U.S. Department of Transportation
Federal Highway Administration

Example Data Analysis Package and Straw Man Outline

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Safe Roads for a Safer Future
Investment in roadway safety saves lives

Example Data Analysis Package and Straw Man Outline

Note to the Reader: This document is an example of the data analysis package and straw man outline prepared for and presented during the workshop of key stakeholders and follow-up implementation planning meeting (Step 6 described in the Intersection Safety Implementation Plan Process). It contains the following sections:

During the workshop and follow-up meeting, participants made decisions on the details of individual countermeasures (e.g., average costs, crash reduction factors (CRF) and on the addition of incapacitating injuries to the analysis. As a result, the information presented in many of these tables is similar to, but not exactly the same as, that shown in the Example Intersection Safety Implementation Plan.

Data Overview

Table 1: Intersection Fatalities

	2003	2004	2005	2006	2007	2008	Total
State FARS	198	173	167	206	173	207	**1,124**
State Crash Data	214	184	187	210	187	200	**1,182**

Table 2: Intersection Crashes and Fatalities - Locality and TCD - 2003-2008

	Crashes		Fatalities	
	Total	Percentage	Total	Percentage
State Rural	**34,339**	**8.27%**	**500**	**42.30%**
Signalized	4,107	0.99%	17	1.44%
Unsignalized	30,232	7.28%	483	40.86%
State Urban	**156,623**	**37.73%**	**301**	**25.47%**
Signalized	73,913	17.81%	124	10.49%
Unsignalized	82,710	19.93%	177	14.97%
Local Rural	**10,830**	**2.61%**	**58**	**4.91%**
Signalized	676	0.16%	5	0.42%
Unsignalized	10,154	2.45%	53	4.48%
Local Urban	**213,306**	**51.39%**	**323**	**27.33%**
Signalized	73,815	17.78%	159	13.45%
Unsignalized	139,491	33.60%	164	13.87%
Grand Total	**415,098**	**100.00%**	**1,182**	**100.00%**

Table 3: All Intersection Crashes - Signalized by Locality - 2003-2008

LOCALITY	TOTAL CRASHES	TOTAL FATALITIES	FATALITIES PER 100 CRASHES
State Roads			
Rural	4,107	17	0.41
Urban	73,913	124	0.17
Total	**78,020**	**141**	**0.18**
Local Roads			
Rural	676	5	0.74
Urban	73,815	159	0.22
Total	**74,491**	**164**	**0.22**

Table 4: All Intersection Crashes - Unsignalized by Locality - 2003-2008

LOCALITY	TOTAL CRASHES	TOTAL FATALITIES	FATALITIES PER 100 CRASHES
State Roads			
Rural	30,232	483	1.60
Urban	82,710	177	0.21
Total	**112,942**	**660**	**0.58**
Local Roads			
Rural	10,154	53	0.52
Urban	139,491	164	0.12
Total	**149,645**	**217**	**0.15**

Table 5: All Intersection Crashes on Divided Roads (Expressways) - Signalized by Locality - 2003-2008

LOCALITY	TOTAL CRASHES	TOTAL FATALITIES	FATALITIES PER 100 CRASHES
State Roads			
Rural	829	8	0.97
Urban	21,266	54	0.25
Total	**22,095**	**62**	**0.28**
Local Roads			
Rural	6	-	0.00
Urban	909	5	0.55
Total	**915**	**5**	**0.55**

Table 6: All Intersection Crashes on Divided Roads (Expressways) - Unsignalized by Locality - 2003-2008

LOCALITY	TOTAL CRASHES	TOTAL FATALITIES	FATALITIES PER 100 CRASHES
State Roads			
Rural	3,799	142	3.74
Urban	17,814	65	0.36
Total	**21,613**	**207**	**0.96**
Local Roads			
Rural	6	-	0.00
Urban	1,185	4	0.34
Total	**1,191**	**4**	**0.34**

Table 7: All Intersection Crashes - Signalized by Speed Limit - 2003-2008

ON-LOCATION SPEED LIMIT	TOTAL CRASHES	TOTAL FATALITIES	FATALITIES PER 100 CRASHES
State Roads			
35 mph or less	25,426	25	0.10
36-40 mph	21,327	31	0.15
41-45 mph	15,897	37	0.23
46-54 mph	2,279	12	0.53
55 mph or greater	8,905	36	0.40
Unknown	4,186	0	0.00
Total	**78,020**	**141**	**0.18**
Local Roads			
35 mph or less	58,242	121	0.21
36-40 mph	6,726	24	0.36
41-45 mph	2,093	14	0.67
46-54 mph	103	3	2.91
55 mph or greater	314	2	0.64
Unknown	7,013	-	0.00
Total	**74,491**	**164**	**0.22**

Table 8: All Intersection Crashes - Unsignalized by Speed Limit - 2003-2008

ON-LOCATION SPEED LIMIT	TOTAL CRASHES	TOTAL FATALITIES	FATALITIES PER 100 CRASHES
State Roads			
35 mph or less	38,143	34	0.09
36-40 mph	21,300	34	0.16
41-45 mph	16,579	52	0.31
46-54 mph	2,657	16	0.60
55 mph or greater	27,831	524	1.88
Unknown	6,432	0	0.00
Total	**112,942**	**660**	**0.58**
Local Roads			
35 mph or less	122,916	148	0.12
36-40 mph	6,993	15	0.21
41-45 mph	3,276	19	0.58
46-54 mph	335	3	0.90
55 mph or greater	1,821	29	1.59
Unknown	14,304	3	0.02
Total	**149,645**	**217**	**0.15**

Table 9: All Intersection Crashes - Signalized by Accident Type - 2003-2008

ACCIDENT TYPE	TOTAL CRASHES	TOTAL FATALITIES	FATALITIES PER 100 CRASHES
State Roads - Rural			
Animal	2	-	0.00
Bicyclist/Pedalcyclist	8	-	0.00
Fixed Object	160	4	2.50
Other Object	5	-	0.00
Pedestrian	7	1	14.29
Train	2	1	50.00
MV in Transport	3,866	11	0.28
MV on Other Roadway	12	-	0.00
Parked MV	15	-	0.00
Non-Collision Overturn	22	-	0.00
Non-Collision Other	8	-	0.00
Total	**4,107**	**17**	**4.24**
State Roads - Urban			
Animal	40	-	0.00
Bicyclist/Pedalcyclist	171	4	2.34
Fixed Object	2,475	31	1.25
Other Object	90	-	0.00
Pedestrian	236	5	2.12
Train	1	-	0.00
MV in Transport	70,445	81	0.11
MV on Other Roadway	88	-	0.00
Parked MV	117	-	0.00
Non-Collision Overturn	149	3	2.01
Non-Collision Other	101	-	0.00
Total	**73,913**	**124**	**2.65**
Local Roads - Rural			
Animal	-	-	N/A
Bicyclist/Pedalcyclist	3	-	0.00
Fixed Object	32	-	0.00
Other Object	2	-	0.00
Pedestrian	1	-	0.00
Train	-	-	N/A
MV in Transport	617	5	0.81
MV on Other Roadway	4	-	0.00
Parked MV	12	-	0.00
Non-Collision Overturn	3	-	0.00
Non-Collision Other	2	-	0.00
Total	**676**	**5**	**1.92**
Local Roads - Urban			
Animal	15	-	0.00
Bicyclist/Pedalcyclist	384	6	1.56
Fixed Object	3,265	22	0.67
Other Object	89	-	0.00
Pedestrian	879	29	3.30
Train	2	-	0.00
MV in Transport	68,351	101	0.15
MV on Other Roadway	58	-	0.00
Parked MV	552	1	0.18
Non-Collision Overturn	120	-	0.00
Non-Collision Other	100	-	0.00
Total	**73,815**	**159**	**2.49**

Table 10: All Intersection Crashes - Unsignalized by Accident Type - 2003-2008

ACCIDENT TYPE	TOTAL CRASHES	TOTAL FATALITIES	FATALITIES PER 100 CRASHES
State Roads - Rural			
Animal	3	-	0.00
Bicyclist/Pedalcyclist	39	1	2.56
Fixed Object	1,434	15	1.05
Other Object	16	-	0.00
Pedestrian	11	-	0.00
Train	2	-	0.00
MV in Transport	28,057	458	1.63
MV on Other Roadway	87	2	2.30
Parked MV	452	2	0.44
Non-Collision Overturn	100	4	4.00
Non-Collision Other	31	1	3.23
Total	**30,232**	**483**	**9.41**
State Roads - Urban			
Animal	2	-	0.00
Bicyclist/Pedalcyclist	92	2	2.17
Fixed Object	359	3	0.84
Other Object	16	-	0.00
Pedestrian	41	-	0.00
Train	-	-	N/A
MV in Transport	81,147	170	0.21
MV on Other Roadway	157	-	0.00
Parked MV	858	1	0.12
Non-Collision Overturn	22	-	0.00
Non-Collision Other	16	1	6.25
Total	**82,710**	**177**	**2.61**
Local Roads - Rural			
Animal	-	-	N/A
Bicyclist/Pedalcyclist	50	-	0.00
Fixed Object	564	8	1.42
Other Object	11	-	0.00
Pedestrian	15	-	0.00
Train	-	-	N/A
MV in Transport	7,763	42	0.54
MV on Other Roadway	28	-	0.00
Parked MV	1,672	1	0.06
Non-Collision Overturn	34	1	2.94
Non-Collision Other	17	1	5.88
Total	**10,154**	**53**	**4.07**
Local Roads - Urban			
Animal	3	-	0.00
Bicyclist/Pedalcyclist	641	1	0.16
Fixed Object	2,367	10	0.42
Other Object	75	2	2.67
Pedestrian	373	5	1.34
Train	1	-	0.00
MV in Transport	110,650	137	0.12
MV on Other Roadway	165	1	0.61
Parked MV	25,082	8	0.03
Non-Collision Overturn	62	-	0.00
Non-Collision Other	72	-	0.00
Total	**139,491**	**164**	**1.98**

Table 11: Angle Intersection Crashes - Signalized by Locality - 2003-2008

LOCALITY	TOTAL CRASHES	TOTAL FATALITIES	FATALITIES PER 100 CRASHES
State Roads			
Rural	1,588	11	0.69
Urban	27,278	66	0.24
Total	**28,866**	**77**	**0.27**
Local Roads			
Rural	238	5	2.10
Urban	31,643	86	0.27
Total	**31,881**	**91**	**0.29**

Table 12: Angle Intersection Crashes - Unsignalized by Locality - 2003-2008

LOCALITY	TOTAL CRASHES	TOTAL FATALITIES	FATALITIES PER 100 CRASHES
State Roads			
Rural	14,393	346	2.40
Urban	28,677	129	0.45
Total	**43,070**	**475**	**1.10**
Local Roads			
Rural	4,066	26	0.64
Urban	54,978	97	0.18
Total	**59,044**	**123**	**0.21**

Table 13: Angle Intersection Crashes on Divided Roads (Expressway) - Signalized by Locality - 2003-2008

LOCALITY	TOTAL CRASHES	TOTAL FATALITIES	FATALITIES PER 100 CRASHES
State Roads			
Rural	320	4	1.25
Urban	7,664	27	0.35
Total	**7,984**	**31**	**0.39**
Local Roads			
Rural	1	-	0.00
Urban	384	2	0.52
Total	**385**	**2**	**0.52**

Table 14: Angle Intersection Crashes on Divided Roads (Expressway) - Unsignalized by Locality - 2003-2008

LOCALITY	TOTAL CRASHES	TOTAL FATALITIES	FATALITIES PER 100 CRASHES
State Roads			
Rural	2,262	122	5.39
Urban	4,591	55	1.20
Total	**6,853**	**177**	**2.58**
Local Roads			
Rural	3	-	0.00
Urban	444	2	0.45
Total	**447**	**2**	**0.45**

Table 15: Left Turn (2 or More Vehicles) Intersection Crashes - Signalized by Locality - 2003-2008

LOCALITY	TOTAL CRASHES	TOTAL FATALITIES	FATALITIES PER 100 CRASHES
State Roads			
Rural	1,266	5	0.39
Urban	21,172	35	0.17
Total	**22,438**	**40**	**0.18**
Local Roads			
Rural	196	1	0.51
Urban	19,747	39	0.20
Total	**19,943**	**40**	**0.20**

Table 16: Pedestrian Intersection Crashes - Signalized by Locality - 2003-2008

LOCALITY	TOTAL CRASHES	TOTAL FATALITIES	FATALITIES PER 100 CRASHES
State Roads			
Rural	7	1	14.29
Urban	236	5	2.12
Total	**243**	**6**	**2.47**
Local Roads			
Rural	1	-	0.00
Urban	879	29	3.30
Total	**880**	**29**	**3.30**

Table 17: Pedestrian Intersection Crashes - Unsignalized by Locality - 2003-2008

LOCALITY	TOTAL CRASHES	TOTAL FATALITIES	FATALITIES PER 100 CRASHES
State Roads			
Rural	11	-	0.00
Urban	41	-	0.00
Total	**52**	**-**	**0.00**
Local Roads			
Rural	15	-	0.00
Urban	373	5	1.34
Total	**388**	**5**	**1.29**

Table 18: Dark Intersection Crashes - Signalized by Locality - 2003-2008

LOCALITY	TOTAL CRASHES	TOTAL FATALITIES	FATALITIES PER 100 CRASHES
State Roads			
Rural	721	7	0.97
Urban	17,840	54	0.30
Total	**18,561**	**61**	**0.33**
Local Roads			
Rural	110	3	2.73
Urban	17,814	81	0.45
Total	**17,924**	**84**	**0.47**

Table 19: Dark Intersection Crashes - Unsignalized by Locality - 2003-2008

LOCALITY	TOTAL CRASHES	TOTAL FATALITIES	FATALITIES PER 100 CRASHES
State Roads			
Rural	5,050	111	2.20
Urban	13,234	29	0.22
Total	**18,284**	**140**	**0.77**
Local Roads			
Rural	1,618	13	0.80
Urban	28,118	73	0.26
Total	**29,736**	**86**	**0.29**

Table 20: Wet Pavement Intersection Crashes (Speed Limit >= 45 MPH) - Signalized by Locality - 2003-2008

LOCALITY	TOTAL CRASHES	TOTAL FATALITIES	FATALITIES PER 100 CRASHES
State Roads			
Rural	433	5	1.15
Urban	5,136	7	0.14
Total	**5,569**	**12**	**0.22**
Local Roads			
Rural	27	-	0.00
Urban	1,548	2	0.13
Total	**1,575**	**2**	**0.13**

Table 21: Wet Pavement Intersection Crashes - Stop TCD by Locality - 2003-2008

LOCALITY	TOTAL CRASHES	TOTAL FATALITIES	FATALITIES PER 100 CRASHES
State Roads			
Rural	3,238	48	1.48
Urban	4,859	12	0.25
Total	**8,097**	**60**	**0.74**
Local Roads			
Rural	345	1	0.29
Urban	2,506	1	0.04
Total	**2,851**	**2**	**0.07**

Table 22: Summary of Intersection Crashes, Fatalities, and Incapacitating Injuries – 2003-2008

	State Rural Signal	State Rural Stop-Controlled	State Urban Signal	State Urban Stop-Controlled	Local Rural Signal	Local Rural Stop-Controlled	Local Urban Signal	Local Urban Stop-Controlled
All Crashes								
Crashes	4,107	30,232	73,913	82,710	676	10,154	73,815	139,491
Fatalities	17	483	124	177	5	53	159	164
Incapacitating Injuries	227	3,769	2,482	2,734	11	531	2,160	3,275
Fatalities per 100 Crashes	0.41	1.60	0.17	0.21	0.74	0.52	0.22	0.12
Incapacitating Injuries per 100 Crashes	5.53	12.47	3.36	3.31	1.63	5.23	2.93	2.35
Divided Highway Crashes								
Crashes	829	3,799	21,266	17,814	6	6	909	1,185
Fatalities	8	142	54	65	-	-	5	4
Incapacitating Injuries	76	863	856	637	-	-	32	52
Fatalities per 100 Crashes	0.97	3.74	0.25	0.36	-	-	0.55	0.34
Incapacitating Injuries per 100 Crashes	9.17	22.72	4.03	3.58	-	-	3.52	4.37
Angle Crashes								
Crashes	1,588	14,393	27,278	28,677	238	4,066	31,643	54,978
Fatalities	11	346	66	129	5	26	86	97
Incapacitating Injuries	148	2,404	1,520	1,632	5	316	1,323	1,842
Fatalities per 100 Crashes	0.69	2.40	0.24	0.45	2.10	0.64	0.27	0.18
Incapacitating Injuries per 100 Crashes	9.32	16.70	5.57	5.69	2.10	7.77	4.18	3.35
Left-Turn Crashes								
Crashes	1,266	-	21,172	-	196	-	19,742	-
Fatalities	5	-	35	-	1	-	39	-
Incapacitating Injuries	77	-	1,127	-	2	-	757	-
Fatalities per 100 Crashes	0.39	-	0.17	-	0.51	-	0.20	-
Incapacitating Injuries per 100 Crashes	6.08	-	5.32	-	1.02	-	3.83	-
Pedestrian Crashes								
Crashes	7	11	236	41	1	15	879	373
Fatalities	1	-	5	-	-	-	29	5
Incapacitating Injuries	3	2	66	4	0	4	170	56
Fatalities per 100 Crashes	-	-	2.12	-	-	-	3.30	1.34
Incapacitating Injuries per 100 Crashes	42.86	18.18	27.97	9.76	0	26.67	19.34	15.01
Dark Crashes								
Crashes	721	5,050	17,840	13,234	110	1,618	17,814	28,118
Fatalities	7	111	54	29	3	13	81	73
Incapacitating Injuries	53	847	683	544	1	91	631	765
Fatalities per 100 Crashes	0.97	2.20	.30	0.22	-	0.80	0.47	0.28
Incapacitating Injuries per 100 Crashes	7.35	16.77	3.83	4.11	0.91	5.62	3.54	2.72
Wet Pavement Crashes								
Crashes	433	3,238	5,136	2,506	27	345	5,136	1,548
Fatalities	5	48	7	1	-	1	7	2
Incapacitating Injuries	31	428	154	246	2	46	25	28
Fatalities per 100 Crashes	-	1.48	0.14	-	-	-	0.14	-
Incapacitating Injuries per 100 Crashes	7.16	1.22	3.00	5.06	7.41	13.33	1.61	1.12

Table 23: Fatal Crashes - State Roads - All TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
50 and greater	-	-	0.00%	-	0.00%
30 - 49	-	-	0.00%	-	0.00%
20 - 29	-	-	0.00%	-	0.00%
10 - 19	-	-	0.00%	-	0.00%
5 - 9	-	-	0.00%	-	0.00%
4	-	-	0.00%	-	0.00%
3	2	2	0.29%	6	0.83%
2	34	36	5.27%	74	10.26%
1	647	683	100.00%	721	100.00%
Total	**683**	**683**	**100.00%**	**721**	**100.00%**

Table 24: Total Crashes - State Rural Roads - Signalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
50 and greater	8	8	1.44%	573	13.95%
30 - 49	23	31	5.57%	1,407	34.26%
20 - 29	36	67	12.03%	2,258	54.98%
10 - 19	56	123	22.08%	3,012	73.34%
5 - 9	73	196	35.19%	3,490	84.98%
4	31	227	40.75%	3,614	88.00%
3	43	270	48.47%	3,743	91.14%
2	77	347	62.30%	3,897	94.89%
1	210	557	100.00%	4,107	100.00%
Total	**557**	**557**	**100.00%**	**4,107**	**100.00%**

Table 25: Total Crashes - State Rural Roads - Unsignalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
50 and greater	7	7	0.07%	428	1.42%
30 - 49	26	33	0.31%	1,390	4.60%
20 - 29	91	124	1.16%	3,506	11.60%
10 - 19	389	513	4.82%	8,601	28.45%
5 - 9	1,033	1,546	14.51%	15,347	50.76%
4	576	2,122	19.92%	17,651	58.39%
3	1,008	3,130	29.38%	20,675	68.39%
2	2,034	5,164	48.47%	24,743	81.84%
1	5,489	10,653	100.00%	30,232	100.00%
Total	**10,653**	**10,653**	**100.00%**	**30,232**	**100.00%**

Table 26: Total Crashes - State Urban Roads - Signalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
100 and greater	63	63	1.44%	8,058	10.90%
50 - 99	308	371	8.46%	28,570	38.65%
30 - 49	461	832	18.98%	46,320	62.67%
20 - 29	483	1,315	30.00%	57,986	78.45%
10 - 19	633	1,948	44.43%	66,850	90.44%
5 - 9	539	2,487	56.73%	70,471	95.34%
4	206	2,693	61.43%	71,295	96.46%
3	262	2,955	67.40%	72,081	97.52%
2	403	3,358	76.60%	72,887	98.61%
1	1,026	4,384	100.00%	73,913	100.00%
Total	**4,384**	**4,384**	**100.00%**	**73,913**	**100.00%**

Table 27: Total Crashes - State Urban Roads - Unsignalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
100 and greater	21	21	0.22%	2,842	3.44%
50 - 99	144	165	1.71%	12,180	14.73%
30 - 49	309	474	4.90%	23,795	28.77%
20 - 29	575	1,049	10.85%	37,525	45.37%
10 - 19	1,556	2,605	26.94%	58,693	70.96%
5 - 9	2,084	4,689	48.49%	72,522	87.68%
4	720	5,409	55.93%	75,402	91.16%
3	852	6,261	64.74%	77,958	94.25%
2	1,342	7,603	78.62%	80,642	97.50%
1	2,068	9,671	100.00%	82,710	100.00%
Total	**9,650**	**9,671**	**100.00%**	**82,710**	**100.00%**

Table 28: Divided Road Crashes - State Rural Roads - Signalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
50 and greater	-	-	0.00%	-	0.00%
30 - 49	8	8	8.00%	284	34.26%
20 - 29	8	16	16.00%	481	58.02%
10 - 19	12	28	28.00%	645	77.80%
5 - 9	10	38	38.00%	712	85.89%
4	9	47	47.00%	748	90.23%
3	7	54	54.00%	769	92.76%
2	14	68	68.00%	797	96.14%
1	32	100	100.00%	829	100.00%
Total	**100**	**100**	**100.00%**	**829**	**100.00%**

Table 29: Divided Road Crashes - State Rural Roads - Unsignalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
50 and greater	2	2	0.18%	107	2.82%
30 - 49	3	5	0.46%	203	5.34%
20 - 29	12	17	1.57%	483	12.71%
10 - 19	53	70	6.46%	1,166	30.69%
5 - 9	169	239	22.07%	2,270	59.75%
4	79	318	29.36%	2,586	68.07%
3	109	427	39.43%	2,913	76.68%
2	230	657	60.66%	3,373	88.79%
1	426	1,083	100.00%	3,799	100.00%
Total	**1,083**	**1,083**	**100.00%**	**3,799**	**100.00%**

Table 30: Divided Road Crashes - State Urban Roads - Signalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
100 and greater	4	4	0.29%	611	2.87%
50 - 99	70	74	5.28%	5,034	23.67%
30 - 49	149	223	15.92%	10,678	50.21%
20 - 29	195	418	29.84%	15,376	72.30%
10 - 19	254	672	47.97%	18,937	89.05%
5 - 9	203	875	62.46%	20,307	95.49%
4	54	929	66.31%	20,523	96.51%
3	75	1,004	71.66%	20,748	97.56%
2	121	1,125	80.30%	20,990	98.70%
1	276	1,401	100.00%	21,266	100.00%
Total	**1,401**	**1,401**	**100.00%**	**21,266**	**100.00%**

Table 31: Divided Road Crashes - State Urban Roads - Unsignalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
100 and greater	2	2	0.09%	315	1.77%
50 - 99	35	37	1.69%	2,719	15.26%
30 - 49	72	109	4.97%	5,478	30.75%
20 - 29	104	213	9.72%	7,943	44.59%
10 - 19	327	540	24.64%	12,405	69.64%
5 - 9	454	994	45.35%	15,393	86.41%
4	167	1,161	52.97%	16,061	90.16%
3	201	1,362	62.14%	16,664	93.54%
2	320	1,682	76.73%	17,304	97.14%
1	510	2,192	100.00%	17,814	100.00%
Total	**2,192**	**2,192**	**100.00%**	**17,814**	**100.00%**

Table 32: Angle Crashes - State Rural Roads - Signalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
50 and greater	-	-	0.00%	-	0.00%
30 - 49	1	1	0.26%	34	2.14%
20 - 29	6	7	1.79%	173	10.89%
10 - 19	40	47	11.99%	707	44.52%
5 - 9	63	110	28.06%	1,112	70.03%
4	21	131	33.42%	1,196	75.31%
3	36	167	42.60%	1,304	82.12%
2	59	226	57.65%	1,422	89.55%
1	166	392	100.00%	1,588	100.00%
Total	**392**	**392**	**100.00%**	**1,588**	**100.00%**

Table 33: Angle Crashes - State Urban Roads - Signalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
100 and greater	-	-	0.00%	-	0.00%
50 - 99	42	42	1.38%	2,698	9.89%
30 - 49	110	152	4.99%	6,708	24.59%
20 - 29	211	363	11.92%	11,728	42.99%
10 - 19	620	983	32.27%	20,184	73.99%
5 - 9	650	1,633	53.61%	24,592	90.15%
4	163	1,796	58.96%	25,244	92.54%
3	231	2,027	66.55%	25,937	95.08%
2	322	2,349	77.12%	26,581	97.44%
1	697	3,046	100.00%	27,278	100.00%
Total	**3,046**	**3,046**	**100.00%**	**27,278**	**100.00%**

Table 34: Angle Crashes - State Rural Divided Roads - Signalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
50 and greater	-	-	0.00%	-	0.00%
30 - 49	-	-	0.00%	-	0.00%
20 - 29	2	2	2.78%	41	12.81%
10 - 19	11	13	18.06%	178	55.63%
5 - 9	8	21	29.17%	231	72.19%
4	4	25	34.72%	247	77.19%
3	9	34	47.22%	274	85.63%
2	8	42	58.33%	290	90.63%
1	30	72	100.00%	320	100.00%
Total	**72**	**72**	**100.00%**	**320**	**100.00%**

Table 35: Angle Crashes - State Urban Divided Roads - Signalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
100 and greater	-	-	0.00%	-	0.00%
50 - 99	5	5	0.48%	426	5.56%
30 - 49	21	26	2.50%	1,171	15.28%
20 - 29	48	74	7.12%	2,292	29.91%
10 - 19	200	274	26.35%	4,895	63.87%
5 - 9	263	537	51.63%	6,671	87.04%
4	71	608	58.46%	6,955	90.75%
3	81	689	66.25%	7,198	93.92%
2	115	804	77.31%	7,428	96.92%
1	236	1,040	100.00%	7,664	100.00%
Total	**1,040**	**1,040**	**100.00%**	**7,664**	**100.00%**

Table 36: Left Turn Crashes (>=2 Vehicles) - State Rural Roads - Signalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
50 and greater	-	-	0.00%	-	0.00%
30 - 49	1	1	0.30%	31	2.45%
20 - 29	6	7	2.11%	166	13.11%
10 - 19	22	29	8.76%	449	35.47%
5 - 9	58	87	26.28%	841	66.43%
4	19	106	32.02%	917	72.43%
3	30	136	41.09%	1,007	79.54%
2	64	200	60.42%	1,135	89.65%
1	131	331	100.00%	1,266	100.00%
Total	**331**	**331**	**100.00%**	**1,266**	**100.00%**

Table 37: Left Turn Crashes (>=2 Vehicles) - State Rural Roads - Unsignalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
50 and greater	-	-	0.00%	-	0.00%
30 - 49	-	-	0.00%	-	0.00%
20 - 29	9	9	0.16%	209	2.13%
10 - 19	47	56	1.01%	794	8.08%
5 - 9	245	301	5.44%	2,300	23.41%
4	200	501	9.06%	3,100	31.55%
3	361	862	15.59%	4,183	42.57%
2	976	1,838	33.24%	6,135	62.44%
1	3,691	5,529	100.00%	9,826	100.00%
Total	**5,529**	**5,529**	**100.00%**	**9,826**	**100.00%**

Table 38: Left Turn Crashes (>=2 Vehicles) - State Urban Roads - Signalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
100 and greater	4	4	0.14%	419	1.98%
50 - 99	23	27	0.94%	1,765	8.34%
30 - 49	78	105	3.66%	4,678	22.10%
20 - 29	126	231	8.06%	7,738	36.55%
10 - 19	447	678	23.66%	13,781	65.09%
5 - 9	650	1,328	46.35%	18,119	85.58%
4	199	1,527	53.30%	18,915	89.34%
3	276	1,803	62.93%	19,743	93.25%
2	367	2,170	75.74%	20,477	96.72%
1	695	2,865	100.00%	21,172	100.00%
Total	**2,865**	**2,865**	**100.00%**	**21,172**	**100.00%**

Table 39: Left Turn Crashes (>=2 Vehicles) - State Urban Roads - Unsignalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
100 and greater	2	2	0.03%	254	1.25%
50 - 99	1	3	0.05%	340	1.67%
30 - 49	11	14	0.24%	752	3.70%
20 - 29	58	72	1.25%	2,105	10.36%
10 - 19	341	413	7.18%	6,497	31.99%
5 - 9	870	1,283	22.31%	12,078	59.47%
4	436	1,719	29.90%	13,822	68.06%
3	656	2,375	41.30%	15,790	77.74%
2	1,145	3,520	61.22%	18,080	89.02%
1	2,230	5,750	100.00%	20,310	100.00%
Total	**5,750**	**5,750**	**100.00%**	**20,310**	**100.00%**

Table 40: Pedestrian Crashes - State Rural Roads - Signalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
50 and greater	-	-	0.00%	-	0.00%
30 - 49	-	-	0.00%	-	0.00%
20 - 29	-	-	0.00%	-	0.00%
10 - 19	-	-	0.00%	-	0.00%
5 - 9	-	-	0.00%	-	0.00%
4	-	-	0.00%	-	0.00%
3	-	-	0.00%	-	0.00%
2	-	-	0.00%	-	0.00%
1	7	7	100.00%	7	100.00%
Total	**7**	**7**	**100.00%**	**7**	**100.00%**

Table 41: Pedestrian Crashes - State Rural Roads - Unsignalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
50 and greater	-	-	0.00%	-	0.00%
30 - 49	-	-	0.00%	-	0.00%
20 - 29	-	-	0.00%	-	0.00%
10 - 19	-	-	0.00%	-	0.00%
5 - 9	-	-	0.00%	-	0.00%
4	-	-	0.00%	-	0.00%
3	-	-	0.00%	-	0.00%
2	-	-	0.00%	-	0.00%
1	11	11	100.00%	11	100.00%
Total	**11**	**11**	**100.00%**	**11**	**100.00%**

Table 42: Pedestrian Crashes - State Urban Roads - Signalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
100 and greater	-	-	0.00%	-	0.00%
50 - 99	-	-	0.00%	-	0.00%
30 - 49	-	-	0.00%	-	0.00%
20 - 29	-	-	0.00%	-	0.00%
10 - 19	-	-	0.00%	-	0.00%
5 - 9	1	1	0.51%	6	2.54%
4	-	1	0.51%	6	2.54%
3	5	6	3.03%	21	8.90%
2	23	29	14.65%	67	28.39%
1	169	198	100.00%	236	100.00%
Total	**198**	**198**	**100.00%**	**236**	**100.00%**

Table 43: Pedestrian Crashes - State Urban Roads - Unsignalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
100 and greater	-	-	0.00%	-	0.00%
50 - 99	-	-	0.00%	-	0.00%
30 - 49	-	-	0.00%	-	0.00%
20 - 29	-	-	0.00%	-	0.00%
10 - 19	-	-	0.00%	-	0.00%
5 - 9	-	-	0.00%	-	0.00%
4	-	-	0.00%	-	0.00%
3	-	-	0.00%	-	0.00%
2	1	1	2.50%	2	4.88%
1	39	40	100.00%	41	100.00%
Total	**40**	**40**	**100.00%**	**41**	**100.00%**

Table 44: Dark Crashes - State Rural Roads - All TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
50 and greater	-	-	0.00%	-	0.00%
30 - 49	-	-	0.00%	-	0.00%
20 - 29	3	3	0.09%	72	1.25%
10 - 19	25	28	0.80%	377	6.53%
5 - 9	117	145	4.14%	1,092	18.92%
4	96	241	6.88%	1,476	25.58%
3	232	473	13.50%	2,172	37.64%
2	569	1,042	29.75%	3,310	57.36%
1	2,461	3,503	100.00%	5,771	100.00%
Total	**3,503**	**3,503**	**100.00%**	**5,771**	**100.00%**

Table 45: Dark Crashes - State Urban Roads - All TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
100 and greater	1	1	0.02%	132	0.42%
50 - 99	19	20	0.32%	1,317	4.24%
30 - 49	92	112	1.77%	4,744	15.27%
20 - 29	163	275	4.35%	8,647	27.83%
10 - 19	547	822	12.99%	16,016	51.54%
5 - 9	1,066	1,888	29.84%	22,949	73.85%
4	419	2,307	36.46%	24,625	79.25%
3	668	2,975	47.02%	26,629	85.70%
2	1,093	4,068	64.30%	28,815	92.73%
1	2,259	6,327	100.00%	31,074	100.00%
Total	**6,327**	**6,327**	**100.00%**	**31,074**	**100.00%**

Table 46: Wet Pavement Crashes (>=45 MPH) - State Roads - All TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
100 and greater	-	-	0.00%	-	0.00%
50 - 99	-	-	0.00%	-	0.00%
30 - 49	11	11	0.20%	372	2.72%
20 - 29	23	34	0.63%	889	6.51%
10 - 19	176	210	3.90%	3,203	23.44%
5 - 9	512	722	13.42%	6,480	47.42%
4	249	971	18.04%	7,476	54.71%
3	438	1,409	26.18%	8,790	64.32%
2	903	2,312	42.96%	10,596	77.54%
1	3,070	5,382	100.00%	13,666	100.00%
Total	**5,382**	**5,382**	**100.00%**	**13,666**	**100.00%**

Table 47: Fatal Crashes - Local Roads - All TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
50 and greater	-	-	0.00%	-	0.00%
30 - 49	-	-	0.00%	-	0.00%
20 - 29	-	-	0.00%	-	0.00%
10 - 19	-	-	0.00%	-	0.00%
5 - 9	-	-	0.00%	-	0.00%
4	-	-	0.00%	-	0.00%
3	1	1	0.30%	3	0.87%
2	7	8	2.38%	17	4.93%
1	328	336	100.00%	345	100.00%
Total	**336**	**336**	**100.00%**	**345**	**100.00%**

Table 48: Total Crashes - Local Rural Roads - Signalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
50 and greater	1	1	0.47%	51	7.54%
30 - 49	2	3	1.40%	123	18.20%
20 - 29	2	5	2.34%	177	26.18%
10 - 19	7	12	5.61%	291	43.05%
5 - 9	16	28	13.08%	393	58.14%
4	8	36	16.82%	425	62.87%
3	19	55	25.70%	482	71.30%
2	35	90	42.06%	552	81.66%
1	124	214	100.00%	676	100.00%
Total	**214**	**214**	**100.00%**	**676**	**100.00%**

Table 49: Total Crashes - Local Rural Roads - Unsignalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
50 and greater	1	1	0.02%	60	0.59%
30 - 49	5	6	0.10%	231	2.27%
20 - 29	5	11	0.18%	337	3.32%
10 - 19	58	69	1.14%	1,110	10.93%
5 - 9	212	281	4.64%	2,423	23.86%
4	140	421	6.96%	2,983	29.38%
3	325	746	12.32%	3,958	38.98%
2	889	1,635	27.01%	5,736	56.49%
1	4,418	6,053	100.00%	10,154	100.00%
Total	**6,053**	**6,053**	**100.00%**	**10,154**	**100.00%**

Table 50: Total Crashes - Local Urban Roads - Signalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
100 and greater	58	58	0.95%	7,650	10.36%
50 - 99	258	316	5.16%	24,839	33.65%
30 - 49	401	717	11.72%	39,978	54.16%
20 - 29	447	1,164	19.02%	50,712	68.70%
10 - 19	818	1,982	32.39%	62,077	84.10%
5 - 9	893	2,875	46.98%	68,064	92.21%
4	314	3,189	52.12%	69,320	93.91%
3	433	3,622	59.19%	70,619	95.67%
2	699	4,321	70.62%	72,017	97.56%
1	1,798	6,119	100.00%	73,815	100.00%
Total	**6,119**	**6,119**	**100.00%**	**73,815**	**100.00%**

Table 51: Total Crashes - Local Urban Roads - Unsignalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
100 and greater	8	8	0.02%	1,066	0.76%
50 - 99	97	105	0.30%	7,683	5.51%
30 - 49	293	398	1.14%	18,328	13.14%
20 - 29	588	986	2.83%	32,119	23.03%
10 - 19	2,289	3,275	9.40%	62,484	44.79%
5 - 9	4,773	8,048	23.11%	93,307	66.89%
4	2,129	10,177	29.22%	101,823	73.00%
3	3,389	13,566	38.95%	111,990	80.28%
2	6,238	19,804	56.86%	124,466	89.23%
1	15,025	34,829	100.00%	139,491	100.00%
Total	**34,821**	**34,829**	**100.00%**	**139,491**	**100.00%**

Table 52: Angle Crashes - Local Rural Roads - Signalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
50 and greater	-	-	0.00%	-	0.00%
30 - 49	-	-	0.00%	-	0.00%
20 - 29	1	1	0.89%	28	11.76%
10 - 19	4	5	4.46%	73	30.67%
5 - 9	4	9	8.04%	100	42.02%
4	3	12	10.71%	112	47.06%
3	7	19	16.96%	133	55.88%
2	12	31	27.68%	157	65.97%
1	81	112	100.00%	238	100.00%
Total	**112**	**112**	**100.00%**	**238**	**100.00%**

Table 53: Angle Crashes - Local Urban Roads - Signalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
100 and greater	3	3	0.07%	320	1.01%
50 - 99	48	51	1.22%	3,353	10.60%
30 - 49	154	205	4.92%	9,036	28.56%
20 - 29	230	435	10.44%	14,591	46.11%
10 - 19	582	1,017	24.41%	22,411	70.82%
5 - 9	715	1,732	41.57%	27,195	85.94%
4	266	1,998	47.96%	28,259	89.31%
3	339	2,337	56.10%	29,276	92.52%
2	538	2,875	69.01%	30,352	95.92%
1	1,291	4,166	100.00%	31,643	100.00%
Total	**4,166**	**4,166**	**100.00%**	**31,643**	**100.00%**

Table 54: Left Turn Crashes (>=2 Vehicles) - Local Rural Roads - Signalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
50 and greater	-	-	0.00%	-	0.00%
30 - 49	1	1	1.12%	31	15.82%
20 - 29	-	1	1.12%	31	15.82%
10 - 19	1	2	2.25%	43	21.94%
5 - 9	6	8	8.99%	84	42.86%
4	2	10	11.24%	92	46.94%
3	7	17	19.10%	113	57.65%
2	11	28	31.46%	135	68.88%
1	61	89	100.00%	196	100.00%
Total	**89**	**89**	**100.00%**	**196**	**100.00%**

Table 55: Left Turn Crashes (>=2 Vehicles) - Local Rural Roads - Unsignalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
50 and greater	-	-	0.00%	-	0.00%
30 - 49	-	-	0.00%	-	0.00%
20 - 29	-	-	0.00%	-	0.00%
10 - 19	2	2	0.12%	30	1.45%
5 - 9	18	20	1.22%	130	6.28%
4	18	38	2.32%	202	9.76%
3	42	80	4.88%	328	15.85%
2	181	261	15.90%	690	33.33%
1	1,380	1,641	100.00%	2,070	100.00%
Total	**1,641**	**1,641**	**100.00%**	**2,070**	**100.00%**

Table 56: Left Turn Crashes (>=2 Vehicles) - Local Urban Roads - Signalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
100 and greater	3	3	0.08%	308	1.56%
50 - 99	21	24	0.66%	1,592	8.06%
30 - 49	58	82	2.27%	3,690	18.69%
20 - 29	110	192	5.30%	6,298	31.89%
10 - 19	352	544	15.03%	11,036	55.89%
5 - 9	665	1,209	33.40%	15,369	77.83%
4	231	1,440	39.78%	16,293	82.51%
3	348	1,788	49.39%	17,337	87.80%
2	578	2,366	65.36%	18,493	93.65%
1	1,254	3,620	100.00%	19,747	100.00%
Total	**3,620**	**3,620**	**100.00%**	**19,747**	**100.00%**

Table 57: Left Turn Crashes (>=2 Vehicles) - Local Urban Roads - Unsignalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
100 and greater	-	-	0.00%	-	0.00%
50 - 99	2	2	0.02%	119	0.42%
30 - 49	12	14	0.11%	557	1.98%
20 - 29	44	58	0.44%	1,591	5.65%
10 - 19	224	282	2.13%	4,488	15.94%
5 - 9	868	1,150	8.69%	9,978	35.44%
4	563	1,713	12.94%	12,230	43.44%
3	1,005	2,718	20.53%	15,245	54.14%
2	2,393	5,111	38.61%	20,031	71.14%
1	8,125	13,236	100.00%	28,156	100.00%
Total	**13,236**	**13,236**	**100.00%**	**28,156**	**100.00%**

Table 58: Pedestrian Crashes - Local Rural Roads - Signalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
50 and greater	-	-	0.00%	-	0.00%
30 - 49	-	-	0.00%	-	0.00%
20 - 29	-	-	0.00%	-	0.00%
10 - 19	-	-	0.00%	-	0.00%
5 - 9	-	-	0.00%	-	0.00%
4	-	-	0.00%	-	0.00%
3	-	-	0.00%	-	0.00%
2	-	-	0.00%	-	0.00%
1	1	1	100.00%	1	100.00%
Total	**1**	**1**	**100.00%**	**1**	**100.00%**

Table 59: Pedestrian Crashes - Local Rural Roads - Unsignalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
50 and greater	-	-	0.00%	-	0.00%
30 - 49	-	-	0.00%	-	0.00%
20 - 29	-	-	0.00%	-	0.00%
10 - 19	-	-	0.00%	-	0.00%
5 - 9	-	-	0.00%	-	0.00%
4	-	-	0.00%	-	0.00%
3	-	-	0.00%	-	0.00%
2	-	-	0.00%	-	0.00%
1	15	15	100.00%	15	100.00%
Total	**15**	**15**	**100.00%**	**15**	**100.00%**

Table 60: Pedestrian Crashes - Local Urban Roads - Signalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
100 and greater	-	-	0.00%	-	0.00%
50 - 99	-	-	0.00%	-	0.00%
30 - 49	-	-	0.00%	-	0.00%
20 - 29	-	-	0.00%	-	0.00%
10 - 19	1	1	0.17%	12	1.37%
5 - 9	20	21	3.60%	122	13.88%
4	13	34	5.83%	174	19.80%
3	30	64	10.98%	264	30.03%
2	96	160	27.44%	456	51.88%
1	423	583	100.00%	879	100.00%
Total	**583**	**583**	**100.00%**	**879**	**100.00%**

Table 61: Pedestrian Crashes - Local Urban Roads - Unsignalized TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
100 and greater	-	-	0.00%	-	0.00%
50 - 99	-	-	0.00%	-	0.00%
30 - 49	-	-	0.00%	-	0.00%
20 - 29	-	-	0.00%	-	0.00%
10 - 19	-	-	0.00%	-	0.00%
5 - 9	-	-	0.00%	-	0.00%
4	2	2	0.34%	8	0.91%
3	-	2	0.34%	8	0.91%
2	15	17	2.92%	38	4.32%
1	335	352	60.38%	373	42.43%
Total	**352**	**583**	**100.00%**	**879**	**100.00%**

Table 62: Dark Crashes - Local Rural Roads - All TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
50 and greater	-	-	0.00%	-	0.00%
30 - 49	-	-	0.00%	-	0.00%
20 - 29	-	-	0.00%	-	0.00%
10 - 19	1	1	0.07%	14	0.81%
5 - 9	13	14	0.97%	86	4.98%
4	11	25	1.72%	130	7.52%
3	29	54	3.72%	217	12.56%
2	115	169	11.66%	447	25.87%
1	1,281	1,450	100.00%	1,728	100.00%
Total	**1,450**	**1,450**	**100.00%**	**1,728**	**100.00%**

Table 63: Dark Crashes - Local Urban Roads - All TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
100 and greater	1	1	0.01%	114	0.25%
50 - 99	25	26	0.16%	1,682	3.66%
30 - 49	75	101	0.61%	4,406	9.59%
20 - 29	149	250	1.50%	7,924	17.25%
10 - 19	538	788	4.74%	15,061	32.79%
5 - 9	1,344	2,132	12.81%	23,716	51.63%
4	767	2,899	17.42%	26,784	58.31%
3	1,255	4,154	24.96%	30,549	66.51%
2	2,896	7,050	42.37%	36,341	79.12%
1	9,591	16,641	100.00%	45,932	100.00%
Total	**16,641**	**16,641**	**100.00%**	**45,932**	**100.00%**

Table 64: Wet Pavement Crashes (>=45 MPH) - Local Roads - All TCD - 2003-2008 - Summary

NUMBER OF CRASHES PER INTERSECTION	NUMBER OF INTERSECTIONS	CUMULATIVE		CUMULATIVE	
		INTERSECTIONS	PERCENT	CRASHES	PERCENT
100 and greater	-	-	0.00%	-	0.00%
50 - 99	-	-	0.00%	-	0.00%
30 - 49	1	1	0.04%	31	0.70%
20 - 29	4	5	0.20%	115	2.60%
10 - 19	24	29	1.16%	429	9.69%
5 - 9	115	144	5.74%	1,140	25.76%
4	78	222	8.86%	1,452	32.81%
3	155	377	15.04%	1,917	43.31%
2	379	756	30.16%	2,675	60.44%
1	1,751	2,507	100.00%	4,426	100.00%
Total	**2,507**	**2,507**	**100.00%**	**4,426**	**100.00%**

Table 65: High Intersection Fatality Section Corridors - 2003-2008

COUNTY	ON LOCATION STREET	SEVERITY				TOTAL CRASHES
		FATAL	INCAPACI-TATING INJURY	EVIDENT INJURY	PROPERTY DAMAGE ONLY	
H	30	13	92	295	857	1,257
R	1	12	35	60	133	240
S	62	9	20	71	196	296
A	31	8	29	103	587	727
P	72	8	41	82	198	329
N	6	8	27	52	128	215
B	40	7	51	66	173	297
C	3	7	27	106	318	458
F	52	7	20	209	565	801
R	301	7	15	93	288	403
AA	5	7	43	377	1,068	1,495
CC	1012	7	42	423	1,310	1,782
F	5	6	16	368	892	1,282
J	ELM ST	6	56	312	768	1,142
FF	30	6	68	184	376	634
O	702	6	20	80	194	300
E	62	6	11	72	212	301
L	1	6	15	246	860	1,127
W	33	6	91	457	2,159	2,713
Z	501	6	40	27	69	142
B	6	6	63	1,051	3,245	4,365
G	30	6	14	484	1,433	1,937

Table 66: Jurisdictions – Fatalities, Injuries, and Total Crashes at Intersections - 2003-2008

NAME	SEVERITY				TOTAL CRASHES
	FATAL	INCAPACITATING INJURY	EVIDENT INJURY	PROPERTY DAMAGE ONLY	
City P	106	701	11,909	42,490	55,206
City R	90	1,027	10,750	40,993	52,860
City B	34	395	6,842	15,851	23,122
City D	25	256	2,717	8,383	11,381

Countermeasure Information

Table 67: Crash Reduction Factors, Typical Crash Thresholds, Additional Application Factors, and Estimated Implementation Cost Ranges for Countermeasures at Stop-Controlled Intersections

Countermeasure	Crash Reduction Factor	Typical Urban Crash Threshold	Typical Rural Crash Threshold	Additional Implementation Factors	Typical Implementation Cost Range per Intersection
Basic set of sign and marking improvements	40%	10 crashes in 5 years	4-5 crashes in 5 years	None	$5,000 to $8,000
Installation of a 6 ft. or greater raised divider on stop approach (installed separately as a supplemental counter measure)	15%	20 crashes in 5 years	10 crashes in 5 years	Widening required to install island	$25,000 to $75,000 (pavement widening but no ROW required)
Either a) flashing solar powered LED beacons on advance intersection warning signs and STOP signs or b) flashing overhead intersection beacons	10% (13% for right angle crashes)	15-20 crashes in 5 years	8-10 crashes in 5 years	None	$5,000 to $15,000
Dynamic warning sign which advises through traffic that a stopped vehicle is at the intersection and may enter the intersection	Unknown	20-30 crashes in 5 years	10-20 crashes in 5 years	5 angle crashes in 5 years and inadequate sight distance from the stop approach	$10,000 to $25,000
Transverse rumble strips across the stop approach lanes in rural areas where noise is not a concern and running STOP signs is a problem ("Stop Ahead" pavement marking legend if noise is a concern)	28% (transverse rumble strips) 15% ("Stop Ahead" pavement markings)	5 running STOP sign crashes in 5 years	3 running STOP sign crashes in 5 years	Inadequate stopping sight distance on the stop approach	$3,000 to $10,000
Dynamic warning sign on the stop approach to advise high-speed approach traffic that a stopped condition is ahead	Unknown	8 running STOP sign crashes in 5 years	5 running STOP sign crashes in 5 years	Inadequate stopping sight distance on the stop approach	$10,000 to $25,000
Extension of the through edge line using short skip pattern may assist drivers to stop at the optimum point	Unknown	10 crashes in 5 years	5 crashes in 5 years	Wide throat and observed vehicles stopping too far back from the intersection	Less than $1,000
Reflective stripes on sign posts may increase attention to the sign, particularly at night	Unknown	10 crashes in 5 years	5 crashes in 5 years	Sign visibility or conspicuity significantly degraded particularly at night	Less than $1,000

Table 68: Crash Reduction Factors, Typical Crash Thresholds, Additional Application Factors, and Estimated Implementation Cost Ranges for Countermeasures at J-Turn Stop-Controlled Intersections

Countermeasure	Crash Reduction Factor	Typical Urban Crash Threshold	Typical Rural Crash Threshold	Additional Intersection Concern	Implementation Cost Range per Intersection
J-turn modifications on high-speed divided arterials	100% cross path, 72-84% frontal impact, 43-53% all crashes	4 angle crashes in 5 years*	4 angle crashes in 5 years*	Ability to make U-turn within about ¼ to ½ mile of intersection	$5,000 to $50,000
* If a highway section has a series of stop-controlled intersections with a high collective number of angle crashes, it is preferable to treat the problem on a system basis addressing all of the stop-controlled intersections rather than improving a few intersections that have isolated high numbers of angle crashes.					

Table 69: Crash Reduction Factors, Typical Crash Thresholds, Additional Application Factors, and Estimated Implementation Cost Ranges for Countermeasures at Signalized Intersections

Countermeasure	Crash Reduction Factor	Typical Urban Crash Threshold	Typical Rural Crash Threshold	Additional Implementation Factors	Typical Implementation Cost Range per Intersection
Basic set of signal and sign improvements	30%	20 crashes in 5 years	10 crashes in 5 years	None	$5,000 to $30,000
Change of permitted and protected left-turn phase to protected-only	41-48% of left turn crashes	5 left turn movement crashes; 3 or more opposing through lanes; minimal turning gaps available	5 left turn movement crashes; 3 or more opposing through lanes; minimal turning gaps available	None	$5,000 to $10,000
Advance cross street name signs for high-speed approaches on arterial highways	Unknown	20 crashes in 5 years	10 crashes in 5 years	High-speed approaches on four or more lane arterial highways	$1,000 to $5,000
Advance left and right “Signal Ahead” warning signs for isolated traffic signals	22%	20 crashes in 5 years	10 crashes in 5 years	Isolated traffic signal with one or more miles between signals; or traffic signals that are not readily visible due to highway alignment or obstructions	$1,000
Supplemental signal face per approach	28%	20 crashes in 5 years	10 crashes in 5 years	Signal faces obstructed by horizontal alignment; or exceptionally wide intersections (>100 ft) where a near side signal is needed	$5,000 to $15,000
Advance detection control systems	40% (injuries)	5 angle crashes in 5 years	5 angle crashes in 5 years	Isolated high-speed (45mph or greater) signalized intersections	$15,000
Signal coordination	32%	20 crashes in 5 years per intersection	10 crashes in 5 years per intersection	Arterials with closely spaced (about 1/2 mile maximum) signals	$5,000 to $50,000
Pedestrian countdown signals	25% (pedestrian crashes)	2 pedestrian crashes in 5 years	2 pedestrian crashes in 5 years	None	$5,000 to $15,000
Separate pedestrian phasing	34% pedestrian crashes)	2 pedestrian crashes in 5 years involving a turning vehicle	2 pedestrian crashes in 5 years involving a turning vehicle	None	$5,000 to $15,000
Pedestrian ladder or cross-hatched crosswalk and advanced pedestrian warning signs	15% (pedestrian crashes) for signs Unknown for crosswalk	2 pedestrian crashes in 5 years	2 pedestrian crashes in 5 years	None	$1,000 to $3,000

Table 70: Crash Reduction Factors, Typical Crash Thresholds, Additional Application Factors, and Estimated Implementation Cost Ranges for Lighting Countermeasures at Unlit or Poorly Lit Intersections

Countermeasure	Crash Reduction Factor	Typical Urban Crash Threshold	Typical Rural Crash Threshold	Additional Intersection Concern	Implementation Cost Range per Intersection
New or upgraded lighting	50% (NEW), 25% (UPGRADED) of night crashes	10 night crashes in 5 years and a night /total crash ratio above the statewide average for urban unlit intersections	5 night crashes in 5 years and a night/total crash ratio above the statewide average for rural unlit intersections	None	$5,000 to $15,000

Table 71: Crash Reduction Factors, Typical Crash Thresholds, Additional Application Factors, and Estimated Implementation Cost Ranges for Skid Resistance Countermeasures at Intersections with High Rates of Low-Friction Crashes

Countermeasure	Crash Reduction Factor	Typical Urban Crash Threshold	Typical Rural Crash Threshold	Additional Intersection Concern	Implementation Cost Range per Intersection
Skid resistance surface	50% (wet pavement crashes only)	8 wet pavement crashes in 5 years, a wet /total crash ratio above the statewide average wet/total crashes for intersections	8 wet pavement crashes in 5 years, a wet /total crash ratio above the statewide average wet/total crashes for intersections	High-speed approaches (45mph or greater) and a ribbed tire skid number of about 30 or less.	$20,000 to $50,000

Table 72: Crash Reduction Factors, Typical Crash Thresholds, Additional Application Factors, and Estimated Implementation Cost Ranges for Countermeasures at Stop-Controlled Intersections with High-Speed Approaches

Countermeasure	Crash Reduction Factor	Typical Urban Crash Threshold	Typical Rural Crash Threshold	Additional Intersection Concern	Implementation Cost Range per Intersection
Lane narrowing using pavement marking and shoulder rumble strips	31%	10 speed-related crashes in 5 years	5 speed-related crashes in 5 years	Free of noise and bicycle issues-single through lane	$20,000 to $40,000
Lane narrowing using pavement marking and raised pavement markers	Unknown but probably less than 31%	10 speed-related crashes in 5 years	5 speed-related crashes in 5 years	Single through lane	$5,000 to $10,000
Peripheral Transverse pavement markings	Unknown	10 speed-related crashes in 5 years	5 speed-related crashes in 5 years		$3,000 to $5,000
Dynamic speed warning sign to reduce speed	30%	10 speed-related crashes in five years	5 speed-related crashes in 5 years		$10,000
"Slow" pavement markings	Unknown	10 speed-related crashes in 5 years	5 speed-related crashes in 5 years		$2,000 to $5,000
High-friction surface	25% (All crashes)	10 speed-related crashes in 5 years	5 speed-related crashes in 5 years		$20,00 to $50,000

Table 73: Crash Reduction Factors, Typical Crash Thresholds, Additional Application Factors, and Estimated Implementation Cost Ranges for Corridor and Municipal Enforcement Countermeasures

Countermeasure	Crash Reduction Factor	Typical Urban Crash Threshold	Typical Rural Crash Threshold	Additional Intersection Concern	Implementation Cost Range
Corridor engineering, education, and enforcement (3E) improvements on high-speed arterials with very high frequencies of severe intersection crashes	25% of corridor intersection fatal and incapacitating injury crashes	10 or more intersection fatalities	10 or more intersection fatalities	Length of corridor should be in the 5-10 mile range	$1,000,000 per corridor + $100,000 education and enforcement annually per corridor
Municipal-wide 3E improvements in municipalities with high frequencies of severe intersection crashes	10% of all intersection crashes	Top 5 or so municipalities with the most intersection fatalities		Consider density of severe crashes per capita	$500,000 to 1,000,000 + $100,000 to 200,000 (dependent on the size of the city) education and enforcement annually per municipality

Table 74: Crash Reduction Factors, Typical Crash Thresholds, Additional Application Factors, and Estimated Implementation Cost Ranges for Countermeasures for Education-Enforcement Strategies at Signalized Intersections to Reduce Red-Light Running

Countermeasure	Crash Reduction Factor	Typical Urban Crash Threshold	Typical Rural Crash Threshold	Additional Intersection Concern	Implementation Cost Range per Intersection
Automated red-light enforcement	25% of angle crashes	8 angle crashes in 5 years	4 angle crashes in 5 years	Enabling legal authority required	Normally 0 if operated by contractor
Enforcement-assisted lights	15% of angle crashes	8 angle crashes in 5 years	4 angle crashes in 5 years	Enforcement commitment required	$1,000

Table 75: Crash Reduction Factors, Typical Crash Thresholds, Additional Application Factors, and Estimated Implementation Cost Ranges for Traditional Major Countermeasures

Countermeasure	Crash Reduction Factor	Typical Urban Crash Threshold	Typical Rural Crash Threshold	Additional Intersection Concern	Implementation Cost Range per Intersection
Roundabouts	72% to 87% (injuries and fatalities)	Intersections with the most frequent severe crashes statewide	Intersections with the most frequent severe crashes statewide	Right of way restrictions; individual intersection analysis required	$500,000 to $1 million each
Left-turn channelization	13% to 24% for left-turn crashes at signalized intersections, 37% to 60% for left-turn crashes at stop-controlled intersections	Intersections with the most frequent severe crashes statewide	Intersections with the most frequent severe crashes statewide	Right of way restrictions; individual intersection analysis required	$350,000 to $400,000 each

Table 76: Basic Set of Sign and Marking Improvements – State Stop-Controlled Intersections

Countermeasure	Threshold Crash Level (6 Years)	Number of Statewide Crash Intersections	Number of Targeted 6 Year Crashes in the Intersections	Estimated Number of Improvements[1]	Construction Costs ($ Million)[2]	Fatalities per 100 Crashes	Annual Targeted Crash Reduction[3]	Annual Estimated Fatality Reduction
Basic Set of Sign and Marking Improvements –Rural	6	1,221	13,722	977	7.82	1.60	732	11.71
Basic Set of Sign and Marking Improvements –Urban	30	474	23,795	379	3.03	0.21	1,269	2.67
Total				1,356	10.85			14.38

[1] Assumes 80% of locations can be improved.
[2] Assumes an average cost of $8,000 per intersection.
[3] A CRF of 0.40 is used.

Table 77: Flashing Beacons – State Stop-Controlled Intersections

Countermeasure	Threshold Crash Level (6 Years)	Number of Statewide Crash Intersections	Number of Targeted 6 Year Crashes in the Intersections	Estimated Number of Improvements[1]	Construction Costs ($ Million)[2]	Fatalities per 100 Crashes	Annual Targeted Crash Reduction[3]	Annual Estimated Fatality Reduction
Flashing Solar Powered LED Beacons on Advance Intersection Warning Signs and STOP Signs or Flashing Overhead Intersection Beacons –Rural	24	66	2,261	52	0.52	1.60	24	0.38
Flashing Solar Powered LED Beacons on Advance Intersection Warning Signs and STOP Signs or Flashing Overhead Intersection Beacons –Urban	100	21	2,842	17	0.17	0.21	30	0.06
Total				69	0.69		54	0.44

[1] Assumes 80% of locations can be improved.
[2] Assumes an average cost of $10,000 per intersection.
[3] A net increased CRF of 0.08 is used – 0.13×(1-0.40) =0.08.

Table 78: J-Turn Modifications on High-Speed Divided Arterials – State, Rural, Stop-Controlled Intersections – Comparison of Costs, and Fatalities Reduced at Various Crash Threshold Levels

Countermeasure	Threshold Crash Level (6 Years)	Number of Statewide Crash Intersections	Number of Targeted 6 Year Crashes in the Intersections	Estimated Number of Improvements[1]	Construction Costs ($ Million)[2]	Fatalities per 100 Crashes	Annual Targeted Crash Reduction[3]	Annual Estimated Fatality Reduction
J-Turns Modifications on High-Speed Divided Arterials – Option 1	4	318	2,586	254	12.70	3.74	172	6.43
J-Turns Modifications on High-Speed Divided Arterials – Option 2	5	239	2,270	191	9.55	3.74	151	5.65
J-Turns Modifications on High-Speed Divided Arterials – Option 3	10	70	1,160	56	2.80	3.74	77	2.87

[1] Assumes 80% of locations can be improved.
[2] Assumes an average cost of $50,000 per intersection.
[3] A CRF of 0.50 is used.

Table 79: J-Turn Modifications on High-Speed Divided Arterials – State, Urban, Stop-Controlled Intersections – Comparison of Costs, and Fatalities Reduced at Various Crash Threshold Levels

Countermeasure	Threshold Crash Level (6 Years)	Number of Statewide Crash Intersections	Number of Targeted 6 Year Crashes in the Intersections	Estimated Number of Improvements[1]	Construction Costs ($ Million)[2]	Fatalities per 100 Crashes	Annual Targeted Crash Reduction[3]	Annual Estimated Fatality Reduction
J-Turns Modifications on High-Speed Divided Arterials – Option 1	20	213	7943	170	8.50	0.36	530	1.91
J-Turns Modifications on High-Speed Divided Arterials – Option 2	30	109	5478	87	4.35	0.36	366	1.31
J-Turns Modifications on High-Speed Divided Arterials – Option 3	50	37	2719	30	1.50	0.36	181	0.65

[1] Assumes 80% of locations can be improved.
[2] Assumes an average cost of $50,000 per intersection.
[3] A CRF of 0.50 is used.

Table 80: Basic Set of Sign and Marking Improvements – Local Stop-Controlled Intersections

Countermeasure	Threshold Crash Level (6 Years)	Number of Statewide Crash Intersections	Number of Targeted 6 Year Crashes in the Intersections	Estimated Number of Improvements[1]	Construction Costs ($ Million)[2]	Fatalities per 100 Crashes	Annual Targeted Crash Reduction[3]	Annual Estimated Fatality Reduction
Basic Set of Sign and Marking Improvements –Rural	6	190	1,968	152	1.22	0.21	105	0.22
Basic Set of Sign and Marking Improvements –Urban	50	105	7,683	84	0.67	0.12	410	0.49
Total				236	1.89		555	0.71

[1] Assumes 80% of locations can be improved.
[2] Assumes an average cost of $8,000 per intersection.
[3] A CRF of 0.40 is used.

Table 81: Basic Set of Signal and Sign Improvements – State Signalized Intersections

Countermeasure	Threshold Crash Level (6 Years)	Number of Statewide Crash Intersections	Number of Targeted 6 Year Crashes in the Intersections	Estimated Number of Improvements[1]	Construction Costs ($ Million)[2]	Fatalities per 100 Crashes	Annual Targeted Crash Reduction[3]	Annual Estimated Fatality Reduction
Basic Set of Signal and Sign Improvements –Rural	20	67	2,258	54	1.62	0.41	90	0.37
Basic Set of Signal and Sign Improvements –Urban	50	371	28,570	300	9.00	0.17	1,142	1.94
Total				354	10.62		1,232	2.31

[1] Assumes 80% of locations can be improved.
[2] Assumes an average cost of $30,000 per intersection.
[3] A CRF of 0.30 is used.

Table 82: Change of Permitted and Protected Left-Turn Phase to Protected Only – State Signalized Intersections

Countermeasure	Threshold Crash Level (6 Years)	Number of Statewide Crash Intersections	Number of Targeted 6 Year Crashes in the Intersections	Estimated Number of Improvements[1]	Construction Costs ($ Million)[2]	Fatalities per 100 Crashes	Annual Targeted Crash Reduction[3]	Annual Estimated Fatality Reduction
Change of Permitted and Protected Left-Turn Phase to Protected Only – Rural	5	87	841	61	0.30	0.39	47	0.18
Change of Permitted and Protected Left-Turn Phase to Protected Only Urban	10	678	13,781	475	2.37	0.17	772	1.31
Total				536	2.67		819	1.49

[1] Assumes 70% of locations can be improved.
[2] Assumes an average cost of $5,000 per intersection.
[3] A CRF of 0.48 is used.

Table 83: Advance Detection Control Systems – Isolated High-Speed State, Rural, Signalized Intersections

Countermeasure	Threshold Crash Level (6 Years)[1]	Number of Statewide Crash Intersections	Number of Targeted 6 Year Crashes in the Intersections	Estimated Number of Improvements[2]	Construction Costs ($ Million)[3]	Fatalities per 100 Crashes	Annual Targeted Crash Reduction[4]	Annual Estimated Fatality Reduction
Advance Detection Control Systems	5	110	1,112	67	1.00	0.69	45	0.31

[1] Angle crashes.
[2] Assumes 60% of locations can be improved.
[3] Assumes an average cost of $15,000 per intersection.
[4] A CRF of 0.40 is used.

Table 84: Basic Set of Signal and Sign Improvements – Local Signalized Intersections

Countermeasure	Threshold Crash Level (6 Years)	Number of Statewide Crash Intersections	Number of Targeted 6 Year Crashes in the Intersections	Estimated Number of Improvements[1]	Construction Costs ($ Million)[2]	Fatalities per 100 Crashes	Annual Targeted Crash Reduction[3]	Annual Estimated Fatality Reduction
Basic Set of Signal and Sign Improvements –Rural	10	12	291	10	.30	0.74	12	0.09
Basic Set of Signal and Sign Improvements –Urban	50	316	24,839	253	7.59	0.22	993	2.18
Total				263	7.89		1,005	2.27

[1] Assumes 80% of locations can be improved.
[2] Assumes an average cost of $30,000 per intersection.
[3] A CRF of 0.30 is used.

Table 85: Change of Permitted and Protected Left-Turn Phase to Protected Only – Local Signalized Intersections

Countermeasure	Threshold Crash Level (6 Years)	Number of Statewide Crash Intersections	Number of Targeted 6 Year Crashes in the Intersections	Estimated Number of Improvements[1]	Construction Costs ($ Million)[2]	Fatalities per 100 Crashes	Annual Targeted Crash Reduction[3]	Annual Estimated Fatality Reduction
Change of Permitted and Protected Left-Turn Phase to Protected Only – Rural	5	8	84	6	0.03	0.51	5	0.03
Change of Permitted and Protected Left-Turn Phase to Protected Only Urban	10	544	11,036	381	1.91	0.20	618	1.24
Total				387	1.94		623	1.27

[1] Assumes 70% of locations can be improved.
[2] Assumes an average cost of $5,000 per intersection.
[3] A CRF of 0.48 is used.

Table 86: Pedestrian Improvements (Pedestrian Countdown Signals, Separate Pedestrian Phasing, Pedestrian Ladder or Cross-Hatched Crosswalk and Advanced Pedestrian Warning Signs) – State Urban Intersections

Countermeasure	Threshold Crash Level (6 Years)	Number of Statewide Crash Intersections	Number of Targeted 6 Year Crashes in the Intersections	Estimated Number of Improvements[1]	Construction Costs ($ Million)[2]	Fatalities per 100 Crashes	Annual Targeted Crash Reduction[3]	Annual Estimated Fatality Reduction
Pedestrian Improvements – Signalized	2	29	67	24	0.72	2.12	4	0.08
Pedestrian Improvements – Stop-Controlled	2	1	2	1	0.03	2.12 est.	-	-
Total				25	0.75		4	0.08

[1] Assumes 80% of locations can be improved.
[2] Assumes an average cost of $30,000 per intersection.
[3] A combined countermeasure CRF of 0.40 is used.

Table 87: Pedestrian Improvements (Pedestrian Countdown Signals, Separate Pedestrian Phasing, Pedestrian Ladder or Cross-Hatched Crosswalk and Advanced Pedestrian Warning Signs) – Local Urban Intersections

Countermeasure	Threshold Crash Level (6 Years)	Number of Statewide Crash Intersections	Number of Targeted 6 Year Crashes in the Intersections	Estimated Number of Improvements[1]	Construction Costs ($ Million)[2]	Fatalities per 100 Crashes	Annual Targeted Crash Reduction[3]	Annual Estimated Fatality Reduction
Pedestrian Improvements – Signalized	2	160	456	128	3.84	3.30	24	0.79
Pedestrian Improvements – Stop-Controlled	2	17	38	14	1.14	1.34	2	0.02
Total				142	4.98		26	0.81

[1] Assumes 80% of locations can be improved.
[2] Assumes an average cost of $30,000 per intersection.
[3] A combined countermeasure CRF of 0.40 is used.

Table 88: New or Upgraded Lighting – State Intersections

Countermeasure	Threshold Crash Level (6 Years)[1]	Number of Statewide Crash Intersections[2]	Number of Targeted 6 Year Crashes in the Intersections	Estimated Number of Improvements[3]	Construction Costs ($ Million)[4]	Fatalities per 100 Crashes	Annual Targeted Crash Reduction[5]	Annual Estimated Fatality Reduction
New or Upgraded Lighting – Urban	30	100 est.	4,200 est.	80	1.20	0.25	140	0.35
New or Upgraded Lighting – Rural	5	130 est.	980 est.	104	1.54	2.20	65	1.43
Total				204	2.74		205	1.78

[1] Dark crashes.
[2] Dark crashes only and where the intersection dark/total ratio exceeds the statewide dark/total crash ratio of 0.20.
[3] Assumes 80% of locations can be improved, rural intersections are predominantly unlit, and urban intersections are poorly lit.
[4] Assumes an average cost of $15,000 per intersection.
[5] A CRF of 0.50 night crashes is used for rural unlit intersections; 0.25 of night crashes for poorly lit urban intersections.

Table 89: New or Upgraded Lighting – Local Intersections

Countermeasure	Threshold Crash Level (6 Years)[1]	Number of Statewide Crash Intersections[2]	Number of Targeted 6 Year Crashes in the Intersections	Estimated Number of Improvements[3]	Construction Costs ($ Million)[4]	Fatalities per 100 Crashes	Annual Targeted Crash Reduction[5]	Annual Estimated Fatality Reduction
New or Upgraded Lighting – Urban	30	90 est.	3900 est.	72	1.08	0.33	117	0.38
New or Upgraded Lighting – Rural	5	12 est.	75 est.	10	0.15	0.80	5	0.04
Total				82	1.23		122	0.42

[1] Dark crashes.
[2] Dark crashes only and where the intersection dark/total ratio exceeds the statewide dark/total crash ratio of 0.20.
[3] Assumes 80% of locations can be improved, rural intersections are predominantly unlit, and urban intersections are poorly lit.
[4] Assumes an average cost of $15,000 per intersection.
[5] A CRF of 0.50 night crashes is used for rural unlit intersections; 0.25 of night crashes for poorly lit urban intersections.

Table 90: High-Friction Surface – State Intersections, 45 mph or Greater Speed Limit

Countermeasure	Threshold Crash Level (6 Years)[1]	Number of Statewide Crash Intersections[2]	Number of Targeted 6 Year Crashes in the Intersections	Estimated Number of Improvements[3]	Construction Costs ($ Million)[4]	Fatalities per 100 Crashes	Annual Targeted Crash Reduction[5]	Annual Estimated Fatality Reduction
High-Friction Surface	10	190 est.	2,900 est.	133	6.65	1.48	193	2.85

[1] Wet crashes at intersections with speed limits of 45 mph or greater.
[2] Assumes 70% of intersections have a skid number of 30 or less and can be overlaid.
[3] Assumes these intersections have at least 10 wet pavement crashes and a wet/total ratio of at least 0.18.
[4] Assumes an average cost of $50,000 per intersection to remove any significant rutting and apply a thin epoxy anti-skid surface.
[5] A CRF of 0.50 is used.

Table 91: Enforcement-Assisted Lights – Candidate Cities

Name	Angle Crashes	Estimated Angle Crashes at Signalized Intersections (45% of Total Angle Crashes)
City A	22,336	10,050
City B	22,335	10,050
City C	8,182	3,680
City D	4,228	1,900
City E	4,181	1,880
City F	3,415	1,540
City G	3,411	1,540
Total	68,088	30,640

It is estimated that the total number of signals in these cities is 2,300 (10,500 total signals × 30/138)

A CRF of 0.15 for enforcement-assisted lights is used.

It is assumed that 5 of the 7 cities, including Cities A and B will agree to adopt the enforcement-assisted lights and will apply them at signalized intersections that comprise 90% of all angle crashes. The estimated angle crashes in these cities is 0.90 × 30,640 = 27,500 angle crashes at signalized intersections impacted.

The severity of angle crashes at intersections within these cities is estimated at 0.25 fatalities/100 crashes.

The estimated annual fatality reduction for citywide efforts is (27,500 × 0.15) × (0.25/100)/6 = 1.72.

The cost for adding the enforcement-assisted lights at 2,300 intersections at $300 per intersection is $0.69 million.

Table 92: Corridor 3E Improvements on High-Speed Arterials with Very High Frequencies of Severe Intersection Crashes – Candidate Locations

County	On Location Street	Severity				Total Crashes
		Fatal	Incapacitating Injury	Evident Injury	Property Damage Only	
H	30	13	92	295	857	1,257
R	1	12	35	60	133	240
S	62	9	20	71	196	296
A	31	8	29	103	587	727
P	72	8	41	82	198	329
N	6	8	27	52	128	215
B	40	7	51	66	173	297
C	3	7	27	106	318	458
F	52	7	20	209	565	801
R	301	7	15	93	288	403
AA	5	7	43	377	1,068	1,495
CC	1012	7	42	423	1,310	1,782
F	5	6	16	368	892	1,282
J	ELM ST	6	56	312	768	1,142
FF	30	6	68	184	376	634
O	702	6	20	80	194	300
E	62	6	11	72	212	301
L	1	6	15	246	860	1,127
W	33	6	91	457	2,159	2,713
Z	501	6	40	27	69	142
B	6	6	63	1,051	3,245	4,365
G	30	6	14	484	1,433	1,937

Number of potential corridors – 22 corridors.

Estimated number of corridors that may be implemented – 6.

Estimated fatalities at the 6 corridors – 50.

Estimated crash reduction factor for applying 3E improvements – 0.25.

Estimated annual reduction in fatalities – (50/6)(0.25) = 2.08.

Estimated costs at $1,000,000 per corridor for infrastructure and $100,000 for education/enforcement = $6.0 million (infrastructure), $0.6 million annually (education and enforcement).

Table 93: Municipal-Wide 3E Improvements in Municipalities with High Frequencies of Severe Intersection Crashes – Candidate Cities with the Highest Intersection Fatalities and Crashes

City	Severity				Total Crashes
	Fatal	Incapacitating Injury	Evident Injury	Property Damage Only	
City P	106	701	11,909	42,490	55,206
City R	90	1,027	10,750	40,993	52,860
City B	34	395	6,842	15,851	23,122
City D	25	256	2,717	8,383	11,381

Number of potential cities – 4 cities.

Number of intersection fatalities within candidate cities – 109.

Estimated number of cities that may pursue 3E improvements – 3 (City P, City R and one of the remaining cities).

Estimated fatalities within the 3 cities = 225.

Estimated crash reduction factor for applying 3E improvements = 0.10.

Estimated annual reduction in fatalities = (225/6)(0.10) = 3.75.

Estimated costs at $2,000,000 per city for infrastructure and $200,000 for education/enforcement for City P and City R and $1,000,000 for remaining city infrastructure and $100,000 for education/enforcement = $5.0 million (infrastructure), $0.5 million annually (education and enforcement).

Table 94: Municipal-Wide 3E Improvements in Municipalities with High Frequencies of Severe Intersection Crashes – Candidate Cities with the Highest Intersection Pedestrian Crashes

City	Pedestrian Crashes
City P	624
City R	240
City B	56
City F	47
City D	32

Speed Reduction Enhancements

Candidate locations – State and local intersections with 5 or more speed related crashes at rural intersections or 8 or more speed related crashes at urban intersections. (Speed related defined as Speeding or Too Fast for Conditions in the harmful events (if data is available).

Table 95: Roundabouts – Candidate Intersections

Locality and Ownership	Traffic Control	Threshold Crash Level	Fatalities per 100 Crashes	Number of Intersections	Number of Crashes
State Rural Intersections	Signalized	50 Crashes	0.41	8	573
	Stop-Controlled	50 Crashes	1.60	7	428
State Urban Intersections	Signalized	150 Crashes	0.17	13	2,170
	Stop-Controlled	150 Crashes	0.21	4	780

Number of potential Intersections – 28.

Number of crashes at the 28 intersections – 3,951.

Estimated number of intersections that may be candidates for roundabouts – 6 (2 rural stop-controlled, 2 rural signal, 1 urban stop-controlled).

Estimated annual crashes:

Rural Stop-Controlled = (2/7)(428/6) =20.

Rural Signal = (2/8)(573/6) = 24.

Urban Stop-Controlled = (1/4)(780/6)= 33.

Estimated injury and fatality crash reduction factor – 0.90.

Estimated annual reduction in fatalities= [(20/100)(1.6) + (24/100)(0.41) + (33/100)(0.21)](0.90)= 0.45.

Estimated costs at $800,000 per intersection = $4.0 million.

Summary Straw Man Outline of Countermeasures

Table 96: Summary of Countermeasure Benefits and Costs

Category	Approach	Number of Intersections	Construction Cost ($ Million)	Enforcement, Education and EMS Costs (Annual $ Thousand)	Estimated Annual Fatalities Reduced	Millions Expended Per Annual Life Saved
Basic Set of Sign and Marking Improvements –State Stop-Controlled Intersections	Systematic	1,356	10.85		14.38	0.75
Flashing Solar Powered LED Beacons on Advance Intersection Warning Signs and STOP Signs or Flashing Overhead Intersection Beacons – State Stop-Controlled Intersections	Systematic	69	0.69		0.44	1.56
J-Turn Modifications on High-Speed Divided Arterials – State Rural Stop-Controlled Intersections	Systematic	239	9.55		5.65	1.69
J-Turn Modifications on High-Speed Divided Arterials – State Urban Stop-Controlled Intersections	Systematic	109	4.35		1.31	3.32
Basic Set of Sign and Marking Improvements – Local Stop-Controlled Intersections	Systematic	236	1.89		0.71	2.48
Basic Set of Signal and Sign Improvements – State Signalized Intersections	Systematic	354	10.62		2.31	4.60
Change of Permitted and Protected Left-Turn Phase to Protected Only – State Signalized Intersections	Systematic	536	2.67		1.49	1.79
Advance Detection Control Systems – State Signalized Intersections	Systematic	67	1.00		0.31	3.22
Basic Set of Signal and Sign Improvements – Local Signalized Intersections	Systematic	263	7.89		2.27	3.47
Change of Permitted and Protected Left-Turn Phase to Protected Only – Local Signalized Intersections	Systematic	387	1.94		1.27	1.52
Pedestrian Improvements –State Urban Intersections	Systematic	55	0.75		0.08	9.37
Pedestrian Improvements –Local Urban Intersections	Systematic	142	4.98		0.81	6.15
New or Upgraded Lighting – State Intersections	Systematic	204	2,74		1.78	1.54
New or Upgraded Lighting – Local Intersections	Systematic	82	1.23		0.42	2.93
High-Friction Surface – State Intersections	Systematic	133	6.65		2.85	2.33
Enforcement-Assisted Lights	Systematic	5 Cities	0.69	0.25	1.72	0.40
Corridor 3E Improvements on High-Speed Arterials with Very High Frequencies of Severe Intersection Crashes	Comprehensive	6 Corridors	6.00	0.60	2.08	2.88
Municipal-Wide 3E Improvements in Municipalities with High Frequencies of Severe Intersection Crashes	Comprehensive	4 Cities	5.00	0.50	3.75	1.33
Roundabouts	Traditional	5	4.00		0.45	8.88
Total		**4,237**	**83.49**	**1.35**	**43.98**	