



Arizona Department of Transportation

Traffic Engineering, HES Section

INTEROFFICE MEMO

To: Chuck Gillick Northern Regional Traffic Engineer	Date: August 9, 2006
From: Reed Henry Manager, Highway Enhancements for Safety (HES)	Subject: Streetlight Request SR 89A, MP 371 to MP 372.99

Safety evaluation was performed on the pedestrian-motor vehicle crashes occurring on SR 89A, MP 371 to MP 373 from January 2003 to December 2005 to determine suitability for funding for streetlight installations.

During the three-year evaluation period, a total of five pedestrian related crashes were reported to occur on the study section. These include one (1) (20%) fatal crash, three (3) (60%) non-fatal injury crashes and one (1) (20%) property damage only crash. Of the three non-fatal injury crashes, one (1) (20%) was non-incapacitating and two (2) (40%) were possible injuries. Due to non-availability of complete crash data, the crashes occurring in the year 2006 are not considered in the Benefit/Cost analysis. However police reports on two pedestrian fatal crashes occurring at the study section in 2006 were reviewed.

Three (3) (60%) crashes in the three-year study period (2003-2005) and two crashes in the last six months (January 2006–June 2006) occurred in darkness.

Considering the Continuous Highway Lighting Guidelines given in the Traffic Engineering Policies, Guides and Procedures (PGP), the following is observed

1. There is no lighting at the study section except at the intersections.
2. The area under consideration has businesses on both side of the road and the district study at the section indicates many pedestrians crossing the road both at intersection and at mid-block.
3. Three (3) (60%) crashes in the three-year study period occurred in darkness which includes one fatality.

Traffic PGP for Illumination indicates that “Continuous lighting on conventional highways is considered to be justified where local agencies find sufficient benefit in the forms of convenience, safety, policing, community promotion, public relations, etc. to pay the cost of installation, maintenance, and operation of the lighting”.

RECOMMENDATION

Based on the evaluation, it is recommended that streetlight may be installed for the section from MP 371 to MP 372.99 (Dry Creek Rd to Soldiers Pass Rd).

DRH: sg

Cc: Jennifer Brown, FHWA Arizona Office
Thomas Tesch, Northern Regional Traffic Engineering
Dennis Kiefer, Northern Regional Traffic Engineering
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Appendix A: Crash Summary

Appendix B: Benefit/ Cost Analysis

APPENDIX A
CRASH SUMMARY
SR 89A, MP 371 to MP 322.99
01/01/2003 to 12/31/2005

Microfilm	Acc_Date_Time	OnRoad	Marker	Distance	
12242197	11/26/2003 13:00	SA0089	372	0.209	
13071301	7/13/2004 11:30	SA0089	372	0.7	
14071706	3/13/2005 0:28	SA0089	371	0.4	
14320232	6/4/2005 23:17	SA0089	371	0.8	
14851213	9/10/2005 22:30	SA0089	372	0.3	
15221168	4/4/2006 20:43	SA0089	371	0	
15410655	1/21/2006 19:56	SA0089	371	0.67	
Microfilm	Acc_Date_Time	Road Surface	Injury Severity	Daylight	Manner of Collision
12242197	11/26/2003 13:00	Unknown	Possible Injury	Daylight	Single Vehicle
13071301	7/13/2004 11:30	Dry	Possible Injury	Daylight	Single Vehicle
14071706	3/13/2005 0:28	Dry	Non-Incapacitating Injury	Darkness	Single Vehicle
14320232	6/4/2005 23:17	Dry	Fatal	Darkness	Single Vehicle
14851213	9/10/2005 22:30	Dry	No Injury	Darkness	Single Vehicle
15221168	4/4/2006 20:43	Dry	Fatal	Darkness	Single Vehicle
15410655	1/21/2006 19:56	Dry	Fatal	Darkness	Single Vehicle
Microfilm	Acc_Date_Time	First Harmful	Total Injury	Total Fatal	Unit #
12242197	11/26/2003 13:00	Collision with Pedestrian	1	0	1
13071301	7/13/2004 11:30	Collision with Pedestrian	1	0	1
14071706	3/13/2005 0:28	Collision with Pedestrian	2	0	2
14320232	6/4/2005 23:17	Collision with Pedestrian	1	1	2
14851213	9/10/2005 22:30	Collision with Pedestrian	0	0	1
15221168	4/4/2006 20:43	Collision with Pedestrian	0	1	2
15410655	1/21/2006 19:56	Collision with Pedestrian	0	1	2
Microfilm	Acc_Date_Time	Physical Condition	Direction of Travel	Weather Condition	Violations/Behavior
12242197	11/26/2003 13:00	No Apparent Influence	W	Clear	Failed to Yield Right-Of-Way
13071301	7/13/2004 11:30	No Apparent Influence	E	Clear	Failed to Yield Right-Of-Way
14071706	3/13/2005 0:28	No Apparent Influence	W	Clear	No Improper Driving
14320232	6/4/2005 23:17	No Apparent Influence	SW	Clear	No Improper Driving
14851213	9/10/2005 22:30	No Apparent Influence	S	Cloudy	Inattention
15221168	4/4/2006 20:43	Unknown	W	Clear	No Improper Driving
15410655	1/21/2006 19:56	No Apparent Influence	W	Clear	No Improper Driving
Microfilm	Acc_Date_Time	Unit Action	Body Style	Vehicle Condition	Vehicle Condition # 2
12242197	11/26/2003 13:00	Making Right Turn	Passenger Car, regular	No Apparent Defects	Not Reported
13071301	7/13/2004 11:30	Leaving Alley or Driveway	Passenger Car, regular	No Apparent Defects	Not Reported
14071706	3/13/2005 0:28	Going Straight Ahead	Passenger Car, regular	No Apparent Defects	Not Reported
14320232	6/4/2005 23:17	Going Straight Ahead	Passenger Car, regular	No Apparent Defects	Not Reported
14851213	9/10/2005 22:30	Making Left Turn	Passenger Car, regular	No Apparent Defects	Not Reported
15221168	4/4/2006 20:43	Going Straight Ahead	Pick-Up Truck (including panel & mini-bus)	No Apparent Defects	Not Reported
15410655	1/21/2006 19:56	Going Straight Ahead	Passenger Car, regular	No Apparent Defects	Not Reported

APPENDIX B
SR 89A, MP 371 to MP 372.99
01/01/2003 to 12/31/2005

Date Compiled: 08/02/06							Completed by: S. Gajula		
Crash Severity and Type									
Severity and Types			2003	2004	2005		Total	Average	Percent
Crash Severity's									
Fatal Injury					1		1	0.33	20.00%
Incapacitating Injury							0	0.00	0.00%
Non Incapacitating Injury					1		1	0.33	20.00%
Possible Injury			1	1			2	0.67	40.00%
PDO					1		1	0.33	20.00%
Unreported							0	0.00	0.00%
Total	0	0	1	1	3		5	1.67	100.00%
Direction of Travel									
Northbound			1	1			2	0.67	40.00%
Southbound					3		3	1.00	60.00%
Eastbound							0	0.00	0.00%
Westbound							0	0.00	0.00%
Crash Involvement									
1-Vehicle			1	1	3		5	1.67	100.00%
2-Vehicles							0	0.00	0.00%
3-Vehicles or more							0	0.00	0.00%
Vehicle Type									
Car/Lt. Truck			1	1	3		5	1.67	100.00%
Truck/Bus							0	0.00	0.00%
Tractor trailer (TT)							0	0.00	0.00%
Motorhome							0	0.00	0.00%
Motorcycle							0	0.00	0.00%
Emergency Vehicle							0	0.00	0.00%
Pedalcycle							0	0.00	0.00%
Farm Equipment							0	0.00	0.00%
Unknown/Other							0	0.00	0.00%
Total	0	0	1	1	3	0	5	1.67	100.00%

APPENDIX B
SR 89A, MP 371 to MP 372.99
01/01/2003 to 12/31/2005

Traffic Volumes (AADT)									
Total			2003	2004	2005		Average		
							#DIV/0!		
Manner of Crash									
Types			2003	2004	2005		Total	Average	Percent
Ran Off Roadway (ROR)									
Hit Fixed Object							0	0.00	0.00%
Overturn							0	0.00	0.00%
Non Crash							0	0.00	0.00%
Hit on Roadway									
Livestock							0	0.00	0.00%
Object From Other Vehicle							0	0.00	0.00%
Object On Roadway							0	0.00	0.00%
Pedalcycle							0	0.00	0.00%
Pedestrian			1	1	3		5	1.67	100.00%
Pet (Domestic)							0	0.00	0.00%
Wild Game							0	0.00	0.00%
Hit Other Vehicle									
Angle							0	0.00	0.00%
Backing							0	0.00	0.00%
Head-On							0	0.00	0.00%
Left Turn							0	0.00	0.00%
U-Turn							0	0.00	0.00%
Parked Vehicle							0	0.00	0.00%
Rear End							0	0.00	0.00%
Sideswipe (Same Direction)							0	0.00	0.00%
Sideswipe (Opposite Direction)							0	0.00	0.00%
Other Types									
Non Crash (Not ROR)							0	0.00	0.00%
Non Crash (Fire)							0	0.00	0.00%
Tractor Trailer (Hot Brakes)							0	0.00	0.00%
Defective Equipment							0	0.00	0.00%
Unusual Road Condition							0	0.00	0.00%
Unknown/Other							0	0.00	0.00%
Total	0	0	1	1	3	0	5	1.67	100.00%

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01/01/2003 to 12/31/2005

Crash Conditions									
			2003	2004	2005		Total	Average	Percent
Light Conditions									
Daylight			1	1			2	0.67	40.00%
Dawn/Dusk							0	0.00	0.00%
Dark					3		3	1.00	60.00%
Road Surface Condition									
Dry				1	3		4	1.33	80.00%
Wet							0	0.00	0.00%
Sand/Gravel							0	0.00	0.00%
Snow/Ice							0	0.00	0.00%
Unknown/Other			1				1	0.33	20.00%
Driver Condition									
No Defect			1	1	3		5	1.67	100.00%
Alcohol/Drugs							0	0.00	0.00%
Sleepy/Fatigue							0	0.00	0.00%
Unknown/Other							0	0.00	0.00%
Vehicle Condition									
No Defect			1	1	3		5	1.67	100.00%
Defective Equipment							0	0.00	0.00%
Blow Out							0	0.00	0.00%
Fire							0	0.00	0.00%
Unknown/Other							0	0.00	0.00%
Violation/Behavior									
No Improper Action					2		2	0.67	40.00%
Speed Too Fast							0	0.00	0.00%
Excessive speed							0	0.00	0.00%
Failed To Yield			1	1			2	0.67	40.00%
Followed To Close							0	0.00	0.00%
Ran Stop Sign							0	0.00	0.00%
Disregard Traffic Signal							0	0.00	0.00%
Improper Turn							0	0.00	0.00%
Drove In Opposing Lane							0	0.00	0.00%
Unsafe Lane Change							0	0.00	0.00%
Inattention					1		1	0.33	20.00%
Improper Pass							0	0.00	0.00%
Under The Influence							0	0.00	0.00%
Trailer Sway							0	0.00	0.00%
Defective Equipment							0	0.00	0.00%
Walk On Wrong Side Of Road							0	0.00	0.00%
Construction Zone							0	0.00	0.00%
Talking On Cell Phone							0	0.00	0.00%
Unknown/Other							0	0.00	0.00%

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01/01/2003 to 12/31/2005

Occurrence by Hour of Day and Day of Week									
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total	Percent
0000 - 0059							1	1	20.00%
0100 - 0159								0	0.00%
0200 - 0259								0	0.00%
0300 - 0359								0	0.00%
0400 - 0459								0	0.00%
0500 - 0559								0	0.00%
0600 - 0659								0	0.00%
0700 - 0759								0	0.00%
0800 - 0859								0	0.00%
0900 - 0959								0	0.00%
1000 - 1059								0	0.00%
1100 - 1159		1						1	20.00%
1200 - 1259								0	0.00%
1300 - 1359			1					1	20.00%
1400 - 1459								0	0.00%
1500 - 1559								0	0.00%
1600 - 1659								0	0.00%
1700 - 1759								0	0.00%
1800 - 1859								0	0.00%
1900 - 1959								0	0.00%
2000 - 2059								0	0.00%
2100 - 2159								0	0.00%
2200 - 2259						1		1	20.00%
2300 - 2359						1		1	20.00%
Total by Days	0	1	1	0	0	2	1	5	100.00%

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01/01/2003 to 12/31/2005

Crash Occurrence by Month										
			2003	2004	2005		Total	Percent		
January							0	0.00%		
February							0	0.00%		
March					1		1	20.00%		
April							0	0.00%		
May							0	0.00%		
June					1		1	20.00%		
July				1			1	20.00%		
August							0	0.00%		
September					1		1	20.00%		
October							0	0.00%		
November			1				1	20.00%		
December							0	0.00%		
Total by Year	0	0	1	1	3	0	5	100.00%		
Crash Types at Intersections							Total	Average	Percent	
Right Angle										
NB & EB							0	0.00	0.00%	
NB & WB							0	0.00	0.00%	
SB & EB							0	0.00	0.00%	
SB & WB							0	0.00	0.00%	
Left Turn										
SB to EB, NB							0	0.00	0.00%	
NB to WB, SB							0	0.00	0.00%	
WB to SB, EB							0	0.00	0.00%	
EB to NB, WB							0	0.00	0.00%	
Rear end										
NB							0	0.00	0.00%	
SB							0	0.00	0.00%	
EB							0	0.00	0.00%	
WB							0	0.00	0.00%	

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01/01/2003 to 12/31/2005

Benefit / Cost Ratio Tabulation					
Annual Benefit Tabulation					
Crash Severity	Annual Average	Estimated Reduction*	Total Reduction	Unit Cost**	Annual Benefit
Fatal	0.33	45%	0.15	\$3,760,000	\$558,360
Incapacitating	0.00	0.00	0.00	\$188,000	\$0
Non Incapacitating	0.33	45%	0.15	\$48,200	\$7,158
Possible	0.67	25%	0.17	\$22,900	\$3,836
Property Damage Only (PDO)	0.33	45%	0.15	\$2,100	\$312
Unreported	0.00	0.00	0.00	\$2,100	\$0
Total Annual Benefits					\$569,665
Costs					
Total Construction Costs					\$1,400,000
Project Life (years)					15
Interest Rate (%)					8%
Capital Recovery Factor					0.1168
Annual Construction Cost					\$163,520
Annual Maintenance Cost					\$150,000
Total Annual Costs					\$313,520
Benefit / Cost					
Annual Benefit	Annual cost		Benefit / Cost Ratio		
\$569,665	\$313,520		1.82		

* Development of Accident Reduction Factors, Research Report KTC-96-13, 1996

** Estimating the Costs of Unintentional Injuries, National Safety Council, 2004