# 5 SAFETY

A safety analysis was conducted to assess safety conditions of the existing GGI Interchange and the anticipated safety performance with the proposed design modifications per the GGI Light Design Concept and the GGI Ultimate Design Concept. The safety analysis focused on the mainline segments of I-95 and SR 826, located within the study limits of the SIMR Re-evaluation. The safety analysis included an evaluation of historical crash data for the existing (No Build) condition and an assessment of future safety conditions with the proposed interchange design modifications. The safety analyses are discussed in the following sections.

## 5.1 Historical Safety Analysis

FDOT's Crash Analysis Reporting System (CAR Online) was used to gather historical crash records for the segments of I-95 and SR 826 within the study limits. CAR Online is a database maintained annually by the FDOT for crashes reported along state highway facilities. The database provides information on various characteristics associated with each crash including collision type, severity, weather conditions and road surface conditions. The CAR Online database was researched to identify and extract crashes reported along the study segments during the five-year period from January 2015 through December 2019. Due to the complexities of the GGI Interchange, the crash analysis procedures could not reasonably evaluate safety conditions for the entire GGI Area of Influence (see also limitations discussed under Section 5.2). Hence, the crash analysis focused on the two primary freeway corridors, I-95, and SR 826, within the study limits. The crashes were analyzed to assess safety conditions along the study segment of I-95 and SR 826. Crash data reported by Signal Four Analytics (an alternative crash data source hosted by University of Florida) was also researched to provide a reasonableness check on the number of crashes reported from CAR Online. Findings from the crash analysis are discussed below.

**I-95 Mainline Historical Crash Analysis**

Table 5-1 contains a summary of the historical crashes reported along the I-95 segments within the study limits. A total of 9,860 crashes were reported during the five-year study period (2015 – 2019), which equates to an average of 1,972 crashes per year. Three thousand and ninety-two (or 31%) of the crashes involved injuries and 24 fatal crashes were reported during the five-year period – 8 in 2015, 10 in 2016, and 2 each in 2017, 2018 and 2019. Most of the crashes experienced along the study corridor were rear end collisions accounting for 5,476 crashes (or 55.5%), followed by sideswipes accounting for 2,126 crashes (or 21.6%). Approximately 63% of the crashes occurred during daylight conditions, and 31% of the crashes occurred during dark conditions. The remaining 6% of the crashes occurred during dusk or dawn. The percentage of crashes experienced under dark conditions (31%) is relatively consistent with FDOT's D6 average of approximately 30%. Approximately 87% of the crashes occurred under dry roadway surface conditions, and 13% occurred under wet roadway surface conditions. The percentage of crashes experienced under wet conditions (13%) is consistent with FDOT's average of approximately 13%.

In order to identify possible high crash locations, the I-95 corridor was segmented into 14 smaller homogenous segments. The segmentation was done following the procedures described in the Highway Safety Manual for conducting predictive safety analysis which is discussed later under the Future Safety Analysis. Following the HSM procedures, segments were identified based on consistency in mainline geometry and traffic volumes. Figure 5-1 shows the resulting segmentation for the I-95 corridor.

The historical crashes occurring within each I-95 segment were summed and plotted in the bar graph shown in Figure 5-2. As shown is Figure 5-2, a larger proportion of the crashes occurring along I-95 are concentrated within Segment 4 (from NW 151st Street to GGI). Statistical tests were also performed, per FDOT's procedures, to determine if the crashes experienced within this segment were abnormally high when compared to similar freeway segments statewide. Results of the statistical test are summarized in the Table 5-2. The results indicate that Segment 4 of the I-95 corridor experienced an abnormally high number of crashes in each year from 2015 through 2019 when compared to similar locations statewide. Furthermore, the crash rate was abnormally high in both NB and SB directions with NB being the more critical direction of travel. These statistical finding all exceeded 99.95% confidence level (FDOT's threshold for identifying high crash locations in urbanized areas).

In addition to the above, the CAR Online database was also researched to identify locations along I-95 that were screened by the FDOT and categorized as high crash locations. This research also identified the segment of I-95 from NW 151st Street to GGI as a high crash location. This segment of I-95 (NW 151st Street to GGI) appears on the FDOT's high crash list for all five years of study period (2015 through 2019). The segment of I-95 in the vicinity of the Miami Gardens Interchange also appears on the FDOT's high crash list in years 2015 through 2019. This interchange (I-95 at Miami Gardens Drive) is located within the limits of an on-going I-95 PD&E Study from Miami Gardens Drive to Miami-Dade County Line (FM No.: 414964-1). This PD&E Study will examine safety and operational improvements at the I-95/Miami Gardens Drive Interchange.

The results of the crash analysis indicate that a large proportion of the crashes experienced along I-95 occur along the Segment between NW 151st Street and the GGI. Statistical analysis confirm that crashes experienced within this segment are abnormally high. This segment of I-95 is heavily congested during peak period and has multiple weaving movements and lane changes occurring between on-ramps, off-ramps and the express lanes ingress and egress points. The excessive congestion and weaving activities generate multiple conflicts within the traffic stream and likely the probable cause for the high number of crashes experienced within this segment of I-95. The proposed new I-95/Turnpike Connectors, per GGI Light and GGI Ultimate will reduce crash risk within this segment of I-95 by eliminating much of the weaving activities.

**Table 5-1: Crash Summary – I-95 from South of Opa-Locka Blvd. to Miami Gardens Drive**

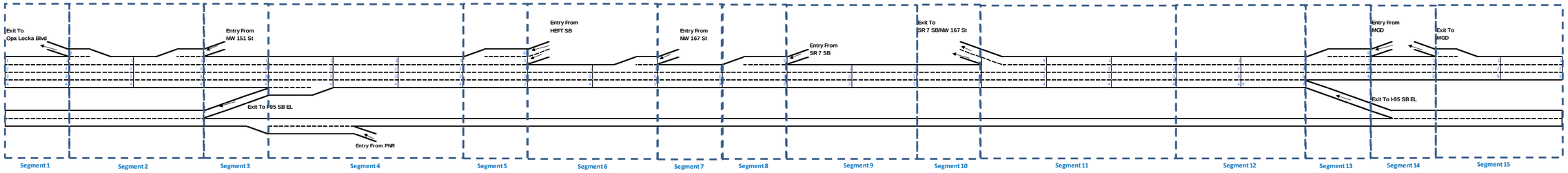
| I-95 From South of Opa-Locka Blvd (MP 10.9) to North of Miami Gardens Drive (MP 14.30) | | Number of Crashes Year 2015 | 2016 | 2017 | 2018 | 2019 | 5 Year Total Crashes | Mean Crashes Per Year | % |
|---|---|---|---|---|---|---|---|---|---|
| CRASH TYPE | Rear End | 1188 | 1154 | 1060 | 1050 | 1024 | 5476 | 1095 | 55.5% |
| | Head On | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| | Angle | 74 | 68 | 74 | 64 | 59 | 339 | 68 | 3.4% |
| | Left Turn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| | Right Turn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| | Sideswipe | 472 | 442 | 376 | 422 | 414 | 2126 | 425 | 21.6% |
| | Backed Into | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| | Pedestrian | 4 | 0 | 4 | 4 | 4 | 16 | 3 | 0.2% |
| | Bicycle | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| | ***Fixed Object*** | *162* | *227* | *182* | *168* | *190* | *929* | *186* | *9.4%* |
| | **Others** | 274 | 211 | 152 | 200 | 137 | 974 | 195 | 9.9% |
| | **Total Crashes** | **2174** | **2102** | **1848** | **1908** | **1828** | **9860** | **1972** | **100.0%** |
| SEVERITY | PDO Crashes | 1474 | 1330 | 1254 | 1378 | 1308 | 6744 | 1349 | 68.4% |
| | Fatal Crashes | 8 | 10 | 2 | 2 | 2 | 24 | 5 | 0.2% |
| | Injury Crashes | 692 | 762 | 592 | 528 | 518 | 3092 | 618 | 31.4% |
| LIGHTING CONDITIONS | Daylight | 1380 | 1354 | 1192 | 1178 | 1138 | 6242 | 1248 | 63.3% |
| | Dusk | 42 | 52 | 58 | 66 | 36 | 254 | 51 | 2.6% |
| | Dawn | 32 | 50 | 84 | 88 | 34 | 288 | 58 | 2.9% |
| | Dark | 720 | 642 | 514 | 576 | 620 | 3072 | 614 | 31.2% |
| | Unknown | 0 | 4 | 0 | 0 | 0 | 4 | 1 | 0.0% |
| SURFACE CONDITIONS | Dry | 1958 | 1800 | 1586 | 1708 | 1532 | 8584 | 1717 | 87.1% |
| | Wet | 216 | 300 | 262 | 198 | 294 | 1270 | 254 | 12.9% |
| | Others | 0 | 2 | 0 | 2 | 2 | 6 | 1 | 0.1% |
| WEATHER CONDITIONS | Clear | 1644 | 1474 | 1422 | 1510 | 1400 | 7450 | 1490 | 75.6% |
| | Cloudy | 412 | 436 | 276 | 306 | 238 | 1668 | 334 | 16.9% |
| | Rain | 112 | 190 | 150 | 92 | 190 | 734 | 147 | 7.4% |
| | Fog, Smog, Smoke | 6 | 0 | 0 | 0 | 0 | 6 | 1 | 0.1% |
| | Other | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 0.0% |

### Table 5-2: Crash Statistics – I-95 from NW 151st Street to GGI

| I-95 from North of NW 151st St to GGI (NB + SB) – Figure 5-1, Segment 4 | | | | | |
|---|---|---|---|---|---|
| **Year** | **2015** | **2016** | **2017** | **2018** | **2019** |
| Number of Crashes | 530 | 556 | 440 | 432 | 514 |
| Actual Crash Rate (ACR) | 6.259 | 6.740 | 4.940 | 5.058 | 5.235 |
| District 6 Average Crash Rate (A) | 2.641 | 2.694 | 2.395 | 2.009 | 2.058 |
| Critical Crash Rate (CCR) | 3.217 | 3.283 | 2.929 | 2.508 | 2.529 |
| Safety Ratio | 1.946 | 2.053 | 1.687 | 2.017 | 2.070 |
| Confidence Level | 99.99% | 99.99% | 99.99% | 99.99% | 99.99% |

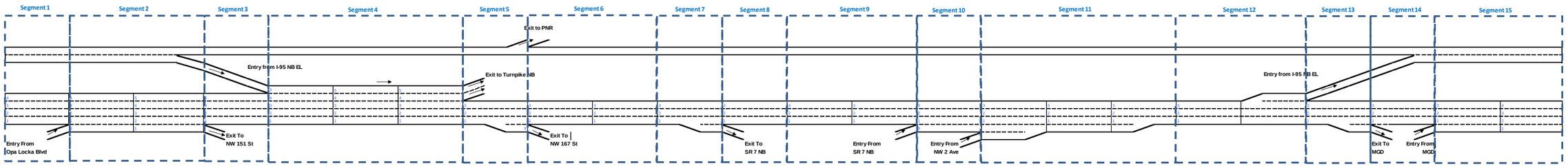
| I-95 from North of NW 151st St to GGI (NB Only) | | | | | |
|---|---|---|---|---|---|
| **Year** | **2015** | **2016** | **2017** | **2018** | **2019** |
| Number of Crashes | 312 | 300 | 250 | 244 | 308 |
| Actual Crash Rate (ACR) | 7.369 | 7.274 | 5.614 | 5.714 | 6.274 |
| District 6 Average Crash Rate (A) | 2.641 | 2.694 | 2.395 | 2.009 | 2.058 |
| Critical Crash Rate (CCR) | 3.452 | 3.523 | 3.147 | 2.711 | 2.722 |
| Safety Ratio | 2.135 | 2.065 | 1.784 | 2.108 | 2.305 |
| Confidence Level | 99.99% | 99.99% | 99.99% | 99.99% | 99.99% |

| I-95 from North of NW 151st St to GGI (SB Only) | | | | | |
|---|---|---|---|---|---|
| **Year** | **2015** | **2016** | **2017** | **2018** | **2019** |
| Number of Crashes | 218 | 256 | 190 | 188 | 206 |
| Actual Crash Rate (ACR) | 5.149 | 6.207 | 4.267 | 4.402 | 4.196 |
| District 6 Average Crash Rate (A) | 2.641 | 2.6934 | 2.394 | 2.009 | 2.058 |
| Critical Crash Rate (CCR) | 3.452 | 3.523 | 3.147 | 2.711 | 2.722 |
| Safety Ratio | 1.492 | 1.762 | 1.356 | 1.624 | 1.541 |
| Confidence Level | 99.99% | 99.99% | 99.99% | 99.99% | 99.99% |




**I-95 SOUTHBOUND** ←

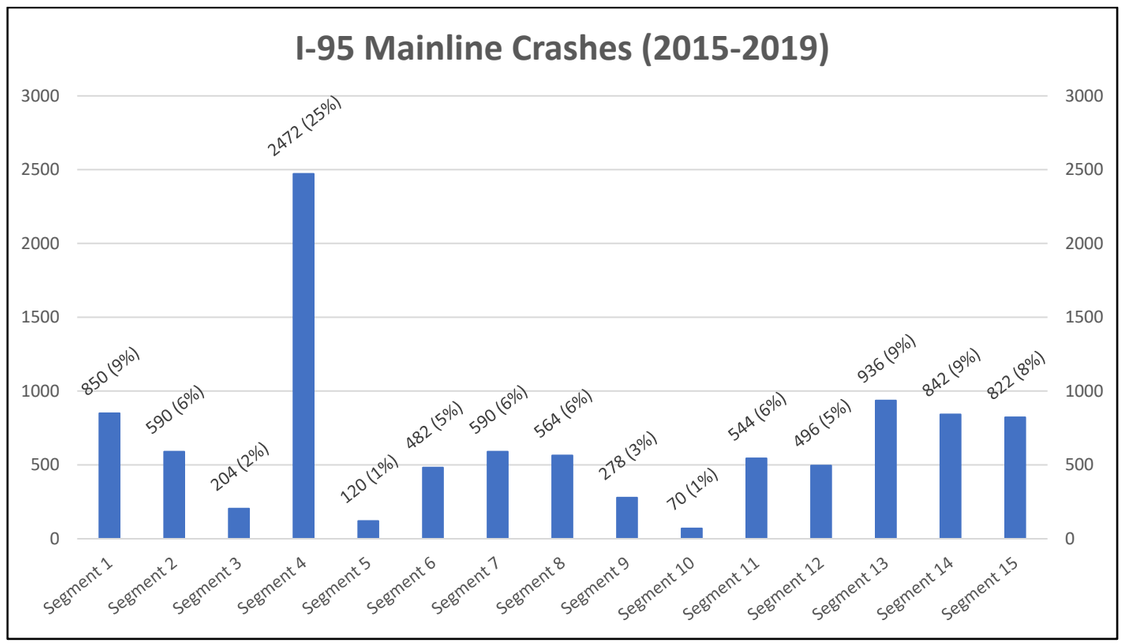
**I-95 NORTHBOUND** →




I-95 Mainline – Existing (No Build)

| | | | |
|---|---|---|---|
| FDOT | SR 826/Palmetto Expressway PD&E Study<br>From SR 93/I-75 to Golden Glades Interchange | Safety Analysis<br>Segmentation of I-95 Mainline | Figure 5-1<br>Sheet 1 of 1 |

Figure 5-2: I-95 Mainline Crash Distribution




Notes: 1. Segments defined per Figure 5-1.

**SR 826 Mainline Historical Crash Analysis**

Table 5-3 contains a summary of the historical crashes reported along the SR 826 segments within the study limits. A total of 1,644 crashes were reported during the five-year study period (2015 - 2019), which equates to an average of 329 crashes per year. Five hundred and twenty-four (or 31.9%) of the crashes involved injuries and 7 fatal crashes were reported during the five-year period – 1 in 2015, 2 in 2017, 1 in 2018 and 3 in 2019. Most of the crashes experienced along the study corridor were rear end collisions accounting for 805 crashes (or 49.0%), followed by sideswipes accounting for 319 crashes (or 19.4%) and fixed object crashes 250 (15.2%). Approximately 67% of the crashes occurred during daylight conditions, and 28% of the crashes occurred during dark conditions. The remaining 5% of the crashes occurred during dusk or dawn. The percentage of crashes experienced under dark conditions (28%) marginally below FDOT's D6 average of approximately 30%. Approximately 79% of the crashes occurred under dry roadway surface conditions, and 21% occurred under wet roadway surface conditions. The percentage of crashes experienced under wet conditions (21%) is higher than FDOT's average of approximately 13%. Resurfacing of SR 826 with new friction course will help to address wet weather related crashes.

In order to identify possible high crash locations, the SR 826 Corridor was segmented into 9 smaller homogenous segments. The segmentation was done following the procedures described in the Highway Safety Manual for conducting predictive safety analysis which is discussed later under the Future Safety Analysis. Following the HSM procedures, segments were identified based on consistency in mainline geometry and traffic volumes. Figure 5-3 shows the resulting segmentation for the SR 826 corridor. The historical crashes occurring within each SR 826 segment were summed and plotted in the bar graph shown in Figure 5-4. As shown is Figure 5-4, a majority of the crashes reported along SR 826 occurred within the segments west of NW 12th Avenue.

Statistical tests were performed, per FDOT's procedures, to determine if the crashes experienced within the SR 826 mainline (from west of NW 27th Avenue to GGI - Figure 5-3. Segments 1 to 9) were abnormally high when compared to similar freeway segments statewide. Results of the statistical test are summarized in the Table 5-4. The results indicate that mainline segment of SR 826 experienced an abnormally high number of crashes in each year from 2015 through 2019 when compared to similar locations statewide. Furthermore, the crash rate was abnormally high in both EB and WB directions with EB being the more critical direction of travel. These statistical finding are calculated within a 99.95% confidence level.

In addition to the above, the CAR Online database was also researched to identify locations along SR 826 that were screened by the FDOT and categorized as high crash locations. This research identified the segment of SR 826 within the vicinity of NW 27th Avenue Interchange as a high crash location – appearing on the FDOT's High Crash List in 2016, 2017 and 2019. This interchange is (SR 826 at NW 27th Avenue) will be modified to a Single Point Urban Interchange as part of the GGI Ultimate Improvements. The proposed interchange modifications together with planned improvements to SR 826 mainline will alleviate congestion and improve safety at the interchange.

The results of the crash analysis confirm that crashes experienced within mainline segment of SR 826 are abnormally high. This segment of SR 826 (from NW 27th Avenue to GGI) is heavily congested during peak periods, particularly in the eastbound direction in the AM peak period. The excessive congestion and lane changing activities are probable cause for the high number of crashes experienced within this segment of SR 826. The proposed new connector for EB SR 826 to NB I-95, per GGI Light and GGI Ultimate, will provide congestion relief within this segment with a corresponding reduction in crash risk.

## Table 5-3: Crash Summary – SR 826 from West of NW 27th Avenue to GGI

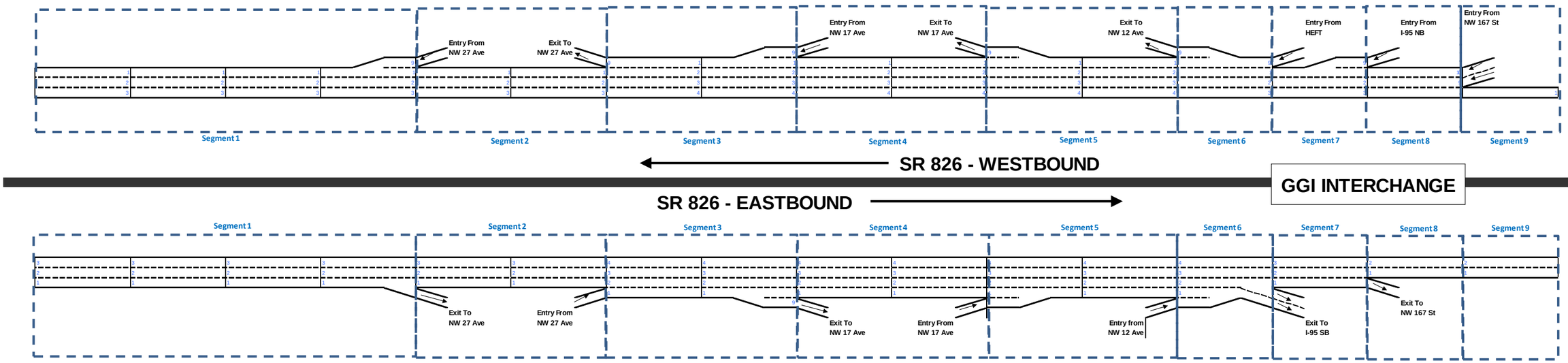
| SR-826 From West of NW 27th Ave (MP 21.530) to GGI (MP 24.33) | | Number of Crashes Year 2015 | 2016 | 2017 | 2018 | 2019 | 5 Year Total Crashes | Mean Crashes Per Year | % |
|---|---|---|---|---|---|---|---|---|---|
| CRASH TYPE | Rear End | 124 | 160 | 179 | 171 | 171 | 805 | 161 | 49.0% |
| | Head On | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0.1% |
| | Angle | 12 | 10 | 18 | 14 | 19 | 73 | 15 | 4.4% |
| | Left Turn | 0 | 3 | 5 | 2 | 5 | 15 | 3 | 0.9% |
| | Right Turn | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0.1% |
| | Sideswipe | 58 | 71 | 74 | 47 | 69 | 319 | 64 | 19.4% |
| | Backed Into | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| | Pedestrian | 0 | 0 | 2 | 0 | 1 | 3 | 1 | 0.2% |
| | Bicycle | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0.1% |
| | ***Fixed Object*** | *49* | *50* | *54* | *44* | *53* | *250* | *50* | *15.2%* |
| | **Others** | 34 | 39 | 32 | 30 | 41 | 176 | 35 | 10.7% |
| | **Total Crashes** | **278** | **334** | **364** | **309** | **359** | **1644** | **329** | **100.0%** |
| SEVERITY | PDO Crashes | 191 | 226 | 250 | 201 | 245 | 1113 | 223 | 67.7% |
| | Fatal Crashes | 1 | 0 | 2 | 1 | 3 | 7 | 1 | 0.4% |
| | Injury Crashes | 86 | 108 | 112 | 107 | 111 | 524 | 105 | 31.9% |
| LIGHTING CONDITIONS | Daylight | 176 | 220 | 246 | 215 | 249 | 1106 | 221 | 67.3% |
| | Dusk | 10 | 9 | 8 | 5 | 10 | 42 | 8 | 2.6% |
| | Dawn | 6 | 12 | 8 | 8 | 7 | 41 | 8 | 2.5% |
| | Dark | 86 | 93 | 102 | 80 | 93 | 454 | 91 | 27.6% |
| | Unknown | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0.1% |
| SURFACE CONDITIONS | Dry | 209 | 252 | 296 | 254 | 284 | 1295 | 259 | 78.8% |
| | Wet | 69 | 82 | 68 | 54 | 75 | 348 | 70 | 21.2% |
| | Others | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0.1% |
| WEATHER CONDITIONS | Clear | 179 | 201 | 276 | 226 | 258 | 1140 | 228 | 69.3% |
| | Cloudy | 60 | 80 | 47 | 49 | 50 | 286 | 57 | 17.4% |
| | Rain | 39 | 53 | 41 | 33 | 51 | 217 | 43 | 13.2% |
| | Fog, Smog, Smoke | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| | Sleet/Hail/Freezing Rain | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| | Blowing Sand, Soil, Dirt | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| | Severe Crosswinds | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| | Other | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0.1% |

## Table 5-4: Crash Statistics – SR 826 from West of NW 27th Avenue to GGI

| SR 826 from W of NW 27th Ave to GGI (EB + WB) – Figure 3, Segments 1 to 9 | | | | | |
|---|---|---|---|---|---|
| **Year** | **2015** | **2016** | **2017** | **2018** | **2019** |
| Number of Crashes | 278 | 334 | 364 | 309 | 359 |
| Actual Crash Rate (ACR) | 5.170 | 6.189 | 6.296 | 6.132 | 7.387 |
| District 6 Average Crash Rate (A) | 2.316 | 2.161 | 2.271 | 1.997 | 2.047 |
| Critical Crash Rate (CCR) | 2.989 | 2.810 | 2.915 | 2.642 | 2.712 |
| Safety Ratio | 1.730 | 2.202 | 2.160 | 2.321 | 2.724 |
| Confidence Level | 99.99% | 99.99% | 99.99% | 99.99% | 99.99% |

| SR 826 from W of NW 27th Ave to GGI (EB Only) | | | | | |
|---|---|---|---|---|---|
| **Year** | **2015** | **2016** | **2017** | **2018** | **2019** |
| Number of Crashes | 161 | 181 | 206 | 179 | 223 |
| Actual Crash Rate (ACR) | 5.922 | 7.048 | 7.018 | 17.672 | 7.786 |
| District 6 Average Crash Rate (A) | 2.316 | 2.161 | 2.271 | 1.997 | 2.047 |
| Critical Crash Rate (CCR) | 3.258 | 3.096 | 3.170 | 3.408 | 2.909 |
| Safety Ratio | 1.818 | 2.276 | 2.214 | 5.185 | 2.676 |
| Confidence Level | 99.99% | 99.99% | 99.99% | 99.99% | 99.99% |

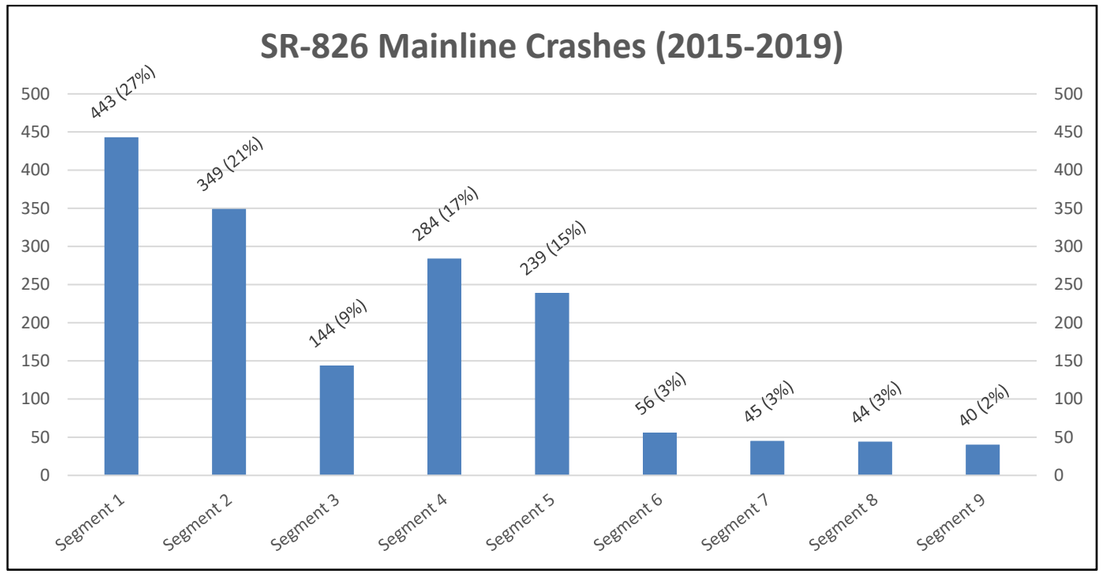
| SR 826 from W of NW 27th Ave to GGI (WB Only) | | | | | |
|---|---|---|---|---|---|
| **Year** | **2015** | **2016** | **2017** | **2018** | **2019** |
| Number of Crashes | 117 | 153 | 158 | 130 | 136 |
| Actual Crash Rate (ACR) | 4.352 | 5.788 | 5.192 | 8.801 | 5.333 |
| District 6 Average Crash Rate (A) | 2.316 | 2.161 | 2.271 | 1.997 | 2.047 |
| Critical Crash Rate (CCR) | 3.263 | 3.083 | 3.154 | 3.173 | 2.960 |
| Safety Ratio | 1.334 | 1.878 | 1.646 | 2.774 | 1.802 |
| Confidence Level | 99.99% | 99.99% | 99.99% | 99.99% | 99.99% |




SR-826 Mainline – Existing (No Build)

| | | | |
|---|---|---|---|
| FDOT | SR 826/Palmetto Expressway PD&E Study<br>From SR 93/I-75 to Golden Glades Interchange | Safety Analysis<br>Segmentation of SR-826 Mainline | Figure 5-3<br>Sheet 1 of 1 |

Figure 5-4: Sr 826 Mainline Crash Distribution




Notes: 1. Segments defined per Figure 5-1

## 5.2 Future Safety Analysis of Proposed Interchange Modifications

A quantitative safety analysis was performed for I-95 Mainline and SR 826 Mainline per the HSM predictive crash procedures. Consistent with the FDOT's Interchange Access Request (IAR) User's Guide Safety Analysis Guidance, an initial step in the process was to assess the applicability of the Predictive Method for evaluating the future safety performance of the GGI Interchange under No Build, GGI Light and GGI Ultimate conditions. This assessment included detailed reviews of the FDOT's IAR Users Guide Safety Analysis Guidance, the HSM Part C Methodology and current publications from NCHRP and FHWA related to the Predictive Method and analysis tools. From this assessment, several limitations of the Predictive Method were noted which restrict its applicability for evaluating the future GGI No Build and Build conditions. These limitations include:

- The procedure does not perform safety analysis for freeway segments with managed lanes. This limitation is relevant to the GGI Interchange Project given that express lanes are present along I-95 for all future scenarios (Build and No Build) and express lanes are present along SR 826 in the GGI Ultimate Design Concept.
- The procedure does not perform safety analysis for ramp and C-D Roads with 3 or more lanes in an urban area. This limitation is relevant to the GGI Interchange Project given that segments of the I-95/Turnpike Connectors (NB and SB) contain 3 or more lanes in the future No Build and Build Scenarios.

In addition to the above limitations of the Predictive Method, it was also noted that the AADTs along segments of I-95 and SR 826 exceeded the applicable range of the safety performance functions currently developed for the Predictive Method. It should also be noted that the Empirical Bayes method is not applicable for this study as the Existing Conditions differ significantly from the proposed Build Conditions. FDOT has also not yet developed calibration factors for interstate crash prediction analysis. Application of the Empirical Bayes Method and calibration factors would enhance the accuracy of the crash prediction process.

Given the above limitations of the Predictive Method, it was determined that the procedure would not provide a reliable prediction of the expected crashes along I-95 and SR 826 for the alternative future scenarios. Hence, the Predictive Method was applied solely as an indicator to assess the relative safety performance of the GGI Interchange under the future Build and No Build scenarios. In addition, only mainline GU lanes and ramp merge/diverge areas were considered in the analysis. Ramp roadway segments were not considered in the analysis given the limited applicability of Predictive Method for the GGI Interchange Project.

Crash predictions for the future No Build and Build scenarios were computed using the Interactive Highway Safety Design Module (IHSDM). This software tool automates the calculations in Part C of the HSM. The analysis required gathering various input data for I-95 and SR 826 segments, ranging from geometric elements, such as alignment and cross section data, roadside and ramp access data and annual average daily traffic (AADT) data. These procedures were used for comparing the predicted crashes in the design year (2048) under No Build and Build scenarios.

The analysis was not performed for the project design life (2028 through 2048) since the objective of the predictive crash analysis was only to assess the relative safety performance of the alternatives and the implementation schedule for the Ultimate Design Concept is unknown, at this time.

For conducting the predictive analysis, I-95 Mainline and SR 826 Mainline were segmented into homogenous segments per the HSM methodology. The segmentation aimed to subdivide the I-95 and SR 826 mainline into segments with consistent geometry and AADT, to the extent possible. Achieving a consistent geometry was not feasible along several mainline segments due to the complex geometry of the GGI Interchange. In such cases, the crash analysis used an averaging procedure, per HSM methodology. For example, crashes on a 7-lane segment (3 lanes in one direction and 4 lanes in opposite direction) would be estimated by averaging the predicted crashes for a 6-lane facility and an 8-lane facility.) AADTs used for the calculations were estimated by applying applicable K-Factors (refer to MLOU under Appendix A.) to the directional peak hour volumes contained under Appendix B. The resulting segmentation of the mainlines used for the crash analysis are depicted in Figure 5-1 (for I-95 Mainline, No Build) and Figure 5-3 (for SR 826 Mainline, No Build). Detailed output reports from the IHSDM for the crash analysis are contained under Appendix D. The results are summarized in Tables 5-5.

The results of the predictive crash analysis indicate that the GGI Light Design Concept and the GGI Ultimate Design Concept will perform better than the No Build Condition. This result is consistent with expectations given that much of the crashes experienced along I-95 and SR 826 are associated with excessive congestion and weaving activities within segments of the corridor. The proposed I-95/Turnpike express lanes connectors (per GGI Light and GGI Ultimate) will reduce congestion, weaving activities, and corresponding crash risk within the segment of I-95 which currently experiences the highest crash rates (i.e., segment of I-95 from NW 151st Street to GGI). Similarly, the proposed new flyover for connecting EB SR 826 to NB I-95 (per GGI Light and GGI Ultimate) will reduce congestion and corresponding crash risk along SR 826. The proposed SR 826/I-95 Express Lanes connects will further reduce congestion and corresponding crash risk along SR 826.

It should be noted that AADT is a key input used in the Predictive Method and the analysis presented herein only considers traffic using the general use lanes. Since the express lanes are better utilized in the Build Alternatives, AADT is lower in the GU lanes along several mainline segments when compared in the No Build Alternative. This reduction in AADT presents a reduction in exposure and a corresponding reduction in crashes, which is reflected in the results of the Predictive Method.

**Table 5-5: Predictive Crash Summary**

| Corridor | Total Predicted Crashes - Year 2048 | | | Comments |
|---|---|---|---|---|
| | No Build | GGI Light | GGI Ultimate | |
| I-95 | 351 | 307 | 315 | GGI Light and GGI Ultimate perform better than No Build |
| SR 826 | 267 | 249 | 234 | GGI Light and GGI Ultimate perform better than No Build |

## 5.3 Qualitative Safety Assessment of Proposed Interchange Modifications

As explained under Section 5.2 of the SIMR the HSM crash prediction procedures are not directly applicable to the GGI Interchange project due to the unique conditions and complex geometry of the interchange. Such unique conditions and complex geometries are not covered by the HSM crash prediction methods. Hence, to support the safety analysis of the project a qualitative assessment of the proposed interchange modifications was also considered. The following improvements support expectations that the GGI Light and GGI Ultimate Design Concepts will provide significant safety benefits when compared to the No Build Condition:

1. **Reduction in weaving activity**. The proposed NB and SB I-95/Turnpike Express Lane Connectors will reduce weaving for travel along the road segments connecting I-95 Express Lanes and Florida Turnpike. The dedicated express lane connectors will eliminate the need

for weaving to/from GU lanes and express lanes - for travel to/from I-95 Express and Florida Turnpike. The weaving activity in the No Build Condition is a source of conflicts and crashes at the GGI Interchange. This is especially problematic along the NB segment of I-95 south of the GGI Interchange which experiences the highest crash rate within the study area. Reducing weaving activity will significantly enhance safety within this segment and other segments along the I-95/Turnpike Connectors.

2. **Reduction in traffic exposure**. The proposed new flyover connecting EB SR 826 and NB I-95 will eliminate the need for drivers to use the long circuitous route via GGI P&R intersections to access NB I-95. This will reduce the amount of traffic using these intersections, resulting in a corresponding reduction in traffic exposure and reduction in crash risk at the intersections. Similarly, traffic using links along the circuitous route will be reduced with a corresponding reduction in traffic exposure and crash risk. Furthermore, the traffic analyses presented herein indicate that the proposed improvements will yield an overall reduction in networkwide vehicle-miles travelled. This reduction in vehicle-miles travelled will generate a networkwide reduction in traffic exposure and corresponding crash risk at the interchange with the proposed improvements.
3. **Increase interchange capacity**. The proposed new ramp connectors, widening along ramp segments and addition of turn lanes will all collectively increase the capacity of the GGI Interchange. The increase in capacity will correspondingly provide congestion relief at the interchange and reduce associated crashes – particularly rear-end collisions.