



Michigan Department of Transportation

**Local Agency
Program's
Before/After Study**

*Local Agency Safety and
High Risk Rural Roads
FY 2010*





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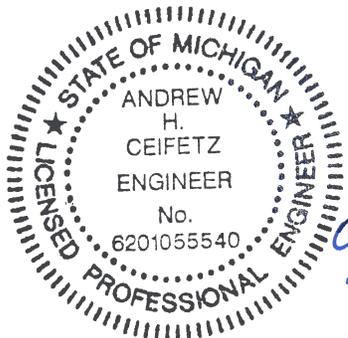
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Executive Summary

- The 2010 Safety Program funded 88 Safety (STH) and 25 High Risk Rural Roads (HRRR) for a total of 113 projects.
- Overall, the 2010 Safety Program saw a 10.7% reduction in the frequency of reported crashes and a 13.3% reduction in the frequency of reported injury crashes.
- The STH funding program projects saw a 10.4% reduction in the frequency of reported crashes and an 11.1% reduction in the frequency of reported injury crashes.
- The HRRR funding program projects saw a 14.5% reduction in the frequency of reported crashes and a 29.1% reduction in the frequency of reported injury crashes.
- The Poisson Test method was used to determine the statistical significance of targeted fatal (K), Type A, Type B, and Type C injury crashes for locations or location groups with a minimum of five (5) average annual crashes or injuries. Testing at the 95th percentile found mixed results in the reported reductions in reported crashes. According to the statistical testing, crash reductions for targeted fatal and injury crashes (KABC) were not significant for the STH funding program while they were significant for the HRRR funding program as well as when considering both programs together.
- Chi Square Testing was also conducted to evaluate the results of each location and various location groupings. Testing at the 95th percentile for reductions in targeted KABC crashes found neither the STH or HRRR program to be significant.
- An economic analysis of the programs produced the following results:

Table 1 - Overall Economic Analysis

Project Grouping	B/C Ratio	Time of Return (yrs.)
STH Funding	1.69	5.2
HRRR Funding	7.75	1.1
2010 Safety Program	2.57	3.4

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1 Introduction

Given the importance of providing a safe environment for the motoring public, the Michigan Department of Transportation (MDOT) commissioned this study to evaluate the effectiveness of the 2010 Safety Program for Local Agencies, through MDOT Local Agency Programs (LAP) unit. The 2010 safety program consisted of 113 projects divided between the Safety Program and the High Risk Rural Roads Program. Table 1 provides a list of locations within each program. Additional detailed information for each location can be found in the Appendix.

The analysis for the 2010 Safety Program focused on three main project groupings; all projects, projects by funding source, and projects by grouping. Projects by grouping were categorized based on the type of work conducted and included the following categories:

- Intersection Improvements
- Pedestrian Related Improvements
- Roadway Departure & Clearzone Improvements
- Roadway Departure Improvements
- Sign Related Improvements
- Traffic Signal Upgrades
- Traffic Signal & Turn Lane Improvements
- Turn Lane Improvements
- Vertical Alignment Improvements
- Vertical Alignment & Roadway Departure & Clearzone Improvements

It should be noted that several projects were excluded from the analysis due to a number of factors which may include a limited or lack of available data. These project locations are included and identified in Table 2 on the following page. Additional figures are included providing the general location of each project following Table 2.

Table 2 - Project Summary

Project Number	Project Type	Project Location
STH 1	Intersection improvement	Blue Star Highway at North Shore Drive,
STH 2	Roadway departure & Clearzone	Riverview Drive, from 4 th Street to Gene Drive
STH 3	Roadway departure & Clearzone	East Torch Lake Drive (CR 593), Alden Highway to M-88
STH 4	Intersection improvement	Melita Road at Main Street
STH 5	Roadway departure & Clearzone	Froberg Road at East Sturgeon Slough
STH 6	Sign Related	Cedar Run Road at Reynolds Road
STH 7	Roadway departure & Clearzone	North Manistee County Line Road (CR-602), 0.31 miles east of Wallaker Road easterly 1500 feet
STH 8	Turn lane	John Beers Road, from Cleveland Avenue to Washington Avenue
STH 9	Roadway departure & Clearzone	South River Road, from Canton Road to Orchard Beach Road
STH 10	Roadway departure & Clearzone	FH-42 (Curly Lewis Highway) at Roxbury Creek, Ankodosh Creek, and Naomikong Creek
STH 11	Intersection improvement	N. Caribou Lake Road at Spring Bay Road
STH 12	Turn lane	N. Lansing Street at Daisy St, Floral St, and North Gateway Schools
STH 13	Roadway departure & Clearzone	9 locations
STH 14	Roadway departure & Clearzone	Stanley Road, from Bray Road to Center Road
STH 15	Traffic signal	Elms Road at Carpenter Road
STH 16	Intersection improvement	Wilson Road at Henderson Road
STH 17	Traffic signal	Elms Road at Flushing Road
STH 18	Roadway departure & Clearzone	Torrey Road, from Oakridge Drive north to Bristol Road
STH 19-1	Sign Related	Cass Road, from Keystone Road to Hartman Road
STH 19-2	Sign Related	Five Mile Rd, from Hammond Rd to the northern East Bay Twp line
STH 19-3	Sign Related	Supply Road, North Hobbs Highway to East Bay East Township line
STH 20	Sign Related	180 locations
STH 21	Roadway departure & Clearzone	Jefferson Road at Sugar Creek
STH 22	Intersection improvement	Paradise Road at Pilgrim Road
STH 23	Traffic signal	9 various locations
STH 24	Turn lane	84 th Street, from Alles Drive to Norfolk Southern RR
STH 25	Traffic signal	Cascade Road at Spaulding Avenue/Hall Street
STH 26-1	Traffic signal	Cascade Road at Forest Hill Avenue
STH 26-2	Traffic signal	Division Avenue at 68 th Street
STH 27-1	Traffic signal	Leonard Street at Ball Street
STH 27-2	Traffic signal	Leonard Street at Fuller Avenue
STH 27-3	Traffic signal	Leonard Street at Leffingwell Avenue
STH 28-1	Traffic signal	Fuller Avenue at 3 Mile Road
STH 28-2	Traffic signal	32 nd Street at Kalamazoo Avenue
STH 29	Roadway departure & Clearzone	Pratt Road, from Lapeer WCL to Green Corners Road
STH 30	Traffic signal	Old US-23 at Spencer Road
STH 31	Roadway departure & Clearzone	Mackinaw Trail, from I-75 business loop northerly 1.0 miles.
STH 32-1	Traffic signal	13 Mile at Utica Road
STH 32-2	Traffic signal	14 Mile at Hayes Road
STH 32-3	Traffic signal	Moravian at Utica Road
STH 32-4	Traffic signal	Schoenherr at 24 Mile
STH 33	Turn lane	15 Mile Road at Schoenherr Road
STH 34	Traffic signal	14 th Avenue at 13 th Street

STH 35-1	Sign Related	Whiteford Road, from Section Road to Sterns Road
STH 35-2	Sign Related	North Dixie Highway, from Pointe Aux Peaux Road to Post Road
STH 36	Intersection improvement	Laketon Avenue at Henry Street
STH 37-1	Traffic signal	Laketon Avenue at Hoyt Street
STH 37-2	Traffic signal	Laketon Avenue at Getty Street
STH 37-3	Traffic signal	Laketon Avenue at Roberts Street
STH 38	Turn lane	Sternberg Road at Grand Haven Road
STH 39	Intersection improvement	Harvey Road at Sternberg Road
STH 40	Intersection improvement	10 Mile Road at Novi Way (Wildcat)
STH 41	Roadway Improvement	E. Pierce Road, from 132 nd Avenue to 144 th Avenue
STH 42	Roadway departure & Clearzone	Kittle Road at Honeywell Creek
STH 43	Roadway departure & Clearzone	40 th Street, from Industrial Avenue to Waverly Road
STH 44	Turn lane	Center Road at Brockway Road
STH 45	Traffic signal	E. Genesee Avenue at Hess Avenue
STH 46	Traffic signal & Turn Lane	Bay Street, from Court Street to W. Genesee Ave
STH 47	Vertical Alignment	Grand River Road at Colby Lake Road
STH 48-1	Intersection improvement	Allen Road at Manor Avenue
STH 48-2	Intersection improvement	Allen Road at Reeck Road
STH 49	Intersection improvement	Springwells Street at Chamberlain Street
STH 50	Roadway Improvement	Livernois Street, from Toledo Street to John Kronk
STH 51	Pedestrian related	West Vernor Highway, from Waterman Street to Lansing Street
STH 52-1	Traffic signal	Beaconsfield Road at Eastland Village Drive
STH 52-2	Traffic signal	Beaconsfield Road at Damman Avenue
STH 52-3	Traffic signal	Beaconsfield Road at Eastwood Drive
STH 52-4	Traffic signal	Beaconsfield Road at Woodside Drive
STH 53-1	Turn lane	Newburgh Road at 5 Mile Road
STH 53-2	Turn lane	Newburgh Road at 7 Mile Road
STH 54	Traffic signal	Middlebelt Road at 5 Mile Road
STH 55-1	Traffic signal	Middlebelt Road at 6 Mile Road
STH 55-2	Traffic signal	Middlebelt Road at 7 Mile Road
STH 56-1	Pedestrian related	Middlebelt Road, at Conrail railroad structure
STH 56-2	Pedestrian Related	Inkster Road, at Conrail railroad structure
STH 57	Turn lane	13 th Street, from Leeson Avenue to GLC RR tracks
STH 58-1	Roadway departure & Clearzone	First Avenue
STH 58-2	Roadway departure & Clearzone	Adams/Hueber Street
STH 58-3	Roadway departure & Clearzone	Ford Avenue
STH 59	Vertical Alignment	Reams Road at Pickerel Lake Road
STH 60	Roadway departure & Clearzone	Lake Mary Dr and CR -3 at Hamilton Creek & the North Branch of the Ford River
STH 61	Vertical Alignment	Crahen Avenue at Bradford Street
STH 62	Traffic signal	Southfield Road at 13 Mile Road
STH 63	Roadway departure & Clearzone	CR 437 at FFRD 2213
STH 64	Vertical Alignment & Roadway Departure & Clearzone	CR 669 (Old Swamp Road) at 40 th Street
STH 65	Roadway departure & Clearzone	66 th Street at CR378
STH 66	Traffic signal	Silver Lake Road at Zimmerman Road
STH 67	Roadway departure & Clearzone	9 locations

HRRR 1	Roadway Departure & Clearzone	Conners Road from Miller Road northerly to a point 0.8 miles north of Miller Road.
HRRR 2	Roadway Improvement	Cherry Avenue (CR 593) from the Torch River R northerly to Cairn Highway
HRRR 3	Sign related	Reynolds R between Fewin R and CR-610, in Almira and Inland Twp's
HRRR 4-1	Intersection improvement	Grand Blanc Road at Duffield Road
HRRR 4-2	Intersection improvement	Grand Blanc Road at Morrish Road and
HRRR 4-3	Intersection improvement	Seymour Road at Baldwin Road
HRRR 5-1	Roadway Departure & Clearzone	Dodge Road from Dosh Road to Oak Road
HRRR 5-2	Roadway Departure & Clearzone	McKinley Rd from 1/4 mile south of Dodge Rd to 1/4 mile north of Dodge Rd
HRRR 6	Roadway Departure & Clearzone	Haynor Road north of Rector Road
HRRR 7-1	Roadway Improvement	Vaughn Road from Davision Road to Indian Lake Road
HRRR 7-2	Roadway Improvement	Plank Road from Old State Road to M-55
HRRR 8	Vertical Alignment	18 Mile Road at Pine Lake Avenue
HRRR 9	Intersection Improvement	Lake Pleasant Road at Lum Road
HRRR 10-1	Roadway Departure & Clearzone	Genesee Road from Maple Leaf Road to Hadley Road
HRRR 10-2	Roadway Departure & Clearzone	Hadley Road from Lippencott Road to Genesee Road
HRRR 10-3	Roadway Departure & Clearzone	Burnside Road from Oliver Road to Laur Road
HRRR 11-1	Intersection Improvement	Ida Center Road at Secor Road
HRRR 11-2	Intersection Improvement	Albain Road at Lewis Avenue
HRRR 12	Vertical Alignment	Sidney Road at Fitzner Road
HRRR 13	Roadway Departure & Clearzone	CR 459 from MP 2.633 to MP 3.24
HRRR 14	Roadway Departure & Clearzone	Wadsworth Road from Gera Road to Block Road
HRRR 15	Intersection Improvement	CR 388 (Phoenix Road) at 62 nd Street
HRRR 16	Roadway improvement	Litchfield Road from Cobb Lake Road to 1/2 mile west of Rowe Road
HRRR 17	Vertical Alignment	North Adams Road at Waldron Road
HRRR 18	Intersection improvement	Frost Road at Orr Road

Highlighted locations had limited or no data available and have been excluded from the analysis

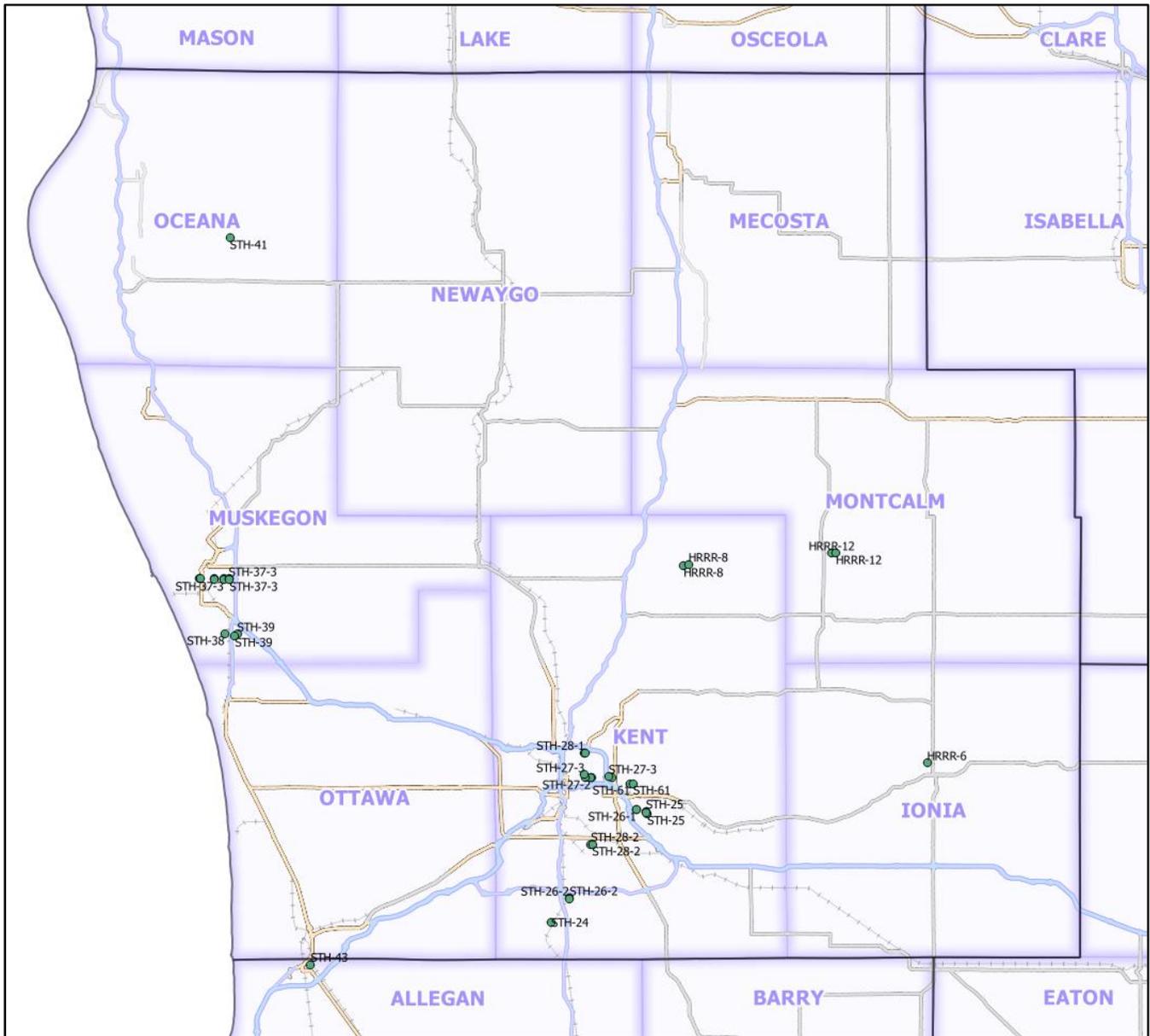


Figure 2 - Grand Region Project Locations

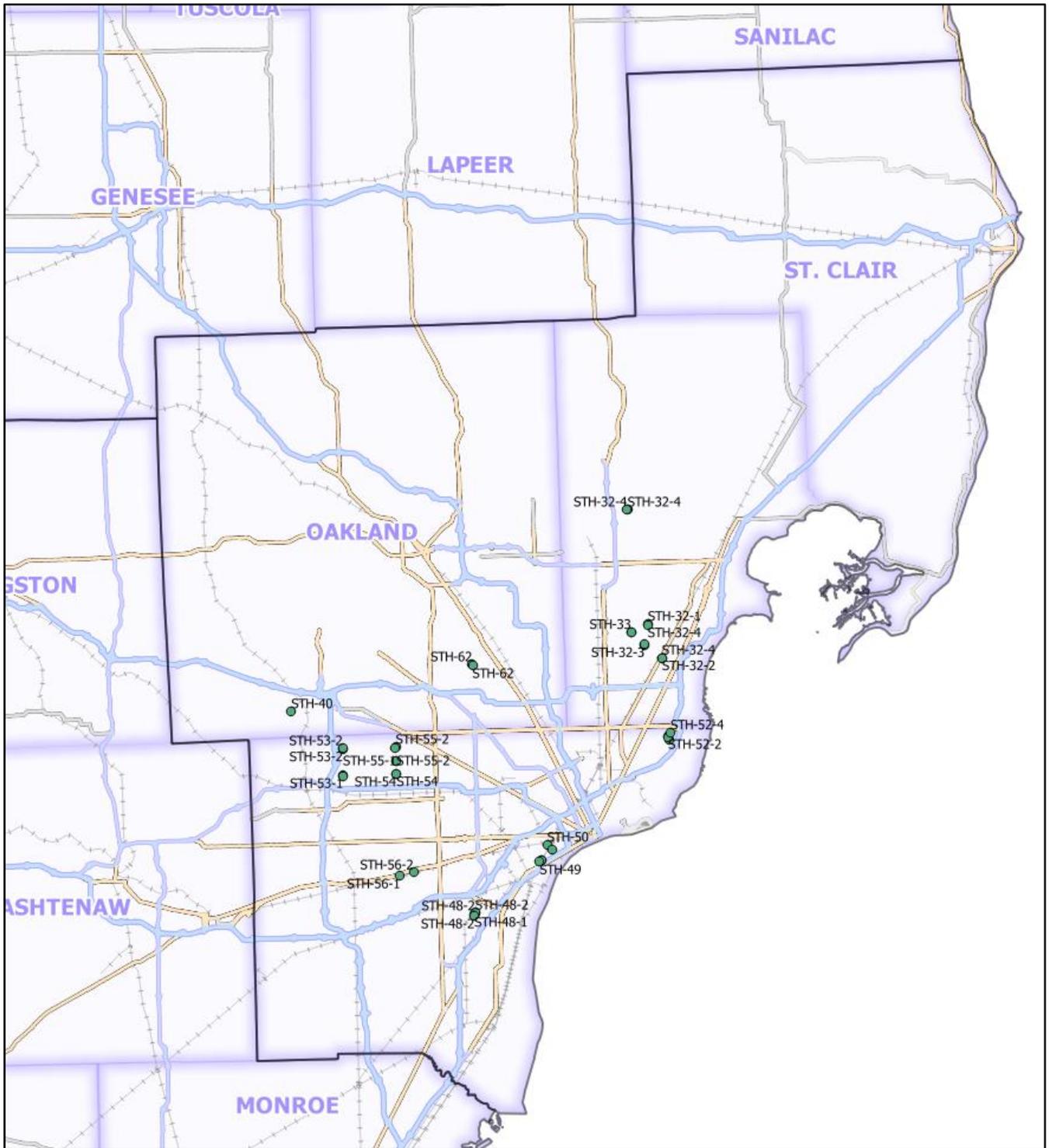


Figure 3 - Metro Region Project Locations

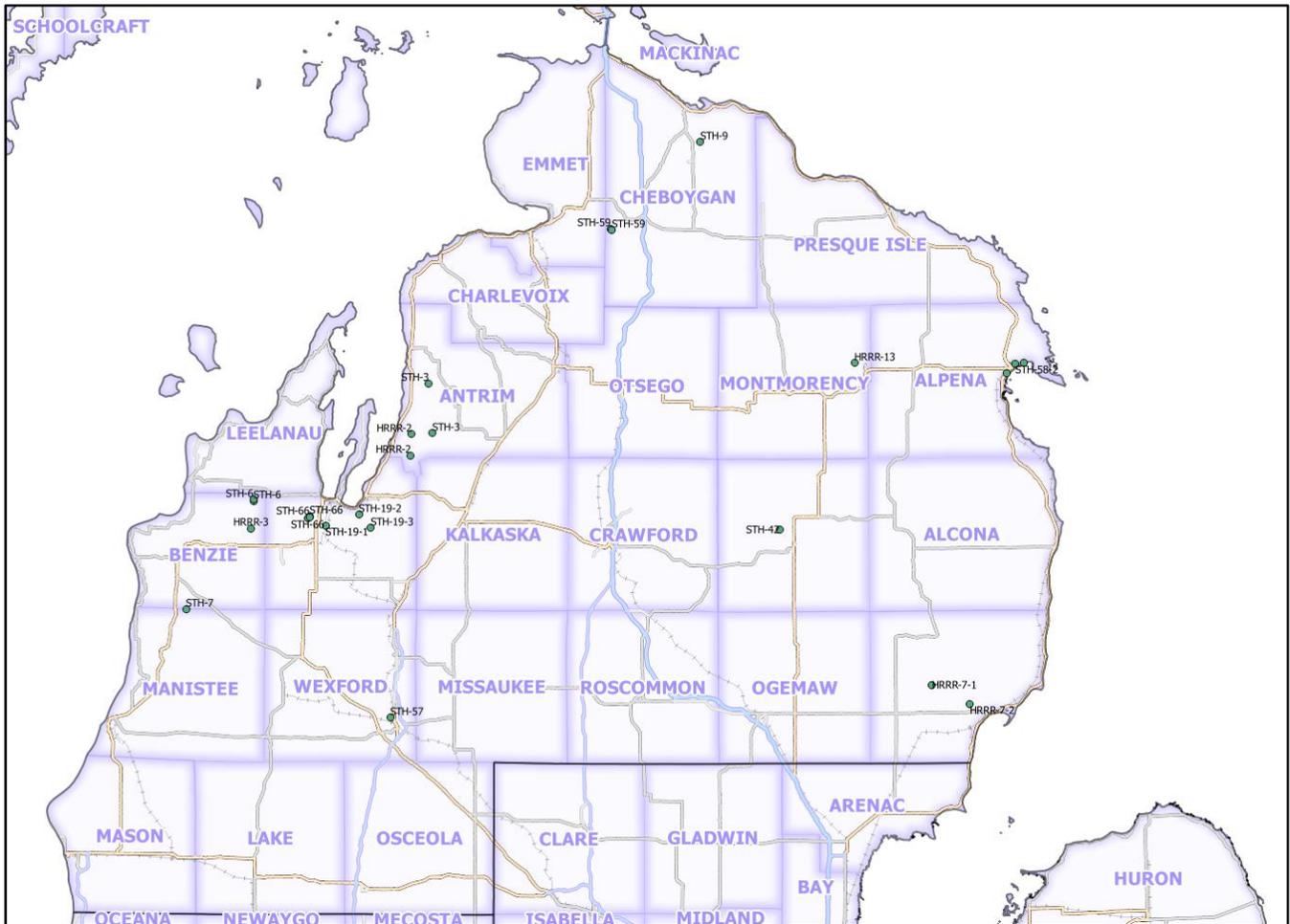


Figure 4 - North Region Project Locations

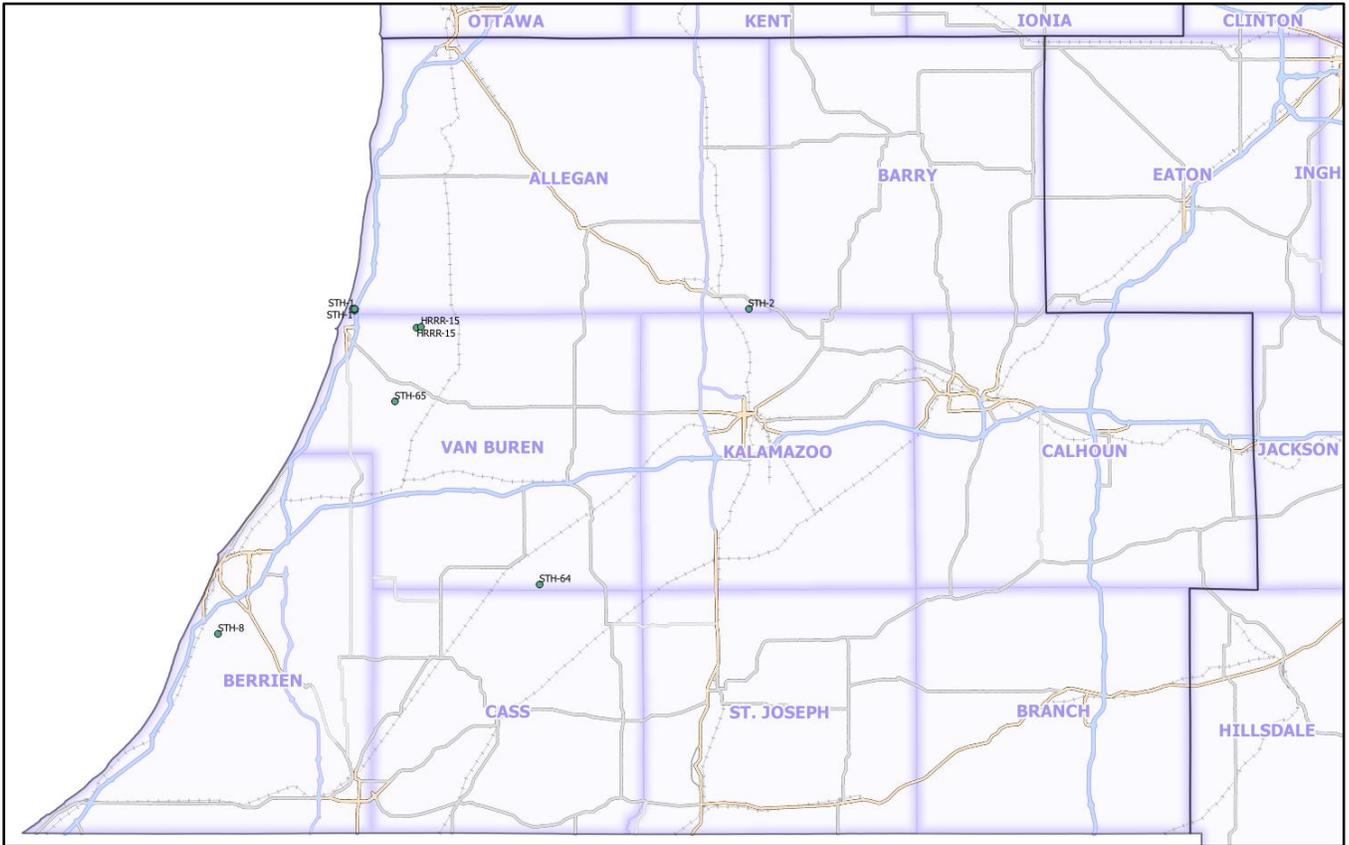


Figure 5 - Southwest Region Project Locations

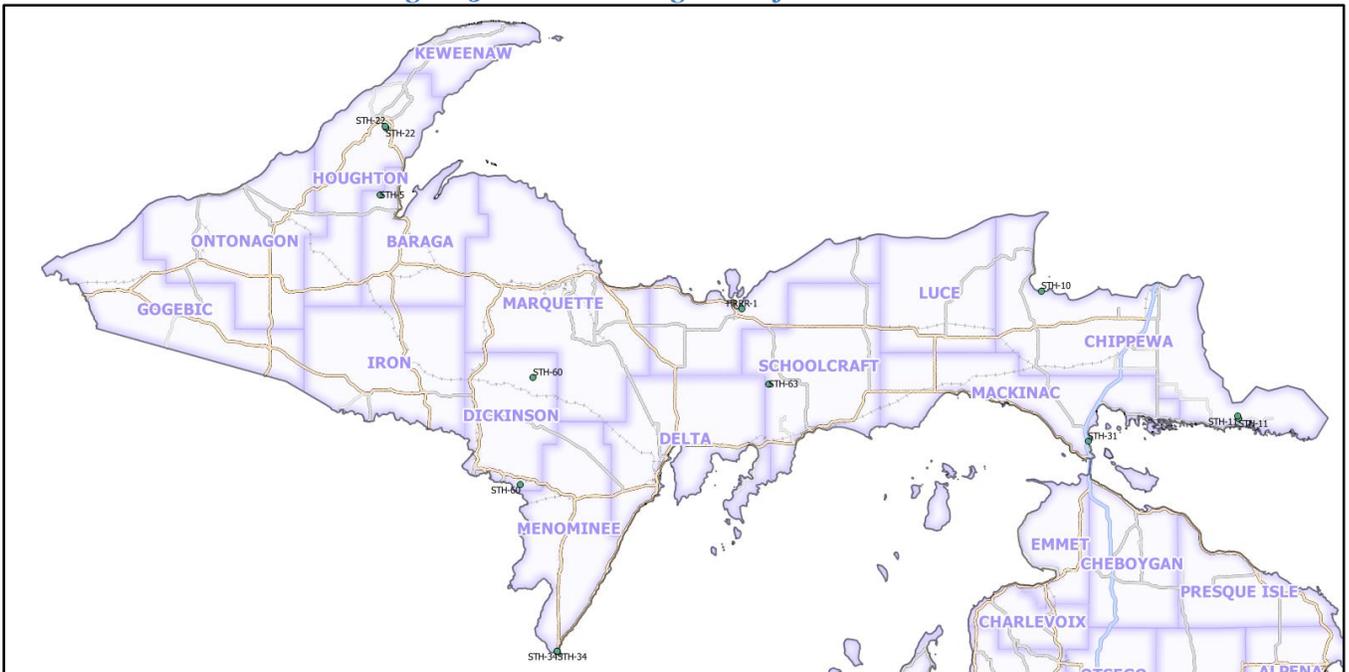


Figure 6 - Superior Region Project Locations

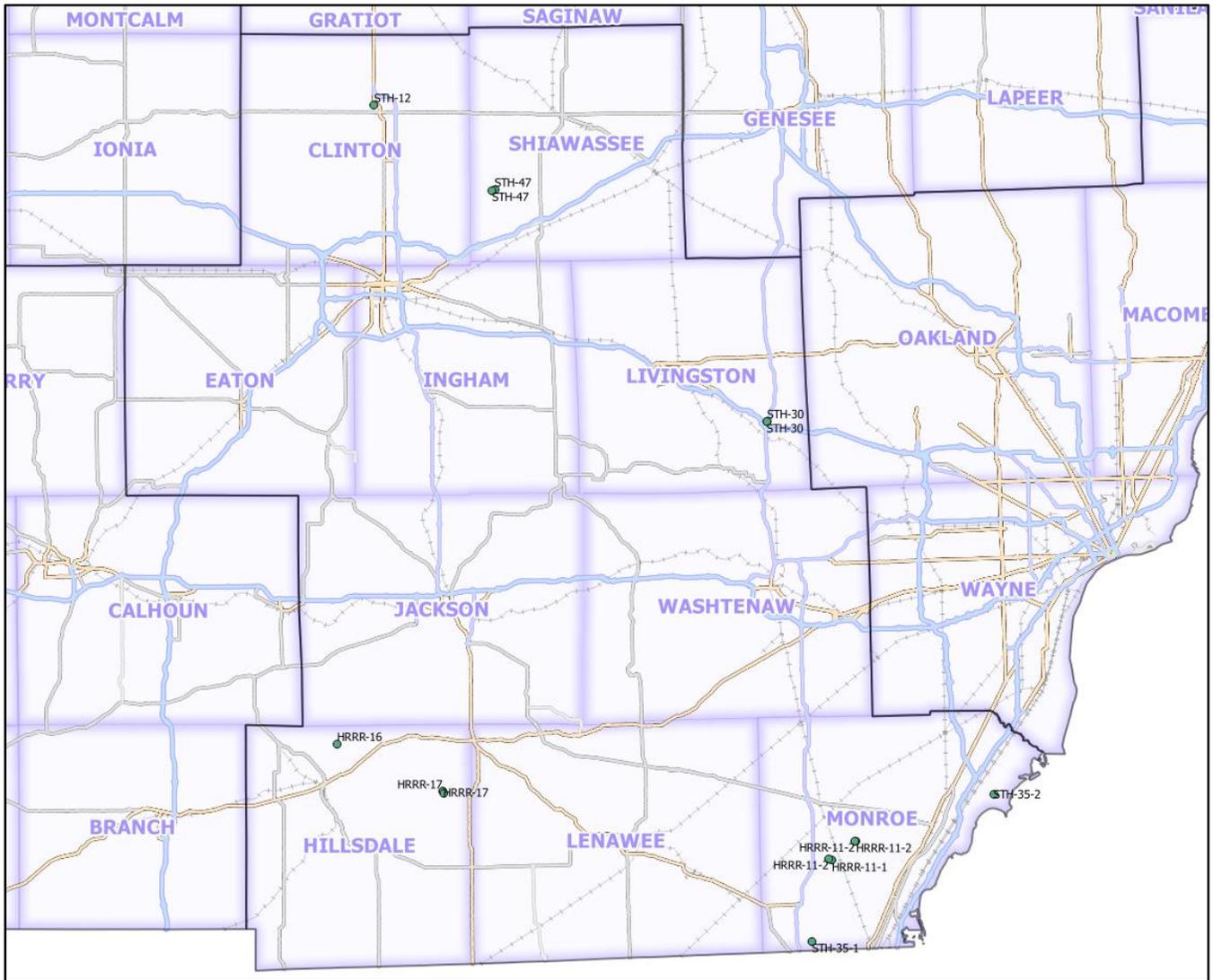


Figure 7 - University Region Project Locations

2 Study Objectives

The purpose of this before and after safety study is outlined as follows:

- Determine the effectiveness of the funded projects by comparing before and after crash and injury data,
- Determine the effectiveness of the selected treatments to reduce crashes and injuries in the before and after periods; and
- Perform a benefit-cost analysis of specific countermeasures.

The results of the analysis outlined in this report are based upon the following parameters:

- Construction for each funded project was completed in the award year; and
- The before and after periods spanned 3 calendar years.

Table 3 - Example Study Dates

Before Study Dates	Project Funded	After Study Dates
January 1, 2007 – December 31, 2009	2010	January 1, 2011 – December 31, 2013

3 Crash Types

The crash types analyzed in the report follow those used by the Michigan UD-10 crash reporting form. Each crash is assigned a type based on the intended direction of travel of each involved vehicle. The following crash type definitions originate from the *State of Michigan UD-10 Traffic Crash Report Manual*. In addition to the ten (10) crash types identified by the State of Michigan's UD-10 crash reporting form, the following types are also recognized:

-
- | | |
|----------------------------------|--------------------|
| ➤ Miscellaneous Single Vehicle | ➤ Other Object |
| ➤ Miscellaneous Multiple Vehicle | ➤ Angle Drive |
| ➤ Other Drive | ➤ Dual Left Turn |
| ➤ Rear-End Drive | ➤ Dual Right Turn |
| ➤ Fixed Object | ➤ Angle Right Turn |
| ➤ Overturn | ➤ Parking |
| ➤ Hit Train | ➤ Pedestrian |
| ➤ Hit Parked Vehicle | ➤ Bicycle |
| ➤ Backing | ➤ Animal |
-

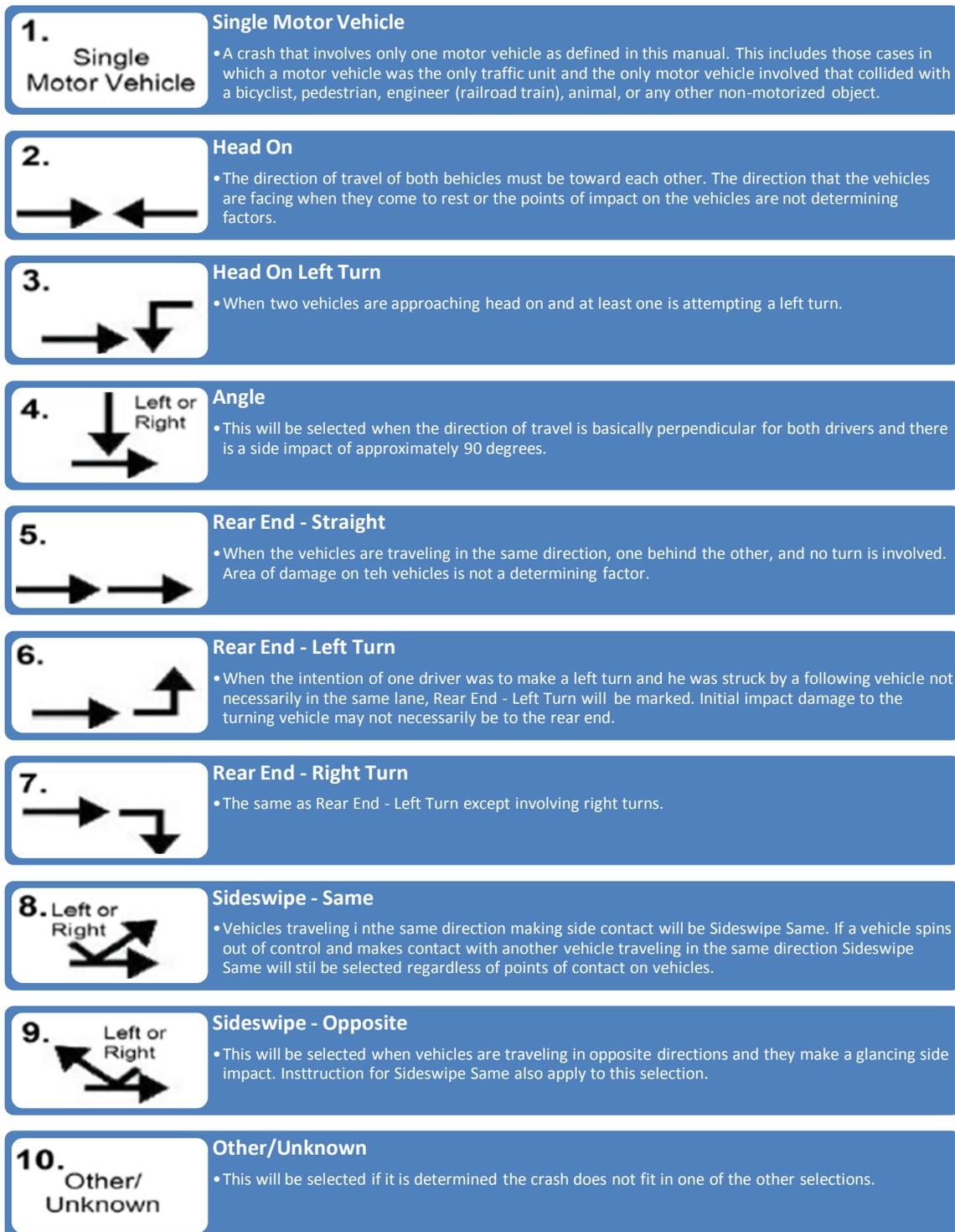


Figure 8 - Crash Type Definitions

4 Crash Severity

The crash severity levels considered in this analysis are defined in the *State of Michigan UD-10 Traffic Crash Report Manual*. The study considered crashes by total crashes, total targeted crashes, and total targeted KABC crashes. The severity levels are defined as follows:

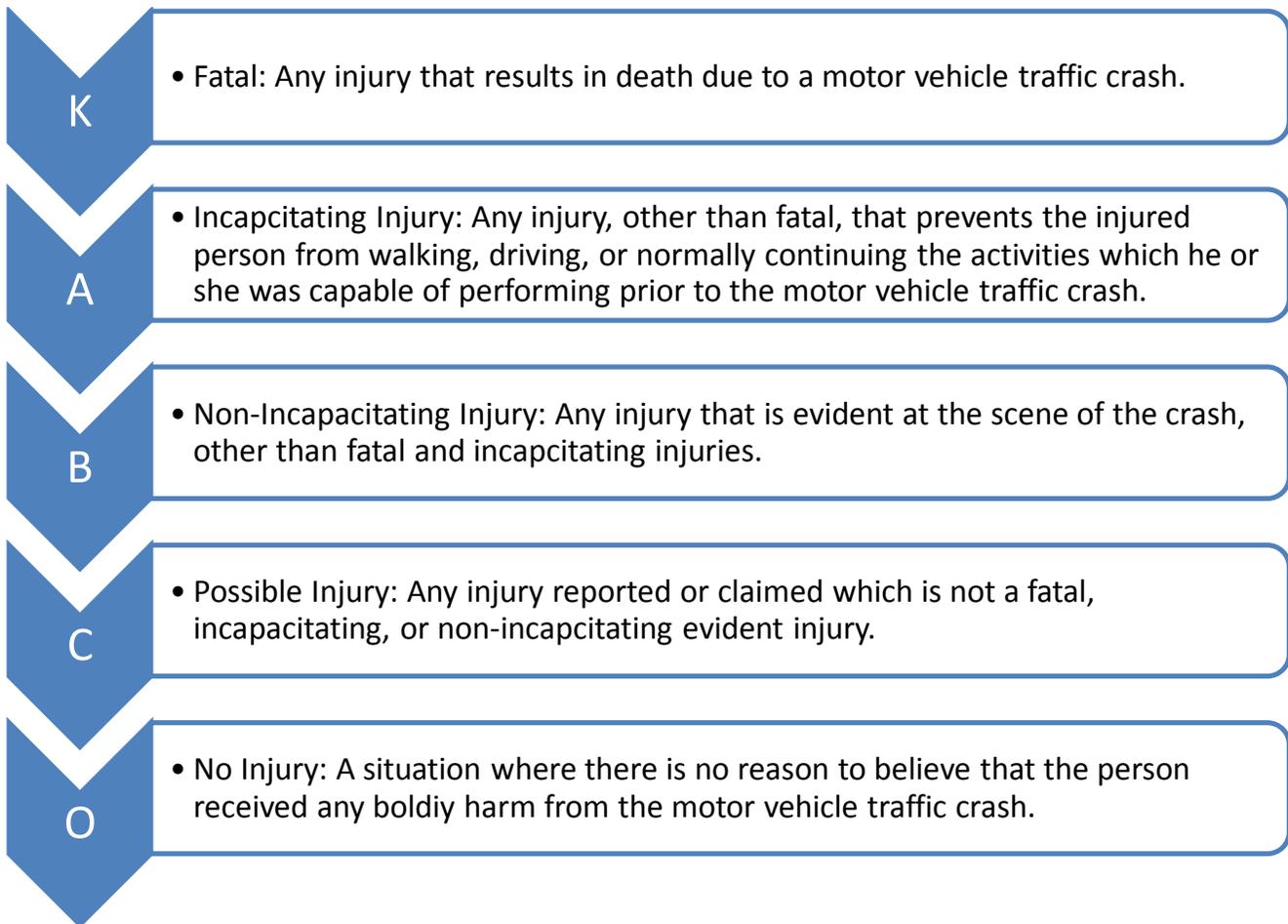


Figure 9 - Severity Definitions

5 Naïve Before and After

A naïve before and after analysis was used to compare the difference in the average frequency of various crash types and severities between the before and after project conditions. Summaries of the project are categorized by all projects, funding source, and project type.

5.1 Project Summary for All Projects

The 2010 Safety Program was reviewed as a whole to determine if there were declines in the overall crash and injury rates. The overall reduction in crashes was approximately 11%, with the reduction in total injuries and fatalities at 13%. Significant reductions were achieved in Fatal (K) crashes, with a 65% reduction and Type A injury crashes, with a 42% reduction. The results of the analysis are summarized in Table 4 with the detailed analysis provided in the appendix.

Table 4 - Before and After for All Projects

Total Safety Program	Annual Average		Percent Reduction
	Before	After	
Fatalities (K)	5.7	2.0	64.9%
Type A Injuries	19.0	11.0	42.1%
Type B Injuries	44.7	43.6	2.5%
Type C Injuries	119.3	107.0	10.3%
Type O Crashes	606.6	545.4	10.1%
Total K, A, B & C Injuries	188.7	163.6	13.3%
Total Crashes	794.3	709	10.7%

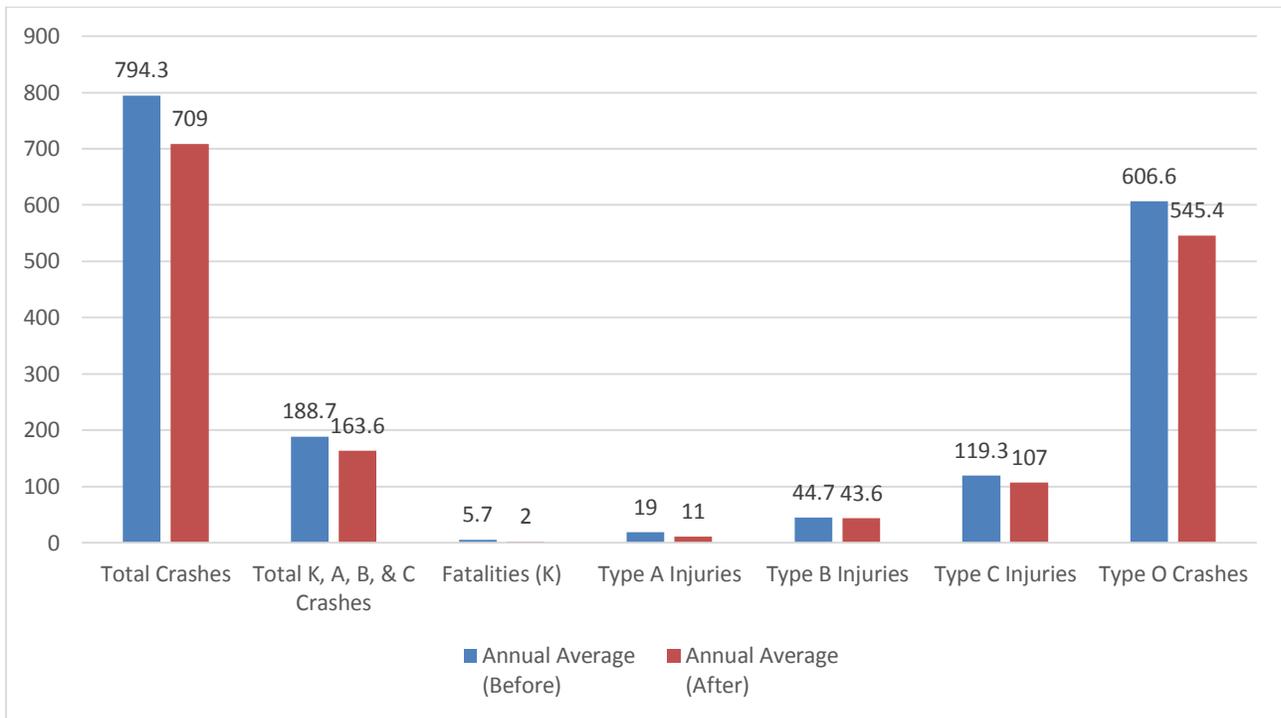


Figure 10 - Before and After for All Projects

5.2 Project Summary by Funding Program

The 2010 Safety Program was funded by two sources; the Surface Transportation Program: Safety Hazard Elimination (STH) and the High Risk Rural Road (HRRR) program. The STH program included 88 projects and the HRRR program included 25 projects. These programs were analyzed separately in order to provide a better understanding of how they performed.

The results of the analysis are summarized in Table 5 and Table 6 with the detailed analysis provided in the appendix.

Table 5 - Safety (STH) Funding Before and After Projects

Total Safety Program	Annual Average		Percent Reduction
	Before	After	
Total Crashes	737.0	660.0	10.4
Fatalities (K)	3.7	1.7	54.1
Type A Injuries	13.3	9.0	32.3
Type B Injuries	36.7	37.3	-1.6
Type C Injuries	112.0	99.3	11.3
Type O Crashes	571.3	512.7	10.3
Total K, A, B & C Injuries	165.7	147.3	11.1

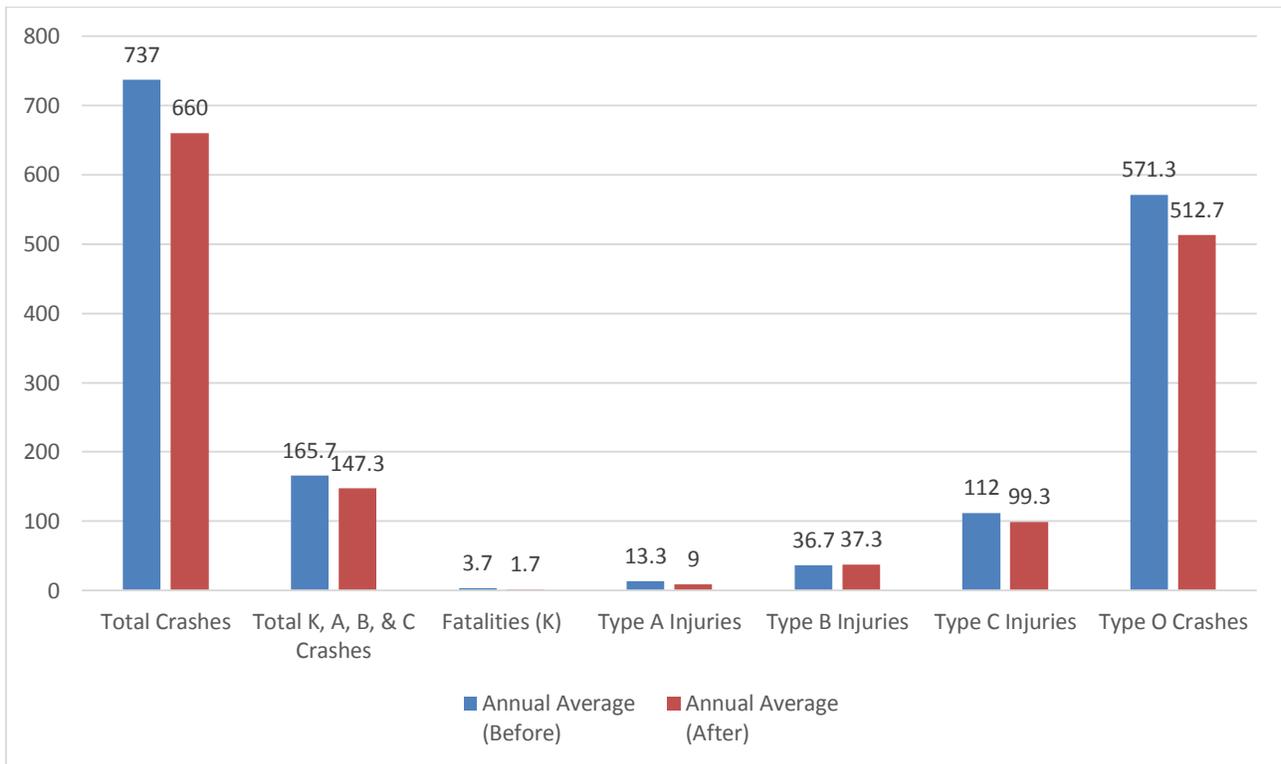


Figure 11 - Safety (STH) Funding Before and After Projects

As shown in the preceding table and chart the STH funded projects experienced an overall reduction in the number of total crashes. Most notably the projects saw a reduction in fatal and type A crashes of 54% and 32% respectively. The following table and chart provide the same information for HRRR projects.

Table 6 - High Risk Rural Roads (HRRR) Funding Before and After Projects

Total Safety Program	Annual Average		Percent Reduction
	Before	After	
Total Crashes	57.3	49.0	14.5
Fatalities (K)	2.0	0.3	85.0
Type A Injuries	5.7	2.0	64.9
Type B Injuries	8.0	6.3	28.8
Type C Injuries	7.3	7.7	-1.5
Type O Crashes	34.3	32.7	4.7
Total K, A, B & C Injuries	23.0	16.3	29.1

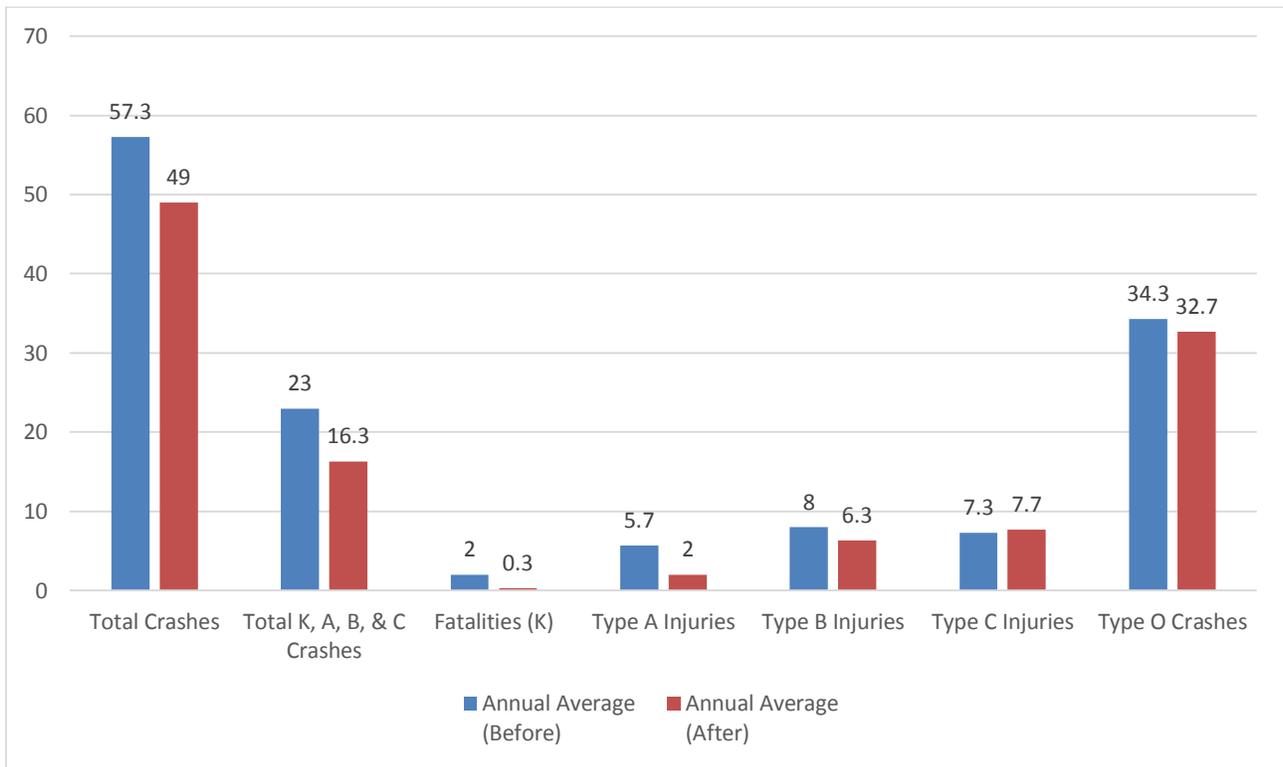


Figure 12 - High Risk Rural Roads (HRRR) Funding Before and After Projects

The projects funded through the HRRR program also saw an overall reduction in the number of total crashes. While there was a lower number of crashes during the before and after period as compared to the STH projects, the HRRR projects generally saw a greater percent decrease.

5.3 Project Summary by Grouping

In addition to analyzing each program as a whole, each project was placed into a grouping with other similar project types. In this way general project types could be evaluated in terms of collision reduction. Each of the following groupings were developed based on a review of each project conducted under either the STH or HRRR programs. This was done to improve the statistical significance in the analysis. Additionally, specific crash types were identified for each project groupings to focus on those collisions which should be most directly impacted by the improvement. An overview of the analysis for each grouping is included here with more detailed information provided in the Appendix.



Figure 13 - List of Project Groupings

5.3.1 Intersection Improvement

Projects which resulted in significant geometric or operational changes to an intersection fell under the intersection improvement category. Between the STH and HRRR funding programs there were a total of 19 intersection improvement projects. Some work done under this category included the installation of roundabouts, intersection sight distance improvements, and construction of concrete medians and attenuators. The following tables and charts provide a brief overview of the reported crash reductions across all 19 locations. Additional detail is available in the Appendix.

Table 7 - Intersection Improvement Before and After – Total Target Crashes

Crash Type	Annual Average		Percent Reduction
	Before	After	
Angle – Straight	20.3	11.3	44.3
Angle – Turn	4.7	4.0	14.9
Head On	0.3	1.7	Increase
Head On Left Turn	5.0	5.7	Increase
Rear End	36.0	34.3	4.5
Total	66.3	54.7	17.5

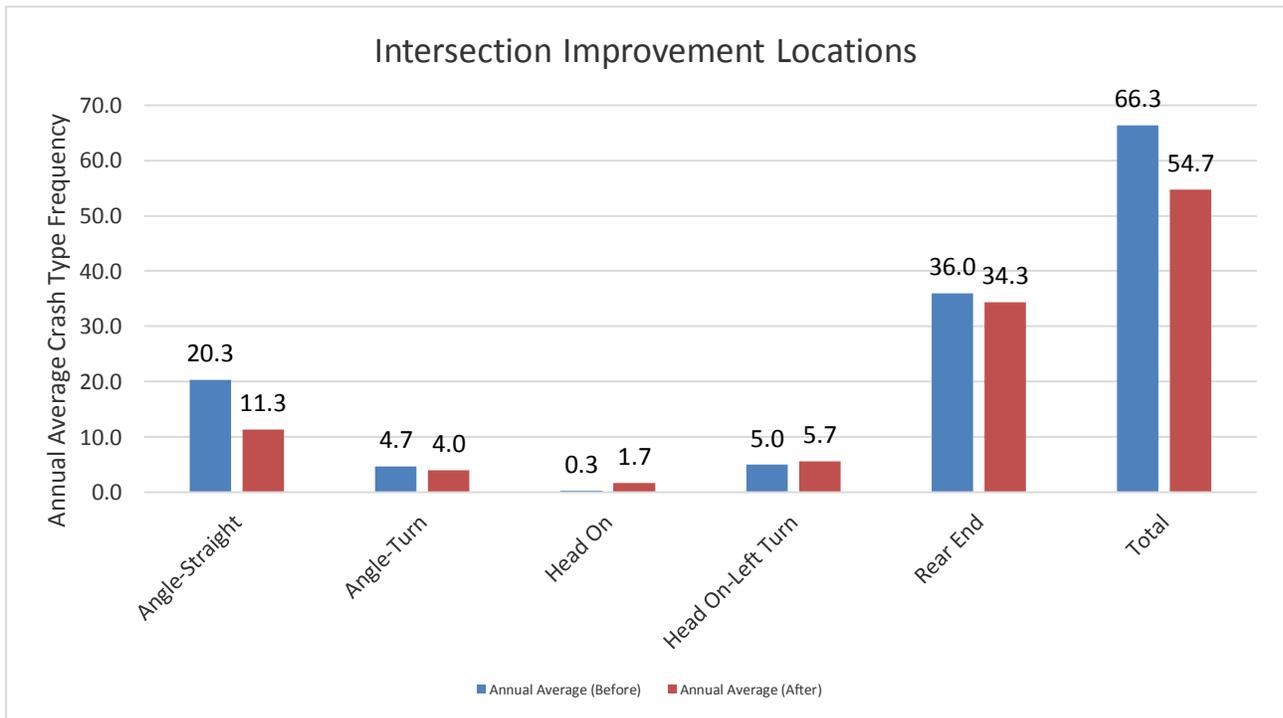
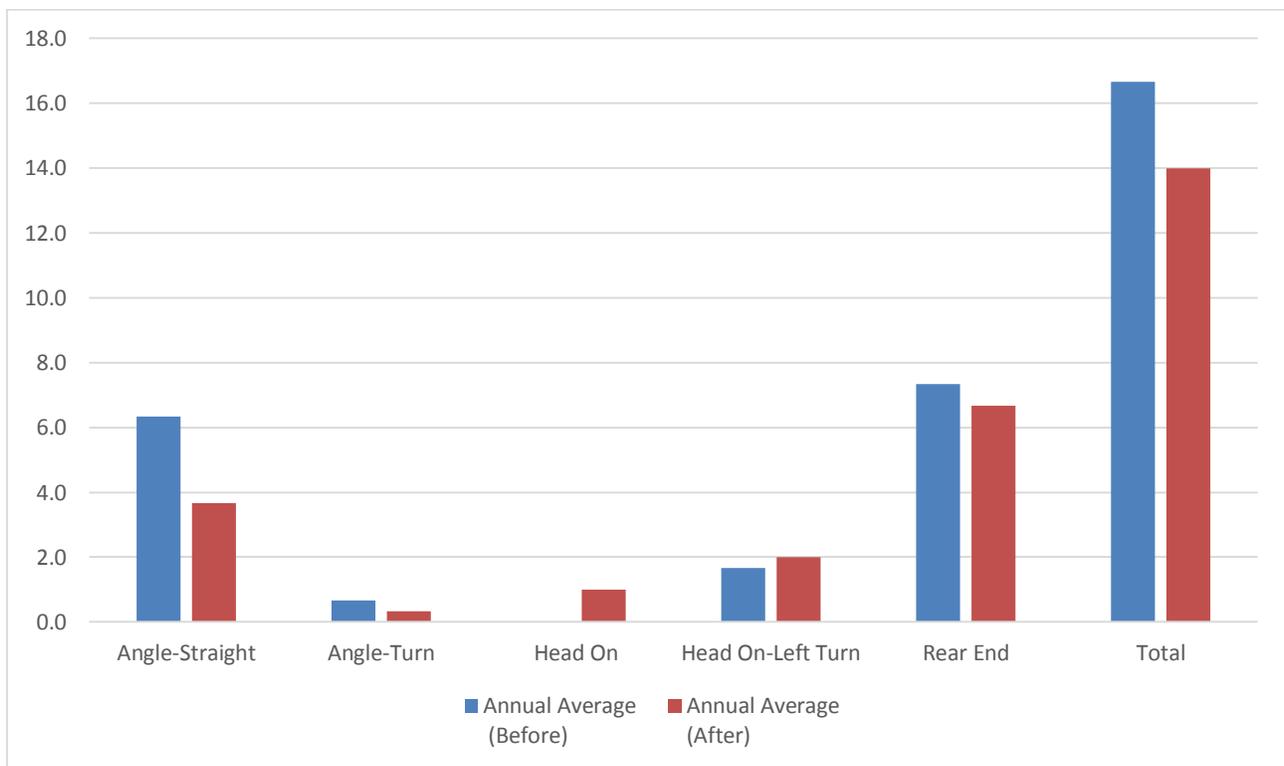


Figure 14 - Intersection Improvement Before and After – Total Target Crashes

Table 8 - Intersection Improvement Before and After – Fatal + Injury Target Crashes

Crash Type	Annual Average		Percent Reduction
	Before	After	
Angle – Straight	9.0	4.7	47.8
Angle – Turn	0.7	0.3	57.1
Head On	0.0	1.0	Increase
Head On Left Turn	1.7	2.0	Increase
Rear End	8.0	6.7	16.3
Total	19.4	14.7	24.2

**Figure 15 - Intersection Improvement Before and After – Fatal + Injury Target Crashes**

5.3.2 Pedestrian Related Improvement

Projects which involved the installation of pedestrian related safety features fell under the pedestrian related improvement category. This included features such as mid-block crossings and various sidewalk improvements. Three projects from the STH funding program were categorized as pedestrian related improvements. The following tables and charts provide a brief overview of the reported crash reductions across these locations with additional details available in the Appendix.

Table 9 - Pedestrian Related Improvement Before and After – Total Target Crashes

Crash Type	Annual Average		Percent Reduction
	Before	After	
Bicyclist Involved	0.3	1.0	Increase
Pedestrian Involved	0.7	1.3	Increase
Total	1.0	2.3	Increase

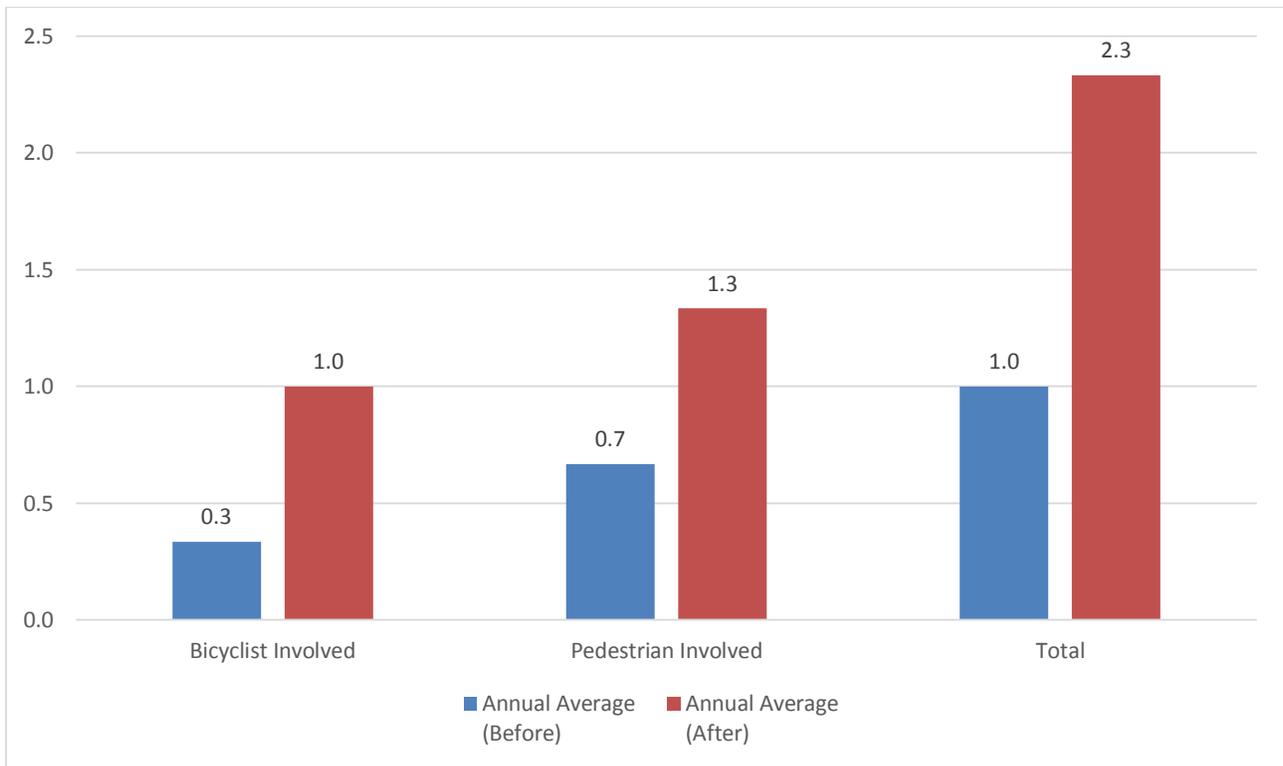
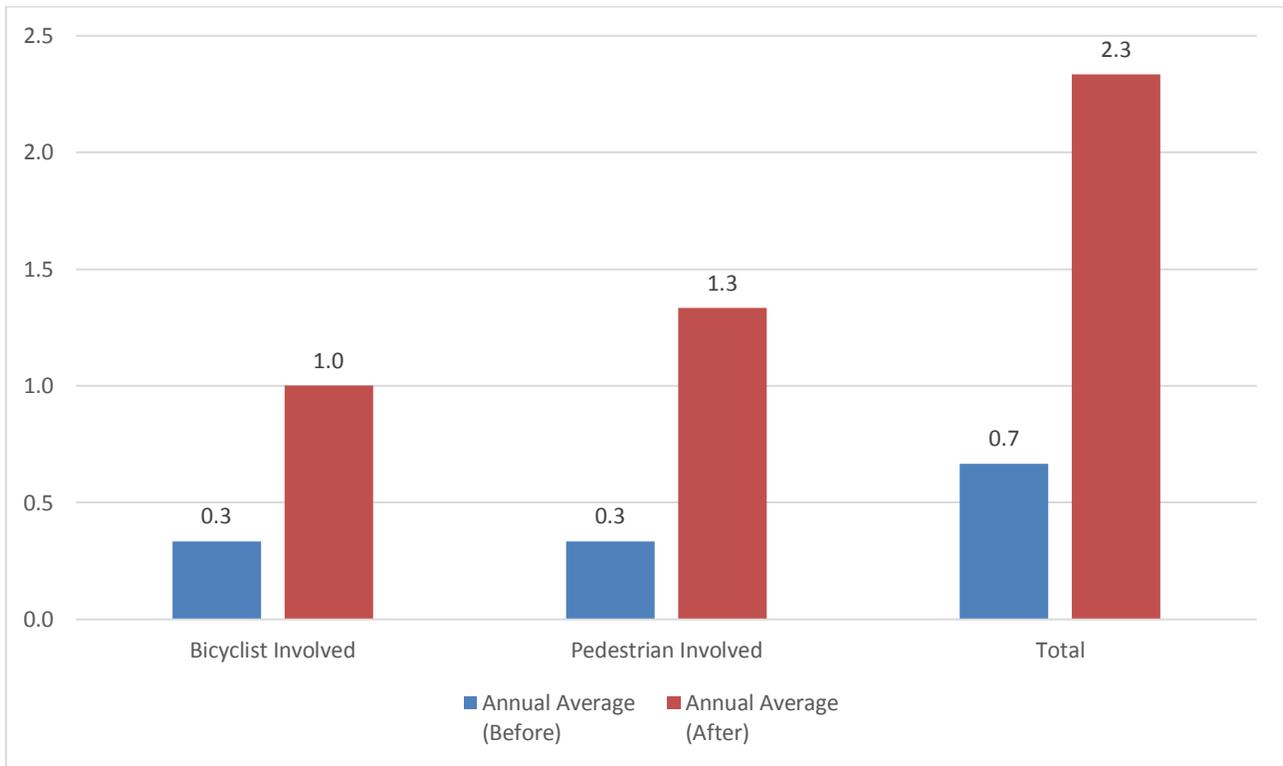


Figure 16 - Pedestrian Related Improvement Before and After – Total Target Crashes

Table 10 - Pedestrian Related Improvement Before and After – Fatal + Injury Target Crashes

Crash Type	Annual Average		Percent Reduction
	Before	After	
Bicyclist Involved	0.3	1.0	Increase
Pedestrian Involved	0.3	1.3	Increase
Total	0.7	2.3	Increase

**Figure 17 - Pedestrian Related Improvement Before and After – Fatal + Injury Target Crashes**

5.3.3 Roadway Departure & Clearzone

Projects which involved the installation of guardrail, the removal of trees or other objects in the right of way, and pavement surface treatments to help reduce the number of drivers leaving the travel way were grouped under roadway departure and clearzone improvements. Twenty-eight projects from the STH and HRRR funding programs involved this type of work and were categorized as roadway departure and clearzone improvement projects. The following tables and charts provide a brief overview of the reported crash reductions across these locations with additional details available in the Appendix.

Table 11 - Roadway Departure & Clearzone Before and After – Total Target Crashes

Crash Type	Annual Average		Percent Reduction
	Before	After	
Overturn	5.3	1.7	67.9
Single Motor Vehicle	28.0	19.3	31.1
Total	33.3	21.0	36.9

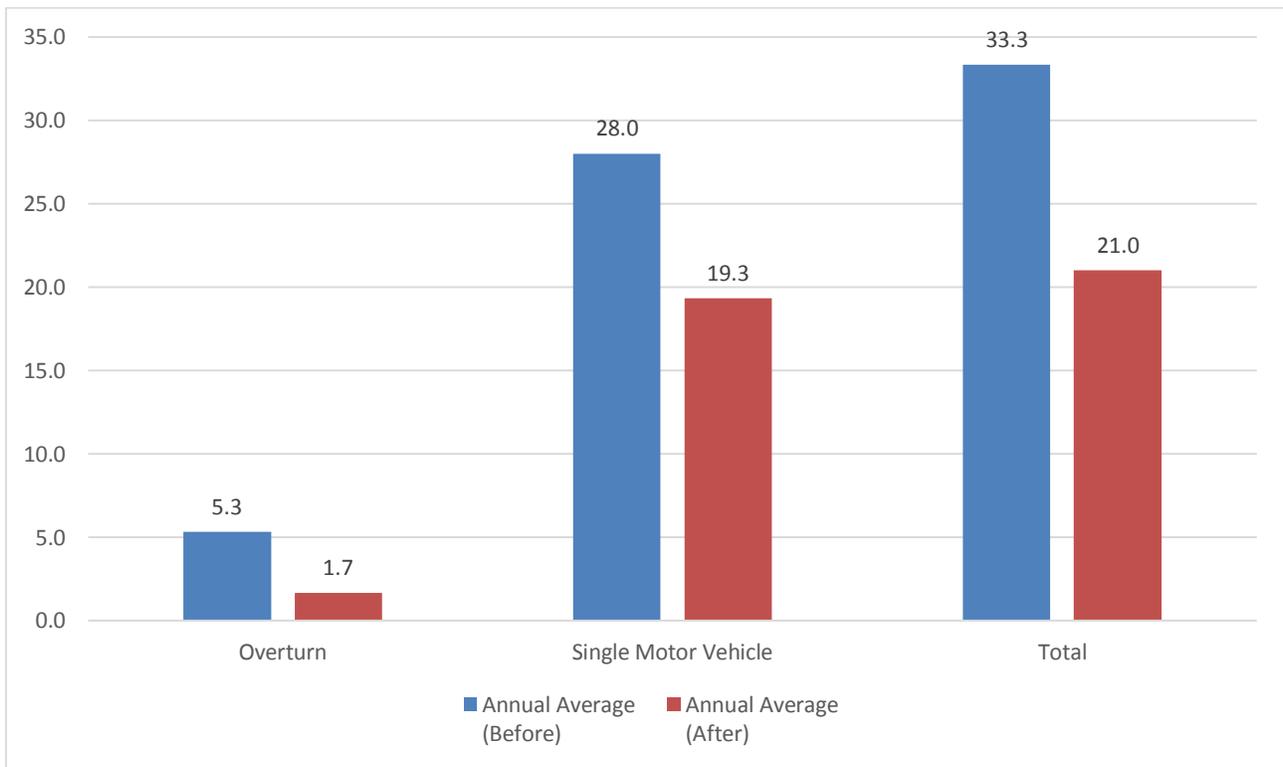
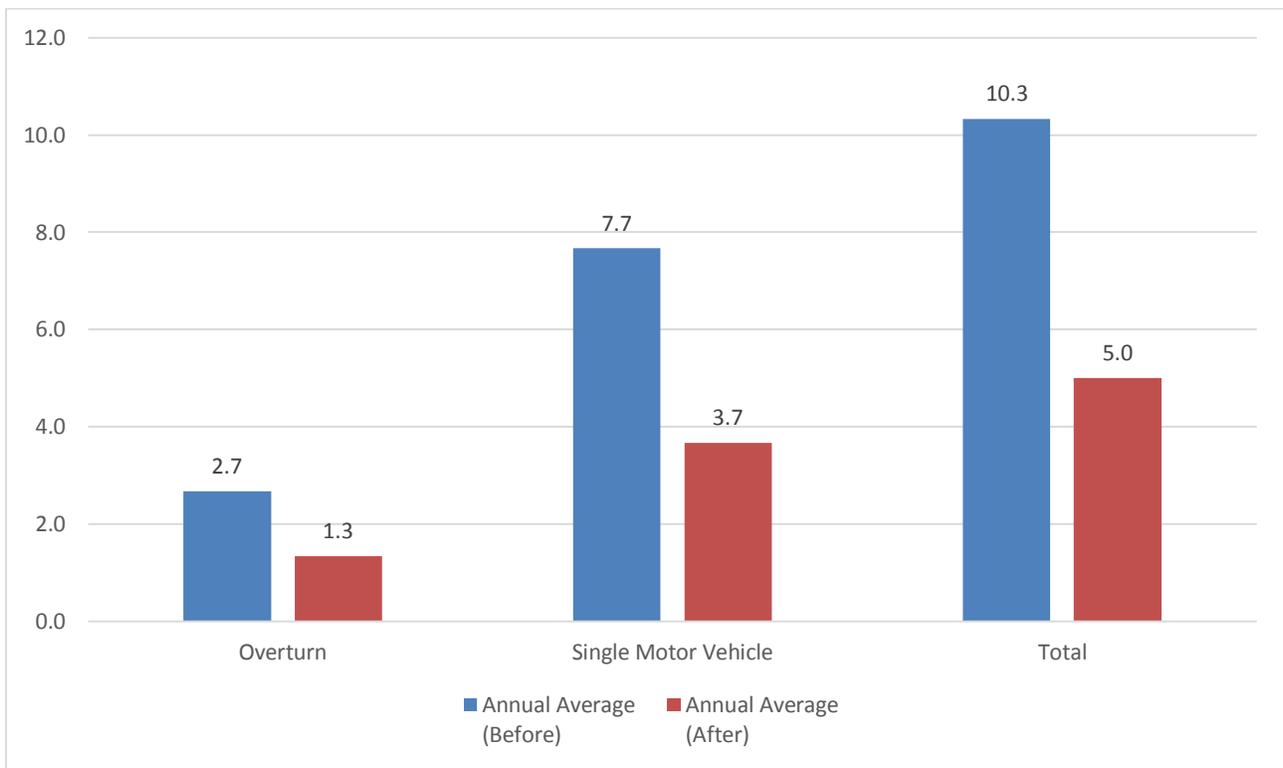


Figure 18 - Roadway Departure & Clearzone Before and After – Total Target Crashes

Table 12 - Roadway Departure & Clearzone Before and After – Fatal + Injury Target Crashes

Crash Type	Annual Average		Percent Reduction
	Before	After	
Overturn	2.7	1.3	51.9
Single Motor Vehicle	7.7	3.7	51.9
Total	10.3	5.0	51.5

**Figure 19 - Roadway Departure & Clearzone Before and After – Fatal + Injury Target Crashes**

5.3.4 Roadway Improvement

Projects which involved general improvements to the physical roadway, whether they included pavement surface improvements, installation of medians, or drainage improvements, were included under this category. Six projects from the STH and HRRR funding programs were categorized as roadway improvements. The following tables and charts provide a brief overview of the reported crash reductions across these locations with additional details available in the Appendix.

Table 13 - Roadway Improvement Before and After – Total Target Crashes

Crash Type	Annual Average		Percent Reduction
	Before	After	
Angle – Straight	2.3	2.0	13.0
Angle – Turn	1.0	0.3	70.0
Head On	1.3	0.0	100
Head On Left Turn	0.7	0.7	-
Rear End	7.0	3.3	52.9
Total	12.3	6.3	48.8

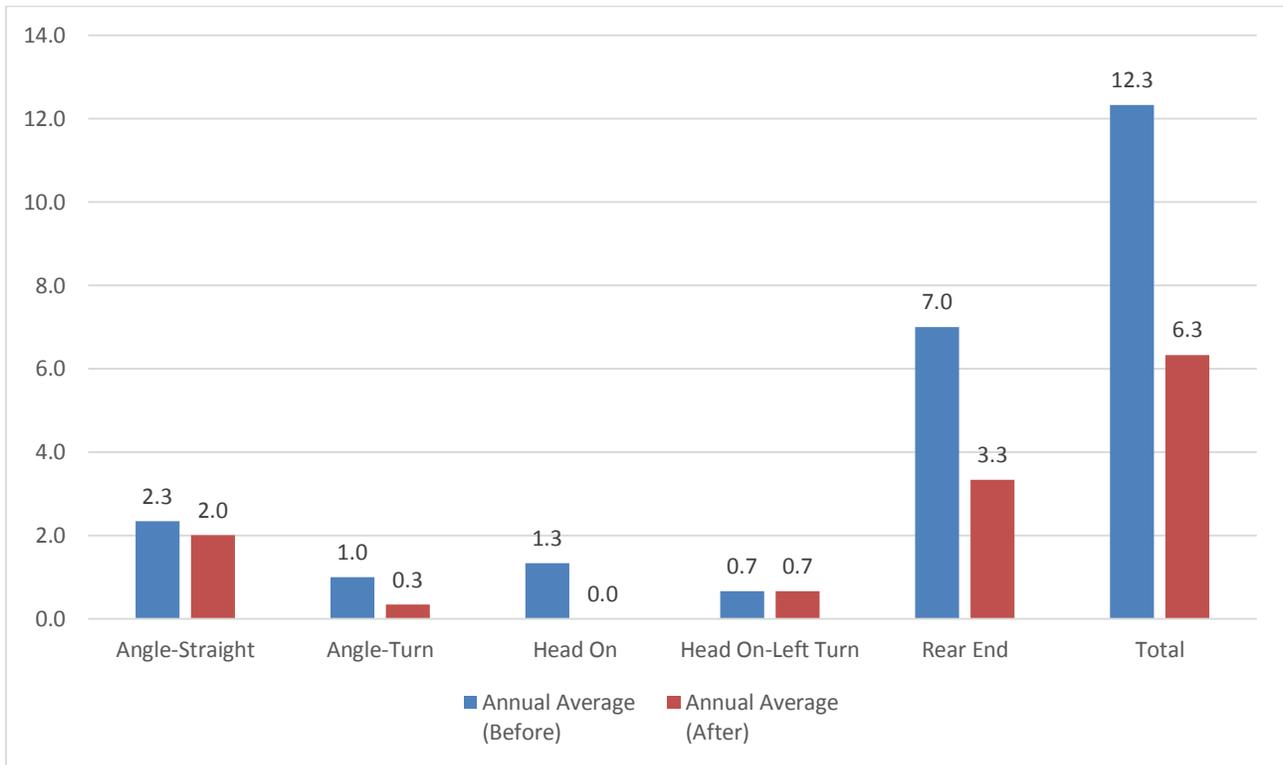
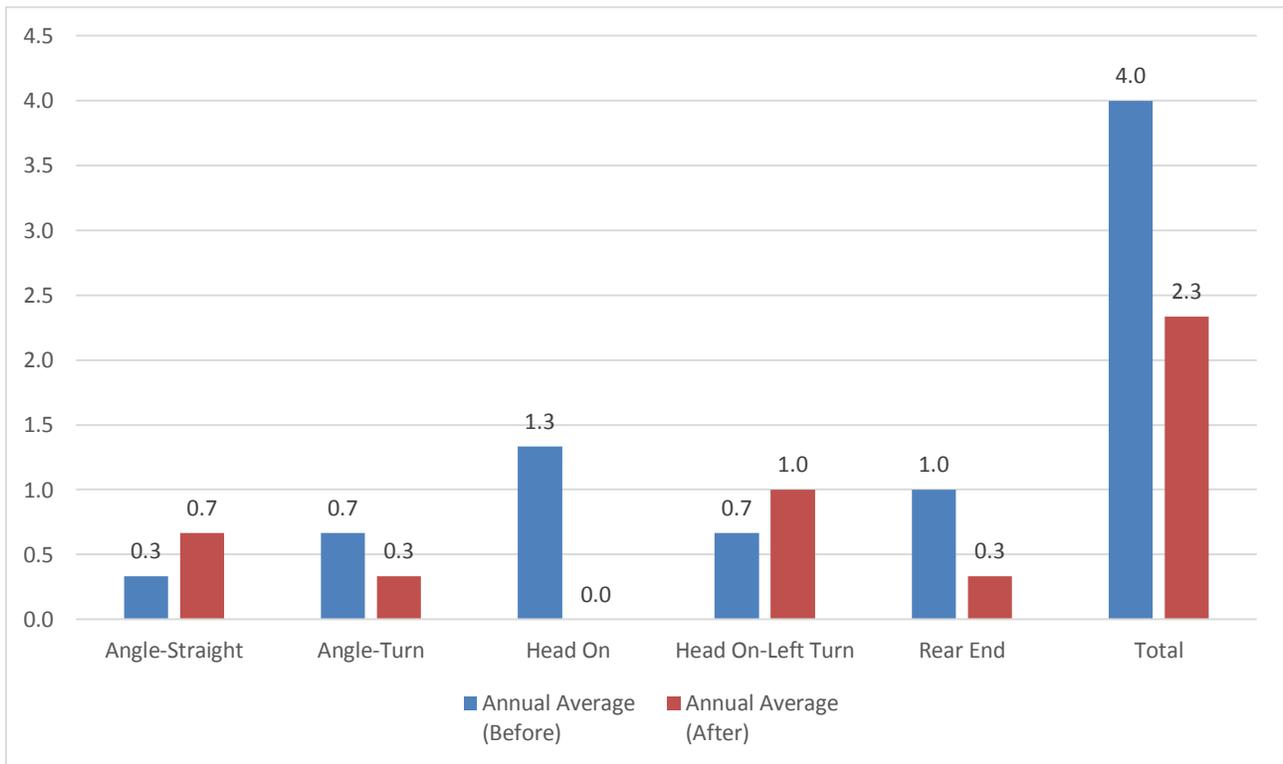


Figure 20 - Roadway Improvement Before and After – Total Target Crashes

Table 14 - Roadway Improvement Before and After – Fatal + Injury Targeted Crashes

Crash Type	Annual Average		Percent Reduction
	Before	After	
Angle – Straight	0.3	0.7	Increase
Angle – Turn	0.7	0.3	57.1
Head On	1.3	0.0	100
Head On Left Turn	0.7	1.0	Increase
Rear End	1.0	0.3	70.0
Total	4.0	2.3	42.5

**Figure 21 - Roadway Improvement Before and After – Fatal + Injury Targeted Crashes**

5.3.5 Sign Related Improvement

Projects which largely involved permanent signing installations or improvements were included in this category. Seven projects from the STH and HRRR funding programs were categorized as sign related improvements. The following tables and charts provide a brief overview of the reported crash reductions across these locations with additional details available in the Appendix.

Table 15 - Sign Related Improvement Before and After – Total Target Crashes

Crash Type	Annual Average		Percent Reduction
	Before	After	
Angle – Straight	5.0	2.3	54.0
Angle – Turn	0.0	0.7	Increase
Head On	2.0	1.0	50.0
Head On Left Turn	1.7	1.0	41.2
Other/Unknown	0.7	0.0	100
Overturn	3.3	3.7	Increase
Rear End	6.3	6.3	-
Sideswipe Opposite	0.3	1.7	Increase
Sideswipe Same	0.0	0.0	-
Single Motor Vehicle	16.0	20.7	Increase
Total	35.3	37.3	Increase

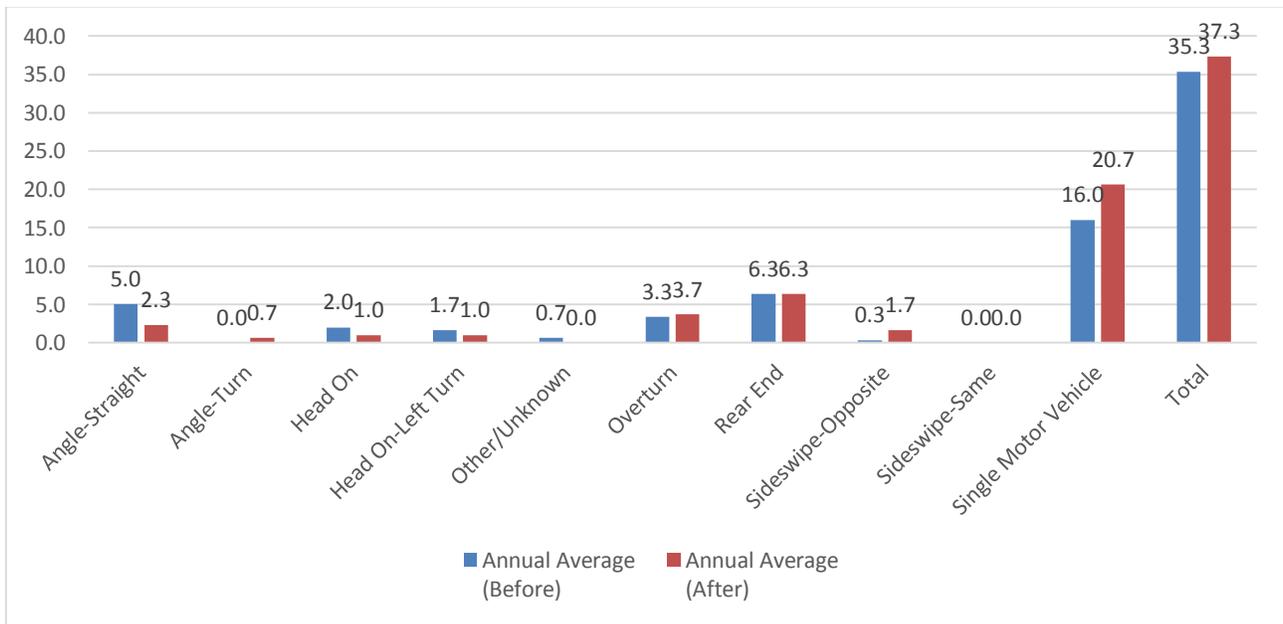


Figure 22 - Sign Related Improvement Before and After – Total Target Crashes

Table 16 - Sign Related Improvement Before and After – Fatal + Injuries

Crash Type	Annual Average		Percent Reduction
	Before	After	
Angle – Straight	2.0	0.3	85.0
Angle – Turn	0.0	0.3	Increase
Head On Left Turn	0.0	0.3	Increase
Head On	0.7	1.0	Increase
Other/Unknown	0.7	0.0	100
Overturn	1.0	1.3	Increase
Rear End	1.3	1.7	Increase
Sideswipe Opposite	0.0	0.3	Increase
Sideswipe Same	0.0	0.0	-
Single Motor Vehicle	6.0	5.3	11.7
Total	11.7	10.7	8.5

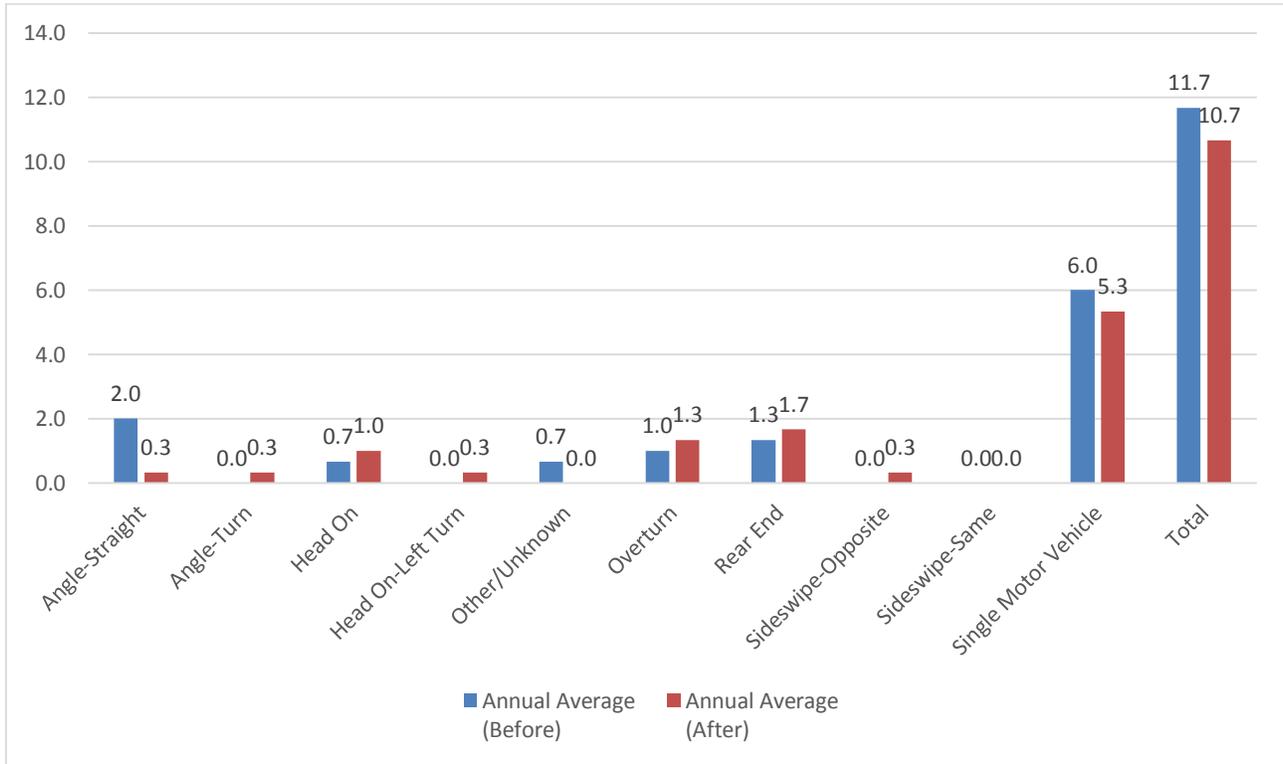


Figure 23 - Sign Related Improvement Before and After – Fatal + Injury Target Crashes

5.3.6 Traffic Signal Upgrades

Projects which involved the installation or upgrading of traffic signals at intersections were included in this category. Some of these tasks included the installation of overhead beacons, conversion to box span installations, and the installation of pedestrian countdown timers. Twenty-nine projects from the STH funding program were categorized as traffic signal upgrades. The following tables and charts provide a brief overview of the reported crash reductions across these locations with additional details available in the Appendix.

Table 17 - Traffic Signal Upgrades Before and After – Total Target Crashes

Crash Type	Annual Average		Percent Reduction
	Before	After	
Angle – Straight	66.0	57.0	13.6
Angle – Turn	14.7	12.3	16.3
Head On	2.3	3.0	Increase
Head On Left Turn	58.3	59.7	Increase
Rear End	154.7	167.7	Increase
Total	296	299.7	Increase

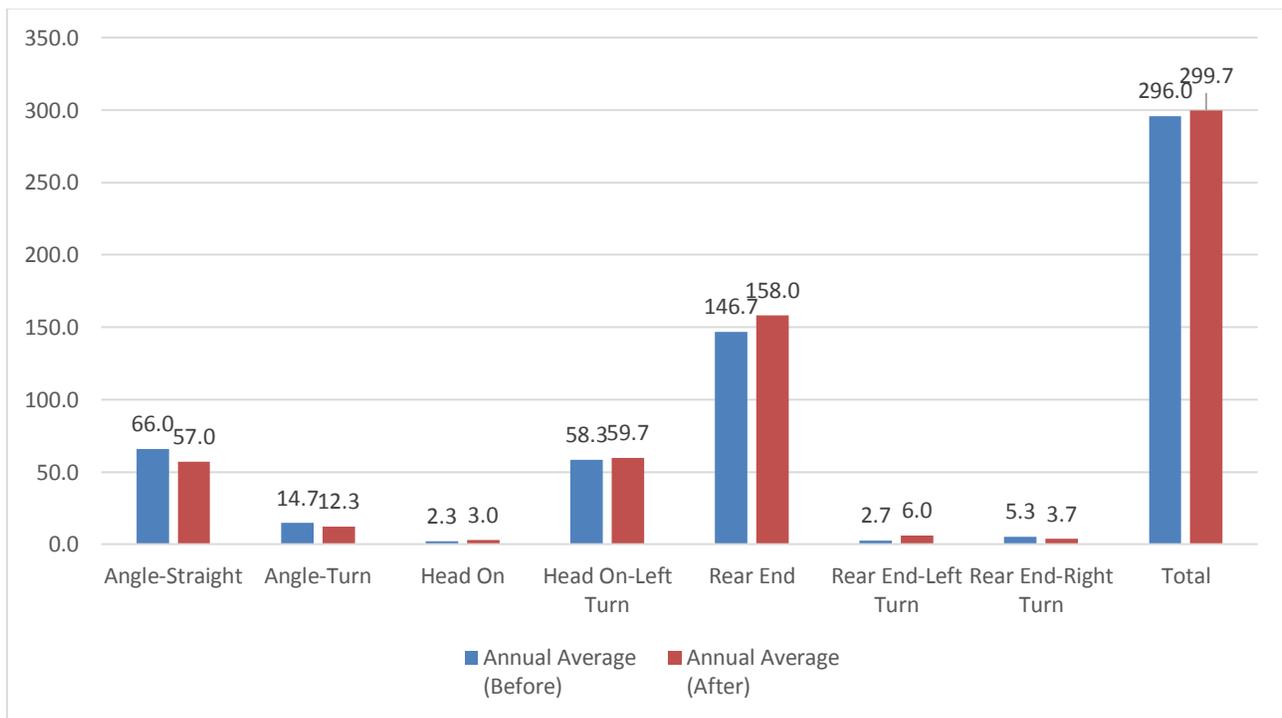


Figure 24 - Traffic Signal Upgrades Before and After – Total Target Crashes

Table 18 - Traffic Signal Upgrades Before and After – Fatal + Injury Target Crashes

Crash Type	Annual Average		Percent Reduction
	Before	After	
Angle – Straight	19.3	14.0	27.5
Angle – Turn	4.0	3.3	17.5
Head On	0.7	1.3	Increase
Head On Left Turn	17.3	18.3	Increase
Rear End	31.0	30.4	1.9
Total	72.3	67.4	6.8

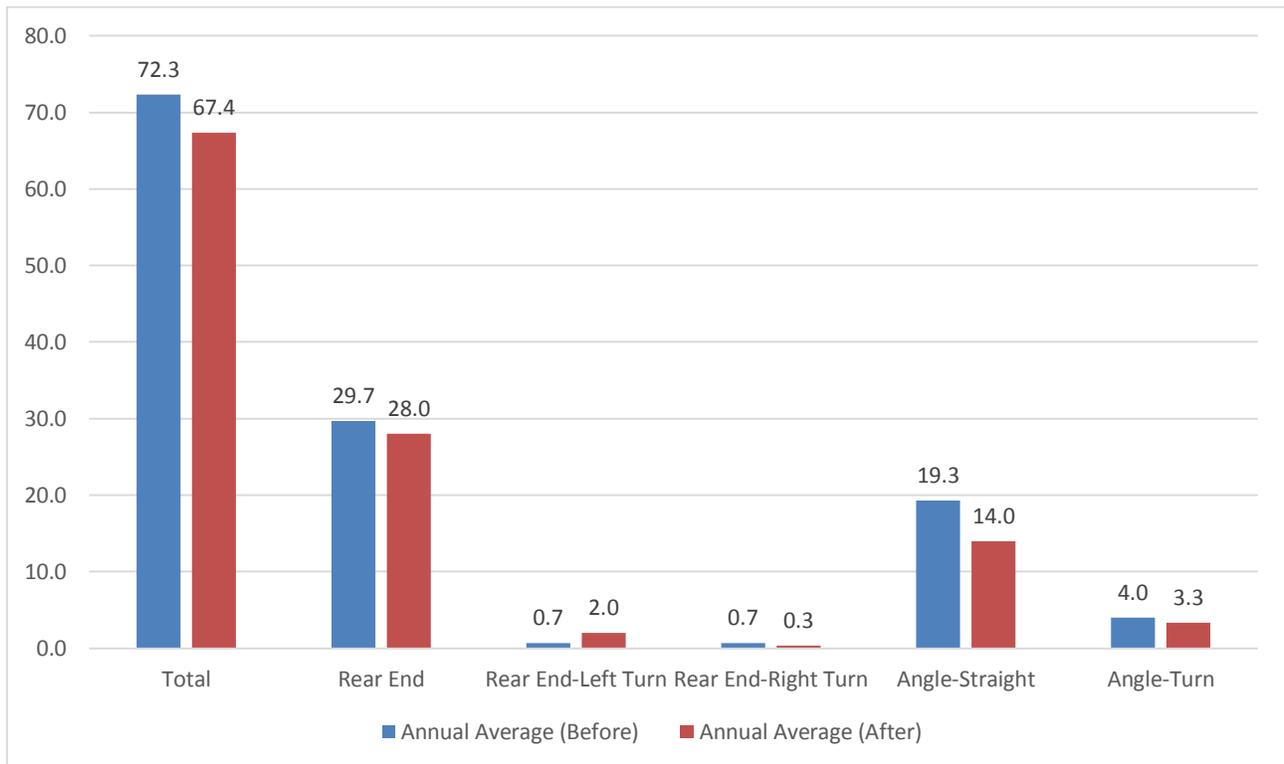


Figure 25 - Traffic Signal Upgrades Before and After – Fatal + Injury Target Crashes

5.3.7 Traffic Signal & Turn Lane Improvement

Projects which involving improvements traffics signals as well as turn lanes were included under this category. One project from the STH funding program fell under this grouping. Work done at this location included the addition of a center left turn lane in addition to signal upgrades, a pedestrian countdown timer, and ADA ramps. The following tables and charts provide a brief overview of the reported crash reductions across these locations with additional details available in the Appendix.

Table 19 - Traffic Signal & Turn Lane Improvement Before and After – Total Target Crashes

Crash Type	Annual Average		Percent Reduction
	Before	After	
Angle – Straight	4.7	2.3	51.1
Angle – Turn	1.0	0.0	100
Head On	0.0	0.0	-
Head On Left Turn	2.0	2.3	Increase
Rear End	4.3	5.3	Increase
Rear End Left Turn	0.3	0.0	-
Rear End Right Turn	0.3	0.3	-
Sideswipe Same	2.0	1.3	35.0
Total	14.7	11.7	20.4

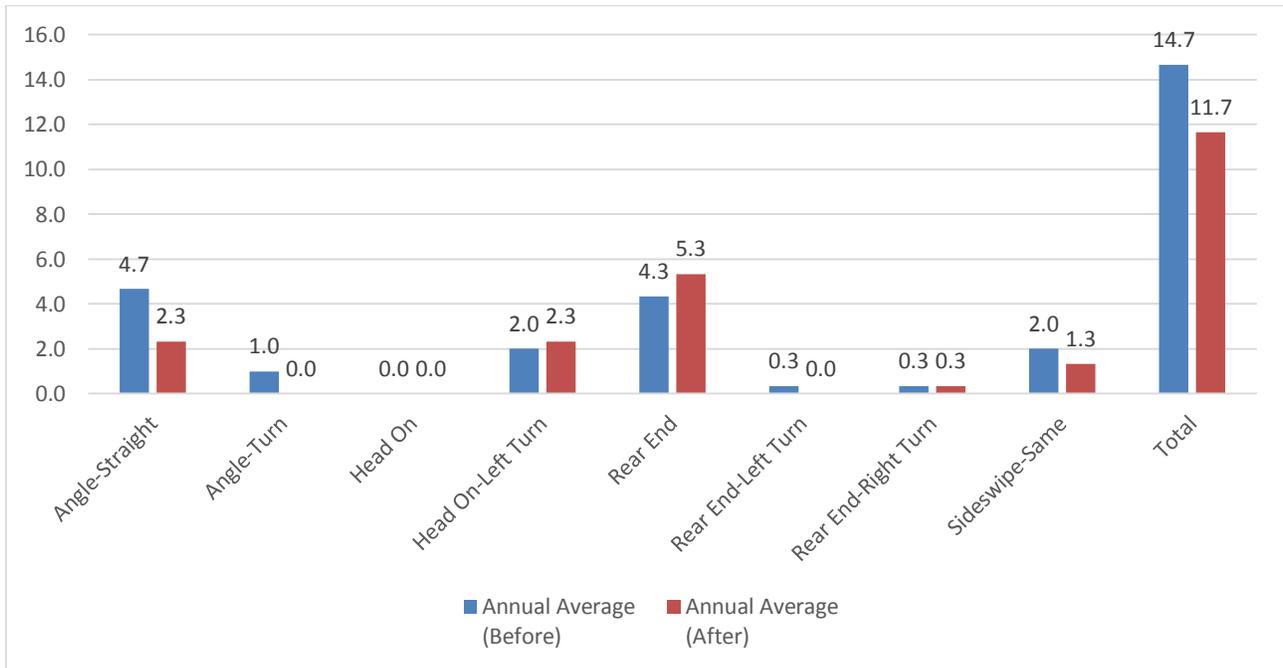


Figure 26 - Traffic Signal & Turn Lane Improvement Before and After – Total Target Crashes

Table 20 - Traffic Signal & Turn Lane Improvement Before and After – Fatal + Injury Target Crashes

Crash Type	Annual Average		Percent Reduction
	Before	After	
Angle – Straight	1.3	0.7	46.2
Angle – Turn	0.0	0.0	-
Head On	0.0	0.0	-
Head On Left Turn	0.3	0.3	0.0
Rear End	2.0	0.0	100
Rear End Left Turn	0.0	0.0	-
Rear End Right Turn	0.0	0.0	-
Sideswipe Same	0.0	0.0	-
Total	3.7	1.0	73.0

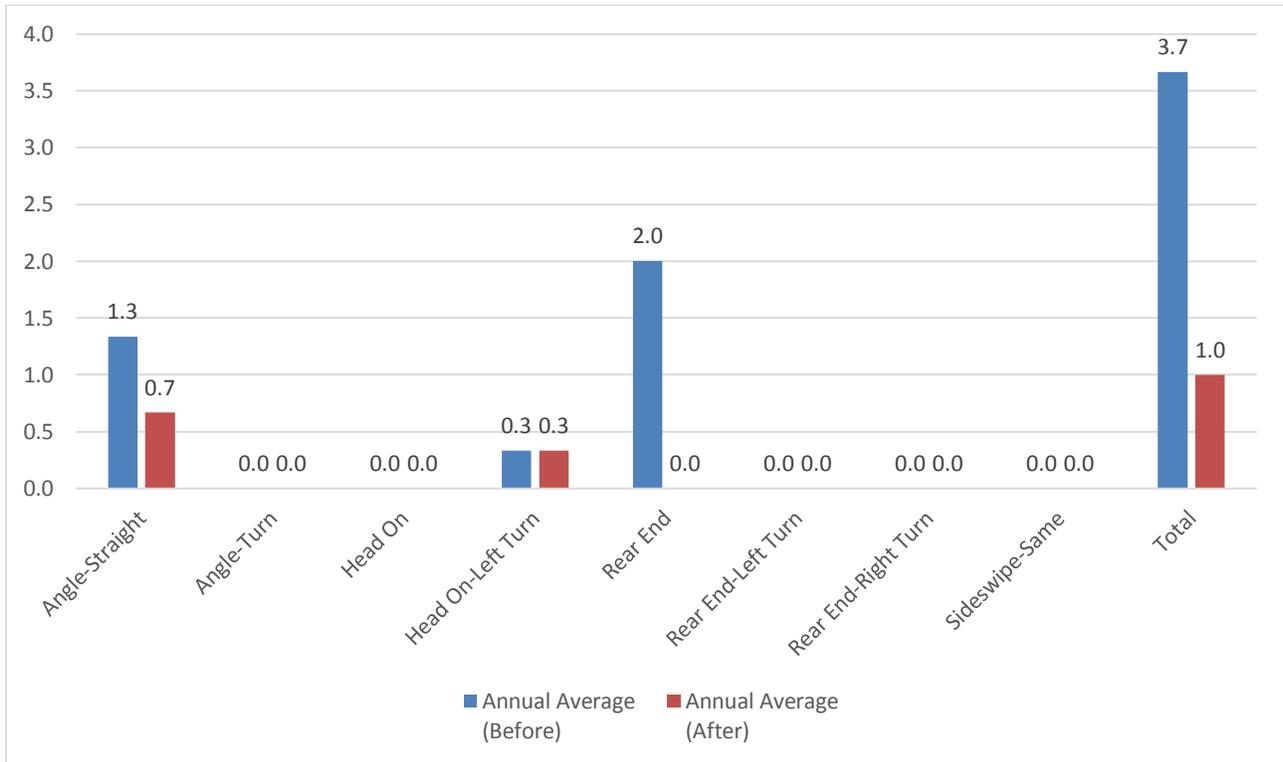


Figure 27 - Traffic Signal & Turn Lane Improvement Before and After – Fatal + Injury Target Crashes

5.3.8 Turn Lane Improvements

Projects which involved the addition of left or right turn lanes were included in this category. Nine projects from the STH funding program were categorized as turn lane improvements. The placement of projects in this category is not related to the traffic control type at each location but the improvements themselves. The following tables and charts provide a brief overview of the reported crash reductions across these locations with additional details available in the Appendix.

Table 21 - Turn Lane Improvement Before and After – Total Target Crashes

Crash Type	Annual Average		Percent Reduction
	Before	After	
Angle – Straight	15.0	15.0	-
Angle – Turn	4.0	5.7	Increase
Head On	0.7	1.0	Increase
Head On Left Turn	7.7	8.0	Increase
Rear End	26.7	24.7	7.5
Rear End Left Turn	4.0	2.3	42.5
Rear End Right Turn	4.7	2.7	42.6
Sideswipe Same	12.7	8.0	37.0
Total	75.3	67.3	10.6

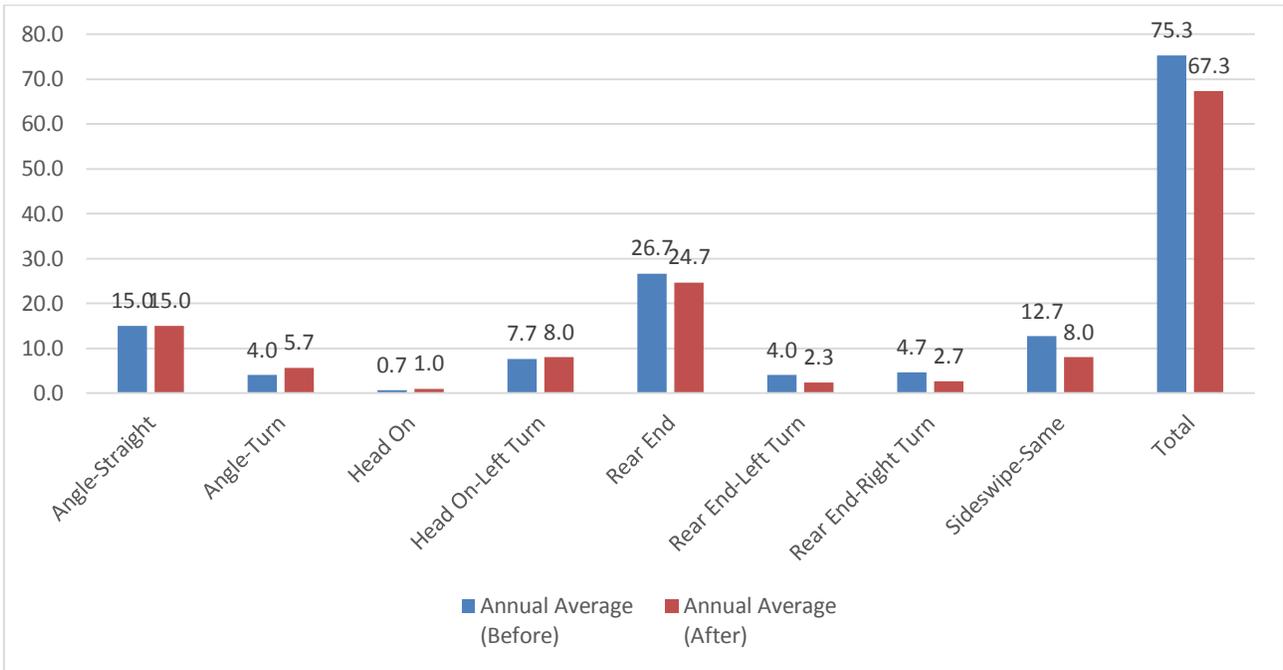


Figure 28 - Turn Lane Improvement Before and After – Total Target Crashes
Table 22 - Turn Lane Improvement Before and After – Fatal + Injury Target Crashes

Crash Type	Annual Average		Percent Reduction
	Before	After	
Angle – Straight	2.7	2.3	14.8
Angle – Turn	2.0	2.0	0.0
Head On	0.0	0.3	Increase
Head On Left Turn	4.0	2.3	42.5
Rear End	5.0	4.0	20.0
Rear End Left Turn	1.0	0.0	100
Rear End Right Turn	1.0	0.3	70.0
Sideswipe Same	0.0	0.0	-
Total	15.7	11.3	28.0

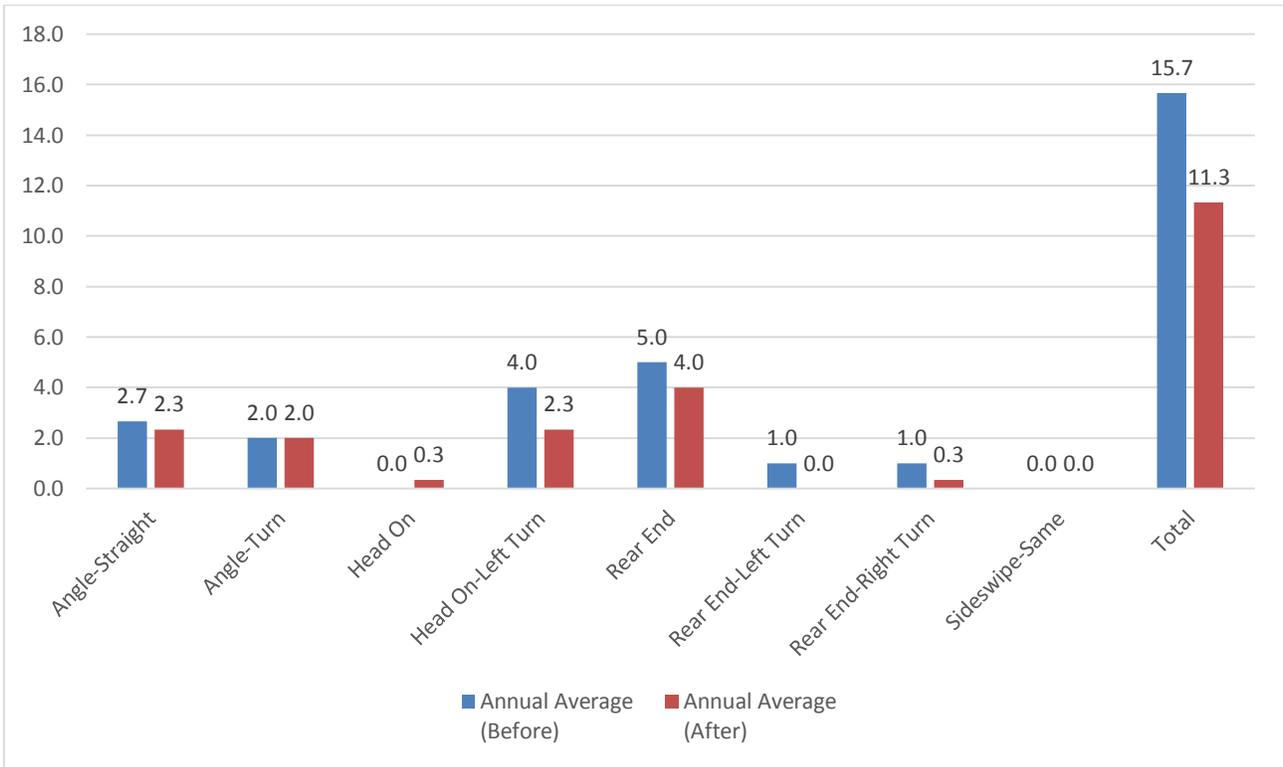


Figure 29 - Turn Lane Improvement Before and After – Fatal + Injury Target Crashes

5.3.9 Vertical Alignment Improvements

Projects which involved adjustments to the vertical alignment or curve of the roadway were included in this category. Six projects from the STH and HRRR funding programs were categorized as vertical alignment improvements. The following tables and charts provide a brief overview of the reported crash reductions across these locations with additional details available in the Appendix.

Table 23 - Vertical Alignment Improvement Before and After – Total Target Crashes

Crash Type	Annual Average		Percent Reduction
	Before	After	
Head On	0.3	0.0	100
Head On Left Turn	0.0	0.3	Increase
Rear End	0.3	1.6	Increase
Sideswipe Same	0.7	0.0	100
Total	1.3	2.0	Increase

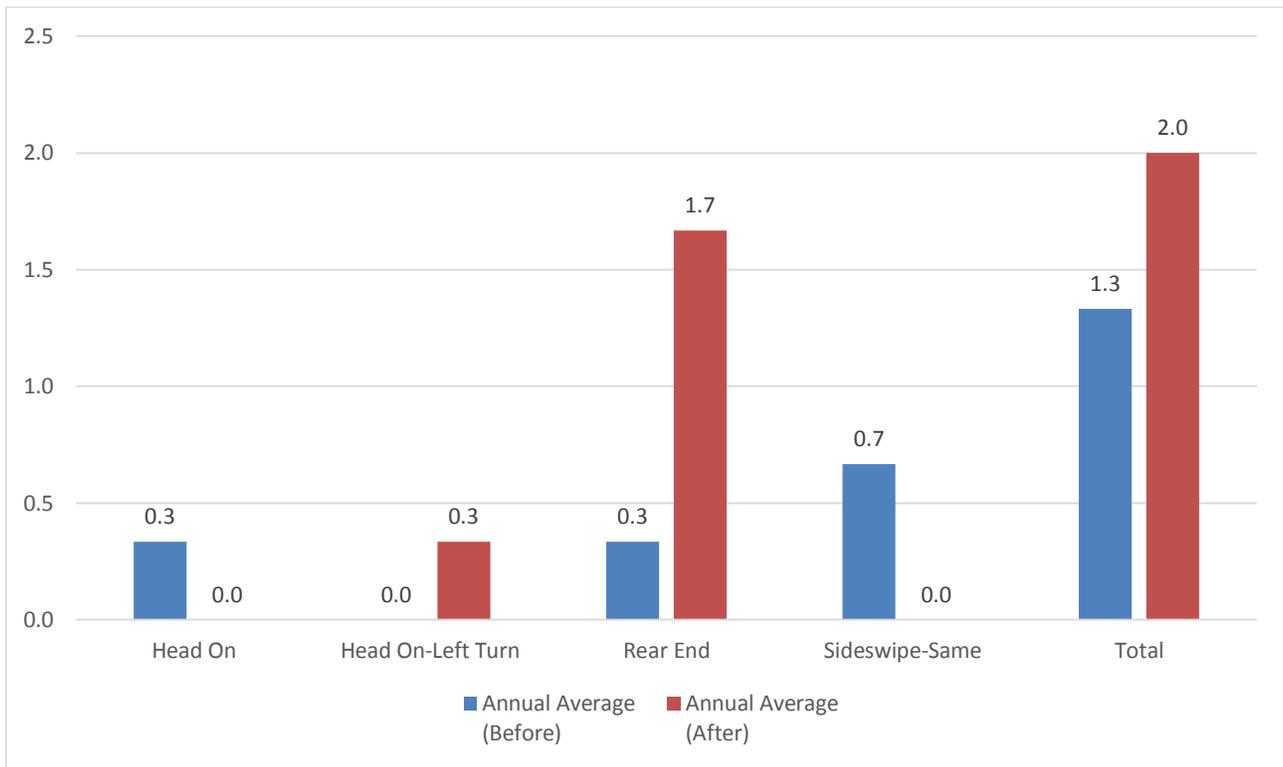


Figure 30 - Vertical Alignment Improvement Before and After – Total Target Crashes

Table 24 - Vertical Alignment Improvement Before and After – Fatal + Injury Target Crashes

Crash Type	Annual Average		Percent Reduction
	Before	After	
Head On	0.0	0.0	-
Head On Left Turn	0.0	0.3	Increase
Sideswipe Same	0.0	0.0	-
Rear End	0.0	0.0	-
Total	0.0	0.3	Increase

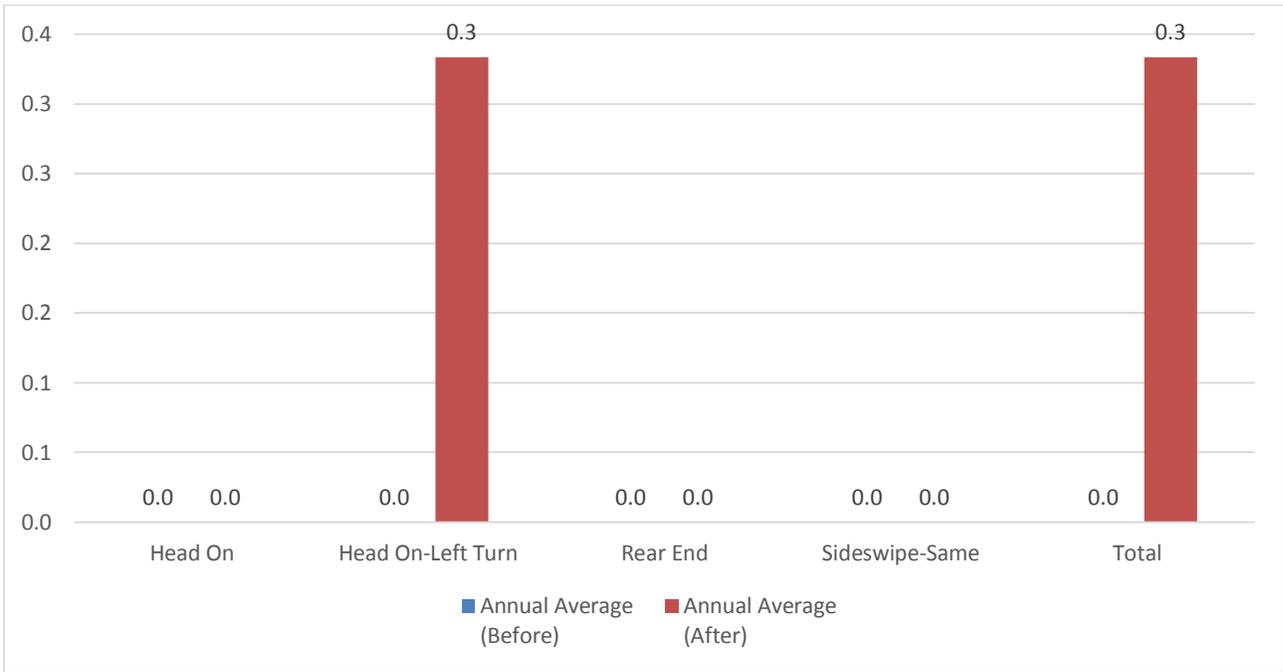


Figure 31 - Vertical Alignment Improvement Before and After – Fatal + Injury Target Crashes

5.3.10 Vertical Alignment & Roadway Departure & Clearzone Improvements

Projects which involved a combination of vertical alignment and roadway departure and clearzone improvements were included in this category. One project from the HRRR funding program was categorized as a vertical alignment and roadway departure and clearzone improvement. However, there were no targeted crashes at this location during either the before or after periods of the study.

6 Statistical Analysis

Poisson and Chi-squared statistical tests were used to evaluate any changes in crash rates for each project location as well as several project groupings. Additionally, crashes reductions were evaluated in terms of total targeted crashes and KABC crashes. The use of these statistical tests help determine whether or not any reductions may be attributed to the improvement(s) at that location or within the project grouping. The following sections review both methods and provide a brief summary of their results.

6.1 Poisson Test

The Poisson Test compares the annual average crash frequency during the before period with the percent reduced to determine whether or not the reduction is significant to the 95% confidence level. It is important to note that there must be at least five average annual crashes at the project location to conduct this test. While the Poisson Test is generally applied to individual locations, there were a number of projects which did not meet this minimum requirement. As such, projects were grouped and tested to provide some level of analysis. The full list of results for individual projects, project groupings, and funding sources is provided in the Appendix.

The Poisson Test results show the various projects and programs produced mixed results. When considering target crashes of all severities, only the HRRR program produced statistically significant reductions in crashes. The results were slightly better when considering only targeted KABC crashes with the HRRR as well as combined results found to be statistically significant.

Table 25 - Poisson Test Results by Program

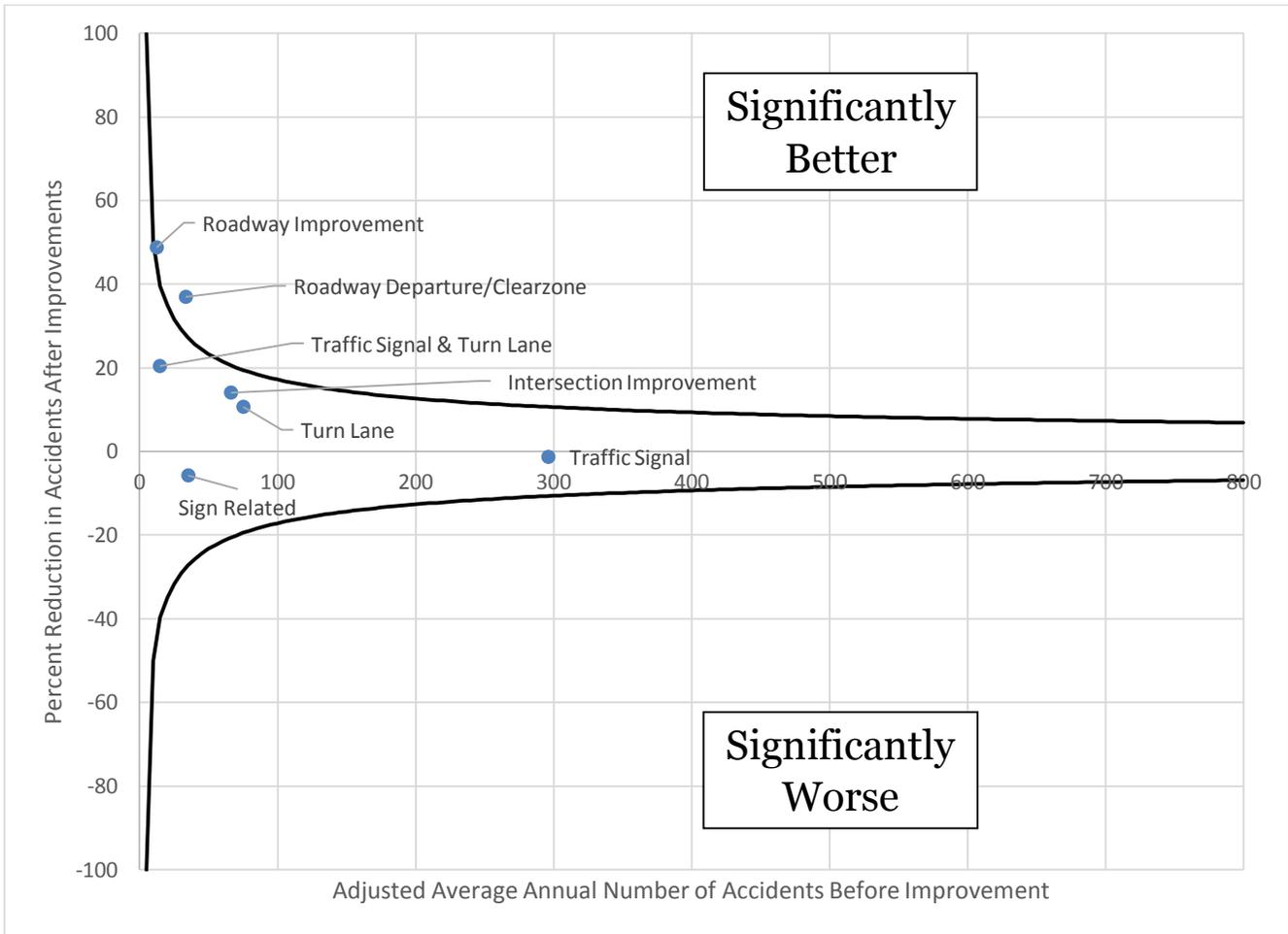
Project Grouping	Total Targeted Crashes				Fatal and Serious Injury Targeted Crashes			
	Annual Average Crash Frequency		Percent Reduction	95% Confidence	Annual KABC Frequency		Percent Reduction	95% Confidence
	Before	After			Before	After		
STH	502.7	479.7	4.6	No	122.3	107.0	12.5	No
HRRR	33.0	22.7	31.2	Yes - Better	15.3	7.7	49.7	Yes - Better
Total	535.7	502.3	6.2	No	137.7	114.7	16.7	Yes - Better

When separating projects by grouping, only roadway departure and clearzone and roadway improvement projects were found have experienced a statistically significant reduction in the number of total targeted crashes. Pedestrian related, vertical alignment, and vertical alignment and roadway departure and clearzone projects did not meet the minimum requirements to conduct the Poisson Test.

Table 26 - Poisson Test for Results for Total Crashes by Group

Project Grouping	Total Targeted Crashes			
	Annual Average Crash Frequency		Percent Reduction	95% Confidence
	Before	After		
Intersection Improvement	66.3	54.7	17.5	No
Pedestrian Related	1.0	2.3	-130.0	Too Low
Roadway Departure & Clearzone	33.3	21.0	36.9	Yes - Better
Roadway Improvement	12.3	6.3	48.8	Yes - Better
Sign Related	35.3	37.3	-5.7	No
Traffic Signal	296.0	299.7	-1.3	No
Traffic Signal & Turn Lane	14.7	11.7	20.4	No
Turn Lane	75.3	67.3	10.6	No
Vertical Alignment	1.3	2.0	-53.8	Too Low
Vertical Alignment & Roadway Departure & Clearzone	0.0	0.0	-	Too Low

Figure 25 below provides a visual summary of each project grouping using the *Diagram for Testing Significance of Accident Variations* from the Florida DOT *Program Prioritization and Evaluation, March 2000*. As shown in the figure, all project groupings other than roadway improvement and roadway departure and clearzone improvements fell within the non-significant area of the graph.



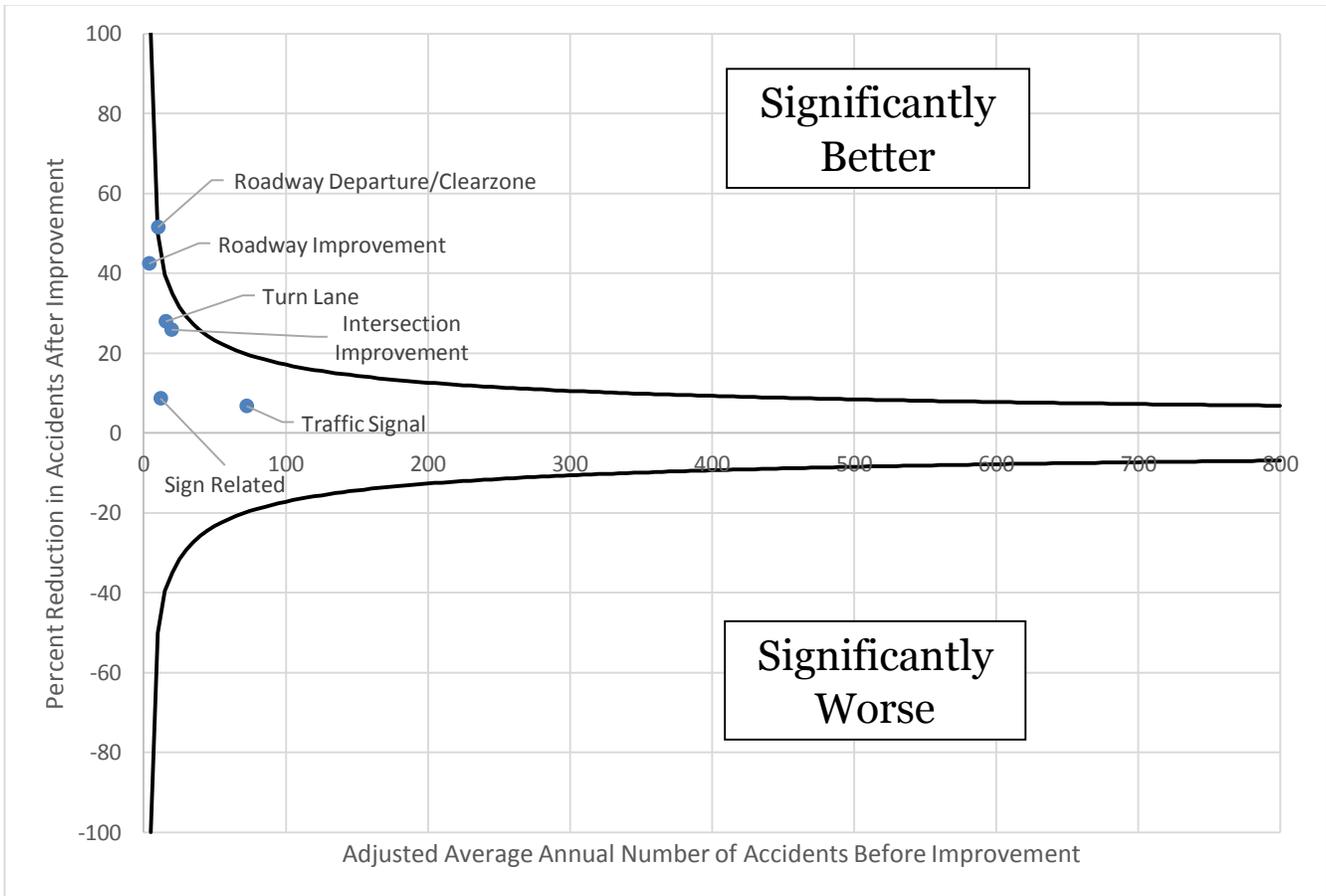
The following groupings have been omitted from the table as they did not meet the minimum requirements for conducting a Poisson Test (i.e. at least five annual average crashes occurring in the before and after period): Pedestrian Related, Vertical Alignment, and Vertical Alignment & Roadway Departure & Clearzone Improvements.

Figure 32 - Poisson Test for Results for Total Targeted Crashes by Group

When considering only the KABC targeted crashes within each project grouping, only the roadway departure and clearzone improvements resulted in a statistically significant reduction in the average annual number of crashes. All remaining groupings saw no statistically significant change during the study period.

Table 27 - Poisson Test Results for Fatal and Injury Target Crashes by Group

Project Grouping	Total Targeted KABC Injuries			
	Annual Average of Crash Frequency		Percent Reduction	95% Confidence
	Before	After		
Intersection Improvement	19.3	14.3	25.9	No
Pedestrian Related	0.7	2.3	-250	Too Low
Roadway Departure & Clearzone	10.3	5.0	51.6	Yes
Roadway Improvement	4.0	2.3	42.5	No
Sign Related	11.7	10.7	8.6	No
Traffic Signal	72.3	67.4	6.8	No
Traffic Signal & Turn Lane	3.7	1.0	72.7	Too Low
Turn Lane	15.7	11.3	28.0	No
Vertical Alignment	0.0	0.3	-100.0	Too Low
Vertical Alignment & Roadway Departure & Clearzone	0.0	0.0	-	Too Low



The following groupings have been omitted from the table as they did not meet the minimum requirements for conducting a Poisson Test (i.e. at least five annual average crashes occurring in the before and after period): Pedestrian Related, Traffic Signal & Turn Lane, Vertical Alignment, and Vertical Alignment & Roadway Departure & Clearzone Improvements.

Figure 33 - Poisson Test Results for Fatal and Injury Target Crashes by Group

6.2 Chi-squared Test

The second statistical test employed in the study was the Chi-squared test and was used to test the significance of the reduction in crash rates for project groupings and funding sources. Due to the nature of the test, it cannot be conducted on individual locations and may only be performed on groupings of at least two locations. The test was conducted using targeted total and KABC crashes during the before and after periods. According to the test results, the STH and overall project groupings saw statistically significant reductions in total targeted crashes while no programs produced statistically significant reductions in targeted KABC crashes.

Reductions in crashes are considered statistically significant if the calculated chi-squared value exceeds the critical chi-squared value. While the critical chi-squared value is based on a table of values determined using the number of project sites and the level of confidence (95%), the calculated chi-squared value is determined using the following formulas:

$$X^2_{calculated} = \sum_{j=1}^k = \frac{(n_{aj} - N_{aj})^2}{N_{aj}}$$

Where,

$$N_{aj} = \left(\frac{t_{aj}}{2}\right) \left[\left(\frac{n_{bj}}{t_{bj}}\right) + \left(\frac{n_{aj}}{t_{aj}}\right)\right]$$

t_{aj} = length of the j-th time period for the “after” period

t_{bj} = length of the j-th time period for the “before” period

n_{aj} = number of crashes or injuries in the j-th time period for the “after” period

n_{bj} = number of crashes or injuries in the j-th time period for the “before” period

k = number of locations

The table of critical chi-squared values can be found in the Appendix.

Table 28 - Program Chi Squared Test Results for Targeted Crashes

Project Grouping	Number of Similar Projects	Total Targeted Crashes			Targeted KABC Crashes		
		X ² calculated	X ² critical	95% Confidence	X ² calculated	X ² critical	95% Confidence
STH	84	158.2	105.27	Yes	46.4	105.27	No
HRRR	25	18.6	36.42	No	9.9	36.42	No
Total	109	176.8	103.3	Yes	56.4	103.3	No

Additional testing was performed based on groupings of urban and rural projects. Table 29 below provides a summary. Based on this grouping, only projects located in urban environments produced statistically significant reduction in total targeted crashes.

Table 29 - Project Location Chi Squared Test Result

Project Grouping	Number of Similar Projects	Total Targeted Crashes			Targeted KABC Crashes		
		χ^2 calculated	χ^2 critical	95% Confidence	χ^2 calculated	χ^2 critical	95% Confidence
Urban	57	142.4	74.47	Yes	29.7	74.47	No
Rural	52	34.5	68.67	No	26.7	68.67	No

Each project grouping was also tested using this method. Based on this grouping only turn lane improvement projects produced statistically significant reductions in both total targeted and KABC targeted crashes. No other project groupings produced statistically significant reductions for either crash grouping.

Table 30 - Project Grouping Chi Squared Test Results

Project Grouping	Number of Projects	Total Targeted Crashes			Targeted KABC Crashes		
		χ^2 calc	χ^2 crit	95% Confidence	χ^2 calc	χ^2 crit	95% Confidence
Intersection Improvements	19	15.8	28.87	No	14.6	28.87	No
Pedestrian Related Improvements	3	0.8	5.99	No	0.7	5.99	No
Roadway Departure & Clearzone Improvements	28	14.9	40.11	No	10.9	40.11	No
Roadway Improvements	6	4.8	11.07	No	0.7	11.07	No
Sign Related	7	12.8	12.59	No	6.6	12.59	No
Traffic Signal	29	38.3	41.34	No	16.1	41.34	No
Traffic Signal & Turn Lane	1	0.5	-	-	2.4	-	-
Turn Lane	9	82.7	15.51	Yes	2.3	15.51	Yes
Vertical Alignment	6	6.2	11.07	No	2.2	11.07	No
Vertical Alignment & Roadway Departure & Clearzone	1	-	-	-	-	-	-

The following figures provide a graphical representation of the table showing the calculated chi-squared values and the critical chi-squared values required to be considered statistically significant.

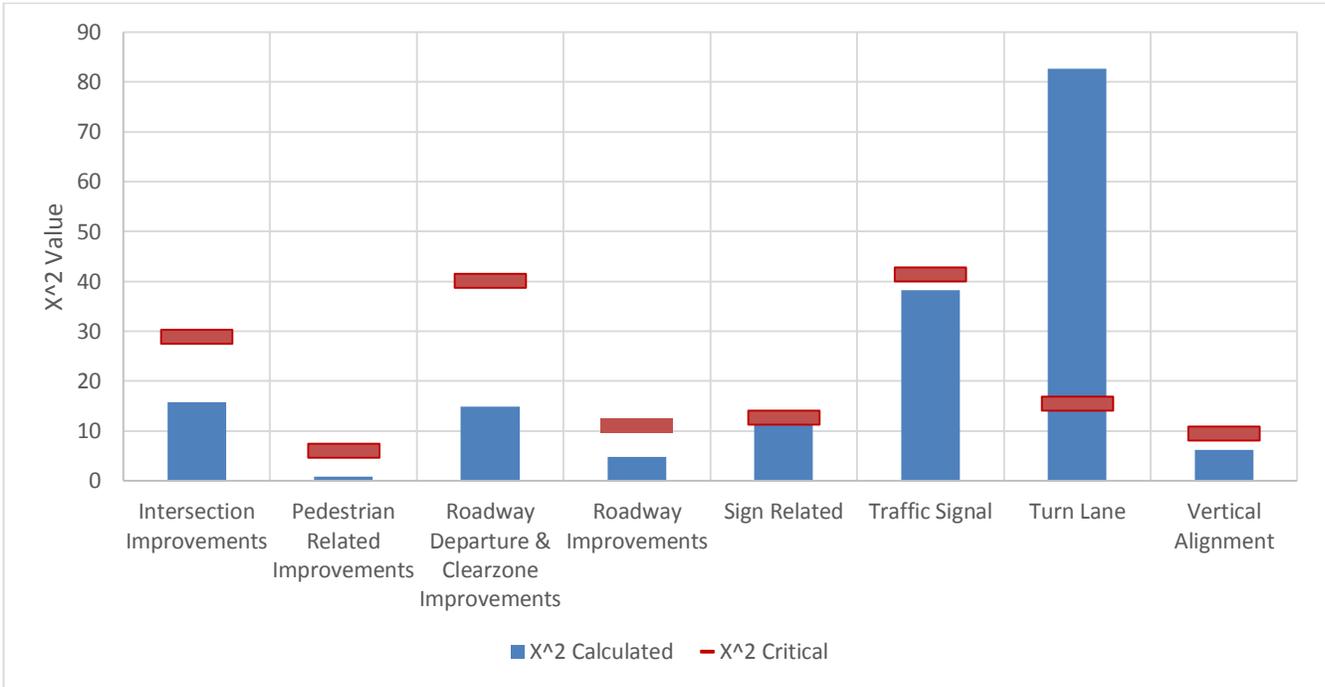


Figure 34 - Project Grouping Chi Squared Test Results – Total Crashes

The following groupings have been omitted from the table as they did not meet the minimum requirements for conducting a Chi-squared Test (i.e. at least two or more treatment locations): Traffic Signal & Turn Lane, and Vertical Alignment & Roadway Departure & Clearzone Improvements.

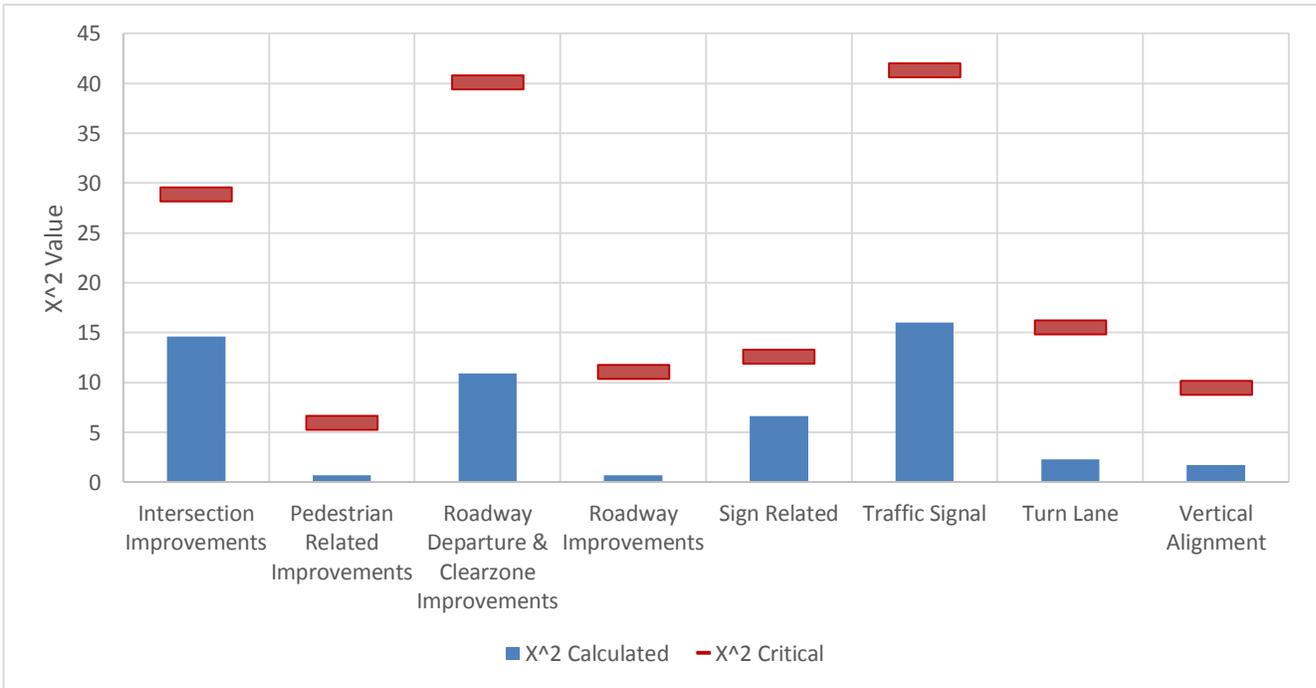


Figure 35 - Project Grouping Chi Squared Test Results – Fatal & Injury Crashes

The following groupings have been omitted from the table as they did not meet the minimum requirements for conducting a Chi-squared Test (i.e. at least two or more treatment locations): Traffic Signal & Turn Lane, and Vertical Alignment & Roadway Departure & Clearzone Improvements.

7 Benefit-Cost and Time of Return Analysis

An economic analysis was performed to assess the cost effectiveness of the various projects included in the 2010 Safety Program. The analyses employed include benefit-cost and time of return and were used to evaluate projects overall, by funding source, general location, project grouping, and on an individual basis. Detailed results may be found in the Appendix.

The Equivalent Uniform Annual Cost (EUAC/EUAB) was used to assess each project. The 2012 National Safety Council Bulletin for Estimating the Cost of Unintentional Injuries was used to evaluate the cost-benefit of any crash reductions. Additionally, a 10-year project life and a 2.5% interest rate were used.

According to this analysis, both project funding groups had a benefit-cost ratio (BCR) greater than 1.0. The STH, HRRR, and Total project grouping had BCRs of roughly 1.7, 7.8, and 2.6 respectively with an expected time of return of 5.2, 1.1, and 3.4, respectively.

Table 31 - Economic Analysis by Program

Project Grouping	Number of Similar Projects	Total Project Costs	Annual Cost (EUAC)	Annual Benefit (EUAB)	B/C Ratio	Time of Return (yrs.)
STH	84	\$19,431,438.91	\$2,220,212.18	\$3,754,300	1.69	5.2
HRRR	25	\$3,011,294.72	\$344,066.81	\$2,667,433	7.75	1.1
Total	109	\$21,859,382.22	\$2,497,625.98	\$6,421,733	2.57	3.4

When grouping projects by their general location, both project funding groups had a BCR greater than 1.0. The following table provides a summary of this analysis.

Table 32 - Economic Analysis by Project Location

Project Grouping	Number of Similar Projects	Total Project Costs	Annual Cost (EUAC)	Annual Benefit (EUAB)	B/C Ratio	Time of Return (yrs.)
Urban	57	\$15,439,441.21	\$1,764,091.46	\$3,899,633	2.21	4.0
Rural	52	\$6,419,941.01	\$733,534.52	\$2,522,100	3.44	2.5

Based on groupings by project type all project groupings had BCRs above 1.0 except vertical alignment and vertical alignment and roadway departure and clearzone improvements, the latter of which had a negative BCR.

Table 33 - Economic Analysis by Project Grouping

Project Grouping	Number of Similar Projects	Total Project Cost	Annual Cost (EUAC)	Annual Benefit (EUAB)	B/C Ratio	Time of Return (yrs.)
Intersection Improvements	19	\$4,739,181.31	\$541,022.89	\$2,687,567	4.96	1.8
Pedestrian Related	3	\$1,167,676.9	\$133,417.32	\$613,267	4.60	1.9
Roadway Departure & Clearzone Improvements	28	\$3,995,763.74	\$456,551.02	\$725,933	1.59	5.5
Roadway Improvements	6	\$1,559,011.9	\$178,130.77	\$966,800	5.43	1.6
Sign Related Improvements	7	\$36,746.12	\$4,198.57	\$145,900	34.75	0.3
Turn Lane Improvements	9	\$1,785,916.99	\$204,056.67	\$776,167	1.02	8.6
Traffic Signal Upgrades	29	\$6,664,137.31	\$761,436.09	\$47,467	1.59	5.5
Traffic Signal & Turn Lane Improvements	1	\$260,796.46	\$29,798.28	\$438,467	2.15	4.1
Vertical Alignment	6	\$1,486,246.36	169,816.67	\$23,133	0.14	64.2
Vertical Alignment & Roadway Departure & Clearzone Improvements	1	\$163,905.13	\$18,727.60	-\$2,967	-0.16	-55.2

8 Conclusions

Overall the Safety and High Risk Rural Roads programs have produced mixed results in terms of statistically significant crash reduction and cost effective projects. While nearly all project groupings experienced a reduction in the number of total and KABC crashes, most were not statistically significant. This holds true when considering projects grouped by their funding source. The following tables provide an overview of the crash reductions by project grouping and funding source.

Table 34 - Summary of Total Crash and Injury Reduction by Project Grouping

Project Grouping	Number of Similar Projects	Total Crash Reductions	KABC Crash Reduction
Intersection Improvements	19	12.3%	37.4%
Pedestrian Related	3	34.6%	11.4%
Roadway Departure & Clearzone Improvements	28	26.6%	12.2%
Roadway Improvements	6	25.7%	14.7%
Sign Related Improvements	7	Increase	8.3%
Traffic Signal Upgrades	29	4.6%	6.1%
Traffic Signal & Turn Lane Improvements	1	29.6%	69.2%
Turn Lane Improvements	9	8.2%	-
Vertical Alignment	6	Increase	25.0%
Vertical Alignment & Roadway Departure & Clearzone Improvements	1	Increase	-

Table 35 - Summary of Crash and Injuries Reduction by Funding

Project Grouping	Number of Similar Locations	Total Crash Reductions	KABC Crash Reductions
STH	84	10.5%	11.1%
HRRR	25	14.5%	29.0%

Table 36 below provides a summary of the results when the projects are grouped by region. The table includes the percent reduction across all projects in each region as well as the Poisson and Chi-Squared test results and the benefit-cost ration and time of return analyses.

Table 36 - Analyses by MDOT Region

Region	Number of Projects	Total (All)								
		Before	After	% Reduction	Poisson	Chi-Square			BCR	Time of Return (yrs.)
					95% Confidence	Calculated	Critical	95% Confidence		
Bay	22	90.7	77.7	14.3%	No	20.3	32.67	No	2.42	3.6
Grand	21	229.3	210.7	8.1%	No	26.7	31.41	No	2.64	3.3
Metro	23	348.7	309.3	11.3%	Yes - Better	37.89	33.92	Yes	2.84	3.1
North	19	78	67.3	13.7%	No	21.91	28.87	No	0.85	10.3
Southwest	6	10.3	7	32.0%	No	14.29	11.07	Yes	2.64	3.3
Superior	9	11	5.3	51.8%	Yes - Better	17	15.51	Yes	0.86	10.2
University	9	26.3	31.7	-20.5%	No	15.42	15.51	No	4.41	2.0

Despite a general lack of statistical significance, most project groupings still produced BCRs greater than one with the majority of projects producing net crash reductions over the study period.

Appendices

Appendix A - Detailed Project List

A.1 Local Agency Safety (STH) Program FY2010

Number	U/R/B	Cont Sect	Job Num	Lead Agency	Project Name	Project Limits	Work Type	Route Name	PR Num	Beginning MP	Ending MP	Project Length	Project Cost	Federal Participation
1	U	03609	108579	Allegan County Road Commission	Blue Star Highway	at North Shore Drive, in Casco Township	Install roundabout	Blue Star Highway	3031224	0.000	0.647	intersection	\$557,804.17	\$400,000.00
								Blue Star Highway	3031226	0.000	0.040			
								Northshore/Blue Star Ramp	3031227	0.000	0.058			
								Northshore Drive	784004	0.799	1.155			
								Old-196	789205	0.477	0.542			
2	R	03609	108581	Allegan County Road Commission	Riverview Drive	from 4th Street to Gene Drive, in Gun Plain Township	Shoulder widening, culvert reconstruction and extension, clearing, and slope flattening.	Riverview Drive	785201	0.579	0.996	0.42 mi	\$450,992.53	\$357,879.62
3	R	05609	108582	Antrim County Road Commission	East Torch Lake Drive (CR 593)	Alden Highway to M-88, in Helena, Forest Home, Central Lake, and Torch Lake Townships.	Add 3 ft paved shoulder ribbon, tree removal, and upgrade permanent signing.	S East Torch Lake Drive	1112402	0.000	3.399	16.33 mi	\$341,380.03	\$273,104.02
								S East Torch Lake Drive	3050009	0.000	12.935			
4	R	06609	108583	Arenac County Road Commission	Melita Road	at Main Street, in Clayton Township	Intersection realignment	N Melita Road	1067405	13.386	14.800	intersection	\$181,589.78	\$145,271.82
								Main Road	1068805	1.356	2.018			
5	R	07609	108739	Baraga County Road Commission	Froberg Road	at East Sturgeon Slough, in L'Anse Township	Bridge and approach guardrail upgrades.	Froberg Road	1190506	3.350	3.757	at waterway	\$90,308.71	\$72,246.97
6	R	10609	108585	Benzie County Road Commission	Cedar Run Road	at Reynolds Road, in Almira Twp.	Install stop rumble strips and permanent signing improvements.	Cedar Run Road	1078706	0.168	0.878	intersection	\$4,162.26	\$3,329.81
								N Reynolds Road	1078309	2.373	3.015			
7	R	10609	108736	Benzie County Road Commission	North Manistee County Line Road (CR-602)	0.31 miles east of Wallaker Road easterly 1500 feet, in Joyfield and Weldon Townships	Add paved shoulder and guardrail upgrades.	N Manistee County Line Road	1074107	1.521	1.801	0.28 mi	\$35,572.85	\$28,458.28
8	U	11609	108586	Berrien County Road Commission	John Beers Road	from Cleveland Avenue to Washington Avenue, in Lincoln Township	Add center left turn lane.	W John Beers Road	1364508	3.193	3.593	0.40 mi	\$260,445.96	\$208,356.77
9	R	16609	108587	Cheboygan County Road Commission	South River Road	from Canton Road to Orchard Beach Road, in Benton Township	Super-elevation modification and guardrail installation at 3 locations.	S River Road	545802	1.788	4.021	2.23 mi	\$7,828.07	\$6,262.46
10	R	17609	108588	Chippewa County Road Commission	FH-42 (Curly Lewis Highway)	at Roxbury Creek, Ankodosh Creek, and Naomikong Creek, in Whitefish and Bay Mills Townships	Guardrail upgrades.	FH-42 (Curly Lewis Highway)	1464403	4.743	6.718	at waterways	\$70,042.94	\$56,034.35
11	R	17609	108589	Chippewa County Road Commission	N. Caribou Lake Road	at Spring Bay Road	Vertical curve modification and removal of right turn lane.	N Caribou Road	1474404	10.939	12.452	intersection	\$74,800.98	\$59,840.78
								S Spring Bay Road	1474405	0.000	0.973			

Number	U/R/B	Cont Sect	Job Num	Lead Agency	Project Name	Project Limits	Work Type	Route Name	PR Num	Beginning MP	Ending MP	Project Length		Project Cost	Federal Participation
12	U	19609	108737	City of St. Johns	N. Lansing Street	at Daisy Street, Floral Street, and North Gateway Schools	Add center left turn lane and sidewalk.	North Lansing Street	207202	2.660	2.800	0.14	mi	\$134,222.59	\$66,240.00
13	R	22609	108591	Dickinson County Road Commission	9 locations	Countywide	Culvert reconstruction and extension, guardrail removal or upgrade, and slope flattening.	Various	omitted	omitted	omitted	countywide		\$305,697.94	\$244,558.35
14	U	25609	108602	Genesee County Road Commission	Stanley Road	from Bray Road to Center Road, in Genesee Township	Widen and add 8 ft paved shoulders and install shoulder rumble strips.	E Stanley Road	1523109	9.929	10.926	1.00	mi	\$262,591.92	\$210,073.54
15	U	25609	108603	Genesee County Road Commission	Elms Road	at Carpenter Road, in Mt. Morris Township	Install overhead flashing beacons.	N Elms Road	1523901	11.129	11.547	intersection		\$17,461.79	\$13,969.43
								Carpenter Road	1536401	1.396	1.726				
16	R	25609	108604	Genesee County Road Commission	Wilson Road	at Henderson Road, in Forest Township	Install advanced warning flashers and pavement markings.	Wilson Road	1515401	19.431	19.716	intersection		\$17,114.51	\$13,691.61
17	U	25609	108605	Genesee County Road Commission	Elms Road	at Flushing Road, in Flushing and Mt. Morris Townships	Traffic signal upgrade and box span installation.	Flushing Road	1506101	2.628	2.891	intersection		\$45,687.69	\$33,120.00
								N Elms Road	1523901	9.488	10.130				
18	U	25609	108607	Genesee County Road Commission	Torrey Road	from Oakridge Drive north to Bristol Road, in City of Flint	Guardrail upgrades.	Torrey Road	1503101	11.134	11.987	0.85	mi	\$66,599.86	\$48,573.23
19	R	28609	108608	Grand Traverse County Road Commission	Cass Road	from Keystone Road to Hartman Road, in Garfield Township	Permanent signing upgrades and recessed pavement markings.	Cass Road	3280050	0.000	1.500	1.50	mi	\$7,161.84	\$5,729.47
					Five Mile Road	from Hammond Road to the northern East Bay Township line, in East Bay Township		5 Mile Road	1001102	0.000	2.328	2.33	mi		
					Supply Road	North Hobbs Highway to East Bay East Township line, in East Bay Township		Supply Road	1001501	1.012	2.814	1.80	mi		
20	R	29609	108609	Gratiot County Road Commission	180 locations	Countywide	Stop and Stop Ahead permanent signing upgrades including sign post delineator installation.	Various	omitted	omitted	omitted	countywide		\$94,940.31	\$75,952.25
21	R	29609	108611	Gratiot County Road Commission	Jefferson Road	at Sugar Creek, in Pine River Township	Culvert reconstruction and extension, and guardrail removal.	W Jefferson Road	497607	9.749	9.999	at waterway		\$194,004.74	\$155,203.79
22	R	31609	108612	Houghton County Road Commission	Paradise Road	at Pilgrim Road, in Portage Township	Intersection sight distance improvements	Paradise Road	1181910	10.085	10.311	intersection		\$56,111.62	\$44,889.30
								Pilgrim Road	1182501	0.000	0.769				
23	U/R	38609	108738	Jackson County Road Commission	9 various locations	Countywide in Blackman, Leoni, and Summit Townships	Replace signal and pedestrian heads with LED bulbs.	Various	omitted	omitted	omitted	countywide		\$48,791.20	\$39,032.96
24	U	41609	108614	Kent County Road Commission	84th Street	from Alles Drive to Norfolk Southern RR, in Byron Township	Add center left turn lane.	84th Street SW	410209	4.338	4.724	0.39	mi	\$392,448.81	\$313,991.04

Number	U/R/B	Cont Sect	Job Num	Lead Agency	Project Name	Project Limits	Work Type	Route Name	PR Num	Beginning MP	Ending MP	Project Length	Project Cost	Federal Participation	
25	U	41609	110109	Kent County Road Commission	Cascade Road	at Spaulding Avenue/Hall Street, in Ada and Cascade Townships	Signal modernization, install left turn phase, and install box span configuration.	Spaulding Ave SE	442202	1.440	1.814	intersection	\$126,637.22	\$88,000.00	
								Hall Street SE	442308	0.000	0.099				
								Cascade Road	442605	3.531	4.128				
26	U	41609	108615	Kent County Road Commission	Cascade Road	at Forest Hill Avenue, in Grand Rapids Township	Signal modernization, install box span configuration and install pedestrian countdown signals.	Cascade Road	442605	2.889	3.033	intersection	\$184,823.97	\$130,499.53	
					Forest Hill Road	405807	1.740	1.965							
					Division Avenue	at 68th Street, in Gaines and Byron Townships	Signal modernization, install box span configuration and install pedestrian countdown signals.	S Division Ave	3030181	5.495	5.687	intersection			
					68th St SW	3410029	1.829	2.072							
27	U	41609	108616	City of Grand Rapids	Leonard Street	at Ball Street, in the City of Grand Rapids	Traffic and pedestrian signal upgrades and box span installation, and pavement markings.	Leonard Street NE	405401	1.827	2.138	intersection	\$306,941.72	\$245,553.38	
					Ball Avenue NE	421505		0.657	1.053						
					Leonard Street	at Fuller Avenue, in the City of Grand Rapids		Leonard Street NE	405401	1.337	1.642	intersection			
					Fuller Avenue NE	406803		3.119	3.708						
					Leonard Street	at Leffingwell Avenue, in the City of Grand Rapids		Leonard Street NE	405401	3.376	3.881	intersection			
					Leffingwell Avenue NE	428802		0.518	1.351						
28	U	41609	108617	City of Grand Rapids	Fuller Avenue	at 3 Mile Road	Traffic and pedestrian signal upgrades and box span installation, and pavement markings.	Fuller Avenue NE	406803	5.140	5.306	intersection	\$162,948.26	\$130,358.61	
					3 Mile Road NE	3410301		1.184	1.351						
					32nd Street	at Kalamazoo Avenue		32nd Street	411705	0.000	0.212	intersection			
					Kalamazoo Avenue SE	434905		9.539	9.632						
29	R	44609	108618	Lapeer County Road Commission	Pratt Road	from Lapeer WCL to Green Corners Road, in Hadley Township	Centerline rumble strips, tree removal, earth excavation, and permanent signing improvements.	Pratt Road	762801	0.000	1.675	1.68	mi	\$52,599.18	\$42,079.34
30	U	47609	108619	Livingston County Road Commission	Old US-23	at Spencer Road, in Brighton Township	Upgrade traffic signal actuated controller and install cameras for vehicle detection.	S Old US-23 Hwy	932204	7.632	7.908	intersection	\$75,648.78	\$60,519.02	
								Spencer Road	933908	1.257	1.310				
31	R	49609	108631	Mackinac County Road Commission	Mackinaw Trail	From I-75 business loop northerly 1.0 miles.	Installation of curve signs and arrows, and recessed pavement markings and rumble strips.	412 (Mackinac Trail)	1143101	0.000	1.000	1.00	mi	\$54,184.29	\$43,347.43

Number	U/R/B	Cont Sect	Job Num	Lead Agency	Project Name	Project Limits	Work Type	Route Name	PR Num	Beginning MP	Ending MP	Project Length	Project Cost	Federal Participation	
32	U	50609	108633	Macomb County Road Commission	13 Mile, 14 Mile, Moravian, & Schoenherr	at Utica, Hayes, Utica, and 24 Mile, in Macomb and Clinton Townships	Install box span configuration and flashing yellow left turn phase, countdown ped signals and ADA ramp upgrades.	Utica Road	4211434	4.168	4.472	intersection	\$534,833.60	\$400,000.00	
								13 Mile Road	803410	4.221	4.437				
								E 14 Mile Road	798407	4.383	4.634				
								Hayes Road	801010	2.421	2.772				
								Moravian Drive	803604	1.638	1.856				
								Utica Road	4211434	1.485	1.673				
								Schoenherr Road	820804	6.488	6.808				
								24 Mile Road	815510	4.854	5.130				
33	U	50609	108634	City of Sterling Heights	15 Mile Road	at Schoenherr Road, in the City of Sterling Heights	Add right turn lanes in all 4 quadrants.	15 Mile Road	803605	4.813	5.216	intersection	\$232,719.15	\$169,428.36	
								Schoenherr Road	798810	6.937	7.293				
34	U	55609	108636	City of Menominee	14th Avenue	at 13th Street	Upgrade traffic signals, install box span configuration and countdown pedestrian signals, and upgrade ADA ramps.	14th Avenue	1322410	1.508	1.655	intersection	\$143,898.92	\$104,000.00	
								13th Street	3550028	0.230	0.378				
35	R	58609	108637	Monroe County Road Commission	Whiteford Road and North Dixie Highway	from Section Road to Sterns Road, and Pointe Aux Peaux Road to Post Road, in Whiteford & Frenchtown Townships	Permanent signing upgrades and delineator installation	Whiteford Road	4301685	0.462	1.516	1.05	mi	\$15,768.02	\$12,614.42
								North Dixie Highway	4301655	5.502	7.307	1.81	mi		
36	U	61609	108639	City of Muskegon	Laketon Avenue	at Henry Street	White topping of intersection.	W Laketon Avenue	859710	0.865	0.953	intersection	\$373,169.84	\$298,535.87	
								Henry Street	863304	5.882	6.087				
37	U	61609	108641	City of Muskegon	Laketon Avenue	at Hoyt Street, Getty Street, and Roberts Street	Install box span signals	Laketon Avenue	859710	2.043	2.201	intersection	\$263,466.75	\$210,773.40	
								Hoyt Street	868710	1.597	1.798				
								Laketon Avenue	859710	2.796	2.927				
								Getty Street	859809	2.257	2.394				
								Laketon Avenue	859710	3.114	3.462				
								Roberts Street	864404	0.027	0.328				
38	U	61609	108642	City of Norton Shores	Sternberg Road	at Grand Haven Road, in the City of Norton Shores	Add right turn/thru lane for EB Sternberg Road.	Sternburg Road	857603	1.010	1.264	0.25	mi	\$50,793.08	\$40,634.46

Number	U/R/B	Cont Sect	Job Num	Lead Agency	Project Name	Project Limits	Work Type	Route Name	PR Num	Beginning MP	Ending MP	Project Length	Project Cost	Federal Participation
39	U	61609	108643	City of Norton Shores	Harvey Road	at Sternberg Road, in the City of Norton Shores	Widening of Harvey Street for dual left turn lanes, traffic signal and pavement marking upgrades.	Sternburg Road	857603	1.874	2.517	intersection	\$200,604.57	\$160,483.65
								Harvey Street	863506	2.011	2.777			
40	U	63609	108644	City of Novi	10 Mile Road	at Novi Way (Wildcat), in City of Novi	Construct right turn lanes, upgrade signals and install box span configuration, add lighting and install ADA ramps.	W 10 Mile Road	656510	8.942	9.208	0.27 mi	\$208,248.99	\$164,968.19
41	R	64609	108646	Oceana County Road Commission	E. Pierce Road	from 132nd Avenue to 144th Avenue, in Ferry Township	Roadway relocation, crush and shape, HMA surfacing, removal of fixed objects, guardrail, pavement markings and signing.	E Pierce Road	1544805	2.110	3.735	1.63 mi	\$513,001.37	\$345,664.94
42	R	68609	108849	Oscoda County Road Commission	Kittle Road	at Honeywell Creek, in Elmer Township	Culvert reconstruction and guardrail upgrades.	W Kittle Road	1334702	3.628	4.128	at waterway	\$151,066.57	\$120,853.26
43	U	70609	108647	City of Holland	40th Street	from Industrial Avenue to Waverly Road, in the City of Holland	Ditch enclosure	E 40th Street	790902	0.265	0.870	0.61 mi	\$686,320.72	\$400,000.00
44	U	73609	108649	Saginaw County Road Commission	Center Road	at Brockway Road, Saginaw Township	Add right turn lane in SB direction, extend ex. center left turn lane tapers, add left turn signal phase and pedestrian signals.	N Center Road	478007	3.286	3.635	intersection	\$271,141.43	\$216,913.14
								Brockway Road	459104	2.141	2.462			
45	U	73609	108652	City of Saginaw	E. Genesee Avenue	at Hess Avenue, in the City of Saginaw	Upgrade traffic signal to box span, install countdown ped countdown signals.	Hess Avenue	461307	2.490	2.697	intersection	\$259,762.73	\$207,810.18
								E Genesee Avenue	461608	2.491	2.552			
								Dixie Highway	468305	15.054	15.129			
46	U	73609	108653	City of Saginaw	Bay Street	from Court Street to W. Genesee Ave., in the City of Saginaw	Add center left turn lane, traffic signal upgrades, countdown ped signals, and ADA ramps.	Bay Street	460105	0.000	0.752	0.75 mi	\$260,796.46	\$208,637.17
47	R	76609	108856	Shiawassee County Road Commission	Grand River Road	at Colby Lake Road	Vertical curve and stopping sight distance improvements.	W Grand River Road	550902	1.613	3.654	intersection	\$374,491.69	\$299,593.35
								Colby Lake Road	551008	0.000	2.003			
48	U	82609	108656	City of Allen Park	Allen Road	at Manor Avenue, in the City of Allen Park and at Reeck Road, in the City of Allen Park	Intersection realignment, add right turn lane on Allen Road, and sight distance improvements.	Allen Road	1594602	1.240	1.431	intersection	\$116,967.40	\$93,573.92
								Manor Avenue	1657607	0.797	0.957			
								Allen Road	1594602	1.431	1.543			
								Reeck Road	1662707	2.240	2.419			
49	U	82609	108658	City of Detroit	Springwells Street	at Chamberlain Street, in the City of Detroit	Construct concrete median, lighting, crash attenuator and sidewalk installation.	Springwells Street	1589810	0.997	1.030	intersection	\$344,467.05	\$290,620.28
								Springwells Street	1611602	0.000	0.026			
								Chamberlain Street	1611603	0.350	0.689			

Number	U/R/B	Cont Sect	Job Num	Lead Agency	Project Name	Project Limits	Work Type	Route Name	PR Num	Beginning MP	Ending MP	Project Length		Project Cost	Federal Participation
50	U	82609	108659	City of Detroit	Livernois Street	from Toledo Street to John Kronk, in the City of Detroit	Construct concrete median, lighting and drainage improvements, and sidewalk installation.	Livernois Street	1581701	1.392	1.888	0.50	mi	\$511,484.23	\$436,350.34
51	U	82609	108662	City of Detroit	West Vernor Highway	from Waterman Street to Lansing Street, in the City of Detroit	Install mid-block crossings, bump-outs at intersections, and pedestrian actuated crossing signals and signs.	W Vernor Highway	1581909	1.534	2.512	0.98	mi	\$692,631.61	\$604,101.48
52	U	82609	108664	City of Harper Woods	Beaconsfield Road	at Eastland Village Drive, Damman Avenue, Eastwood Drive and Woodside Drive	Traffic signal upgrade and box span installation, install countdown ped signals.	Woodland Drive	1632602	0.363	0.805	intersection		\$345,518.68	\$276,352.42
								Eastwood Drive	1632605	0.084	1.361				
								Damman Avenue	16338802	0.400	0.666				
								Baconsfield Road	4711343	0.473	0.815				
								Baconsfield Road	4711343	0.900	1.221				
53	U	82609	108665	City of Livonia	Newburgh Road	at 5 Mile Road, in the City of Livonia and at 7 Mile Road, in the City of Livonia	Add right turn lane for NB Newburgh. Add right turn lane for SB Newburgh, access mgt. and upgrade pedestrian signals.	5 Mile Road	1606203	2.846	2.988	intersection		\$150,386.23	\$120,308.98
								Newburgh Road	4710394	7.780	8.151				
								Seven Mile Road	1700106	0.911	1.058				
								Newburgh Road	4710394	9.940	10.266				
54	U	82609	108666	City of Livonia	Middlebelt Road	at 5 Mile Road, in the City of Livonia	Proposed traffic signal modernization and box span installation.	5 Mile Road	1606203	6.792	7.006	intersection		\$138,406.26	\$110,725.01
								Middlebelt Road	1674403	19.289	19.570				
55	U	82609	108667	City of Livonia	Middlebelt Road	at 6 Mile Road & 7 Mile Road, in the City of Livonia	Proposed traffic signal modernization and box span installation.	Middlebelt Road	1674403	20.246	20.579	intersection		\$243,205.62	\$191,973.00
								Six Mile Road	1680701	10.889	11.239				
								Middlebelt Road	1674403	21.293	21.600				
								Seven Mile Road	1700106	4.674	5.158				
56	U	82609	108668	City of Inkster	Inkster Road and Middlebelt Road	at Conrail railroad structure, in the City of Inkster	Install barrier wall, guardrail, and sidewalk improvements.	Middlebelt Road	1674403	11.623	11.889	at RR structure		\$475,045.29	\$380,036.23
								Inkster Road	1674404	12.545	12.832				
57	U	83609	108669	Wexford County Road Commission	13th Street	from Leeson Avenue to GLC RR tracks, in Haring Township and the City of Cadillac	Add right turn lanes at intersections and convert 4-lane section to 3-lane section.	E 13th Street	1128201	2.508	3.254	0.75	mi	\$293,759.74	\$235,007.79

Number	U/R/B	Cont Sect	Job Num	Lead Agency	Project Name	Project Limits	Work Type	Route Name	PR Num	Beginning MP	Ending MP	Project Length		Project Cost	Federal Participation
58	U	04609	100369	City of Alpena	Ford Avenue, First Avenue and Adams/Hueber Street		Guardrail upgrade	S 1st Avenue	1024203	0.410	0.550	0.14	mi	\$35,052.67	\$28,042.14
								W Hueber Street	1027501	0.305	0.345	0.04	mi		
								Ford Avenue	1030206	1.386	2.283	0.90	mi		
59	R	16609	100317	Cheboygan County Road Commission	Reams Road	at Pickerel Lake Road	Vertical curve modifications.	Pickeral Lake Road	547107	0.672	1.052	intersection		\$108,519.94	\$86,815.95
								Reams Road	547305	9.245	10.641				
60	R	22609	100321	Dickinson County Road Commission	Lake Mary Drive and CR -3	at Hamilton Creek & the North Branch of the Ford River	Culvert replacement and extensions	County Road 3	1554102	6.323	6.797	at waterway		\$180,039.06	\$144,031.24
								North Lake Mary Drive	1554709	0.000	0.038				
61	U	41609	105018	Kent County Road Commission	Crahen Avenue	at Bradford Street	Vertical curve modification	Bradford Street NE	3415615	0.857	1.621	intersection		\$397,602.13	\$136,000.00
								Crahen Avenue	407501	0.608	1.604				
62	U	63609	105037	Road Commission for Oakland County	Southfield Road	at 13 Mile Road	Traffic signal upgrade	W 13 Mile Road	607408	6.867	7.182	intersection		\$146,006.12	\$116,804.90
								Southfield Road	611304	0.828	1.332				
63	R	75609	105061	Schoolcraft County Road Commission	CR 437	at FFRD 2213	Remove guardrail, flatten slopes, improve drainage and correct roadway cross section	County Road 437	1200702	15.127	16.011	0.88	mi	\$94,208.44	\$60,293.40
64	R	80609	105064	Van Buren County Road Commission	CR 669 (Old Swamp Road)	at 40th Street	Vertical curve modification, edge and centerline rumble strips, tree removal and signing upgrades.	County Road 669	602709	4.859	4.959	0.10	mi	\$163,905.13	\$131,124.10
65	R	80609	105066	Van Buren County Road Commission	66th Street	at CR378	Tree removal and sign upgrade	66th Street	585206	3.464	3.738	intersection		\$169,791.74	\$79,649.18
66	U	28609	105004	Grand Traverse County Road Commission	Silver Lake Road	at Zimmerman Road	Traffic Signal upgrade	Zimmerman Road	1847607	0.000	0.136	intersection		\$232,752.64	\$160,000.00
								West Silver Lake Road	992309	3.680	4.532				
								N East Silver Lake Road	992403	3.686	3.801				
67	R	59609	108839	Montcalm County Road Commission	9 locations	Countywide	Guardrail upgrades.	Various	omitted	omitted	omitted	countywide		\$133,921.96	\$107,137.57
TOTAL =														\$14,195,302.35	\$10,766,025.49

A.2 Local Agency High Risk Rural Roads Program FY2010

Number	U/R/B	Cont Sect	Job Num	Lead Agency	Project Name	Project Limits	Work Type	Route Name	PR Number	Beginning MP	Ending MP	Project Length	# of 'K' & 'A' Injuries	Project Cost	Federal Participation
1	R	02609	107949	Alger County Road Commission	Connors Road	From Miller Road northerly to a point 0.8 miles north of Miller Road.	Tree Removal and guardrail installation	Connors Road	3770540	10.426	11.226	0.80 mi	K=2, A=3	\$63,298.37	\$56,968.53
2	R	05609	107952	Antrim County Road Commission	Cherry Avenue (CR 593)	from the Torch River Road northerly to Cairn Highway	Proposed shoulder widening and adding 3 ft paved shoulder ribbon, permanent signing upgrades and recessed pavement markings.	Cherry Avenue (County Highway 593)	1113304	0	3.216	6.78 mi	K=1, A=1	\$117,374.85	\$105,637.37
									1113401	0.151	3.719				
3	R	10609	107955	Benzie County Road Commission	Reynolds Road	between Fewin Road and CR-610, in Almira and Inland Twp's	Permanent signing upgrades	Reynolds Road	1074706	3.039	6.753	3.71 mi	K=2, A=1	\$9,654.00	\$9,654.00
4	R	25609	107976	Genesee County Road Commission	Grand Blanc Road at Duffield Road, Grand Blanc Road at Morrish Road and Seymour Road at Baldwin Road	Grand Blanc Road at Duffield Road in Gaines Township, Grand Blanc Road at Morrish Road in Gaines Township and Seymour Road at Baldwin Road in Gaines Township	Install advanced warning flashers and pavement markings.	Seymour Road	1509803	5.447	6.662	Intersection	K=3, A=4	\$39,599.99	\$39,599.99
								Duffield Road	1512406	1.818	3.106				
								Morrish Road	1519303	1.485	3.023				
								Bladwin Road	1519309	2.962	4.479				
								Grand Blanc Road	1519606	0.404	1.086				
Grand Blanc Road	1519606	4.424	5.383												
5	R	25609	107977	Genesee County Road Commission	Dodge Road and McKinley Road	Dodge Road from Dosh Road to Oak Road, in Forest Township	Widen and pave full width shoulders, install shoulder rumble strips	Dodge Road	3250252	9.625	9.882	0.26 mi	K=1, A=0	\$155,961.18	\$110,340.00
						McKinley Road from 1/4 mile south of Dodge Road to 1/4 mile north of Dodge Road, in Montrose Township	Widen and pave full width shoulders, install centerline and shoulder rumble strips	McKinley Road	1506606	5.879	6.379	0.50 mi	K=2, A=0		
6	R	34609	107996	Ionia County Road Commission	Haynor Road	north of Rector Road, in Easton Township	Horizontal curve realignment, vertical curve improvements, culvert extension, and fixed object removal	Haynor Road	503502	1.08	1.38	0.30 mi	K=1, A=1	\$288,051.86	\$202,872.50
7	R	35609	107978	Iosco County Road Commission	Vaughn Road and Plank Road	Vaughn Road from Davision Road to Indian Lake Road, in Planifield and Grant Twp's and Plank Road from Old State Road to M-55, in Tawas Township	Shoulder trenching and HMA surfacing, install centerline and shoulder rumble strips, and permanent pavement markings.	Vaughn Road	1250802	10.82	12.266	1.45 mi	K=0, A=3	\$214,814.44	\$193,732.44
								N Plank Road	1254902	5.051	8.557	3.51 mi			
8	R	41609	107982	Kent County Road Commission	18 Mile Road	at Pine Lake Avenue	Vertical curve modification.	18 Mile Road NE	407903	3.197	4.413	Intersection	K=2, A=3	\$181,105.89	\$162,995.30
								Pine Lake Ave NE	454307	2.306	4.098				
9	R	44609	108031	Lapeer County Road Commission	Lake Pleasant Road	at Lum Road, in Arcadia Township	Permanent signing upgrades and stop rumble strip installation.	N Lake Pleasant Road	755306	8.183	9.33	Intersection	K=0, A=2	\$17,248.78	\$17,248.78
								Lum Road	757309	2.237	2.998				

Number	U/R/B	Cont Sect	Job Num	Lead Agency	Project Name	Project Limits	Work Type	Route Name	PR Number	Beginning MP	Ending MP	Project Length	# of 'K' & 'A' Injuries	Project Cost	Federal Participation
10	R	44609	108034	Lapeer County Road Commission	Genesee Road	from Maple Leaf Road to Hadley Road, in Elba Township	Centerline rumble strips, tree removal, and permanent signing upgrades.	Genesee Road	755010	1.461	2.551	1.09 mi	K=1, A=2	\$160,140.77	\$144,126.69
					Hadley Road	from Lippencott Road to Genesee Road, in Elba Township	Guardrail installation and tree removal.	Hadley Road	756506	2.503	3.901	1.40 mi	K=1, A=1		
					Burnside Road	from Oliver Road to Laur Road, in Deerfield Township	Guardrail installation, tree removal, and permanent signing upgrades.	W Burnside Road	761802	2.911	5.658	2.75 mi	K=0, A=4		
11	R	58609	107983	Monroe County Road Commission	Ida Center Road	at Secor Road	Flashing beacon installation and permanent signing upgrades.	Ida Center Road	1223704	6.973	8.163	Intersection	K=1, A=8	\$14,627.70	\$14,627.70
					Secor Road	1233210		2.902	3.496						
					Lewis Avenue	1226808		11.14	11.603						
					Albain Road	4301495		3.036	4.721						
12	R	59609	107984	Montcalm County Road Commission	Sidney Road	at Fitzner Road	Vertical curve modification.	Sidney Road (County Road 510)	1205209	3.03	4.328	Intersection	K=0, A=1	\$137,066.35	\$123,359.72
								S Fitzner Road	1211809	1.501	3.505				
13	R	60609	107985	Montmorency County Road Commission	CR 459	from MP 2.633 to MP 3.24, in Hillman Township	Install centerline and shoulder rumble strips, delineators, chevrons and pav't mrkgs on curves.	W County Road 459	1219006	1.995	3.494	1.50 mi	K=1, A=1	\$61,967.99	\$61,967.99
14	R	73609	107987	Saginaw County Road Commission	Wadsworth Road	from Gera Road to Block Road, in Blumfield Township	Super-elevation modification, ditch enclosure, RR grade xing improvements, tree removal, and permanent signing installation.	Wadsworth Road	463401	8.994	10.009	1.02 mi	K=1, A=2	\$323,759.25	\$291,383.33
15	R	80609	107989	Van Buren County Road Commission	CR 388 (Phoenix Road)	at 62nd Street, in Geneva Township	Add turn lanes, stop rumble strips and permanent signing upgrades.	62nd Street	578706	8.687	8.922	Intersection	K=1, A=4	\$240,206.36	\$216,185.72
								County Road 388	585809	4.944	6.034				
16	R	30609	104465	Hillsdale County Road Commission	Litchfield Road	from Cobb Lake Road to 1/2 mile west of Rowe Road	HMA paving, shoulder widening, box culvert replacement, slope flattening and guardrail	Litchfield Road	514002	9.515	9.742	0.23 mi	K-1, A-1	\$202,337.01	\$182,103.31
17	R	30609	104466	Hillsdale County Road Commission	North Adams Road	at Waldron Road	HMA surfacing and widening, vertical alignment correction and guardrail installation	North Adams Road	514301	12.056	13.861	Intersection	K-1, A-2	\$287,460.36	\$239,683.68
								Waldron Road	522501	17.814	18.553				
18	R	73609	104485	Saginaw County Road Commission	Frost Road	at Orr Road	Vertical curve modification, add right turn lanes and add deceleration tapers	Frost Road	470205	9.638	10.612	Intersection	K-0, A-1	\$496,619.57	\$184,500.00
								Orr Road	470310	8.448	10.229				
TOTAL =														\$3,011,294.72	\$2,356,987.05

Appendix B - Before and After Crash/Injury Table

B.1 2010 LAP Analysis – STH

Project Number	Project Type	Project Location	Total Projects																				
			Annual Average Fatal Crash Frequency (Before)	Annual Average Fatal Crash Frequency (After)	% Reduction	Annual Average of Type A Injuries (Before)	Annual Average of Type A Injuries (After)	% Reduction	Annual Average of Type B Injuries (Before)	Annual Average of Type B Injuries (After)	% Reduction	Annual Average of Type C Injuries (Before)	Annual Average of Type C Injuries (After)	% Reduction	Annual Average of PDO (Before)	Annual Average of PDO (After)	% Reduction	Annual Average of Fatal & Type KABC Injuries (Before)	Annual Average of Fatal & Type KABC Injuries (After)	% Reduction	Annual Average of Total Crashes (Before)	Annual Average of Total Crashes (After)	% Reduction
STH-1	Intersection improvement	Blue Star Highway at North Shore Drive,	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	1.67	0.00	100.0%	0.33	1.00	-200.0%	1.67	0.00	100.0%	2.00	1.00	50.0%
STH-2	Roadway departure & Clearzone	Riverview Drive, from 4th Street to Gene Drive	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.33	-	1.33	0.33	75.0%	0.33	0.33	0.0%	1.67	0.67	60.0%
STH-3	Roadway departure & Clearzone	East Torch Lake Drive (CR 593), Alden Highway to M-88	0.00	0.00	-	0.33	0.33	0.0%	1.67	0.00	100.0%	0.67	0.67	0.0%	11.00	10.67	3.0%	2.67	1.00	62.5%	13.67	11.67	14.6%
STH-4	Intersection improvement	Melita Road at Main Street	0.00	0.00	-	0.00	0.00	-	2.00	0.00	100.0%	1.00	0.00	100.0%	2.00	0.00	100.0%	3.00	0.00	100.0%	5.00	0.00	100.0%
STH-5	Roadway departure & Clearzone	Froberg Road at East Sturgeon Slough	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-6	Sign Related	Cedar Run Road at Reynolds Road	0.33	0.00	100.0%	0.00	0.00	-	0.33	0.33	0.0%	0.00	0.00	-	0.67	0.00	100.0%	0.67	0.33	50.0%	1.33	0.33	75.0%
STH-7	Roadway departure & Clearzone	North Manistee County Line Road (CR-602), 0.31 miles east of Wallaker Road easterly 1500 feet	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.67	0.00	100.0%	0.00	0.00	-	0.67	0.00	100.0%
STH-8	Turn lane	John Beers Road, from Cleveland Avenue to Washington Avenue	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.33	-	0.67	0.67	0.0%	2.33	2.00	14.3%	1.00	1.00	0.0%	3.33	3.00	10.0%
STH-9	Roadway departure & Clearzone	South River Road, from Canton Road to Orchard Beach Road	0.00	0.00	-	0.00	0.33	-	0.00	0.00	-	0.67	0.33	50.0%	0.33	1.00	-200.0%	0.67	0.67	0.0%	1.00	1.67	-66.7%
STH-10	Roadway departure & Clearzone	FH-42 (Curly Lewis Highway) at Roxbury Creek, Ankodosh Creek, and Naomikong Creek	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-11	Intersection improvement	N. Caribou Lake Road at Spring Bay Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-12	Turn lane	N. Lansing Street at Daisy Street, Floral Street, and North Gateway Schools	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.33	0.33	0.0%	0.00	0.00	-	0.33	0.33	0.0%
STH-13	Roadway departure & Clearzone	9 locations																					
STH-14	Roadway departure & Clearzone	Stanley Road, from Bray Road to Center Road	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.33	-	0.33	1.33	-300.0%	1.33	1.00	25.0%	0.67	1.67	-150.0%	2.00	2.67	-33.3%
STH-15	Traffic signal	Elms Road at Carpenter Road	0.33	0.00	100.0%	0.67	0.00	100.0%	0.67	0.00	100.0%	0.67	2.33	-250.0%	4.33	3.67	15.4%	2.33	2.33	0.0%	6.67	6.00	10.0%
STH-16	Intersection improvement	Wilson Road at Henderson Road	0.00	0.00	-	0.67	0.00	100.0%	0.33	0.33	0.0%	0.00	0.00	-	0.67	0.67	0.0%	1.00	0.33	66.7%	1.67	1.00	40.0%
STH-17	Traffic signal	Elms Road at Flushing Road	0.00	0.00	-	0.00	0.00	-	0.00	0.33	-	1.00	1.33	-33.3%	3.67	5.67	-54.5%	1.00	1.67	-66.7%	4.67	7.33	-57.1%
STH-18	Roadway departure & Clearzone	Torrey Road, from Oakridge Drive north to Bristol Road	0.00	0.00	-	0.00	0.67	-	0.67	0.00	100.0%	0.67	1.00	-50.0%	4.67	1.00	78.6%	1.33	1.67	-25.0%	6.00	2.67	55.6%
STH-19-1	Sign Related	Cass Road, from Keystone Road to Hartman Road	0.00	0.00	-	0.00	0.00	-	0.67	0.00	100.0%	1.00	1.67	-66.7%	6.00	6.00	0.0%	1.67	1.67	0.0%	7.67	7.67	0.0%
STH-19-2	Sign Related	Five Mile Road, from Hammond Road to the	0.00	0.00	-	0.67	0.00	100.0%	0.67	0.33	50.0%	2.00	1.33	33.3%	9.67	6.67	31.0%	3.33	1.67	50.0%	13.00	8.33	35.9%

Project Number	Project Type	Project Location	Total Projects																					
			Annual Average Fatal Crash Frequency (Before)	Annual Average Fatal Crash Frequency (After)	% Reduction	Annual Average of Type A Injuries (Before)	Annual Average of Type A Injuries (After)	% Reduction	Annual Average of Type B Injuries (Before)	Annual Average of Type B Injuries (After)	% Reduction	Annual Average of Type C Injuries (Before)	Annual Average of Type C Injuries (After)	% Reduction	Annual Average of PDO (Before)	Annual Average of PDO (After)	% Reduction	Annual Average of Fatal & Type KABC Injuries	Annual Average of Fatal & Type KABC Injuries (After)	% Reduction	Annual Average of Total Crashes (Before)	Annual Average of Total Crashes (After)	% Reduction	
		northern East Bay Township line																						
STH-19-3	Sign Related	Supply Road, North Hobbs Highway to East Bay East Township line	0.00	0.33	-	0.33	0.33	0.0%	0.67	1.33	-100.0%	0.33	2.00	-500.0%	2.33	3.33	-42.9%	1.33	4.00	-200.0%	3.67	7.33	-100.0%	
STH-20	Sign Related	180 locations																						
STH-21	Roadway departure & Clearzone	Jefferson Road at Sugar Creek	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	0.67	0.00	100.0%	0.33	0.00	100.0%	1.00	0.00	100.0%	
STH-22	Intersection improvement	Paradise Road at Pilgrim Road	0.00	0.33	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	1.00	1.67	-66.7%	0.00	0.33	-	1.00	2.00	-100.0%	
STH-23	Traffic signal	9 various locations																						
STH-24	Turn lane	84th Street, from Alles Drive to Norfolk Southern RR	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.67	0.67	0.0%	2.67	1.33	50.0%	1.00	0.67	33.3%	3.67	2.00	45.5%	
STH-25	Traffic signal	Cascade Road at Spaulding Avenue/Hall Street	0.33	0.00	100.0%	0.00	0.00	-	0.33	0.33	0.0%	1.67	1.00	40.0%	6.67	7.00	-5.0%	2.33	1.33	42.9%	9.00	8.33	7.4%	
STH-26-1	Traffic signal	Cascade Road at Forest Hill Avenue	0.00	0.00	-	1.33	0.00	100.0%	0.67	0.33	50.0%	0.33	2.00	-500.0%	19.00	10.67	43.9%	2.33	2.33	0.0%	21.33	13.00	39.1%	
STH-26-2	Traffic signal	Division Avenue at 68th Street	0.00	0.00	-	0.00	0.00	-	1.00	1.33	-33.3%	2.67	1.67	37.5%	10.33	16.00	-54.8%	3.67	3.00	18.2%	14.00	19.00	-35.7%	
STH-27-1	Traffic signal	Leonard Street at Ball Street	0.00	0.00	-	0.33	0.00	100.0%	1.33	0.00	100.0%	2.00	1.00	50.0%	6.33	4.67	26.3%	3.67	1.00	72.7%	10.00	5.67	43.3%	
STH-27-2	Traffic signal	Leonard Street at Fuller Avenue	0.00	0.00	-	0.67	0.33	50.0%	1.00	0.67	33.3%	5.33	7.33	-37.5%	30.67	33.00	-7.6%	7.00	8.33	-19.0%	37.67	41.33	-9.7%	
STH-27-3	Traffic signal	Leonard Street at Leffingwell Avenue	0.00	0.00	-	0.00	0.33	-	1.00	0.33	66.7%	0.67	1.67	-150.0%	5.67	6.67	-17.6%	1.67	2.33	-40.0%	7.33	9.00	-22.7%	
STH-28-1	Traffic signal	Fuller Avenue at 3 Mile Road	0.00	0.00	-	0.00	0.00	-	0.33	0.67	-100.0%	1.33	2.67	-100.0%	6.00	3.67	38.9%	1.67	3.33	-100.0%	7.67	7.00	8.7%	
STH-28-2	Traffic signal	32nd Street at Kalamazoo Avenue	0.00	0.00	-	0.00	0.00	-	0.67	0.67	0.0%	1.00	0.67	33.3%	6.67	5.00	25.0%	1.67	1.33	20.0%	8.33	6.33	24.0%	
STH-29	Roadway departure & Clearzone	Pratt Road, from Lapeer WCL to Green Corners Road	0.00	0.00	-	0.00	0.00	-	0.33	0.67	-100.0%	0.00	0.33	-	2.33	1.33	42.9%	0.33	1.00	-200.0%	2.67	2.33	12.5%	
STH-30	Traffic signal	Old US-23 at Spencer Road	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	0.33	0.67	-100.0%	5.00	6.00	-20.0%	0.67	0.67	0.0%	5.67	6.67	-17.6%	
STH-31	Roadway departure & Clearzone	Mackinaw Trail, from I-75 business loop northerly 1.0 miles.	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	1.33	0.67	50.0%	0.33	0.00	100.0%	1.67	0.67	60.0%	
STH-32-1	Traffic signal	13 Mile at Utica Road	0.00	0.00	-	0.00	0.00	-	0.67	1.67	-150.0%	2.67	3.67	-37.5%	16.00	20.33	-27.1%	3.33	5.33	-60.0%	19.33	25.67	-32.8%	
STH-32-2	Traffic signal	14 Mile at Hayes Road	0.00	0.00	-	0.33	0.00	100.0%	0.67	0.67	0.0%	1.67	1.67	0.0%	12.00	7.33	38.9%	2.67	2.33	12.5%	14.67	9.67	34.1%	
STH-32-3	Traffic signal	Moravian at Utica Road	0.00	0.00	-	0.33	0.00	100.0%	0.33	0.33	0.0%	6.00	2.67	55.6%	15.33	11.33	26.1%	6.67	3.00	55.0%	22.00	14.33	34.8%	
STH-32-4	Traffic signal	Schoenherr at 24 Mile	0.00	0.00	-	0.33	0.00	100.0%	0.67	0.33	50.0%	1.33	2.00	-50.0%	9.00	8.00	11.1%	2.33	2.33	0.0%	11.33	10.33	8.8%	
STH-33	Turn lane	15 Mile Road at Schoenherr Road	0.00	0.00	-	0.33	0.00	100.0%	0.33	0.67	-100.0%	2.00	2.67	-33.3%	15.00	13.00	13.3%	2.67	3.33	-25.0%	17.67	16.33	7.5%	
STH-34	Traffic signal	14th Avenue at 13th Street	0.00	0.00	-	0.33	0.00	100.0%	0.67	0.00	100.0%	1.67	0.33	80.0%	4.67	2.00	57.1%	2.67	0.33	87.5%	7.33	2.33	68.2%	
STH-35-1	Sign Related	Whiteford Road, from Section Road to Sterns Road	0.00	0.00	-	1.00	0.00	100.0%	0.00	0.00	-	1.00	0.00	100.0%	2.67	3.00	-12.5%	2.00	0.00	100.0%	4.67	3.00	35.7%	

Project Number	Project Type	Project Location	Total Projects																				
			Annual Average Fatal Crash Frequency (Before)	Annual Average Fatal Crash Frequency (After)	% Reduction	Annual Average of Type A Injuries (Before)	Annual Average of Type A Injuries (After)	% Reduction	Annual Average of Type B Injuries (Before)	Annual Average of Type B Injuries (After)	% Reduction	Annual Average of Type C Injuries (Before)	Annual Average of Type C Injuries (After)	% Reduction	Annual Average of PDO (Before)	Annual Average of PDO (After)	% Reduction	Annual Average of Fatal & Type KABC Injuries	Annual Average of Fatal & Type KABC Injuries (After)	% Reduction	Annual Average of Total Crashes (Before)	Annual Average of Total Crashes (After)	% Reduction
STH-35-2	Sign Related	North Dixie Highway, from Pointe Aux Peaux Road to Post Road	0.00	0.00	-	0.33	0.00	100.0%	0.67	1.00	-50.0%	1.67	2.33	-40.0%	5.67	10.67	-88.2%	2.67	3.33	-25.0%	8.33	14.00	-68.0%
STH-36	Intersection improvement	Laketon Avenue at Henry Street	0.00	0.00	-	0.33	0.00	100.0%	1.00	1.00	0.0%	0.67	0.33	50.0%	8.67	8.33	3.8%	2.00	1.33	33.3%	10.67	9.67	9.4%
STH-37-1	Traffic signal	Laketon Avenue at Hoyt Street	0.00	0.33	-	0.00	0.33	-	0.67	1.00	-50.0%	1.67	1.33	20.0%	5.33	4.00	25.0%	2.33	3.00	-28.6%	7.67	7.00	8.7%
STH-37-2	Traffic signal	Laketon Avenue at Getty Street	0.00	0.00	-	1.33	0.33	75.0%	1.00	1.33	-33.3%	3.33	2.00	40.0%	19.00	21.33	-12.3%	5.67	3.67	35.3%	24.67	25.00	-1.4%
STH-37-3	Traffic signal	Laketon Avenue at Roberts Street	0.00	0.00	-	0.67	0.00	100.0%	1.00	0.67	33.3%	1.33	0.33	75.0%	9.67	7.33	24.1%	3.00	1.00	66.7%	12.67	8.33	34.2%
STH-38	Turn lane	Sternberg Road at Grand Haven Road	0.33	0.00	100.0%	0.00	0.00	-	0.67	0.67	0.0%	1.00	0.33	66.7%	1.33	1.00	25.0%	2.00	1.00	50.0%	3.33	2.00	40.0%
STH-39	Intersection improvement	Harvey Road at Sternberg Road	0.00	0.00	-	0.33	0.33	0.0%	0.33	1.67	-400.0%	4.33	4.00	7.7%	37.33	36.00	3.6%	5.00	6.00	-20.0%	42.33	42.00	0.8%
STH-40	Intersection improvement	10 Mile Road at Novi Way (Wildcat)	0.00	0.00	-	0.00	0.00	-	0.67	0.00	100.0%	1.67	2.67	-60.0%	6.00	5.33	11.1%	2.33	2.67	-14.3%	8.33	8.00	4.0%
STH-41	Roadway Improvement	E. Pierce Road, from 132nd Avenue to 144th Avenue	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.33	0.33	0.0%	0.67	0.00	100.0%	0.33	0.33	0.0%	1.00	0.33	66.7%
STH-42	Roadway departure & Clearzone	Kittle Road at Honeywell Creek	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.33	-	0.33	0.00	100.0%	0.33	0.33	0.0%
STH-43	Roadway departure & Clearzone	40th Street, from Industrial Avenue to Waverly Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.33	-	2.67	0.67	75.0%	0.00	0.33	-	2.67	1.00	62.5%
STH-44	Turn lane	Center Road at Brockway Road	0.00	0.33	-	0.00	0.33	-	0.67	0.67	0.0%	1.00	1.00	0.0%	8.67	7.67	11.5%	1.67	2.33	-40.0%	10.33	10.00	3.2%
STH-45	Traffic signal	E. Genesee Avenue at Hess Avenue	0.00	0.00	-	0.00	0.33	-	0.67	0.67	0.0%	1.00	1.33	-33.3%	7.67	8.33	-8.7%	1.67	2.33	-40.0%	9.33	10.67	-14.3%
STH-46	Traffic signal & Turn Lane	Bay Street, from Court Street to W. Genesee Ave	0.00	0.00	-	0.00	0.00	-	0.33	0.33	0.0%	4.00	1.00	75.0%	13.67	11.33	17.1%	4.33	1.33	69.2%	18.00	12.67	29.6%
STH-47	Vertical Alignment	Grand River Road at Colby Lake Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.33	-	0.67	0.67	0.0%	0.00	0.33	-	0.67	1.00	-50.0%
STH-48-1	Intersection improvement	Allen Road at Manor Avenue	0.00	0.00	-	0.33	0.00	100.0%	0.67	0.00	100.0%	0.00	0.00	-	1.67	1.33	20.0%	1.00	0.00	100.0%	2.67	1.33	50.0%
STH-48-2	Intersection improvement	Allen Road at Reeck Road	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	1.00	0.00	100.0%	1.67	0.00	100.0%	1.33	0.00	100.0%	3.00	0.00	100.0%
STH-49	Intersection improvement	Springwells Street at Chamberlain Street	0.67	0.00	100.0%	0.00	0.33	-	1.00	0.00	100.0%	0.33	1.33	-300.0%	1.67	3.33	-100.0%	2.00	1.67	16.7%	3.67	5.00	-36.4%
STH-50	Roadway Improvement	Livernois Street, from Toledo Street to John Kronk	0.67	0.33	50.0%	0.33	0.33	0.0%	0.33	1.33	-300.0%	2.33	1.67	28.6%	13.33	6.00	55.0%	3.67	3.67	0.0%	17.00	9.67	43.1%
STH-51	Pedestrian related	West Vernor Highway, from Waterman Street to Lansing Street	0.33	0.00	100.0%	0.33	1.00	-200.0%	1.67	1.33	20.0%	6.00	6.00	0.0%	38.67	23.00	40.5%	8.33	8.33	0.0%	47.00	31.33	33.3%
STH-52-1	Traffic signal	Beaconsfield Road at Eastland Village Drive	0.00	0.00	-	0.00	0.33	-	0.00	0.00	-	0.33	0.33	0.0%	0.33	0.33	0.0%	0.33	0.67	-100.0%	0.67	1.00	-50.0%
STH-52-2	Traffic signal	Beaconsfield Road at Damman Avenue	0.00	0.00	-	0.00	0.33	-	0.00	0.67	-	0.00	0.33	-	0.67	0.33	50.0%	0.00	1.33	#DIV/0!	0.67	1.67	-150.0%
STH-52-3	Traffic signal	Beaconsfield Road at Eastwood Drive	0.00	0.00	-	0.00	0.00	-	0.00	0.33	-	0.33	0.00	100.0%	1.67	0.67	60.0%	0.33	0.33	0.0%	2.00	1.00	50.0%
STH-52-4	Traffic signal	Beaconsfield Road at Woodside Drive	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	0.33	0.33	0.0%	0.33	0.00	100.0%	0.67	0.33	50.0%

Project Number	Project Type	Project Location	Total Projects																				
			Annual Average Fatal Crash Frequency (Before)	Annual Average Fatal Crash Frequency (After)	% Reduction	Annual Average of Type A Injuries (Before)	Annual Average of Type A Injuries (After)	% Reduction	Annual Average of Type B Injuries (Before)	Annual Average of Type B Injuries (After)	% Reduction	Annual Average of Type C Injuries (Before)	Annual Average of Type C Injuries (After)	% Reduction	Annual Average of PDO (Before)	Annual Average of PDO (after)	% Reduction	Annual Average of Fatal & Type KABC Injuries	Annual Average of Fatal & Type KABC Injuries (After)	% Reduction	Annual Average of Total Crashes (Before)	Annual Average of Total Crashes (After)	% Reduction
STH-53-1	Turn lane	Newburgh Road at 5 Mile Road	0.00	0.00	-	0.00	0.67	-	0.00	1.67	-	4.00	3.67	8.3%	18.67	18.33	1.8%	4.00	6.00	-50.0%	22.67	24.33	-7.4%
STH-53-2	Turn lane	Newburgh Road at 7 Mile Road	0.00	0.00	-	0.00	0.33	-	0.33	1.67	-400.0%	4.00	1.33	66.7%	13.67	14.33	-4.9%	4.33	3.33	23.1%	18.00	17.67	1.9%
STH-54	Traffic signal	Middlebelt Road at 5 Mile Road	0.00	0.00	-	0.00	0.67	-	0.67	2.00	-200.0%	5.00	5.33	-6.7%	23.67	30.67	-29.6%	5.67	8.00	-41.2%	29.33	38.67	-31.8%
STH-55-1	Traffic signal	Middlebelt Road at 6 Mile Road	0.00	0.00	-	0.00	0.00	-	0.67	2.67	-300.0%	2.33	1.33	42.9%	18.33	18.67	-1.8%	3.00	4.00	-33.3%	21.33	22.67	-6.3%
STH-55-2	Traffic signal	Middlebelt Road at 7 Mile Road	0.00	0.00	-	0.33	0.67	-100.0%	2.33	1.67	28.6%	5.33	4.33	18.8%	16.00	17.00	-6.3%	8.00	6.67	16.7%	24.00	23.67	1.4%
STH-56-1	Pedestrian related	Middlebelt Road, at Conrail railroad structure	0.00	0.00	-	0.00	0.00	-	0.00	0.33	-	0.67	0.33	50.0%	5.00	3.67	26.7%	0.67	0.67	0.0%	5.67	4.33	23.5%
STH-56-2	Pedestrian Related	Inkster Road, at Conrail railroad structure	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	2.33	1.33	42.9%	4.33	2.00	53.8%	2.67	1.33	50.0%	7.00	3.33	52.4%
STH-57	Turn lane	13th Street, from Leeson Avenue to GLC RR tracks	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	1.33	0.67	50.0%	4.67	2.33	50.0%	1.67	0.67	60.0%	6.33	3.00	52.6%
STH-58-1	Roadway departure & Clearzone	First Avenue	0.00	0.00	-	0.00	0.00	-	0.00	0.33	-	0.00	0.00	-	0.67	0.00	100.0%	0.00	0.33	#DIV/0!	0.67	0.33	50.0%
STH-58-2	Roadway departure & Clearzone	Adams/Hueber Street	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	0.33	0.00	100.0%
STH-58-3	Roadway departure & Clearzone	Ford Avenue	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-59	Vertical Alignment	Reams Road at Pickerel Lake Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.33	-	0.33	0.00	100.0%	0.33	0.33	0.0%
STH-60	Roadway departure & Clearzone	Lake Mary Drive and CR -3 at Hamilton Creek & the North Branch of the Ford River	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-61	Vertical Alignment	Crahen Avenue at Bradford Street	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	0.33	0.33	0.0%	0.67	2.00	-200.0%	0.67	0.33	50.0%	1.33	2.33	-75.0%
STH-62	Traffic signal	Southfield Road at 13 Mile Road	0.00	0.00	-	0.00	0.00	-	1.33	2.33	-75.0%	8.67	6.33	26.9%	40.00	30.33	24.2%	10.00	8.67	13.3%	50.00	39.00	22.0%
STH-63	Roadway departure & Clearzone	CR 437 at FFRD 2213	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-64	Vertical Alignment & Roadway Departure & Clearzone	CR 669 (Old Swamp Road) at 40th Street	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.33	-	0.00	0.00	-	0.00	0.33	-
STH-65	Roadway departure & Clearzone	66th Street at CR378	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	0.67	0.00	100.0%	0.67	0.00	100.0%
STH-66	Traffic signal	Silver Lake Road at Zimmerman Road	0.00	0.00	-	0.00	0.33	-	0.67	0.00	100.0%	1.00	1.33	-33.3%	7.67	8.33	-8.7%	1.67	1.67	0.0%	9.33	10.00	-7.1%
STH-67	Roadway departure & Clearzone	9 locations																					
Total Projects			3.67	1.67	54.5%	13.33	9.00	32.5%	36.67	37.33	-1.8%	112.00	99.33	11.3%	571.33	512.67	10.3%	165.67	147.33	11.1%	737.00	660.00	10.4%

B.2 2010 LAP Analysis – HRRR

Project Number	Project Type	Project Location	Total Projects																				
			Annual Average Fatal Crash Frequency (Before)	Annual Average Fatal Crash Frequency (After)	% Reduction	Annual Average of Type A Injuries (Before)	Annual Average of Type A Injuries (After)	% Reduction	Annual Average of Type B Injuries (Before)	Annual Average of Type B Injuries (After)	% Reduction	Annual Average of Type C Injuries (Before)	Annual Average of Type C Injuries (After)	% Reduction	Annual Average of PDO (Before)	Annual Average of PDO (after)	% Reduction	Annual Average of Fatal & Injuries (Before)	Annual Average of Fatal & Injuries (After)	% Reduction	Annual Average of Total Crashes (Before)	Annual Average of Total Crashes (After)	% Reduction
HRRR-1	Roadway Departure & Clearzone	Connors Road from Miller Road northerly to a point 0.8 miles north of Miller Road.	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.33	-	0.67	0.00	100.0%	0.33	0.33	0.0%	1.00	0.33	66.7%
HRRR-2	Roadway Improvement	Cherry Avenue (CR 593) from the Torch River Road northerly to Cairn Highway	0.00	0.00	-	0.33	0.67	-100.0%	1.67	1.67	0.0%	1.67	0.33	80.0%	4.67	5.33	-14.3%	3.67	2.67	27.3%	8.33	8.00	4.0%
HRRR-3	Sign related	Reynolds Road between Fewin Road and CR-610, in Almira and Inland Twp's	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	1.67	0.33	80.0%	0.33	0.00	100.0%	2.00	0.33	83.3%
HRRR-4-1	Intersection improvement	Grand Blanc Road at Duffield Road	0.33	0.00	100.0%	0.33	0.00	100.0%	0.67	0.33	50.0%	0.33	0.67	-100.0%	2.33	1.33	42.9%	1.67	1.00	40.0%	4.00	2.33	41.7%
HRRR-4-2	Intersection improvement	Grand Blanc Road at Morrish Road and	0.00	0.00	-	0.33	0.33	0.0%	0.33	0.67	-100.0%	1.00	0.33	66.7%	1.00	2.67	-166.7%	1.67	1.33	20.0%	2.67	4.00	-50.0%
HRRR-4-3	Intersection improvement	Seymour Road at Baldwin Road	0.33	0.00	100.0%	0.33	0.00	100.0%	0.33	0.33	0.0%	0.33	0.67	-100.0%	0.67	0.00	100.0%	1.33	1.00	25.0%	2.00	1.00	50.0%
HRRR-5-1	Roadway Departure & Clearzone	Dodge Road from Dosh Road to Oak Road	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	1.67	1.00	40.0%	0.33	0.00	100.0%	2.00	1.00	50.0%
HRRR-5-2	Roadway Departure & Clearzone	McKinley Road from 1/4 mile south of Dodge Road to 1/4 mile north of Dodge Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	0.33	1.33	-300.0%	0.33	0.00	100.0%	0.67	1.33	-100.0%
HRRR-6	Roadway Departure & Clearzone	Haynor Road north of Rector Road	0.33	0.00	100.0%	0.33	0.00	100.0%	0.00	0.00	-	0.33	0.00	100.0%	1.00	0.00	100.0%	1.00	0.00	100.0%	2.00	0.00	100.0%
HRRR-7-1	Roadway Improvement	Vaughn Road from Davision Road to Indian Lake Road	0.00	0.00	-	0.33	0.33	0.0%	0.67	0.00	100.0%	0.00	0.33	-	0.33	1.00	-200.0%	1.00	0.67	33.3%	1.33	1.67	-25.0%
HRRR-7-2	Roadway Improvement	Plank Road from Old State Road to M-55	0.00	0.00	-	0.00	0.33	-	1.00	0.33	66.7%	1.33	1.00	25.0%	4.67	3.67	21.4%	2.33	1.67	28.6%	7.00	5.33	23.8%
HRRR-8	Vertical Alignment	18 Mile Road at Pine Lake Avenue	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.33	-	1.00	0.00	100.0%	0.00	0.33	-	1.00	0.33	66.7%
HRRR-9	Intersection Improvement	Lake Pleasant Road at Lum Road	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.33	-	0.33	2.00	-500.0%	0.33	0.33	0.0%	0.67	2.33	-250.0%
HRRR-10-1	Roadway Departure & Clearzone	Genesee Road from Maple Leaf Road to Hadley Road	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.67	-	0.00	0.67	-	0.33	0.67	-100.0%	0.33	1.33	-300.0%	0.67	2.00	-200.0%
HRRR-10-2	Roadway Departure & Clearzone	Hadley Road from Lippencott Road to Genesee Road	0.00	0.00	-	0.00	0.00	-	0.67	0.00	100.0%	0.00	0.00	-	1.00	1.00	0.0%	0.67	0.00	100.0%	1.67	1.00	40.0%
HRRR-10-3	Roadway Departure & Clearzone	Burnside Road from Oliver Road to Laur Road	0.00	0.00	-	0.67	0.33	50.0%	0.33	1.33	-300.0%	1.00	1.00	0.0%	3.67	2.33	36.4%	2.00	2.67	-33.3%	5.67	5.00	11.8%
HRRR-11-1	Intersection Improvement	Ida Center Road at Secor Road	0.00	0.00	-	0.33	0.00	100.0%	0.67	0.00	100.0%	0.00	0.33	-	0.33	1.00	-200.0%	1.00	0.33	66.7%	1.33	1.33	0.0%
HRRR-11-2	Intersection Improvement	Albain Road at Lewis Avenue	0.00	0.00	-	0.33	0.00	100.0%	0.67	0.00	100.0%	0.33	0.67	-100.0%	3.33	3.67	-10.0%	1.33	0.67	50.0%	4.67	4.33	7.1%

Project Number	Project Type	Project Location	Total Projects																				
			Annual Average Fatal Crash Frequency (Before)	Annual Average Fatal Crash Frequency (After)	% Reduction	Annual Average of Type A Injuries (Before)	Annual Average of Type A Injuries (After)	% Reduction	Annual Average of Type B Injuries (Before)	Annual Average of Type B Injuries (After)	% Reduction	Annual Average of Type C Injuries (Before)	Annual Average of Type C Injuries (After)	% Reduction	Annual Average of PDO (Before)	Annual Average of PDO (after)	% Reduction	Annual Average of Fatal & Injuries (Before)	Annual Average of Fatal & Injuries (After)	% Reduction	Annual Average of Total Crashes (Before)	Annual Average of Total Crashes (After)	% Reduction
HRRR-12	Vertical Alignment	Sidney Road at Fitzner Road	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.67	1.00	-50.0%	0.33	0.00	100.0%	1.00	1.00	0.0%
HRRR-13	Roadway Departure & Clearzone	CR 459 from MP 2.633 to MP 3.24	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.67	1.00	-50.0%	0.33	0.00	100.0%	1.00	1.00	0.0%
HRRR-14	Roadway Departure & Clearzone	Wadsworth Road from Gera Road to Block Road	0.00	0.33	-	0.33	0.00	100.0%	0.00	0.00	-	0.33	0.33	0.0%	1.00	1.33	-33.3%	0.67	0.67	0.0%	1.67	2.00	-20.0%
HRRR-15	Intersection Improvement	CR 388 (Phoenix Road) at 62nd Street	0.33	0.00	100.0%	0.00	0.00	-	0.33	0.33	0.0%	0.00	0.33	-	2.00	1.33	33.3%	0.67	0.67	0.0%	2.67	2.00	25.0%
HRRR-16	Roadway improvement	Litchfield Road from Cobb Lake Road to 1/2 mile west of Rowe Road	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.67	-	0.00	0.00	-	0.00	0.33	-	0.33	0.67	-100.0%	0.33	1.00	-200.0%
HRRR-17	Vertical Alignment	North Adams Road at Waldron Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	0.33	0.00	100.0%
HRRR-18	Intersection improvement	Frost Road at Orr Road	0.00	0.00	-	0.33	0.00	100.0%	0.33	0.00	100.0%	0.33	0.00	100.0%	0.67	0.33	50.0%	1.00	0.00	100.0%	1.67	0.33	80.0%
Total Projects			2.00	0.33	83.3%	5.67	2.00	64.7%	8.00	6.33	20.8%	7.33	7.67	-4.5%	34.3	32.6	4.9%	23.0	16.3	29.0%	57.3	49.0	14.5%

B.3 2010 LAP Analysis – Intersection Improvements

Project Number	Project Type	Project Location	Total Crashes						Targeted Crashes																	
			Total Crashes						Angle - Straight						Angle - Turn											
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction
STH-1	Intersection improvement	Blue Star Highway at North Shore Drive,	2.00	1.00	50.0%	1.67	0.00	100.0%	1.67	0.00	100.0%	1.67	0.00	100.0%	1.00	0.00	100.0%	1.00	0.00	100.0%	0.00	0.00	-	0.00	0.00	-
STH-4	Intersection improvement	Melita Road at Main Street	5.00	0.00	100.0%	3.00	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-11	Intersection improvement	N. Caribou Lake Road at Spring Bay Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-16	Intersection improvement	Wilson Road at Henderson Road	1.67	1.00	40.0%	1.00	0.33	66.7%	1.00	1.00	0.0%	1.00	0.33	66.7%	1.00	0.67	33.3%	1.00	0.33	66.7%	0.00	0.33	-100.0%	0.00	0.00	-
STH-22	Intersection improvement	Paradise Road at Pilgrim Road	1.00	2.00	-100.0%	0.00	0.33	-1.0%	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-36	Intersection improvement	Laketon Avenue at Henry Street	10.67	9.67	9.4%	2.00	1.33	33.3%	5.67	7.00	-23.5%	0.00	1.00	-100.0%	2.33	1.67	28.6%	0.00	0.00	-	1.00	0.33	66.7%	0.00	0.00	-
STH-39	Intersection improvement	Harvey Road at Sternberg Road	42.33	42.00	0.8%	5.00	6.00	-20.0%	31.67	24.00	24.2%	4.67	5.00	-7.1%	5.67	1.00	82.4%	1.00	0.67	33.3%	1.67	2.33	-40.0%	0.00	0.33	-100.0%
STH-40	Intersection improvement	10 Mile Road at Novi Way (Wildcat)	8.33	8.00	4.0%	2.33	2.67	-14.3%	6.67	7.00	-5.0%	2.00	2.00	0.0%	0.33	0.00	100.0%	0.00	0.00	-	0.67	0.00	100.0%	0.00	0.00	-
STH-48-1	Intersection improvement	Allen Road at Manor Avenue	2.67	1.33	50.0%	1.00	0.00	100.0%	2.00	1.00	50.0%	0.67	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-48-2	Intersection improvement	Allen Road at Reeck Road	3.00	0.00	100.0%	1.33	0.00	100.0%	2.33	0.00	100.0%	1.00	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-49	Intersection improvement	Springwells Street at Chamberlain Street	3.67	5.00	-36.4%	2.00	1.67	16.7%	0.00	1.33	-100.0%	0.00	0.67	-100.0%	0.00	0.33	-100.0%	0.00	0.33	-100.0%	0.00	0.00	-	0.00	0.00	-
HRRR-4-1	Intersection improvement	Grand Blanc Road at Duffield Road	4.00	2.33	41.7%	1.67	1.00	40.0%	3.33	1.33	60.0%	1.33	0.67	50.0%	3.00	0.67	77.8%	1.33	0.33	75.0%	0.00	0.00	-	0.00	0.00	-
HRRR-4-2	Intersection improvement	Grand Blanc Road at Morrish Road and	2.67	4.00	-50.0%	1.67	1.33	20.0%	2.33	3.67	-57.1%	1.67	1.33	20.0%	1.00	2.33	-133.3%	0.67	1.33	-100.0%	0.67	0.33	50.0%	0.33	0.00	100.0%
HRRR-4-3	Intersection improvement	Seymour Road at Baldwin Road	2.00	1.00	50.0%	1.33	1.00	25.0%	1.67	1.00	40.0%	1.33	1.00	25.0%	1.33	0.33	75.0%	1.00	0.33	66.7%	0.33	0.00	100.0%	0.33	0.00	100.0%
HRRR-9	Intersection Improvement	Lake Pleasant Road at Lum Road	0.67	2.33	-250.0%	0.33	0.33	0.0%	0.33	1.67	-400.0%	0.33	0.33	0.0%	0.33	0.67	-100.0%	0.33	0.00	100.0%	0.00	0.33	-100.0%	0.00	0.00	-
HRRR-11-1	Intersection Improvement	Ida Center Road at Secor Road	1.33	1.33	0.0%	1.00	0.33	66.7%	1.00	1.00	0.0%	1.00	0.33	66.7%	1.00	1.00	0.0%	1.00	0.33	66.7%	0.00	0.00	-	0.00	0.00	-
HRRR-11-2	Intersection Improvement	Albain Road at Lewis Avenue	4.67	4.33	7.1%	1.33	0.67	50.0%	3.33	3.00	10.0%	1.33	0.67	50.0%	2.33	2.67	-14.3%	0.67	0.67	0.0%	0.00	0.00	-	0.00	0.00	-
HRRR-15	Intersection Improvement	CR 388 (Phoenix Road) at 62nd Street	2.67	2.00	25.0%	0.67	0.67	0.0%	2.00	1.33	33.3%	0.67	0.67	0.0%	1.00	0.33	66.7%	0.67	0.00	100.0%	0.33	0.33	0.0%	0.00	0.00	-
HRRR-18	Intersection improvement	Frost Road at Orr Road	1.67	0.33	80.0%	1.00	0.00	100.0%	1.00	0.00	100.0%	0.67	0.00	100.0%	0.33	0.00	100.0%	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-
Intersection Improvement Total			100.00	87.67	12.3%	28.33	17.67	37.6%	66.33	54.33	18.1%	19.33	14.00	27.6%	20.67	11.67	43.5%	9.00	4.33	51.9%	4.67	4.00	14.3%	0.67	0.33	50.0%

Project Number	Project Type	Project Location	Targeted Crashes																	
			Head On						Head On Left Turn						Rear End					
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction
STH-1	Intersection improvement	Blue Star Highway at North Shore Drive,	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.67	0.00	100.0%	0.67	0.00	100.0%
STH-4	Intersection improvement	Melita Road at Main Street	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-11	Intersection improvement	N. Caribou Lake Road at Spring Bay Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-16	Intersection improvement	Wilson Road at Henderson Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-22	Intersection improvement	Paradise Road at Pilgrim Road	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-36	Intersection improvement	Laketon Avenue at Henry Street	0.00	0.00	-	0.00	0.00	-	0.67	1.33	-100.0%	0.00	0.33	-100.0%	1.67	3.70	-122.0%	0.00	0.67	-100.0%
STH-39	Intersection improvement	Harvey Road at Sternberg Road	0.00	0.33	-100.0%	0.00	0.00	-	1.33	1.67	-25.0%	0.33	0.33	0.0%	23.00	21.00	8.7%	3.30	4.00	-21.2%
STH-40	Intersection improvement	10 Mile Road at Novi Way (Wildcat)	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	5.67	7.00	-23.5%	2.00	2.00	0.0%
STH-48-1	Intersection improvement	Allen Road at Manor Avenue	0.00	0.00	-	0.00	0.00	-	0.67	0.67	0.0%	0.33	0.00	100.0%	1.33	0.33	75.0%	0.33	0.00	100.0%
STH-48-2	Intersection improvement	Allen Road at Reeck Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	2.33	0.00	100.0%	1.00	0.00	100.0%
STH-49	Intersection improvement	Springwells Street at Chamberlain Street	0.00	0.67	-100.0%	0.00	0.33	-100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.33	-	0.00	0.00	-
HRRR-4-1	Intersection improvement	Grand Blanc Road at Duffield Road	0.00	0.33	-100.0%	0.00	0.33	-100.0%	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.33	-	0.00	0.00	-
HRRR-4-2	Intersection improvement	Grand Blanc Road at Morrish Road and	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	0.33	0.00	100.0%	0.33	1.00	-200.0%	0.33	0.00	100.0%
HRRR-4-3	Intersection improvement	Seymour Road at Baldwin Road	0.00	0.33	-100.0%	0.00	0.33	-100.0%	0.00	0.33	-100.0%	0.00	0.33	-100.0%	0.00	0.00	-	0.00	0.00	-
HRRR-9	Intersection Improvement	Lake Pleasant Road at Lum Road	0.00	0.00	-	0.00	0.00	-	0.00	0.33	-100.0%	0.00	0.33	-100.0%	0.00	0.33	-100.0%	0.00	0.00	-
HRRR-11-1	Intersection Improvement	Ida Center Road at Secor Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
HRRR-11-2	Intersection Improvement	Albain Road at Lewis Avenue	0.33	0.00	100.0%	0.00	0.00	-	0.33	0.00	100.0%	0.33	0.00	100.0%	0.33	0.33	0.0%	0.33	0.00	100.0%
HRRR-15	Intersection Improvement	CR 388 (Phoenix Road) at 62nd Street	0.00	0.33	-	0.00	0.33	-100.0%	0.00	0.33	-100.0%	0.00	0.33	-100.0%	0.67	0.00	100.0%	0.00	0.00	-
HRRR-18	Intersection improvement	Frost Road at Orr Road	0.67	0.00	100.0%	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
Intersection Improvement Total			1.00	2.00	-100.0%	0.33	1.33	-300.0%	4.00	4.67	-16.7%	1.33	1.67	-25.0%	36.00	34.37	4.5%	7.97	6.67	16.3%

B.4 2010 LAP Analysis – Pedestrian Related Improvements

Project Number	Project Type	Project Location	Total Crashes						Targeted Crashes																	
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Total Crashes						Bicycle Involved					Pedestrian Involved						
									Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction
STH-51	Pedestrian related	West Vernor Highway, from Waterman Street to Lansing Street	47.00	31.33	33.3%	8.33	8.33	0.0%	1.00	2.33	-133.3%	0.67	2.33	-250.0%	0.33	1.00	-200.0%	0.33	1.00	-200.0%	0.67	1.33	-100.0%	0.33	1.33	-300.0%
STH-56-1	Pedestrian related	Middlebelt Road, at Conrail railroad structure	5.67	4.33	23.5%	0.67	0.67	0.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-56-2	Pedestrian Related	Inkster Road, at Conrail railroad structure	7.00	3.33	52.4%	2.67	1.33	50.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
Pedestrian Related Totals			59.67	39.00	34.6%	11.67	10.33	11.4%	1.00	2.33	-133.3%	0.67	2.33	-250.0%	0.33	1.00	-200.0%	0.33	1.00	-200.0%	0.67	1.33	-100.0%	0.33	1.33	-300.0%

B.5 2010 LAP Analysis – Roadway Departure & Clearzone Improvements

Project Number	Project Type	Project Location	Total Crashes					
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction
STH-2	Roadway departure & Clearzone	Riverview Drive, from 4th Street to Gene Drive	1.67	0.67	60.0%	0.33	0.33	0.0%
STH-3	Roadway departure & Clearzone	East Torch Lake Drive (CR 593), Alden Highway to M-88	13.67	11.67	14.6%	2.67	1.00	62.5%
STH-5	Roadway departure & Clearzone	Froberg Road at East Sturgeon Slough	0.00	0.00	-	0.00	0.00	-
STH-7	Roadway departure & Clearzone	North Manistee County Line Road (CR-602), 0.31 miles east of Wallaker Road easterly 1500 feet	0.67	0.00	100.0%	0.00	0.00	-
STH-9	Roadway departure & Clearzone	South River Road, from Canton Road to Orchard Beach Road	1.00	1.67	-66.7%	0.67	0.67	0.0%
STH-10	Roadway departure & Clearzone	FH-42 (Curly Lewis Highway) at Roxbury Creek, Ankodosh Creek, and Naomikong Creek	0.00	0.00	-	0.00	0.00	-
STH-13	Roadway departure & Clearzone	9 locations						
STH-14	Roadway departure & Clearzone	Stanley Road, from Bray Road to Center Road	2.00	2.67	-33.3%	0.67	1.67	-150.0%
STH-18	Roadway departure & Clearzone	Torrey Road, from Oakridge Drive north to Bristol Road	6.00	2.67	55.6%	1.33	1.67	-25.0%
STH-21	Roadway departure & Clearzone	Jefferson Road at Sugar Creek	1.00	0.00	100.0%	0.33	0.00	100.0%
STH-29	Roadway departure & Clearzone	Pratt Road, from Lapeer WCL to Green Corners Road	2.67	2.33	12.5%	0.33	1.00	-200.0%
STH-31	Roadway departure & Clearzone	Mackinaw Trail, from I-75 business loop northerly 1.0 miles.	1.67	0.67	60.0%	0.33	0.00	100.0%
STH-42	Roadway departure & Clearzone	Kittle Road at Honeywell Creek	0.33	0.33	0.0%	0.33	0.00	100.0%
STH-43	Roadway departure & Clearzone	40th Street, from Industrial Avenue to Waverly Road	2.67	1.00	62.5%	0.00	0.33	-1.0%
STH-58-1	Roadway departure & Clearzone	First Avenue	0.67	0.33	50.0%	0.00	0.33	-1.0%
STH-58-2	Roadway departure & Clearzone	Adams/Hueber Street	0.33	0.00	100.0%	0.00	0.00	-
STH-58-3	Roadway departure & Clearzone	Ford Avenue	0.00	0.00	-	0.00	0.00	-
STH-60	Roadway departure & Clearzone	Lake Mary Drive and CR -3 at Hamilton Creek & the North Branch of the Ford River	0.00	0.00	-	0.00	0.00	-
STH-63	Roadway departure & Clearzone	CR 437 at FFRD 2213	0.00	0.00	-	0.00	0.00	-
STH-65	Roadway departure & Clearzone	66th Street at CR378	0.67	0.00	100.0%	0.67	0.00	100.0%
STH-67	Roadway departure & Clearzone	9 locations						
HRRR-1	Roadway Departure & Clearzone	Conners Road from Miller Road northerly to a point 0.8 miles north of Miller Road.	1.00	0.33	66.7%	0.33	0.33	0.0%
HRRR-5-1	Roadway Departure & Clearzone	Dodge Road from Dosh Road to Oak Road	2.00	1.00	50.0%	0.33	0.00	100.0%
HRRR-5-2	Roadway Departure & Clearzone	McKinley Road from 1/4 mile south of Dodge Road to 1/4 mile north of Dodge Road	0.67	1.33	-100.0%	0.33	0.00	100.0%
HRRR-6	Roadway Departure & Clearzone	Haynor Road north of Rector Road	2.00	0.00	100.0%	1.00	0.00	100.0%
HRRR-10-1	Roadway Departure & Clearzone	Genesee Road from Maple Leaf Road to Hadley Road	0.67	2.00	-200.0%	0.33	1.33	-300.0%
HRRR-10-2	Roadway Departure & Clearzone	Hadley Road from Lippencott Road to Genesee Road	1.67	1.00	40.0%	0.67	0.00	100.0%
HRRR-10-3	Roadway Departure & Clearzone	Burnside Road from Oliver Road to Laur Road	5.67	5.00	11.8%	2.00	2.67	-33.3%
HRRR-13	Roadway Departure & Clearzone	CR 459 from MP 2.633 to MP 3.24	1.00	1.00	0.0%	0.33	0.00	100.0%
HRRR-14	Roadway Departure & Clearzone	Wadsworth Road from Gera Road to Block Road	1.67	2.00	-20.0%	0.67	0.67	0.0%
Roadway Departure & Clearzone Totals			51.33	37.67	26.6%	13.67	12.00	12.2%

Project Number	Project Type	Project Location	Targeted Crashes																	
			Total Crashes						Overturn						Single Motor Vehicle					
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction
STH-2	Roadway departure & Clearzone	Riverview Drive, from 4th Street to Gene Drive	1.33	0.67	50.0%	0.00	0.33	-100.0%	0.00	0.33	-100.0%	0.00	0.33	-100.0%	1.33	0.33	75.0%	0.00	0.00	-
STH-3	Roadway departure & Clearzone	East Torch Lake Drive (CR 593), Alden Highway to M-88	9.67	7.00	27.6%	2.33	0.33	85.7%	0.67	0.33	50.0%	0.00	0.00	-	9.00	6.67	25.9%	2.33	0.33	85.7%
STH-5	Roadway departure & Clearzone	Froberg Road at East Sturgeon Slough	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-7	Roadway departure & Clearzone	North Manistee County Line Road (CR-602), 0.31 miles east of Wallaker Road easterly 1500 feet	0.67	0.00	100.0%	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-
STH-9	Roadway departure & Clearzone	South River Road, from Canton Road to Orchard Beach Road	0.67	1.33	-100.0%	0.67	0.67	0.0%	0.33	0.00	100.0%	0.33	0.00	100.0%	0.33	1.33	-300.0%	0.33	0.67	-100.0%
STH-10	Roadway departure & Clearzone	FH-42 (Curly Lewis Highway) at Roxbury Creek, Ankodosh Creek, and Naomikong Creek	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-13	Roadway departure & Clearzone	9 locations																		
STH-14	Roadway departure & Clearzone	Stanley Road, from Bray Road to Center Road	1.00	0.33	66.7%	0.33	0.00	100.0%	0.33	0.00	100.0%	0.00	0.00	-	0.67	0.33	50.0%	0.33	0.00	100.0%
STH-18	Roadway departure & Clearzone	Torrey Road, from Oakridge Drive north to Bristol Road	3.00	1.00	66.7%	0.33	0.67	-100.0%	0.67	0.67	0.0%	0.33	0.67	-100.0%	2.33	0.33	85.7%	0.00	0.00	-
STH-21	Roadway departure & Clearzone	Jefferson Road at Sugar Creek	0.67	0.00	100.0%	0.33	0.00	100.0%	0.33	0.00	100.0%	0.33	0.00	100.0%	0.33	0.00	100.0%	0.00	0.00	-
STH-29	Roadway departure & Clearzone	Pratt Road, from Lapeer WCL to Green Corners Road	2.33	1.33	42.9%	0.33	0.33	0.0%	0.33	0.00	100.0%	0.00	0.00	-	2.00	1.33	33.3%	0.33	0.33	0.0%
STH-31	Roadway departure & Clearzone	Mackinaw Trail, from I-75 business loop northerly 1.0 miles.	1.00	0.67	33.3%	0.33	0.00	100.0%	0.33	0.00	100.0%	0.00	0.00	-	0.67	0.67	0.0%	0.33	0.00	100.0%
STH-42	Roadway departure & Clearzone	Kittle Road at Honeywell Creek	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-43	Roadway departure & Clearzone	40th Street, from Industrial Avenue to Waverly Road	1.00	0.33	66.7%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	1.00	0.33	66.7%	0.00	0.00	-
STH-58-1	Roadway departure & Clearzone	First Avenue	0.00	0.33	-100.0%	0.00	0.33	-100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.33	-100.0%	0.00	0.33	-100.0%
STH-58-2	Roadway departure & Clearzone	Adams/Hueber Street	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-
STH-58-3	Roadway departure & Clearzone	Ford Avenue	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-60	Roadway departure & Clearzone	Lake Mary Drive and CR -3 at Hamilton Creek & the North Branch of the Ford River	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-63	Roadway departure & Clearzone	CR 437 at FFRD 2213	0.33	0.00	100.0%	0.33	0.00	100.0%	0.33	0.00	100.0%	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-
STH-65	Roadway departure & Clearzone	66th Street at CR378	0.33	0.00	100.0%	0.33	0.00	100.0%	0.33	0.00	100.0%	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-
STH-67	Roadway departure & Clearzone	9 locations																		
HRRR-1	Roadway Departure & Clearzone	Conners Road from Miller Road northerly to a point 0.8 miles north of Miller Road.	1.00	0.33	66.7%	0.33	0.33	0.0%	0.00	0.00	-	0.00	0.00	-	1.00	0.33	66.7%	0.33	0.33	0.0%
HRRR-5-1	Roadway Departure & Clearzone	Dodge Road from Dosh Road to Oak Road	1.33	0.67	50.0%	0.33	0.00	100.0%	0.33	0.00	100.0%	0.33	0.00	100.0%	1.00	0.67	33.3%	0.00	0.00	-
HRRR-5-2	Roadway Departure & Clearzone	McKinley Road from 1/4 mile south of Dodge Road to 1/4 mile north of Dodge Road	0.33	1.00	-200.0%	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.33	1.00	-200.0%	0.33	0.00	100.0%
HRRR-6	Roadway Departure & Clearzone	Haynor Road north of Rector Road	2.00	0.00	100.0%	1.00	0.00	100.0%	0.33	0.00	100.0%	0.00	0.00	-	1.67	0.00	100.0%	1.00	0.00	100.0%
HRRR-10-1	Roadway Departure & Clearzone	Genesee Road from Maple Leaf Road to Hadley Road	0.33	1.67	-400.0%	0.33	1.00	-200.0%	0.00	0.00	-	0.00	0.00	-	0.33	1.67	-400.0%	0.33	1.00	-200.0%
HRRR-10-2	Roadway Departure & Clearzone	Hadley Road from Lippencott Road to Genesee Road	0.67	0.33	50.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.67	0.33	50.0%	0.00	0.00	-
HRRR-10-3	Roadway Departure & Clearzone	Burnside Road from Oliver Road to Laur Road	2.67	2.67	0.0%	1.33	1.00	25.0%	0.33	0.33	0.0%	0.33	0.33	0.0%	2.33	2.33	0.0%	1.00	0.67	33.3%
HRRR-13	Roadway Departure & Clearzone	CR 459 from MP 2.633 to MP 3.24	1.00	0.67	33.3%	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	1.00	0.67	33.3%	0.33	0.00	100.0%
HRRR-14	Roadway Departure & Clearzone	Wadsworth Road from Gera Road to Block Road	1.67	0.67	60.0%	1.00	0.00	100.0%	0.33	0.00	100.0%	0.33	0.00	100.0%	1.33	0.67	50.0%	0.67	0.00	100.0%
Roadway Departure & Clearzone Totals			33.33	21.00	37.0%	10.33	5.00	51.6%	5.33	1.67	68.8%	2.67	1.33	50.0%	28.00	19.33	31.0%	7.67	3.67	52.2%

B.6 2010 LAP Analysis – Roadway Improvements

Project Number	Project Type	Project Location	Total Crashes						Targeted Crashes												
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Total Crashes						Angle - Straight						
									Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	
STH-41	Roadway Improvement	E. Pierce Road, from 132nd Avenue to 144th Avenue	1.00	0.33	66.7%	0.33	0.33	0.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	
STH-50	Roadway Improvement	Livernois Street, from Toledo Street to John Kronk	17.00	9.67	43.1%	3.67	3.67	0.0%	7.33	5.00	31.8%	1.67	2.00	-20.0%	1.00	1.67	-66.7%	0.00	0.67	-100.0%	
HRRR-2	Roadway Improvement	Cherry Avenue (CR 593) from the Torch River Road northerly to Cairn Highway	8.33	8.00	4.0%	3.67	2.67	27.3%	2.33	0.33	85.7%	1.00	0.00	100.0%	0.67	0.00	100.0%	0.00	0.00	-	
HRRR-7-1	Roadway Improvement	Vaughn Road from Davision Road to Indian Lake Road	1.33	1.67	-25.0%	1.00	0.67	33.3%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	
HRRR-7-2	Roadway Improvement	Plank Road from Old State Road to M-55	7.00	5.33	23.8%	2.33	1.67	28.6%	1.33	0.67	50.0%	0.67	0.00	100.0%	0.33	0.33	0.0%	0.33	0.00	100.0%	
HRRR-16	Roadway improvement	Litchfield Road from Cobb Lake Road to 1/2 mile west of Rowe Road	0.33	1.00	-200.0%	0.33	0.67	-100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	
Roadway Improvement Totals			35.00	26.00	25.7%	11.33	9.67	14.7%	11.00	6.00	45.5%	3.33	2.00	40.0%	2.00	2.00	0.0%	0.33	0.67	-100.0%	

Project Number	Project Type	Project Location	Targeted Crashes														
			Angle - Turn						Head On								
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction			
STH-41	Roadway Improvement	E. Pierce Road, from 132nd Avenue to 144th Avenue	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-50	Roadway Improvement	Livernois Street, from Toledo Street to John Kronk	1.00	0.33	66.7%	0.67	0.33	50.0%	0.33	0.00	100.0%	0.33	0.00	100.0%			
HRRR-2	Roadway Improvement	Cherry Avenue (CR 593) from the Torch River Road northerly to Cairn Highway	0.00	0.00	-	0.00	0.00	-	1.00	0.00	100.0%	1.00	0.00	100.0%			
HRRR-7-1	Roadway Improvement	Vaughn Road from Davision Road to Indian Lake Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-			
HRRR-7-2	Roadway Improvement	Plank Road from Old State Road to M-55	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-			
HRRR-16	Roadway improvement	Litchfield Road from Cobb Lake Road to 1/2 mile west of Rowe Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-			
Roadway Improvement Totals			1.00	0.33	66.7%	0.67	0.33	50.0%	1.33	0.00	100.0%	1.33	0.00	100.0%			

Project Number	Project Type	Project Location	Targeted Crashes											
			Head On Left Turn						Rear End					
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction
STH-41	Roadway Improvement	E. Pierce Road, from 132nd Avenue to 144th Avenue	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-50	Roadway Improvement	Livernois Street, from Toledo Street to John Kronk	0.33	0.67	-100.0%	0.33	1.00	-200.0%	5.67	2.67	52.9%	1.00	0.33	66.7%
HRRR-2	Roadway Improvement	Cherry Avenue (CR 593) from the Torch River Road northerly to Cairn Highway	0.00	0.00	-	0.00	0.00	-	0.67	0.33	50.0%	0.00	0.00	-
HRRR-7-1	Roadway Improvement	Vaughn Road from Davision Road to Indian Lake Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
HRRR-7-2	Roadway Improvement	Plank Road from Old State Road to M-55	0.33	0.00	100.0%	0.33	0.00	100.0%	0.67	0.33	50.0%	0.00	0.00	-
HRRR-16	Roadway improvement	Litchfield Road from Cobb Lake Road to 1/2 mile west of Rowe Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
Roadway Improvement Totals			0.67	0.67	0.0%	0.67	1.00	-50.0%	7.00	3.33	52.4%	1.00	0.33	66.7%

B.7 2010 LAP Analysis – Sign Related Improvements

Project Number	Project Type	Project Location	Total Crashes						Targeted Crashes											
			Total Crashes						Total Crashes						Angle - Straight					
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction
STH-6	Sign Related	Cedar Run Road at Reynolds Road	1.33	0.33	75.0%	0.67	0.33	50.0%	1.33	0.33	75.0%	0.67	0.33	50.0%	1.33	0.33	75.0%	0.67	0.33	50.0%
STH-19-1	Sign Related	Cass Road, from Keystone Road to Hartman Road	7.67	7.67	0.0%	1.67	1.67	0.0%	7.67	7.67	0.0%	1.67	1.67	0.0%	0.33	0.33	0.0%	0.00	0.00	-
STH-19-2	Sign Related	Five Mile Road, from Hammond Road to the northern East Bay Township line	13.00	8.33	35.9%	3.33	1.67	50.0%	12.00	7.00	41.7%	3.33	1.67	50.0%	1.67	0.67	60.0%	0.67	0.00	100.0%
STH-19-3	Sign Related	Supply Road, North Hobbs Highway to East Bay East Township line	3.67	7.33	-100.0%	1.33	4.00	-200.0%	3.00	7.33	-144.4%	1.33	3.67	-175.0%	0.00	0.33	-100.0%	0.00	0.00	-
STH-20	Sign Related	180 locations																		
STH-35-1	Sign Related	Whiteford Road, from Section Road to Sterns Road	4.67	3.00	35.7%	2.00	0.00	100.0%	3.67	2.67	27.3%	2.00	0.00	100.0%	1.33	0.67	50.0%	0.67	0.00	100.0%
STH-35-2	Sign Related	North Dixie Highway, from Pointe Aux Peaux Road to Post Road	8.33	14.00	-68.0%	2.67	3.33	-25.0%	5.67	12.00	-111.8%	2.33	3.33	-42.9%	0.00	0.00	-	0.00	0.00	-
HRRR-3	Sign related	Reynolds Road between Fewin Road and CR-610, in Almira and Inland Twp's	2.00	0.33	83.3%	0.33	0.00	100.0%	2.00	0.33	83.3%	0.33	0.00	100.0%	0.33	0.00	100.0%	0.00	0.00	-
Sign Related Totals			40.67	41.00	-0.8%	12.00	11.00	8.3%	35.33	37.33	-5.7%	11.67	10.67	8.6%	5.00	2.33	53.3%	2.00	0.33	83.3%

Project Number	Project Type	Project Location	Targeted Crashes																	
			Angle - Turn						Head On					Head On Left Turn						
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction
STH-6	Sign Related	Cedar Run Road at Reynolds Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-19-1	Sign Related	Cass Road, from Keystone Road to Hartman Road	0.00	0.33	-100.0%	0.00	0.33	-100.0%	0.33	0.00	100.0%	0.33	0.00	100.0%	3.67	4.67	-27.3%	0.00	0.00	-
STH-19-2	Sign Related	Five Mile Road, from Hammond Road to the northern East Bay Township line	0.00	0.33	-100.0%	0.00	0.00	-	1.00	0.33	66.7%	0.33	0.33	0.0%	6.00	4.33	27.8%	0.00	0.00	-
STH-19-3	Sign Related	Supply Road, North Hobbs Highway to East Bay East Township line	0.00	0.00	-	0.00	0.00	-	0.33	0.67	-100.0%	0.00	0.67	-100.0%	1.67	3.67	-120.0%	0.00	0.33	-100.0%
STH-20	Sign Related	180 locations																		
STH-35-1	Sign Related	Whiteford Road, from Section Road to Sterns Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.67	1.67	-150.0%	0.00	0.00	-
STH-35-2	Sign Related	North Dixie Highway, from Pointe Aux Peaux Road to Post Road	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	3.33	6.00	-80.0%	0.00	0.00	-
HRRR-3	Sign related	Reynolds Road between Fewin Road and CR-610, in Almira and Inland Twp's	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.67	0.33	50.0%	0.00	0.00	-
Sign Related Totals			0.00	0.67	-100.0%	0.00	0.33	-100.0%	2.00	1.00	50.0%	0.67	1.00	-50.0%	16.00	20.67	-29.2%	0.00	0.33	-100.0%

Project Number	Project Type	Project Location	Targeted Crashes																	
			Other/Unknown						Overturn						Rear End					
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction
STH-6	Sign Related	Cedar Run Road at Reynolds Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-19-1	Sign Related	Cass Road, from Keystone Road to Hartman Road	0.00	0.00	-	0.00	0.00	-	0.67	0.00	100.0%	0.00	0.00	-	2.33	1.67	28.6%	0.33	0.33	0.0%
STH-19-2	Sign Related	Five Mile Road, from Hammond Road to the northern East Bay Township line	0.00	0.00	-	0.00	0.00	-	1.00	0.33	66.7%	0.33	0.00	100.0%	1.67	1.00	40.0%	0.33	0.00	100.0%
STH-19-3	Sign Related	Supply Road, North Hobbs Highway to East Bay East Township line	0.00	0.00	-	0.00	0.00	-	0.67	1.33	-100.0%	0.33	0.00	100.0%	0.00	0.33	-100.0%	0.00	0.33	-100.0%
STH-20	Sign Related	180 locations																		
STH-35-1	Sign Related	Whiteford Road, from Section Road to Sterns Road	0.67	0.00	100.0%	0.67	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-
STH-35-2	Sign Related	North Dixie Highway, from Pointe Aux Peaux Road to Post Road	0.00	0.00	-	0.00	0.00	-	0.33	2.00	-500.0%	0.00	1.33	-	1.67	2.67	-60.0%	0.67	1.00	-50.0%
HRRR-3	Sign related	Reynolds Road between Fewin Road and CR-610, in Almira and Inland Twp's	0.00	0.00	-	0.00	0.00	-	0.67	0.00	100.0%	0.33	0.00	100.0%	0.33	0.00	100.0%	0.00	0.00	-
Sign Related Totals			0.67	0.00	100.0%	0.67	0.00	100.0%	3.33	3.67	-10.0%	1.00	1.33	-33.3%	6.33	5.67	10.5%	1.33	1.67	-25.0%

Project Number	Project Type	Project Location	Targeted Crashes																	
			Sideswipe - Same						Sideswipe - Opposite						Single Motor Vehicle					
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction
STH-6	Sign Related	Cedar Run Road at Reynolds Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-19-1	Sign Related	Cass Road, from Keystone Road to Hartman Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	3.67	4.67	-27.3%	1.00	1.00	0.0%
STH-19-2	Sign Related	Five Mile Road, from Hammond Road to the northern East Bay Township line	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	6.00	4.33	27.8%	1.67	1.33	20.0%
STH-19-3	Sign Related	Supply Road, North Hobbs Highway to East Bay East Township line	0.00	0.00	-	0.00	0.00	-	0.00	0.67	-100.0%	0.00	0.33	-	1.67	3.67	-120.0%	1.00	2.00	-100.0%
STH-20	Sign Related	180 locations																		
STH-35-1	Sign Related	Whiteford Road, from Section Road to Sterns Road	0.00	0.00	-	0.00	0.00	-	0.00	0.33	-100.0%	0.00	0.00	-	0.67	1.67	-150.0%	0.67	0.00	100.0%
STH-35-2	Sign Related	North Dixie Highway, from Pointe Aux Peaux Road to Post Road	0.00	0.00	-	0.00	0.00	-	0.00	0.67	-100.0%	0.00	0.00	-	3.33	6.00	-80.0%	1.67	1.00	40.0%
HRRR-3	Sign related	Reynolds Road between Fewin Road and CR-610, in Almira and Inland Twp's	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.67	0.33	50.0%	0.00	0.00	-
Sign Related Totals			0.00	0.00	-	0.00	0.00	-	0.33	1.67	-400.0%	0.00	0.33	-100.0%	16.00	20.67	-29.2%	6.00	5.33	11.1%

B.8 2010 LAP Analysis – Traffic Signal Upgrades

Project Number	Project Type	Project Location	Total Crashes						Targeted Crashes																	
			Total Crashes						Angle - Straight					Angle - Turn												
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction						
STH-15	Traffic signal	Elms Road at Carpenter Road	6.67	6.00	10.0%	2.33	2.33	0.0%	6.33	7.00	-10.5%	2.00	3.00	-50.0%	0.00	1.33	-100.0%	1.33	0.33	75.0%	0.00	0.33	-100.0%	0.00	0.33	-100.0%
STH-17	Traffic signal	Elms Road at Flushing Road	4.67	7.33	-57.1%	1.00	1.67	-66.7%	5.67	9.00	-58.8%	1.00	1.67	-66.7%	0.00	0.00	-	0.00	0.00	-	0.00	0.67	-100.0%	0.00	0.00	-
STH-23	Traffic signal	9 various locations																								
STH-25	Traffic signal	Cascade Road at Spaulding Avenue/Hall Street	9.00	8.33	7.4%	2.33	1.33	42.9%	10.33	11.33	-9.7%	2.67	2.33	12.5%	0.33	1.00	-200.0%	0.33	0.33	0.0%	0.33	0.00	100.0%	0.33	0.00	100.0%
STH-26-1	Traffic signal	Cascade Road at Forest Hill Avenue	21.33	13.00	39.1%	2.33	2.33	0.0%	25.67	14.67	42.9%	3.00	3.00	0.0%	2.00	3.33	-66.7%	0.00	0.33	-100.0%	2.00	0.33	83.3%	0.67	0.33	50.0%
STH-26-2	Traffic signal	Division Avenue at 68th Street	14.00	19.00	-35.7%	3.67	3.00	18.2%	15.67	18.33	-17.0%	3.00	3.00	0.0%	0.00	1.33	-100.0%	0.33	0.00	100.0%	0.00	0.33	-100.0%	0.00	0.33	-100.0%
STH-27-1	Traffic signal	Leonard Street at Ball Street	10.00	5.67	43.3%	3.67	1.00	72.7%	8.33	4.00	52.0%	3.33	0.33	90.0%	0.33	1.33	-300.0%	0.67	0.00	100.0%	0.33	0.00	100.0%	0.00	0.00	-
STH-27-2	Traffic signal	Leonard Street at Fuller Avenue	37.67	41.33	-9.7%	7.00	8.33	-19.0%	40.67	49.00	-20.5%	7.33	10.00	-36.4%	1.33	9.33	-600.0%	0.67	2.00	-200.0%	1.33	0.67	50.0%	0.67	0.33	50.0%
STH-27-3	Traffic signal	Leonard Street at Leffingwell Avenue	7.33	9.00	-22.7%	1.67	2.33	-40.0%	7.00	9.67	-38.1%	1.33	1.33	0.0%	0.33	1.67	-400.0%	0.00	0.67	-100.0%	0.33	0.00	100.0%	0.33	0.00	100.0%
STH-28-1	Traffic signal	Fuller Avenue at 3 Mile Road	7.67	7.00	8.7%	1.67	3.33	-100.0%	7.67	7.67	0.0%	1.67	3.33	-100.0%	0.33	4.00	-1100.0%	1.33	3.00	-125.0%	0.33	0.33	0.0%	0.33	0.33	0.0%
STH-28-2	Traffic signal	32nd Street at Kalamazoo Avenue	8.33	6.33	24.0%	1.67	1.33	20.0%	11.00	7.67	30.3%	1.33	0.67	50.0%	0.67	0.00	100.0%	0.00	0.00	-	0.67	0.00	100.0%	0.00	0.00	-
STH-30	Traffic signal	Old US-23 at Spencer Road	5.67	6.67	-17.6%	0.67	0.67	0.0%	9.00	8.67	3.7%	1.33	1.00	25.0%	0.00	1.00	-100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-32-1	Traffic signal	13 Mile at Utica Road	19.33	25.67	-32.8%	3.33	5.33	-60.0%	24.67	34.00	-37.8%	3.33	6.33	-90.0%	1.67	4.67	-180.0%	1.33	1.33	0.0%	1.67	0.33	80.0%	0.00	0.00	-
STH-32-2	Traffic signal	14 Mile at Hayes Road	14.67	9.67	34.1%	2.67	2.33	12.5%	19.00	12.00	36.8%	3.67	2.33	36.4%	0.33	2.00	-500.0%	0.33	0.67	-100.0%	0.33	0.67	-100.0%	0.00	0.00	-
STH-32-3	Traffic signal	Moravian at Utica Road	22.00	14.33	34.8%	6.67	3.00	55.0%	25.67	21.33	16.9%	8.67	2.07	76.2%	0.33	1.00	-200.0%	0.67	0.33	50.0%	0.33	0.00	100.0%	0.00	0.00	-
STH-32-4	Traffic signal	Schoenherr at 24 Mile	11.33	10.33	8.8%	2.33	2.33	0.0%	16.33	16.00	2.0%	2.67	3.00	-12.5%	0.67	0.33	50.0%	0.00	0.33	-100.0%	0.67	0.67	0.0%	0.33	0.33	0.0%
STH-34	Traffic signal	14th Avenue at 13th Street	7.33	2.33	68.2%	2.67	0.33	87.5%	9.33	3.33	64.3%	2.67	0.67	75.0%	0.67	0.00	100.0%	0.33	0.00	100.0%	0.67	0.00	100.0%	0.33	0.00	100.0%
STH-37-1	Traffic signal	Laketon Avenue at Hoyt Street	7.67	7.00	8.7%	2.33	3.00	-28.6%	6.00	9.00	-50.0%	2.00	2.67	-33.3%	0.33	1.00	-200.0%	0.33	0.33	0.0%	0.33	0.33	0.0%	0.00	0.33	-100.0%
STH-37-2	Traffic signal	Laketon Avenue at Getty Street	24.67	25.00	-1.4%	5.67	3.67	35.3%	28.33	30.00	-5.9%	6.33	4.67	26.3%	1.00	2.67	-166.7%	2.00	1.00	50.0%	1.00	2.67	-166.7%	0.00	0.00	-
STH-37-3	Traffic signal	Laketon Avenue at Roberts Street	12.67	8.33	34.2%	3.00	1.00	66.7%	12.67	8.33	34.2%	2.33	1.67	28.6%	0.33	1.33	-300.0%	1.33	0.00	100.0%	0.33	0.33	0.0%	0.00	0.00	-
STH-45	Traffic signal	E. Genesee Avenue at Hess Avenue	9.33	10.67	-14.3%	1.67	2.33	-40.0%	11.00	10.00	9.1%	2.00	2.33	-16.7%	0.67	2.67	-300.0%	0.67	0.33	50.0%	0.67	0.00	100.0%	0.00	0.00	-
STH-52-1	Traffic signal	Beaconsfield Road at Eastland Village Drive	0.67	1.00	-50.0%	0.33	0.67	-100.0%	1.33	1.00	25.0%	0.67	1.00	-50.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-52-2	Traffic signal	Beaconsfield Road at Damman Avenue	0.67	1.67	-150.0%	0.00	1.33	-1.0%	1.33	1.33	0.0%	0.00	1.33	-100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-52-3	Traffic signal	Beaconsfield Road at Eastwood Drive	2.00	1.00	50.0%	0.33	0.33	0.0%	2.00	0.67	66.7%	0.67	0.33	50.0%	0.00	0.67	-100.0%	0.00	0.33	-100.0%	0.00	0.00	-	0.00	0.00	-
STH-52-4	Traffic signal	Beaconsfield Road at Woodside Drive	0.67	0.33	50.0%	0.33	0.00	100.0%	0.67	0.67	0.0%	0.33	0.00	100.0%	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-
STH-54	Traffic signal	Middlebelt Road at 5 Mile Road	29.33	38.67	-31.8%	5.67	8.00	-41.2%	37.33	50.33	-34.8%	8.67	11.33	-30.8%	0.33	2.67	-700.0%	0.67	0.00	100.0%	0.33	0.67	-100.0%	0.00	0.00	-
STH-55-1	Traffic signal	Middlebelt Road at 6 Mile Road	21.33	22.67	-6.3%	3.00	4.00	-33.3%	25.33	28.67	-13.2%	4.00	4.67	-16.7%	0.00	2.67	-100.0%	1.00	0.33	66.7%	0.00	1.00	-100.0%	0.00	0.33	-100.0%
STH-55-2	Traffic signal	Middlebelt Road at 7 Mile Road	24.00	23.67	1.4%	8.00	6.67	16.7%	11.33	26.33	-132.4%	11.33	7.67	32.4%	0.67	4.00	-500.0%	1.33	1.67	-25.0%	0.67	1.33	-100.0%	0.67	0.00	100.0%
STH-62	Traffic signal	Southfield Road at 13 Mile Road	50.00	39.00	22.0%	10.00	8.67	13.3%	62.00	54.00	12.9%	14.00	13.33	4.8%	1.67	4.67	-180.0%	3.33	0.33	90.0%	1.67	0.67	60.0%	0.33	0.33	0.0%
STH-66	Traffic signal	Silver Lake Road at Zimmerman Road	9.33	10.00	-7.1%	1.67	1.67	0.0%	8.33	12.67	-52.0%	1.67	2.00	-20.0%	0.67	2.33	-250.0%	1.00	0.33	66.7%	0.67	1.00	-50.0%	0.00	0.33	-100.0%
Traffic Signal Upgrade Totals			399.33	381.00	4.6%	87.67	82.33	6.1%	450.00	466.67	-3.7%	103.00	97.07	5.8%	14.67	57.00	-288.6%	19.33	14.00	27.6%	14.67	12.33	15.9%	4.00	3.33	16.7%

Project Number	Project Type	Project Location	Targeted Crashes																	
			Head On						Head On Left Turn						Rear End					
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction
STH-15	Traffic signal	Elms Road at Carpenter Road	0.00	0.00	-	0.00	0.00	-	0.33	1.33	-300.0%	0.00	1.00	-100.0%	1.33	2.00	-50.0%	0.33	0.67	-100.0%
STH-17	Traffic signal	Elms Road at Flushing Road	0.00	0.00	-	0.00	0.00	-	0.33	1.00	-200.0%	0.33	1.00	-200.0%	2.33	3.67	-57.1%	0.33	0.33	0.0%
STH-23	Traffic signal	9 various locations																		
STH-25	Traffic signal	Cascade Road at Spaulding Avenue/Hall Street	0.00	0.00	-	0.00	0.00	-	2.33	1.00	57.1%	0.67	0.00	100.0%	3.00	4.67	-55.6%	0.67	1.00	-50.0%
STH-26-1	Traffic signal	Cascade Road at Forest Hill Avenue	0.00	0.00	-	0.00	0.00	-	2.33	1.67	28.6%	0.33	0.33	0.0%	9.67	4.67	51.7%	1.00	1.00	0.0%
STH-26-2	Traffic signal	Division Avenue at 68th Street	0.33	0.33	0.0%	0.00	0.33	-100.0%	1.33	5.33	-300.0%	0.00	1.33	-100.0%	6.33	5.67	10.5%	1.33	0.67	50.0%
STH-27-1	Traffic signal	Leonard Street at Ball Street	0.00	0.00	-	0.00	0.00	-	2.67	1.33	50.0%	0.67	0.33	50.0%	1.33	0.67	50.0%	1.00	0.00	100.0%
STH-27-2	Traffic signal	Leonard Street at Fuller Avenue	0.00	0.33	-100.0%	0.00	0.33	-100.0%	10.00	8.67	13.3%	2.67	2.00	25.0%	10.67	15.00	-40.6%	1.67	2.67	-60.0%
STH-27-3	Traffic signal	Leonard Street at Leffingwell Avenue	0.00	0.00	-	0.00	0.00	-	3.00	2.67	11.1%	1.00	0.67	33.3%	1.33	2.67	-100.0%	0.00	0.00	-
STH-28-1	Traffic signal	Fuller Avenue at 3 Mile Road	0.00	0.00	-	0.00	0.00	-	1.00	0.00	100.0%	0.00	0.00	-	1.00	1.67	-66.7%	0.00	0.00	-
STH-28-2	Traffic signal	32nd Street at Kalamazoo Avenue	0.00	0.00	-	0.00	0.00	-	0.00	0.33	-100.0%	0.00	0.00	-	4.67	3.67	21.4%	0.67	0.33	50.0%
STH-30	Traffic signal	Old US-23 at Spencer Road	0.33	0.00	100.0%	0.00	0.00	-	0.67	1.00	-50.0%	0.00	0.33	-100.0%	4.00	3.33	16.7%	0.67	0.33	50.0%
STH-32-1	Traffic signal	13 Mile at Utica Road	0.00	0.33	-100.0%	0.00	0.00	-	0.67	2.00	-200.0%	0.67	1.00	-50.0%	8.67	13.33	-53.8%	0.67	2.00	-200.0%
STH-32-2	Traffic signal	14 Mile at Hayes Road	0.00	0.00	-	0.00	0.00	-	1.33	2.00	-50.0%	0.00	1.00	-100.0%	8.33	3.67	56.0%	1.67	0.33	80.0%
STH-32-3	Traffic signal	Moravian at Utica Road	0.67	0.00	100.0%	0.33	0.00	100.0%	4.00	2.33	41.7%	1.33	0.33	75.0%	9.33	9.00	3.6%	3.33	0.70	79.0%
STH-32-4	Traffic signal	Schoenherr at 24 Mile	0.00	0.33	-100.0%	0.00	0.00	-	4.00	2.00	50.0%	1.67	0.33	80.0%	5.67	6.33	-11.8%	0.33	1.00	-200.0%
STH-34	Traffic signal	14th Avenue at 13th Street	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	4.00	1.67	58.3%	1.00	0.33	66.7%
STH-37-1	Traffic signal	Laketon Avenue at Hoyt Street	0.00	0.00	-	0.00	0.00	-	1.00	0.33	66.7%	0.33	0.00	100.0%	1.67	3.67	-120.0%	0.67	1.00	-50.0%
STH-37-2	Traffic signal	Laketon Avenue at Getty Street	0.00	0.33	-100.0%	0.00	0.33	-100.0%	4.33	7.00	-61.5%	1.67	1.33	20.0%	9.33	8.67	7.1%	1.33	1.00	25.0%
STH-37-3	Traffic signal	Laketon Avenue at Roberts Street	0.00	0.00	-	0.00	0.00	-	2.67	2.67	0.0%	1.00	0.33	66.7%	3.00	2.00	33.3%	0.00	0.67	0.0%
STH-45	Traffic signal	E. Genesee Avenue at Hess Avenue	0.00	0.00	-	0.00	0.00	-	2.67	1.33	50.0%	0.67	0.67	0.0%	2.67	3.00	-12.5%	0.33	0.67	-100.0%
STH-52-1	Traffic signal	Beaconsfield Road at Eastland Village Drive	0.00	0.00	-	0.00	0.00	-	0.00	0.33	-100.0%	0.00	0.33	-100.0%	0.67	0.33	50.0%	0.33	0.33	0.0%
STH-52-2	Traffic signal	Beaconsfield Road at Damman Avenue	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.67	0.67	0.0%	0.00	0.67	-100.0%
STH-52-3	Traffic signal	Beaconsfield Road at Eastwood Drive	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	1.00	0.00	100.0%	0.33	0.00	100.0%
STH-52-4	Traffic signal	Beaconsfield Road at Woodside Drive	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.33	-100.0%	0.00	0.00	-
STH-54	Traffic signal	Middlebelt Road at 5 Mile Road	0.33	0.33	0.0%	0.00	0.33	-100.0%	5.67	5.67	0.0%	1.33	1.33	0.0%	13.67	20.67	-51.2%	3.33	5.00	-50.0%
STH-55-1	Traffic signal	Middlebelt Road at 6 Mile Road	0.00	0.33	-100.0%	0.00	0.00	-	2.33	2.67	-14.3%	0.33	2.00	-500.0%	10.00	11.00	-10.0%	1.33	1.00	25.0%
STH-55-2	Traffic signal	Middlebelt Road at 7 Mile Road	0.33	0.67	-100.0%	0.33	0.00	100.0%	1.00	3.00	-200.0%	1.00	1.33	-33.3%	4.00	8.67	-116.7%	4.00	2.33	41.7%
STH-62	Traffic signal	Southfield Road at 13 Mile Road	0.33	0.00	100.0%	0.00	0.00	-	2.00	3.33	-66.7%	1.00	0.67	33.3%	24.33	22.67	6.8%	4.67	6.00	-28.6%
STH-66	Traffic signal	Silver Lake Road at Zimmerman Road	0.00	0.00	-	0.00	0.00	-	2.33	0.67	71.4%	0.67	0.67	0.0%	2.00	4.33	-116.7%	0.00	0.33	-100.0%
Traffic Signal Upgrade Totals			2.33	3.00	-28.6%	0.67	1.33	-100.0%	58.33	59.67	-2.3%	17.33	18.33	-5.8%	154.67	167.67	-8.4%	31.00	30.37	2.0%

B.9 2010 LAP Analysis – Traffic Signal and Turn Lane Upgrades

Project Number	Project Type	Project Location	Total Crashes						Target Crashes																	
			Total Crashes						Angle - Straight					Angle - Turn												
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction						
STH-46	Traffic signal & Turn Lane	Bay Street, from Court Street to W. Genesee Ave	18.00	12.67	29.6%	4.33	1.33	69.2%	14.67	11.67	20.5%	5.67	1.00	82.4%	4.67	2.33	50.0%	1.33	0.67	50.0%	1.00	0.00	100.0%	0.00	0.00	-
Traffic Signal & Turn Lane Totals			18.00	12.67	29.6%	4.33	1.33	69.2%	14.67	11.67	20.5%	5.67	1.00	82.4%	4.67	2.33	50.0%	1.33	0.67	50.0%	1.00	0.00	100.0%	0.00	0.00	-

Project Number	Project Type	Project Location	Target Crashes																	
			Head On						Head On Left Turn						Rear End					
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction
STH-46	Traffic signal & Turn Lane	Bay Street, from Court Street to W. Genesee Ave	0.00	0.00	-	0.00	0.00	-	2.00	2.33	-16.7%	0.33	0.33	0.0%	4.67	5.33	-14.3%	2.00	2.00	0.0%
Traffic Signal & Turn Lane Totals			0.00	0.00	-	0.00	0.00	-	2.00	2.33	-16.7%	0.33	0.33	0.0%	4.67	5.33	-14.3%	2.00	2.00	0.0%

Project Number	Project Type	Project Location	Target Crashes																	
			Rear End - Left Turn						Rear End - Right Turn						Sideswipe - Same					
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction			
STH-46	Traffic signal & Turn Lane	Bay Street, from Court Street to W. Genesee Ave	0.00	0.00	-	0.00	0.00	-	0.33	0.33	0.0%	0.00	0.00	-	2.00	1.33	33.3%	0.00	0.00	-
Traffic Signal & Turn Lane Totals			0.00	0.00	-	0.00	0.00	-	0.33	0.33	0.0%	0.00	0.00	-	2.00	1.33	33.3%	0.00	0.00	-

B.10 2010 LAP Analysis – Turn Lane Improvements

Project Number	Project Type	Project Location	Total Crashes						Targeted Crashes												
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Total Crashes						Angle - Straight						
									Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	
STH-8	Turn lane	John Beers Road, from Cleveland Avenue to Washington Avenue	3.33	3.00	10.0%	1.00	1.00	0.0%	3.33	2.67	20.0%	1.00	1.00	0.0%	0.67	0.33	50.0%	0.33	0.00	100.0%	
STH-12	Turn lane	N. Lansing Street at Daisy Street, Floral Street, and North Gateway Schools	0.33	0.33	0.0%	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	
STH-24	Turn lane	84th Street, from Alles Drive to Norfolk Southern RR	3.67	2.00	45.5%	1.00	0.67	33.3%	2.67	0.33	87.5%	1.00	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	
STH-33	Turn lane	15 Mile Road at Schoenherr Road	17.67	16.33	7.5%	2.67	3.33	-25.0%	14.33	13.67	4.7%	2.00	2.00	0.0%	2.00	1.67	16.7%	0.33	0.00	100.0%	
STH-38	Turn lane	Sternberg Road at Grand Haven Road	3.33	2.00	40.0%	2.00	1.00	50.0%	2.00	2.00	0.0%	1.00	1.00	0.0%	1.33	0.67	50.0%	1.00	0.33	66.7%	
STH-44	Turn lane	Center Road at Brockway Road	10.33	10.00	3.2%	1.67	2.33	-40.0%	9.33	9.33	0.0%	1.67	2.00	-20.0%	3.67	2.33	36.4%	1.00	1.00	0.0%	
STH-53-1	Turn lane	Newburgh Road at 5 Mile Road	22.67	24.33	-7.4%	4.00	6.00	-50.0%	20.67	21.33	-3.2%	4.00	1.00	75.0%	3.00	4.33	-44.4%	0.00	0.00	-	
STH-53-2	Turn lane	Newburgh Road at 7 Mile Road	18.00	17.67	1.9%	4.33	3.33	23.1%	17.33	15.67	9.6%	4.00	3.00	25.0%	2.67	4.67	-75.0%	0.00	1.00	-100.0%	
STH-57	Turn lane	13th Street, from Leeson Avenue to GLC RR tracks	6.33	3.00	52.6%	1.67	0.67	60.0%	5.33	2.33	56.3%	1.00	0.67	33.3%	1.33	1.00	25.0%	0.00	0.00	-	
Turn Lane Totals			85.67	78.67	8.2%	18.33	18.33	0.0%	75.33	67.33	10.6%	15.67	10.67	31.9%	15.00	15.00	0.0%	2.67	2.33	12.5%	

Project Number	Project Type	Project Location	Targeted Crashes																	
			Angle - Turn						Head On						Head On Left Turn					
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction
STH-8	Turn lane	John Beers Road, from Cleveland Avenue to Washington Avenue	0.00	0.33	-100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-12	Turn lane	N. Lansing Street at Daisy Street, Floral Street, and North Gateway Schools	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-24	Turn lane	84th Street, from Alles Drive to Norfolk Southern RR	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	1.00	0.00	100.0%	0.33	0.00	100.0%
STH-33	Turn lane	15 Mile Road at Schoenherr Road	0.33	0.67	-100.0%	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.33	3.00	-800.0%	0.33	1.33	-300.0%
STH-38	Turn lane	Sternberg Road at Grand Haven Road	0.00	0.33	-100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.67	-100.0%	0.00	0.33	-100.0%
STH-44	Turn lane	Center Road at Brockway Road	1.00	0.67	33.3%	0.33	0.00	100.0%	0.00	0.33	-100.0%	0.00	0.33	-100.0%	1.33	2.33	-75.0%	0.33	0.67	-100.0%
STH-53-1	Turn lane	Newburgh Road at 5 Mile Road	1.00	1.00	0.0%	0.67	1.00	-50.0%	0.33	0.67	-100.0%	0.00	0.00	-	2.67	2.00	25.0%	1.33	0.00	100.0%
STH-53-2	Turn lane	Newburgh Road at 7 Mile Road	0.67	1.67	-150.0%	0.67	0.33	50.0%	0.33	0.00	100.0%	0.00	0.00	-	1.67	0.00	100.0%	1.00	0.00	100.0%
STH-57	Turn lane	13th Street, from Leeson Avenue to GLC RR tracks	1.00	1.00	0.0%	0.00	0.67	-100.0%	0.00	0.00	-	0.00	0.00	-	0.67	0.00	100.0%	0.67	0.00	100.0%
Turn Lane Totals			4.00	5.67	-41.7%	2.00	2.00	0.0%	0.67	1.00	-50.0%	0.00	0.33	-100.0%	7.67	8.00	-4.3%	4.00	2.33	41.7%

Project Number	Project Type	Project Location	Targeted Crashes																							
			Rear End						Rear End -Left Turn						Rear End - Right Turn						Sideswipe - Same					
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction
STH-8	Turn lane	John Beers Road, from Cleveland Avenue to Washington Avenue	2.00	2.00	0.0%	0.33	1.00	-200.0%	0.67	0.00	100.0%	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-12	Turn lane	N. Lansing Street at Daisy Street, Floral Street, and North Gateway Schools	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-24	Turn lane	84th Street, from Alles Drive to Norfolk Southern RR	1.00	0.33	66.7%	0.33	0.00	100.0%	0.67	0.00	100.0%	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-33	Turn lane	15 Mile Road at Schoenherr Road	8.33	4.67	44.0%	1.00	0.67	33.3%	0.00	0.67	-100.0%	0.00	0.00	-	0.00	0.67	-100.0%	0.00	0.00	-	3.33	2.33	30.0%	0.00	0.00	-
STH-38	Turn lane	Sternberg Road at Grand Haven Road	0.33	0.33	0.0%	0.00	0.33	-100.0%	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-44	Turn lane	Center Road at Brockway Road	2.00	3.00	-50.0%	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	0.67	0.67	0.0%	0.00	0.00	-
STH-53-1	Turn lane	Newburgh Road at 5 Mile Road	9.00	9.67	-7.4%	2.00	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.67	1.00	-50.0%	0.00	0.00	-	4.00	2.67	33.3%	0.00	0.00	-
STH-53-2	Turn lane	Newburgh Road at 7 Mile Road	8.00	6.67	16.7%	1.67	1.67	0.0%	0.00	0.00	-	0.00	0.00	-	1.00	0.33	66.7%	0.67	0.00	100.0%	3.00	2.33	22.2%	0.00	0.00	-
STH-57	Turn lane	13th Street, from Leeson Avenue to GLC RR tracks	0.33	0.33	0.0%	0.33	0.00	100.0%	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	1.67	0.00	100.0%	0.00	0.00	-
Turn Lane Totals			31.00	27.00	12.9%	5.67	3.67	35.3%	2.00	0.67	66.7%	0.67	0.00	100.0%	2.33	2.00	14.3%	0.67	0.00	100.0%	12.67	8.00	36.8%	0.00	0.00	-

B.11 2010 LAP Analysis – Vertical Alignment Improvements

Project Number	Project Type	Project Location	Total Crashes						Target Crashes											
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Total Crashes						Head On					
									Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction
STH-47	Vertical Alignment	Grand River Road at Colby Lake Road	0.67	1.00	-50.0%	0.00	0.33	-100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-59	Vertical Alignment	Reams Road at Pickerel Lake Road	0.33	0.33	0.0%	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-61	Vertical Alignment	Crahen Avenue at Bradford Street	1.33	2.33	-75.0%	0.67	0.33	50.0%	0.33	2.00	-500.0%	0.00	0.33	-100.0%	0.33	0.00	100.0%	0.00	0.00	-
HRRR-8	Vertical Alignment	18 Mile Road at Pine Lake Avenue	1.00	0.33	66.7%	0.00	0.33	-100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
HRRR-12	Vertical Alignment	Sidney Road at Fitzner Road	1.00	1.00	0.0%	0.33	0.00	100.0%	1.00	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
HRRR-17	Vertical Alignment	North Adams Road at Waldron Road	0.33	0.00	100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
Vertical Alignment Totals			4.67	5.00	-7.1%	1.33	1.00	25.0%	1.33	2.00	-50.0%	0.00	0.33	-100.0%	0.33	0.00	100.0%	0.00	0.00	-

Project Number	Project Type	Project Location	Target Crashes																	
			Head On Left Turn						Rear End					Sideswipe - Same						
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction
STH-47	Vertical Alignment	Grand River Road at Colby Lake Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-59	Vertical Alignment	Reams Road at Pickerel Lake Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
STH-61	Vertical Alignment	Crahen Avenue at Bradford Street	0.00	0.33	-100.0%	0.00	0.33	-100.0%	0.00	1.67	-100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
HRRR-8	Vertical Alignment	18 Mile Road at Pine Lake Avenue	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
HRRR-12	Vertical Alignment	Sidney Road at Fitzner Road	0.00	0.00	-	0.00	0.00	-	0.33	0.00	100.0%	0.00	0.00	-	0.67	0.00	100.0%	0.00	0.00	-
HRRR-17	Vertical Alignment	North Adams Road at Waldron Road	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
Vertical Alignment Totals			0.00	0.33	-100.0%	0.00	0.33	-100.0%	0.33	1.67	-400.0%	0.00	0.00	-	0.67	0.00	100.0%	0.00	0.00	-

B.12 2010 LAP Analysis – Vertical Alignment & Roadway Departure & Clearzone Improvements

Project Number	Project Type	Project Location	Total Crashes						Targeted Crashes																	
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Total Crashes						Head On											
									Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction						
STH-64	Vertical Alignment & Roadway Departure & Clearzone	CR 669 (Old Swamp Road) at 40th Street	0.00	0.30	-100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
Vertical Alignment & Road Departure & Clearzone			0.00	0.30	-100.0%	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-

Project Number	Project Type	Project Location	Targeted Crashes																							
			Head On Left Turn						Rear End						Sideswipe - Same						Single Motor Vehicle					
			Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction	Annual Average Crash Frequency (Before)	Annual Average Crash Frequency (After)	% Reduction	Annual Average of KABC Injuries (Before)	Annual Average of KABC Injuries (After)	% Reduction
STH-64	Vertical Alignment & Roadway Departure & Clearzone	CR 669 (Old Swamp Road) at 40th Street	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
Vertical Alignment & Road Departure & Clearzone			0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-

Appendix C - Poisson Test Results Table

C.1 Poisson Text – 2010 LAP Analysis – STH Projects

Project Number	Project Type	Project Location	Total Targeted Crashes				Targeted KABC Crashes			
			Annual Average of Crash Frequency (Before)	Annual Average of Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence	Annual Average of KABC Crash Frequency (Before)	Annual Average of KABC Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence
STH-1	Intersection improvement	Blue Star Highway at North Shore Drive,	1.7	0.0	100.0%	Too Low	1.7	0.0	100.0%	Too Low
STH-2	Roadway departure & Clearzone	Riverview Drive, from 4th Street to Gene Drive	1.3	0.7	50.0%	Too Low	0.0	0.3	-100.0%	Too Low
STH-3	Roadway departure & Clearzone	East Torch Lake Drive (CR 593), Alden Highway to M-88	9.7	7.0	27.6%	No	2.3	0.3	85.7%	Too Low
STH-4	Intersection improvement	Melita Road at Main Street	0.0	0.0	-	-	0.0	0.0	-	-
STH-5	Roadway departure & Clearzone	Froberg Road at East Sturgeon Slough	0.0	0.0	-	-	0.0	0.0	-	-
STH-6	Sign Related	Cedar Run Road at Reynolds Road	1.3	0.3	75.0%	Too Low	0.7	0.3	50.0%	Too Low
STH-7	Roadway departure & Clearzone	North Manistee County Line Road (CR-602), 0.31 miles east of Wallaker Road easterly 1500 feet	0.7	0.0	100.0%	Too Low	0.0	0.0	-	-
STH-8	Turn lane	John Beers Road, from Cleveland Avenue to Washington Avenue	3.3	2.7	20.0%	No	1.0	1.0	0.0%	Too Low
STH-9	Roadway departure & Clearzone	South River Road, from Canton Road to Orchard Beach Road	0.7	1.3	-100.0%	Too Low	0.7	0.7	0.0%	Too Low
STH-10	Roadway departure & Clearzone	FH-42 (Curly Lewis Highway) at Roxbury Creek, Ankodosh Creek, and Naomikong Creek	0.0	0.0	-	-	0.0	0.0	-	-
STH-11	Intersection improvement	N. Caribou Lake Road at Spring Bay Road	0.0	0.0	-	-	0.0	0.0	-	-
STH-12	Turn lane	N. Lansing Street at Daisy Street, Floral Street, and North Gateway Schools	0.3	0.0	100.0%	Too Low	0.0	0.0	-	-
STH-13	Roadway departure & Clearzone	9 locations								
STH-14	Roadway departure & Clearzone	Stanley Road, from Bray Road to Center Road	1.0	0.3	66.7%	Too Low	0.3	0.0	100.0%	Too Low
STH-15	Traffic signal	Elms Road at Carpenter Road	5.0	5.0	0.0%	-	1.7	2.3	-40.0%	Too Low
STH-16	Intersection improvement	Wilson Road at Henderson Road	1.0	1.0	0.0%	Too Low	1.0	0.3	66.7%	Too Low
STH-17	Traffic signal	Elms Road at Flushing Road	3.3	5.3	-60.0%	No	0.7	1.3	-100.0%	Too Low
STH-18	Roadway departure & Clearzone	Torrey Road, from Oakridge Drive north to Bristol Road	3.0	1.0	66.7%	Too Low	0.3	0.7	-100.0%	Too Low
STH-19-1	Sign Related	Cass Road, from Keystone Road to Hartman Road	7.7	7.7	0.0%	-	1.7	1.7	0.0%	Too Low
STH-19-2	Sign Related	Five Mile Road, from Hammond Road to the northern East Bay Township line	12.0	7.0	41.7%	No	3.3	1.7	50.0%	No
STH-19-3	Sign Related	Supply Road, North Hobbs Highway to East Bay East Township line	3.0	7.3	-144.4%	Yes - Worse	1.3	3.7	-175.0%	No
STH-20	Sign Related	180 locations								
STH-21	Roadway departure & Clearzone	Jefferson Road at Sugar Creek	0.7	0.0	100.0%	Too Low	0.3	0.0	100.0%	Too Low
STH-22	Intersection improvement	Paradise Road at Pilgrim Road	0.3	0.0	100.0%	Too Low	0.0	0.0	-	-
STH-23	Traffic signal	9 various locations								
STH-24	Turn lane	84th Street, from Alles Drive to Norfolk Southern RR	2.7	0.3	87.5%	Too Low	1.0	0.0	100.0%	Too Low
STH-25	Traffic signal	Cascade Road at Spaulding Avenue/Hall Street	7.3	6.7	9.1%	No	2.0	1.3	33.3%	Too Low
STH-26-1	Traffic signal	Cascade Road at Forest Hill Avenue	16.0	10.0	37.5%	No	2.0	2.0	0.0%	Too Low
STH-26-2	Traffic signal	Division Avenue at 68th Street	9.3	13.0	-39.3%	No	1.7	2.7	-60.0%	Too Low
STH-27-1	Traffic signal	Leonard Street at Ball Street	7.0	3.3	52.4%	No	2.3	0.3	85.7%	Too Low
STH-27-2	Traffic signal	Leonard Street at Fuller Avenue	30.0	34.0	-13.3%	No	5.7	7.3	-29.4%	No
STH-27-3	Traffic signal	Leonard Street at Leffingwell Avenue	5.7	7.0	-23.5%	No	1.3	1.3	0.0%	Too Low
STH-28-1	Traffic signal	Fuller Avenue at 3 Mile Road	6.7	6.0	10.0%	No	1.7	3.3	-100.0%	No

STH-28-2	Traffic signal	32nd Street at Kalamazoo Avenue	6.3	4.0	36.8%	No	0.7	0.3	50.0%	Too Low
STH-29	Roadway departure & Clearzone	Pratt Road, from Lapeer WCL to Green Corners Road	2.3	1.3	42.9%	Too Low	0.3	0.3	0.0%	Too Low
STH-30	Traffic signal	Old US-23 at Spencer Road	5.0	5.3	-6.7%	No	0.7	0.7	0.0%	Too Low
STH-31	Roadway departure & Clearzone	Mackinaw Trail, from I-75 business loop northerly 1.0 miles.	1.0	0.7	33.3%	Too Low	0.3	0.0	100.0%	Too Low
STH-32-1	Traffic signal	13 Mile at Utica Road	16.0	20.7	-29.2%	No	2.7	4.3	-62.5%	No
STH-32-2	Traffic signal	14 Mile at Hayes Road	10.7	8.3	21.9%	No	2.0	2.0	0.0%	Too Low
STH-32-3	Traffic signal	Moravian at Utica Road	17.0	12.3	27.5%	No	5.7	1.4	75.9%	Yes - Better
STH-32-4	Traffic signal	Schoenherr at 24 Mile	10.7	9.7	9.4%	No	2.3	2.0	14.3%	Too Low
STH-33	Turn lane	15 Mile Road at Schoenherr Road	14.3	13.7	4.7%	No	2.0	2.0	0.0%	Too Low
STH-34	Traffic signal	14th Avenue at 13th Street	5.3	1.7	68.8%	Yes - Better	1.7	0.3	80.0%	Too Low
STH-35-1	Sign Related	Whiteford Road, from Section Road to Sterns Road	3.7	2.7	27.3%	No	2.0	0.0	100.0%	Too Low
STH-35-2	Sign Related	North Dixie Highway, from Pointe Aux Peaux Road to Post Road	5.7	12.0	-111.8%	Yes - Worse	2.3	3.3	-42.9%	No
STH-36	Intersection improvement	Laketon Avenue at Henry Street	5.7	7.0	-23.5%	No	0.0	1.0	-100.0%	Too Low
STH-37-1	Traffic signal	Laketon Avenue at Hoyt Street	4.3	5.3	-23.1%	No	1.3	1.7	-25.0%	Too Low
STH-37-2	Traffic signal	Laketon Avenue at Getty Street	19.0	21.3	-12.3%	No	5.0	3.7	26.7%	No
STH-37-3	Traffic signal	Laketon Avenue at Roberts Street	9.7	6.3	34.5%	No	2.3	1.0	57.1%	Too Low
STH-38	Turn lane	Sternberg Road at Grand Haven Road	2.0	2.0	0.0%	Too Low	1.0	1.0	0.0%	Too Low
STH-39	Intersection improvement	Harvey Road at Sternberg Road	31.7	24.0	24.2%	No	4.7	5.0	-7.1%	No
STH-40	Intersection improvement	10 Mile Road at Novi Way (Wildcat)	6.7	7.0	-5.0%	No	2.0	2.0	0.0%	Too Low
STH-41	Roadway Improvement	E. Pierce Road, from 132nd Avenue to 144th Avenue	0.0	0.0	-	-	0.0	0.0	-	-
STH-42	Roadway departure & Clearzone	Kittle Road at Honeywell Creek	0.0	0.0	-	-	0.0	0.0	-	-
STH-43	Roadway departure & Clearzone	40th Street, from Industrial Avenue to Waverly Road	1.0	0.3	66.7%	Too Low	0.0	0.0	-	-
STH-44	Turn lane	Center Road at Brockway Road	9.3	9.3	0.0%	-	1.7	2.0	-20.0%	Too Low
STH-45	Traffic signal	E. Genesee Avenue at Hess Avenue	8.3	7.0	16.0%	No	1.7	1.7	0.0%	Too Low
STH-46	Traffic signal & Turn Lane	Bay Street, from Court Street to W. Genesee Ave	14.7	11.7	20.5%	No	3.7	1.0	72.7%	Too Low
STH-47	Vertical Alignment	Grand River Road at Colby Lake Road	0.0	0.0	-	-	0.0	0.0	-	-
STH-48-1	Intersection improvement	Allen Road at Manor Avenue	2.0	1.0	50.0%	Too Low	0.7	0.0	100.0%	Too Low
STH-48-2	Intersection improvement	Allen Road at Reeck Road	2.3	0.0	100.0%	Too Low	1.0	0.0	100.0%	Too Low
STH-49	Intersection improvement	Springwells Street at Chamberlain Street	0.0	1.3	-100.0%	Too Low	0.0	0.7	-100.0%	Too Low
STH-50	Roadway Improvement	Livernois Street, from Toledo Street to John Kronk	8.3	5.3	36.0%	No	2.3	2.3	0.0%	Too Low
STH-51	Pedestrian related	West Vernor Highway, from Waterman Street to Lansing Street	1.0	2.3	-133.3%	Too Low	0.7	2.3	-250.0%	Too Low
STH-52-1	Traffic signal	Beaconsfield Road at Eastland Village Drive	0.7	0.7	0.0%	Too Low	0.3	0.7	-100.0%	Too Low
STH-52-2	Traffic signal	Beaconsfield Road at Damman Avenue	0.7	0.7	0.0%	Too Low	0.0	0.7	-100.0%	Too Low
STH-52-3	Traffic signal	Beaconsfield Road at Eastwood Drive	1.0	0.7	33.3%	Too Low	0.3	0.3	0.0%	Too Low
STH-52-4	Traffic signal	Beaconsfield Road at Woodside Drive	0.7	0.3	50.0%	Too Low	0.3	0.0	100.0%	Too Low
STH-53-1	Turn lane	Newburgh Road at 5 Mile Road	20.7	21.3	-3.2%	No	4.0	1.7	58.3%	No
STH-53-2	Turn lane	Newburgh Road at 7 Mile Road	17.3	15.7	9.6%	No	4.0	3.0	25.0%	No
STH-54	Traffic signal	Middlebelt Road at 5 Mile Road	23.7	30.0	-26.8%	No	5.3	6.7	-25.0%	No
STH-55-1	Traffic signal	Middlebelt Road at 6 Mile Road	15.3	17.7	-15.2%	No	2.7	3.7	-37.5%	No
STH-55-2	Traffic signal	Middlebelt Road at 7 Mile Road	7.3	17.7	-140.9%	Yes - Worse	7.3	5.3	27.3%	No
STH-56-1	Pedestrian related	Middlebelt Road, at Conrail railroad structure	0.0	0.0	-	-	0.0	0.0	-	-
STH-56-2	Pedestrian Related	Inkster Road, at Conrail railroad structure	0.0	0.0	-	-	0.0	0.0	-	-

STH-57	Turn lane	13th Street, from Leeson Avenue to GLC RR tracks	5.3	2.3	56.3%	No	1.0	0.7	33.3%	Too Low
STH-58-1	Roadway departure & Clearzone	First Avenue	0.0	0.3	-100.0%	Too Low	0.0	0.3	-100.0%	Too Low
STH-58-2	Roadway departure & Clearzone	Adams/Hueber Street	0.3	0.0	100.0%	Too Low	0.0	0.0	-	-
STH-58-3	Roadway departure & Clearzone	Ford Avenue	0.0	0.0	-	-	0.0	0.0	-	-
STH-59	Vertical Alignment	Reams Road at Pickerel Lake Road	0.0	0.0	-	-	0.0	0.0	-	-
STH-60	Roadway departure & Clearzone	Lake Mary Drive and CR -3 at Hamilton Creek & the North Branch of the Ford River	0.0	0.0	-	-	0.0	0.0	-	-
STH-61	Vertical Alignment	Crahen Avenue at Bradford Street	0.3	2.0	-500.0%	Too Low	0.0	0.3	-100.0%	Too Low
STH-62	Traffic signal	Southfield Road at 13 Mile Road	37.7	31.3	16.8%	No	9.3	7.3	21.4%	No
STH-63	Roadway departure & Clearzone	CR 437 at FFRD 2213	0.3	0.0	100.0%	Too Low	0.3	0.0	100.0%	Too Low
STH-64	Vertical Alignment & Roadway Departure & Clearzone	CR 669 (Old Swamp Road) at 40th Street	0.0	0.0	-	-	0.0	0.0	-	-
STH-65	Roadway departure & Clearzone	66th Street at CR378	0.3	0.0	100.0%	Too Low	0.3	0.0	100.0%	Too Low
STH-66	Traffic signal	Silver Lake Road at Zimmerman Road	6.3	8.3	-31.6%	No	1.7	1.7	0.0%	Too Low
STH-67	Roadway departure & Clearzone	9 locations								
Total Projects			502.7	479.7	4.6%	No	122.3	107.0	12.5%	Yes - Better

C.2 Poisson Test – 2010 LAP Analysis – HRRR Projects

Project Number	Project Type	Project Location	Total Targeted Crashes				Targeted KABC Crashes			
			Annual Average of Crash Frequency (Before)	Annual Average of Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence	Annual Average of KABC Crash Frequency (Before)	Annual Average of KABC Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence
HRRR-1	Roadway Departure & Clearzone	Connors Road from Miller Road northerly to a point 0.8 miles north of Miller Road.	1.0	0.3	66.7%	Too Low	0.3	0.3	0.0%	Too Low
HRRR-2	Roadway Improvement	Cherry Avenue (CR 593) from the Torch River Road northerly to Cairn Highway	2.7	0.3	87.5%	Too Low	1.0	0.0	100.0%	Too Low
HRRR-3	Sign related	Reynolds Road between Fewin Road and CR-610, in Almira and Inland Twp's	2.0	0.3	83.3%	Too Low	0.3	0.0	100.0%	Too Low
HRRR-4-1	Intersection improvement	Grand Blanc Road at Duffield Road	3.3	1.3	60.0%	Too Low	1.3	0.7	50.0%	Too Low
HRRR-4-2	Intersection improvement	Grand Blanc Road at Morrish Road and	2.3	3.7	-57.1%	No	1.7	1.3	20.0%	Too Low
HRRR-4-3	Intersection improvement	Seymour Road at Baldwin Road	1.7	1.0	40.0%	Too Low	1.3	1.0	25.0%	Too Low
HRRR-5-1	Roadway Departure & Clearzone	Dodge Road from Dosh Road to Oak Road	1.3	0.7	50.0%	Too Low	0.3	0.0	100.0%	Too Low
HRRR-5-2	Roadway Departure & Clearzone	McKinley Road from 1/4 mile south of Dodge Road to 1/4 mile north of Dodge Road	0.3	1.0	-200.0%	Too Low	0.3	0.0	100.0%	Too Low
HRRR-6	Roadway Departure & Clearzone	Haynor Road north of Rector Road	2.0	0.0	100.0%	Too Low	1.0	0.0	100.0%	Too Low
HRRR-7-1	Roadway Improvement	Vaughn Road from Davision Road to Indian Lake Road	0.0	0.0	-	-	0.0	0.0	-	-
HRRR-7-2	Roadway Improvement	Plank Road from Old State Road to M-55	1.3	0.7	50.0%	Too Low	0.7	0.0	100.0%	Too Low
HRRR-8	Vertical Alignment	18 Mile Road at Pine Lake Avenue	0.0	0.0	-	-	0.0	0.0	-	-
HRRR-9	Intersection Improvement	Lake Pleasant Road at Lum Road	0.3	1.7	-400.0%	Too Low	0.3	0.3	0.0%	Too Low
HRRR-10-1	Roadway Departure & Clearzone	Genesee Road from Maple Leaf Road to Hadley Road	0.3	1.7	-400.0%	Too Low	0.3	1.0	-200.0%	Too Low
HRRR-10-2	Roadway Departure & Clearzone	Hadley Road from Lippencott Road to Genesee Road	0.7	0.3	50.0%	Too Low	0.0	0.0	-	-
HRRR-10-3	Roadway Departure & Clearzone	Burnside Road from Oliver Road to Laur Road	2.7	2.7	0.0%	-	1.3	1.0	25.0%	Too Low
HRRR-11-1	Intersection Improvement	Ida Center Road at Secor Road	1.0	1.0	0.0%	Too Low	1.0	0.3	66.7%	Too Low
HRRR-11-2	Intersection Improvement	Albain Road at Lewis Avenue	3.3	3.0	10.0%	No	1.3	0.7	50.0%	Too Low
HRRR-12	Vertical Alignment	Sidney Road at Fitzner Road	1.0	0.0	100.0%	Too Low	0.0	0.0	-	-
HRRR-13	Roadway Departure & Clearzone	CR 459 from MP 2.633 to MP 3.24	1.0	0.7	33.3%	Too Low	0.3	0.0	100.0%	Too Low
HRRR-14	Roadway Departure & Clearzone	Wadsworth Road from Gera Road to Block Road	1.7	0.7	60.0%	Too Low	1.0	0.0	100.0%	Too Low
HRRR-15	Intersection Improvement	CR 388 (Phoenix Road) at 62nd Street	2.0	1.7	16.7%	Too Low	0.7	1.0	-50.0%	Too Low
HRRR-16	Roadway improvement	Litchfield Road from Cobb Lake Road to 1/2 mile west of Rowe Road	0.0	0.0	-	-	0.0	0.0	-	-
HRRR-17	Vertical Alignment	North Adams Road at Waldron Road	0.0	0.0	-	-	0.0	0.0	-	-
HRRR-18	Intersection improvement	Frost Road at Orr Road	1.0	0.0	100.0%	Too Low	0.7	0.0	100.0%	Too Low
Total Projects			33.0	22.7	31.3%	No	15.3	7.7	50.0%	Yes - Better

C.3 Poisson Test – Intersection Improvements

Project Number	Project Type	Project Location	Total Targeted Crashes				Targeted KABC Crashes			
			Annual Average of Crash Frequency (Before)	Annual Average of Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence	Annual Average of KABC Crash Frequency (Before)	Annual Average of KABC Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence
STH-1	Intersection improvement	Blue Star Highway at North Shore Drive,	1.7	0.0	100.0%	Too Low	1.7	0.0	100.0%	Too Low
STH-4	Intersection improvement	Melita Road at Main Street	0.0	0.0	-	-	0.0	0.0	-	-
STH-11	Intersection improvement	N. Caribou Lake Road at Spring Bay Road	0.0	0.0	-	-	0.0	0.0	-	-
STH-16	Intersection improvement	Wilson Road at Henderson Road	1.0	1.0	0.0%	Too Low	1.0	0.3	66.7%	Too Low
STH-22	Intersection improvement	Paradise Road at Pilgrim Road	0.3	0.0	100.0%	Too Low	0.0	0.0	-	-
STH-36	Intersection improvement	Laketon Avenue at Henry Street	5.7	7.0	-23.5%	No	0.0	1.0	-100.0%	Too Low
STH-39	Intersection improvement	Harvey Road at Sternberg Road	31.7	24.0	24.2%	No	4.7	5.0	-7.1%	No
STH-40	Intersection improvement	10 Mile Road at Novi Way (Wildcat)	6.7	7.0	-5.0%	No	2.0	2.0	0.0%	Too Low
STH-48-1	Intersection improvement	Allen Road at Manor Avenue	2.0	1.0	50.0%	Too Low	0.7	0.0	100.0%	Too Low
STH-48-2	Intersection improvement	Allen Road at Reeck Road	2.3	0.0	100.0%	Too Low	1.0	0.0	100.0%	Too Low
STH-49	Intersection improvement	Springwells Street at Chamberlain Street	0.0	1.3	-100.0%	Too Low	0.0	0.7	-100.0%	Too Low
HRRR-4-1	Intersection improvement	Grand Blanc Road at Duffield Road	3.3	1.3	60.0%	Too Low	1.3	0.7	50.0%	Too Low
HRRR-4-2	Intersection improvement	Grand Blanc Road at Morrish Road and	2.3	3.7	-57.1%	No	1.7	1.3	20.0%	Too Low
HRRR-4-3	Intersection improvement	Seymour Road at Baldwin Road	1.7	1.0	40.0%	Too Low	1.3	1.0	25.0%	Too Low
HRRR-9	Intersection Improvement	Lake Pleasant Road at Lum Road	0.3	1.7	-400.0%	Too Low	0.3	0.3	0.0%	Too Low
HRRR-11-1	Intersection Improvement	Ida Center Road at Secor Road	1.0	1.0	0.0%	Too Low	1.0	0.3	66.7%	Too Low
HRRR-11-2	Intersection Improvement	Albain Road at Lewis Avenue	3.3	3.0	10.0%	No	1.3	0.7	50.0%	Too Low
HRRR-15	Intersection Improvement	CR 388 (Phoenix Road) at 62nd Street	2.0	1.7	16.7%	Too Low	0.7	1.0	-50.0%	Too Low
HRRR-18	Intersection improvement	Frost Road at Orr Road	1.0	0.0	100.0%	Too Low	0.7	0.0	100.0%	Too Low
Total Projects			66.3	54.7	17.6%	No	19.3	14.3	25.9%	No

C.4 Poisson Test – Pedestrian Related Improvements

Project Number	Project Type	Project Location	Total Targeted Crashes				Targeted KABC Crashes			
			Annual Average of Crash Frequency (Before)	Annual Average of Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence	Annual Average of KABC Crash Frequency (Before)	Annual Average of KABC Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence
STH-51	Pedestrian related	West Vernor Highway, from Waterman Street to Lansing Street	1.0	2.3	-133.3%	Too Low	0.7	2.3	-250.0%	Too Low
STH-56-1	Pedestrian related	Middlebelt Road, at Conrail railroad structure	0.0	0.0	-	-	0.0	0.0	-	-
STH-56-2	Pedestrian Related	Inkster Road, at Conrail railroad structure	0.0	0.0	-	-	0.0	0.0	-	-
Total Projects			1.0	2.3	-133.3%	Too Low	0.7	2.3	-250.0%	Too Low

C.5 Poisson Test – Roadway Departure & Clearzone Improvements

Project Number	Project Type	Project Location	Total Targeted Crashes				Targeted KABC Crashes			
			Annual Average of Crash Frequency (Before)	Annual Average of Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence	Annual Average of KABC Crash Frequency (Before)	Annual Average of KABC Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence
STH-2	Roadway departure & Clearzone	Riverview Drive, from 4th Street to Gene Drive	1.3	0.7	50.0%	Too Low	0.0	0.3	-100.0%	Too Low
STH-3	Roadway departure & Clearzone	East Torch Lake Drive (CR 593), Alden Highway to M-88	9.7	7.0	27.6%	No	2.3	0.3	85.7%	Too Low
STH-5	Roadway departure & Clearzone	Froberg Road at East Sturgeon Slough	0.0	0.0	-	-	0.0	0.0	-	-
STH-7	Roadway departure & Clearzone	North Manistee County Line Road (CR-602), 0.31 miles east of Wallaker Road easterly 1500 feet	0.7	0.0	100.0%	Too Low	0.0	0.0	-	-
STH-9	Roadway departure & Clearzone	South River Road, from Canton Road to Orchard Beach Road	0.7	1.3	-100.0%	Too Low	0.7	0.7	0.0%	Too Low
STH-10	Roadway departure & Clearzone	FH-42 (Curly Lewis Highway) at Roxbury Creek, Ankodosh Creek, and Naomikong Creek	0.0	0.0	-	-	0.0	0.0	-	-
STH-13	Roadway departure & Clearzone	9 locations								
STH-14	Roadway departure & Clearzone	Stanley Road, from Bray Road to Center Road	1.0	0.3	66.7%	Too Low	0.3	0.0	100.0%	Too Low
STH-18	Roadway departure & Clearzone	Torrey Road, from Oakridge Drive north to Bristol Road	3.0	1.0	66.7%	Too Low	0.3	0.7	-100.0%	Too Low
STH-21	Roadway departure & Clearzone	Jefferson Road at Sugar Creek	0.7	0.0	100.0%	Too Low	0.3	0.0	100.0%	Too Low
STH-29	Roadway departure & Clearzone	Pratt Road, from Lapeer WCL to Green Corners Road	2.3	1.3	42.9%	Too Low	0.3	0.3	0.0%	Too Low
STH-31	Roadway departure & Clearzone	Mackinaw Trail, from I-75 business loop northerly 1.0 miles.	1.0	0.7	33.3%	Too Low	0.3	0.0	100.0%	Too Low
STH-42	Roadway departure & Clearzone	Kittle Road at Honeywell Creek	0.0	0.0	-	-	0.0	0.0	-	-
STH-43	Roadway departure & Clearzone	40th Street, from Industrial Avenue to Waverly Road	1.0	0.3	66.7%	Too Low	0.0	0.0	-	-
STH-58-1	Roadway departure & Clearzone	First Avenue	0.0	0.3	-100.0%	Too Low	0.0	0.3	-100.0%	Too Low
STH-58-2	Roadway departure & Clearzone	Adams/Hueber Street	0.3	0.0	100.0%	Too Low	0.0	0.0	-	-
STH-58-3	Roadway departure & Clearzone	Ford Avenue	0.0	0.0	-	-	0.0	0.0	-	-
STH-60	Roadway departure & Clearzone	Lake Mary Drive and CR -3 at Hamilton Creek & the North Branch of the Ford River	0.0	0.0	-	-	0.0	0.0	-	-
STH-63	Roadway departure & Clearzone	CR 437 at FFRD 2213	0.3	0.0	100.0%	Too Low	0.3	0.0	100.0%	Too Low
STH-65	Roadway departure & Clearzone	66th Street at CR378	0.3	0.0	100.0%	Too Low	0.3	0.0	100.0%	Too Low
STH-67	Roadway departure & Clearzone	9 locations								
HRRR-1	Roadway Departure & Clearzone	Conners Road from Miller Road northerly to a point 0.8 miles north of Miller Road.	1.0	0.3	66.7%	Too Low	0.3	0.3	0.0%	Too Low
HRRR-5-1	Roadway Departure & Clearzone	Dodge Road from Dosh Road to Oak Road	1.3	0.7	50.0%	Too Low	0.3	0.0	100.0%	Too Low
HRRR-5-2	Roadway Departure & Clearzone	McKinley Road from 1/4 mile south of Dodge Road to 1/4 mile north of Dodge Road	0.3	1.0	-200.0%	Too Low	0.3	0.0	100.0%	Too Low
HRRR-6	Roadway Departure & Clearzone	Haynor Road north of Rector Road	2.0	0.0	100.0%	Too Low	1.0	0.0	100.0%	Too Low
HRRR-10-1	Roadway Departure & Clearzone	Genesee Road from Maple Leaf Road to Hadley Road	0.3	1.7	-400.0%	Too Low	0.3	1.0	-200.0%	Too Low
HRRR-10-2	Roadway Departure & Clearzone	Hadley Road from Lippencott Road to Genesee Road	0.7	0.3	50.0%	Too Low	0.0	0.0	-	-
HRRR-10-3	Roadway Departure & Clearzone	Burnside Road from Oliver Road to Laur Road	2.7	2.7	0.0%	-	1.3	1.0	25.0%	Too Low
HRRR-13	Roadway Departure & Clearzone	CR 459 from MP 2.633 to MP 3.24	1.0	0.7	33.3%	Too Low	0.3	0.0	100.0%	Too Low
HRRR-14	Roadway Departure & Clearzone	Wadsworth Road from Gera Road to Block Road	1.7	0.7	60.0%	Too Low	1.0	0.0	100.0%	Too Low
Total Projects			33.3	21.0	37.0%	Yes - Better	10.3	5.0	51.6%	Yes - Better

C.6 Poisson Test – Roadway Improvements

Project Number	Project Type	Project Location	Total Targeted Crashes				Targeted KABC Crashes			
			Annual Average of Crash Frequency (Before)	Annual Average of Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence	Annual Average of KABC Crash Frequency (Before)	Annual Average of KABC Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence
STH-41	Roadway Improvement	E. Pierce Road, from 132nd Avenue to 144th Avenue	0.0	0.0	-	-	0.0	0.0	-	-
STH-50	Roadway Improvement	Livernois Street, from Toledo Street to John Kronk	8.3	5.3	36.0%	No	2.3	2.3	0.0%	Too Low
HRRR-2	Roadway Improvement	Cherry Avenue (CR 593) from the Torch River Road northerly to Cairn Highway	2.7	0.3	87.5%	Too Low	1.0	0.0	100.0%	Too Low
HRRR-7-1	Roadway Improvement	Vaughn Road from Davision Road to Indian Lake Road	0.0	0.0	-	-	0.0	0.0	-	-
HRRR-7-2	Roadway Improvement	Plank Road from Old State Road to M-55	1.3	0.7	50.0%	Too Low	0.7	0.0	100.0%	Too Low
HRRR-16	Roadway improvement	Litchfield Road from Cobb Lake Road to 1/2 mile west of Rowe Road	0.0	0.0	-	-	0.0	0.0	-	-
Total Projects			12.3	6.3	48.6%	No	4.0	2.3	41.7%	No

C.7 Poisson Test – Sign Related Improvements

Project Number	Project Type	Project Location	Total Targeted Crashes				Targeted KABC Crashes			
			Annual Average of Crash Frequency (Before)	Annual Average of Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence	Annual Average of KABC Crash Frequency (Before)	Annual Average of KABC Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence
STH-6	Sign Related	Cedar Run Road at Reynolds Road	1.3	0.3	75.0%	Too Low	0.7	0.3	50.0%	Too Low
STH-19-1	Sign Related	Cass Road, from Keystone Road to Hartman Road	7.7	7.7	0.0%	-	1.7	1.7	0.0%	Too Low
STH-19-2	Sign Related	Five Mile Road, from Hammond Road to the northern East Bay Township line	12.0	7.0	41.7%	No	3.3	1.7	50.0%	No
STH-19-3	Sign Related	Supply Road, North Hobbs Highway to East Bay East Township line	3.0	7.3	-144.4%	Yes - Worse	1.3	3.7	-175.0%	No
STH-20	Sign Related	180 locations								
STH-35-1	Sign Related	Whiteford Road, from Section Road to Sterns Road	3.7	2.7	27.3%	No	2.0	0.0	100.0%	Too Low
STH-35-2	Sign Related	North Dixie Highway, from Pointe Aux Peaux Road to Post Road	5.7	12.0	-111.8%	Yes - Worse	2.3	3.3	-42.9%	No
HRRR-3	Sign related	Reynolds Road between Fewin Road and CR-610, in Almira and Inland Twp's	2.0	0.3	83.3%	Too Low	0.3	0.0	100.0%	Too Low
Total Projects			35.3	37.3	-5.7%	No	11.7	10.7	8.6%	No

C.8 Poisson Test – Traffic Signal Upgrades

Project Number	Project Type	Project Location	Total Targeted Crashes				Targeted KABC Crashes			
			Annual Average of Crash Frequency (Before)	Annual Average of Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence	Annual Average of KABC Crash Frequency (Before)	Annual Average of KABC Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence
STH-15	Traffic signal	Elms Road at Carpenter Road	5.0	5.0	0.0%	-	1.7	2.3	-40.0%	Too Low
STH-17	Traffic signal	Elms Road at Flushing Road	3.3	5.3	-60.0%	No	0.7	1.3	-100.0%	Too Low
STH-23	Traffic signal	9 various locations								
STH-25	Traffic signal	Cascade Road at Spaulding Avenue/Hall Street	7.3	6.7	9.1%	No	2.0	1.3	33.3%	Too Low
STH-26-1	Traffic signal	Cascade Road at Forest Hill Avenue	16.0	10.0	37.5%	No	2.0	2.0	0.0%	Too Low
STH-26-2	Traffic signal	Division Avenue at 68th Street	9.3	13.0	-39.3%	No	1.7	2.7	-60.0%	Too Low
STH-27-1	Traffic signal	Leonard Street at Ball Street	7.0	3.3	52.4%	No	2.3	0.3	85.7%	Too Low
STH-27-2	Traffic signal	Leonard Street at Fuller Avenue	30.0	34.0	-13.3%	No	5.7	7.3	-29.4%	No
STH-27-3	Traffic signal	Leonard Street at Leffingwell Avenue	5.7	7.0	-23.5%	No	1.3	1.3	0.0%	Too Low
STH-28-1	Traffic signal	Fuller Avenue at 3 Mile Road	6.7	6.0	10.0%	No	1.7	3.3	-100.0%	No
STH-28-2	Traffic signal	32nd Street at Kalamazoo Avenue	6.3	4.0	36.8%	No	0.7	0.3	50.0%	Too Low
STH-30	Traffic signal	Old US-23 at Spencer Road	5.0	5.3	-6.7%	No	0.7	0.7	0.0%	Too Low
STH-32-1	Traffic signal	13 Mile at Utica Road	16.0	20.7	-29.2%	No	2.7	4.3	-62.5%	No
STH-32-2	Traffic signal	14 Mile at Hayes Road	10.7	8.3	21.9%	No	2.0	2.0	0.0%	Too Low
STH-32-3	Traffic signal	Moravian at Utica Road	17.0	12.3	27.5%	No	5.7	1.4	75.9%	Yes - Better
STH-32-4	Traffic signal	Schoenherr at 24 Mile	10.7	9.7	9.4%	No	2.3	2.0	14.3%	Too Low
STH-34	Traffic signal	14th Avenue at 13th Street	5.3	1.7	68.8%	Yes - Better	1.7	0.3	80.0%	Too Low
STH-37-1	Traffic signal	Laketon Avenue at Hoyt Street	4.3	5.3	-23.1%	No	1.3	1.7	-25.0%	Too Low
STH-37-2	Traffic signal	Laketon Avenue at Getty Street	19.0	21.3	-12.3%	No	5.0	3.7	26.7%	No
STH-37-3	Traffic signal	Laketon Avenue at Roberts Street	9.7	6.3	34.5%	No	2.3	1.0	57.1%	Too Low
STH-45	Traffic signal	E. Genesee Avenue at Hess Avenue	8.3	7.0	16.0%	No	1.7	1.7	0.0%	Too Low
STH-52-1	Traffic signal	Beaconsfield Road at Eastland Village Drive	0.7	0.7	0.0%	Too Low	0.3	0.7	-100.0%	Too Low
STH-52-2	Traffic signal	Beaconsfield Road at Damman Avenue	0.7	0.7	0.0%	Too Low	0.0	0.7	-100.0%	Too Low
STH-52-3	Traffic signal	Beaconsfield Road at Eastwood Drive	1.0	0.7	33.3%	Too Low	0.3	0.3	0.0%	Too Low
STH-52-4	Traffic signal	Beaconsfield Road at Woodside Drive	0.7	0.3	50.0%	Too Low	0.3	0.0	100.0%	Too Low
STH-54	Traffic signal	Middlebelt Road at 5 Mile Road	23.7	30.0	-26.8%	No	5.3	6.7	-25.0%	No
STH-55-1	Traffic signal	Middlebelt Road at 6 Mile Road	15.3	17.7	-15.2%	No	2.7	3.7	-37.5%	No
STH-55-2	Traffic signal	Middlebelt Road at 7 Mile Road	7.3	17.7	-140.9%	Yes - Worse	7.3	5.3	27.3%	No
STH-62	Traffic signal	Southfield Road at 13 Mile Road	37.7	31.3	16.8%	No	9.3	7.3	21.4%	No
STH-66	Traffic signal	Silver Lake Road at Zimmerman Road	6.3	8.3	-31.6%	No	1.7	1.7	0.0%	Too Low
Total Projects			296.0	299.7	-1.2%	No	72.3	67.4	6.9%	No

C.9 Poisson Test – Traffic Signal & Turn Lane Upgrades

Project Number	Project Type	Project Location	Total Targeted Crashes				Targeted KABC Crashes			
			Annual Average of Crash Frequency (Before)	Annual Average of Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence	Annual Average of KABC Crash Frequency (Before)	Annual Average of KABC Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence
STH-46	Traffic signal & Turn Lane	Bay Street, from Court Street to W. Genesee Ave	14.7	11.7	20.5%	No	3.7	1.0	72.7%	Too Low
Total Projects			14.7	11.7	20.5%	No	3.7	1.0	72.7%	Too Low

C.10 Poisson Test – Turn Lane Improvements

Project Number	Project Type	Project Location	Total Targeted Crashes				Targeted KABC Crashes			
			Annual Average of Crash Frequency (Before)	Annual Average of Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence	Annual Average of KABC Crash Frequency (Before)	Annual Average of KABC Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence
STH-8	Turn lane	John Beers Road, from Cleveland Avenue to Washington Avenue	3.3	2.7	20.0%	No	1.0	1.0	0.0%	Too Low
STH-12	Turn lane	N. Lansing Street at Daisy Street, Floral Street, and North Gateway Schools	0.3	0.0	100.0%	Too Low	0.0	0.0	-	-
STH-24	Turn lane	84th Street, from Alles Drive to Norfolk Southern RR	2.7	0.3	87.5%	Too Low	1.0	0.0	100.0%	Too Low
STH-33	Turn lane	15 Mile Road at Schoenherr Road	14.3	13.7	4.7%	No	2.0	2.0	0.0%	Too Low
STH-38	Turn lane	Sternberg Road at Grand Haven Road	2.0	2.0	0.0%	Too Low	1.0	1.0	0.0%	Too Low
STH-44	Turn lane	Center Road at Brockway Road	9.3	9.3	0.0%	-	1.7	2.0	-20.0%	Too Low
STH-53-1	Turn lane	Newburgh Road at 5 Mile Road	20.7	21.3	-3.2%	No	4.0	1.7	58.3%	No
STH-53-2	Turn lane	Newburgh Road at 7 Mile Road	17.3	15.7	9.6%	No	4.0	3.0	25.0%	No
STH-57	Turn lane	13th Street, from Leeson Avenue to GLC RR tracks	5.3	2.3	56.3%	No	1.0	0.7	33.3%	Too Low
Total Projects			75.3	67.3	10.6%	No	15.7	11.3	27.7%	No

C.11 Poisson Test – Vertical Alignment Improvements

Project Number	Project Type	Project Location	Total Targeted Crashes				Targeted KABC Crashes			
			Annual Average of Crash Frequency (Before)	Annual Average of Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence	Annual Average of KABC Crash Frequency (Before)	Annual Average of KABC Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence
STH-47	Vertical Alignment	Grand River Road at Colby Lake Road	0.0	0.0	-	-	0.0	0.0	-	-
STH-59	Vertical Alignment	Reams Road at Pickerel Lake Road	0.0	0.0	-	-	0.0	0.0	-	-
STH-61	Vertical Alignment	Crahen Avenue at Bradford Street	0.3	2.0	-500.0%	Too Low	0.0	0.3	-100.0%	Too Low
HRRR-8	Vertical Alignment	18 Mile Road at Pine Lake Avenue	0.0	0.0	-	-	0.0	0.0	-	-
HRRR-12	Vertical Alignment	Sidney Road at Fitzner Road	1.0	0.0	100.0%	Too Low	0.0	0.0	-	-
HRRR-17	Vertical Alignment	North Adams Road at Waldron Road	0.0	0.0	-	-	0.0	0.0	-	-
Total Projects			1.3	2.0	-50.0%	Too Low	0.0	0.3	-100.0%	Too Low

C.12 Poisson Test – Vertical Alignment & Roadway Departure & Clearzone Improvements

Project Number	Project Type	Project Location	Total Targeted Crashes				Targeted KABC Crashes			
			Annual Average of Crash Frequency (Before)	Annual Average of Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence	Annual Average of KABC Crash Frequency (Before)	Annual Average of KABC Crash Frequency (After)	% Reduction	Statistically Significant at 95% Level of Confidence
STH-64	Vertical Alignment & Roadway Departure & Clearzone	CR 669 (Old Swamp Road) at 40th Street	0.0	0.0	-	-	0.0	0.0	-	-
Total Projects			0.0	0.0	-	-	0.0	0.0	-	-

Appendix D - Chi-squared Test Results Tables

D.1 Chi-squared Test – 2010 LAP Analysis

Project Number	Project Type	Project Location	Total Projects											
			Total Targeted Crashes						KABC Targeted Crashes					
			# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2 Calculated	# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2 Calculated
Nb	tb	Na	ta			Nb	tb	Na	ta					
STH-1	Intersection improvement	Blue Star Highway at North Shore Drive,	5	3	0	3	2.5	2.5	5	3	0	3	2.5	2.5
STH-2	Roadway departure & Clearzone	Riverview Drive, from 4th Street to Gene Drive	4	3	2	3	3	0.33	1	3	1	3	1	0
STH-3	Roadway departure & Clearzone	East Torch Lake Drive (CR 593), Alden Highway to M-88	29	3	21	3	25	0.64	8	3	3	3	5.5	1.14
STH-4	Intersection improvement	Melita Road at Main Street	0	3	0	3	0	-	9	3	0	3	4.5	4.5
STH-5	Roadway departure & Clearzone	Froberg Road at East Sturgeon Slough	0	3	0	3	0	-	0	3	0	3	0	-
STH-6	Sign Related	Cedar Run Road at Reynolds Road	4	3	1	3	2.5	0.9	2	3	1	3	1.5	0.17
STH-7	Roadway departure & Clearzone	North Manistee County Line Road (CR-602), 0.31 miles east of Wallaker Road easterly 1500 feet	2	3	0	3	1	1	0	3	0	3	0	-
STH-8	Turn lane	John Beers Road, from Cleveland Avenue to Washington Avenue	10	3	0	3	5	5	3	3	3	3	3	0
STH-9	Roadway departure & Clearzone	South River Road, from Canton Road to Orchard Beach Road	2	3	4	3	3	0.33	2	3	2	3	2	0
STH-10	Roadway departure & Clearzone	FH-42 (Curly Lewis Highway) at Roxbury Creek, Ankodosh Creek, and Naomikong Creek	0	3	0	3	0	-	0	3	0	3	0	-
STH-11	Intersection improvement	N. Caribou Lake Road at Spring Bay Road	0	3	0	3	0	-	0	3	0	3	0	-
STH-12	Turn lane	N. Lansing Street at Daisy Street, Floral Street, and North Gateway Schools	1	3	0	3	0.5	0.5	0	3	0	3	0	-
STH-13	Roadway departure & Clearzone	9 locations												
STH-14	Roadway departure & Clearzone	Stanley Road, from Bray Road to Center Road	3	3	1	3	2	0.5	2	3	5	3	3.5	0.64
STH-15	Traffic signal	Elms Road at Carpenter Road	19	3	21	3	20	0.05	7	3	7	3	7	0.0
STH-16	Intersection improvement	Wilson Road at Henderson Road	3	3	3	3	3	0	3	3	1	3	2	0.5
STH-17	Traffic signal	Elms Road at Flushing Road	17	3	27	3	22	1.14	3	3	5	3	4	0.25
STH-18	Roadway departure & Clearzone	Torrey Road, from Oakridge Drive north to Bristol Road	9	3	3	3	6	1.5	4	3	5	3	4.5	0.06
STH-19-1	Sign Related	Cass Road, from Keystone Road to Hartman Road	30	3	29	3	29.5	0.01	5	3	5	3	5	0
STH-19-2	Sign Related	Five Mile Road, from Hammond Road to the northern East Bay Township line	41	3	24	3	32.5	2.22	10	3	5	3	7.5	0.83
STH-19-3	Sign Related	Supply Road, North Hobbs Highway to East Bay East Township line	9	3	23	3	16	3.06	4	3	12	3	8	2
STH-20	Sign Related	180 locations												
STH-21	Roadway departure & Clearzone	Jefferson Road at Sugar Creek	2	3	0	3	1	1	1	3	0	3	0.5	0.5
STH-22	Intersection improvement	Paradise Road at Pilgrim Road	1	3	0	3	0.5	0.5	0	3	1	3	0.5	0.5
STH-23	Traffic signal	9 various locations												
STH-24	Turn lane	84th Street, from Alles Drive to Norfolk Southern RR	8	3	0	3	4	4	3	3	2	3	2.5	0.1
STH-25	Traffic signal	Cascade Road at Spaulding Avenue/Hall Street	31	3	34	3	32.5	0.07	7	3	4	3	5.5	0.41
STH-26-1	Traffic signal	Cascade Road at Forest Hill Avenue	77	3	44	3	60.5	4.5	7	3	7	3	7	0
STH-26-2	Traffic signal	Division Avenue at 68th Street	47	3	55	3	51	0.31	11	3	9	3	10	0.1
STH-27-1	Traffic signal	Leonard Street at Ball Street	25	3	12	3	18.5	2.28	11	3	3	3	7	2.29
STH-27-2	Traffic signal	Leonard Street at Fuller Avenue	122	3	147	3	134.5	1.16	21	3	25	3	23	0.17
STH-27-3	Traffic signal	Leonard Street at Leffingwell Avenue	21	3	29	3	25	0.64	5	3	7	3	6	0.17
STH-28-1	Traffic signal	Fuller Avenue at 3 Mile Road	23	3	23	3	23	0	5	3	10	3	7.5	0.83

Total Projects														
Project Number	Project Type	Project Location	Total Targeted Crashes						KABC Targeted Crashes					
			# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2 Calculated	# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2 Calculated
			Nb	tb	Na	ta			Nb	tb	Na	ta		
STH-28-2	Traffic signal	32nd Street at Kalamazoo Avenue	33	3	23	3	28	0.89	5	3	4	3	4.5	0.06
STH-29	Roadway departure & Clearzone	Pratt Road, from Lapeer WCL to Green Corners Road	7	3	4	3	5.5	0.41	1	3	3	3	2	0.5
STH-30	Traffic signal	Old US-23 at Spencer Road	27	3	26	3	26.5	0.01	2	3	2	3	2	0
STH-31	Roadway departure & Clearzone	Mackinaw Trail, from I-75 business loop northerly 1.0 miles.	3	3	2	3	2.5	0.1	1	3	0	3	0.5	0.5
STH-32-1	Traffic signal	13 Mile at Utica Road	74	3	102	3	88	2.23	10	3	16	3	13	0.69
STH-32-2	Traffic signal	14 Mile at Hayes Road	57	3	36	3	46.5	2.372	8	3	7	3	7.5	0.03
STH-32-3	Traffic signal	Moravian at Utica Road	77	3	64	3	70.5	0.60	20	3	9	3	14.5	2.09
STH-32-4	Traffic signal	Schoenherr at 24 Mile	49	3	48	3	48.5	0.01	7	3	7	3	7	0.0
STH-33	Turn lane	15 Mile Road at Schoenherr Road	43	3	7	3	25	12.96	8	3	10	3	9	0.11
STH-34	Traffic signal	14th Avenue at 13th Street	28	3	10	3	19	4.26	8	3	1	3	4.5	2.72
STH-35-1	Sign Related	Whiteford Road, from Section Road to Sterns Road	12	3	8	3	10	0.4	6	3	0	3	3	3
STH-35-2	Sign Related	North Dixie Highway, from Pointe Aux Peaux Road to Post Road	22	3	45	3	33.5	3.95	8	3	10	3	9	0.11
STH-36	Intersection improvement	Laketon Avenue at Henry Street	17	3	21	3	19	0.21	6	3	4	3	5	0.2
STH-37-1	Traffic signal	Laketon Avenue at Hoyt Street	18	3	27	3	22.5	0.9	7	3	9	3	8	0.125
STH-37-2	Traffic signal	Laketon Avenue at Getty Street	85	3	90	3	87.5	0.07	17	3	11	3	14	0.64
STH-37-3	Traffic signal	Laketon Avenue at Roberts Street	38	3	25	3	31.5	1.34	9	3	3	3	6	1.5
STH-38	Turn lane	Sternberg Road at Grand Haven Road	6	3	0	3	3	3	6	3	3	3	4.5	0.5
STH-39	Intersection improvement	Harvey Road at Sternberg Road	95	3	72	3	83.5	1.58	15	3	18	3	16.5	0.14
STH-40	Intersection improvement	10 Mile Road at Novi Way (Wildcat)	20	3	21	3	20.5	0.01	7	3	8	3	7.5	0.03
STH-41	Roadway Improvement	E. Pierce Road, from 132nd Avenue to 144th Avenue	0	3	0	3	0	-	1	3	1	3	1	0
STH-42	Roadway departure & Clearzone	Kittle Road at Honeywell Creek	0	3	0	3	0	-	1	3	0	3	0.5	0.5
STH-43	Roadway departure & Clearzone	40th Street, from Industrial Avenue to Waverly Road	3	3	1	3	2	0.5	0	3	1	3	0.5	0.5
STH-44	Turn lane	Center Road at Brockway Road	28	3	2	3	15	11.27	5	3	7	3	6	0.17
STH-45	Traffic signal	E. Genesee Avenue at Hess Avenue	33	3	30	3	31.5	0.07	5	3	7	3	6	0.17
STH-46	Traffic signal & Turn Lane	Bay Street, from Court Street to W. Genesee Ave	44	3	35	3	39.5	0.51	13	3	4	3	8.5	2.38
STH-47	Vertical Alignment	Grand River Road at Colby Lake Road	0	3	0	3	0	-	0	3	1	3	0.5	0.5
STH-48-1	Intersection improvement	Allen Road at Manor Avenue	6	3	3	3	4.5	0.5	3	3	0	3	1.5	1.5
STH-48-2	Intersection improvement	Allen Road at Reeck Road	7	3	0	3	3.5	3.5	4	3	0	3	2	2
STH-49	Intersection improvement	Springwells Street at Chamberlain Street	0	3	4	3	2	2	6	3	5	3	5.5	0.05
STH-50	Roadway Improvement	Livernois Street, from Toledo Street to John Kronk	39	3	23	3	31	2.06	11	3	11	3	11	0
STH-51	Pedestrian related	West Vernor Highway, from Waterman Street to Lansing Street	3	3	7	3	5	0.8	25	3	25	3	25	0
STH-52-1	Traffic signal	Beaconsfield Road at Eastland Village Drive	4	3	3	3	3.5	0.07	1	3	2	3	1.5	0.17
STH-52-2	Traffic signal	Beaconsfield Road at Damman Avenue	4	3	4	3	4	0	0	3	4	3	2	2
STH-52-3	Traffic signal	Beaconsfield Road at Eastwood Drive	6	3	2	3	4	1	1	3	1	3	1	0
STH-52-4	Traffic signal	Beaconsfield Road at Woodside Drive	2	3	2	3	2	0	1	3	0	3	0.5	0.5
STH-53-1	Turn lane	Newburgh Road at 5 Mile Road	62	3	8	3	35	20.83	12	3	18	3	15	0.6
STH-53-2	Turn lane	Newburgh Road at 7 Mile Road	52	3	7	3	29.5	17.16	13	3	10	3	11.5	0.20

Total Projects														
Project Number	Project Type	Project Location	Total Targeted Crashes						KABC Targeted Crashes					
			# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2 Calculated	# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2 Calculated
			Nb	tb	Na	ta			Nb	tb	Na	ta		
STH-54	Traffic signal	Middlebelt Road at 5 Mile Road	112	3	151	3	131.5	2.89	17	3	24	3	20.5	0.60
STH-55-1	Traffic signal	Middlebelt Road at 6 Mile Road	76	3	86	3	81	0.31	9	3	12	3	10.5	0.21
STH-55-2	Traffic signal	Middlebelt Road at 7 Mile Road	34	3	79	3	56.5	8.96	24	3	20	3	22	0.18
STH-56-1	Pedestrian related	Middlebelt Road, at Conrail railroad structure	0	3	0	3	0	-	2	3	2	3	2	0
STH-56-2	Pedestrian Related	Inkster Road, at Conrail railroad structure	0	3	0	3	0	-	8	3	4	3	6	0.67
STH-57	Turn lane	13th Street, from Leeson Avenue to GLC RR tracks	16	3	0	3	8	8	5	3	2	3	3.5	0.64
STH-58-1	Roadway departure & Clearzone	First Avenue	0	3	1	3	0.5	0.5	0	3	1	3	0.5	0.5
STH-58-2	Roadway departure & Clearzone	Adams/Hueber Street	1	3	0	3	0.5	0.5	0	3	0	3	0	-
STH-58-3	Roadway departure & Clearzone	Ford Avenue	0	3	0	3	0	-	0	3	0	3	0	-
STH-59	Vertical Alignment	Reams Road at Pickerel Lake Road	0	3	0	3	0	-	1	3	0	3	0.5	0.5
STH-60	Roadway departure & Clearzone	Lake Mary Drive and CR -3 at Hamilton Creek & the North Branch of the Ford River	0	3	0	3	0	-	0	3	0	3	0	-
STH-61	Vertical Alignment	Crahen Avenue at Bradford Street	1	3	11	3	6	4.17	2	3	1	3	1.5	0.17
STH-62	Traffic signal	Southfield Road at 13 Mile Road	186	3	162	3	174	0.83	30	3	26	3	28	0.14
STH-63	Roadway departure & Clearzone	CR 437 at FFRD 2213	1	3	0	3	0.5	0.5	0	3	0	3	0	-
STH-64	Vertical Alignment & Roadway Departure & Clearzone	CR 669 (Old Swamp Road) at 40th Street	0	3	0	3	0	-	0	3	0	3	0	-
STH-65	Roadway departure & Clearzone	66th Street at CR378	1	3	0	3	0.5	0.5	2	3	0	3	1	1
STH-66	Traffic signal	Silver Lake Road at Zimmerman Road	25	3	38	3	31.5	1.34	5	3	5	3	5	0
STH-67	Roadway departure & Clearzone	9 locations												
HRRR-1	Roadway Departure & Clearzone	Conners Road from Miller Road northerly to a point 0.8 miles north of Miller Road.	3	3	1	3	2	0.5	1	3	1	3	1	0
HRRR-2	Roadway Improvement	Cherry Avenue (CR 593) from the Torch River Road northerly to Cairn Highway	9	3	2	3	5.5	2.23	11	3	8	3	9.5	0.24
HRRR-3	Sign related	Reynolds Road between Fewin Road and CR-610, in Almira and Inland Twp's	7	3	1	3	4	2.25	1	3	0	3	0.5	0.5
HRRR-4-1	Intersection improvement	Grand Blanc Road at Duffield Road	10	3	4	3	7	1.29	5	3	3	3	4	0.25
HRRR-4-2	Intersection improvement	Grand Blanc Road at Morrish Road and	7	3	11	3	9	0.44	5	3	4	3	4.5	0.06
HRRR-4-3	Intersection improvement	Seymour Road at Baldwin Road	5	3	3	3	4	0.25	4	3	3	3	3.5	0.07
HRRR-5-1	Roadway Departure & Clearzone	Dodge Road from Dosh Road to Oak Road	4	3	2	3	3	0.33	1	3	0	3	0.5	0.5
HRRR-5-2	Roadway Departure & Clearzone	McKinley Road from 1/4 mile south of Dodge Road to 1/4 mile north of Dodge Road	1	3	3	3	2	0.5	1	3	0	3	0.5	0.5
HRRR-6	Roadway Departure & Clearzone	Haynor Road north of Rector Road	6	3	0	3	3	3	3	3	0	3	1.5	1.5
HRRR-7-1	Roadway Improvement	Vaughn Road from Davision Road to Indian Lake Road	0	3	0	3	0	-	3	3	2	3	2.5	0.1
HRRR-7-2	Roadway Improvement	Plank Road from Old State Road to M-55	6	3	3	3	4.5	0.5	7	3	5	3	6	0.17
HRRR-8	Vertical Alignment	18 Mile Road at Pine Lake Avenue	0	3	0	3	0	-	0	3	1	3	0.5	0.5
HRRR-9	Intersection Improvement	Lake Pleasant Road at Lum Road	1	3	5	3	3	1.33	1	3	1	3	1	0
HRRR-10-1	Roadway Departure & Clearzone	Genesee Road from Maple Leaf Road to Hadley Road	1	3	5	3	3	1.33	1	3	4	3	2.5	0.9
HRRR-10-2	Roadway Departure & Clearzone	Hadley Road from Lippencott Road to Genesee Road	2	3	1	3	1.5	0.17	20	3	0	3	1	1
HRRR-10-3	Roadway Departure & Clearzone	Burnside Road from Oliver Road to Laur Road	8	3	8	3	8	0	6	3	8	3	7	0.14
HRRR-11-1	Intersection Improvement	Ida Center Road at Secor Road	3	3	3	3	3	0	3	3	1	3	2	0.5
HRRR-11-2	Intersection Improvement	Albain Road at Lewis Avenue	10	3	9	3	9.5	0.03	4	3	2	3	3	0.33
HRRR-12	Vertical Alignment	Sidney Road at Fitzner Road	4	3	0	3	2	2	1	3	0	3	0.5	0.5

Total Projects														
Project Number	Project Type	Project Location	Total Targeted Crashes						KABC Targeted Crashes					
			# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2 Calculated	# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2 Calculated
			Nb	tb	Na	ta			Nb	tb	Na	ta		
HRRR-13	Roadway Departure & Clearzone	CR 459 from MP 2.633 to MP 3.24	3	3	2	3	2.5	0.1	1	3	0	3	0.5	0.5
HRRR-14	Roadway Departure & Clearzone	Wadsworth Road from Gera Road to Block Road	5	3	2	3	3.5	0.64	2	3	2	3	2	0
HRRR-15	Intersection Improvement	CR 388 (Phoenix Road) at 62nd Street	6	3	4	3	5	0.2	2	3	2	3	2	0
HRRR-16	Roadway improvement	Litchfield Road from Cobb Lake Road to 1/2 mile west of Rowe Road	0	3	0	3	0	-	1	3	2	3	1.5	0.17
HRRR-17	Vertical Alignment	North Adams Road at Waldron Road	0	3	0	3	0	-	0	3	0	3	0	-
HRRR-18	Intersection improvement	Frost Road at Orr Road	3	3	0	3	1.5	1.5	3	3	0	3	1.5	1.5

X^2 Calculated	176.83	X^2 Calculated	56.36
X^2 Critical	133.26	X^2 Critical	133.26
	For 109 projects		For 109 projects

D.2 Chi-squared Test – 2010 LAP Analysis – STH Projects

STH Projects														
Project Number	Project Type	Project Location	Total Targeted Crashes						KABC Targeted Crashes					
			# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2 Calculated	# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2
			Nb	tb	Na	ta			Nb	tb	Na	ta		
STH-1	Intersection improvement	Blue Star Highway at North Shore Drive,	5	3	0	3	2.5	2.5	5	3	0	3	2.5	2.5
STH-2	Roadway departure & Clearzone	Riverview Drive, from 4th Street to Gene Drive	4	3	2	3	3	0.33	1	3	1	3	1	0
STH-3	Roadway departure & Clearzone	East Torch Lake Drive (CR 593), Alden Highway to M-88	29	3	21	3	25	0.64	8	3	3	3	5.5	1.14
STH-4	Intersection improvement	Melita Road at Main Street	0	3	0	3	0	-	9	3	0	3	4.5	4.5
STH-5	Roadway departure & Clearzone	Froberg Road at East Sturgeon Slough	0	3	0	3	0	-	0	3	0	3	0	-
STH-6	Sign Related	Cedar Run Road at Reynolds Road	4	3	1	3	2.5	0.9	2	3	1	3	1.5	0.167
STH-7	Roadway departure & Clearzone	North Manistee County Line Road (CR-602), 0.31 miles east of Wallaker Road easterly 1500 feet	2	3	0	3	1	1	0	3	0	3	0	-
STH-8	Turn lane	John Beers Road, from Cleveland Avenue to Washington Avenue	10	3	0	3	5	5	3	3	3	3	3	0
STH-9	Roadway departure & Clearzone	South River Road, from Canton Road to Orchard Beach Road	2	3	4	3	3	0.33	2	3	2	3	2	0
STH-10	Roadway departure & Clearzone	FH-42 (Curly Lewis Highway) at Roxbury Creek, Ankodosh Creek, and Naomikong Creek	0	3	0	3	0	-	0	3	0	3	0	-
STH-11	Intersection improvement	N. Caribou Lake Road at Spring Bay Road	0	3	0	3	0	-	0	3	0	3	0	-
STH-12	Turn lane	N. Lansing Street at Daisy Street, Floral Street, and North Gateway Schools	1	3	0	3	0.5	0.5	0	3	0	3	0	-
STH-13	Roadway departure & Clearzone	9 locations												
STH-14	Roadway departure & Clearzone	Stanley Road, from Bray Road to Center Road	3	3	1	3	2	0.5	2	3	5	3	3.5	0.64
STH-15	Traffic signal	Elms Road at Carpenter Road	19	3	21	3	20	0.05	7	3	7	3	7	0.0
STH-16	Intersection improvement	Wilson Road at Henderson Road	3	3	3	3	3	0	3	3	1	3	2	0.5
STH-17	Traffic signal	Elms Road at Flushing Road	17	3	27	3	22	1.134	3	3	5	3	4	0.25
STH-18	Roadway departure & Clearzone	Torrey Road, from Oakridge Drive north to Bristol Road	9	3	3	3	6	1.5	4	3	5	3	4.5	0.056
STH-19-1	Sign Related	Cass Road, from Keystone Road to Hartman Road	30	3	29	3	29.5	0.008	5	3	5	3	5	0

STH Projects														
Project Number	Project Type	Project Location	Total Targeted Crashes						KABC Targeted Crashes					
			# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2 Calculated	# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2
			Nb	tb	Na	ta			Nb	tb	Na	ta		
STH-19-2	Sign Related	Five Mile Road, from Hammond Road to the northern East Bay Township line	41	3	24	3	32.5	2.22	10	3	5	3	7.5	0.833
STH-19-3	Sign Related	Supply Road, North Hobbs Highway to East Bay East Township line	9	3	23	3	16	3.0625	4	3	12	3	8	2
STH-20	Sign Related	180 locations												
STH-21	Roadway departure & Clearzone	Jefferson Road at Sugar Creek	2	3	0	3	1	1	1	3	0	3	0.5	0.5
STH-22	Intersection improvement	Paradise Road at Pilgrim Road	1	3	0	3	0.5	0.5	0	3	1	3	0.5	0.5
STH-23	Traffic signal	9 various locations												
STH-24	Turn lane	84th Street, from Alles Drive to Norfolk Southern RR	8	3	0	3	4	4	3	3	2	3	2.5	0.1
STH-25	Traffic signal	Cascade Road at Spaulding Avenue/Hall Street	31	3	34	3	32.5	0.063	7	3	4	3	5.5	0.409
STH-26-1	Traffic signal	Cascade Road at Forest Hill Avenue	77	3	44	3	60.5	4.5	7	3	7	3	7	0
STH-26-2	Traffic signal	Division Avenue at 68th Street	47	3	55	3	51	0.314	11	3	9	3	10	0.1
STH-27-1	Traffic signal	Leonard Street at Ball Street	25	3	12	3	18.5	2.284	11	3	3	3	7	2.286
STH-27-2	Traffic signal	Leonard Street at Fuller Avenue	122	3	147	3	134.5	1.162	21	3	25	3	23	0.174
STH-27-3	Traffic signal	Leonard Street at Leffingwell Avenue	21	3	29	3	25	0.64	5	3	7	3	6	0.167
STH-28-1	Traffic signal	Fuller Avenue at 3 Mile Road	23	3	23	3	23	0	5	3	10	3	7.5	0.833
STH-28-2	Traffic signal	32nd Street at Kalamazoo Avenue	33	3	23	3	28	0.893	5	3	4	3	4.5	0.056
STH-29	Roadway departure & Clearzone	Pratt Road, from Lapeer WCL to Green Corners Road	7	3	4	3	5.5	0.409	1	3	3	3	2	0.5
STH-30	Traffic signal	Old US-23 at Spencer Road	27	3	26	3	26.5	0.009	2	3	2	3	2	0
STH-31	Roadway departure & Clearzone	Mackinaw Trail, from I-75 business loop northerly 1.0 miles.	3	3	2	3	2.5	0.1	1	3	0	3	0.5	0.5
STH-32-1	Traffic signal	13 Mile at Utica Road	74	3	102	3	88	2.227	10	3	16	3	13	0.692
STH-32-2	Traffic signal	14 Mile at Hayes Road	57	3	36	3	46.5	2.37	8	3	7	3	7.5	0.033
STH-32-3	Traffic signal	Moravian at Utica Road	77	3	64	3	70.5	0.599	20	3	9	3	14.5	2.09
STH-32-4	Traffic signal	Schoenherr at 24 Mile	49	3	48	3	48.5	0.005	7	3	7	3	7	0.0
STH-33	Turn lane	15 Mile Road at Schoenherr Road	43	3	7	3	25	12.96	8	3	10	3	9	0.111
STH-34	Traffic signal	14th Avenue at 13th Street	28	3	10	3	19	4.263	8	3	1	3	4.5	2.722
STH-35-1	Sign Related	Whiteford Road, from Section Road to Sterns Road	12	3	8	3	10	0.4	6	3	0	3	3	3
STH-35-2	Sign Related	North Dixie Highway, from Pointe Aux Peaux Road to Post Road	22	3	45	3	33.5	3.948	8	3	10	3	9	0.111
STH-36	Intersection improvement	Laketon Avenue at Henry Street	17	3	21	3	19	0.211	6	3	4	3	5	0.2
STH-37-1	Traffic signal	Laketon Avenue at Hoyt Street	18	3	27	3	22.5	0.9	7	3	9	3	8	0.125
STH-37-2	Traffic signal	Laketon Avenue at Getty Street	85	3	90	3	87.5	0.071	17	3	11	3	14	0.643
STH-37-3	Traffic signal	Laketon Avenue at Roberts Street	38	3	25	3	31.5	1.341	9	3	3	3	6	1.5
STH-38	Turn lane	Sternberg Road at Grand Haven Road	6	3	0	3	3	3	6	3	3	3	4.5	0.5
STH-39	Intersection improvement	Harvey Road at Sternberg Road	95	3	72	3	83.5	1.584	15	3	18	3	16.5	0.136
STH-40	Intersection improvement	10 Mile Road at Novi Way (Wildcat)	20	3	21	3	20.5	0.012	7	3	8	3	7.5	0.033
STH-41	Roadway Improvement	E. Pierce Road, from 132nd Avenue to 144th Avenue	0	3	0	3	0	-	1	3	1	3	1	0
STH-42	Roadway departure & Clearzone	Kittle Road at Honeywell Creek	0	3	0	3	0	-	1	3	0	3	0.5	0.5
STH-43	Roadway departure & Clearzone	40th Street, from Industrial Avenue to Waverly Road	3	3	1	3	2	0.5	0	3	1	3	0.5	0.5

STH Projects														
Project Number	Project Type	Project Location	Total Targeted Crashes						KABC Targeted Crashes					
			# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2 Calculated	# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2
			Nb	tb	Na	ta			Nb	tb	Na	ta		
STH-44	Turn lane	Center Road at Brockway Road	28	3	2	3	15	11.267	5	3	7	3	6	0.167
STH-45	Traffic signal	E. Genesee Avenue at Hess Avenue	33	3	30	3	31.5	0.071	5	3	7	3	6	0.167
STH-46	Traffic signal & Turn Lane	Bay Street, from Court Street to W. Genesee Ave	44	3	35	3	39.5	0.513	13	3	4	3	8.5	2.382
STH-47	Vertical Alignment	Grand River Road at Colby Lake Road	0	3	0	3	0	-	0	3	1	3	0.5	0.5
STH-48-1	Intersection improvement	Allen Road at Manor Avenue	6	3	3	3	4.5	0.5	3	3	0	3	1.5	1.5
STH-48-2	Intersection improvement	Allen Road at Reeck Road	7	3	0	3	3.5	3.5	4	3	0	3	2	2
STH-49	Intersection improvement	Springwells Street at Chamberlain Street	0	3	4	3	2	2	6	3	5	3	5.5	0.045
STH-50	Roadway Improvement	Livernois Street, from Toledo Street to John Kronk	39	3	23	3	31	2.065	11	3	11	3	11	0
STH-51	Pedestrian related	West Vernor Highway, from Waterman Street to Lansing Street	3	3	7	3	5	0.8	25	3	25	3	25	0
STH-52-1	Traffic signal	Beaconsfield Road at Eastland Village Drive	4	3	3	3	3.5	0.071	1	3	2	3	1.5	0.167
STH-52-2	Traffic signal	Beaconsfield Road at Damman Avenue	4	3	4	3	4	0	0	3	4	3	2	2
STH-52-3	Traffic signal	Beaconsfield Road at Eastwood Drive	6	3	2	3	4	1	1	3	1	3	1	0
STH-52-4	Traffic signal	Beaconsfield Road at Woodside Drive	2	3	2	3	2	0	1	3	0	3	0.5	0.5
STH-53-1	Turn lane	Newburgh Road at 5 Mile Road	62	3	8	3	35	20.829	12	3	18	3	15	0.6
STH-53-2	Turn lane	Newburgh Road at 7 Mile Road	52	3	7	3	29.5	17.161	13	3	10	3	11.5	0.196
STH-54	Traffic signal	Middlebelt Road at 5 Mile Road	112	3	151	3	131.5	2.892	17	3	24	3	20.5	0.598
STH-55-1	Traffic signal	Middlebelt Road at 6 Mile Road	76	3	86	3	81	0.309	9	3	12	3	10.5	0.214
STH-55-2	Traffic signal	Middlebelt Road at 7 Mile Road	34	3	79	3	56.5	8.96	24.	3	20	3	22	0.181
STH-56-1	Pedestrian related	Middlebelt Road, at Conrail railroad structure	0	3	0	3	0	-	2	3	2	3	2	0
STH-56-2	Pedestrian Related	Inkster Road, at Conrail railroad structure	0	3	0	3	0	-	8	3	4	3	6	0.667
STH-57	Turn lane	13th Street, from Leeson Avenue to GLC RR tracks	16	3	0	3	8	8	5	3	2	3	3.5	0.6429
STH-58-1	Roadway departure & Clearzone	First Avenue	0	3	1	3	0.5	0.5	0	3	1	3	0.5	0.5
STH-58-2	Roadway departure & Clearzone	Adams/Hueber Street	1	3	0	3	0.5	0.5	0	3	0	3	0	-
STH-58-3	Roadway departure & Clearzone	Ford Avenue	0	3	0	3	0	-	0	3	0	3	0	-
STH-59	Vertical Alignment	Reams Road at Pickerel Lake Road	0	3	0	3	0	-	1	3	0	3	0.5	0.5
STH-60	Roadway departure & Clearzone	Lake Mary Drive and CR -3 at Hamilton Creek & the North Branch of the Ford River	0	3	0	3	0	-	0	3	0	3	0	-
STH-61	Vertical Alignment	Crahen Avenue at Bradford Street	1	3	11	3	6	4.167	2	3	1	3	1.5	0.167
STH-62	Traffic signal	Southfield Road at 13 Mile Road	186	3	162	3	174	0.828	30	3	26	3	28	0.143
STH-63	Roadway departure & Clearzone	CR 437 at FFRD 2213	1	3	0	3	0.5	0.5	0	3	0	3	0	-
STH-64	Vertical Alignment & Roadway Departure & Clearzone	CR 669 (Old Swamp Road) at 40th Street	0	3	0	3	0	-	0	3	0	3	0	-
STH-65	Roadway departure & Clearzone	66th Street at CR378	1	3	0	3	0.5	0.5	2	3	0	3	1	1
STH-66	Traffic signal	Silver Lake Road at Zimmerman Road	25	3	38	3	31.5	1.341	5	3	5	3	5	0
STH-67	Roadway departure & Clearzone	9 locations												

X^2 Calculated	158.23	X^2 Calculated	46.44
X^2 Critical	105.27	X^2 Critical	105.27
	For 84 projects		For 84 projects

D.3 Chi-squared Test – 2010 LAP Analysis – HRRR Projects

HRRR Projects														
Project Number	Project Type	Project Location	Total Targeted Crashes						KABC Targeted Crashes					
			# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2 Calculated	# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2
			Nb	tb	Na	ta			Nb	tb	Na	ta		
HRRR-1	Roadway Departure & Clearzone	Connors Road from Miller Road northerly to a point 0.8 miles north of Miller Road.	3	3	1	3	2	0.5	1	3	1	3	1	0
HRRR-2	Roadway Improvement	Cherry Avenue (CR 593) from the Torch River Road northerly to Cairn Highway	9	3	2	3	5.5	2.23	11	3	8	3	9.5	0.24
HRRR-3	Sign related	Reynolds Road between Fewin Road and CR-610, in Almira and Inland Twp's	7	3	1	3	4	2.25	1	3	0	3	0.5	0.5
HRRR-4-1	Intersection improvement	Grand Blanc Road at Duffield Road	10	3	4	3	7	1.29	5	3	3	3	4	0.25
HRRR-4-2	Intersection improvement	Grand Blanc Road at Morrish Road and	7	3	11	3	9	0.44	5	3	4	3	4.5	0.06
HRRR-4-3	Intersection improvement	Seymour Road at Baldwin Road	5	3	3	3	4	0.25	4	3	3	3	3.5	0.07
HRRR-5-1	Roadway Departure & Clearzone	Dodge Road from Dosh Road to Oak Road	4	3	2	3	3	0.33	1	3	0	3	0.5	0.5
HRRR-5-2	Roadway Departure & Clearzone	McKinley Road from 1/4 mile south of Dodge Road to 1/4 mile north of Dodge Road	1	3	3	3	2	0.5	1	3	0	3	0.5	0.5
HRRR-6	Roadway Departure & Clearzone	Haynor Road north of Rector Road	6	3	0	3	3	3	3	3	0	3	1.5	1.5
HRRR-7-1	Roadway Improvement	Vaughn Road from Davision Road to Indian Lake Road	0	3	0	3	0	-	3	3	2	3	2.5	0.1
HRRR-7-2	Roadway Improvement	Plank Road from Old State Road to M-55	6	3	3	3	4.5	0.5	7	3	5	3	6	0.17
HRRR-8	Vertical Alignment	18 Mile Road at Pine Lake Avenue	0	3	0	3	0	-	0	3	1	3	0.5	0.5
HRRR-9	Intersection Improvement	Lake Pleasant Road at Lum Road	1	3	5	3	3	1.33	1	3	1	3	1	0
HRRR-10-1	Roadway Departure & Clearzone	Genesee Road from Maple Leaf Road to Hadley Road	1	3	5	3	3	1.33	1	3	4	3	2.5	0.9
HRRR-10-2	Roadway Departure & Clearzone	Hadley Road from Lippencott Road to Genesee Road	2	3	1	3	1.5	0.17	2	3	0	3	1	1
HRRR-10-3	Roadway Departure & Clearzone	Burnside Road from Oliver Road to Laur Road	8	3	8	3	8	0	6	3	8	3	7	0.14
HRRR-11-1	Intersection Improvement	Ida Center Road at Secor Road	3	3	3	3	3	0	3	3	1	3	2	0.5
HRRR-11-2	Intersection Improvement	Albain Road at Lewis Avenue	10	3	9	3	9.5	0.03	4	3	2	3	3	0.33
HRRR-12	Vertical Alignment	Sidney Road at Fitzner Road	4	3	0	3	2	2	1	3	0	3	0.5	0.5
HRRR-13	Roadway Departure & Clearzone	CR 459 from MP 2.633 to MP 3.24	3	3	2	3	2.5	0.1	1	3	0	3	0.5	0.5
HRRR-14	Roadway Departure & Clearzone	Wadsworth Road from Gera Road to Block Road	5	3	2	3	3.5	0.64	2	3	2	3	2	0
HRRR-15	Intersection Improvement	CR 388 (Phoenix Road) at 62nd Street	6	3	4	3	5	0.2	2	3	2	3	2	0
HRRR-16	Roadway improvement	Litchfield Road from Cobb Lake Road to 1/2 mile west of Rowe Road	0	3	0	3	0	-	1	3	2	3	1.5	0.17
HRRR-17	Vertical Alignment	North Adams Road at Waldron Road	0	3	0	3	0	-	0	3	0	3	0	-
HRRR-18	Intersection improvement	Frost Road at Orr Road	3	3	0	3	1.5	1.5	3	3	0	3	1.5	1.5

X^2 Calculated 18.59

X^2 Calculated 9.92

X^2 Critical **36.42**
For 25 projects

X^2 Critical **36.42**
For 25 projects

D.4 Chi-squared Test – 2010 LAP Analysis – Intersection Improvement Projects

Project Number	Project Type	Project Location	Total Projects											
			Total Targeted Crashes						KABC Targeted Crashes					
			# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	χ ² Calculated	# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	χ ²
STH-1	Intersection improvement	Blue Star Highway at North Shore Drive,	5	3	0	3	2.5	2.5	5	3	0	3	2.5	2.5
STH-4	Intersection improvement	Melita Road at Main Street	0	3	0	3	0	-	9	3	0	3	4.5	4.5
STH-11	Intersection improvement	N. Caribou Lake Road at Spring Bay Road	0	3	0	3	0	-	0	3	0	3	0	-
STH-16	Intersection improvement	Wilson Road at Henderson Road	3	3	3	3	3	0	3	3	1	3	2	0.5
STH-22	Intersection improvement	Paradise Road at Pilgrim Road	1	3	0	3	0.5	0.5	0	3	1	3	0.5	0.5
STH-36	Intersection improvement	Laketon Avenue at Henry Street	17	3	21	3	19	0.21	6	3	4	3	5	0.2
STH-39	Intersection improvement	Harvey Road at Sternberg Road	95	3	72	3	83.5	1.58	15	3	18	3	16.5	0.14
STH-40	Intersection improvement	10 Mile Road at Novi Way (Wildcat)	20	3	21	3	20.5	0.01	7	3	8	3	7.5	0.03
STH-48-1	Intersection improvement	Allen Road at Manor Avenue	6	3	3	3	4.5	0.5	3	3	0	3	1.5	1.5
STH-48-2	Intersection improvement	Allen Road at Reeck Road	7	3	0	3	3.5	3.5	4	3	0	3	2	2
STH-49	Intersection improvement	Springwells Street at Chamberlain Street	0	3	4	3	2	2	6	3	5	3	5.5	0.05
HRRR-4-1	Intersection improvement	Grand Blanc Road at Duffield Road	10	3	4	3	7	1.29	5	3	3	3	4	0.25
HRRR-4-2	Intersection improvement	Grand Blanc Road at Morrish Road and	7	3	11	3	9	0.44	5	3	4	3	4.5	0.06
HRRR-4-3	Intersection improvement	Seymour Road at Baldwin Road	5	3	3	3	4	0.25	4	3	3	3	3.5	0.07
HRRR-9	Intersection Improvement	Lake Pleasant Road at Lum Road	1	3	5	3	3	1.33	1	3	1	3	1	0
HRRR-11-1	Intersection Improvement	Ida Center Road at Secor Road	3	3	3	3	3	0	3	3	1	3	2	0.5
HRRR-11-2	Intersection Improvement	Albain Road at Lewis Avenue	10	3	9	3	9.5	0.03	4	3	2	3	3	0.33
HRRR-15	Intersection Improvement	CR 388 (Phoenix Road) at 62nd Street	6	3	4	3	5	0.2	2	3	2	3	2	0
HRRR-18	Intersection improvement	Frost Road at Orr Road	3	3	0	3	1.5	1.5	3	3	0	3	1.5	1.5

χ² Calculated 15.85

χ² Calculated 14.63

χ² Critical **28.87**
For 19 projects

χ² Critical **28.87**
For 19 projects

D.5 Chi-squared Test – 2010 LAP Analysis – Pedestrian Related Projects

Total Projects														
Project Number	Project Type	Project Location	Total Targeted Crashes						KABC Targeted Crashes					
			# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2 Calculated	# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2
STH-51	Pedestrian related	West Vernor Highway, from Waterman Street to Lansing Street	3	3	7	3	5	0.8	25	3	25	3	25	0
STH-56-1	Pedestrian related	Middlebelt Road, at Conrail railroad structure	0	3	0	3	0	-	2	3	2	3	2	0
STH-56-2	Pedestrian Related	Inkster Road, at Conrail railroad structure	0	3	0	3	0	-	8	3	4	3	6	0.67

X^2 Calculated

0.8

X^2 Calculated

0.67

X^2 Critical

5.99

For 3 projects

X^2 Critical

5.99

For 3 projects

D.6 Chi-squared Test – 2010 LAP Analysis – Roadway Departure & Clearzone Projects

Project Number	Project Type	Project Location	Total Projects											
			Total Targeted Crashes						KABC Targeted Crashes					
			# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2 Calculated	# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2
STH-2	Roadway departure & Clearzone	Riverview Drive, from 4th Street to Gene Drive	4	3	2	3	3	0.33	1	3	1	3	1	0
STH-3	Roadway departure & Clearzone	East Torch Lake Drive (CR 593), Alden Highway to M-88	29	3	21	3	25	0.64	8	3	3	3	5.5	1.14
STH-5	Roadway departure & Clearzone	Froberg Road at East Sturgeon Slough	0	3	0	3	0	-	0	3	0	3	0	-
STH-7	Roadway departure & Clearzone	North Manistee County Line Road (CR-602), 0.31 miles east of Wallaker Road easterly 1500 feet	2	3	0	3	1	1	0	3	0	3	0	-
STH-9	Roadway departure & Clearzone	South River Road, from Canton Road to Orchard Beach Road	2	3	4	3	3	0.33	2	3	2	3	2	0
STH-10	Roadway departure & Clearzone	FH-42 (Curly Lewis Highway) at Roxbury Creek, Ankodosh Creek, and Naomikong Creek	0	3	0	3	0	-	0	3	0	3	0	-
STH-13	Roadway departure & Clearzone	9 locations												
STH-14	Roadway departure & Clearzone	Stanley Road, from Bray Road to Center Road	3	3	1	3	2	0.5	2	3	5	3	3.5	0.64
STH-18	Roadway departure & Clearzone	Torrey Road, from Oakridge Drive north to Bristol Road	9	3	3	3	6	1.5	4	3	5	3	4.5	0.06
STH-21	Roadway departure & Clearzone	Jefferson Road at Sugar Creek	2	3	0	3	1	1	1	3	0	3	0.5	0.5
STH-29	Roadway departure & Clearzone	Pratt Road, from Lapeer WCL to Green Corners Road	7	3	4	3	5.5	0.41	1	3	3	3	2	0.5
STH-31	Roadway departure & Clearzone	Mackinaw Trail, from I-75 business loop northerly 1.0 miles.	3	3	2	3	2.5	0.1	1	3	0	3	0.5	0.5
STH-42	Roadway departure & Clearzone	Kittle Road at Honeywell Creek	0	3	0	3	0	-	1	3	0	3	0.5	0.5
STH-43	Roadway departure & Clearzone	40th Street, from Industrial Avenue to Waverly Road	3	3	1	3	2	0.5	0	3	1	3	0.5	0.5
STH-58-1	Roadway departure & Clearzone	First Avenue	0	3	1	3	0.5	0.5	0	3	1	3	0.5	0.5
STH-58-2	Roadway departure & Clearzone	Adams/Hueber Street	1	3	0	3	0.5	0.5	0	3	0	3	0	-
STH-58-3	Roadway departure & Clearzone	Ford Avenue	0	3	0	3	0	-	0	3	0	3	0	-
STH-60	Roadway departure & Clearzone	Lake Mary Drive and CR -3 at Hamilton Creek & the North Branch of the Ford River	0	3	0	3	0	-	0	3	0	3	0	-
STH-63	Roadway departure & Clearzone	CR 437 at FFRD 2213	1	3	0	3	0.5	0.5	0	3	0	3	0	-
STH-65	Roadway departure & Clearzone	66th Street at CR378	1	3	0	3	0.5	0.5	2	3	0	3	1	1
STH-67	Roadway departure & Clearzone	9 locations												
HRRR-1	Roadway Departure & Clearzone	Connors Road from Miller Road northerly to a point 0.8 miles north of Miller Road.	3	3	1	3	2	0.5	1	3	1	3	1	0
HRRR-5-1	Roadway Departure & Clearzone	Dodge Road from Dosh Road to Oak Road	4	3	2	3	3	0.33	1	3	0	3	0.5	0.5
HRRR-5-2	Roadway Departure & Clearzone	McKinley Road from 1/4 mile south of Dodge Road to 1/4 mile north of Dodge Road	1	3	3	3	2	0.5	1	3	0	3	0.5	0.5
HRRR-6	Roadway Departure & Clearzone	Haynor Road north of Rector Road	6	3	0	3	3	3	3	3	0	3	1.5	1.5
HRRR-10-1	Roadway Departure & Clearzone	Genesee Road from Maple Leaf Road to Hadley Road	1	3	5	3	3	1.33	1	3	4	3	2.5	0.9
HRRR-10-2	Roadway Departure & Clearzone	Hadley Road from Lippencott Road to Genesee Road	2	3	1	3	1.5	0.17	2	3	0	3	1	1
HRRR-10-3	Roadway Departure & Clearzone	Burnside Road from Oliver Road to Laur Road	8	3	8	3	8	0	6	3	8	3	7	0.14
HRRR-13	Roadway Departure & Clearzone	CR 459 from MP 2.633 to MP 3.24	3	3	2	3	2.5	0.1	1	3	0	3	0.5	0.5
HRRR-14	Roadway Departure & Clearzone	Wadsworth Road from Gera Road to Block Road	5	3	2	3	3.5	0.64	2	3	2	3	2	0

X^2 Calculated 14.89

X^2 Calculated 10.88

X^2 Critical **40.11**
For 28 projects

X^2 Critical **40.11**
For 28 projects

D.7 Chi-squared Test – 2010 LAP Analysis – Roadway Improvement Projects

Total Projects														
Project Number	Project Type	Project Location	Total Targeted Crashes						KABC Targeted Crashes					
			# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2 Calculated	# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2
STH-41	Roadway Improvement	E. Pierce Road, from 132nd Avenue to 144th Avenue	0	3	0	3	0	-	1	3	1	3	1	0
STH-50	Roadway Improvement	Livernois Street, from Toledo Street to John Kronk	39	3	23	3	31	2.06	11	3	11	3	11	0
HRRR-2	Roadway Improvement	Cherry Avenue (CR 593) from the Torch River Road northerly to Cairn Highway	9	3	2	3	5.5	2.23	11	3	8	3	9.5	0.24
HRRR-7-1	Roadway Improvement	Vaughn Road from Davision Road to Indian Lake Road	0	3	0	3	0	-	3	3	2	3	2.5	0.1
HRRR-7-2	Roadway Improvement	Plank Road from Old State Road to M-55	6	3	3	3	4.5	0.5	7	3	5	3	6	0.17
HRRR-16	Roadway improvement	Litchfield Road from Cobb Lake Road to 1/2 mile west of Rowe Road	0	3	0	3	0	-	1	3	2	3	1.5	0.17

X^2 Calculated	4.79	X^2 Calculated	0.67
X^2 Critical	11.07	X^2 Critical	11.07
	For 6 projects		For 6 projects

D.8 Chi-squared Test – 2010 LAP Analysis – Sign Related Projects

Total Projects														
Project Number	Project Type	Project Location	Total Targeted Crashes						KABC Targeted Crashes					
			# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2 Calculated	# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2
STH-6	Sign Related	Cedar Run Road at Reynolds Road	4	3	1	3	2.5	0.9	2	3	1	3	1.5	0.17
STH-19-1	Sign Related	Cass Road, from Keystone Road to Hartman Road	30	3	29	3	29.5	0.01	5	3	5	3	5	0
STH-19-2	Sign Related	Five Mile Road, from Hammond Road to the northern East Bay Township line	41	3	24	3	32.5	2.22	10	3	5	3	7.5	0.83
STH-19-3	Sign Related	Supply Road, North Hobbs Highway to East Bay East Township line	9	3	23	3	16	3.06	4	3	12	3	8	2
STH-20	Sign Related	180 locations												
STH-35-1	Sign Related	Whiteford Road, from Section Road to Sterns Road	12	3	8	3	10	0.4	6	3	0	3	3	3
STH-35-2	Sign Related	North Dixie Highway, from Pointe Aux Peaux Road to Post Road	22	3	45	3	33.5	3.95	8	3	10	3	9	0.11
HRRR-3	Sign related	Reynolds Road between Fegin Road and CR-610, in Almira and Inland Twp's	7	3	1	3	4	2.25	1	3	0	3	0.5	0.5

X^2 Calculated	12.79	X^2 Calculated	6.61
X^2 Critical	12.59	X^2 Critical	12.59
	For 7 projects		For 7 projects

D.9 Chi-squared Test – 2010 LAP Analysis – Traffic Signal Projects

Project Number	Project Type	Project Location	Total Projects											
			Total Targeted Crashes						KABC Targeted Crashes					
			# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2 Calculated	# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2
STH-15	Traffic signal	Elms Road at Carpenter Road	19	3	21	3	20	0.05	7	3	7	3	7	1.12694E-31
STH-17	Traffic signal	Elms Road at Flushing Road	17	3	27	3	22	1.14	3	3	5	3	4	0.25
STH-23	Traffic signal	9 various locations												
STH-25	Traffic signal	Cascade Road at Spaulding Avenue/Hall Street	31	3	34	3	32.5	0.07	7	3	4	3	5.5	0.41
STH-26-1	Traffic signal	Cascade Road at Forest Hill Avenue	77	3	44	3	60.5	4.5	7	3	7	3	7	0
STH-26-2	Traffic signal	Division Avenue at 68th Street	47	3	55	3	51	0.31	11	3	9	3	10	0.1
STH-27-1	Traffic signal	Leonard Street at Ball Street	25	3	12	3	18.5	2.28	11	3	3	3	7	2.29
STH-27-2	Traffic signal	Leonard Street at Fuller Avenue	122	3	147	3	134.5	1.16	21	3	25	3	23	0.17
STH-27-3	Traffic signal	Leonard Street at Leffingwell Avenue	21	3	29	3	25	0.64	5	3	7	3	6	0.17
STH-28-1	Traffic signal	Fuller Avenue at 3 Mile Road	23	3	23	3	23	0	5	3	10	3	7.5	0.83
STH-28-2	Traffic signal	32nd Street at Kalamazoo Avenue	33	3	23	3	28	0.89	5	3	4	3	4.5	0.06
STH-30	Traffic signal	Old US-23 at Spencer Road	27	3	26	3	26.5	0.01	2	3	2	3	2	0
STH-32-1	Traffic signal	13 Mile at Utica Road	74	3	102	3	88	2.23	10	3	16	3	13	0.69
STH-32-2	Traffic signal	14 Mile at Hayes Road	57	3	36	3	46.5	2.37	8	3	7	3	7.5	0.03
STH-32-3	Traffic signal	Moravian at Utica Road	77	3	64	3	70.5	0.60	20	3	9	3	14.5	2.09
STH-32-4	Traffic signal	Schoenherr at 24 Mile	49	3	48	3	48.5	0.01	7	3	7	3	7	1.12694E-31
STH-34	Traffic signal	14th Avenue at 13th Street	28	3	10	3	19	4.26	8	3	1	3	4.5	2.72
STH-37-1	Traffic signal	Laketon Avenue at Hoyt Street	18	3	27	3	22.5	0.9	7	3	9	3	8	0.125
STH-37-2	Traffic signal	Laketon Avenue at Getty Street	85	3	90	3	87.5	0.07	17	3	11	3	14	0.64
STH-37-3	Traffic signal	Laketon Avenue at Roberts Street	38	3	25	3	31.5	1.34	9	3	3	3	6	1.5
STH-45	Traffic signal	E. Genesee Avenue at Hess Avenue	33	3	30	3	31.5	0.07	5	3	7	3	6	0.17
STH-52-1	Traffic signal	Beaconsfield Road at Eastland Village Drive	4	3	3	3	3.5	0.07	1	3	2	3	1.5	0.17
STH-52-2	Traffic signal	Beaconsfield Road at Damman Avenue	4	3	4	3	4	0	0	3	4	3	2	2
STH-52-3	Traffic signal	Beaconsfield Road at Eastwood Drive	6	3	2	3	4	1	1	3	1	3	1	0
STH-52-4	Traffic signal	Beaconsfield Road at Woodside Drive	2	3	2	3	2	0	1.	3	0	3	0.5	0.5
STH-54	Traffic signal	Middlebelt Road at 5 Mile Road	112	3	151	3	131.5	2.89	17	3	24	3	20.5	0.60
STH-55-1	Traffic signal	Middlebelt Road at 6 Mile Road	76	3	86	3	81	0.31	9	3	12	3	10.5	0.21
STH-55-2	Traffic signal	Middlebelt Road at 7 Mile Road	34	3	79	3	56.5	8.96	24	3	20	3	22	0.18
STH-62	Traffic signal	Southfield Road at 13 Mile Road	186	3	162	3	174	0.83	30	3	26	3	28	0.14
STH-66	Traffic signal	Silver Lake Road at Zimmerman Road	25	3	38	3	31.5	1.34	5	3	5	3	5	0

X^2 Calculated **38.31**

X^2 Calculated **16.05**

X^2 Critical **41.34**
For 29 projects

X^2 Critical **41.34**
For 29 projects

D.10 Chi-squared Test – 2010 LAP Analysis – Traffic Signal & Turn Lane Projects

Total Projects														
Project Number	Project Type	Project Location	Total Targeted Crashes					KABC Targeted Crashes						
			# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2 Calculated	# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2
STH-46	Traffic signal & Turn Lane	Bay Street, from Court Street to W. Genesee Ave	44	3	35	3	39.5	0.51	13	3	4	3	8.5	2.38

X^2 Calculated	0.51	X^2 Calculated	2.38
X^2 Critical	-	X^2 Critical	-
	For 1 projects		For 1 projects

D.11 Chi-squared Test – 2010 LAP Analysis – Turn Lane Improvements

Total Projects														
Project Number	Project Type	Project Location	Total Targeted Crashes						KABC Targeted Crashes					
			# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2 Calculated	# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2
STH-8	Turn lane	John Beers Road, from Cleveland Avenue to Washington Avenue	10	3	0	3	5	5	3	3	3	3	3	0
STH-12	Turn lane	N. Lansing Street at Daisy Street, Floral Street, and North Gateway Schools	1	3	0	3	0.5	0.5	0	3	0	3	0	-
STH-24	Turn lane	84th Street, from Alles Drive to Norfolk Southern RR	8	3	0	3	4	4	3	3	2	3	2.5	0.1
STH-33	Turn lane	15 Mile Road at Schoenherr Road	43	3	7	3	25	12.96	8	3	10	3	9	0.11
STH-38	Turn lane	Sternberg Road at Grand Haven Road	6	3	0	3	3	3	6	3	3	3	4.5	0.5
STH-44	Turn lane	Center Road at Brockway Road	28	3	2	3	15	11.27	5	3	7	3	6	0.17
STH-53-1	Turn lane	Newburgh Road at 5 Mile Road	62	3	8	3	35	20.83	12	3	18	3	15	0.6
STH-53-2	Turn lane	Newburgh Road at 7 Mile Road	52	3	7	3	29.5	17.16	13	3	10	3	11.5	0.20
STH-57	Turn lane	13th Street, from Leeson Avenue to GLC RR tracks	16	3	0	3	8	8	5	3	2	3	3.5	0.64

X^2 Calculated 82.72

X^2 Calculated 2.32

X^2 Critical 14.07
For 8 projects

X^2 Critical 14.07
For 8 projects

D.12 Chi-squared Test – 2010 LAP Analysis – Vertical Alignment Projects

Project Number	U/R/B	Project Type	Project Location	Total Targeted Crashes						KABC Targeted Crashes					
				# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2 Calculated	# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2
				Nb	tb	Na	ta			Nb	tb	Na	ta		
STH-47	R	Vertical Alignment	Grand River Road at Colby Lake Road	0	3	0	3	0	-	0	3	1	3	0.5	0.50
STH-59	R	Vertical Alignment	Reams Road at Pickerel Lake Road	0	3	0	3	0	-	1	3	0	3	0.5	0.50
STH-61	U	Vertical Alignment	Crahen Avenue at Bradford Street	1	3	11	3	6	4.17	2	3	1	3	1.5	0.17
HRRR-8	R	Vertical Alignment	18 Mile Road at Pine Lake Avenue	0	3	0	3	0	-	0.00	3	1	3	0.5	0.50
HRRR-12	R	Vertical Alignment	Sidney Road at Fitzner Road	4	3	0	3	2	2.00	1.00	3	0	3	0.5	0.50
HRRR-17	R	Vertical Alignment	North Adams Road at Waldron Road	0	3	0	3	0	-	0.00	3	0	3	0	-

X^2 Calculated 6.17

X^2 Calculated 2.17

X^2 Critical **11.07**
For 6 projects

X^2 Critical **11.07**
For 6 projects

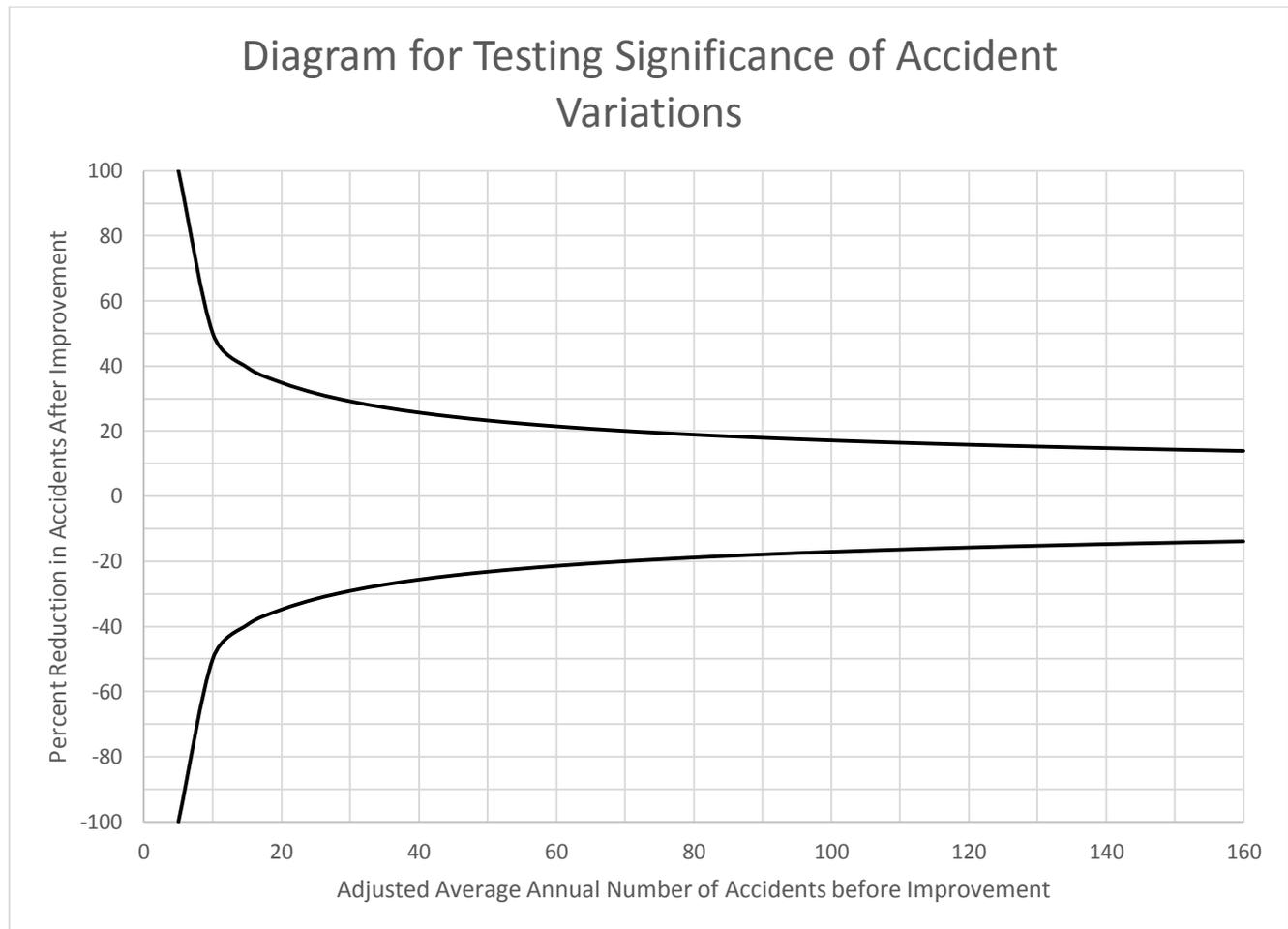
D.13 Chi-squared Test – 2010 LAP Analysis – Vertical Alignment & Roadway Departure & Clearzone Projects

Total Projects														
Project Number	Project Type	Project Location	Total Targeted Crashes						KABC Targeted Crashes					
			# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2 Calculated	# of Crashes Before	# of Years Before	# of Crashes After	# of Years After	Nahat	X^2
STH-64	Vertical Alignment & Roadway Departure & Clearzone	CR 669 (Old Swamp Road) at 40th Street	0	3	0	3	0	-	0.00	3	0.00	3	0	-

X^2 Calculated	0	X^2 Calculated	0
X^2 Critical	-	X^2 Critical	-
	For 1 projects		For 1 projects

Appendix E - Diagram for Test Significance of Accident Variations & Table of Chi Square Statistics

E.1 Diagram for Testing Significance of Accident Variations



E.2 Table of Chi-squared Statistics

Degrees of Freedom	Probability			Degrees of Freedom	Probability			Degrees of Freedom	Probability		
	0.10	0.05	0.025		0.10	0.05	0.025		0.10	0.05	0.025
1	2.706	3.841	5.024	41	52.949	56.942	60.561	81	97.680	103.010	107.783
2	4.605	5.991	7.378	42	54.090	58.124	61.777	82	98.780	104.139	108.937
3	6.251	7.815	9.348	43	55.230	59.304	62.990	83	99.880	105.267	110.090
4	7.779	9.488	11.143	44	56.369	60.481	64.201	84	100.980	106.395	111.242
5	9.236	11.070	12.833	45	57.505	61.656	65.410	85	102.079	107.522	112.393
6	10.645	12.592	14.449	46	58.641	62.830	66.617	86	103.177	108.648	113.544
7	12.017	14.067	16.013	47	59.774	64.001	67.821	87	104.275	109.773	114.693
8	13.362	15.507	17.535	48	60.907	65.171	69.023	88	105.372	110.898	115.841
9	14.684	16.919	19.023	49	62.038	66.339	70.222	89	106.469	112.022	116.989
10	15.987	18.307	20.483	50	63.167	67.505	71.420	90	107.565	113.145	118.136
11	17.275	19.675	21.920	51	64.295	68.669	72.616	91	108.661	114.268	119.282
12	18.549	21.026	23.337	52	65.422	69.832	73.810	92	109.756	115.390	120.427
13	19.812	22.362	24.736	53	66.548	70.993	75.002	93	110.850	116.511	121.571
14	21.064	23.685	26.119	54	67.673	72.153	76.192	94	111.944	117.632	122.715
15	22.307	24.996	27.488	55	68.796	73.311	77.380	95	113.038	118.752	123.858
16	23.542	26.296	28.845	56	69.919	74.468	78.567	96	114.131	119.871	125.000
17	24.769	27.587	30.191	57	71.040	75.624	79.752	97	115.223	120.990	126.141
18	25.989	28.869	31.526	58	72.160	76.778	80.936	98	116.315	122.108	127.282
19	27.204	30.144	32.852	59	73.279	77.931	82.117	99	117.407	123.225	128.422
20	28.412	31.410	34.170	60	74.397	79.082	83.298	100	118.498	124.342	129.561
21	29.615	32.671	35.479	61	75.514	80.232	84.476	101	119.589	125.458	130.700
22	30.813	33.924	36.781	62	76.630	81.381	85.654	102	120.679	126.574	131.838
23	32.007	35.172	38.076	63	77.745	82.529	86.830	103	121.769	127.689	132.975
24	33.196	36.415	39.364	64	78.860	83.675	88.004	104	122.858	128.804	134.111
25	34.382	37.652	40.646	65	79.973	84.821	89.177	105	123.947	129.918	135.247
26	35.563	38.885	41.923	66	81.085	85.965	90.349	106	125.035	131.031	136.382
27	36.741	40.113	43.195	67	82.197	87.108	91.519	107	126.123	132.144	137.517
28	37.916	41.337	44.461	68	83.308	88.250	92.689	108	127.211	133.257	138.651
29	39.087	42.557	45.722	69	84.418	89.391	93.856	109	128.298	134.369	139.784
30	40.256	43.773	46.979	70	85.527	90.531	95.023	110	129.385	135.480	140.917
31	41.422	44.985	48.232	71	86.635	91.670	96.189				
32	42.585	46.194	49.480	72	87.743	92.808	97.353				
33	43.745	47.400	50.725	73	88.850	93.945	98.516				
34	44.903	48.602	51.966	74	89.956	95.081	99.678				
35	46.059	49.802	53.203	75	91.061	96.217	100.839				
36	47.212	50.998	54.437	76	92.166	97.351	101.999				
37	48.363	52.192	55.668	77	93.270	98.484	103.158				
38	49.513	53.384	56.896	78	94.374	99.617	104.316				
39	50.660	54.572	58.120	79	95.476	100.749	105.473				
40	51.805	55.758	59.342	80	96.578	101.879	106.629				

Appendix F - Benefit – Cost Analysis Results

F.1 Cost – Benefit – 2010 LAP Analysis – Total Projects

Project Number	Project Type	Project Location	Total Project Costs	Total Crash Reduction					Crash Costs					Service Life	Interest Rate	EUAC	EUAB	B/C Ratio	Time of Return (yrs.)
				K	A	B	C	O	K	A	B	C	O						
STH-1	Intersection improvement	Blue Star Highway at North Shore Drive,	\$557,804.17	0.0	0.0	0.0	1.7	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$63,734.01	\$8,900	0.14	62.7
STH-2	Roadway departure & Clearzone	Riverview Dr, from 4th Street to Gene Dr	\$450,992.53	0.0	0.3	0.0	-0.3	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$51,529.85	\$30,167	0.59	15.0
STH-3	Roadway departure & Clearzone	East Torch Lake Drive (CR 593), Alden Highway to M-88	\$341,380.03	0.0	0.0	1.7	0.0	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$39,005.66	\$41,967	1.08	8.1
STH-4	Intersection improvement	Melita Road at Main Street	\$181,589.78	0.0	0.0	2.0	1.0	2.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$20,748.22	\$73,500	3.54	2.5
STH-5	Roadway departure & Clearzone	Froberg Road at East Sturgeon Slough	\$90,308.71	0.0	0.0	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$10,318.56	\$0	0.00	-
STH-6	Sign Related	Cedar Run Road at Reynolds Road	\$4,162.26	0.3	0.0	0.0	0.0	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$475.57	\$475,933	1000.75	0.0
STH-7	Roadway departure & Clearzone	North Manistee County Line Road (CR-602), 0.31 miles east of Wallaker Road easterly 1500 feet	\$35,572.85	0.0	0.0	0.0	0.0	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$4,064.51	\$5,933	1.46	6.0
STH-8	Turn lane	John Beers Road, from Cleveland Avenue to Washington Avenue	\$260,445.96	0.0	0.3	-0.3	0.0	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$29,758.23	\$19,400	0.65	13.4
STH-9	Roadway departure & Clearzone	South River Road, from Canton Road to Orchard Beach Road	\$7,828.07	0.0	-0.3	0.0	0.3	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$894.43	-\$27,200	-30.41	-0.3
STH-10	Roadway departure & Clearzone	FH-42 (Curly Lewis Highway) at Roxbury Creek, Ankodosh Creek, and Naomikong Creek	\$70,042.94	0.0	0.0	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,003.02	\$0	0.00	-
STH-11	Intersection improvement	N. Caribou Lake Road at Spring Bay Road	\$74,800.98	0.0	0.0	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,546.67	\$0	0.00	-
STH-12	Turn lane	N. Lansing Street at Daisy Street, Floral Street, and North Gateway Schools	\$134,222.59	0.0	0.0	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$15,336.11	\$0	0.00	-
STH-13	Roadway departure & Clearzone	9 locations																	
STH-14	Roadway departure & Clearzone	Stanley Road, from Bray Road to Center Rd	\$262,591.92	0.0	0.3	-0.3	-1.0	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$30,003.43	\$10,500	0.35	25.0
STH-15	Traffic signal	Elms Road at Carpenter Road	\$17,461.79	0.3	0.7	0.7	-1.7	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,995.16	\$525,167	263.22	0.0
STH-16	Intersection improvement	Wilson Road at Henderson Road	\$17,114.51	0.0	0.7	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,955.48	\$48,467	24.79	0.4
STH-17	Traffic signal	Elms Road at Flushing Road	\$45,687.69	0.0	0.0	-0.3	-0.3	-2.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$5,220.22	-\$28,567	-5.47	-1.6
STH-18	Roadway departure & Clearzone	Torrey Road, from Oakridge Drive north to Bristol Road	\$66,599.86	0.0	-0.7	0.7	-0.3	3.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$7,609.62	-\$3,200	-0.42	-20.8
STH-19-1	Sign Related	Cass Road, from Keystone Road to Hartman Road	\$1,908.13	0.0	0.0	0.7	-0.7	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$218.02	\$9,667	44.34	0.2
STH-19-2	Sign Related	Five Mile Road, from Hammond Road to the northern East Bay Township line	\$2,961.41	0.0	0.7	0.3	0.7	3.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$338.37	\$88,900	262.73	0.0
STH-19-3	Sign Related	Supply Road, North Hobbs Highway to East Bay East Township line	\$2,292.30	-0.3	0.0	-0.7	-1.7	-1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$261.92	-\$509,333	1944.65	0.0
STH-20	Sign Related	180 locations																	
STH-21	Roadway departure & Clearzone	Jefferson Road at Sugar Creek	\$194,004.74	0.0	0.0	0.0	0.3	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$22,166.74	\$8,900	0.40	21.8
STH-22	Intersection improvement	Paradise Road at Pilgrim Road	\$56,111.62	-0.3	0.0	0.0	0.0	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$6,411.24	-\$475,933	-74.23	-0.1
STH-23	Traffic signal	9 various locations																	
STH-24	Turn lane	84th Street, from Alles Drive to Norfolk Southern RR	\$392,448.81	0.3	0.0	0.0	0.0	1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$44,840.72	\$481,867	10.75	0.8
STH-25	Traffic signal	Cascade Road at Spaulding Avenue/Hall St	\$126,637.22	0.3	0.0	0.0	0.7	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$14,469.41	\$472,967	32.69	0.3
STH-26-1	Traffic signal	Cascade Road at Forest Hill Avenue	\$84,825.93	0.0	1.3	0.3	-1.7	8.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$9,692.11	\$164,067	16.93	0.5
STH-26-2	Traffic signal	Division Avenue at 68th Street	\$99,998.04	0.0	0.0	-0.3	1.0	-5.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$11,425.65	-\$49,333	-4.32	-2.0
STH-27-1	Traffic signal	Leonard Street at Ball Street	\$73,837.29	0.0	0.3	1.3	1.0	1.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,436.56	\$79,167	9.38	0.9
STH-27-2	Traffic signal	Leonard Street at Fuller Avenue	\$93,367.10	0.0	0.3	0.3	-2.0	-2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$10,668.01	-\$6,533	-0.61	-14.3
STH-27-3	Traffic signal	Leonard Street at Leffingwell Avenue	\$139,737.33	0.0	-0.3	0.7	-1.0	-1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$15,966.21	-\$26,433	-1.66	-5.3
STH-28-1	Traffic signal	Fuller Avenue at 3 Mile Road	\$85,049.80	0.0	0.0	-0.3	-1.3	2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$9,717.68	\$1,100	0.11	77.3
STH-28-2	Traffic signal	32nd Street at Kalamazoo Avenue	\$77,898.46	0.0	0.0	0.0	0.3	1.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,900.58	\$17,800	2.00	4.4

STH-29	Roadway departure & Clearzone	Pratt Road, from Lapeer WCL to Green Corners Road	\$52,599.18	0.0	0.0	-0.3	-0.3	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$6,009.92	-\$1,867	-0.31	-28.2
STH-30	Traffic signal	Old US-23 at Spencer Road	\$75,648.78	0.0	0.0	0.3	-0.3	-1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,643.54	-\$4,067	-0.47	-18.6
STH-31	Roadway departure & Clearzone	Mackinaw Trail, from I-75 business loop northerly 1.0 miles.	\$54,184.29	0.0	0.0	0.0	0.3	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$6,191.03	\$8,900	1.44	6.1
STH-32-1	Traffic signal	13 Mile at Utica Road	\$130,938.55	0.0	0.0	-1.0	-1.0	-4.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$14,960.88	-\$70,867	-4.74	-1.8
STH-32-2	Traffic signal	14 Mile at Hayes Road	\$151,586.55	0.0	0.3	0.0	0.0	4.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$17,320.09	\$65,767	3.80	2.3
STH-32-3	Traffic signal	Moravian at Utica Road	\$102,232.79	0.0	0.3	0.0	3.3	4.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$11,680.99	\$89,500	7.66	1.1
STH-32-4	Traffic signal	Schoenherr at 24 Mile	\$150,075.72	0.0	0.3	0.3	-0.7	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$17,147.47	\$35,000	2.04	4.3
STH-33	Turn lane	15 Mile Road at Schoenherr Road	\$232,719.15	0.0	0.3	-0.3	-0.7	2.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$26,590.20	\$28,300	1.06	8.2
STH-34	Traffic signal	14th Avenue at 13th Street	\$143,898.92	0.0	0.3	0.7	1.3	2.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$16,441.71	\$75,433	4.59	1.9
STH-35-1	Sign Related	Whiteford Road, from Section Road to Sterns Road	\$5,813.04	0.0	1.0	0.0	1.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$664.19	\$78,633	118.39	0.1
STH-35-2	Sign Related	North Dixie Highway, from Pointe Aux Peaux Road to Post Road	\$9,954.98	0.0	0.3	-0.3	-0.7	-5.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,137.44	-\$34,000	-29.89	-0.3
STH-36	Intersection improvement	Laketon Avenue at Henry Street	\$373,169.84	0.0	0.3	0.0	0.3	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$42,637.92	\$30,167	0.71	12.4
STH-37-1	Traffic signal	Laketon Avenue at Hoyt Street	\$74,125.83	-0.3	-0.3	-0.3	0.3	1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,469.53	-\$487,200	-57.52	-0.2
STH-37-2	Traffic signal	Laketon Avenue at Getty Street	\$55,336.28	0.0	1.0	-0.3	1.3	-2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$6,322.65	\$56,000	8.86	1.0
STH-37-3	Traffic signal	Laketon Avenue at Roberts Street	\$134,004.64	0.0	0.7	0.3	1.0	2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$15,311.20	\$85,933	5.61	1.6
STH-38	Turn lane	Sternberg Road at Grand Haven Road	\$50,793.08	0.3	0.0	0.0	0.7	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$5,803.55	\$478,900	82.52	0.1
STH-39	Intersection improvement	Harvey Road at Sternberg Road	\$2,000,604.57	0.0	0.0	-1.3	0.3	1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$228,586.60	-\$16,367	-0.07	-122.2
STH-40	Intersection improvement	10 Mile Road at Novi Way (Wildcat)	\$208,248.99	0.0	0.0	0.7	-1.0	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$23,794.27	\$12,633	0.53	16.5
STH-41	Roadway Improvement	E. Pierce Road, from 132nd Avenue to 144th Avenue	\$513,001.37	0.0	0.0	0.0	0.0	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$58,614.90	\$5,933	0.10	86.5
STH-42	Roadway departure & Clearzone	Kittle Road at Honeywell Creek	\$151,066.57	0.0	0.0	0.3	0.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$17,260.68	\$4,833	0.28	31.3
STH-43	Roadway departure & Clearzone	40th Street, from Industrial Avenue to Waverly Road	\$686,320.72	0.0	0.0	0.0	-0.3	2.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$78,418.16	\$14,833	0.19	46.3
STH-44	Turn lane	Center Road at Brockway Road	\$271,141.43	-0.3	-0.3	0.0	0.0	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$30,980.28	-\$485,333	-15.67	-0.6
STH-45	Traffic signal	E. Genesee Avenue at Hess Avenue	\$259,762.73	0.0	-0.3	0.0	-0.3	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$29,680.17	-\$33,133	-1.12	-7.8
STH-46	Traffic signal & Turn Lane	Bay Street, from Court Street to W. Genesee Ave	\$260,796.46	0.0	0.0	0.0	3.0	2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$29,798.28	\$47,467	1.59	5.5
STH-47	Vertical Alignment	Grand River Road at Colby Lake Road	\$374,491.69	0.0	0.0	0.0	-0.3	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$42,788.96	-\$2,967	-0.07	-126.2
STH-48-1	Intersection improvement	Allen Road at Manor Avenue	\$63,949.47	0.0	0.3	0.7	0.0	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$7,306.79	\$42,800	5.86	1.5
STH-48-2	Intersection improvement	Allen Road at Reeck Road	\$53,017.93	0.3	0.0	0.0	1.0	1.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$6,057.76	\$493,733	81.50	0.1
STH-49	Intersection improvement	Springwells Street at Chamberlain Street	\$344,467.05	0.7	-0.3	1.0	-1.0	-1.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$39,358.38	\$915,433	23.26	0.4
STH-50	Roadway Improvement	Livernois Street, from Toledo Street to John Kronk	\$511,484.23	0.3	0.0	-1.0	0.7	7.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$58,441.56	\$517,800	8.86	1.0
STH-51	Pedestrian related	West Vernor Highway, from Waterman Street to Lansing St	\$692,631.61	0.3	-0.7	0.3	0.0	15.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$79,139.23	\$568,767	7.19	1.2
STH-52-1	Traffic signal	Beaconsfield Road at Eastland Village Dr	\$57,673.44	0.0	-0.3	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$6,589.70	-\$24,233	-3.68	-2.4
STH-52-2	Traffic signal	Beaconsfield Road at Damman Avenue	\$166,626.64	0.0	-0.3	-0.7	-0.3	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$19,038.55	-\$39,833	-2.09	-4.2
STH-52-3	Traffic signal	Beaconsfield Road at Eastwood Drive	\$3,470,845.00	0.0	0.0	-0.3	0.3	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$396,574.46	\$4,067	0.01	853.5
STH-52-4	Traffic signal	Beaconsfield Road at Woodside Drive	\$86,510.15	0.0	0.0	0.0	0.3	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$9,884.54	\$2,967	0.30	29.2
STH-53-1	Turn lane	Newburgh Road at 5 Mile Road	\$78,243.55	0.0	-0.7	-1.7	0.3	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,940.01	-\$81,533	-9.12	-1.0
STH-53-2	Turn lane	Newburgh Road at 7 Mile Road	\$72,142.68	0.0	-0.3	-1.3	2.7	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,242.93	-\$37,633	-4.57	-1.9
STH-54	Traffic signal	Middlebelt Road at 5 Mile Road	\$138,406.26	0.0	-0.7	-1.3	-0.3	-7.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$15,814.13	-\$144,933	-9.16	-1.0
STH-55-1	Traffic signal	Middlebelt Road at 6 Mile Road	\$112,692.97	0.0	0.0	-2.0	1.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$12,876.16	-\$40,867	-3.17	-2.8
STH-55-2	Traffic signal	Middlebelt Road at 7 Mile Road	\$130,512.65	0.0	-0.3	0.7	1.0	-1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$14,912.21	-\$8,633	-0.58	-15.1
STH-56-1	Pedestrian related	Middlebelt Road, at Conrail railroad structure	\$228,502.80	0.0	0.0	-0.3	0.3	1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$26,108.45	\$7,033	0.27	32.5

STH-56-2	Pedestrian Related	Inkster Road, at Conrail railroad structure	\$246,542.49	0.0	0.0	0.3	1.0	2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$28,169.64	\$37,467	1.33	6.6
STH-57	Turn lane	13th Street, from Leeson Avenue to GLC RR tracks	\$293,759.74	0.0	0.0	0.3	0.7	2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$33,564.62	\$34,500	1.03	8.5
STH-58-1	Roadway departure & Clearzone	First Avenue	\$4,556.52	0.0	0.0	-0.3	0.0	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$520.62	-\$1,867	-3.59	-2.4
STH-58-2	Roadway departure & Clearzone	Adams/Hueber Street	\$1,301.86	0.0	0.0	0.0	0.0	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$148.75	\$2,967	19.94	0.4
STH-58-3	Roadway departure & Clearzone	Ford Avenue	\$29,194.29	0.0	0.0	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$3,335.70	\$0	0.00	-
STH-59	Vertical Alignment	Reams Road at Pickerel Lake Road	\$108,519.94	0.0	0.0	0.0	0.3	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$12,399.35	\$0	0.00	#DIV/0!
STH-60	Roadway departure & Clearzone	Lake Mary Drive and CR -3 at Hamilton Creek & the North Branch of the Ford River	\$180,039.06	0.0	0.0	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$20,571.04	\$0	0.00	-
STH-61	Vertical Alignment	Crahen Avenue at Bradford Street	\$397,602.13	0.0	0.0	0.3	0.0	-1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$45,429.53	-\$4,067	-0.09	-97.8
STH-62	Traffic signal	Southfield Road at 13 Mile Road	\$146,006.12	0.0	0.0	-1.0	2.3	9.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$16,682.48	\$83,400	5.00	1.8
STH-63	Roadway departure & Clearzone	CR 437 at FFRD 2213	\$94,208.44	0.0	0.0	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$10,764.14	\$0	0.00	-
STH-64	Vertical Alignment & Roadway Departure & Clearzone	CR 669 (Old Swamp Road) at 40th Street	\$163,905.13	0.0	0.0	0.0	0.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$18,727.60	-\$2,967	-0.16	-55.2
STH-65	Roadway departure & Clearzone	66th Street at CR378	\$169,791.74	0.0	0.3	0.0	0.3	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$19,400.19	\$27,200	1.40	6.2
STH-66	Traffic signal	Silver Lake Road at Zimmerman Road	\$232,752.64	0.0	-0.3	0.7	-0.3	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$26,594.03	-\$17,533	-0.66	-13.3
STH-67	Roadway departure & Clearzone	9 locations																	
HRRR-1	Roadway Departure & Clearzone	Conners Road from Miller Road northerly to a point 0.8 miles north of Miller Road.	\$63,298.37	0.3	0.0	0.0	-0.3	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$7,232.39	\$472,967	65.40	0.1
HRRR-2	Roadway Improvement	Cherry Avenue (CR 593) from the Torch River Road northerly to Cairn Highway	\$117,374.85	0.0	-0.3	0.0	1.3	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$13,411.11	-\$18,300	-1.36	-6.4
HRRR-3	Sign related	Reynolds Road between Fewin Road and CR-610, in Almira and Inland Twp's	\$9,654.00	0.0	0.3	0.0	0.0	1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,103.05	\$36,100	32.73	0.3
HRRR-4-1	Intersection improvement	Grand Blanc Road at Duffield Road	\$13,768.41	0.3	0.3	0.3	-0.3	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,103.05	\$507,967	460.51	0.0
HRRR-4-2	Intersection improvement	Grand Blanc Road at Morrish Road and	\$16,804.83	0.0	0.0	-0.3	0.7	-1.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,920.10	-\$16,700	-8.70	-1.0
HRRR-4-3	Intersection improvement	Seymour Road at Baldwin Road	\$9,026.75	0.3	0.3	0.0	-0.3	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,031.39	\$497,200	482.07	0.0
HRRR-5-1	Roadway Departure & Clearzone	Dodge Road from Dosh Road to Oak Road	\$52,948.51	0.0	0.3	0.0	0.0	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$6,049.83	\$30,167	4.99	1.8
HRRR-5-2	Roadway Departure & Clearzone	McKinley Rd from 1/4 mile south of Dodge Rd to 1/4 mile north of Dodge Rd	\$103,012.67	0.0	0.0	0.0	0.3	-1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$11,770.10	-\$5,933	-0.50	-17.4
HRRR-6	Roadway Departure & Clearzone	Haynor Road north of Rector Road	\$288,051.86	0.3	0.3	0.0	0.3	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$32,912.45	\$506,100	15.38	0.6
HRRR-7-1	Roadway Improvement	Vaughn Road from Davision Road to Indian Lake Road	\$62,726.51	0.0	0.0	0.7	-0.3	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$7,167.05	\$6,700	0.93	9.4
HRRR-7-2	Roadway Improvement	Plank Road from Old State Road to M-55	\$152,087.93	0.0	-0.3	0.7	0.3	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$17,377.38	\$3,233	0.19	47.0
HRRR-8	Vertical Alignment	18 Mile Road at Pine Lake Avenue	\$181,105.89	0.0	0.0	0.0	-0.3	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$20,692.93	\$5,933	0.29	30.5
HRRR-9	Intersection Improvement	Lake Pleasant Road at Lum Road	\$17,248.78	0.0	0.0	0.3	-0.3	-1.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,970.82	-\$10,000	-5.07	-1.7
HRRR-10-1	Roadway Departure & Clearzone	Genesee Road from Maple Leaf Road to Hadley Road	\$33,343.54	0.0	0.3	-0.7	-0.7	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$3,809.79	-\$267	-0.07	-125.0
HRRR-10-2	Roadway Departure & Clearzone	Hadley Road from Lippencott Road to Genesee Road	\$42,765.39	0.0	0.0	0.7	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$4,886.32	\$15,600	3.19	2.7
HRRR-10-3	Roadway Departure & Clearzone	Burnside Rd from Oliver Rd to Laur Rd	\$84,031.84	0.0	0.3	-1.0	0.0	1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$9,601.37	\$12,700	1.32	6.6
HRRR-11-1	Intersection Improvement	Ida Center Road at Secor Road	\$6,636.78	0.0	0.3	0.7	-0.3	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$758.31	\$30,933	40.79	0.2
HRRR-11-2	Intersection Improvement	Albain Road at Lewis Avenue	\$7,990.92	0.0	0.3	0.7	-0.3	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$913.03	\$33,900	37.13	0.2
HRRR-12	Vertical Alignment	Sidney Road at Fitzner Road	\$137,066.35	0.0	0.3	0.0	0.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$15,661.03	\$21,267	1.36	6.4
HRRR-13	Roadway Departure & Clearzone	CR 459 from MP 2.633 to MP 3.24	\$61,967.99	0.0	0.3	0.0	0.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$7,080.39	\$21,267	3.00	2.9
HRRR-14	Roadway Departure & Clearzone	Wadsworth Rd from Gera Rd to Block Rd	\$323,759.25	-0.3	0.3	0.0	0.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$36,992.33	-\$448,733	-12.13	-0.7
HRRR-15	Intersection Improvement	CR 388 (Phoenix Road) at 62nd Street	\$240,206.36	0.3	0.0	0.0	-0.3	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$27,445.68	\$472,967	17.23	0.5
HRRR-16	Roadway improvement	Litchfield Road from Cobb Lake Road to 1/2 mile west of Rowe Rd	\$202,337.01	0.3	0.0	-0.7	0.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$23,118.78	\$451,433	19.53	0.4
HRRR-17	Vertical Alignment	North Adams Road at Waldron Road	\$287,460.36	0.0	0.0	0.0	0.0	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$32,844.87	\$2,967	0.09	96.9
HRRR-18	Intersection improvement	Frost Road at Orr Road	\$496,619.57	0.0	0.3	0.3	0.3	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$56,743.14	\$37,967	0.67	13.1
Total Projects			\$21,859,382.22	3.7	8.0	1.0	12.3	60.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$2,497,625.98	\$6,421,733	2.57	3.4

F.2 Cost – Benefit Analysis – 2010 LAP Analysis – STH Projects

Project Number	Project Type	Project Location	Total Project Costs	Total Crash Reduction					Crash Costs					Service Life	Interest Rate	EUAC	EUAB	B/C Ratio	Time of Return (yrs.)
				K	A	B	C	O	K	A	B	C	O						
STH-1	Intersection improvement	Blue Star Highway at North Shore Drive,	\$557,804.17	0.0	0.0	0.0	1.7	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$63,734.01	\$8,900	0.14	62.7
STH-2	Roadway departure & Clearzone	Riverview Drive, from 4th Street to Gene Drive	\$450,992.53	0.0	0.3	0.0	-0.3	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$51,529.85	\$30,167	0.59	15.0
STH-3	Roadway departure & Clearzone	East Torch Lake Drive (CR 593), Alden Highway to M-88	\$341,380.03	0.0	0.0	1.7	0.0	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$39,005.66	\$41,967	1.08	8.1
STH-4	Intersection improvement	Melita Road at Main Street	\$181,589.78	0.0	0.0	2.0	1.0	2.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$20,748.22	\$73,500	3.54	2.5
STH-5	Roadway departure & Clearzone	Froberg Road at East Sturgeon Slough	\$90,308.71	0.0	0.0	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$10,318.56	\$0	0.00	-
STH-6	Sign Related	Cedar Run Road at Reynolds Road	\$4,162.26	0.3	0.0	0.0	0.0	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$475.57	\$475,933	1000.75	0.0
STH-7	Roadway departure & Clearzone	North Manistee County Line Rd (CR-602), 0.31 miles east of Wallaker Road easterly 1500 feet	\$35,572.85	0.0	0.0	0.0	0.0	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$4,064.51	\$5,933	1.46	6.0
STH-8	Turn lane	John Beers Road, from Cleveland Avenue to Washington Avenue	\$260,445.96	0.0	0.3	-0.3	0.0	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$29,758.23	\$19,400	0.65	13.4
STH-9	Roadway departure & Clearzone	South River Road, from Canton Road to Orchard Beach Road	\$7,828.07	0.0	-0.3	0.0	0.3	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$894.43	-\$27,200	-30.41	-0.3
STH-10	Roadway departure & Clearzone	FH-42 (Curly Lewis Highway) at Roxbury Creek, Ankodosh Creek, and Naomikong Creek	\$70,042.94	0.0	0.0	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,003.02	\$0	0.00	-
STH-11	Intersection improvement	N. Caribou Lake Road at Spring Bay Road	\$74,800.98	0.0	0.0	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,546.67	\$0	0.00	-
STH-12	Turn lane	N. Lansing Street at Daisy Street, Floral Street, and North Gateway Schools	\$134,222.59	0.0	0.0	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$15,336.11	\$0	0.00	-
STH-13	Roadway departure & Clearzone	9 locations																	
STH-14	Roadway departure & Clearzone	Stanley Road, from Bray Road to Center Road	\$262,591.92	0.0	0.3	-0.3	-1.0	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$30,003.43	\$10,500	0.35	25.0
STH-15	Traffic signal	Elms Road at Carpenter Road	\$17,461.79	0.3	0.7	0.7	-1.7	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,995.16	\$525,167	263.22	0.0
STH-16	Intersection improvement	Wilson Road at Henderson Road	\$17,114.51	0.0	0.7	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,955.48	\$48,467	24.79	0.4
STH-17	Traffic signal	Elms Road at Flushing Road	\$45,687.69	0.0	0.0	-0.3	-0.3	-2.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$5,220.22	-\$28,567	-5.47	-1.6
STH-18	Roadway departure & Clearzone	Torrey Road, from Oakridge Drive north to Bristol Road	\$66,599.86	0.0	-0.7	0.7	-0.3	3.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$7,609.62	-\$3,200	-0.42	-20.8
STH-19-1	Sign Related	Cass Road, from Keystone Road to Hartman Road	\$1,908.13	0.0	0.0	0.7	-0.7	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$218.02	\$9,667	44.34	0.2
STH-19-2	Sign Related	Five Mile Road, from Hammond Road to the northern East Bay Township line	\$2,961.41	0.0	0.7	0.3	0.7	3.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$338.37	\$88,900	262.73	0.0
STH-19-3	Sign Related	Supply Road, North Hobbs Highway to East Bay East Township line	\$2,292.30	-0.3	0.0	-0.7	-1.7	-1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$261.92	-\$509,333	-1944.65	0.0
STH-20	Sign Related	180 locations																	
STH-21	Roadway departure & Clearzone	Jefferson Road at Sugar Creek	\$194,004.74	0.0	0.0	0.0	0.3	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$22,166.74	\$8,900	0.40	21.8
STH-22	Intersection improvement	Paradise Road at Pilgrim Road	\$56,111.62	-0.3	0.0	0.0	0.0	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$6,411.24	-\$475,933	-74.23	-0.1
STH-23	Traffic signal	9 various locations																	
STH-24	Turn lane	84th Street, from Alles Drive to Norfolk Southern RR	\$392,448.81	0.3	0.0	0.0	0.0	1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$44,840.72	\$481,867	10.75	0.8
STH-25	Traffic signal	Cascade Road at Spaulding Avenue/Hall Street	\$126,637.22	0.3	0.0	0.0	0.7	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$14,469.41	\$472,967	32.69	0.3
STH-26-1	Traffic signal	Cascade Road at Forest Hill Avenue	\$84,825.93	0.0	1.3	0.3	-1.7	8.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$9,692.11	\$164,067	16.93	0.5
STH-26-2	Traffic signal	Division Avenue at 68th Street	\$99,998.04	0.0	0.0	-0.3	1.0	-5.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$11,425.65	-\$49,333	-4.32	-2.0
STH-27-1	Traffic signal	Leonard Street at Ball Street	\$73,837.29	0.0	0.3	1.3	1.0	1.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,436.56	\$79,167	9.38	0.9
STH-27-2	Traffic signal	Leonard Street at Fuller Avenue	\$93,367.10	0.0	0.3	0.3	-2.0	-2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$10,668.01	-\$6,533	-0.61	-14.3
STH-27-3	Traffic signal	Leonard Street at Leffingwell Avenue	\$139,737.33	0.0	-0.3	0.7	-1.0	-1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$15,966.21	-\$26,433	-1.66	-5.3
STH-28-1	Traffic signal	Fuller Avenue at 3 Mile Road	\$85,049.80	0.0	0.0	-0.3	-1.3	2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$9,717.68	\$1,100	0.11	77.3
STH-28-2	Traffic signal	32nd Street at Kalamazoo Avenue	\$77,898.46	0.0	0.0	0.0	0.3	1.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,900.58	\$17,800	2.00	4.4
STH-29	Roadway departure & Clearzone	Pratt Road, from Lapeer WCL to Green Corners Road	\$52,599.18	0.0	0.0	-0.3	-0.3	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$6,009.92	-\$1,867	-0.31	-28.2
STH-30	Traffic signal	Old US-23 at Spencer Road	\$75,648.78	0.0	0.0	0.3	-0.3	-1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,643.54	-\$4,067	-0.47	-18.6

STH-31	Roadway departure & Clearzone	Mackinaw Trail, from I-75 business loop northerly 1.0 miles.	\$54,184.29	0.0	0.0	0.0	0.3	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$6,191.03	\$8,900	1.44	6.1
STH-32-1	Traffic signal	13 Mile at Utica Road	\$130,938.55	0.0	0.0	-1.0	-1.0	-4.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$14,960.88	-\$70,867	-4.74	-1.8
STH-32-2	Traffic signal	14 Mile at Hayes Road	\$151,586.55	0.0	0.3	0.0	0.0	4.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$17,320.09	\$65,767	3.80	2.3
STH-32-3	Traffic signal	Moravian at Utica Road	\$102,232.79	0.0	0.3	0.0	3.3	4.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$11,680.99	\$89,500	7.66	1.1
STH-32-4	Traffic signal	Schoenherr at 24 Mile	\$150,075.72	0.0	0.3	0.3	-0.7	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$17,147.47	\$35,000	2.04	4.3
STH-33	Turn lane	15 Mile Road at Schoenherr Road	\$232,719.15	0.0	0.3	-0.3	-0.7	2.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$26,590.20	\$28,300	1.06	8.2
STH-34	Traffic signal	14th Avenue at 13th Street	\$143,898.92	0.0	0.3	0.7	1.3	2.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$16,441.71	\$75,433	4.59	1.9
STH-35-1	Sign Related	Whiteford Road, from Section Road to Sterns Road	\$5,813.04	0.0	1.0	0.0	1.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$664.19	\$78,633	118.39	0.1
STH-35-2	Sign Related	North Dixie Highway, from Pointe Aux Peaux Road to Post Road	\$9,954.98	0.0	0.3	-0.3	-0.7	-5.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,137.44	-\$34,000	-29.89	-0.3
STH-36	Intersection improvement	Laketon Avenue at Henry Street	\$373,169.84	0.0	0.3	0.0	0.3	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$42,637.92	\$30,167	0.71	12.4
STH-37-1	Traffic signal	Laketon Avenue at Hoyt Street	\$74,125.83	-0.3	-0.3	-0.3	0.3	1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,469.53	-\$487,200	-57.52	-0.2
STH-37-2	Traffic signal	Laketon Avenue at Getty Street	\$55,336.28	0.0	1.0	-0.3	1.3	-2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$6,322.65	\$56,000	8.86	1.0
STH-37-3	Traffic signal	Laketon Avenue at Roberts Street	\$134,004.64	0.0	0.7	0.3	1.0	2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$15,311.20	\$85,933	5.61	1.6
STH-38	Turn lane	Sternberg Road at Grand Haven Road	\$50,793.08	0.3	0.0	0.0	0.7	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$5,803.55	\$478,900	82.52	0.1
STH-39	Intersection improvement	Harvey Road at Sternberg Road	\$2,000,604.57	0.0	0.0	-1.3	0.3	1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$228,586.60	-\$16,367	-0.07	-122.2
STH-40	Intersection improvement	10 Mile Road at Novi Way (Wildcat)	\$208,248.99	0.0	0.0	0.7	-1.0	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$23,794.27	\$12,633	0.53	16.5
STH-41	Roadway Improvement	E. Pierce Road, from 132nd Avenue to 144th Avenue	\$513,001.37	0.0	0.0	0.0	0.0	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$58,614.90	\$5,933	0.10	86.5
STH-42	Roadway departure & Clearzone	Kittle Road at Honeywell Creek	\$151,066.57	0.0	0.0	0.3	0.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$17,260.68	\$4,833	0.28	31.3
STH-43	Roadway departure & Clearzone	40th Street, from Industrial Avenue to Waverly Road	\$686,320.72	0.0	0.0	0.0	-0.3	2.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$78,418.16	\$14,833	0.19	46.3
STH-44	Turn lane	Center Road at Brockway Road	\$271,141.43	-0.3	-0.3	0.0	0.0	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$30,980.28	-\$485,333	-15.67	-0.6
STH-45	Traffic signal	E. Genesee Avenue at Hess Avenue	\$259,762.73	0.0	-0.3	0.0	-0.3	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$29,680.17	-\$33,133	-1.12	-7.8
STH-46	Traffic signal & Turn Lane	Bay Street, from Court Street to W. Genesee Ave	\$260,796.46	0.0	0.0	0.0	3.0	2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$29,798.28	\$47,467	1.59	5.5
STH-47	Vertical Alignment	Grand River Road at Colby Lake Road	\$374,491.69	0.0	0.0	0.0	-0.3	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$42,788.96	-\$2,967	-0.07	-126.2
STH-48-1	Intersection improvement	Allen Road at Manor Avenue	\$63,949.47	0.0	0.3	0.7	0.0	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$7,306.79	\$42,800	5.86	1.5
STH-48-2	Intersection improvement	Allen Road at Reeck Road	\$53,017.93	0.3	0.0	0.0	1.0	1.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$6,057.76	\$493,733	81.50	0.1
STH-49	Intersection improvement	Springwells Street at Chamberlain Street	\$344,467.05	0.7	-0.3	1.0	-1.0	-1.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$39,358.38	\$915,433	23.26	0.4
STH-50	Roadway Improvement	Livornois Street, from Toledo Street to John Kronk	\$511,484.23	0.3	0.0	-1.0	0.7	7.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$58,441.56	\$517,800	8.86	1.0
STH-51	Pedestrian related	West Vernor Highway, from Waterman Street to Lansing Street	\$692,631.61	0.3	-0.7	0.3	0.0	15.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$79,139.23	\$568,767	7.19	1.2
STH-52-1	Traffic signal	Beaconsfield Road at Eastland Village Drive	\$57,673.44	0.0	-0.3	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$6,589.70	-\$24,233	-3.68	-2.4
STH-52-2	Traffic signal	Beaconsfield Road at Damman Avenue	\$166,626.64	0.0	-0.3	-0.7	-0.3	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$19,038.55	-\$39,833	-2.09	-4.2
STH-52-3	Traffic signal	Beaconsfield Road at Eastwood Drive	\$3,470,845.00	0.0	0.0	-0.3	0.3	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$396,574.46	\$4,067	0.01	853.5
STH-52-4	Traffic signal	Beaconsfield Road at Woodside Drive	\$86,510.15	0.0	0.0	0.0	0.3	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$9,884.54	\$2,967	0.30	29.2
STH-53-1	Turn lane	Newburgh Road at 5 Mile Road	\$78,243.55	0.0	-0.7	-1.7	0.3	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,940.01	-\$81,533	-9.12	-1.0
STH-53-2	Turn lane	Newburgh Road at 7 Mile Road	\$72,142.68	0.0	-0.3	-1.3	2.7	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,242.93	-\$37,633	-4.57	-1.9
STH-54	Traffic signal	Middlebelt Road at 5 Mile Road	\$138,406.26	0.0	-0.7	-1.3	-0.3	-7.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$15,814.13	-\$144,933	-9.16	-1.0
STH-55-1	Traffic signal	Middlebelt Road at 6 Mile Road	\$112,692.97	0.0	0.0	-2.0	1.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$12,876.16	-\$40,867	-3.17	-2.8
STH-55-2	Traffic signal	Middlebelt Road at 7 Mile Road	\$130,512.65	0.0	-0.3	0.7	1.0	-1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$14,912.21	-\$8,633	-0.58	-15.1
STH-56-1	Pedestrian related	Middlebelt Road, at Conrail railroad structure	\$228,502.80	0.0	0.0	-0.3	0.3	1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$26,108.45	\$7,033	0.27	32.5
STH-56-2	Pedestrian Related	Inkster Road, at Conrail railroad structure	\$246,542.49	0.0	0.0	0.3	1.0	2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$28,169.64	\$37,467	1.33	6.6
STH-57	Turn lane	13th Street, from Leeson Avenue to GLC RR tracks	\$293,759.74	0.0	0.0	0.3	0.7	2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$33,564.62	\$34,500	1.03	8.5
STH-58-1	Roadway departure & Clearzone	First Avenue	\$4,556.52	0.0	0.0	-0.3	0.0	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$520.62	-\$1,867	-3.59	-2.4

STH-58-2	Roadway departure & Clearzone	Adams/Hueber Street	\$1,301.86	0.0	0.0	0.0	0.0	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$148.75	\$2,967	19.94	0.4
STH-58-3	Roadway departure & Clearzone	Ford Avenue	\$29,194.29	0.0	0.0	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$3,335.70	\$0	0.00	-
STH-59	Vertical Alignment	Reams Road at Pickerel Lake Road	\$108,519.94	0.0	0.0	0.0	0.3	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$12,399.35	\$0	0.00	#DIV/0!
STH-60	Roadway departure & Clearzone	Lake Mary Drive and CR -3 at Hamilton Creek & the North Branch of the Ford River	\$180,039.06	0.0	0.0	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$20,571.04	\$0	0.00	-
STH-61	Vertical Alignment	Crahen Avenue at Bradford Street	\$397,602.13	0.0	0.0	0.3	0.0	-1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$45,429.53	-\$4,067	-0.09	-97.8
STH-62	Traffic signal	Southfield Road at 13 Mile Road	\$146,006.12	0.0	0.0	-1.0	2.3	9.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$16,682.48	\$83,400	5.00	1.8
STH-63	Roadway departure & Clearzone	CR 437 at FFRD 2213	\$94,208.44	0.0	0.0	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$10,764.14	\$0	0.00	-
STH-64	Vertical Alignment & Roadway Departure & Clearzone	CR 669 (Old Swamp Road) at 40th Street	\$163,905.13	0.0	0.0	0.0	0.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$18,727.60	-\$2,967	-0.16	-55.2
STH-65	Roadway departure & Clearzone	66th Street at CR378	\$169,791.74	0.0	0.3	0.0	0.3	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$19,400.19	\$27,200	1.40	6.2
STH-66	Traffic signal	Silver Lake Road at Zimmerman Road	\$232,752.64	0.0	-0.3	0.7	-0.3	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$26,594.03	-\$17,533	-0.66	-13.3
STH-67	Roadway departure & Clearzone	9 locations																	
Total Projects			\$18,848,087.50	2.0	4.3	-0.7	12.7	58.7	\$1,410,000	\$72,700	\$23,400	\$13,200	\$8,900	10	2.5%	\$2,220,212.18	\$3,754,300	1.69	5.2

F.3 Cost – Benefit Analysis – 2010 LAP Analysis – HRRR Projects

Project Number	Project Type	Project Location	Total Project Costs	Total Crash Reduction					Crash Costs					Service Life	Interest Rate	EUAC	EUAB	B/C Ratio	Time of Return (yrs.)
				K	A	B	C	O	K	A	B	C	O						
HRRR-1	Roadway Departure & Clearzone	Conners Road from Miller Road northerly to a point 0.8 miles north of Miller Road.	\$63,298.37	0.3	0.0	0.0	-0.3	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$7,232.39	\$472,967	65.40	0.1
HRRR-2	Roadway Improvement	Cherry Avenue (CR 593) from the Torch River Road northerly to Cairn Highway	\$117,374.85	0.0	-0.3	0.0	1.3	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$13,411.11	-\$18,300	-1.36	-6.4
HRRR-3	Sign related	Reynolds Road between Fewin Road and CR-610, in Almira and Inland Twp's	\$9,654.00	0.0	0.3	0.0	0.0	1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,103.05	\$36,100	32.73	0.3
HRRR-4-1	Intersection improvement	Grand Blanc Road at Duffield Road	\$13,768.41	0.3	0.3	0.3	-0.3	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,103.05	\$507,967	460.51	0.0
HRRR-4-2	Intersection improvement	Grand Blanc Road at Morrish Road and	\$16,804.83	0.0	0.0	-0.3	0.7	-1.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,920.10	-\$16,700	-8.70	-1.0
HRRR-4-3	Intersection improvement	Seymour Road at Baldwin Road	\$9,026.75	0.3	0.3	0.0	-0.3	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,031.39	\$497,200	482.07	0.0
HRRR-5-1	Roadway Departure & Clearzone	Dodge Road from Dosh Road to Oak Road	\$52,948.51	0.0	0.3	0.0	0.0	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$6,049.83	\$30,167	4.99	1.8
HRRR-5-2	Roadway Departure & Clearzone	McKinley Rd from 1/4 mile south of Dodge Rd to 1/4 mile north of Dodge Rd	\$103,012.67	0.0	0.0	0.0	0.3	-1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$11,770.10	-\$5,933	-0.50	-17.4
HRRR-6	Roadway Departure & Clearzone	Haynor Road north of Rector Road	\$288,051.86	0.3	0.3	0.0	0.3	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$32,912.45	\$506,100	15.38	0.6
HRRR-7-1	Roadway Improvement	Vaughn Road from Davision Road to Indian Lake Road	\$62,726.51	0.0	0.0	0.7	-0.3	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$7,167.05	\$6,700	0.93	9.4
HRRR-7-2	Roadway Improvement	Plank Road from Old State Road to M-55	\$152,087.93	0.0	-0.3	0.7	0.3	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$17,377.38	\$3,233	0.19	47.0
HRRR-8	Vertical Alignment	18 Mile Road at Pine Lake Avenue	\$181,105.89	0.0	0.0	0.0	-0.3	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$20,692.93	\$5,933	0.29	30.5
HRRR-9	Intersection Improvement	Lake Pleasant Road at Lum Road	\$17,248.78	0.0	0.0	0.3	-0.3	-1.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,970.82	-\$10,000	-5.07	-1.7
HRRR-10-1	Roadway Departure & Clearzone	Genesee Road from Maple Leaf Road to Hadley Road	\$33,343.54	0.0	0.3	-0.7	-0.7	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$3,809.79	-\$267	-0.07	-125.0
HRRR-10-2	Roadway Departure & Clearzone	Hadley Road from Lippencott Road to Genesee Road	\$42,765.39	0.0	0.0	0.7	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$4,886.32	\$15,600	3.19	2.7
HRRR-10-3	Roadway Departure & Clearzone	Burnside Road from Oliver Road to Laur Road	\$84,031.84	0.0	0.3	-1.0	0.0	1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$9,601.37	\$12,700	1.32	6.6
HRRR-11-1	Intersection Improvement	Ida Center Road at Secor Road	\$6,636.78	0.0	0.3	0.7	-0.3	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$758.31	\$30,933	40.79	0.2
HRRR-11-2	Intersection Improvement	Albain Road at Lewis Avenue	\$7,990.92	0.0	0.3	0.7	-0.3	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$913.03	\$33,900	37.13	0.2
HRRR-12	Vertical Alignment	Sidney Road at Fitzner Road	\$137,066.35	0.0	0.3	0.0	0.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$15,661.03	\$21,267	1.36	6.4
HRRR-13	Roadway Departure & Clearzone	CR 459 from MP 2.633 to MP 3.24	\$61,967.99	0.0	0.3	0.0	0.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$7,080.39	\$21,267	3.00	2.9
HRRR-14	Roadway Departure & Clearzone	Wadsworth Road from Gera Road to Block Road	\$323,759.25	-0.3	0.3	0.0	0.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$36,992.33	-\$448,733	-12.13	-0.7
HRRR-15	Intersection Improvement	CR 388 (Phoenix Road) at 62nd Street	\$240,206.36	0.3	0.0	0.0	-0.3	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$27,445.68	\$472,967	17.23	0.5
HRRR-16	Roadway improvement	Litchfield Road from Cobb Lake Road to 1/2 mile west of Rowe Road	\$202,337.01	0.3	0.0	-0.7	0.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$23,118.78	\$451,433	19.53	0.4
HRRR-17	Vertical Alignment	North Adams Road at Waldron Road	\$287,460.36	0.0	0.0	0.0	0.0	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$32,844.87	\$2,967	0.09	96.9
HRRR-18	Intersection improvement	Frost Road at Orr Road	\$496,619.57	0.0	0.3	0.3	0.3	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$56,743.14	\$37,967	0.67	13.1
Total Projects			\$3,011,294.72	1.7	3.7	1.7	-0.3	1.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$344,066.81	\$2,667,433	7.75	1.1

F.4 Cost – Benefit Analysis – 2010 LAP Analysis – Intersection Improvement Projects

Project Number	Project Type	Project Location	Total Project Costs	Total Crash Reduction					Crash Costs					Service Life	Interest Rate	EUAC	EUAB	B/C Ratio	Time of Return (yrs.)
				K	A	B	C	O	K	A	B	C	O						
STH-1	Intersection improvement	Blue Star Highway at North Shore Drive,	\$557,804.17	0.0	0.0	0.0	1.7	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$63,734.01	\$8,900	0.14	62.7
STH-4	Intersection improvement	Melita Road at Main Street	\$181,589.78	0.0	0.0	2.0	1.0	2.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$20,748.22	\$73,500	3.54	2.5
STH-11	Intersection improvement	N. Caribou Lake Road at Spring Bay Road	\$74,800.98	0.0	0.0	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,546.67	\$0	0.00	-
STH-16	Intersection improvement	Wilson Road at Henderson Road	\$17,114.51	0.0	0.7	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,955.48	\$48,467	24.79	0.4
STH-22	Intersection improvement	Paradise Road at Pilgrim Road	\$56,111.62	-0.3	0.0	0.0	0.0	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$6,411.24	-\$475,933	-74.23	-0.1
STH-36	Intersection improvement	Laketon Avenue at Henry Street	\$373,169.84	0.0	0.3	0.0	0.3	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$42,637.92	\$30,167	0.71	12.4
STH-39	Intersection improvement	Harvey Road at Sternberg Road	\$2,000,604.57	0.0	0.0	-1.3	0.3	1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$228,586.60	-\$16,367	-0.07	-122.2
STH-40	Intersection improvement	10 Mile Road at Novi Way (Wildcat)	\$208,248.99	0.0	0.0	0.7	-1.0	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$23,794.27	\$12,633	0.53	16.5
STH-48-1	Intersection improvement	Allen Road at Manor Avenue	\$63,949.47	0.0	0.3	0.7	0.0	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$7,306.79	\$42,800	5.86	1.5
STH-48-2	Intersection improvement	Allen Road at Reeck Road	\$53,017.93	0.3	0.0	0.0	1.0	1.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$6,057.76	\$493,733	81.50	0.1
STH-49	Intersection improvement	Springwells Street at Chamberlain Street	\$344,467.05	0.7	-0.3	1.0	-1.0	-1.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$39,358.38	\$915,433	23.26	0.4
HRRR-4-1	Intersection improvement	Grand Blanc Road at Duffield Road	\$13,768.41	0.3	0.3	0.3	-0.3	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,573.16	\$507,967	322.90	0.0
HRRR-4-2	Intersection improvement	Grand Blanc Road at Morrish Road and	\$16,804.83	0.0	0.0	-0.3	0.7	-1.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,920.10	-\$16,700	-8.70	-1.0
HRRR-4-3	Intersection improvement	Seymour Road at Baldwin Road	\$9,026.75	0.3	0.3	0.0	-0.3	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,031.39	\$497,200	482.07	0.0
HRRR-9	Intersection Improvement	Lake Pleasant Road at Lum Road	\$17,248.78	0.0	0.0	0.3	-0.3	-1.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,970.82	-\$10,000	-5.07	-1.7
HRRR-11-1	Intersection Improvement	Ida Center Road at Secor Road	\$6,636.78	0.0	0.3	0.7	-0.3	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$758.31	\$30,933	40.79	0.2
HRRR-11-2	Intersection Improvement	Albain Road at Lewis Avenue	\$7,990.92	0.0	0.3	0.7	-0.3	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$913.03	\$33,900	37.13	0.2
HRRR-15	Intersection Improvement	CR 388 (Phoenix Road) at 62nd Street	\$240,206.36	0.3	0.0	0.0	-0.3	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$27,445.68	\$472,967	17.23	0.5
HRRR-18	Intersection improvement	Frost Road at Orr Road	\$496,619.57	0.0	0.3	0.3	0.3	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$56,743.14	\$37,967	0.67	13.1
Total Projects			\$4,739,181.31	1.7	2.7	5.0	1.3	1.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$541,492.99	\$2,687,567	4.96	1.8

F.5 Cost – Benefit Analysis – 2010 LAP Analysis – Pedestrian Related Projects

Project Number	Project Type	Project Location	Total Project Costs	Total Crash Reduction					Crash Costs					Service Life	Interest Rate	EUAC	EUAB	B/C Ratio	Time of Return (yrs.)
				K	A	B	C	O	K	A	B	C	O						
STH-51	Pedestrian related	West Vernor Highway, from Waterman Street to Lansing Street	\$692,631.61	0.3	-0.7	0.3	0.0	15.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$79,139.23	\$568,767	7.19	1.2
STH-56-1	Pedestrian related	Middlebelt Road, at Conrail railroad structure	\$228,502.80	0.0	0.0	-0.3	0.3	1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$26,108.45	\$7,033	0.27	32.5
STH-56-2	Pedestrian Related	Inkster Road, at Conrail railroad structure	\$246,542.49	0.0	0.0	0.3	1.0	2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$28,169.64	\$37,467	1.33	6.6
Total Projects			\$1,167,676.90	0.3	-0.7	0.3	1.3	19.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$133,417.32	\$613,267	4.60	1.9

F.6 Cost – Benefit Analysis – 2010 LAP Analysis – Roadway Departure & Clearzone Projects

Project Number	Project Type	Project Location	Total Project Costs	Total Crash Reduction					Crash Costs					Service Life	Interest Rate	EUAC	EUAB	B/C Ratio	Time of Return (yrs.)
				K	A	B	C	O	K	A	B	C	O						
STH-2	Roadway departure & Clearzone	Riverview Drive, from 4th Street to Gene Drive	\$450,992.53	0.0	0.3	0.0	-0.3	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$51,529.85	\$30,167	0.59	15.0
STH-3	Roadway departure & Clearzone	East Torch Lake Drive (CR 593), Alden Highway to M-88	\$341,380.03	0.0	0.0	1.7	0.0	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$39,005.66	\$41,967	1.08	8.1
STH-5	Roadway departure & Clearzone	Froberg Road at East Sturgeon Slough	\$90,308.71	0.0	0.0	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$10,318.56	\$0	0.00	-
STH-7	Roadway departure & Clearzone	North Manistee County Line Road (CR-602), 0.31 miles east of Wallaker Road easterly 1500 feet	\$35,572.85	0.0	0.0	0.0	0.0	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$4,064.51	\$5,933	1.46	6.0
STH-9	Roadway departure & Clearzone	South River Road, from Canton Road to Orchard Beach Road	\$7,828.07	0.0	-0.3	0.0	0.3	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$894.43	-\$27,200	-30.41	-0.3
STH-10	Roadway departure & Clearzone	FH-42 (Curly Lewis Highway) at Roxbury Creek, Ankodosh Creek, and Naomikong Creek	\$70,042.94	0.0	0.0	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,003.02	\$0	0.00	-
STH-13	Roadway departure & Clearzone	9 locations																	
STH-14	Roadway departure & Clearzone	Stanley Road, from Bray Road to Center Road	\$262,591.92	0.0	0.3	-0.3	-1.0	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$30,003.43	\$10,500	0.35	25.0
STH-18	Roadway departure & Clearzone	Torrey Road, from Oakridge Drive north to Bristol Road	\$66,599.86	0.0	-0.7	0.7	-0.3	3.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$7,609.62	-\$3,200	-0.42	-20.8
STH-21	Roadway departure & Clearzone	Jefferson Road at Sugar Creek	\$194,004.74	0.0	0.0	0.0	0.3	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$22,166.74	\$8,900	0.40	21.8
STH-29	Roadway departure & Clearzone	Pratt Road, from Lapeer WCL to Green Corners Road	\$52,599.18	0.0	0.0	-0.3	-0.3	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$6,009.92	-\$1,867	-0.31	-28.2
STH-31	Roadway departure & Clearzone	Mackinaw Trail, from I-75 business loop northerly 1.0 miles.	\$54,184.29	0.0	0.0	0.0	0.3	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$6,191.03	\$8,900	1.44	6.1
STH-42	Roadway departure & Clearzone	Kittle Road at Honeywell Creek	\$151,066.57	0.0	0.0	0.3	0.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$17,260.68	\$4,833	0.28	31.3
STH-43	Roadway departure & Clearzone	40th Street, from Industrial Avenue to Waverly Road	\$686,320.72	0.0	0.0	0.0	-0.3	2.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$78,418.16	\$14,833	0.19	46.3
STH-58-1	Roadway departure & Clearzone	First Avenue	\$4,556.52	0.0	0.0	-0.3	0.0	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$520.62	-\$1,867	-3.59	-2.4
STH-58-2	Roadway departure & Clearzone	Adams/Hueber Street	\$1,301.86	0.0	0.0	0.0	0.0	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$148.75	\$2,967	19.94	0.4
STH-58-3	Roadway departure & Clearzone	Ford Avenue	\$29,194.29	0.0	0.0	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$3,335.70	\$0	0.00	-
STH-60	Roadway departure & Clearzone	Lake Mary Drive and CR -3 at Hamilton Creek & the North Branch of the Ford River	\$180,039.06	0.0	0.0	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$20,571.04	\$0	0.00	-
STH-63	Roadway departure & Clearzone	CR 437 at FFRD 2213	\$94,208.44	0.0	0.0	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$10,764.14	\$0	0.00	-
STH-65	Roadway departure & Clearzone	66th Street at CR378	\$169,791.74	0.0	0.3	0.0	0.3	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$19,400.19	\$27,200	1.40	6.2
STH-67	Roadway departure & Clearzone	9 locations																	
HRRR-1	Roadway Departure & Clearzone	Conners Road from Miller Road northerly to a point 0.8 miles north of Miller Road.	\$63,298.37	0.3	0.0	0.0	-0.3	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$7,232.39	\$472,967	65.40	0.1
HRRR-5-1	Roadway Departure & Clearzone	Dodge Road from Dosh Road to Oak Road	\$52,948.51	0.0	0.3	0.0	0.0	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$6,049.83	\$30,167	4.99	1.8
HRRR-5-2	Roadway Departure & Clearzone	McKinley Road from 1/4 mile south of Dodge Road to 1/4 mile north of Dodge Road	\$103,012.67	0.0	0.0	0.0	0.3	-1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$11,770.10	-\$5,933	-0.50	-17.4
HRRR-6	Roadway Departure & Clearzone	Haynor Road north of Rector Road	\$288,051.86	0.3	0.3	0.0	0.3	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$32,912.45	\$506,100	15.38	0.6
HRRR-10-1	Roadway Departure & Clearzone	Genesee Road from Maple Leaf Road to Hadley Road	\$33,343.54	0.0	0.3	-0.7	-0.7	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$3,809.79	-\$267	-0.07	-125.0
HRRR-10-2	Roadway Departure & Clearzone	Hadley Road from Lippencott Road to Genesee Road	\$42,765.39	0.0	0.0	0.7	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$4,886.32	\$15,600	3.19	2.7
HRRR-10-3	Roadway Departure & Clearzone	Burnside Road from Oliver Road to Laur Road	\$84,031.84	0.0	0.3	-1.0	0.0	1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$9,601.37	\$12,700	1.32	6.6
HRRR-13	Roadway Departure & Clearzone	CR 459 from MP 2.633 to MP 3.24	\$61,967.99	0.0	0.3	0.0	0.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$7,080.39	\$21,267	3.00	2.9
HRRR-14	Roadway Departure & Clearzone	Wadsworth Road from Gera Road to Block Road	\$323,759.25	-0.3	0.3	0.0	0.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$36,992.33	-\$448,733	-12.13	-0.7
Total Projects			\$3,995,763.74	0.3	2.0	0.7	-1.3	12.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$456,551.02	\$725,933	1.59	5.5

F.7 Cost – Benefit Analysis – 2010 LAP Analysis – Roadway Improvement Projects

Project Number	Project Type	Project Location	Total Project Costs	Total Crash Reduction					Crash Costs					Service Life	Interest Rate	EUAC	EUAB	B/C Ratio	Time of Return (yrs.)
				K	A	B	C	O	K	A	B	C	O						
STH-41	Roadway Improvement	E. Pierce Road, from 132nd Avenue to 144th Avenue	\$513,001.37	0.0	0.0	0.0	0.0	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$58,614.90	\$5,933	0.10	86.5
STH-50	Roadway Improvement	Livernois Street, from Toledo Street to John Kronk	\$511,484.23	0.3	0.0	-1.0	0.7	7.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$58,441.56	\$517,800	8.86	1.0
HRRR-2	Roadway Improvement	Cherry Avenue (CR 593) from the Torch River Road northerly to Cairn Highway	\$117,374.85	0.0	-0.3	0.0	1.3	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$13,411.11	-\$18,300	-1.36	-6.4
HRRR-7-1	Roadway Improvement	Vaughn Road from Davision Road to Indian Lake Road	\$62,726.51	0.0	0.0	0.7	-0.3	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$7,167.05	\$6,700	0.93	9.4
HRRR-7-2	Roadway Improvement	Plank Road from Old State Road to M-55	\$152,087.93	0.0	-0.3	0.7	0.3	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$17,377.38	\$3,233	0.19	47.0
HRRR-16	Roadway improvement	Litchfield Road from Cobb Lake Road to 1/2 mile west of Rowe Road	\$202,337.01	0.3	0.0	-0.7	0.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$23,118.78	\$451,433	19.53	0.4
Total Projects			\$1,559,011.90	0.7	-0.7	-0.3	2.0	7.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$178,130.77	\$966,800	5.43	1.6

F.8 Cost – Benefit Analysis – 2010 LAP Analysis – Sign Related Projects

Project Number	Project Type	Project Location	Total Project Costs	Total Crash Reduction					Crash Costs					Service Life	Interest Rate	EUAC	EUAB	B/C Ratio	Time of Return (yrs.)
				K	A	B	C	O	K	A	B	C	O						
STH-6	Sign Related	Cedar Run Road at Reynolds Road	\$4,162.26	0.3	0.0	0.0	0.0	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$475.57	\$475,933	1000.75	0.0
STH-19-1	Sign Related	Cass Road, from Keystone Road to Hartman Road	\$1,908.13	0.0	0.0	0.7	-0.7	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$218.02	\$9,667	44.34	0.2
STH-19-2	Sign Related	Five Mile Road, from Hammond Road to the northern East Bay Township line	\$2,961.41	0.0	0.7	0.3	0.7	3.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$338.37	\$88,900	262.73	0.0
STH-19-3	Sign Related	Supply Road, North Hobbs Highway to East Bay East Township line	\$2,292.30	-0.3	0.0	-0.7	-1.7	-1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$261.92	-\$509,333	-1944.65	0.0
STH-20	Sign Related	180 locations																	
STH-35-1	Sign Related	Whiteford Road, from Section Road to Sterns Road	\$5,813.04	0.0	1.0	0.0	1.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$664.19	\$78,633	118.39	0.1
STH-35-2	Sign Related	North Dixie Highway, from Pointe Aux Peaux Road to Post Road	\$9,954.98	0.0	0.3	-0.3	-0.7	-5.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,137.44	-\$34,000	-29.89	-0.3
HRRR-3	Sign related	Reynolds Road between Fewin Road and CR-610, in Almira and Inland Twp's	\$9,654.00	0.0	0.3	0.0	0.0	1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,103.05	\$36,100	32.73	0.3
Total Projects			\$36,746.12	0.0	2.3	0.0	-1.3	-1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$4,198.57	\$145,900	34.75	0.3

F.9 Cost – Benefit Analysis – 2010 LAP Analysis – Traffic Signal Projects

Project Number	Project Type	Project Location	Total Project Costs	Total Crash Reduction					Crash Costs					Service Life	Interest Rate	EUAC	EUAB	B/C Ratio	Time of Return (yrs.)
				K	A	B	C	O	K	A	B	C	O						
STH-15	Traffic signal	Elms Road at Carpenter Road	\$17,461.79	0.3	0.7	0.7	-1.7	0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$1,995.16	\$525,167	263.22	0.0
STH-17	Traffic signal	Elms Road at Flushing Road	\$45,687.69	0.0	0.0	-0.3	-0.3	-2.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$5,220.22	-\$28,567	-5.47	-1.6
STH-23	Traffic signal	9 various locations																	
STH-25	Traffic signal	Cascade Road at Spaulding Avenue/Hall Street	\$126,637.22	0.3	0.0	0.0	0.7	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$14,469.41	\$472,967	32.69	0.3
STH-26-1	Traffic signal	Cascade Road at Forest Hill Avenue	\$84,825.93	0.0	1.3	0.3	-1.7	8.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$9,692.11	\$164,067	16.93	0.5
STH-26-2	Traffic signal	Division Avenue at 68th Street	\$99,998.04	0.0	0.0	-0.3	1.0	-5.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$11,425.65	-\$49,333	-4.32	-2.0
STH-27-1	Traffic signal	Leonard Street at Ball Street	\$73,837.29	0.0	0.3	1.3	1.0	1.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,436.56	\$79,167	9.38	0.9
STH-27-2	Traffic signal	Leonard Street at Fuller Avenue	\$93,367.10	0.0	0.3	0.3	-2.0	-2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$10,668.01	-\$6,533	-0.61	-14.3
STH-27-3	Traffic signal	Leonard Street at Leffingwell Avenue	\$139,737.33	0.0	-0.3	0.7	-1.0	-1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$15,966.21	-\$26,433	-1.66	-5.3
STH-28-1	Traffic signal	Fuller Avenue at 3 Mile Road	\$85,049.80	0.0	0.0	-0.3	-1.3	2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$9,717.68	\$1,100	0.11	77.3
STH-28-2	Traffic signal	32nd Street at Kalamazoo Avenue	\$77,898.46	0.0	0.0	0.0	0.3	1.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,900.58	\$17,800	2.00	4.4
STH-30	Traffic signal	Old US-23 at Spencer Road	\$75,648.78	0.0	0.0	0.3	-0.3	-1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,643.54	-\$4,067	-0.47	-18.6
STH-32-1	Traffic signal	13 Mile at Utica Road	\$130,938.55	0.0	0.0	-1.0	-1.0	-4.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$14,960.88	-\$70,867	-4.74	-1.8
STH-32-2	Traffic signal	14 Mile at Hayes Road	\$151,586.55	0.0	0.3	0.0	0.0	4.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$17,320.09	\$65,767	3.80	2.3
STH-32-3	Traffic signal	Moravian at Utica Road	\$102,232.79	0.0	0.3	0.0	3.3	4.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$11,680.99	\$89,500	7.66	1.1
STH-32-4	Traffic signal	Schoenherr at 24 Mile	\$150,075.72	0.0	0.3	0.3	-0.7	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$17,147.47	\$35,000	2.04	4.3
STH-34	Traffic signal	14th Avenue at 13th Street	\$143,898.92	0.0	0.3	0.7	1.3	2.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$16,441.71	\$75,433	4.59	1.9
STH-37-1	Traffic signal	Laketon Avenue at Hoyt Street	\$74,125.83	-0.3	-0.3	-0.3	0.3	1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,469.53	-\$487,200	-57.52	-0.2
STH-37-2	Traffic signal	Laketon Avenue at Getty Street	\$55,336.28	0.0	1.0	-0.3	1.3	-2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$6,322.65	\$56,000	8.86	1.0
STH-37-3	Traffic signal	Laketon Avenue at Roberts Street	\$134,004.64	0.0	0.7	0.3	1.0	2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$15,311.20	\$85,933	5.61	1.6
STH-45	Traffic signal	E. Genesee Avenue at Hess Avenue	\$259,762.73	0.0	-0.3	0.0	-0.3	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$29,680.17	-\$33,133	-1.12	-7.8
STH-52-1	Traffic signal	Beaconsfield Road at Eastland Village Drive	\$57,673.44	0.0	-0.3	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$6,589.70	-\$24,233	-3.68	-2.4
STH-52-2	Traffic signal	Beaconsfield Road at Damman Avenue	\$166,626.64	0.0	-0.3	-0.7	-0.3	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$19,038.55	-\$39,833	-2.09	-4.2
STH-52-3	Traffic signal	Beaconsfield Road at Eastwood Drive	\$3,470,845.00	0.0	0.0	-0.3	0.3	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$396,574.46	\$4,067	0.01	853.5
STH-52-4	Traffic signal	Beaconsfield Road at Woodside Drive	\$86,510.15	0.0	0.0	0.0	0.3	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$9,884.54	\$2,967	0.30	29.2
STH-54	Traffic signal	Middlebelt Road at 5 Mile Road	\$138,406.26	0.0	-0.7	-1.3	-0.3	-7.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$15,814.13	-\$144,933	-9.16	-1.0
STH-55-1	Traffic signal	Middlebelt Road at 6 Mile Road	\$112,692.97	0.0	0.0	-2.0	1.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$12,876.16	-\$40,867	-3.17	-2.8
STH-55-2	Traffic signal	Middlebelt Road at 7 Mile Road	\$130,512.65	0.0	-0.3	0.7	1.0	-1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$14,912.21	-\$8,633	-0.58	-15.1
STH-62	Traffic signal	Southfield Road at 13 Mile Road	\$146,006.12	0.0	0.0	-1.0	2.3	9.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$16,682.48	\$83,400	5.00	1.8
STH-66	Traffic signal	Silver Lake Road at Zimmerman Road	\$232,752.64	0.0	-0.3	0.7	-0.3	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$26,594.03	-\$17,533	-0.66	-13.3
Total Projects			\$6,664,137.31	0.3	2.7	-1.7	4.0	13.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$761,436.09	\$776,167	1.02	8.6

F.10 Cost – Benefit Analysis – 2010 LAP Analysis – Traffic Signal & Turn Lane Projects

Project Number	Project Type	Project Location	Total Project Costs	Total Crash Reduction					Crash Costs					Service Life	Interest Rate	EUAC	EUAB	B/C Ratio	Time of Return (yrs.)
				K	A	B	C	O	K	A	B	C	O						
STH-46	Traffic signal & Turn Lane	Bay Street, from Court Street to W. Genesee Ave	\$260,796.46	0.0	0.0	0.0	3.0	2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$29,798.28	\$47,467	1.59	5.5
Total Projects			\$260,796.46	0.0	0.0	0.0	3.0	2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$29,798.28	\$47,467	1.59	5.5

F.11 Cost – Benefit Analysis – 2010 LAP Analysis – Turn Lane Improvements

Project Number	Project Type	Project Location	Total Project Costs	Total Crash Reduction					Crash Costs					Service Life	Interest Rate	EUAC	EUAB	B/C Ratio	Time of Return (yrs.)
				K	A	B	C	O	K	A	B	C	O						
STH-8	Turn lane	John Beers Road, from Cleveland Avenue to Washington Avenue	\$260,445.96	0.0	0.3	-0.3	0.0	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$29,758.23	\$19,400	0.65	13.4
STH-12	Turn lane	N. Lansing Street at Daisy Street, Floral Street, and North Gateway Schools	\$134,222.59	0.0	0.0	0.0	0.0	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$15,336.11	\$0	0.00	-
STH-24	Turn lane	84th Street, from Alles Drive to Norfolk Southern RR	\$392,448.81	0.3	0.0	0.0	0.0	1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$44,840.72	\$481,867	10.75	0.8
STH-33	Turn lane	15 Mile Road at Schoenherr Road	\$232,719.15	0.0	0.3	-0.3	-0.7	2.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$26,590.20	\$28,300	1.06	8.2
STH-38	Turn lane	Sternberg Road at Grand Haven Road	\$50,793.08	0.3	0.0	0.0	0.7	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$5,803.55	\$478,900	82.52	0.1
STH-44	Turn lane	Center Road at Brockway Road	\$271,141.43	-0.3	-0.3	0.0	0.0	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$30,980.28	-\$485,333	-15.67	-0.6
STH-53-1	Turn lane	Newburgh Road at 5 Mile Road	\$78,243.55	0.0	-0.7	-1.7	0.3	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,940.01	-\$81,533	-9.12	-1.0
STH-53-2	Turn lane	Newburgh Road at 7 Mile Road	\$72,142.68	0.0	-0.3	-1.3	2.7	-0.7	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$8,242.93	-\$37,633	-4.57	-1.9
STH-57	Turn lane	13th Street, from Leeson Avenue to GLC RR tracks	\$293,759.74	0.0	0.0	0.3	0.7	2.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$33,564.62	\$34,500	1.03	8.5
Total Projects			\$1,785,916.99	0.3	-0.7	-3.3	3.7	7.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$204,056.67	\$438,467	2.15	4.1

F.12 Cost – Benefit Analysis – 2010 LAP Analysis – Vertical Alignment Projects

Project Number	Project Type	Project Location	Total Project Costs	Total Crash Reduction					Crash Costs					Service Life	Interest Rate	EUAC	EUAB	B/C Ratio	Time of Return (yrs.)
				K	A	B	C	O	K	A	B	C	O						
STH-47	Vertical Alignment	Grand River Road at Colby Lake Road	\$374,491.69	0.0	0.0	0.0	-0.3	0.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$42,788.96	-\$2,967	-0.07	-126.2
STH-59	Vertical Alignment	Reams Road at Pickerel Lake Road	\$108,519.94	0.0	0.0	0.0	0.3	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$12,399.35	\$0	0.00	-
STH-61	Vertical Alignment	Crahen Avenue at Bradford Street	\$397,602.13	0.0	0.0	0.3	0.0	-1.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$45,429.53	-\$4,067	-0.09	-97.8
HRRR-8	Vertical Alignment	18 Mile Road at Pine Lake Avenue	\$181,105.89	0.0	0.0	0.0	-0.3	1.0	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$20,692.93	\$5,933	0.29	30.5
HRRR-12	Vertical Alignment	Sidney Road at Fitzner Road	\$137,066.35	0.0	0.3	0.0	0.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$15,661.03	\$21,267	1.36	6.4
HRRR-17	Vertical Alignment	North Adams Road at Waldron Road	\$287,460.36	0.0	0.0	0.0	0.0	0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$32,844.87	\$2,967	0.09	96.9
Total Projects			\$1,486,246.36	0.00	0.33	0.33	-0.33	-0.67	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$169,816.67	\$23,133	0.14	64.2

F.13 Cost – Benefit Analysis – 2010 LAP Analysis – Vertical Alignment & Roadway Departure & Clearzone Projects

Project Number	Project Type	Project Location	Total Project Costs	Total Crash Reduction					Crash Costs					Service Life	Interest Rate	EUAC	EUAB	B/C Ratio	Time of Return (yrs.)
				K	A	B	C	O	K	A	B	C	O						
STH-64	Vertical Alignment & Roadway Departure & Clearzone	CR 669 (Old Swamp Road) at 40th Street	\$163,905.13	0.0	0.0	0.0	0.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$18,727.60	-\$2,967	-0.16	-55.2
Total Projects			\$163,905.13	0.0	0.0	0.0	0.0	-0.3	\$1,410,000	\$72,700	\$23,400	\$8,900	\$8,900	10	2.5%	\$18,727.60	-\$2,967	-0.16	-55.2



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