APPENDIX

E SAFETY ANALYSIS

FIGURES

TABLES

1 CRITICAL RATE FACTOR

The Critical Rate Factor (CRF) calculation is a two-step process that quantifies the safety performance of a roadway in relation to the average crash rate for similar roadway types. The first step determines the crash rate in units of crashes per 100 million vehicle miles, based on the number of crashes, the length of the study period, the length of the segment, and the average daily traffic through the section. One of two formulas were used, depending on the length of the section analyzed. The "spot" formula was applied to segments less than 0.3 mile in length, and the "segment" formula was applied to sections 0.3 mile in length or greater.

$$\text{Crash Rate}_{(spot)} = (A * 10^6) / (365 * T * V)$$

$$\text{Crash Rate}_{(segment)} = (A * 10^6) / (365 * T * V * L)$$

- Crash Rate, expressed in 100 million vehicle miles traveled
- A = Number of reported crashes
- T = Time period of the analysis
- V = Annual average daily traffic volume
- L = Length of the segment

The second step uses a ratio to compare the calculated crash rate of the segment to Kentucky's Critical Crash Rate for the type of spot or segment analyzed. Kentucky's Critical Crash Rates are based on the Kentucky Transportation Center's (KTC), *Analysis of Traffic Crash Data in Kentucky (2014-2018)*. This study identified critical crash rates for urban interstates in Kentucky. If the crash rate for the spot or segment is larger than the Critical Crash Rate, then it is considered to have statistically higher crashes than similar sections of roadway in Kentucky.

The Critical Crash Rate methodology provides a quantified threshold, it can result in overemphasis on segments with lower volumes; because the calculation assumes a linear relationship between traffic volumes and crash rates. Additionally, the calculation results in ratio between crash rates, rather than specifically indicating the number of crashes over what is expected. As a result, segments with lower crash rates but higher traffic volumes and a higher number of crashes over the average could get overlooked.

The CRF methodology relies on the data from KTC. Critical rates used for this study were based on urban interstates. KTC did not provide critical rates of interstate components such as ramps, weaving segments, diverges, or merges.

The CRF was calculated for the 121 segments within the study area. CRF values of 9+ were considered high crash locations and considered for in-depth analysis.

2 EXCESS EXPECTED CRASHES

A second methodology for quantifying the crash performance involved determining the number of crashes in excess of the expected number of crashes within a section, or the Excess Expected Crashes (EEC). This methodology is a multi-step process that involves predicting the number of crashes expected in a specific roadway segment, statistically weighting the historic crash data and comparing the two values.

To predict the frequency of crashes on a section of roadway, the Highway Safety Manual promotes the use of Safety Performance Functions (SPFs). SPFs are functions that when plotted, model the predicted crash frequency based on factors such as the length of the section, the volume of traffic, and other factors such as lane width, shoulder width, roadside barriers, urban or rural characteristics, etc. SPFs are typically modeled using negative binomial regression, which is a more accurate representation between crashes and traffic volumes than the linear relationship with CRF. The functional form of an SPF is as follows:

$$SPF_{(crashes)} = L * e^{a} * AADT^{b} * AF$$

- SPF $_{(Crashes)}$ = Crash Prediction
- L = Length of Segment
- AADT = Annual Average Daily Traffic
- a & b = Regression Coefficients (Provided by KTC)
- AF = Adjustment Factor (Provided by KTC)

The second step is to calculate the expected number of crashes, using the Empirical Bayes (EB) method. This method combines historic crash data with the SPF model to combat regression toward the mean of the historic crash data sample. Regression towards the mean occurs when extreme or outlying data points skew a data set. In crash analysis, often only a small timeframe of 3-5 years is representative of existing conditions. Therefore, regression to the mean is common when examining the safety performance of roadways, which can result in an overemphasis of the effectiveness of performance measures.

To obtain a more precise representation of a roadway segment's safety performance, the EB method combines the SPF crash prediction model with the historic crash data of that segment. The two crash measures are balanced using a weight parameter that is a function of how well the SPF model represents the dataset from which it was correlated. If the SPF has poor correlation, the weight parameter places more emphasis on the historic crash data, and vice versa. The EB method uses the following formula:

EB Expected Crashes = w * SPF Crashes+(1-w) * Historic Crashes

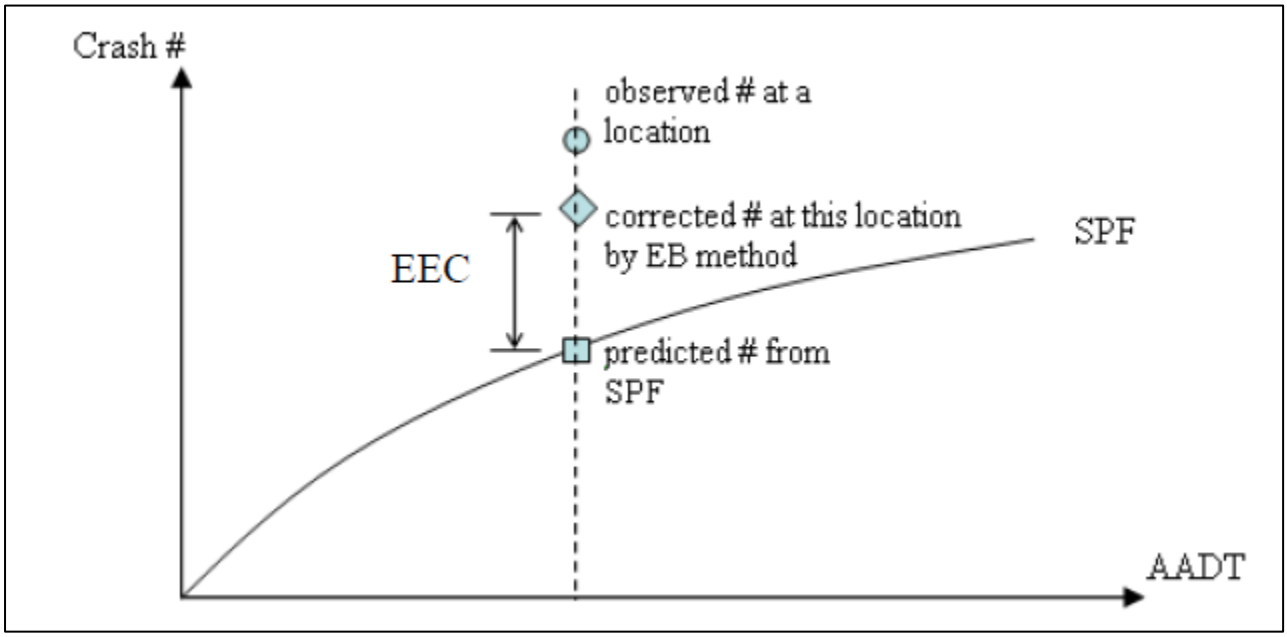
- w = Weight (based on over dispersion parameter from calibrated SPF, provided by KTC)
- SPF Crashes = Crash Prediction
- Historic Crashes = Total Historic Crashes on a Segment

Once the SPF crashes and the EB expected crashes are calculated, the EEC is calculated from subtracting the SPF from the EB. The equation uses the following formula:

EEC = EB Expected Crashes – SPF

Figure 1 was provided by KTC and shows a graphical representation of the SPF predicted crashes, historic crashes, EB expected crashes, and EEC.

Figure 1: EEC Graph



Source: Safety Analysis for SHIFT Implementation, KTC 2019.

The crash analysis for this study was coordinated with KTC's research project, *Safety Analysis for SHIFT Implementation, 2019*. Through this research, KTC established SPF functions for predicted crashes and weighting factors for EB expected crashes to calculate EECs based on roadway type.

The 121 segments of the study area were classified by roadway types that corresponded to KTC's research. Roadway types used for this study include urban interstate, ramps, and intersections. For this study, the term "intersections" refers to merges and diverges on collector-distributors (CD) roadways. This specific type of location was not defined in KTC's research. The project team in collaboration with KTC defined these locations as "divided, three-leg, urban, no control" intersections.

KTC provided Kentucky-specific SPF functions for predicted crashes and weighting factors for EB expected crashes for the roadway types included in this study. This information was used to calculate EEC values for each of the 121 segments within the study area. A detailed analysis was completed for 24 segments with an EEC value of 20+ and is discussed in Section 3.

3 DETAILED ANALYSIS FOR "HIGH CRASH" SEGMENTS

The 24 segments shown in **Table 1** and **Figure 2** were identified as safety "hot spots" for meeting the following thresholds:

- CRF = 9 or higher
- EEC = 20 crashes or more
- Severe Crashes (KA) = 3 crashes or more
- Fatal Crash = 1 or more

Table 1 includes a summary of the findings of the detailed safety analysis. More detailed information for each of these segments is included in the following sub-sections.

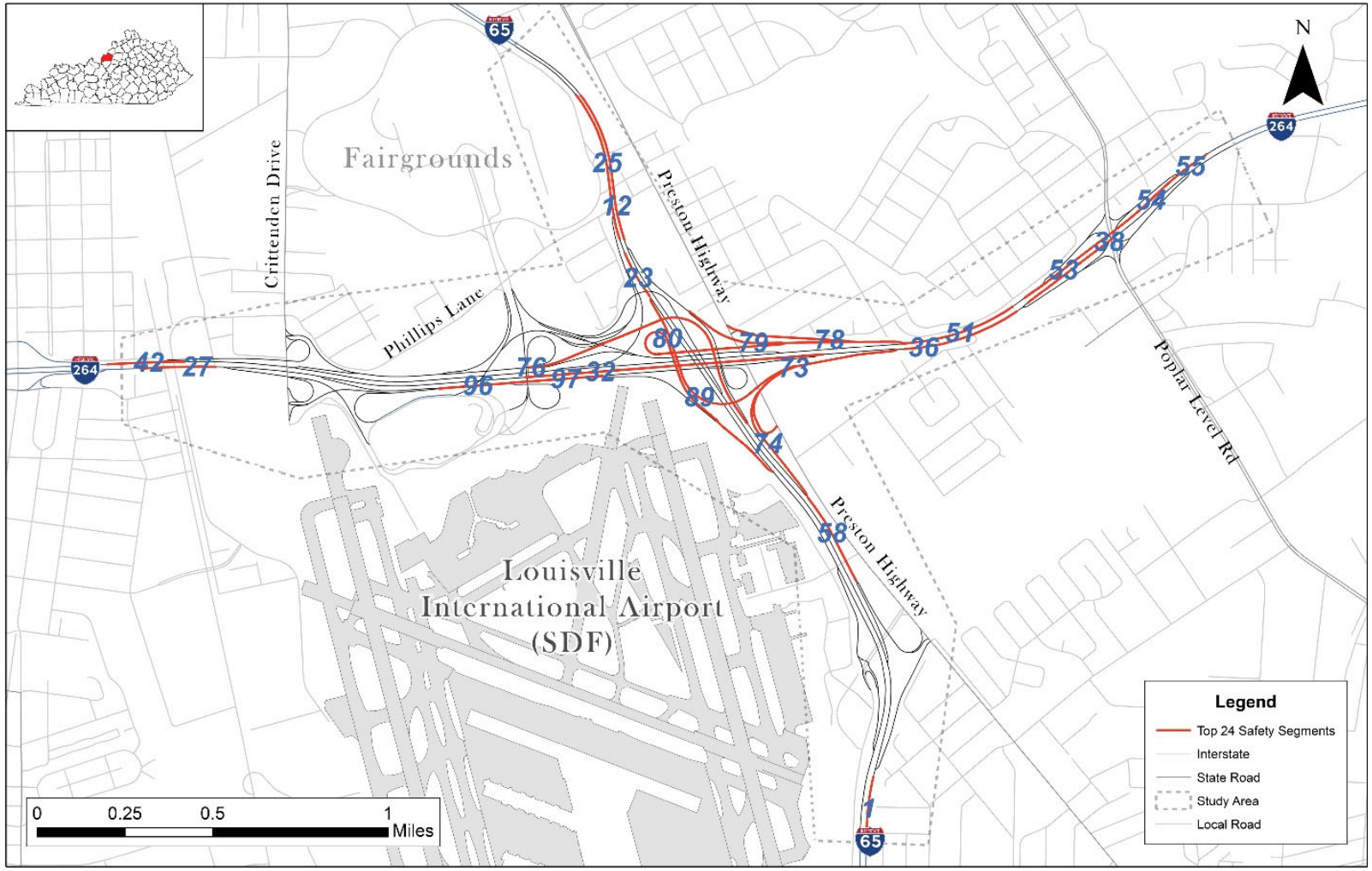
Table 1: Summary of Crash Analysis for "Hot Spot" Segments

Segment	EEC	CRF	Total Crashes	Fatal	Injury	PDO	KA	Top Crash Type(s) (%)	Contributing Factors to Crashes
51	173	5	202	0	24	178	4	Rear End (68%) Sideswipe–Same Direction (26%)	Congestion Weaving Multiple Destinations
27	76	3	92	0	22	70	4	Rear End (85%)	Congestion Weaving Multiple Destinations
58	74	6	78	0	9	69	0	Rear End (59%) Sideswipe-Same Direction (40%)	Congestion Weaving
53	73	3	94	0	14	80	0	Rear End (62%) Sideswipe-Same Direction (37%)	Congestion Multiple Destinations
80	66	2	74	0	20	54	1	Rear End (68%) Sideswipe-Same Direction (16%) Single Vehicle (14%)	Geometry Congestion
25	58	2	80	0	15	65	2	Rear End (45%) Sideswipe-Same Direction (41%)	Congestion Multiple Destinations
74	48	5	52	0	6	46	0	Rear End (67%) Sideswipe-Same Direction (21%)	Congestion Dropped Lane Added Lane
76	46	2	53	0	16	37	0	Single Vehicle (72%) Sideswipe-Same Direction (15%)	Geometry Merging Added Lane
73	44	10	49	0	4	45	1	Rear End (51%) Sideswipe-Same Direction (39%)	Congestion Merging Added Lane
36	42	1	71	1	6	64	6	Sideswipe-Same Direction (46%) Rear End (42%)	Weaving Congestion Multiple Destinations
78	40	12	45	0	7	51	0	Rear End (84%)	Congestion
89	35	3	40	0	10	30	1	Rear End (78%)	Congestion Added Lane
54	33	1	51	0	8	43	3	Rear End (80%) Sideswipe-Same Direction (14%)	Congestion Multiple Destinations

Segment	EEC	CRF	Total Crashes	Fatal	Injury	PDO	KA	Top Crash Type(s) (%)	Contributing Factors to Crashes
1	33	1	48	0	1	47	0	Rear End (54%) Sideswipe-Same Direction (40%)	Congestion Multiple Destinations Dropped Lanes
97	30	3	33	0	8	25	0	Rear End (76%) Sideswipe-Same Direction (18%)	Congestion Dropped Lane
23	24	2	29	0	5	24	4	Rear End (59%) Sideswipe-Same Direction (38%)	Congestion Dropped Lane
12	21	1	43	0	11	32	1	Sideswipe-Same Direction (33%) Rear End (28%) Single Vehicle (28%)	Merging Added Lane Congestion
79	21	3	24	0	5	19	0	Rear End (46%) Single Vehicle (25%) Sideswipe-Same Direction (21%)	Congestion Geometry Merging
42	21	1	32	0	5	27	0	Rear End (39%) Sideswipe-Same Direction (39%)	Weaving Multiple Destinations
55	20	0.7	27	0	2	25	1	Rear End (70%)	Congestion
96	20	2	22	0	4	18	0	Rear End (77%)	Congestion Added Lanes Multiple Destinations
32/ 33*	10	0.7	38	1	9	28	4	Rear End (42%) Sideswipe-Same Direction (32%) Single Vehicle (24%)	Congestion Weaving Multiple Destinations
38	7	0.8	29	1	7	25	2	Rear End (69%) Sideswipe-Same Direction (21%)	Congestion

** Segments 32 and 33 were combined for analysis. On its own, Segment 33 did not meet the EEC or CRF threshold for detailed analysis. The project team decided to combine these segments, because Segment 33 included a fatality and the two segments have similar physical characteristics.*

Figure 2: Crash "Hot Spot" Locations



** Segments 32 and 33 are combined.*

3.1 SAFETY ANALYSIS - SEGMENT 51

Segment 51 consists of westbound I-264 between KY 864 (Poplar Level) and I-65. This segment includes a weaving area for vehicles entering from KY 864 and vehicles exiting to the ramp that serves I-65/KY 61 (Preston Highway). This segment is heavily congested in peak hours resulting in overall delays and queues of traffic.

Summary:

- **Total Crashes:** 202
- **EEC:** 173
- **CRF:** 5
- **KA:** 4
- **Crashes Resulting in Injury:** 24 (12%)
- **Primary Crash Types:**
  - **Rear End:** 138 (68%)
  - **Sideswipe-Same Direction:** 52 (26%)

Factors Contributing to Crashes:

- Congestion
- Weaving
- Multiple Destinations

Figure 3: Segment 51 Crashes by Severity

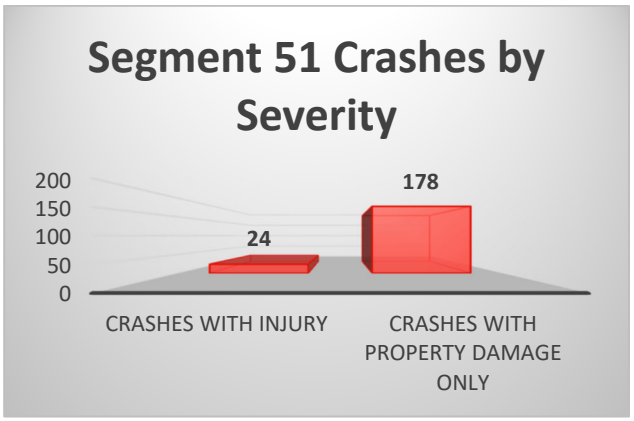
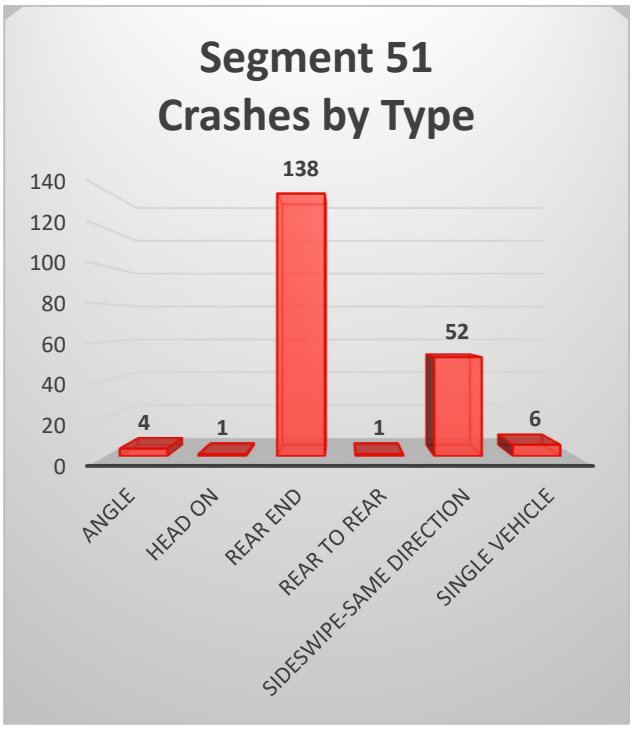


Figure 4: Segment 51 Crashes by Type



3.2 SAFETY ANALYSIS – SEGMENT 27

Segment 27 consists of eastbound mainline I-264 at the western project limit. The weaving area through this segment includes drivers entering from the 3rd Street ramp and exiting to the ramp that serves Crittenden Drive and the Louisville Muhammad Ali International Airport. Regular congestion occurs in this segment during peak hours.

Summary:

- **Total Crashes:** 92
- **EEC:** 76
- **CRF:** 3
- **KA:** 4
- **Crashes Resulting in Injury:** 22 (24%)
- **Primary Crash Type:**
  - **Rear End:** 78 (85%)

Factors Contributing to Crashes:

- Congestion
- Weaving
- Multiple Destinations

Figure 5: Segment 27 Crashes by Severity

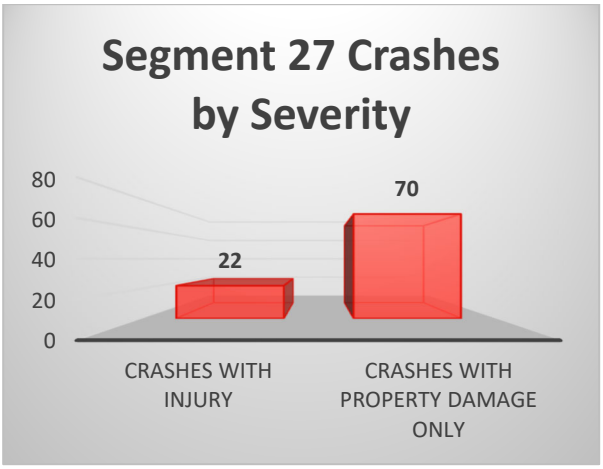
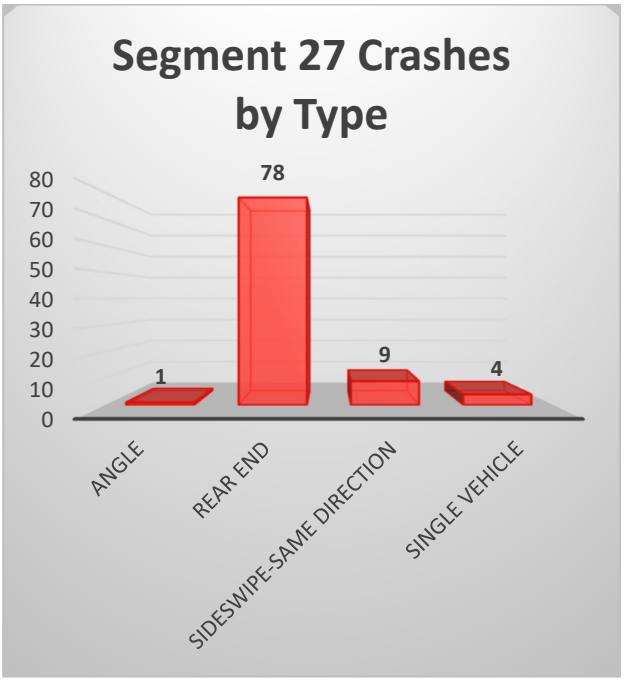


Figure 6: Segment 27 Crashes by Type



3.3 SAFETY ANALYSIS - SEGMENT 58

Segment 58 is the portion of northbound I-65 between the ramp from KY 61 (Preston Highway) and the exit ramp to eastbound I-264. Crash data did not have sufficient detail to delineate between mainline I-65. The CD includes a weaving segment from the ramp from KY 61 (Preston Highway) and the dropped lane that serves the ramp to westbound I-264. The segment is heavily congested in peak hours particularly on the CD.

Summary:

- **Total Crashes:** 78
- **EEC:** 74
- **CRF:** 6
- **KA:** 0
- **Crashes Resulting in Injury:** 9 (12%)
- **Primary Crash Types:**
  - **Rear End:** 46 (59%)
  - **Sideswipe – Same Direction:** 31 (40%)

Factors Contributing to Crashes:

- Congestion
- Weaving

Figure 7: Segment 58 Crashes by Severity

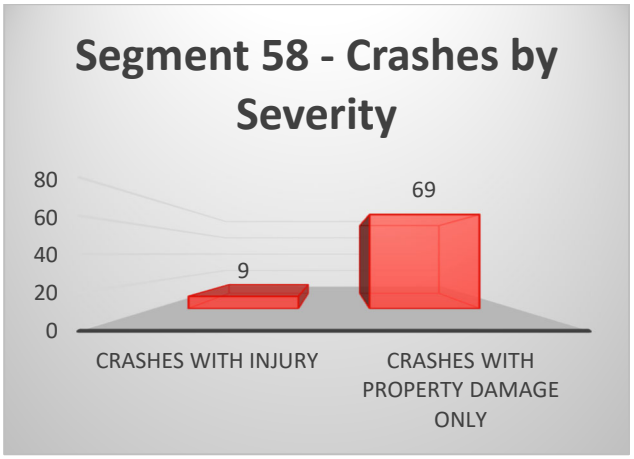
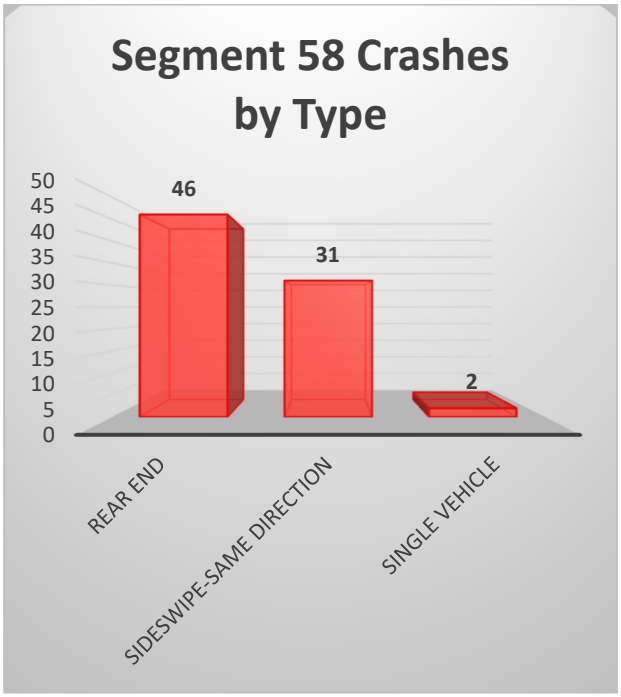


Figure 8: Segment 58 Crashes by Type



3.4 SAFETY ANALYSIS – SEGMENT 53

Segment 53 is the portion of westbound I-264 from the KY 864 (Poplar Level Road) overpass to the added lanes from the KY 864 (Poplar Level Road) entrance ramp. Some vehicles in this segment are changing lanes to position themselves for the upcoming weaving condition in the adjacent segment which includes the ramp from KY 864 (Poplar Level Road) and the ramp to I-65/KY 61 (Preston Highway). This segment is heavily congested in peak hours.

Summary:

- **Total Crashes:** 94
- **EEC:** 73
- **CRF:** 3
- **KA:** 0
- **Crashes Resulting in Injury:** 14 (15%)
- **Primary Crash Types:**
  - **Rear End:** 58 (62%)
  - **Sideswipe – Same Direction:** 35 (37%)

Factors Contributing to Crashes:

- Congestion
- Multiple Destinations

Figure 9: Segment 53 Crashes by Severity

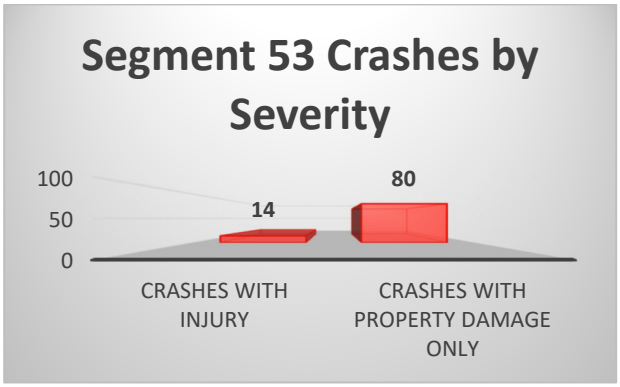
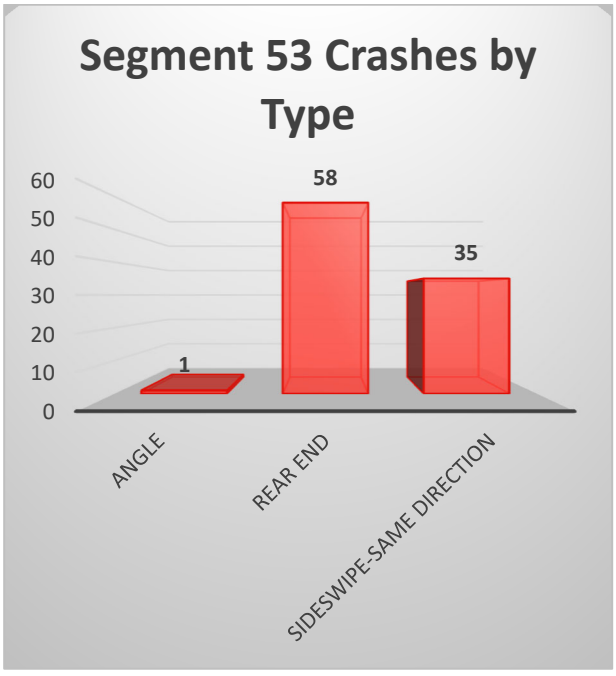


Figure 10: Segment 53 Crashes by Type



3.5 SAFETY ANALYSIS – SEGMENT 80

Segment 80 consists of the loop ramp from the CD that connects westbound I-264/KY 61 (Preston Highway)/I-65 to southbound I-65. Currently, the ramp has a posted 25 miles per hour (mph) advisory speed, and the curvature is delineated through a series of post mounted advisory signs and chevrons. This segment also includes the added lane from eastbound I-264 to southbound I-65. Queues of traffic are regularly generated at this ramp during peak hours.

Summary:

- **Total Crashes:** 74
- **EEC:** 66
- **CRF:** 2
- **KA:** 1
- **Crashes Resulting in Injury:** 20 (27%)
- **Primary Crash Types:**
  - **Rear End:** 50 (68%)
  - **Sideswipe – Same Direction:** 12 (16%)
  - **Single Vehicle:** 10 (14%)

Factors Contributing to Crashes:

- Geometry
- Congestion

Figure 11: Segment 80 Crashes by Severity

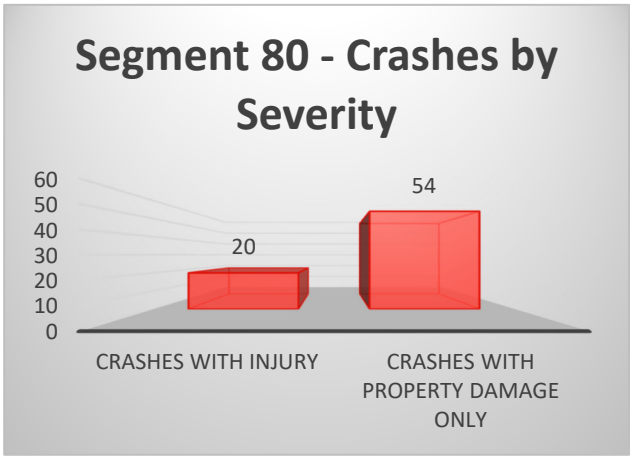
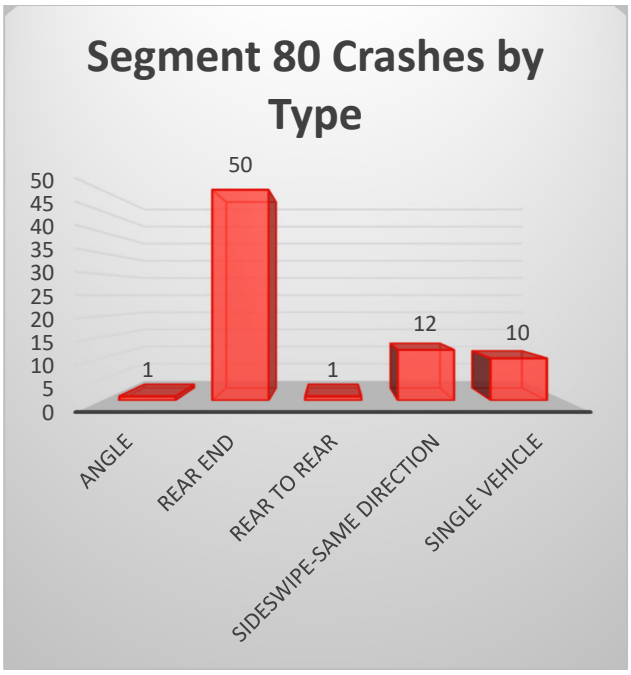


Figure 12: Segment 80 Crashes by Type



3.6 SAFETY ANALYSIS – SEGMENT 25

Segment 25 consists of mainline southbound I-65 from the northern project limit to the ramp to westbound I-264/Louisville Muhammad Ali International Airport/Fairgrounds. Approximately 1,500 feet south of this segment, the right most lane of I-65 becomes exit only to eastbound I-264.

Summary:

- **Total Crashes:** 80
- **EEC:** 58
- **CRF:** 2
- **KA:** 2
- **Crashes Resulting in Injury:** 15 (19%)
- **Primary Crash Types:**
  - **Rear End:** 36 (45%)
  - **Sideswipe – Same Direction:** 33 (41%)

Factors Contributing to Crashes:

- Congestion
- Multiple Destinations

Figure 13: Segment 25 Crashes by Severity

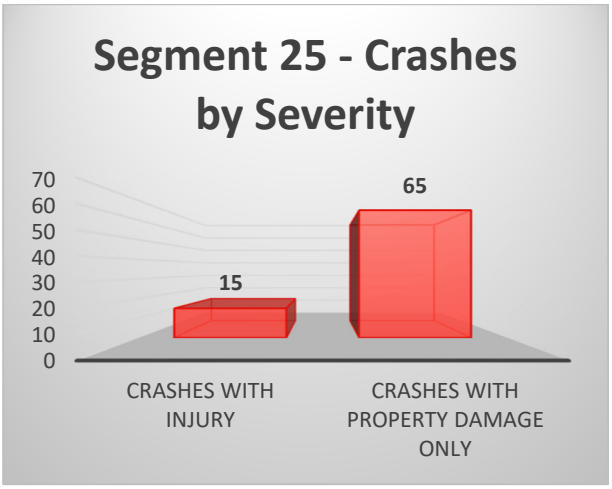
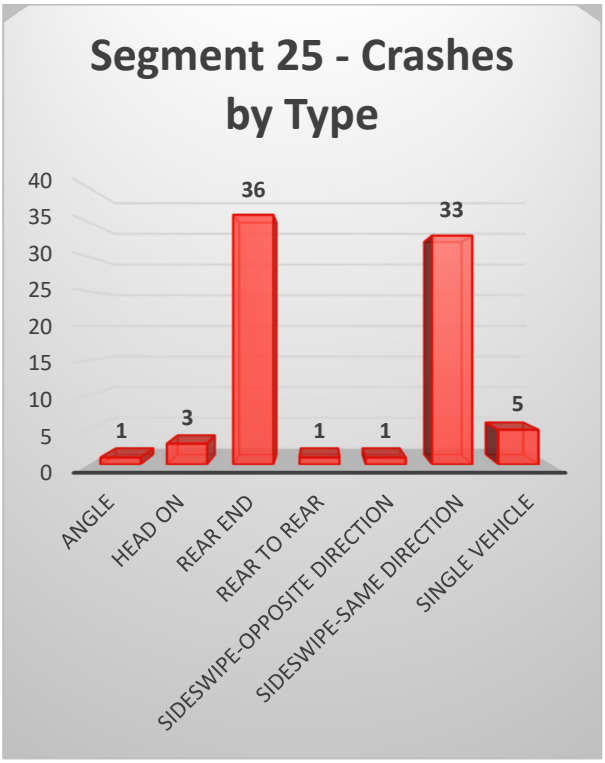


Figure 14: Segment 25 Crashes by Type



3.7 SAFETY ANALYSIS – SEGMENT 74

Segment 74 consists of a portion of the ramp from the CD that runs parallel to northbound I-65 to I-264. This segment begins at the lane drop to the ramp and terminates at the added lane from KY 61 (Preston Highway). Traffic within this segment is heavily congested during peak hours.

Summary:

- **Total Crashes:** 52
- **EEC:** 48
- **CRF:** 5
- **KA:** 0
- **Crashes Resulting in Injury:** 6 (12%)
- **Primary Crash Type:**
  - **Rear End:** 35 (67%)
  - **Side Swipe – Same Direction:** 11 (21%)

Factors Contributing to Crashes:

- Congestion
- Dropped Lane
- Added Lane

Figure 15: Segment 74 Crashes by Severity

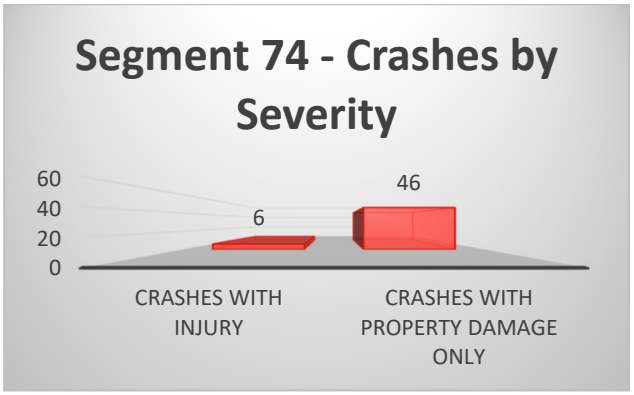
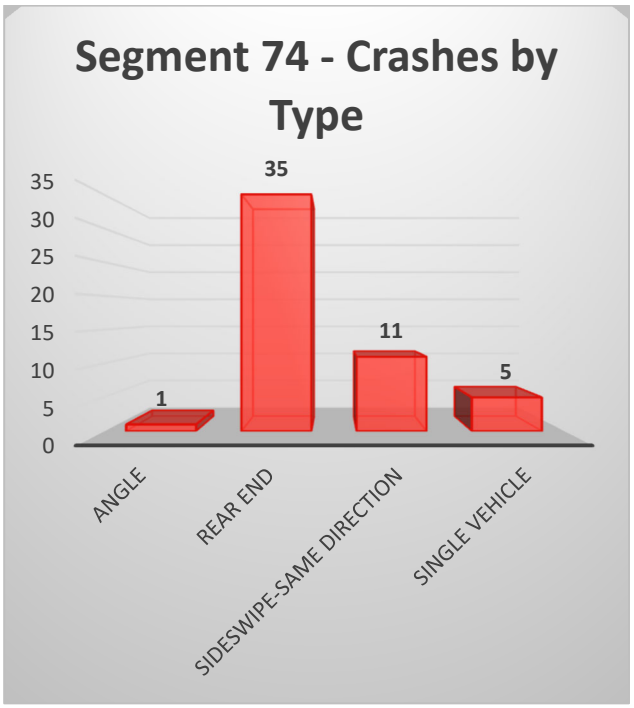


Figure 16: Segment 74 Crashes by Type



3.8 SAFETY ANALYSIS – SEGMENT 76

Segment 76 consists of the ramp from the CD that runs parallel to northbound I-65 to the CD that runs parallel to westbound I-264. This segment includes the diverge to the Muhammad Ali Louisville International Airport. The terminus of this segment includes a merge from the loop ramps from the Muhammad Ali Louisville International Airport, and an added lane condition from the CD that runs parallel to westbound I-264. Additionally, the ramp is curved with a 45-mph advisory speed that is delineated with dual mounted curve advisory signs and chevrons.

Summary:

- **Total Crashes:** 53
- **EEC:** 46
- **CRF:** 2
- **KA:** 0
- **Crashes Resulting in Injury:** 16 (30% - highest injury rate within the study area)
- **Primary Crash Type:**
  - **Single Vehicle:** 38 (72%)

Factors Contributing to Crashes:

- Geometry
- Merging
- Added Lane

Figure 17: Segment 76 Crashes by Severity

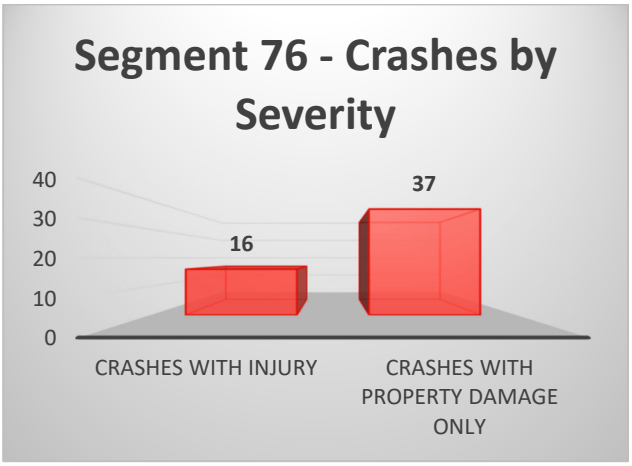
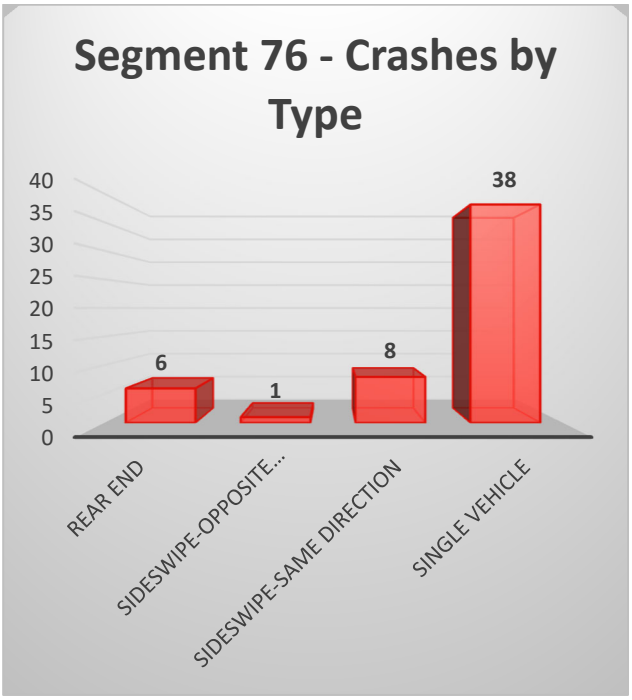


Figure 18: Segment 76 Crashes by Type



3.9 SAFETY ANALYSIS – SEGMENT 73

Segment 73 consists of the ramp from KY 61 (Preston Highway) to the merge with eastbound I-264. The segment includes a merge with the ramp from the CD that runs parallel to northbound I-65 and the added lane from the southbound I-65 ramp. This results in a two-lane ramp approaching eastbound I-264. Congestion in peak hours regularly generates traffic queues.

Summary:

- **Total Crashes:** 49
- **EEC:** 44
- **CRF:** 10
- **KA:** 1
- **Crashes Resulting in Injury:** 4 (8%)
- **Primary Crash Type:**
  - **Rear End:** 25 (51%)
  - **Sideswipe – Same Direction:** 19 (39%)

Factors Contributing to Crashes:

- Congestion
- Merging
- Added Lane

Figure 19: Segment 73 Crashes by Severity

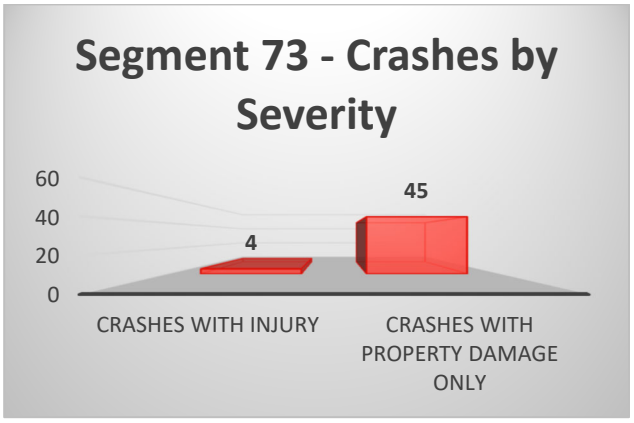
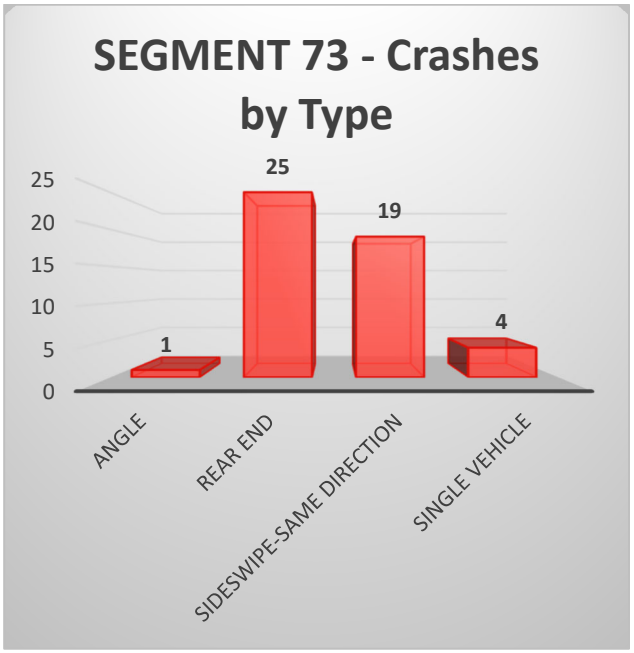


Figure 20: Segment 73 Crashes by Type



3.10 SAFETY ANALYSIS – SEGMENT 36

Segment 36 consists of eastbound I-264 between I-65 and KY 864 (Poplar Level Road). This segment includes a weaving area between the entrance ramp from I-65/KY 61 (Preston Highway) and the exit to KY 864 (Poplar Level Road). In peak hours, this segment is regularly congested.

Summary:

- **Total Crashes:** 71
- **EEC:** 42
- **CRF:** 1
- **KA:** 6
- **Crashes Resulting in Fatality:** 1
  - **Fatal Crash Type:** Single Vehicle
- **Crashes Resulting in Injury:** 6 (8%)
- **Primary Crash Type:**
  - **Sideswipe – Same Direction:** 33 (46%)
  - **Rear End:** 30 (42%)

Factors Contributing to Crashes:

- Weaving
- Congestion
- Multiple Destinations

Figure 21: Segment 36 Crashes by Severity

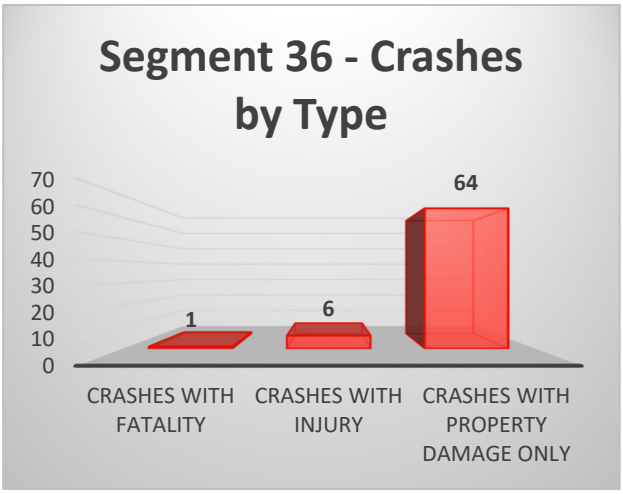
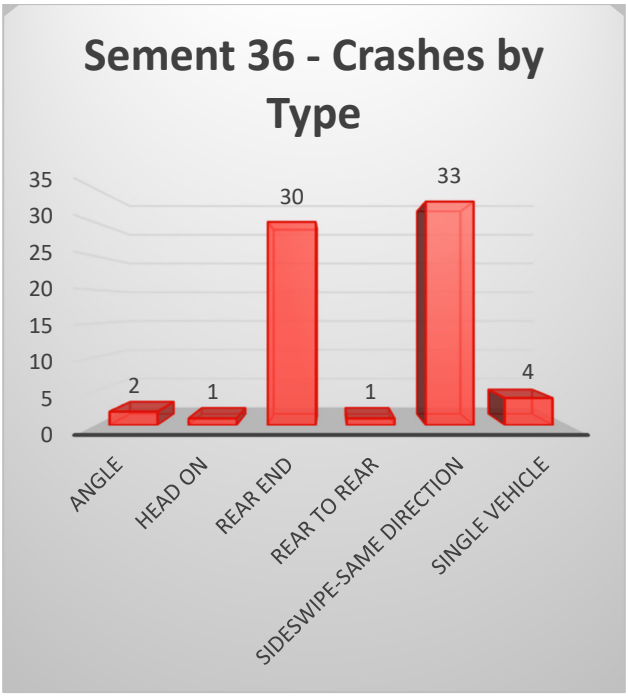


Figure 22: Segment 36 Crashes by Type



3.11 SAFETY ANALYSIS – SEGMENT 78

Segment 78 consists of the ramp that connects the CD that runs parallel to westbound I-264 to KY 61 (Preston Highway). During peak hours, a queue of traffic develops at the ramp terminal.

Crash Summary

- **Total Crashes:** 58
- **EEC:** 40
- **CRF:** 12
- KA: 0
- **Crashes Resulting in Injury:** 7 (12%)
- **Primary Crash Type:**
  - **Rear End:** 49 (84%)

Factors Contributing to Crashes:

- Congestion

Figure 23: Segment 78 Crashes by Severity

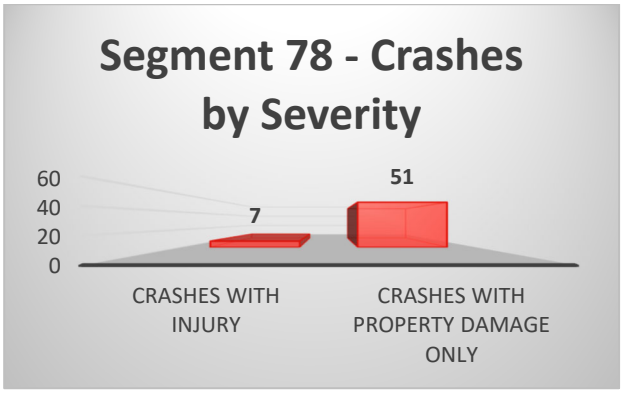
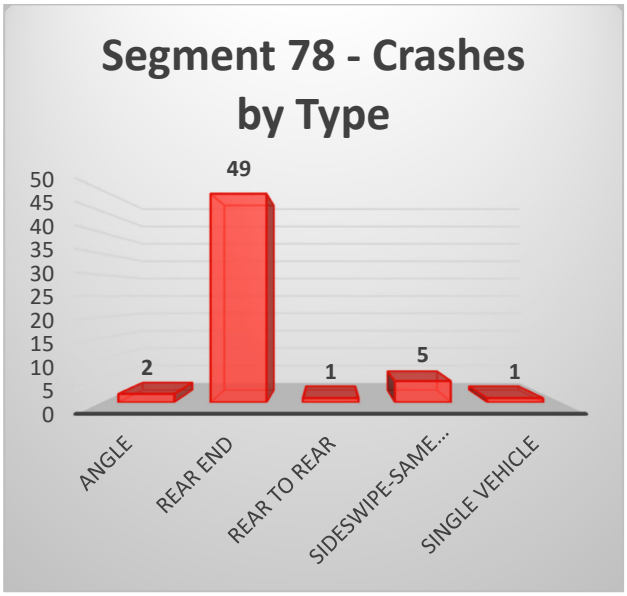


Figure 24: Segment 78 Crashes by Type



3.12 SAFETY ANALYSIS – SEGMENT 89

Segment 89 consists of the ramp from southbound I-65 towards eastbound I-264, and at the added lane ramp from northbound I-65/KY 61 (Preston Highway). Congestion in peak hours regularly results in a queue of vehicles.

Summary:

- **Total Crashes:** 40
- **EEC:** 35
- **CRF:** 3
- **KA:** 1
- **Crashes Resulting in Injury:** 10 (25%)
- **Primary Crash Type:**
  - **Rear End:** 31 (78%)

Factors Contributing to Crashes:

- Congestion
- Added Lane

Figure 25: Segment 89 Crashes by Severity

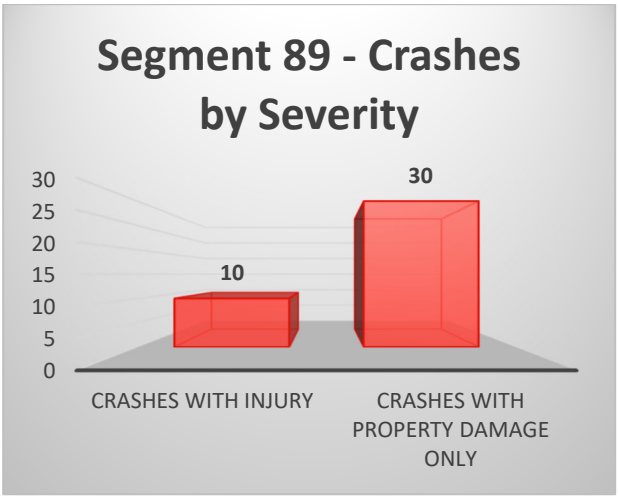
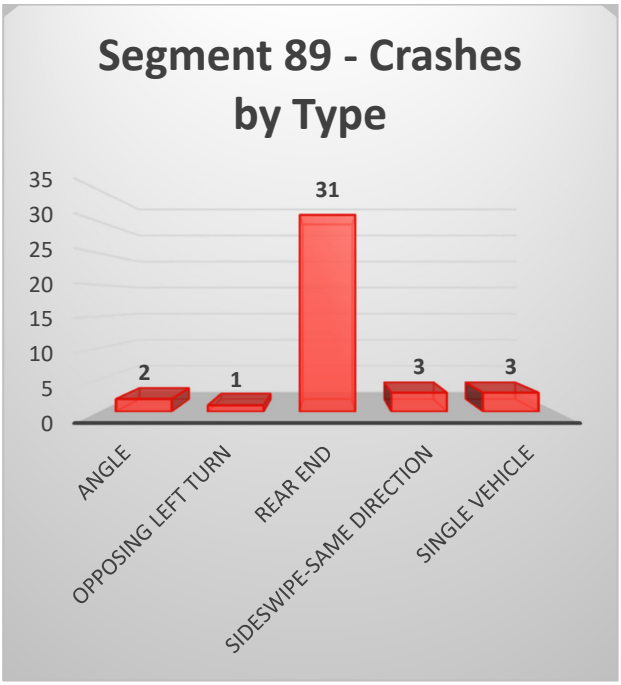


Figure 26: Segment 89 Crashes by Type



3.13 SAFETY ANALYSIS – SEGMENT 54

Segment 54 consists of eastbound mainline I-264 from (and including) the diverge to KY 864 (Poplar Level Road) to the KY 864 overpass. Some vehicles in this segment are changing lanes to position themselves for the upcoming weaving condition in the segment that includes the ramp from KY 864 (Poplar Level Road) and the ramp to I-65/KY 61 (Preston Highway). Congestion in peak hours often results in delays through this segment.

Summary:

- **Total Crashes:** 51
- **EEC:** 33
- **CRF:** 1
- **KA:** 3
- **Crashes Resulting in Injury:** 8 (16%)
- **Primary Crash Type:**
  - **Rear End:** 41 (80%)
  - **Sideswipe-Same Direction:** 7 (14%)

Factors Contributing to Crashes:

- Congestion
- Multiple Destinations

Figure 27: Segment 54 Crashes by Severity

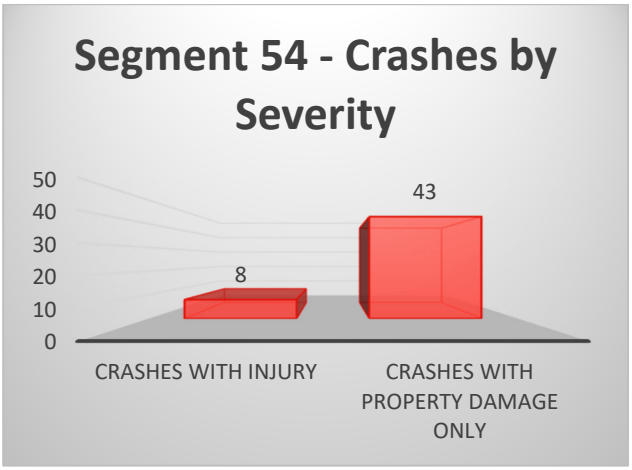
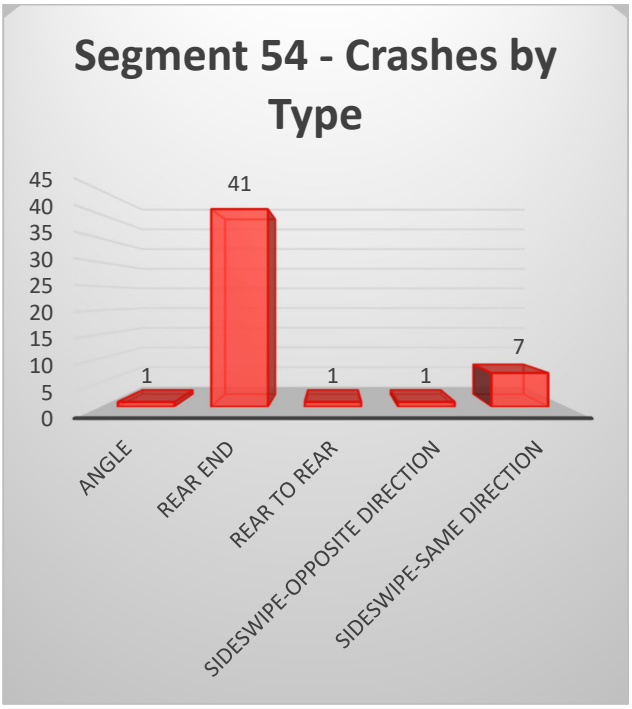


Figure 28: Segment 54 Crashes by Type



3.14 SAFETY ANALYSIS – SEGMENT 1

Segment 1 consists of northbound I-65 from the southern project limit to the diverge to KY 61 (Preston Highway). Traffic in this segment also changes lanes to position themselves for the upcoming CD. Traffic within this segment regularly backs up during peak hours.

Summary:

- **Total Crashes:** 48
- **EEC:** 33
- **CRF:** 1
- **KA:** 0
- **Crashes Resulting in Injury:** 1 (2%)
- **Primary Crash Type:**
  - **Rear End:** 26 (54%)
  - **Side Swipe – Same Direction:** 19 (40%)

Factors Contributing to Crashes:

- Congestion
- Multiple Destinations
- Dropped Lanes

Figure 29: Segment 1 Crashes by Severity

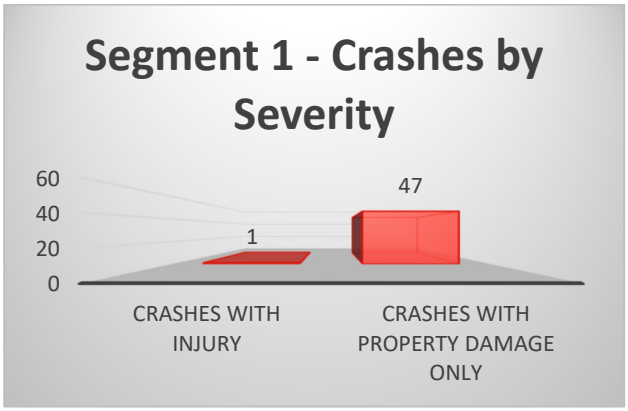
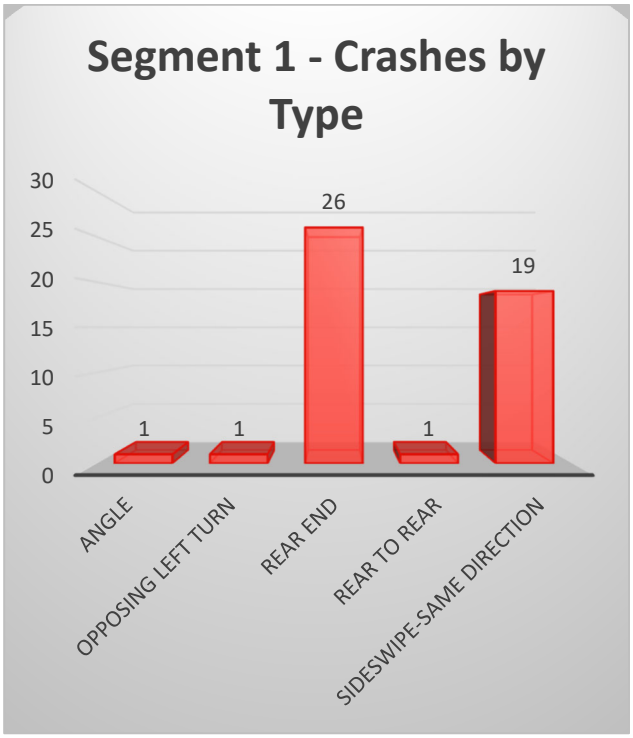


Figure 30: Segment 1 Crashes by Type



3.15 SAFETY ANALYSIS – SEGMENT 97

Segment 97 consists of eastbound I-264 between the diverge to Sandiford Field Road and the diverge to southbound I-65. On the CD, at the terminus of this segment, the right-most lane becomes an exit only ramp to southbound I-65. The crash data did not have sufficient detail to differentiate between the CD and mainline I-264. Congestion in peak hours results in delay.

Summary:

- **Total Crashes:** 33
- **EEC:** 30
- **CRF:** 3
- **KA:** 0
- **Crashes Resulting in Injury:** 8 (24%)
- **Primary Crash Type:**
  - **Rear End:** 25 (76%)
  - **Sideswipe – Same Direction:** 6 (18%)

Factors Contributing to Crashes

- Congestion
- Dropped Lane

Figure 31: Segment 97 Crashes by Severity

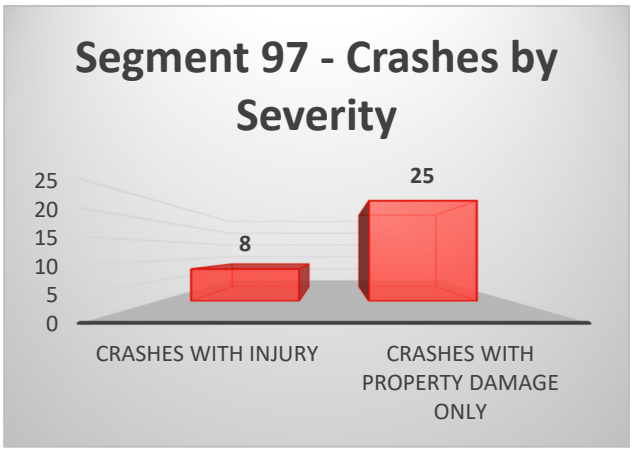
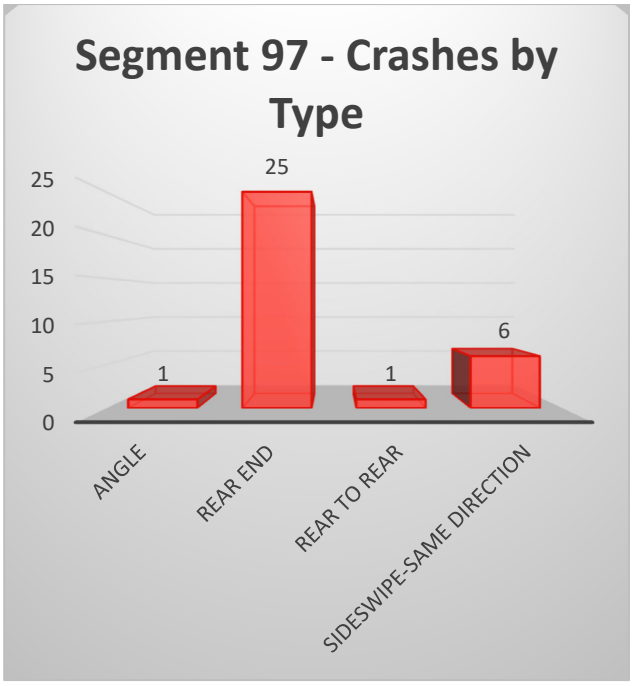


Figure 32: Segment 97 Crashes by Type



3.16 SAFETY ANALYSIS – SEGMENT 23

Segment 23 consists of southbound I-65 from the diverge to westbound I-264/Fairgrounds/the Louisville Muhammad Ali International Airport to the dropped lane to eastbound I-264.

Summary:

- **Total Crashes:** 29
- **EEC:** 24
- **CRF:** 2
- **KA:** 4
- **Crashes Resulting in Injury:** 5 (17%)
- **Primary Crash Type:**
  - **Rear End:** 17 (59%)
  - **Sideswipe – Same Direction:** 11 (38%)

Factors Contributing to Crashes:

- Congestion
- Dropped Lane

Figure 33: Segment 23 Crashes by Severity

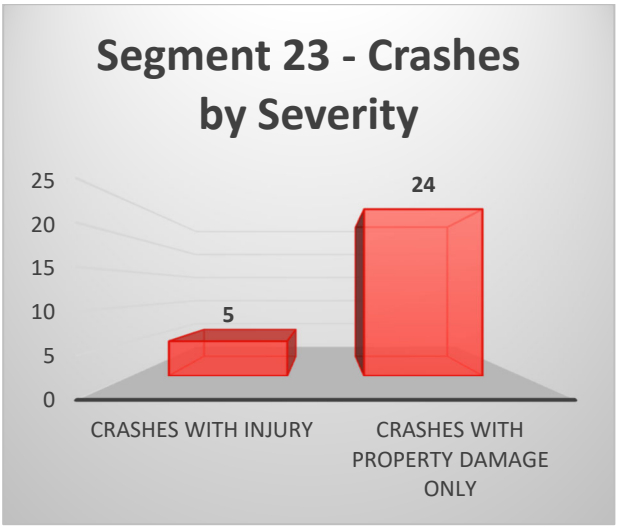
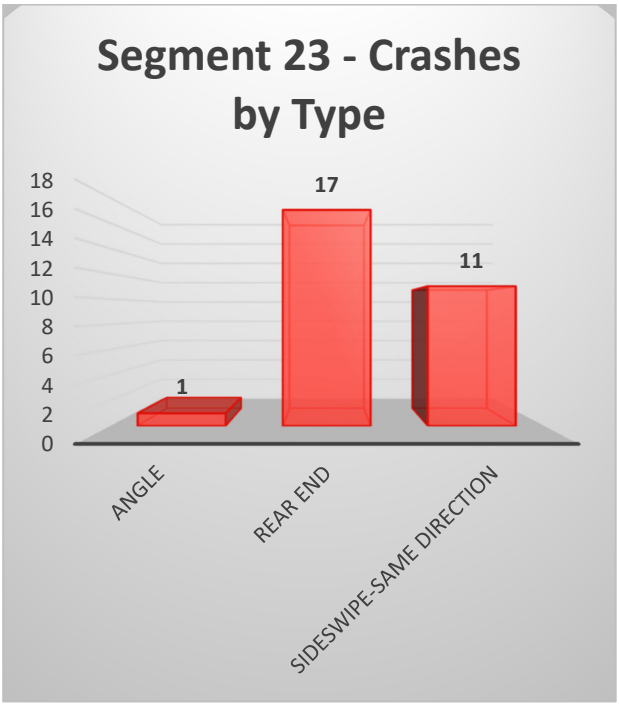


Figure 34: Segment 23 Crashes by Type



3.17 SAFETY ANALYSIS – SEGMENT 12

Segment 12 consists of northbound I-65 from the I-264/KY 61 (Preston Highway) ramp through the northern project limit. Within this segment, the two lanes on the ramp merge into one, and then become an added lane on northbound I-65. Traffic is congested during the peak hours.

Summary:

- **Total Crashes:** 43
- **EEC:** 21
- **CRF:** 1
- **KA:** 1
- **Crashes Resulting in Injury:** 11 (26%)
- **Primary Crash Type:**
  - **Sideswipe – Same Direction:** 14 (33%)
  - **Rear End:** 12 (28%)
  - **Single Vehicle:** 12 (28%)

Factors Contributing to Crashes:

- Merging
- Added Lane
- Congestion

Figure 35: Segment 12 Crashes by Severity

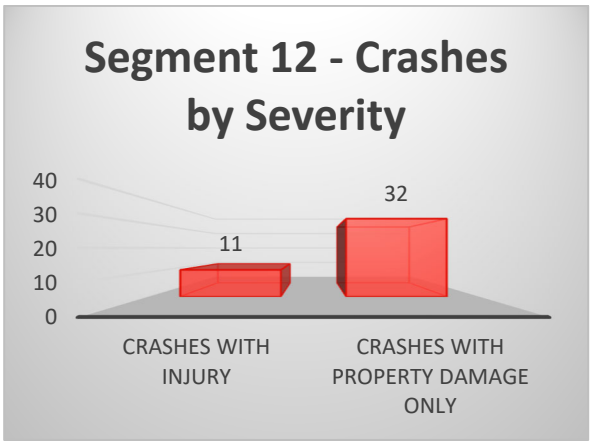
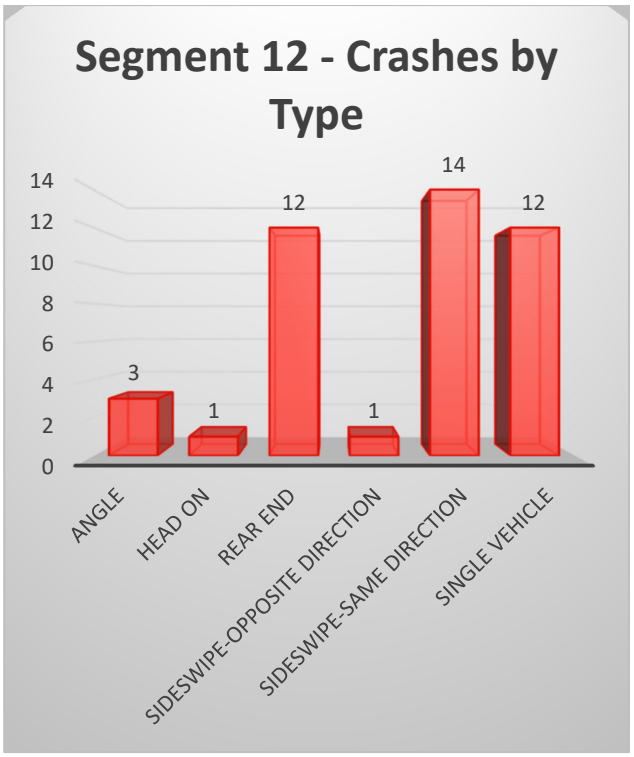


Figure 36: Segment 12 Crashes by Type



3.18 SAFETY ANALYSIS – SEGMENT 79

Segment 79 consists of a portion of the ramp from westbound I-264 to northbound I-65. The segment originates at the diverge to KY 61 (Preston Highway) and terminates at northbound I-65. The segment includes a diverge to southbound I-65 from the left lane. The ramp is two lanes throughout the segment that merge into one as it approaches I-65. There is a slight curve on the ramp; however, no ramp advisory speed is currently posted. This segment is congested during the peak period, just before the diverge to southbound I-65.

Summary:

- **Total Crashes:** 24
- **EEC:** 21
- **CRF:** 3
- **KA:** 0
- **Crashes Resulting in Injury:** 5 (21%)
- **Primary Crash Type:**
  - **Rear End:** 11 (46%)
  - **Single Vehicle:** 6 (25%)
  - **Sideswipe – Same Direction:** 5 (21%)

Factors Contributing to Crashes:

- Congestion
- Geometry
- Merging

Figure 37: Segment 79 Crashes by Severity

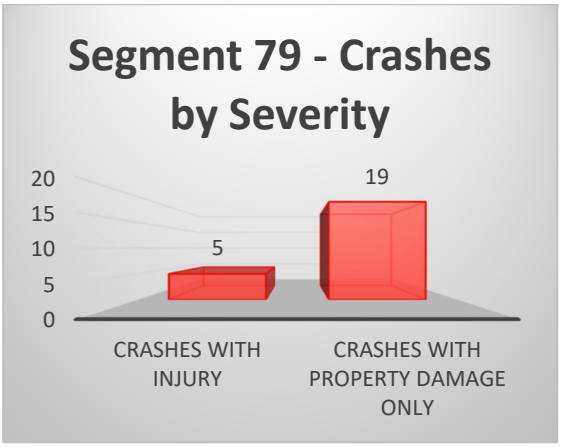
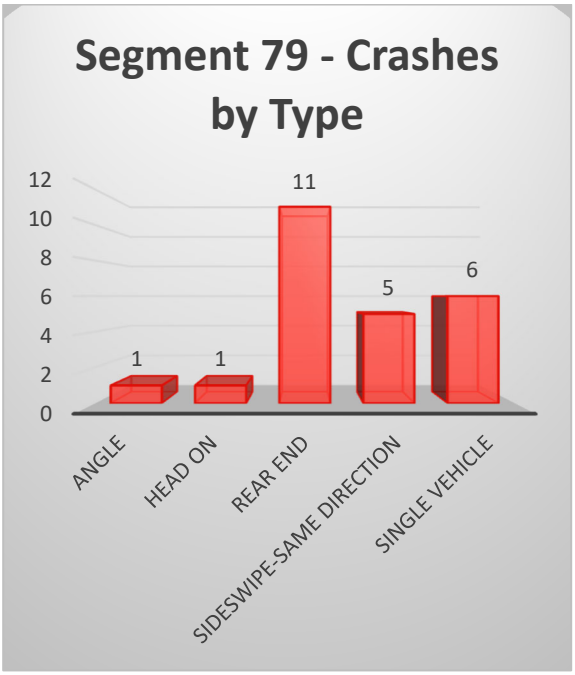


Figure 38: Segment 79 Crashes by Type



3.19 SAFETY ANALYSIS – SEGMENT 42

Segment 42 consists of the eastbound I-264 weaving area between the ramp from 3rd Street (just outside of the project limit) and the ramp to Crittenden Drive and the Muhammad Ali Louisville International Airport. The dual lane ramp from 3rd Street merges into one added-lane onto I-264, and the exit to Crittenden Drive and the Muhammad Ali Louisville International Airport is a dual lane exit with one lane and a shared through/exit lane. After the exit, the dual lane splits into two ramps, including a ramp to the Muhammad Ali Louisville International Airport and a ramp to Crittenden Drive.

Summary:

- **Total Crashes:** 32
- **EEC:** 21
- **CRF:** 1
- **KA:** 0
- **Crashes Resulting in Injury:** 5 (16%)
- **Primary Crash Type:**
  - **Rear End:** 12 (39%)
  - **Sideswipe – Same Direction:** 12 (39%)

Factors Contributing to Crashes:

- Weaving
- Multiple Destinations

Figure 39: Segment 42 Crashes by Severity

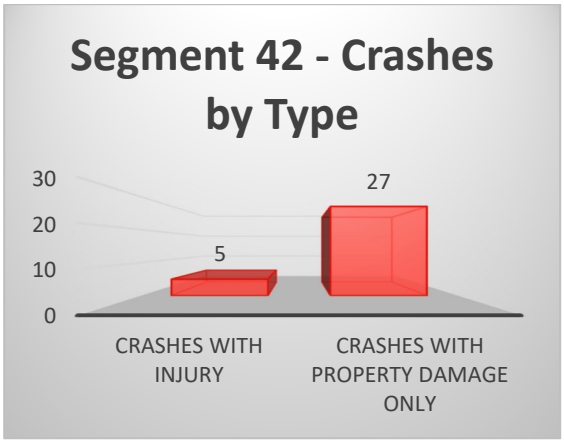
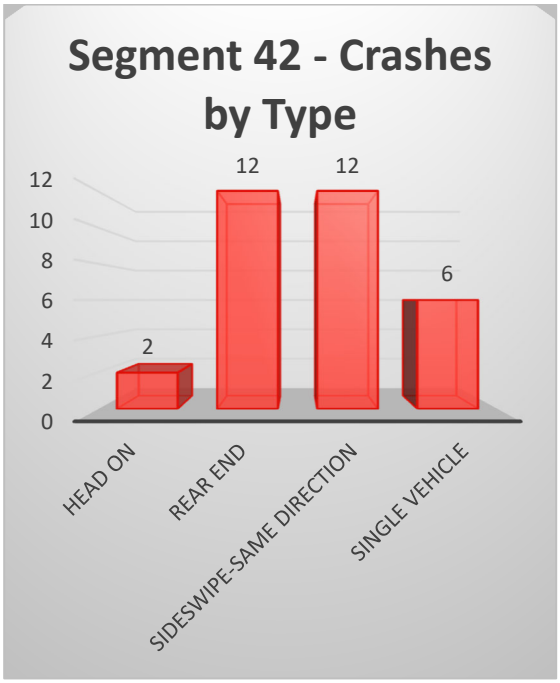


Figure 40: Segment 42 Crashes by Type



3.20 SAFETY ANALYSIS – SEGMENT 55

Segment 55 consists of westbound I-264 from the eastern project limit to the KY 864 (Poplar Level Road) exit ramp. In peak hours, there is often a queue of traffic from the exit ramp to I-65 that extends into this segment.

Summary:

- **Total Crashes:** 27
- **EEC:** 20
- **CRF:** 0.7
- **KA:** 1
- **Crashes Resulting in Injury:** 2 (7%)
- **Primary Crash Type:**
  - **Rear End:** 19 (70%)

Factors Contributing to Crashes:

- Congestion

Figure 41: Segment 55 Crashes by Severity

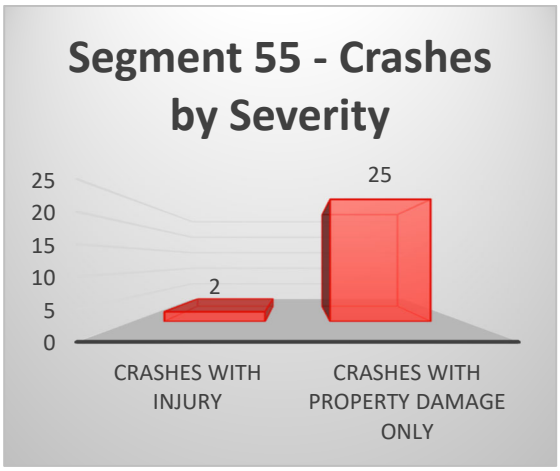
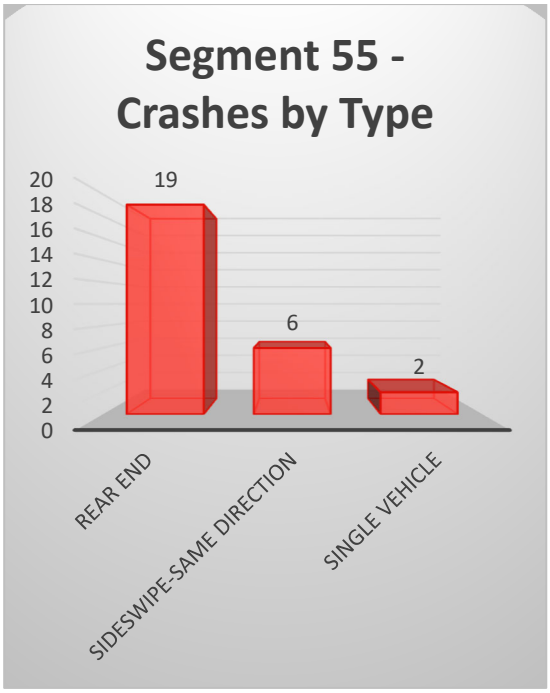


Figure 42: Segment 55 Crashes by Type



3.21 SAFETY ANALYSIS – SEGMENT 96

Segment 96 consists of mainline eastbound I-264 and the adjacent CD between Crittenden Drive/Muhammad Ali Louisville International Airport and the ramp to the Fairgrounds. The crash data did not delineate between crashes that occurred on the mainline with the CD. The CD is a three-lane segment, with one added lane each from eastbound I-264, the Muhammad Ali Louisville International Airport and Crittenden drive. The area where these lanes converge is often congested in peak hours. The CD on the eastern end of the segment includes a diverge onto Freedom Way.

Summary:

- **Total Crashes:** 22
- **EEC:** 20
- **CRF:** 2
- **KA:** 0
- **Crashes Resulting in Injury:** 4 (18%)
- **Primary Crash Type:**
  - **Rear End:** 17 (77%)

Factors Contributing to Crashes:

- Congestion
- Added Lane
- Multiple Destinations

Figure 43: Segment 96 Crashes by Severity

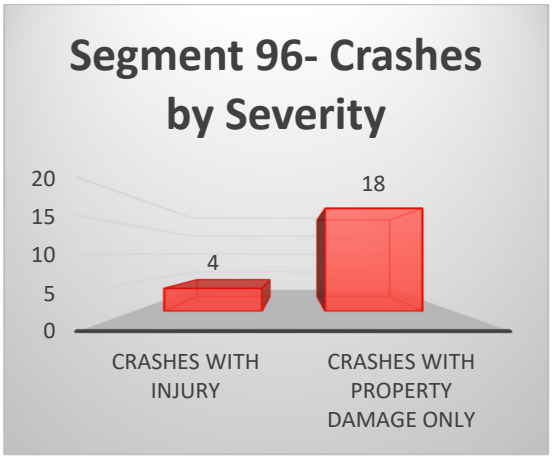
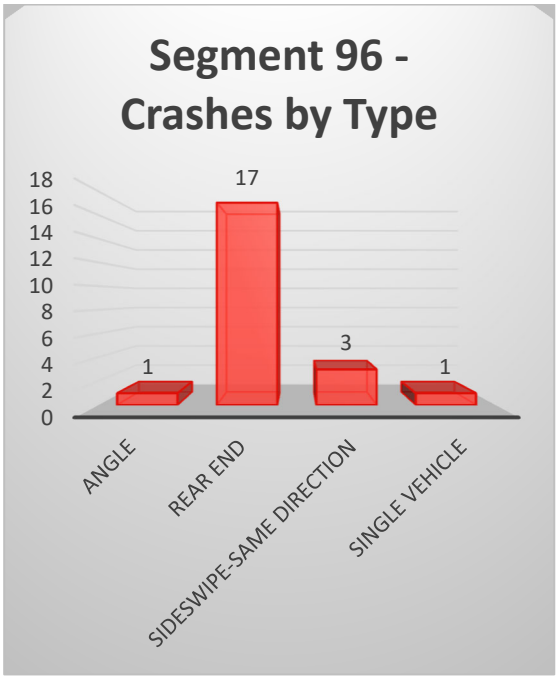


Figure 44: Segment 96 Crashes by Type



3.22 SAFETY ANALYSIS – SEGMENT 32/33

Segments 32 and 33 were combined for analysis. Together, they consist of eastbound I-264 from the Standiford Field Road overpass to the merge from the parallel CD to I-264. Crash data did not distinguish between mainline and the CD. Additionally, the CD includes a dropped lane to northbound I-65. On its own, Segment 33 did not meet the EEC or CRF threshold for detailed analysis. The project team decided to combine these segments, because Segment 33 included a fatality and the two segments have similar physical characteristics.

Combined Summary Segments 32 and 33:

- **Total Crashes:** 38
- **EEC:** 10
- **CRF:** 0.0
- **Crashes Resulting in Fatality:** 1
  - **Fatal Crash Type:** Rear End
- **Crashes Resulting in Injury:** 9 (24%)
- **Primary Crash Type:**
  - **Rear End:** 16 (42%)
  - **Sideswipe – Same Direction:** 12 (32%)
  - **Single Vehicle:** 9 (24%)

Factors Contributing to Crashes

- Congestion
- Dropped Lane
- Multiple Destinations
- Diverging

Figure 45: Segments 32 and 33 Crashes by Severity

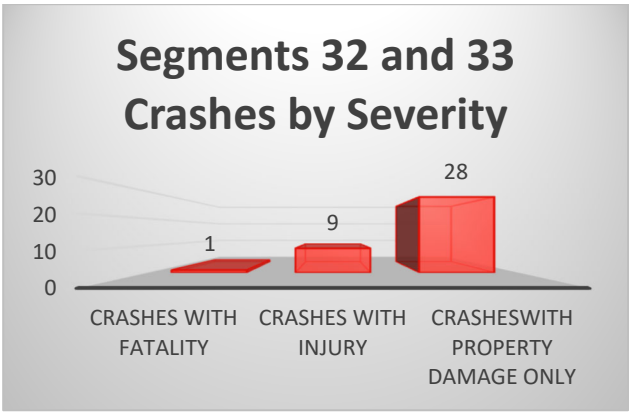
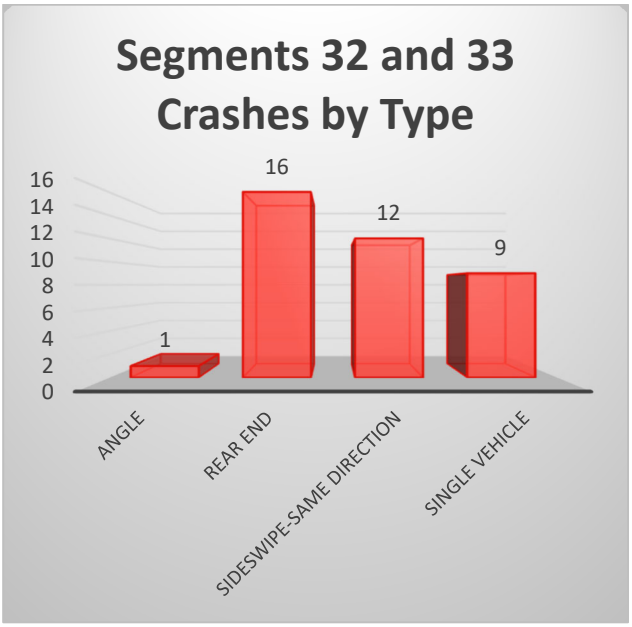


Figure 46: Segment 32 and 33 Crashes by Type



3.23 SAFETY ANALYSIS – SEGMENT 38

Segment 38 consists of eastbound mainline I-264 between the diverge to KY 864 (Poplar Level Road) and the KY 864 (Poplar Level Road) bridge over I-264. This segment is congested during the peak hours.

Crash Summary

- **Total Crashes:** 29
- **EEC:** 7
- **CRF:** 0.8
- **Crashes Resulting in Fatality:** 1
  - **Fatal Crash Type:** Rear End
- **Crashes Resulting in Injury:** 4 (14%)
- **Primary Crash Type:**
  - **Rear End:** 20 (69%)
  - **Sideswipe – Same Direction:** 6 (21%)

Factors Contributing to Crashes

- Congestion

Figure 47: Segment 38 Crashes by Severity

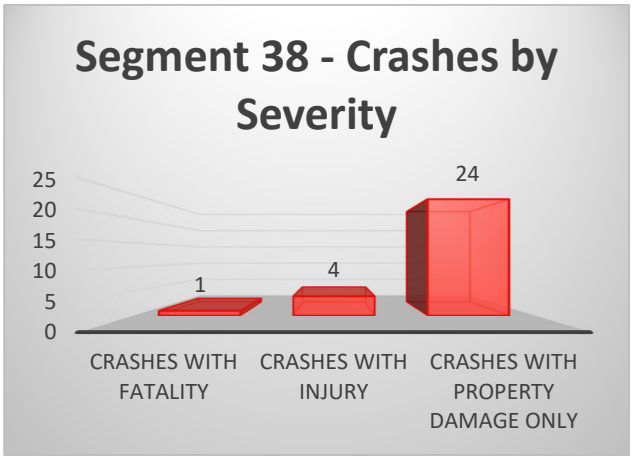


Figure 48: Segment 38 Crashes by Severity