6.4 Build Alternative Safety Analysis

The Highway Safety manual (HSM) assists professionals in taking a substantive approach to safety, where expected crash frequencies and outcomes for different proposed alternatives can be predicted and analyzed. Tools identified in the HSM provide crash predictive methods that use roadway design and traffic data as key input data which are fundamental to project development. These quantitative safety analysis tools allow safety professionals to predict the number of crashes on the facility based on the roadway geometric features similar to how the Highway Capacity Software is used to predict how a facility will function in the future from an operations standpoint based on its proposed geometric configuration.

The Enhanced Interchange Safety Analysis Tool (ISATe) Version 6i is a safety analysis tool approved by FDOT to evaluate freeway and interchange safety. 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 – PDO crashes). 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. As part of the I-95/Pioneer Trail IJR, ISATe was used to estimate crashes on mainline freeway and ramp segments.

The study segment of I-95 was divided into unique segments within which the site characteristics, such as traffic volume and geometry, are constant. Similarly, the ramp segments of the I-95/ SR 421 interchange and the I-95/ SR 44 interchange were also divided into unique segments based on geometry. The section of I-95 within the study area is being widened to a six-lane cross-section; as such, existing crash patterns do not represent the future conditions and were not included as part of the analysis. The roadway inventory data including lane width, shoulder width, median width, clear zone, rumble strips, and roadway barriers were obtained from the roadway design plans. Future traffic projections developed as part of the IJR were included in the analysis.

The opening year (YR 2022) and design year (YR 2042) conditions were analyzed using the HSM predictive methods coded in the ISATe tool to predict the number and severity of crashes expected to occur within the interchange area. The build alternative analyzed 16 freeway segments and 20 ramp segments while the no build alternative analyzed 12 freeway segments and 14 ramp segments.

ISATe results are expressed as a crash frequency. This is defined as the number of crashes segregated by severity type in a given time period, usually one year. The observed crash frequency is based on actual historical crash data, the predicted crash frequency uses results from a statistical model which can be for any time period past, present or future, and the expected average crash frequency combines the observed and predicted frequencies and is the most reliable for predicting the number of crashes at a specific site. As mentioned above, the predicted crash frequency has been recorded because of the I-95 widening project and no site specific crash data was entered as part of the analysis.

The analysis maintained the same study area limits for both the alternatives but varied the traffic volumes and geometric features based on the current design. The predicted crash number results are representative of the freeway and ramp segments within the study area.

Table 6-15 shows the predicted annual crashes by severity for the No Build Alternative using the ISATe analysis. The majority of predicted crashes are single injury (C) and property damage only crashes. These results are the predicted crashes for a specific yearly time period based on a statistical model from the ISATe software. ISATe worksheets are provided in **Appendix J.**

Table 6-15: No Build Alternative ISATe Outputs

Alternative	Analysis Year	Crash Severity					Total
		K	A	B	C	PDO	
No Build	2022	0.7	1.9	9.6	15.2	55.4	82.8
	2042	1.3	3.5	17.8	28.6	120.2	171.5

Table 6-16 shows the predicted annual crashes by severity for the Build Alternative using the ISATe analysis. The proposed Build Alternative is a diamond type interchange for I-95/Pioneer Trail.

Table 6-16: Build Alternative ISATe Outputs

Alternative	Crash Severity	Total

	Analysis Year	K	A	B	C	PDO	
Build	2022	0.7	1.9	9.5	15.2	55.9	83.2
	2042	1.3	3.4	17.7	28.5	120.2	171.2

Similar to the No Build Alternative, the majority of predicted crashes in the Build Alternative are single injury (C) and property damage only crashes. As shown in **Table 6-16**, total crashes were slightly higher in the opening year mainly due to property damage crashes. However, predicted crashes showed a downward trend and resulted in slight reduction in crashes by the design year. It should be noted that both No Build and Build alternatives are predicted to have similar number of fatalities and severe injury crashes.

As traffic volumes increase by Year 2042, crashes on I-95 and at the interchanges can be expected to increase. However, the Year 2042 traffic forecasts show that building the Pioneer Trail interchange will reduce peak hour trips when compared with the no build conditions and has no adverse impacts to the safety of the interstate system within the area of influence. As previously stated, Pioneer Trail will be built to current design standards.