

Michigan Safety Time of Return Economic Analysis

Dale Lighthizer

Bob Rios

Jim D'Lamater

MDOT Local Agency Programs

Today

- What is the TOR?
- Why do we use it?
- Components of the TOR?
- Example applications

Time of Return (TOR)

- Is a type of cost benefit tool
- Estimate benefits (reducing crashes/injuries/deaths)
- What is the number of years required to recover the safety investment

Why Use a TOR

- HSIP requires that we invest safety dollars where they are needed most – where we get the greatest return
- Prioritize competing safety projects
- Review of how the safety fix matches the demonstrated safety problem

TOR Components

- Estimated costs of deaths and injuries (NSC)
- Estimated benefits resulting from reducing crashes
- Traffic volumes
- Reduction in fatalities and A injuries combined
- Reduction in minor (no A injuries or fatalities) crashes
- Q factor to blend the impact of fatalities and A injuries
- Estimated project costs
- Number of years of crash data used (3 - 5)
- Urban, Rural, and Between

NUMBER OF CRASHES OR INJURED PERSONS.

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
	2002	2003	2004	2005	2006
Head-On Left Turn	%REDUCTION	50%			
Number of Crashes					
PDO+Minor Inj Crashes					
A-Injured or Killed Persons					
Left Turn Rear End	%REDUCTION	80%			
Number of Crashes					
PDO+Minor Inj Crashes					
A-Injured or Killed Persons					
Other Rear End	%REDUCTION	15%			
Number of Crashes					
PDO+Minor Inj Crashes					
A-Injured or Killed Persons					
Head-On	%REDUCTION	20%			
Number of Crashes					
PDO+Minor Inj Crashes					
A-Injured or Killed Persons					
All Other Types	%REDUCTION	20%			
Number of Crashes					
PDO+Minor Inj Crashes					
A-Injured or Killed Persons					

Fatalities

For reference only; "Q" accounts for the risk of a fatality.

PROJECT COST ESTIMATE :

If unknown, enter "0" (zero).

ADTb (before-volume)

1.0

You may change these

ADTa (after-volume)

1.1

default ADT values.

NUMBER OF YEARS OF DATA:

3 to 5 years should be used.

RATE OF INFLATION:

2.50%

AREA TYPE:

(1=RURAL,2=URBAN,3=BETWEEN)

REMARKS:

[Redacted area]

COMPUTED BENEFITS DERIVED THROUGH CRASH REDUCTION

TOR '08 (Non-Trunkline)	Date	0-Jan-00
0	City/Twp.	0
	County	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 are :

2005 NSC VALUES:

Death	\$1,150,000	=FATCOST
Disabling (A) injury:	\$52,900	=INJCOST
PDO and/or Minor Injury Crash:	\$7,500	=PDOCOST

$$BTOTAL = ADTa/ADTbx(QxR1+(PDOCOSTxR2))$$

WHERE:

BTOTAL=	Total Benefit in Dollars Over Years Used	#VALUE!
ADTa =	Average traffic volume after the improvement	1.1
ADTb =	Average traffic volume before the improvement	1.0
R1 =	Reduction in fatalities and A-Injuries Combined.	0.0
R2 =	Reduction in Minor (no A-Injuries or Fatalities) crashes:	0.0
Q =	[FATCOST+((1/F)XINJCOST)]/[1+(1/F)]	
=	#VALUE!	#VALUE!
	for AREA TYPE ERR	
1/F =		ERR-AREAT

Q-Reference	Q	A- Inuries	Fatalit ies	I/F
RURAL	194100	16084	2376	6.77
URBAN	144500	11186	1019	10.98
BETWEEN	174400	27270	3395	8.03
Based on 5 years of local data through 2006				

Q-Reference	Q	A-Injuries	Fatalities	I/F
RURAL	194100	16084	2376	6.77
URBAN	144500	11186	1019	10.98
BETWEEN	174400	27270	3395	8.03

Data from Geometric Design Unit, W. Taylor.
5-Year, Statewide, Non-Trunkline crash figures.
(From 1-1-02 through 12-31-06) used. See DATA 2006.

Time of Return (T.O.R.) is based on 0.0 years of data.

NOINFB =No-Inflation Annual Benefit=BTOTAL/years #VALUE!

With an inflation rate of 2.50%

B=Annual Benefit=Present Value (with Inflation) #VALUE!

C = Project Cost UNKNOWN

TOR=C/B=COST/ANNUAL BENEFIT=#VALUE!

Crash Reports

- Interpreting report
- Matching crashes with proposed treatment

Standard Crash Report - Intersection By Year

PR No.	Road Name	UD-10 #	UD-10 Crash		Crash Type	Crash Severity	Date	Hour of Occurrence	Number of:			Weekday	Environmental Condition			Relationship On Road
			Location	UD-10 Crossroad Reference					Veh.	Occup.	Inj.		Weather	Lighting	Surface	
Year: 2002																
442605	Cascade Rd SE	2705470	20' W	ROBINSON	Head-On Left-Turn	PDO	2/28/2002	01PM-02PM	2	0	0	Thursday	Cloudy	Daylight	Dry	On Road
442605	Cascade Rd SE	2654840	20' W	ROBINSON	Side-Swipe Same	PDO	3/13/2002	11AM-NOON	2	2	0	Wednesday	Clear	Daylight	Dry	On Road
442605	Cascade Rd SE	2704210	15' N	ROBINSON	Angle Straight	Injury	5/31/2002	10AM-11AM	2	2	1	Friday	Clear	Daylight	Dry	On Road
442605	Cascade Rd SE	2201473	20' NW	ROBINSON	Angle Turn	PDO	8/19/2002	07PM-08PM	2	3	0	Monday	Clear	Daylight	Dry	On Road
442605	Cascade Rd SE	2737683	0' X	ROBINSON	Head-On Left-Turn	Injury	8/20/2002	05PM-06PM	2	2	1	Tuesday	Clear	Daylight	Dry	On Road
442605	Cascade Rd SE	3720439	25' NW	ROBINSON	Rear-End Straight	PDO	8/22/2002	03PM-04PM	2	3	0	Thursday	Cloudy	Daylight	Wet	On Road
442605	Cascade Rd SE	2737176	0' X	ROBINSON	Angle Turn	PDO	9/21/2002	06PM-07PM	2	5	0	Saturday	Clear	Daylight	Dry	On Road
442605	Cascade Rd SE	2651522	10' S	Robinson	Head-On Left-Turn	Injury	1/10/2002	02PM-03PM	3	1	1	Thursday	Cloudy	Daylight	Dry	On Road
442605	Cascade Rd SE	4620199	20' E	Robinson	Angle Straight	PDO	12/13/2002	06PM-07PM	2	3	0	Friday	Cloudy	Dark,Lighted	Wet	On Road
442605	Cascade Rd SE	2704402	10' E	ROBINSON	Misc. Multiple Vehicle	PDO	1/16/2002	07PM-08PM	2	4	0	Wednesday	Snow	Dark	Snowy	On Road
442605	Cascade Rd SE	2737473	10' E	ROBINSON	Misc. Multiple Vehicle	Injury	9/27/2002	05PM-06PM	2	2	1	Friday	Clear	Daylight	Uncoded	On Road
419106	Robinson Rd SE	2703644	10' SE	CASCADE	Rear-End Straight	Injury	5/16/2002	05PM-06PM	2	4	1	Thursday	Rain	Daylight	Wet	On Road
419106	Robinson Rd SE	2737382	15' S	CASCADE	Rear-End Drive	PDO	9/23/2002	09AM-10AM	2	3	0	Monday	Clear	Daylight	Dry	On Road
419106	Robinson Rd SE	2736967	20' W	CASCADE	Rear-End Straight	Injury	9/26/2002	01PM-02PM	2	2	1	Thursday	Clear	Daylight	Dry	On Road
419106	Robinson Rd SE	2737340	50' W	CASCADE	Rear-End Straight	Injury	10/4/2002	NOON-01PM	2	2	2	Friday	Rain	Daylight	Wet	On Road

Total Crashes for 2002: 15

Total Fatal Crashes: 0 Total Injury Crashes: 7 Total PDO Crashes: 8

Year: 2003

442605	Cascade Rd SE	4442304	50' NW	ROBINSON	Rear-End Straight	PDO	3/17/2003	09PM-10PM	2	3	0	Monday	Clear	Dark	Dry	On Road
442605	Cascade Rd SE	4672850	0' X	ROBINSON	Misc. Multiple Vehicle	PDO	1/19/2003	09PM-10PM	2	2	0	Sunday	Snow	Dark,Lighted	Snowy	On Road
442605	Cascade Rd SE	4596776	6' N	ROBINSON	Head-On Left-Turn	PDO	3/3/2003	06PM-07PM	2	2	0	Monday	Snow	Dark	Snowy	On Road
442605	Cascade Rd SE	4236128	10' NW	ROBINSON	Angle Turn	PDO	5/15/2003	NOON-01PM	2	2	0	Thursday	Rain	Daylight	Wet	On Road
442605	Cascade Rd SE	4209161	5' SE	ROBINSON	Head-On Left-Turn	Injury	6/26/2003	01PM-02PM	2	2	2	Thursday	Cloudy	Daylight	Wet	On Road
442605	Cascade Rd SE	4442520	0' X	ROBINSON	Misc. Multiple Vehicle	PDO	6/19/2003	08PM-09PM	2	2	0	Thursday	Clear	Dusk	Dry	On Road
442605	Cascade Rd SE	4012660	0'	ROBINSON	Head-On Left-Turn	Injury	12/30/2003	05PM-06PM	2	3	2	Tuesday	Clear	Dark,Lighted	Dry	On Road
419106	Robinson Rd SE	4012522	40' W	CASCADE	Rear-End Straight	PDO	1/23/2003	10AM-11AM	2	2	0	Thursday	Clear	Daylight	Dry	On Road
419106	Robinson Rd SE	4012576	15' W	CASCADE	Misc. Multiple Vehicle	Injury	2/11/2003	Unknown	2	3	1	Tuesday	Snow	Daylight	Snowy	On Road
419106	Robinson Rd SE	4208173	30' W	CASCADE	Rear-End Drive	PDO	9/10/2003	05PM-06PM	2	2	0	Wednesday	Clear	Daylight	Dry	On Road
419106	Robinson Rd SE	4012696	0'	CASCADE	Rear End Right Turn	PDO	10/29/2003	08AM-09AM	2	1	0	Wednesday	Other	Daylight	Other	On Road

Total Crashes for 2003: 11

Total Fatal Crashes: 0 Total Injury Crashes: 3 Total PDO Crashes: 8

Year: 2004

442605	Cascade Rd SE	7525322	20' W	ROBINSON	Rear-End Straight	PDO	10/12/2004	05PM-06PM	2	2	0	Tuesday	Clear	Daylight	Dry	On Road
442605	Cascade Rd SE	6974803	0' X	ROBINSON	Rear-End Straight	PDO	9/8/2004	Unknown	2	2	0	Wednesday	Clear	Daylight	Dry	On Road

PR No.	Road Name	UD-10 #	UD-10 Crash		Crash Type	Crash Severity	Date	Hour of Occurrence	Number of:			Weekday	Environmental Condition			Relationship On Road
			Location	UD-10 Crossroad Reference					Veh.	Occup.	Inj.		Weather	Lighting	Surface	
442605	Cascade Rd SE	6974874	10' W	ROBINSON	Head-On Left-Turn	Injury	11/12/2004	02PM-03PM	2	5	2	Friday	Clear	Daylight	Dry	On Road
442605	Cascade Rd SE	6672359	5' E	ROBINSON	Head-On Left-Turn	PDO	9/27/2004	08PM-09PM	2	1	0	Monday	Clear	Daylight	Uncoded	On Road
442605	Cascade Rd SE	7526098	10' S	ROBINSON	Head-On Left-Turn	PDO	12/1/2004	02PM-03PM	2	3	0	Wednesday	Clear	Daylight	Wet	On Road
442605	Cascade Rd SE	6699650	20' E	ROBINSON	Rear-End Straight	PDO	7/14/2004	01PM-02PM	2	2	0	Wednesday	Clear	Daylight	Dry	On Road
419106	Robinson Rd SE	6997593	30' W	CASCADE	Misc. Multiple Vehicle	PDO	7/13/2004	06PM-07PM	2	2	0	Tuesday	Clear	Daylight	Dry	On Road
419106	Robinson Rd SE	6974867	25' S	CASCADE	Rear-End Straight	PDO	10/16/2004	01PM-02PM	2	2	0	Saturday	Rain	Daylight	Wet	On Road

Total Crashes for 2004: 8

Total Fatal Crashes: 0 Total Injury Crashes: 1 Total PDO Crashes: 7

Year: 2005

442605	Cascade Rd SE	8140003	15' W	ROBINSON	Angle Straight	Injury	10/10/2005	11PM-MDNT	2	3	2	Monday	Clear	Dark	Dry	On Road
442605	Cascade Rd SE	6974841	1' SW	ROBINSON	Head-On Left-Turn	PDO	2/23/2005	NOON-01PM	2	3	0	Wednesday	Cloudy	Daylight	Wet	On Road
442605	Cascade Rd SE	8061978	0' X	ROBINSON	Head-On Left-Turn	Injury	9/17/2005	10PM-11PM	2	8	1	Saturday	Clear	Dark	Dry	On Road
442605	Cascade Rd SE	7526513	20' E	ROBINSON	Fixed Object	PDO	5/24/2005	03PM-04PM	1	1	0	Tuesday	Cloudy	Daylight	Dry	Out/Shoulder/Curb
442605	Cascade Rd SE	7524853	30' E	ROBINSON	Rear-End Straight	PDO	2/9/2005	07AM-08AM	2	3	0	Wednesday	Snow	Daylight	Icy	On Road

Total Crashes for 2005: 5

Total Fatal Crashes: 0 Total Injury Crashes: 2 Total PDO Crashes: 3

Year: 2006

442605	Cascade Rd SE	8585001	35' NW	ROBINSON	Fixed Object	PDO	12/16/2006 01AM-02AM	1	1	0	Saturday	Clear	Dark,Lighted	Dry	On Shoulder
442605	Cascade Rd SE	8940373	5' NW	ROBINSON	Angle Straight	Injury	10/26/2006 11PM-MDNT	2	3	1	Thursday	Rain	Dark	Wet	On Road
442605	Cascade Rd SE	8139562	50' NE	ROBINSON	Fixed Object	PDO	1/24/2006 09PM-10PM	1	1	0	Tuesday	Snow	Dark	Icy	On Shoulder
442605	Cascade Rd SE	8584498	10' SW	ROBINSON	Head-on	Injury	6/2/2006 04PM-05PM	2	2	2	Friday	Rain	Daylight	Wet	On Road
442605	Cascade Rd SE	8139816	5' S	ROBINSON	Head-On Left-Turn	Injury	5/22/2006 02PM-03PM	2	2	1	Monday	Clear	Daylight	Dry	On Road
442605	Cascade Rd SE	8141043	100' E	ROBINSON	Slide-Swipe Same	PDO	5/25/2006 05PM-06PM	2	3	0	Thursday	Clear	Daylight	Dry	On Road
419106	Robinson Rd SE	8586052	10' W	CASCADE	Rear-End Straight	Injury	7/23/2006 07PM-08PM	2	2	1	Sunday	Clear	Daylight	Dry	On Road
419106	Robinson Rd SE	8061941	5' W	CASCADE	Dual Right-Turn	PDO	9/6/2006 09AM-10AM	2	2	0	Wednesday	Other	Other	Other	Uncoded
419106	Robinson Rd SE	8935752	20' S	CASCADE	Rear-End Straight	PDO	12/6/2006 01PM-02PM	2	2	0	Wednesday	Cloudy	Daylight	Wet	On Road
419106	Robinson Rd SE	8848414	2640' W	FULTON	Rear-End Straight	PDO	10/31/2006 09AM-10AM	2	2	0	Tuesday	Clear	Daylight	Dry	Uncoded

Total Crashes for 2006: 10

Total Fatal Crashes: 0 Total Injury Crashes: 4 Total PDO Crashes: 6

Crash Data

- Crash type
- Number of crashes
- Property damage only + minor injury (B,C)
- Number of A injuries or number killed (People)
- Each incident is one crash

Examples

- Typical treatment #1

CLTL CRFs

Construct Center Left-Turn Lane	80% Reduction: Rear-End Left-Turn 50% Reduction: Head-On Left-Turn 20% Reduction: Head-On, Angle, Other* 15% Reduction: Non Left-Turn Rear-End
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NUMBER OF CRASHES OR INJURED PERSONS.

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
	2002	2003	2004	2005	2006
Head-On Left Turn	%REDUCTION	50%			
Number of Crashes	3	3	3	2	1
PDO+Minor Inj Crashes	3	3	3	2	1
A-Injured or Killed Persons	0	0	0	0	0
Left Turn Rear End	%REDUCTION	80%			
Number of Crashes					
PDO+Minor Inj Crashes					
A-Injured or Killed Persons					
Other Rear End	%REDUCTION	15%			
Number of Crashes	1	1	3	1	
PDO+Minor Inj Crashes	1	1	3	1	
A-Injured or Killed Persons	0	0	0	0	
Head-On	%REDUCTION	20%			
Number of Crashes					1
PDO+Minor Inj Crashes					0
A-Injured or Killed Persons					2
All Other Types	%REDUCTION	20%			
Number of Crashes	7	3		1	2
PDO+Minor Inj Crashes	7	3		1	2
A-Injured or Killed Persons	0	0		0	0

# Fatalities	0	For reference only; "Q" accounts for the risk of a fatality.
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PROJECT COST ESTIMATE :

\$250,000	If unknown, enter "0" (zero).
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ADTb (before-volume)

1.0	You may change these
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ADTa (after-volume)

1.1	default ADT values.
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NUMBER OF YEARS OF DATA:

5.00	3 to 5 years should be used.
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RATE OF INFLATION:

2.50%

AREA TYPE:

1

(1=RURAL,2=URBAN,3=BETWEEN)

REMARKS:

as Coded

Time of Return (T.O.R.) is based on 5.0 years of data.

NOINFB =No-Inflation Annual Benefit=BTOTAL/years \$32,756

With an inflation rate of 2.50%

B=Annual Benefit=Present Value (with Inflation) \$41,930

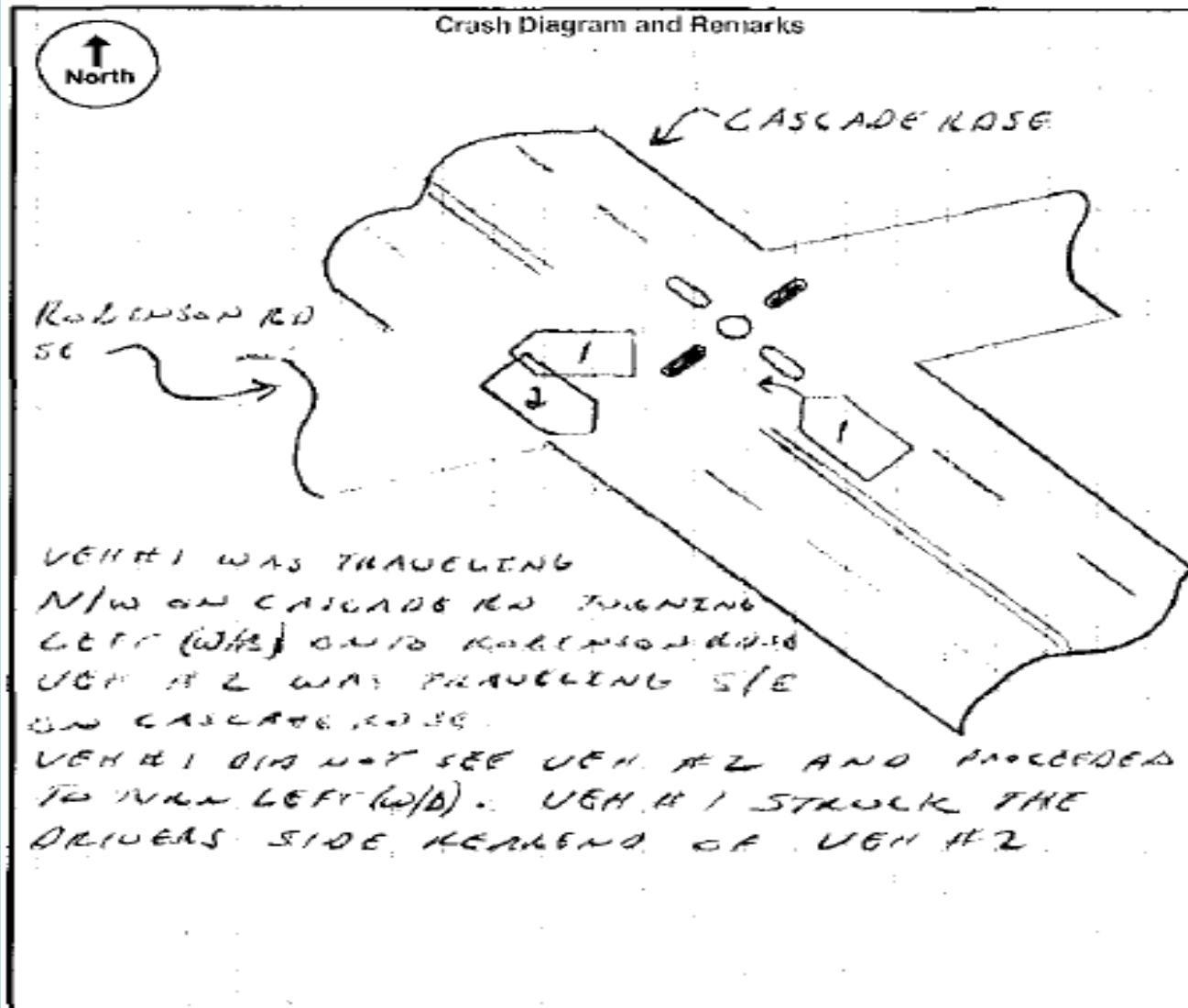
C = Project Cost \$250,000

TOR=C/B=COST/ANNUAL BENEFIT= 5.96

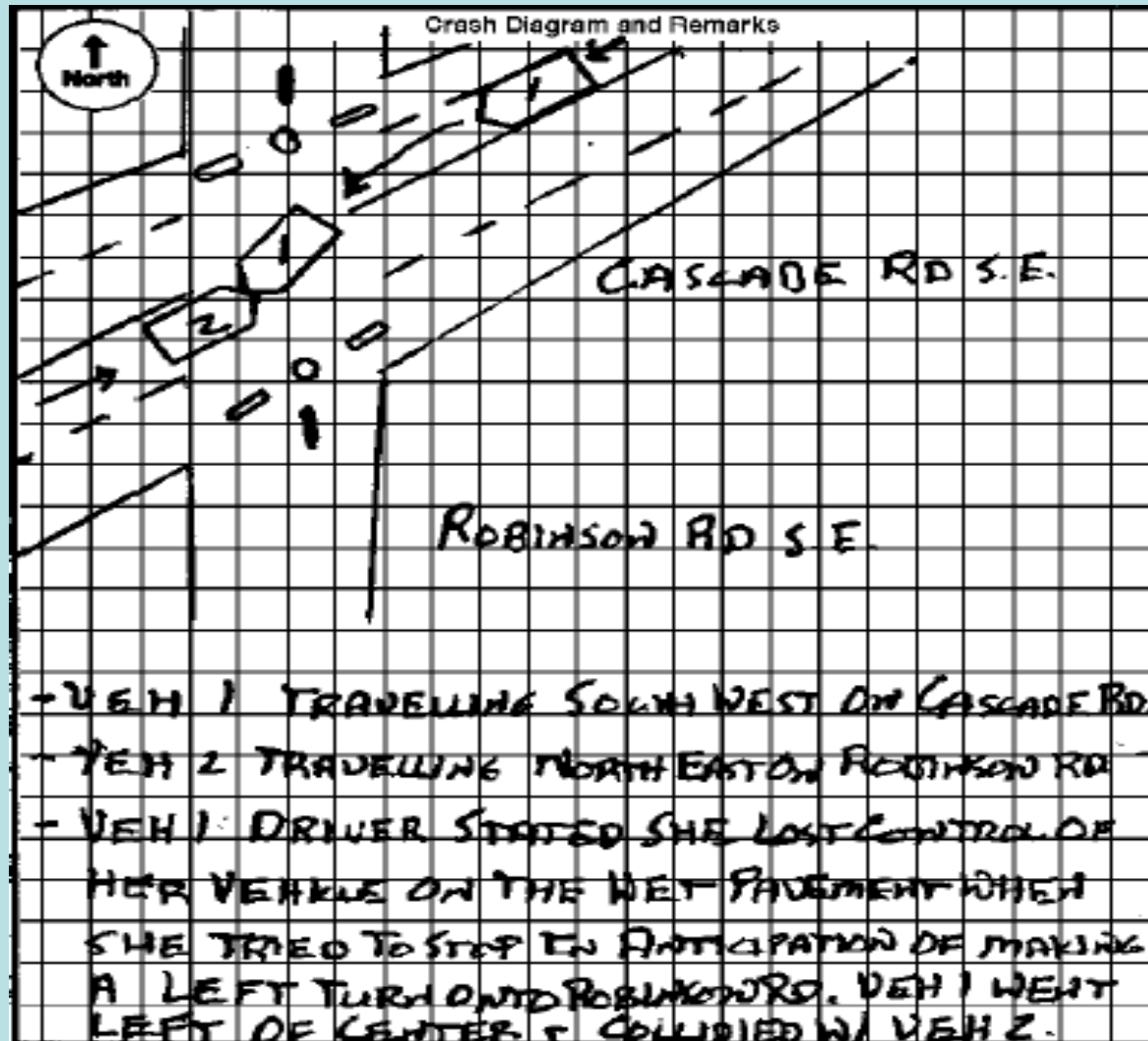
Before

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
	2002	2003	2004	2005	2006
Head-On Left Turn	%REDUCTION	50%			
Number of Crashes	3	3	3	2	1
PDO+Minor Inj Crashes	3	3	3	2	1
A-Injured or Killed Persons	0	0	0	0	0

Change angle turn to HOLT



Change HO to HOLT



After

NUMBER OF CRASHES OR INJURED PERSONS.

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
	2002	2003	2004	2005	2006
Head-On Left Turn					
%REDUCTION		50%			
Number of Crashes	5	5	3	2	2
PDO+Minor Inj Crashes	5	5	3	2	1
A-Injured or Killed Persons	0	0	0	0	2

NUMBER OF CRASHES OR INJURED PERSONS.

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
	2002	2003	2004	2005	2006
Head-On Left Turn	%REDUCTION	50%			
Number of Crashes	5	5	3	2	2
PDO+Minor Inj Crashes	5	5	3	2	1
A-Injured or Killed Persons	0	0	0	0	2
Left Turn Rear End	%REDUCTION	80%			
Number of Crashes				1	1
PDO+Minor Inj Crashes				1	1
A-Injured or Killed Persons				0	0
Other Rear End	%REDUCTION	15%			
Number of Crashes	1	1	3		
PDO+Minor Inj Crashes	1	1	3		
A-Injured or Killed Persons	0	0	0		
Head-On	%REDUCTION	20%			
Number of Crashes					
PDO+Minor Inj Crashes					
A-Injured or Killed Persons					
All Other Types	%REDUCTION	20%			
Number of Crashes	5	1		1	1
PDO+Minor Inj Crashes	5	1		1	1
A-Injured or Killed Persons	0	0		0	0

# Fatalities	0	For reference only; "Q" accounts for the risk of a fatality.
PROJECT COST ESTIMATE :	\$250,000	If unknown, enter "0" (zero).
ADTb (before-volume)	1.0	You may change these default ADT values.
ADTa (after-volume)	1.1	
NUMBER OF YEARS OF DATA:	5.00	3 to 5 years should be used.
RATE OF INFLATION:	2.50%	
AREA TYPE:	1	

(1=RURAL,2=URBAN,3=BETWEEN)

REMARKS:

corrected

Time of Return (T.O.R.) is based on	5.0 years of dat
NOINFB =No-Inflation Annual Benefit=BTOTAL/years	\$62,420
With an inflation rate of	----- 2.50%
B=Annual Benefit=Present Value (with Inflation)	\$79,902
C = Project Cost	\$250,000
TOR=C/B=COST/ANNUAL BENEFIT=	3.13

MilePoint	UD10 #	UD10 City/Township	UD-10 Crash		Crash Type	Crash Severity	Date	Hour of Occurrence	Number of:			Weekday	Environmental Condition			Relationship On Road
			Location	UD-10 Crossroad Reference					Veh.	Occup.	Inj.		Weather	Lighting	Surface	
PR Number: 1228304		Road Name: Newport Rd														
2.584	3500529	Berlin Twp	200' E	I275	Other Object	Injury	6/15/2002	01PM-02PM	1	2	1	Saturday	Cloudy	Daylight	Dry	On Road
2.844	3176376	Berlin Twp	1320' E	275	Fixed Object	Injury	1/10/2002	MDNT-01AM	1	1	1	Thursday	Clear	Dark	Wet	On Shoulder
3.160	3176259	Berlin Twp	2840' E	I75	Rear-End Left Turn	PDO	5/4/2002	06PM-07PM	2	4	0	Saturday	Clear	Daylight	Dry	On Road
3.248	3496395	Berlin Twp	15' SE	JOANN	Rear-End Straight	PDO	7/13/2002	10AM-11AM	2	2	0	Saturday	Clear	Daylight	Dry	On Road
3.419	3170451	Berlin Twp	1320' E	JORNN	Fixed Object	Injury	4/27/2002	01AM-02AM	1	1	1	Saturday	Cloudy	Dark	Dry	Out Shou/Curb
3.620	2732700	Berlin Twp	528' E	Swan Creek	Misc. Single Vehicle	PDO	6/25/2002	06PM-09PM	1	1	0	Tuesday	Cloudy	Daylight	Dry	On Road
3.651	2732263	Berlin Twp	528' W	I75	Side-Swipe Opposite	Injury	1/16/2002	06PM-07PM	2	3	2	Wednesday	Snow	Dark	Wet	On Road
3.651	3500270	Berlin Twp	528' W	I75	Rear-End Straight	PDO	6/15/2002	02PM-03PM	2	2	0	Saturday	Cloudy	Daylight	Dry	On Road

Total crashes for PR 1228304: 8

Total Fatal Crashes: 0 Total Injury Crashes: 4 Total PDO Crashes: 4

MilePoint	UD10 #	UD10 City/Township	UD-10 Crash		Crash Type	Crash Severity	Date	Hour of Occurrence	Number of:			Weekday	Environmental Condition			Relationship On Road
			Location	UD-10 Crossroad Reference					Veh.	Occup.	Inj.		Weather	Lighting	Surface	
PR Number: 1228304		Road Name: Newport Rd														
2.644	4692044	Berlin Twp	528' E	I275	Fixed Object	PDO	1/14/2003	06AM-07AM	1	1	0	Tuesday	Cloudy	Dark	Dry	Out Shou/Curb
3.137	5671737	Berlin Twp	100' W	CANTERBERRY	Fixed Object	PDO	8/17/2003	04PM-05PM	1	1	0	Sunday	Clear	Daylight	Dry	On Shoulder
3.147	5353492	Berlin Twp	530' W	JOANN	Fixed Object	Injury	12/10/2003	07PM-08PM	1	1	1	Wednesday	Rain	Dark,Lighted	Wet	Out Shou/Curb
3.232	4073319	Berlin Twp	300' W	JOANN	Rear-End Drive	Injury	6/30/2003	NOON-01PM	2	3	1	Monday	Clear	Daylight	Dry	On Road
3.619	4032612	Berlin Twp	530' W	I75	Angle Turn	PDO	11/8/2003	03PM-04PM	2	3	0	Saturday	Clear	Daylight	Dry	On Road
3.672	4106141	Berlin Twp	365' W	I75	Fixed Object	Injury	3/16/2003	01AM-02AM	1	1	1	Sunday	Fog	Dark,Lighted	Dry	Unknown
3.715	4074413	Berlin Twp	20' W	NEWPORTWOODS	Rear-End Drive	PDO	4/4/2003	04PM-05PM	2	2	0	Friday	Cloudy	Daylight	Wet	On Road
3.719	4130489	Berlin Twp	0' X	I75	Angle Straight	PDO	7/11/2003	08PM-09PM	3	7	0	Friday	Clear	Dusk	Dry	On Road
Total crashes for PR 1228304: 8								Total Fatal Crashes: 0 Total Injury Crashes: 3 Total PDO Crashes: 5								

MilePoint	UD10 #	UD10 City/Township	UD-10 Crash		Crash Type	Crash Severity	Date	Hour of Occurrence	Number of:			Weekday	Environmental Condition			Relationship On Road
			Location	UD-10 Crossroad Reference					Veh.	Occup.	Inj.		Weather	Lighting	Surface	
PR Number: 1228304			Road Name: Newport Rd													
2.706	5354923	Berlin Twp	1056' E	I275	Fixed Object	PDO	3/25/2004	10AM-11AM	1	1	0	Thursday	Cloudy	Daylight	Dry	Out Show/Curb
2.756	5670882	Berlin Twp	1320' E	I275	Head-On Left-Turn	PDO	4/24/2004	08PM-09PM	2	3	0	Saturday	Cloudy	Dark	Dry	On Road
2.903	6623825	Berlin Twp	1336' W	CANTERBERRY	Fixed Object	PDO	9/24/2004	MDNT-01AM	1	1	0	Tuesday	Clear	Dark	Dry	Uncoded
3.147	5671413	Berlin Twp	528' W	JOANN	Angle Turn	Injury	3/14/2004	08AM-09AM	3	2	1	Sunday	Rain	Daylight	Wet	On Road
3.149	6623344	Berlin Twp	520' W	JOANN	Side-Swipe Same	PDO	5/19/2004	NOON-01PM	2	3	0	Wednesday	Clear	Daylight	Dry	On Road
3.247	6623662	Berlin Twp	0' X	JOANN	Angle Turn	Injury	9/15/2004	04PM-05PM	2	2	2	Wednesday	Cloudy	Daylight	Dry	On Road
3.249	5354534	Berlin Twp	10' E	JOANN	Rear-End Straight	PDO	2/20/2004	03PM-04PM	2	2	0	Friday	Rain	Daylight	Wet	On Road
3.638	5354266	Berlin Twp	1060' W	I75	Fixed Object	PDO	2/21/2004	09AM-10AM	1	2	0	Saturday	Cloudy	Daylight	Icy	In the Gore

Total crashes for PR 1228304: 8

Total Fatal Crashes: 0 Total Injury Crashes: 2 Total PDO Crashes: 6

MilePoint	UD10 #	UD10 City/Township	UD-10 Crash		Crash Type	Crash Severity	Date	Hour of Occurrence	Number of:			Weekday	Environmental Condition			Relationship On Road
			Location	UD-10 Crossroad Reference					Veh.	Occup.	Inj.		Weather	Lighting	Surface	
PR Number: 1228304		Road Name: Newport Rd														
2.690	6616389	Berlin Twp	5260' E	TELEGRAPH	Fixed Object	Injury	3/10/2005	09PM-10PM	1	1	1	Thursday	Snow	Dark	Icy	On Road
2.690	8171626	Berlin Twp	5260' E	TELEGRAPH	Fixed Object	PDO	12/1/2005	09PM-10PM	1	1	0	Thursday	Cloudy	Dark	Icy	Uncoded
2.719	7325542	Berlin Twp	1123' E	N I 275	Misc. Single Vehicle	PDO	3/9/2005	05PM-06PM	1	3	0	Wednesday	Cloudy	Daylight	Dry	Out Show/Curb
3.156	7078966	Berlin Twp	50' S	CANTERBURY	Fixed Object	Injury	8/21/2005	07AM-08AM	1	1	1	Sunday	Clear	Daylight	Dry	Unknown
3.190	7079176	Berlin Twp	20' E	CANTERBURY	Angle Turn	PDO	11/19/2005	02PM-03PM	2	3	0	Saturday	Clear	Daylight	Dry	On Road
3.190	8171766	Berlin Twp	300' W	JOANN	Side-Swipe Opposite	Injury	8/1/2005	06PM-07PM	2	2	1	Monday	Clear	Daylight	Dry	On Road
3.248	7773297	Berlin Twp	3' E	JOANN	Head-On Left-Turn	Fatal	12/19/2005	11AM-NOON	3	4	0	Monday	Cloudy	Daylight	Dry	On Road
3.268	7551008	Berlin Twp	110' E	JOANN	Head-On Left-Turn	Injury	2/14/2005	01PM-02PM	2	4	2	Monday	Rain	Daylight	Wet	Uncoded
3.469	7078560	Berlin Twp	1320' W	RAMP024D	Fixed Object	PDO	4/23/2005	01PM-02PM	1	1	0	Saturday	Rain	Daylight	Wet	On Road
3.469	7552591	Berlin Twp	1320' W	RAMP 024D	Head-on	Injury	6/17/2005	10AM-11AM	2	3	3	Friday	Clear	Daylight	Dry	On Road
3.605	7551708	Berlin Twp	600' W	I75	Side-Swipe Opposite	PDO	3/11/2005	07AM-08AM	2	4	0	Friday	Cloudy	Daylight	Icy	On Road
3.605	7551709	Berlin Twp	600' W	I75	Fixed Object	PDO	3/11/2005	07AM-08AM	1	3	0	Friday	Cloudy	Daylight	Icy	Out Show/Curb
3.624	7078393	Berlin Twp	500' W	I75	Fixed Object	PDO	11/25/2005	09PM-10PM	1	2	0	Friday	Cloudy	Dark,Lighted	Dry	Out Show/Curb
3.719	7551713	Berlin Twp	15' NE	RAMP 024D	Angle Straight	PDO	3/17/2005	07AM-08AM	2	2	0	Thursday	Clear	Daylight	Dry	On Road
3.719	7078967	Berlin Twp	0' X	RAMP 024D	Side-Swipe Same	Injury	9/5/2005	03PM-04PM	3	6	4	Monday	Clear	Daylight	Dry	On Road

Total crashes for PR 1228304: 15

Total Fatal Crashes: 1 Total Injury Crashes: 6 Total PDO Crashes: 8

MilePoint	UD10 #	UD10 City/Township	UD-10 Crash		Crash Type	Crash Severity	Date	Hour of Occurrence	Number of:			Weekday	Environmental Condition			Relationship On Road
			Location	UD-10 Crossroad Reference					Veh.	Occup.	Inj.		Weather	Lighting	Surface	
PR Number: 1228304		Road Name: Newport Rd														
2.631	7773202	Berlin Twp	680' E	I275	Fixed Object	PDO	5/19/2006	MDNT-01AM	1	1	0	Thursday	Rain	Dark,Lighted	Wet	On Shoulder
2.756	8794078	Berlin Twp	1320' E	I275	Fixed Object	Injury	12/24/2006	05AM-06AM	1	1	1	Sunday	Cloudy	Dark	Dry	On Road
2.847	8793592	Berlin Twp	2112' W	JOANNE	Rear-End Straight	PDO	9/7/2006	04PM-05PM	2	7	0	Thursday	Clear	Daylight	Dry	On Road
2.895	7773265	Berlin Twp	3960' E	WAR	Fixed Object	PDO	4/5/2006	08AM-09AM	1	1	0	Wednesday	Cloudy	Daylight	Dry	Out Shou/Curb
3.150	7773199	Berlin Twp	30' W	CANTERBURY	Fixed Object	PDO	4/29/2006	11PM-MDNT	1	1	0	Saturday	Clear	Dark	Dry	On Shoulder
3.247	8793110	Berlin Twp	4' N	JOANN	Rear End Left Turn	Injury	5/7/2006	07PM-08PM	2	6	3	Sunday	Clear	Daylight	Dry	On Road
3.619	8794434	Berlin Twp	2640' W	SWAN CREEK	Fixed Object	PDO	11/12/2006	01AM-02AM	1	1	0	Sunday	Clear	Dark	Dry	On Road
3.624	8793784	Berlin Twp	500' W	I75	Misc. Single Vehicle	PDO	12/9/2006	NOON-01PM	1	2	0	Saturday	Clear	Daylight	Dry	Out Shou/Curb
3.709	8796144	Berlin Twp	54' NW	SWAN CREEK	Pedestrian	Injury	12/23/2006	09PM-10PM	2	0	1	Saturday	Rain	Dark	Wet	On Road
3.716	8796754	Berlin Twp	15' W	NEWPORT	Fixed Object	Injury	9/28/2006	08PM-09PM	1	2	2	Tuesday	Clear	Dark	Dry	Out Shou/Curb
3.719	6616396	Berlin Twp	0' X	RAMP 024D	Other Object	PDO	1/6/2006	05PM-06PM	1	1	0	Friday	Cloudy	Dark	Dry	On Road

Total crashes for PR 1228304: 11

Total Fatal Crashes: 0 Total Injury Crashes: 4 Total PDO Crashes: 7

NUMBER OF CRASHES OR INJURED PERSONS.

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
	2002	2003	2004	2005	2006
Head-On Left Turn	%REDUCTION	50%			
Number of Crashes			1	2	
PDO+Minor Inj Crashes			1	1	
A-Injured or Killed Persons				1	
Left Turn Rear End	%REDUCTION	80%			
Number of Crashes	1				1
PDO+Minor Inj Crashes	1				1
A-Injured or Killed Persons					
Other Rear End	%REDUCTION	15%			
Number of Crashes	2	2	1		1
PDO+Minor Inj Crashes	2	1	1		1
A-Injured or Killed Persons		1			
Head-On	%REDUCTION	20%			
Number of Crashes				1	
PDO+Minor Inj Crashes				1	
A-Injured or Killed Persons					
All Other Types	%REDUCTION	20%			
Number of Crashes	2	2	3	6	1
PDO+Minor Inj Crashes	2	2	3	6	1
A-Injured or Killed Persons					

Fatalities **0** For reference only; "Q" accounts for the risk of a fatality.

PROJECT COST ESTIMATE : **\$800,000** If unknown, enter "0" (zero).

ADTb (before-volume) **1.0** You may change these

ADTa (after-volume) **1.1** default ADT values.

NUMBER OF YEARS OF DATA: **5.00** 3 to 5 years should be used.

RATE OF INFLATION: **2.50%**

AREA TYPE: **3**

(1=RURAL,2=URBAN,3=BETWEEN)

REMARKS:

as Coded

Time of Return (T.O.R.) is based on 5.0 years of data.

NOINFB =No-Inflation Annual Benefit=BTOTAL/years \$37,233

With an inflation rate of 2.50%

B=Annual Benefit=Present Value (with Inflation) \$47,661

C = Project Cost \$800,000

TOR=C/B=COST/ANNUAL BENEFIT= 16.79

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
	2002	2003	2004	2005	2006
Head-On Left Turn	%REDUCTION	50%			
Number of Crashes			1	2	
PDO+Minor Inj Crashes			1	1	
A-Injured or Killed Persons			0	1	
Left Turn Rear End	%REDUCTION	80%			
Number of Crashes	1	1	3		3
PDO+Minor Inj Crashes	1	0	3		3
A-Injured or Killed Persons	0	1	0		0
Other Rear End	%REDUCTION	15%			
Number of Crashes	2	1			
PDO+Minor Inj Crashes	2	1			
A-Injured or Killed Persons	0	0			
Head-On	%REDUCTION	20%			
Number of Crashes	1			5	
PDO+Minor Inj Crashes	1			5	
A-Injured or Killed Persons	0			0	
All Other Types	%REDUCTION	20%			
Number of Crashes		2	1	1	
PDO+Minor Inj Crashes		2	1	1	
A-Injured or Killed Persons		0	0	0	

# Fatalities	1	For reference only; "Q" accounts for the risk of a fatality.
PROJECT COST ESTIMATE :	\$800,000	If unknown, enter "0" (zero).
ADTb (before-volume)	1.0	You may change these default ADT values.
ADTa (after-volume)	1.1	
NUMBER OF YEARS OF DATA:	5.00	3 to 5 years should be used.
RATE OF INFLATION:	2.50%	
AREA TYPE:	3	

(1=RURAL,2=URBAN,3=BETWEEN)

REMARKS:

Center Left-Turn Lane
 Correct Coding
 5-Years (2002 - 2006)

Time of Return (T.O.R.) is based on	5.0 years of data.
NOINFB =No-Inflation Annual Benefit=BTOTAL/years	\$64,811
With an inflation rate of	----- 2.50%
B=Annual Benefit=Present Value (with Inflation)	\$82,963
C = Project Cost	\$800,000
TOR=C/B=COST/ANNUAL BENEFIT=	9.64

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
		2003	2004	2005	2006
-	-	-	-	-	-
Head-On Left Turn	%REDUCTION	50%			
Number of Crashes			1	2	
PDO+Minor Inj Crashes			1	1	
A-Injured or Killed Persons			0	1	
-	-	-	-	-	-
Left Turn Rear End	%REDUCTION	80%			
Number of Crashes		1	3		3
PDO+Minor Inj Crashes		0	3		3
A-Injured or Killed Persons		1	0		0
-	-	-	-	-	-
Other Rear End	%REDUCTION	15%			
Number of Crashes		1			
PDO+Minor Inj Crashes		1			
A-Injured or Killed Persons		0			
-	-	-	-	-	-
Head-On	%REDUCTION	20%			
Number of Crashes				5	
PDO+Minor Inj Crashes				5	
A-Injured or Killed Persons				0	
-	-	-	-	-	-
All Other Types	%REDUCTION	20%			
Number of Crashes		2	1	1	
PDO+Minor Inj Crashes		2	1	1	
A-Injured or Killed Persons		0	0	0	
-	-	-	-	-	-

# Fatalities	1	For reference only; "Q" accounts for the risk of a fatality.
PROJECT COST ESTIMATE :	\$800,000	If unknown, enter "0" (zero).
ADTb (before-volume)	1.0	You may change these default ADT values.
ADTa (after-volume)	1.1	
NUMBER OF YEARS OF DATA:	4.00	3 to 5 years should be used.
RATE OF INFLATION:	2.50%	
AREA TYPE:	3	

(1=RURAL,2=URBAN,3=BETWEEN)

REMARKS:

Center Left-Turn Lane
 Correct Coding
 4-Years (2003 - 2006)

Time of Return (T.O.R.) is based on 4.0 years of data.

NOINFB =No-Inflation Annual Benefit=BTOTAL/years \$78,332

With an inflation rate of 2.50%

B=Annual Benefit=Present Value (with Inflation) \$100,272

C = Project Cost \$800,000

TOR=C/B=COST/ANNUAL BENEFIT= 7.98

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
		2003	2004	2005	
Head-On Left Turn	%REDUCTION	50%			
Number of Crashes			1	2	
PDO+Minor Inj Crashes			1	1	
A-Injured or Killed Persons			0	1	
Left Turn Rear End	%REDUCTION	80%			
Number of Crashes		1	3		
PDO+Minor Inj Crashes		0	3		
A-Injured or Killed Persons		1	0		
Other Rear End	%REDUCTION	15%			
Number of Crashes		1			
PDO+Minor Inj Crashes		1			
A-Injured or Killed Persons		0			
Head-On	%REDUCTION	20%			
Number of Crashes				5	
PDO+Minor Inj Crashes				5	
A-Injured or Killed Persons				0	
All Other Types	%REDUCTION	20%			
Number of Crashes		2	1	1	
PDO+Minor Inj Crashes		2	1	1	
A-Injured or Killed Persons		0	0	0	

# Fatalities	1	For reference only; "Q" accounts for the risk of a fatality.
PROJECT COST ESTIMATE :	\$800,000	If unknown, enter "0" (zero).
ADTb (before-volume)	1.0	You may change these default ADT values.
ADTa (after-volume)	1.1	
NUMBER OF YEARS OF DATA:	3.00	3 to 5 years should be used.
RATE OF INFLATION:	2.50%	
AREA TYPE:	3	

(1=RURAL,2=URBAN,3=BETWEEN)

REMARKS:

Center Left-Turn Lane
 Correct Coding
 3-Years (2003 - 2005)

Time of Return (T.O.R.) is based on	3.0 years of data.
NOINFB =No-Inflation Annual Benefit=BTOTAL/years	\$97,843
With an inflation rate of	2.50%
B=Annual Benefit=Present Value (with Inflation)	\$125,248
C = Project Cost	\$800,000
TOR=C/B=COST/ANNUAL BENEFIT=	6.39

Where to obtain UD-10 Reports

- Roadsoft March 2008 release
- TCRS (Michigan.gov/crash) website
- Local Police Agencies

Benefit/Cost Analysis Requirement for High Risk Rural Road Projects

- All selected HRRR projects are required to have before & after Benefit/Cost analysis conducted
- The HRRR project will be evaluated for the first 3 years after project constructed
- Example B= Benefit per year with inflation/ Total cost
- Example B/C $\$41,930/\$250,000= 0.17$

Changes to 2009 STH & HRRR Program

- Project applications due March 28,2008
- Time-of-Return/Benefit Cost analysis required with submittal
- Availability of Traffic Crash Maps located on MDOT web site at; www.michigan.gov/highwaysafety
- Maps provide 2000-2006 'K' & 'A' crash locations

2009 High Risk Rural Road (HRRR) Program

- \$3,190,000 of Federal funds available
- Funding 90% Fed/10% Local and some qualifying projects at 100% Federal Funds
- Maximum \$400,000 Federal available per project
- Roadway is required to be classified as Rural Local, Rural Minor Collector, or Rural Major Collector
- Roadway needs to have had 1 'A' or 'K' crash within last 5 years

2009 Safety (STH) Program

- \$12,150,000 of Federal funds available
- Funding 80% Federal/ 20% Local
- Maximum \$400,000 Federal available per project

Funding Targets

- \$10,000,000 for projects correcting Type 'A' & 'K' crashes
- \$1,000,000 for guardrail upgrades and clear zone improvements
- \$200,000 for shoulder and centerline rumble strips projects

5% Report Projects

- P.E. eligible for STH funding
- Must be on 2006 or 2007 lists
- Reference
<http://safety.fhwa.dot.gov/fivepercent/index.htm>

QUESTIONS