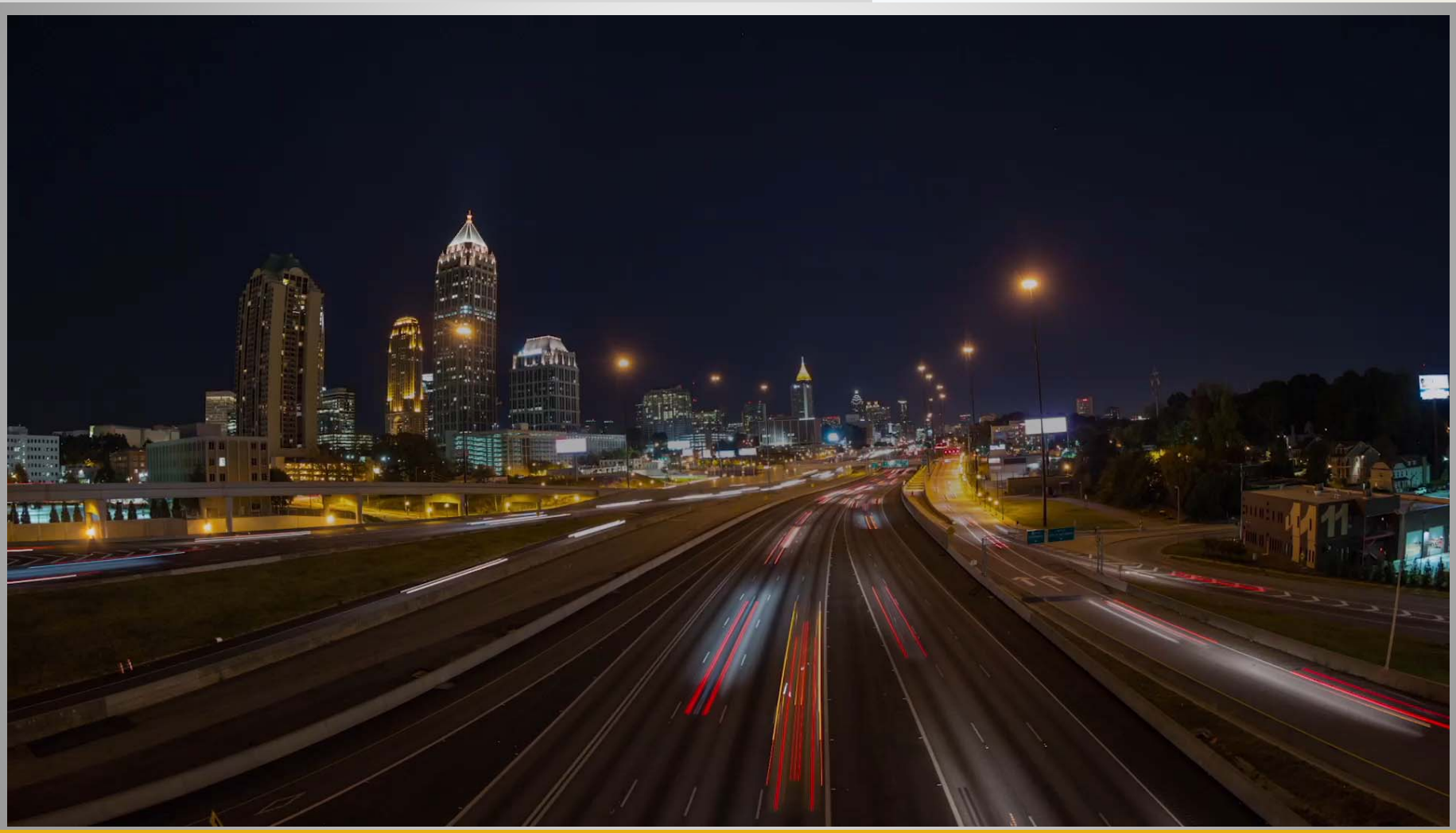
Proven Practices

Improving Road Safety in Your County

MDOT
Michigan Department of Transportation

TZD®
Toward Zero Deaths



ZERO is not an impossible goal.

It will take **ALL OF US** to get there.

The sum of all our efforts is **ZERO**.

60% of Fatalities Occur on Locally Owned Roadways

What Can ***Your*** County Do?

What Will We Learn Today?

- Summary of a Project – Beginning to End
- Before/After Studies
- Case Studies
- Up and Coming Low Cost Countermeasures

How Do I Find a Project Location?

- LSI – Local Safety Initiative
- LRSP – Local Road Safety Plan
  - Local Planning Organizations
- MDOT Local 5% or High Crash List

Local Safety Initiative

How do I sign up?

Contact-

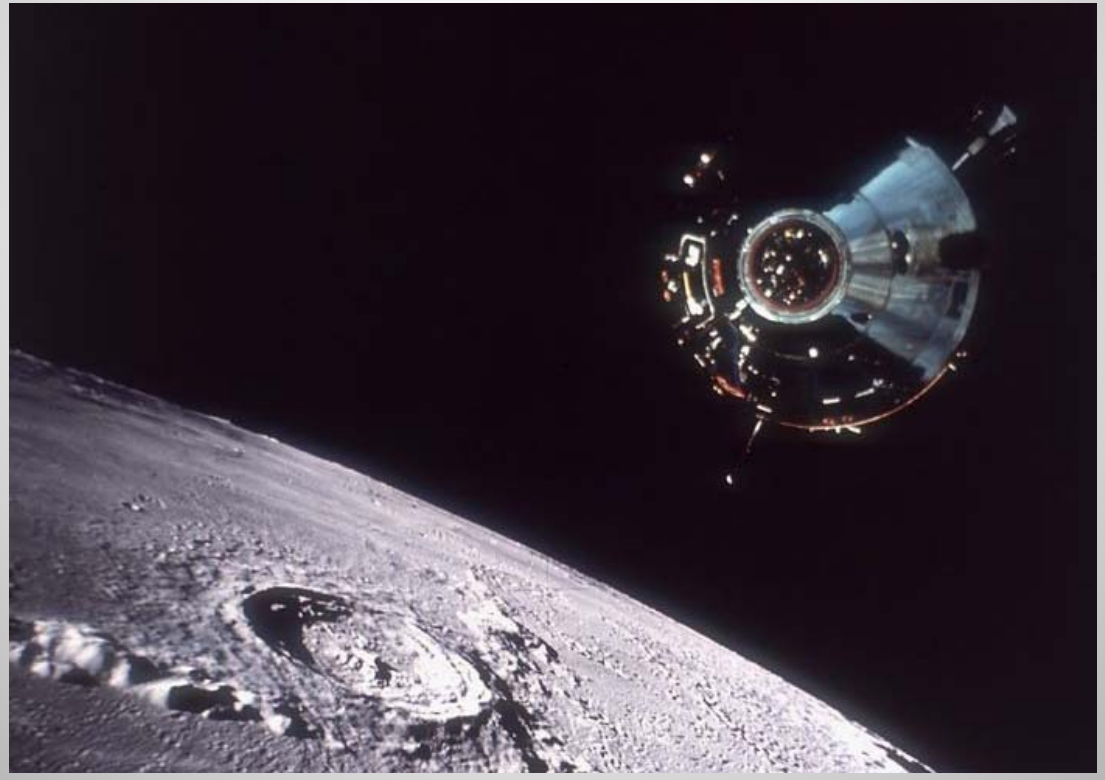
- MDOT-zerodeaths@michigan.gov
- Steve Shaughnessy
  - ShaughnessyS@michigan.gov

Local Road Safety Plans

- All Plans to be completed by December 2017
- Identify a Local Champion – Per Planning Region
- Contact Kimberly Lariviere
  - LariviereK@michigan.gov

Toward Zero Deaths

HOUSTON WE HAVE A PROBLEM!



A Pattern Has Been Identified

What Are The Possible Fixes?

- Identified by LSI/LRSP/High Crash/5%
- CRF's from TOR
- CMF Clearinghouse
- What is the "Biggest bang for the buck"

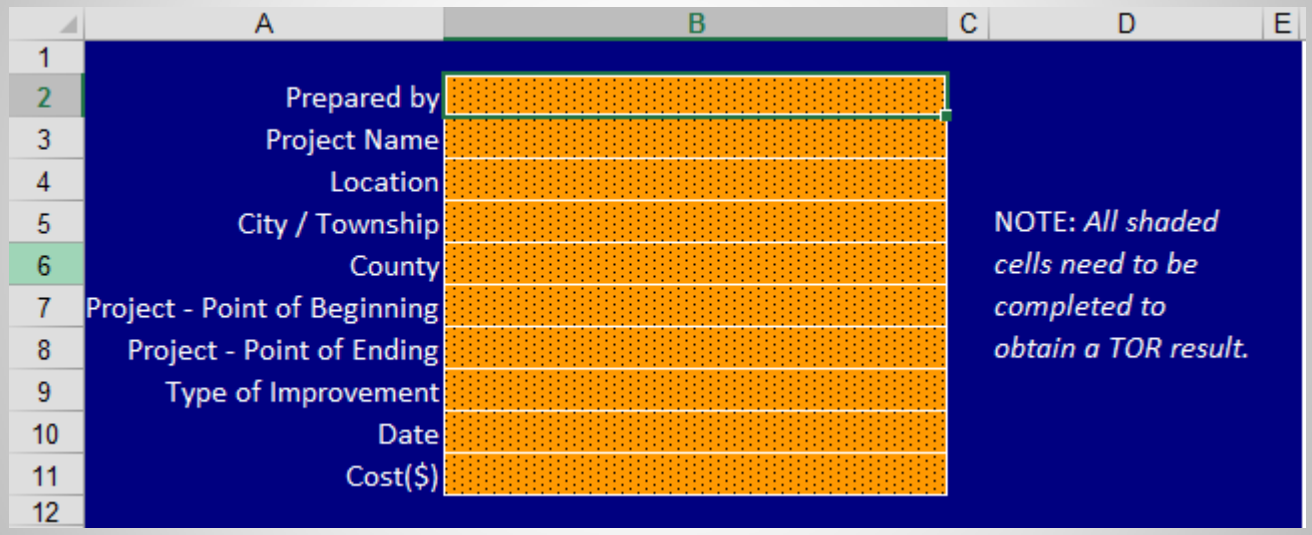
TOR Steps

- Identify Crashes
- Analyze crashes
  - Does your fix…FIX the crashes?
  - Did you miss crashes?
  - Did you correct your crashes?
  - Include recent crash data

Toward Zero Deaths

	A	B
1		**TIME-OF-RETURN (TOR) ANALYSIS USING THE "NON-TRUNKLINE TOR FY 2017" EXCEL WORKSHEET**
2		1) Please contact Lynnette Firman of Local Agency Programs, Development Services Division, at (517) 335-2224, if you have questions concerning this worksheet. For more information on the MDOT Local Agency Programs, Safety Program please visit
3		http://www.michigan.gov/mdot/0,4616,7-151-9625_25885_40552---,00.html
4		
5		2) If a dialogue box appears which states, "Macros in this workbook are disabled...", click "OK".
6		
7		3) The **"Info"** tab's orange shaded fields must be filled out completely to obtain a TOR value.
8		
9		4) Information in the **"TOR_MAIN"** tab should be completed to obtain a TOR value. The cells will change color when completed. At least one group of related crashes must be filled out with at least three years of data.
10		
11		5) To gain information on the crash reduction factors (CRF) for the **"TOR_MAIN"** tab, use the **"Intersection CRF"** and **"Segment CRF"** tabs. If you would like to use a CRF or improvement not listed, please contact Lynnette Firman at (517) - 335-2224. Also, reference the CMF (Crash Modification Factors) Clearning house at
12		http://www.cmfclearinghouse.org/
13		

INSTRUCTIONS | 1-Info | 2-TOR_MAIN | 3-PRINT | Segment CRF | Intersection CRF


A
B
C
D
E
1
2
3
4
5
6
7
8
9
10
11
12
Prepared by
Project Name
Location
City / Township
County
Project - Point of Beginning
Project - Point of Ending
Type of Improvement
Date
Cost($)
NOTE: All shaded cells need to be completed to obtain a TOR result.
INSTRUCTIONS
1-Info
2-TOR_MAIN
3-PRINT
Segment CRF
Intersection CRF

Toward Zero Deaths

42							
43	**NUMBER OF CRASHES OR INJURED PERSONS.**						
44							
45			YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
46			2010	2011	2012	2013	2014
47	-	-	-	-	-	-	-
48					%REDUCTION		
49	Number of Crashes						
50	PDO+C Injury Crashes						
51	B-Injured Persons						
52	A-Injured or Killed Persons						
53	-	-	-	-	-	-	-
54					%REDUCTION		
55	Number of Crashes						
56	PDO+C Injury Crashes						
57	B-Injured Persons						
58	A-Injured or Killed Persons						
59	-	-	-	-	-	-	-
60					%REDUCTION		
61	Number of Crashes						
62	PDO+C Injury Crashes						
63	B-Injured Persons						
64	A-Injured or Killed Persons						
65	-	-	-	-	-	-	-
66					%REDUCTION		
67	Number of Crashes						
68	PDO+C Injury Crashes						
69	B-Injured Persons						
70	A-Injured or Killed Persons						
71	-	-	-	-	-	-	-
72					%REDUCTION		
73	Number of Crashes						
74	PDO+C Injury Crashes						
75	B-Injured Persons						
76	A-Injured or Killed Persons						
77	-	-	-	-	-	-	-

TOR
#VALUE!

INSTRUCTIONS | 1-Info | 2-TOR_MAIN | 3-PRINT | Segment CRF | Intersection CRF

Toward Zero Deaths

NUMBER OF CRASHES OR INJURED PERSONS.

			YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
			2010	2011	2012	2013	2014
-	-		-	-	-	-	-
0				0%	%REDUCTION		
Number of Crashes			0	0	0	0	0
PDO+C Injury Crashes			0	0	0	0	0
B-Injured Persons			0	0	0	0	0
A-Injured or Killed Persons			0	0	0	0	0
-	-		-	-	-	-	-
0				0%	%REDUCTION		
Number of Crashes			0	0	0	0	0
PDO+C Injury Crashes			0	0	0	0	0
B-Injured Persons			0	0	0	0	0
A-Injured or Killed Persons			0	0	0	0	0
-	-		-	-	-	-	-

COMPUTED BENEFITS DERIVED THROUGH CRASH REDUCTION

TOR FY 2017 (Local Agency) Date: **0-Jan-00**

Proj: **0** City/Twp.: **0**

Prepared by: **0** County: **0**

PR Number: **0** PR MP: **0**

The method of evaluating crash costs, used below, is given on page 67 of Roy Jorgensen's report of Highway Safety Improvement Criteria 1966 edition. This same method is given in the Bureau of Public Roads IM21-3-67. In 1994 we have adapted the Q formula to blend Fatalities and A-injuries only. In the following analysis the costs provided by the National Safety Council (NSC) are:

2013 NSC VALUES:

Death	$1,500,000	=FATCOST
Disabling (A) injury:	$80,700	=ACOST
B-Injury	$28,600	=BCOST
PDO and/or Minor Injury Crash:	$9,300	=PDOCCST

INSTRUCTIONS | 1-Info | 2-TOR_MAIN | 3-PRINT | Segment CRF | Intersection CRF

Toward Zero Deaths

SEGMENT CRASH REDUCTION FACTORS		
Proposed Improvement	**% Reduction**	**Associated Crash Types**
Geometric Safety Enhancements		
Center Left-Turn Lane - *Construct*	80%	Rear-End Left-Turn
	50%	Head-On Left-Turn
	20%	Head-On, Sideswipe Opposite, Other*
	15%	Non Left-Turn Rear-End, Other Applicable Crashes*
Horizontal Curve Flattening	30%	Lane Departure***
Curve Superelevation Modification	20%	Lane Departure***
Widen Pavement (Lane Plus Paved Shoulder)	5% per foot**	Lane Departure***
Vertical Curve Flattening	20%	All Applicable Crash Types
General Segment Enhancements		
Access Management - *Improve*	15%	Driveway Related Crashes
Lighting - *Install on segment*	20%	Dark Unlighted Crashes

Toward Zero Deaths

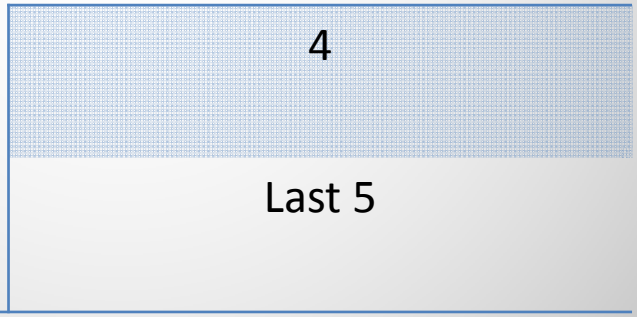
INTERSECTION CRASH REDUCTION FACTORS		
Proposed Improvement	**% Reduction**	**Associated Crash Types**
Signal Timing / Hardware Enhancements		
Center Left-Turn Lane - Install	80%	Rear-End Left-Turn
	50%	Head-On Left-Turn
	20%	Head-On, Sideswipe Opposite, Angle
	15%	Non Left-Turn Rear-End, Other Applicable Crashes
Install Reflectorized Backplates	15%	All Applicable Crashes
Add All-Red Clearance Interval - *Add per ITE*	20%	Head-On Left-Turn, Angle
Yellow-Change Interval - *Increase*	10%	All Crash Types
Box Span Signal - *Upgrade from Stop Control*	65%	Angle
	-25%	Rear-End (Increases Crashes)
	20%	All Other Non Rear-End Crashes
Box Span Signal - *Upgrade from Diagonal Span*	10%	All Applicable Crashes
Protected Left-Turn Signal Phase - *Add*	30%	Left-Turn
Signal Head Size - *Increase to 12 "*	10%	All Applicable Crashes
Signal Optimization & Timing Updates	10%	All Applicable Crashes
Pedestrian / Bicycle Enhancements		
Bump Out / Curb Extension - *Remove Parking / Install*	30%	All Applicable Crashes
Bicycle Lanes	50%	Bicycle Crashes
	75%	Pedestrian Fatal - Dark Unlighted Crashes

INSTRUCTIONS | 1-Info | 2-TOR_MAIN | 3-PRINT | Segment CRF | **Intersection CRF**

UD-10's

If It Makes Sense, Use It …. If You Use It, Include It

Years of Submittal



…….DO NOT Skip Years

TOR Hints

- Include impaired crashes IF the treatment can impact that crash
- NO animal crashes
- Outside the typical ‘intersection radius’
- CRF’s are PROVEN COUNTERMEASURES

TOR Hints

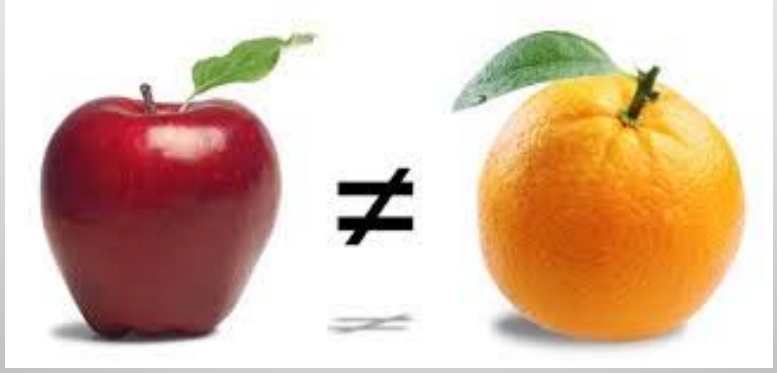
- Use highest reduction factor for crash
- 1 Crash can only be used ONCE!
- Cannot Combine CRF's!
- 1 Crash and 1 Reduction Factor
  - 15% for Shoulder Improvements and 20% for Shoulder Rumbles is NOT a 35% Reduction

Highway Safety Manual

- LTAP Tutorials
  - Intro and Rural Model Examples
  - http://michiganltap.org/hsm-spreadsheet-tutorials
- Use Spreadsheet WITH Manual
- Obtain Formal Training
  - Contact LTAP or Heidi Spangler

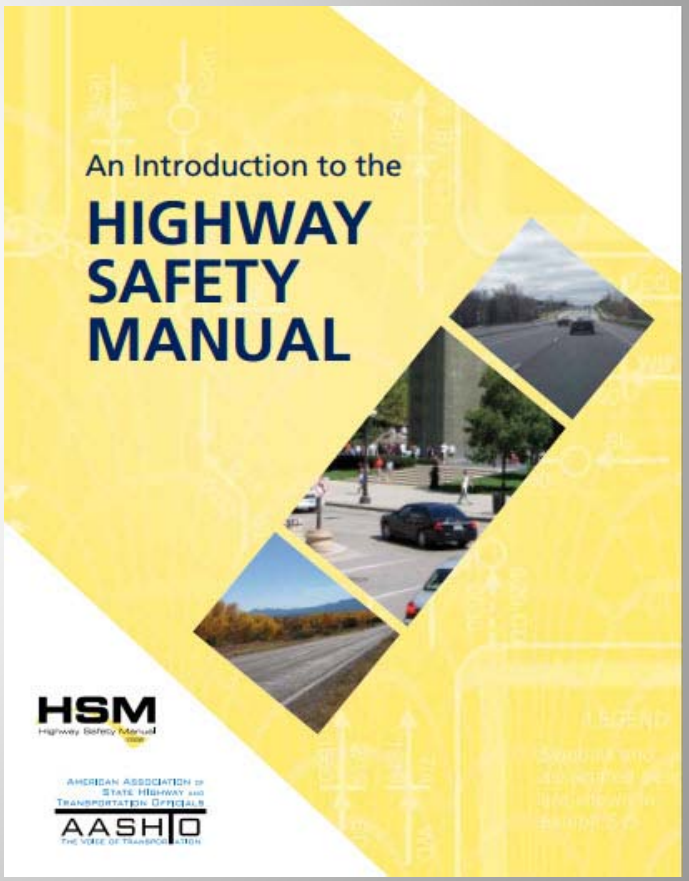
Highway Safety Manual

- Human Factors Considerations
- Crash Modification Factor Selection
  - www.cmfclearinghouse.org
  - CMFs are related (not the same) to CRFs



Highway Safety Manual

- Network Screening
- Project Prioritization
- Give Predictive Analysis a Chance!!!



The Logistics of Submitting a Project

- Items to Submit in Call Letter
- Hard Copy or Electronic

  (Email MDOT-Design LAP)

DO IT!!!

General Scoring Process

Committee	Financial Goals
MDOT & FHWA	2017 MDOT Regions

Helpful Hints

- The Scoring Committee Does NOT Visit the Site
- Be Comprehensive
- Pictures, Not Required – but VERY Helpful
- Not Everything on the Internet is True!

  (Let Us Know the Low Cost Alternatives You've Already Tried)

I'm Selected !?!?!

- Notificati
- TIP/STIP
- PE Obliga

GO!!!

- Local Agencies wi linate with their MPO to ensure inclusion of their project in the area's Transportation Improvement Program for the fiscal year for which the project was selected. LAP will supply a list of selected projects to the MDOT Planning group, but it is the local agency's responsibility to ensure these projects are included in the State Transportation Improvement Program.

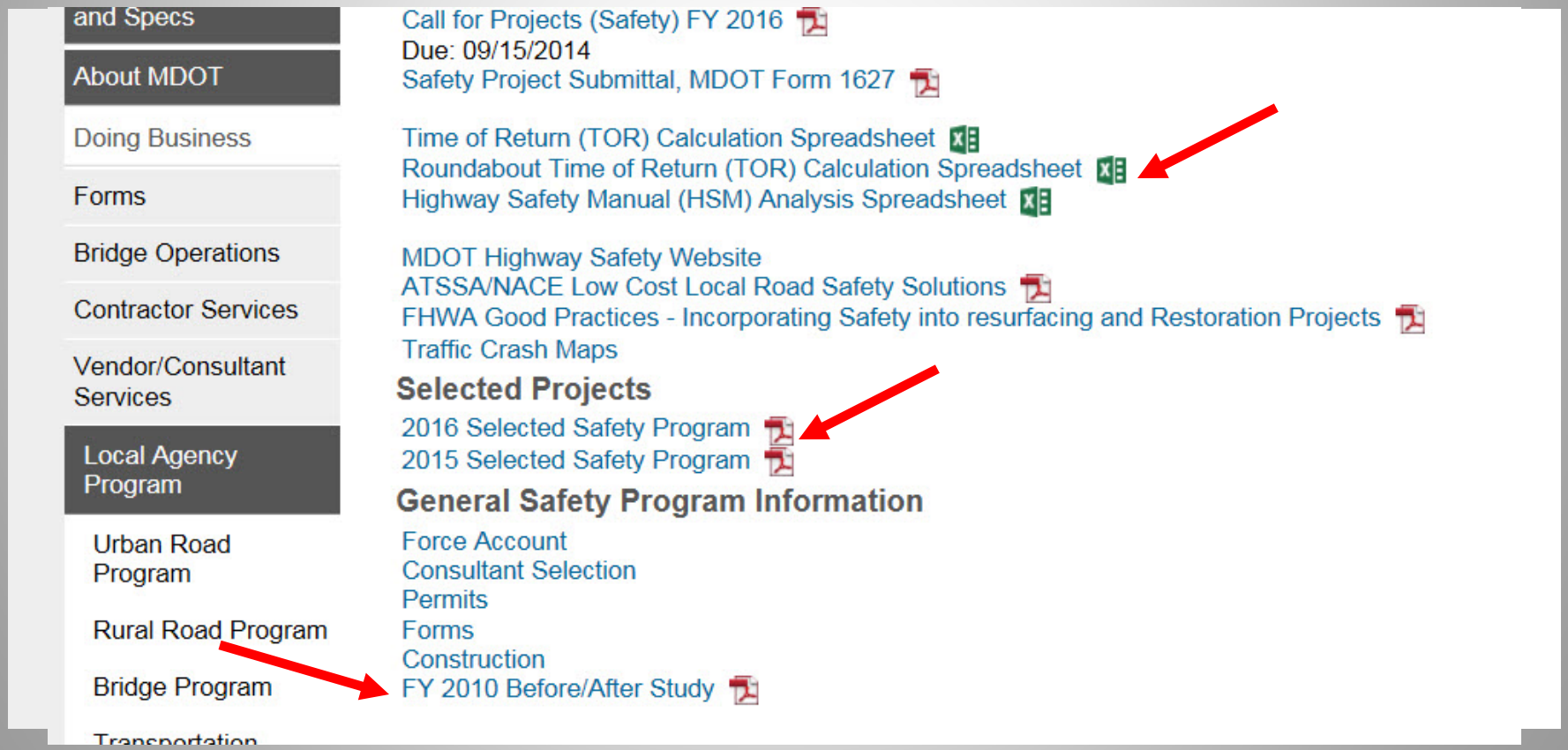
3 Years Later…

Before/After Results

Local Agency Programs

- www.michigan.gov/mdotlap
- Click on ‘Safety Program’
- Contact -
  - Mark Harbison - HarbisonM@michigan.gov
  - Pam Blazo - BlazoP@michigan.gov

Local Agency Programs



Before/After Results

- Posted on LAP Website
- What Does the Report Show
  - Safety improvements
  - Crash analysis
  - Low crash locations – numbers may be skewed with total crashes

Before/After Results

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 of 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

Genesee County - Flashing Beacons

Oakland County - Flash Mode

- Significant Reduction in Angle Crashes
- Evaluate Your System
- FHWA-HRT-13-069

PROVEN COUNTERMEASURES

Huron County – Lollipops

- Installed November/December 2006
- MDOT Funded
- Stop and Stop Ahead Sign Posts

LOLLIPOPS

15% Reduction
Applicable Crashes

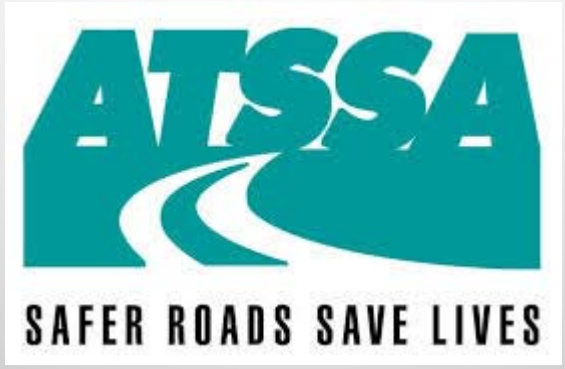
CENTERLINE RUMBLE STRIPS

51% Reduction in Fatal Crashes

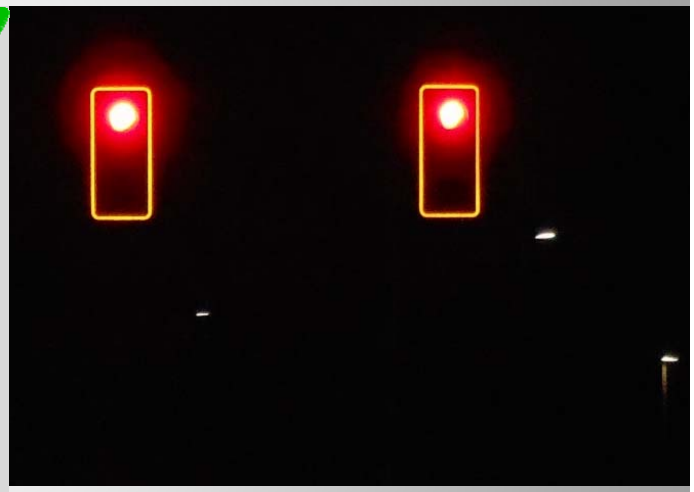
ROUNDABOUTS

78% Reduction in
fatal and serious injuries

PROVEN COUNTERMEASURES FROM OTHER STATES



BACKPLATES



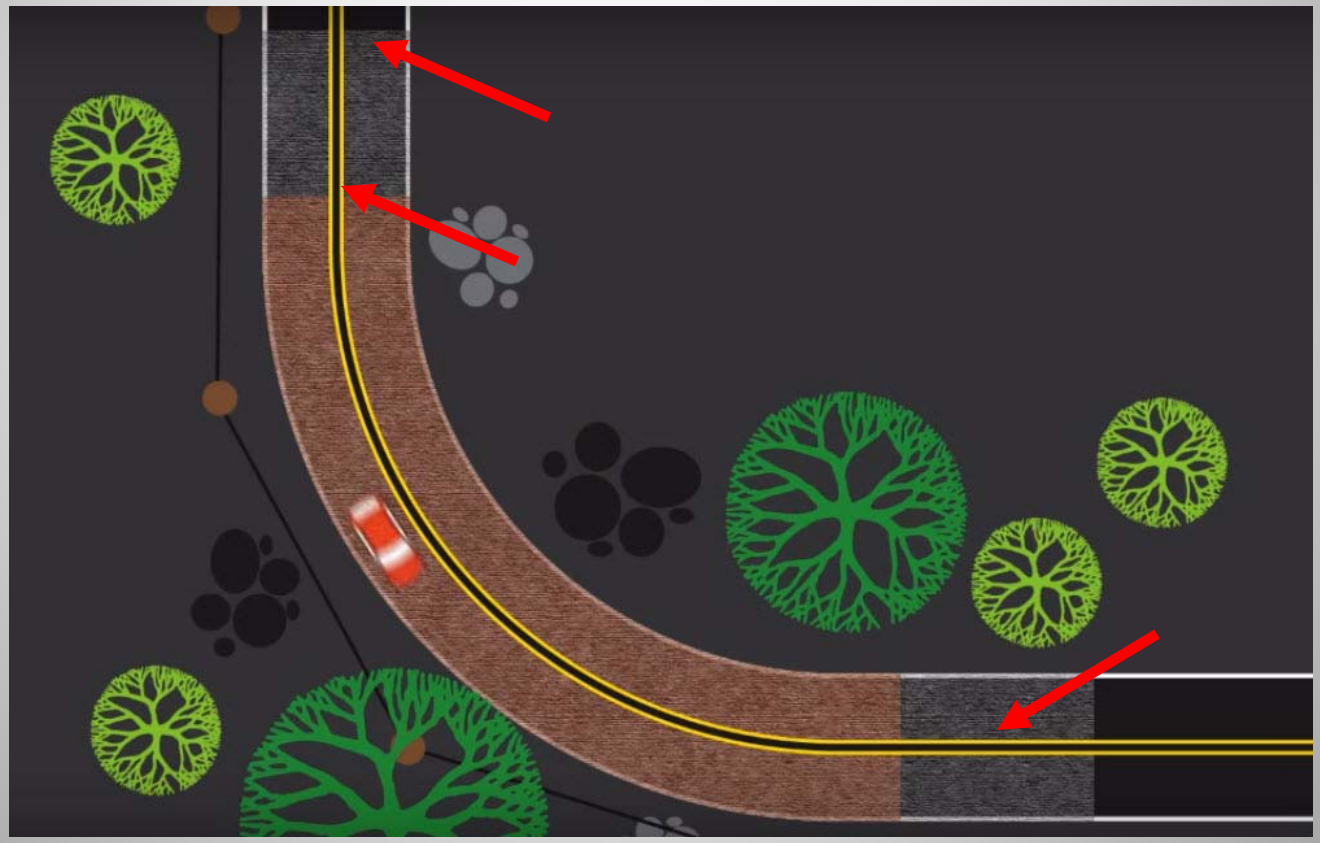
15% Reduction
Applicable Crashes

LIVING SNOW FENCE

Up to 40% Reduction
Applicable Crashes

HIGH FRICTION SURFACE

HIGH FRICTION SURFACE



HIGH FRICTION SURFACE

ATSSA – High urface

35% Reduction
Applicable Crashes

Conclusions

- Where do go in the Future
- Low Cost Proven Countermeasures
- Be Innovative
- Think outside the Safety Box!