

## SAFETY ANALYSIS

### 7.0 SAFETY ANALYSIS

Crash data for the I-4 ramps was obtained from the FDOT D7 Crash Data Management System, which pulls data from the FDOT Crash Analysis Reporting (CAR) Online, and crash data for Branch Forbes Road was obtained from FDOT State Safety Office GIS (SSOGis). Crash data was provided for the available last five-year period from January 1, 2014 to December 31, 2018.

The I-4 at Branch Forbes Road interchange influence area for which crash data was analyzed includes 1.146 mile of I-4 from MP 24.160 (0.30 mile west of the I-4 eastbound off-ramp) to MP 25.306 (0.30 mile east of the I-4 westbound off-ramp) and each of the ramps. The crash data for Branch Forbes Road includes 1,000 feet south of the US 92 intersection to 1,000 feet north of the Harvey Tew Road intersection. **Table 7-1** provides a summary of the total crashes per year in the study area and the location of the crashes. **Table 7-2** provides a summary of the crash severity along I-4, the ramps, and Branch Forbes Road.

**Table 7-1: Number of Crashes (2014-2018)**

Year	Location			Total
	I-4 mainline	I-4 on/off ramps EB	Branch Forbes Road	
2014	67	9	17	93
2015	70	21	13	104
2016	79	19	12	110
2017	70	16	11	97
2018	76	15	9	100
<b>Total</b>	<b>362</b>	<b>80</b>	<b>62</b>	<b>504</b>

**Table 7-2: Crash Summary (2014-2018)**

Location	Total Number of Crashes	Number of Fatal Crashes	Number of Fatalities	Number of Injury Crashes	Number of Injuries	Number of Property Damage Only (PDO) Crashes
I-4 mainline	362	3	3	132	227	227
I-4 on/off ramps	80	0	0	23	26	57
Branch Forbes Road	62	0	0	25	37	37
<b>Total</b>	<b>504</b>	<b>3</b>	<b>3</b>	<b>180</b>	<b>290</b>	<b>321</b>

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As shown in **Tables 7-1 and Table 7-2**, 504 crashes occurred in the I-4 at Branch Forbes Road Interchange AOI, of which three were fatal crashes and 180 were injury crashes, resulting in three fatalities and 290 injuries. 321 of crashes resulted in property damaged only (PDO). On average, the crash frequency for the I-4 at Branch Forbes Road interchange AOI is 101 crashes per year.

**Table 7-3** summarizes the types of crashes. The most predominant crash types are rear end with 270 crashes (54%), sideswipe with 63 crashes (12%), hit fixed object with 48 crashes (10%), and angle with 37 crashes (7%).

**Table 7-3: Crash Type Summary**

Type of Crash	Location			Total
	I-4 mainline	I-4 on/off-ramps	Branch Forbes Road	
Rear End	196	57	17	270
Angle	5	4	28	37
Sideswipe	56	3	4	63
Head-on	3	0	3	6
Hit Fixed Object	43	5	0	48
Hit Non-Fixed Object	14	1	0	15
Single Vehicle	31	5	0	36
Bike	0	0	0	0
Run Off Road	4	1	0	5
Pedestrian	1	0	0	1
Right Turn	0	1	0	1
Left Turn	2	3	0	5
Unknown/Other	7	0	10	17
<b>Total</b>	<b>362</b>	<b>80</b>	<b>62</b>	<b>504</b>

**Table 7-4** shows the common cause of crash is operating a motor vehicle in a careless or negligent manner with 253 crashes (50%) followed by failed to yield the right-of-way with 47 crashes (9%).

**Table 7-5** shows 351 of the crashes (70%) occurred at daylight, and **Table 7-6** shows 419 of the crashes (83%) occurred on dry pavement.

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**Table 7-4: Cause of Crashes**

Type of Crash	Location			Total
	I-4 mainline	I-4 on/off-ramps	Branch Forbes Road	
Failed to Keep in Proper Lane	27	1	1	29
Followed too Closely	20	4	6	30
Failed to Yield Right-of-Way	9	10	28	47
No Contributing Action	40	5	3	48
Other Contributing Actions	20	1	3	24
Improper Turn	0	0	2	2
Operated MV in Careless or Negligent Manner	194	51	8	253
Drove Too Fast for Conditions	11	3	3	17
Ran off Roadway	2	0		2
Over-Correcting/Over-Steering	6	2		8
Unknown	23	3	6	32
Improper Passing	3	0	0	3
Swerved or Avoided: Due to Wind, Slippery Surface, MV, Object, Non-Motorist in Roadway, etc.	6	0	1	7
Operated MV in Erratic, Reckless or Aggressive Manner	1	0	1	2
<b>Total</b>	<b>362</b>	<b>80</b>	<b>62</b>	<b>504</b>

**Table 7-5: Lightning Conditions**

Type of Crash	Location			Total
	I-4 mainline	I-4 on/off-ramps	Branch Forbes Road	
Daylight	244	58	49	351
Dark-Lighted	50	7	2	59
Dusk	17	6	2	25
Dark-Not Lighted	29	4	9	42
Dawn	21	5	0	26
Unknown	1	0	0	1
<b>Total</b>	<b>362</b>	<b>80</b>	<b>62</b>	<b>504</b>

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**Table 7-6: Pavement Conditions**

Type of Crash	Location			Total
	I-4 mainline	I-4 on/off-ramps	Branch Forbes Road	
Dry	298	67	54	419
Wet	64	13	8	85
<b>Total</b>	<b>362</b>	<b>80</b>	<b>62</b>	<b>504</b>

**Table 7-7** shows the economic loss of the interchange study area using the FDOT KABCO injury classification scale crash costs. The costs were taken from the *2021 FDOT Design Manual Table 122.6.2* and are included in **Appendix L**.

**Table 7-7: 2014-2018 Crash Estimated Economic Loss**

Crash Severity	Crash Cost	Number of Crashes	Economic Loss
Fatal (K)	\$10,670,000	3	\$32,010,000
Severe Injury (A)	\$872,612	16	\$13,961,792
Moderate Injury (B)	\$174,018	44	\$7,656,792
Minor Injury (C)	\$106,215	120	\$12,745,800
Property Damage Only (O)	\$7,700	321	\$2,471,700
<b>Total</b>		<b>504</b>	<b>\$68,846,084</b>

**Table 7-8** shows the intersection crash rate for the intersections in the AOI. The 2020 Annual Average Daily Traffic (AADT) volume taken during the data collection process were used to determine the crashes per million vehicles entering the intersection. The intersection crash rate for the I-4 ramp terminal intersections are less than the statewide average. Even though the number of crashes for the ramp terminal intersections is lower than the statewide average for the same type of facility, projected traffic volumes are expected to worsen the operations of the ramp terminal intersections and projected queues spillback for the off-ramp might impact the safety along I-4 mainline.

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**Table 7-8: Average Intersection Crash Rates (2014-2018)**

Branch Forbes Road Intersection	Number of Crashes	Crash Rate (MEV) <sup>1</sup>	Statewide Average Crash Rate
Harvey Tew Road	9	0.573	0.293
I-4 WB Ramp Terminal	35	0.862	1.507
I-4 EB Ramp Terminal	45	0.887	1.507
Glen Harwell Rd/ Beauchamp Rd	21	0.538	0.293
US 92	24	0.438	0.293

<sup>1</sup>Million entering vehicles

The Build Alternative improvements for the I-4 ramps and Branch Forbes Road intersection includes adding a traffic signal at both ramp terminals and adding an exclusive right turn lane on the eastbound off-ramp. A crash modification factor (CMF) of 0.61 was obtained from the CMF Clearinghouse. CMF ID 7848 was used on this report because it includes Florida data. The CMFs represents a reduction of 39% in total crashes at the intersections. Therefore, the improvement is expected to reduce 39% of the 73 applicable crashes (of the total of 80 crashes) that occur at the ramp terminal intersections. CMF are available for exclusive right turn lane, but those CMFs are not applicable to interchanges.

The CMFs information is included in **Appendix M**.