Illinois Department of Transportation
2300 South Dirksen Parkway / Springfield, Illinois / 62764

December 8, 2005 #05-11

FY 2007 Highway Safety Improvement Program and High Risk Rural Roads Program

County Engineers/Superintendent of Highways
Metropolitan Planning Organizations - Directors
Municipal Engineers/Public Works Directors
Consulting Engineers

The Illinois Comprehensive Highway Safety Plan (CHSP) outlines a mission to develop, implement, and manage an integrated multi-stakeholder process to improve the attributes of roads, users, and vehicles to reduce traffic-related deaths and life-altering injuries in Illinois. The Bureau of Safety Engineering is responsible for oversight and implementation of the CHSP. As part of this plan, we are requesting candidate projects for the Highway Safety Improvement Program (HSIP) and the High Risk Rural Roads Program (HRRRP) for FY 2007. These two new programs established under SAFETEA-LU, the new federal highway bill, replace the old Hazard Elimination Safety Program (HES). The HSIP and HRRRP projects selected will be in addition to the previously selected HES projects for FY 2007. For following years, only HSIP and HRRRP projects will be selected.

FUNDING

HSIP funds are provided to address safety opportunities. These funds are designated as such so that individual safety issues can be addressed independently without completely reconstructing entire roadway segments or intersections to all of the latest policies and standards. If enabling legislation is passed and signed, we anticipate funding for the local highway system of approximately $3 million for the HRRRP and $5 million for the HSIP will be available July 2006. The federal funding level is a maximum of 90 percent of the total improvement cost for these projects, with the local agency responsible for the 10 percent matching funds. Information regarding additional funds that may be used to fund each candidate should also be provided in the application.

HSIP

The Highway Safety Improvement Program is a new core Federal-aid funding program with the goal of achieving a significant reduction in traffic fatalities and serious injuries on all public roads. Highway safety improvement projects correct or improve a hazardous road location or feature, or address a highway safety problem. Safety improvements listed in the benefit-cost methodology, as well as other proposed improvements that can be justified based on accepted engineering studies or research, will be reviewed for possible selection for this program.

HRRRP

The High Risk Rural Roads Program is a specific set-aside provision of the HSIP to support construction and operational safety improvements on roadways functionally classified as a rural major or minor collector or rural local road that have fatal and incapacitating injury crash rates higher than the statewide average for those functional classes of roads; or that will likely have increases in volume that are likely to create such rates. For applications to be considered eligible, the local agency must prove that the project location has an annual fatality rate or incapacitating injury (Class A injury) rate above the listed averages for the respective functional class and that the proposed improvement should effectively reduce that rate.

Functional Class	State Ave Fatalities (Fatal / 100 miles)	State Ave A-Inj (Injury / 100 miles)
Rural Major Collector	3.12	5.44
Rural Minor Collector	1.12	0.25
Rural Local Road	0.49	6.17

Applications which are not eligible or selected under the HRRRP may be considered for funding under the more broad HSIP.

APPLICATION

An application form, evaluation form and benefit-cost methodology are attached. Each submitted candidate project must have a completed application packet which provides a detailed benefit-cost analysis in accordance with the attached methodology to support the funding requested. Supporting documentation shall include crash analysis; either detailed collision diagrams or individual crash reports; and may include additional relevant information such as the local area strategic safety plan, photographs, newspaper articles, or letters from local officials that will help to focus on the problem area and support the proposed improvement.

Crash data may be provided and utilized in the benefit-cost ratio for as many years as are relevant to the existing safety problem addressed by the project. It is recommended that 5-8 years of crash data be used for analyses. Highway safety improvement projects may include one or more of the following: improvement of highway signage or pavement markings, elimination of roadside obstacles, installation of guardrails, barriers, or crash attenuators, intersection safety improvements, pavement and shoulder widening, installation of rumble strips or other warning devices, installation of a skid-resistant surface, improvements for pedestrian or bicyclist safety, and construction of traffic calming features. The final annualized benefit-cost should be adjusted to the number of years considered. Additional information should include a short narrative explaining the crash problem and how the proposed improvement will alleviate the situation.

The attached evaluation form should also be completed and submitted with the application. Include all information that is known and estimates for those items still undetermined. Evaluating the effectiveness of funded safety projects is a key

provision to continual improvement of the comprehensive plan. The information provided should demonstrate that the proposed improvement has the potential to reduce fatalities and incapacitating injuries and outline the objectives and measures of effectiveness that will be used to determine in the future if the anticipated benefits were realized.

SELECTION

Candidate projects will be evaluated, prioritized and recommended by the State Safety Projects Committee, with final approval by the Secretary of Transportation. The committee will consist of two people from FHWA, three people from the Bureau of Safety Engineering, and two people from the Central Bureau of Local Roads and Streets. The purpose of the committee is to ensure all projects are given equal consideration and provide consistent standards and uniformity in the selection process. Local agencies will be notified of their selection by the Department.

EVALUATION

Local agencies are expected to submit annual evaluations for each of the three years following the completion of a funded HSIP or HRRRP project using the attached format. This is a minimum requirement which will allow IDOT to establish a database to measure the effectiveness of different types of highway safety improvement projects. This information will also provide the basis for reporting evaluation results to the FHWA.

Proposed projects should be submitted to the reorganized IDOT District office no later than February 10, 2006. Any questions regarding the HSIP or HRRRP should be directed to Leigh Ann Lareau at (217) 785-5178.

Sincerely,

Charles J. Ingersoll, P. E.
Engineer of Local Roads and Streets

Priscilla A. Tobias, P. E.
State Safety Engineer

Attachments

cc: Mike Staggs
Eric Harm
Chuck Schmitt

JPA/jpa

Project Application

Highway Safety Improvement Program or
High Risk Rural Roads Program

IDOT District_____ Local Agency _____

Check Programs applying for: HSIP_____ HRRRP _____

Route Name/ Number. _____

Limits _____(Add Location Map)

Project Description : _____

_____

_____

_____

_____

_____

_____

ADT: _____ Functional Classification:_____

Fatality Rate (fatal/100 miles):_____ Class A Injury Rate (Inj / 100 mi):_____

Annualized Benefit/Cost Ratio: _____ Fatalities in past 5 years:_____

CHSP Emphasis Area: _____ % Reduction Expected:_____

Year	Number of Fatalities	Number of Class A Injuries	Total Number of Crashes
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Total Estimated Cost: _____ Total Safety Funds: _____

NOTE: PROJECTS WILL BE CONSIDERED ONLY WHEN SUPPORTED BY CRASH DATA, CRASH ANALYSIS AND DETAILED BENEFIT-COST ANALYSIS (REPORTS AND/OR DIAGRAMS).

Illinois Department of Transportation
Evaluation of Highway Safety Improvement Program Project

Section #:

County:

City:

Location:

Evaluator:

Date:

Initial Implementation Cost:

Annual Operating and Maintenance Cost:

Cost of Evaluation Study:

Discussion of problem addressed by project:

List objectives and “Measures of Effectiveness (MOE)”:

Time period which evaluation spans:

Discuss data collection activities, techniques, equipment used and analysis:

List % change in each MOE expected and realized:

Discuss benefit/cost anticipated and economic analysis of what was realized:

Discuss anticipated or actual problems encountered, conclusions and recommendations for future safety improvements and evaluation studies:

LOCAL ROADS HSIP / HRRRP PROJECT BENEFIT - COST METHODOLOGY

This method has been developed to determine the benefit-to-cost ratios for proposed highway safety construction projects. This information will be utilized in conjunction with other safety considerations to select cost-effective countermeasures. A form is provided for calculating and reporting these ratios **(Attachment A)**.

To explain this method, an example is analyzed **(Attachment B)**. The example is a proposed signal installation project, with an estimated cost of $125,000, including an estimated R.O.W. cost of $20,000. The collision diagram printouts for the three years report a total of 11 rear-end crashes, 15 head-on crashes, and 13 left-turn crashes. This site is located on a state-marked route in a rural area. Each column on the form is numbered for reference in describing the method and is explained as follows:

Column 1 - Location number.

In this case: 1.

Column 2 - Estimated project cost in dollars, excluding R.O.W. cost.

In this case: $105,000.

Estimated R.O.W. cost should not be included with this number, but should be shown as a separate R.O.W. cost.

In this case: $20,000.

Column 3 - Estimated service life in years **(Table A)**.

For this example: 15 years for signal installation and 20 years for R.O.W.

Column 4 - Annualized costs of construction (without R.O.W.) and R.O.W. shown separately. This is calculated by dividing Column 2 by Column 3.

For this example: $105,000/15 = $7,000 and $20,000/20 = $1,000.

Add the individualized costs to determine a total annualized cost.

For this example: $7,000 + $1,000 = $8,000.

Column 5 - Crashes reported as occurring at the proposed location during the period of the analysis.

In this example: 39 total.

Column 6 - Affected crashes. This is the number of crashes (for each type of crash) that could be expected to be reduced by the proposed improvement. This number is calculated by first determining the crash types that could be affected by the improvement from **Table B**. When selecting crash types from **Table B**, use only those types designated on the line for the improvement of interest.

As an example, for signal installation projects, the crash types affected are pedestrian, fixed object, rear-end, sideswipe-same direction, angle, left-turn, and right-turn crashes. Furthermore, the crash types are likely to be affected during all light and pavement conditions.

The second step is to check the collision diagram information printout for the number of crashes that occurred for each type of crash.

In this example: the collision diagram indicated 11 rear-end, 15 head-on, and 13 left-turn crashes.

Include in Column 6 only the numbers of rear-end and left-turn crashes, since these are the only types affected.

Column 7 - Crash reduction factor. This is the value taken from **Table A** for the type of improvement proposed.

For this example: with new traffic signals proposed, the crash reduction factor is 15 percent.

The crash factor applies only to the crash types affected **(Table B)**.

In this example: rear-end and left-turn crashes.

Column 8 - Affected crashes reduced. This is calculated by multiplying Column 6 by Column 7.

For this example: 11 rear-end crashes x 15% = 1.65 crashes reduced; 13 left-turn crashes x 15% = 1.95 crashes reduced.

Column 9 - Benefits. This is the crash cost prevented as a result of the improvement. This is obtained by multiplying the affected crashes reduced for each crash type (Column 8) by the appropriate average crash costs, found in **Tables C, D, and E,** and summing.

In this case, which is a rural state-marked project, the benefits are: (1.65 x $33,033 = $54,504) + (1.95 x $36,856 = $71,869) = $126,373.

Column 10 - Annual benefit to cost ratio. This ratio is obtained by dividing Column 9 by Column 4 and then dividing by three.

In this example: $126,373/$8,000/3 = 5.27

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Table A

SERVICE LIFE OF SAFETY IMPROVEMENTS AND CRASH REDUCTION FACTORS

	INTERSECTION	SERVICE LIFE	CRASH REDUCTION FACTOR (%)
01	**General**		
	AA - Improvement	15	35
	AB - Realignment	15	35
	AC - Reconstruction	15	35
02	**Pavement**		
	BA - Widen/Resurface	15	45
	BB - Widening	15	45
	BC - Resurfacing	10	30
	BD - Skid Proofing	5	45
	BE - Grooving	7	45
	BF - Rumble Stripping	3	30
	BG - Seal Coating	3	45
03	**Channelization**		
	CA - Raised Curb Median	15	50
	CB - Raised Reflector Median	7	50
	CC - Rumble Strip Median	10	50
	CD - Thermo-Plastic Tape	3	50
	CE - Paint	2	50
	CF - Lane Transition	15	50
	CG - Lane Addition	15	50
	CH - Left Turn Lane/Throat Widening	15	50
	CI - Right Turn Lane	15	50
	CJ - Left Turn Lane	15	50
	CK - Bi-Directional Turn Lane	15	50
	CL - Left Turn Acceleration	15	50
	CM - Right Turn Acceleration Lane	15	50
	CN - Deceleration Lane	15	50
	CO - One-Way Couple	15	50
04	**Signing**		
	DA – Modernization	6	35
	DB – Installation	6	40
	DC - Speed	6	40
	DD - Advanced Warning	6	40
	DE - Street Name	6	25
	DF - Four-Way Stop	5	40
	DG - Minor Leg Stop	5	40
	DH - Yield	5	40
	DI - Changeable Message	5	40
	DJ - No-Turn-On-Red	6	40
	DK - Delineators	4	40
	DL - Flexible Post	4	40
	DM - Overhead Truss	15	40

Table A

SERVICE LIFE OF SAFETY IMPROVEMENTS AND CRASH REDUCTION FACTORS

	INTERSECTION (CONTINUED)	SERVICE LIFE	CRASH REDUCTION FACTOR (%)
05	**Signalization**		
	EA - Modernization	10	25
	EB - Installation	15	15
	EC - Relocation	15	25
	ED - Warning Flasher	10	15
	EE - Red/Yellow Flashing Beacon	10	15
	EF - Red Flashing Beacon	10	15
	EG - Left Turn with Lane	15	25
	EH - Left Turn without Lane	10	25
	EI - Phase Adjustment	10	25
	EJ - Twelve Inch Lens	10	25
	EK - Traffic Actuated	10	25
	EL - Time Lane Control	10	25
	EM - Optical Programmed	10	25
	EN - Pedestrian Control	10	25
	EO - Mast Arming	15	25
	EP - Safety Lighting	15	25
	NON-INTERSECTION		
06	**Pavement Treatment**		
	FA - Widen/Resurface	15	45
	FB - Widening	15	45
	FC - Resurfacing	10	30
	FD - Skid Proofing	5	45
	FE - Grooving	7	45
	FF - Rumble Stripping	3	30
	FG - Seal Coating	3	45
07	**Pavement Marking**		
	GA - General Pavement Marking	1	30
	GB - Center Line	1	30
	GC - Edge Line	1	30
	GD - Raised Reflector	4	30
	GE - No-Pass Striping	1	30
	GF - Thermo-Plastic Tape	3	30
	GG - Paint	1	30
08	**Railroad Crossing**		
	HA - Modification	15	50
	HB - Gates	15	60
	HC - Crossbucks	15	60
	HD - Flashing Lights	15	60
	HE - Flashing Beacons	15	60
	HF - Warning Bells	15	50
	HG - Pavement Markings	2	30
	HH - Warning Signs-Standard	2	40
	HI - Warning Signs-Special	5	40
	HJ - Delineators	4	40
	HK - Safety Lighting	15	50
	HL - Resurfacing	10	25
	HM - Grade Separation	20	50
	HN - Removal	20	50

Table A

SERVICE LIFE OF SAFETY IMPROVEMENTS AND CRASH REDUCTION FACTORS

	NON-INTERSECTION (CONTINUED)	SERVICE LIFE	CRASH REDUCTION FACTOR (%)
09	**Bridge**		
	IA - General Repair	10	45
	IB - Widen/Resurface	15	45
	IC - Widening	15	45
	ID - Resurfacing	10	30
	IE - Skid Proofing	5	45
	IF - Grooving	7	45
	IG - Frost/Ice Detectors-Sign	10	25
	IH - Frost/Ice Detectors-Radio	10	25
	II - Guardrail	10	15
	IJ - Pedestrian Handrail	15	15
	IK - Safety Lighting	15	50
	IL - Delineators	4	15
	IM - Impact Attenuators	3	15
	IN - Reconstruction	20	50
	IO - Removal	20	50
10	**Curve**		
	JA - Realignment	15	35
	JB - Reconstruction	15	50
	JC - Superelevation	15	40
	JD - Daylighting	15	30
	JE - Widen/Resurface	15	45
	JF - Widening	15	45
	JG - Resurfacing	10	30
	JH - Skid Proofing	5	45
	JI - Grooving	7	45
	JJ - Guardrail	10	15
	JK - Advance Warning Sign	5	40
	JL - Warning Flasher	10	15
	JM - Delineators	4	40
	JN - Relocation	15	45
11	**Roadside Safety**		
	KA - General Obstacle Removal	20	50
	KB - Fixed Object Removal	20	50
	KC - Fringe Parking Removal	20	50
	KD - Bike Path Removal	20	50
	KE - Guardrail Installation	10	15
	KF - Utility Adjustment	15	10
	KG - Drainage Improvement	10	10
	KH - Shoulder Repair	5	10
	KI - Slope Stabilization	10	10
	KJ - Impact Attenuators	3	10
	KK - Glare Shields	10	15
	KL - Fencing	10	15
	KM - Access Control	20	15
12	**Other**		
	OA - Turnout	15	50
	OB - Ramp Improvement	15	45
	OC - Right of Way	20	*

*- Crash Reduction Factor included under Type of Safety Improvement

Table B

CRASH TYPES AFFECTED BY TYPE OF SAFETY IMPROVEMENT

		CRASH TYPE AFFECTED															LIGHT CONDITION			PAVEMENT CONDITION			
		ALL CRASH TYPES	OVERTURNED	PEDESTRIAN	TRAIN	PEDALCYCLIST	FIXED OBJECT	PARKED	REAR END	HEAD ON	SIDESWIPE SD	SIDESWIPE OD	ANGLE	TURNING LEFT	TURNING RIGHT	RAN OFF ROAD	DAYLIGHT	DARKNESS	DARK ROAD LIT	DRY	WET	ICE AND SNOW	HOUR SPECIFY
01	**General**																						
	AA - Improvement	AA															AA	AA	AA	AA	AA	AA	AA
	AB - Realignment	AB															AB	AB	AB	AB	AB	AB	AB
	AC - Reconstruction	AC															AC	AC	AC	AC	AC	AC	AC
02	**Pavement**																						
	BA - Widen/Resurface									BA	BA	BA				BA	BA	BA	BA	BA	BA	BA	
	BB - Widening									BB	BB	BB				BB	BB	BB	BB	BB	BB	BB	
	BC - Resurfacing	BC															BC	BC	BC		BC		
	BD - Skid Proofing	BD															BD	BD	BD		BD		
	BE - Grooving	BE															BE	BE	BE		BE		
	BF – Rumble Stripping				BF		BF		BF					BF	BF	BF	BF	BF	BF	BF	BF	BF	
	BG – Seal Coating	BG															BG	BG	BG	BG	BG	BG	
03	**Channelization**																						
	CA – Raised Curb Median								CA	CA	CA	CA		CA		CA	CA	CA	CA	CA	CA	CA	
	CB – Raised Reflector Median									CB		CB		CB				CB	CB	CB	CB	CB	
	CC – Rumble Strip Median									CC		CC		CC		CC	CC	CC	CC	CC	CC	CC	
	CD – Thermo-plastic Tape								CD	CD	CD	CD		CD	CD		CD	CD	CD	CD	CD	CD	
	CE – Paint								CE	CE	CE	CE		CE	CE		CE	CE	CE	CE	CE	CE	
	CF – Lane Transition								CF		CF				CF		CF	CF	CF	CF	CF	CF	
	CG – Lane Addition								CG		CG			CG	CG		CG	CG	CG	CG	CG	CG	CG
	CH – Left Turn Lane/Throat Widening								CH		CH	CH		CH			CH	CH	CH	CH	CH	CH	CH
	CI – Right Turn Lane								CI		CI				CI		CI	CI	CI	CI	CI	CI	CI
	CJ – Left Turn Lane								CJ		CJ	CJ		CJ			CJ	CJ	CJ	CJ	CJ	CJ	CJ
	CK – Bi-Directional Turn Lane								CK	CK	CK	CK		CK			CK	CK	CK	CK	CK	CK	
	CL – Left Turn Acceleration Lane								CL		CL	CL	CL	CL			CL	CL	CL	CL	CL	CL	CL
	CM – Right Turn Acceleration Lane								CM		CM				CM		CM	CM	CM	CM	CM	CM	CM
	CN – Deceleration Lane								CN		CN				CN		CN	CN	CN	CN	CN	CN	CN
	CO – One-Way Couple	CO															CO	CO	CO	CO	CO	CO	CO

Table B

CRASH TYPES AFFECTED BY TYPE OF SAFETY IMPROVEMENT

		CRASH TYPE AFFECTED															LIGHT CONDITION			PAVEMENT CONDITION			
		ALL CRASH TYPES	OVERTURNED	PEDESTRIAN	TRAIN	PEDALCYCLIST	FIXED OBJECT	PARKED	REAR END	HEAD ON	SIDESWIPE SD	SIDESWIPE OD	ANGLE	TURNING LEFT	TURNING RIGHT	RAN OFF ROAD	DAYLIGHT	DARKNESS	DARK ROAD LIT	DRY	WET	ICE AND SNOW	HOUR SPECIFY
04	**Signing**																						
	DA – Modernization	DA															DA	DA	DA	DA	DA	DA	DA
	DB – Installation	DB															DB	DB	DB	DB	DB	DB	DB
	DC – Speed	DC															DC	DC	DC	DC	DC	DC	DC
	DD – Advanced Warning	DD															DD	DD	DD	DD	DD	DD	DD
	DE – Street Name																DE	DE	DE	DE	DE	DE	DE
	DF – Four-Way Stop			DF		DF			DF				DF	DF	DF		DF	DF	DF	DF	DF	DF	DF
	DG – Minor Leg Stop												DG	DG	DG		DG	DG	DG	DG	DG	DG	DG
	DH – Yield												DH	DH	DH		DH	DH	DH	DH	DH	DH	DH
	DI – Changeable Message	DI															DI	DI	DI	DI	DI	DI	
	DJ – No-Turn-On-Red								DJ						DJ		DJ	DJ	DJ	DJ	DJ	DJ	
	DK – Delineators																DK	DK	DK	DK	DK	DK	
	DL – Flexible Post	DL															DL	DL	DL	DL	DL	DL	
	DM – Overhead Truss								DM		DM						DM	DM	DM	DM	DM	DM	DM
05	**Signalization**																						
	EA – Modernization			EA			EA		EA		EA		EA	EA	EA		EA	EA	EA	EA	EA	EA	EA
	EB – Installation			EB			EB		EB		EB		EB	EB	EB		EB	EB	EB	EB	EB	EB	EB
	EC – Relocation						EC										EC	EC	EC	EC	EC	EC	
	ED – Warning Flasher		ED				ED		ED		ED	ED	ED	ED	ED	ED	ED	ED	ED	ED	ED	ED	
	EE – Red/Yellow Flashing Beacon								EE		EE		EE	EE	EE	EE	EE	EE	EE	EE	EE	EE	
	EF – Red Flashing Beacon								EF		EF		EF	EF	EF	EF	EF	EF	EF	EF	EF	EF	
	EG – Left Turn with Lane								EG					EG			EG	EG	EG	EG	EG	EG	EG
	EH – Left Turn without Lane																						
	EI – Phase Adjustment								EI				EI	EI	EI		EI	EI	EI	EI	EI	EI	EI
	EJ – Twelve Inch Lens								EJ				EJ	EJ	EJ		EJ	EJ	EJ	EJ	EJ	EJ	EJ
	EK – Traffic Actuated								EK				EK	EK	EK		EK	EK	EK	EK	EK	EK	EK
	EL – Time Lane Control									EL		EL					EL	EL	EL	EL	EL	EL	EL

Table B

CRASH TYPES AFFECTED BY TYPE OF SAFETY IMPROVEMENT

		CRASH TYPE AFFECTED															LIGHT CONDITION			PAVEMENT CONDITION			
		ALL CRASH TYPES	OVERTURNED	PEDESTRIAN	TRAIN	PEDALCYCLIST	FIXED OBJECT	PARKED	REAR END	HEAD ON	SIDESWIPE SD	SIDESWIPE OD	ANGLE	TURNING LEFT	TURNING RIGHT	RAN OFF ROAD	DAYLIGHT	DARKNESS	DARK ROAD LIT	DRY	WET	ICE AND SNOW	HOUR SPECIFY
	EM – Optical Programmed								EM				EM	EM	EM		EM	EM	EM	EM	EM	EM	EM
	EN – Pedestrian Control			EN		EN											EN	EN	EN	EN	EN	EN	EN
	EO – Mast Arming								EO				EO	EO	EO		EO	EO	EO	EO	EO	EO	EO
	EP – Safety Lighting	EP																EP	EP	EP	EP	EP	EP
06	**Pavement Treatment**																						
	FA – Widen/Resurface									FA	FA	FA				FA	FA	FA	FA	FA	FA	FA	
	FB – Widening	FB															FB	FB	FB		FB		
	FC – Resurfacing	FC															FC	FC	FC		FC		
	FD – Skid Proofing	FD															FD	FD	FD		FD		
	FE – Grooving	FE															FE	FE	FE		FE		
	FF – Rumble Stripping						FF				FF					FF	FF	FF	FF	FF	FF	FF	
	FG – Seal Coating																FG	FG	FG		FG		
07	**Pavement Marking**																						
	GA – General Pavement Marking									GA	GA	GA				GA	GA	GA	GA	GA	GA	GA	
	GB – Center Line									GB	GB	GB					GB	GB	GB	GB	GB	GB	
	GC – Edge Line															GC	GC	GC	GC	GC	GC	GC	
	GD – Raised Reflector									GD	GD	GD				GD	GD	GD	GD	GD	GD	GD	
	GE – No-Pass Striping									GE	GE	GE					GE	GE	GE	GE	GE	GE	
	GF – Thermo-Plastic Tape									GF	GF	GF					GF	GF	GF	GF	GF	GF	
	GG – Paint									GG	GG	GG					GG	GG	GG	GG	GG	GG	
08	**Railroad Crossing**																						
	HA – Modification				HA		HA		HA							HA	HA	HA	HA	HA	HA	HA	
	HB – Gates				HB		HB		HB							HB	HB	HB	HB	HB	HB		
	HC – Crossbucks				HC		HC										HC	HC	HC	HC	HC	HC	
	HD – Flashing Lights				HD		HD		HD							HD	HD	HD	HD	HD	HD	HD	
	HE – Flashing Beacons				HE		HE		HE							HE	HE	HE	HE	HE	HE	HE	
	HF – Warning Bells				HF												HF	HF	HF	HF	HF	HF	
	HG – Pavement Markings				HG				HG							HG	HG	HG	HG	HG	HG	HG	

Table B

CRASH TYPES AFFECTED BY TYPE OF SAFETY IMPROVEMENT

		CRASH TYPE AFFECTED															LIGHT CONDITION			PAVEMENT CONDITION			
		ALL CRASH TYPES	OVERTURNED	PEDESTRIAN	TRAIN	PEDALCYCLIST	FIXED OBJECT	PARKED	REAR END	HEAD ON	SIDESWIPE SD	SIDESWIPE OD	ANGLE	TURNING LEFT	TURNING RIGHT	RAN OFF ROAD	DAYLIGHT	DARKNESS	DARK ROAD LIT	DRY	WET	ICE AND SNOW	HOUR SPECIFY
	HH – Warning Signs-Standard				HH		HH		HH							HH	HH	HH	HH	HH	HH	HH	
	HI – Warning Signs-Special				HI		HI		HI							HI	HI	HI	HI	HI	HI	HI	
	HJ – Delineators				HJ		HJ									HJ		HJ	HJ	HJ	HJ	HJ	
	HK – Safety Lighting				HK		HK		HK							HK		HK	HK	HK	HK	HK	
	HL – Resurfacing				HL		HL		HL							HL	HL	HL	HL	HL	HL		
	HM – Grade Separation	HM															HM	HM	HM	HM	HM	HM	
	HN – Removal	HN															HN	HN	HN	HN	HN	HN	
09	**Bridge**																						
	IA – General Repair							IA		IA	IA	IA				IA	IA	IA	IA	IA	IA	IA	
	IB – Widen/Resurface						IB			IB	IB	IB				IB	IB	IB	IB	IB	IB	IB	
	IC – Widening	IC										IC				IC	IC	IC		IC			
	ID – Resurfacing	ID										ID				ID	ID	ID		ID			
	IE – Skid Proofing						IE			IE	IE	IE				IE	IE	IE	IE		IE		
	IF – Grooving							IF		IF	IF	IF				IF	IF	IF	IF		IF		
	IG – Frost/Ice Detectors-Sign						IG			IG	IG	IG				IG	IG	IG	IG			IG	
	IH – Frost/Ice Detectors-Radio							IH		IH	IH	IH				IH	IH	IH	IH			IH	
	II – Guardrail						II									II	II	II	II	II	II	II	
	IJ – Pedestrian Handrail			IJ		IJ	IJ									IJ	IJ	IJ	IJ	IJ	IJ	IJ	
	IK – Safety Lighting			IK		IK	IK	IK		IK	IK	IK				IK		IK	IK	IK	IK	IK	
	IL – Delineators						IL									IL		IL	IL	IL	IL	IL	
	IM – Impact Attenuators						IM									IM	IM	IM	IM	IM	IM	IM	
	IN – Reconstruction						IN			IN	IN	IN				IN	IN	IN	IN	IN	IN	IN	
	IO – Removal	IO															IO	IO	IO	IO	IO	IO	
10	**Curve**																						
	JA – Realignment		JA							JA	JA	JA				JA	JA	JA	JA	JA	JA	JA	
	JB – Reconstruction		JB							JB	JB	JB				JB	JB	JB	JB	JB	JB	JB	

Table B

CRASH TYPES AFFECTED BY TYPE OF SAFETY IMPROVEMENT

		CRASH TYPE AFFECTED															LIGHT CONDITION			PAVEMENT CONDITION			
		ALL CRASH TYPES	OVERTURNED	PEDESTRIAN	TRAIN	PEDALCYCLIST	FIXED OBJECT	PARKED	REAR END	HEAD ON	SIDESWIPE SD	SIDESWIPE OD	ANGLE	TURNING LEFT	TURNING RIGHT	RAN OFF ROAD	DAYLIGHT	DARKNESS	DARK ROAD LIT	DRY	WET	ICE AND SNOW	HOUR SPECIFY
	JC – Superelevation		JC							JC	JC	JC				JC	JC	JC	JC	JC	JC	JC	
	JD – Daylighting		JD							JD	JD	JD				JD	JD	JD	JD	JD	JD	JDC	
	JE – Widen/Resurface		JE							JE	JE	JE				JE	JE	JE	JE	JE	JE	JE	
	JF – Widening		JF							JF	JF	JF				JF	JF	JF	JF	JF	JF	JF	
	JG – Resurfacing		JG							JG	JG	JG				JG	JG	JG	JG	JG	JG		
	JH – Skid Proofing	JH															JH	JH	JH		JH		
	JI - Grooving	JI															JI	JI	JI		JI		
	JJ – Guardrail	JJ					JJ									JJ	JJ	JJ	JJ	JJ	JJ	JJ	
	JK – Advance Warning Sign	JK								JK		JK				JK	JK	JK	JK	JK	JK	JK	
	JL – Warning Flasher		JL							JL		JL				JL	JL	JL	JL	JL	JL	JL	
	JM – Delineators		JM							JM		JM				JM		JM	JM	JM	JM	JM	
	JN- Relocation		JN							JN	JN	JN	JN	JN	JN	JN	JN	JN	JN	JN	JN	JN	
11	**Roadside Safety**																						
	KA – General Obstacle Removal						KA									KA	KA	KA	KA	KA	KA	KA	
	KB – Fixed Object Removal						KB									KB	KB	KB	KB	KB	KB	KB	
	KC – Fringe Parking Removal							KC	KC							KC	KC	KC	KC	KC	KC	KC	KC
	KD – Bike Path Removal					KD										KD	KD	KD	KD	KD	KD	KD	KD
	KE – Guardrail Installation						KE									KE	KE	KE	KE	KE	KE	KE	
	KF – Utility Adjustment						KF									KF	KF	KF	KF	KF	KF	KF	
	KG – Drainage Improvement	KG															KG	KG	KG		KG		
	KH – Shoulder Repair											KH				KH	KH	KH	KH	KH	KH	KH	
	KI – Slope Stabilization															KI	KI	KI	KI	KI	KI	KI	
	KJ – Impact Attenuators						KJ									KJ	KJ	KJ	KJ	KJ	KJ	KJ	
	KK – Glare Shields										KK		KK			KK		KK	KK	KK	KK	KK	
	KL – Fencing	KL															KL	KL	KL		KL	KL	
	KM – Access Control	KM															KM	KM	KM	KM	KM	KM	

Table B

CRASH TYPES AFFECTED BY TYPE OF SAFETY IMPROVEMENT

		CRASH TYPE AFFECTED															LIGHT CONDITION			PAVEMENT CONDITION			
		ALL CRASH TYPES	OVERTURNED	PEDESTRIAN	TRAIN	PEDALCYCLIST	FIXED OBJECT	PARKED	REAR END	HEAD ON	SIDESWIPE SD	SIDESWIPE OD	ANGLE	TURNING LEFT	TURNING RIGHT	RAN OFF ROAD	DAYLIGHT	DARKNESS	DARK ROAD LIT	DRY	WET	ICE AND SNOW	HOUR SPECIFY
12	**Other**																						
	OA – Turnout	OA															OA	OA	OA	OA	OA	OA	
	OB – Ramp Improvement		OB									OB				OB	OB	OB	OB	OB	OB	OB	OB
	OC – Right of Way		Crash Types Affected is included under Type of Safety Improvement.																				

Table C
AVERAGE COST FOR
URBAN

Type of Collision On and Off Roadway	Property Damage Crashes	Injury Crashes	Fatal Crashes	Number of Persons Killed	Number of Persons Injured	Total Crashes	Average Cost
Overturned	955	1,331	33	35	1,819	2,319	$51,179
Pedestrian	49	2,164	152	156	2,327	2,365	$111,827
Train	25	16	2	3	21	43	$102,810
Pedalcyclist	160	1,669	18	18	1,743	1,847	$49,454
Animal	308	25	0	0	26	333	$9,618
Fixed Object	14,570	4,315	183	203	5,233	19,068	$28,010
Other Object	2,975	435	5	5	513	3,415	$13,775
Non-Collision	2,006	716	3	3	812	2,725	$18,474
Parked	4,613	484	6	6	592	5,103	$12,313
Rear-End	110,049	31,971	55	60	46,077	142,075	$19,047
Head-On	789	1,067	82	100	2,306	1,938	$106,783
Sideswipe – Same Direction	23,953	1,960	15	16	2,733	25,928	$11,432
Sideswipe – Opposite Direction	1,619	538	9	12	853	2,166	$27,246
Angle	26,080	10,722	127	139	18,050	36,929	$28,882
Turning	59,271	20,510	146	155	33,507	79,927	$24,323
Other	96	14	0	0	20	110	$14,962
ANNUAL AVERAGE	**82,506**	**25,979**	**279**	**304**	**38,877**	**108,764**	**$22,849**

Average costs are calculated using 2001, 2002, and 2003 crash data and the appropriate National Safety Council costs for each year.

Table D
AVERAGE COST FOR
RURAL

Type of Collision On and Off Roadway	Property Damage Crashes	Injury Crashes	Fatal Crashes	Number of Persons Killed	Number of Persons Injured	Total Crashes	Average Cost
Overturned	1,933	2,839	110	121	3,963	4,882	$62,691
Pedestrian	7	135	31	33	157	173	$242,736
Train	12	4	1	2	4	17	$96,119
Pedalcyclist	9	103	9	9	113	121	$119,771
Animal	864	116	4	4	144	984	$16,445
Fixed Object	8,125	3,447	210	231	4,331	11,782	$41,255
Other Object	1,844	387	6	6	492	2,237	$17,599
Non-Collision	1,743	592	1	1	712	2,336	$17,944
Parked	781	157	2	2	211	940	$17,286
Rear-End	7,234	3,042	70	77	5,113	10,346	$33,033
Head-On	113	371	162	213	1,040	646	$423,594
Sideswipe – Same Direction	2,211	402	5	5	629	2,618	$17,865
Sideswipe – Opposite Direction	670	380	20	22	621	1,070	$50,349
Angle	3,099	2,120	152	183	4,280	5,371	$73,333
Turning	4,511	2,117	54	58	3,730	6,682	$36,856
Other	17	1	0	0	1	18	$8,217
ANNUAL AVERAGE	**11,058**	**5,404**	**279**	**322**	**8,514**	**16,741**	**$46,166**

Average costs are calculated using 2001, 2002, and 2003 crash data and the appropriate National Safety Council costs for each year.

Table E
AVERAGE COST FOR
CHICAGO

Type of Collision On and Off Roadway	Property Damage Crashes	Injury Crashes	Fatal Crashes	Number of Persons Killed	Number of Persons Injured	Total Crashes	Average Cost
Overturned	22	44	2	2	60	68	$68,996
Pedestrian	7	769	18	18	803	793	$65,662
Train	0	1	0	0	4	1	$60,667
Pedalcyclist	15	242	0	0	249	257	$39,779
Animal	5	0	0	0	0	5	$4,800
Fixed Object	1,313	442	19	21	554	1,774	$30,692
Other Object	272	31	0	0	40	303	$11,617
Non-Collision	169	33	1	1	36	203	$18,179
Parked	2,081	161	1	1	203	2,243	$10,645
Rear-End	11,840	2,139	4	4	3,294	13,983	$15,815
Head-On	126	88	1	1	193	215	$48,663
Sideswipe – Same Direction	4,889	355	3	3	543	5,247	$11,354
Sideswipe – Opposite Direction	251	40	0	0	65	291	$15,640
Angle	3,666	980	6	6	1,698	4,652	$21,693
Turning	6,576	1,540	7	7	2,582	8,123	$19,525
Other	67	5	0	0	6	72	$11,194
ANNUAL AVERAGE	**10,433**	**2,290**	**21**	**21**	**3,443**	**12,743**	**$18,529**

Average costs are calculated using 2001, 2002, and 2003 crash data and the appropriate National Safety Council costs for each year.

Attachment A

SAFETY IMPROVEMENT PROJECTS – PROJECTED BENEFIT/COST RATIOS

DISTRICT _____

FISCAL YEAR _____

(1) LOCATION NUMBER	(2) ESTIMATED COST	(3) SERVICE LIFE (YEARS)	(4) ANNUALIZED CONST. COST (2) / (3)	(5) TOTAL CRASHES	(6) AFFECTED CRASHES	(7) CRASH REDUCTION FACTOR (%)	(8) AFFECTED CRASHES REDUCED (6) x (7)	(9) BENEFITS ($) (8) x CRASH COST	(10) ANNUALIZED BENEFIT/COST (9) / (4) / yrs

Attachment B

SPOT SAFETY IMPROVEMENT PROJECTS – PROJECTED BENEFIT/COST RATIOS

DISTRICT 6

FISCAL YEAR _____

(1) LOCATION NUMBER	(2) ESTIMATED COST	(3) SERVICE LIFE (YEARS)	(4) ANNUALIZED CONST. COST (2) / (3)	(5) TOTAL CRASHES	(6) AFFECTED CRASHES	(7) CRASH REDUCTION FACTOR (%)	(8) AFFECTED CRASHES REDUCED (6) x (7)	(9) BENEFITS ($) (8) x CRASH COST	(10) ANNUALIZED BENEFIT/COST (9) / (4) / 3
				EXAMPLE					
1	$105,000	15	$7,000						
	$20,000	20	$1,000						
			$8,000 (Total)	39	11 Rear-End	15	1.65	$54,504	
					13 Left-Turn	15	1.95	$71,869	
								$126,373 (Total)	
							Benefit/Cost		**5.27**