

INTERSECTION CRASH REDUCTION FACTORS		
Proposed Improvement	% Reduction	Associated Crash Types
<b>Signal Timing / Hardware Enhancements</b>		
All-Red Clearance Interval - <i>Add per ITE recommendations</i>	10%	All Crash Types
Rural Box Span Signal - <i>Upgrade from Stop Control</i>	75%	Angle
	40%	All other Crashes
Urban Box Span Signal - <i>Upgrade from Stop Control</i>	65%	Angle
	20%	All other Crashes
Box Span Signal - <i>Upgrade from Diagonal Span</i>	10%	All Crashes
Left-Turn Signal Phase - <i>Add</i>	30%	Left-Turn
Signal Head Size - <i>Increase to 12"</i>	10%	All Crash Types
Signal Optimization & Timing Updates	10%	All Crash Types
Yellow-Change Interval - <i>Increase</i>	10%	All Crash Types
<b>Pedestrian / Bicycle Enhancements</b>		
Bump Out / Curb Extension - <i>Remove Parking / Install</i>	30%	All Crashes
Bicycle Lanes - <i>Install per standards</i>	25%	Bicycle Crashes
Intersection Lighting - <i>Install</i>	30%	Pedestrian Fatal and A-Injuries
	20%	Other Crashes
Ped. Countdown Signals - <i>Install w/o existing signal</i>	30%	Pedestrian, Bicycle
Ped. Countdown Signals - <i>Upgrade from existing signal</i>	25%	Pedestrian, Bicycle
Sidewalk for Pedestrians - <i>Construct</i>	85%	Pedestrian Crashes
<b>Intersection Geometric Enhancements</b>		
Bump Out / Curb Extension - <i>Remove Parking / Install</i>	30%	All Crashes
	80%	Rear-End, Left-Turn
Center Left-Turn Lane - <i>Construct</i>	50%	Head-On Left-Turn
	20%	Head-On, Angle, Other
	15%	Non Left-Turn Rear-End
Intersection Improvements (Realignment, Sight-Distance Improvements, Radii Improvements, Etc.)	30%	Angle
	15%	Rear-End
Offset Left-Turn Lanes	10%	Head-On, Sideswipe, Pedestrian, Bicycle, Left-Turn Related
	10%	Head-On Crashes
Right-Turn Lane - <i>Construct</i>	65%	Rear-End Right-Turn
	20%	Non Right-Turn Rear-End, Sideswipe Same Direction
Roundabout - <i>Refer to Roundabout TOR</i>	76% K&A	Contact Jim D'Lamater (517) 335-2224 for Roundabout TOR form
	39% Minor Crh	
<b>General Intersection Enhancements</b>		
All-Way Stop Control Operation at Intersection - <i>Provide</i>	60%	All Crash Types
Flashing Traffic Signals - <i>Install/Upgrade</i>	20%	All Crash Types
Intersection Lighting - <i>Install</i>	30%	Pedestrian Fatal and A-Injuries
	20%	Other Crashes
Reflective Sheeting on Sign Posts ( <i>lollipops</i> )	15%	All Crashes
Ground Mounted Flashing Beacons (Red) - <i>Install**</i>	30%	All Crashes On Install Approach
Ground Mounted Flashing Beacons(Amber) - <i>Install**</i>	20%	All Crashes On Install Approach
Signage and Pavement Markings - <i>improve/Upgrade</i>	30%	Angle, Rear-End
	10%	Head-On, Pedestrian

\* "Other" includes and other crash which might be mitigate by the addition of a center left-turn lane in the judgment of the crash analyst

\*\* applies with overhead flashing beacon removal

#### REFERENCES:

The references listed below are the sources recognized by MDOT for obtaining crash reduction factors. If you have a situation that none of these sources can provide a crash reduction factor for, please contact Jim D'Lamater 517.335.2224.

- 1) MDOT Safety Programs Unit - Crash Reduction Factors (As recommended by K. Kunde. P.E.); October, 1986
- 2) *Selection Process for Local High Safety Projects*, - Transportation Research Record 847: 1982
- 3) UKTRP - 85-6, University of Kentucky; March, 1985
- 4) *Desktop Reference for Crash Reduction Factor*, Federal Highway Administration. 2007
- 5) NCHRP Report 617: *Accident Modification Factors for Traffic Engineering and ITS Improvements*, TRB 2008
- 6) Crash Modification Factor Clearinghouse, <http://www.cmfclearinghouse.org/index.cfm>, 2008

SEGMENT CRASH REDUCTION FACTORS		
Proposed Improvement	% Reduction	Associated Crash Types
<b>Geometric Enhancements</b>		
Center Left-Turn Lane - Construct	80%	Rear-End, Left-Turn
	50%	Head-On Left-Turn
	20%	Head-On, Angle, Other
	15%	Non Left-Turn Rear-End
Horizontal Curve Flattening	30%	Head-On, Fixed-Object, Overturn
Increase Lane Width - Per foot	10%	All Crash Types
Shoulders - Widen to Standard Width	5% per ft. **	All Crash Types
Superelevation Modification	20%	Head-On, Fixed-Object, Overturn
Vertical Curve Modification	20%	Head-On, Sideswipe
	10%	Fixed-Object, Overturn
<b>Operational Enhancements</b>		
Access Management - Improve	15%	Drive-way Related
Centerline Rumble Strips - Install	55%	Sideswipe Opposite, Head-On, Run-Off the Road Left Crashes
Lighting - Install on segment	20%	Night Crashes
Pavement Surface - Improve	20%	Wet Crashes
Pedestrian Refuge - Install	50%	Pedestrian Crashes
Should Rumble Strips	20%	Run-Off the Road Right Crashes
Signing/Delineation on Horizontal Curves - Install	20%	Head-On, Sideswipe, Fixed-Object, Overturn
<b>Roadside Enhancements</b>		
Fixed Objects From Clearzone (Trees, Culverts, Etc.) - Remove	75%	Fixed-Object
Guardrail - Install	55%	Fatalities and "A" Injuries
Sidewalk for Pedestrians - Construct	85%	Pedestrian Crashes
Slope Flattening	15%	Fixed-Object, Overturn

\* "Other" includes and other crash which might be mitigate by the addition of a center left-turn lane in the judgment of the crash analyst

\*\* 5% per foot widened each side (i.e. 3 foot shoulder on each side = 15% reduction)

#### **REFERENCES:**

The references listed below are the sources recognized by MDOT for obtaining crash reduction factors. If you have a situation that none of these sources can provide a crash reduction factor for, please contact Jim D'Lamater 517.335.2224.

- 1) MDOT Safety Programs Unit - Crash Reduction Factors (As recommended by K. Kunde. P.E.): October, 1986
- 2) *Selection Process for Local High Safety Projects*, - Transportation Research Record 847: 1982
- 3) UKTRP - 85-6, University of Kentucky; March, 1985
- 4) *Desktop Reference for Crash Reduction Factor*, Federal Highway Administration. 2007
- 5) NCHRP Report 617: *Accident Modification Factors for Traffic Engineering and ITS Improvements*, TRB 2008
- 6) Crash Modification Factor Clearinghouse, <http://www.cmfclearinghouse.org/index.cfm> , 2008

12/9/2009