



### 5.7.2 Crash Reduction Analysis

As discussed above, the limitations in the HSM methodology could not quantify the safety benefits of the proposed improvements under the Build conditions. Therefore, in consultation with FDOT and District 4 Safety staff, it was determined that a traditional crash reduction analysis should be conducted to determine the safety benefits of the proposed improvements.

In order to estimate the potential safety benefits associated with proposed freeway, interchange, and arterial improvements, the crash reduction analysis utilized the following steps:

1. Identifying applicable crash reduction factors (CRF)
2. Identifying potentially correctable crashes for each improvement with an applicable CRF
3. Applying the CRFs to potentially correctable crashes to estimate the crash reduction per year.

This analysis was conducted based on historic crash data for the years 2012 to 2016. Life cycle analysis, which takes into account the project life in years and capital recovery factor, was not included in this analysis.

The following available resources in the order listed, were used to determine the applicable CRFs:

- FHWA Desktop Reference for Crash Reduction Factors
- FDOT approved Technical Report "Update of Florida Crash Reduction Factors and Countermeasures to improve the Development of District Safety Improvement Projects"
- CMFClearinghouse.org website
- Literature Review for any recent studies that may provide applicable CRFs

Based on the available CRF data, applicable CRFs were identified for the following eight proposed improvements under the Build alternatives:

1. I-95 NB auxiliary lanes between Hillsboro Boulevard and Palmetto Park Road.
2. I-95 SB auxiliary lanes between Hillsboro Boulevard and Palmetto Park Road.
3. I-95 SB auxiliary lane between SW 10th Street and Sample Road.
4. Widen NB off-ramp to SW 10th Street from one lane to two lanes.
5. Provide two right-turn lanes on the SB off-ramp to SW 10th Street.
6. Provide an additional WB left-turn lane at the SW 10th Street and SB entry/exit ramp intersection.
7. Provide dual EB and WB left turn lanes at the SW 10th Street/Newport Center Drive intersection.
8. Provide dual EB and WB left turn lanes and an exclusive EB right turn lane at the SW 10th Street/Natura Blvd Intersection



It is important to note that appropriate CRFs are not available for many of the proposed improvements under the Build alternatives. These improvements are very likely to improve the operations and consequently the safety, the benefits of which cannot be quantified due to the lack of available data. Some of the improvements for which no appropriate CRFs could be obtained are:

1. Removal of the traffic signal for the WB to SB movement at the SW 10th Street interchange. This signal is being combined with the SB off-ramp signal.
2. Elimination of the weaving between the EB Hillsboro Boulevard to I-95 NB loop ramp and the NB I-95 to WB Hillsboro Boulevard loop ramp.
3. Elimination (through braided ramps) of the conflict between the NB On-ramp from SW 10th Street and NB Off-Ramp to Hillsboro Boulevard.
4. Elimination (through braided ramps) of the conflict between the SB On-ramp from Hillsboro Boulevard and the SB Off-Ramp to SW 10th Street.
5. Elimination of the WB to SB I-95 loop ramp merge with I-95 mainline lanes at Hillsboro Boulevard
6. Increasing the storage length of the NB Off-Ramp to Hillsboro Boulevard from 2450' to 4100' to prevent queue spillback onto I-95 mainline.
7. Increasing the storage length of the SB Off-Ramp to SW 10th Street from 1360' to 4150' to prevent queue spillback onto I-95 mainline.

The 2012 to 2016 crash data related to the eight (8) improvements for which CRFs were available was obtained and a high-level review was conducted to determine which crashes may be correctable as a result of each of the proposed improvements. Crash data for all but one of the improvements was obtained from the FDOT Crash Analysis Reporting System (CARS). SW 10th Street is not a State Road east of the NB I-95 on/off ramp intersection. As such, the crash data for the SW 10th Street/Natura Boulevard intersection had to be obtained from Signal Four Analytics. The crash data was filtered to include only those crashes that would be applicable to the associated improvements. For example, only the crashes that occurred in the southbound direction were used in the analysis for the SB auxiliary lane improvements. All pertinent data is included in Appendix Q. The results of this analysis are summarized in **Table 5.28**. The analysis results show that approximately 42 crashes per year may be reduced by the proposed improvements resulting in an annual safety benefit of \$6,156,952. The safety benefit per year was calculated based on the average cost per crash provided in the FDOT Design Manual which is based on the 2012 to 2016 crash data.

**Table 5.28: Crash Reduction Analysis Summary**

Item	Improvement	BMP	EMP	CRF <sup>1</sup>	Source	Potentially Correctable Crashes <sup>2</sup> (2012-2016)	Total Crashes Reduced	Estimated Crash Reduction (per year)	Cost per crash <sup>3</sup>	Estimated Safety Benefit (per year)
1	I-95 NB auxiliary lanes between Hillsboro Boulevard and Palmetto Park Road.	25.013/0.000	25.334/1.354	21%	CMF Clearing House	227	47.67	9.534	\$153,130	\$1,459,941.42
2	I-95 SB auxiliary lanes between Hillsboro Boulevard and Palmetto Park Road.	25.334/1.337	24.980/0.000	21%	CMF Clearing House	278	58.38	11.676	\$153,130	\$1,787,945.88
3	I-95 SB auxiliary lane between SW 10th Street and Sample Road.	23.526	21.983	21%	CMF Clearing House	201	42.21	8.442	\$153,130	\$1,292,723.46
4	Widen NB off-ramp to SW 10th Street from one lane to two lanes	-	-	25%	FDOT Report	57	14.25	2.85	\$153,130	\$436,420.50
5	Provide two right-turn lanes on the SB off-ramp to SW 10th Street	-	-	17%	FDOT Report	52	8.84	1.768	\$153,130	\$270,733.84
6	Provide an additional WB left-turn lane at the SW 10th Street and SB entry/exit ramp intersection	1.955	2.135	17%	FDOT Report	44	7.48	1.496	\$123,598	\$184,902.61
7	Provide dual EB and WB left turn lanes at the SW 10th Street/Newport Center Drive intersection	1.774	1.874	17%	FDOT Report	62	10.54	2.108	\$123,598	\$260,554.58
8	Provide dual EB and WB left turn lanes and an exclusive EB right turn lane at the SW 10th Street/Natura Blvd Intersection <sup>4</sup>	n/a	n/a	28%	FDOT Report	67	18.76	3.752	\$123,598	\$463,739.70
<b>Total</b>							<b>208</b>	<b>42</b>		<b>\$6,156,951.99</b>

1. See appendix Q for CRF Reference Information

2. See Appendix Q for Crash Data

3. Cost per crash based on FDOT Design Manual Section 122.6.1 Table 122.6.1

4. This portion of SW 10th Street is not part of the SHS, crash data was obtained from Signal Four Analytics

In Table 5.28, items 1 thru 6 are related to I-95 mainline/ramp improvements and items 7 and 8 are related to improvements along SW 10<sup>th</sup> Street. Out of the total estimated annual safety benefit of \$6,156,951.99, \$5,432,667.71 is caused by improvements along I-95 and \$724,284.28 is caused by improvements along SW 10<sup>th</sup> Street. The total number of estimated crash reduction per year is 42. A reduction of 36 crashes per year are related to I-95 improvements and a reduction of 6 crashes are related to SW 10<sup>th</sup> Street improvements.

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