

Agency:	El Mirage		Title of Project:	El Mirage Flashing Yellow Arrows	
Date:	10/28/2019				
Contact Name and Title:		Phone:		E-Mail:	
Tessa Wessel, Civil Engineer		623-876-2971		twessel@elmirageaz.gov	
Roadway Safety Program (RSP) Project Scope					
1.	Describe your safety improvement project in detail: (50 words or less)				
1a.	The City of El Mirage is proposing to implement flashing yellow arrows at 10 signalized intersections within the City of El Mirage. The 10 signalized intersections currently have permissive-only left-turns, protected-permissive left-turns, or both.				
2.	Describe the project location, include pertinent demographic and land development information:				
2a.	Improvements for this project will take place at 10 signalized intersections within the City of El Mirage. Intersection locations include: Dysart Road at Thunderbird Road and at Cactus Road; El Mirage Road at Thunderbird Road, Cactus Road, Peoria Avenue, Cinnabar Avenue, Joe R. Ramirez Road, and at Olive Avenue; Thunderbird Road at 129th Avenue and at Grand Avenue Frontage Road.				
3	For projects on State System:	BMP: (Begin Milepost)	N/A	EMP: (End Milepost)	N/A
4.	What network screening method was used to identify this project? <input checked="" type="checkbox"/> MAG <input type="checkbox"/> ADOT <input type="checkbox"/> Other (Below)				
4a					
5.	Was this project identified as a recommendation in a study? If so, what kind? (check all that apply)				
5a	<input type="checkbox"/> RSA <input type="checkbox"/> PA <input type="checkbox"/> SRTS Study <input type="checkbox"/> LASS Study <input checked="" type="checkbox"/> Other				
6.	Was the project identified using an agency adopted predictive safety analysis? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO				
7.	What is the safety justification for the proposed project?				
7a	By implementing flashing yellow arrows, the City of El Mirage intends to reduce the amount of left-turn crashes at 10 signalized intersections. The signalized intersections included in this project will have FYA traffic control signal features installed per the 2009 Edition of the Manual on Uniform Traffic Control Devices (MUTCD). MUTCD states the appropriate position and arrangement for the flashing yellow arrow signal heads for permissive-only and protected/permissive mode left turns. Once installed, the flashing yellow arrows should reduce the chances of left-turn crashes based on research from the National Cooperative Highway Research Program (NCHRP), provided in Report 493, which showed that drivers had a better understanding that they needed to yield before making a left turn when flashing yellow arrows were used, as opposed to a circular green.				
8.	Is Public outreach required for your project? If "yes" Provide what was done, the date(s) and outcomes. (Attach documentation if applicable)				
8a	No.				
9.	What safety related public education will your agency be providing before placing the safety improvement in service, if applicable?				
9a	Prior to implementing the flashing yellow arrows, the City will provide public education by posting information about the new safety feature through social media, a dedicated webpage on the City's website, and a news release.				
10.	Equity: Input the largest percent for each element for the one-mile radius or offset (Click on the hyperlinks in the text to open maps. See directions on side on maps):				
	65 yrs and Older	Minority Groups	No Vehicle Households	Disabled	Living in Poverty
10a	8.30%	59.90%	3.00%	41.40%	45.90%
11.	Avg Daily Traffic (ADT) Volume:		28,269	Year Collected:	
12.	Total Crash Frequency:		17	Crash Rate (MVM or MEV):	
13.	What is the posted speed limit?		45	Benefit/Cost:	
				1.5	

PROJECT COST ESTIMATE WORKSHEET

(Cost Estimates Are Required Regardless of Programming)

	REQUESTED PROGRAMMING (Complete if Item will be programmed in the MAG TIP)	Location Description	City of El Mirage - Citywide				
		Work Description	Flashing Yellow Arrows				
		Funding Source	Local				
		Preferred Year to Program Work	2020				
COST ESTIMATE FOR DESIGN			UNITS	QUANTITY	UNIT COST	TOTAL	
DESIGN	PRELIMINARY ENGINEERING (15% plans) (Required for Budget)	Topographic Survey	LS	0	-	\$ -	
		Design Concept Report (DCR)	LS	0	-	\$ -	
		Federal Project Environmental Determination	LS	0	15,000.00	\$ -	
		HAZMAT Assessment	LS	0	5,000.00	\$ -	
		SUBTOTAL – PRELIMINARY ENGINEERING COSTS					\$ -
	FINAL DESIGN (30, 60, 95, 100% plans) (Required for Budget)	Plans, Specifications, Cost Estimates, Bidding	LS	1	45,000.00	\$ 45,000.00	
		Geotechnical Report	LS	0	-	\$ -	
		Drainage Report	LS	0	-	\$ -	
		SWPPP	LS	0	-	\$ -	
		SUBTOTAL – FINAL DESIGN COSTS					\$ 45,000.00
	TOTAL PRELIMINARY ENGINEERING AND DESIGN COST AVAILABLE FOR PROGRAMMING						\$ 45,000.00
	CONSTRUCTION	REQUESTED PROGRAMMING (Complete only if Construction will be programmed in the MAG TIP)	Location Description	City of El Mirage - Citywide			
			Work Description	Flashing Yellow Arrows			
			Funding Source	RSP			
			Preferred Year to Program Work	2021			
COST ESTIMATE FOR CONSTRUCTION			UNITS	QUANTITY	UNIT COST	TOTAL	
CONSTRUCTION (Required for Budget)		Traffic Signal Head (Four-Section)	EA	70	1,000.00	\$ 70,000.00	
		Electrical Conductors	EA	10	5,000.00	\$ 50,000.00	
		Traffic Signs & Mounting Assembly	EA	35	350.00	\$ 12,250.00	
		Smart Monitor (MMU)	EA	1	2,500.00	\$ 2,500.00	
		Force Account - Pullbox & Conduit Reconditioning	LS	1	25,000.00	\$ 25,000.00	
		Remove & Salvage Existing Signal Heads	EA	68	300.00	\$ 20,400.00	
		As-Built Preparation	LS	1	10,000.00	\$ 10,000.00	
		Off-Duty Officer	HOUR	160	65.00	\$ 10,400.00	
		Construction Survey and Layout	LS	1	6,800.00	\$ 6,800.00	
SUBTOTAL - CONSTRUCTION COST					\$ 207,350.00		
MOBILIZATION AND ADMINISTRATION COSTS	CONTRACTOR MOBILIZATION (Typically 8% of construction cost)				10%	\$ 20,735.00	
	TRAFFIC CONTROL (0-8% of construction cost)				10%	\$ 20,735.00	
	CONSTRUCTION CONTINGENCIES (Typically 5% of construction cost)				10%	\$ 20,735.00	
	CONSTRUCTION ADMINISTRATION (Averaging 18% of construction cost)				18%	\$ 37,323.00	
SUBTOTAL – MOBILIZATION & ADMINISTRATION COSTS					\$ 99,528.00		
TOTAL UTILITIES, CONSTRUCTION AND MOBILIZATION FOR PROGRAMMING						\$ 306,878.00	
TOTAL COST ESTIMATE						\$ 351,878	

Budget and Signature Page

Please describe the agency programming of this project in the agency's CIP The El Mirage Flashing Yellow Arrows project will be programmed for design in the City's FY20/21 CIP.

Phase	Location Description	Work Description	Year to be Programmed	Funding Source	Amount
Design	City of El Mirage - Citywide	Flashing Yellow Arrows	2020	Local	\$ 65,000
Construction	City of El Mirage - Citywide	Flashing Yellow Arrows	2021	RSP	\$ 306,878
Total Cost					\$ 371,878

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Signature: To be signed with printed hard copy that is sent to MAG

As the jurisdiction's manager/administrator or designated representative, I certify that the information contained in this application is accurate and complete and that the local funds for this project will be included in the Lead Agency's local current CIP/TIP or budget document if the project is selected for MAG Roadway Safety Program funding. I also certify the Lead Agency's commitment to maintain or operate the facility.

Signature: 

Name: Jorge Gastelum, P.E.

Title: Community Development Director / City Engineer

Date: 11/4/2019

RSP Application Benefit-Cost Tabulation Sheet

Agency:	El Mirage	Title of Project:	El Mirage Flashing Yellow Arrows
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Annual Benefit Tabulation

Severity	Annual Average	Estimated CRF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.00	16%	0.00	\$9,515,371	\$0
Incapacitating Injury	0.20	16%	0.03	\$550,499	\$17,616
Non-Incapacitating	1.40	16%	0.22	\$149,132	\$33,406
Possible Injury	1.80	16%	0.29	\$103,145	\$29,706
Total Annual Benefits					\$80,727

Costs

Total Project Cost	\$351,878	
Project Life (years)	10	
Interest Rate (%)	8%	
Capital Recovery Factor	0.1490	
Annual Construction Cost	\$52,440	
Annual Maintenance Cost	\$0.00	
Total Annual Costs		\$52,440

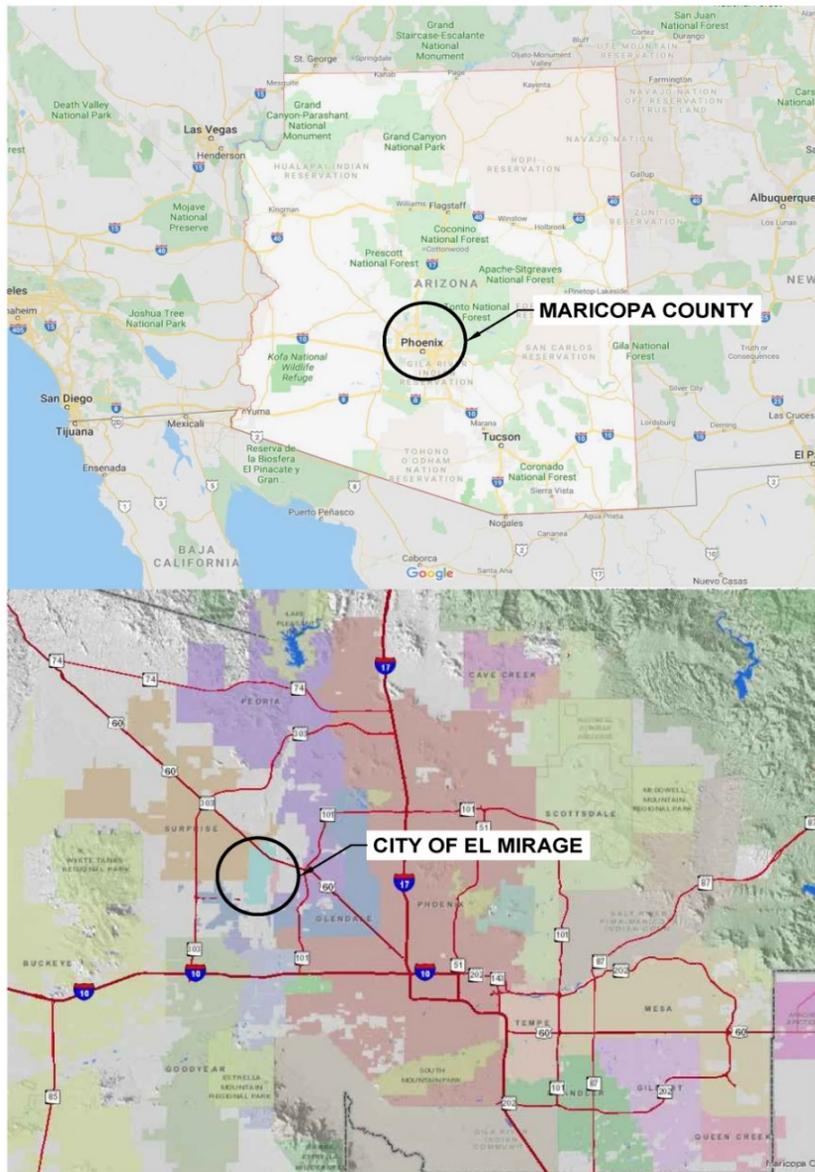
Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
\$80,727	\$52,440	1.5

List CMF(s) Used in the field below and its associated countermeasure(s)

CMF ID 7690: Change from protected-only to FYA protected/permissive left-turn.
 CMF ID 4175: Changing left-turn phasing from at least one permissive approach to FYA.
 CMF ID 4177: Changing left-turn phasing from protected-permissive to FYA.

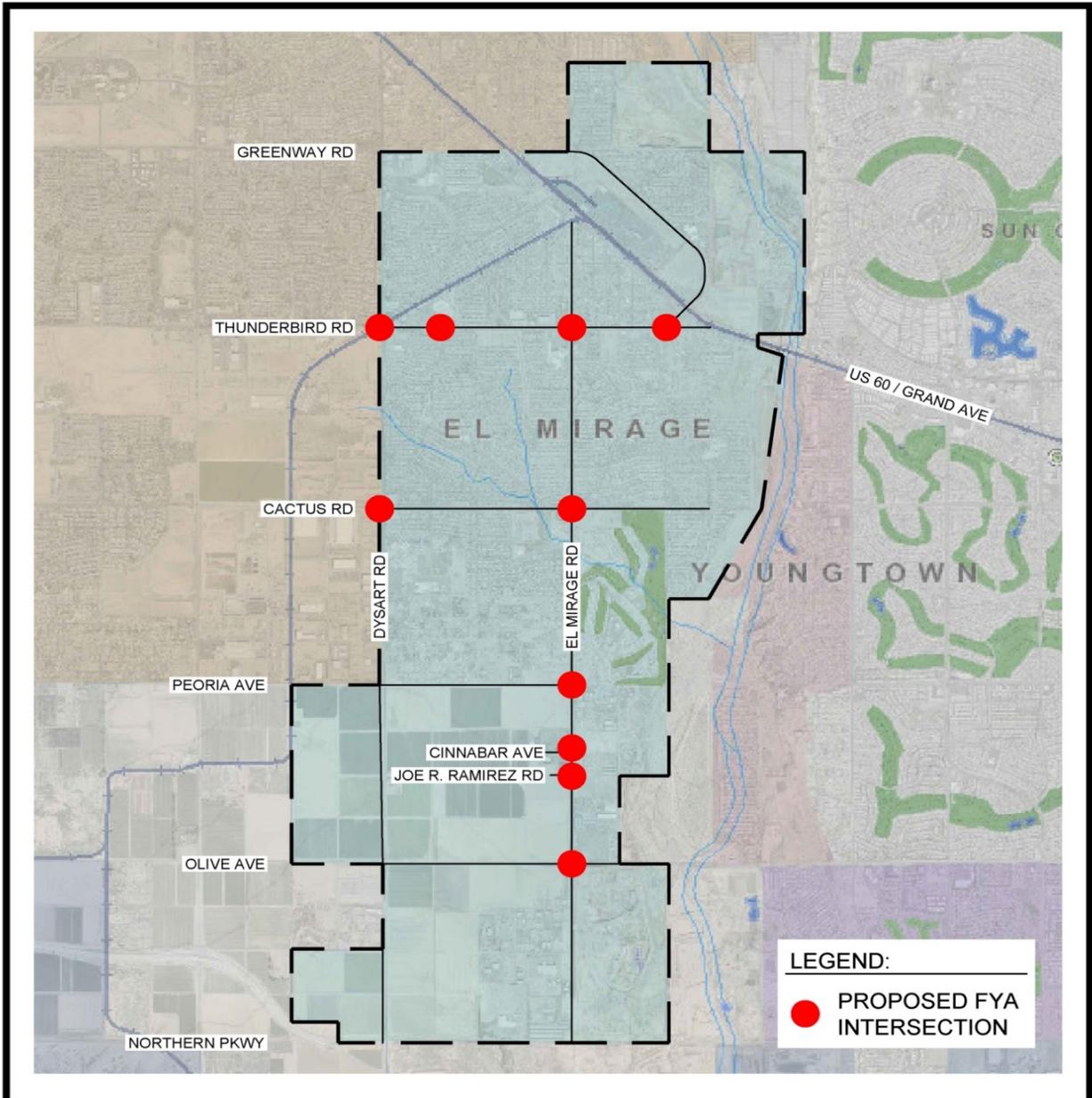
El Mirage				El Mirage Flashing Yellow Arrows						RSP App V1_2019															
Incident ID	Incident Date & Time	Incident On Road	Incident Crossing Feature	Incident Offset	Incident Injury Severity Description	Incident First Harmful Description	Incident Collision Manner Desc	Incident Light Condition Desc	Incident Weather Desc	Incident Intersection Type Desc	Incident Junction Relation Desc	Incident Traffic Way Type Desc	Unit Travel Direction Desc	Unit Action Desc	Unit Road Condition Desc1	Unit Surface Condition Desc1	Unit Env Condition Desc1	Unit Defect Desc1	Unit Number	Unit Event Sequence Desc1	Person Type Desc	Person Safety Device Desc	Person Violation Desc1	Person Physical Desc0	Person Physical Desc1
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	25	26	27	28	29
2808201	1/30/2014 6:55:00 PM	07 DYSART RD	Cactus Rd	0	Possible Injury	Motor Vehicle In Transport	Other	Dark Lighted	Clear	Four Way Intersection	Intersection Non Interchange	Two Way Divided Unprotected Painted 4 Feet Median	1 - North	Making Left Turn	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport	Driver	Not Applicable	Made Improper Turn	0 - No Apparent Influence	
2809363	2/16/2014 6:45:00 PM	EL MIRAGE RD	Cinnabar Ave	0	Possible Injury	Motor Vehicle In Transport	Other	Dark Lighted	Clear	T Intesection	Intersection Non Interchange	Two Way Not Divided With Continuous Left Turn Lane	2 - South	Making U Turn	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Other Non Collision	Driver	Shoulder And Lap Belt	Made Improper Turn	0 - No Apparent Influence	
2862864	8/7/2014 8:10:00 AM	07 THUNDERBIRD RD	129th Ave	0	Possible Injury	Motor Vehicle In Transport	Left Turn	Daylight	Clear	Four Way Intersection	Intersection Non Interchange	Two Way Divided Unprotected Painted 4 Feet Median	3 - East	Making Left Turn	Unknown	Dry	Unknown	Unknown	1	Motor Vehicle In Transport	Driver	Shoulder And Lap Belt	Failed To Yield Right Of Way	0 - No Apparent Influence	
2920706	1/27/2015 3:32:00 PM	07 CACTUS RD	Dysart Rd	0	Possible Injury	Motor Vehicle In Transport	Left Turn	Daylight	Clear	Four Way Intersection	Intersection Non Interchange	Two Way Not Divided	3 - East	Making Left Turn	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport	Driver	Shoulder And Lap Belt	Failed To Yield Right Of Way	0 - No Apparent Influence	
2991096	9/2/2015 2:46:00 PM	07 THUNDERBIRD RD	Dysart Rd	30	Suspected Serious Injury	Motor Vehicle In Transport	Left Turn	Daylight	Clear	Four Way Intersection	Intersection Related Non Interchange	Two Way Divided Unprotected Painted 4 Feet Median	8 - Southeast	Making Left Turn	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport	Driver	Air Bag Deployed/Shoulder-Lap Belt	Made Improper Turn	0 - No Apparent Influence	
2996123	9/17/2015 10:06:00 PM	07 THUNDERBIRD RD	Dysart Rd	0	Possible Injury	Motor Vehicle In Transport	Left Turn	Dark Lighted	Clear	Four Way Intersection	Intersection Non Interchange	Two Way Not Divided	6 - Northeast	Making Left Turn	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport	Driver	Shoulder And Lap Belt	Failed To Yield Right Of Way	0 - No Apparent Influence	
3017513	11/10/2015 5:25:00 PM	07 THUNDERBIRD RD	129th Ave	0	Possible Injury	Motor Vehicle In Transport	Left Turn	Daylight	Clear	Four Way Intersection	Intersection Non Interchange	Two Way Divided Unprotected Painted 4 Feet Median	3 - East	Going Straight Ahead	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport	Driver	Shoulder And Lap Belt	Speed To Fast For Conditions	0 - No Apparent Influence	
3136442	9/28/2016 7:07:00 AM	07 CACTUS RD	Dysart Rd	0	Suspected Minor Injury	Motor Vehicle In Transport	Left Turn	Daylight	Clear	Four Way Intersection	Intersection Non Interchange	Two Way Not Divided With Continuous Left Turn Lane	7 - Southwest	Making Left Turn	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport	Driver	Shoulder And Lap Belt	Disregarded Traffic Signal	0 - No Apparent Influence	
3155257	11/7/2016 1:16:00 PM	07 EL MIRAGE RD	Cactus Rd	0	Suspected Minor Injury	Motor Vehicle In Transport	Left Turn	Daylight	Clear	Four Way Intersection	Intersection Non Interchange	Unknown	5 - Northwest	Making Left Turn	Unknown	Dry	Unknown	Unknown	1	Motor Vehicle In Transport	Driver	Shoulder And Lap Belt	Unknown	0 - No Apparent Influence	
3234605	5/19/2017 10:56:00 PM	07 DYSART RD	Thunderbird Rd	0	Possible Injury	Motor Vehicle In Transport	Left Turn	Dark Lighted	Clear	Four Way Intersection	Intersection Non Interchange	Two Way Not Divided With Continuous Left Turn Lane	3 - East	Going Straight Ahead	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport	Driver	Air Bag Deployed/Shoulder-Lap Belt	No Improper Action	0 - No Apparent Influence	
3282824	10/4/2017 8:37:00 AM	07 THUNDERBIRD RD	129th Ave	0	Possible Injury	Pedalcycle	Angle (Front To Side)(Other Than Left Turn)	Daylight	Clear	Four Way Intersection	Intersection Non Interchange	Two Way Divided Positive Median Barrier	5 - Northwest	Making Left Turn	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Pedalcycle	Driver	None Used	Failed To Yield Right Of Way	0 - No Apparent Influence	
3291704	11/3/2017 6:32:00 PM	07 DYSART RD	Cactus Rd	0	Suspected Minor Injury	Motor Vehicle In Transport	Angle (Front To Side)(Other Than Left Turn)	Dark Lighted	Clear	Four Way Intersection	Intersection Non Interchange	Two Way Divided Unprotected Painted 4 Feet Median	1 - North	Making Left Turn	Unknown	Dry	Unknown	Unknown	1	Motor Vehicle In Transport	Driver	Shoulder And Lap Belt	Failed To Yield Right Of Way		
3393389	7/16/2018 4:22:00 PM	07 EL MIRAGE RD	Cactus Rd	25	Suspected Minor Injury	Motor Vehicle In Transport	Head On	Daylight	Clear	Not Reported	Intersection	Two Way Divided Positive Median Barrier	6 - Northeast	Making Left Turn	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport	Driver	Shoulder And Lap Belt	Failed To Yield Right Of Way	0 - No Apparent Influence	
3425966	10/12/2018 4:01:00 PM	07 EL MIRAGE RD	Cactus Rd	0	Suspected Minor Injury	Motor Vehicle In Transport	Left Turn	Daylight	Clear	Not Reported	Intersection 4 Way	Two Way Divided Positive Median Barrier	4 - West	Making Left Turn	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport	Driver	Shoulder And Lap Belt	Failed To Yield Right Of Way		1 - Illness Or Physical Impairment
3426876	10/19/2018 6:53:00 PM	07 EL MIRAGE RD	Cactus Rd	0	Suspected Minor Injury	Pedestrian	Other	Dark Lighted	Clear	Not Reported	Intersection Related	Two Way Not Divided	3 - East	Making Left Turn		Dry	Stopped Parked Vehicle		1	Pedestrian	Driver	Shoulder And Lap Belt	Unknown	0 - No Apparent Influence	
3429083	10/23/2018 5:15:00 PM	07 THUNDERBIRD RD	Dysart Rd	0	Possible Injury	Motor Vehicle In Transport	Left Turn	Dusk	Cloudy	Not Reported	Intersection 4 Way	Two Way Divided Unprotected Painted 4 Feet Median	4 - West	Making Left Turn	Road Surface Condition	Wet			1	Motor Vehicle In Transport	Driver	Shoulder And Lap Belt	Failed To Keep In Proper Lane	0 - No Apparent Influence	
3436016	10/26/2018 11:49:00 AM	07 EL MIRAGE RD	Cactus Rd	0	Suspected Minor Injury	Motor Vehicle In Transport	Head On	Daylight	Clear	Not Reported	Intersection 4 Way	Two Way Not Divided	3 - East	Making Left Turn	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport	Driver	Shoulder And Lap Belt	Failed To Yield Right Of Way	0 - No Apparent Influence	



EL MIRAGE FLASHING YELLOW ARROWS

VICINITY MAP

DRAWN BY:	T. WESSEL	OCT. 2019	SCALE: N.T.S. 
REVIEWED BY:			
NO.	REVISION	DATE	
1			
2			



EL MIRAGE FLASHING YELLOW ARROWS

PROJECT AREA

DRAWN BY:	T. WESSEL	OCT. 2019	SCALE: N.T.S.
REVIEWED BY:			
NO.	REVISION	DATE	
1			
2			