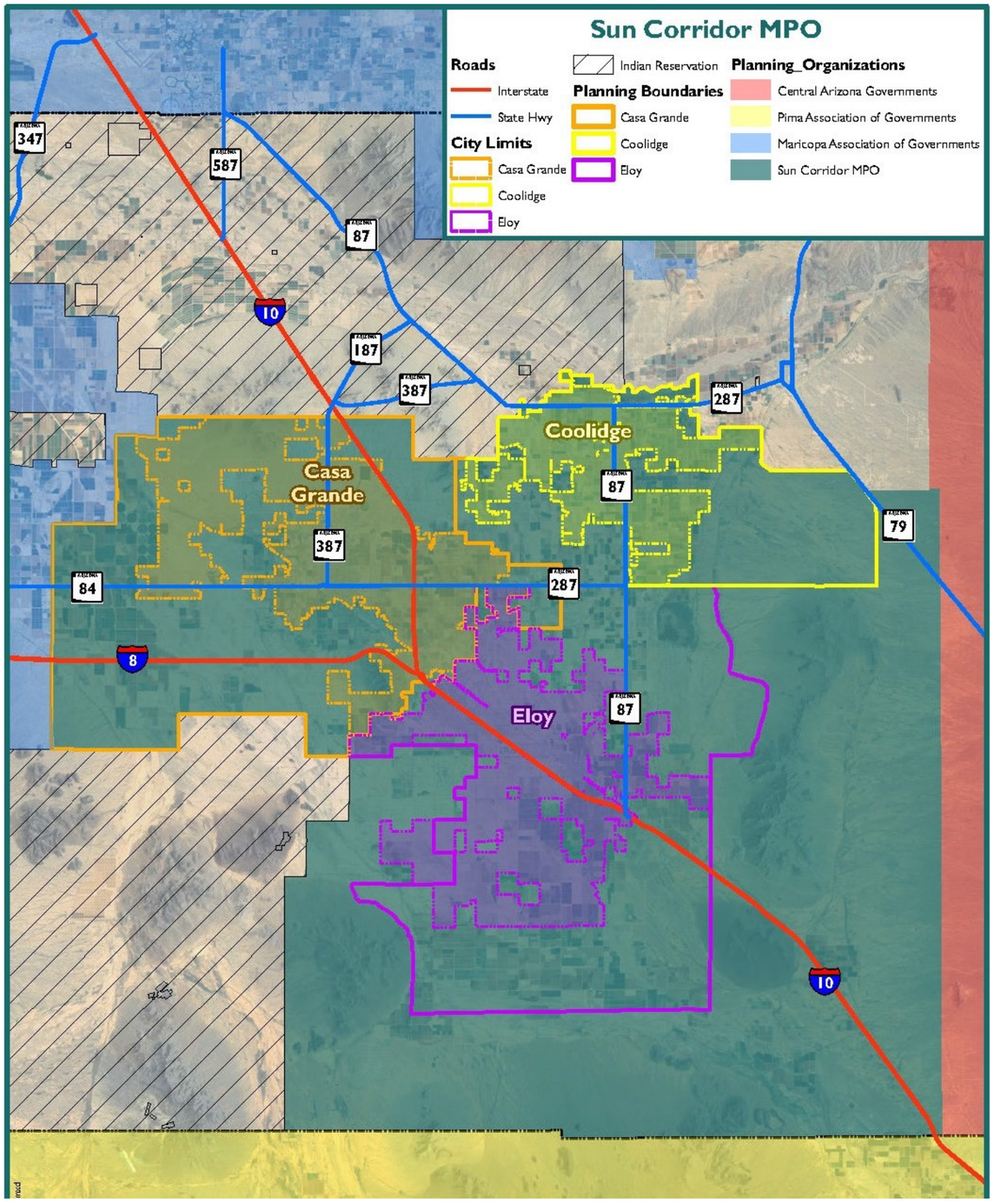


SunCorridor
Metropolitan Planning Organization

STRATEGIC TRANSPORTATION SAFETY PLAN

HSIP CORRIDORS PROJECT REPORT

24 FEBRUARY 2017

COMPILED BY:

RICK ENGINEERING COMPANY

FOR THE PRIME CONSULTANT:

amec foster wheeler

I. HSIP Corridors

Amec Foster Wheeler (AFW), prime consultant for the Sun Corridor Metropolitan Planning Organization (SCMPO) Strategic Transportation Safety Plan (STSP), identified 12 Project Corridors with potential for funding through the HSIP program. In addition, AFW identified a systemic program need for lane departure crashes. Rick Engineering Company (RICK), as a subconsultant to AFW for this study, was tasked with:

- Analyzing the crash data
- Identifying and selecting crash mitigation measures
- Determining the benefit/cost ratios for each corridor for the identified crash mitigation measures
- Summarizing the potential safety projects for future HSIP application purposes

AFW provided the latest available five years of crash data for each of these project corridors. RICK reviewed the crash data for **Severity Level 4, Serious Injury Crashes,** and for **Severity Level 5, Fatal Crashes,** within the 12 HSIP Project Corridors and region-wide for **Systemic Lane Departure Crashes**.

The HSIP Project Corridors are set forth in the following table. The numbering order of the corridors was based on the number of Severity Level 4 and 5 crashes for each corridor, in descending order of frequency, with the Regional Systemic Lane Departure Crashes at the end following the corridors.

No.	HSIP Project Corridor	Number of Collisions Resulting in:	
		4 - Serious Injury	5 - Fatal
1.	SR 87 & SR 287	21	8
2.	I-10, MP 211 – MP 215	13	6
3.	Florence Boulevard	12	5
4.	Jimmie Kerr Blvd / Frontier St	11	4
5.	SR 287 Rural	10	3
6.	Trekell Rd	9	2
7.	Maricopa-Casa Grande Hwy	7	3
8.	Skousen Rd & Eleven Mile Corner Rd	7	2
9.	Pinal Avenue (SR 387)	7	1
10.	Peart Rd	5	4
11.	Overfield Rd	4	3
12.	Macrae Rd, Martin Rd & Woodruff Rd	5	1
13.	Systemic Lane Departures	61	26

II. Corridor Crash Data Analysis

A detailed review of all crash data for each corridor and existing roadway characteristics was completed to determine collision patterns. The top three most common accident types for each corridor are noted in the table below with their corresponding percentage of all crashes in the corridor.

No.	HSIP Project Corridor	Most Common		2nd Most		3rd Most	
1.	SR 87 & SR 287	Rear End	26%	Angle	19%	Single Vehicle	17%
2.	I-10, MP 211 – MP 215	Single Vehicle	43%	Rear End	27%	Sideswipe	14%
3.	Florence Boulevard	Rear End	39%	Left Turn	16%	Angle	16%
4.	Jimmie Kerr Blvd / Frontier St	Single Vehicle	24%	Rear End	24%	Sideswipe	16%
5.	SR 287 Rural	Rear End	34%	Angle	26%	Single Vehicle	14%
6.	Trekell Rd	Rear End	31%	Left Turn	22%	Angle	17%
7.	Maricopa-Casa Grande Hwy	Single Vehicle	65%	Rear End	9%	Sideswipe & Left Turn	5%
8.	Skousen Rd & Eleven Mile Corner Rd	Single Vehicle	37%	Angle	29%	Rear End	12%
9.	Pinal Avenue (SR 387)	Rear End	38%	Angle	17%	Left Turn	14%
10.	Peart Rd	Rear End	43%	Angle	16%	Left Turn	13%
11.	Overfield Rd	Angle	38%	Single Vehicle	25%	Left turn & Rear End	9%
12.	Macrae Rd, Martin Rd & Woodruff Rd	Single Vehicle	35%	Rear End	35%	Sideswipe	9%
13.	Systemic Lane Departures	N/A					

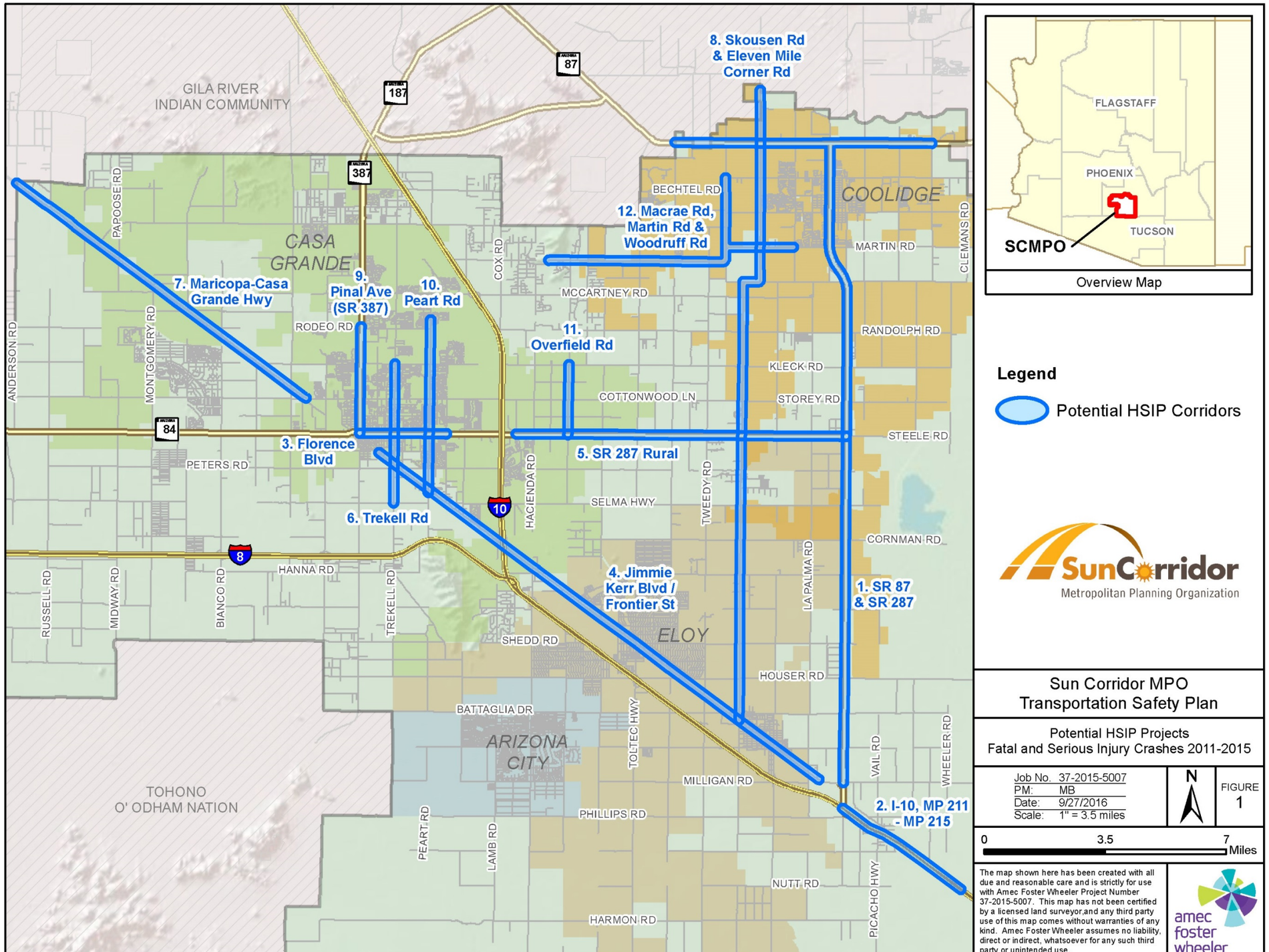
The table below summarizes the five types of accidents making up the top three types of crashes for all 12 HSIP Project Corridors and reflects the color code scheme for the above table.

Type of Crash	HSIP Project Corridors
Rear End	All 12 HSIP Project Corridors
Single Vehicle	8 of the 12 HSIP Project Corridors + Systemic Lane Departures
Angle	8 of the 12 HSIP Project Corridors
Left Turn	6 of the 12 HSIP Project Corridors
Sideswipe	4 of the 12 HSIP Project Corridors

III. Corridor Location Map

The location of the 12 Potential HSIP Project Corridors are shown on the map on this page.

The Systemic Lane Departure program is MPO region-wide.



IV. Crash Modification & Reduction Factors

RICK reviewed the crash data and researched the **Crash Modification Factors Clearinghouse** website *(http://www.cmfclearinghouse.org)* to determine appropriate countermeasures for each type of crash. The Crash Modification Factor (CMF) for each countermeasure was determined from 4-star and 5-star rated countermeasures. Only ADOT preapproved countermeasures were recommended.

Remedial roadway construction and modification countermeasures are compiled in the table shown on this page. The table also contains the:

- Crash Modification Factor (CMF)
- ADOT CMF Identification Number
- Corresponding Crash Reduction Factor (CRF)
- Assigned improvement unit cost for each countermeasure
- Note field defining the unit
- Types of crashes mitigated
- Mitigation Improvement category

The project cost for each corridor (as shown on the *HSIP Project Cost Estimate Worksheets* contained herein) is the sum total of the annualized costs to implement the countermeasures.

The project benefit (as shown on the *HSIP Benefit Cost Summary Report* contained herein) for each corridor is the sum total of the computed annualized benefits of each implemented countermeasure.

The benefit amount is based on the assigned benefit for incapacitating injuries ($400,000 per crash) and for fatal injuries ($5,800,000 per crash), the annualized number of incapacitating injury crashes and fatal crashes respectively, and the composite crash reduction factor (CRF).

The **Benefit/Cost Ratio** is calculated by dividing the total annualized benefit by the total annualized cost. A summary listing of the benefit/cost ratios for each corridor is shown in the table on the following page.

COUNTERMEASURE IMPROVEMENT	CMF	ADOT CMF ID	CRF	Unit Cost	Unit Note	Types of Crashes Mitigated	Category
Provide a raised median	0.61	21	39%	$1,500,000	Mile	ALL	Access Management
Provide a left-turn lane on one major-road approach (3-leg)	0.45	255	55%	$150,000	1 Approach	ALL	Intersection Geometry
Provide a left-turn lane on one major-road approach (4-leg)	0.65	264	35%	$150,000	1 Approach	ALL	Intersection Geometry
Provide a right-turn lane on one major-road approach	0.77	287	23%	$150,000	Intersection	ALL	Intersection Geometry
Painted channelization of both major and minor roads	0.43	294	57%	$20,000	Intersection	ALL	Intersection Geometry
Illumination	0.73	581	27%	$200,000	Mile	ALL	Highway Lighting
Implement truck lane restrictions on multilane freeways	0.60	1931	40%	$2,000	Each Sign	Truck Related	Roadway
Install transverse rumble strips on stop controlled approaches	0.79	2709	22%	$6,000	1 Approach	ALL	Roadway
Convert minor-road stop control to all-way stop control	0.23	3128	77%	$5,000	Intersection	ALL	Intersection Traffic Control
Install edgeline rumble strips on roadways with a shoulder width of 5 feet or greater (add shoulder)	0.43	3408	57%	$1,000,000	Mile	Run Off Road	Roadway
Improve signal visibility, including signal lens size upgrade, installation of new back-plates, addition of reflective tapes to existing back-plates, and installation of additional signal heads	0.90	4111	10%	$12,000	Intersection	Nighttime	Intersection Traffic Control
Install automated section speed enforcement system	0.44	4142	56%	$75,000	Each	ALL	Advanced Technology & ITS
Change left-turn phase from permissive to protected/permissive or permissive/protected phasing on one or more approaches	0.84	4578	16%	$20,000	intersection	Left Turn	Intersection Traffic Control
Install wider markings and both edgeline and centerline rumble strips with resurfacing (markings and rumble strips only)	0.62	4790	38%	$40,000	Mile	ALL	Delineation
Installation of an actuated advance warning dilemma zone protection system at high-speed signalized intersections	0.89	4855	11%	$25,000	1 Approach	ALL	Intersection Traffic Control

V. HSIP Project Corridors

The following HSIP Project Corridor sections contain:

- Corridor information
- Crash maps, data, and associated graphs for each of the corridors
- HSIP project cost estimate worksheets
- Crash mitigation measures maps
- Corridor benefit cost summary reports

The table below provides a summary of the individual project corridors and their associated benefit/cost ratios.

No.	HSIP Project Corridor	Benefit / Cost Ratio	Reduction in Fatal Crashes / 5-Years	Reduction in Serious Injury Crashes / 5-Yrs
1.	SR 87 & SR 287	8.7	5.50	14.50
2.	I-10, MP 211 – MP 215	17.4	3.35	7.30
3.	Florence Boulevard	11.2	2.30	5.50
4.	Jimmie Kerr Blvd / Frontier St	9.8	3.35	9.25
5.	SR 287 Rural	14.7	2.05	6.80
6.	Trekell Rd	6.1	1.00	4.40
7.	Maricopa-Casa Grande Hwy	2.9	2.20	5.10
8.	Skousen Rd & Eleven Mile Corner Rd	4.8	1.45	4.90
9.	Pinal Avenue (SR 387)	9.6	0.50	3.65
10.	Peart Rd	25.7	1.95	2.45
11.	Overfield Rd	14.3	2.05	2.70
12.	Macrae Rd, Martin Rd & Woodruff Rd	6.8	0.75	3.75
13.	Systemic Lane Departures	19.1	9.90	23.20
	Total Crash Reduction – 5 Year Period		36.35	93.50

The HSIP Project Cost Estimate Worksheets contained in the subsequent corridor information sections include a State or Local Match budget amount. However, there are various types of projects that don't require a State or Local Match.

According to *23 U.S.C. 120(c)(1)* , the Federal share payable may amount to 100 percent of the construction of any project for:

- Traffic control signalization (including HAWK),
- Maintaining minimum levels of retroreflectivity of highway signs or pavement markings,
- Traffic circles/roundabouts,
- Safety rest areas,
- Pavement marking,
- Shoulder and centerline rumble strips and stripes,
- Commuter carpooling and vanpooling,
- Rail-highway crossing closure,
- Installation of traffic signs, traffic lights, guardrails, impact attenuators, concrete barrier end treatments, breakaway utility poles, or
- Priority control systems for emergency vehicles or transit vehicles at signalized intersections.

The HSIP Project Cost Estimate Worksheets have been modified to show no state/local match on the line items where applicable.

Federally funded projects involve a high level of effort to meet the ADOT project development requirements. To better reflect the design, environmental, and administrative costs associated with using HSIP funds as seen on these types of projects, the HSIP Project Cost Estimate Worksheets contained in the subsequent corridor information sections have been prepared using these assumptions:

Construction Cost	Design Fee as a % of Construction Cost
$250K to $1M	18%
>$1M to $2M	16%
>$2M to $3M	14%
>$3M to $4M	12%
>$4M to $5M	10%
>$5M	10%

The cost to secure environmental clearance for each project is estimated at 30% of the design fee.

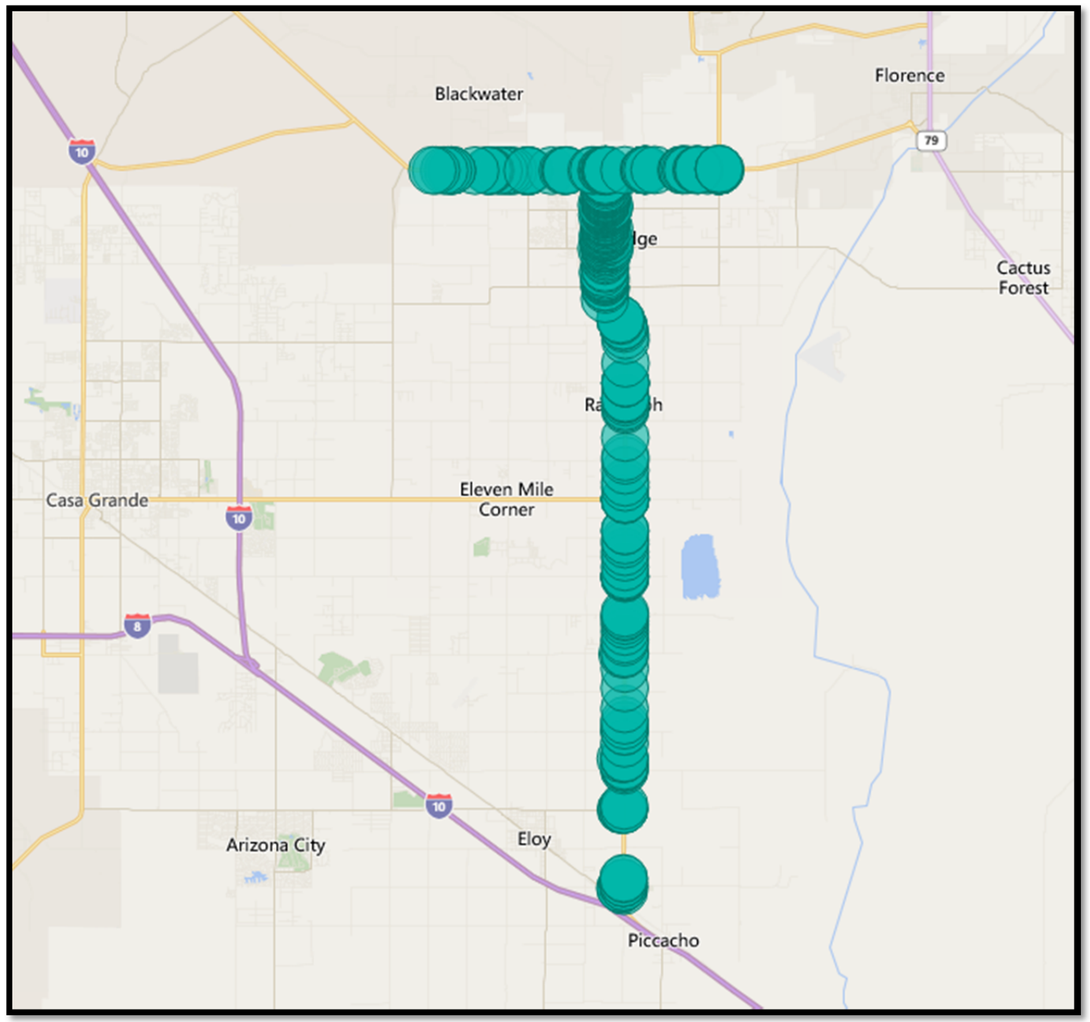
The ADOT administrative cost for each project is set at the amount of $45,000 for each project or 1% of the total construction project cost, whichever is greater.

1. SR 87 & SR 287

Corridor 1 – consists of three roadway segments:

1. SR 87; Curry Road to SR 287 junction (east/west)
2. SR 87; Junction of SR 287 & SR 87 south to Milligan Road (north/south)
3. SR 287; Junction SR 87 to Attaway Road (east/west)

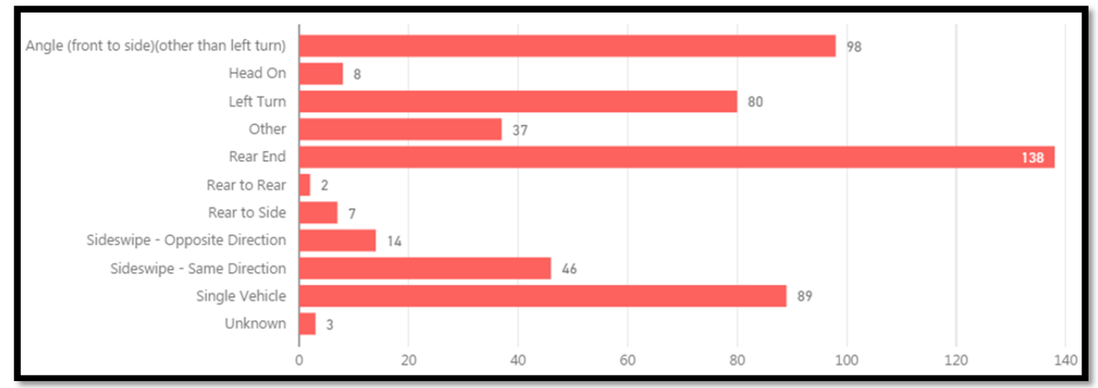
Corridor 1 SR 87 & SR 287 Map – Dots represent all crashes in the corridor



Corridor 1 SR 87 & SR 287 Crash Summary

No.	HSIP Project Corridor	Total Crashes	4 – Serious Injury Crashes	5 – Fatal Crashes
1.	SR 87 & SR 287	522	21	8

Total Crashes (522) for Corridor 1 by Type



No.	HSIP Project Corridor	Most Common		2nd Most		3rd Most	
1.	SR 87 & SR 287	Rear End	26%	Angle	19%	Single Vehicle	17%

Corridor 1 SR 87 & SR 287 Characteristics

- Both routes are ADOT state highways
- Corridor No. 1 is mostly a 2-lane rural roadway with paved shoulder
- There is a 2.5 mile section of 5-lane urban roadway with curb and gutter passing through the City of Coolidge
- There are 2 rural signalized intersections at SR 287 & SR 87 and at SR 287 & Attaway Road
- There are 4 urban signalized intersections in the City of Coolidge

Corridor 1, SR 87 & SR 287, Project Justification

The corridor safety improvement project was identified through network screening of all crashes over the last ten years (2005 – 2014) and refined by reviewing fatal and serious injury crashes over the last five years (2011 – 2015).

The proposed road safety improvement project is on SR 87 from Curry Road to SR 287 and from SR 287 to Milligan Road, and on SR 287 from SR 87 to Attaway Road, in the Coolidge area. The proposed road safety improvement project will reduce the number of vehicle conflict points, improve visibility, provide tactile driver warning, and consists of the following:

- Provide a total of 28 left turn lanes at intersections
- Installation of two actuated advance warning dilemma zone protection systems
- Improve signal visibility at two intersections
- Provide illumination at one intersection
- Installation of one mile of raised median
- Installation of transverse rumble strips at six stop sign controlled intersections

The construction of all improvements will be performed by a licensed Contractor. There will be ground disturbing activities associated with this project. No new right of way or utility relocations are anticipated to be needed for this project.

The corridor experienced 8 fatal, 21 serious injury, and 522 total crashes over the referenced five year period.

A combined crash reduction factor (CCRF) of 69% was established using the 3 highest and/or most appropriate CRFs associated with the safety countermeasures above, and was computed using the following methodology:

CCRF = 1-(1-CRF1)X(1-CRF2)X(1-CRF3)

Countermeasures and their CRFs that were used:

#264, Install left-turn lane: CRF= 35%

#21, Install raised median: CRF= 39%

#2709, Install transverse rumble strips at stop sign controlled intersections: CRF= 22%

CCRF = 1-(1-.35)X(1-.39)X(1-.22) **CCRF = .69**

Based on this CCRF, the expected five year reduction in fatal crashes would be 5.50 and the reduction in serious injury crashes would be 14.50.

This corridor project supports these safety emphasis areas:

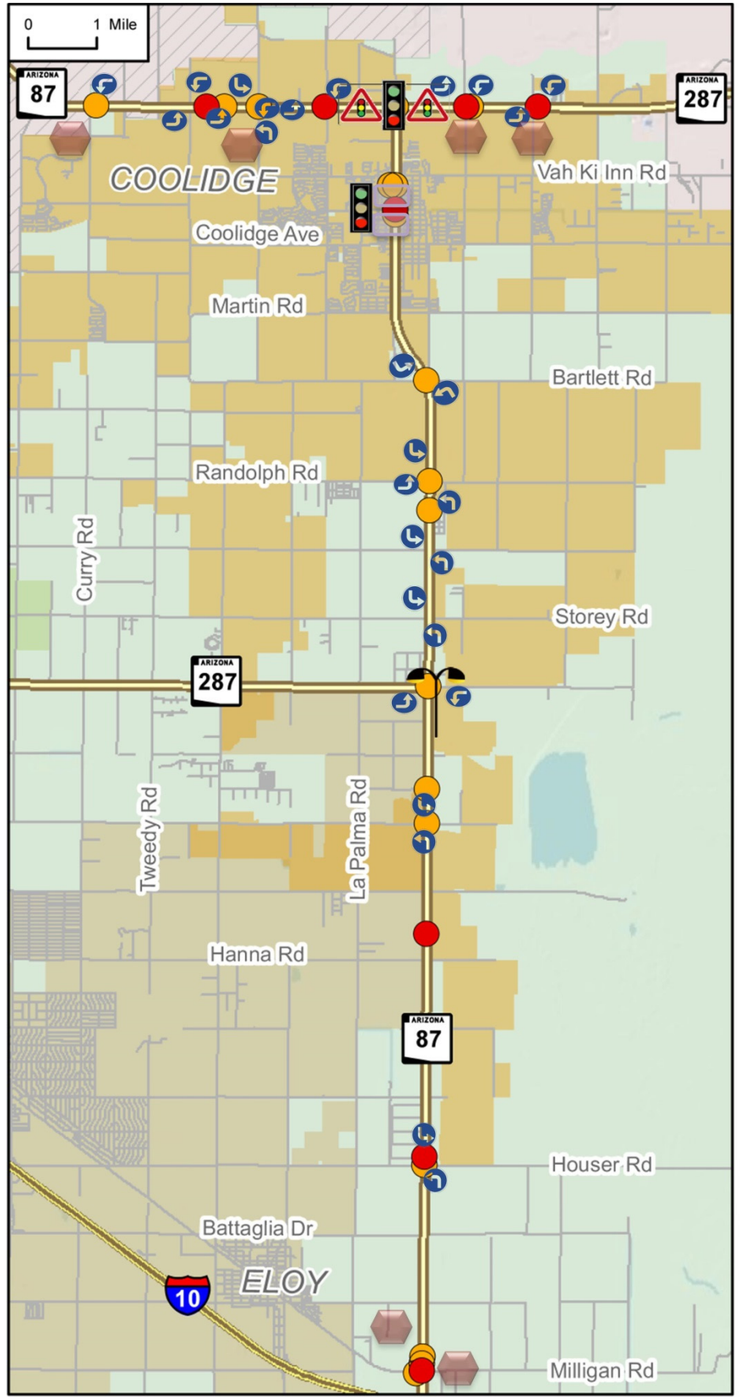
- Intersections
- Lane Departures

The estimated total project cost is $8,513,377 providing a **benefit/cost ratio of 8.7**. The state match (ADOT) is estimated at $480,692.

Corridor 1 - SR 87 & SR 287		*See Map on Report Page 9 for Locations of Individual Projects*		
Project Number	Component Project	No. of Locations	Cost per Location	Total Cost by Project Type
1A	LT Lane Major Road 3-Leg Approach	1	$218,292	$218,292
1B	LT Lane Major Road 4-Leg Approach	27	$218,292	$5,893,876
1C	Actuated Advance Warning Dilemna Zone Protection System	2	$36,382	$72,764
1D	Improve Signal Visibility	2	$17,463	$34,927
1E	Illumination	1	$58,211	$58,211
1F	Raised Median	1	$2,182,917	$2,182,917
1G	Transverse Rumble Strips at Stop Controlled Intersections	6	$8,732	$52,390
			Total Project Cost	$8,513,377

Corridor 1 SR 87 & SR 287 HSIP Project Cost Estimate Worksheet

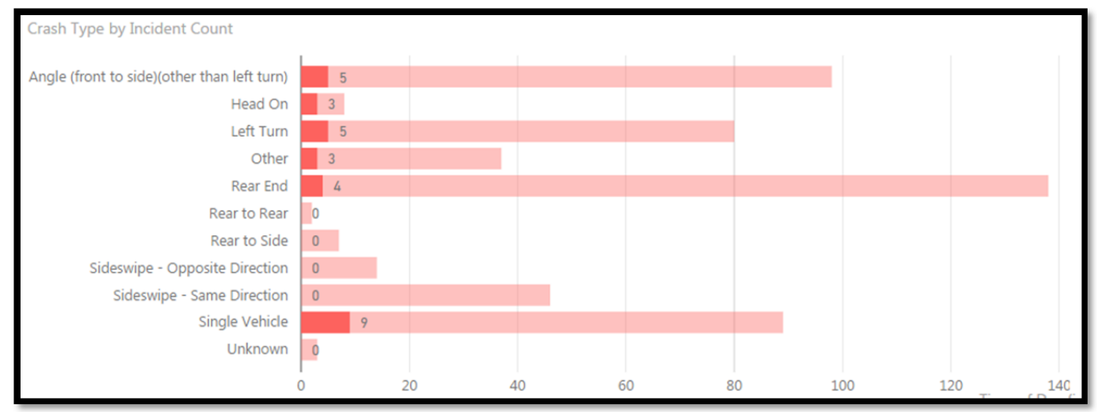
Agency:	SCMPO	Name of Project:	1. SR 87 & SR 287	Project is on a Federal or State Roadway				
HSIP Project Cost Estimate Worksheet								
Project Cost Estimate:	**Description:**	**Unit:**	**Quantity:**	**Unit Cost:**	**HSIP:** 94.30%	**State Match:** 5.70%	**Other Amt:** 0.00%	**TOTAL COST**
Planning or Study:			0	$ -	$ -	$ -	$ -	$ -
Preliminary Engineering:	Design		1	$ 585,000	$ 551,655	$ 33,345	$ -	$ 585,000
Non-Infrastructure (NI) Elements:	Environmental		1	$ 175,500	$ 165,497	$ 10,004	$ -	$ 175,500
ADOT Admin Costs:			1	$ 76,069	$ 71,733	$ 4,336	$ -	$ 76,069
Sub-Total					**$ 788,884**	**$ 47,684**	**$ -**	**$ 836,569**
ADOT ICAP:			**8.36%**		$ 65,950	$ 3,986		$ 69,937
Design Sub-Total					**$ 854,835**	**$ 51,671**		**$ 906,505**
Construction: CM #255	Provide a left-turn lane on one major-road approach (3-leg)	1 Approach	1	$ 150,000	$ 141,450	$ 8,550	$ -	$ 150,000
Construction: CM #264	Provide a left-turn lane on one major-road approach (4-leg)	1 Approach	27	$ 150,000	$ 3,819,150	$ 230,850	$ -	$ 4,050,000
Construction: CM #4855	Installation of an actuated advance warning dilemma zone protection system at high-speed signalized intersections	1 Approach	2	$ 25,000	$ 50,000	*No match required	$ -	$ 50,000
Construction: CM #4111	Improve signal visibility, including signal lens size upgrade, installation of new back-plates, addition of reflective tapes to existing back-plates, and installation of additional signal	Intersection	2	$ 12,000	$ 24,000	*No match required	$ -	$ 24,000
Construction: CM #581	Illumination	Mile	0.2	$ 200,000	$ 37,720	$ 2,280		$ 40,000
Construction: CM #21	Provide a raised median	1 Mile	1	$ 1,500,000	$ 1,414,500	$ 85,500	$ -	$ 1,500,000
Construction: CM #2709	Install transverse rumble strips on stop controlled approaches in rural areas	each	6	$ 6,000	$ 33,948	$ 2,052	$ -	$ 36,000
Sub-Total					**$ 5,520,768**	**$ 329,232**	**$ -**	**$ 5,850,000**
Sales Tax:	N/A		**0.00%**		$ -	$ -	$ -	$ -
Sub-Total			0		**$ 5,520,768**	**$ 329,232**	**$ -**	**$ 5,850,000**
Construction Admin :			**14.00%**		$ 772,317	$ 46,683	$ -	$ 819,000
Contingencies :			**5.00%**		$ 275,828	$ 16,673	$ -	$ 292,500
Post Design			**1.00%**		$ 55,166	$ 3,335	$ -	$ 58,500
Post Sub-Total					**$ 1,103,310**	**$ 66,690**	**$ -**	**$ 1,170,000**
Construction Sub-Total					**$ 6,624,078**	**$ 395,922**	**$ -**	**$ 7,020,000**
ADOT ICAP:			**8.36%**		$ 553,773	$ 33,099		$ 586,872
Construction Sub-Total					**$ 7,177,851**	**$ 429,021**		**$ 7,606,872**
TOTAL REQUEST					**$ 8,032,685**	**$ 480,692**	**$ -**	**$ 8,513,377**



Crash Mitigation Measures Map & Legend for Corridor1 SR 87 & SR 287

Improvement Category	Type of Crashes Mitigated	Improvement	Location Symbol
Intersection Geometry	All	Provide a left-turn lane on one major-road approach	
Intersection Traffic Control	All	Installation of an actuated advance warning dilemma zone protection system at high-speed signalized intersections	
Intersection Traffic Control	Nighttime	Improve signal visibility, including signal lens size upgrade, installation of new back-plates, addition of reflective tapes to existing back-plates, and installation of additional signal heads	
Access Management	All	Provide a raised median	
Roadway	All	Install transverse rumble strips on stop controlled approaches in rural areas	
Highway Lighting	All	Illumination	
		Location of Fatal Crash	
		Location of Incapacitating Injury Crash	

Level 4 &5 Crashes for Corridor 1 SR 87 & SR 287 by Type



Corridor 1 SR 87 & SR 287 Benefit Cost Summary

HSIP Benefit Cost Summary Report

Agency:	SCMPO	Title of Project:	1. SR 87 & SR 287

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CMF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	**1.60**	**69%**	1.10	$5,800,000	$6,403,200
Incapacitating Injury	**4.20**	**69%**	2.90	$400,000	$1,159,200
				Total Annual Benefits	$7,562,400

Costs

Total Project Cost	**$ 8,513,377**
Project Life (years)	**20**
Interest Rate (%)	8%
Capital Recovery Factor	0.1019
Annual Construction Cost	$867,106
Annual Maintenance Cost	$100.00
Total Annual Costs	$867,206

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
$7,562,400	$867,206	**8.7**

***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 17 - 19 preferred.**

2. I-10; MP 211 TO MP 215

Corridor 2 – the Picacho section of I-10 consists of the following roadway segment:

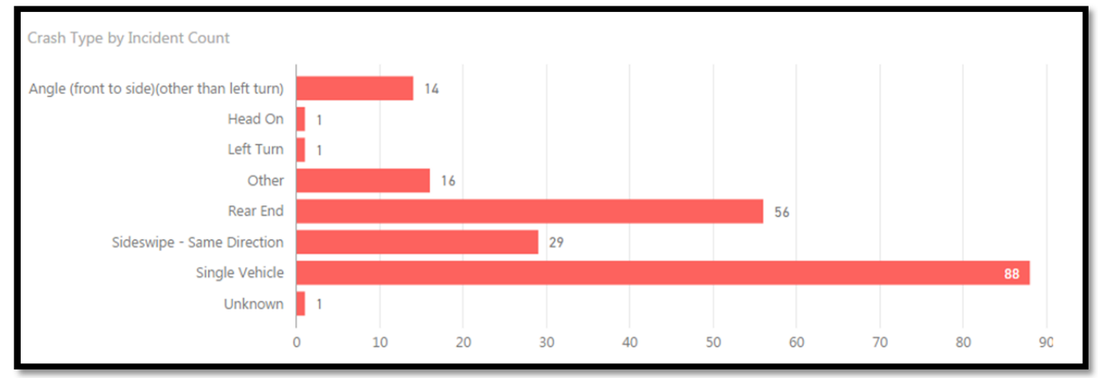
1. I-10; MP 211 to MP 215

Corridor 2, I-10; MP 211 to MP 215, Map – Dots represent all crashes in the corridor

Corridor 2, I-10; MP 211 to MP 215, Crash Summary

No.	HSIP Project Corridor	Total Crashes	4 – Serious Injury Crashes	5 – Fatal Crashes
2.	I-10; MP 211 to MP 215	206	13	6

Total Crashes (206) for Corridor 2 by Type



No.	HSIP Project Corridor	Most Common		2nd Most		3rd Most	
2.	I-10; MP 211 to MP 215	Single Vehicle	43%	Rear End	27%	Sideswipe	14%

Corridor 2, I-10; MP 211 to MP 215, Characteristics

- Picacho Corridor is a segment of ADOT Interstate Highway 10
- There are 2 lanes in each direction in the northwest half of the segment and 3 lanes in each direction in the southeast half of the section
- The lanes are separated by a wide depressed median
- Both directions of travel have left and right paved shoulders

Corridor 2, I-10; MP 211 to MP 215, Project Justification

The corridor safety improvement project was identified through network screening of all crashes over the last ten years (2005 – 2014) and refined by reviewing fatal and serious injury crashes over the last five years (2011 – 2015).

The proposed road safety improvement project is on I-10 from Milepost 211 to Milepost 215, in the Picacho area. The proposed road safety improvement project will reduce the number of vehicle conflict points, improve visibility, decrease lane departures, provide visual driver warning, and consists of the following:

- Provide illumination along 8 miles of freeway
- Implementation of truck lane restrictions through signage

The construction of all improvements will be performed by a licensed Contractor. There will be ground disturbing activities associated with this project. No new right of way or utility relocations are anticipated to be needed for this project.

The corridor experienced 6 fatal, 13 serious injury, and 206 total crashes over the referenced five year period.

A combined crash reduction factor (CCRF) of 56% was established using the following methodology:

CCRF = 1-(1-CRF1)X(1-CRF2)

Countermeasures and their CRFs that were used:

#581, Install illumination: CRF= 27%

#1931, Implement truck lane restrictions: CRF= 40%

CCRF = 1-(1-.27)X(1-.40) **CCRF = .56**

Based on this CCRF, the expected five year reduction in fatal crashes would be 3.35 and the reduction in serious injury crashes would be 7.30.

This corridor project supports these safety emphasis areas:

- Lane Departures

The estimated total project cost is $2,514,306 providing a **benefit/cost ratio of 17.4**. The local match (ADOT) is estimated at $142,327.

Corridor 2 - I-10, MP 211 - MP 215		*See Map on Report Page 14 for Locations of Individual Projects*		
Project Number	Component Project	No. of Locations	Cost per Location	Total Cost by Project Type
2A	Illumination	1	$2,489,412	$2,489,412
2B	Truck Lane Restrictions	1	$24,894	$24,894
			Total Project Cost	$2,514,306

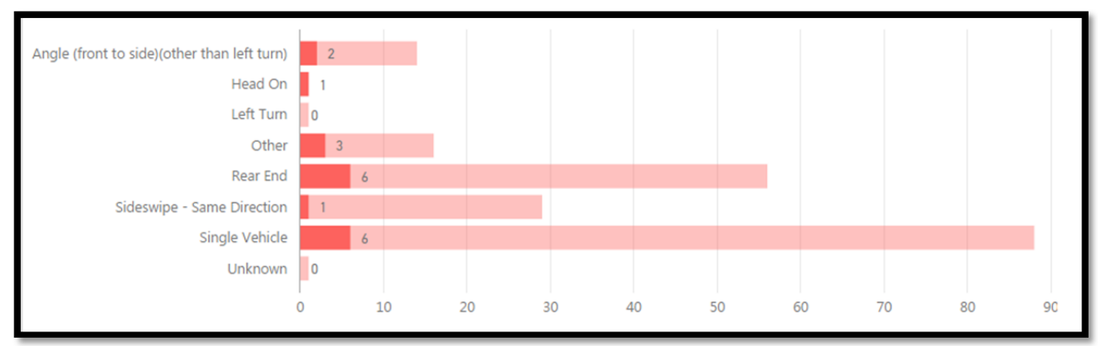
Corridor 2, I-10; MP 211 to MP 215, HSIP Project Cost Estimate Worksheet

Agency:	**SCMPO**	**Name of Project:**	**2. I-10; MP 211 TO MP 215**		**Project is on a Federal or State Roadway**			
HSIP Project Cost Estimate Worksheet								
Project Cost Estimate:	**Description:**		**Quantity:**	**Unit Cost:**	**HSIP:**	**State Match:**	**Other Amt:**	**TOTAL COST**
					94.30%	**5.70%**	**0.00%**	
Planning or Study:			0	$ -	$ -	$ -	$ -	$ -
Preliminary Engineering:	Design		1	$ 258,560	$ 243,822	$ 14,738	$ -	$ 258,560
Non-Infrastructure (NI) Elements:	Environmental		1	$ 77,568	$ 73,147	$ 4,421	$ -	$ 77,568
ADOT Admin Costs:			1	$ 45,000	$ 42,435	$ 2,565	$ -	$ 45,000
Sub-Total					**$ 359,404**	**$ 21,724**	**$ -**	**$ 381,128**
ADOT ICAP:			**8.36%**		$ 30,046	$ 1,816		$ 31,862
Design Sub-Total					**$ 389,450**	**$ 23,540**		**$ 412,990**
Construction: CM #581	Illumination	mile	8	$ 200,000	$ 1,508,800	$ 91,200	$ -	$ 1,600,000
Construction: CM #1931	Implement truck lane restrictions on multilane freeways	each sign	8	$ 2,000	$ 16,000	*No match required	$ -	$ 16,000
Sub-Total			0		**$ 1,524,800**	**$ 91,200**	**$ -**	**$ 1,616,000**
Sales Tax:	N/A		**0.00%**		$ -	$ -	$ -	$ -
Sub-Total					**$ 1,524,800**	**$ 91,200**	**$ -**	**$ 1,616,000**
Construction Admin :			**14.00%**		$ 213,344	$ 12,896	$ -	$ 226,240
Contingencies :			**5.00%**		$ 76,194	$ 4,606	$ -	$ 80,800
Post Design			**1.00%**		$ 15,239	$ 921	$ -	$ 16,160
Post Sub-Total					**$ 304,778**	**$ 18,422**	**$ -**	**$ 323,200**
Construction Sub-Total					**$ 1,829,578**	**$ 109,622**	**$ -**	**$ 1,939,200**
ADOT ICAP:			**8.36%**		$ 152,952	$ 9,164		$ 162,116
Construction Sub-Total					**$ 1,982,530**	**$ 118,786**		**$ 2,101,316**
TOTAL REQUEST					**$ 2,371,980**	**$ 142,327**	**$ -**	**$ 2,514,306**

Crash Mitigation Measures Map & Legend for Corridor2, I-10; MP 211 to MP 215

Improvement Category	Type of Crashes Mitigated	Improvement	Location Symbol
Highway Lighting	All	Illumination	
Roadway	All	Implement truck lane restrictions on multilane freeways	
		Location of Fatal Crash	
		Location of Incapacitating Injury Crash	

Level 4 &5 Crashes for Corridor 2, I-10; MP 211 to MP 215, by Type



Corridor 2, I-10; MP 211 to MP 215, Benefit Cost Summary

HSIP Benefit Cost Summary Report

Agency:	SCMPO	Title of Project:	2. I-10; MP 211 TO MP 215

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CMF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	1.20	56%	0.67	$5,800,000	$3,897,600
Incapacitating Injury	2.60	56%	1.46	$400,000	$582,400
				Total Annual Benefits	$4,480,000

Costs

Total Project Cost	$ 2,514,306
Project Life (years)	20
Interest Rate (%)	8%
Capital Recovery Factor	0.1019
Annual Construction Cost	$256,088
Annual Maintenance Cost	$100.00
Total Annual Costs	$256,188

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
$4,480,000	$256,188	**17.4**

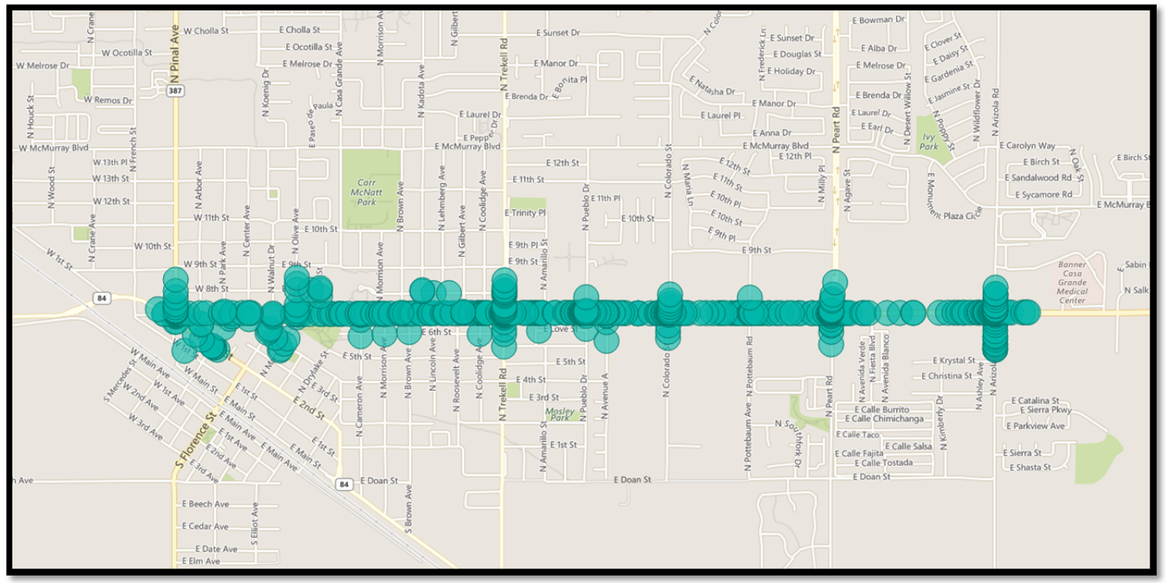
***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 17 - 19 preferred.**

3. FLORENCE BOULEVARD

Corridor 3 – consists of the following roadway segment:

1. Florence Boulevard; Pinal Avenue to Arizola Road

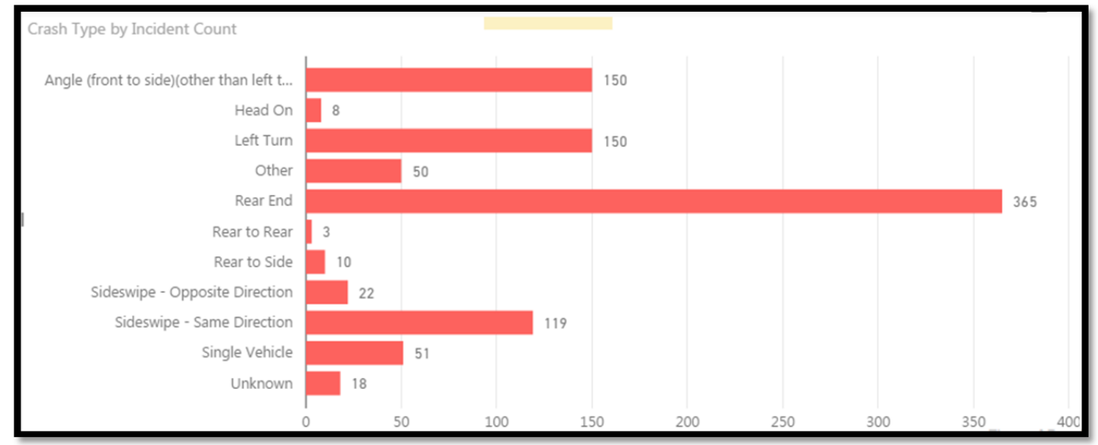
Corridor 3 Florence Boulevard Map – Dots represent all crashes in the corridor



Corridor 3 Florence Boulevard Crash Summary

No.	HSIP Project Corridor	Total Crashes	4 – Serious Injury Crashes	5 – Fatal Crashes
3.	Florence Boulevard	946	12	5

Total Crashes (946) for Corridor 3 by Type



No.	HSIP Project Corridor	Most Common		2nd Most		3rd Most	
3.	Florence Boulevard	Rear End	39%	Left Turn	16%	Angle	16%

Corridor 3 Florence Boulevard Characteristics

- Florence Boulevard is a major east-west route through the central city area
- Florence Boulevard is served by a traffic interchange with I-10
- The roadway is a 5 lane urban section with center two way left turn lanes and signals at major intersections
- Near Arizola Road there are also several right turn lanes into ajacent businesses
- Florence Blvd contains a short distance of raised median from Peart Road to Pottebaum Road
- There is a high visibility unsignalized pedestrian crosswalk at Brown Ave

Corridor 3, Florence Boulevard, Project Justification

The corridor safety improvement project was identified through network screening of all crashes over the last ten years (2005 – 2014) and refined by reviewing fatal and serious injury crashes over the last five years (2011 – 2015).

The proposed road safety improvement project is on Florence Boulevard from Pinal Avenue to Arizola Road in the City of Casa Grande. The proposed road safety improvement project will reduce the number of vehicle conflict points, improve visibility, decrease lane departures, provide visual driver warning, and consists of the following:

- Installation of one actuated advance warning dilemma zone protection system
- Installation of one mile of raised median
- Change left turn phase from permissive to protected/permissive at four intersections

The construction of all improvements will be performed by a licensed Contractor. There will be ground disturbing activities associated with this project. No new right of way or utility relocations are anticipated to be needed for this project.

The corridor experienced 5 fatal, 12 serious injury, and 946 total crashes over the referenced 5 year period.

A combined crash reduction factor (CCRF) of 46% was established using the highest and/or most appropriate CRFs associated with the safety countermeasures above, using the following methodology:

CCRF = 1-(1-CRF1)X(1-CRF2)

Countermeasures and their CRFs that were used:

#4855, Install actuated advance warning dilemma zone protection system: CRF= 11%

#21, Install raised median: CRF= 39%

CCRF = 1-(1-.11)X(1-.39) **CCRF = .46**

Based on this CCRF, the expected five year reduction in fatal crashes would be 2.30 and the reduction in serious injury crashes would be 5.50.

This corridor project supports these safety emphasis areas:

- Intersections
- Pedestrians

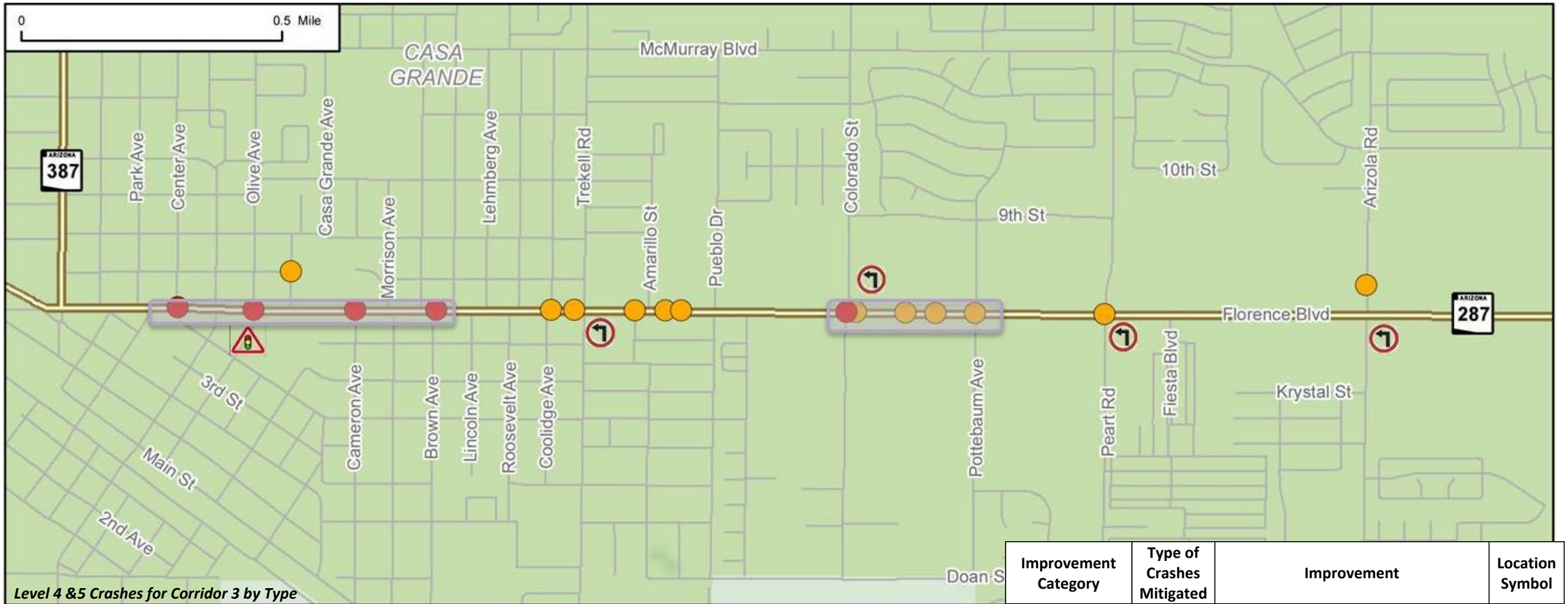
The estimated total project cost is $2,709,300 providing a **benefit/cost ratio of 11.2**. The local match is estimated at $147,248.

Corridor 3 - Florence Boulevard		*See Map on Report Page 19 for Locations of Individual Projects*		
Project Number	Component Project	No. of Locations	Cost per Location	Total Cost by Project Type
3A	Actuated Advance Warning Dilemna Zone Protection System	1	$42,201	$42,201
3B	Raised Median	1	$2,532,056	$2,532,056
3C	LT Phase Change - Perm/Protect or Protective/Permissive	4	$33,761	$135,043
			Total Project Cost	$2,709,300

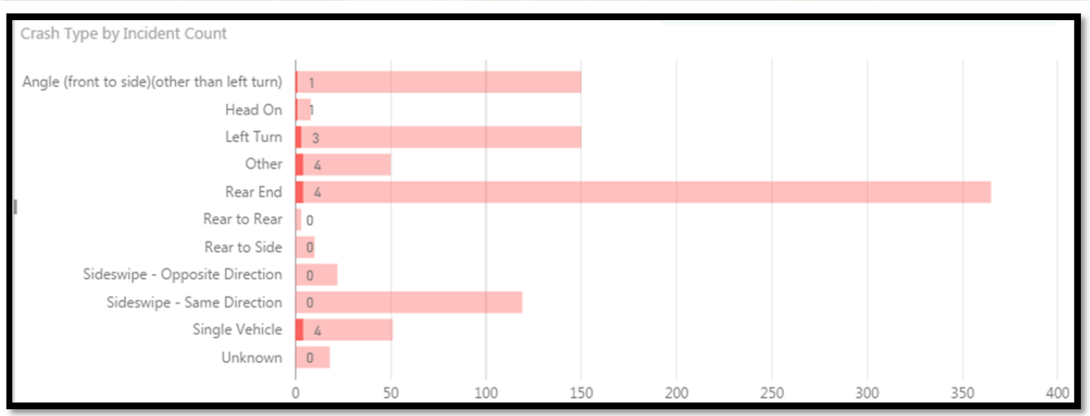
Corridor 3 Florence Boulevard HSIP Project Cost Estimate Worksheet

Agency:	SCMPO	Name of Project:	3. FLORENCE BOULEVARD		Corridor Improvement			
HSIP Project Cost Estimate Worksheet								
Project Cost Estimate:	Description:	Unit	Quantity:	Unit Cost:	HSIP: 94.30%	Local Match: 5.70%	Other Amt: 0.00%	TOTAL COST
Design			1	$ 256,800	$ 242,162	$ 14,638	$ -	$ 256,800
Environmental Clearance			1	$ 77,040	$ 72,649	$ 4,391	$ -	$ 77,040
ADOT Admin Costs:			1	$ 45,000	$ 42,435	$ 2,565	$ -	$ 45,000
Design Sub-Total					**$ 357,246**	**$ 21,594**	**$ -**	**$ 378,840**
Construction: CM #4855	Installation of an actuated advance warning dilemma zone protection system at high-speed signalized intersections	1 Approach	1	$ 25,000	$ 25,000	*No match required	$ -	$ 25,000
Construction: CM #21	Provide a raised median	1 Mile	1	$ 1,500,000	$ 1,414,500	$ 85,500	$ -	$ 1,500,000
Construction: CM #4578	Change left-turn phase from permissive to protected/permissive or permissive/protected phasing on one or more approaches	Intersection	4	$ 20,000	$ 80,000	*No match required	$ -	$ 80,000
HSIP Eligible Sub-Total			**6**		**$ 1,519,500**	**$ 85,500**	**$ -**	**$ 1,605,000**
Traffic Control:			**10.00%**		$ 151,950	$ 8,550	$ -	$ 160,500
Mobilization:			**10.00%**		$ 151,950	$ 8,550	$ -	$ 160,500
Construction Sub-Total					**$ 1,823,400**	**$ 102,600**	**$ -**	**$ 1,926,000**
Construction Admin :			**14.00%**		$ 254,271	$ 15,369	$ -	$ 269,640
Contingencies :			**5.00%**		$ 90,811	$ 5,489	$ -	$ 96,300
Post Design:			**1.00%**		$ 18,162	$ 1,098	$ -	$ 19,260
Communications:			**1.00%**		$ 18,162	$ 1,098	$ -	$ 19,260
Post Sub-Total					$ 381,406	$ 23,054	$ -	$ 404,460
Post Const Sub-Total					**$ 2,204,806**	**$ 125,654**	**$ -**	**$ 2,330,460**
TOTAL REQUEST					**$ 2,562,052**	**$ 147,248**	**$ -**	**$ 2,709,300**

Crash Mitigation Measures Map & Legend for Corridor 3 Florence Boulevard



Level 4 &5 Crashes for Corridor 3 by Type



Improvement Category	Type of Crashes Mitigated	Improvement	Location Symbol
Intersection Traffic Control	All	Installation of an actuated advance warning dilemma zone protection system at high-speed signalized intersections	
Access Management	All	Provide a raised median	
Intersection Traffic Control	All	Change left-turn phase from permissive to protected/permissive or permissive/protected phasing on one or more approaches	
		Location of Fatal Crash	
		Location of Incapacitating Injury Crash	

Corridor 3 Florence Boulevard Benefit Cost Summary

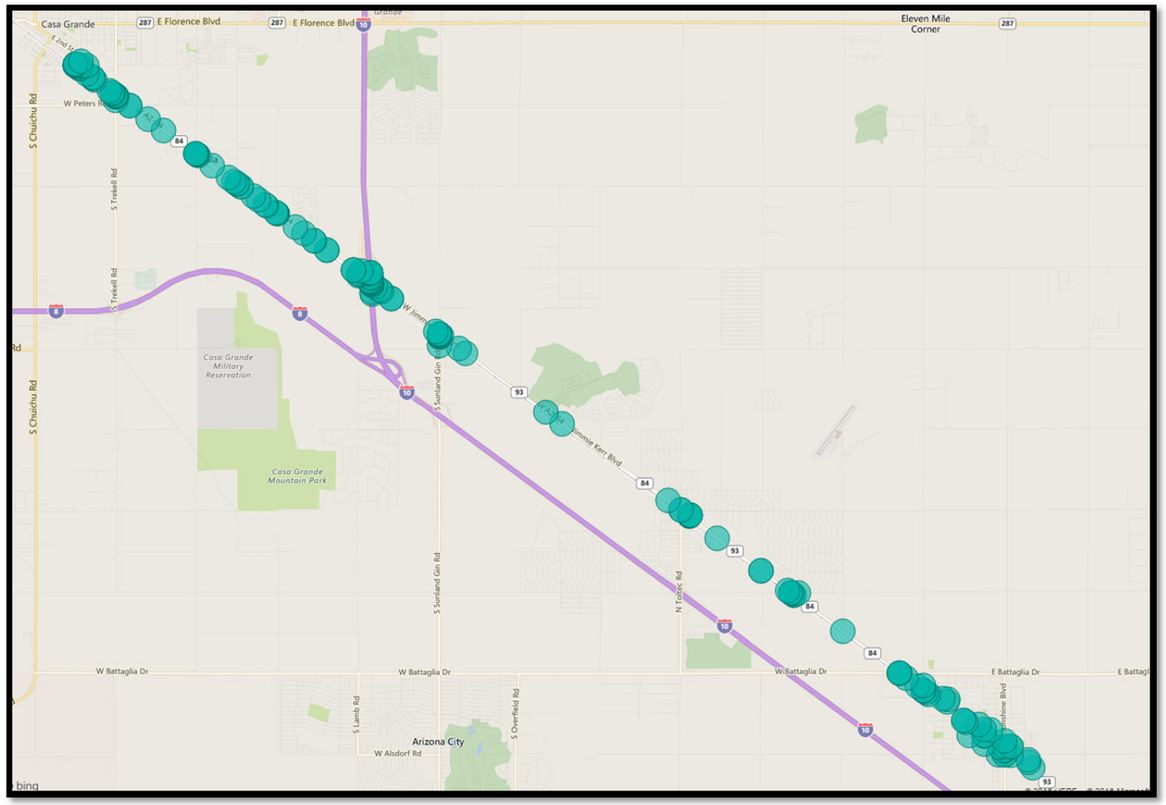
HSIP Benefit Cost Summary Report					
Agency:	**SCMPO**		**Title of Project:**	**3. FLORENCE BOULEVARD**	
Benefit / Cost Ratio Tabulation					
Annual Benefit Tabulation					
Severity	Annual Average	Estimated CMF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	**1.00**	**46%**	0.46	$5,800,000	$2,668,000
Incapacitating Injury	**2.40**	**46%**	1.10	$400,000	$441,600
				Total Annual Benefits	$3,109,600
Costs					
Total Project Cost					**$ 2,709,300**
Project Life (years)					**20**
Interest Rate (%)					8%
Capital Recovery Factor					0.1019
Annual Construction Cost					$275,948
Annual Maintenance Cost					$100.00
				Total Annual Costs	$276,048
Benefit / Cost					
Annual Benefit	Annual cost	Benefit / Cost Ratio			
$3,109,600	$276,048	**11.2**			
***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 17 - 19 preferred.**					

4. JIMMIE KERR BLVD / FRONTIER ST

Corridor 4 – consists of the following roadway segment:

1. Jimmie Kerr Boulevard (Casa Grande) & Frontier Street (Eloy); Casa Grande Avenue to Milligan Road

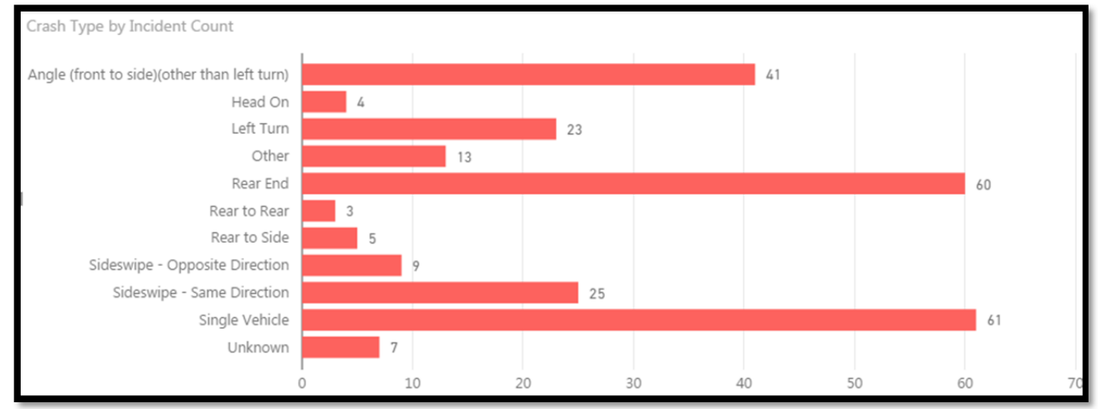
Corridor 4 Jimmie Kerr Blvd / Frontier St Map – Dots represent all crashes in the corridor



Corridor 4 Crash Summary

No.	HSIP Project Corridor	Total Crashes	4 – Serious Injury Crashes	5 – Fatal Crashes
4.	Jimmie Kerr Blvd / Frontier St	251	11	4

Total Crashes (251) for Corridor 4 by Type



No.	HSIP Project Corridor	Most Common		2nd Most		3rd Most	
4.	Jimmie Kerr Blvd / Frontier St	Single Vehicle	24%	Rear End	24%	Sideswipe	16%

Corridor 4 Jimmie Kerr Blvd / Frontier St Characteristics

- The intersections are skewed due to the diagonal route
- The minor roads are stop sign control
- Some of the major roads have left turn lanes
- The roadway is generally a 2-lane rural road with paved shoulders except through the City of Eloy where it becomes a 5-lane section with raised medians and street lights
- North of Eloy, the roadway transitions back to a two lane rural roadway with paved shoulders
- At Sunland Gin Road, the roadway becomes a three lane road with a center two-way left turn lane
- There are auxilliary lanes at the I-10 ramps
- A half mile west of I-10 , Jimmie Kerr Blvd transitions from two lanes to five lanes
- The intersections with Peart Rd and Trekell Rd are both signalized

Corridor 4, Jimmie Kerr Blvd / Frontier St, Project Justification

The corridor safety improvement project was identified through network screening of all crashes over the last ten years (2005 – 2014) and refined by reviewing fatal and serious injury crashes over the last five years (2011 – 2015).

The proposed road safety improvement project is on Jimmie Kerr Boulevard in Casa Grande and Frontier Street in Eloy from Casa Grande Avenue to Milligan Road. The proposed road safety improvement project will reduce the number of vehicle conflict points, improve visibility, decrease lane departures, provide visual and tactile driver warning, and consists of the following:

- Installation of one actuated advance warning dilemma zone protection system
- Provide one mile of raised median
- Change left turn phase from permissive to protected/permissive for one intersection
- Install edge line rumble strips with shoulder widening for one mile
- Painted channelization for six intersections
- Install wider markings and edge line and center line rumble strips

The construction of all improvements will be performed by a licensed Contractor. There will be ground disturbing activities associated with this project. No new right of way or utility relocations are anticipated to be needed for this project.

The corridor experienced 4 fatal, 11 serious injury, and 251 total crashes over the referenced five year period.

A combined crash reduction factor (CCRF) of 84% was established using the 3 highest and/or most appropriate CRFs associated with the safety countermeasures above, using the following methodology:

CCRF = 1-(1-CRF1)X(1-CRF2)X(1-CRF3)

Countermeasures and their CRFs that were used:

#21, Install raised median: CRF= 39%

#4790, Install wider markings and edgeline and centerline rumble strips: CRF= 38%

#294, Install painted channelization: CRF= 57%

CCRF = 1-(1-.39)X(1-.38)X(1-.57) **CCRF = .84**

Based on this CCRF, the expected five year reduction in fatal crashes would be 3.35 and the reduction in serious injury crashes would be 9.25.

This corridor project supports these safety emphasis areas:

- Intersections
- Lane Departures

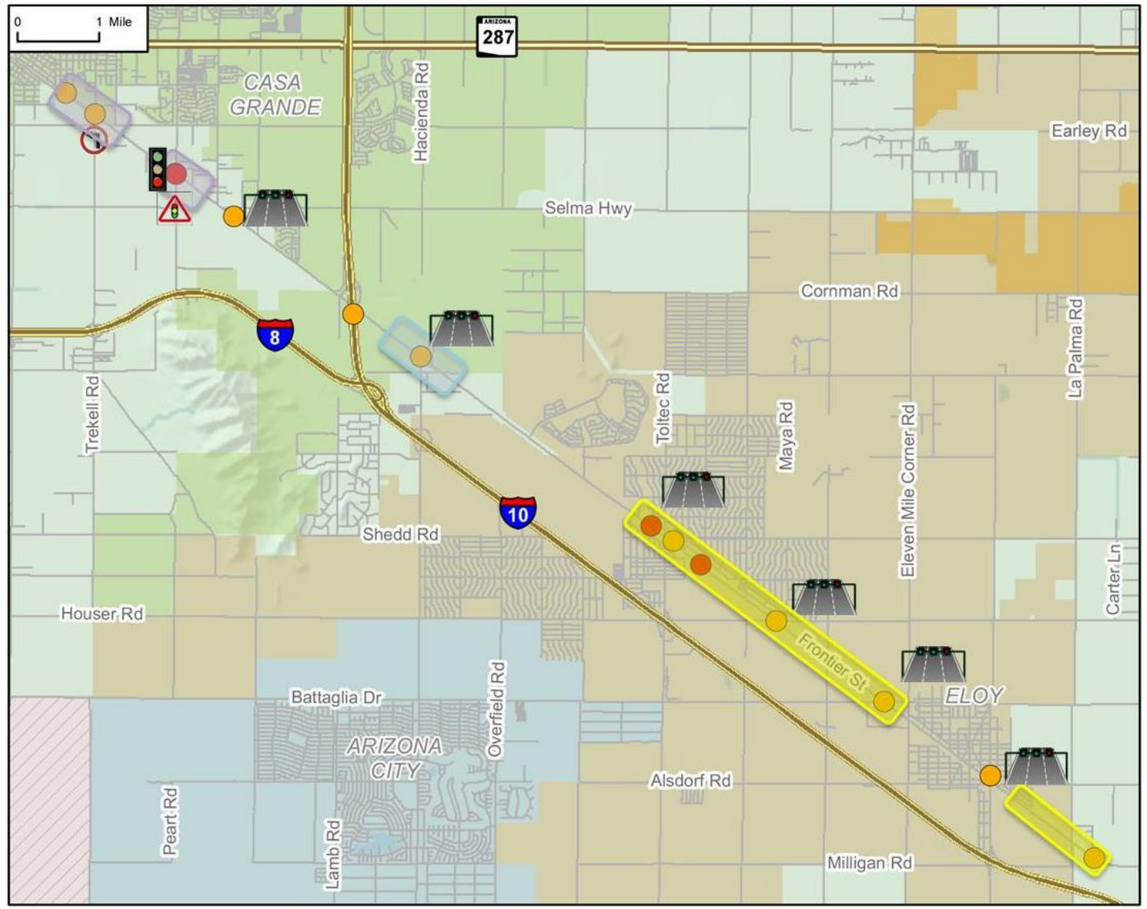
The estimated total project cost is $4,641,442 providing a **benefit/cost ratio of 9.8**. The local match is estimated at $243,153.

Corridor 4 - Jimmie Kerr Blvd/Frontier St		*See Map on Report Page 24 for Locations of Individual Projects*		
Project Number	Component Project	No. of Locations	Cost per Location	Total Cost by Project Type
4A	Actuated Advance Warning Dilemna Zone Protection System	1	$41,250	$41,250
4B	Raised Median	2	$1,237,498	$2,474,996
4C	LT Phase Change - Perm/Protect or Protective/Permissive	1	$29,700	$29,700
4D	Edgeline Rumble Strips - Add Shoulder	2	$824,999	$1,649,997
4E	Painted Channelization Both Roads at Intersections	6	$33,000	$198,000
4F	Wider Markings & Centerline & Edgeline Rumble Strips	1	$247,500	$247,500
			Total Project Cost	$4,641,442

Corridor 4 Jimmie Kerr Blvd / Frontier St HSIP Project Cost Estimate Worksheet

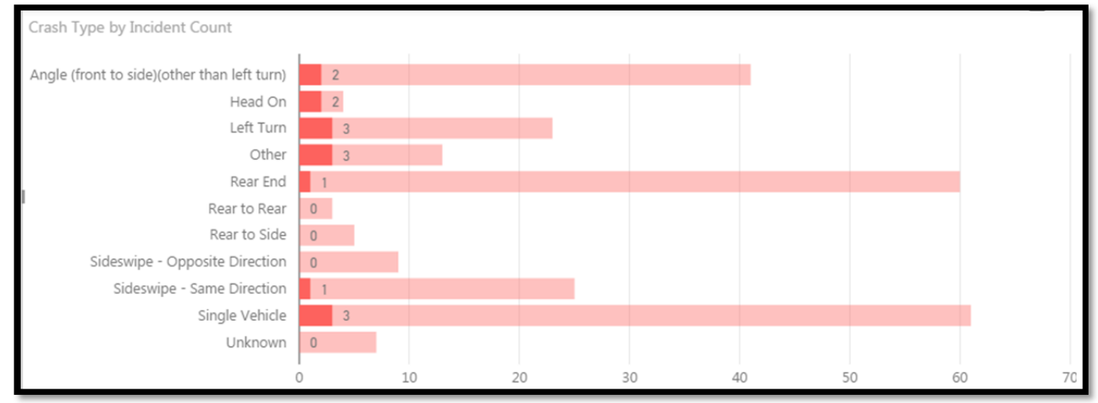
Agency:	**SCMPO**	**Name of Project:**	**4. Jimmie Kerr Blvd / Frontier St**		**Corridor Improvement**			
HSIP Project Cost Estimate Worksheet								
Project Cost Estimate:	**Description:**	**Unit**	**Quantity:**	**Unit Cost:**	**HSIP:** 94.30%	**Local Match:** 5.70%	**Other Amt:** 0.00%	**TOTAL COST**
Design:			1	$ 393,820	$ 371,372	$ 22,448	$ -	$ 393,820
Environmental Clearance			1	$ 118,146	$ 111,412	$ 6,734	$ -	$ 118,146
ADOT Admin Costs:			1	$ 45,000	$ 42,435	$ 2,565	$ -	$ 45,000
Design Sub-Total					**$ 525,219**	**$ 31,747**	**$ -**	**$ 556,966**
Construction: CM #4855	Installation of an actuated advance warning dilemma zone protection system at high-speed signalized intersections	1 Approach	1	$ 25,000	$ 25,000	*No match required	$ -	$ 25,000
Construction: CM #21	Provide a raised median	1 Mile	1	$ 1,500,000	$ 1,414,500	$ 85,500	$ -	$ 1,500,000
Construction: CM #4578	Change left-turn phase from permissive to protected/permissive or permissive/protected phasing on one or more approaches	intersection	1	$ 18,000	$ 18,000	*No match required	$ -	$ 18,000
Construction: CM #3408	Install edgeline rumble strips on roadways with a shoulder width of 5 feet or greater (add shoulder)	mile	1	$ 1,000,000	$ 943,000	$ 57,000	$ -	$ 1,000,000
Construction: CM #294	Painted channelization of both major and minor roads	Intersection	6	$ 20,000	$ 120,000	*No match required	$ -	$ 120,000
Construction: CM #4790	Install wider markings and both edgeline and centerline rumble strips with resurfacing (markings & rumble strips only)	mile	5	$ 30,000	$ 150,000	*No match required	$ -	$ 150,000
HSIP Eligible Sub-Total					**$ 2,670,500**	**$ 142,500**	**$ -**	**$ 2,813,000**
Traffic Control:			**10.00%**		$ 267,050	$ 14,250	$ -	$ 281,300
Mobilization:			**10.00%**		$ 267,050	$ 14,250	$ -	$ 281,300
Construction Sub-Total					$ 3,204,600	$ 171,000	$ -	3,375,600
Construction Admin :			**14.00%**		$ 445,647	$ 26,937	$ -	$ 472,584
Contingencies :			**5.00%**		$ 159,160	$ 9,620	$ -	$ 168,780
Post Design:			**1.00%**		$ 31,832	$ 1,924	$ -	$ 33,756
Communications:			**1.00%**		$ 31,832	$ 1,924	$ -	$ 33,756
Post Sub-Total					$ 668,470	$ 40,406	$ -	708,876
Post Const Sub-Total					**$ 3,873,070**	**$ 211,406**	**$ -**	**$ 4,084,476**
TOTAL REQUEST					**$ 4,398,289**	**$ 243,153**	**$ -**	**$ 4,641,442**

Crash Mitigation Measures Map & Legend for Corridor4 Jimmie Kerr Blvd / Frontier St



Note: The City of Casa Grande will be signalizing the intersection of Jimmie Kerr Boulevard & Hacienda Road in the near future.

Level 4 &5 Crashes for Corridor 4 Jimmie Kerr Blvd / Frontier St by Type



Improvement Category	Type of Crashes Mitigated	Improvement	Location Symbol
Intersection Traffic Control	All	Installation of an actuated advance warning dilemma zone protection system at high-speed signalized intersections	
Access Management	All	Provide a raised median	
Intersection Traffic Control	All	Change left-turn phase from permissive to protected/permissive or permissive/protected phasing on one or more approaches	
Roadway	All	Install edge line rumble strips on roadways with a shoulder width of 5 feet or greater (add shoulder)	
Intersection Geometry	All	Painted channelization of both major and minor roads	
Delineation	All	Install wider markings and both edge line and centerline rumble strips with resurfacing (markings and rumble strips only)	
		Location of Fatal Crash	
		Location of Incapacitating Injury Crash	

Corridor 4 Jimmie Kerr Blvd / Frontier St Benefit Cost Summary

HSIP Benefit Cost Summary Report

Agency:	SCMPO	Title of Project:	4. Jimmie Kerr Blvd / Frontier St

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CMF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.80	84%	0.67	$5,800,000	$3,897,600
Incapacitating Injury	2.20	84%	1.85	$400,000	$739,200
				Total Annual Benefits	$4,636,800

Costs

Total Project Cost	$ 4,641,442
Project Life (years)	20
Interest Rate (%)	8%
Capital Recovery Factor	0.1019
Annual Construction Cost	$472,741
Annual Maintenance Cost	$100.00
Total Annual Costs	$472,841

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
$4,636,800	$472,841	**9.8**

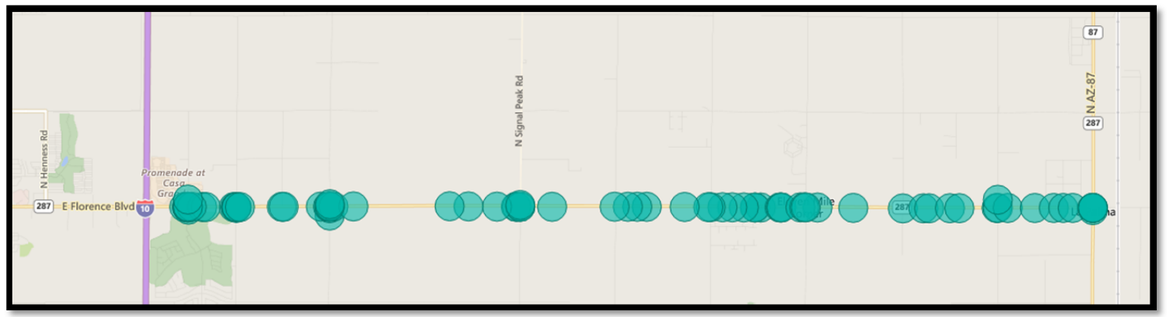
***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 17 - 19 preferred.**

5. SR 287 RURAL

Corridor 5 – consists of the following roadway segment:

1. SR 287; I-10 to SR 87

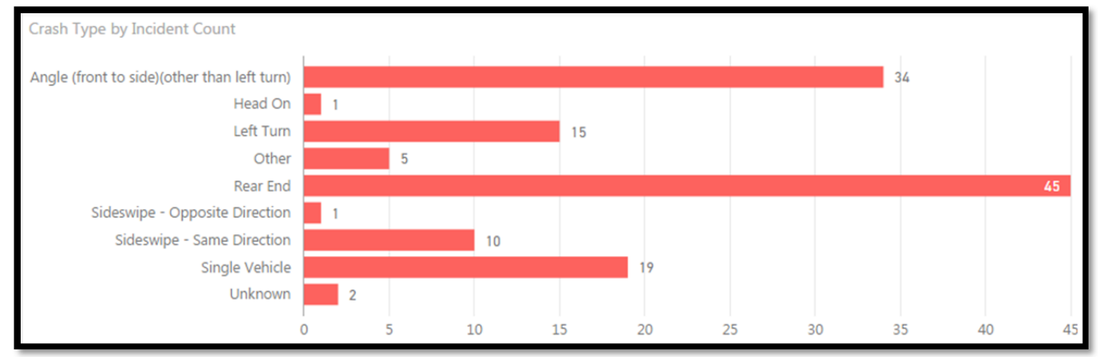
Corridor 5 SR 287 Rural Map – Dots represent all crashes in the corridor



Corridor 5 SR 287 Rural Crash Summary

No.	HSIP Project Corridor	Total Crashes	4 – Serious Injury Crashes	5 – Fatal Crashes
5.	SR 287 Rural	132	10	3

Total Crashes (132) for Corridor 5 by Type



No.	HSIP Project Corridor	Most Common		2nd Most		3rd Most	
5.	SR 287 Rural	Rear End	34%	Angle	26%	Single Vehicle	14%

Corridor 5 SR 287 Rural Characteristics

- The route is ADOT State Highway 287
- SR 287 east of I-10 transitions from a 5 lane urban section with several signals and auxiliary turn lanes to a rural section at Hacienda Rd
- East of Hacienda, SR 287 is two lanes with paved shoulders and mostly stopped controlled intersections
- There is a signal and turn lane widening at the intersection with Eleven Mile Corner Rd

Corridor 5, SR 287 Rural, Project Justification

The corridor safety improvement project was identified through network screening of all crashes over the last ten years (2005 – 2014) and refined by reviewing fatal and serious injury crashes over the last five years (2011 – 2015).

The proposed road safety improvement project is on SR 287 from I-10 to SR 87 in the Casa Grande area. The proposed road safety improvement project will reduce the number of vehicle conflict points, improve visibility, decrease lane departures, provide visual and tactile driver warning, and consists of the following:

- Provide 3 left turn lanes
- Provide 2 right turn lanes
- Install transverse rumble strips on three stop sign controlled approaches
- Install wider markings and edge line and center line rumble strips on 9 miles
- Install illumination for 1 intersection

The construction of all improvements will be performed by a licensed Contractor. There will be ground disturbing activities associated with this project. No new right of way or utility relocations are anticipated to be needed for this project.

The corridor experienced 3 fatal, 10 serious injury, and 132 total crashes over the referenced five year period.

A combined crash reduction factor (CCRF) of 68% was established using the 3 highest and/or most appropriate CRFs associated with the safety countermeasures above, using the following methodology:

CCRF = 1-(1-CRF1)X(1-CRF2)X(1-CRF3)

Countermeasures and their CRFs that were used:

#4790, Install wider markings and edgeline and centerline rumble strips: CRF= 38%

#264, Install left-turn lane: CRF= 35%

#2709, Install transverse rumble strips at stop sign controlled intersections: CRF= 22%

CCRF = 1-(1-.38)X(1-.35)X(1-.22) **CCRF = .68**

Based on this CCRF, the expected five year reduction in fatal crashes would be 2.05 and the reduction in serious injury crashes would be 6.80.

This corridor project supports these safety emphasis areas:

- Intersections
- Lane Departures

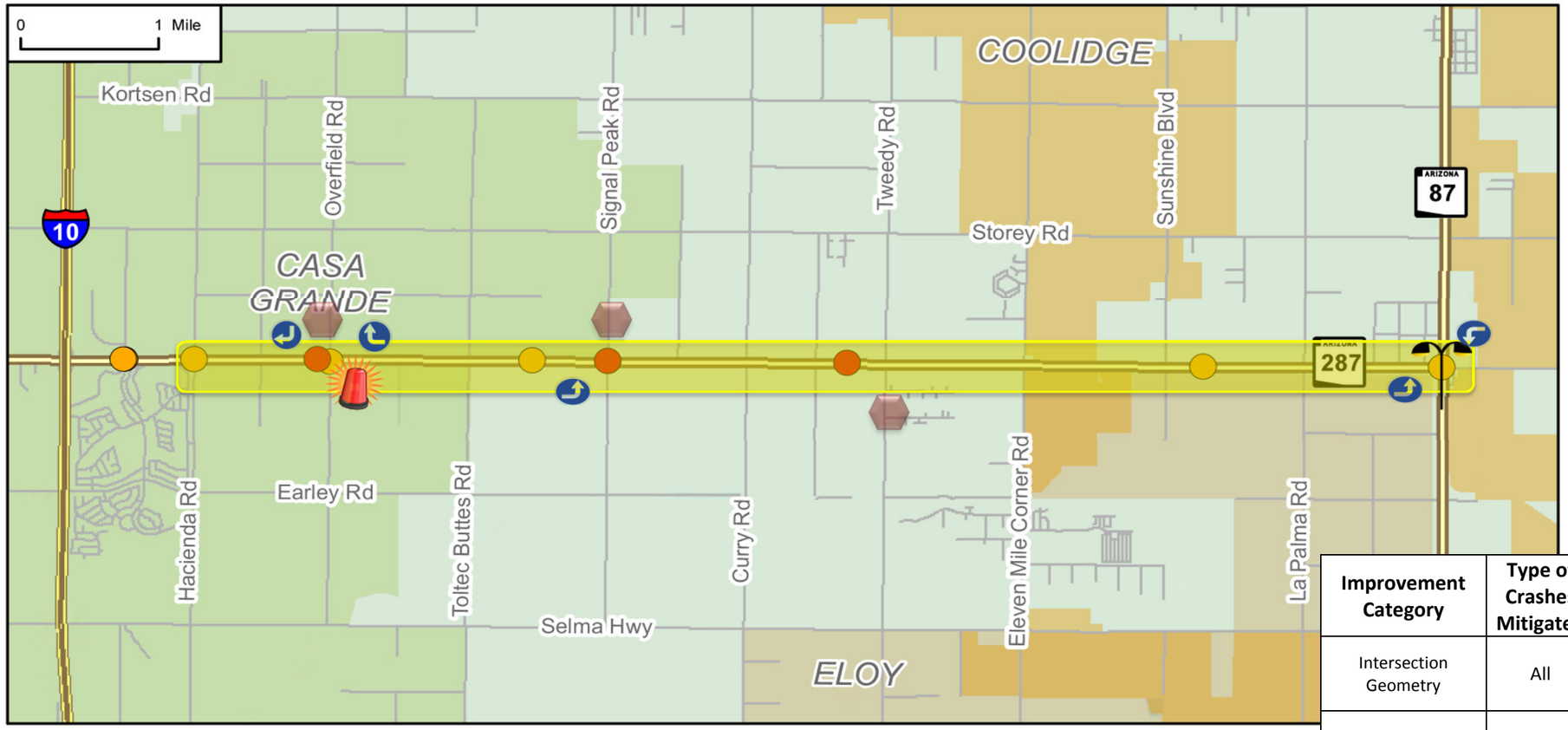
The estimated total project cost is $1,939,151 providing a **benefit/cost ratio of 14.7**. The state match (ADOT) is estimated at $88,296.

Corridor 5 - SR 287 Rural		*See Map on Report Page 29 for Locations of Individual Projects*		
Project Number	Component Project	No. of Locations	Cost per Location	Total Cost by Project Type
5A	LT Lane Major Road 4-Leg Approach	3	$249,035	$747,104
5B	RT Lane Major Road Approach	2	$249,035	$498,070
5C	Transverse Rumble Strips at Stop Controlled Intersections	3	$9,961	$29,884
5D	Wider Markings & Centerline & Edgeline Rumble Strips	1	$597,684	$597,684
5E	Illumination	1	$66,409	$66,409
			Total Project Cost	$1,939,151

Corridor 5 SR 287 Rural HSIP Project Cost Estimate Worksheet

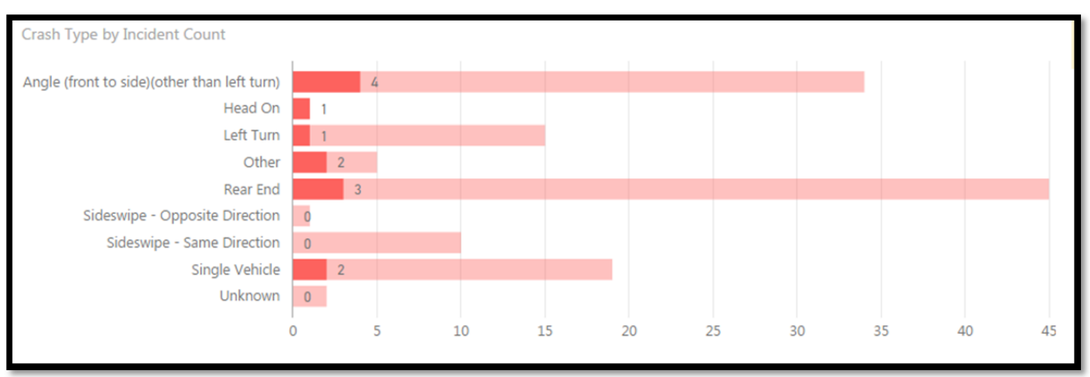
Agency:	SCMPO	Name of Project:	5. SR 287 RURAL		Project is on a Federal or State Roadway			
HSIP Project Cost Estimate Worksheet								
Project Cost Estimate:	**Description:**	**Unit:**	**Quantity:**	**Unit Cost:**	**HSIP:** 94.30%	**State Match:** 5.70%	**Other Amt:** 0.00%	**TOTAL COST**
Planning or Study:			0	$ -	$ -	$ -	$ -	$ -
Preliminary Engineering:	Design		1	$ 186,880	$ 176,228	$ 10,652	$ -	$ 186,880
Non-Infrastructure (NI) Elements:	Environmental		1	$ 56,064	$ 52,868	$ 3,196	$ -	$ 56,064
ADOT Admin Costs:			1	$ 45,000	$ 136,735	$ 8,265	$ -	$ 145,000
Sub-Total					**$ 365,832**	**$ 22,113**	**$ -**	**$ 387,944**
ADOT ICAP:			**8.36%**		$ 30,583	$ 1,849		$ 32,432
Design Sub-Total					**$ 396,416**	**$ 23,961**		**$ 420,376**
Construction: CM #264	Provide a left-turn lane on one major-road approach (4-leg)	1 Approach	3	$ 150,000	$ 424,350	$ 25,650	$ -	$ 450,000
Construction: CM #287	Provide a right-turn lane on one major-road approach	1 Approach	2	$ 150,000	$ 282,900	$ 17,100	$ -	$ 300,000
Construction: CM #2709	Install transverse rumble strips on stop controlled approaches in rural areas	Each	3	$ 6,000	$ 16,974	$ 1,026	$ -	$ 18,000
Construction: CM #4790	Install wider markings and both edgeline and centerline rumble strips with resurfacing (markings & rumble strips only)	Mile	9	$ 40,000	$ 360,000	*No match required	$ -	$ 360,000
Construction: CM #581	Illumination	Mile	0.2	$ 200,000	$ 37,720	$ 2,280	$ -	$ 40,000
Sub-Total					$ 1,121,944	$ 46,056	$ -	$ 1,168,000
Sales Tax:	N/A		**0.00%**		$ -	$ -	$ -	$ -
Sub-Total					**$ 1,121,944**	**$ 46,056**	**$ -**	**$ 1,168,000**
Construction Admin :			**14.00%**		$ 154,199	$ 9,321	$ -	$ 163,520
Contingencies :			**5.00%**		$ 55,071	$ 3,329	$ -	$ 58,400
Post Design			**1.00%**		$ 11,014	$ 666	$ -	$ 11,680
Post Sub-Total					**$ 220,285**	**$ 13,315**	**$ -**	**$ 233,600**
Construction Sub-Total					**$ 1,342,229**	**$ 59,371**	**$ -**	**$ 1,401,600**
ADOT ICAP:			**8.36%**		$ 112,210	$ 4,963		$ 117,174
Construction Sub-Total					**$ 1,454,439**	**$ 64,335**		**$ 1,518,774**
TOTAL REQUEST					**$ 1,850,855**	**$ 88,296**	**$ -**	**$ 1,939,151**

Crash Mitigation Measures Map & Legend for Corridor 5 SR 287 Rural



Improvement Category	Type of Crashes Mitigated	Improvement	Location Symbol
Intersection Geometry	All	Provide a left-turn lane on one major-road approach	
Roadway	All	Install transverse rumble strips on stop controlled approaches in rural areas	
Highway Lighting	All	Illumination	
Delineation	All	Install wider markings and both edge line and centerline rumble strips with resurfacing (markings and rumble strips only)	
Intersection Geometry	All	Provide a right-turn lane on one major-road approach	
		Existing Flasher on Overfield Rd leg	
		Location of Fatal Crash	
		Location of Incapacitating Injury Crash	

Level 4 &5 Crashes for Corridor 5 by Type



Corridor 5 SR 287 Rural Benefit Cost Summary

HSIP Benefit Cost Summary Report

Agency:	SCMPO	Title of Project:	5. SR 287 RURAL

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CMF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	**0.60**	**68%**	0.41	$5,800,000	$2,366,400
Incapacitating Injury	**2.00**	**68%**	1.36	$400,000	$544,000
				Total Annual Benefits	$2,910,400

Costs

Total Project Cost	**$ 1,939,151**
Project Life (years)	**20**
Interest Rate (%)	8%
Capital Recovery Factor	0.1019
Annual Construction Cost	$197,507
Annual Maintenance Cost	$100.00
Total Annual Costs	$197,607

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
$2,910,400	$197,607	**14.7**

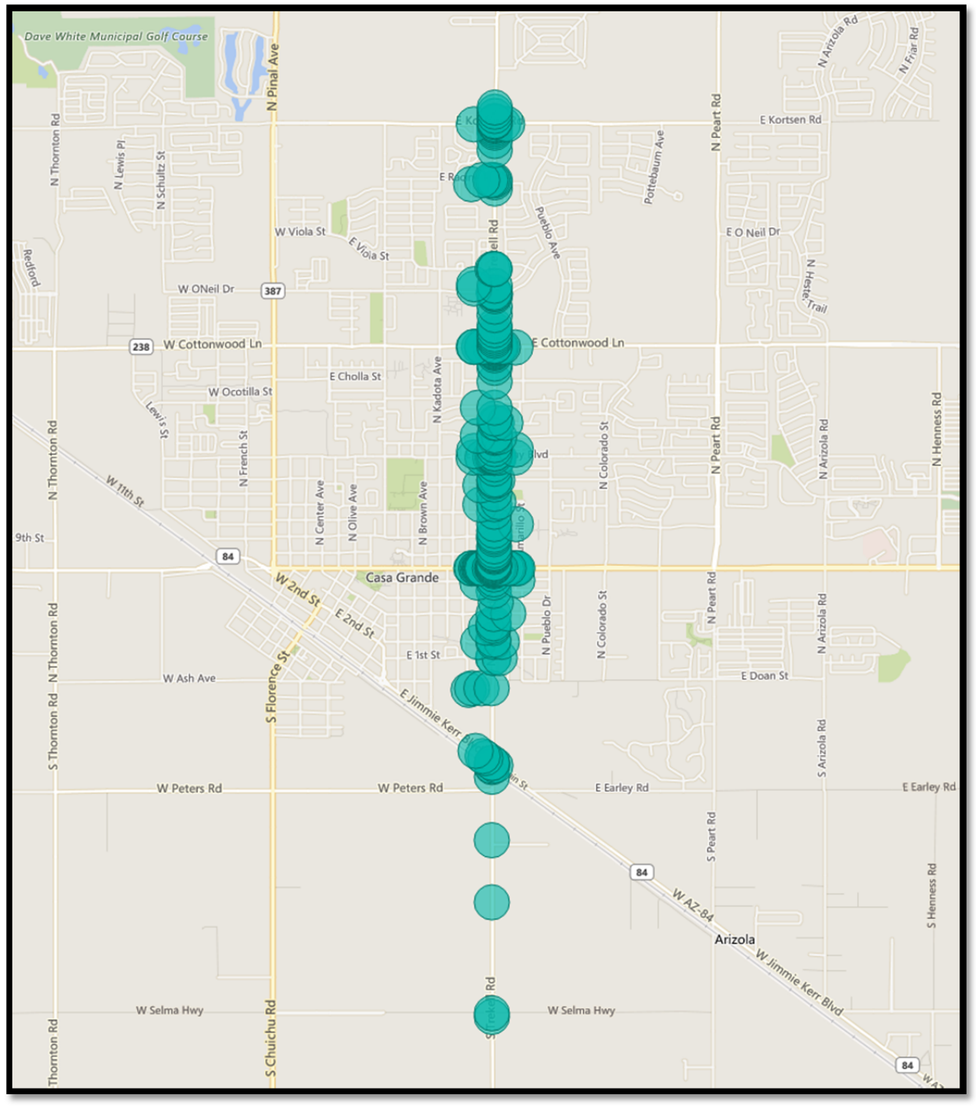
***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 17 - 19 preferred.**

6. TREKELL RD

Corridor 6 – consists of the following roadway segment:

1. Trekell Road; Selma Hwy to Kortsen Rd

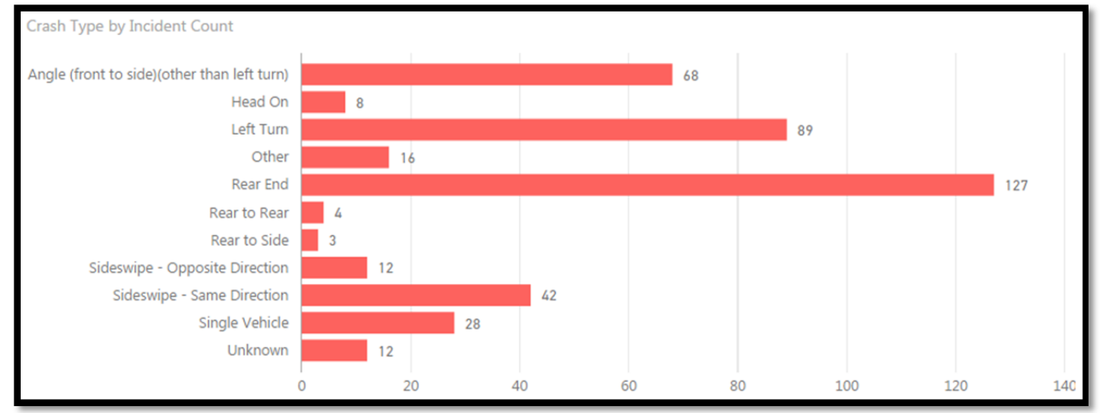
Corridor 6 Trekell Rd Map – Dots represent all crashes in the corridor



Corridor 6 Trekell Rd Crash Summary

No.	HSIP Project Corridor	Total Crashes	4 – Serious Injury Crashes	5 – Fatal Crashes
6.	Trekell Rd	409	9	2

Total Crashes (409) for Corridor 6 by Type



No.	HSIP Project Corridor	Most Common		2nd Most		3rd Most	
6.	Trekell Rd	Rear End	31%	Left Turn	22%	Angle	17%

Corridor 6 Trekell Rd Characteristics

- North of Selma Rd, the Trekell Rd Corridor is in the City of Casa Grande; the southern portion is in Pinal County
- Trekell Rd from Selma Hwy north to Jimmie Kerr Blvd is a two lane roadway with graded shoulders
- North of Jimmie Kerr Blvd, Trekell Rd has a narrow paved shoulder on the west side and a graded shoulder on the east side
- The roadway widens to 5 lanes with curb and gutter north of Doan Street; then narrows to 4 lanes (2 lanes in each direction) with curb and gutter approaching 2nd street
- Approaching and to the north of Florence Blvd, Trekell Rd is a 5 lane urban section with signals at major intersections
- There is a high visibility school crosswalk north of 10th St
- The Trekell Rd intersection at Cottonwood Ln has raised medians on the north, east, and west legs

Corridor 6, Trekell Rd, Project Justification

The corridor safety improvement project was identified through network screening of all crashes over the last ten years (2005 – 2014) and refined by reviewing fatal and serious injury crashes over the last five years (2011 – 2015).

The proposed road safety improvement project is on Trekell Road, from Selma Highway to Kortsen Road, in Casa Grande. The proposed road safety improvement project will reduce the number of vehicle conflict points, improve visibility, decrease lane departures, provide visual and tactile driver warning, and consists of the following:

- Providing a raised median for ¼ mile
- Change left turn phase from permissive to protected/permissive for 1 intersection
- Install edge line rumble strip with shoulder widening for 1 mile

The construction of all improvements will be performed by a licensed Contractor. There will be ground disturbing activities associated with this project. No new right of way or utility relocations are anticipated to be needed for this project.

The corridor experienced 2 fatal, 9 serious injury, and 409 total crashes over the referenced five year period.

A combined crash reduction factor (CCRF) of 49% was established using the highest and/or most appropriate CRFs associated with the safety countermeasures above, using the following methodology:

CCRF = 1-(1-CRF1)X(1-CRF2)

Countermeasures and their CRFs that were used:

#21, Install raised median: CRF= 39%

#4578, Change left turn phase from permissive to protected/permissive: CRF= 16%

CCRF = 1-(1-.39)X(1-.16) **CCRF = .49**

Based on this CCRF, the expected five year reduction in fatal crashes would be 1.00 and the reduction in serious injury crashes would be 4.40.

This corridor project supports these safety emphasis areas:

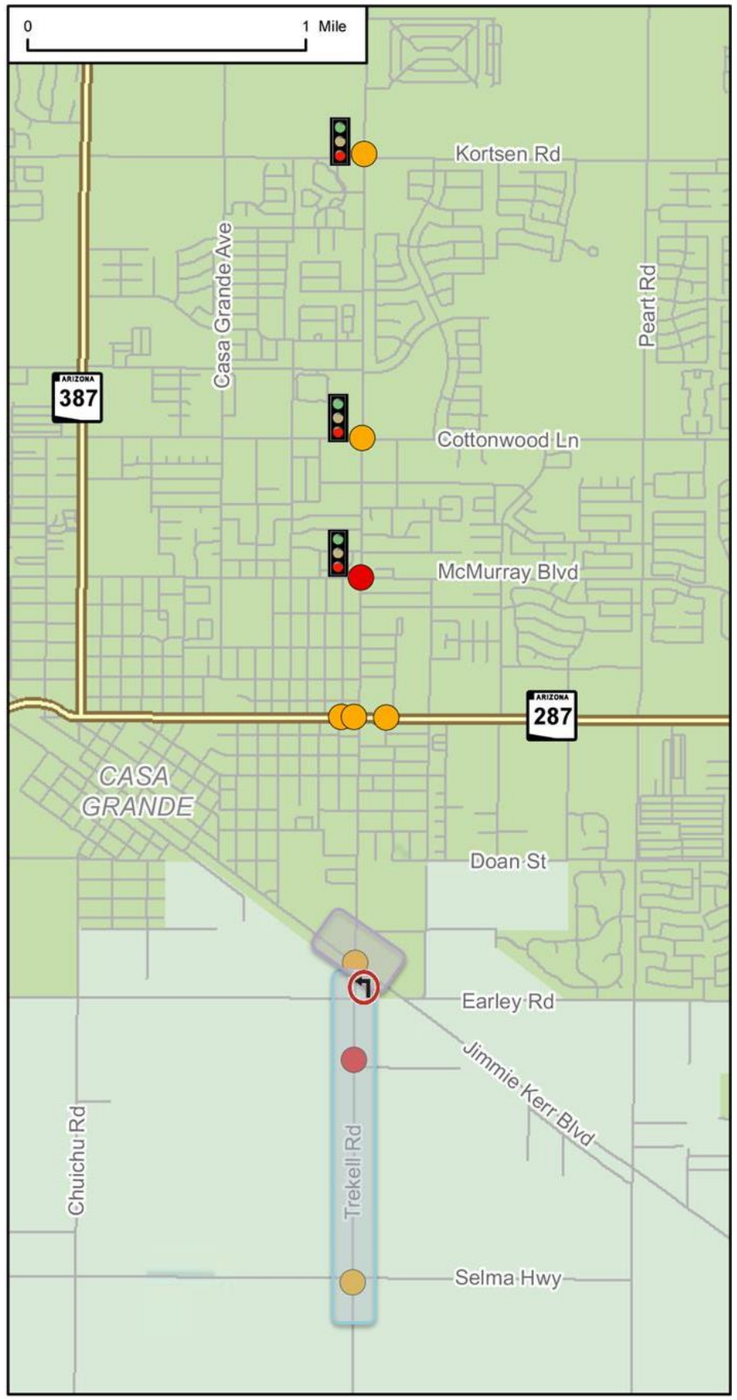
- Intersections
- Lane Departures

The estimated total project cost is $2,360,700 providing a **benefit/cost ratio of 6.1**. The local match is estimated at $133,192.

Corridor 6 - Trekell Road		*See Map on Report Page 34 for Locations of Individual Projects*		
Project Number	Component Project	No. of Locations	Cost per Location	Total Cost by Project Type
6A	Raised Median	1	$634,597	$634,597
6B	LT Phase Change - Perm/Protect or Protective/Permissive	1	$33,845	$33,845
6C	Edgeline Rumble Strips - Add Shoulder	1	$1,692,258	$1,692,258
			Total Project Cost	$2,360,700

Corridor 6 Trekell Rd HSIP Project Cost Estimate Worksheet

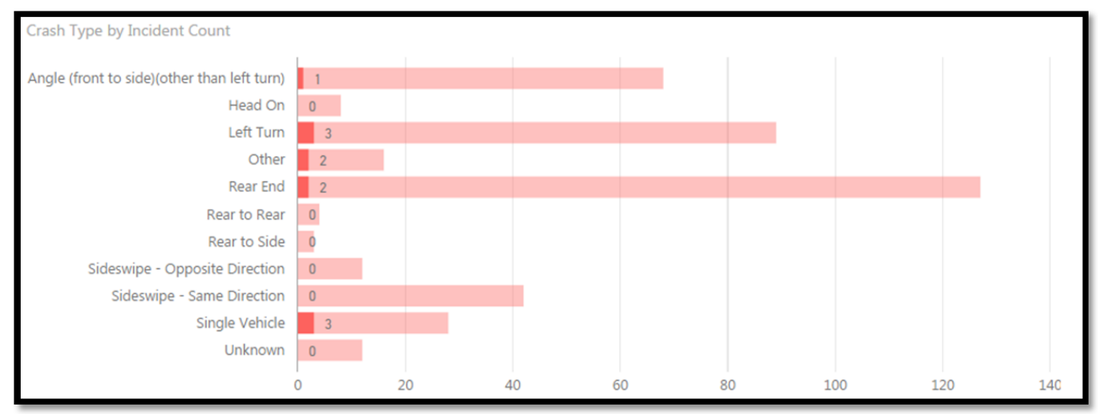
Agency:	SCMPO		Name of Project:	6. TREKELL RD	Corridor Improvement			
HSIP Project Cost Estimate Worksheet								
Project Cost Estimate:	Description:	Unit	Quantity:	Unit Cost:	HSIP:	Local Match:	Other Amt:	TOTAL COST
					94.30%	5.70%	0.00%	
Design:			1	$ 223,200	$ 210,478	$ 12,722	$ -	$ 223,200
Environmental Clearance			1	$ 66,960	$ 63,143	$ 3,817	$ -	$ 66,960
ADOT Admin Costs:			1	$ 45,000	$ 42,435	$ 2,565	$ -	$ 45,000
Design Sub-Total					**$ 316,056**	**$ 19,104**	**$ -**	**$ 335,160**
Construction: CM #21	Provide a raised median	1 Mile	0.25	$ 1,500,000	$ 353,625	$ 21,375	$ -	$ 375,000
Construction: CM #4578	Change left-turn phase from permissive to protected/permissive or permissive/protected phasing on one or more approaches	intersection	1	$ 20,000	$ 20,000	*No match required	$ -	$ 20,000
Construction: CM #3408	Install edgeline rumble strips on roadways with a shoulder width of 5 feet or greater (Add Shoulder)	mile	1	$ 1,000,000	$ 943,000	$ 57,000	$ -	$ 1,000,000
HSIP Eligible Sub-Total					$ 1,316,625	$ 78,375	$ -	$ 1,395,000
Construction:							$ -	$ -
Non-HSIP Eligible Sub-Total							$ -	$ -
Construction Sub-Total					$ 1,316,625	$ 78,375	$ -	$ 1,395,000
Traffic Control:			**10.00%**		$ 131,663	$ 7,838	$ -	$ 139,500
Mobilization:			**10.00%**		$ 131,663	$ 7,838	$ -	$ 139,500
Construction Sub-Total					$ 1,579,950	$ 94,050	$ -	$ 1,674,000
Construction Admin :			**14.00%**		$ 221,001	$ 13,359	$ -	$ 234,360
Contingencies :			**5.00%**		$ 78,929	$ 4,771	$ -	$ 83,700
Post Design:			**1.00%**		$ 15,786	$ 954	$ -	$ 16,740
Communications:			**1.00%**		$ 15,786	$ 954	$ -	$ 16,740
					$ -	$ -	$ -	$ -
Post Sub-Total					$ 331,502	$ 20,038	$ -	$ 351,540
Post Const Sub-Total					**$ 1,911,452**	**$ 114,088**	**$ -**	**$ 2,025,540**
TOTAL REQUEST					**$ 2,227,508**	**$ 133,192**	**$ -**	**$ 2,360,700**



Crash Mitigation Measures Map & Legend for Corridor 6 Trekell Rd

Improvement Category	Type of Crashes Mitigated	Improvement	Location Symbol
Access Management	All	Provide a raised median	
Intersection Traffic Control	All	Change left-turn phase from permissive to protected/permissive or permissive/protected phasing on one or more approaches	
Roadway	All	Install edge line rumble strips on roadways with a shoulder width of 5 feet or greater (add shoulder)	
		Location of Fatal Crash	
		Location of Incapacitating Injury Crash	

Level 4 &5 Crashes for Corridor 6 by Type



Corridor 6 Trekell Rd Benefit Cost Summary

HSIP Benefit Cost Summary Report					
Agency:	SCMPO		Title of Project:	6. TREKELL RD	
Benefit / Cost Ratio Tabulation					
Annual Benefit Tabulation					
Severity	Annual Average	Estimated CMF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.40	49%	0.20	$5,800,000	$1,136,800
Incapacitating Injury	1.80	49%	0.88	$400,000	$352,800
				Total Annual Benefits	$1,489,600
Costs					
Total Project Cost					$ 2,360,700
Project Life (years)					20
Interest Rate (%)					8%
Capital Recovery Factor					0.1019
Annual Construction Cost					$240,443
Annual Maintenance Cost					$100.00
				Total Annual Costs	$240,543
Benefit / Cost					
Annual Benefit	Annual cost	Benefit / Cost Ratio			
$1,489,600	$240,543	6.1			
*REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 17 - 19 preferred.					

7. MARICOPA-CASA GRANDE HIGHWAY

Corridor 7 – consists of the following roadway segment:

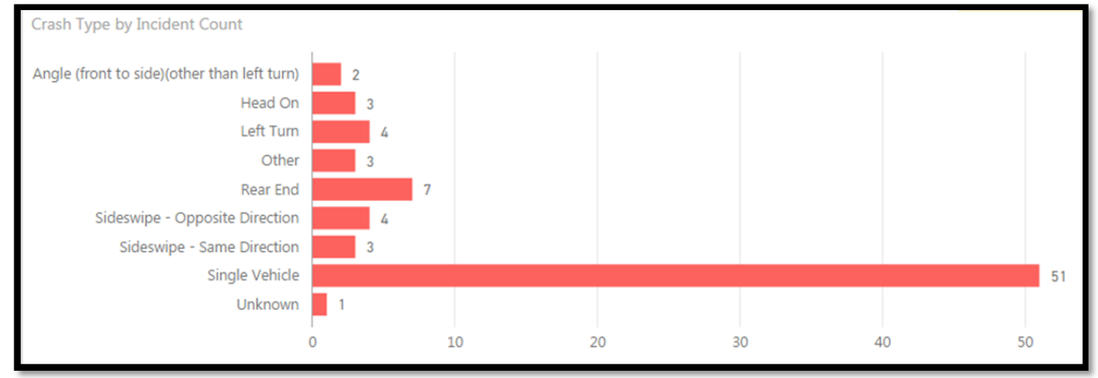
1. Maricopa Casa Grande Highway; Clayton Rd to Anderson Rd

Corridor 7 Maricopa-Casa Grande Highway Map – Dots represent all crashes in the corridor

Corridor 7 Maricopa-Casa Grande Highway Crash Summary

No.	HSIP Project Corridor	Total Crashes	4 – Serious Injury Crashes	5 – Fatal Crashes
7.	Maricopa-Casa Grande Hwy	78	7	3

Total Crashes (78) for Corridor 7 by Type



No.	HSIP Project Corridor	Most Common		2nd Most		3rd Most	
7.	Maricopa-Casa Grande Hwy	Single Vehicle	65%	Rear End	9%	Sideswipe & Left Turn	5%

Corridor 7 Characteristics

- Maricopa-Casa Grande Highway connects Casa Grande on the south to Maricopa on the north
- The roadway transitions from an urban route in Casa Grande to a rural roadway
- The southern urban portion is 5 lanes with curb and gutter and some sidewalk
- North of the Burris Road Intersection (after the Frito Lay plant), the roadway transitions to a two lane roadway with paved shoulders
- North of Corrales Road, the two lane roadway has graded shoulders
- There is a railroad running parallel to and southwest of the corridor

Corridor 7, Maricopa-Casa Grande Hwy, Project Justification

The corridor safety improvement project was identified through network screening of all crashes over the last ten years (2005 – 2014) and refined by reviewing fatal and serious injury crashes over the last five years (2011 – 2015).

The proposed road safety improvement project is on the Maricopa-Casa Grande Highway from Clayton Road to Anderson Road in the Casa Grande area. The proposed road safety improvement project will reduce the number of vehicle conflict points, improve visibility, decrease lane departures, provide visual and tactile driver warning, and consists of the following:

- Install illumination for one intersection
- Install edge line rumble strips with shoulder widening for 6 miles
- Install wider markings with edge line and center line rumble strip for 3 miles

The construction of all improvements will be performed by a licensed Contractor. There will be ground disturbing activities associated with this project. No new right of way or utility relocations are anticipated to be needed for this project.

The corridor experienced 3 fatal, 7 serious injury, and 78 total crashes over the referenced five year period.

A combined crash reduction factor (CCRF) of 73% was established using the highest and/or most appropriate CRFs associated with the safety countermeasures above, using the following methodology:

CCRF = 1-(1-CRF1)X(1-CRF2)

Countermeasures and their CRFs that were used:

#3408, Widen shoulder and install edgeline rumble strips: CRF= 57%

#4790, Install wider markings and edgeline and centerline rumble strips: CRF= 38%

CCRF = 1-(1-.57)X(1-.38) **CCRF = .73**

Based on this CCRF, the expected five year reduction in fatal crashes would be 2.20 and the reduction in serious injury crashes would be 5.10.

This corridor project supports these safety emphasis areas:

- Intersections
- Lane Departures

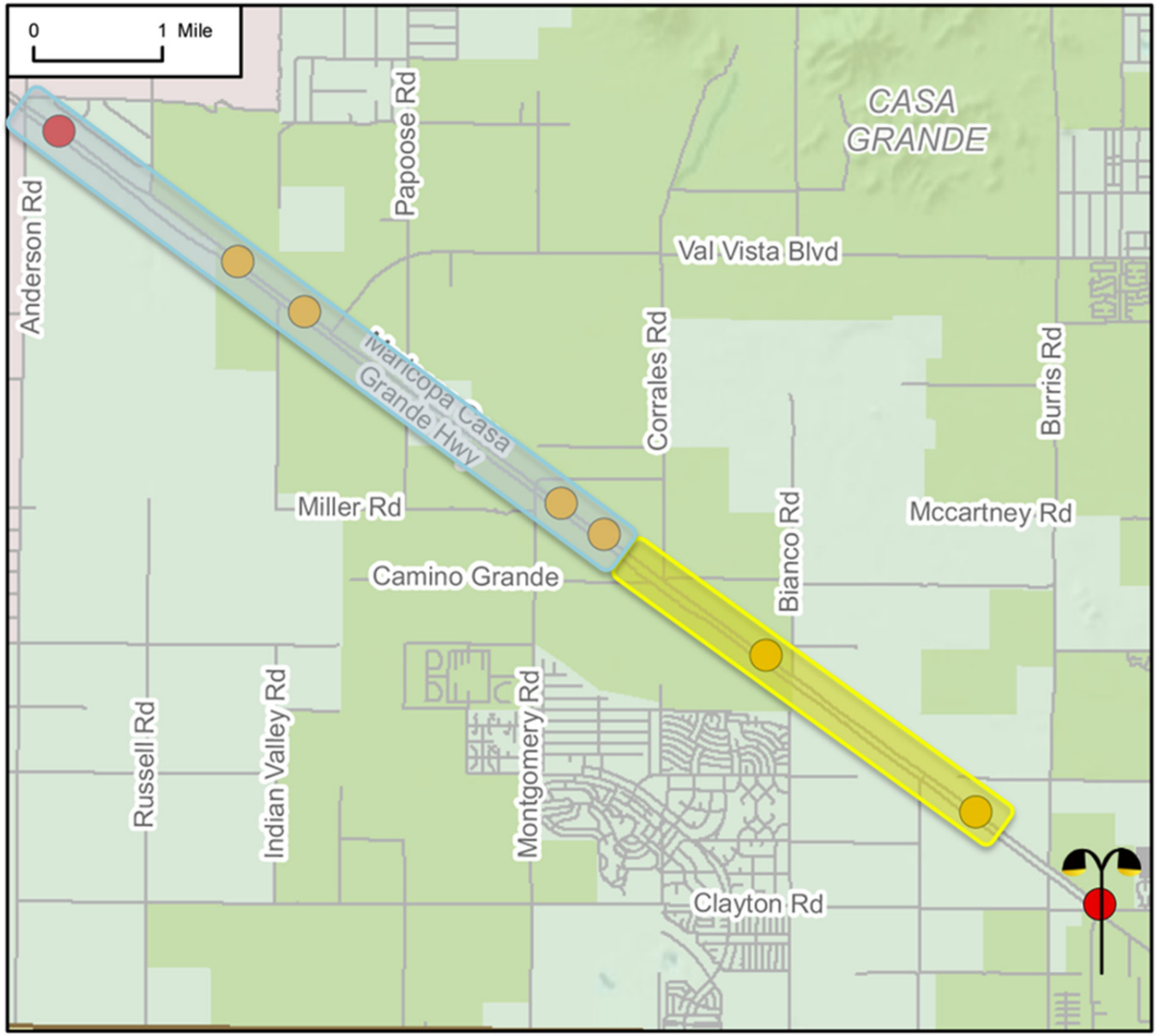
The estimated total project cost is $9,834,563 providing a **benefit/cost ratio of 2.9**. The local match is estimated at $552,362.

Corridor 7 - Maricopa-Casa Grande Highway		*See Map on Report Page 39 for Locations of Individual Projects*		
Project Number	Component Project	No. of Locations	Cost per Location	Total Cost by Project Type
7A	Illumination	1	$63,861	$63,861
7B	Edgeline Rumble Strips - Add Shoulder	1	$9,579,120	$9,579,120
7C	Wider Markings & Centerline & Edgeline Rumble Strips	1	$191,582	$191,582
			Total Project Cost	$9,834,563

Corridor 7 Maricopa-Casa Grande Highway HSIP Project Cost Estimate Worksheet

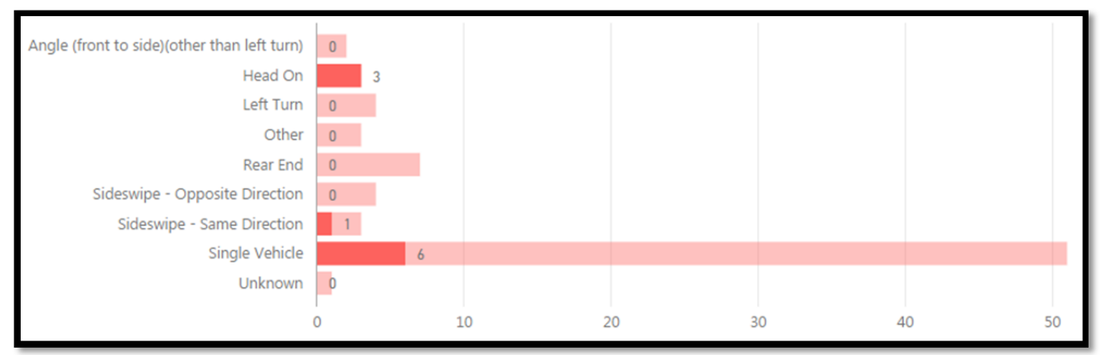
Agency:	SCMPO	Name of Project:	7. MARICOPA CASA GRANDE HWY		Corridor Improvement			
HSIP Project Cost Estimate Worksheet								
Project Cost Estimate:	**Description:**	**Unit**	**Quantity:**	**Unit Cost:**	**HSIP:**	**Local Match:**	**Other Amt:**	**TOTAL COST**
					94.30%	5.70%	0.00%	
Design:			1	$ 616,000	$ 580,888	$ 35,112	$ -	$ 616,000
Environmental Clearance			1	$ 184,800	$ 174,266	$ 10,534	$ -	$ 184,800
ADOT Admin Costs:			1	$ 89,443	$ 84,345	$ 5,098	$ -	$ 89,443
Design Sub-Total					**$ 839,499**	**$ 50,744**	**$ -**	**$ 890,243**
Construction: CM #581	Illumination	mile	0.2	$ 200,000	$ 37,720	$ 2,280	$ -	$ 40,000
Construction: CM #3408	Install edgeline rumble strips on roadways with a shoulder width of 5 feet or greater (add shoulder)	mile	6	$ 1,000,000	$ 5,658,000	$ 342,000	$ -	$ 6,000,000
Construction: CM #4790	Install wider markings and both edgeline and centerline rumble strips with resurfacing (markings & rumble strips only)	mile	3	$ 40,000	$ 120,000	*No match required	$ -	$ 120,000
HSIP Eligible Sub-Total					$ 5,815,720	$ 344,280	$ -	$ 6,160,000
Construction:							$ -	$ -
Non-HSIP Eligible Sub-Total							$ -	$ -
Construction Sub-Total					$ 5,815,720	$ 344,280	$ -	$ 6,160,000
Traffic Control:			**10.00%**		$ 581,572	$ 34,428	$ -	$ 616,000
Mobilization:			**10.00%**		$ 581,572	$ 34,428	$ -	$ 616,000
Construction Sub-Total					$ 6,978,864	$ 413,136	$ -	$ 7,392,000
Construction Admin :			**14.00%**		$ 975,892	$ 58,988	$ -	$ 1,034,880
Contingencies :			**5.00%**		$ 348,533	$ 21,067	$ -	$ 369,600
Post Design:			**1.00%**		$ 69,707	$ 4,213	$ -	$ 73,920
Communications:			**1.00%**		$ 69,707	$ 4,213	$ -	$ 73,920
Post Sub-Total					$ 1,463,838	$ 88,482	$ -	$ 1,552,320
Post Const Sub-Total					**$ 8,442,702**	**$ 501,618**	**$ -**	**$ 8,944,320**
TOTAL REQUEST					**$ 9,282,201**	**$ 552,362**	**$ -**	**$ 9,834,563**

Crash Mitigation Measures Map & Legend for Corridor 7 Maricopa-Casa Grande Highway



Improvement Category	Type of Crashes Mitigated	Improvement	Location Symbol
Highway Lighting	All	Illumination	
Roadway	All	Install edge line rumble strips on roadways with a shoulder width of 5 feet or greater (add shoulder)	
Delineation	All	Install wider markings and both edge line and centerline rumble strips with resurfacing (markings and rumble strips only)	
		Location of Fatal Crash	
		Location of Incapacitating Injury Crash	

Level 4 &5 Crashes for Corridor 7 by Type



Corridor 7 Maricopa-Casa Grande Highway Benefit Cost Summary

HSIP Benefit Cost Summary Report

Agency:	SCMPO	Title of Project:	7. MARICOPA CASA GRANDE HWY

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CMF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	**0.60**	**73%**	0.44	$5,800,000	$2,540,400
Incapacitating Injury	**1.40**	**73%**	1.02	$400,000	$408,800
				Total Annual Benefits	$2,949,200

Costs

Total Project Cost	**$ 9,834,563**
Project Life (years)	**20**
Interest Rate (%)	8%
Capital Recovery Factor	0.1019
Annual Construction Cost	$1,001,672
Annual Maintenance Cost	$100.00
Total Annual Costs	$1,001,772

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
$2,949,200	$1,001,772	**2.9**

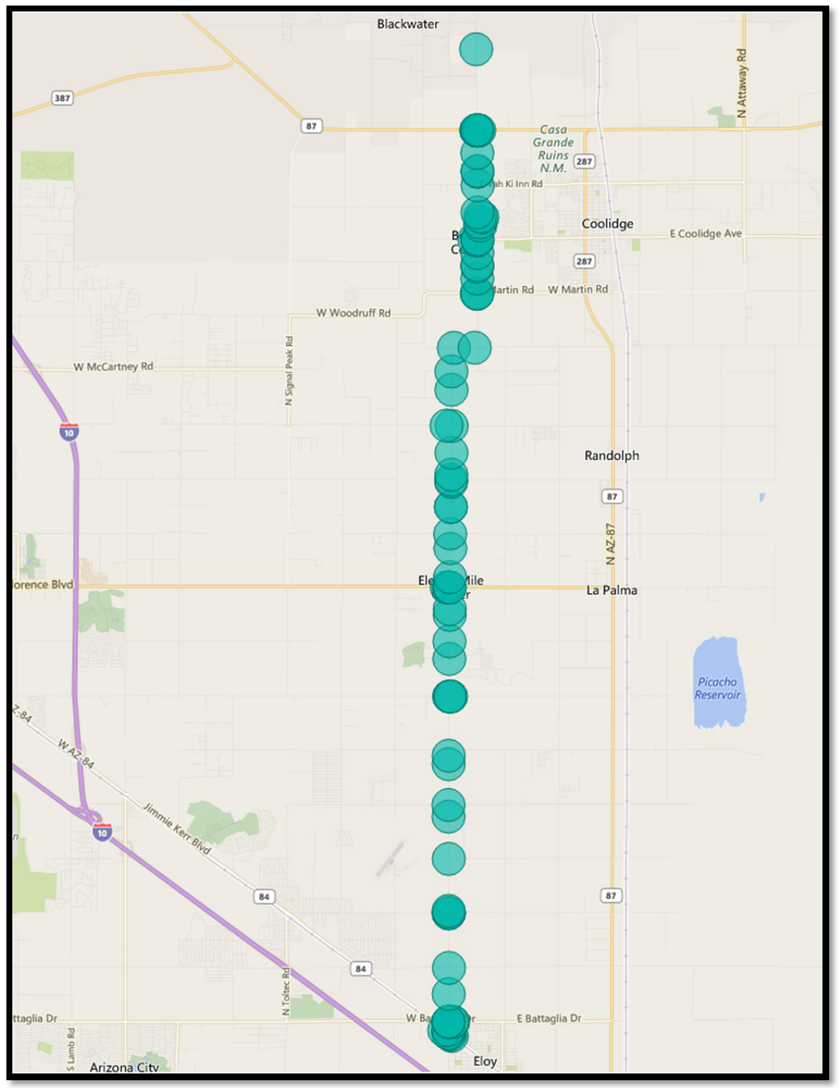
***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 17 - 19 preferred.**

8. SKOUSEN RD & ELEVEN MILE CORNER RD

Corridor 8 – consists of the following roadway segments:

1. Eleven Mile Corner Rd; Frontier St to Bartlett Rd
2. Bartlett Rd; Eleven Mile Corner Rd to Skousen Rd
3. Skousen Rd; Bartlett Rd to Dove Rd (1 mile north of SR 87)

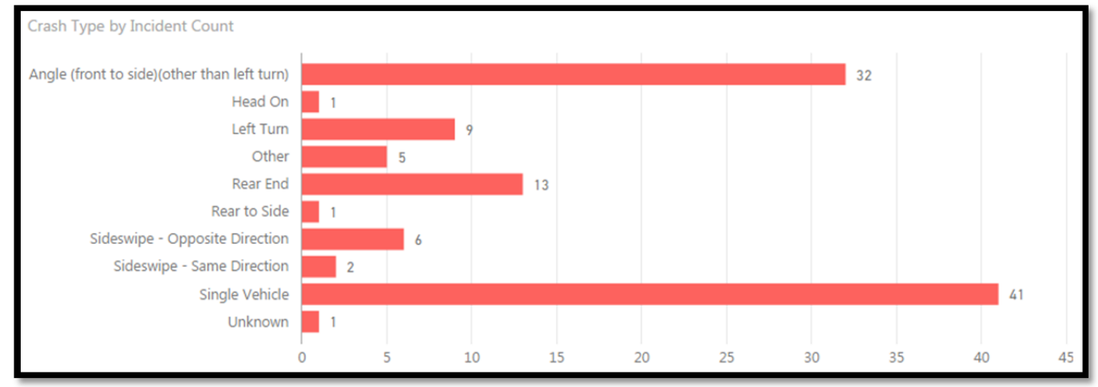
Corridor 8 Skousen Rd & Eleven Mile Corner Rd Map – Dots represent all crashes in the corridor



Corridor 8 Skousen Rd & Eleven Mile Corner Rd Crash Summary

No.	HSIP Project Corridor	Total Crashes	4 – Serious Injury Crashes	5 – Fatal Crashes
8.	Skousen Rd & Eleven Mile Corner Rd	132	10	3

Total Crashes (132) for Corridor 8 by Type



No.	HSIP Project Corridor	Most Common		2nd Most		3rd Most	
8.	Skousen Rd & Eleven Mile Corner Rd	Single Vehicle	37%	Angle	29%	Rear End	12%

Corridor 8 Skousen Rd & Eleven Mile Corner Rd Characteristics

- The route begins in Eloy, travels through Pinal County and ends in the City of Coolidge
- From the south, Eleven Mile Corner Rd is a two lane rural roadway with narrow paved shoulders and stop sign control intersections on the minor legs
- North of Selma Hwy the shoulders are graded
- The intersection with SR 287 is signalized
- North of SR 287, Eleven Mile Corner Road has areas of narrow paved shoulders and graded shoulders
- The roadway transitions at Barlett Rd to Skousen Rd via two 90 degree turns
- Skousen Road is under stop control at the SR 87 intersection

Corridor 8, Skousen Rd & Eleven Mile Corner Rd, Project Justification

The corridor safety improvement project was identified through network screening of all crashes over the last ten years (2005 – 2014) and refined by reviewing fatal and serious injury crashes over the last five years (2011 – 2015).

The proposed road safety improvement project is on Eleven Mile Corner Road from Frontier Street to Bartlett Road, on Bartlett Road from Eleven Mile Corner Road to Skousen Road, and on Skousen Road from Bartlett Road to Dove Road in the Coolidge and Eloy area. The proposed road safety improvement project will reduce the number of vehicle conflict points, improve visibility, decrease lane departures, provide visual and tactile driver warning, and consists of the following:

- Provide 3 left turn lanes
- Install transverse rumble strips on stop sign controlled intersections at 5 approaches
- Install edge line rumble strips with shoulder widening for 2 miles
- Install wider markings and edge line and center line rumble strips for 3 miles

The construction of all improvements will be performed by a licensed Contractor. There will be ground disturbing activities associated with this project. No new right of way or utility relocations are anticipated to be needed for this project.

The corridor experienced 3 fatal, 10 serious injury, and 132 total crashes over the referenced five year period.

A combined crash reduction factor (CCRF) of 49% was established using the highest and/or most appropriate CRFs associated with the safety countermeasures above, using the following methodology:

CCRF = 1-(1-CRF1)X(1-CRF2)

Countermeasures and their CRFs that were used:

#264, Install left-turn lane: CRF= 35%

#2709, Install transverse rumble strips at stop sign controlled intersections: CRF= 22%

CCRF = 1-(1-.35)X(1-.22) **CCRF = .49**

Based on this CCRF, the expected five year reduction in fatal crashes would be 1.45 and the reduction in serious injury crashes would be 4.90.

This corridor project supports these safety emphasis areas:

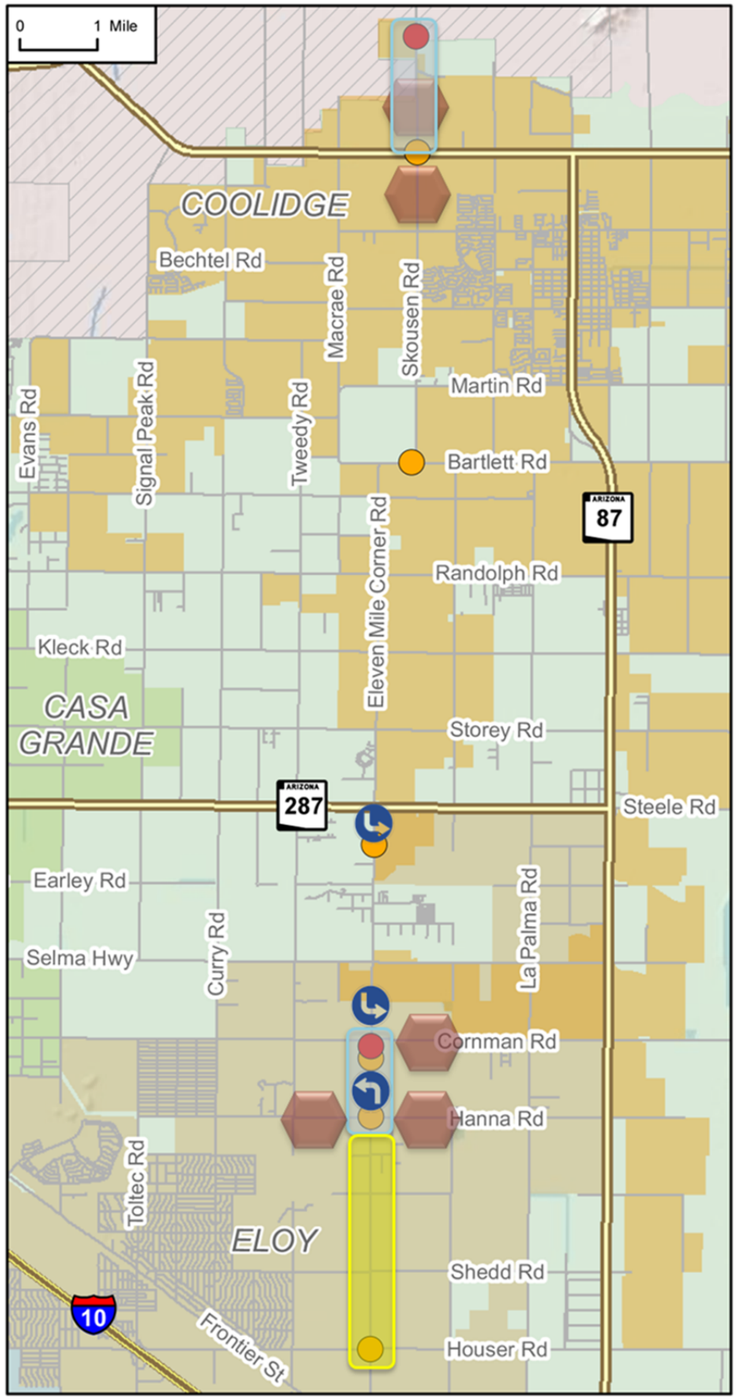
- Intersections
- Lane Departures

The estimated total project cost is $4,244,380 providing a **benefit/cost ratio of 4.8**. The local match is estimated at $235,773.

Corridor 8 - Skousen Rd & Eleven Mile Corner Rd		*See Map on Report Page 44 for Locations of Individual Projects*		
Project Number	Component Project	No. of Locations	Cost per Location	Total Cost by Project Type
8A	LT Lane Major Road 3-Leg Approach	1	$247,726	$247,726
8B	LT Lane Major Road 4-Leg Approach	2	$247,726	$495,453
8C	Transverse Rumble Strips at Stop Controlled Intersections	5	$9,909	$49,545
8D	Edgeline Rumble Strips - Add Shoulder	2	$1,651,510	$3,303,019
8E	Wider Markings & Centerline & Edgeline Rumble Strips	1	$148,636	$148,636
			Total Project Cost	$4,244,380

Corridor 8 Skousen Rd & Eleven Mile Corner Rd HSIP Project Cost Estimate Worksheet

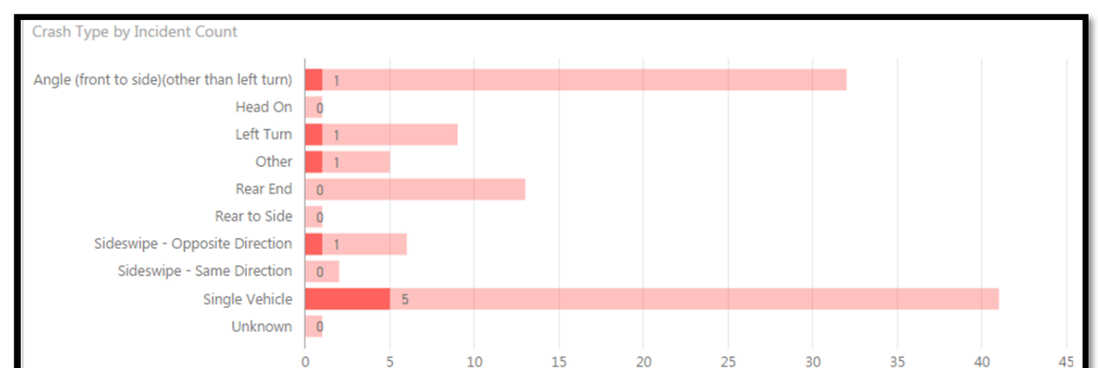
Agency:	SCMPO	Name of Project:	8. SKOUSEN RD & ELEVEN MILE CORNER	Corridor Improvement					
HSIP Project Cost Estimate Worksheet									
Project Cost Estimate:	**Description:**	**Unit:**	**Quantity:**	**Unit Cost:**	**HSIP:**	**Local Match:**	**Other Amt:**	**TOTAL COST**	
					94.30%	5.70%	0.00%		
Design:			1	$ 359,800	$ 339,291	$ 20,509	$ -	$ 359,800	
Environmental Clearance			1	$ 107,940	$ 101,787	$ 6,153	$ -	$ 107,940	
ADOT Admin Costs:			1	$ 45,000	$ 42,435	$ 2,565	$ -	$ 45,000	
Design Sub-Total					**$ 483,514**	**$ 29,226**	**$ -**	**$ 512,740**	
Construction: CM #255	Provide a left-turn lane on one major-road approach (3-leg)	1 Approach	1	$ 150,000	$ 141,450	$ 8,550	$ -	$ 150,000	
Construction: CM #264	Provide a left-turn lane on one major-road approach (4-leg)	1 Approach	2	$ 150,000	$ 282,900	$ 17,100	$ -	$ 300,000	
Construction: CM #2709	Install transverse rumble strips on stop controlled approaches in rural areas	each	5	$ 6,000	$ 28,290	$ 1,710	$ -	$ 30,000	
Construction: CM #3408	Install edgeline rumble strips on roadways with a shoulder width of 5 feet or greater (add shoulder)	mile	2	$ 1,000,000	$ 1,886,000	$ 114,000	$ -	$ 2,000,000	
Construction: CM #4790	Install wider markings and both edgeline and centerline rumble strips with resurfacing (markings & rumble strips only)	mile	3	$ 30,000	$ 90,000	*No match required	$ -	$ 90,000	
HSIP Eligible Sub-Total					$ 2,428,640	$ 141,360	$ -	$ 2,570,000	
Construction:							$ -	$ -	
Non-HSIP Eligible Sub-Total							$ -	$ -	
Construction Sub-Total					$ 2,428,640	$ 141,360	$ -	$ 2,570,000	
Traffic Control:			**10.00%**		$ 242,864	$ 14,136	$ -	$ 257,000	
Mobilization:			**10.00%**		$ 242,864	$ 14,136	$ -	$ 257,000	
Construction Sub-Total					$ 2,914,368	$ 169,632	$ -	$ 3,084,000	
Construction Admin :			**14.00%**		$ 407,150	$ 24,610	$ -	$ 431,760	
Contingencies :			**5.00%**		$ 145,411	$ 8,789	$ -	$ 154,200	
Post Design:			**1.00%**		$ 29,082	$ 1,758	$ -	$ 30,840	
Communications:			**1.00%**		$ 29,082	$ 1,758	$ -	$ 30,840	
Post Sub-Total					$ 610,725	$ 36,915	$ -	$ 647,640	
Post Const Sub-Total					**$ 3,525,093**	**$ 206,547**	**$ -**	**$ 3,731,640**	
TOTAL REQUEST					**$ 4,008,606**	**$ 235,773**	**$ -**	**$ 4,244,380**	



Crash Mitigation Measures Map & Legend for Corridor 8 Skousen Rd & Eleven Mile Corner Rd

Improvement Category	Type of Crashes Mitigated	Improvement	Location Symbol
Intersection Geometry	All	Provide a left-turn lane on one major-road approach	
Roadway	All	Install transverse rumble strips on stop controlled approaches in rural areas	
Roadway	All	Install edge line rumble strips on roadways with a shoulder width of 5 feet or greater (add shoulder)	
Delineation	All	Install wider markings and both edge line and centerline rumble strips with resurfacing (markings and rumble strips only)	
		Location of Fatal Crash	
		Location of Incapacitating Injury Crash	

Level 4 &5 Crashes for Corridor 8 by Type



Corridor 8 Skousen Rd & Eleven Mile Corner Rd Benefit Cost Summary

HSIP Benefit Cost Summary Report

Agency:	SCMPO	Title of Project:	8. SKOUSEN RD & ELEVEN MILE CORNER RD

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CMF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.60	49%	0.29	$5,800,000	$1,705,200
Incapacitating Injury	2.00	49%	0.98	$400,000	$392,000
				Total Annual Benefits	$2,097,200

Costs

Total Project Cost	$ 4,244,380
Project Life (years)	20
Interest Rate (%)	8%
Capital Recovery Factor	0.1019
Annual Construction Cost	$432,299
Annual Maintenance Cost	$100.00
Total Annual Costs	$432,399

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
$2,097,200	$432,399	**4.8**

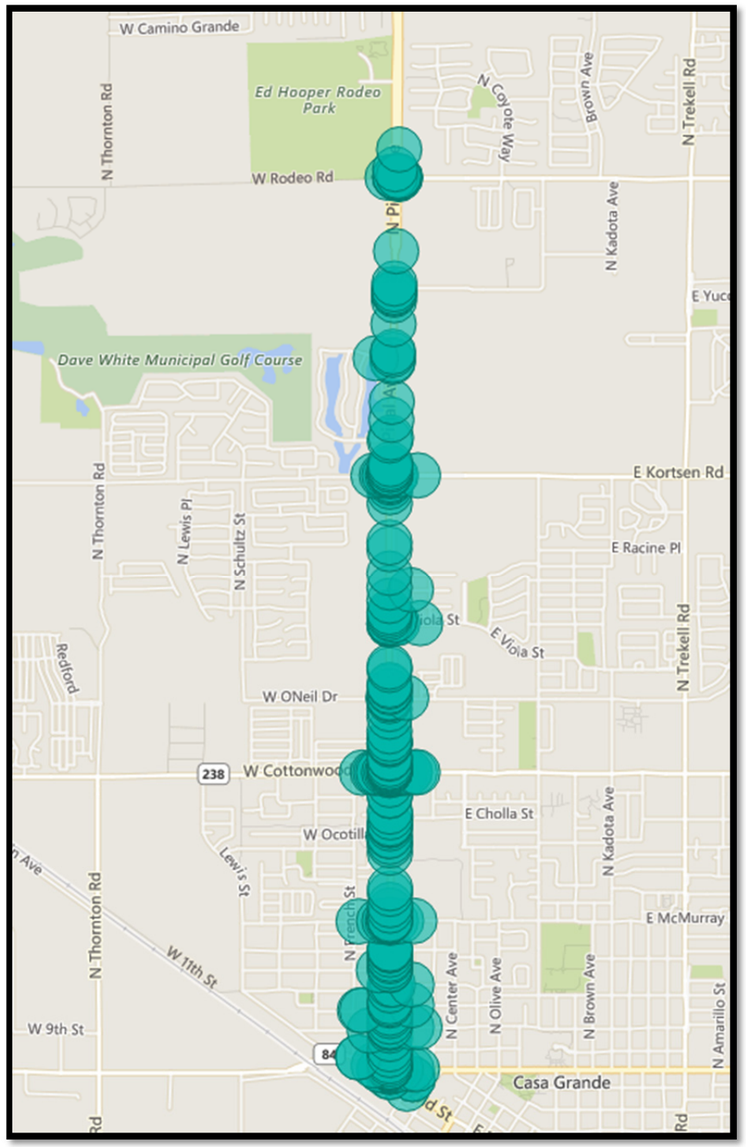
***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 17 - 19 preferred.**

9. PINAL AVE (SR 387)

Corridor 9 – consists of the following roadway segment:

1. Pinal Ave; Florence Blvd to Rodeo Rd

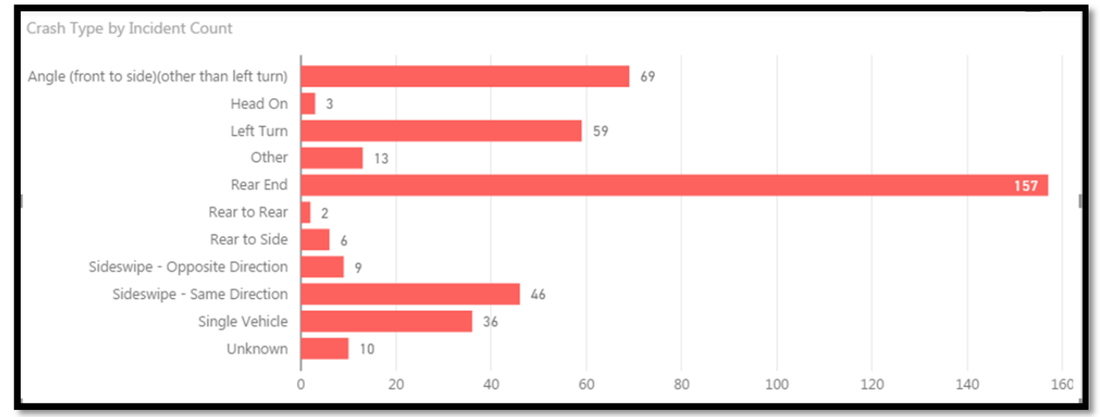
Corridor 9 Pinal Ave (SR 387) Map – Dots represent all crashes in the corridor



Corridor 9 Pinal Ave (SR 387) Crash Summary

No.	HSIP Project Corridor	Total Crashes	4 – Serious Injury Crashes	5 – Fatal Crashes
9.	Pinal Ave (SR 387)	410	7	1

Total Crashes (410) for Corridor 9 by Type



No.	HSIP Project Corridor	Most Common		2nd Most		3rd Most	
9.	Pinal Avenue	Rear End	38%	Angle	17%	Left Turn	14%

Corridor 9 Pinal Ave (SR 387) Characteristics

- Pinal Avenue is SR 387, an ADOT state highway
- Pinal Ave (SR 387) is a 5-lane urban section with curb, gutter and sidewalk and signals at major intersections
- There are permitted protected arrows at Cottonwood Lane, Kortsen Rd, and Rodeo Rd signals
- There is a wide median at Rodeo Road; the turn lanes do not have a positive offset, possibly making the sight distance for permitted left turns at the intersection limited

Corridor 9, Pinal Ave (SR 387), Project Justification

The corridor safety improvement project was identified through network screening of all crashes over the last ten years (2005 – 2014) and refined by reviewing fatal and serious injury crashes over the last five years (2011 – 2015).

The proposed road safety improvement project is on Pinal Avenue (SR 387) from Florence Boulevard to Rodeo Road, in the City of Casa Grande. The proposed road safety improvement project will reduce the number of vehicle conflict points, improve visibility, decrease lane departures, provide visual and tactile driver warning, and consists of the following:

- Improve signal visibility for five intersections
- Change left turn phase from permissive to protected/permissive at 1 intersection
- Install wider markings and edge line and center line rumble strips for 1 mile
- Install 3 right turn lanes

The construction of all improvements will be performed by a licensed Contractor. There will be ground disturbing activities associated with this project. No new right of way or utility relocations are anticipated to be needed for this project.

The corridor experienced 1 fatal, 7 serious injury, and 410 total crashes over the referenced five year period.

A combined crash reduction factor (CCRF) of 52% was established using the highest and/or most appropriate CRFs associated with the safety countermeasures above, using the following methodology:

CCRF = 1-(1-CRF1)X(1-CRF2)

Countermeasures and their CRFs that were used:

#4790, Install wider markings and edgeline and centerline rumble strips: CRF= 38%

#287, Install right turn lane: CRF= 23%

CCRF = 1-(1-.38)X(1-.23) **CCRF = .52**

Based on this CCRF, the expected five year reduction in fatal crashes would be 0.50 and the reduction in serious injury crashes would be 3.65.

This corridor project supports these safety emphasis areas:

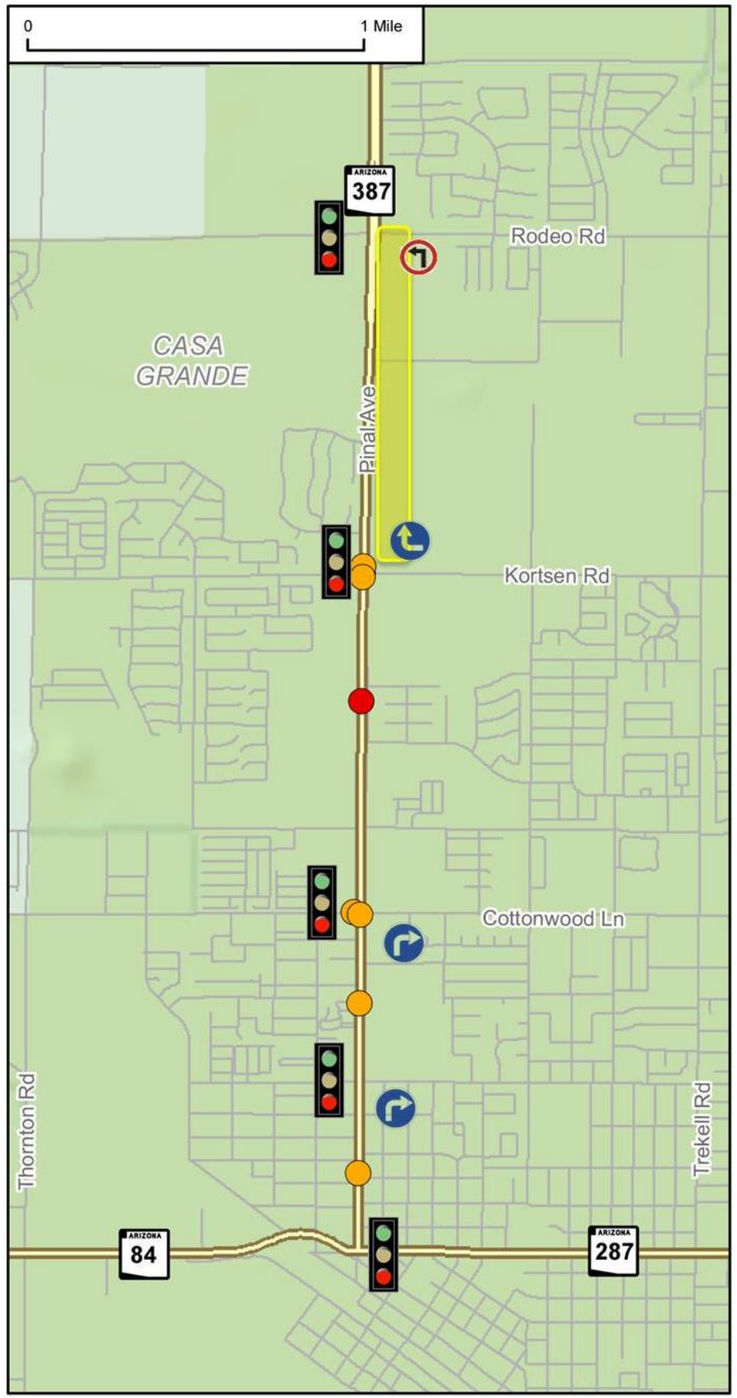
- Intersections
- Lane Departures

The estimated total project cost is $907,385 providing a **benefit/cost ratio of 9.6**. The state match (ADOT) is estimated at $44,310.

Corridor 9 - Pinal Avenue (SR 387)		*See Map on Report Page 49 for Locations of Individual Projects*		
Project Number	Component Project	No. of Locations	Cost per Location	Total Cost by Project Type
9A	Improve Signal Visibility	5	$19,103	$95,514
9B	LT Phase Change - Perm/Protect or Protective/Permissive	1	$31,838	$31,838
9C	Wider Markings & Centerline & Edgeline Rumble Strips	1	$63,676	$63,676
9D	RT Lane Major Road Approach	3	$238,786	$716,357
			Total Project Cost	$907,385

Corridor 9 Pinal Ave (SR 387) HSIP Project Cost Estimate Worksheet

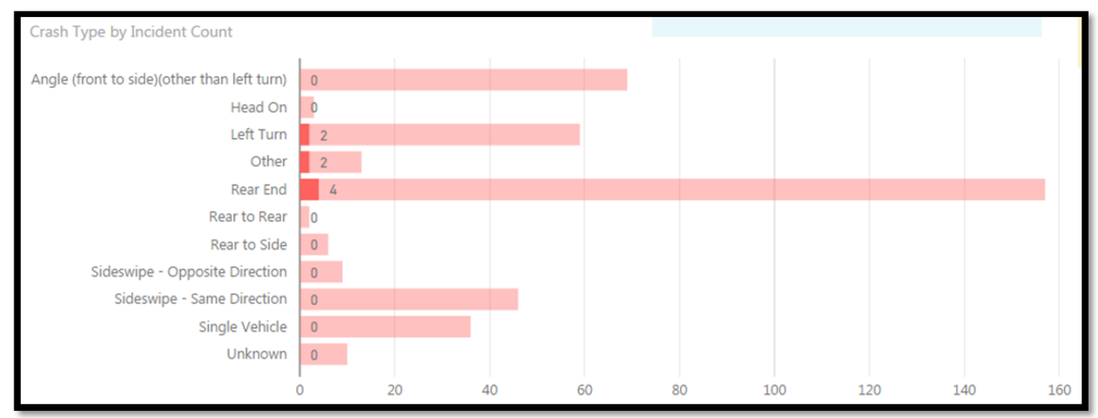
Agency:	SCMPO	Name of Project:	9. PINAL AVE (SR 387)		Project is on a Federal or State Roadway			
HSIP Project Cost Estimate Worksheet								
Project Cost Estimate:	**Description:**	**Unit:**	**Quantity:**	**Unit Cost:**	**HSIP:** 94.30%	**State Match:** 5.70%	**Other Amt:** 0.00%	**TOTAL COST**
Planning or Study:			0	$ -	$ -	$ -	$ -	$ -
Preliminary Engineering:	Design		1	$ 102,600	$ 96,752	$ 5,848	$ -	$ 102,600
Non-Infrastructure (NI) Elements:	Environmental		1	$ 30,780	$ 29,026	$ 1,754	$ -	$ 30,780
ADOT Admin Costs:			1	$ 45,000	$ 18,860	$ 1,140	$ -	$ 20,000
Sub-Total					**$ 144,637**	**$ 8,743**	**$ -**	**$ 153,380**
ADOT ICAP:			**8.36%**		$ 12,092	$ 731		$ 12,823
Design Sub-Total					**$ 156,729**	**$ 9,474**		**$ 166,203**
Construction: CM #4111	Improve signal visibility, including signal lens size upgrade, installation of new back-plates, addition of reflective tapes to existing back-plates, and installation of additional signal heads	Intersection	5	$ 12,000	$ 60,000	*No match required	$ -	$ 60,000
Construction: CM #4578	Change left-turn phase from permissive to protected/permissive or permissive/protected phasing on one or more approaches	intersection	1	$ 20,000	$ 20,000	*No match required	$ -	$ 20,000
Construction: CM #4790	Install wider markings and both edgeline and centerline rumble strips with resurfacing (markings and rumble strips only)	mile	1	$ 40,000	$ 40,000	*No match required	$ -	$ 40,000
Construction: CM #287	Provide a right-turn lane on one major-road approach	Intersection	3	$ 150,000	$ 424,350	$ 25,650	$ -	$ 450,000
Sub-Total			**0**		**$ 544,350**	**$ 25,650**	**$ -**	**$ 570,000**
Sales Tax:	N/A		**0.00%**		$ -	$ -	$ -	$ -
Sub-Total					**$ 544,350**	**$ 25,650**	**$ -**	**$ 570,000**
Construction Admin :			**14.00%**		$ 75,251	$ 4,549	$ -	$ 79,800
Contingencies :			**5.00%**		$ 26,876	$ 1,625	$ -	$ 28,500
Post Design			**1.00%**		$ 5,375	$ 325	$ -	$ 5,700
Post Sub-Total					**$ 107,502**	**$ 6,498**	**$ -**	**$ 114,000**
Construction Sub-Total					**$ 651,852**	**$ 32,148**	**$ -**	**$ 684,000**
ADOT ICAP:			**8.36%**		$ 54,495	$ 2,688		$ 57,183
Construction Sub-Total					**$ 706,347**	**$ 34,836**		**$ 741,183**
TOTAL REQUEST					**$ 863,076**	**$ 44,310**	**$ -**	**$ 907,385**



Crash Mitigation Measures Map & Legend for Corridor 9 Pinal Ave (SR 387)

Improvement Category	Type of Crashes Mitigated	Improvement	Location Symbol
Intersection Traffic Control	Nighttime	Improve signal visibility, including signal lens size upgrade, installation of new back-plates, addition of reflective tapes to existing back-plates, and installation of additional signal heads	
Intersection Traffic Control	All	Change left-turn phase from permissive to protected/permissive or permissive/protected phasing on one or more approaches	
Delineation	All	Install wider markings and both edge line and centerline rumble strips with resurfacing (markings and rumble strips only)	
Intersection Geometry	All	Provide a right-turn lane on one major-road approach	
		Location of Fatal Crash	
		Location of Incapacitating Injury Crash	

Level 4 &5 Crashes for Corridor 9 by Type



Corridor 9 Pinal Ave (SR 387) Benefit Cost Summary

HSIP Benefit Cost Summary Report

Agency:	SCMPO	Title of Project:	9. PINAL AVE (SR 387)

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CMF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.20	52%	0.10	$5,800,000	$603,200
Incapacitating Injury	1.40	52%	0.73	$400,000	$291,200
				Total Annual Benefits	$894,400

Costs

Total Project Cost	$ 907,385
Project Life (years)	20
Interest Rate (%)	8%
Capital Recovery Factor	0.1019
Annual Construction Cost	$92,419
Annual Maintenance Cost	$100.00
Total Annual Costs	$92,519

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
$894,400	$92,519	**9.6**

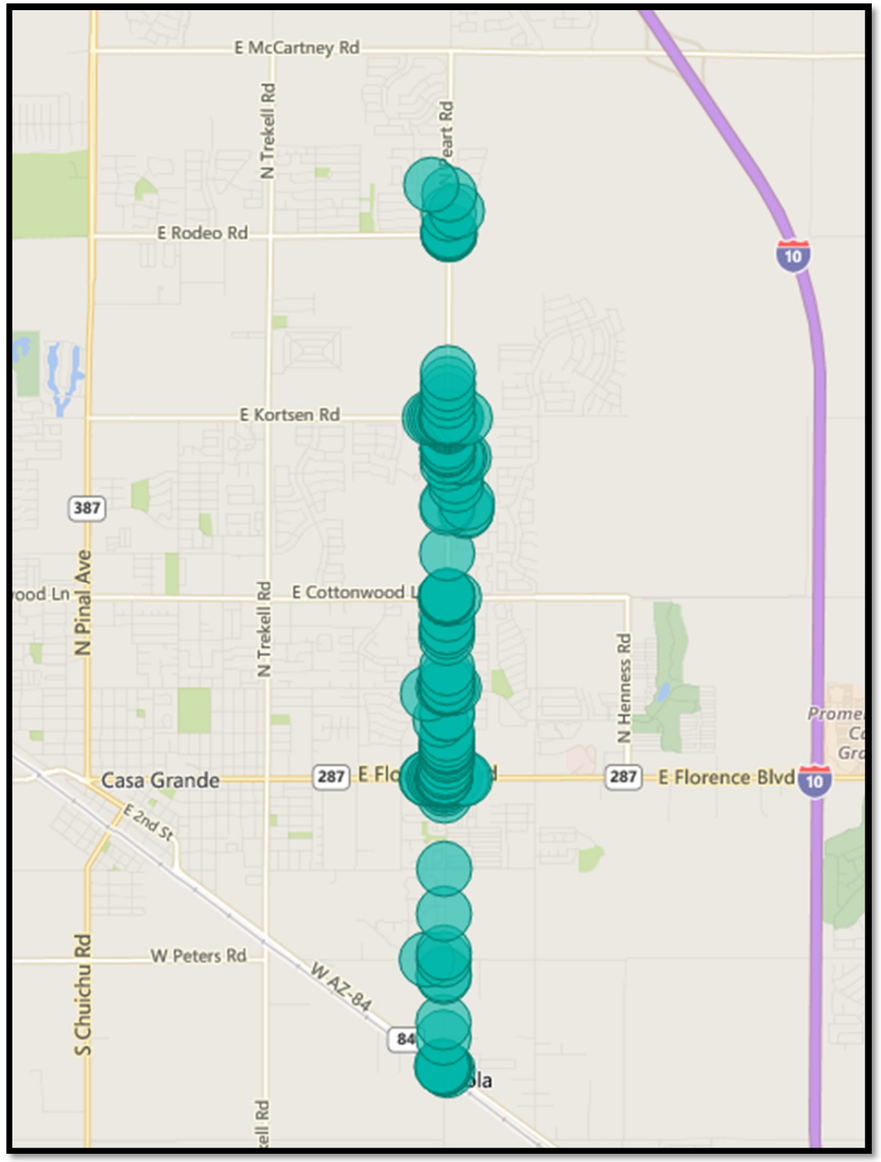
***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 17 - 19 preferred.**

10. PEART RD

Corridor 10– consists of the following roadway segment:

1. Peart Rd; Jimmy Kerr Blvd to Avenida Ellena (north of Rodeo Rd)

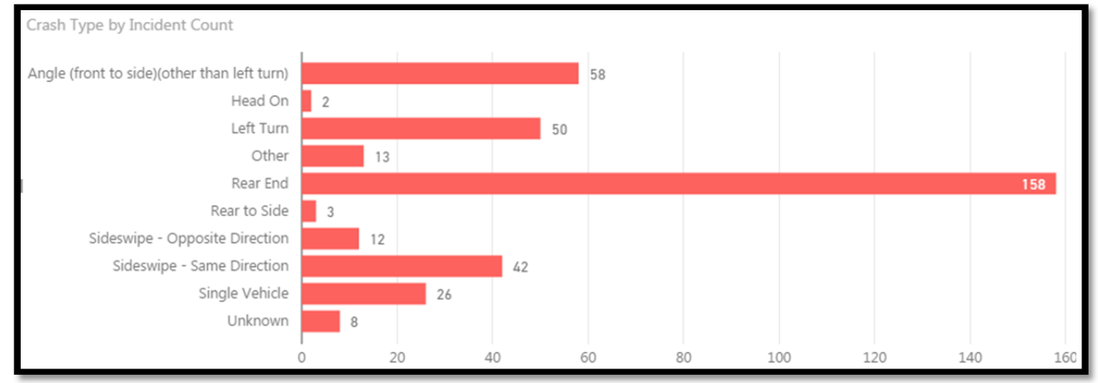
Corridor 10 Peart Rd Map – Dots represent all crashes in the corridor



Corridor 10 Peart Rd Crash Summary

No.	HSIP Project Corridor	Total Crashes	4 – Serious Injury Crashes	5 – Fatal Crashes
10.	Peart Rd	372	5	4

Total Crashes (372) for Corridor 10 by Type



No.	HSIP Project Corridor	Most Common		2nd Most		3rd Most	
10.	Peart Rd	Rear End	43%	Angle	16%	Left Turn	13%

Corridor 10 Peart Rd Characteristics

- The route is mostly in the City of Casa Grande; at the south end, a small portion lies within Pinal County
- Peart Road transitions from a rural 2-lane section with paved shoulders near the southern end to a 5-lane urban section with curb, gutter, and sidewalk north of Earley Road
- Earley Road and Doan Street are two way stopped controlled intersections with Peart Rd
- The urban section is signalized at major intersections except for Rodeo Rd
- Rodeo Rd is a 3 way stopped controlled intersection

Corridor 10, Peart Rd, Project Justification

The corridor safety improvement project was identified through network screening of all crashes over the last ten years (2005 – 2014) and refined by reviewing fatal and serious injury crashes over the last five years (2011 – 2015).

The proposed road safety improvement project is on Peart Road from Jimmie Kerr Road to Avenida Ellena in the City of Casa Grande. The proposed road safety improvement project will reduce the number of vehicle conflict points, improve visibility, provide visual and tactile driver warning, and consists of the following:

- Provide a total of 3 left turn lanes at intersections
- Install transverse rumble strips on 5 stop sign controlled intersection approaches
- Provide illumination at 1 intersection
- Change left turn phase from permissive to protected/permissive at one intersection
- Convert minor road stop sign control to all-way stop sign control for 1 intersection

The construction of all improvements will be performed by a licensed Contractor. There will be ground disturbing activities associated with this project. No new right of way or utility relocations are anticipated to be needed for this project.

The corridor experienced 4 fatal, 5 serious injury, and 372 total crashes over the referenced five year period.

A combined crash reduction factor (CCRF) of 49% was established using the highest and/or most appropriate CRFs associated with the safety countermeasures above, using the following methodology:

CCRF = 1-(1-CRF1)X(1-CRF2)

Countermeasures and their CRFs that were used:

#264, Install left-turn lane: CRF= 35%

#2709, Install transverse rumble strips at stop sign controlled intersections: CRF= 22%

CCRF = 1-(1-.35)X(1-.22) **CCRF = .49**

Based on this CCRF, the expected five year reduction in fatal crashes would be 1.95 and the reduction in serious injury crashes would be 2.45.

This corridor project supports these safety emphasis areas:

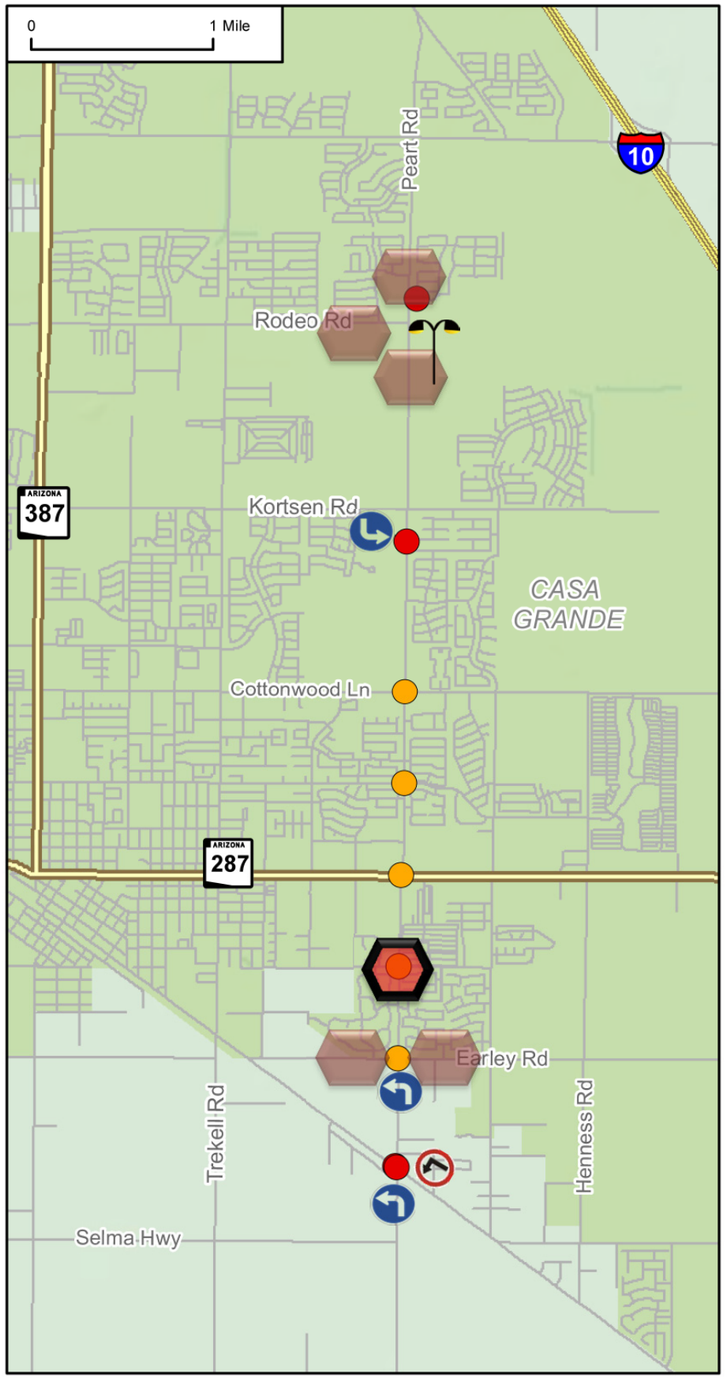
- Intersections

The estimated total project cost is $938,870 providing a **benefit/cost ratio of 25.7**. The local match is estimated at $51,806.

Corridor 10 - Peart Rd		*See Map on Report Page 54 for Locations of Individual Projects*		
Project Number	Component Project	No. of Locations	Cost per Location	Total Cost by Project Type
10A	LT Lane Major Road 4-Leg Approach	3	$258,405	$775,214
10B	Transverse Rumble Strips at Stop Controlled Intersections	5	$10,336	$51,681
10C	Illumination	1	$68,908	$68,908
10D	LT Phase Change - Perm/Protect or Protective/Permissive	1	$34,454	$34,454
10E	Convert Minor Road Stop to All-Way Stop Control	1	$8,613	$8,613
		Revised Total Project Cost		$938,870

Corridor 10 Peart Rd HSIP Project Cost Estimate Worksheet

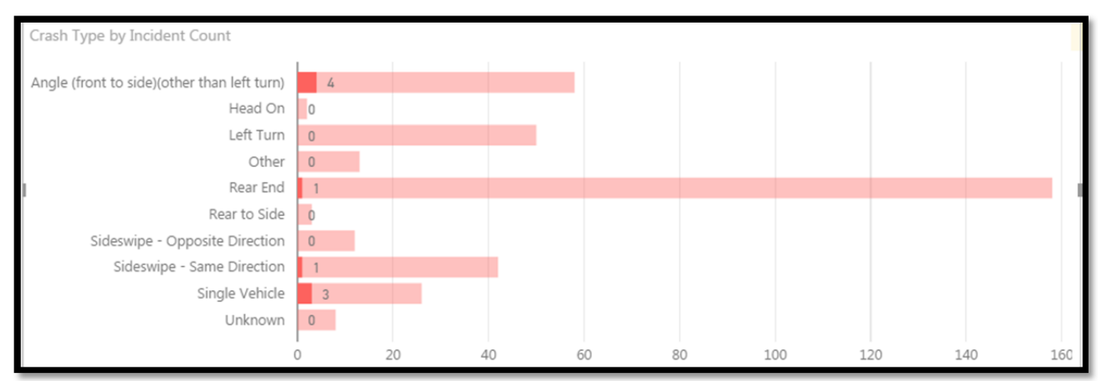
Agency:	SCMPO	Name of Project:	10. PEART RD		Corridor Improvement			
HSIP Project Cost Estimate Worksheet								
Project Cost Estimate:	Description:	Unit	Quantity:	Unit Cost:	HSIP:	Local Match:	Other Amt:	TOTAL COST
					94.30%	5.70%	0.00%	
Design:			1	$ 98,100	$ 92,508	$ 5,592	$ -	$ 98,100
Environmental Clearance			1	$ 29,430	$ 27,752	$ 1,678	$ -	$ 29,430
ADOT Admin Costs:			1	$ 45,000	$ 18,860	$ 1,140	$ -	$ 20,000
Design Sub-Total					**$ 139,121**	**$ 8,409**	**$ -**	**$ 147,530**
Construction: CM #264	Provide a left-turn lane on one major-road approach	1 Approach	3	$ 150,000	$ 424,350	$ 25,650	$ -	$ 450,000
Construction: CM #2709	Install transverse rumble strips on stop controlled approaches in rural areas	each	5	$ 6,000	$ 28,290	$ 1,710	$ -	$ 30,000
Construction: CM #581	Illumination	mile	0.2	$ 200,000	$ 37,720	$ 2,280	$ -	$ 40,000
Construction: CM #4578	Change left-turn phase from permissive to protected/permissive or permissive/protected phasing on one or more approaches	Intersection	1	$ 20,000	$ 20,000	*No match required	$ -	$ 20,000
Construction: CM #3128	Convert minor-road stop control to all-way stop control	Intersection	1	$ 5,000	$ 5,000	*No match required	$ -	$ 5,000
HSIP Eligible Sub-Total					**$ 515,360**	**$ 29,640**	**$ -**	**$ 545,000**
Construction:							$ -	$ -
Non-HSIP Eligible Sub-Total							$ -	$ -
Construction Sub-Total					**$ 515,360**	**$ 29,640**	**$ -**	**$ 545,000**
Traffic Control:			**10.00%**		$ 51,536	$ 2,964	$ -	$ 54,500
Mobilization:			**10.00%**		$ 51,536	$ 2,964	$ -	$ 54,500
Construction Sub-Total					**$ 618,432**	**$ 35,568**	**$ -**	**$ 654,000**
Construction Admin :			**14.00%**		$ 86,341	$ 5,219	$ -	$ 91,560
Contingencies :			**5.00%**		$ 30,836	$ 1,864	$ -	$ 32,700
Post Design:			**1.00%**		$ 6,167	$ 373	$ -	$ 6,540
Communications:			**1.00%**		$ 6,167	$ 373	$ -	$ 6,540
Post Sub-Total					$ 129,512	$ 7,828	$ -	$ 137,340
Post Const Sub-Total					**$ 747,944**	**$ 43,396**	**$ -**	**$ 791,340**
TOTAL REQUEST					**$ 887,064**	**$ 51,806**	**$ -**	**$ 938,870**



Crash Mitigation Measures Map & Legend for Corridor 10 Peart Rd

Improvement Category	Type of Crashes Mitigated	Improvement	Location Symbol
Intersection Geometry	All	Provide a left-turn lane on one major-road approach	
Roadway	All	Install transverse rumble strips on stop controlled approaches in rural areas	
Highway Lighting	All	Illumination	
Intersection Traffic Control	All	Change left-turn phase from permissive to protected/permissive or permissive/protected phasing on one or more approaches	
Intersection Traffic Control	All	Convert minor-road stop control to all-way stop control	
		Location of Fatal Crash	
		Location of Incapacitating Injury Crash	

Level 4 &5 Crashes for Corridor 10 by Type



Corridor 10 Peart Rd Benefit Cost Summary

HSIP Benefit Cost Summary Report					
Agency:	**SCMPO**		**Title of Project:**	**10. PEART RD**	
Benefit / Cost Ratio Tabulation					
Annual Benefit Tabulation					
Severity	Annual Average	Estimated CMF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	**0.80**	**49%**	0.39	$5,800,000	$2,273,600
Incapacitating Injury	**1.00**	**49%**	0.49	$400,000	$196,000
				Total Annual Benefits	$2,469,600
Costs					
Total Project Cost					**$ 938,870**
Project Life (years)					**20**
Interest Rate (%)					8%
Capital Recovery Factor					0.1019
Annual Construction Cost					$95,626
Annual Maintenance Cost					$100.00
				Total Annual Costs	$95,726
Benefit / Cost					
Annual Benefit	Annual cost		Benefit / Cost Ratio		
$2,469,600	$95,726		**25.7**		
***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 17 - 19 preferred.**					

11. OVERFIELD RD

Corridor 11 – consists of the following roadway segment:

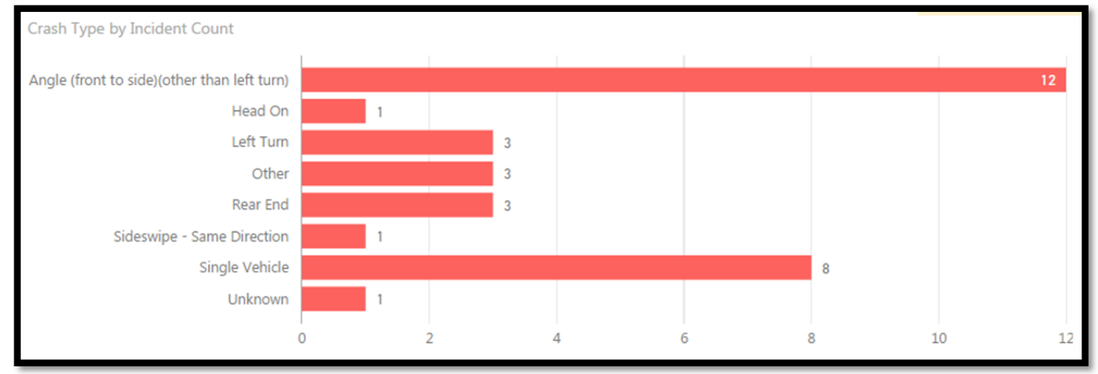
1. Overfield Rd; SR 287 to Kortsen Rd (Kleck Rd in Coolidge)

Corridor 11 Overfield Rd Map – Dots represent all crashes in the corridor

Corridor 11 Overfield Rd Crash Summary

No.	HSIP Project Corridor	Total Crashes	4 – Serious Injury Crashes	5 – Fatal Crashes
11.	Overfield Road	32	4	3

Total Crashes (32) for Corridor 11 by Type



No.	HSIP Project Corridor	Most Common		2nd Most		3rd Most	
11.	Overfield Rd	Angle	38%	Single Vehicle	25%	Left turn & Rear End	9%

Corridor 11 Overfield Rd Characteristics

- The route is within the city limits of Casa Grande
- Overfield Road is a paved two-lane rural roadway with narrow paved shoulders
- Overfield Rd at Cottonwood Lane and at Kortsen Rd (Kleck Rd in Coolidge) are two-way stop control intersections
- There are red flashers on the north leg of the SR 287 & Overfield Rd intersection

Corridor 11, Overfield Road, Project Justification

The corridor safety improvement project was identified through network screening of all crashes over the last ten years (2005 – 2014) and refined by reviewing fatal and serious injury crashes over the last five years (2011 – 2015).

The proposed road safety improvement project is on Overfield Road from SR 287 to Kortsen Road in the Casa Grande area. The proposed road safety improvement project will reduce the number of vehicle conflict points, improve visibility, decrease lane departures, provide visual and tactile driver warning, and consists of the following:

- Providing a total of 5 left turn lanes
- Install transverse rumble strips on five stop sign controlled intersection approaches
- Install wider markings and edge line and center line rumble strips for 2 miles
- Provide a total of 1 right turn lane

The construction of all improvements will be performed by a licensed Contractor. There will be ground disturbing activities associated with this project. No new right of way or utility relocations are anticipated to be needed for this project.

The corridor experienced 3 fatal, 4 serious injury, and 32 total crashes over the referenced five year period.

A combined crash reduction factor (CCRF) of 68% was established using the 3 highest and/or most appropriate CRFs associated with the safety countermeasures above, using the following methodology:

CCRF = 1-(1-CRF1)X(1-CRF2)X(1-CRF3)

Countermeasures and their CRFs that were used:

#264, Install left-turn lane: CRF= 35%

#4790, Install wider markings and edgeline and centerline rumble strips: CRF= 38%

#2709, Install transverse rumble strips at stop sign controlled intersections: CRF= 22%

CCRF = 1-(1-.35)X(1-.38)X(1-.22) **CCRF = .68**

Based on this CCRF, the expected five year reduction in fatal crashes would be 2.05 and the reduction in serious injury crashes would be 2.70.

This corridor project supports these safety emphasis areas:

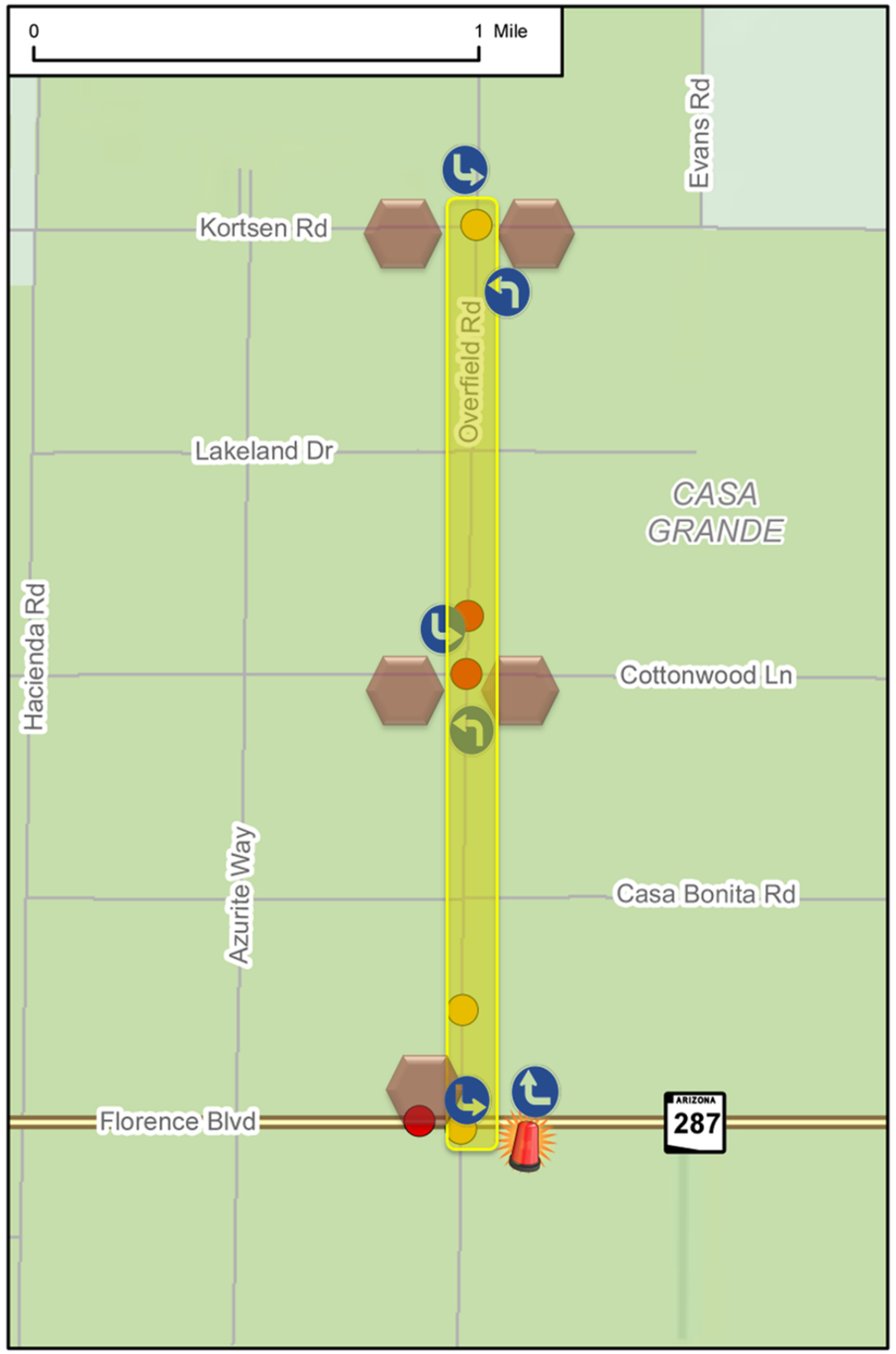
- Intersections
- Lane Departures

The estimated total project cost is $1,771,300 providing a **benefit/cost ratio of 14.3**. The local match is estimated at $95,492.

Corridor 11 - Overfield Road		*See Map on Report Page 59 for Locations of Individual Projects*		
Project Number	Component Project	No. of Locations	Cost per Location	Total Cost by Project Type
11A	LT Lane Major Road 4-Leg Approach	5	$251,844	$1,259,218
11B	Transverse Rumble Strips at Stop Controlled Intersections	5	$25,184	$125,922
11C	Wider Markings & Centerline & Edgeline Rumble Strips	1	$134,317	$134,317
11D	RT Lane Major Road Approach	1	$251,844	$251,844
			Total Project Cost	$1,771,300

Corridor 11 Overfield Rd HSIP Project Cost Estimate Worksheet

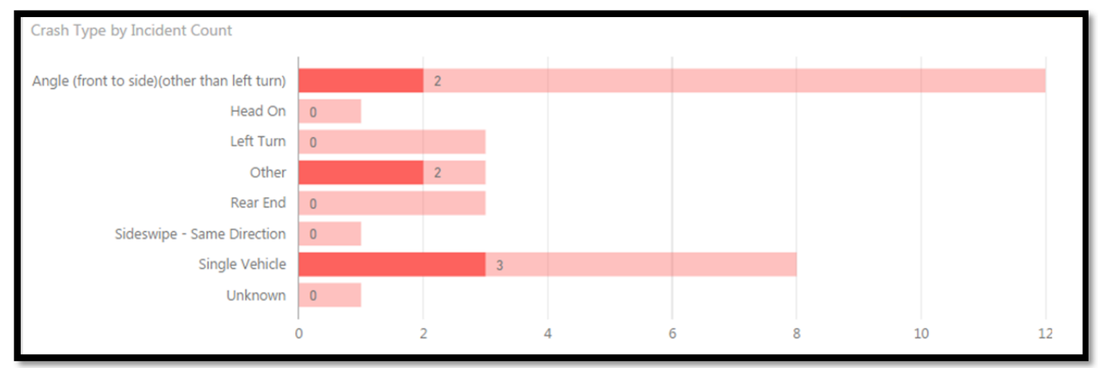
Agency:	SCMPO	Name of Project:	11. OVERFIELD RD		Corridor Improvement			
HSIP Project Cost Estimate Worksheet								
Project Cost Estimate:	**Description:**	**Unit:**	**Quantity:**	**Unit Cost:**	**HSIP:** 94.30%	**Local Match:** 5.70%	**Other Amt:** 0.00%	**TOTAL COST**
Design:			1	$ 168,800	$ 159,178	$ 9,622	$ -	$ 168,800
Environmental Clearance			1	$ 50,640	$ 47,754	$ 2,886	$ -	$ 50,640
ADOT Admin Costs:			1	$ 45,000	$ 18,860	$ 1,140	$ -	$ 20,000
Design Sub-Total					**$ 225,791**	**$ 13,648**	**$ -**	**$ 239,440**
Construction: CM #264	Provide a left-turn lane on one major-road approach	1 Approach	5	$ 150,000	$ 707,250	$ 42,750	$ -	$ 750,000
Construction: CM #2709	Install transverse rumble strips on stop controlled approaches in rural areas	Each	5	$ 15,000	$ 70,725	$ 4,275	$ -	$ 75,000
Construction: CM #4790	Install wider markings and both edgeline and centerline rumble strips with resurfacing (markings and rumble strips only)	Mile	2	$ 40,000	$ 80,000	*No match required	$ -	$ 80,000
Construction: CM #287	Provide a right-turn lane on one major-road approach	Intersection	1	$ 150,000	$ 141,450	$ 8,550	$ -	$ 150,000
HSIP Eligible Sub-Total					**$ 999,425**	**$ 55,575**	**$ -**	**$ 1,055,000**
Construction:							$ -	$ -
Non-HSIP Eligible Sub-Total							$ -	$ -
Construction Sub-Total					**$ 999,425**	**$ 55,575**	**$ -**	**$ 1,055,000**
Traffic Control:			**10.00%**		$ 99,943	$ 5,558	$ -	$ 105,500
Mobilization:			**10.00%**		$ 99,943	$ 5,558	$ -	$ 105,500
Construction Sub-Total					**$ 1,199,310**	**$ 66,690**	**$ -**	**$ 1,266,000**
Construction Admin :			**14.00%**		$ 167,137	$ 10,103	$ -	$ 177,240
Contingencies :			**5.00%**		$ 59,692	$ 3,608	$ -	$ 63,300
Post Design:			**1.00%**		$ 11,938	$ 722	$ -	$ 12,660
Communications:			**1.00%**		$ 11,938	$ 722	$ -	$ 12,660
Post Sub-Total					$ 250,706	$ 15,154	$ -	$ 265,860
Post Const Sub-Total					**$ 1,450,016**	**$ 81,844**	**$ -**	**$ 1,531,860**
TOTAL REQUEST					**$ 1,675,807**	**$ 95,492**	**$ -**	**$ 1,771,300**



Crash Mitigation Measures Map & Legend for Corridor 11 Overfield Rd

Improvement Category	Type of Crashes Mitigated	Improvement	Location Symbol
Intersection Geometry	All	Provide a left-turn lane on one major-road approach	
Roadway	All	Install transverse rumble strips on stop controlled approaches in rural areas	
Delineation	All	Install wider markings and both edge line and centerline rumble strips with resurfacing (markings and rumble strips only)	
		Existing Flasher	
		Location of Fatal Crash	
		Location of Incapacitating Injury Crash	

Level 4 & 5 Crashes for Corridor 11 Overfield Road by Type



Corridor 11 Overfield Rd Benefit Cost Summary

HSIP Benefit Cost Summary Report

Agency:	SCMPO	Title of Project:	11. OVERFIELD RD

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CMF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	0.60	68%	0.41	$5,800,000	$2,366,400
Incapacitating Injury	0.80	68%	0.54	$400,000	$217,600
				Total Annual Benefits	$2,584,000

Costs

Total Project Cost	$ 1,771,300
Project Life (years)	20
Interest Rate (%)	8%
Capital Recovery Factor	0.1019
Annual Construction Cost	$180,411
Annual Maintenance Cost	$100.00
Total Annual Costs	$180,511

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
$2,584,000	$180,511	**14.3**

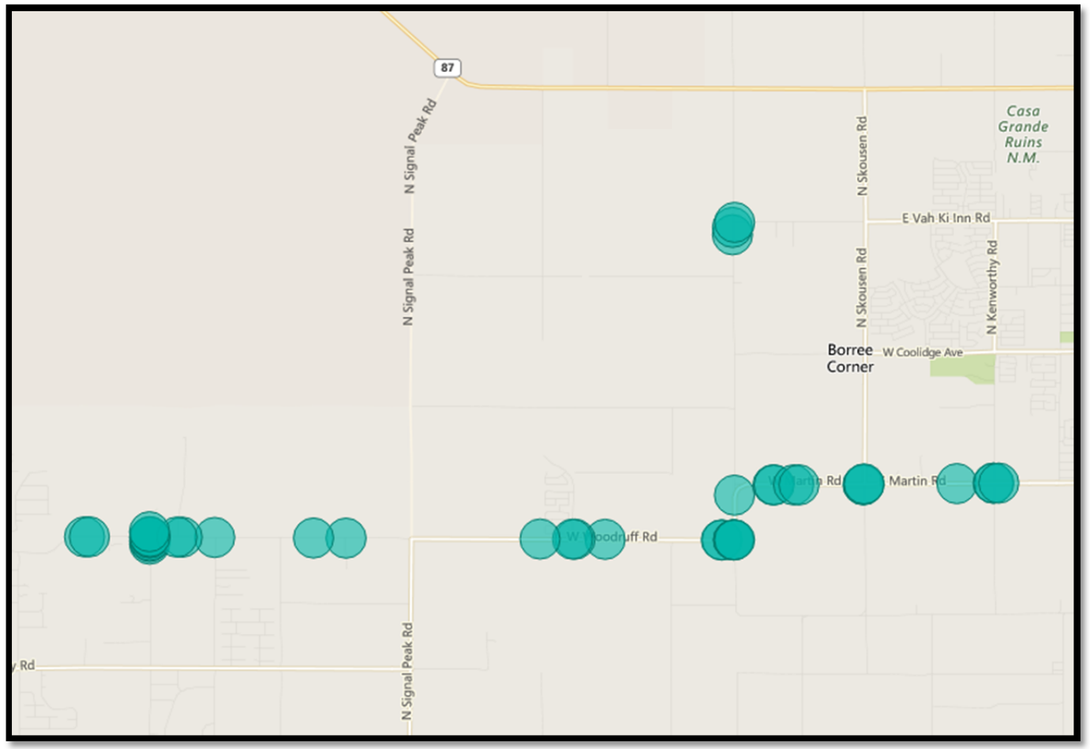
***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 17 - 19 preferred.**

12. MACRAE RD, MARTIN RD & WOODRUFF RD

Corridor 12 – consists of the following roadway segment:

1. MacRae Rd; Woodruff Rd to Vah Ki Inn Rd
2. Martin Rd; MacRae Rd to Kenworthy Rd
3. Woodruff Rd; west of Black Mountain Drive to MacRae Road

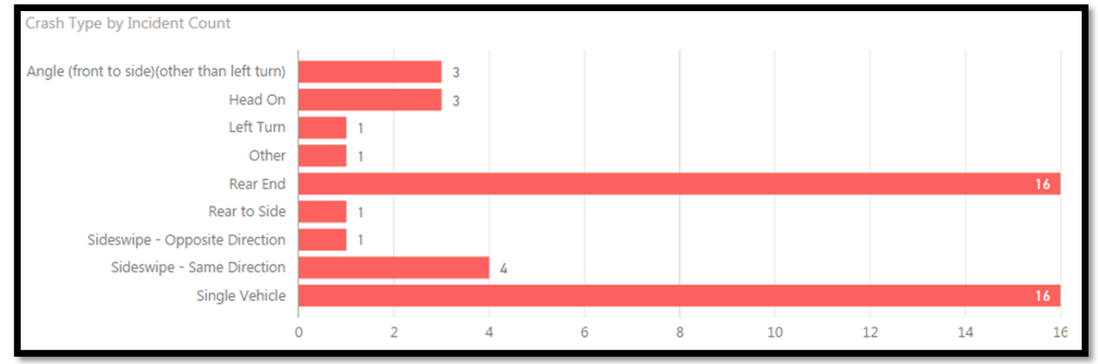
Corridor 12 Macrae Rd, Martin Rd & Woodruff Rd Map – Dots represent all crashes in the corridor



Corridor 12 Macrae Rd, Martin Rd & Woodruff Rd Crash Summary

No.	HSIP Project Corridor	Total Crashes	4 – Serious Injury Crashes	5 – Fatal Crashes
12.	Macrae Rd, Martin Rd & Woodruff Rd	46	5	1

Total Crashes (46) for Corridor 12 by Type



No.	HSIP Project Corridor	Most Common		2nd Most		3rd Most	
12.	Macrae Rd, Martin Rd & Woodruff Rd	Single Vehicle	35%	Rear End	35%	Sideswipe	9%

Corridor 12 Macrae Rd, Martin Rd & Woodruff Rd Characteristics

- Woodruff Road is mostly two-lane with graded shoulders
- Martin Road is two-lane with some paved shoulder areas
- Macrae Road is an unstriped two-lane roadway in poor condition with some unpaved and/or chip sealed portions
- Woodruff Road transitions to Martin road via MacRae and two 90 degree turns

Corridor 12, Macrae Rd, Martin Rd & Woodruff Rd, Project Justification

The corridor safety improvement project was identified through network screening of all crashes over the last ten years (2005 – 2014) and refined by reviewing fatal and serious injury crashes over the last five years (2011 – 2015).

The proposed road safety improvement project is on MacRae Road from Woodruff Road to Vah Ki Inn Road, on Martin Road from MacRae Road to Kenworthy Road, and on Woodruff Road from west of Black Mountain Drive to MacRae Road, in the Coolidge area. The proposed road safety improvement project will reduce the number of vehicle conflict points, improve visibility, decrease lane departures, provide visual and tactile driver warning, and consists of the following:

- Provide a total of 4 left turn lanes at intersections
- Provide painted channelization at 1 intersection
- Install wider markings and edge line and center line rumble strips for 9 miles

The construction of all improvements will be performed by a licensed Contractor. There will be ground disturbing activities associated with this project. No new right of way or utility relocations are anticipated to be needed for this project.

The corridor experienced 1 fatal, 5 serious injury, and 46 total crashes over the referenced five year period.

A combined crash reduction factor (CCRF) of 75% was established using the highest and/or most appropriate CRFs associated with the safety countermeasures above, using the following methodology:

CCRF = 1-(1-CRF1)X(1-CRF2)

Countermeasures and their CRFs that were used:

#264, Install left-turn lane: CRF= 35%

#4790, Install wider markings and edgeline and centerline rumble strips: CRF= 38%

CCRF = 1-(1-.35)X(1-.38) **CCRF = .75**

Based on this CCRF, the expected five year reduction in fatal crashes would be 0.75 and the reduction in serious injury crashes would be 3.75.

This corridor project supports these safety emphasis areas:

- Intersections
- Lane Departures

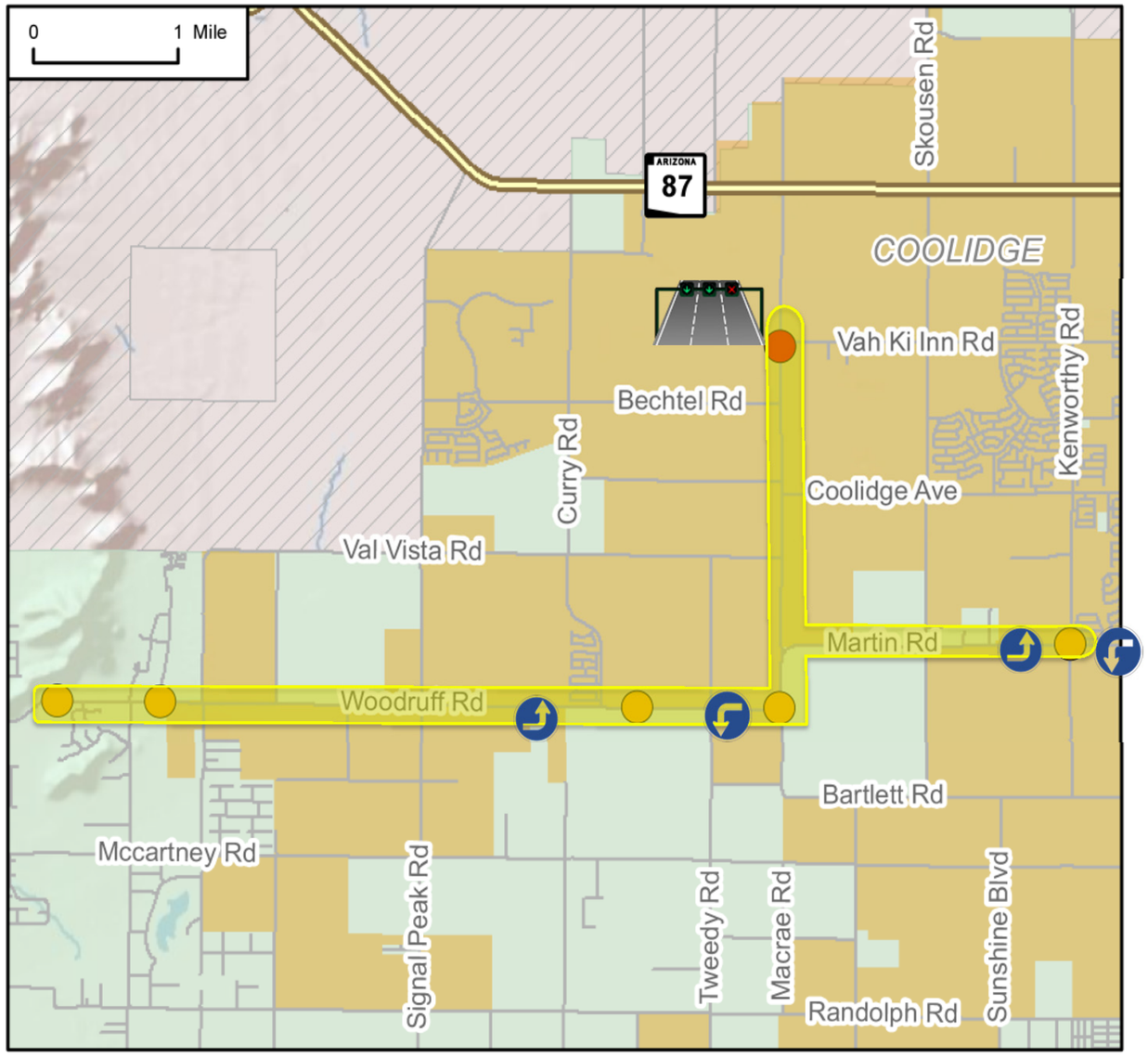
The estimated total project cost is $1,672,280 providing a **benefit/cost ratio of 6.8**. The local match is estimated at $69,328.

Corridor 12 - Macrae Rd, Martin Rd & Woodruff Rd		*See Map on Report Page 64 for Locations of Individual Projects*		
Project Number	Component Project	No. of Locations	Cost per Location	Total Cost by Project Type
12A	LT Lane Major Road 3-Leg Approach	2	$255,961	$511,922
12B	LT Lane Major Road 4-Leg Approach	2	$255,961	$511,922
12C	Painted Channelization Both Roads at Intersections	1	$34,128	$34,128
12D	Wider Markings & Centerline & Edgeline Rumble Strips	1	$614,307	$614,307
			Total Project Cost	$1,672,280

Corridor 12 Macrae Rd, Martin Rd & Woodruff Rd HSIP Project Cost Estimate Worksheet

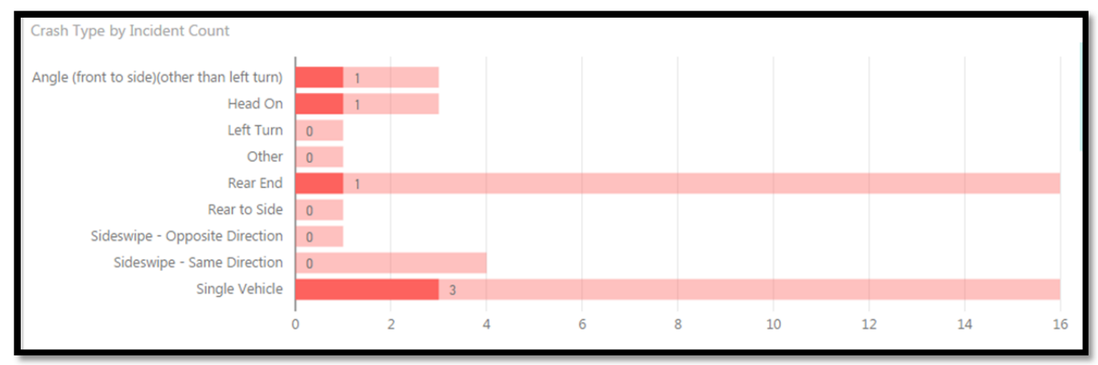
Agency:	**SCMPO**	**Name of Project:**	**12. MACRAE RD, MARTIN RD & WOODRUFF RD**	**Corridor Improvement**				
HSIP Project Cost Estimate Worksheet								
Project Cost Estimate:	**Description:**	**Unit:**	**Quantity:**	**Unit Cost:**	**HSIP:** 94.30%	**Local Match:** 5.70%	**Other Amt:** 0.00%	**TOTAL COST**
Design:			1	$ 176,400	$ 166,345	$ 10,055	$ -	$ 176,400
Environmental Clearance			1	$ 52,920	$ 49,904	$ 3,016	$ -	$ 52,920
ADOT Admin Costs:			1	$ 45,000	$ 18,860	$ 1,140	$ -	$ 20,000
Design Sub-Total					**$ 235,109**	**$ 14,211**	**$ -**	**$ 249,320**
Construction: CM #255	Provide a left-turn lane on one major-road approach (3-leg)	1 Approach	2	$ 150,000	$ 282,900	$ 17,100	$ -	$ 300,000
Construction: CM #264	Provide a left-turn lane on one major-road approach (4-leg)	1 Approach	2	$ 150,000	$ 282,900	$ 17,100	$ -	$ 300,000
Construction: CM #294	Painted channelization of both major and minor roads	Intersection	1	$ 20,000	$ 20,000	*No match required	$ -	$ 20,000
Construction: CM #4790	Install wider markings and both edgeline and centerline rumble strips with resurfacing (markings & rumble strips only)	Mile	9	$ 40,000	$ 360,000	*No match required	$ -	$ 360,000
HSIP Eligible Sub-Total					**$ 945,800**	**$ 34,200**	**$ -**	**$ 980,000**
Construction:							$ -	$ -
Non-HSIP Eligible Sub-Total							$ -	$ -
Construction Sub-Total					**$ 945,800**	**$ 34,200**	**$ -**	**$ 980,000**
Traffic Control:			**10.00%**		$ 94,580	$ 3,420	$ -	$ 98,000
Mobilization:			**10.00%**		$ 94,580	$ 3,420	$ -	$ 98,000
Construction Sub-Total					**$ 1,134,960**	**$ 41,040**	**$ -**	**$ 1,176,000**
Construction Admin :			**14.00%**		$ 155,256	$ 9,384	$ -	$ 164,640
Contingencies :			**5.00%**		$ 55,448	$ 3,352	$ -	$ 58,800
Post Design:			**1.00%**		$ 11,090	$ 670	$ -	$ 11,760
Communications:			**1.00%**		$ 11,090	$ 670	$ -	$ 11,760
Post Sub-Total					$ 232,883	$ 14,077	$ -	$ 246,960
Post Const Sub-Total					**$ 1,367,843**	**$ 55,117**	**$ -**	**$ 1,422,960**
TOTAL REQUEST					**$ 1,602,952**	**$ 69,328**	**$ -**	**$ 1,672,280**

Crash Mitigation Measures Map & Legend for Corridor 12 Macrae Rd, Martin Rd & Woodruff Rd



Improvement Category	Type of Crashes Mitigated	Improvement	Location Symbol
Intersection Geometry	All	Provide a left-turn lane on one major-road approach	
Intersection Geometry	All	Painted channelization of both major and minor roads	
Delineation	All	Install wider markings and both edge line and centerline rumble strips with resurfacing (markings and rumble strips only)	
		Location of Fatal Crash	
		Location of Incapacitating Injury Crash	

Level 4 &5 Crashes for Corridor 12 by Type



Corridor 12 Macrae Rd, Martin Rd & Woodruff Rd Benefit Cost Summary

HSIP Benefit Cost Summary Report

Agency:	SCMPO	Title of Project:	12. MACRAE RD, MARTIN RD & WOODRUFF RD

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CMF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	**0.20**	**75%**	0.15	$5,800,000	$870,000
Incapacitating Injury	**1.00**	**75%**	0.75	$400,000	$300,000
				Total Annual Benefits	$1,170,000

Costs

Total Project Cost	**$ 1,672,280**
Project Life (years)	**20**
Interest Rate (%)	8%
Capital Recovery Factor	0.1019
Annual Construction Cost	$170,325
Annual Maintenance Cost	$100.00
Total Annual Costs	$170,425

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
$1,170,000	$170,425	**6.8**

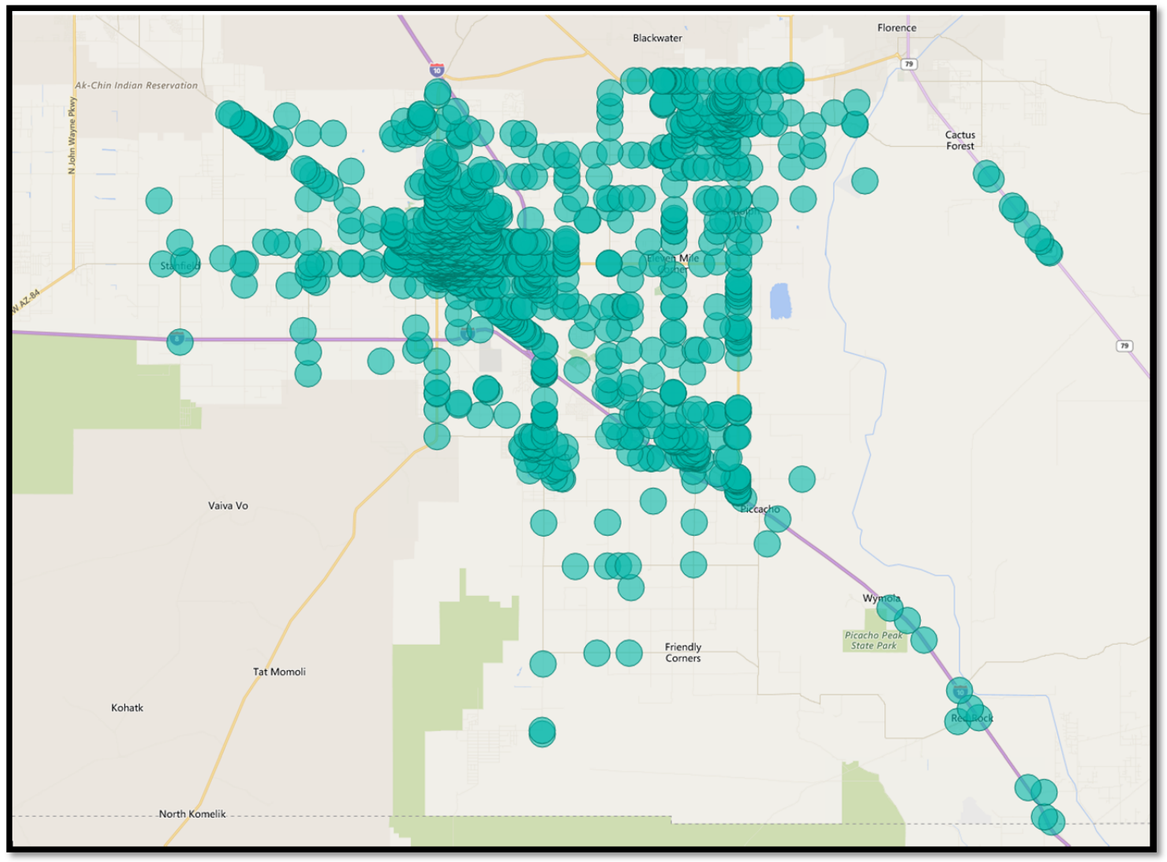
***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 17 - 19 preferred.**

13. SYSTEMIC LANE DEPARTURES

Corridor 13 – consists of the following region:

1. The entire SCMPO Region

Corridor 13 Systemic Lane Departures Map – Dots represent all crashes in the SCMPO region



Corridor 13 Systemic Lane Departures Crash Summary

No.	HSIP Project Corridor	Total Crashes	4 – Serious Injury Crashes	5 – Fatal Crashes
13.	Systemic Lane Departures	1173	61	26

Corridor 13 Systemic Lane Departures Map Characteristics

- The SCMPO Region contains rural 2 lane roadways, urban sections, ADOT state highways, and ADOT Interstate Highways 8 & 10
- The communities of Casa Grande, Eloy, and Coolidge, and rural unincorporated areas of Pinal County are within the region

Systemic Lane Departure Project Justification

The corridor safety improvement project was identified through network screening of all crashes over the last ten years (2005 – 2014) and refined by reviewing fatal and serious injury crashes over the last five years (2011 – 2015).

The proposed road safety improvement project is located on various roadway segments throughout the SCMPO region.

The proposed road safety improvement project will reduce the number of vehicle conflict points, improve visibility, decrease lane departures, provide visual and tactile driver warning, and consists of the following:

- Install wider markings and edge line and center line rumble strips for 107 miles

The construction of all improvements will be performed by a licensed Contractor. There will be ground disturbing activities associated with this project. No new right of way or utility relocations are anticipated to be needed for this project.

The SCMPO region experienced 26 fatal, 61 serious injury, and 1,173 total lane departure crashes over the referenced five year period.

Based on a crash reduction factor (CRF) of 38% obtained from the preapproved ADOT CRF list, the expected five year reduction in fatal crashes would be 9.90 and the reduction in serious injury crashes would be 23.20.

This corridor project supports these safety emphasis areas:

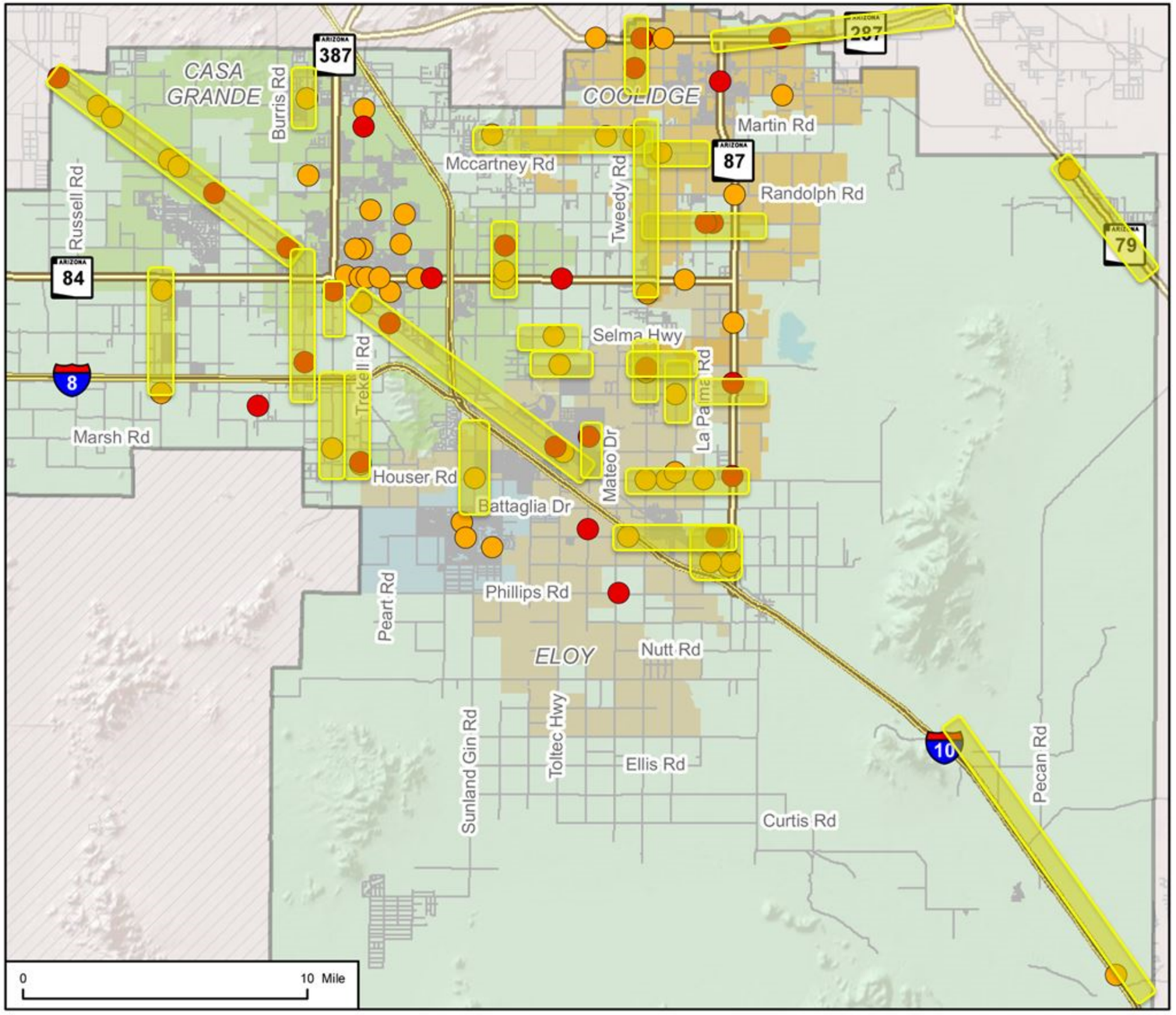
- Lane Departures

The estimated total project cost is $6,833,106 providing a **benefit/cost ratio of 19.1.** The local match is estimated at $96,735.

Corridor 13 Systemic Lane Departures Map HSIP Project Cost Estimate Worksheet

Agency:	SCMPO	Name of Project:	13. SYSTEMIC LANE DEPARTURES		Systemic Lane Departures			
HSIP Project Cost Estimate Worksheet								
Project Cost Estimate:	Description:	Unit	Quantity:	Unit Cost:	HSIP:	Local Match:	Other Amt:	TOTAL COST
					94.30%	5.70%	0.00%	
Design:			1	$ 428,000	$ 403,604	$ 24,396	$ -	$ 428,000
Environmental Clearance			1	$ 128,400	$ 121,081	$ 7,319	$ -	$ 128,400
ADOT Admin Costs:			1	$ 62,146	$ 58,603	$ 3,542	$ -	$ 62,146
Design Sub-Total					**$ 583,289**	**$ 35,257**	**$ -**	**$ 618,546**
Construction: CM #4790	Install wider markings and both edgeline and centerline rumble strips with resurfacing (marking and rumble strips only)	Mile	107	$ 40,000	$ 4,280,000	*No match required	$ -	$ 4,280,000
HSIP Eligible Sub-Total			**107**		**$ 4,280,000**	**$ -**	**$ -**	**$ 4,280,000**
Construction:							$ -	$ -
Non-HSIP Eligible Sub-Total							$ -	$ -
Construction Sub-Total					**$ 4,280,000**	**$ -**	**$ -**	**$ 4,280,000**
Traffic Control:			**10.00%**		$ 428,000	$ -	$ -	$ 428,000
Mobilization:			**10.00%**		$ 428,000	$ -	$ -	$ 428,000
Construction Sub-Total					**$ 5,136,000**	**$ -**	**$ -**	**$ 5,136,000**
Construction Admin :			**14.00%**		$ 678,055	$ 40,985	$ -	$ 719,040
Contingencies :			**5.00%**		$ 242,162	$ 14,638	$ -	$ 256,800
Post Design:			**1.00%**		$ 48,432	$ 2,928	$ -	$ 51,360
Communications:			**1.00%**		$ 48,432	$ 2,928	$ -	$ 51,360
Post Sub-Total					$ 1,017,082	$ 61,478	$ -	$ 1,078,560
Post Const Sub-Total					**$ 6,153,082**	**$ 61,478**	**$ -**	**$ 6,214,560**
TOTAL REQUEST					**$ 6,736,371**	**$ 96,735**	**$ -**	**$ 6,833,106**

Corridor 13 Systemic Lane Departures Map – Dots represent all 4 & 5 level crashes in the region



Improvement Category	Type of Crashes Mitigated	Improvement	Location Symbol
Delineation	All	Install wider markings and both edge line and centerline rumble strips with resurfacing (markings and rumble strips only)	
		Location of Fatal Crash	
		Location of Incapacitating Injury Crash	

Targeted roadways for mitigation measures to reduce lane departure crashes as shown on the map to the left on this page total approximately 107 miles. The table on the next page includes a listing of the road segments corresponding with the map road segments.

Corridor 13 Systemic Lane Departures Benefit Cost Summary

Required for all HSIP Applications

Agency:	SCMPO	Title of Project:	13. SYSTEMIC LANE DEPARTURES

Benefit / Cost Ratio Tabulation

Annual Benefit Tabulation

Severity	Annual Average	Estimated CMF* Reduction	Total Reduction	Unit Cost	Annual Benefit
Fatal	5.20	38%	1.98	$5,800,000	$11,460,800
Incapacitating Injury	12.20	38%	4.64	$400,000	$1,854,400
				Total Annual Benefits	$13,315,200

Costs

Total Project Cost	$ 6,833,106
Project Life (years)	20
Interest Rate (%)	8%
Capital Recovery Factor	0.1019
Annual Construction Cost	$695,967
Annual Maintenance Cost	$100.00
Total Annual Costs	$696,067

Benefit / Cost

Annual Benefit	Annual cost	Benefit / Cost Ratio
$13,315,200	$696,067	19.1

***REQUIRED: Use 4 and 5 star CMFs from ADOT Lists Only at Tabs 17 - 19 preferred.**

Roadway Segments included in the Systemic Road Departures Program

Road Name	From	To	Length (mi)
Maricopa-Casa Grande Highway	Anderson Road	Thornton Road	11
Jimmie Kerr Blvd	Brown Road	North Valley Drive	12
Montgomery Road	Gila Bend Highway	I-8	4
Thornton Road	Hanna Road	Cottonwood Lane	5
Scott Dr	Val Vista	Ghost Ranch Road	1
Trekell Road	I-8	Shedd Road	3
Sunland Gin Road	Battaglia	Arica Road	3
Overfield Road	Florence Blvd	Kleck Road	2
Woodruff Road	Weaver Road	MacRae Road	6
Skousen Road	Bartlett Road	SR 287	5
Macrae Road/SR 87	Bechtel Road	SR 87	2
Kleck Road	Palma Road	Vail Road	1
State Route 87 / Alsdorf Area	Milligan	La Palma	4
Houser Road/Sunshine/SR87	Tumbleweed	Edgedale	4
Eleven Mile Corner Road	Cornman Road	Hanna	1
Hanna Road	11 Mile Corner	La Palma	2
Cornman Road	Toltec Road	Tweedy Road	2
Selma Hwy	Toltec Road	Tweedy Road	2
State Route 79	Desert Hills	Cactus Forest	4
Alsdorf Road	West of I-10	SR 87	4
Camino Adelante	Missile Base Road	Sasco	15
Chuichu Road	Shedd Road	I-8	3
Estrella Road	Shedd Road	Hanna Road	2
Florence St	Main Street	Peters Ave	2
State Route 287	SR 87	SR 79	9
		Total Cummulative Miles	**107**

SCMPO STRATEGIC TRANSPORTATION SAFETY PLAN
HSIP CORRIDORS PROJECT REPORT

SunCorridor
Metropolitan Planning Organization

RICK
ENGINEERING COMPANY

24 February 2017