4.2 Safety Analysis

A quantitative analysis was completed to provide a comparison between the Alternative 2 and Alternative 3, as well as to show baseline results for Alternative 1 from the previously approved IJR. The quantitative safety analysis was performed using the Enhanced Interchange Safety Analysis Tool (ISATe) consistent with approved MLOU and the Original IJR. Results for Alternative 1 were included for informational purposes only.

The ISATe was developed for inclusion as a Part C predictive method for the HSM. The ISATe predicts crashes by crash location, i.e., mainline freeway segments, ramp segments, and ramp terminals. The methodology also predicts crash severity for each crash type using the KABCO scale (K – fatal crashes; A, B, C – injury crashes of decreasing severity; O – Property Damage Only crashes). KABCO Inputs to the tool include both geometric and operational characteristics of roadway and ramp facilities. In this regard, the freeway facility is broken into one or more freeway sections based on the geometric characteristics and ramp junctions. ISATe also accounts for annual average daily traffic (AADT) volumes through user inputs. The measures are then combined as needed to describe the performance of the freeway section, interchange, or facility as a whole. The ISATe inputs and outputs are provided in **Appendix G**. Freeway Model Calibration Factors are based on the previously approved IJR safety analysis and remain unchanged.

The opening year (2024) and design year (2044) conditions were analyzed using HSM predictive methods coded in the ISATe tool, to predict the number and severity of crashes expected to occur within the interchange area. Since the ISATe tool uses a default KABCO scale based on national averages, HSM Crash Distributions from the Florida Design Manual Chapter 122 for freeways segments and ramps were applied to the ISATe results. **Table 17** shows the predicted crashes, with HSM Crash Distributions incorporated, by severity for Alternatives 1, 2, and 3 during the study period (2024 – 2044). The ISATe results indicate the following:

- Alternative 1 resulted in the most predicted crashes, totaling 1577.5 crashes over the 20-year period. Alternative 2 results in the second highest total of predicted crashes, totaling 1508.2 crashes. Alternative 3 resulted in the fewest predicted crashes, totaling 1500 crashes anticipated over the 20-year period.
- Similar to Alternative 1, Alternative 2, and Alternative 3 show the majority of predicted crashes are single injury (C) and property damage only crashes.
- The overall facility predictive crash total for the Alternative 3 is expected to be slightly less than the Alternative 2 with additional traffic from the SW Bypass and East-West Connector projects. The difference between the two alternatives is 0.5%, with Alternative 3 experiencing less property damage crashes. Differences in predictive crash totals are due to varying factors such as ramp segment lengths, inside and outside barrier presence, segmentation of the freeway and associated AADTs and ramp terminals.

- Of the overall 1500 crashes expected to occur for Alternative 3 during the 20-year time span, approximately 69% of those crashes are anticipated to occur at the crossroad ramp terminals.

Table 17 | ISATe Output Comparison

Alternative	Crash Severity					Total	Total Percent Change
	K	A	B	C	O		
Alternative 1	3.3	38.2	174.9	638.6	722.6	1577.5	-
Alternative 2	3.1	36.5	167.1	611.2	690.2	1508.2	-
Alternative 3	3.1	36.0	165.7	609.9	685.3	1500.0	0.5% decrease from ALT 2

4.2.1 Benefit-Cost Analysis

The Benefit-Cost Analysis is used to analyze the benefit to society from the crash reduction as compared to the cost the project has to society. The FDOT documents crash costs by type in the FDOT Design Manual Section 122, Table 122.6.2, FDOT KABCO Crash Costs. **Table 18** shows the crash cost comparison and savings between alternatives using FDOT crash cost and the outputs from the ISATe evaluation.

Associated costs by severity for the overall predictive crash totals for Alternative 3 decreased by 0.9% when comparing to Alternative 2. The number of total fatal crashes and suspected injury-related crashes for Alternative 3 showed an anticipated slight decrease.

Table 18 | Crash Cost Comparison

Alternative	Crash Severity					Total	Total Percent Change
	K	A	B	C	O		
Alternative 1	$ 34,436,067	$22,855,826	$28,373,741	64,374,062	$5,491,640	$155,531,337	-
Alternative 2	$33,252,616	$21,885,734	$27,105,222	$61,609,771	$5,245,731	$149,099,075	-
Alternative 3	$32,541,797	$21,591,765	$26,882,353	$61,476,041	$5,208,482	$147,700,436	0.9% decrease (cost savings) from ALT 2