

8.0 Quantitative Safety Analysis

A quantitative safety analysis was conducted to evaluate the highway safety benefits of implementing the Build Alternative. The *Highway Safety Manual (HSM)* provides techniques to estimate crashes for a given facility, test the effectiveness of design alternatives on crash reduction, and evaluate their economic crash benefits. The FDOT *IARUG Safety Analysis Guidance* also gives guidance on performing safety analyses relative to this IOAR.

For this quantitative safety analysis, Safety Performance Functions (SPFs) from the Enhanced Interchange Safety Analysis Tool (ISATe) were utilized to evaluate the safety benefits of the primary improvements proposed for the I-75 at Fletcher Avenue interchange, as listed below:

1. Install a traffic signal at the southbound I-75 and Fletcher Avenue intersection;
2. Extend the westbound to southbound left turn storage at the intersection of Fletcher Avenue and the southbound I-75 ramp terminal intersection; and
3. Coordinate the new traffic signal with existing traffic signals at Hidden River Parkway/Morris Bridge Road and the northbound I-75 ramp terminal intersections.

ISATe uses a combination of SPFs, Crash Modification Factors (CMFs), and Florida specific calibration factors to estimate the predicted number of crashes for the ramp terminal. **Appendix J** provides the ISATe documents employed to estimate the annual number of crashes for the No Build and Build Alternatives. The ISATe results show a significant reduction in right angle crashes and a corresponding increase in rear end crashes with the implementation of traffic signal control at the southbound I-75 off ramp.

The HSM crash distribution for Florida for freeway ramps, provided in Table 122.6.4 of the FDM, was applied to the ISATe results to determine the distribution of crash severity for the No-Build and Build Alternatives. **Table 16** shows the No Build and Build crash estimates for the entire 11-year study period (2025 – 2035) for the southbound I-75 ramp terminal intersection only.

Table 16: Crash Severity Summary for the Study Period (2025 – 2035) at the Fletcher Avenue and Southbound I-75 Ramp Terminal Intersection

Crash Severity	HSM Crash Distribution for Florida ¹	No Build Predicted Crashes (2025 - 2035)	Build Predicted Crashes (2025 - 2035)
Fatal	0.004	1.0	1.0
Severe Injury (Incapacitating)	0.032	8.2	8.1
Moderate Injury (Non-incapacitating)	0.107	27.6	27.1
Minor Injury	0.210	54.1	53.2
Property Damage Only	0.647	166.7	163.8
Total	1.000	257.6	253.1

¹Source: Florida Department of Transportation State Safety Office's Crash Analysis Reporting (CAR) System, analysis years 2014 through 2018. Published by FDOT State Safety Office on 11/5/2020.

Table 17 shows the cost summary during the study period for the southbound ramp terminal. Between 2025 and 2035, the predicted economic loss without the proposed improvements is approximately \$30.1 million. Under the Build scenario for that same time period, the estimated economic loss is approximately \$29.8 million, resulting in \$300,000 in savings.

Table 17: Estimated Economic Loss from Crashes for the Study Period (2025 – 2035) at the Fletcher Avenue and Southbound I-75 Ramp Terminal Intersection

Crash Severity	CARS Crash Cost ¹	No Build Scenario (2025 - 2035)		Build Scenario (2025 - 2035)	
		Number of Crashes	Economic Loss	Number of Crashes	Economic Loss
Fatal	\$10,890,000	1.0	\$10,890,000	1.0	\$10,890,000
Severe Injury (Incapacitating)	\$888,030	8.2	\$7,281,846	8.1	\$7,193,043
Moderate Injury (Non-incapacitating)	\$180,180	27.6	\$4,972,968	27.1	\$4,882,878
Minor Injury	\$103,950	54.1	\$5,623,695	53.2	\$5,530,140
Property Damage Only	\$7,700	166.7	\$1,283,590	163.8	\$1,261,260
Total		257.6	\$30,052,099	253.1	\$29,757,321

¹Source: Florida Department of Transportation State Safety Office's Crash Analysis Reporting (CAR) System, analysis years 2014 through 2018. Published by FDOT State Safety Office on 11/5/2020.