



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: Installation of HAWK/PHB signals

Project Location: 1. Thomas Road between 46th Drive and 48th Drive

2. 27th Avenue between Rose Lane and Bethany Home Road

3. McDowell Road between 51st Avenue and 53rd Avenue

4. 35th Avenue between Harrison Street and Sherman Street

5. Indian School Road between 47th Avenue and 49th Avenue

6. Perry Park on 32nd Street between Thomas Road and Virginia Avenue

7. 32nd Street between McDowell Road and Palm Lane

8. 7th Street between Union Hills Road and Michigan Avenue

9. Camelback Road between 19th Avenue and 21st Avenue

10. 43rd Avenue between Indian School Road and Whitton Avenue

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 Pedestrian Hybrid Beacons (HAWK) signals and crosswalks 10 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 the HAWK signals will require vehicles to stop at the stop bar to protect the pedestrian at the crosswalk. In addition, the street lights installed on the HAWK signal pole will increase illumination of the crosswalk and will improve visibility of the crossing pedestrians and bicyclists. 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 drilling for foundations, and 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 35 total mid-block pedestrian related crashes including 16 fatal and 10 incapacitating crashes. With a Crash Reduction Factor (CRF) of 56.8% obtained from the ADOT 4/5 Star list for all pedestrian crashes, the city of Phoenix could see a 5-year reduction of 2.96 crashes including 1.82 fatal and 1.14 serious injury crashes.

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The city of Phoenix has determined that, in accordance with 23 USC 148(a)(4)(A), this project is consistent with Maricopa Association of Government's (MAG) and the State's 2014 Strategic Highway Safety Plan (SHSP). It supports MAG's STSP (Strategic Transportation Safety Plan) 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 Nonmotorized users: reduce frequency and severity of nonmotorized users by reducing nonmotorized exposure to vehicle traffic.
B/C Ratio = 28.9

The city of Phoenix has estimated the total project cost of this project to be \$4,008,331. Of that amount request, ADOT determined that \$2,896,486 is HSIP eligible, with \$1,111,844 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.

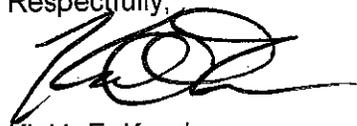
The city of Phoenix is aware that, if funded, additional Highway Safety Improvement Program (HSIP) funds above the attached estimated cost are not available to pay for excess costs and that other funds whether STP, local or other will have to provided or secured by the city of Phoenix to cover the additional 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. Knudson
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:	Installation of HAWK/PHB signals
County:	Maricopa	COG/MPO:	MAG
District:	Central	Date:	5/10/2019
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:		\$4,008,331	
Anticipated dollar amount of HSIP Funding:		\$2,896,486	
Anticipated Dollar amount of Local Match (5.7%) (5.66%):		\$0.00	
Anticipated Dollar amount of Other:		\$1,111,844	
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:	A lower cost option, such as an unsignalized crosswalk, would not effectively reduce fatalities and serious/incapacitating injuries.	
2.	Which 23 USC 148 highway safety improvement project category does this project come under?		
2a.	26. Pedestrian hybrid beacons		
3.	Describe your safety improvement project in detail: (50 words or less)		
3a.	The project will install pedestrian hybrid beacons at 10 locations. The countermeasure that will be applied is CMF 9021 - Install PHB or HAWK with advanced yield or stop marking and signs.		
4.	Describe the location of this safety project:		

FY 23 and FY24 HSIP Application

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County:	Maricopa	COG/MPO:	MAG
District:	Central	Date:	5/10/2019
4a.	<ol style="list-style-type: none"> 1. Thomas Road between 46th Drive and 48th Drive 2. 27th Avenue between Rose Lane and Bethany Home Road 3. McDowell Road between 51st Avenue and 53rd Avenue 4. 35th Avenue between Harrison Street and Sherman Street 5. Indian School Road between 47th Avenue and 49th Avenue 6. 32nd Street between Thomas Road and Osborn Road 7. 32nd Street between McDowell Road and Palm Lane 8. 7th Street between Union Hills Road and Michigan Avenue 9. Broadway Road between 16th Street and 20th Street 10. 43rd Avenue between Indian School Road and Whitton Avenue 		
5.	What crash data screening method was used to identify this project?		
5a.	The city of Phoenix identified mid-block locations that had a high rate of pedestrian/bicycle fatalities and serious injuries. Staff evaluated each location and identified appropriate locations for pedestrian hybrid signals. The locations for the HAWK were identified based on the access/connections to residential developments, parks, office parks, shopping centers, and schools the crossing could provide to the community.		
6.	What is the safety justification for the proposed project?		
6a.	The intent of this project is to provide safe and controlled mid-block crossings for pedestrians and bicyclists. The ultimate goal is to reduce pedestrian/bicyclist crashes that result in fatalities and incapacitating injuries. By installing a HAWK and additional street lighting, the city of Phoenix intends to improve the visibility of bicyclists and pedestrians and provide a safe and controlled environment for pedestrian/bicyclists crossings.		
7.	Will there be ground disturbing activities?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
8.	Is project within applicants permanent ROW?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
8a.	If NO please explain:		
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

FY 23 and FY24 HSIP Application

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District:	Central	Date:	5/10/2019
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		
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

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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			
40.	Which SHSP Emphasis Area (EA) does this project support?:	Nonmotorized_Users	
40a.	Which EA Strategy does it support?:	(Pedestrians) <input checked="" type="checkbox"/> Improve sight distance and/or visibility between motor vehicles and pedestrians.	

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40b.	Does this project support a second SHSP EA? If so, which EA.:	Roadway_Infrastructure_and_Operations	
40c.	Which EA Strategy supports the second EA?	(Intersections) Reduce frequency and severity of intersection crashes through traffic-control and operational improvements.	
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 checked="" type="checkbox"/> YES <input type="checkbox"/> NO
41a.	If so, which countermeasure?:	Pedestrian Hybrid Beacon	
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?:	Pedestrians_and_Bicyclists	
43a.	Which HSIP Improvement Sub-Category does this project support?:		
	Pedestrian beacons		
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)		
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	

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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
Stratigic 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:	28.90	CMF ID Number: 9021.00
			2nd CMF ID No.:
			3rd CMF ID NO.:

**HIGHWAY SAFETY IMPROVEMENT PROGRAM
APPLICATION - COST ESTIMATE**

Agency:	City of Phoenix	Name of Project:		Installation of HAWK/PHB Signals		Non-State Agency Cost Estimate - Countermeasure 100% HSIP Eligible				
HSIP Project Cost Estimate Worksheet										
Project Cost Estimate:	Description:	Quantity:	Unit	Unit Cost:	Total Cost	HSIP Eligible:	HSIP:	State Match:	Other Amt:	TOTAL COST
							100.00%	0.00%	0.00%	
Environmental					\$ 100,000				\$ 100,000	\$ 100,000
Design					\$ 500,000				\$ 500,000	\$ 500,000
DCM Design Administration Fee					\$ 236,966				\$ 236,966	\$ 236,966
APS/SRP Design Fee					\$ 100,000				\$ 100,000	\$ 100,000
ADOT Design Review Fee					\$ 10,000				\$ 10,000	\$ 10,000
Procurement - Design					\$ 5,000				\$ 5,000	\$ 5,000
Project Handoff Admin - Tpp/ENV/UTIL					\$ 6,520		\$ -	\$ -	\$ 6,520	\$ 6,520
Design Total					\$ 958,486	\$ -	\$ -	\$ -	\$ 958,486	\$ 958,486
Midblock Ramp		26	EA	\$ 1,500.00	\$ 39,000	\$ 39,000	\$ 39,000	\$ -	\$ -	\$ 39,000
Truncated Domes		260	SF	\$ 35.00	\$ 9,100	\$ 9,100	\$ 9,100	\$ -	\$ -	\$ 9,100
Foundation for Sign Post		40	EA	\$ 150.00	\$ 6,000	\$ 6,000	\$ 6,000	\$ -	\$ -	\$ 6,000
HAWK Signal		10	EA	\$ 125,000.00	\$ 1,250,000	\$ 1,250,000	\$ 1,250,000	\$ -	\$ -	\$ 1,250,000
Pavement Marking Symbol		40	EA	\$ 150.00	\$ 6,000	\$ 6,000	\$ 6,000	\$ -	\$ -	\$ 6,000
Pavement Marking - White		2,520	LF	\$ 0.40	\$ 1,008	\$ 1,008	\$ 1,008	\$ -	\$ -	\$ 1,008
Regulation Sign Panels		360	SF	\$ 20.00	\$ 7,200	\$ 7,200	\$ 7,200	\$ -	\$ -	\$ 7,200
Remove Concrete D/W, S/W, VG, SLAB, ETC.		500	SF	\$ 5.00	\$ 2,500	\$ 2,500	\$ 2,500	\$ -	\$ -	\$ 2,500
Remove Vert Curb & Gutter, Single Curb		500	LF	\$ 6.50	\$ 3,250	\$ 3,250	\$ 3,250	\$ -	\$ -	\$ 3,250
Sign Post (P-1) (Perforated) (Single)		40	EA	\$ 80.00	\$ 3,200	\$ 3,200	\$ 3,200	\$ -	\$ -	\$ 3,200
Streetlight - Contingencies		19	EA	\$ 3,600.00	\$ 68,400	\$ 68,400	\$ 68,400	\$ -	\$ -	\$ 68,400
Streetlight - Trenching/Power/J-Box		4,150	LF	\$ 25.00	\$ 103,750	\$ 103,750	\$ 103,750	\$ -	\$ -	\$ 103,750
Construction (infrastructure) Sub-Total					\$ 1,499,408	\$ 1,499,408	\$ 1,499,408	\$ -	\$ -	\$ 1,499,408
SWPP Allowance (.7%)					\$ 10,496	\$ 10,496	\$ 10,496	\$ -	\$ -	\$ 10,496
Misc Removal and other work (2%)					\$ 29,988	\$ 29,988	\$ 29,988	\$ -	\$ -	\$ 29,988
Mobilization (0% Local or Collector, 2% Major)					\$ 29,988	\$ 29,988	\$ 29,988	\$ -	\$ -	\$ 29,988
Traffic Control/Police Officer					\$ 74,970	\$ 74,970	\$ 74,970	\$ -	\$ -	\$ 74,970
Allowance for Extra Work					\$ 29,988	\$ 29,988	\$ 29,988	\$ -	\$ -	\$ 29,988
Contingency (20%)					\$ 299,882	\$ 299,882	\$ 299,882	\$ -	\$ -	\$ 299,882
DCM Construction Administration Fee					\$ 376,020	\$ 376,020	\$ 376,020	\$ -	\$ -	\$ 376,020
Procurement - Construction					\$ 8,000	\$ 8,000	\$ 8,000	\$ -	\$ -	\$ 8,000
Testing & Materials (1%)					\$ 19,747	\$ 19,747	\$ 19,747	\$ -	\$ -	\$ 19,747
Utilities Adjustment (5%)					\$ 98,736	\$ 98,736	\$ 98,736	\$ -	\$ -	\$ 98,736
Utility Inspection					\$ 19,747	\$ 19,747	\$ 19,747	\$ -	\$ -	\$ 19,747
Construction (other) Sub-Total					\$ 997,563	\$ 997,563	\$ 997,563	\$ -	\$ -	\$ 997,563
Construction Total					\$ 2,496,971	\$ 2,496,971	\$ 2,496,971	\$ -	\$ -	\$ 2,496,971
SUB TOTAL REQUEST					\$ 3,455,458	\$ 2,496,971	\$ 2,496,971	\$ -	\$ 958,486	\$ 3,455,457
Inflation		1.16			1.16	1.16	1.16		1.16	1.16
					\$ 4,008,331	\$ 2,896,486	\$ 2,896,486	\$ -	\$ 1,111,844	\$ 4,008,331

Comments:

**Note: To factor in inflation, the total value was multiplied by 1.16. Cost Estimates are based on the city of Phoenix's infrastructure cost estimate spreadsheet.

Required for all HSIP Applications					
Agency:	City of Phoenix	Title of Project:	Installation of HAWK/PHB Signals		
Benefit / Cost Ratio Tabulation					
Annual Benefit Tabulation					
Severity	Annual Average	Estimated CRE* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	3.20	57%	1.82	\$9,515,371	\$17,295,138
Incapacitating Injury	2.00	57%	1.14	\$550,499	\$625,367
Total Annual Benefits					\$17,920,505
Costs					
Total Project Cost					\$4,008,331
Project Life (years)					10
Interest Rate (%)					8%
Capital Recovery Factor					0.1490
Annual Construction Cost					\$597,359
Annual Maintenance Cost					\$22,000.00
Total Annual Costs					\$619,359
Benefit / Cost					
Annual Benefit		Annual cost		Benefit / Cost Ratio	
\$17,920,505		\$619,359		28.9	
<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>					

Location	Crashes Correctable by Installation of PHB		Average Peak Hour Pedestrian Crossing within 500 Feet from Proposed HAWK		Proximity to Nearest Traffic Signal/Existing PHB		Posted Speed Limit		Roadway Traffic Volume		Raised Median		Trail Crossing		Roadway Illumination		Within 500 ft of Pedestrian Activity Generator		Crossing Distance Greater than 36 ft		Total Points
	#	Points	#	Points	#	Points	#	Points	#	Points	Y/N	Points	Y/N	Points	Limited/Illuminated	Points	Y/N	Points	Y/N	Points	
32nd Street between McDowell Road and Palm Lane	2	10	No Data Available		679 ft	0	40 mph	4	NB: 17,822 SB: 17,258	6	N	S	N	0	Limited; lighting only on one side of the street. Considered dark street.	5	N	0	Y 70 ft	5	
32nd Street between Thomas and Osborn	3	15	No Data Available		541 ft	0	40 mph	4	NB: 10,844 SB: 10,336	6	N	S	N	0	Limited; lighting only on one side of the street. Considered dark street.	5	Yes; Near Career Success Schools: Sage Elementary School	5	Y 60 ft	5	
Broadway Road between 16th St and 20th St	2	10	No Data Available		1,775 ft	5	40 mph	4	WB: 12,001 EB: 13,254	6	Y	0	N	0	Limited; lighting only on one side of the street. Considered dark street.	5	Yes; HAWK is directly adjacent to a community garden.	5	Area has median	0	
27th Ave between Rosa Lane and Bethany Home Road	3	15	No Data Available		388 ft	-5	40 mph	4	NB: 10,840 SB: 9,741	6	N	S	N	0	Limited; lighting only on one side of the street. Considered dark street.	5	N	0	Y 68 ft	5	
McDowell Rd between 51st Ave and 53rd Ave	3	15	No Data Available		665 ft	0	45 mph	4	WB: 13,546 EB: 13,056	6	N	S	N	0	Limited; lighting only on one side of the street. Considered dark street.	5	N	0	Y 60 ft	5	
Thomas Road between 46th Drive and 48th Drive	3	15	No Data Available		801 ft	0	40 mph	4	WB: 16,138 EB: 16,209	6	N	S	N	0	Limited; lighting only on one side of the street. Considered dark street.	5	N	0	Y 62 ft	5	
Indian School Road between 51st Ave and 53rd Ave	2	10	No Data Available		542 ft	0	40 mph	4	WB: 19,260 EB: 21,139	6	N	S	N	0	Limited; lighting only on one side of the street. Considered dark street.	5	N	0	Y 62 ft	5	
43rd Ave between Indian School Road and Whitton Ave	3	15	No Data Available		1,117 ft	5	40 mph	4	NB: 17,981 SB: 15,586	6	N	S	N	0	Limited; lighting only on one side of the street. Considered dark street.	5	N	0	Y 62 ft	5	
35th Ave between Harrison Street and Sherman Street	3	15	No Data Available		1,016 ft	5	40 mph	4	NB: 15,256 SB: 11,606	6	N	S	N	0	Limited; lighting only on one side of the street. Considered dark street.	5	N	0	Y 57 ft	5	
7th Street between Union Hills Road and Michigan Ave	2	10	No Data Available		713 ft	0	45 mph	4	NB: 16,124 SB: 16,793	6	N	S	N	0	Limited; lighting only on one side of the street. Considered dark street.	5	N	0	Y 81 ft	5	

HAWKS

Project ID	Inputs										Analysis								
	Total Project Cost	Project Life (years)	Annual Maintenance Cost	Fatal Crashes	Incapacitating Injury Crashes	Number of Years	Fatality CRF*	Injury CRF*	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			
Thomas Road between 46th Drive and 48th Drive	\$390,668	10	\$2,200	2	1	5	57%	57%	0.23	0.11	\$ 2,224,429	0.1490	\$ 58,221	\$ 2,200	\$ 60,421	36.8			
27th Ave between Rose Lane and Bethany Home Road	\$390,463	10	\$2,200	2	1	5	57%	57%	0.23	0.11	\$ 2,224,429	0.1490	\$ 58,191	\$ 2,200	\$ 60,391	36.8			
McDowell Rd between 51st Ave and 53rd Ave	\$401,436	10	\$2,200	3	0	5	57%	57%	0.34	0.00	\$ 3,242,838	0.1490	\$ 59,826	\$ 2,200	\$ 62,026	52.2			
35th Ave between Harrison Street and Sherman Street	\$401,436	10	\$2,200	1	2	5	57%	57%	0.11	0.23	\$ 1,206,020	0.1490	\$ 59,826	\$ 2,200	\$ 62,026	19.4			
Indian School Road between 51st Ave and 53rd Ave	\$417,150	10	\$2,200	1	1	5	57%	57%	0.11	0.11	\$ 1,143,483	0.1490	\$ 62,168	\$ 2,200	\$ 64,368	17.7			
32nd Street between Thomas and Osborn	\$401,436	10	\$2,200	1	2	5	57%	57%	0.11	0.23	\$ 1,206,020	0.1490	\$ 59,826	\$ 2,200	\$ 62,026	19.4			
32nd Street between McDowell Road and Palm Lane	\$401,436	10	\$2,200	2	0	5	57%	57%	0.23	0.00	\$ 2,161,892	0.1490	\$ 59,826	\$ 2,200	\$ 62,026	34.8			
7th Street between Union Hills Road and Michigan Ave	\$401,436	10	\$2,200	2	0	5	57%	57%	0.23	0.00	\$ 2,161,892	0.1490	\$ 59,826	\$ 2,200	\$ 62,026	34.8			
Broadway Road between 16th St and 20th St Ave	\$401,436	10	\$2,200	1	1	5	57%	57%	0.11	0.11	\$ 1,143,483	0.1490	\$ 59,826	\$ 2,200	\$ 62,026	18.4			
43rd Ave between Indian School Road and Whitton Ave	\$401,436	10	\$2,200	1	2	5	57%	57%	0.11	0.23	\$ 1,206,020	0.1490	\$ 59,826	\$ 2,200	\$ 62,026	19.4			

Required for all HSIP Applications

Agency:	#REF!	Title of Project:	
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Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.40	57%	0.23	\$9,515,371	\$2,161,892
Incapacitating Injury	0.20	57%	0.11	\$550,499	\$62,537
Total Annual Benefits					\$2,224,429

Costs

Total Project Cost	\$390,668	
Project Life (years)	10	
Interest Rate (%)	8%	
Capital Recovery Factor	0.1490	
Annual Construction Cost	\$58,221	
Annual Maintenance Cost	\$2,200.00	
Total Annual Costs		\$60,421

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$2,224,429	\$60,421	36.8

***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:	
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Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.40	57%	0.23	\$9,515,371	\$2,161,892
Incapacitating Injury	0.20	57%	0.11	\$550,499	\$62,537
Total Annual Benefits					\$2,224,429

Costs

Total Project Cost	\$390,463
Project Life (years)	10
Interest Rate (%)	8%
Capital Recovery Factor	0.1490
Annual Construction Cost	\$58,191
Annual Maintenance Cost	\$2,200.00
Total Annual Costs	\$60,391

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$2,224,429	\$60,391	36.8

***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:	
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Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.60	57%	0.34	\$9,515,371	\$3,242,838
Incapacitating Injury	0.00	57%	0.00	\$550,499	\$0
Total Annual Benefits					\$3,242,838

Costs

Total Project Cost	\$401,436	
Project Life (years)	10	
Interest Rate (%)	8%	
Capital Recovery Factor	0.1490	
Annual Construction Cost	\$59,826	
Annual Maintenance Cost	\$2,200.00	
Total Annual Costs		\$62,026

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$3,242,838	\$62,026	52.2

***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:	
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Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.20	57%	0.11	\$9,515,371	\$1,080,946
Incapacitating Injury	0.40	57%	0.23	\$550,499	\$125,073
Total Annual Benefits					\$1,206,020

Costs

Total Project Cost	\$401,436	
Project Life (years)	10	
Interest Rate (%)	8%	
Capital Recovery Factor	0.1490	
Annual Construction Cost	\$59,826	
Annual Maintenance Cost	\$2,200.00	
Total Annual Costs		\$62,026

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$1,206,020	\$62,026	19.4

***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:	
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Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.20	57%	0.11	\$9,515,371	\$1,080,946
Incapacitating Injury	0.20	57%	0.11	\$550,499	\$62,537
Total Annual Benefits					\$1,143,483

Costs

Total Project Cost	\$417,150	
Project Life (years)	10	
Interest Rate (%)	8%	
Capital Recovery Factor	0.1490	
Annual Construction Cost	\$62,168	
Annual Maintenance Cost	\$2,200.00	
Total Annual Costs		\$64,368

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$1,143,483	\$64,368	17.7

***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:	
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Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.20	57%	0.11	\$9,515,371	\$1,080,946
Incapacitating Injury	0.40	57%	0.23	\$550,499	\$125,073
Total Annual Benefits					\$1,206,020

Costs

Total Project Cost	\$401,436	
Project Life (years)	10	
Interest Rate (%)	8%	
Capital Recovery Factor	0.1490	
Annual Construction Cost	\$59,826	
Annual Maintenance Cost	\$2,200.00	
Total Annual Costs		\$62,026

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$1,206,020	\$62,026	19.4

***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	57%	0.23
Incapacitating Injury	0.00	57%	0.00
Total Annual Benefits			\$2,161,892
Costs			
Total Project Cost			\$401,436
Project Life (years)			10
Interest Rate (%)			8%
Capital Recovery Factor			0.1490
Annual Construction Cost			\$59,826
Annual Maintenance Cost			\$2,200.00
Total Annual Costs			\$62,026
Benefit / Cost			
Annual Benefit	Annual cost		Benefit / Cost Ratio
\$2,161,892	\$62,026		34.8
*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			

Required for all HSIP Applications

Agency:	#REF!	Title of Project:	
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Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.40	57%	0.23	\$9,515,371	\$2,161,892
Incapacitating Injury	0.00	57%	0.00	\$550,499	\$0
Total Annual Benefits					\$2,161,892

Costs

Total Project Cost	\$401,436	
Project Life (years)	10	
Interest Rate (%)	8%	
Capital Recovery Factor	0.1490	
Annual Construction Cost	\$59,826	
Annual Maintenance Cost	\$2,200.00	
Total Annual Costs		\$62,026

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$2,161,892	\$62,026	34.8

***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	57%	0.11	\$9,515,371	\$1,080,946
Incapacitating Injury	0.20	57%	0.11	\$550,499	\$62,537
Total Annual Benefits					\$1,143,483
Costs					
Total Project Cost					\$401,436
Project Life (years)					10
Interest Rate (%)					8%
Capital Recovery Factor					0.1490
Annual Construction Cost					\$59,826
Annual Maintenance Cost					\$2,200.00
Total Annual Costs					\$62,026
Benefit / Cost					
Annual Benefit	Annual cost		Benefit / Cost Ratio		
\$1,143,483	\$62,026		18.4		
<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:	
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Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.20	57%	0.11	\$9,515,371	\$1,080,946
Incapacitating Injury	0.40	57%	0.23	\$550,499	\$125,073
Total Annual Benefits					\$1,206,020

Costs

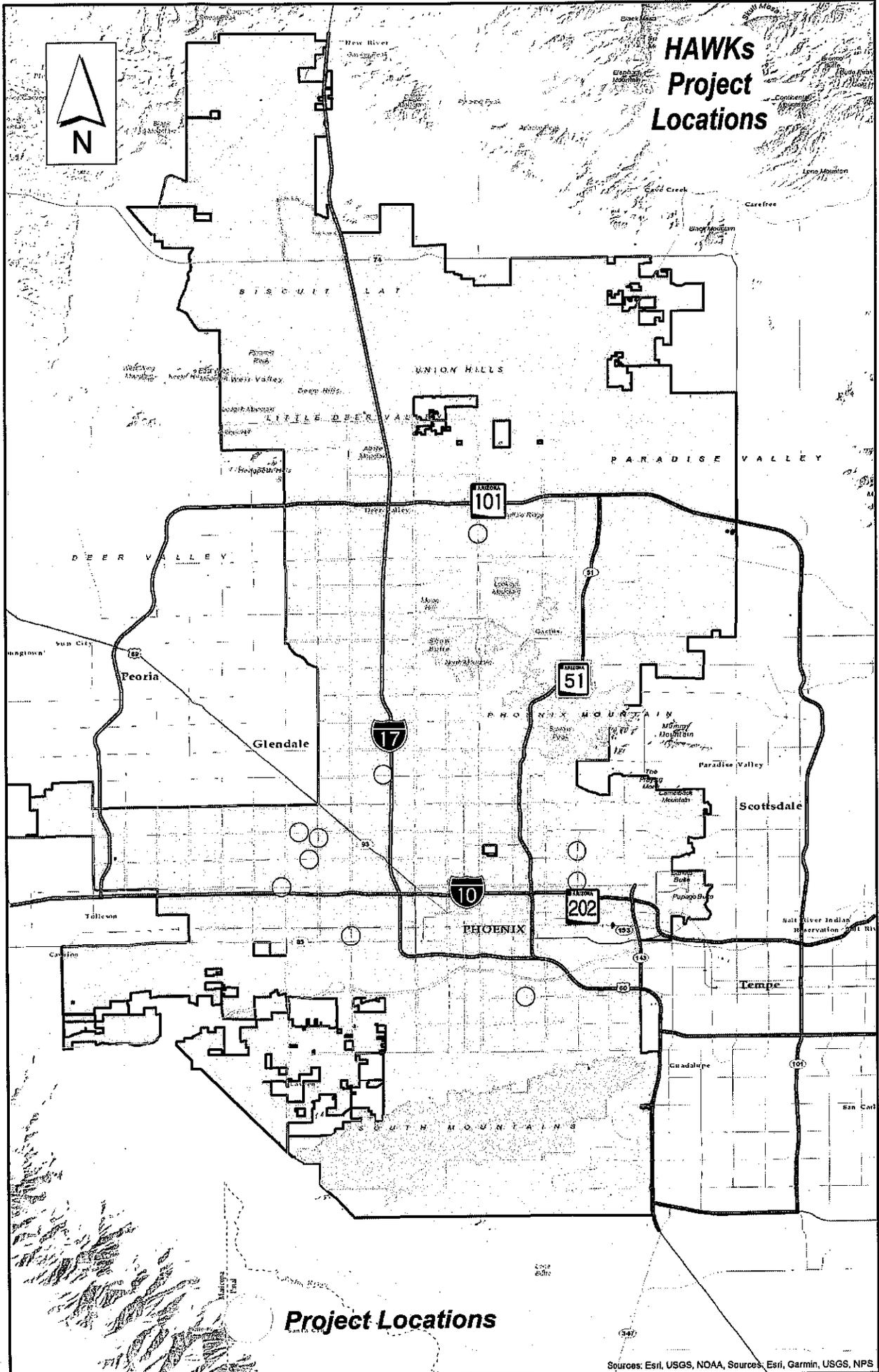
Total Project Cost	\$401,436
Project Life (years)	10
Interest Rate (%)	8%
Capital Recovery Factor	0.1490
Annual Construction Cost	\$59,826
Annual Maintenance Cost	\$2,200.00
Total Annual Costs	\$62,026

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$1,206,020	\$62,026	19.4

***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**

HAWKS Project Locations

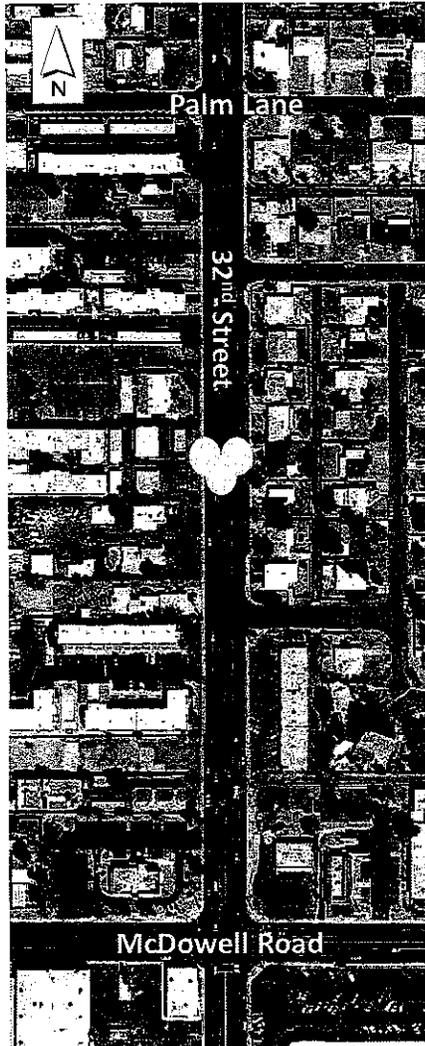


Project Locations

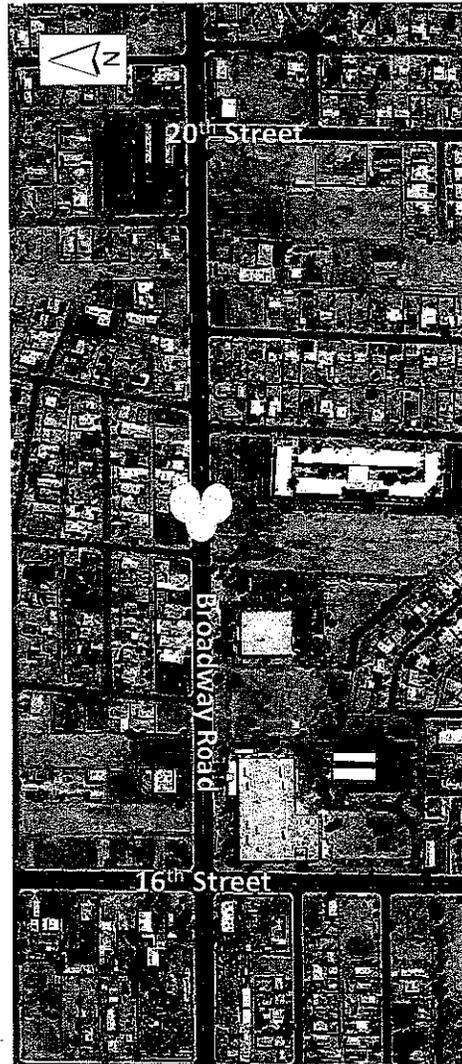
Sources: Esri, USGS, NOAA, Sources: Esri, Garmin, USGS, NPS

IncidentID	Year	Onroad	Crossroad	MC	LC	1stHarm	InjTot	FatTot	Sev	Latitude	Longitude
2894915	2014	32nd St	Granada Rd	Pedestrian	Dark	Pedestrian	0	1 Fatal		33.4687	-112.013
3072971	2016	32nd St	Almeria Rd	Pedestrian	Dark	Pedestrian	0	1 Fatal		33.46719	-112.013
2710985	2013	Rovey Av	27th Av	Pedestrian	Dark	Pedestrian	0	1 Fatal		33.52514	-112.117
3224331	2017	27th Av	Berridge Ln	Pedestrian	Dark	Pedestrian	0	1 Fatal		33.52522	-112.117
2727524	2013	Mcdowell Rd	51st Av	Pedestrian	Dusk	Pedestrian	0	1 Fatal		33.46598	-112.171
2912481	2014	Mcdowell Rd	52nd Av	Pedestrian	Dark	Pedestrian	0	1 Fatal		33.466	-112.172
3331841	2017	Mcdowell Rd	51st Av	Pedestrian	Dark	Pedestrian	0	1 Fatal		33.46598	-112.171
2808235	2013	Thomas Rd	46th Av	Pedestrian	Dark	Pedestrian	0	1 Fatal		33.48048	-112.158
3076212	2016	Thomas Rd	44th Ln	Pedestrian	Dawn	Pedestrian	0	1 Fatal		33.48048	-112.156
3269149	2017	Indian School Rd	48th Av	Pedestrian	Dark	Pedestrian	0	1 Fatal		33.49493	-112.163
3088527	2016	35th Av	Sherman St	Pedestrian	Dark	Pedestrian	0	1 Fatal		33.44057	-112.135
2990011	2015	7th St	Michigan Av	Pedestrian	Dark	Pedestrian	0	1 Fatal		33.65147	-112.066
3302432	2017	7th St	Union Hills Dr	Pedestrian	Dark	Pedestrian	0	1 Fatal		33.65411	-112.066
3113316	2016	43rd Av	Whitton Av	Pedestrian	Dark	Pedestrian	0	1 Fatal		33.49067	-112.152
2966668	2014	32nd St	Earll Dr	Pedestrian	Light	Pedestrian	0	1 Fatal		33.48473	-112.013
3190558	2016	Broadway Rd	19th St	Pedestrian	Light	Pedestrian	0	1 Fatal		33.40681	-112.041
2706747	2013	27th Av	Berridge Ln	Pedestrian	Dark	Pedestrian	1	0 Serious		33.52527	-112.117
3173008	2017	Thomas Rd	46th Dr	Pedestrian	Dark	Pedestrian	1	0 Serious		33.4805	-112.159
3072141	2016	Indian School Rd	47th Dr	Pedestrian	Light	Pedestrian	1	0 Serious		33.49507	-112.162
2796245	2013	35th Av	Sherman St	Pedestrian	Dark	Pedestrian	1	0 Serious		33.44025	-112.135
2876576	2014	35th Av	Hadley St	Pedestrian	Light	Pedestrian	1	0 Serious		33.43912	-112.135
3295216	2017	43rd Av	Indianola Av	Pedestrian	Dark	Pedestrian	1	0 Serious		33.49297	-112.152
3297519	2017	43rd Av	Clarendon Av	Pedestrian	Dark	Pedestrian	1	0 Serious		33.49127	-112.152
2705112	2013	32nd St	Pinchot Av	Pedestrian	Light	Pedestrian	1	0 Serious		33.48268	-112.013
2926800	2015	32nd St	Cheery Lynn Rd	Pedestrian	Dark	Pedestrian	1	0 Serious		33.4851	-112.013
3302973	2017	18th Pl	Broadway Rd	Pedestrian	Dark	Pedestrian	1	0 Serious		33.40669	-112.042

32nd St between McDowell Rd and Palm Lane



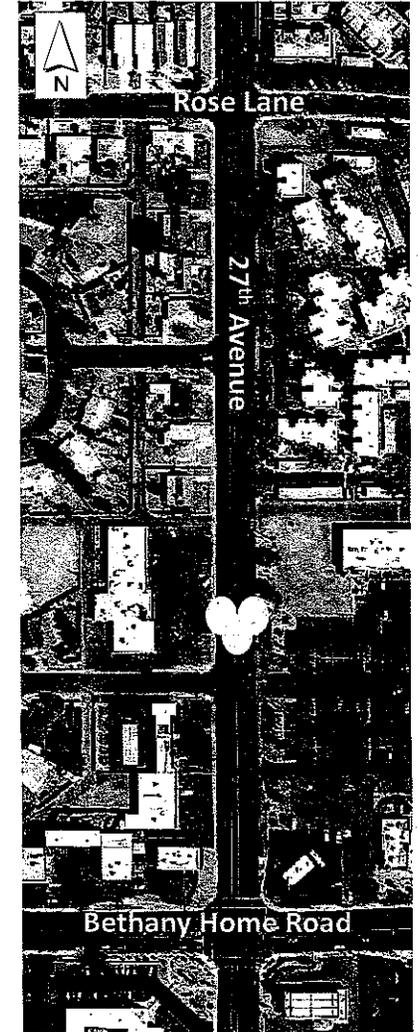
Broadway between 16th St and 20th St



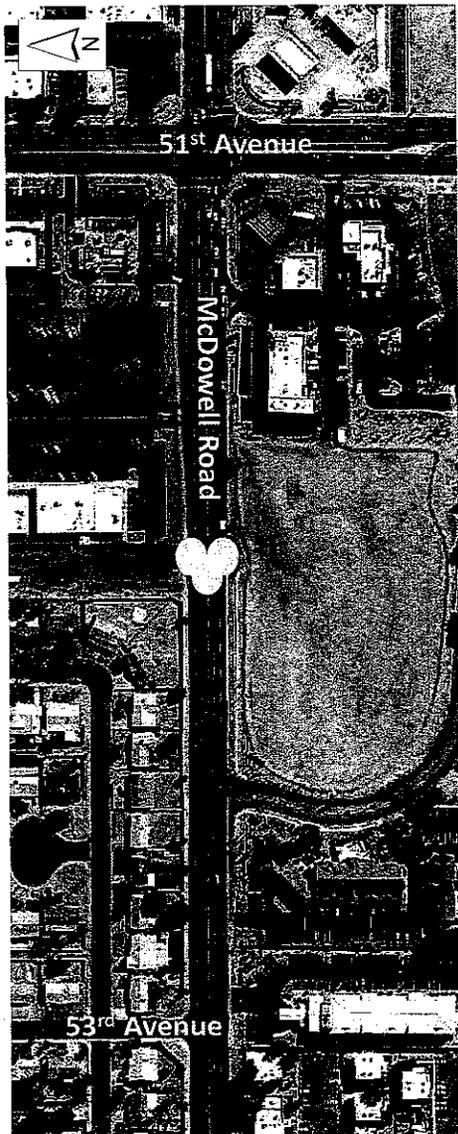
32nd St between Osborn Rd and Thomas Rd



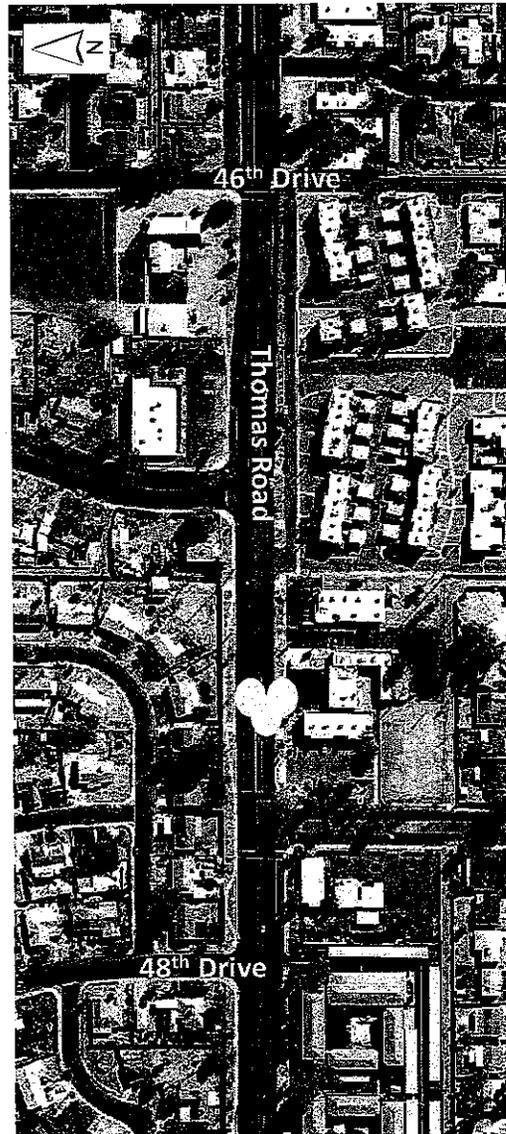
27th Ave between Rose Lane and Bethany Home Rd



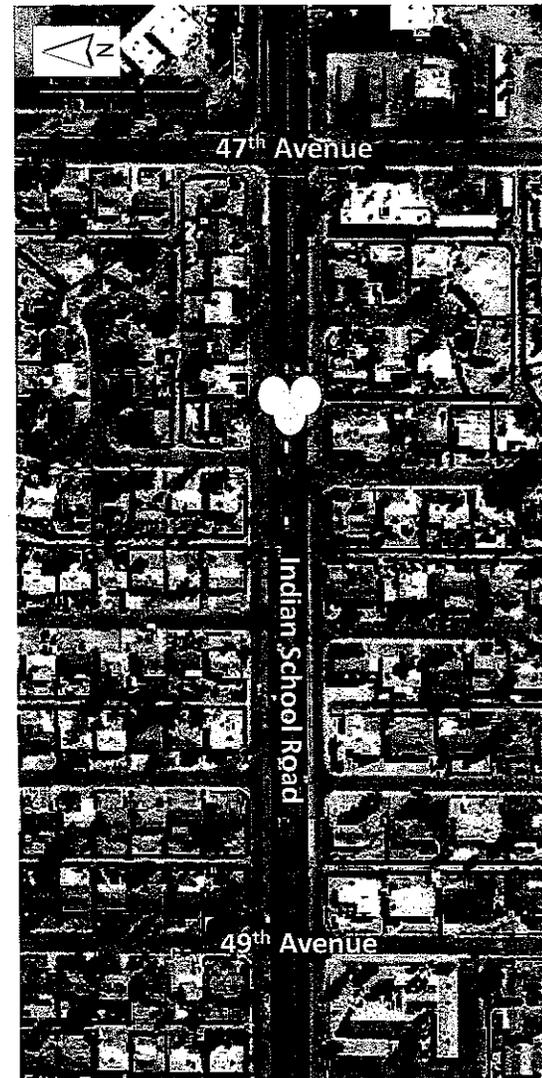
McDowell Rd between 51st Ave
and 53rd Ave



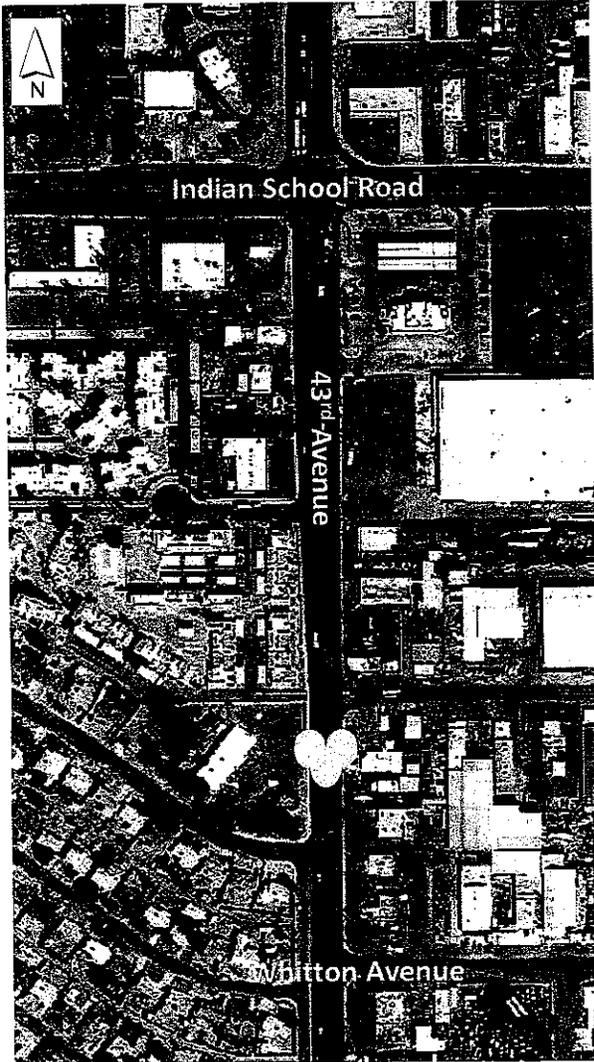
Thomas Rd between 46th Drive
and 48th Drive



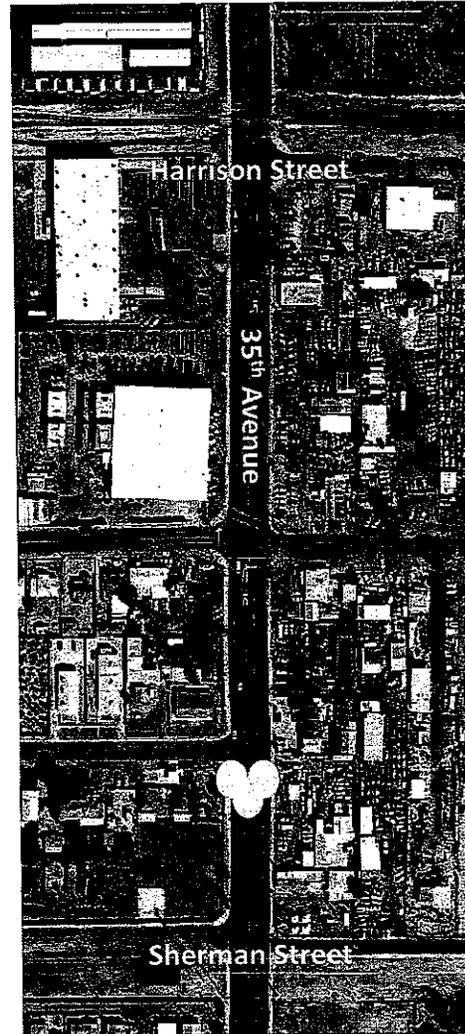
Indian School Rd between 47th
Ave and 49th Ave



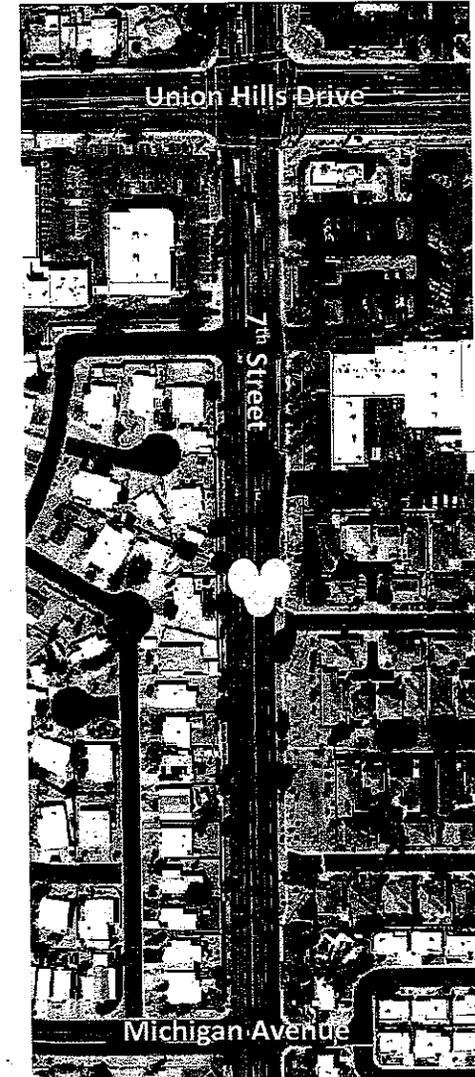
43rd Ave between Indian School Rd and Whitton Ave



35th Ave between Harrison Street and Sherman Street



7th St between Union Hills and Michigan Ave





CMF / CRF Details

CMF ID: 9021

Install pedestrian hybrid beacon (PHB or HAWK) with advanced yield or stop markings and signs

Description: Install a combination of a pedestrian hybrid beacon (PHB) and advanced yield or stop markings and signs

Prior Condition: No PHB or advanced yield or stop markings and signs

Category: Pedestrians

Study: *Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments, Zegeer et al., 2017*

Star Quality Rating: ★★★★★ [\[View score details\]](#)

Crash Modification Factor (CMF)

Value: 0.432

Adjusted Standard Error:

Unadjusted Standard Error: 0.134

Crash Reduction Factor (CRF)

Value: 56.8 (This value indicates a **decrease** in crashes)

Adjusted Standard Error:

Unadjusted Standard Error: 13.4

Applicability

Crash Type: Vehicle/pedestrian

Crash Severity: All

Roadway Types: Minor Arterial

Number of Lanes: 2 to 8

Road Division Type:

Speed Limit:

Area Type: Urban and suburban

Traffic Volume: Minimum of 6634 to Maximum of 48791 Annual Average Daily Traffic (AADT)

Average Traffic Volume: 20673 Annual Average Daily Traffic (AADT)

Time of Day: All

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: 2004 to 2013

Municipality:

State: AZ, FL, IL, MA, NY, NC, OR, VA, WI

Country: USA

Type of Methodology Used: Other before/after

Sample Size (crashes): 10 crashes before, 4 crashes after

Sample Size (sites): 27 sites before, 27 sites after

Other Details

Included in Highway Safety Manual? No

Date Added to Clearinghouse: Nov-17-2017

Comments: Methodology used was a combination of EB before-after and cross-sectional estimations. Also, study sites were a combination of intersection and mid-block locations.

[View the Full Study Details](#)

[Export Detail Page As A PDF](#)