

US 231/I-65 Interchange Study
Appendix B
Crash Analysis

Table B-1 High Crash Segment Calculations along US 231, Warren County																			
Route	Begin MP	End MP	Length (Miles)	ADT	Number of Lanes	Divided Undivided	Rural Urban	Avg. Veh. Crash Rate	Critical Veh. Crash Rate	Vehicle Crashes				HMVM	Rates per HMVM				Critical Rate Factor
										Fatal	Injury	PDO	Total		Fatal	Injury	PDO	Total	
US 231	7.958	8.391	0.433	19000	4	Undivided	Urban	458	607.476	0	12	33	45	0.14	0.00	84.13	231.36	315.49	0.52
US 231	8.391	8.852	0.461	26000	4	Undivided	Urban	458	581.340	0	14	75	89	0.21	0.00	67.37	360.91	428.28	0.74
US 231	8.852	8.958	0.106	26000	4	Divided	Urban	281	489.009	0	11	43	54	0.05	0.00	230.21	899.92	1130.13	2.31
US 231	8.958	9.381	0.423	39200	4	Divided	Urban	281	363.276	1	70	277	348	0.29	3.48	243.49	963.53	1210.50	3.33
US 231	9.381	9.455	0.074	39200	4	Undivided	Urban	458	713.767	0	2	11	13	0.05	0.00	39.77	218.72	258.49	0.36
US 231	9.455	9.958	0.503	39200	4	Divided	Urban	281	356.317	4	90	382	476	0.34	11.70	263.27	1117.44	1392.41	3.91
KY 884	8.631	9.631	1.000	7720	2	Undivided	Rural	244	357.722	0	12	62	74	0.13	0.00	89.66	463.22	552.88	1.55
I-65	20.539	22.349	1.810	49100	4	Divided	Urban	93	113.338	2	34	104	140	1.54	1.30	22.07	67.50	90.86	0.80
I-65	22.349	25.664	3.315	48400	4	Divided	Urban	93	108.074	1	38	177	216	2.78	0.36	13.66	63.63	77.65	0.72

Table B-2 High Crash Spot Calculations along US 231, Warren County																			
Route	Begin MP	End MP	Length (Miles)	ADT	Number of Lanes	Divided/ Undivided	Rural/ Urban	Avg. Veh. Crash Rate	Critical Veh. Crash Rate	Vehicle Crashes				MVM	Rates per MVM				Critical Rate Factor
										Fatal	Injury	PDO	Total		Fatal	Injury	PDO	Total	
US 231	8.350	8.450	0.100	22000	4	Undivided	Urban	0.440	0.730	0	4	14	18	38.14	0.00	0.10	0.37	0.47	0.65
US 231	8.450	8.550	0.1	26000	4	Undivided	Urban	0.44	0.706	0	7	39	46	45.08	0.00	0.16	0.87	1.02	1.45
US 231	8.862	8.962	0.1	26000	4	Divided	Urban	0.28	0.494	0	10	46	56	45.08	0.00	0.22	1.02	1.24	2.51
US 231	8.972	9.072	0.1	39200	4	Divided	Urban	0.28	0.453	1	26	103	130	67.96	0.01	0.38	1.52	1.91	4.23
US 231	9.076	9.176	0.1	39200	4	Divided	Urban	0.28	0.453	0	23	73	96	67.96	0.00	0.34	1.07	1.41	3.12
US 231	9.185	9.285	0.1	39200	4	Divided	Urban	0.28	0.453	0	14	65	79	67.96	0.00	0.21	0.96	1.16	2.57
US 231	9.448	9.548	0.1	39200	4	Divided	Urban	0.28	0.453	0	16	99	115	67.96	0.00	0.24	1.46	1.69	3.74
US 231	9.548	9.648	0.1	39200	4	Divided	Urban	0.28	0.453	4	27	72	103	67.96	0.06	0.40	1.06	1.52	3.35
US 231	9.698	9.798	0.1	39200	4	Divided	Urban	0.28	0.453	0	14	78	92	67.96	0.00	0.21	1.15	1.35	2.99
US 231	9.800	9.900	0.1	39200	4	Divided	Urban	0.28	0.453	0	19	84	103	67.96	0.00	0.28	1.24	1.52	3.35

Crash Overview: US 231 in Warren County

High Crash Segments along Key Routes

Segment 1: US 231 - Milepoints 9.455 to 9.958

476 incidents; 4 fatal and 90 injury

0.503 miles

ADT: 39,200 vpd

CRF **3.91**

Rear Ends: 330
Object Collisions: 8
Turning related: 84
Other: 54

By Year	2004:	2005:	2006:
2002:	114	86	
2003:	108	51	

Segment 2: US 231 - Milepoints 9.381 to 9.455

13 incidents; 2 injury

0.074 miles

ADT: 39,200 vpd

CRF **0.36**

Rear Ends: 8
Object Collisions: 1
Turning related: 1
Other: 3

By Year	2004:	2005:	2006:
2002:	2	1	
2003:	3	0	

Segment 7: KY 884 - Milepoints 8.631 to 9.631

74 incidents; 12 injury

1.000 miles

ADT: 7,720 vpd

CRF **1.55**

Rear Ends: 19
Object Collisions: 11
Turning related: 16
Other: 28

By Year	2004:	2005:	2006:
2002:	12	15	
2003:	22	7	

Segment 9: I 65 - Milepoints 20.539 to 22.349

140 incidents; 2 fatal and 34 injury

1.810 miles

ADT: 49,100 vpd

CRF **0.80**

Rear Ends: 39
Object Collisions: 54
Run Off Roadway: 11
Other: 36

By Year	2004:	2005:	2006:
2002:	30	27	
2003:	35	23	

Segment 8: I 65 - Milepoints 22.349 to 25.664

216 incidents; 1 fatal and 38 injury

3.315 miles

ADT: 48,400 vpd

CRF **0.72**

Rear Ends: 103
Object Collisions: 56
Run Off Roadway: 14
Other: 43

By Year	2004:	2005:	2006:
2002:	54	51	
2003:	37	30	

Segment 3: US 231 - Milepoints 8.958 to 9.381

348 incidents; 1 fatal and 70 injury

0.423 miles

ADT: 39,200 vpd

CRF **3.33**

Rear Ends: 227
Object Collisions: 8
Turning related: 65
Other: 48

By Year	2004:	2005:	2006:
2002:	85	76	
2003:	61	45	

Segment 4: US 231 - Milepoints 8.852 to 8.958

54 incidents; 11 injury

0.106 miles

ADT: 26,000 vpd

CRF **2.31**

Rear Ends: 24
Object Collisions: 0
Turning related: 21
Other: 9

By Year	2004:	2005:	2006:
2002:	8	13	
2003:	11	9	

Segment 5: US 231 - Milepoints 8.391 to 8.852

89 incidents; 14 injury

0.461 miles

ADT: 26,000 vpd

CRF **0.74**

Rear Ends: 52
Object Collisions: 0
Turning related: 26
Other: 11

By Year	2004:	2005:	2006:
2002:	14	20	
2003:	18	14	

Segment 6: US 231 - Milepoints 7.958 to 8.391

45 incidents; 12 injury

0.433 miles

ADT: 19,000 vpd

CRF **0.52**

Rear Ends: 21
Object Collisions: 3
Turning related: 17
Other: 4

By Year	2004:	2005:	2006:
2002:	12	5	
2003:	12	6	

US 231 within the study area represents 2 miles of roadway and 1,025 crashes between January 2002 and September 2006. This includes 5 fatal crashes and 199 injury crashes covering 298 injured persons.



Crash Summary:
US 231 in Warren County
High density spots and segments

Crash Spots are defined as 0.1 mile long locations centered on the given mile point.
Segments can be any length, with natural breaks where traffic volumes or lane configurations change.

Reported data covers January 2002 through September 2006.

A single pedestrian collision is reported, dated April 2004, occurring at milepoint 9.41 on US 231.

Segment 1 – MP 8.550 to 8.862 32 Crashes; 5 Injury ADT: 26,000 vpd Length: 0.312 mi CRF 0.37	
Rear Ends: 23	2002: 1
Sideswipe: 3	2003: 12
Turning: 5	2004: 4
Other: 4	2005: 9
NB: 50%, SB: 50%	2006: 6

Segment 2 – MP 9.288 to 9.420 45 Crashes; 8 Injury ADT: 39,200 vpd Length: 0.132 mi CRF 1.16	
Rear Ends: 38	2002: 10
Sideswipe: 4	2003: 5
Turning: 1	2004: 12
Other: 2	2005: 10
NB: 67%, SB: 33%	2006: 8

Segment 3 – MP 9.662 to 9.694 17 Crashes; 4 Injury ADT: 39,200 vpd Length: 0.032 mi CRF 1.31	
Rear Ends: 15	2002: 3
Sideswipe: 0	2003: 7
Turning: 2	2004: 4
Other: 0	2005: 1
NB: 82%, SB: 18%	2006: 2

Segment 4 – MP 9.908 to 9.955 54 Crashes; 11 Injury ADT: 39,200 vpd Length: 0.047 mi CRF 3.14	
Rear Ends: 40	2002: 15
Sideswipe: 3	2003: 14
Turning: 10	2004: 13
Other: 1	2005: 10
NB: 52%, SB: 48%	2006: 2

Spot A – MP 8.4 18 Crashes; 4 Injury ADT: 22,000 vpd CRF 0.65	
Rear Ends: 10	2002: 2
Sideswipe: 0	2003: 2
Turning: 7	2004: 5
Other: 1	2005: 4
NB: 67%, SB: 33%	2006: 5

Spot B – Milepoint 8.500 46 Crashes; 7 Injury ADT: 26,000 vpd CRF 1.45	
Rear Ends: 25	2002: 12
Sideswipe: 4	2003: 5
Turning: 14	2004: 14
Other: 3	2005: 9
NB: 54%, SB: 46%	2006: 6

Spot C – Milepoint 8.912 56 Crashes; 10 Injury ADT: 26,000 vpd CRF 2.51	
Rear Ends: 24	2002: 9
Sideswipe: 3	2003: 10
Turning: 23	2004: 14
Other: 6	2005: 13
NB: 63%, SB: 37%	2006: 10

Spot D – Milepoint 9.022 130 Crashes; 1 Fatal and 26 Injury ADT: 39,200 vpd CRF 4.23	
Rear Ends: 74	2002: 37
Sideswipe: 12	2003: 19
Turning: 29	2004: 27
Other: 15	2005: 28
NB: 58%, SB: 42%	2006: 19

Spot E – Milepoint 9.126 96 Crashes; 23 Injury ADT: 39,200 vpd CRF 3.12	
Rear Ends: 58	2002: 17
Sideswipe: 9	2003: 21
Turning: 22	2004: 23
Other: 7	2005: 23
NB: 52%, SB: 48%	2006: 12

Spot F – Milepoint 9.235 79 Crashes; 14 Injury ADT: 39,200 vpd CRF 2.57	
Rear Ends: 58	2002: 20
Sideswipe: 6	2003: 16
Turning: 11	2004: 22
Other: 4	2005: 16
NB: 58%, SB: 42%	2006: 5

Spot G – Milepoint 9.498 115 Crashes; 16 Injury ADT: 39,200 vpd CRF 3.74	
Rear Ends: 74	2002: 34
Sideswipe: 9	2003: 27
Turning: 22	2004: 26
Other: 10	2005: 17
NB: 46%, SB: 54%	2006: 11

Spot H – Milepoint 9.598 103 Crashes; 4 Fatal and 27 Injury ADT: 39,200 vpd CRF 3.35	
Rear Ends: 73	2002: 20
Sideswipe: 7	2003: 21
Turning: 17	2004: 23
Other: 6	2005: 23
NB: 54%, SB: 46%	2006: 16

Spot I – Milepoint 9.748 92 Crashes; 19 Injury ADT: 39,200 vpd CRF 2.99	
Rear Ends: 67	2002: 26
Sideswipe: 5	2003: 25
Turning: 15	2004: 24
Other: 5	2005: 12
NB: 62%, SB: 38%	2006: 5

Spot J – Milepoint 9.850 103 Crashes; 19 Injury ADT: 39,200 vpd CRF 3.35	
Rear Ends: 67	2002: 18
Sideswipe: 7	2003: 17
Turning: 19	2004: 30
Other: 10	2005: 23
NB: 68%, SB: 32%	2006: 15