are not recommended to use sidewalks as motorists are not expecting them; however, along this bridge there are no vehicular conflict points, there are minimal pedestrians, and the sidewalk width is approximately 8-ft wide.

In the long term, evaluate the feasibility of narrowing the westbound through lanes to provide a continuous bike lane westbound across the overpass.

Observations and Recommendations

Green Bike Lane

Conflicts were observed around the Turnpike interchange and cyclists, as vehicles from the Turnpike crossed the path of bicyclists. Per 8.4.2.2 of the *Plans Preparation Manual* (PPM), green color in a bicycle lane is permitted on the State Highway System when both of the following conditions exist:

1. A traffic conflict area (“keyhole”) exists at one of the following locations:
 - Bike lane crosses a right-turn lane
 - Traffic in a channelized right-turn lane crosses a bike lane
 - Bike lane is adjacent to a dedicated bus bay
2. A need for this treatment is demonstrated by either of the following:
 - History of 3 or more motor vehicle-bicycle crashes exists at or adjacent to the traffic conflict area over the most recent three-year period
 - Government agency has observed and documented conflicts between bicyclists and vehicles at an average rate of two per peak hour

Due to higher vehicular volume and observed conflicts at the Turnpike off-ramp, **provide green color bicycle lanes at this location**. Note that there is not a trend of bicycle crashes at this location at this time.

Bicycle “RIDE WITH TRAFFIC” and “WRONG WAY” Signs

Ten bicycle crashes were the result of bicyclists traveling contraflow on the sidewalk or bike lanes along the SR-704 (Okeechobee Boulevard). This crash type is typically the result of drivers looking left for adequate gaps in traffic upstream and not expecting approaching bicycle traffic from the sidewalks/shoulders from the right. To encourage bicyclists to travel with traffic, **install R9-3Cp (“RIDE WITH TRAFFIC”) and R5-1b (“BICYCLES WRONG WAY”) signs**, as shown in Figure 23.



Figure 23: MUTCD “RIDE WITH TRAFFIC” (R9-3Cp) and “BICYCLES WRONG WAY” (R5-1b) Signs

Vehicular Observations and Recommendations

Florida’s Turnpike Approaches

The Turnpike interchange is located east of the overpass on the north side of SR-704 (Okeechobee Boulevard). To an unfamiliar driver, it may not be apparent that both northbound and southbound on-ramps are on the north side of SR-704 (Okeechobee Boulevard). Rear-end and sideswipe crashes were identified on approach to the Turnpike Access/College Plaza signal.

Provide “TURNPIKE LEFT LANES” advance signs on the eastbound approach between Vista Parkway/Dealer Center and Turnpike overpass. Additionally, provide “TURNPIKE RIGHT LANES” signs westbound west of Meridian Road/West Drive. Provide in-pavement Turnpike shields on the eastbound left-turn lanes and westbound right-turn lane to reinforce their use.



Figure 24: In-road Shield

Additionally, due to the number of through lanes along SR-704 (Okeechobee Boulevard), **provide a W3-3 ("SIGNAL AHEAD") warning sign on the outside shoulder in addition to the existing sign provided along the median;** note that right-of-way is limited here on account of the overpass.



Figure 25: Eastbound "SIGNAL AHEAD" signs

Florida's Turnpike Signal

All four off-ramps and on-ramps to and from the Turnpike are located on the north side of SR-704 (Okeechobee Boulevard); at night, particularly if there are no southbound drivers, an eastbound driver turning left from the inside left-turn lane can turn too tightly into the southbound lanes.

Extend the inside yellow edgeline with optional dotted lane extension markings, per MUTCD Figure 3B-13. Additionally, provide a R4-7c ("KEEP RIGHT") sign on the median nose on the north side of Turnpike signal.



Figure 26: R4-7c "KEEP RIGHT" Sign



Figure 27: Eastbound Left Turn at Florida's Turnpike

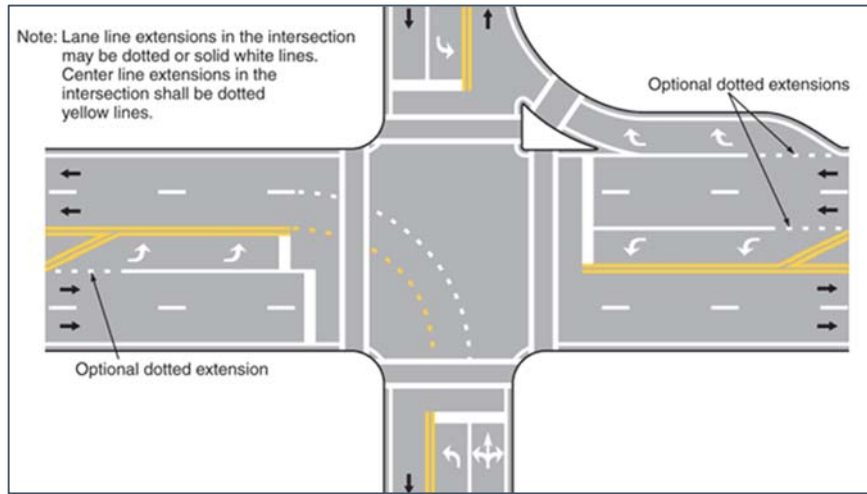


Figure 28: MUTCD Figure 3B-13D

Lighting

Roadway lighting is a critical component of roadway safety and should be designed to provide adequate illumination for all roadway users. Many factors affect roadway lighting, such as location, orientation, intensity, color, ambient light, etc., and its effectiveness in increasing safety. New research on the placement of lighting in relationship to crosswalks is summarized in FHWA's "Informational Report on Lighting Design for Midblock Crosswalks."

Figure 29 provides an example of preferred lighting locations. Currently, the FDOT Central Office is working to develop standards for crosswalk luminance which, once finalized, can be used to design lighting enhancements where needed.

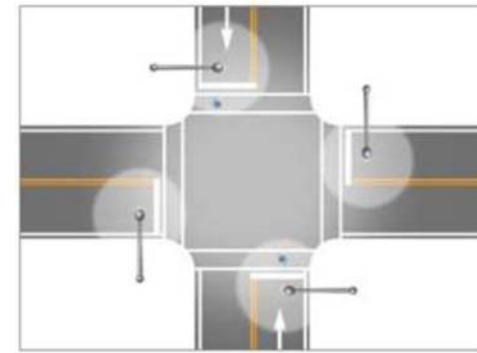


Figure 29: Intersection Lighting Layout Design

Generally, lighting along SR-704 (Okeechobee Boulevard) is spaced at approximately 180-200 ft. 293 (23%) of the overall 1,295 crashes occurred during nighttime conditions. As shown Figure 30, during night reviews, most of the corridor and intersection quadrants appeared to be well-lit.



Figure 30: SR-704 (Okeechobee Boulevard) during Night Observations

However, at SR-704 (Okeechobee Boulevard) and Vista Parkway lighting is spaced at 240 ft and there is a darker area along the north side of the intersection on the 70-ft median. A nighttime pedestrian crash occurred on

Observations and Recommendations

the west side of this intersection. As a **long-term improvement, consider conducting a feasibility study to determine appropriate lighting type and location(s) of installing additional lighting at or near the median along the north side of Vista Parkway.**

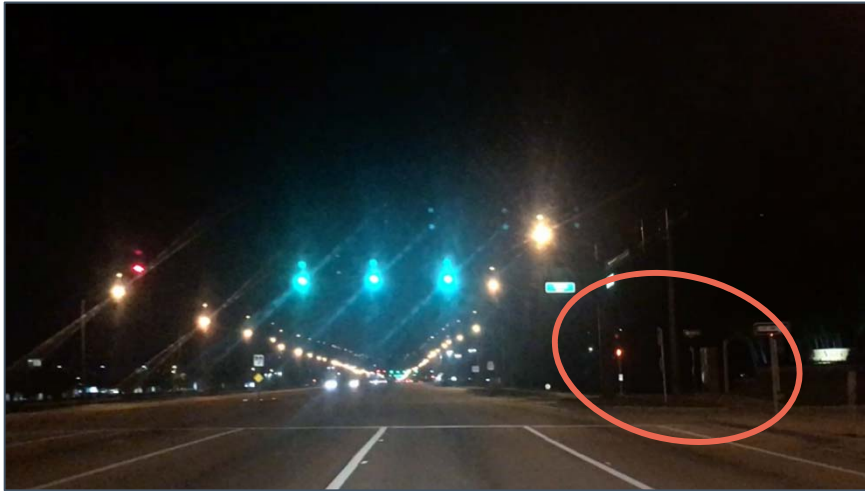


Figure 31: Vista Parkway/Dealer Center Looking West

Quadrant lighting was identified at all other intersections, with the exception of SR-704 (Okeechobee Boulevard) at Cross County/Biscayne Boulevard. At this intersection there is lighting only on the southwest quadrant of the intersection (see Figure 32) and the north side appeared darker. A nighttime bicycle crash occurred at this intersection within the crosswalk on the east side. As a long-term improvement, **consider installing additional lighting along the remaining three corners of the intersection.**



Figure 32: Biscayne Boulevard/Cross County Plaza Looking West

Extending Frontage Road

According to Lieutenant Kyle Ventry of Palm Beach County Fire Rescue Station 23, emergency vehicles use the frontage road just north of SR-704 (Okeechobee Boulevard) to bypass congestion. To save on response times, Lieutenant Ventry requests **the frontage road be extended east and connect to the fire station driveway.**

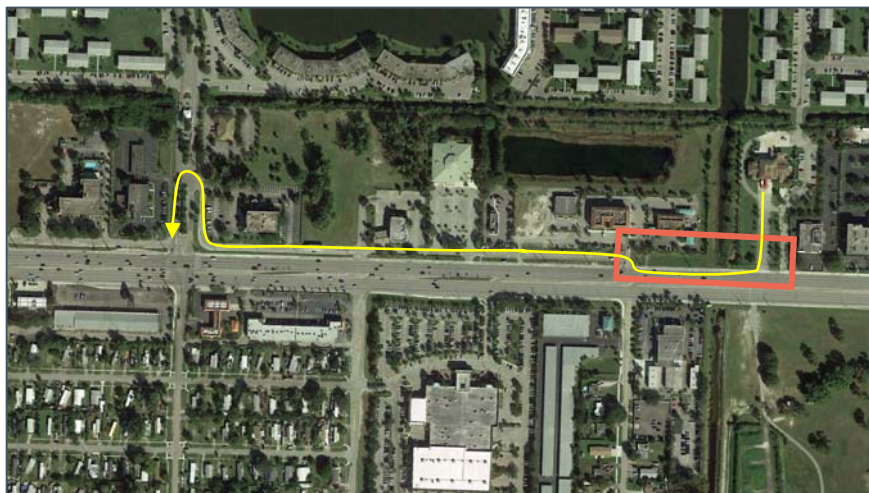


Figure 33: Existing Emergency Route to Bypass Congestion



Figure 34: Requested Emergency Route

Road Safety Audit Findings Summary

ID	Location Description:	Spot Observation Overview:	Suggestions for Consideration:	Assigned to:
01	North side of SR-704 (Okeechobee Boulevard) at Vista Parkway	Dark spot along wide median	Provide additional lighting	FDOT
02	Crossings at signalized intersections	Three signalized intersections have protected crossings on three of four legs	Provide pedestrian features on all signalized intersection legs	FDOT
03	Florida Turnpike eastbound approach	Single signal ahead warning along multilane road	Provide additional "SIGNAL AHEAD" signs	FDOT
04	Bike lane along SR-704 (Okeechobee Blvd)	Bike lane narrows along overpass	Evaluate the feasibility of providing a continuous bike lane	FDOT
05	Florida Turnpike	Both northbound and southbound on-ramps are on the north side of SR-704 (Okeechobee Boulevard)	Add "Turnpike Left Lanes" and "Turnpike Right Lanes" signs	FDOT
06	Florida Turnpike	All four off-ramps and on-ramps to and from the Turnpike are located on the north side of SR-704 (Okeechobee Boulevard).	Extend the inside yellow edge-line.	FDOT
07	Various signalized intersection approaches	Pedestrians crossing mid-block at bus stops	Install "USE CROSSWALK" signs	FDOT
08	Frontage road just north of SR-704 (Okeechobee Boulevard)	Emergency vehicles use the frontage road	Connect frontage road to driveway	FDOT
09	SR-704 (Okeechobee Blvd)	Bicycle crashes traveling contraflow on the sidewalk or bike lanes	Add "Ride with Traffic" and "Bicycles Wrong Way" signs	FDOT
10	Various mid-block near bus stops	Pedestrian/bicycle-related crashes identified near bus stops	Evaluate feasibility of mid-block crossings	FDOT
11	Various Signalized Intersections	Conflicts between pedestrians crossing in crosswalks and right turning vehicles	Provide 4-section flashing yellow signals	FDOT
12	Various Signalized Intersections	Pedestrian crashes near and around signalized intersections	Provide special emphasis crosswalk markings	FDOT
13	Various Signalized Intersections	Pedestrians were arriving after the countdown head displayed "Don't Walk"	Use the "rest in walk" feature for all minor street crossings.	FDOT
14	Various Signalized Intersections	Short pedestrian crossing time	Evaluate clearance intervals	FDOT
15	Various Signalized Intersection Approaches	Reinforce protected crossing corridorwide	Install pedestrian signs on approach to signals	FDOT
16	SR-704 (Okeechobee Boulevard)	No quadrant lighting at Cross County/Biscayne Boulevard	Installing additional lighting	FDOT

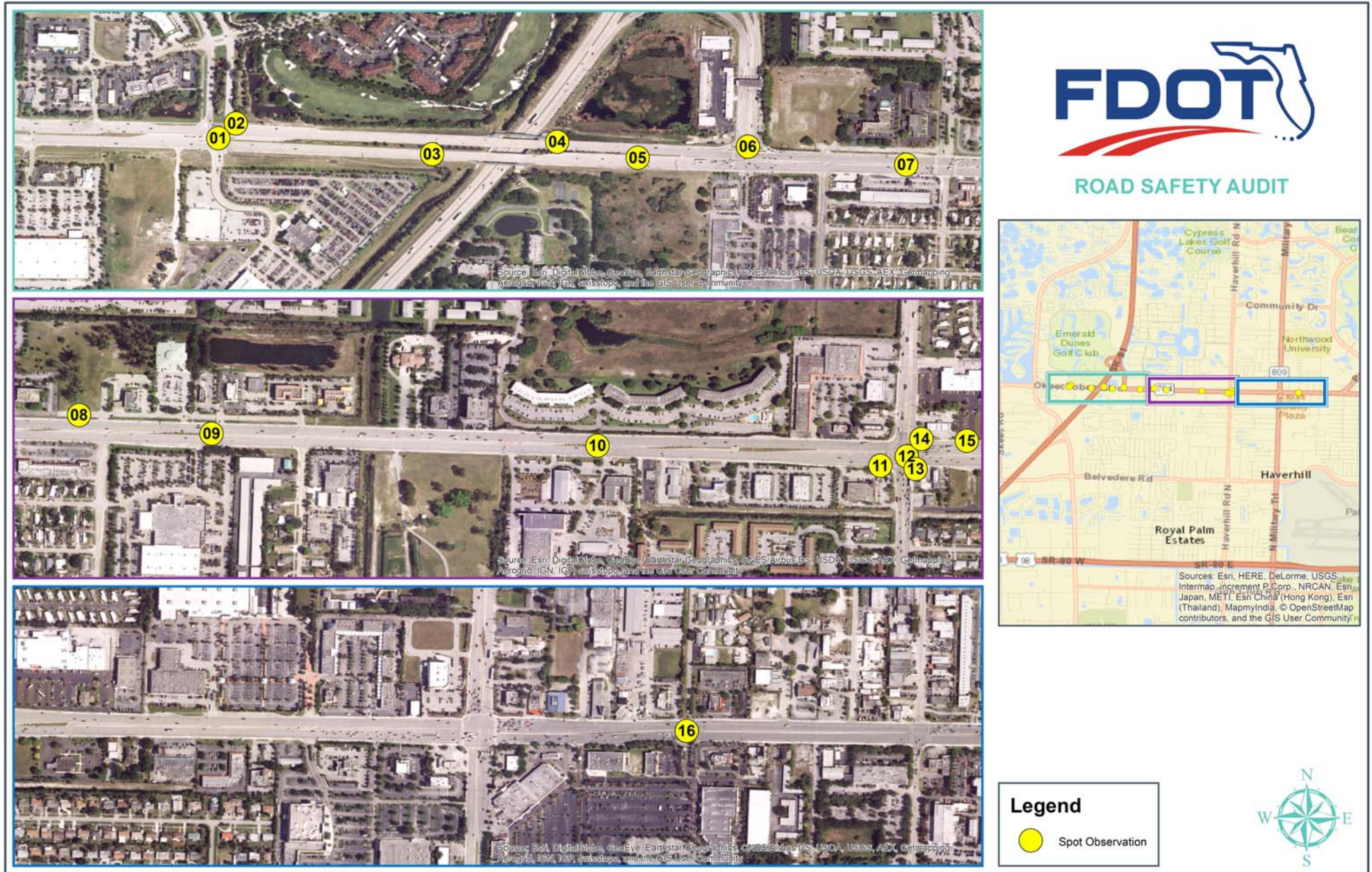


Figure 3: Project Overview

Road Safety Audit Findings Details - Spot Observations

ID	Location Description:	Spot Observation Overview:	Suggestions for Consideration:
01	North side of SR-704 (Okeechobee Boulevard) at Vista Parkway	Dark spot along wide median	Provide additional lighting



Spot Observation Details:

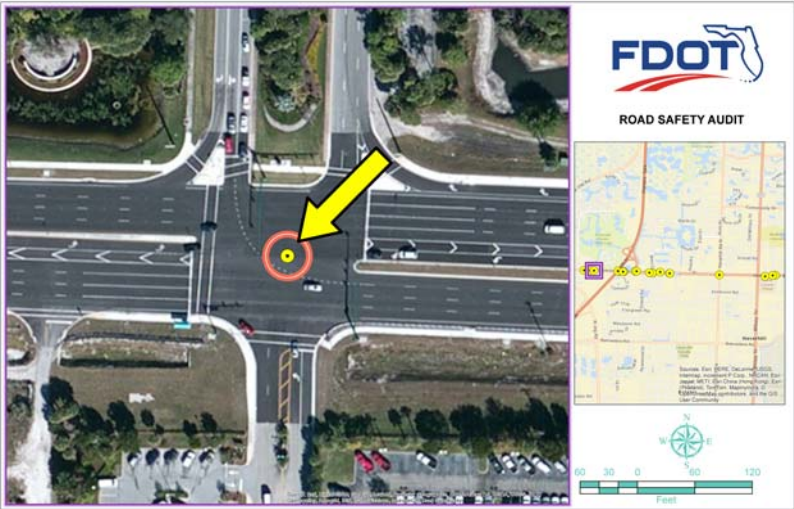
Generally, lighting along SR-704 (Okeechobee Boulevard) is spaced at approximately 180-200 ft. 293 (23%) of the overall 1,295 crashes occurred during nighttime conditions. During night reviews, most of the corridor and intersection quadrants appeared to be well-lit.

However, at SR-704 (Okeechobee Boulevard) and Vista Parkway lighting is spaced at 240 feet and there is a darker area along the north quadrant of the intersection at the 70-ft median.

A nighttime pedestrian crash occurred on the west side of this intersection.

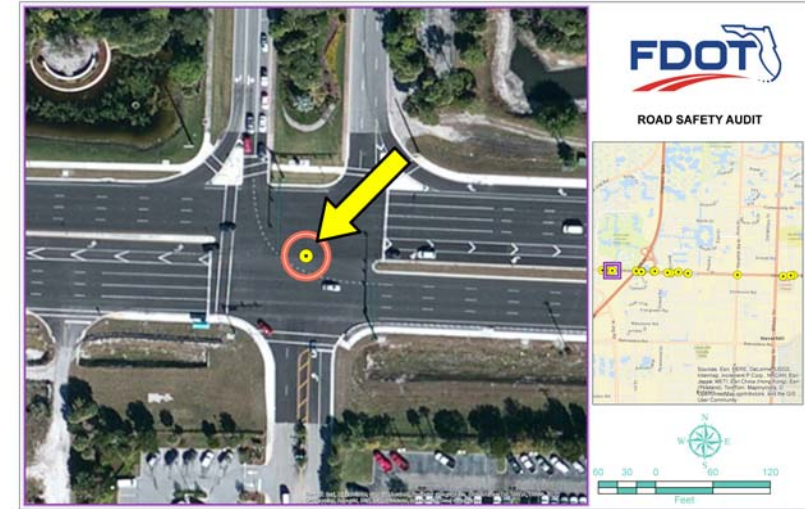
Suggestion Details:

In light of the nighttime pedestrian crash history, evaluate the lighting level at the north quadrant of Vista Parkway and enhance the lighting if illumination levels are found to be low.



Agency:	Improvement Type:
FDOT	Lighting
Time Frame:	EEE:
Mid	Engineering
Level of Effort:	Comment:
Mid	

ID	Location Description:	Spot Observation Overview:	Suggestions for Consideration:
02	Crossings at signalized intersections	Three signalized intersections have protected crossings on three of four legs	Provide pedestrian features on all signalized intersection legs



Spot Observation Details:

The RSA team noted that three signalized intersections have protected crossings on three of four legs, the three intersections are:

- East side of Vista Parkway/Dealer Center
- East side of Turnpike Access/College Plaza
- West side of Biscayne Boulevard/Cross County Plaza

Pedestrian and bicycle crashes Remaining signalized intersection have crossings on all four legs.

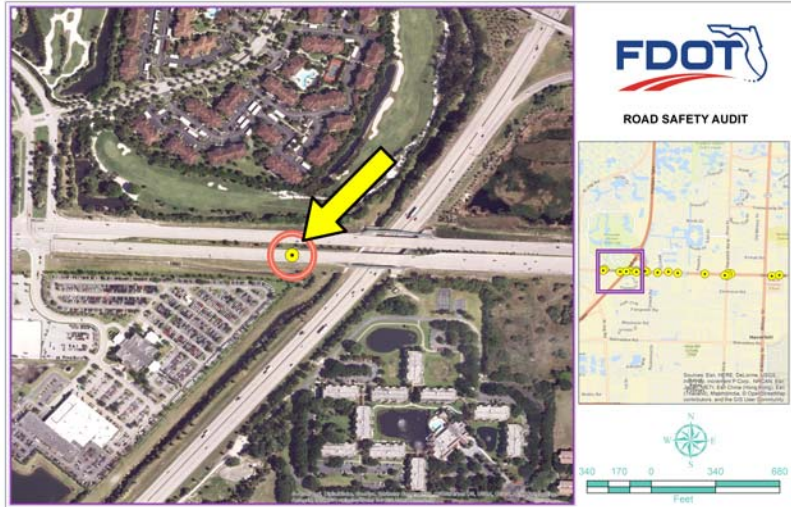
Suggestion Details:

As a long-term improvement, encourage pedestrians to use protected signalized crossings by providing pedestrian features on the missing leg at the aforementioned three locations.

Possible constructability issues that would need to be addressed include the guardrail on the south side of Vista Parkway/Dealer Center and the driveway/gutter along the north side of Cross County/Biscayne Boulevard. This improvement would also include installing curb ramps along with pedestrian crossing features.

Agency:	Improvement Type:
FDOT	Pedestrian
Time Frame:	EEE:
Long	Engineering
Level of Effort:	Comment:
Mid	

ID	Location Description:	Spot Observation Overview:	Suggestions for Consideration:
03	Florida Turnpike eastbound approach	Single signal ahead warning along multilane road	Provide additional "SIGNAL AHEAD" signs



Spot Observation Details:

Rear-end and sideswipe crashes were identified on approach to the Turnpike Access/College Plaza signal. A single SIGNAL AHEAD warning sign is provided in the median on the north side of SR-704 (Okeechobee Boulevard) eastbound. It was noted during the sight visit that due to the number of through lanes, a large vehicle can block the view of the existing warning sign.

Suggestion Details:

Provide an additional W3-3 ("SIGNAL AHEAD") warning sign on the outside shoulder in addition to the existing sign provided at the median; note that right-of-way is limited here on account of the overpass.

Agency:	Improvement Type:
FDOT	Signs
Time Frame:	EEE:
Short	Engineering
Level of Effort:	Comment:
Low	

ID	Location Description:	Spot Observation Overview:	Suggestions for Consideration:
04	Bike lane along SR-704 (Okeechobee Blvd)	Bike lane narrows along overpass	Evaluate the feasibility of providing a continuous bike lane



Spot Observation Details:

The westbound bike lane along SR-704 (Okeechobee Boulevard) narrows for approximately 600 feet along the overpass over Florida's Turnpike.

Suggestion Details:

In the short-term, provide a curb cut and ramp east of the guardrail to provide a choice for cyclists to cross along the pedestrian overpass in lieu of traversing along through lanes with vehicles. Consider striping a Bike Symbol on the ramp and providing R9-3/R9-3a (NO PEDESTRIAN CROSSING) signs to discourage pedestrians from using the ramp and leaving the sidewalk. Typically fast-moving cyclists are not recommended to use sidewalks as motorists are not expecting them; however, along this bridge there are no vehicular conflict points, there are minimal pedestrians, and the sidewalk width is approximately 8-ft wide.

In the long term, evaluate the feasibility of narrowing the westbound through lanes to provide a continuous bike lane westbound across the overpass.

Agency:	Improvement Type:
FDOT	Bike Lane
Time Frame:	EEE:
Mid/Long	Engineering
Level of Effort:	Comment:
Mid	

ID	Location Description:	Spot Observation Overview:	Suggestions for Consideration:
05	Florida Turnpike	Both northbound and southbound on-ramps are on the north side of SR-704 (Okeechobee Boulevard)	Add "Turnpike Left Lanes" and "Turnpike Right Lanes" signs



Spot Observation Details:

The Turnpike interchange is located east of the overpass on the north side of SR-704 (Okeechobee Boulevard); all on/off-ramps are on the north side of SR-704 (Okeechobee Boulevard).

To an unfamiliar driver, it may not be apparent that both northbound and southbound on-ramps are on the north side of SR-704 (Okeechobee Boulevard).

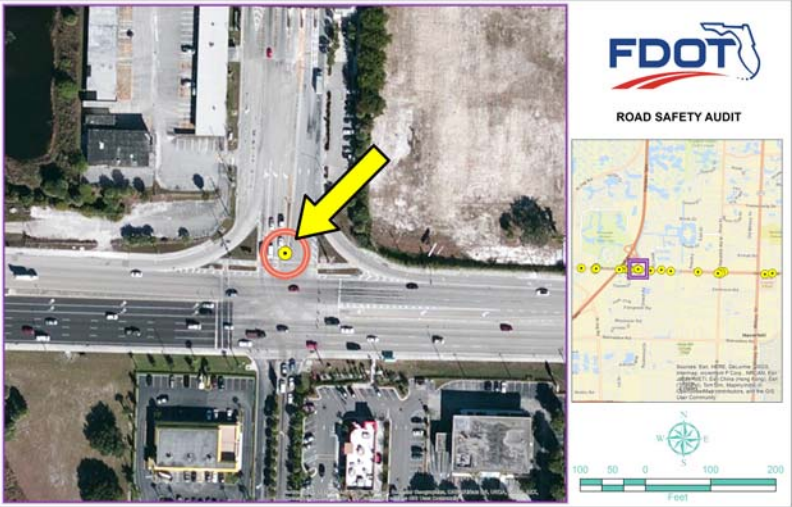
Suggestion Details:

Provide "TURNPIKE LEFT LANES" advance signs on the eastbound approach between Vista Parkway/Dealer Center and Turnpike overpass. Additionally, provide "TURNPIKE RIGHT LANES" signs westbound west of Meridian Road/West Drive.

Provide in-pavement Turnpike shields on the eastbound left-turn lanes and westbound right-turn lane to reinforce their use.

Agency:	Improvement Type:
FDOT	Signs
Time Frame:	EEE:
Short	Engineering
Level of Effort:	Comment:
Low	

ID	Location Description:	Spot Observation Overview:	Suggestions for Consideration:
06	Florida Turnpike	All four off-ramps and on-ramps to and from the Turnpike are located on the north side of SR-704 (Okeechobee Boulevard).	Extend the inside yellow edge-line.



Spot Observation Details:

All off-ramps and on-ramps to and from the Turnpike are located on the north side of SR-704 (Okeechobee Boulevard); at night, particularly if there are no southbound drivers, an eastbound driver turning left from the inside left-turn lane can turn too tightly into the southbound lanes.

Suggestion Details:

More clearly delineate the intended travel path by extending the inside yellow edge-line with optional dotted lane extension markings, per MUTCD Figure 3B-13. Additionally, provide a R4-7c (“KEEP RIGHT”) sign on the median nose on the north side of Turnpike signal.

Agency:	Improvement Type:
FDOT	Markings
Time Frame:	EEE:
Short	Engineering
Level of Effort:	Comment:
Low	

ID	Location Description:	Spot Observation Overview:	Suggestions for Consideration:
07	Various signalized intersection approaches	Pedestrians crossing mid-block at bus stops	Install "USE CROSSWALK" signs



Spot Observation Details:

The RSA team observed pedestrians crossing mid-block along SR-704 (Okeechobee Boulevard) throughout the study area near bus stops. Crashes have been reported around bus stops. A number of crossings also were observed at signalized intersection influence areas.

The locations near protected crossings include:

- Bus stop 150 feet west of Vista Parkway
- Bus stop 150 feet east of Florida Turnpike
- Bus stops 240 feet west of Meridian Road/West Drive
- Median at Clinton Drive 640 feet east of Meridian Road/West Drive
- Bus stop 260 feet west of Haverhill Road
- Bus stop 350 feet east of Haverhill Road
- Median at Lowe's driveway 830 feet west of SR-809 (Military Trail)
- Bus stop 250 feet west of SR-809 (Military Trail)
- Bust stop 170 feet west of Biscayne Boulevard/Cross County Plaza

Suggestion Details:

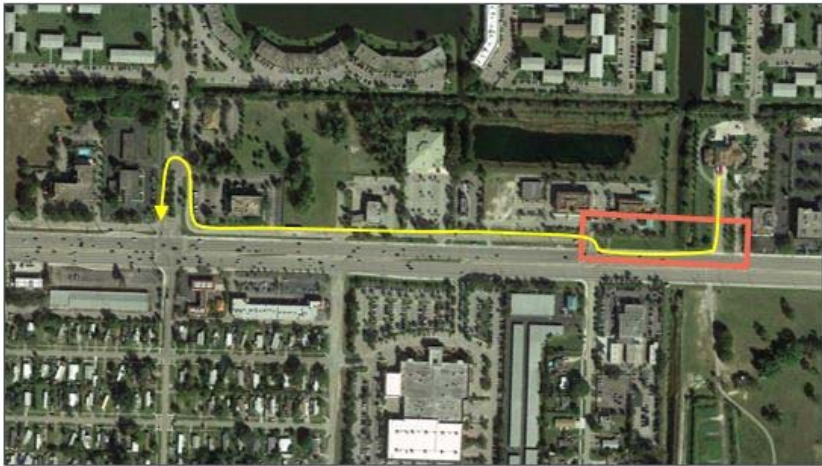
There is an opportunity to reduce vehicle-pedestrian crashes corridorwide by encouraging pedestrians to use signalized crossings with R9-3b ("USE CROSSWALK") signs installed at bus stops near signalized crossings and at crash locations near crosswalks.

Note that these signs already have been approved and installed at SR-809 (Military Trail) as part of a July 2015 pedestrian safety study; the signs inclusion at other locations would make the SR-809 (Military Trail) recommendations a systemic improvement.



Agency:	Improvement Type:
FDOT	Signs
Time Frame:	EEE:
Short	Engineering
Level of Effort:	Comment:
Low	

ID	Location Description:	Spot Observation Overview:	Suggestions for Consideration:
08	Frontage road just north of SR-704 (Okeechobee Boulevard)	Emergency vehicles use the frontage road	Connect frontage road to driveway



Spot Observation Details:

According to Lieutenant Kyle Ventry of Palm Beach County Fire Rescue Station 23, emergency vehicles use the frontage road just north of SR-704 (Okeechobee Boulevard) to bypass congestion along westbound SR-704.

Suggestion Details:

To save on response times, Lieutenant Ventry requests the evaluation of feasibility of connecting the frontage road to the fire station driveway. Doing so will allow responders direct access to the frontage road.

Agency:	Improvement Type:
FDOT	Construction
Time Frame:	EEE:
Long	Engineering
Level of Effort:	Comment:
High	

ID	Location Description:	Spot Observation Overview:	Suggestions for Consideration:
09	SR-704 (Okeechobee Blvd)	Bicycle crashes traveling contraflow on the sidewalk or bike lanes	Add "Ride with Traffic" and "Bicycles Wrong Way" signs



Spot Observation Details:

Ten bicycle crashes were the result of bicyclists traveling contraflow on the sidewalk or bike lanes along the SR-704 (Okeechobee Boulevard).

This crash type is typically the result of drivers looking left for adequate gaps in traffic upstream and not expecting approaching bicycle traffic from the sidewalks/shoulders from the right.

Suggestion Details:

To encourage bicyclists to travel with traffic, install R9-3Cp ("RIDE WITH TRAFFIC") and R5-1b ("BICYCLES WRONG WAY") signs along SR-704 (Okeechobee Boulevard).

Agency:	Improvement Type:
FDOT	Signs
Time Frame:	EEE:
Mid	Engineering
Level of Effort:	Comment:
Mid	

ID	Location Description:	Spot Observation Overview:	Suggestions for Consideration:
10	Various mid-block near bus stops	Pedestrian/bicycle-related crashes identified near bus stops	Evaluate feasibility of mid-block crossings



Spot Observation Details:

Approximately 8 pedestrian/bicycle-related crashes were identified mid-block in the vicinity of bus stops corridorwide from 2010 to 2014.

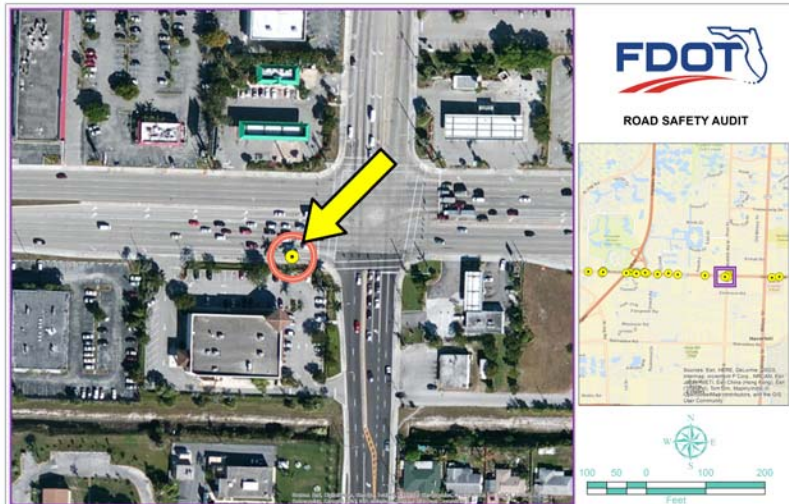
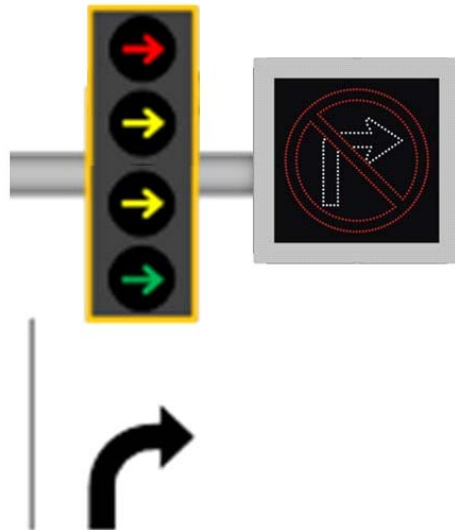
Suggestion Details:

Evaluate the feasibility of mid-block pedestrian crossings per TEM 3.8 at the locations of most used transit stops by ridership.

As a long-term improvement for the corridor, conduct a transit study to review locations that best meet the needs of transit users, aligning bus stops to create pedestrian funneling for potential pedestrian mid-blocks and relocating bus stops upstream from signals.

Agency:	Improvement Type:
FDOT	Pedestrian
Time Frame:	EEE:
Mid	Engineering
Level of Effort:	Comment:
High	

ID	Location Description:	Spot Observation Overview:	Suggestions for Consideration:
11	Various Signalized Intersections	Conflicts between pedestrians crossing in crosswalks and right turning vehicles	Provide 4-section flashing yellow signals



Spot Observation Details:

Conflicts were observed between pedestrians crossing in crosswalks and right-turning vehicles.

Various intersections currently have right-turn overlaps with 5-section signal heads, they are:

- Haverhill Road eastbound right-turn lane
- Haverhill Road westbound right-turn lane
- Haverhill Road southbound right-turn lane
- SR-809 (Military Trail) eastbound right-turn lane
- SR-809 (Military Trail) westbound right-turn lane
- SR-809 (Military Trail) northbound right-turn lane
- SR-809 (Military Trail) southbound right-turn lane
- Biscayne Boulevard northbound right-turn lane

Suggestion Details:

Replace the 5-section signal heads with a 3-section on through lane and 4-section signal head on right-turn lane that would display a solid flashing yellow arrow. This improvement would allow for the continued use of a right-turn overlap while indicating to drivers to turn with caution during mainline green.

A structural analysis is recommended as 5-section signal heads would be replaced with a 3-section for through lanes and 4-section signal head for right-turn lane. In addition, it is recommended to conduct an educational and enforcement campaign as this improvement is new to the area.

Agency:	Improvement Type:
FDOT	Signal
Time Frame:	EEE:
Mid	Engineering
Level of Effort:	Comment:
High	

ID	Location Description:	Spot Observation Overview:	Suggestions for Consideration:
12	Various Signalized Intersections	Pedestrian crashes near and around signalized intersections	Provide special emphasis crosswalk markings



Spot Observation Details:

The signals that currently have standard crosswalks markings include:

- Vista Parkway/Dealer Center (3 legs)
- Haverhill Road (4 legs)

Suggestion Details:

Due to the number of pedestrian crashes near and around signalized intersections, provide consistent markings by installing special emphasis crosswalk markings at all signalized crossings.



Agency:	Improvement Type:
FDOT	Markings
Time Frame:	EEE:
Short	Engineering
Level of Effort:	Comment:
Mid	

ID	Location Description:	Spot Observation Overview:	Suggestions for Consideration:
13	Various Signalized Intersections	Pedestrians were arriving after the countdown head displayed "Don't Walk"	Use the "rest in walk" feature for all minor street crossings.



Spot Observation Details:

Pedestrians were observed arriving at signalized intersection while walking along SR-704 (Okeechobee Boulevard) after the countdown head displayed "DON'T WALK"; however, due to cycle length, enough green time remained on the mainline for a pedestrian crossing. Pedestrians were seen pressing push buttons to cross the side street while all mainline signals were still green and proceeding to cross against the pedestrian indication.

Suggestion Details:

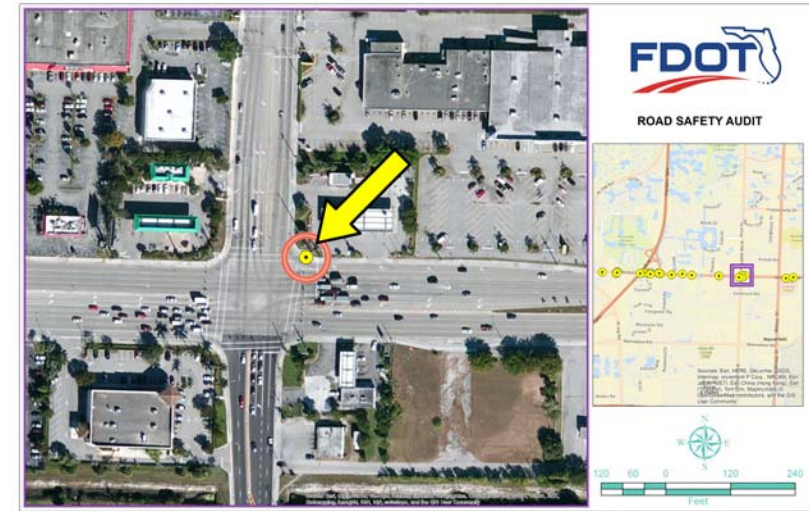
Due to the number of pedestrian crashes corridorwide and at signalized intersections, consider modifying the signal operation to use the "rest in walk" feature for all minor street crossings, which will help encourage pedestrians to use signalized crossings by maximizing the amount of "WALK" time displayed.

"Rest in walk" is used in vehicle-actuated systems with a variable-duration vehicular green phase. The vehicular phase is either "resting" (with no vehicles detected on conflicting phases) or being extended by approaching vehicles. During the "resting" phase, the parallel concurrent pedestrian phase remains in "WALK." In the absence of a conflicting call, the "WALK" remains on indefinitely. It is only after a conflicting phase call is detected that the pedestrian change interval "DON'T WALK" phase (flashing orange hand) begins timing.



Agency:	Improvement Type:
FDOT	Signal Timing
Time Frame:	EEE:
Mid	Engineering
Level of Effort:	Comment:
Mid	

ID	Location Description:	Spot Observation Overview:	Suggestions for Consideration:
14	Various Signalized Intersections	Short pedestrian crossing time	Evaluate clearance intervals



Spot Observation Details:

Based on field observations, the team noted that the time provided by countdown pedestrian heads was not adequate for crossing. Observed countdown timings for the “DO NOT WALK” phase.

Suggestion Details:

Evaluate signal timing and adjust walk clearance intervals as needed at all signalized intersection crossings.

Agency:	Improvement Type:
FDOT	Signal Timing
Time Frame:	EEE:
Short	Engineering
Level of Effort:	Comment:
Low	

ID	Location Description:	Spot Observation Overview:	Suggestions for Consideration:
15	Various Signalized Intersection Approaches	Reinforce protected crossing corridorwide	Install pedestrian signs on approach to signals



Spot Observation Details:

Bicycle and pedestrian crashes have been reported throughout the study corridor including signalized intersections. Signalized intersection approaches do not include pedestrian warning signs; signalized approaches include:

- Vista Parkway/Dealer Center
- Turnpike Access/College Plaza (westbound)
- West Drive/Meridian Road
- Haverhill Road
- Biscayne Boulevard/Cross County Plaza

Suggestion Details:

Due to the number of pedestrian crossings near signalized intersections, install R10-15R(a) ("TURNING VEHICLES STOP FOR PEDESTRIANS") on signalized intersection approaches.

Reinforce protected crossing locations by installing W11-2 ("PEDESTRIAN CROSSING") with supplemental W16-9P ("AHEAD") yellow signs and W11-2 ("PEDESTRIAN CROSSING") with supplemental W16-7P (ARROW) yellow signs on approach to each signalized crossing as a corridorwide treatment.

Note that these signs already have been installed at SR-809 (Military Trail) as part of a July 2015 pedestrian safety study; their inclusion at other signals makes it a corridorwide improvement.

Agency:

FDOT

Improvement Type:

Signs

Time Frame:

Short

EEE:

Engineering

Level of Effort:

Low

Comment:

ID	Location Description:	Spot Observation Overview:	Suggestions for Consideration:
16	SR-704 (Okeechobee Boulevard)	No quadrant lighting at Cross County/Biscayne Boulevard	Installing additional lighting



Spot Observation Details:

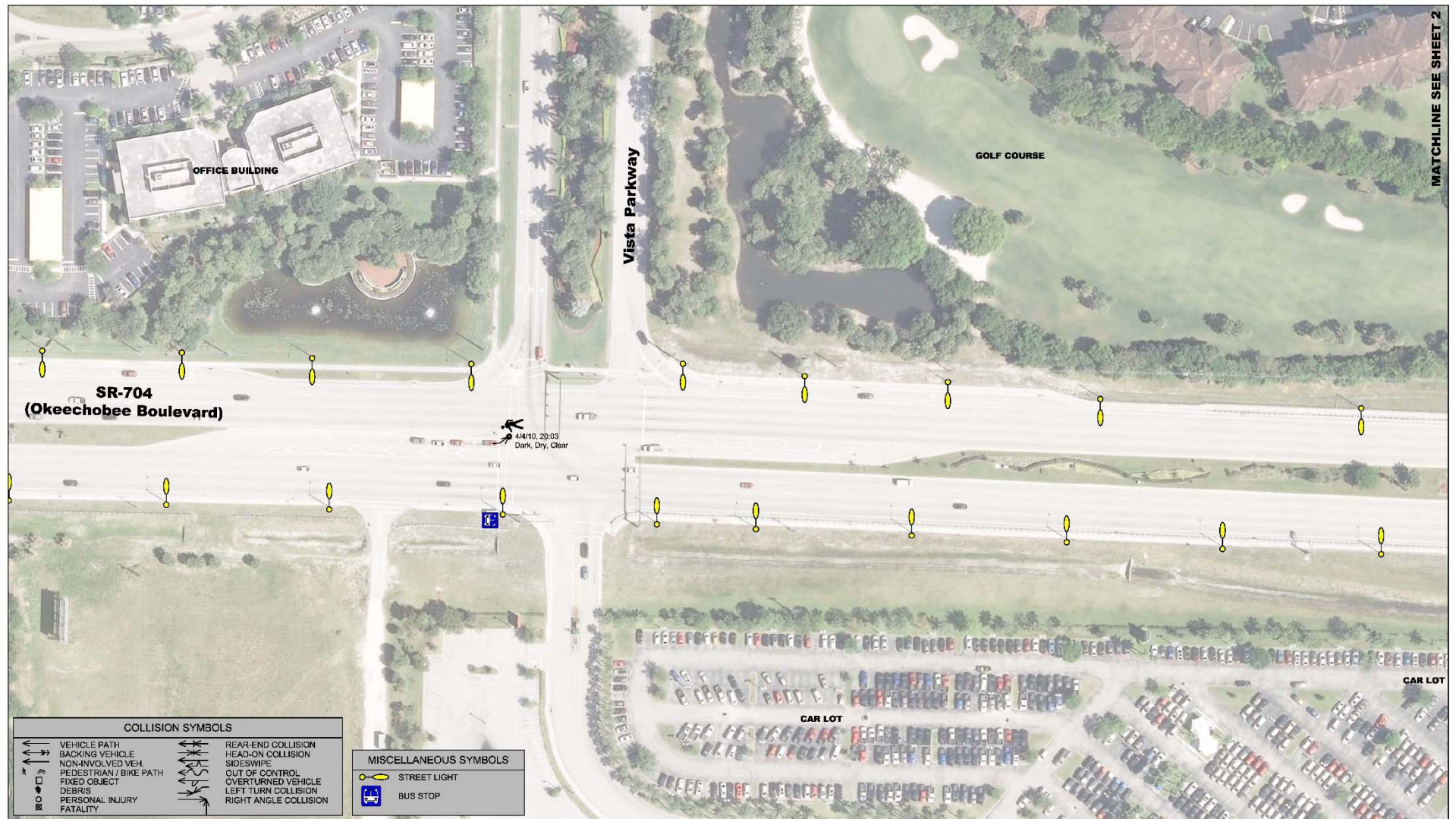
Quadrant lighting was identified at all other intersections, with the exception of SR-704 (Okeechobee Boulevard) at Cross County/Biscayne Boulevard. At this intersection there is lighting only on the southwest quadrant of the intersection (see Figure 32) and the north side appeared darker. A nighttime bicycle crash occurred at this intersection within the crosswalk on the east side.

Suggestion Details:

As a long-term improvement, consider installing additional lighting along the remaining three corners of the intersection.

Agency:	Improvement Type:
FDOT	Lighting
Time Frame:	EEE:
Mid	Engineering
Level of Effort:	Comment:
High	

Appendix A: Collision Diagram



SR-704 (Vista Parkway to Spafford Avenue) Collision Diagram (2010 -2014)

Sheet
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Appendix A: Collision Diagram



SR-704 (Vista Parkway to Spafford Avenue) Collision Diagram (2010 -2014)

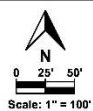
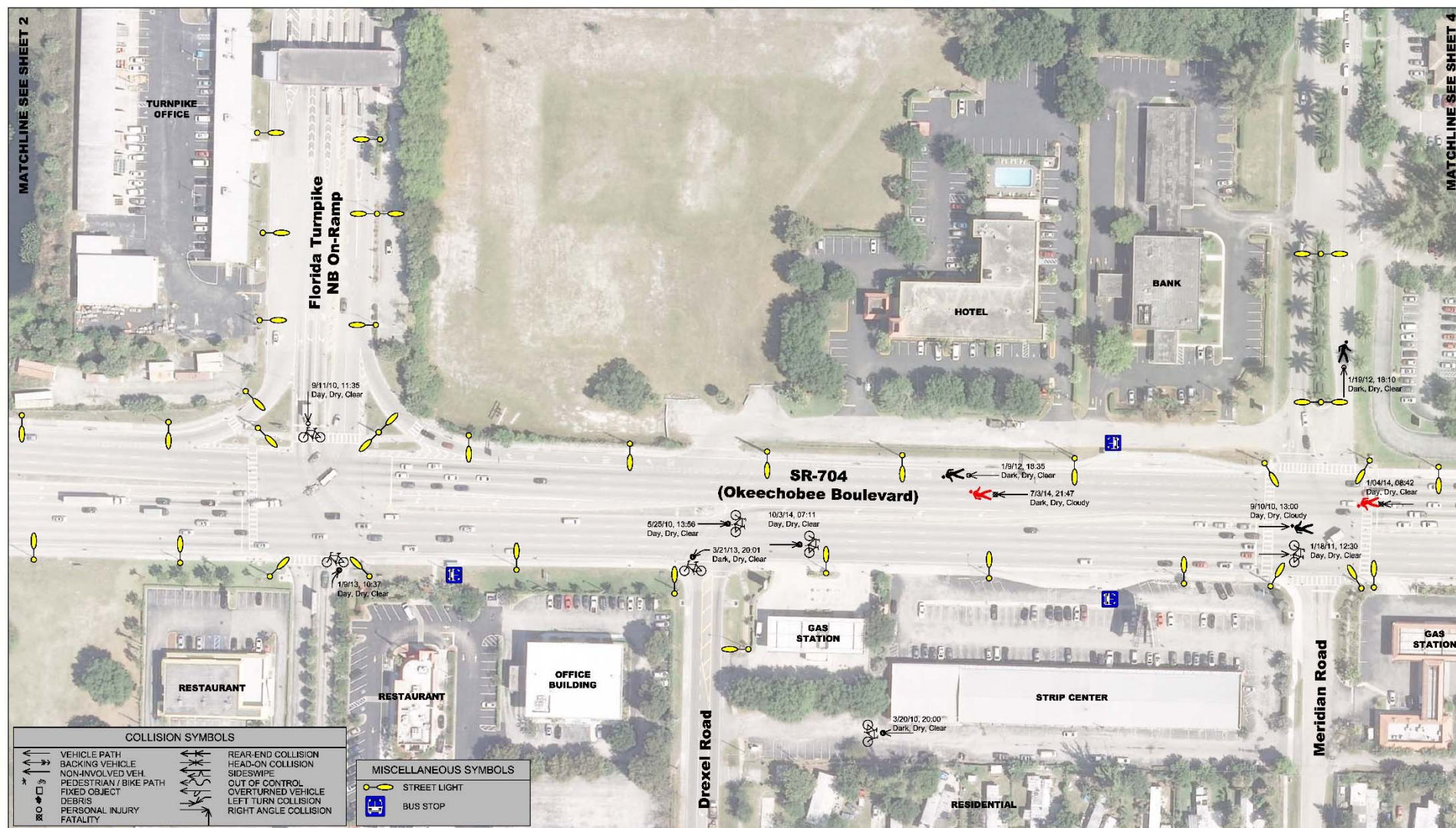
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Appendix A: Collision Diagram



SR-704 (Vista Parkway to Spafford Avenue) Collision Diagram (2010 - 2014)

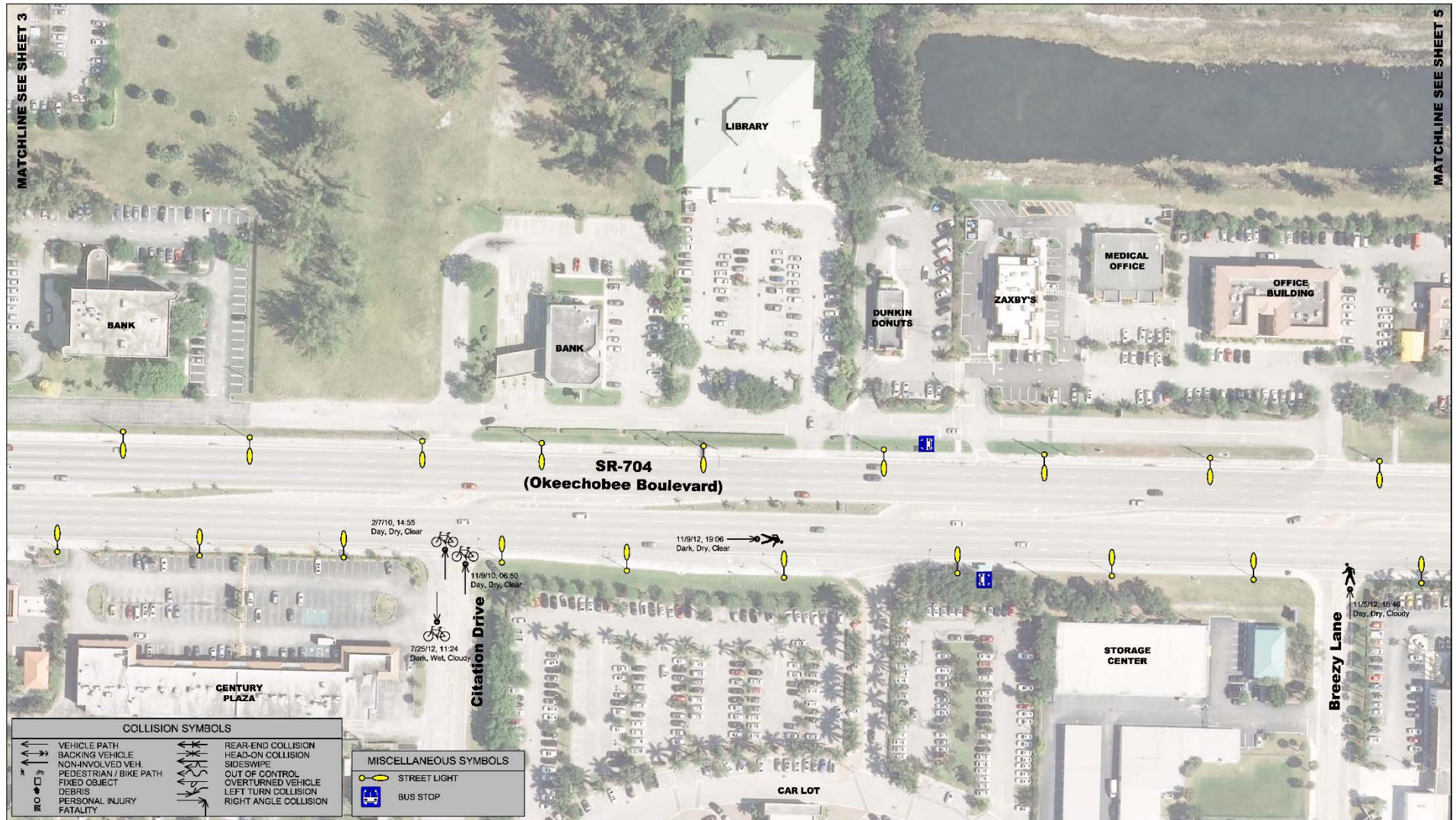
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Appendix A: Collision Diagram



COLLISION SYMBOLS	
→	VEHICLE PATH
↔	BACKING VEHICLE
↔	NON-INVOLVED VEH.
→	PEDESTRIAN / BIKE PATH
✱	FIXED OBJECT
✱	DEBRIS
✱	PERSONAL INJURY
✱	FATALITY
↔	REAR-END COLLISION
↔	HEAD-ON COLLISION
↔	SIDESWIPE
↔	OUT OF CONTROL
↔	OVERTURNED VEHICLE
↔	LEFT TURN COLLISION
↔	RIGHT ANGLE COLLISION

MISCELLANEOUS SYMBOLS	
○	STREET LIGHT
Ⓟ	BUS STOP



SR-704 (Vista Parkway to Spafford Avenue) Collision Diagram (2010 - 2014)

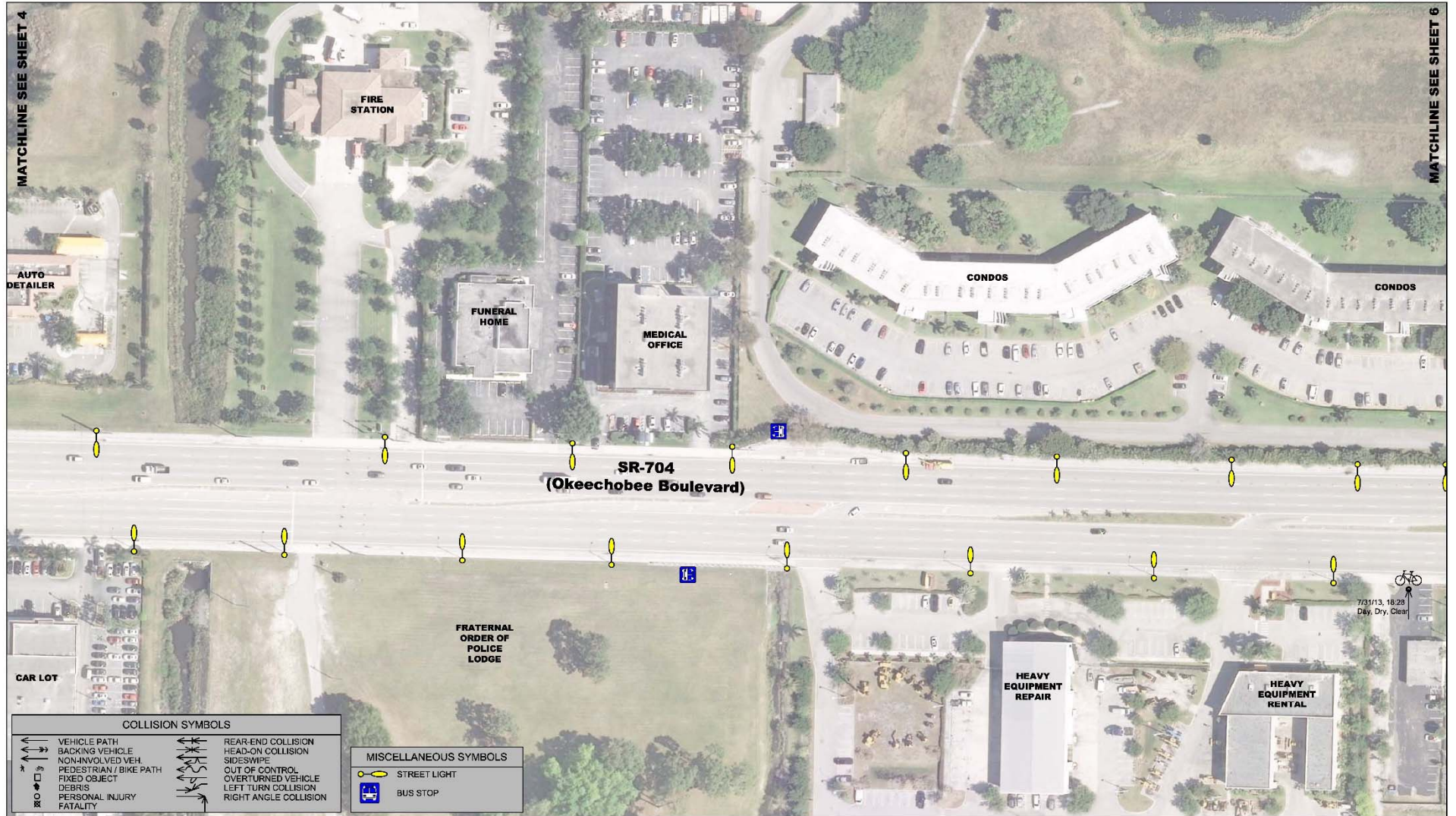
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Appendix A: Collision Diagram



SR-704 (Vista Parkway to Spafford Avenue) Collision Diagram (2010 - 2014)

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Appendix A: Collision Diagram



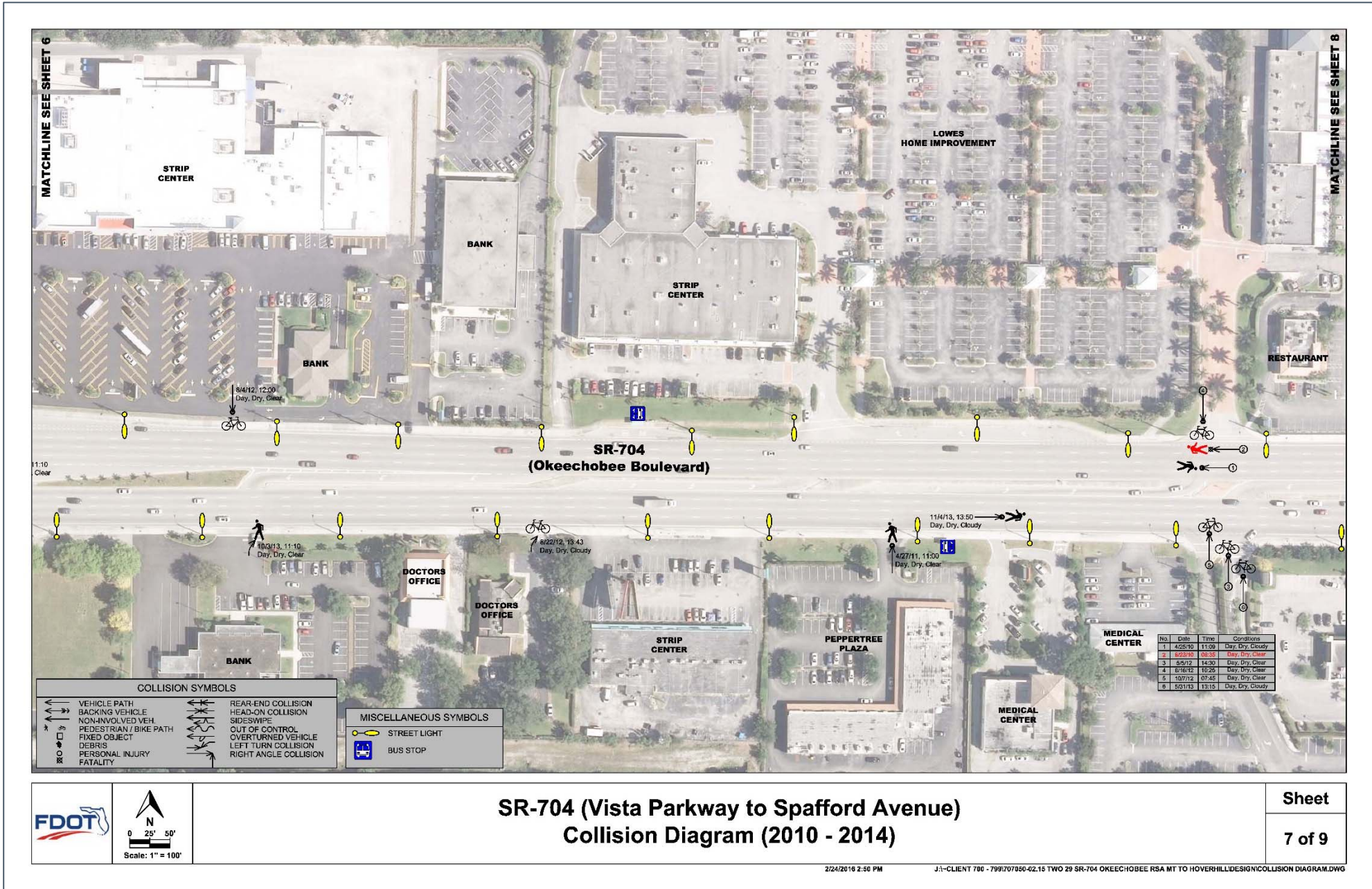
SR-704 (Vista Parkway to Spafford Avenue) Collision Diagram (2010 - 2014)

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Appendix A: Collision Diagram



SR-704 (Vista Parkway to Spafford Avenue) Collision Diagram (2010 - 2014)

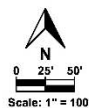
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Appendix A: Collision Diagram



SR-704 (Vista Parkway to Spafford Avenue) Collision Diagram (2010 - 2014)

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