

## 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 Guidebook* also gives guidance on performing safety analyses for studies, such as this IMR.

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 implementing a barrier separated three-lane C-D road from SR 56 to the I-275/I-75 Apex with merges from SR 56 to I-75 and I-275 south of the Apex.

The number of vehicle crashes for the No Build and Build Alternatives were estimated using ISATe. ISATe uses a combination of SPFs, historical crash data, traffic volumes, roadway geometric features, and Florida-based calibration factors to estimate the frequency of crashes. The HSM crash distribution for Florida for urban freeways, 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 34** shows the estimated number of crashes and crash severity for the No Build and Build Alternatives for the study period from year 2030 to year 2050.

Table 34: Crash Severity for the Study Period (2030 – 2050)

Crash Severity	HSM Crash Distribution for Florida <sup>1</sup>	No Build Predicted Crashes (2030 - 2050)	Build Predicted Crashes (2030 - 2050)
Fatal	0.006	33	29
Severe Injury (Incapacitating)	0.035	197	172
Moderate Injury (Non-incapacitating)	0.113	638	554
Minor Injury	0.206	1,162	1,011
Property Damage Only	0.641	3,620	3,149
<b>Total</b>	<b>1.000</b>	<b>5,650</b>	<b>4,915</b>

<sup>1</sup>Source: Table 122.6.2 of the FDM, dated January 1, 2022.

**Appendix M** provides the ISATe input and output summary sheets detailing the estimated number of crashes for the No Build and Build Alternatives. The implementation of a barrier separated C-D road along southbound I-75 between SR 56 and the I-275/I-75 Apex with merges from SR 56 to I-75 and I-275 south of the Apex is estimated to result in approximately a 13% reduction in the number of overall crashes.

**Table 35** shows the economic loss due to crashes for the No Build and Build Alternatives, which is estimated to be \$798 million and \$698 million, respectively. Implementing the Build Alternative is estimated to result in \$100 million in savings.

Table 35: Estimated Economic Loss for Future Crashes (2030 – 2050)

Crash Severity	CARS Crash Cost <sup>1</sup>	No Build Alternative		Build Alternative	
		Number of Crashes	Economic Loss	Number of Crashes	Economic Loss
Fatal	\$10,890,000	33	\$359,370,000	29	\$315,810,000
Severe Injury (Incapacitating)	\$888,030	197	\$174,941,910	172	\$152,741,160
Moderate Injury (Non-incapacitating)	\$180,180	638	\$114,954,840	554	\$99,819,720
Minor Injury	\$103,950	1,162	\$120,789,900	1,011	\$105,093,450
Property Damage Only	\$7,700	3,620	\$27,874,000	3,149	\$24,247,300
<b>Total</b>		<b>5,650</b>	<b>\$797,930,650</b>	<b>4,915</b>	<b>\$697,711,630</b>

<sup>1</sup>Source: Table 122.6.2 of the FDM, dated January 1, 2022.