

Crash Data Analysis Technical Memorandum

Fowler Avenue (State Road 582) from N. Florida Avenue to west of N. 56th Street

Project Development & Environment (PD&E) Study



Florida Department of Transportation District 7

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Hillsborough County, Florida

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The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated May 26, 2022, and executed by FHWA and FDOT.

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Introduction & Executive Summary

Integral to the Purpose and Need for improvements to SR 582/Fowler Avenue from North Florida Avenue to North 56th Street is the need to address traffic safety issues—especially regarding non-motorized mobility. This Technical Memorandum summarizes the analysis of 5 years of traffic crash data (2016 – 2020) and identifies key take-aways to inform the development and selection of alternatives. Key elements of the corridor crash data analysis include the following:

- Methodology
- Corridor wide Crash Summary
- Analysis of Non-Motorized Crash Characteristics
- High Crash Location Summaries

The single most pressing safety issue along the Fowler Avenue study corridor is crashes involving non-motorized road users (pedestrians and bicyclists). Although these account for less than 5% of all study corridor crashes, nearly half of all severe crashes involve a pedestrian or bicyclist. Approximately three quarters of these crashes occur when the non-motorized road users attempting to cross Fowler Avenue, with these roadway crossing crashes more-or-less evenly divided between unsignalized locations and locations that are at or adjacent to existing traffic signals.

Study corridor non-motorized user crashes are nearly twice as likely to occur at night than other crash types and a review of the 25 fatal and incapacitating non-motorized user crashes indicate an over-representation of (10 of 25) persons without permanent housing. Within this sample of 25 severe non-motorized user crashes, the crash reports indicate that in all 17 of the crashes that occurred at or adjacent to existing traffic signals, the non-motorized road user was crossing against the signal.

Of the 122 reported non-motorized user crashes, 90 occurred along the 1.5-mile portion of the 4-mile study corridor between Nebraska Avenue and Bruce B. Downs Boulevard. This portion of the corridor is categorized by commercial uses along Fowler Avenue with residential uses behind and is the segment of Fowler Avenue identified as part of the Hillsborough Area Regional Transit Authority (HART) Arterial Bus Rapid Transit alignment.

The observations above suggest that spot interventions, such as installation of additional midblock pedestrian signals are, by themselves, unlikely to substantially address the non-motorized crash problem along Fowler Avenue. In addition to these strategies, consideration should be given to measures that substantively reduce operating speeds, reduce speed differentials, and improve the quality of gaps in traffic operating along the corridor—especially in the segment between Nebraska Avenue and Bruce B. Downs Boulevard. Strategies that effectively reduce operating speeds and improve traffic “platooning” are also likely to reduce the frequency and severity of other crash types including angle and left-turn crashes, the second most common severe crash type, and rear-end crashes, the most common overall crash type.

Methodology

Crash data was selected using the District 7 Safety Office Crash Data Management System (CDMS) for the Years 2016 – 2020. This represents the most recent 5-year period for which crash record processing has been completed by the FDOT State Safety Office. In addition to screening crashes for that range of years, the following filters were used to select crashes for further analysis:

- Parking Lot and Interstate Crashes Excluded: Crashes coded as having occurred in parking lots/private property or having occurred along limited access highways and ramps were removed from the crash data selection as these areas will not be positively or negatively impacted by the Fowler Avenue PD&E alternatives.
- Geographic Extent: A cordon line narrowly bordering the Fowler Avenue Corridor was used to select crashes with southwest and northeast vertices at -82.4606, 28.0527 and -82.3900, 28.0562 respectively.

- GIS Buffer: Crashes were then exported from the CDMS to ArcGIS Shapefile format and the CDMS crash selection was filtered to only include crashes within 250 feet of Fowler Avenue. This extent captures crashes along Fowler Avenue itself as well as the immediate influence area of approaching streets.

Corridor Wide Crash Summary

Based on the crash selection methodology above, there were 3,184 crashes reported along the subject corridor over the 5 years from 2016 – 2020. Key summary statistics for these crashes include:

- There were 56 Severe Crashes in which 10 fatalities and 48 incapacitating injuries were reported; 9 out of 10 fatalities involved a non-motorized user (7 pedestrians, 2 bicyclists).
- Rear-end crashes were the most commonly reported crash type (56%) but non-motorized user and left-turn/angle crashes accounted for 48 of 56 severe crashes and one fatality.
- There were 122 non-motorized user crashes overall, 90 of which (74%) occurred from Nebraska Avenue to Bruce B. Downs Boulevard.
- About 30% of all reported crashes, 50% of all non-motorized user crashes and 60% of severe crashes occurred at night.
- Nearly 80% of all crashes along the corridor are clustered around 11 intersection crash “nodes.”

Figure 1 shows the number of crashes, fatal crashes, and incapacitating injury crashes for each year from 2016 – 2020 as well as the annual average for all five years. Crashes are shown using the scale on the left and range from a low of 441 reported corridor crashes in 2016 to 833 reported crashes in 2018. The grey and black stacked bars correspond to the scale on the right and show the number of severe (fatal and incapacitating injury) crashes recorded for each year and the average for each annually.

Figure 1: Fowler Avenue Annual and Average Annual Crash Frequency and Severity

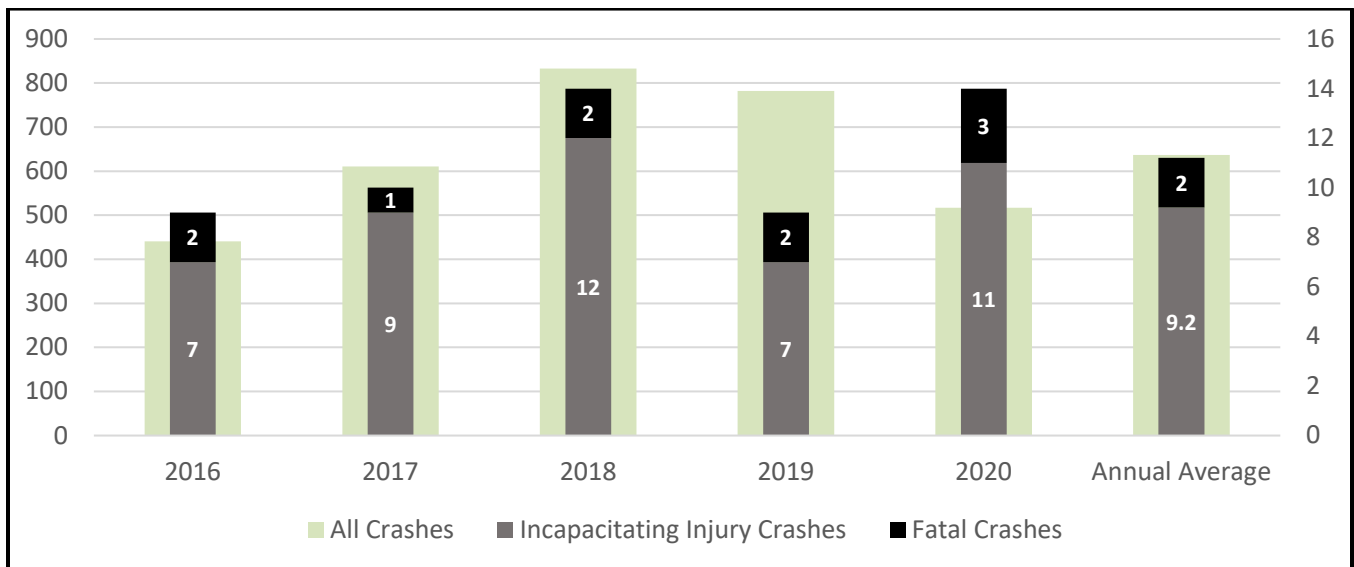


Table 1 shows the cost of these crashes using the KABCO scale and comprehensive crash cost values from the FDOT Safety Office. The cumulative cost of crashes reported along the study segment of Fowler Avenue over five years is approximately \$275 million dollars of which 54% is derived from 56 fatal and incapacitating injury crashes.

Table 1: Fowler Avenue Comprehensive Crash Cost Calculation

Crash Severity	Comprehensive Crash Cost	Crashes	Crash Cost
Fatal (K)	\$10,890,000	10	\$108,900,000
Severe Injury (A)	\$888,030	46	\$40,849,380
Moderate Injury (B)	\$180,180	260	\$46,846,800
Minor Injury (C)	\$103,950	593	\$61,642,350
Property Damage Only (O)	\$7,700	2,275	\$17,517,500
All Crashes		3,184	\$275,756,030

Source: Florida Department of Transportation State Safety Office's Crash Analysis Reporting (CAR) System, analysis years 2015 through 2019. Published by FDOT State Safety Office on 2/23/2022.

Figure 2 shows the distribution of major crash types for all signalized and un-signalized locations along the corridor. The graphics depict the distribution of All Crashes (outer ring), Incapacitating Injury Crashes (middle ring), and Fatal Crashes (inner ring). Overall crash distributions are comparable regardless of traffic control type (signal vs. not signalized). With respect to fatal and incapacitating injury crashes, angle/left turn and non-motorized user crashes are significantly more prevalent than rear end and sideswipe crash types.

Figure 2: Fowler Avenue Signalized and Unsignalized Location Crash Type Distributions

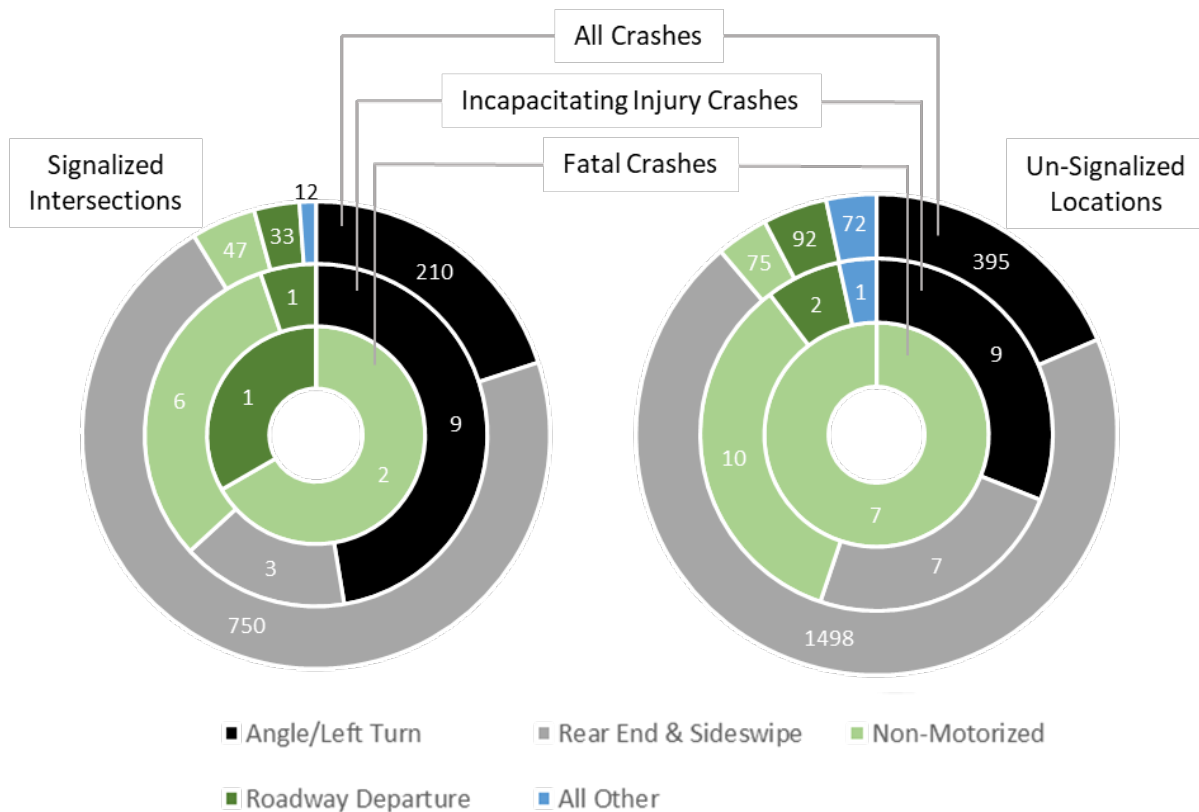


Table 2 provides a summary of the 11 high-crash locations referenced above. This table shows the number of crashes assigned to each location as well as the number and location-specific percentage of non-motorized, angle and left-turn, nighttime, and severe crashes for each of the 11 locations. Attention is directed to the fact that while these crashes are assigned to nodes representing individual intersections, the crashes may occur some distance away from the reference intersection and the assignment of a crash to an intersection node ID depends on what reference

information is provided in the traffic crash report among other factors. Observations related to the high-crash location summary data include the following:

- N. 15th Street, a 2-lane collector street, has a disproportionately high number of crashes associated with it compared with 4 and 6-lane arterial roadways like Florida Avenue, Nebraska Avenue, and N. 56th Street.
- N. 15th Street, Nebraska Avenue, N. 22nd Street, and N. 56th Street all have a higher-than-average proportion of non-motorized user crashes.
- N. 15th Street, N. 22nd Street, and Club Drive have a higher-than-average proportion of angle and left-turn crashes.
- N. 56th Street has the highest proportion of nighttime crashes.
- Those locations with overrepresentation of non-motorized crashes and/or angle/left-turn crashes also have higher-than-average proportions of severe crashes.

Table 2: Fowler Avenue High-Crash Location Summary Data

Intersection	Crash Node ID	Total Crashes	Non-Motorized		Angle & Left Turn		Nighttime		Severe	
Bruce B. Downs Blvd.	10_27134	582	9	1.7%	55	9.5%	170	29.2%	6	1.0%
N. 15th St.	10_27147	323	29	10.2%	112	34.7%	109	33.7%	6	1.9%
Nebraska Ave	10_27161	288	15	5.2%	26	9.0%	82	28.5%	9	3.1%
N. 56th St.	10_27112	245	16	6.3%	41	16.1%	107	42.1%	5	2.0%
McKinley Dr.	10_27133	237	4	2.5%	21	8.9%	80	33.8%	3	1.3%
N. 22nd St.	10_27144	215	14	7.0%	81	37.7%	67	31.2%	7	3.3%
N. 50th St.	10_27114	174	3	2.9%	25	14.4%	49	28.2%	3	1.7%
Leroy Collins Blvd.	10_27132	139	2	2.2%	8	5.8%	46	33.1%	0	0.0%
Club Dr.	10_27136	107	4	3.7%	29	27.1%	31	29.0%	3	2.8%
N. 46th St.	10_27129	104	1	1.0%	14	13.5%	21	20.2%	2	1.9%
N. Florida Ave.	10_27177	101	2	2.0%	15	14.9%	18	17.8%	1	1.0%
Top 11 Intersection Subtotal		2,524	99	3.9%	427	16.9%	780	30.9%	45	1.8%
Corridor-wide		3,184	122	3.8%	545	17.1%	938	29.5%	56	1.8%
High Crash Location % of Corridor		79.3%	81.1%		78.3%		83.2%		80.4%	

**Bold text indicates values that significantly exceed the corridor averages*

Table 3a shows the estimated number of crashes per million entering vehicles (MEV) for each of these 11 intersections. Based on archived data from FDOT's now offline Crash Analysis and Reporting System the districtwide average intersection crash rate for an urban 6+ lane divided roadway with a raised median is 3.64 crashes per MEV based on a districtwide value of 40,901 reported crashes for this roadway type and 11,236 cumulative MEV. The statewide average for the same roadway crash rate category is 4.24 crashes per MEV.

Table 3b shows the segment crash rates (excluding influence area crashes) between these high-crash intersections. For reference, the districtwide and statewide average crash rates are 4.183 and 4.970 crashes per million vehicle miles of travel (mVMT) per year.

Table 3a: Fowler Avenue High Crash Intersection Crash Rate

Intersection	Crash Node ID	Total Crashes	Intersection Leg AADT				Entering Volume	Average Crashes/Year	Million Entering Vehicles/Year	Crashes / Million Entering Vehicles
			West	East	North	South				
Bruce B. Downs Blvd.	10_27134	582	56,000	60,000	45,000	31,000	96,000	116	35	3.32
N. 15th St.	10_27147	323	56,000	55,000	5,800	8,300	62,550	65	23	2.83
Nebraska Ave	10_27161	288	50,000	57,500	26,500	22,000	78,000	58	28	2.02
N. 56th St.	10_27112	254	59,000	54,500	28,500	31,000	86,500	51	32	1.61
McKinley Dr.	10_27133	237	60,000	54,500	3,100	20,000	68,800	47	25	1.89
N. 22nd St.	10_27144	215	52,000	52,000	4,700	8,400	58,550	43	21	2.01
N. 50th St.	10_27114	174	61,500	62,000	9,400	6,200	69,550	35	25	1.37
Leroy Collins Blvd.	10_27132	139	54,500	60,500	10,000		62,500	28	23	1.22
Club Dr.	10_27136	107	52,000	51,000	3,300		53,150	21	19	1.10
N. 46th St.	10_27129	104	60,500	61,500			61,000	21	22	0.93
N. Florida Ave.	10_27177	101	5,800	20,000	23,500	23,500	36,400	20	13	1.52

AADT Source Data: Figure 2.1, September, 2022 Existing Conditions and Calibration Report

Table 3b: Fowler Avenue Segment Crash Rates

From Street	To Street	Milepost	Milepost	Crashes (2016-20)	Segment AADT	mVMT/Year	Crashes/mVMT/Year
Florida Ave.	Nebraska Ave.	0.000	0.505	163	50,000	9.22	3.537
Nebraska Ave.	15th St.	0.505	1.013	256	56,000	10.38	4.931
15th St.	22nd St.	1.013	1.518	270	52,000	9.58	5.634
22nd St.	Bruce B. Downs Blvd.	1.518	2.036	274	56,000	10.59	5.176
Bruce B. Downs Blvd.	McKinley Dr.	2.036	2.642	220	60,000	13.27	3.315
McKinley Dr.	LeRoy Collins Blvd.	2.642	2.825	90	54,500	3.64	4.945
LeRoy Collins Blvd.	46th St.	2.825	3.027	84	60,500	4.46	3.766
46th St.	50th St.	3.027	3.529	112	61,500	11.27	1.988
50th St.	56th St.	3.529	4.019	202	59,000	10.55	3.829

Figure 3 uses a “heat map” format to show crash concentrations along the corridor and Figure 4 shows non-motorized user crash concentrations as well as the location of pedestrian and bicycle crash fatalities. These figures reference landmarks along the corridor including the RITHM@Uptown development (formerly University Mall), the University of South Florida, and the Museum of Science and Industry (MOSI).

Figure 3: Fowler Avenue Overall Corridor Crash Concentrations

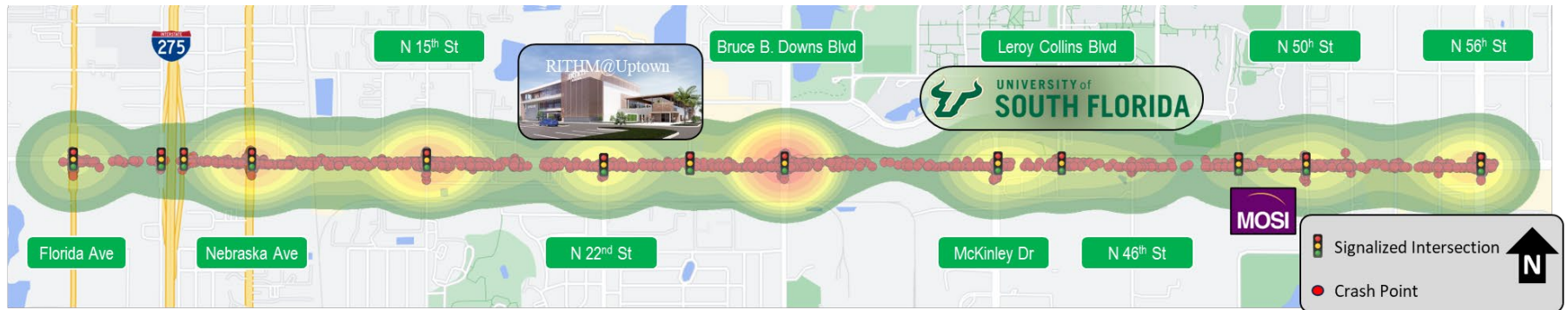
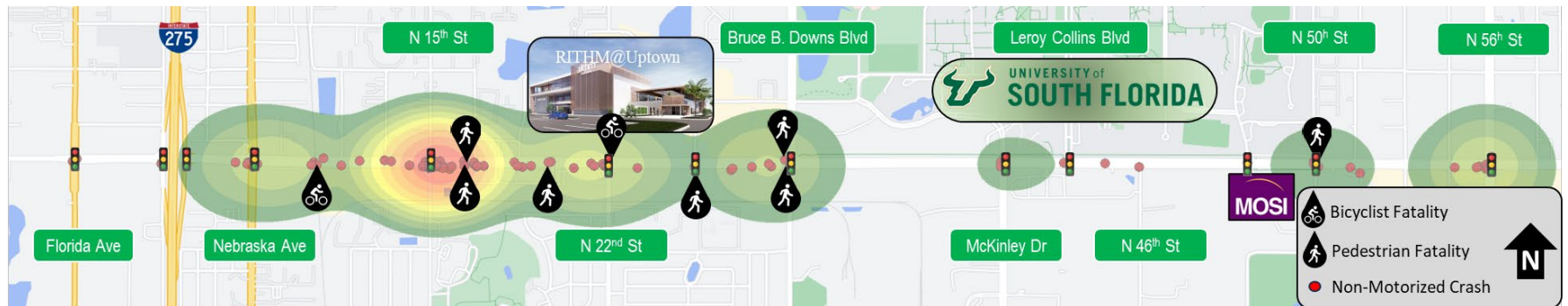


Figure 4: Fowler Avenue Non-Motorized Road User Crash Concentrations and Fatalities



Analysis of Non-Motorized Crash Characteristics

As noted in the prior section, although bicyclists or pedestrian involvement was reported in only 122 of 3,140 reported crashes (4.2%) they account for 9 of 10 traffic fatalities recorded along the study corridor and 16 of 46 reported incapacitating injury crashes. Key aspects of non-motorized user crashes include the following:

- Male non-motorized users were over 4-times more likely to be involved in a crash than females (96 vs. 23)
- Pedestrian crashes were more than twice as likely to occur at night than motor vehicle vs. motor vehicle crashes (62.3% vs. 28.8%) and all 7 fatal pedestrian crashes occurred at night.
- Bicycle crashes were slightly less likely than motor vehicle vs. motor vehicle crashes (24.5% vs. 28.8%) to occur at night and both fatal bicycle crashes occurred during daylight hours.
- 72% of non-motorized user crashes involved attempts to cross the roadway with 10% walking/cycling along the roadway and 9% walking/cycling along the sidewalk. All 9 fatal crashes involved attempts to cross the roadway. The remainder of non-motorized user crashes are not easily categorized.
- About half of Roadway Crossing crashes occurred at signalized locations; however, 7 out of 9 fatal roadway crossing crashes occurred at unsignalized locations.

Using available scanned crash reports, 25 fatal or incapacitating non-motorized road user crash reports were reviewed to gain additional insight into crash patterns. Table 4, shows the analysis of these crashes from which summary observations are provided below:

- 10 out of 25 of non-motorist's addresses were noted as "At Large"
- 17 out of 25 crashes occurred either at a traffic signal or within 300 feet of a traffic signal.
- In each of 17 signalized intersection/intersection influence area crashes, the non-motorized user was recorded as the party in violation of the traffic control device.
- 23 of 25 crashes occurred during clear weather conditions.
- Only 5 of 25 crashes occurred during daylight conditions.
- 22 of 25 severe non-motorized user crashes occurred between I-275 and Bruce B. Downs Boulevard

This data suggests that providing mid-block pedestrian signals alone may not significantly reduce severe non-motorized user crashes along the Fowler Avenue corridor without other complimentary interventions. Potential supplemental and complimentary strategies include:

- Reduced operating speeds to improve driver ability to see and avoid non-motorized and to reduce the severity of crash outcomes.
- Enhanced lighting to improve driver ability to see and avoid non-motorized users.
- Reduced signal cycle length to help improve non-motorized user compliance and implement strategies to improve platooning/gap quality to allow for better unsignalized location roadway crossing opportunities.
- Strategies to add value to controlled crossing locations.
- Social services support for people without permanent housing

Appendix A provides specific engineering interventions for consideration that respond to the general strategies described above.

Table 4: Fowler Avenue Fatal and Incapacitating Injury Non-Motorized Crash Details

HSMV Number	Crash Date	Crash Time	Cross-Street	Signalized Intersection	Vehicle Movement	Non-Motorized Movement	Lighting Condition	Weather Condition	Crash Severity	Unknown Address	Nearest Signal (ft)	Notes
86154468	08/02/16	21:08	Club Drive	NO	EB Thru	Crossing Fowler Ave. S > N	Dark-Lighted	Rain	Fatal	X	550	MV changed lanes into ped's position
86157388	11/19/16	12:18	RR Tracks	NO	EB Thru	Crossing Fowler Ave. S > N	Daylight	Clear	Fatal		900	
87516894	12/23/17	20:22	17th St	NO	WB Thru	Crossing Fowler Ave. S > N	Dark-Lighted	Clear	Fatal		500	
87530583	09/16/18	19:57	17th St	NO	WB Thru	Crossing Fowler Ave. N > S	Dark-Lighted	Clear	Fatal		500	
88759213	12/05/18	16:10	22nd St	YES	WB Thru	Crossing Fowler Ave S > N	Daylight	Clear	Fatal		NA	Multiple Threat Crash; NM - Against Signal
88765443	03/30/19	20:20	Bruce B. Downs	NO	WB Thru	Crossing Fowler Ave N > S	Dark-Lighted	Clear	Fatal		320	
89160206	10/14/19	19:35	50th St	YES	EB Left	Crossing 50th St W > E	Dark-Lighted	Clear	Fatal		NA	NM - Against Signal
89168189	03/28/20	6:25	Bruce B. Downs	NO	EB Thru	Crossing Fowler Ave S > N	Dark-Lighted	Clear	Fatal	X	280	Pedestrian Intoxicated
89966522	12/07/20	18:56	N 19th Street	NO	WB Thru	Crossing Fowler Ave S > N	Dark-Lighted	Clear	Fatal		700	
86156963	11/03/16	6:41	Nebraska Ave	YES	WB Thru	Crossing Fowler Ave. S > N	Dark-Lighted	Clear	Incap.		NA	NM - Against Signal
86838679	03/11/17	0:53	Nebraska Ave	NO	EB Thru	Crossing Fowler Ave. N > S	Dark-Lighted	Clear	Incap.	X	1000	Pedestrian Intoxicated
86839789	04/15/17	17:42	Nebraska Ave	YES	WB Thru	Crossing Fowler Ave. S > N	Daylight	Clear	Incap.		NA	Signal changed after cyclist entered intersection
87526602	07/01/18	0:10	Nebraska Ave	NO	WB Thru	Crossing Fowler Ave. S > N	Dark-Lighted	Clear	Incap.	X	30	
87531480	10/03/18	9:47	Nebraska Ave	YES	SB Thru	Crossing Nebraska Ave W > E	Daylight	Clear	Incap.	X	NA	NM - Against Signal; Report notes Traffic Homicide
87532082	10/15/18	6:58	15th Street	NO	EB Thru	Crossing Fowler Ave. N > S	Dark-Lighted	Clear	Incap.	X	75	
87533097	11/02/18	13:54	15th Street	NO	EB Thru	Crossing Fowler Ave. S > N	Daylight	Cloudy	Incap.		200	
88758937	11/30/18	20:56	Nebraska Ave	NO	EB Thru	Crossing Fowler Ave. N > S	Dark-Lighted	Clear	Incap.	X	250	
88759899	12/17/18	20:55	15th Street	NO	EB Thru	Crossing Fowler Ave. S > N	Dark-Lighted	Clear	Incap.	X	100	
88760724	01/04/19	21:42	22nd St	NO	WB Thru	Crossing Fowler Ave N > S	Dark-Lighted	Clear	Incap.		60	
88760872	01/08/19	17:50	Bull Run Dr.	NO	EB Thru	Bicyclist WB in EB Bike Lane	Dark-Lighted	Clear	Incap.		900	Bicyclist Possibly Entered into EBT Lane
88761370	01/18/19	19:50	Nebraska Ave	NO	WB Thru	Crossing Fowler Ave N > S	Dusk	Clear	Incap.	X	200	
88765526	04/06/19	21:20	22nd St	NO	WB Thru	Crossing Fowler Ave N > S	Dark-Lighted	Clear	Incap.	X	245	
89165958	02/08/20	22:56	15th St	YES	EB Left	Non-Motorist Secondary Collision	Dark-Lighted	Clear	Incap.		NA	V1 Failed to Yield Permissive EBLT vs. V2 WBT
89170895	07/17/20	21:03	Spectrum Blvd	YES	WB Thru	Crossing Fowler Ave N > S	Dark-Lighted	Clear	Incap.		NA	Entering into EBT Lane
24122558	10/07/20	12:12	56th St	YES	EB Right	EB Bicycle on Shoulder	Daylight	Clear	Incap.		NA	Motorized Bicycle

High Crash Location Summaries

This section provides crash-data summary tables for each of the 11 high-crash locations summarized in Tables 2 and 3 organized geographically along the corridor from west to east. Observations related to each location are provided after each table. For reference, the following baseline values for the corridor were used for comparison purposes based on the corridor-wide crash data distributions:

- Wet Surface Conditions: >16%
- Daylight: < 65%
- Angle and Left Turn Crashes: >20%

Appendix B provides additional analysis of high crash intersection conditions and crash patterns. Attention is directed to the fact that the data summaries provided in this section are based on the official coded crash record values. The crash pattern notes included in Appendix B include professional judgment interpretations of the crash events based on the responding police officer's narrative and collision diagram drawing which, in some cases vary from the coded values contained in the crash data tables.

SR-582 (E Fowler Ave) at USB-41/ SR-685 (N Florida Ave)

SR-582 (E Fowler Ave) at USB-41/ SR-685 (N Florida Ave)		Years					5 - Year Total	Mean Crashes per Year	Severe Crashes	%
		2016	2017	2018	2019	2020				
Crash Type	Angle	3	3	4	4	1	15	3	0	14.9%
	Bike	0	0	1	0	0	1	0.2	0	1.0%
	Head-On	0	0	3	1	2	6	1.2	0	5.9%
	Hit Fixed Object	0	1	1	0	1	3	0.6	1	3.0%
	Hit Non-Fixed Object	1	0	0	0	0	1	0.2	0	1.0%
	Rear-end	5	18	15	9	8	55	11	0	54.5%
	Right-turn	1	0	1	0	0	2	0.4	0	2.0%
	Sideswipe	3	4	2	5	2	16	3.2	0	15.8%
	U-Turn	1	0	1	0	0	2	0.4	0	2.0%
	Total	14	26	28	19	14	101	20.2	1	100%
Injury Severity	Fatal	0	0	0	0	0	0	0	-	0.0%
	Incapacitating	0	0	1	0	0	1	0.2	-	1.0%
	Non-Incapacitating	2	0	4	1	2	9	1.8	-	8.9%
	Possible	4	3	4	1	2	14	2.8	-	13.9%
	None	8	23	19	17	10	77	15.4	-	76.2%
	Total	14	26	28	19	14	101	20.2	-	100%
Lighting Condition	Daylight	9	24	24	15	11	83	16.6	0	82.2%
	Dawn	1	0	0	0	0	1	0.2	0	1.0%
	Dusk	0	1	0	0	0	1	0.2	0	1.0%
	Dark-Lighted	4	1	4	4	3	16	3.2	1	15.8%
	Total	14	26	28	19	14	101	20.2	1	100%
Surface Conditions	Dry	14	21	26	16	13	90	18	1	89.1%
	Wet	0	5	2	3	1	11	2.2	0	10.9%
	Total	14	26	28	19	14	101	20.2	1	100%

SR-582 (E Fowler Ave) at SR-45/US-41 (N Nebraska Ave)

SR-582 (E Fowler Ave) at SR-45/US-41 (N Nebraska Ave)		Years					5 - Year Total	Mean Crashes per Year	Severe Crashes	%
		2016	2017	2018	2019	2020				
Crash Type	Angle	1	6	6	4	3	20	4	0	6.9%
	Bike	1	1	1	1	1	5	1	2	1.7%
	Head-On	0	0	2	0	0	2	0.4	0	0.7%
	Hit Fixed Object	3	1	1	2	2	9	1.8	0	3.1%
	Left-turn	2	2	0	0	2	6	1.2	1	2.1%
	Pedestrian	2	1	3	1	0	7	1.4	6	2.4%
	Rear-end	20	33	49	35	32	169	33.7	0	58.7%
	Right-turn	1	0	1	2	0	4	0.8	0	1.4%
	Sideswipe	6	12	27	14	4	63	12.6	0	21.9%
	Single Vehicle	0	0	1	0	0	1	0.2	0	0.3%
	Unknown	0	1	0	0	0	1	0.2	0	0.3%
	U-Turn	0	1	0	0	0	1	0.2	0	0.3%
<i>Total</i>		36	58	91	59	44	288	57.5	9	100%
Injury Severity	Fatal	1	0	0	0	0	1	0.2	-	0.3%
	Incapacitating	2	2	3	1	0	8	1.6	-	2.8%
	Non-Incapacitating	3	3	7	1	4	18	3.6	-	6.3%
	Possible	8	9	11	7	11	46	9.2	-	16.0%
	None	22	44	70	50	29	215	42.9	-	74.7%
	<i>Total</i>		36	58	91	59	44	288	57.5	-
Lighting Condition	Daylight	25	42	67	42	30	206	41.1	3	71.5%
	Dawn	1	2	3	2	1	9	1.8	0	3.1%
	Dusk	0	2	1	3	0	6	1.2	1	2.1%
	Dark-Lighted	10	12	20	12	13	67	13.4	5	23.3%
	<i>Total</i>		36	58	91	59	44	288	57.5	9
Surface Conditions	Dry	35	51	81	54	40	261	52.1	9	90.6%
	Wet	1	7	10	5	4	27	5.4	0	9.4%
	<i>Total</i>		36	58	91	59	44	288	57.5	9

SR-582 (E Fowler Ave) at N 15th St

SR-582 (E Fowler Ave) at N 15th St		Years					5 - Year Total	Mean Crashes per Year	Severe Crashes	%
		2016	2017	2018	2019	2020				
Crash Type	Angle	9	17	22	15	12	75	15	1	23.2%
	Bike	3	0	2	4	1	10	2	0	3.1%
	Head-On	0	1	1	0	0	2	0.4	0	0.6%
	Hit Fixed Object	0	1	2	0	0	3	0.6	0	0.9%
	Hit Non-Fixed Object	0	0	0	2	1	3	0.6	0	0.9%
	Left-turn	7	4	9	12	5	37	7.4	2	11.5%
	Pedestrian	2	1	3	3	2	11	2.2	3	3.4%
	Rear-end	20	32	31	27	18	128	25.6	0	39.6%
	Right-turn	0	0	0	1	0	1	0.2	0	0.3%
	Sideswipe	5	7	11	13	9	45	9	0	13.9%
	Single Vehicle	0	0	1	0	0	1	0.2	0	0.3%
	Unknown	3	1	1	1	0	6	1.2	0	1.9%
	U-Turn	0	1	0	0	0	1	0.2	0	0.3%
Total	49	65	83	78	48	323	64.5	6	100%	
Injury Severity	Fatal	0	0	0	0	0	0	0	-	0.0%
	Incapacitating	0	2	3	0	1	6	1.2	-	1.9%
	Non-Incapacitating	9	6	10	7	5	37	7.4	-	11.5%
	Possible	18	15	9	10	14	66	13.2	-	20.4%
	None	22	42	61	61	28	214	42.7	-	66.3%
	Total	49	65	83	78	48	323	64.5	-	100%
Lighting Condition	Daylight	28	42	56	54	34	214	42.7	3	66.3%
	Dawn	2	1	1	2	0	6	1.2	0	1.9%
	Dusk	1	2	6	2	2	13	2.6	0	4.0%
	Dark-Lighted	16	19	20	20	12	87	17.4	3	26.9%
	Dark-Not Lighted	2	1	0	0	0	3	0.6	0	0.9%
	Total	49	65	83	78	48	323	64.5	6	100%
Surface Conditions	Dry	45	58	75	72	43	293	58.5	5	90.7%
	Wet	4	7	8	6	5	30	6	1	9.3%
	Total	49	65	83	78	48	323	64.5	6	100%

- High proportion of angle/left-turn crashes.
 - Evaluate left turn phasing.
 - Verify that westbound lane drop at Nebraska Ave does not contribute to lane utilization related “thru-the-queue” crashes at 15th St.

SR-582 (E Fowler Ave) at N 22nd St/ University Mall Entrance

SR-582 (E Fowler Ave) at N 22nd St/ University Mall Entrance		Years					5 - Year Total	Mean Crashes per Year	Severe Crashes	%
		2016	2017	2018	2019	2020				
Crash Type	Angle	12	13	13	5	8	51	10.2	1	23.7%
	Bike	0	1	1	1	0	3	0.6	1	1.4%
	Head-On	1	0	0	0	1	2	0.4	0	0.9%
	Hit Fixed Object	1	0	0	0	0	1	0.2	0	0.5%
	Hit Non-Fixed Object	0	1	0	0	1	2	0.4	0	0.9%
	Left-turn	11	5	5	5	4	30	6	3	14.0%
	Pedestrian	0	2	2	3	1	8	1.6	2	3.7%
	Rear-end	18	14	26	13	9	80	16	0	37.2%
	Sideswipe	3	6	12	6	2	29	5.8	0	13.5%
	Single Vehicle	0	1	0	1	0	2	0.4	0	0.9%
	Unknown	1	2	1	1	0	5	1	0	2.3%
	U-Turn	0	1	1	0	0	2	0.4	0	0.9%
Total	47	46	61	35	26	215	42.9	7	100%	
Injury Severity	Fatal	0	0	1	0	0	1	0.2	-	0.5%
	Incapacitating	0	1	2	2	1	6	1.2	-	2.8%
	Non-Incapacitating	8	9	4	3	3	27	5.4	-	12.6%
	Possible	17	13	10	7	7	54	10.8	-	25.1%
	None	22	23	44	23	15	127	25.4	-	59.1%
	Total	47	46	61	35	26	215	42.9	-	100%
Lighting Condition	Daylight	30	28	49	23	18	148	29.6	5	68.8%
	Dawn	0	0	1	1	0	2	0.4	0	0.9%
	Dusk	2	1	1	0	1	5	1	0	2.3%
	Dark-Lighted	14	17	9	11	7	58	11.6	2	27.0%
	Dark-Not Lighted	1	0	0	0	0	1	0.2	0	0.5%
	Dark-Unknown Lighting	0	0	1	0	0	1	0.2	0	0.5%
	Total	47	46	61	35	26	215	42.9	7	100%
Surface Conditions	Dry	41	41	58	32	25	197	39.3	7	91.6%
	Wet	5	5	3	3	1	17	3.4	0	7.9%
	Unknown	1	0	0	0	0	1	0.2	0	0.5%
	Total	47	46	61	35	26	215	42.9	7	100%

- High proportion of angle/left-turn crashes; evaluate left turn phasing.

SR-582 (E Fowler Ave) at Club Dr

SR-582 (E Fowler Ave) at Club Dr		Years					5 - Year Total	Mean Crashes per Year	Severe Crashes	%
		2016	2017	2018	2019	2020				
Crash Type	Angle	1	4	4	3	6	18	3.6	0	16.8%
	Bike	0	0	0	1	1	2	0.4	0	1.9%
	Head-On	0	0	0	1	1	2	0.4	0	1.9%
	Hit Non-Fixed Object	0	0	0	0	1	1	0.2	0	0.9%
	Left-turn	5	0	2	2	2	11	2.2	1	10.3%
	Pedestrian	1	0	0	0	0	1	0.2	1	0.9%
	Rear-end	6	8	12	19	5	50	10	0	46.7%
	Sideswipe	2	0	6	7	4	19	3.8	0	17.8%
	Single Vehicle	0	0	0	0	1	1	0.2	1	0.9%
	Unknown	0	0	0	1	0	1	0.2	0	0.9%
	U-Turn	0	0	0	1	0	1	0.2	0	0.9%
	Total	15	12	24	35	21	107	21.4	3	100%
Injury Severity	Fatal	1	0	0	0	1	2	0.4	-	1.9%
	Incapacitating	0	0	1	0	0	1	0.2	-	0.9%
	Non-Incapacitating	2	1	4	0	3	10	2	-	9.3%
	Possible	4	5	5	4	5	23	4.6	-	21.5%
	None	8	6	14	31	12	71	14.2	-	66.4%
	Total	15	12	24	35	21	107	21.4	-	100%
Lighting Condition	Daylight	10	9	19	24	14	76	15.2	2	71.0%
	Dawn	0	0	0	1	0	1	0.2	0	0.9%
	Dusk	1	1	1	2	0	5	1	0	4.7%
	Dark-Lighted	4	2	4	8	7	25	5	1	23.4%
	Total	15	12	24	35	21	107	21.4	3	100%
Surface Conditions	Dry	13	11	21	33	19	97	19.4	2	90.7%
	Wet	2	1	3	2	2	10	2	1	9.3%
	Total	15	12	24	35	21	107	21.4	3	100%

SR-582 (E Fowler Ave) at CR-581 (Bruce B Downs Blvd/ N 30th St)

SR-582 (E Fowler Ave) at CR-581 (Bruce B Downs Blvd/ N 30th St)		Years					5 - Year Total	Mean Crashes per Year	Severe Crashes	%
		2016	2017	2018	2019	2020				
Crash Type	Angle	3	9	10	18	10	50	10	0	8.6%
	Bike	1	0	2	0	1	4	0.8	0	0.7%
	Head-On	0	1	2	5	1	9	1.8	0	1.5%
	Hit Fixed Object	0	2	1	1	1	5	1	0	0.9%
	Hit Non-Fixed Object	1	1	1	0	0	3	0.6	0	0.5%
	Left-turn	0	0	3	1	1	5	1	0	0.9%
	Pedestrian	1	0	0	1	2	4	0.8	2	0.7%
	Rear-end	40	85	115	105	54	399	79.7	2	68.6%
	Right-turn	1	1	0	0	0	2	0.4	1	0.3%
	Run Off-road	0	0	0	1	0	1	0.2	0	0.2%
	Sideswipe	10	7	30	22	18	87	17.4	1	14.9%
	Single Vehicle	1	0	1	0	1	3	0.6	0	0.5%
	Unknown	3	3	1	0	0	7	1.4	0	1.2%
	U-Turn	0	1	0	1	1	3	0.6	0	0.5%
	<i>Total</i>	<i>61</i>	<i>110</i>	<i>166</i>	<i>155</i>	<i>90</i>	<i>582</i>	<i>116.2</i>	<i>6</i>	<i>100%</i>
Injury Severity	Fatal	0	0	0	1	1	2	0.4	-	0.3%
	Incapacitating	3	0	1	0	0	4	0.8	-	0.7%
	Non-Incapacitating	7	2	5	5	8	27	5.4	-	4.6%
	Possible	19	23	20	19	14	95	19	-	16.3%
	None	32	85	140	130	67	454	90.7	-	78.0%
	<i>Total</i>	<i>61</i>	<i>110</i>	<i>166</i>	<i>155</i>	<i>90</i>	<i>582</i>	<i>116.2</i>	<i>-</i>	<i>100%</i>
Lighting Condition	Daylight	38	69	127	117	61	412	82.3	1	70.8%
	Dawn	0	3	3	2	1	9	1.8	0	1.5%
	Dusk	2	3	5	4	1	15	3	0	2.6%
	Dark-Lighted	20	35	30	32	27	144	28.8	5	24.7%
	Dark-Not Lighted	1	0	1	0	0	2	0.4	0	0.3%
	<i>Total</i>	<i>61</i>	<i>110</i>	<i>166</i>	<i>155</i>	<i>90</i>	<i>582</i>	<i>116.2</i>	<i>6</i>	<i>100%</i>
Surface Conditions	Dry	53	92	136	130	81	492	98.2	6	84.5%
	Wet	8	18	28	25	9	88	17.6	0	15.1%
	Mud, Dirt, Gravel	0	0	1	0	0	1	0.2	0	0.2%
	Other, Explain in Narrative	0	0	1	0	0	1	0.2	0	0.2%
	<i>Total</i>	<i>61</i>	<i>110</i>	<i>166</i>	<i>155</i>	<i>90</i>	<i>582</i>	<i>116.2</i>	<i>6</i>	<i>100%</i>

SR-582 (E Fowler Ave) at CR-585A (McKinley Dr)/ Spectrum Blvd

SR-582 (E Fowler Ave) at CR-585A (McKinley Dr)/ Spectrum Blvd		Years					5 - Year Total	Mean Crashes per Year	Severe Crashes	%
		2016	2017	2018	2019	2020				
Crash Type	Angle	1	3	7	5	4	20	4	0	8.4%
	Bike	0	0	0	0	1	1	0.2	0	0.4%
	Head-On	1	1	0	0	0	2	0.4	0	0.8%
	Hit Fixed Object	0	1	0	1	2	4	0.8	1	1.7%
	Left-turn	0	0	0	1	0	1	0.2	0	0.4%
	Pedestrian	0	0	2	0	1	3	0.6	1	1.3%
	Rear-end	18	28	52	42	27	167	33.3	1	70.5%
	Sideswipe	4	2	12	7	5	30	6	0	12.7%
	Single Vehicle	1	1	0	0	0	2	0.4	0	0.8%
	Unknown	1	2	0	0	0	3	0.6	0	1.3%
	U-Turn	0	1	1	2	0	4	0.8	0	1.7%
Total	26	39	74	58	40	237	47.3	3	100%	
Injury Severity	Fatal	0	0	0	0	0	0	0	-	0.0%
	Incapacitating	0	1	0	0	2	3	0.6	-	1.3%
	Non-Incapacitating	4	2	3	2	2	13	2.6	-	5.5%
	Possible	5	8	11	8	2	34	6.8	-	14.3%
	None	17	28	60	48	34	187	37.3	-	78.9%
	Total	26	39	74	58	40	237	47.3	-	100%
Lighting Condition	Daylight	16	26	54	35	26	157	31.3	2	66.2%
	Dawn	0	0	3	3	0	6	1.2	0	2.5%
	Dusk	4	2	3	5	1	15	3	0	6.3%
	Dark-Lighted	6	11	14	14	13	58	11.6	1	24.5%
	Dark-Not Lighted	0	0	0	1	0	1	0.2	0	0.4%
	Total	26	39	74	58	40	237	47.3	3	100%
Surface Conditions	Dry	21	27	58	46	29	181	36.1	3	76.4%
	Wet	4	12	16	12	11	55	11	0	23.2%
	Unknown	1	0	0	0	0	1	0.2	0	0.4%
	Total	26	39	74	58	40	237	47.3	3	100%

- High proportion of wet pavement condition crashes; evaluate pavement conditions and drainage.

SR-582 (E Fowler Ave) at Leroy Collins Blvd

SR-582 (E Fowler Ave) at Leroy Collins Blvd		Years					5 - Year Total	Mean Crashes per Year	Severe Crashes	%
		2016	2017	2018	2019	2020				
Crash Type	Angle	2	1	3	1	0	7	1.4	0	5.0%
	Bike	0	0	0	1	0	1	0.2	0	0.7%
	Head-On	1	0	1	1	0	3	0.6	0	2.2%
	Hit Fixed Object	1	0	0	0	0	1	0.2	0	0.7%
	Left-turn	1	0	0	0	0	1	0.2	0	0.7%
	Pedestrian	0	0	0	1	0	1	0.2	0	0.7%
	Rear-end	16	36	28	24	8	112	22.4	0	80.6%
	Sideswipe	1	4	2	4	2	13	2.6	0	9.4%
	<i>Total</i>	<i>22</i>	<i>41</i>	<i>34</i>	<i>32</i>	<i>10</i>	<i>139</i>	<i>27.8</i>	<i>0</i>	<i>100%</i>
Injury Severity	Non-Incapacitating	1	2	3	4	0	10	2	-	7.2%
	Possible	8	8	4	6	3	29	5.8	-	20.9%
	None	13	31	27	22	7	100	20	-	71.9%
	<i>Total</i>	<i>22</i>	<i>41</i>	<i>34</i>	<i>32</i>	<i>10</i>	<i>139</i>	<i>27.8</i>	<i>-</i>	<i>100%</i>
Lighting Condition	Daylight	12	27	23	26	5	93	18.6	0	66.9%
	Dawn	0	0	0	1	0	1	0.2	0	0.7%
	Dusk	0	0	2	1	0	3	0.6	0	2.2%
	Dark-Lighted	9	14	8	4	5	40	8	0	28.8%
	Dark-Not Lighted	0	0	1	0	0	1	0.2	0	0.7%
	Dark-Unknown Lighting	1	0	0	0	0	1	0.2	0	0.7%
	<i>Total</i>	<i>22</i>	<i>41</i>	<i>34</i>	<i>32</i>	<i>10</i>	<i>139</i>	<i>27.8</i>	<i>0</i>	<i>100%</i>
Surface Conditions	Dry	15	29	22	24	7	97	19.4	0	69.8%
	Wet	7	12	12	8	3	42	8.4	0	30.2%
	<i>Total</i>	<i>22</i>	<i>41</i>	<i>34</i>	<i>32</i>	<i>10</i>	<i>139</i>	<i>27.8</i>	<i>0</i>	<i>100%</i>

- High proportion of wet pavement condition crashes; evaluate pavement conditions and drainage.

SR-582 (E Fowler Ave) at N 46th St

SR-582 (E Fowler Ave) at N 46th St		Years					5 - Year Total	Mean Crashes per Year	Severe Crashes	%
		2016	2017	2018	2019	2020				
Crash Type	Angle	3	1	4	1	3	12	2.4	1	11.5%
	Head-On	1	0	0	0	0	1	0.2	0	1.0%
	Hit Fixed Object	0	1	0	0	0	1	0.2	0	1.0%
	Hit Non-Fixed Object	1	0	0	0	0	1	0.2	0	1.0%
	Left-turn	0	0	0	0	1	1	0.2	1	1.0%
	Pedestrian	0	0	1	0	0	1	0.2	0	1.0%
	Rear-end	4	17	17	26	7	71	14.2	0	68.3%
	Run Off-road	0	0	0	1	0	1	0.2	0	1.0%
	Sideswipe	0	1	4	6	0	11	2.2	0	10.6%
	Single Vehicle	1	0	0	0	0	1	0.2	0	1.0%
	Unknown	1	1	0	0	0	2	0.4	0	1.9%
	U-Turn	0	1	0	0	0	1	0.2	0	1.0%
Total	11	22	26	34	11	104	20.8	2	100%	
Injury Severity	Fatal	0	0	0	0	0	0	0	-	0.0%
	Incapacitating	0	0	0	0	2	2	0.4	-	1.9%
	Non-Incapacitating	1	0	4	1	0	6	1.2	-	5.8%
	Possible	2	7	2	4	3	18	3.6	-	17.3%
	None	8	15	20	29	6	78	15.6	-	75.0%
	Total	11	22	26	34	11	104	20.8	-	100%
Lighting Condition	Daylight	7	20	19	27	10	83	16.6	1	79.8%
	Dawn	1	0	1	2	0	4	0.8	0	3.8%
	Dusk	0	0	2	1	0	3	0.6	0	2.9%
	Dark-Lighted	3	2	3	4	1	13	2.6	1	12.5%
	Dark-Not Lighted	0	0	1	0	0	1	0.2	0	1.0%
	Total	11	22	26	34	11	104	20.8	2	100%
Surface Conditions	Dry	6	19	23	28	11	87	17.4	2	83.7%
	Wet	5	3	3	6	0	17	3.4	0	16.3%
	Total	11	22	26	34	11	104	20.8	2	100%

SR-582 (E Fowler Ave) at N 50th St

SR-582 (E Fowler Ave) at N 50th St		Years					5 - Year Total	Mean Crashes per Year	Severe Crashes	%
		2016	2017	2018	2019	2020				
Crash Type	Angle	3	2	7	3	4	19	3.8	0	10.9%
	Bike	1	0	0	0	0	1	0.2	0	0.6%
	Head-On	1	1	0	1	3	6	1.2	0	3.4%
	Hit Fixed Object	0	0	0	0	1	1	0.2	0	0.6%
	Hit Non-Fixed Object	1	0	0	0	0	1	0.2	0	0.6%
	Left-turn	1	0	2	2	0	5	1	0	2.9%
	Pedestrian	1	0	0	1	0	2	0.4	1	1.1%
	Rear-end	9	20	36	24	24	113	22.6	2	64.9%
	Sideswipe	4	2	3	6	6	21	4.2	0	12.1%
	Single Vehicle	0	0	0	1	0	1	0.2	0	0.6%
	Unknown	1	0	0	0	0	1	0.2	0	0.6%
	U-Turn	0	0	2	1	0	3	0.6	0	1.7%
Total	22	25	50	39	38	174	34.7	3	100%	
Injury Severity	Fatal	0	0	0	1	0	1	0.2	-	0.6%
	Incapacitating	1	1	0	0	0	2	0.4	-	1.1%
	Non-Incapacitating	3	1	1	3	3	11	2.2	-	6.3%
	Possible	7	4	7	7	8	33	6.6	-	19.0%
	None	11	19	42	28	27	127	25.4	-	73.0%
	Total	22	25	50	39	38	174	34.7	-	100%
Lighting Condition	Daylight	15	16	37	30	27	125	25	1	71.8%
	Dawn	0	0	1	1	0	2	0.4	0	1.1%
	Dusk	0	2	3	2	1	8	1.6	0	4.6%
	Dark-Lighted	7	7	9	5	9	37	7.4	2	21.3%
	Dark-Not Lighted	0	0	0	1	1	2	0.4	0	1.1%
	Total	22	25	50	39	38	174	34.7	3	100%
Surface Conditions	Dry	17	22	39	29	32	139	27.8	3	79.9%
	Wet	5	3	11	10	6	35	7	0	20.1%
	Total	22	25	50	39	38	174	34.7	3	100%

- High proportion of wet pavement condition crashes; evaluate pavement conditions and drainage.

SR-582 (E Fowler Ave) at SR-583/CR-583 (N 56th St)

SR-582 (E Fowler Ave) at SR-583/CR-583 (N 56th St)		Years					5 - Year Total	Mean Crashes per Year	Severe Crashes	%
		2016	2017	2018	2019	2020				
Crash Type	Angle	6	7	7	9	5	34	6.8	0	13.4%
	Bike	2	2	0	1	3	8	1.6	1	3.1%
	Head-On	0	1	1	2	0	4	0.8	0	1.6%
	Hit Fixed Object	1	1	1	1	1	5	1	1	2.0%
	Left-turn	3	0	1	1	2	7	1.4	2	2.8%
	Pedestrian	0	2	1	0	1	4	0.8	0	1.6%
	Rear-end	28	26	29	47	25	155	30.9	1	61.0%
	Right-turn	0	0	0	1	0	1	0.2	0	0.4%
	Run Off-road	1	0	0	0	0	1	0.2	0	0.4%
	Sideswipe	8	5	7	7	2	29	5.8	0	11.4%
	Single Vehicle	1	0	1	0	0	2	0.4	0	0.8%
	Unknown	0	2	0	0	0	2	0.4	0	0.8%
	U-Turn	1	0	1	0	0	2	0.4	0	0.8%
Total	51	46	49	69	39	254	50.7	5	100%	
Injury Severity	Fatal	0	0	0	0	0	0	0	-	0.0%
	Incapacitating	0	2	0	0	3	5	1	-	2.0%
	Non-Incapacitating	8	5	2	3	5	23	4.6	-	9.1%
	Possible	15	11	11	11	6	54	10.8	-	21.3%
	None	28	28	36	55	25	172	34.3	-	67.7%
	Total	51	46	49	69	39	254	50.7	-	100%
Lighting Condition	Daylight	31	23	31	40	22	147	29.4	1	57.9%
	Dawn	3	1	0	1	0	5	1	0	2.0%
	Dusk	5	1	2	0	1	9	1.8	0	3.5%
	Dark-Lighted	11	20	15	28	16	90	18	4	35.4%
	Dark-Not Lighted	1	1	1	0	0	3	0.6	0	1.2%
	Total	51	46	49	69	39	254	50.7	5	100%
Surface Conditions	Dry	40	39	44	57	35	215	42.9	4	84.6%
	Wet	11	7	5	12	4	39	7.8	1	15.4%
	Total	51	46	49	69	39	254	50.7	5	100%

- High proportion of non-daylight crashes; consider lighting improvements.

*APPENDIX A:
NON-MOTORIZED CRASH COUNTERMEASURE STRATEGIES*

Strategy 1: Reduce operating speeds to improve driver ability to see and avoid non-motorized and to reduce the severity of crash outcomes.

As noted in the review of fatal and incapacitating injury non-motorized crashes, 10 out of 25 non-motorist addresses were noted as “At Large.” Because people experiencing homelessness are more likely to suffer from substance abuse and mental health issues, it is reasonable to postulate that they are less well equipped to navigate safely across higher-speed, higher-volume, eight-lane urban roadway corridors. Reducing the operating speed of motor vehicles along Fowler Avenue, and similar urban arterial corridors provides the following safety benefits:

- Better perception-reaction ability for drivers
- Better ability for non-motorized users to judge and react to approaching motor vehicle traffic.
- Lower energy crashes, less severe outcomes when crashes cannot be avoided.

Specific applicable strategies to reduce operating speeds provided in FDM Table 202.3.1 include:

- Lane Repurposing (included for 35 mph target speed only)
- Lane Narrowing
- Horizontal Deflection
- Speed Feedback Signs
- Pedestrian Hybrid Beacon/Mid-Block Pedestrian Signal
- Street Trees/Landscaping (included for 35 mph target speed only)

In addition to these strategies signal density and coordination strategies discussed under Strategy 3 may also serve to reduce operating speeds. Interventions to manage speeds, especially those involving additional signalized intersections should be considered in context with the overall access management strategies deployed along the corridor. This includes consideration of access controls in reducing angle and left-turn crash risks and providing potential refuge areas for pedestrian crossings.

Strategy 2: Enhanced lighting to improve driver ability to see and avoid non-motorized users.

80% of fatal or incapacitating injury non-motorized user crashes and 60% of all severe crashes occurred at night. As with strategies to reduce operating speeds, strategies to improve lighting principally work by giving attentive drivers a greater opportunity to perceive and react to non-motorized users in the roadway. Chapter 231 of the FDM provides standards for lighting along urban arterials including detailed direction for illumination measurement and calculation for thru movements and turning movements.

- Ensure the Fowler Avenue Corridor, its signalized intersections and any new mid-block crossings meet the standards provided by FDM 231.

Attention is directed to the fact that segments of Fowler Avenue were subject to LED lighting upgrades and intersection lighting improvements for crosswalk illumination. The efficacy of these improvements should be monitored.

Strategy 3: Implement signalization strategies to improve non-motorized user compliance and implement strategies to improve platooning/gap quality to allow for better unsignalized location roadway crossing opportunities.

Chapter 2 of FHWA’s Traffic Signal Timing Manual discusses policy influence on signal timing notes that shorter cycle lengths should be considered in pedestrian/bicycle focused contexts and notes that longer cycle lengths may reduce pedestrian compliance. Additionally, because non-motorized users (and motor vehicle drivers) need to be able to navigate across Fowler Avenue at unsignalized locations, signal timing strategies to improve the frequency and quality of acceptable gaps are important to enhancing both motorized and non-motorized user safety.

Specific strategies that may be considered to reduce cycle lengths and potentially improve unsignalized location gap quality along the existing roadway corridor include the following:

- Reduce cycle length where feasible—especially during off-peak conditions or at minor street intersections.
- From Nebraska Avenue to Bruce B. Downs Boulevard, maintain major intersection signal splits at minor signalized intersections to help maintain platoon density along the corridor.
- Rather than introducing stand-alone mid-block pedestrian signals, consider opportunities to increase overall signal density to better establish consistent traffic platoons and corresponding gaps.

In addition to these strategies, the introduction of 2-phase operation with short cycle lengths and 2-stage pedestrian crossing movements between Nebraska Avenue and Bruce B. Downs Boulevard could dramatically improve safety for all road users. This can be accomplished by signaling existing dual-directional median openings to create RCUT intersections and retrofitting existing conventional signalized intersections at 15th Street, 22nd Street, and the University Square Shopping Center to MUT or RCUT configurations.

All of the potential strategies noted above would require significant operational analysis and/or pilot implementation and monitoring to verify their feasibility and effectiveness.

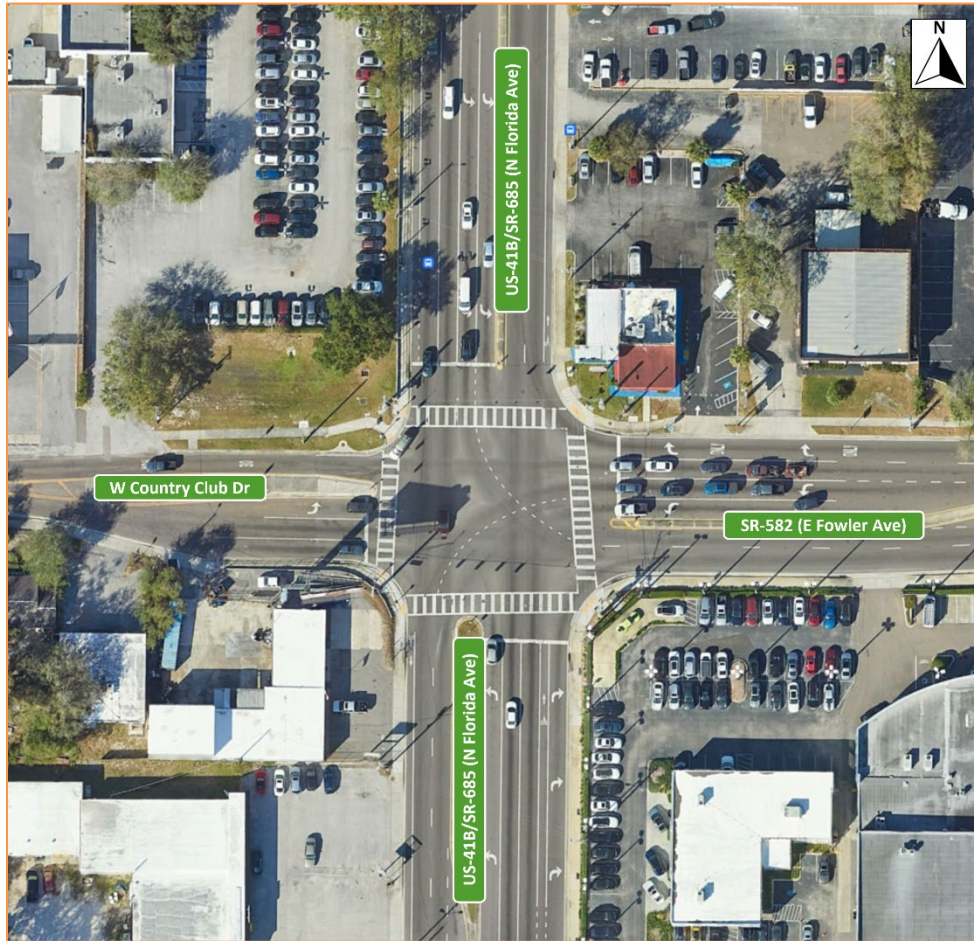
Strategy 4: Add value to controlled crossing locations.

Traffic signals assign right-of-way but do not guarantee motorist and non-motorist user compliance or safety. In addition to the strategies discussed above, the following interventions may be considered to improve safety for non-motorized users at large, signalized intersections and, in so doing provide the ancillary benefit of encouraging more non-motorized users to cross at controlled locations.

- Signalization
 - Protected-only left turn phasing
 - Leading pedestrian interval
 - Audible pedestrian signal
 - Proper, intuitive push-button placement
 - Push-button confirmation lights (or other feedback)
 - Pedestrian walk time extension (with active detection)
- Lighting – See Strategy 2
- Geometry
 - Reduced curb radii
 - Truck aprons
 - Appropriately designed right turn channelization islands
 - Centerline/left turn hardening

*APPENDIX B:
HIGH CRASH INTERSECTION DESKTOP REVIEWS*

Study Intersection: SR-582 (E Fowler Ave)/SR-685 (N Florida Ave)



- SR-582 (E Fowler Ave):
 - 4-lane divided with posted speed limit of 40 mph.
 - Dual left-turn lanes and a right-turn drop lane are provided on the WB approach.
 - 2'-4' dotted guideline provided for dual left-turn lanes.
 - Protected left turn phasing provided at intersection.
 - Bike lanes are not present.
- W Country Club Rd:
 - 2-lane undivided with posted speed limit of 30 mph.
 - One left-turn lane is provided for the EB approach.
 - Protected left turn phasing provided at intersection.
 - Bike lanes are not present.
- US-41B/SR-685 (N Florida Ave):
 - 4-lane divided with posted speed limit of 45 mph.
 - Dual left-turn lanes are provided for the SB approach.
 - One left-turn lane and one right-turn lane are provided for the NB approach.
 - 2'-4' dotted guide line provided for dual SB left turn lanes.
 - Protected left turn phasing provided at intersection.

- Marked bike lanes are provided.
- Traffic signals have backplates with yellow retroreflective borders.
- Advanced street name signages are provided for all approaches except for the EB approach.
- LED illuminated street name signs present at intersection.
- Intersection street lighting is provided for all corners at intersection.
- Pedestrian features and crossings are provided at the signalized intersection.
- As of May 2022, roadway surface and pavement markings appear to be in good condition.
- Pedestrian ramps appear to be in good condition with detectable warning surfaces.
- Turning Vehicles Yield to Peds (R10-15) signage present on all intersection legs.

Crash Data Observations:

- 2016-2020: 101 crashes
 - Crashes reviewed: fatal, incapacitating injury, angle, sideswipe, pedestrian, and bike.
- 55 rear-end crashes, 11 crashes/year
 - No severe injuries
 - 8 crashes occurred at nighttime, 14.5% of rear-end crashes.
 - 7 crashes occurred during wet roadway, 12.7% of rear-end crashes.
- Top 2 crash types (excluding rear-end crashes): 10 angle and 19 sideswipe
 - Angle crashes: 4 involved WB at-fault vehicle, 4 involved NB at-fault vehicle, and 2 involved EB at-fault vehicle.
 - Sideswipe crashes distribution: 10 involved WB vehicles, 5 involved SB vehicles, 3 involved NB vehicles, and 1 involved EB vehicle.
- Bike – 1 crash
 - Dark-lighted, dry. WB V1 making right turn FTYROW and struck SB bicyclist crossing at marked crosswalk.
- Pedestrian – 0 crashes
- 0 fatal, 1 incapacitating injury (Hit fixed object crash)
- 18% of crashes occurred at nighttime and 11% of crashes occurred during wet roadway conditions, which are all below the statewide averages of 30% and 18%, respectively.

Recommendations:

- Review yellow and all-red clearance intervals to reduce angle, sideswipe, and rear-end crashes. Replace Turning Vehicles YIELD to Peds signage with Turning Vehicles STOP for Peds signage on all intersection legs.
- As best practice, coordinate with Hillsborough County to install an advanced Signal Ahead (W3-3) sign for the EB approach to provide advance warning to the motorist of the traffic signal.

Study Intersection: SR-582 (E Fowler Ave)/SR-45 (N Nebraska Ave)



- Dual left turn lanes in all directions with 2'-4' dotted guidelines.
- Two through lanes for NB and SB approach with one separate right-turn lane.
- Three through lanes for WB approach with right turn drop lane.
- Three through lanes and one shared through/right lane for EB approach.
- North intersection leg has painted channelized right turn lanes with no Yield signage.
- Street lighting is present near all corners of the intersection.
- LED illuminated street name signs are present at the intersection.
- One traffic signal head per lane is provided for every approach with yellow retroreflective backplates. Additionally, supplemental near side traffic signals are provided in all approaches except for the WB approach.
- As of March 2023, roadway surface and pavement markings appear to be in good condition.
- Recent intersection improvements from late-2021:
 - Reduced turning radius with a larger concrete pad and curb and gutter.
 - Reduced painted channelized islands.
 - Pedestrian curb ramps and detectable warning surfaces were updated.

- Green-colored bike lanes for north and east intersection legs.
- Advance street name signage is present for all approaches.
- Turning Vehicles YIELD to Peds signage present for SB approach only.
- Turning Vehicles STOP for Peds signage present for NB, EB, and WB approaches.
- Marked bike lanes along north and east legs. Bike keyhole lane present for west leg.
- Posted speed limits:
 - SR-582 (E Fowler Ave): 40 MPH
 - US-41/SR-45 (N Nebraska Ave): 45 MPH

Crash Data Observations:

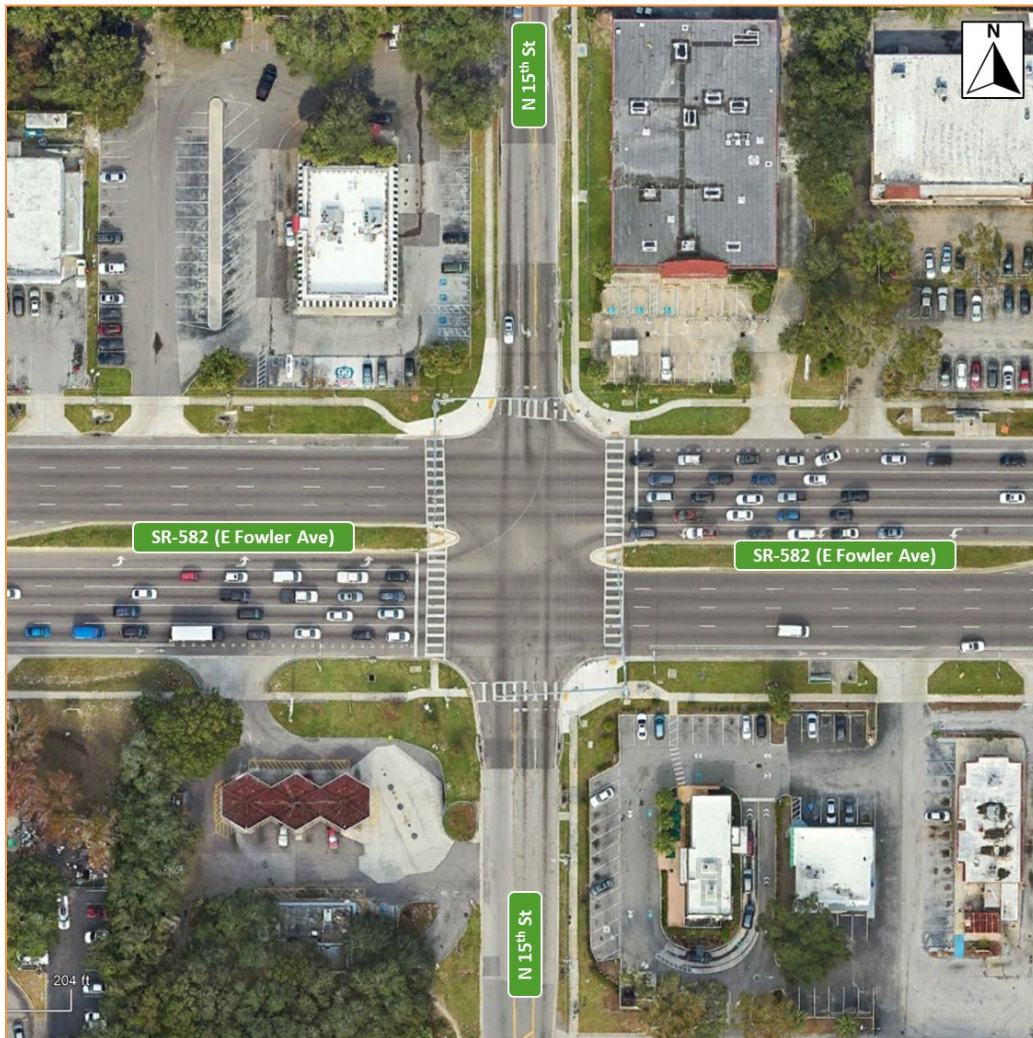
2016-2020: 275 crashes, 54.9 crashes/year

- Crashes reviewed: fatal, incapacitating injury, angle, right-turn, sideswipe, pedestrian, and bike.
 - 173 rear-end crashes,
 - 0 severe injury crashes.
 - 78 crashes occurred during nighttime conditions, 29.5% coded as rear-end crashes.
 - 26 crashes occurred during wet roadway conditions, 65.4% coded as rear-end crashes.
 - Top 3 crash types (excluding rear-end crashes): 58 sideswipe (same direction), 7 pedestrian, 8 right-turn crashes.
 - Sideswipe crash distribution as follows: 24 WB, 16 EB, 10 SB, 6 NB. 2 crashes involved left-turning and right-turning vehicle collision.
 - Right-turn crashes: 3 crashes occurred at the 920 E Fowler Ave (McDonald's) driveway, 2 occurred at signalized intersection, no patterns with remaining crash directions.
 - Bike – 5 crashes
 - 0 fatal, 1 incapacitating injury.
 - 4 (80%) of the total 5 bike crashes occurred in daylight conditions including the incapacitating injury crash.
 - 2 bike crashes occurred at a marked crosswalk, 2 occurred midblock, and 1 occurred along the bike lane.
 - 2 bike crashes involved right turning vehicles.
 - Pedestrian – 7 crashes
 - 0 fatal, 5 incapacitating injury crashes.
 - 6 (87.5%) of the total 7 pedestrian crashes occurred in nighttime conditions including 4 incapacitating injury crashes.
 - 3 pedestrian crashes occurred at a marked crosswalk, and 4 occurred midblock.
 - 1 pedestrian crash involved a right turning vehicle.
 - 28.4% of crashes occurred at nighttime and 9.5% occurred during wet roadway conditions, which are both lower than the statewide averages of 30% and 18%, respectively.

Recommendations:

- Review yellow and all-red clearance intervals to reduce angle, sideswipe, and rear-end crashes.
- Replace Turning Vehicles YIELD to Peds sign at north intersection leg with a Turning Vehicles STOP for Peds sign.
- As best practice, install YIELD signs / YIELD pavement markings for the painted channelized islands on the north intersection leg.
- Per MUTCD Section 4D.14, a signal head shall be located no less than 40' beyond the stop line, no more than 180' beyond the stop line unless a supplemental near-side signal is provided, and as near as practical to the line of the driver's normal view, if mounted over the roadway. No near-side signal heads are provided for the westbound approach; existing signal heads are ~170' beyond the stop line. As best practice, provide near-side signal heads on the existing span wire assemblies. Note that structural analysis may be needed for this installation.
- Coordinate with local officials to promote safe crossing behavior within local residents to help reduce pedestrian/bike crashes.

Study Intersection: SR-582 (E Fowler Ave) at N 15th St



- Left turn lanes provided for all approaches.
- SR-582 (E Fowler Ave) is an 8-lane divided corridor.
- N 15th St is a 2-lane undivided corridor.
- Intersection lighting is provided at all corners of the intersection.
- One traffic signal head per lane is provided for every approach with yellow retroreflective backplates.
- All left turn lanes are protected-permissive.
- As of March 2023, roadway surface and pavement markings appear to be in good condition.
- Recent intersection improvements from late-2021/early-2022:
 - Turning radius at NB and SB right turns (NW & SE corners) were reduced with a larger concrete pad and curb and gutter.
- No advanced street name signage for NB and SB approaches.
- Turning Vehicles YIELD to Peds signage present at all approaches, except SB.
- Pedestrian ramps appear to be in good condition with detectable warning surfaces.

- Marked buffered bike lanes along East and West legs.
- Curb and gutter present
- Posted Speeds:
 - E Fowler Ave: 45 MPH
 - N 15th St: 30 MPH

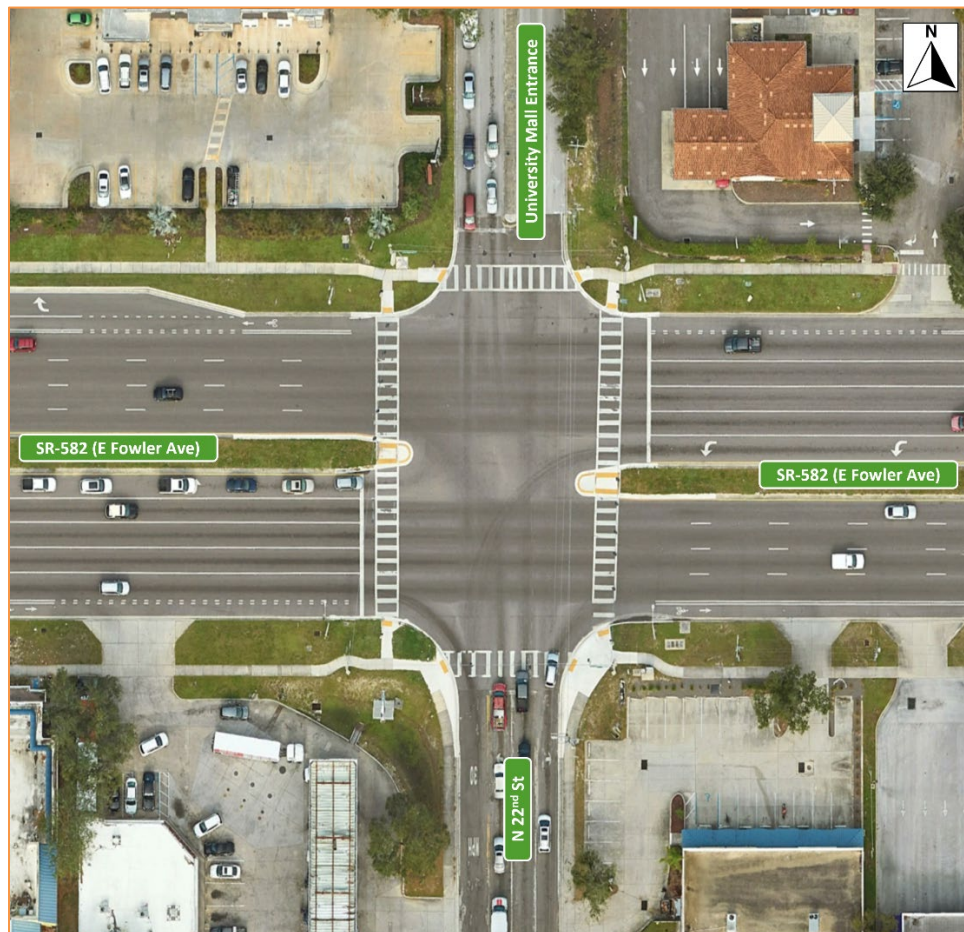
Crash Data Observations:

- 2016-2020: 323 Crashes
Crashes reviewed: fatal, incapacitating injury, angle, left-turn, sideswipe, pedestrian, bike, head-on, and single vehicle.
- 130 rear-end crashes, 26 crashes/year.
 - 109 crashes occurred during nighttime conditions, 37.6% coded as rear-end crashes.
 - 29 crashes occurred during wet roadway conditions, 34.5% coded as rear-end crashes.
- Top 2 crash types (excluding rear-end crashes): 68 left-turn, 50 sideswipe, and 23 angle.
 - The majority of left-turn crashes at-fault driver distribution were as follows: 32 WB Left and 24 EB Left.
 - 32 (47%) of total left-turn crashes occurred at nighttime.
 - Left-turn crashes were distributed throughout the day.
- Majority of sideswipe crashes were as follows: 19 EB and 21 WB, with no patterns with remaining crash directions.
 - No severe injury crashes.
- Angle crashes at-fault driver distribution were as follows: 7 NB, 6 SB, 6 EB and 4 WB. 12 crashes involved left-turning vehicle collisions and 1 crash involved U-turning vehicle collision.
 - No severe injury crashes.
- Bike – 17 crashes
 - No severe injury crashes.
 - All bike crashes occurred in dry roadway pavement conditions.
 - 3 (17.6%) of the total 17 bike crashes occurred at nighttime.
 - 7 bike crashes occurred at a marked crosswalk, 6 crashes occurred at nearby business driveways, 2 crashes occurred just outside marked crosswalk, and 2 crashes occurred midblock.
 - 5 crashes occurred due to right-turning vehicles
- Pedestrian – 10 crashes
 - 0 fatal and 3 incapacitating injury crashes.
 - All incapacitating injury crashes involved midblock crossing behavior.
 - 2 of the total 3 incapacitating injury crashes occurred at nighttime.
 - 5 (50%) of the 10 pedestrian crashes occurred at nighttime.
 - 5 pedestrian crashes occurred midblock, and 3 crashes involved right-turning vehicles with pedestrians at a marked crosswalk.
- 34.4% of crashes occurred at nighttime and 9.1% of crashes occurred during wet roadway conditions; nighttime is higher than the statewide average of 30% and wet roadway is less than the statewide average of 18%.

Recommendations/Notes:

- Review yellow and all-red clearance intervals to reduce angle, sideswipe, and rear-end crashes.
- Replace Turning Vehicles YIELD to Peds signage present with Turning Vehicles STOP for Peds signage for the EB, WB, and NB approaches.
- Install a Turning Vehicles STOP for Peds sign for the SB approach.
- As best practice, install advanced street name signage for NB and SB approaches to increase driver awareness of signalized intersection ahead and reduce sideswipe crashes.
- Review intersection lighting to ensure lighting conditions are adequate at night and meet lighting maintained values under FDOT Design Manual 231.2.
- Replace EB and WB protected/permissive left-turn signals with protected left-turn signals. Alternatively, review vehicle volumes to determine if peak hour protected timing phases should be modified.

Study Intersection: SR-582 (E Fowler Ave) at N 22nd St/ University Mall Entrance



- SR-582 (E Fowler Ave):
 - 8-lane divided with a posted speed limit of 45 mph.
 - Left-turn lanes provided for both the EB and WB approaches at the intersection.
 - Flashing yellow arrow (FYA) traffic signals provided for both EB and WB approaches.
- N 22nd St:
 - Posted speed limit of 30 mph.
 - Left-turn lane provided.
 - Permissive-only left-turn phasing.
 - One supplemental near side and two far side signal heads are provided for both the northbound and southbound approaches.
- Street lighting is present on all corners of the intersection.
- LED illuminated street name signs are present at the intersection.
- Traffic signals have yellow retroreflective backplates.
- Advanced street name signs are present for the EB and WB approaches.
- As of March 2023, roadway surface and pavement conditions along east and west intersection legs appear to be in good condition. For the south leg, roadway surface and pavement markings appear to be in poor condition and require maintenance. Note that the north intersection leg is private property.

- Recent intersection improvements from late 2021-early2022:
 - Construction of refuge islands at median for the east and west intersection legs.
 - Reconstruction of curb ramps at all intersection corners.
- Pedestrian features and crossings are provided on all four legs of the signalized intersection.
- Pedestrian ramps appear to be in good condition with detectable warning surfaces.
- Marked bike lanes are provided along east and west legs only.
- Turning Vehicles Yield to Peds signage present at all intersection legs except for the north leg.

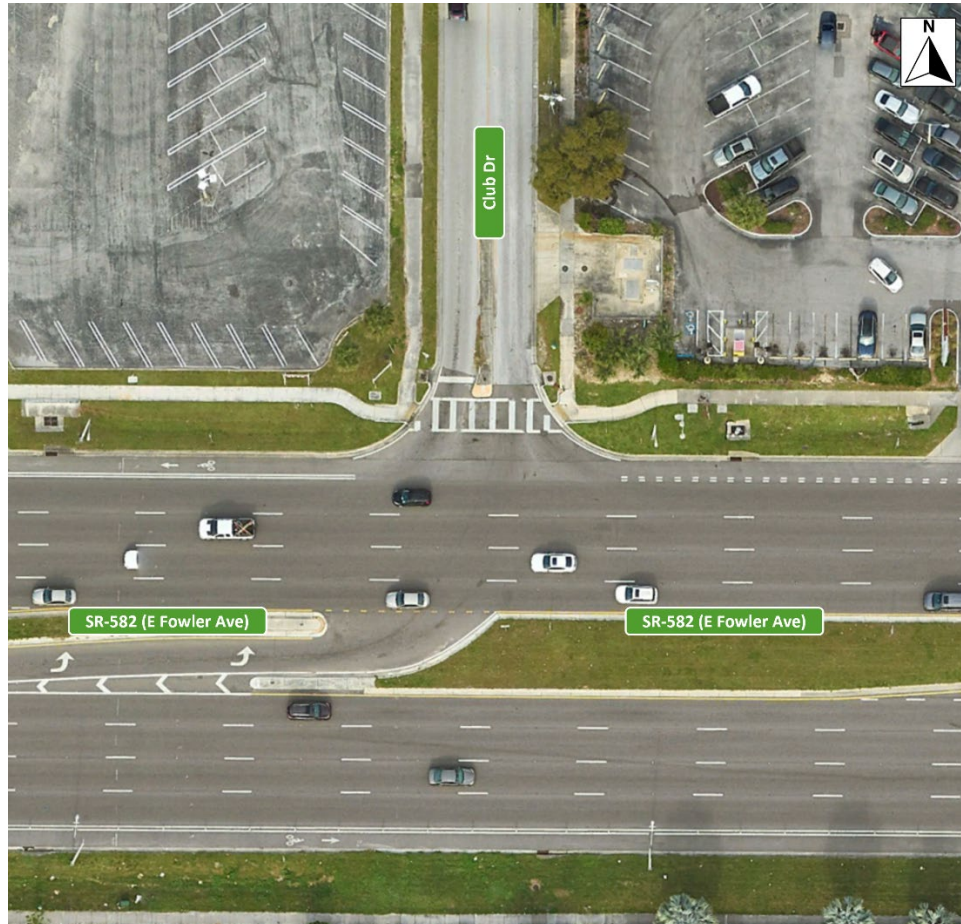
Crash Data Observations:

- 2016-2020: 215 crashes
 - Crashes reviewed: fatal, incapacitating injury, angle, left-turn, sideswipe, pedestrian, and bike.
- 80 rear-end crashes, 16 crashes/year
 - No severe injuries
 - 22 crashes occurred at nighttime, 27.5% coded as rear-end crashes.
 - 6 crashes occurred during wet roadway, 7.5% coded as rear-end crashes.
- Top 2 crash types (excluding rear-end crashes): 40 left-turn, 26 sideswipe
 - Left-turn crashes distribution as follows: 16 EB at-fault vehicles, 13 WB at-fault vehicles, 6 SB at-fault vehicles, 5 NB at-fault vehicles.
 - Time of day (12 PM – 4 PM): 21 crashes
 - Sideswipe crashes distribution as follows: 12 EB, 11 WB, and no patterns with remaining crash directions.
- Bike - 7 crashes
 - 4 of the total 7 (57.1%) bike crashes occurred during daylight, dry conditions.
 - 1 fatal: vehicles on green, struck bike NB crossing intersection.
 - 3 involving vehicles at-fault, struck bike against traffic.
 - 2 involving vehicles at-fault where bike was traveling at a marked crosswalk
- Pedestrian - 8 crashes
 - 6 of the total 8 (75%) pedestrian crashes occurred during nighttime, dry conditions.
 - 3 involving pedestrians at-fault crossing midblock (2 incapacitating)
 - 3 crashes where vehicles at-fault struck pedestrians on marked crosswalk.
- 1 fatal (bike), 6 incapacitating injury (3 left-turn, 2 pedestrians, 1 angle)
- 30.8% of crashes occurred at nighttime, equal to the statewide average of 30%.
- 8.6% of crashes occurred during wet roadway conditions, lower than the statewide average of 18%.

Recommendations/Notes:

- Review protected/permissive signal timings of left turns by time of day and vehicle volumes to ensure optimum protected timing and reduce left-turn crashes.
- Review yellow and all-red clearance intervals to reduce angle, sideswipe, and rear-end crashes.
- Replace Turning Vehicles YIELD to Peds signage with Turning Vehicles STOP for Peds signage for the east, west, and south intersection legs.

Study Intersection: SR-582 (E Fowler Ave) at Club Dr



- SR-582 (E Fowler Ave):
 - Directional median opening, 8-lane divided with a speed limit of 45 mph.
 - EB left-turn into side street (Club Dr).
 - Combine No U-Turn/No Left Turn signage on WB approach facing west and DO NOT ENTER signage on WB approach facing north.
- Club Dr:
 - Side street, 2-lane undivided with a posted speed limit of 20 mph.
 - SB right-turn with STOP signage and RIGHT TURN ONLY signage.
- Street lighting is present near the NW and NE corner of Club Dr.
- Buffered bike lanes are provided along EB and WB directions. Bike lane flex posts are provided on the EB side, missing on the WB side.
- Marked crosswalk is provided at side street, slightly faded, but in visible condition.
- Pedestrian ramps are in good condition with detectable warning surfaces.
- As of March 2023, roadway surface and pavement conditions appear to be in good condition.
- All intersection corners have curbed shoulders.

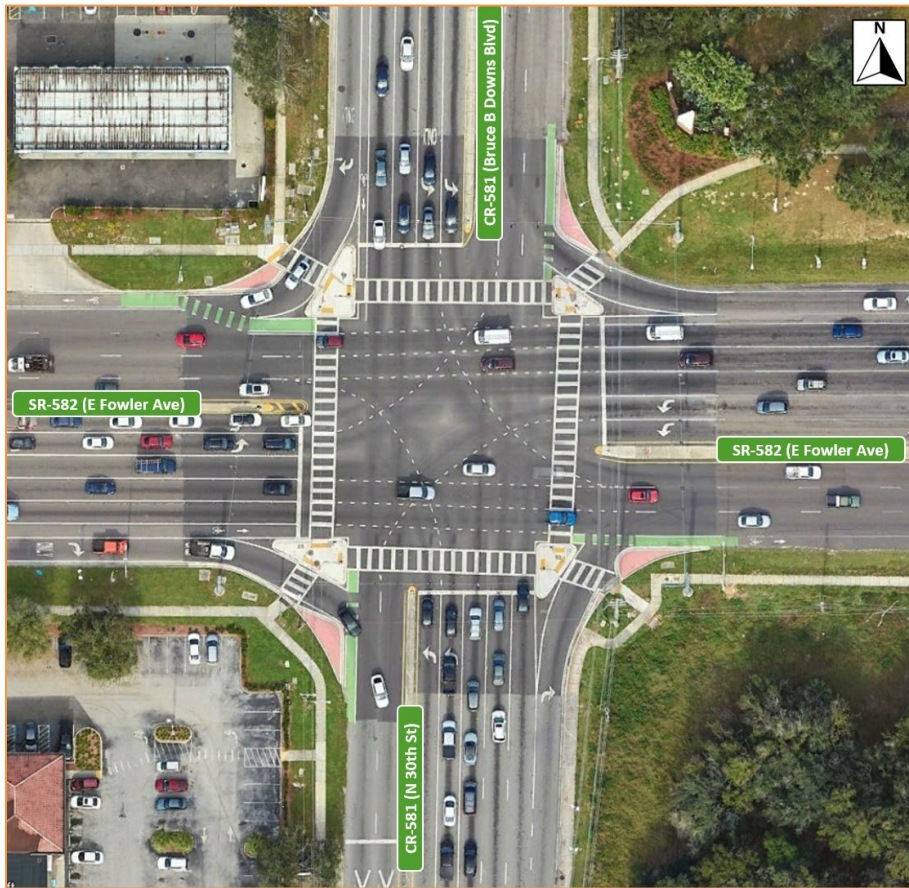
Crash Data Observations:

- 2016-2020: 80 crashes, 16.0 crashes/year
 - Crashes reviewed: fatal, incapacitating injury, left-turn, sideswipe, pedestrian, and bike.
- 51 rear-end crashes, 10.2 crashes/year
 - Possibly due to congestion as this side street is near a signalized intersection located 570 ft east.
 - No severe injuries.
 - 12 crashes occurred at nighttime, 23.5% of rear-end crashes.
 - 10 crashes occurred during wet roadway, 19.6% of rear-end crashes.
- Top 2 crash types (excluding rear-end crashes): 9 left-turn and 12 sideswipe.
 - Left-turn crashes: 9 involved EB at-fault vehicles.
 - Sideswipe crashes: 7 involved WB vehicles, 4 involved EB vehicles, and 1 crash was sideswipe opposing direction with NB/SB vehicles.
- Pedestrian – 1 crash
 - Dark-lighted, wet. EB V1 changed lanes to make left turn and struck NB pedestrian crossing midblock.
- Bike – 1 crash
 - Daylight, dry. SB V1 ran a stop sign and struck EB bike in crosswalk.
- 1 fatal (pedestrian), 1 incapacitating injuries (left-turn)
- 27.5% of crashes occurred during nighttime conditions, 12.5% of crashes occurred during wet roadway conditions; both less than the statewide average of 30% and 18%, respectively.

Recommendations/Notes:

- The averages per year for left-turn and sideswipe crashes are low. 1.8 crashes/year for left-turn crashes and 2.2 crashes/year for sideswipe crashes. There are no other recommendations at the time of the study.
- Ped/bike crashes are also low and there are no recommendations at the time of this study.
- Review intersection lighting to ensure lighting conditions are adequate at night and meet lighting maintained values under FDOT Design Manual 231.2.

Study Intersection: SR-582 (E Fowler Ave) at CR-581 (Bruce B Downs Blvd / N 30th St)



- Dual left turn lanes in all directions with 2'-4' dotted guidelines.
- Three through lanes for all approaches, except SB which has two through lanes.
- 2'-4' dotted guidelines provided for both the EB and WB through lanes.
- All right turns are channelized with raised pedestrian islands and are YIELD sign controlled.
- Intersection lighting is provided at all corners of the intersection.
- One traffic signal head per lane is provided for every approach with yellow retroreflective backplates.
- As of March 2023, roadway surface and pavement markings appear to be in good condition.
- Recent intersection improvements from mid-2022:
 - Resurfaced intersection.
 - Turning radius at all right turns were reduced with truck aprons.
 - Pedestrian refuge islands were updated.
 - Green bike lanes were added.
- No advance street name signage for NB and SB approaches.
- Turning Vehicles YIELD to Peds signage present at all right turn lanes.
- Pedestrian ramps appear to be in good condition with detectable warning surfaces.
- Marked bike lanes along East, West, and North (inconsistent) legs.
- Posted Speeds: E Fowler Ave: 45 MPH; Bruce B Downs Blvd: 45 mph

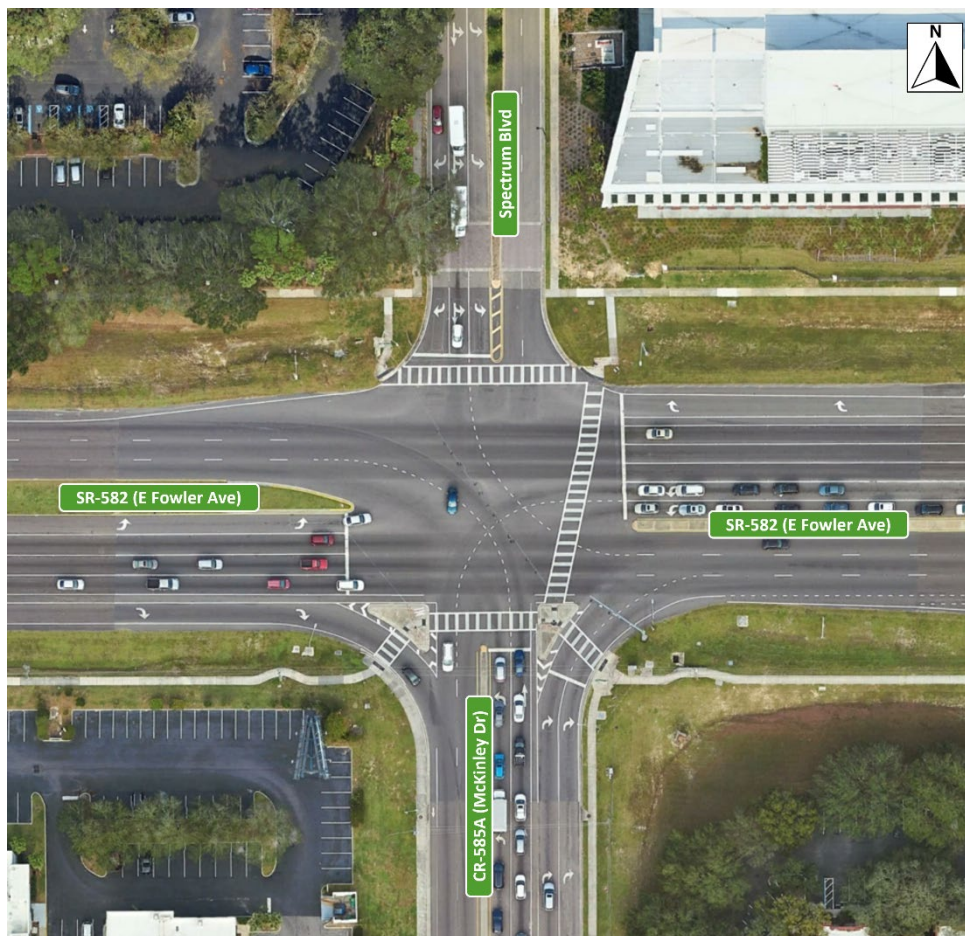
Crash Data Observations:

- 2016-2020: 570 crashes, 115 crashes/year
Crashes reviewed: fatal, incapacitating injury, angle, sideswipe, pedestrian, and bike.
 - 407 rear-end crashes,
 - 2 severe injury crashes:
 - Vehicle changing lanes and rear ended vehicle in front for both crashes (one involved a motorcycle).
 - 113 crashes occurred during nighttime conditions, 27.8% coded as rear-end crashes.
 - 64 occurred during wet roadway conditions, 15.7% coded as rear-end crashes.
 - Top 2 crash types (excluding rear-end crashes): 92 sideswipe (same direction) & 22 angle.
 - Majority of sideswipe crashes were as follows: 24 EB, 22 SB, 22 WB, with no patterns with remaining crash directions.
 - Angle crashes: 9 involved EB at-fault vehicle, no patterns with remaining crash directions
 - Bike – 6 crashes
 - 3 involving NB right turning vehicles where bike was traveling WB at a marked crosswalk.
 - All daylight, clear/dry weather
 - All at marked crosswalk, except 1 that occurred at a nearby driveway
 - Pedestrian – 3 crashes
 - 2 fatal, both pedestrian at-fault crossing outside of marked crosswalk
 - 2 at nighttime
 - All clear/dry weather
 - 29.4% of crashes occurred at nighttime and 15.0% of crashes occurred during wet roadway conditions; nighttime is equal to the statewide average of 30% and wet roadway is less than the statewide average of 18%.

Recommendations:

- Review yellow and all-red clearance intervals to reduce angle, sideswipe, and rear-end crashes.
- Replace Turning Vehicles YIELD to Peds signage present at all right turn lanes with Turning Vehicles STOP for Peds signage.
- Install advanced street name signage for NB and SB approaches to increase driver awareness of signalized intersection ahead and reduce sideswipe crashes.
- Review intersection lighting to ensure lighting conditions are adequate at night and meet lighting maintained values under FDOT Design Manual 231.2.
- Based on MUTCD Section 4D.13, the required signal for all through traffic on an approach shall be located not less than 8' apart measured horizontally perpendicular to the approach between the centers of the signal faces. Consider repositioning the WB traffic signal head for the outside lane as it appears to not be centered directly above the through lane.
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Study Intersection: SR-582 (E Fowler Ave) at CR-585A (McKinley Dr)/Spectrum Blvd



- Intersection Google Maps Observations:
 - SR-582 (E Fowler Ave):
 - 6-lane divided with a posted speed limit of 50 mph.
 - Dual left-turn lanes provided for WB approach and single left-turn lane provided for EB approach.
 - Protected left-turn phasing provided for both EB and WB approaches.
 - U-Turn Yield to Right Turns signage on WB left-turn
 - Right-turn lane provided for both EB and WB approaches.
 - YIELD signage provided for EB right-turn
 - CR-585A (McKinley Dr):
 - Posted speed limit of 45 mph.
 - Dual left-turn and right-turn lanes provided for NB approach with a shared NB through.
 - Protected phasing for all turning movements for NB approach.
 - Spectrum Blvd:
 - Posted speed limit of 25 mph.
 - Dual left-turn lanes provided for SB approach with a shared SB through.
 - Protected phasing for SB left turns.

- Exclusive right-turn lane provided for SB approach.
- 2'-4' dotted guidelines provided for all dual left-turn lanes.
- Street lighting is present on all corners of the intersection.
- Traffic signals have backplates with yellow retroreflective borders.
- Advanced street name signs provided on EB and WB approaches.
- LED illuminated street name signs are present at the intersection.
- As of March 2023, roadway surface and pavement conditions appear to be in good condition.
 - Pedestrian ramps appear to be in fair condition with detectable warning surfaces.
- Pedestrian features and crossings are provided on all legs of the signalized intersection, except for the west leg.
- Pedestrian refuge island on both sides of south leg of intersection.
- Marked bike lanes are provided along all legs of the intersection, except the north leg.

Crash Data Observations:

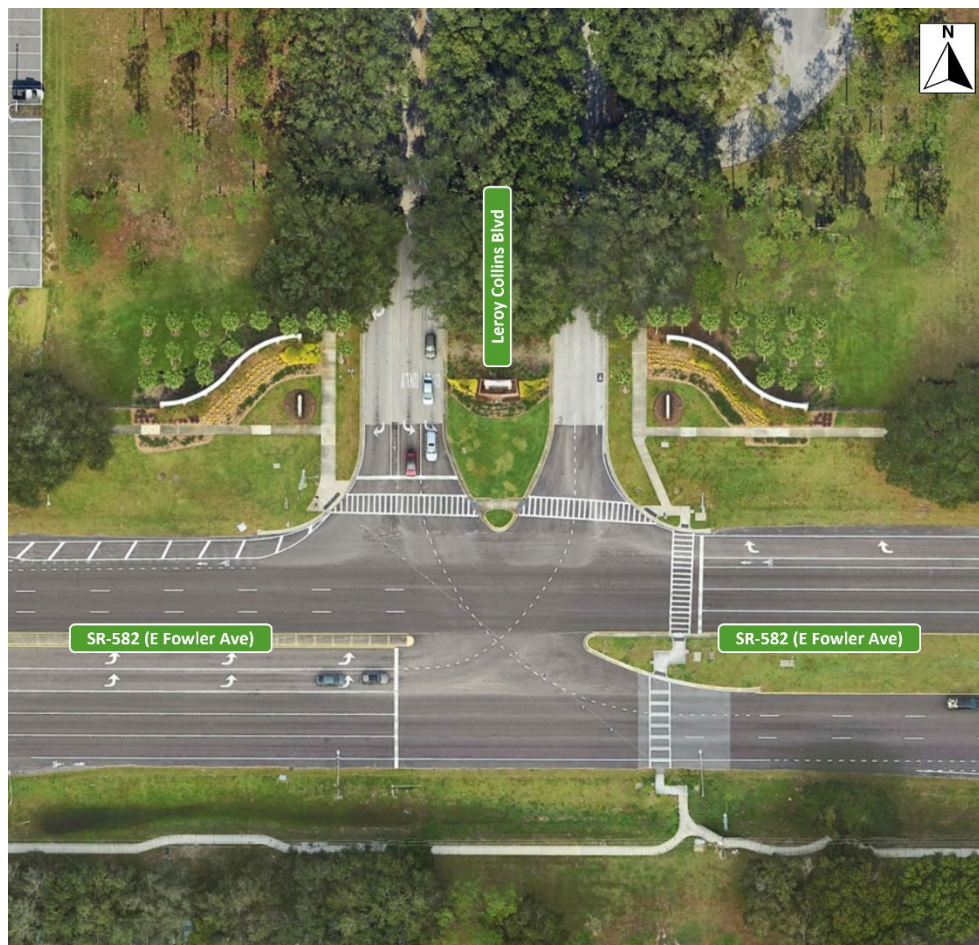
- 2016-2020: 237 crashes
 - Crashes reviewed: fatal, incapacitating injury, angle, sideswipe, pedestrian, and bike.
- 170 rear-end crashes, 34.9 crashes/year
 - No severe injuries
 - 59 crashes occurred at nighttime, 34.7% coded as rear-end crashes.
 - 41 crashes occurred during wet roadway, 24.1% coded as rear-end crashes.
- Top crash type (excluding rear-end crashes): 28 sideswipe
 - 10 involved WB vehicles, 10 involved NB vehicles, 6 involved EB vehicles, and 1 SB.
- Bike – 3 crashes
 - Daylight, dry. EB V1 making a right turn, EB bike on crosswalk failed to yield right of way and collided with vehicle.
 - Dark-lighted, dry. EB V1 making right turn, struck SB bike outside of crosswalk.
 - Dark-lighted, dry. SB V1 making right turn on green, struck bike EB on crosswalk with walk signal.
- Pedestrian – 1 crash
 - Dark-lighted, dry. WB V1 on green, struck SB pedestrian outside of crosswalk.
- 0 fatal, 3 incapacitating injury crashes (1 pedestrian, 1 hit fixed object, 1 rear-end)
- 34.1% of crashes occurred at nighttime and 23.7% of crashes occurred during wet roadway conditions; both are higher than the statewide averages of 30% and 18%, respectively.
 - 42 of 54 wet roadway crashes were rear-end crashes.

Recommendations:

- Review yellow and all-red clearance intervals to reduce sideswipe and rear-end crashes.
- Review intersection lighting to ensure lighting conditions are adequate at night and meet design lighting criteria values under FDOT Design Manual 231.2.
- Install Turning Vehicles STOP for Peds signage at all right-turn lanes approaching the intersection.
- Based on the Hillsborough County Crosswalk Needs Analysis by FDOT, adding a crosswalk to the west approach would have a significant impact on the operation of the intersection since this would result in the possibility of having two pedestrian movements crossing Fowler Ave sequentially. If a pedestrian movement on that side of the intersection is required, the split phase operation may be

the only alternative. Due to low pedestrian and bike crashes, adding a crosswalk is not recommended at this time.

Study Intersection: SR-582 (E Fowler Ave) at Leroy Collins Blvd



- SR-582 (E Fowler Ave):
 - 6-lane divided with a posted speed limit of 50 mph.
 - Dual protected left-turn lanes provided for EB approach.
 - Right-turn lane provided for WB approach.
 - Marked bike lanes provided along east and west legs.
 - No advanced street name signages for EB/WB approaches.
- Leroy Collins Blvd:
 - Dual protected left-turn lanes and exclusive protected right-turn lane provided for SB approach.
 - Marked bike lane provided for the NB approach.
 - 2 through lanes provided for NB approach.
- 2'-4' dotted guidelines provided for dual left-turn lanes for both SB and EB approaches.
- Street lighting is present at this T-intersection. All lighting is high pressure sodium.
- Traffic signal heads do not have yellow retroreflective backplates.
- All intersection corners have curbed shoulders.
- Marked crosswalks are provided on east and north legs, missing crosswalk on west leg.
- Pedestrian ramps appear to be in good condition with detectable warning surfaces.

- As of March 2023, roadway surface and pavement markings appear to be in good condition.

Crash Data Observations:

- 2016-2020: 139 crashes, 27.6 crashes/year
 - Crashes reviewed: fatal, incapacitating injury, angle, sideswipe, pedestrian, and bike.
- 114 rear-end crashes, 22.8 crashes/year
 - No severe injuries
 - 36 crashes occurred at nighttime, 31% of rear-end crashes.
 - 38 crashes occurred during wet roadway, 32.8% of rear-end crashes.
- Top crash type (excluding rear-end crashes) 13 sideswipe.
 - Sideswipes crashes: 8 involved WB vehicles, 4 involved EB vehicles, no patterns with remaining crash directions
- Bike – 2 crashes
 - Daylight, dry. EB V1 making right turn on red light and struck EB bike on marked crosswalk with green walk signal.
 - Daylight, dry. WB V1 struck SB bike crossing midblock.
- 0 fatal, 0 incapacitating injury crashes.
- High nighttime crash rate of 32.6%, and high wet roadway crash rate of 30.4%; both higher than the statewide average of 30% and 18%, respectively.
 - Nighttime crashes: 36 rear-end crashes, 5 sideswipe crashes, 2 head-on crashes, 1 left-turn crash, and 1 angle crash.
 - Wet roadway crashes: 38 rear-end crashes, 2 head-on crashes, and 2 sideswipe crashes.

Recommendations/Notes:

- As best practice, install advanced street name signage for the WB and EB approaches to reduce sideswipe crashes.
- Install yellow retroreflective backplates on all signals at the signalized intersection to improve visibility of traffic signals and reduce all crash types.
- Based on the Hillsborough County Crosswalk Needs Analysis by FDOT, providing pedestrian crossing features on the west leg of this intersection would have a significant impact on the operation of the intersection. Adding a crosswalk would require moving the eastbound stop bar back about sixty feet from its current location, which would have an impact on intersection efficiency. Due to low pedestrian and bike crashes at this intersection, installing a crossing on the west leg is not recommended.
- Replace existing high pressure sodium street lighting with LED and review intersection lighting to ensure lighting conditions are adequate at night and meet lighting maintained values under Florida Design Manual 231.2.

Study Intersection: SR-582 (E Fowler Ave) at N 46th St



- SR-582 (E Fowler Ave):
 - Directional median opening, 6-lane divided with a speed limit of 50 mph.
 - Right merge lane provided for east leg.
 - WB left-turn lane provided to go SB into side street.
 - EB left-turn lane provided to make a U-Turn to go WB.
 - EB right-turn lane provided to go SB into side street.
- N 46th St:
 - 2-lane undivided with a posted speed limit of 30 mph.
 - STOP sign and Right Turn Only sign provided at the NE corner.
- Sidewalks are present along south side of E Fowler Ave and west side of N 46th St.
- Marked bike lanes along east and west leg. No bike lane for south leg.
- As of May 2023, roadway surface and pavement markings appear to be in good condition.
 - Pedestrian ramps appear to be in good condition with detectable warning surfaces, however there is no crosswalk provided for the side street.
- Street lighting is present along SR-582 (E Fowler Ave), no street lighting is present for N 46th St.
- All intersection corners have flushed shoulders.

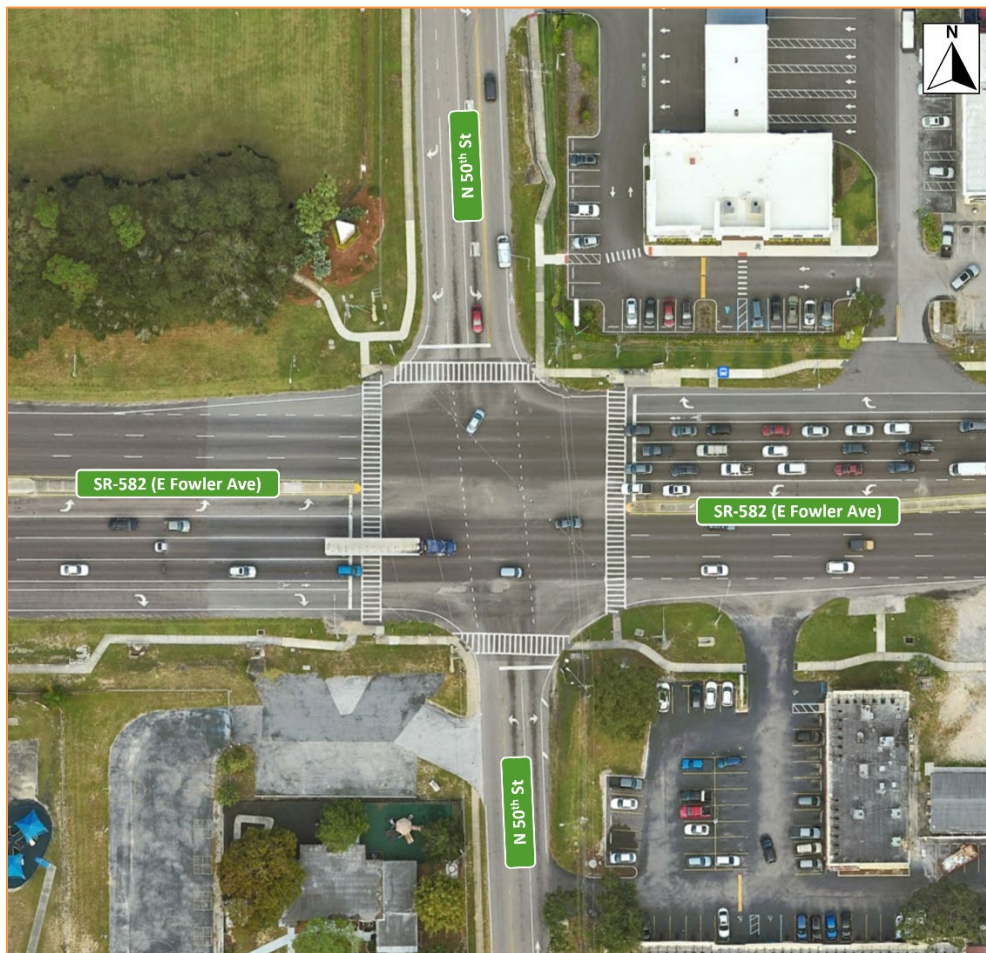
Crash Data Observations:

- 2016-2020: 104 crashes
 - Crashes reviewed: fatal, incapacitating injury, left-turn, sideswipe, pedestrian, bike, and rear-end.
- 61 rear-end crashes, 12.2 crashes/year:
 - No severe injuries
 - 9 crashes occurred at nighttime, 14.8% of rear-end crashes.
 - 16 crashes occurred during wet roadway, 26.2% of rear-end crashes.
- Top 2 crash types (excluding rear-end crashes): 7 left-turn and 10 sideswipe.
 - Left-turn crashes: 7 involved WB at-fault vehicles.
 - Sideswipe crashes: 6 involved EB vehicles, 2 involved WB vehicles, and 2 involved NB vehicles.
- Pedestrian – 1 crash:
 - Daylight, dry. NB V1 making right turn, pedestrian crossing side street at unmarked crosswalk.
- 0 fatal, 2 incapacitating injuries (2 left-turn)
- 20% of crashes occurred during nighttime conditions, and 16.3% of crashes occurred during wet roadway conditions; both less than the statewide average of 30% and 18%, respectively.

Recommendations/Notes:

- The averages per year for left-turn and sideswipe crashes are low, there are no recommendations at this time.
- Pedestrian crashes are low, there are no other recommendations at the time of this study.

Study Intersection: SR-582 (E Fowler Ave) at N 50th St



- Intersection Google Maps Observations:
 - SR-582 (E Fowler Ave):
 - 6-lane divided with posted speed limit of 50 mph.
 - Left turn and right turn lanes are provided at intersection.
 - Protected left turn phasing provided for both the EB and WB approaches.
 - No advanced street name signages for EB/WB approaches.
 - N 50th St:
 - 2-lane undivided with posted speed limit of 30 mph (south leg) and 35 mph (north leg).
 - 2'-4' dotted guidelines provided for both the NB and SB through movements.
 - Exclusive left turn and right turn lane provided for SB approach.
 - Exclusive left turn lane provided for NB approach.
 - Permissive-only phasing provided for both the NB and SB approaches.
 - Street lighting is present near all corners of the intersection.
 - LED illuminated street name signs are present at the intersection.
 - EB and WB traffic signal heads have backplates without yellow retroreflective borders. NB and WB traffic signal heads do not have backplates and yellow retroreflective backplates.

- As of March 2023, roadway surface and pavement conditions appear to be in good condition.
- Pedestrian features and marked crossings are provided on all four intersection legs.
- All intersection corners have flush shoulders except for the SW corner that has a small segment of curbed shoulder.
- Pedestrian ramps appear to be in fair condition with detectable warning surfaces. Detectable warning surfaces are missing on the NE corner for the east-west marked crosswalk.
- Marked bike lanes along east, west, and north leg. No bike lane for south leg.
- Turning Vehicles Yield to Peds signage present on all intersection legs.

Crash Data Observations:

- 2016-2020: 174 crashes
 - Crashes reviewed: fatal, incapacitating injury, angle, left-turn, sideswipe, pedestrian, and bike.
- 113 rear-end crashes
 - 2 severe injuries
 1. Vehicle followed too closely during slow traffic and rear-ended vehicles in front.
 2. Vehicle failed to stop and rear-ended vehicles in front at red traffic signal. After initial collision, a vehicle that was rear-ended struck fixed objects.
 - 49 rear-end crashes occurred at nighttime, 42.2% of rear-end crashes. 34 crashes occurred during wet roadway, 29.3% of rear-end crashes.
- Top 2 crash types (excluding rear-end crashes): 11 left-turn, 19 sideswipe
 - Left-turn crashes distribution as follows: 7 SB at-fault vehicles, 2 WB at-fault vehicles, 1 EB at-fault vehicle, and 1 NB at-fault vehicle.
 - Sideswipe crashes: 12 involved WB vehicles, no patterns with remaining crash directions.
- Bike – 3 crashes
 - Daylight, wet. WB V1 stopped after stop bar on red light and struck NB bicyclist crossing at marked crosswalk.
 - Daylight, dry. EB V1 traveling with a green light struck NB bicyclist crossing against pedestrian traffic control signal at marked crosswalk.
 - Dark-lighted, dry. EB V1 making a left turn struck EB bicyclist crossing against pedestrian traffic control signals at marked crosswalk.
- Pedestrian – 1 crash
 - Dark-lighted, dry. SB V1 making a left turn struck NB pedestrian crossing with a WALK signal at marked crosswalk.
- 1 fatal (bike), 2 incapacitating injury (2 rear-end)
- 28.5% of crashes occurred at nighttime, slightly lower than the statewide average of 30%.
- 19.8% of crashes occurred during wet roadway conditions, slightly higher than the statewide average of 18%.

Recommendations/Notes:

- Review yellow and all-red clearance intervals to reduce angle, sideswipe, and rear-end crashes.
- Install advanced street name signage for the WB and EB approaches to increase driver awareness of the signalized intersection ahead and reduce sideswipe crashes.
- Install flexible backplates with yellow retroreflective borders on all signal heads for the signalized intersection to improve signal visibility.
- Replace Turning Vehicles YIELD to Peds signage with Turning Vehicles STOP for Peds signage for all intersection legs.
- Review intersection lighting to ensure lighting conditions are adequate at night and meet lighting maintained values under FDOT Design Manual 231.2.
- Curb ramps at the signalized intersections appear to have no landings and are at grade-level which provides no protection for pedestrians from turning vehicles. If feasible, consider installing vertical curb faces along the corner(s) of the signalized intersection where it would not present a trip hazard for pedestrians to help ensure vehicles do not “cut” the corner and may help slow down turning vehicle speeds which is a benefit to pedestrians. Reconstruction of the sidewalk and curb ramps may be needed.

Study Intersection: SR-582 (E Fowler Ave) at SR-583 (N 56th St)/CR-583 (N 56th St)



- Dual left turn lanes for all approaches with 2'-4' dotted guidelines, except NB which has three left-turn lanes. All left turns are protected.
- Three through lanes for all approaches, except for NB which has two through lanes.
- All right turns are channelized with raised pedestrian islands and are YIELD sign controlled.
- Intersection lighting is provided at all corners of the intersection.
- All traffic signals do not have yellow retroreflective backplates.
- Not all travel lanes have a designated traffic signal.
- As of March 2023, roadway surface and pavement markings appear to be in good condition.
 - Pedestrian ramps appear to be in good condition with detectable warning surfaces.
- Recent intersection improvements from mid-2022:
 - Pedestrian refuge islands were installed with pedestrian pushbuttons.
 - Pedestrian crosswalks were shortened and realigned for the new pedestrian refuge islands.
 - Green bike lanes were installed.
 - Truck aprons were installed along all right-turn lanes to reduce turning radius for vehicles.
 - Resurfaced intersection.
- Marked bike lanes along all intersection legs.
- Turning Vehicles YIELD to Peds signage present at all right-turn lanes.
- LED illuminated street name signs are present at the intersection.

- Advance street name signage is present for all approaches.
- Posted speed limits:
 - SR-582 (E Fowler Ave): 50 MPH
 - SR-583/CR-583 (N 56th St): 40 MPH

Crash Data Observations:

- 2016-2020: 245 crashes
Crashes reviewed: fatal, incapacitating injury, angle, left-turn, sideswipe, pedestrian, and bike.
 - 157 rear-end crashes, 31.3 crashes/year
 - 1 incapacitating injury: dark-lighted, dry. Multi-vehicles crash with a chain reaction.
 - 54 crashes occurred in nighttime conditions, 34.4% of rear-end crashes.
 - 22 crashes occurred during wet roadway conditions, 14% of rear-end crashes.
 - Top 3 crash types (excluding rear-end crashes): 31 sideswipe, 13 angle, and 12 left-turn
 - Sideswipe crash distribution is as follows: 11 WB, 8 NB, 7 EB, and 5 SB. 7 crashes involved left-turning and right-turning vehicle collision.
 - Angle crash distribution is as follows: 7 SB at-fault vehicles, 5 WB at-fault vehicles, and 1 NB at-fault vehicle.
 - Left-turn crash distribution is as follows: 4 EB at-fault vehicles, 3 WB at-fault vehicles, 3 NB at-fault vehicles, and 2 SB at-fault vehicles.
 - Bike – 8 crashes
 - 0 fatal, 1 incapacitating injury.
 - 7 (87.5%) of the total 8 bike crashes occurred in daylight conditions including the incapacitating injury crash.
 - 5 bike crashes occurred at a marked crosswalk.
 - 2 bike crashes involved left turning and right turning vehicles.
 - 6 crashes where bike was at-fault.
 - Pedestrian – 6 crashes
 - 0 fatal, 0 incapacitating injury.
 - 5 (83.3%) of the total 6 pedestrian crashes occurred in nighttime conditions.
 - 5 pedestrian crashes occurred at a marked crosswalk, and 1 occurred midblock.
 - 3 pedestrian crashes involved right turning vehicles.
 - 0 fatal, 5 incapacitating injuries (2 left-turn, 1 medical, 1 bike, and 1 rear-end)
 - 42% of crashes occurred at nighttime, which is higher than the statewide average of 30%.
 - 4 incapacitating injuries
 - Peak Time of day – 8PM: 20 crashes
 - 54 rear-end crashes, 53.9% of nighttime crashes.
 - 15.9% occurred during wet roadway conditions, which is lower than the statewide averages of 18%.

Recommendations/Notes:

- Review yellow and all-red clearance intervals to reduce angle, sideswipe, and rear-end crashes.
- Replace Turning Vehicles YIELD to Peds sign at all intersection legs with a Turning Vehicles STOP for Peds sign.
- Review intersection lighting to ensure lighting conditions are adequate at night and meet lighting maintained values under FDOT Design Manual 231.2.

- Install one traffic signal head per lane for every approach to increase driver awareness at the signalized intersection and reduce angle and rear-end crashes.
- Install yellow retroreflective backplates to all signals to reduce all crash types.