



City of Phoenix

Street Transportation Department

May 9, 2019

Ms. Mona Aglan-Swick, P.E.
Transportation Systems Management & Operations, Traffic Safety
Arizona Department of Transportation
1615 W. Jackson ST., MD 065R
Phoenix, AZ 85007-3217

RE: Highway Safety Improvement Program (HSIP) Project Determination and Application
Agency: City of Phoenix

Project Name: Improving illumination by installing additional street lighting

Project Location:

1. 27th Ave between Missouri Ave and Bethany Home Rd
2. 27th Ave between Maryland Ave and Glendale Ave
3. 27th Ave between Campbell Ave and Camelback Rd
4. 27th Ave between Indian School Rd and Campbell Ave
5. 27th Ave between Osborn Rd and Indian School Rd
6. 43rd Ave between Maryland Ave and Bethany Home Rd
7. 43rd Ave between Maryland Ave and Glendale Rd
8. Bethany Home Rd between 35th Ave and 39th Ave
9. Peoria Rd between 39th Ave and 43rd Ave
10. Peoria Rd between 35th Ave and 39th Ave
11. Thomas Rd between 27th Ave and 31st Ave
12. Thomas Rd between 31st Ave and 35th Ave
13. Thomas Rd between 43rd Ave and 47th Ave
14. Thomas Rd between 47th Ave and 51st Ave

Dear Ms. Aglan-Swick:

The city of Phoenix is submitting herewith a project application for Highway Safety Improvement Program (HSIP) funding. This road safety improvement project was identified through the local network crash data screening process and meets all requirements of Title 23. The proposed request is for the installation of additional street lights at 14 locations within Phoenix and does not include any non-infrastructure funding request. This application is for a spot improvement project, and the individual BCAs for each project are attached to this application.

Installation of additional street lighting will improve illumination along the segments and improve visibility of all road users. City staff will hire a consultant to complete the design portion of the project. After the design phase, city staff will procure bids for a contractor to construct the project. There will be ground disturbing activities, including trenching. It is anticipated that some minor utility relocations will need to happen.

During the most recent five year period ending December 2017, the city of Phoenix experienced 51 total crashes that occurred during dark lighting conditions, including 19 fatal and 32 serious/incapacitating crashes. A Crash Reduction Factor (CRF) was not able to be obtained from the ADOT 4/5 Star list and the CMF Clearinghouse did not have a 4/5 Star CRF for implementing street lighting. As a result, the city of Phoenix obtained a 3/5 star CRF of 69%

RE: Highway Safety Improvement Program (HSIP) Project Determination and Application
Agency: City of Phoenix
Project Name: Improving illumination by installing additional street lighting

from the CMF Clearinghouse. Based on a CRF of 69%, the city of Phoenix could see a 5-year reduction of 5.74 crashes including 3.31 fatal and 2.43 serious injury crashes.

The city of Phoenix has determined that, in accordance with 23 USC 148(a)(4)(A), this project is consistent with Maricopa Association of Governments' (MAG) and the State's 2014 State Goal No. 4: Eliminate Death and Severe Injury for vulnerable road users - pedestrians, bicycles, and persons with disabilities. Additionally, the project supports the State's goal for to reduce fatalities and the occurrence and severity of serious injuries on all public roadways in Arizona through enhanced roadway infrastructure and operations.
B/C Ratio = 45.6

The city of Phoenix has estimated the total project cost of this project to be \$4,715,724. Of that amount request, ADOT determined that \$3,292,304 is Highway Safety Improvement Program (HSIP) eligible, with \$1,423,420 being Other funds. In accordance with Title 23, the Federal share for safety improvement items are eligible to be funded at 100% Federal share per 23 U.S.C. 120(c) as described in Code of Federal Register 23 CFR Part 924. Therefore, the city of Phoenix does not propose to contribute any match for the above mentioned project. Furthermore, the city of Phoenix is not requesting reimbursement for staff time for installation. Table 5 summarizes the anticipated cost estimate projected for this project.

The city of Phoenix is aware that, if funded, additional HSIP funds above the attached estimated cost are not available to pay for excess costs and that other funds whether STP, local or other will have to provided or secured by the city of Phoenix to cover the additional costs or the project will have to be withdrawn and resubmitted in the next call-for-projects.

The city of Phoenix agrees to conduct and provide to ADOT TSS on a yearly basis a written before-and-after study utilizing the same crash data included in the countermeasure influence area in order to determine the effectiveness of the countermeasure on fatal and serious injury crashes.

The city of Phoenix further understands that Federal funds can only be used once to install or upgrade either a spot or systemic countermeasure and that once installed, the city of Phoenix will maintain the countermeasure at or above the standard to which it was installed.

If you have any questions, please contact Carl Langford at 602-262-4613 or email carl.langford@phoenix.gov.

Respectfully,



Kini L.E. Khudson
Director

Attachments: Application
Vicinity Map
B/C Ratio
Crash Data
List of Locations

FY 23 and FY24 HSIP Application

Agency:	City of Phoenix	Title of Project:	Improving illumination by installing additional street lighting
County:	Maricopa	COG/MPO:	MAG
District:	Central	Date:	3/29/2019
Contact:		Phone:	E-Mail:
Carl Langford		602-262-4613	carl.langford@phoenix.gov
Type of Safety Improvement:	Spot: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Systemic: <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
Mark all that apply to your project: <input checked="" type="checkbox"/> Design <input checked="" type="checkbox"/> Construction <input checked="" type="checkbox"/> Procurement <input checked="" type="checkbox"/> Non-Infrastructure			
Anticipated Total Cost Estimate:		\$4,715,724.39	
Anticipated dollar amount of HSIP Funding:		\$3,292,304.34	
Anticipated Dollar amount of Local Match (5.7%) (5.66%):		\$0.00	
Anticipated Dollar amount of Other:		\$1,423,420.05	
Funding Source: <input checked="" type="checkbox"/> 100% HSIP <input type="checkbox"/> 94.3% <input type="checkbox"/> 94.34% HSIP	Cost Estimate Tab: 5. 100% Contract Install		
Administration of Project:	Agency: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	ADOT: <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
Name and Title of COG/MPO Representative:		Margaret Herrera	
Basic Project Information			
Anticipated Design Year (Construction year cannot be the same):		<input checked="" type="checkbox"/> FY23	
If additional ROW is needed, what FY is purchase anticipated?:		<input type="checkbox"/> FY23 <input type="checkbox"/> FY24	
Anticipated Construction Year:		<input checked="" type="checkbox"/> FY24	
1.	Have lower cost countermeasures been considered or implemented? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
1a.	If "Yes", describe: If "No", explain why not:	There are not any lower cost countermeasures that could be applied to effectively reduce fatal and serious/incapitating crashes.	
2.	Which 23 USC 148 highway safety improvement project category does this project come under?		
2a.	22. Roadway safety infrastructure improvementsincluded in "Hwy Design Book" for older drivers/ped		
3.	Describe your safety improvement project in detail: (50 words or less)		
3a.	Staff has identified 16 half-mile segments of roadway that only have street lighting on one side of the roadway and have high amounts of crashes that occurred during dark lighting conditions. This project will improve illumination on roadways by installing street lighting on the other side of the street. The first countermeasure that will be applied is CMF 571 - Illumination		
4.	Describe the location of this safety project:		

FY 23 and FY24 HSIP Application

Agency:	City of Phoenix	Title of Project:	Improving illumination by installing additional street lighting
County:	Maricopa	COG/MPO:	MAG
District:	Central	Date:	3/29/2019
4a.	<ol style="list-style-type: none"> 1. 27th Ave between Missouri Ave and Bethany Home Rd 2. 27th Ave between Maryland Ave and Glendale Ave 3. 27th Ave between Campbell Ave and Camelback Rd 4. 27th Ave between Indian School Rd and Campbell Ave 5. 27th Ave between Osborn Rd and Indian School Rd 6. 43rd Ave between Maryland Ave and Bethany Home Rd 7. 43rd Ave between Maryland Ave and Glendale Rd 8. Bethany Home Rd between 35th Ave and 39th Ave 9. Peoria Rd between 39th Ave and 43rd Ave 10. Peoria Rd between 35th Ave and 39th Ave 11. Thomas Rd between 27th Ave and 31st Ave 12. Thomas Rd between 31st Ave and 35th Ave 13. Thomas Rd between 43rd Ave and 47th Ave 14. Thomas Rd between 47th Ave and 51st Ave 		
5.	What crash data screening method was used to identify this project?		
5a.	The city of Phoenix identified half-mile segments that only had lighting on one side of the roadway and had a high rate of dark fatalities and serious injuries. Staff evaluated each location and identified appropriate locations for streetlights.		
6.	What is the safety justification for the proposed project?		
6a.	The intent of this project is to improve illumination of roadways at night. The ultimate goal is to reduce dark crashes that result in fatalities and incapacitating injuries. By installing additional street lighting, the city of Phoenix intends to improve visibility for all road users.		
7.	Will there be ground disturbing activities? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		
8.	Is project within applicants permanent ROW? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
8a.	If NO please explain:	The 43rd Ave between Maryland Ave and Bethany Home Rd and 43rd Ave between Maryland Ave and Glendale Ave are partially in the city of Glendale's ROW. The city of Phoenix has worked with the city of Glendale before with similar circumstances and plans to enter an IGA for the project.	

FY 23 and FY24 HSIP Application

Agency:	City of Phoenix	Title of Project:	Improving illumination by installing additional street lighting	
County:	Maricopa	COG/MPO:	MAG	
District:	Central	Date:	3/29/2019	
9.	Will any temporary right-of-way acquisitions be required?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
10.	Will there be any utility relocation needed?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
10a.	If YES please explain:	Because there are overhead powerlines and underground utilities that conflict with the proposed location of poles, the project is likely to require some level of utility relocation.		
11.	Does Section 4(f) apply to any portion of this project?		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
11a.	If YES please explain:			
12.	Are there any other issues that may impact or delay development or construction of this project?		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
12a.	If YES please explain:			
13.	Is this project in compliance with revised ADA Standards?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
13a.	If NO please explain:			
14.	Does the project support Arizona's Strategic Highway Safety Plan?		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
15.	Are there any Studies, RSA's or Other evaluations that support this project?		<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
16.	If the project is a traffic control device requiring a warrant, is a copy attached?		<input type="checkbox"/> YES	<input type="checkbox"/> NO
17.	HSIP Roadway Functional Classification:		Urban Principal Arterial - Other	
18.	For projects on State System:	BMP:	EMP:	
19.	Average Daily Traffic Volume and Year Collected:		ADT: 10,000-56,000	Year: 2016
20.	What is the source of ADT?:	City of Phoenix Volume map		
21.	What is the posted speed limit?	45 mph		
22.	Detailed engineer's cost estimate attached:		<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
"Systemic" Safety Project				
23.	Completed B/C Ratio Tabulation Sheet Attached (Required):		<input type="checkbox"/> YES	<input type="checkbox"/> NO

FY 23 and FY24 HSIP Application

Agency:	City of Phoenix	Title of Project:	Improving illumination by installing additional street lighting
County:	Maricopa	COG/MPO:	MAG
District:	Central	Date:	3/29/2019
24.	Most current 5 Years Crash Data from ADOT ALISS database sorted by year & severity (required):		
25.	What are the inclusive dates of the crash data?		
26.	Have all crashes that will not be influenced by this countermeasure been deleted from the crash list? (pedestrian, pedalcycle, etc. as applicable)		
27.	If purchasing equipment or materials, who will install?	<input type="checkbox"/> Town/City <input type="checkbox"/> County <input type="checkbox"/> Tribe <input type="checkbox"/> Contractor	
28.	Does the project require proprietary items (23CFR 635.411)?:	<input type="checkbox"/> Yes <input type="checkbox"/> No	
29.	Is a list of locations for systemic projects provided on the attached form?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
30.	How are (will) the proposed locations be prioritized for replacement? (explain below)		
30a.			
31.	Are the supporting structures in good condition, meet local standards and have an anticipated service life longer than the countermeasure being installed?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
"Spot" Improvement Projects Only			
32.	Completed B/C Ratio Tabulation Sheet Attached (required):	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
33.	Is the most current 5 Years Crash Data from ADOT ALISS database sorted by year & severity attached and in correct format? (required):	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
34.	What are the inclusive dates of the crash data?	2013-2017	
35.	Have all crashes that will not be influenced by this countermeasure been deleted from the crash list? (pedestrian, pedalcycle etc. as applicable)	Yes	
36.	Have any infrastructure changes occurred within the work limits of this project during the years the crash data covers?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
37.	If YES please explain:		
38.	Project vicinity map is provided:	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
39.	Project work limits map is provided:	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
SHSP - All Projects			

FY 23 and FY24 HSIP Application

Agency:	City of Phoenix	Title of Project:	Improving illumination by installing additional street lighting
County:	Maricopa	COG/MPO:	MAG
District:	Central	Date:	3/29/2019
40.	Which SHSP Emphasis Area (EA) does this project support?:	Nonmotorized_Users	
40a.	Which EA Strategy does it support?:	(Pedestrians) Improve sight distance and/or visibility between motor vehicles and pedestrians.	
40b.	Does this project support a second SHSP EA? If so, which EA.:		
40c.	Which EA Strategy supports the second EA?		
40d.	Does this project support a third SHSP EA? If so, which EA.:		
40e.	Which EA Strategy supports the third EA?		
41.	Does this project support one of the nine FHWA proven countermeasures?:	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
41a.	If so, which countermeasure?:		
42.	Does this project support one of the three Arizona Focus Areas?:	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
42a.	If so, which focus area?:	Pedestrian	
43.	Which HSIP Improvement Category does this project support?:	Lighting	
43a.	Which HSIP Improvement Sub-Category does this project support?:	Continuous roadway lighting	
44.	Does your COG/MPO have a Strategic Transportation Safety Plan (STSP)?:	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
44a.	If "YES", does this project support an Emphasis Area in the COG/MPO STSP?:	Yes	
44b.	List the EA:	Eliminate Death and Severe Injury for vulnerable road users - Pedestrian, bicycles, and persons with disabilities	
44c.	If your COG/MPO has a STSP and it was Federally Funded and you answered NO in 41a, explain why this project is being submitted over a STSP identified project. (For Local Agencies Only)		

FY 23 and FY24 HSIP Application

Agency:	City of Phoenix	Title of Project:	Improving illumination by installing additional street lighting	
County:	Maricopa	COG/MPO:	MAG	
District:	Central	Date:	3/29/2019	
44d.	Rational:	N/A		
45.	Are any temporary safety countermeasures needed prior to this permanent solution being installed?			
45a.	If yes, please explain:	N/A		
46.	For State Agencies, has the Regional Traffic Engineer been made aware of this potential project and does he/she concur with it?		<input type="checkbox"/> YES <input type="checkbox"/> NO	
Strategic Transportation Safety Plans Funds (COG/MPO)				
47.	What is the date of your last STSP or update completed?			
48.	How many projects that were identified in your last STSP or update were submitted for HSIP funding?			
49.	What was the total dollar amount of the projects in question 45?			
50.	How many projects that were submitted for HSIP funding were eligible and funded by ADOT?			
51.	What was the total dollar amount of the projects in question 47?			
B/C Ratio				
52.	The calculated B/C Ratio is:	45.60	CMF ID Number:	571.00
			2nd CMF ID No.:	
			3rd CMF ID NO.:	

Required for all HSIP Applications					
Agency:	City of Phoenix	Title of Project:	Improving illumination by installing additional street lighting		
Benefit / Cost Ratio Tabulation					
Annual Benefit Tabulation					
Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	4.80	69%	3.31	\$9,515,371	\$31,514,909
Incapacitating Injury	7.60	32%	2.43	\$550,499	\$1,338,814
Total Annual Benefits					\$32,853,722
Costs					
Total Project Cost					\$4,715,724
Project Life (years)					10
Interest Rate (%)					8%
Capital Recovery Factor					0.1490
Annual Construction Cost					\$702,782
Annual Maintenance Cost					\$16,960.00
Total Annual Costs					\$719,742
Benefit / Cost					
Annual Benefit		Annual cost		Benefit / Cost Ratio	
\$32,853,722		\$719,742		45.6	
*REQUIRED: Use 4 and 5 star CMFs from ADOT Lists <u>Only</u> at Tabs 11 - 12 preferred. The CMF's CRF is used in the above calculation					

Street Lighting

Project ID	Inputs										Analysis							
	Total Project Cost	Project Life (years)	Annual Maintenance Cost	Crash Statistics			Street Lighting		Fatal Crashes Reduced (Average Annual)	Incapacitating crashes Reduced (Average Annual)	Annual Benefit	Capital Recovery Factor	Annual Capital Cost	Annual O&M Cost	Total Annual Cost	B/C Ratio		
				Dark Fatal Total	Dark Incapacitating Injury Total	Number of Years	Fatality CR	Injury CRF										
Thomas Road 43rd Ave to 47th Ave	\$402,219	10	\$1,060	2	5	5	69%	32%	0.28	0.32	\$ 2,802,402	0.1490	\$ 59,943	\$ 1,060	\$ 61,003	45.9		
27th Ave Missouri to Bethany Home	\$300,547	10	\$1,060	2	3	5	69%	32%	0.28	0.19	\$ 2,731,938	0.1490	\$ 44,790	\$ 1,060	\$ 45,850	59.5		
Bethany Home Road 35th Ave to 39th Ave	\$300,163	10	\$1,060	2	3	5	69%	32%	0.28	0.19	\$ 2,731,938	0.1490	\$ 44,733	\$ 1,060	\$ 45,793	59.6		
Thomas Road 47th Ave to 51st Ave	\$428,665	10	\$1,060	2	3	5	69%	32%	0.28	0.19	\$ 2,731,938	0.1490	\$ 63,884	\$ 1,060	\$ 64,944	42.0		
27th Ave Osborn to Indian School	\$310,038	10	\$1,060	2	2	5	69%	32%	0.28	0.13	\$ 2,696,706	0.1490	\$ 46,205	\$ 1,060	\$ 47,265	57.0		
27th Ave Indian School to Campbell	\$300,713	10	\$1,060	2	2	5	69%	32%	0.28	0.13	\$ 2,696,706	0.1490	\$ 44,815	\$ 1,060	\$ 45,875	58.7		
Peoria Road 39th Ave to 43rd Ave	\$300,713	10	\$1,060	2	1	5	69%	32%	0.28	0.06	\$ 2,661,474	0.1490	\$ 44,815	\$ 1,060	\$ 45,875	58.0		
27th Ave Campbell to Camelback	\$310,038	10	\$1,060	1	3	5	69%	32%	0.14	0.19	\$ 1,418,817	0.1490	\$ 46,205	\$ 1,060	\$ 47,265	30.0		
Thomas Road 31st Ave to 35th Ave	\$310,038	10	\$1,060	1	3	5	69%	32%	0.14	0.19	\$ 1,418,817	0.1490	\$ 46,205	\$ 1,060	\$ 47,265	30.0		
Peroria Road 35th Ave to 39th Ave	\$310,038	10	\$1,060	1	3	5	69%	32%	0.14	0.19	\$ 1,418,817	0.1490	\$ 46,205	\$ 1,060	\$ 47,265	30.0		
27th Ave Maryland to Glendale	\$310,038	10	\$1,060	1	2	5	69%	32%	0.14	0.13	\$ 1,383,585	0.1490	\$ 46,205	\$ 1,060	\$ 47,265	29.2		
Thomas Road 27th Ave to 31st Ave	\$310,038	10	\$1,060	1	2	5	69%	32%	0.14	0.13	\$ 1,383,585	0.1490	\$ 46,205	\$ 1,060	\$ 47,265	29.2		
43rd Ave Bethany Home Road to Maryland Ave	\$394,929	10	\$1,060	3	3	5	69%	32%	0.28	0.19	\$ 4,045,059	0.1490	\$ 58,856	\$ 1,060	\$ 59,916	67.5		
43rd Ave Maryland Ave to Glendale Ave	\$444,423	10	\$1,060	2	3	5	69%	32%	0.28	0.19	\$ 2,731,938	0.1490	\$ 66,232	\$ 1,060	\$ 67,292	40.5		

Required for all HSIP Applications

Agency:	#REF!	Title of Project:	
----------------	-------	--------------------------	--

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.40	69%	0.28	\$9,515,371	\$2,626,242
Incapacitating Injury	1.00	32%	0.32	\$550,499	\$176,160
Total Annual Benefits					\$2,802,402

Costs

Total Project Cost	\$402,219
Project Life (years)	10
Interest Rate (%)	8%
Capital Recovery Factor	0.1490
Annual Construction Cost	\$59,943
Annual Maintenance Cost	\$1,060.00
Total Annual Costs	\$61,003

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$2,802,402	\$61,003	45.9

***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 11 - 12 preferred. The CMF's CRF is used in the above calculation**

Required for all HSIP Applications

Agency:	#REF!	Title of Project:	
----------------	-------	--------------------------	--

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.40	69%	0.28	\$9,515,371	\$2,626,242
Incapacitating Injury	0.60	32%	0.19	\$550,499	\$105,696
Total Annual Benefits					\$2,731,938

Costs

Total Project Cost	\$300,547
Project Life (years)	10
Interest Rate (%)	8%
Capital Recovery Factor	0.1490
Annual Construction Cost	\$44,790
Annual Maintenance Cost	\$1,060.00
Total Annual Costs	\$45,850

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$2,731,938	\$45,850	59.5

***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 11 - 12 preferred. The CMF's CRF is used in the above calculation**

Required for all HSIP Applications

Agency:	#REF!	Title of Project:	
Benefit / Cost Ratio Tabulation			
Annual Benefit Tabulation			
Severity	Annual Average	Estimated CRF* Reduction	Total Reduction
Fatal	0.40	69%	0.28
Incapacitating Injury	0.60	32%	0.19
Total Annual Benefits			\$2,731,938
Costs			
Total Project Cost			\$300,163
Project Life (years)			10
Interest Rate (%)			8%
Capital Recovery Factor			0.1490
Annual Construction Cost			\$44,733
Annual Maintenance Cost			\$1,060.00
Total Annual Costs			\$45,793
Benefit / Cost			
Annual Benefit	Annual cost		Benefit / Cost Ratio
\$2,731,938	\$45,793		59.6
<p>*REQUIRED: Use 4 and 5 star CMFs from ADOT Lists <u>Only</u> at Tabs 11 - 12 preferred. The CMF's CRF is used in the above calculation</p>			

Required for all HSIP Applications

Agency:	#REF!	Title of Project:	
----------------	-------	--------------------------	--

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.40	69%	0.28	\$9,515,371	\$2,626,242
Incapacitating Injury	0.60	32%	0.19	\$550,499	\$105,696
Total Annual Benefits					\$2,731,938

Costs

Total Project Cost	\$428,665	
Project Life (years)	10	
Interest Rate (%)	8%	
Capital Recovery Factor	0.1490	
Annual Construction Cost	\$63,884	
Annual Maintenance Cost	\$1,060.00	
Total Annual Costs		\$64,944

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$2,731,938	\$64,944	42.0

***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 11 - 12 preferred. The CMF's CRF is used in the above calculation**

Required for all HSIP Applications

Agency:	#REF!	Title of Project:	
----------------	-------	--------------------------	--

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.40	69%	0.28	\$9,515,371	\$2,626,242
Incapacitating Injury	0.40	32%	0.13	\$550,499	\$70,464
Total Annual Benefits					\$2,696,706

Costs

Total Project Cost	\$310,038	
Project Life (years)	10	
Interest Rate (%)	8%	
Capital Recovery Factor	0.1490	
Annual Construction Cost	\$46,205	
Annual Maintenance Cost	\$1,060.00	
Total Annual Costs		\$47,265

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$2,696,706	\$47,265	57.0

***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 11 - 12 preferred. The CMF's CRF is used in the above calculation**

Required for all HSIP Applications

Agency:	#REF!	Title of Project:	
----------------	-------	--------------------------	--

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.40	69%	0.28	\$9,515,371	\$2,626,242
Incapacitating Injury	0.40	32%	0.13	\$550,499	\$70,464
Total Annual Benefits					\$2,696,706

Costs

Total Project Cost	\$300,713	
Project Life (years)	10	
Interest Rate (%)	8%	
Capital Recovery Factor	0.1490	
Annual Construction Cost	\$44,815	
Annual Maintenance Cost	\$1,060.00	
Total Annual Costs		\$45,875

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$2,696,706	\$45,875	58.7

***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 11 - 12 preferred. The CMF's CRF is used in the above calculation**

Required for all HSIP Applications

Agency:	#REF!	Title of Project:	
----------------	-------	--------------------------	--

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.40	69%	0.28	\$9,515,371	\$2,626,242
Incapacitating Injury	0.20	32%	0.06	\$550,499	\$35,232
Total Annual Benefits					\$2,661,474

Costs

Total Project Cost	\$300,713	
Project Life (years)	10	
Interest Rate (%)	8%	
Capital Recovery Factor	0.1490	
Annual Construction Cost	\$44,815	
Annual Maintenance Cost	\$1,060.00	
Total Annual Costs		\$45,875

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$2,661,474	\$45,875	58.0

***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 11 - 12 preferred. The CMF's CRF is used in the above calculation**

Required for all HSIP Applications

Agency:	#REF!	Title of Project:	
----------------	-------	--------------------------	--

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.20	69%	0.14	\$9,515,371	\$1,313,121
Incapacitating Injury	0.60	32%	0.19	\$550,499	\$105,696
Total Annual Benefits					\$1,418,817

Costs

Total Project Cost	\$310,038	
Project Life (years)	10	
Interest Rate (%)	8%	
Capital Recovery Factor	0.1490	
Annual Construction Cost	\$46,205	
Annual Maintenance Cost	\$1,060.00	
Total Annual Costs		\$47,265

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$1,418,817	\$47,265	30.0

***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 11 - 12 preferred. The CMF's CRF is used in the above calculation**

Required for all HSIP Applications

Agency:	#REF!	Title of Project:	
----------------	-------	--------------------------	--

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.20	69%	0.14	\$9,515,371	\$1,313,121
Incapacitating Injury	0.60	32%	0.19	\$550,499	\$105,696
Total Annual Benefits					\$1,418,817

Costs

Total Project Cost	\$310,038	
Project Life (years)	10	
Interest Rate (%)	8%	
Capital Recovery Factor	0.1490	
Annual Construction Cost	\$46,205	
Annual Maintenance Cost	\$1,060.00	
Total Annual Costs		\$47,265

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$1,418,817	\$47,265	30.0

***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 11 - 12 preferred. The CMF's CRF is used in the above calculation**

Required for all HSIP Applications

Agency:	#REF!	Title of Project:	
----------------	-------	--------------------------	--

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.20	69%	0.14	\$9,515,371	\$1,313,121
Incapacitating Injury	0.60	32%	0.19	\$550,499	\$105,696
Total Annual Benefits					\$1,418,817

Costs

Total Project Cost	\$310,038	
Project Life (years)	10	
Interest Rate (%)	8%	
Capital Recovery Factor	0.1490	
Annual Construction Cost	\$46,205	
Annual Maintenance Cost	\$1,060.00	
Total Annual Costs		\$47,265

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$1,418,817	\$47,265	30.0

***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 11 - 12 preferred. The CMF's CRF is used in the above calculation**

Required for all HSIP Applications

Agency:	#REF!	Title of Project:	
----------------	-------	--------------------------	--

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.20	69%	0.14	\$9,515,371	\$1,313,121
Incapacitating Injury	0.40	32%	0.13	\$550,499	\$70,464
Total Annual Benefits					\$1,383,585

Costs

Total Project Cost	\$310,038	
Project Life (years)	10	
Interest Rate (%)	8%	
Capital Recovery Factor	0.1490	
Annual Construction Cost	\$46,205	
Annual Maintenance Cost	\$1,060.00	
Total Annual Costs		\$47,265

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$1,383,585	\$47,265	29.2

***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 11 - 12 preferred. The CMF's CRF is used in the above calculation**

Required for all HSIP Applications

Agency:	#REF!	Title of Project:	
----------------	-------	--------------------------	--

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.20	69%	0.14	\$9,515,371	\$1,313,121
Incapacitating Injury	0.40	32%	0.13	\$550,499	\$70,464
Total Annual Benefits					\$1,383,585

Costs

Total Project Cost	\$310,038
Project Life (years)	10
Interest Rate (%)	8%
Capital Recovery Factor	0.1490
Annual Construction Cost	\$46,205
Annual Maintenance Cost	\$1,060.00
Total Annual Costs	\$47,265

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$1,383,585	\$47,265	29.2

***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 11 - 12 preferred. The CMF's CRF is used in the above calculation**

Required for all HSIP Applications

Agency:	#REF!	Title of Project:	
----------------	-------	--------------------------	--

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.60	69%	0.41	\$9,515,371	\$3,939,364
Incapacitating Injury	0.60	32%	0.19	\$550,499	\$105,696
Total Annual Benefits					\$4,045,059

Costs

Total Project Cost	\$394,929
Project Life (years)	10
Interest Rate (%)	8%
Capital Recovery Factor	0.1490
Annual Construction Cost	\$58,856
Annual Maintenance Cost	\$1,060.00
Total Annual Costs	\$59,916

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$4,045,059	\$59,916	67.5

***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 11 - 12 preferred. The CMF's CRF is used in the above calculation**

Required for all HSIP Applications

Agency:	#REF!	Title of Project:	
----------------	-------	--------------------------	--

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.40	69%	0.28	\$9,515,371	\$2,626,242
Incapacitating Injury	0.60	32%	0.19	\$550,499	\$105,696
Total Annual Benefits					\$2,731,938

Costs

Total Project Cost	\$444,423
Project Life (years)	10
Interest Rate (%)	8%
Capital Recovery Factor	0.1490
Annual Construction Cost	\$66,232
Annual Maintenance Cost	\$1,060.00
Total Annual Costs	\$67,292

Benefit / Cost

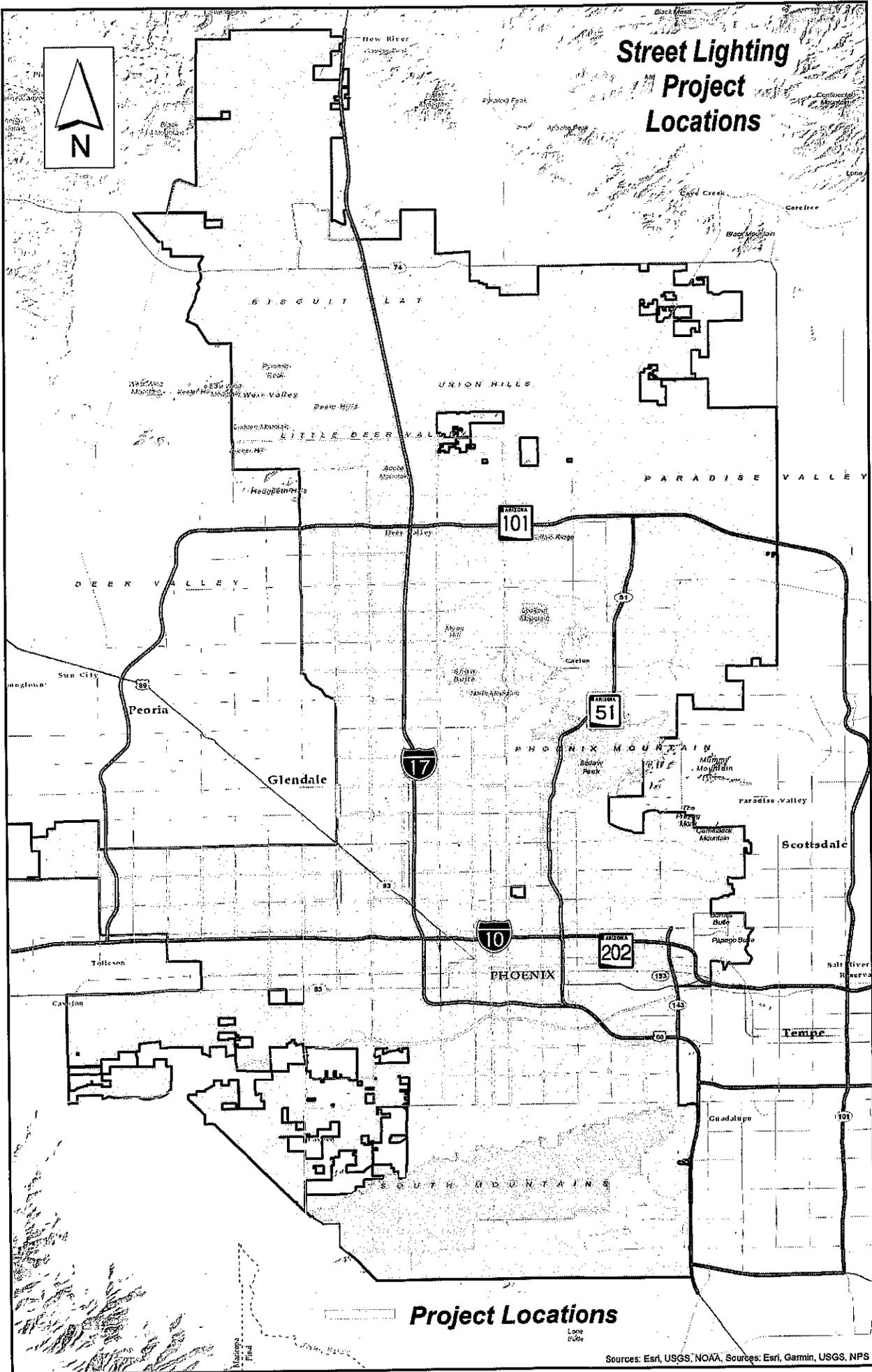
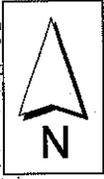
Annual Benefit	Annual cost	Benefit / Cost Ratio
\$2,731,938	\$67,292	40.5

***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 11 - 12 preferred. The CMF's CRF is used in the above calculation**

IncidentID	Year	Onroad	Crossroad	MC	LC	1stHarm	TotUnits	InjTot	FatTot	Sev
3072962	2016	27th Av	Bethany Home Rd	Pedestrian	Dark	Pedestrian	2	0	1	Fatal
3292904	2017	27th Av	Montebello Av	Pedestrian	Dawn	Pedestrian	2	0	1	Fatal
3079240	2016	27th Av	Ocotillo Rd	Pedestrian	Dark	Pedestrian	2	0	1	Fatal
3042823	2015	Camelback Rd	27th Av	Pedestrian	Dawn	Pedestrian	2	0	1	Fatal
2951472	2014	27th Av	Glenrosa Av	Pedestrian	Dark	Pedestrian	2	0	1	Fatal
2959526	2015	27th Av	Devonshire Av	Pedestrian	Dark	Pedestrian	3	0	1	Fatal
2966682	2015	27th Av	Weldon Av	Pedestrian	Dark	Pedestrian	2	0	1	Fatal
2808235	2013	Thomas Rd	46th Av	Pedestrian	Dark	Pedestrian	2	0	1	Fatal
3076212	2016	Thomas Rd	44th Ln	Pedestrian	Dawn	Pedestrian	3	0	1	Fatal
3053904	2015	Glendale Av	43rd Av	Bike	Dawn	Bicyclist	2	0	1	Fatal
3194849	2016	Bethany Home Rd	37th Av	Pedestrian	Dark	Pedestrian	3	0	1	Fatal
2746489	2013	Bethany Home Rd	38th Av	Bike	Dark	Bicyclist	2	0	1	Fatal
3043328	2015	35th Av	Bethany Home Rd	Bike	Dark	Bicyclist	4	0	1	Fatal
2840820	2013	Thomas Rd	48th Dr	Pedestrian	Dark	Pedestrian	2	0	1	Fatal
3196875	2016	Thomas Rd	48th Dr	Head On	Dark	Motor Vehicle	3	5	1	Fatal
2796262	2013	Thomas Rd	33rd Av	Pedestrian	Dark	Pedestrian	2	0	1	Fatal
2926557	2015	35th Av	Thomas Rd	Left Turn	Dark	Motor Vehicle	2	1	1	Fatal
2853494	2014	Thomas Rd	29th Av	Pedestrian	Dark	Pedestrian	2	0	1	Fatal
2853494	2014	Thomas Rd	29th Av	Pedestrian	Dark	Pedestrian	2	0	1	Fatal
3190454	2016	43rd Av	Cavalier Dr	Bike	Dark	Bicyclist	2	0	1	Fatal
3286760	2017	43rd Av	Citrus Wy	Left Turn	Dark	Motor Vehicle	2	1	1	Fatal
3321980	2017	43rd Av	Maryland Av	Pedestrian	Dark	Pedestrian	3	1	1	Fatal
2941799	2014	43rd Av	Glendale Av	Pedestrian	Dark	Pedestrian	2	0	1	Fatal
2766815	2013	27th Av	Missouri Av	Pedestrian	Dark	Pedestrian	2	1	0	Serious
3083529	2016	27th Av	Missouri Av	Pedestrian	Dark	Pedestrian	2	1	0	Serious
3023492	2015	27th Av	Bethany Home Rd	Bike	Dark	Bicyclist	2	1	0	Serious
2692126	2013	27th Av	Glendale Av	Left Turn	Dark	Motor Vehicle	2	2	0	Serious
3214322	2017	Tuckey Ln	27th Av	Rear End	Dark	Motor Vehicle	2	2	0	Serious
3169973	2016	27th Av	Pierson St	Pedestrian	Dark	Pedestrian	2	1	0	Serious
3231090	2017	27th Av	Glenrosa Av	Left Turn	Dark	Motor Vehicle	2	1	0	Serious
3288148	2017	27th Av	Campbell Av	Angle	Dark	Motor Vehicle	2	3	0	Serious
3016409	2015	27th Av	Glenrosa Av	Pedestrian	Dark	Pedestrian	2	1	0	Serious
3231090	2017	27th Av	Glenrosa Av	Left Turn	Dark	Motor Vehicle	2	1	0	Serious
2705202	2013	27th Av	Weldon Av	Pedestrian	Dark	Pedestrian	2	1	0	Serious
2882625	2014	27th Av	Indian School Rd	Pedestrian	Twilight	Pedestrian	2	1	0	Serious
3277462	2017	Indian School Rd	27th Av	Pedestrian	Dark	Pedestrian	2	1	0	Serious
3173008	2017	Thomas Rd	46th Dr	Pedestrian	Dark	Pedestrian	2	1	0	Serious
2915445	2014	Thomas Rd	43rd Av	Left Turn	Dark	Motor Vehicle	4	1	0	Serious
3053808	2016	Thomas Rd	43rd Av	Single Vehicle	Dark	Barrier	1	1	0	Serious
3102315	2016	Thomas Rd	45th Av	Rear End	Dark	Motor Vehicle	3	2	0	Serious
3207702	2017	Thomas Rd	43rd Av	Single Vehicle	Dark	Curb	1	1	0	Serious
2705152	2013	Bethany Home Rd	43rd Av	Left Turn	Dark	Motor Vehicle	2	2	0	Serious
2845955	2014	Bethany Home Rd	37th Av	Pedestrian	Dark	Pedestrian	2	1	0	Serious
3191194	2017	Bethany Home Rd	37th Av	Rear End	Dark	Motor Vehicle	2	1	0	Serious
2826737	2014	Thomas Rd	49th Dr	Pedestrian	Dark	Pedestrian	2	1	0	Serious
3316365	2017	51st Av	Thomas Rd	Pedestrian	Dark	Pedestrian	2	1	0	Serious
3052984	2016	51st Av	Thomas Rd	Angle	Dark	Motor Vehicle	2	1	0	Serious
3164236	2016	Thomas Rd	33rd Av	Head On	Dark	Motor Vehicle	2	5	0	Serious
3278590	2017	Thomas Rd	29th Dr	Pedestrian	Dark	Pedestrian	2	1	0	Serious

2704894	2013	Thomas Rd	29th Av	Rear End	Dark	Motor Vehicle	2	3	0	Serious
2824595	2014	Thomas Rd	27th Av	Rear End	Dark	Motor Vehicle	3	2	0	Serious
3278590	2017	Thomas Rd	29th Dr	Pedestrian	Dark	Pedestrian	2	1	0	Serious
2704894	2013	Thomas Rd	29th Av	Rear End	Dark	Motor Vehicle	2	3	0	Serious
2824595	2014	Thomas Rd	27th Av	Rear End	Dark	Motor Vehicle	3	2	0	Serious
2821349	2014	Peoria Av	35th Av	Pedestrian	Dark	Pedestrian	2	1	0	Serious
3214857	2017	35th Av	Peoria Av	Pedestrian	Dark	Pedestrian	2	1	0	Serious
2821349	2014	Peoria Av	35th Av	Pedestrian	Dark	Pedestrian	2	1	0	Serious
3214857	2017	35th Av	Peoria Av	Pedestrian	Dark	Pedestrian	2	1	0	Serious
2749408	2013	43rd Av	Bethany Home Rd	Pedestrian	Dark	Pedestrian	2	1	0	Serious
3308285	2017	43rd Av	Rose Ln	Angle	Dark	Motor Vehicle	2	1	0	Serious
2869869	2014	43rd Av	Ocotillo Rd	Pedestrian	Dark	Pedestrian	2	1	0	Serious
3045606	2016	43rd Av	Glendale Av	Pedestrian	Dark	Pedestrian	2	1	0	Serious

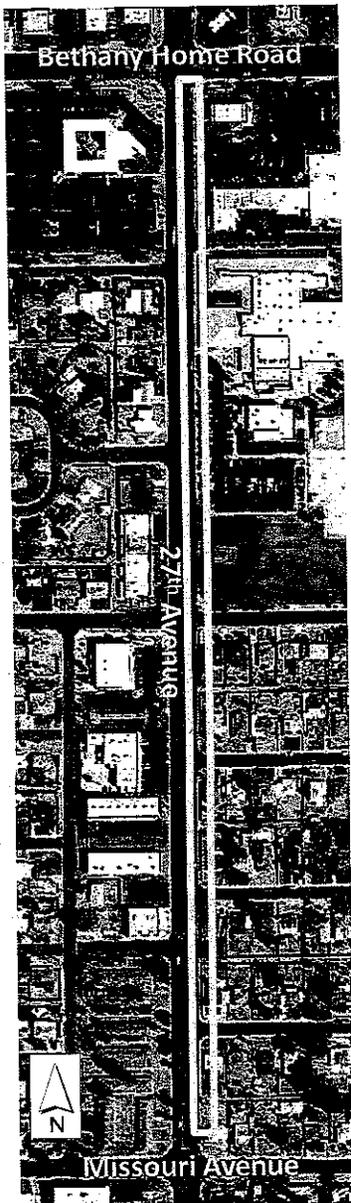
Street Lighting Project Locations



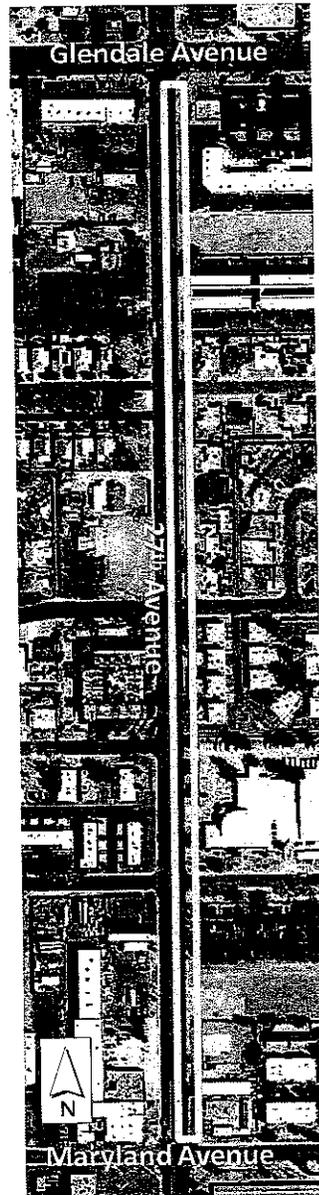
Project Locations

Sources: Esri, USGS, NOAA, Sources: Esri, Garmin, USGS, NPS

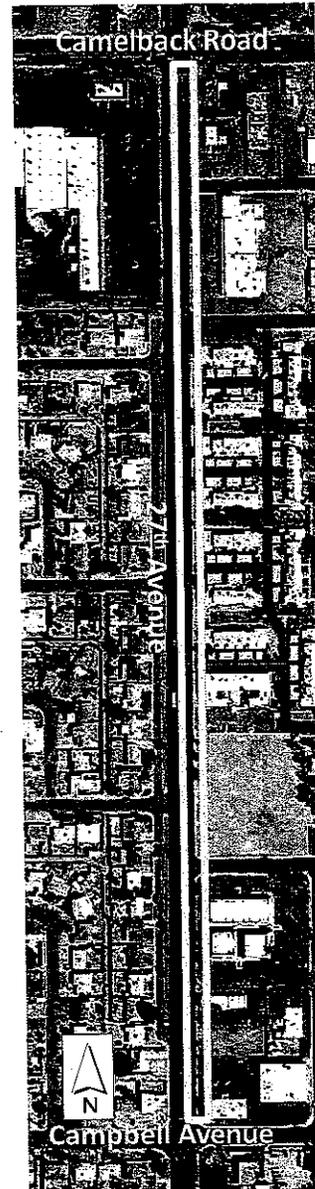
27TH Ave between Missouri Ave and Bethany Home Rd



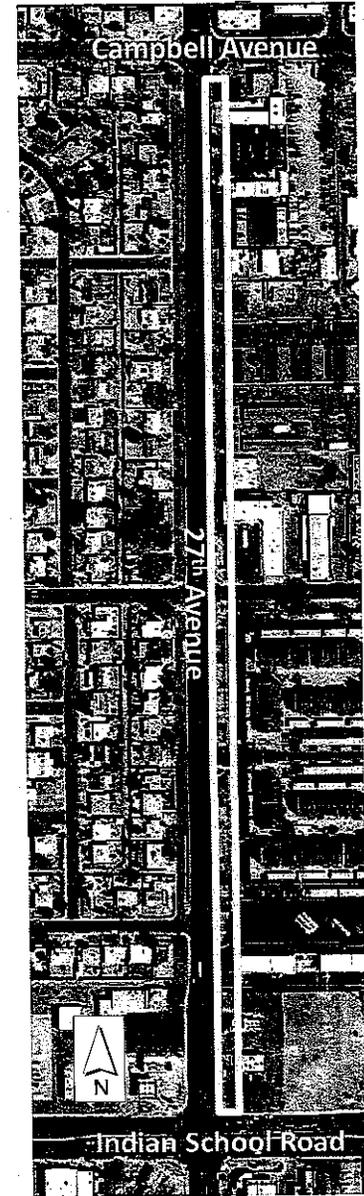
27TH Ave between Maryland Ave and Glendale Ave



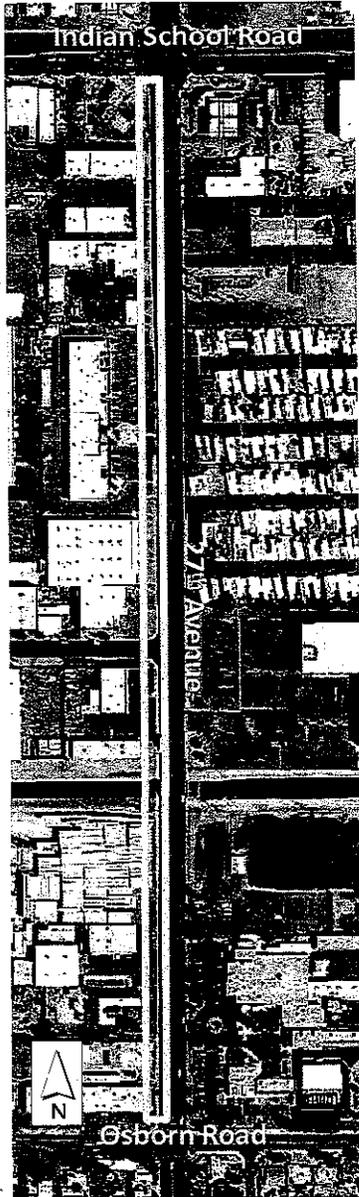
27TH Ave between Campbell Ave and Camelback Rd



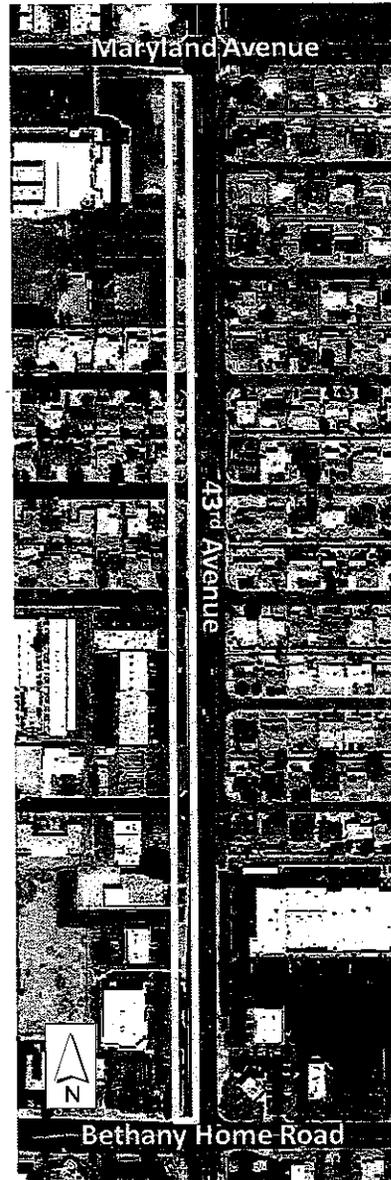
27TH Ave between Indian School Rd and Campbell Ave



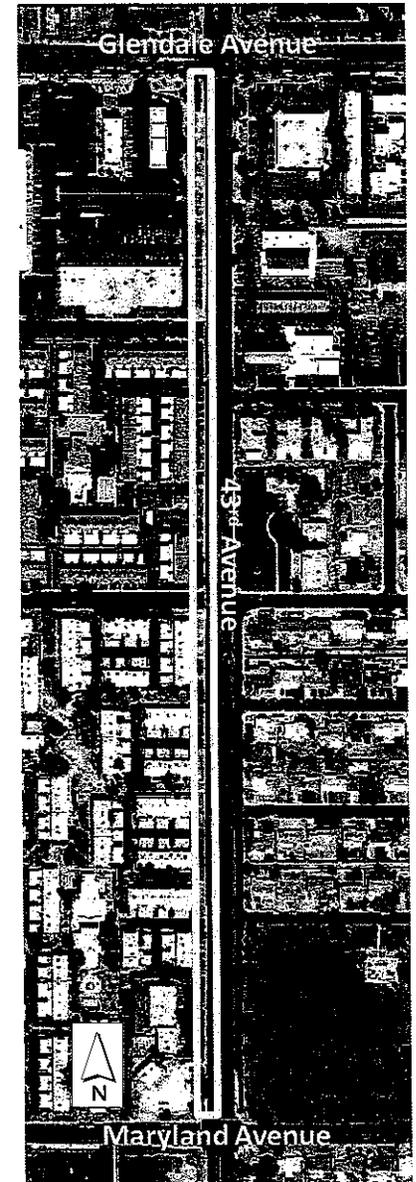
27TH Ave between Osborn Rd and Indian School Rd



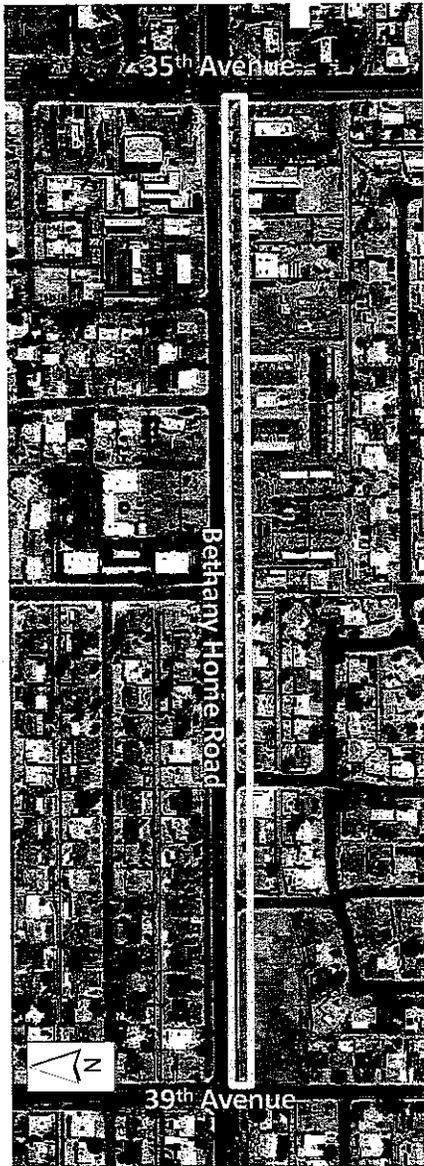
43rd Ave between Maryland Ave and Bethany Home Rd



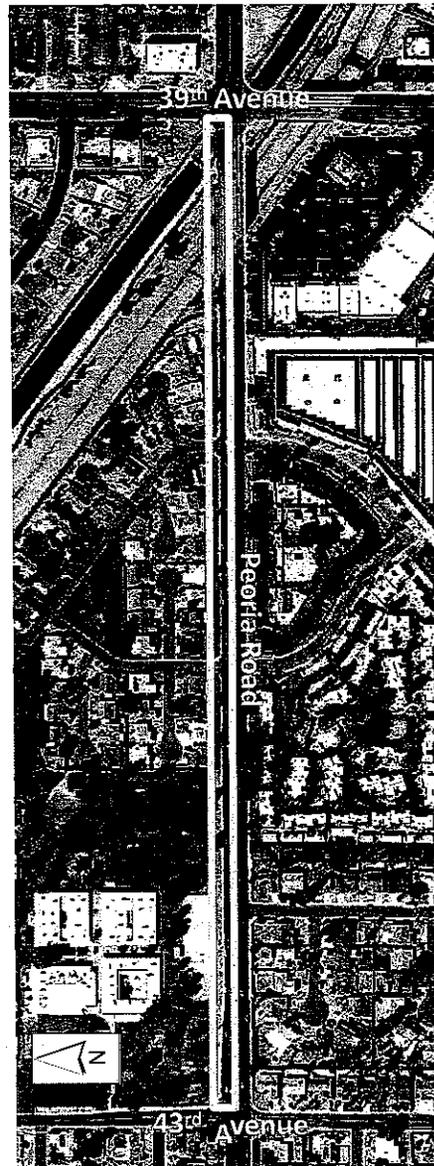
43rd Ave between Maryland Ave and Glendale Ave



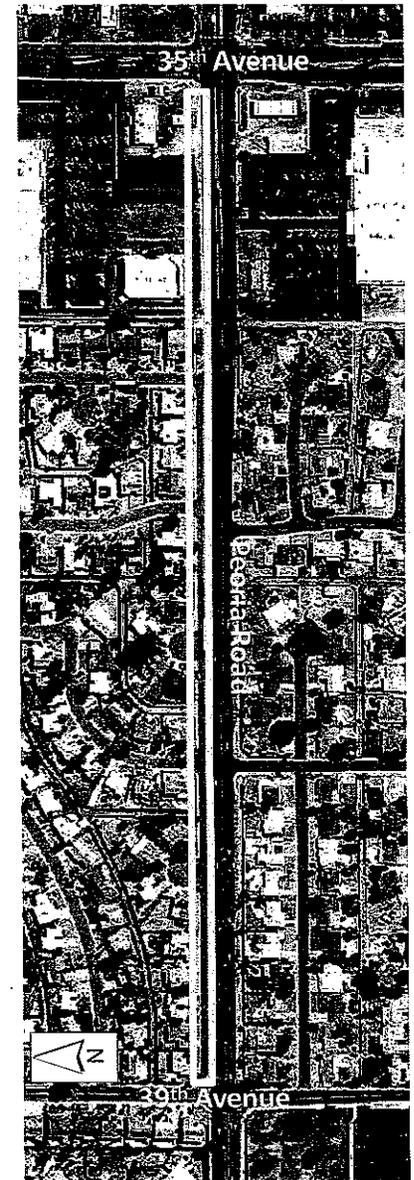
Bethany Home Road between
35th Ave and 39th Ave



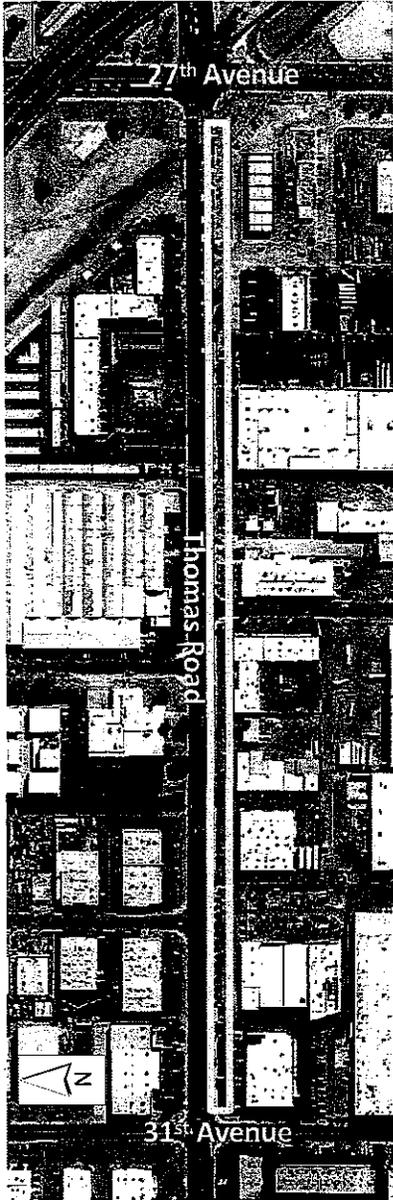
Peoria Road between 39th Ave
and 43rd Ave



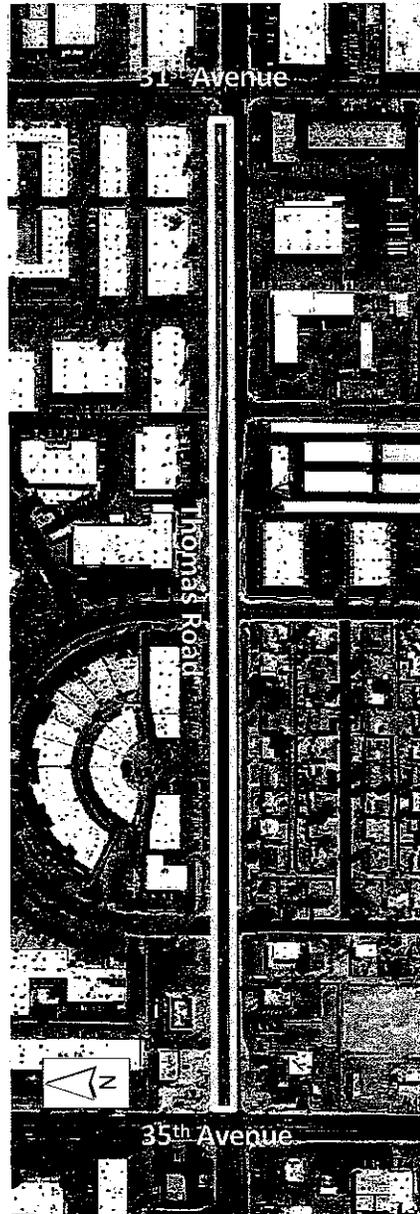
Peoria Road between 35th Ave
and 39th Ave



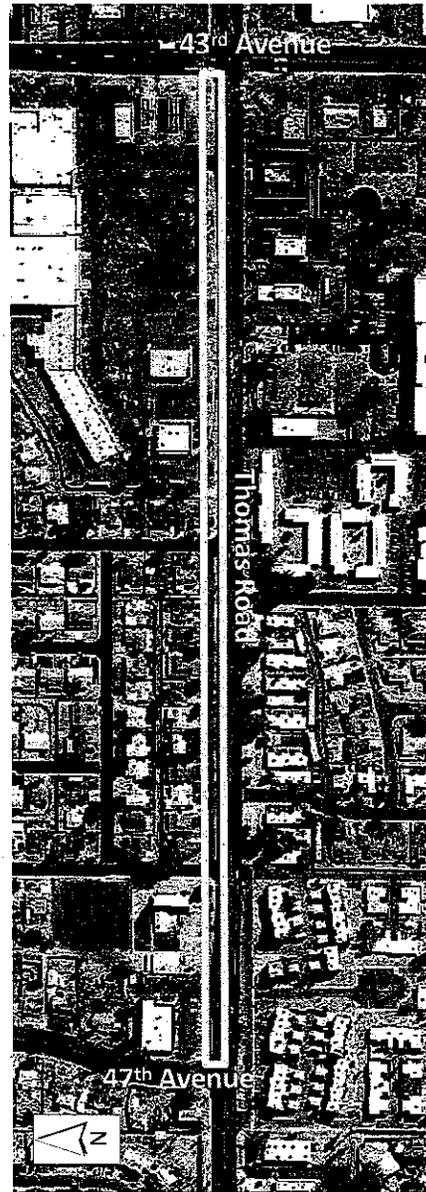
Thomas Road between 31st Ave and 27th Ave



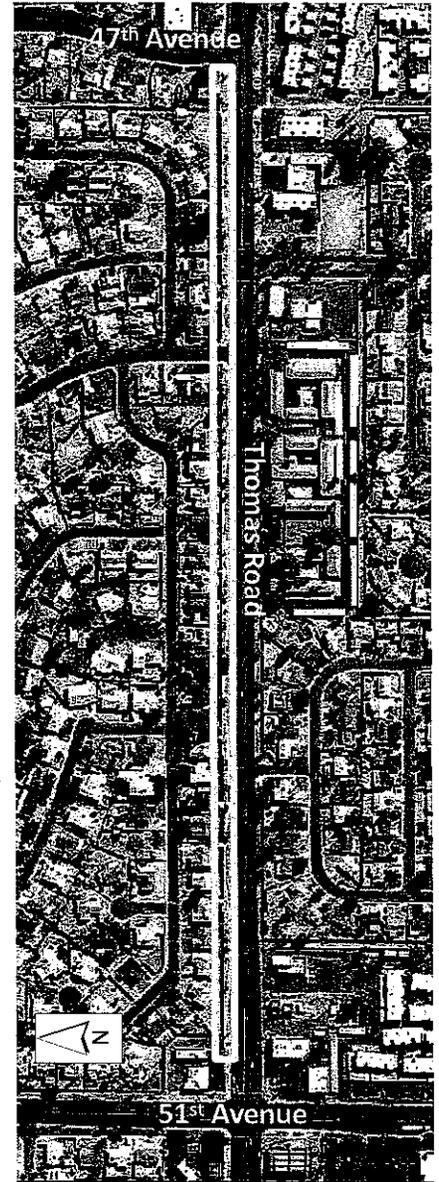
Thomas Road between 31st Ave and 35th Ave



Thomas Road between 43rd Ave and 47th Ave



Thomas Road between 47th Ave and 51st Ave





CMF / CRF Details

CMF ID: 571

Illumination

Description:

Prior Condition: *No Prior Condition(s)*

Category: Highway lighting

Study: *Handbook of Road Safety Measures* Elvik, R. and Vaa, T., 2004

Star Quality Rating: ★★★★★

Crash Modification Factor (CMF)

Value: 0.31

Adjusted Standard Error: 0.36

Unadjusted Standard Error:

Crash Reduction Factor (CRF)

Value: 69 *(This value indicates a decrease in crashes)*

Adjusted Standard Error: 36

Unadjusted Standard Error:

Applicability

Crash Type: All

Crash Severity: K (fatal)

Roadway Types: All

Number of Lanes:

Road Division Type:

Speed Limit:

Area Type: All

Traffic Volume:

Average Traffic Volume:

Time of Day:

If countermeasure is intersection-based

Intersection Type:

Intersection Geometry:

Traffic Control:

Major Road Traffic Volume:

Minor Road Traffic Volume:

Average Major Road Volume :

Average Minor Road Volume :

Development Details

Date Range of Data Used:

Municipality:

State:

Country:

Type of Methodology Used: Meta-analysis

Other Details

Included in Highway Safety Manual? No

Date Added to Clearinghouse: Dec-01-2009

Comments:

[View the Full Study Details](#)

[Export Detail Page As A PDF](#)

This site is funded by the U.S. Department of Transportation Federal Highway Administration and maintained by the University of North Carolina Highway Safety Research Center

For more information, contact Karen Scurry at karen.scurry@dot.gov

The information contained in the Crash Modification Factors (CMF) Clearinghouse is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The U.S. Government assumes no liability



CMF / CRF Details

CMF ID: 578

Illumination

Description:

Prior Condition: *No Prior Condition(s)*

Category: Highway lighting

Study: *Handbook of Road Safety Measures, Elvik, R. and Vaa, T., 2004*

Star Quality Rating: ★★★★★

Crash Modification Factor (CMF)

Value: 0.69

Adjusted Standard Error: 0.07

Unadjusted Standard Error:

Crash Reduction Factor (CRF)

Value: 32 *(This value indicates a **decrease** in crashes)*

Adjusted Standard Error: 7

Unadjusted Standard Error:

Applicability

Crash Type: All

Crash Severity: A (serious injury), B (minor injury), C (possible injury)

Roadway Types: All

Number of Lanes:

Road Division Type:

Speed Limit:

Area Type: Urban

Traffic Volume:

Average Traffic Volume:

Time of Day:

If countermeasure is intersection-based

Intersection Type:

Intersection Geometry:

Traffic Control:

Major Road Traffic Volume:

Minor Road Traffic Volume:

Average Major Road Volume :

Average Minor Road Volume :

Development Details

Date Range of Data Used:

Municipality:

State:

Country:

Type of Methodology Used: Meta-analysis

Other Details

Included in Highway Safety Manual? No

Date Added to Clearinghouse: Dec-01-2009

Comments:

[View the Full Study Details](#)

[Export Detail Page As A PDF](#)

This site is funded by the U.S. Department of Transportation Federal Highway Administration and maintained by the University of North Carolina Highway Safety Research Center

For more information, contact Karen Scurry at karen.scurry@dot.gov

The information contained in the Crash Modification Factors (CMF) Clearinghouse is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The U.S. Government assumes no liability