



March 24, 2016

Ms. Mona Aglan-Swick, P.E.
Traffic Engineering Group, Traffic Safety Section
Arizona Department of Transportation
1615 W. Jackson ST., MD 065R
Phoenix, AZ 85007-3217

RE: Highway Safety Improvement Program (HSIP) Project Determination and Application

COG/MPO:

MAG

Agency:

City of Glendale

Project Name:

Phase- III Design FYA and Geometric Modifications to Improve Safety at Various Intersections

Project Location:

City of Glendale Arterial-Arterial (Various Locations)

Dear Ms. Aglan-Swick:

The City of Glendale is submitting herewith a project application for local Highway Safety Improvement Program (HSIP) funding. This road safety improvement project was identified through the state network crash data screening process and meets all requirements of Title 23. The proposed request is for systemic improvements at all arterial to arterial intersections within the City of Glendale. This includes changing the left-turn phasing from protected/permissive phasing to flashing yellow arrow (FYA), improving left-turn lane offset to create a positive offset, and adding three inch yellow retroreflective sheeting to signal backplates at all forty five (45) arterial to arterial intersections in Glendale, Arizona and does not include any non-infrastructure funding request. Implementation of FYA operation, creating positive left-turn offsets, and installing three inch yellow retroreflective sheeting on the signal backplates are viable countermeasures for improving the safety at forty five (45) arterial to arterial intersections within the City of Glendale. Each of those countermeasures are rated as four or five star. FYA operation has proven to enhance safety for left-turn operation because it is easier for drivers to understand and it is considered a safer condition than the circular green ball (i.e., FHWA suggests that if drivers are unsure, they will yield, rather than with a green ball, where drivers tend to assume the right-of-way). Creating a positive offset will give left-turning vehicles better sight distance, and retroreflective sheeting gives the signal better visibility and captures the driver's attention. This systemic project will be conducted in three phases.

Phases-I (12 intersections) currently underway as an LPA project and Phase-II (11 intersections) is currently under design as a local in-house project.

The nature of this request only includes the design of Phase -III for the remaining 22 arterial to arterial intersections. Phase III preliminary engineering/design will be performed in FY 2017 with project construction in FY 2019.

During the most recent five year period ending in 2014, the city experienced 965 total intersection related left-turn crashes at arterial - arterial intersections, including two (2) fatal and 19 incapacitating crashes. With a Crash Reduction Factor (CRF) of 19.4% for converting left-turn signal operation from protected/permissive to flashing yellow arrow (FYA), a CRF of 38.0% for improving left-turn lane offset to create a positive offset, and a CRF of 15.0% for adding a three inch yellow retroreflective sheeting to signal backplates obtained from the Clearinghouse 4/5 Star (and pre-approved by ADOT prior to application submission) list for left-turn intersection crashes, the City could see a five year reduction of 560 left-turn crashes, including a reduction of 1.2 fatalities and 11 serious injury crashes.

The City of Glendale has determined that, in accordance with 23 USC 148(a)(4)(A), this project is consistent with the MAG and State's 2014 SHSP. It supports ADOT's *Roadway Infrastructure and Operations* emphasis area (EA) (Intersections) and MAG's action area (AA), *Eliminate Death and Injuries Related to Intersections. B/C and Weighted HSIP scores are as follows:*

B/C Ratio = 5.3

Weighted HSIP Score = 22.3

City of Glendale

Public Works – Transportation

6210 West Myrtle Avenue, Suite 112 • Glendale, Arizona 85301 • (623) 930-2940

ADOT FY17 HIGHWAY SAFETY IMPROVEMENT PROGRAM APPLICATION

Agency:	City of Glendale	Title of Project:	Phase- III Design FYA and Geometric Modifications to Improve Safety at Various Intersections	
County:	Maricopa	COG/MPO:	MAG	
District:	Central	HSIP Funds:	<input type="checkbox"/> STATE	<input checked="" type="checkbox"/> LOCAL
Contact:		Phone:	E-Mail:	
Kiran Guntupalli		623-930-2951	kguntupalli@glendaleaz.com	
Type of Safety Improvement:	Spot: <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Systemic: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		
Mark all that apply to your project: <input checked="" type="checkbox"/> PE <input type="checkbox"/> Const. <input type="checkbox"/> Procurement <input type="checkbox"/> Non-Infrastructure				
Anticipated Total Cost Estimate:		\$322,514.25		
Anticipated dollar amount of HSIP Funding:		\$288,000.00		
Anticipated Dollar amount of Local Match (5.7%) (5.66%):		\$3,566.36		
Anticipated Dollar amount of Other:		\$30,947.89		
Funding Source: <input checked="" type="checkbox"/> 100% HSIP <input checked="" type="checkbox"/> 94.3% HSIP <input type="checkbox"/> 94.34% HSIP			Cost Estimate Tab:	6. Phased Cost Est.
Local Initiated Projects				
Anticipated Design Year (Construction/procurement year cannot be the same):			<input checked="" type="checkbox"/> FY17	<input type="checkbox"/> FY18 (State)
If additional ROW is needed, what FY is purchase anticipated?:			<input type="checkbox"/> FY18	<input type="checkbox"/> FY19
Anticipated Construction Year:			<input type="checkbox"/> FY17*	<input type="checkbox"/> FY18 <input checked="" type="checkbox"/> FY19
Administration of Project:		Agency: <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	ADOT: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
If competing for State Funds, COG/MPO agrees to transfer TOTAL local HSIP OA to State.				<input type="checkbox"/> YES
Name and Title of COG/MPO Representative:			Margaret Boone, PE	
State Initiated Projects				
Anticipated Design Year (Construction/procurement year cannot be the same):			<input type="checkbox"/> FY18	
If additional ROW is needed, what FY is purchase anticipated?:			<input type="checkbox"/> FY18	<input type="checkbox"/> FY19
Anticipated Construction Year:			<input type="checkbox"/> FY18*	<input checked="" type="checkbox"/> FY19 <input type="checkbox"/> FY20
Basic Project Information				
1.	Have lower cost countermeasures been considered or implemented?			<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
1a.	If "Yes", describe: If "No", explain why not:	City of Glendale periodically reviews signal phasing and timing at all intersections.		
2.	Which 23 USC 148 highway safety improvement project category does this project come under?			
2a.	24. Systemic safety improvements			
3.	Describe your safety improvement project in detail: (50 words or less)			

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County:	Maricopa	COG/MPO:	MAG
District:	Central	HSIP Funds:	<input type="checkbox"/> STATE <input checked="" type="checkbox"/> LOCAL
3a.	The scope of work includes three elements. 1. The City intends to convert protected/permissive left-turns to Flashing Yellow Arrow (FYA) signal operation, CMF 0.806. 2. The City intends to cut back medians and install carrots to eliminate negative left-turn lane offset and create positive offset, CMF 0.620. 3. The City intends to add 3" retroreflective sheeting to all signal back plates to improve visibility, CMF 0.850.		
4.	Describe the location of this safety project:		
4a.	As a systemic project, the City chose all arterial to arterial intersections within the city (45). Phases I & II are currently underway. Phase III includes the remaining 22 priority locations. All 5-section protected/permissive signal heads will be removed and replaced with 4-section flashing yellow arrow signal heads. Medians will be cut back a maximum of 20 feet and striping "carrots" will be placed in order to shift vehicles to the left to eliminate negative offset and create a positive offset in left-turn lanes and improve sight distance. In addition, 3" retroreflective sheeting will be added to all signal backplates to improve visibility.		
5.	What crash data screening method was used to identify this project?		
5a.	MAG crash rankings were used to determine the locations within the city that have the highest crash rankings. Data downloaded from ADOT Safety DataMart was used in this application. The crash data is included in Tab 20 (Crash Data).		
6.	What is the safety justification for the proposed project?		
6a.	<p>1. NCHRP/FHWA have studied the use of Flashing Yellow Arrow signal operation and determined that it is safe and more effective than the circular green ball in conveying to drivers the need to yield before turning left. In addition, FYA tends to have a safer fail condition than the circular green in that drivers will yield on the FYA rather than proceed on a circular green.</p> <p>2. FHWA research has determined that a strategy of eliminating a negative left-turn lane offset has the potential to reduce total and target crashes.</p> <p>3. FHWA has published reports supporting the installation of 3" retroreflective sheeting (borders) on signal backplated to increase the visibility of traffic signals, especially at night, and identified it as a countermeasure to reduce crashes by improving driver awareness of signals.</p>		
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:		

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County:	Maricopa	COG/MPO:	MAG	
District:	Central	HSIP Funds:	<input type="checkbox"/> STATE	<input checked="" type="checkbox"/> LOCAL
9.	Will any temporary right-of-way acquisitions be required?			<input type="checkbox"/> YES <input checked="" 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:	When relocating signal poles, utility relocation may be necessary but will be determined during design process.		
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.	HSIP Roadway Functional Classification:	Rural Principal Arterial - Other		
17.	Average Daily Traffic Volume and Year Collected:	~25000	2012	
18.	What is the source of ADT?:	City of Glendale		
19.	What is the posted speed limit?	40 mph		
20.	Detailed engineer's cost estimate attached:			<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
"Systemic" Safety Project				
21.	Completed B/C Ratio Tabulation Sheet Attached (Required):			<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
22.	Most current 5 Years Crash Data from ADOT ALISS database sorted by year & severity (required):			<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
23.	What are the inclusive dates of the crash data?			2010-2014

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District:	Central	HSIP Funds:	<input type="checkbox"/> STATE <input checked="" type="checkbox"/> LOCAL
24.	Have all crashes that will not be influenced by this countermeasure been deleted from the crash list? (alcohol/drug related, pedestrian, etc. as applicable)		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
25.	If purchasing equipment or materials, who will install?	<input type="checkbox"/> Town/City <input type="checkbox"/> County <input checked="" type="checkbox"/> Contractor <input type="checkbox"/> Tribe	
26.	Does the project require proprietary Items (23CFR 635.411)?:		<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
27.	Is a list of locations for systemic projects provided on the attached form?		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
28.	How are (will) the proposed locations be prioritized for replacement? (explain below)		
28a.	The locations for Phase I were prioritized by MAG crash rank. The locations for Phase II intersections to be completed in-house by the City of Glendale forces to employ the countermeasures. Phase III locations encompassed all of the remaining arterial to arterial intersections.		
29.	Are the supporting structures in good condition, meet local standards and have an anticipated service life longer than the countermeasure being installed?		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
"Spot" Improvement Projects Only			
30.	Completed B/C Ratio Tabulation Sheet Attached (required):		<input type="checkbox"/> YES <input type="checkbox"/> NO
31.	Is the most current 5 Years Crash Data from ADOT ALISS database sorted by year & severity attached and in correct format? (required):		<input type="checkbox"/> YES <input type="checkbox"/> NO
32.	What are the inclusive dates of the crash data?		
	Have all crashes that will not be influenced by this countermeasure been deleted from the crash list? (alcohol/drug related, pedestrian, etc. as applicable)		<input type="checkbox"/> YES <input type="checkbox"/> NO
33.	Have any infrastructure changes occurred within the work limits of this project during the years the crash data covers?		<input type="checkbox"/> YES <input type="checkbox"/> NO
34.	If YES please explain:		
35.	Project vicinity map is provided:		<input type="checkbox"/> YES <input type="checkbox"/> NO
36.	Project work limits map is provided:		<input type="checkbox"/> YES <input type="checkbox"/> NO
SHSP - All Projects			

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District:	Central	HSIP Funds:	<input type="checkbox"/> STATE <input checked="" type="checkbox"/> LOCAL
37.	Which SHSP Emphasis Area (EA) does this project support?:	Roadway_Infrastructure_and_Operations	
37a.	Which EA Strategy does it support?:	(Intersections) Reduce frequency and severity of intersection crashes through traffic-control and operational improvements.	
37b.	Does this project support a second SHSP EA? If so, which EA.:	Roadway_Infrastructure_and_Operations	
37c.	Which EA Strategy supports the second EA?	(Intersections) Reduce frequency and severity of intersection crashes through geometric improvements.	
37d.	Does this project support a third SHSP EA? If so, which EA.:		
37e.	Which EA Strategy supports the third EA?		
38.	Does this project support one of the nine FHWA proven countermeasures?:	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
38a.	If so, which countermeasure?:	Backplates with Retroreflective Borders	
39.	Does this project support one of the three Arizona Focus Areas?:	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
39a.	If so, which focus area?:	Intersection	
40.	Which HSIP Improvement Category does this project support?:	Intersection_Traffic_Control	
40a.	Which HSIP Improvement Sub-Category does this project support?:	Modify traffic signal – add flashing yellow arrow	
41.	Does your COG/MPO have a Strategic Transportation Safety Plan (STSP)?:	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
41a.	If "YES", does this project support an Emphasis Area in the COG/MPO STSP?:	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
41b.	List the EA:	Eliminate Death and Injuries Related to Intersections	
41c.	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.		
41d.	Rational		

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District:	Central	HSIP Funds:	<input type="checkbox"/> STATE <input checked="" type="checkbox"/> LOCAL	
42.	Are any temporary safety countermeasures needed prior to this permanent solution being installed?			<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
42a.	If yes, please explain:			
B/C Ratio and Weighted Score				
43.	The calculated B/C Ratio is:	5.30	The Weighted Score is:	22.30

RE: Highway Safety Improvement Program (HSIP) Project Determination and Application

COG/MPO:

MAG

Agency:

City of Glendale

The City of Glendale has estimated the total project design cost to be \$322,514. Of that amount requested it is determined that \$288,000 is HSIP eligible, with \$3,566 being required as local match and \$30,948 being paid for with Other local funds. In accordance with U.S.C. 120(c) as described in Code of Federal Register 23 CFR Part 924, the Traffic signal improvements for safety are eligible to be 100% federally funded while Geometric improvements are eligible at 94.3%. Therefore, the City of Glendale proposes committing a local match in the amount of \$3,566 and \$30,948 of Other local funds. Table 6 summarizes the anticipated cost estimate projected for this project.

The City of Glendale 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 be provided or secured by the City of Glendale to cover the additional costs or the project will have to be withdrawn and resubmitted in the next call-for-projects.

The City of Glendale 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 Glendale 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 Glendale will maintain the countermeasure at or above the standard to which it was installed.

If you have any questions, please contact me at 623-930-2940 or email DAAlbert@glendaleaz.com.

Sincerely,



Debbie Albert P.E., P.T.O.E. City Traffic Engineer
City of Glendale, Arizona
6210 W. Myrtle Avenue, Ste 112
Glendale, Arizona 85301

Attachments: Application (excel format) to include cost estimate, vicinity map and/or list of locations
B/C Ratio and Crash Data

Agency:	Name of Project:	Phase- III Design FYA and Geometric Modifications to Improve Safety at Various Intersections						
Project Cost Estimate Worksheet								
Project Cost Estimate:	Description:	Quantity:	Cost (Unit):	Total Cost	HSIP:	Local Match:	Other Amt:	TOTAL COST
					100.00%	0.00%	0.00%	
Preliminary Engineering:		1	\$ 215,009.50	\$ 215,009.50	\$ 181,684.04	\$ 2,377.58	\$ 30,947.89	\$ 215,009.51
ADOT Admin Costs - Phase III:		1	\$ 107,504.75	\$ 107,504.75	\$ 106,315.96	\$ 1,188.79		\$ 107,504.75
Total Phase 1 - Project Year 1				\$ 322,514.25	\$ 288,000.00	\$ 3,566.37	\$ 30,947.89	\$ 322,514.26
ADOT Admin Costs-Year 2:		1	\$ 30,000.00	\$ 30,000.00	\$ 30,000.00	\$ -	\$ -	\$ 30,000.00
Materials:	Regulatory Signs	1	\$ 50.00	\$ 50.00	\$ 50.00	\$ -	\$ -	\$ 50.00
Materials:	Mounting Hardware	1	\$ 6.00	\$ 6.00	\$ 6.00	\$ -	\$ -	\$ 6.00
Sub-Total Material Cost - Phase 2				\$ 56.00	\$ 56.00	\$ -	\$ -	\$ 56.00
Sales Tax:		10.00%		\$ 5.60	\$ 5.60	\$ -	\$ -	\$ 5.60
Equipment and Installation Sub-Total Phase 2 - Year 2				\$ 61.60	\$ 61.60	\$ -	\$ -	\$ 61.60
Construction Admin :		14.00%		\$ 8.62	\$ 8.62	\$ -	\$ -	\$ 8.62
Contingencies :		5.00%		\$ 3.08	\$ 3.08	\$ -	\$ -	\$ 3.08
Post Design:		1.00%		\$ 0.62	\$ 0.62	\$ -	\$ -	\$ 0.62
Administration Sub-Total Phase 2 - Year 2				\$ 12.32	\$ 12.32	\$ -	\$ -	\$ 12.32
Total Phase 2 - Project Year 2				\$ 30,073.92	\$ 30,073.92	\$ -	\$ -	\$ 30,073.92
ADOT Admin Costs-Year 3:		1	\$ 15,000.00	\$ 15,000.00	\$ 15,000.00	\$ -	\$ -	\$ 15,000.00
Materials:	Regulatory Signs	1	\$ 50.00	\$ 50.00	\$ 50.00	\$ -	\$ -	\$ 50.00
Materials:	Mounting Hardware	1	\$ 6.00	\$ 6.00	\$ 6.00	\$ -	\$ -	\$ 6.00
Sub-Total Material Cost - Phase 3				\$ 56.00	\$ 56.00	\$ -	\$ -	\$ 56.00
Sales Tax:		10.00%		\$ 5.60	\$ 5.60	\$ -	\$ -	\$ 5.60
Equipment and Installation Sub-Total Phase 3 - Year 3				\$ 61.60	\$ 61.60	\$ -	\$ -	\$ 61.60
Construction Admin :		14.00%		\$ 8.62	\$ 8.62	\$ -	\$ -	\$ 8.62
Contingencies :		5.00%		\$ 3.08	\$ 3.08	\$ -	\$ -	\$ 3.08
Post Design:		1.00%		\$ 0.62	\$ 0.62	\$ -	\$ -	\$ 0.62
Administration Sub-Total Phase 3 - Year 3				\$ 12.32	\$ 12.32	\$ -	\$ -	\$ 12.32
Total Phase 3 - Project Year 3				\$ 15,073.92	\$ 15,073.92	\$ -	\$ -	\$ 15,073.92
ADOT Admin Costs-Year 4:		1	\$ 15,000.00	\$ 15,000.00	\$ 15,000.00	\$ -	\$ -	\$ 15,000.00
Materials:	Regulatory Signs	1	\$ 50.00	\$ 50.00	\$ 50.00	\$ -	\$ -	\$ 50.00
Materials:	Mounting Hardware	1	\$ 6.00	\$ 6.00	\$ 6.00	\$ -	\$ -	\$ 6.00
Sub-Total Material Cost - Phase 4				\$ 56.00	\$ 56.00	\$ -	\$ -	\$ 56.00
Sales Tax:		10.00%		\$ 5.60	\$ 5.60	\$ -	\$ -	\$ 5.60
Equipment and Installation Sub-Total Phase 4 - Year 4				\$ 61.60	\$ 61.60	\$ -	\$ -	\$ 61.60
Construction Admin :		14.00%		\$ 8.62	\$ 8.62	\$ -	\$ -	\$ 8.62
Contingencies :		5.00%		\$ 3.08	\$ 3.08	\$ -	\$ -	\$ 3.08
Post Design:		1.00%		\$ 0.62	\$ 0.62	\$ -	\$ -	\$ 0.62
Administration Sub-Total Phase 2 - Year 2				\$ 12.32	\$ 12.32	\$ -	\$ -	\$ 12.32
Total Phase 4 - Project Year 4				\$ 15,073.92	\$ 15,073.92	\$ -	\$ -	\$ 15,073.92
Total Request				\$ 382,736.01	\$ 348,221.76	\$ 3,566.37	\$ 30,947.89	\$ 382,736.02

Required for all HSIP Applications

Agency:	City of Glendale	Title of Project:	Phase III Design I/A and Geometric Modifications to Improve Safety at Various Intersections
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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	58%	0.23	\$5,800,000	\$1,334,000
Incapacitating Injury	3.80	58%	2.19	\$400,000	\$876,000
Total Annual Benefits					\$2,210,000

Costs

Total Project Cost	\$2,754,813
Project Life (years)	10
Interest Rate (%)	8%
Capital Recovery Factor	0.1490
Annual Construction Cost	\$410,548
Annual Maintenance Cost	\$1,000.00
Total Annual Costs	\$411,548

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$2,210,000	\$411,548	5.3

***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 14 - 15 preferred. The CMF's CRF is used in the above calculation**

incidentid	IncidentDateTime	IncidentOnroad	IncidentCrossingFeat	IncidentOffset	IncidentInjurySeverityDesc	CollisionMain	IncidentIntersectionTypeDesc	IncidentLightConditionDesc	IncidentWeatherDesc
2930846	09-Dec-14	07 59TH AVE	07 PEORIA AVE		0 INCAPACITATING_IN JURY	LEFT_TURN	FOUR_WAY_INTERSECTION	DAYLIGHT	CLEAR
2814422	23-Nov-13	07 67TH AVE	07 CAMELBACK RD		0 INCAPACITATING_IN JURY	LEFT_TURN	FOUR_WAY_INTERSECTION	DARK_LIGHTED	SLEET_HAIL_FREEZING_RAIN_OR_DRIZZLE
2814404	16-Dec-13	07 PEORIA AVE	07 51ST AVE		0 FATAL	SINGLE_VE	FOUR_WAY_INTERSECTION	DAYLIGHT	CLEAR
2808236	30-Nov-13	07 67TH AVE	07 GLENDALE AVE		0 INCAPACITATING_IN JURY	LEFT_TURN	FOUR_WAY_INTERSECTION	DAYLIGHT	UNKNOWN
2782560	09-Jul-13	07 DEER VALLEY RD	07 67TH AVE		0 INCAPACITATING_IN JURY	LEFT_TURN	FOUR_WAY_INTERSECTION	DAYLIGHT	CLEAR
2781970	01-Oct-13	07 CAMELBACK RD	07 83RD AVE		0 INCAPACITATING_IN JURY	LEFT_TURN	FOUR_WAY_INTERSECTION	DAYLIGHT	CLEAR
2781959	22-Oct-13	07 BELL RD	07 59TH AVE		0 INCAPACITATING_IN JURY	LEFT_TURN	FOUR_WAY_INTERSECTION	DAYLIGHT	CLEAR
2773342	18-Sep-13	07 NORTHERN AVE	07 59TH AVE		0 INCAPACITATING_IN JURY	LEFT_TURN	FOUR_WAY_INTERSECTION	DAYLIGHT	CLEAR
2726835	01-Apr-13	07 99TH AVE	07 CAMELBACK RD		0 INCAPACITATING_IN JURY	LEFT_TURN	FOUR_WAY_INTERSECTION	DAYLIGHT	CLOUDY
2718978	07-Mar-13	07 51ST AVE	07 PEORIA AVE		0 INCAPACITATING_IN JURY	LEFT_TURN	FOUR_WAY_INTERSECTION	DAYLIGHT	CLEAR
2691504	30-Nov-12	07 59TH AVE	07 PEORIA AVE		0 INCAPACITATING_IN JURY	LEFT_TURN	FOUR_WAY_INTERSECTION	DARK_LIGHTED	CLEAR
2653133	17-Aug-12	07 67TH AVE	07 GLENDALE AVE		0 INCAPACITATING_IN JURY	LEFT_TURN	FOUR_WAY_INTERSECTION	DAYLIGHT	CLOUDY
2644278	02-Jul-12	07 51ST AVE	07 PEORIA AVE		0 INCAPACITATING_IN JURY	LEFT_TURN	FOUR_WAY_INTERSECTION	DAYLIGHT	CLOUDY
2617141	28-Feb-12	07 59TH AVE	07 CACTUS RD		0 INCAPACITATING_IN JURY	LEFT_TURN	FOUR_WAY_INTERSECTION	DAYLIGHT	CLOUDY
2609005	12-Feb-12	07 51ST AVE	07 PEORIA AVE		0 INCAPACITATING_IN JURY	LEFT_TURN	FOUR_WAY_INTERSECTION	DARK_LIGHTED	CLOUDY
2580775	05-Nov-11	07 GLENDALE AVE	07 67TH AVE	0.0057	0 INCAPACITATING_IN JURY	LEFT_TURN	FOUR_WAY_INTERSECTION	DAYLIGHT	CLEAR
2580572	05-Nov-11	07 83RD AVE	07 CAMELBACK RD		0 INCAPACITATING_IN JURY	LEFT_TURN	FOUR_WAY_INTERSECTION	DARK_LIGHTED	CLEAR
2554188	19-Sep-10	07 59TH AVE	07 BETHANY HOME RD		0 FATAL	LEFT_TURN	FOUR_WAY_INTERSECTION	DARK_LIGHTED	CLEAR
2525656	08-May-11	07 GLENDALE AVE	07 51ST AVE	0.0064	0 INCAPACITATING_IN JURY	LEFT_TURN	FOUR_WAY_INTERSECTION	DARK_LIGHTED	CLEAR

2436129	14-Jul-10	07 PEORIA AVE	07 59TH AVE	0	INCAPACITATING_IN JURY	LEFT_TU RN	FOUR_WAY_INTER SECTION	DAYLIGHT	CLEAR
2419018	25-Jun-10	07 99TH AVE	07 CAMELBACK RD	0	INCAPACITATING_IN JURY	LEFT_TU RN	FOUR_WAY_INTER SECTION	DAYLIGHT	CLEAR

Coded incorrectly; this is a left-turn accident

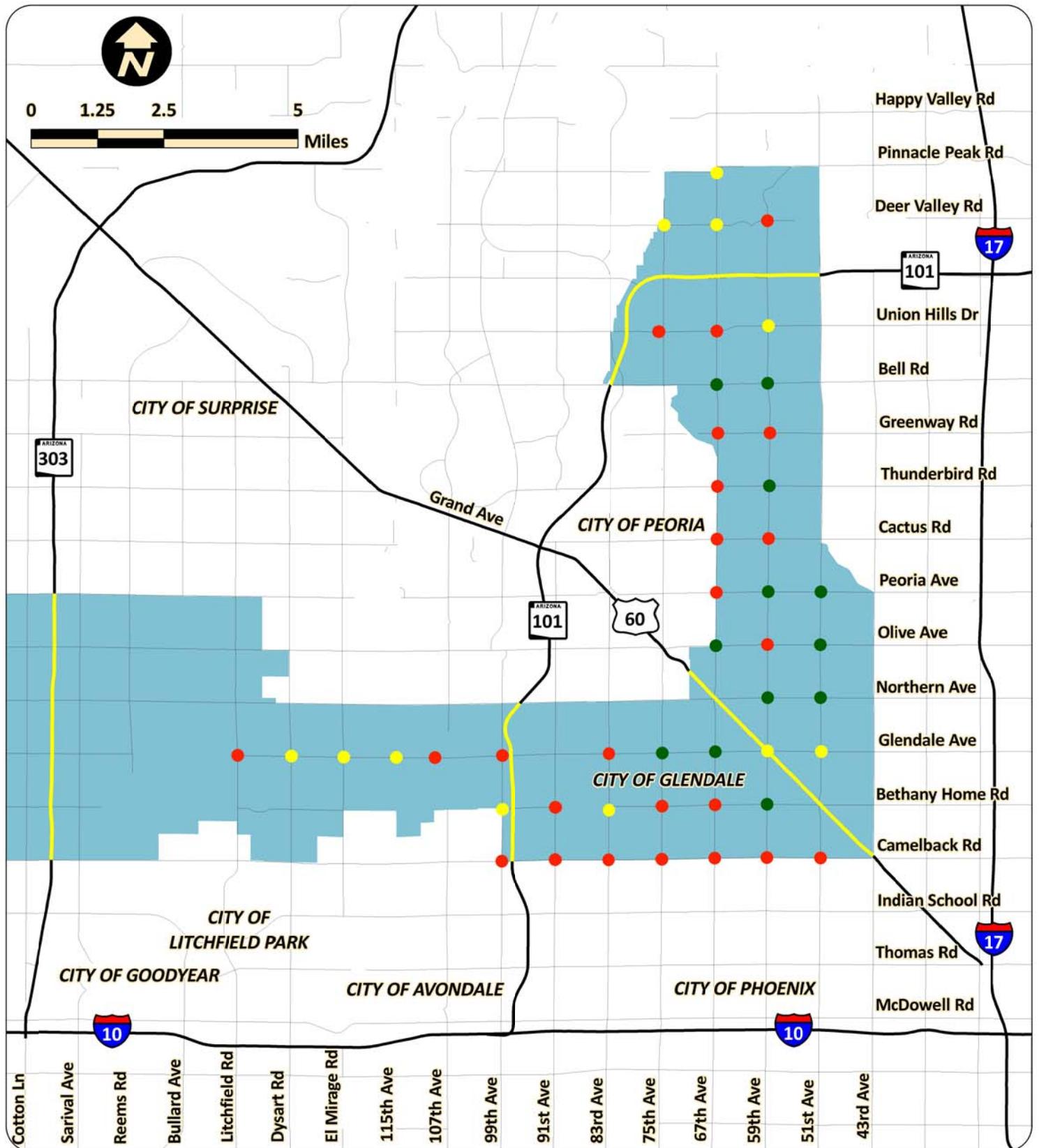


	EXHIBIT TITLE		LEGEND	
	Flashing Yellow Arrow Phases		● Phase 1	● Phase 2
	DATE	PROJECT NO	● Phase 3	■ Glendale City Limits
	7/30/2015	N/A		
SCALE	PAGE NO	TOTAL PAGES		
1-Inch = 2.5-Miles	1	1		



September 25, 2015

Ms. Debbie Albert, P.E., PTOE
Interim Deputy Public Works Director
City of Glendale
6210 West Myrtle Avenue, Suite 112
Glendale, Arizona 85301

Re: **FY16 – FY20 Local/Consolidated Highway Safety Improvement Program (HSIP)**
City of Glendale – Install Flashing Yellow Arrows and Geometric Safety Countermeasures at
Arterial-to-Arterial Intersections
ADOT Project No. : TBD
Federal Project No.: TBD
COG/MPO: MAG
COG/MPO TIP No.: TBD
Phoenix Maintenance District, Maricopa County

Dear Ms. Albert:

The Arizona Department of Transportation has approved local/consolidated Highway Safety Improvement Program (HSIP) eligibility for FY 2016 through FY 2020 as requested by the City of Glendale.

The City of Glendale has eligibility approval to utilize local HSIP funds in FY16 and FY18 and consolidated HSIP funds in FY19 and FY20 to design and install the following three safety countermeasures on all approaches at 34 arterial-to-arterial intersections:

1. replace existing left turn protected/permmissive phased signals with flashing yellow arrows (FYA) signals
2. remove raised medians and/or restripe left-turn lanes to create a positive offset
3. install three inch yellow retroreflective sheeting on signal blackplates

The entire systemic project which has been divided into three phases will also include the above three countermeasures being installed on all approaches at an additional 11 intersections by the City of Glendale utilizing other funds. A total of 45 arterial-to-arterial intersections will receive the safety improvements.

Phase I will consist of design and installation of the three approved countermeasures at the 12 highest priority intersections as identified in attachment three.

Phase II will consist of installation of the three approved countermeasures at 11 intersections identified in attachment three.

Phase III will consist of design and installation of the three approved countermeasures at the 22 intersections identified in attachment three.

Ground disturbing activities will occur and potential utility relocations are anticipated. Phase I and Phase III will be accomplished by contract. Phase II will be completed by City of Glendale staff and costs will not be reimbursed.

With a Crash Reduction Factor (CRF) of 19.4% for converting left-turn signal operation from protected/permissive to flashing yellow arrow (FYA), a CRF of 38.0% for improving left-turn lane offset to create a positive offset, and a CRF of 15.0% for adding a three inch yellow retroreflective sheeting to signal backplates obtained from the FHWA Clearing house, the Combined Crash Reduction Factor (CCRF) was calculated as shown below:

$$\text{CCRF} = 1 - (1 - .194) * (1 - .38) * (1 - .15)$$

$$\text{CCRF} = 1 - (.806) * (.62) * (.85)$$

$$\text{CCRF} = 1 - .425$$

$$\text{CCRF} = .575 \text{ or } .58$$

Utilizing the CRF above, a Benefit Cost Ratio (B/C) analysis determined the B/C of these countermeasures for the 45 intersections to be 5.3 with a weighed score of 22.3.

During a 5-year period ending December 2014, the City of Glendale experienced 965 total intersection related left-turn crashes at these 45 arterial-to-arterial intersections, including two fatal and 19 incapacitating crashes. Utilizing the CCRF of .58, the City of Glendale could realize a five year reduction of one fatal and 11 serious injury crashes.

The funding for this countermeasure is established under the ADOT HSIP and is eligible to be funded at 100% for the conversion of the traffic signals and 94.3% for the geometric and retroreflective sheeting countermeasures with a 5.7% match by the City of Glendale per 23 USC 120(c) Code of Federal Register 23 CFR Part 924 (Ref: *Highway Safety Improvement Program [HSIP], Arizona Department of Transportation [ADOT], Traffic Engineering Group, Traffic Safety Section, May 2015; 1.1.4 Funding, Federal Share*). The City of Glendale has anticipated the total design/construction anticipated cost of the project at **\$2,754,813.00** as outlined below.

FY16 - Anticipated Design (Phase I) & Construction Cost (Phase II)

Local HSIP: Design & ADOT Admin	\$ 174,039.00
Local Match HSIP*	\$ 1,949.00
Other: City of Glendale Staff	\$ 122,163.00
Estimated Total	\$ 298,391.00

FY17 - Anticipated Construction Cost (Phase II)

Other: City of Glendale Staff	\$ 122,163.00
Estimated Total	\$ 122,163.00

FY18 - Anticipated Construction Cost (Phase I)

Local HSIP	\$ 702,776.00
Local Match*	\$ 8,131.00
Estimated Total	\$ 710,907.00

FY19 - Anticipated Design Cost (Phase III)

Consolidated HSIP: Design & ADOT Admin	\$ 318,947.00
Local Match*	\$ 3,566.00
Estimated Total	\$ 322,513.00

FY20 - Anticipated Construction Cost (Phase III)

Consolidated HSIP: Design & ADOT Admin	\$1,285,950.00
Local Match*	\$ 14,858.00
Estimated Total	\$1,300,808.00

* Local Match is not 5.7% of the above Total Costs, but of the cost of the countermeasures that are not 100% eligible. See Cost Estimate, Attachment 1, for calculations.

Please note that eligibility does not give you authorization to begin work. ADOT clearances and an executed JPA will need to be completed between ADOT and the City of Glendale prior to February 1, 2016 in order for ADOT to request federal authorization for design in FY16. Any work performed prior to federal authorization is not eligible for reimbursement.

The Phase III, FY19 design and FY20 construction, of this project will be processed under the May 2015, Arizona Highway Safety Improvement Program Manual, Appendix A. As such, it will be included in the FY19 HSIP funding ranking list with a weighted score of 22.3. A final decision on the funding year for this phase will be determined by ADOT utilizing the Planning to Programming process (P2P). This process will require you to submit an updated application with a revised B/C ratio analysis and weighted score utilizing the most recent 5-year crash data and cost estimate when the FY19 HSIP applications are due which is tentatively scheduled for May 1, 2017.

Per 23 USC 148 (c)(2)(F)(i) you are required to establish and maintain a data inventory of before and after crashes for this safety improvement project in order for an analysis and evaluation to be carried out as requested by ADOT.

Should the project scope of work change, the cost estimate increase by more than 20%, or the limits of the project change, a revised eligibility letter and application will need to be submitted and approved prior to obligation of funds.

Please ensure that each phase of this project is in the TIP for the correct funding amount, the correct FYs and that design and construction are broken out as separate line items.

If you have any questions regarding this request, please call me at 602-712-7374. Thank you.

Sincerely,



Mona Aglan-Swick, P.E.

HSIP Manager

ADOT-Traffic Safety Section

LTT

Cc: FHWA, Arizona Division Office, ATTN: Kelly LaRosa, P.E.
ADOT, LPA, ATTN: Eric Boyles
ADOT, MPD, ATTN: Charla Glendening
ADOT, Phoenix Maintenance District, ATTN: Madhu Reddy
ADOT, Phoenix Construction District, ATTN: James Windsor
MAG, ATTN: Sarath Josha

Encl: 1. Cost Estimate
2. B/C Ratio Analysis
3. Intersection List and Location Map