Sun Corridor Metropolitan Planning Organization
2016
Strategic Transportation Safety Plan

"Reducing fatal and serious injury crashes through implementation of effective safety strategies and countermeasures"

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Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.

1 EXECUTIVE SUMMARY

With the population growth in the Sun Corridor region of Pinal County, development of a Strategic Transportation Safety Plan (STSP) has become necessary to reduce fatal and serious injury traffic crashes in the region. Over the past 10 years (2005-2014), the region experienced 16,525 crashes, including 243 fatal crashes. Interstate 10 had the highest number of total (3,332) and fatal (89) crashes in the region. The most common crash type in the region was single vehicle (4,455) which also had the highest fatal crash type (120). The Sun Corridor Metropolitan Planning Organization (SCMPO) led the development of this STSP to identify traffic safety issues and to better position the region to obtain funding to improve safety in the region.

The SCMPO STSP vision is **"*Reduce fatal and serious injury crashes through implementation of effective safety strategies and countermeasures*"** and the STSP goal is **"*Reduce the number of fatalities and serious injuries in the Sun Corridor MPO region by 3 to 7 percent during the next 5 years*"**. The vision and goal were developed with stakeholder input and were inspired by the Federal Highway Administration's (FHWA) vision "Towards Zero Deaths" and Arizona's vision "Toward Zero Deaths by Reducing Crashes for a Safer Arizona".

Emphasis areas for the SCMPO region were based on the emphasis areas identified in the 2014 Arizona Strategic Highway Safety Plan (SHSP); these areas contribute the most to overall crashes and/or fatal crashes. The 10 emphasis areas for the region are:

- Speeding
- Impaired Driving
- Occupant Protection
- Distracted Driving
- Older Drivers
- Young Drivers
- Pedestrians
- Intersections
- Lane Departure
- Weather-Related

The region defers to the Arizona SHSP for the additional emphasis areas not listed above.

Safety strategies were generated for each emphasis area based on the 4 E's of traffic safety: engineering, enforcement, education, and emergency services.

The FHWA established five safety performance measure requirements for state DOTs and MPOs: fatalities, fatality rate, serious injuries, serious injury rate, and number of combined non-motorized fatalities and serious injuries. These performance measures will be used to set targets and evaluate year to year increase or reduction in crashes.

Network screening was conducted to determine which intersections and segments are priority locations for future safety projects. Using crash frequency, rate, and severity, prioritized lists of unsignalized intersections, signalized intersections, and segments were created. Corridors with multiple highly ranked intersections and segments were identified as locations for pursuing federal safety funds. These included corridors and systemic projects as shown in Figure 1-1. The potential projects are listed from highest to lowest for total number of fatal and serious injury crashes occurring from 2011 to 2015 (excluding the systemic project).

Figure 1-1: Potential Safety Projects

Project Name
SR 87 & SR 287
I-10 Picacho
Florence Boulevard
Jimmie Kerr Blvd / Frontier St
SR 287 Rural
Trekell Rd
Maricopa-Casa Grande Hwy
Skousen Rd & Eleven Mile Corner Rd
Pinal Avenue (SR 387)
Peart Rd
Overfield Rd
Macrae Rd, Martin Rd & Woodruff Rd
Systemic Lane Departures

2 INTRODUCTION

This safety plan represents the first Strategic Transportation Safety Plan (STSP) for the Sun Corridor Metropolitan Planning Organization (SCMPO) region. This plan establishes a vision, goal, emphasis areas, strategies, network screening methodology, and potential safety projects for the region, consistent with those set forth by the Arizona State Highway Safety Plan (SHSP). The purpose of this safety plan is to reduce the risk of death and serious injury to all transportation users in the SCMPO region.

The project benefitted greatly from oversight and guidance provided by the SCMPO Technical Advisory Committee (TAC) along with participation from law enforcement, emergency responders, and safety advocacy groups, among other key stakeholders. The group was challenged to build a transportation safety culture that includes a broad range of experts and user groups across the four E's of safety (engineering, enforcement, education, and emergency services). Continuation of this group and growth of a transportation safety culture in the implementation phase of this Plan will be essential to achieving lasting impacts in transportation safety. The stakeholders group participated in project workshops and meetings at key points during the project. This safety plan was developed based on:

- State crash data analysis
- Stakeholder input
- Public input
- Coordination with the Arizona Strategic Highway Safety Plan

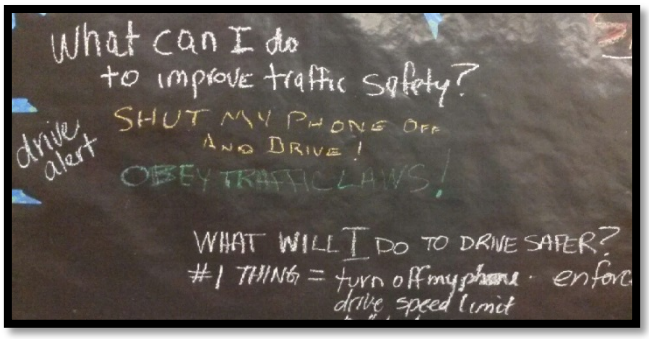
The SCMPO STSP will serve as a tool for recommending projects for inclusion in the Transportation Improvement Program and in future updates to the Regional Transportation Plan.

3 PUBLIC INVOLVEMENT

Public involvement was key in getting stakeholder and community feedback to address safety issues and concerns. Several opportunities were provided to facilitate participation in the safety plan development, including four public meetings, two stakeholder workshops, and presentations at SCMPO Executive Board, TAC, City Council, and Pinal County Board of Supervisors meetings. These meetings and workshops provided opportunities to obtain input for the plan development, to educate on traffic safety issues, and to solicit cooperation in implementing the safety plan, both on an agency and an individual basis.

Public Meetings were held on the following dates:

- January 6th, 2016 – Eloy
- January 19th, 2016 – Casa Grande
- January 25th, 2016 – Coolidge
- November 9th, 2016 – Coolidge



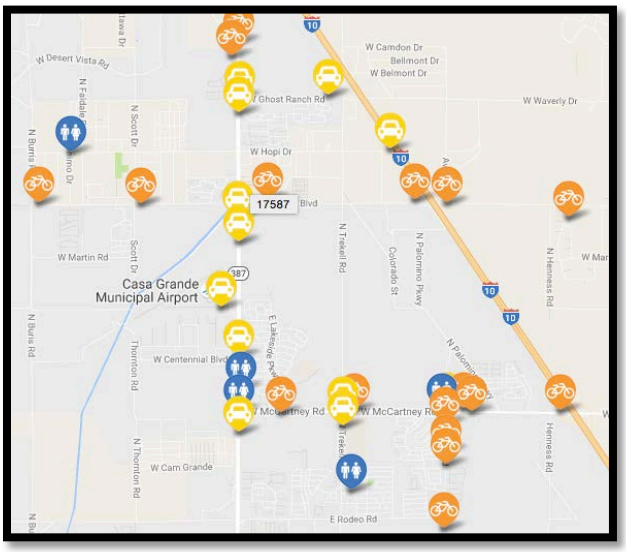
Stakeholder meetings were held on the following dates:

- September 16th, 2015 – Coolidge
- May 18th, 2016 – Coolidge

Transportation Safety Surveys were distributed during the public meetings to obtain feedback on safety concerns. A total of 19 surveys were completed and are included in Appendix A.

In addition to meetings, the public had an opportunity to provide comments online using a Social Pinpoint mapping tool. The online public engagement platform was launched April 25, 2016 to supplement the public meeting outreach events listed above. The Social Pinpoint tool provided users with an easy to use platform to identify specific locations on a map to comment on safety concerns from a driver, a pedestrian, and a bicyclist perspective.

Figure 3-1: Social Pinpoint Mapping Tool



A total of 208 comments were added by the public to the Social Pinpoint map, with 512 unique visits to the site. Most participants (51%) made comments concerning vehicle travel. Pedestrian travel comments accounted for 34%, and bicyclist comments accounted for the remaining 15%. Comments originated from the following jurisdictions or areas:

- Casa Grande: 143
- Tucson: 27
- Eloy: 17
- Coolidge: 10
- Arizona City: 5
- Florence: 2
- Scottsdale: 2
- Sells: 1
- Unknown: 1

All comments from the Social Pinpoint mapping tool are included in Appendix A. SCMPO's member agencies are encouraged to use these comments to help identify potential safety issues that may need to be addressed.

Other public involvement activities included staffing a Traffic Safety booth at the Coolidge Police Department GAIN (Getting Arizonans Involved in Neighborhoods) Night and making a presentation at the Pinal County Law Enforcement Association meeting in Coolidge. Appendix A provides more details on the public outreach effort.

4 SAFETY SYSTEM PERFORMANCE

Crash data was obtained from the Arizona Department of Transportation's (ADOT) Accident Location Identification and Surveillance System (ALISS) database. The most recent 10 years of crash data (2005-2014) was analyzed to determine existing crash performance, comparison to state data, and identify crash hot spots in the region. Key findings from the crash data analysis include:

- 49% of fatal crashes were single vehicle crashes
- 12% of fatal crashes were pedestrians
- 51% of fatal crashes occurred at night/dawn/dusk
- 40% of fatal crashes involved speeding
- 64% of fatal crashes involved lane departure
- 53% of fatal crashes involved unrestrained occupants
- 37% of fatal crashes occurred on Interstate 10

Figure 4-1: Crash Severity by Year

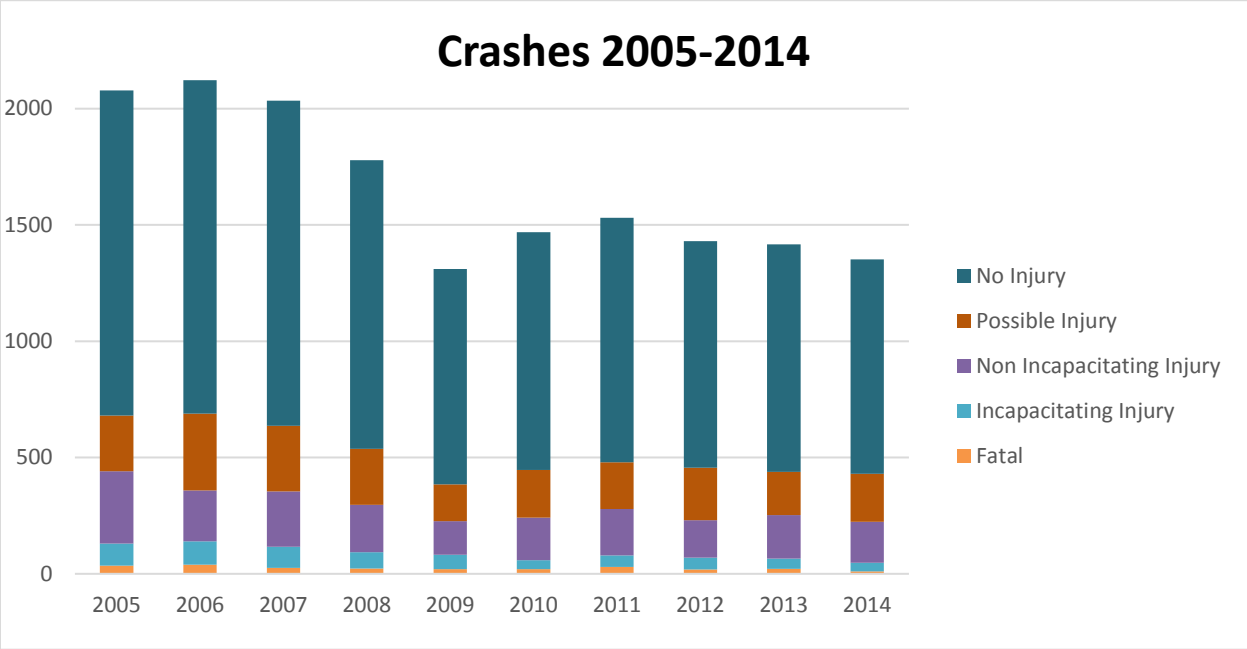


Figure 4-2: Crashes by Month

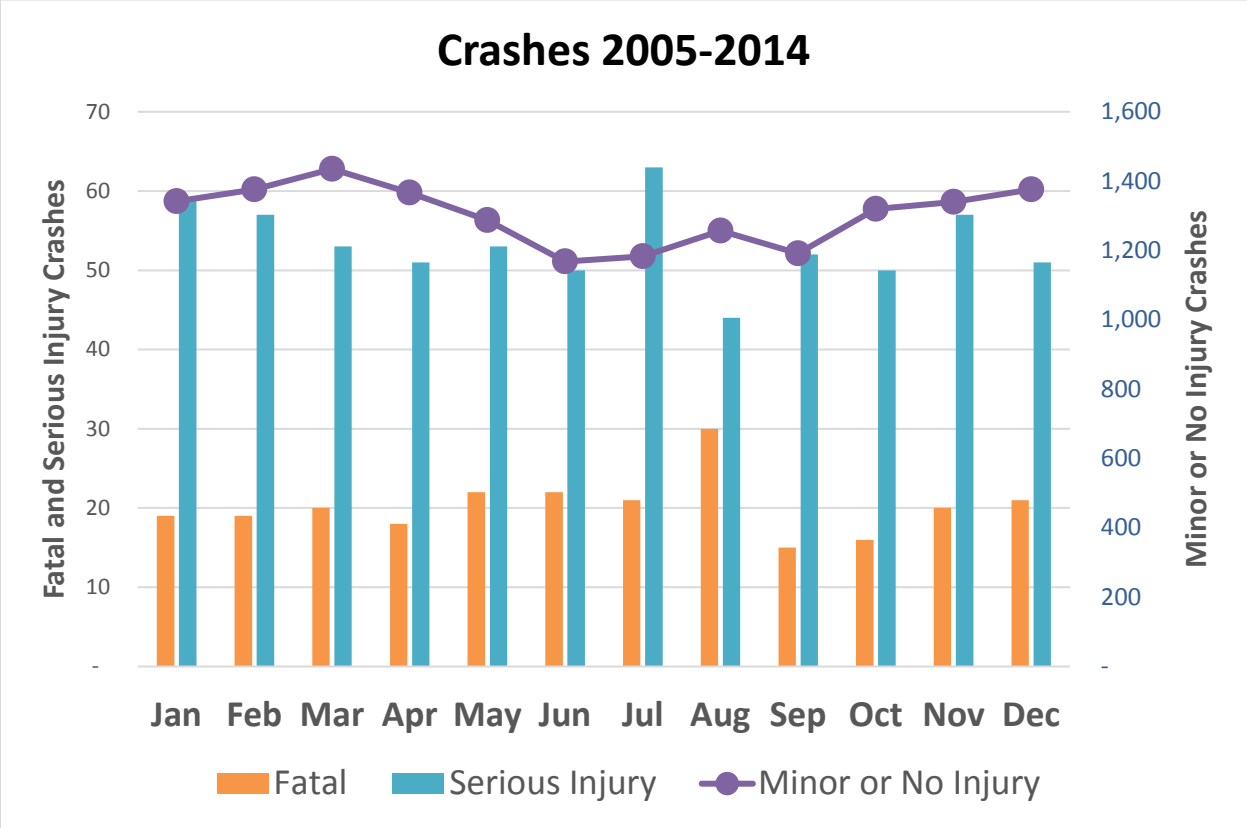


Figure 4-3: Crashes by Day of the Week

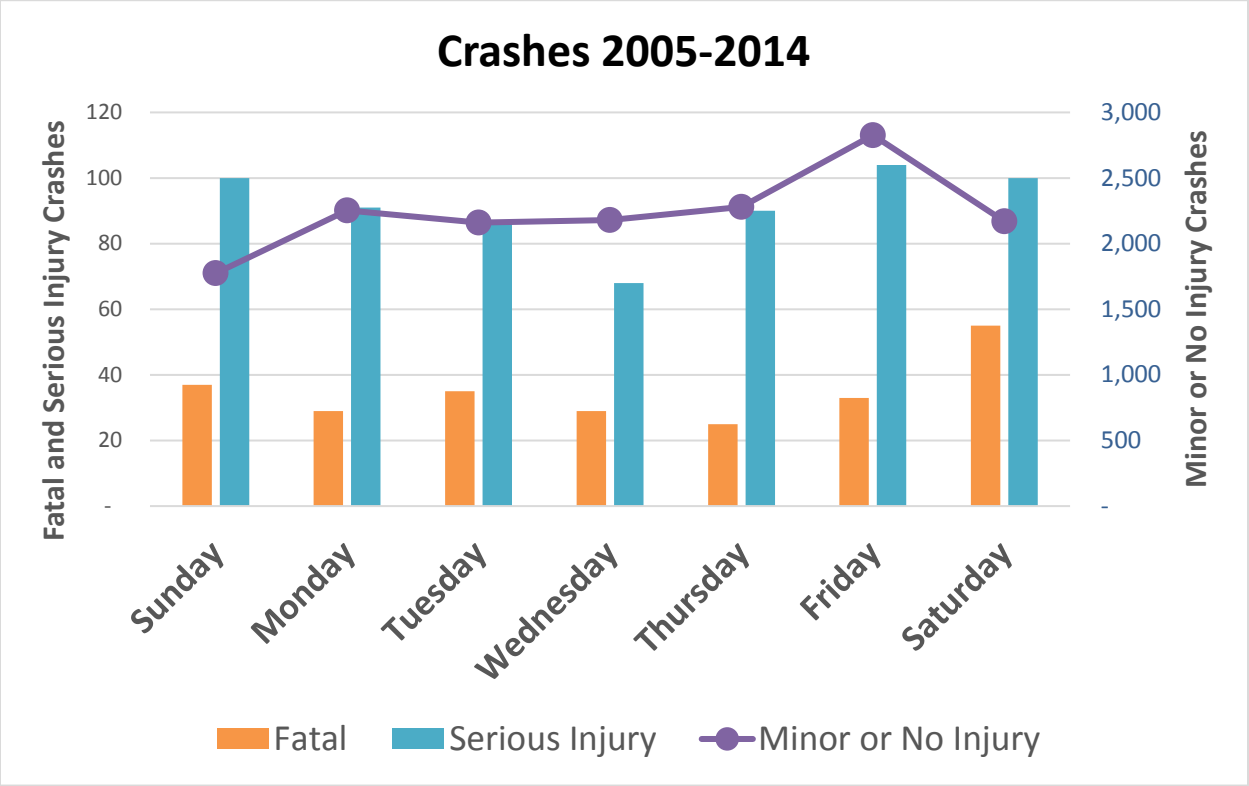


Figure 4-4: Crashes by Hour of Day

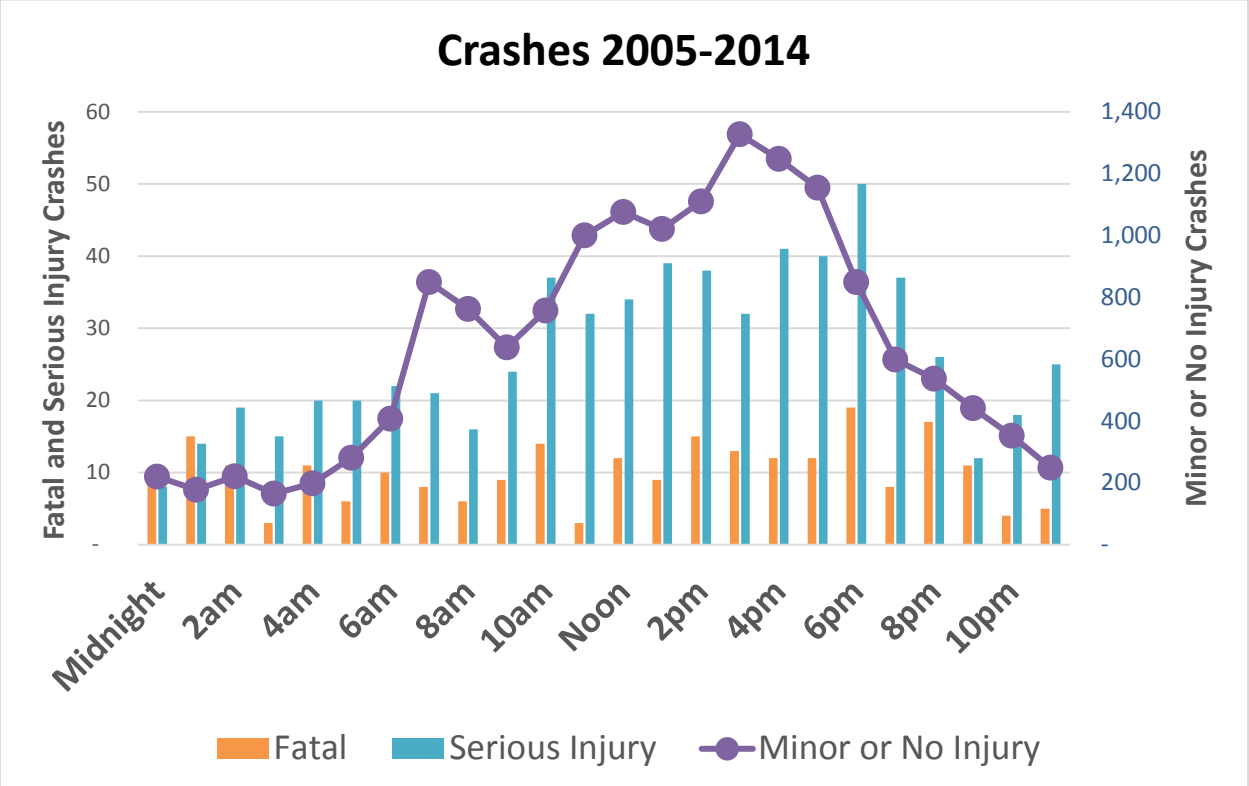


Figure 4-5: Crash Violations

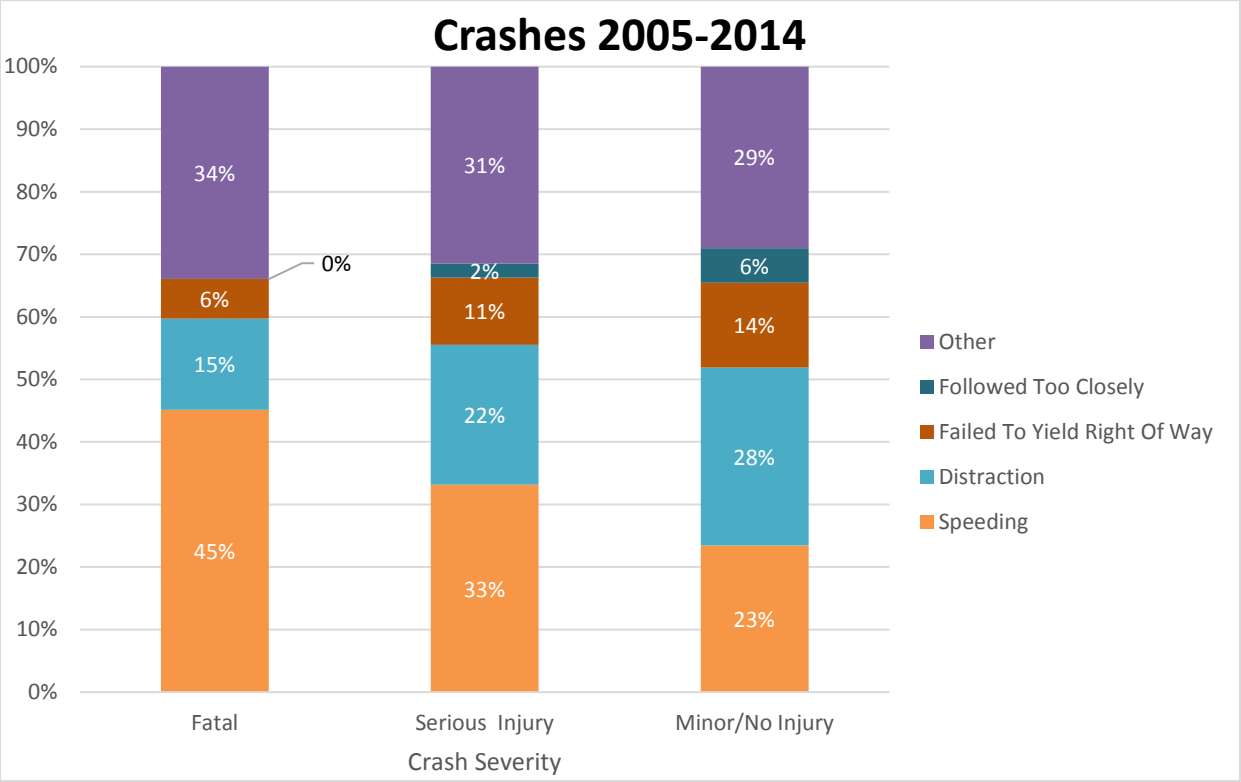


Figure 4-6: Impaired Driver Crashes

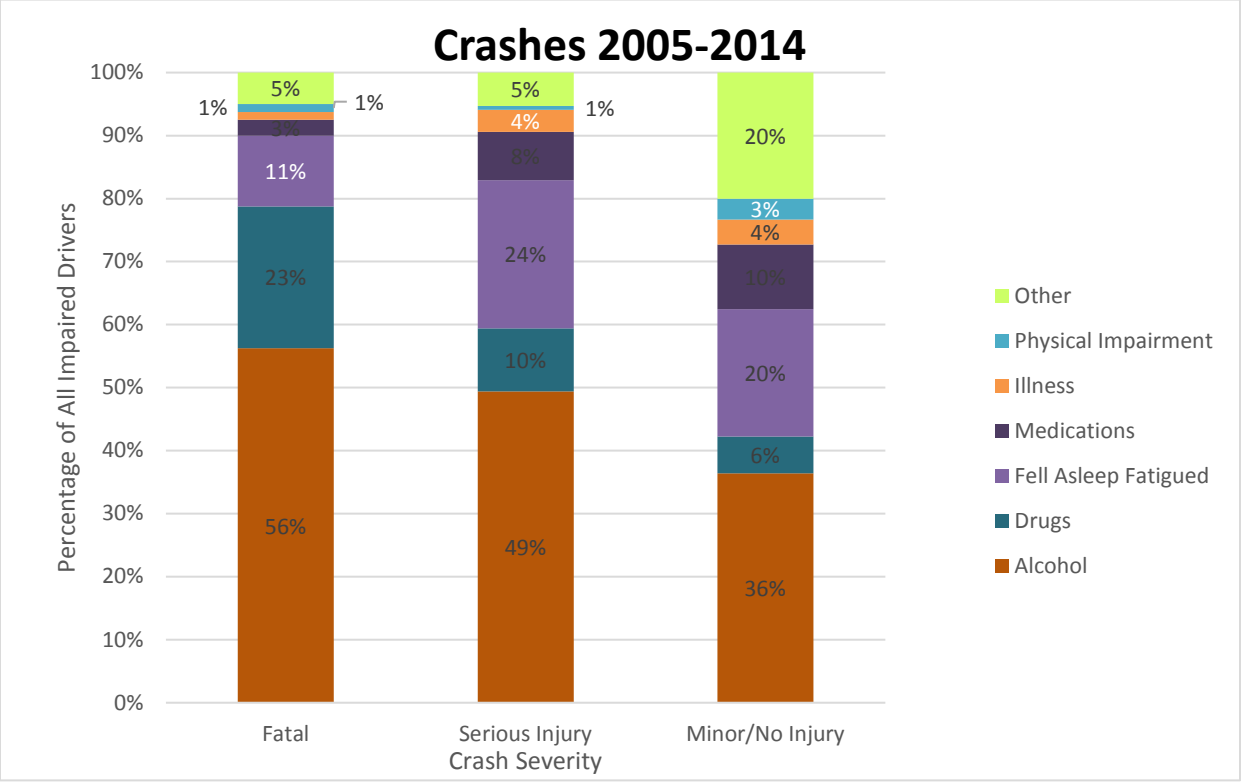


Figure 4-7: Speeding and Distraction Crashes

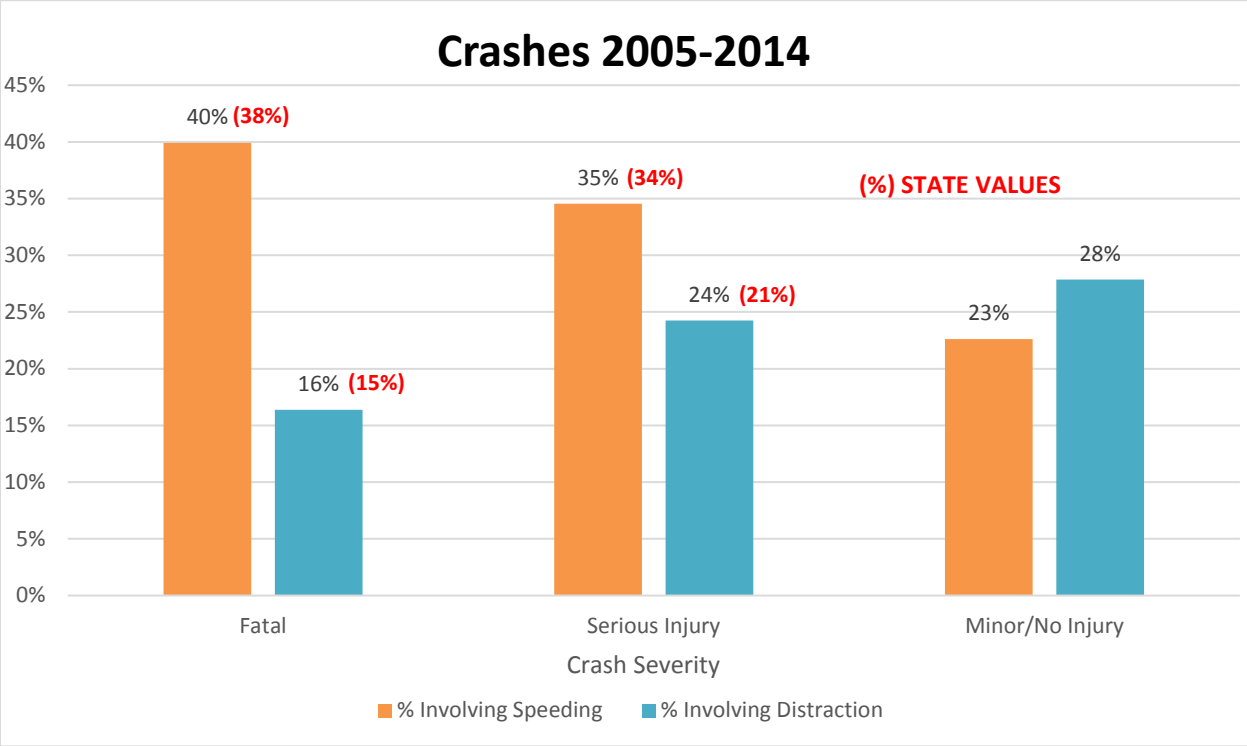


Figure 4-8: Crashes with At Least One Impairment

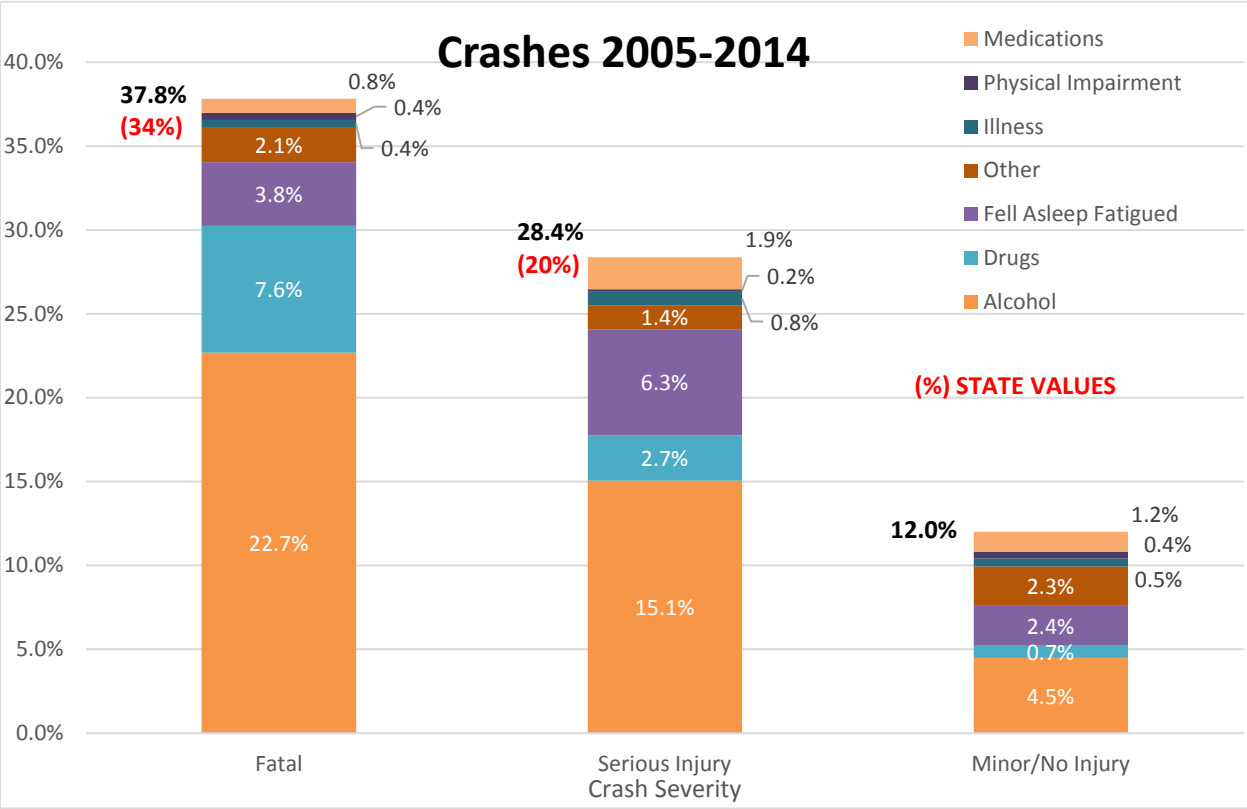


Figure 4-9: Unrestrained Occupants

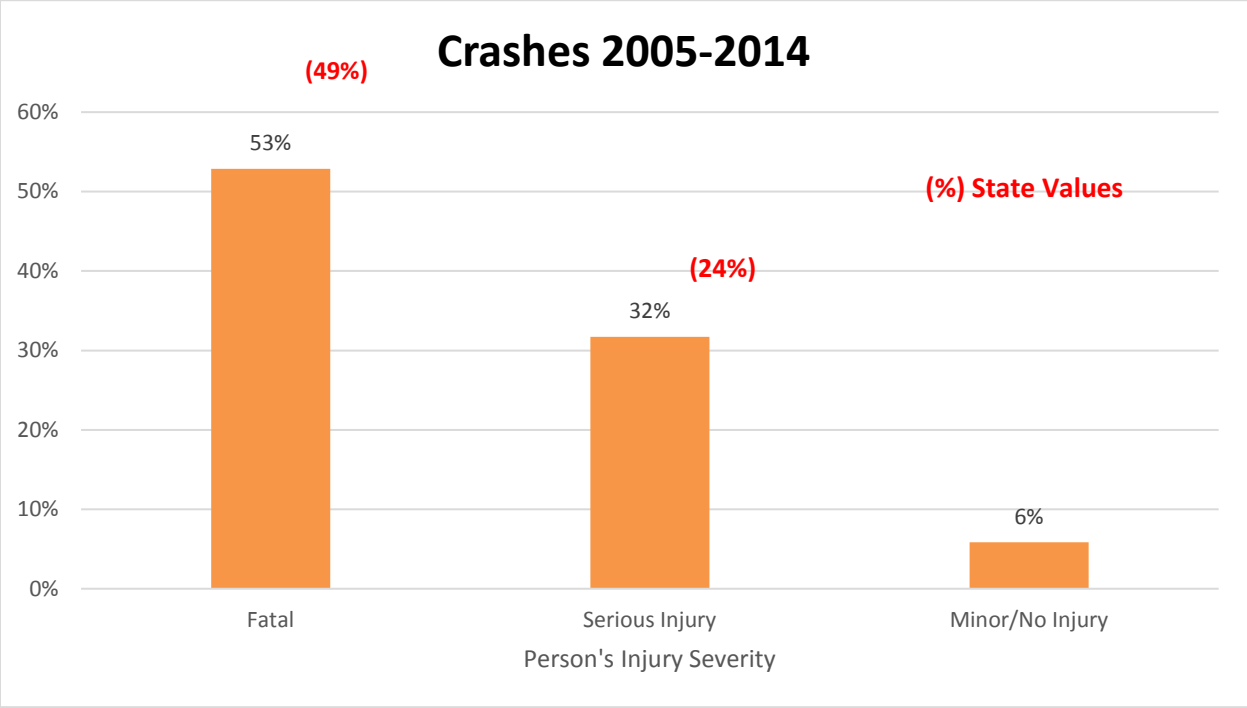


Figure 4-10: Crashes by Driver Age

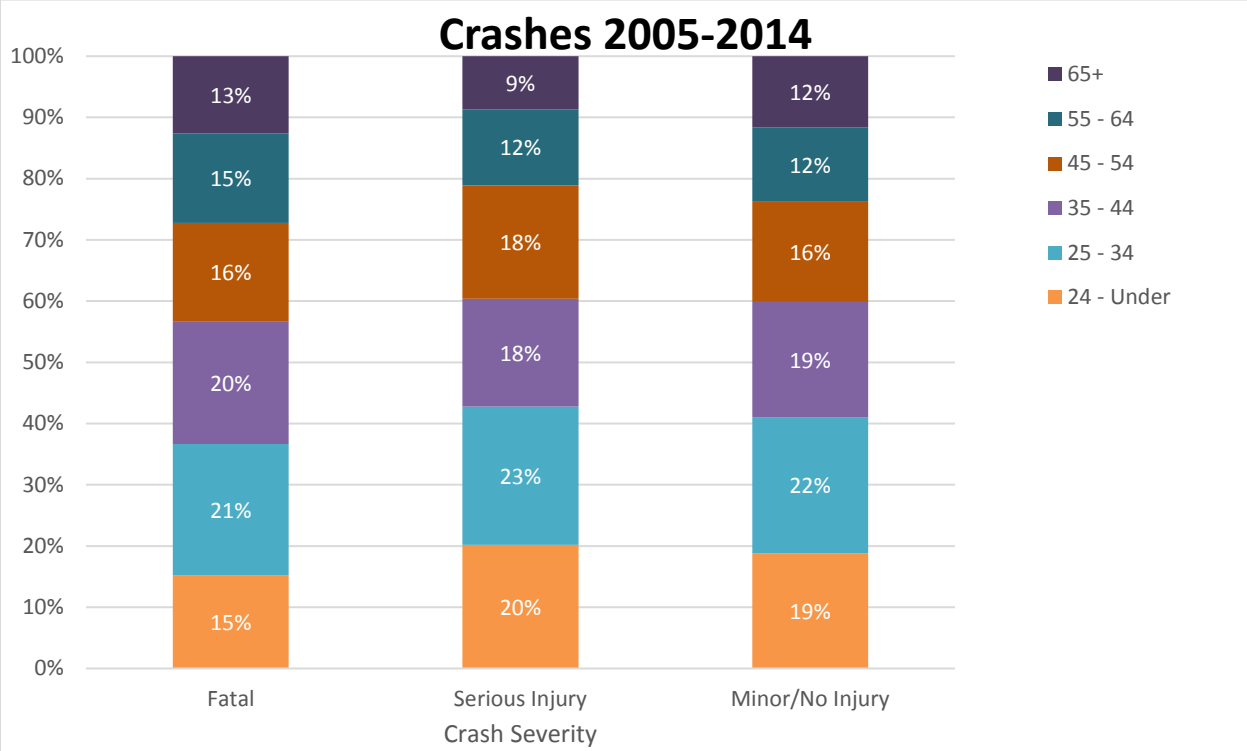


Figure 4-11: Crashes with at Least One Driver in Age Group

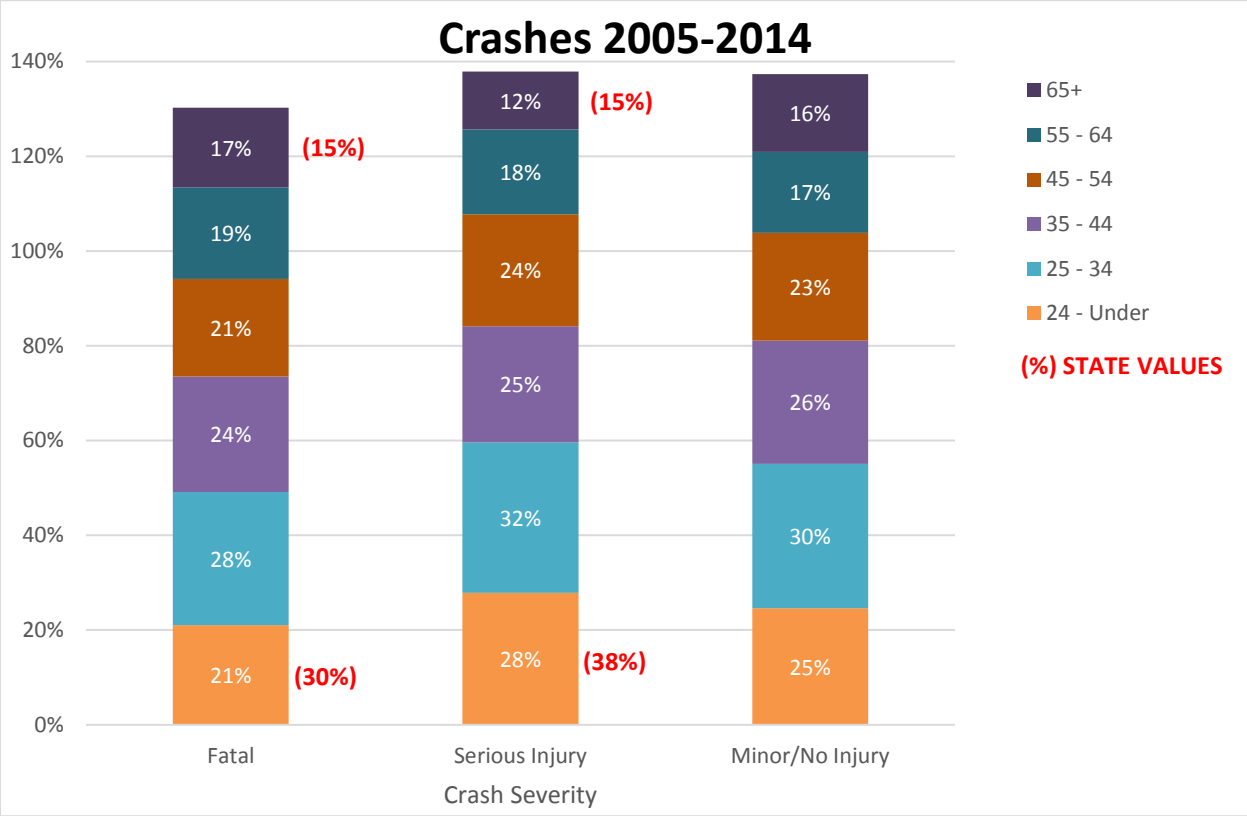


Figure 4-12: Crashes by Light Condition

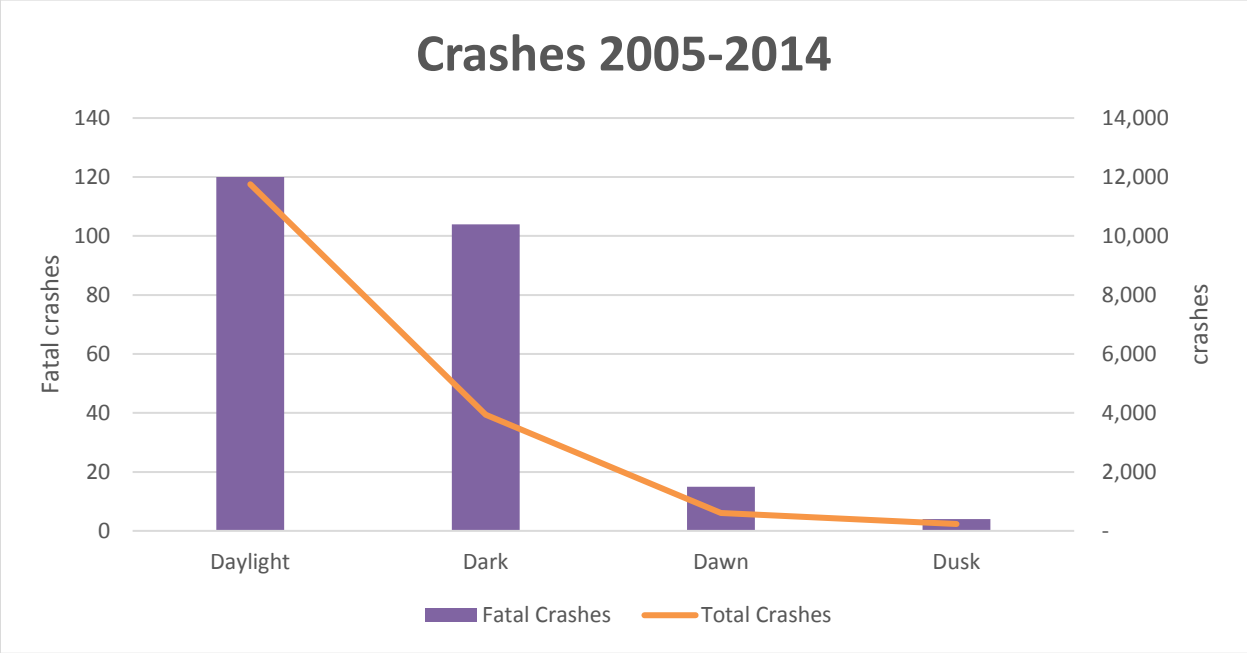
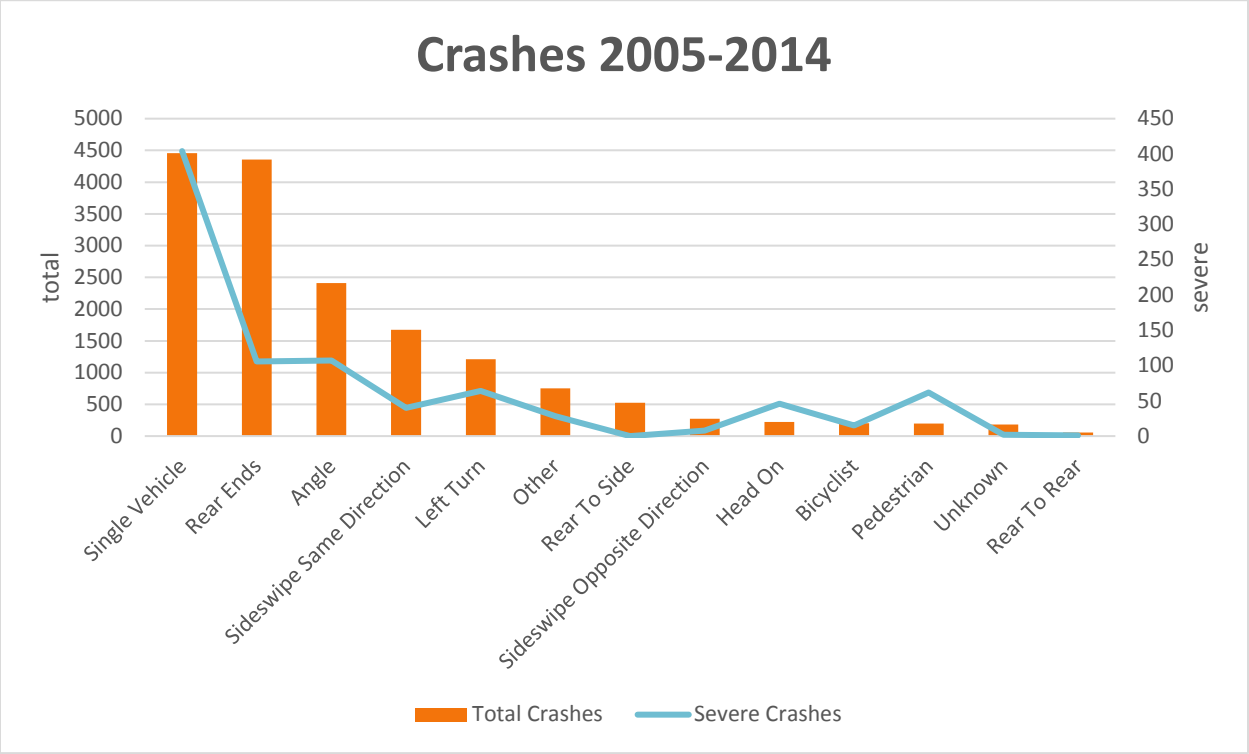


Figure 4-13: Crashes by Collision Manner



The roadways with the highest number of fatal crashes are I-10, Florence Boulevard/SR 287, and I-8, as shown in Table 4-1.

Table 4-1: Corridors with Highest Number of Fatal Crashes

Corridor	Fatal
Interstate 10	89
Florence Blvd/SR 287	22
Interstate 8	9
State Route 87	8
Pinal Ave/SR 387	7
Maricopa Casa Grande Hwy	5

The maps in Figure 4-14 through Figure 4-22 show locations of all crashes, fatal and serious injury crashes, and pedestrian and bicyclist crashes.

Figure 4-14: Crash Locations – All Crashes – Casa Grande

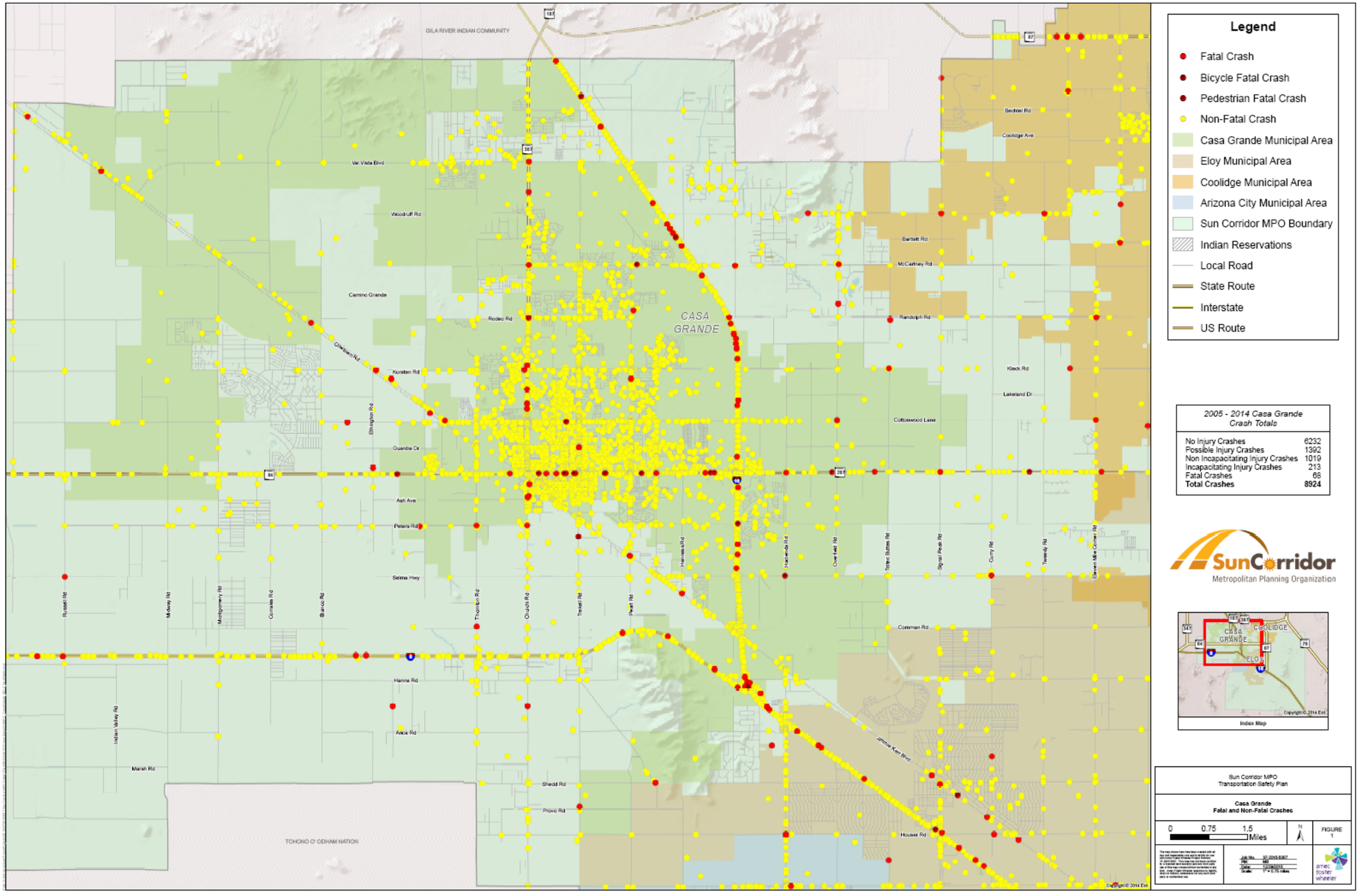


Figure 4-15: Crash Locations – All Crashes – Coolidge

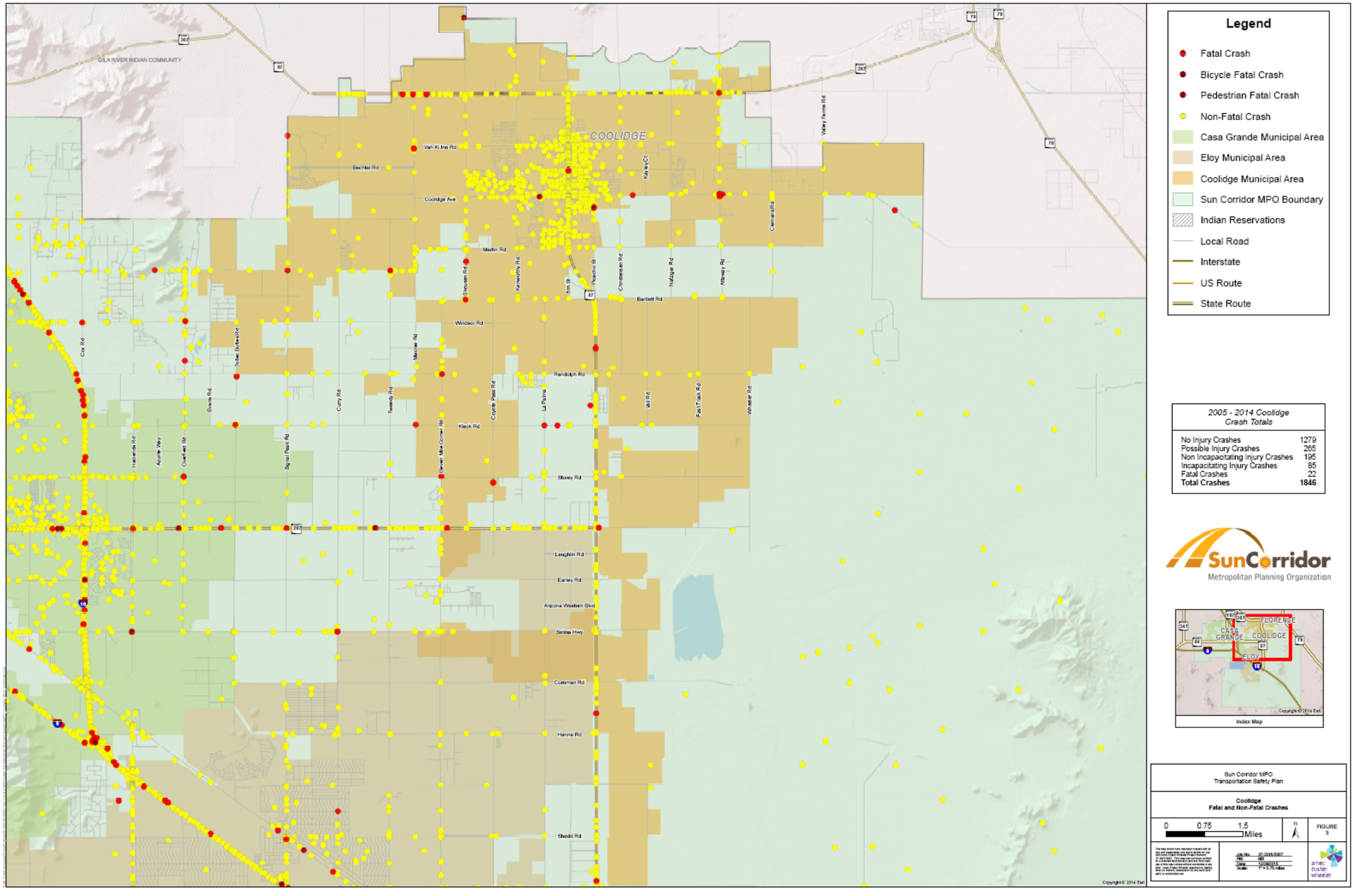


Figure 4-16: Crash Locations – All Crashes – Eloy

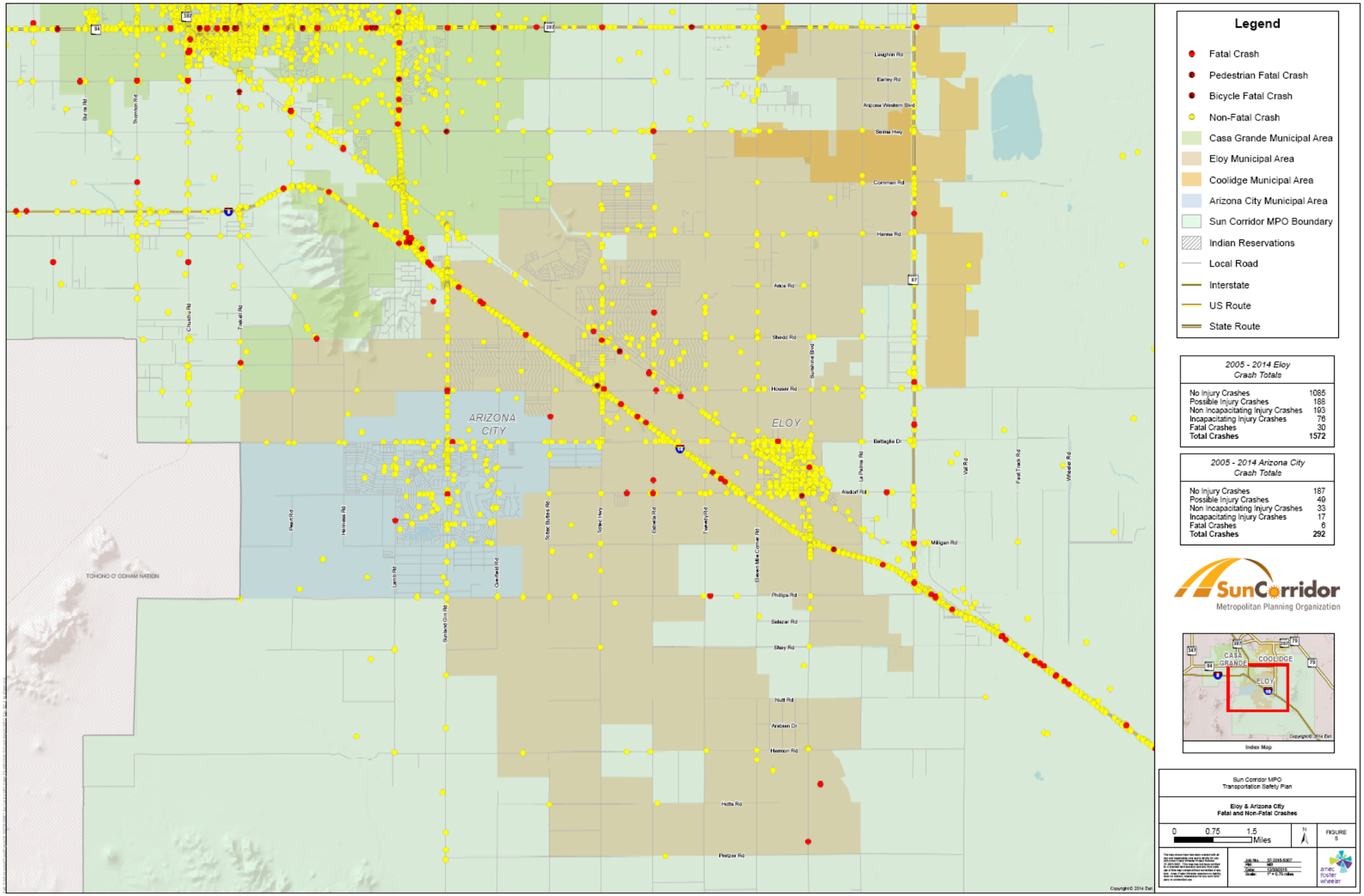


Figure 4-17: Crash Locations – Fatal and Serious Injury Crashes – Casa Grande

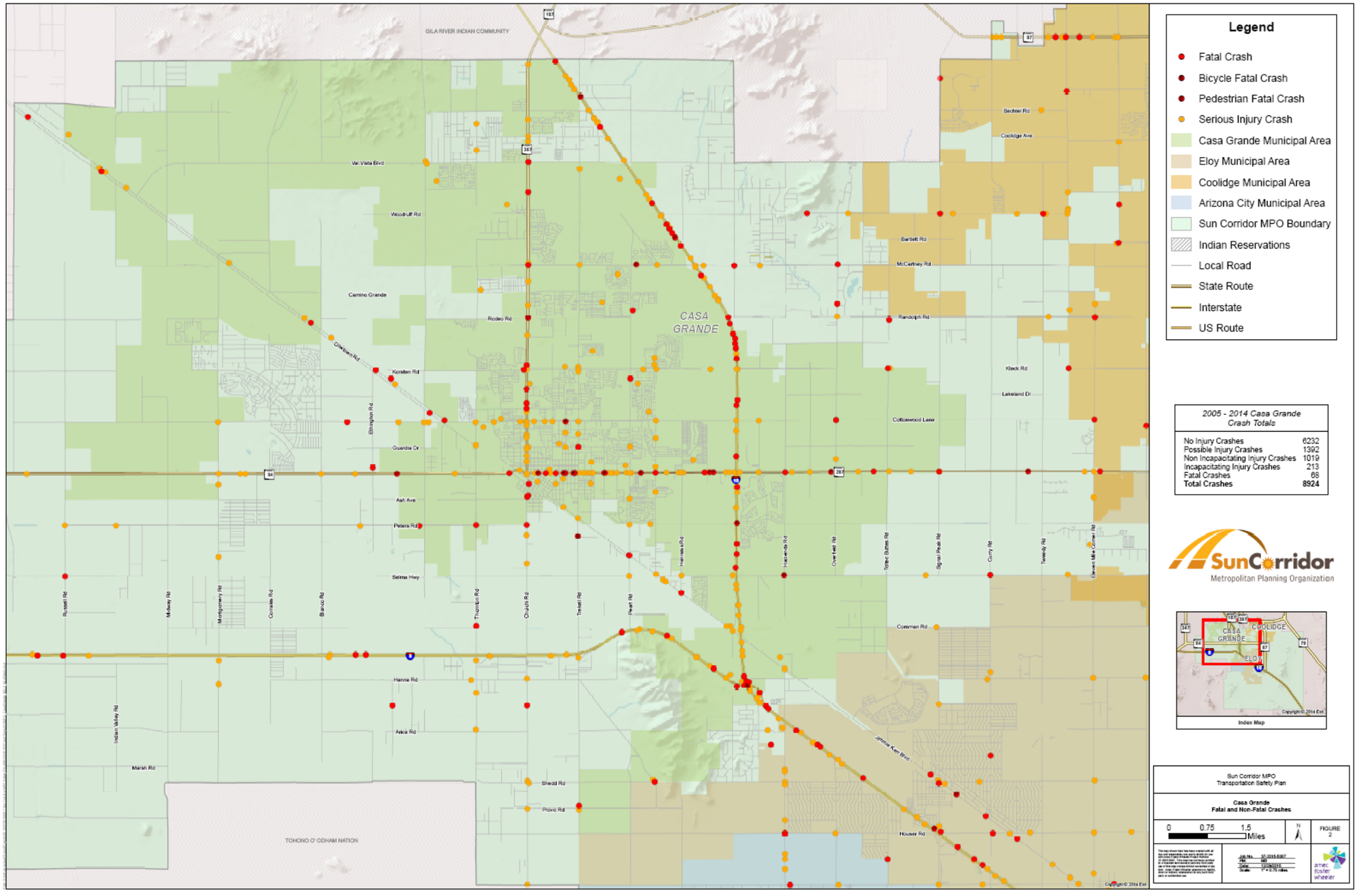


Figure 4-18: Crash Locations – Fatal and Serious Injury Crashes – Coolidge

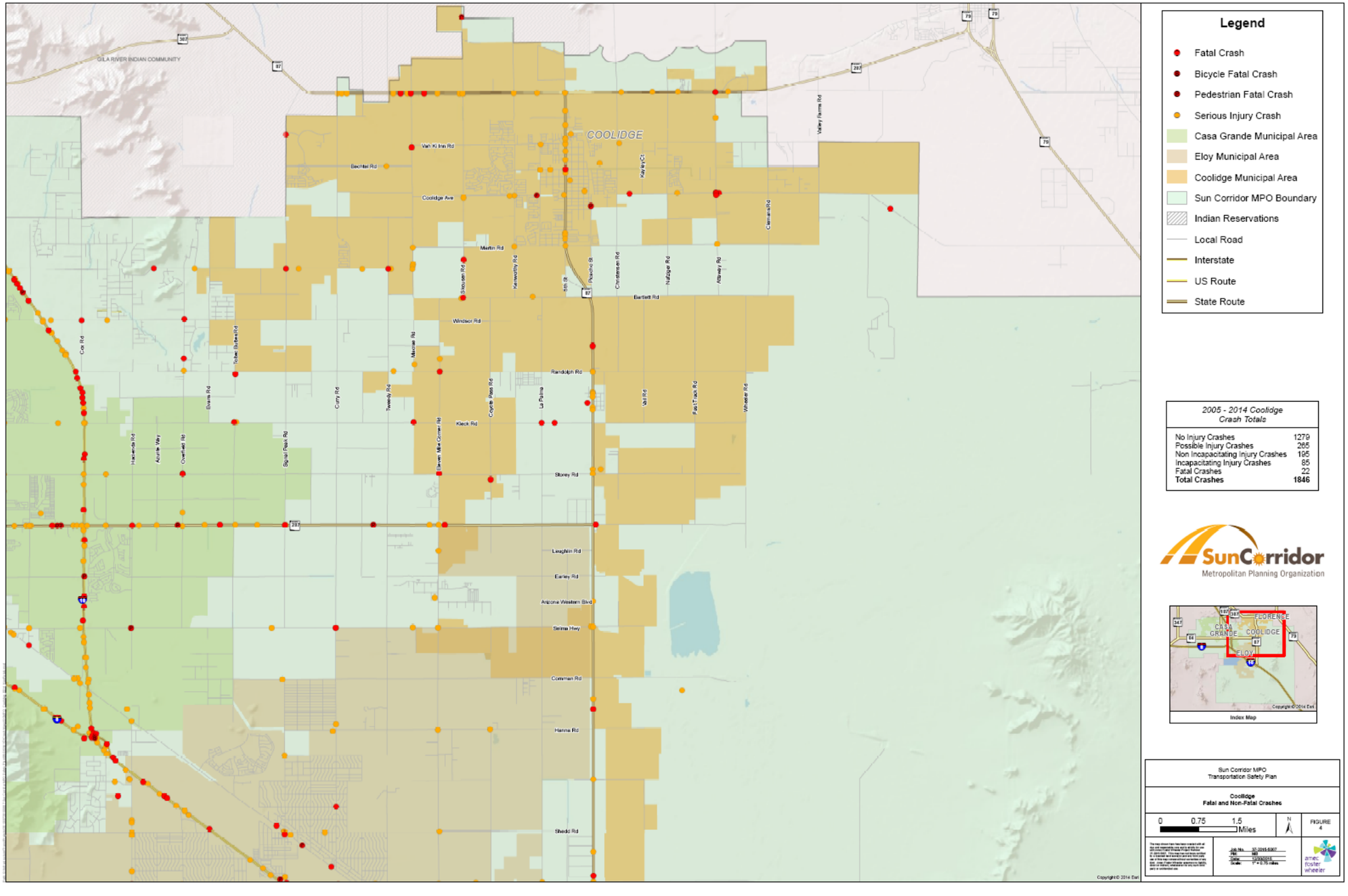


Figure 4-19: Crash Locations – Fatal and Serious Injury Crashes – Eloy

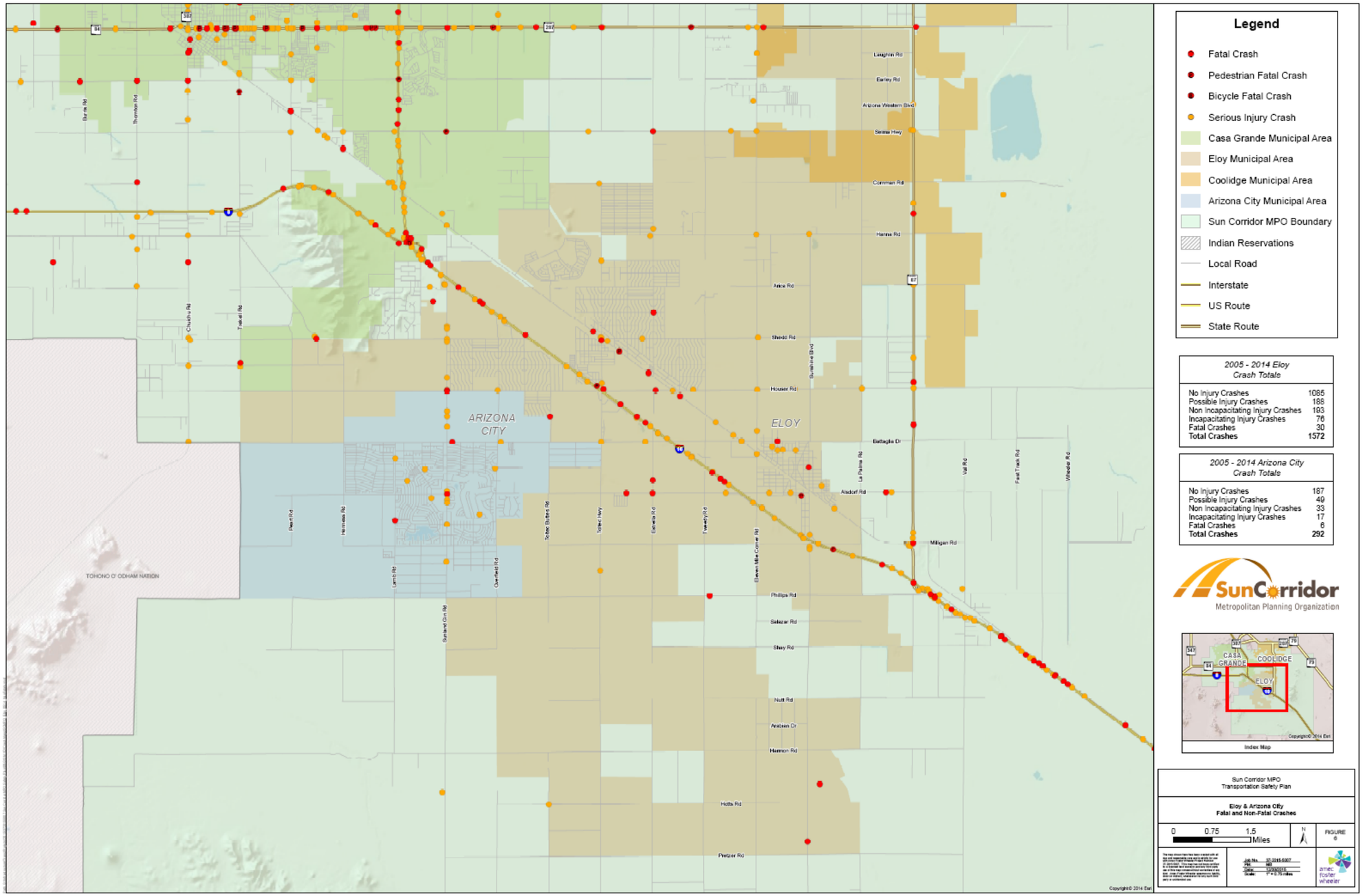


Figure 4-20: Crash Locations – Bike and Pedestrian Fatal and Serious Injuries – Casa Grande

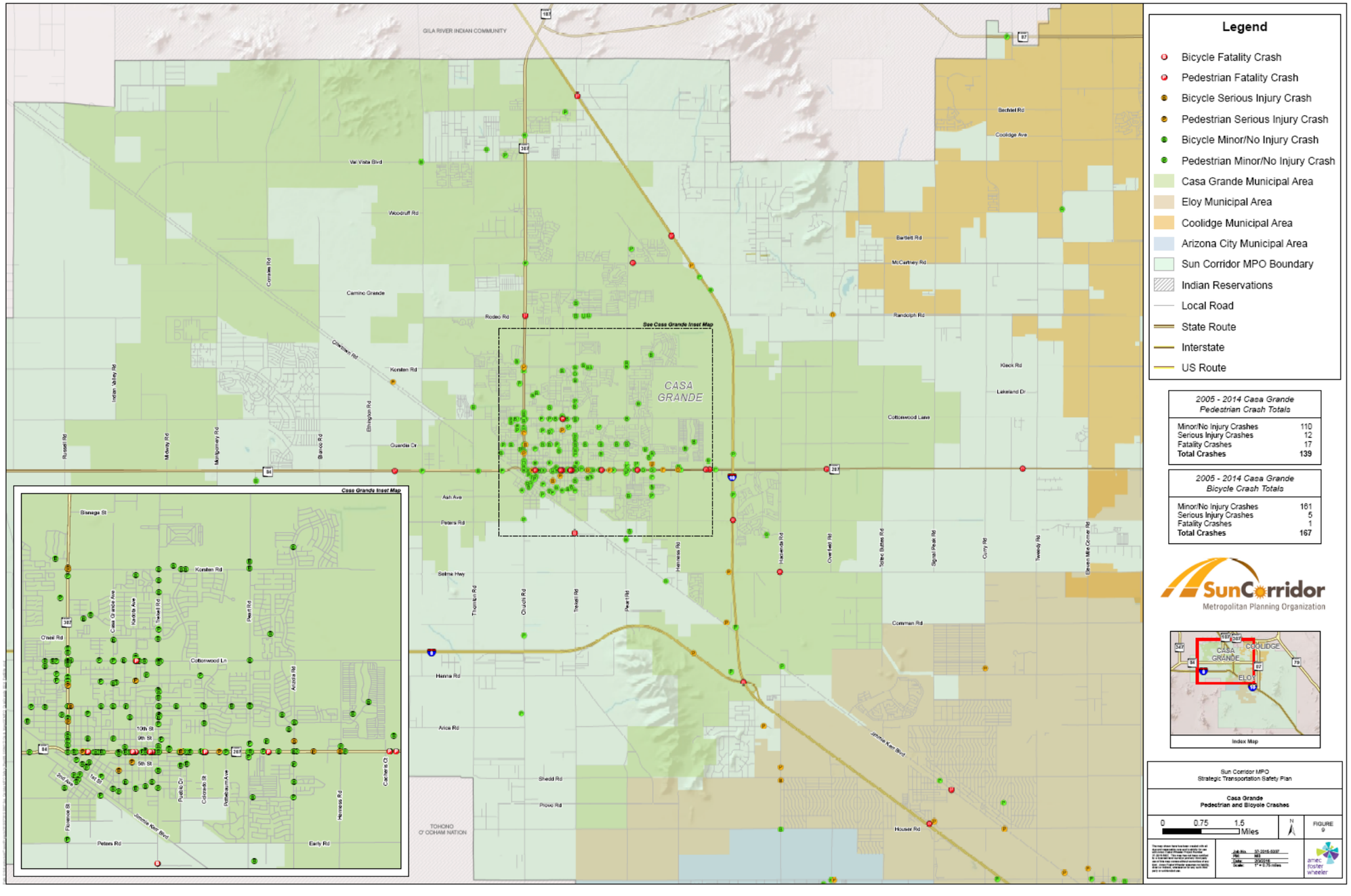


Figure 4-21: Crash Locations – Bike and Pedestrian Fatal and Serious Injuries – Coolidge

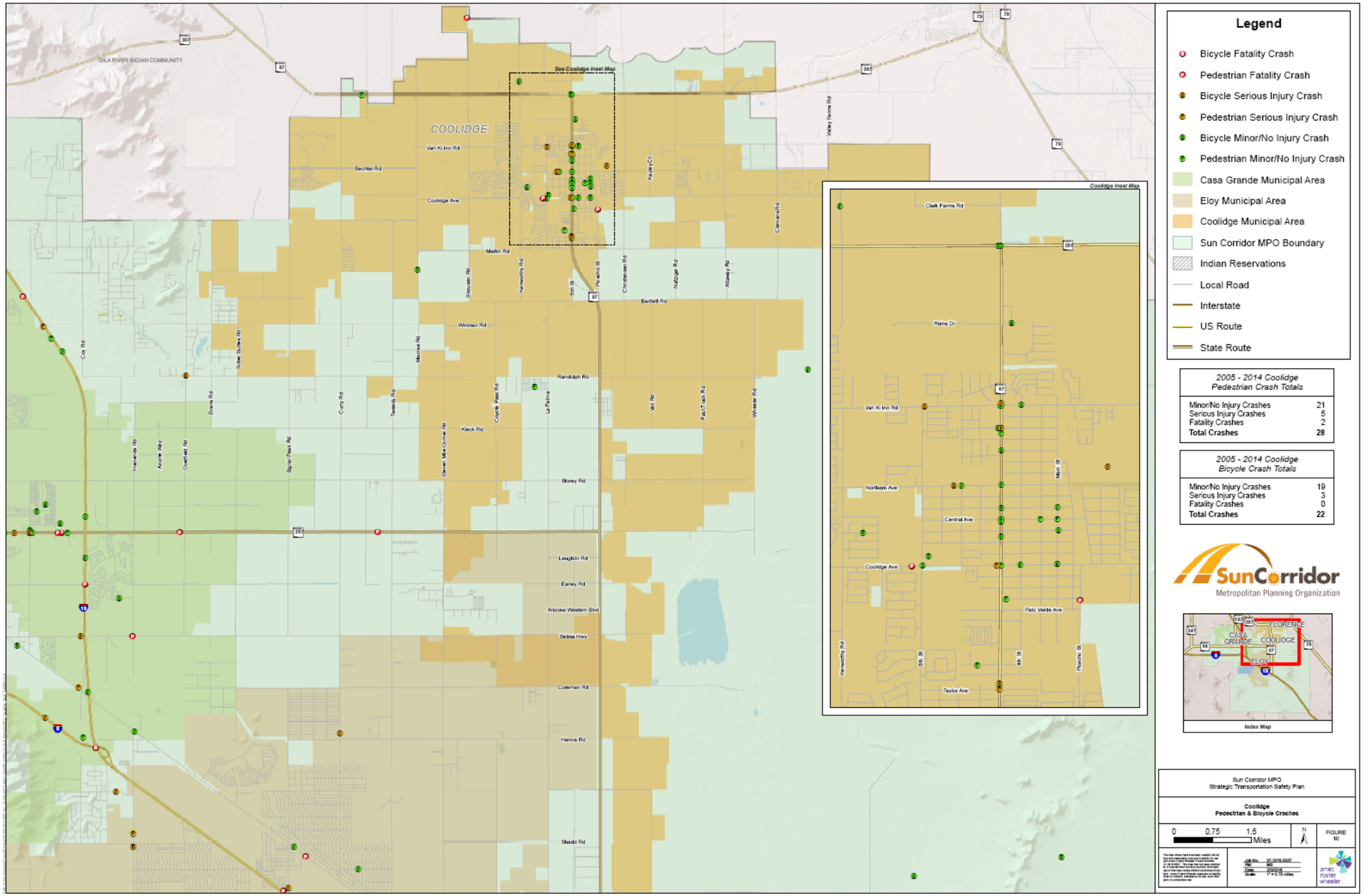
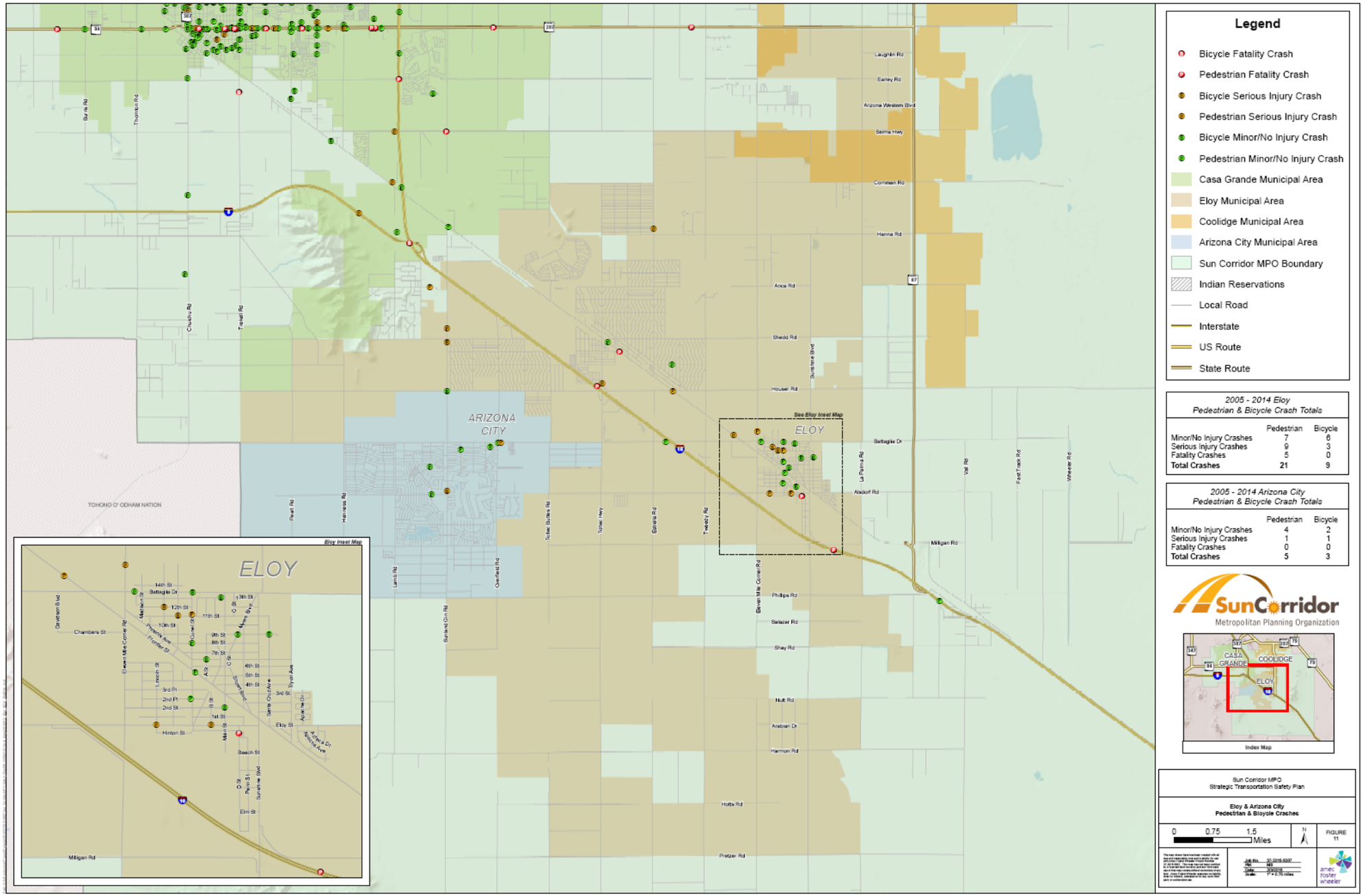


Figure 4-22: Crash Locations – Bike and Pedestrian Fatal and Serious Injuries – Eloy



5 FUNDING AND SAFETY RESOURCES

5.1 FUNDING RESOURCES

The Highway Safety Improvement Program (HSIP) is a core federal aid program administered by ADOT with Federal Highway Administration (FHWA) oversight. The goal of the program is to achieve a significant reduction in traffic fatalities and serious injuries on all public roads. The HSIP requires a data-driven, strategic approach to improving highway safety on all public roads that focuses on performance. The federal legislation states that "a highway safety improvement project is any strategy, activity, or project on a public road that is consistent with the data-driven State Strategic Highway Safety Plan (SHSP) and corrects or improves a hazardous road location or feature or addresses a highway safety problem." Candidate projects submitted by local agencies for HSIP funding can address spot locations or systemic treatments. Potential projects are prioritized based on Benefit/Cost ratio, potential crash reduction for fatal and incapacitating injury crashes, and connection with the state's SHSP emphasis areas.

Currently, local agencies can use HSIP applications to pursue both the SCMPO regional apportionment and the ADOT statewide HSIP apportionment to develop safety projects. Arizona HSIP funds are approximately $42,000,000 annually and the SCMPO sub-allocation is approximately $493,000 per year. Beginning in fiscal year 2019, sub-allocations to COGs and MPOs will be discontinued, and all agencies will compete for the statewide HSIP funds. This STSP will position SCMPO and its member agencies to better compete for the statewide HSIP funds by identifying and justifying safety projects through a data-driven process. HSIP funding can only be used for infrastructure projects and some safety studies; with passage of the Fixing America's Surface Transportation (FAST) Act, HSIP funds can no longer be used for non-infrastructure projects, e.g. education, enforcement, etc.

The FAST Act replaced the MAP-21 Transportation Alternatives Program (TAP) with a set-aside of Surface Transportation Block Grant (STBG) program funding for transportation alternatives. These set-aside funds include all projects and activities that were previously eligible under TAP, encompassing a variety of smaller-scale transportation projects such as pedestrian and bicycle facilities, recreational trails, and safe routes to school projects. For example, STBG funds could be used for installing a pedestrian hybrid beacon, or HAWK, at a pedestrian crossing experiencing pedestrian crashes. Approximately $7,000,000 in transportation alternatives funding is available annually in Arizona for local agencies (excluding MAG and PAG regions, which have an additional set-aside). STBG transportation alternatives funds are allocated through a statewide competitive process.

The Governor's Office of Highway Safety (GOHS) administers National Highway Traffic Safety Administration (NHTSA) funding through grant applications. Typical projects include law enforcement activities such as targeted DUI checkpoints and improvements to crash data collection. Local agencies have utilized GOHS funding to purchase portable speed feedback trailers to rotate placement on streets experiencing speed-related crashes. GOHS funds have also been used in educational efforts, for example, to conduct mock crash demonstrations at high schools during prom season. Annual funding available through GOHS is approximately $8,000,000 in Arizona.

The ADOT Railroad-Highway Grade Crossing Program administers approximately $2,300,000 annually for improving safety at public railroad crossings. A diagnostic review team consisting of representatives from

ADOT, the Arizona Corporation Commission, FHWA, the Railroad and the Road Sponsor (State, City, County, or Tribe) evaluates the identified railroad crossings through an on-site diagnostic review, developing a list of potential projects.

The High Risk Rural Road (HRRR) funding set-aside was eliminated in the 2012 Moving Ahead for Progress in the 21st Century Act (MAP-21) federal legislation. That set-aside has been replaced with a Special Rule that requires states with an increase in fatality rates on rural roads to obligate 200% of the state's 2009 HRRR funding amount, which was $1,800,000 in Arizona, meaning $3,600,000 of HSIP funds would be required to be used on HRRRs. The use of HRRR-related HSIP funding would become an option for the SCMPO member agencies if Arizona was found to have an increase in fatalities on rural roads over the most recent two years.

5.2 Traffic Safety Programs

Several local and state safety programs are available to SCMPO and its member agencies. The following programs are intended to be a resource to allow collaboration among the various agencies across the region regarding safety strategies.

Arizona Bicycle and Pedestrian Program

ADOT maintains a website dedicated to providing bicycling and walking information. Resources such as maps, safety tips, organizations/programs, commuting information, walking and biking to school resources, as well as the Statewide Bicycle and Pedestrian Plan, are included at this website. More information can be found at the ADOT Bicycle and Pedestrian Program webpage (http://www.azbikeped.org/).

Arizona Road Safety Assessment Program

ADOT manages the Arizona Road Safety Assessment (RSA) Program, a free service to public agencies in Arizona. An RSA is a formal examination of user safety of a roadway by an independent multidisciplinary audit team. The RSA team identifies safety issues and appropriate countermeasures for the specific location. (https://www.azdot.gov/business/engineering-and-construction/traffic/traffic-safety/road-safety-assessments).

Arizona Strategic Highway Safety Plan

The Arizona Strategic Highway Safety Plan (SHSP) was developed through a data-driven, collaborative approach among Arizona's safety stakeholders. The SHSP represents the Arizona state safety goal statement and identifies the Emphasis Areas that the state will focus on to achieve its goal. The SHSP is an overarching strategic statewide safety document to guide safety planning and programming processes; facilitate implementation of recommended safety strategies and action steps or countermeasures through existing plans and programs; and modify current planning processes over time to adopt and institutionalize a change in Arizona's transportation safety culture. The plan can be accessed through the Arizona SHSP webpage (https://azdot.gov/about/transportation-safety/arizona-strategic-highway-safety-plan).

Sun Corridor MPO Regional Transportation Plan 2040: Creating Connectivity

The Regional Transportation Plan (RTP) identifies an investment strategy and a project selection and prioritization process to guide how federal funds are spent on transportation improvements within the region. Recommendations from the STSP will be referenced as part of the RTP. The RTP can be located on the SCMPO webpage (http://scmpo.org/test/regional-transportation-plan/).

6 REGIONAL VISION AND GOAL

The Federal Highway Administration (FHWA) has adopted the vision "Towards Zero Deaths" with the goal of zero fatalities across the nation's highway system. In its 2014 Strategic Highway Safety Plan (SHSP), the state of Arizona has adopted this vision to be "Toward Zero Deaths by Reducing Crashes for a Safer Arizona", with a goal to reduce fatalities and serious injuries by 3-7% over the next 5 years (2014-2018).

The SCMPO STSP safety vision and goal were developed based on input from the SCMPO Technical Advisory Committee (TAC) and stakeholders attending the September 16, 2015 STSP workshop and to be consistent with the vision and goal in the Arizona SHSP.

The safety ***vision*** for the SCMPO region is,

> "***Reduce fatal and serious injury crashes through implementation of effective safety strategies and countermeasures***"

The regional ***goal*** for traffic safety is,

> "***Reduce the number of fatalities and serious injuries in the Sun Corridor MPO region by 3 to 7 percent during the next 5 years***"

7 EMPHASIS AREAS AND SAFETY STRATEGIES

7.1 EMPHASIS AREAS

In the 2014 Arizona SHSP, 12 emphasis areas were chosen to improve road and highway safety, with five "top focus" emphasis areas considered to be top priority due to the high contribution to fatalities and serious injuries statewide. The five top focus emphasis areas are: 1) Speeding and Aggressive Driving, 2) Impaired Driving (alcohol, drugs, medication, illness, fatigue, and physical impairment), 3) Occupant Protection (seat belts, child safety seats, and helmets), 4) Motorcycles, and 5) Distracted Driving.

The remainder of the 12 emphasis areas are: 6) Roadways Infrastructure and Operations (Lane/Roadway Departure, Intersections/Railroad Crossings), 7) Age Related (Young – Under 25, Older – Over 64), 8) Heavy Vehicles/Buses/Transit, 9) Non-Motorized Users (Pedestrians, Bicyclists), 10) Natural Risks (Weather, Animals), 11) Traffic Incident Management, and 12) Interjurisdictional. The support areas are Data Improvements, which includes improving and sharing safety data, and Policy Initiatives, which includes providing direction on proposed changes to policies, procedures, or laws.

Using these statewide emphasis areas as a framework to identify potential emphasis areas for the SCMPO region, crash data was analyzed for each emphasis area in the Arizona SHSP. From the analysis, emphasis

areas that contributed significantly to the total number of crashes or fatal crashes, or were comparable to the statewide fatal crashes, were considered as an emphasis area for the region. Table 7-1 shows the emphasis areas chosen for the SCMPO region. The region fully supports all of the emphasis areas in the Arizona SHSP, including those not selected as emphasis areas for this plan.

Table 7-1: SCMPO Region Emphasis Areas

Emphasis Areas	SCMPO Fatal Crashes	Statewide Fatal Crashes
Lane Departure	64%	53%
Occupant Protection	53%	49%
Speeding	40%	38%
Impaired Driving	38%	34%
Young Drivers	21%	30%
Intersections	19%	23%
Older Drivers	17%	15%
Distracted Driving	16%	15%
Pedestrians	11%	15%
Weather-Related	5%	4%

7.2 Safety Strategies

Several potential strategies to improve the safety performance of the Emphasis Areas are listed below. The list is not comprehensive, but is provided as a toolbox of ideas that project owners may draw from when considering safety improvements.

7.2.1 Lane Departure

- Engineering (Design/Implementation)
  - Use traffic control devices to better delineate the edge of the roadway (e.g. signs, RPMs, edgelines, rumble strips)
  - Construct roadway infrastructure improvements (e.g. paved/graded shoulders, gradual side slopes, Safety Edge, etc.)
- Education
  - Increase public education on corrective roadway departure driving techniques

7.2.2 Occupant Protection

- Enforcement
  - Conduct high-visibility, saturated seat belt enforcement campaigns
- Education
  - Conduct seat belt education events for children
  - Provide child protection seat distribution programs coupled with high-profile inspection events/clinics utilizing certified child protection seat technicians
  - Train law-enforcement personnel to check for proper child restraint use during all motorist encounters

7.2.3 Speeding

- Enforcement
  - Targeted enforcement in school zones and locations with speeding related crashes
- Engineering
  - Install speed feedback signs
  - Install traffic calming to reduce speeds (e.g. speed humps, road diets, curb bulbouts)
- Education
  - Launch NHTSA's "5 To Drive" campaign in area schools

7.2.4 Impaired Driving

- Engineering (Design/Implementation)
  - Implement wrong-way detection systems to reduce wrong-way crashes on freeways
- Education
  - Improve public awareness of and access to alternate forms of transportation
  - Partner with employers to suggest policies and procedures aimed at reducing impaired driving by their employees
  - Develop materials for educating target groups for impaired driving including mass-media campaigns on DUI dangers and penalties
  - Utilize Dynamic Message Signs for impaired driving educational messages
- Enforcement
  - Conduct high visibility DUI saturation patrols
  - Promote policies and practices that result in the imposition of meaningful penalties for impaired-driving convictions

7.2.5 Young Drivers

- Engineering (Planning)
  - Promote technology which monitors young driver behavior
- Education
  - Identify best practices for promoting and/or implementing Safe Driving pledge campaigns
  - Strengthen driver education
  - Promote stronger parental/guardian education and engagement in the licensure process for young drivers
  - Enhance outreach campaigns to young drivers and their families about safe driving behavior and programs, e.g. the Tucson Police Department's START (Safe Teen Accident Reduction Training) Program
  - Develop public relations campaigns highlighting the risks of distracted driving
  - Promote insurance and other incentives for safe driving
  - Conduct mock crash demonstrations for high school students

7.2.6 Intersections

- Engineering (Planning/Policy)
  - Identify practices or standards that integrate safety into planning and design
  - Conduct Road Safety Assessments (RSAs) at high risk locations
  - Implement systemic improvements based on identifying characteristics of high risk intersections

- Engineering (Design/Implementation)
    - Improve intersection geometry
    - Install roundabouts where feasible
    - Evaluate and improve sight distance
    - Evaluate signal phasing for improvements
    - Provide/improve intersection lighting
- Enforcement
    - Conduct targeted enforcement of high crash risk intersections
    - Implement speeding and red light running enforcement efforts
- EMS
    - Implement emergency vehicle preemption at signalized intersections

7.2.7 Older Drivers

- Engineering (Design/Implementation)
    - improve visibility of traffic control devices
- Education
    - increase awareness about and availability of alternative transportation options
    - promote insurance and other incentives for safe driving
    - initiate a safe driving campaign for elderly drivers (including seasonal residents)
- Enforcement
    - support efforts to require more frequent testing (vision, medical) of older drivers for license renewals
    - Implement local ordinances banning texting while driving

7.2.8 Distracted Driving

- Education
    - Initiate/strengthen distracted driving school campaigns
- Enforcement
    - Implement local ordinances banning texting while driving

7.2.9 Pedestrians

- Engineering (Planning/Policy):
    - encourage submittal of TIP projects that include safety elements for all modes by including safety as an explicit project evaluation criteria
    - promote the use of “best practices” that integrate safety analysis and design throughout the planning process
    - identify high risk locations for potential implementation of enhanced pedestrian crossings
    - develop and implement a Complete Streets program
    - develop a system to evaluate whether certain midblock and/or multi-lane uncontrolled crosswalks should remain, be improved, or be removed
    - Develop an ADA Transition Plan
- Engineering (Design/Implementation)
    - Evaluate and install controlled pedestrian crossings
    - Install medians and pedestrian crossing islands
    - Provide sidewalks, multi-use paths, and/or marked crosswalks

    - Improve sight distance and/or visibility between motor vehicles and pedestrians
    - Utilize the Safe Routes to School program
    - Provide street lighting at uncontrolled arterial crosswalks
- Education
    - Develop/maintain training and public information pedestrian safety campaigns
    - Increase pedestrian safety education for all roadway users
    - Promote the use of pedestrian safety lights

7.2.10 Weather-Related

- Education
    - Education campaigns, public service announcements, etc. on driving techniques during weather events such as dust storms
- Engineering
    - Signage about weather conditions

8 NETWORK SCREENING AND SAFETY NEEDS PRIORITIZATION

Network screening of a roadway system is the data-driven analysis of the intersections and segments within the system. The process utilizes spatial analysis of crash data and is performed in order to determine high priority locations that may require safety improvements. Crashes are spatially attributed to individual intersections and segments in order to facilitate network analysis.

The goal of network screening is to develop a list of specific sites, for example, signalized intersections, that are ranked by priority. Priority is typically developed from crash frequency, rate, and severity, but other crash factors can be incorporated into the analysis as appropriate. This priority list is then used to plan and implement safety projects at individual locations or at the system-wide level. The list can also serve as a resource for local governments when applying for state or federal traffic safety funding.

A Priority Index (PI) ranking was used to screen intersections and a combination of PI ranking and sliding window analysis was used to screen segments. The PI ranking system has been used successfully in Arizona by the Pima County DOT, Pima Association of Governments (PAG), and Yuma MPO to identify high-risk locations and is recommended for use by the SCMPO based on:

- Minimal data requirements (traffic volumes and crash frequency and severity)
- Reliability in identifying high-risk locations
- Flexibility (agencies can adjust the importance of the 3 crash factors used to calculate the PI)

The PI rankings developed for this STSP gave equal weighting to crash frequency, crash severity, and crash rate.

8.1 INTERSECTION PRIORITY INDEX RANKING

The resulting lists of signalized and unsignalized intersections are intended to provide SCMPO with a guideline in determining locations that may require a closer examination for safety improvements. Individual priority ranking lists were developed for signalized and unsignalized intersections. Traffic volumes were assigned to intersections using the ADOT and SCMPO Transportation Data Management

System databases. The top 20 signalized intersection priority ranking is shown in Table 8-1. The top 20 unsignalized intersection priority ranking is shown in Table 8-2. Following are explanations of the values in each column:

- ADT – average daily traffic volume, in vehicles per day, entering the intersection
- Crash Freq. – number of crashes at the intersection in 10 years (2005-2014)
- Crash Rate – crashes per million vehicles entering the intersection
- Severity Index – score assigned to intersection based on the severity of crashes at the intersection
- PI Rank – Priority Index rank based on combination of crash frequency, crash rate, and severity index

Table 8-1: Top 20 Signalized Intersections

Intersection	Owner	ADT	Crash Freq.	Crash Rate	Severity Index	PI Rank
Trekell Rd & Cottonwood Ln	Casa Grande	33230	201	1.66	1.43	1
Attaway Rd & SR 287 (Florence-Coolidge Hwy)	Coolidge	13190	78	1.62	1.71	2
Colorado St & SR 287 (Florence Blvd)	Casa Grande	30184	212	1.92	1.36	3
Peart Rd & SR 287 (Florence Blvd)	Casa Grande	36165	277	2.10	1.32	4
SR 387 (Pinal Ave) & Cottonwood Ln	ADOT	29722	212	1.95	1.33	5
SR 387 (Pinal Ave) & Val Vista Blvd	ADOT	30674	104	0.93	1.72	6
Arizola Rd & SR 287 (Florence Blvd)	Casa Grande	32478	254	2.14	1.27	7
Trekell Rd & McMurray Blvd	Casa Grande	21015	89	1.16	1.48	8
SR 387 (Pinal Ave) & Kortsen Rd	ADOT	25384	128	1.38	1.36	9
Peart Rd & Cottonwood Ln	Casa Grande	26999	128	1.30	1.38	10
I-10 East (Exit 194) & SR 287 (Florence Blvd)	ADOT	32723	159	1.33	1.35	11
Trekell Rd & Kortsen Rd	Casa Grande	20119	81	1.10	1.45	12
Henness Rd & SR 287 (Florence Blvd)	Casa Grande	23649	80	0.93	1.54	13
Trekell Rd & SR 287 (Florence Blvd)	Casa Grande	31756	190	1.64	1.26	14
SR 387 (Pinal Ave) & Rodeo Rd	Casa Grande	24514	77	0.86	1.45	15
Sunland Gin Rd & I-10 East (Exit 200)	Eloy	21420	80	1.02	1.35	16
Olive Ave & SR 287 (Florence Blvd)	Casa Grande	27222	80	0.81	1.43	17
SR 87 & Vah Ki Inn Rd	Coolidge	18477	69	1.02	1.43	18
SR 387 (Pinal Ave) & SR 287 (Florence Blvd)	ADOT	21341	117	1.50	1.22	19
I-10 West (Exit 194) & SR 287 (Florence Blvd)	ADOT	24949	99	1.09	1.32	20

Table 8-2: Top 20 Unsignalized Intersections

Intersection	Owner	ADT	Crash Freq.	Crash Rate	Severity Index	PI Rank
Attaway Rd & Coolidge Ave	Coolidge	5642	23	1.12	2.14	1
Eleven Mile Corner Rd & Randolph Rd	Coolidge	3730	12	0.88	2.30	2
Skousen Rd & SR 87	Coolidge	18186	39	0.59	1.95	3
Battaglia Rd & Frontier St	Eloy	7192	26	0.99	1.72	4
Randolph Rd & SR 87	Coolidge	6834	20	0.80	2.07	5
Jimmie Kerr Blvd & Sunland Gin Rd	Casa Grande	11064	42	1.04	1.44	6
Hacienda Rd & SR 287 (Florence Blvd)	Casa Grande	12230	29	0.65	1.68	7
Battaglia Rd & Eleven Mile Corner Rd	Eloy	3772	22	1.60	1.50	8
SR 287 & SR 87	ADOT	11344	29	0.70	1.59	9
Martin Rd & SR 87	Coolidge	10541	24	0.62	1.53	10
Colorado St & McMurray Blvd	Casa Grande	11818	36	0.83	1.39	11
SR 84 & Stanfield Rd	ADOT/County	6241	26	1.14	1.35	12
Casa Grande Ave & Viola St	Casa Grande	4314	13	0.83	1.62	13
Eleven Mile Corner Rd & Frontier St	Eloy	6792	27	1.09	1.33	14
Signal Peak Rd & Woodruff Rd	County	7067	11	0.43	2.40	15
Frontier St & Main St	Eloy	7474	23	0.84	1.35	16
Jimmie Kerr Blvd & I-10 East Ramp	Casa Grande	11752	21	0.49	1.51	17
Main Ave & Thornton Rd	Casa Grande	7050	12	0.47	1.82	18
Eleven Mile Corner Rd & Selma Hwy	Coolidge	2781	6	0.59	2.47	19
9th St & Coolidge Ave	Coolidge	6078	14	0.63	1.43	20

8.2 SEGMENT PRIORITY INDEX RANKING

Priority Index values were generated for segments using a sliding window analysis. This analysis excluded intersection crashes to focus on crashes on just the segments. PI values were calculated for a segment length of 0.3 miles. This window is incrementally moved by 0.1 miles along each corridor. This is repeated until the entire road has been analyzed by 0.3 mile segments. The 0.3 mile long windows with the highest PI values are the segments identified as high crash risk locations. Results of the segment analysis are highlighted in Figure 8-1 through Figure 8.3.

8.3 DRIVER VIOLATION NETWORK SCREENING

Heat maps were created for major driver violations associated with crashes and crash severity for the cities of Casa Grande, Coolidge and Eloy. The violations included exceeding the lawful speed, speed too fast for conditions, impaired driving, and not wearing a seat belt. These heat maps, shown in Figure 8-4 through Figure 8-15, are useful for law enforcement to conduct targeted enforcement and education campaigns.

Figure 8-1: Priority Segments – Casa Grande

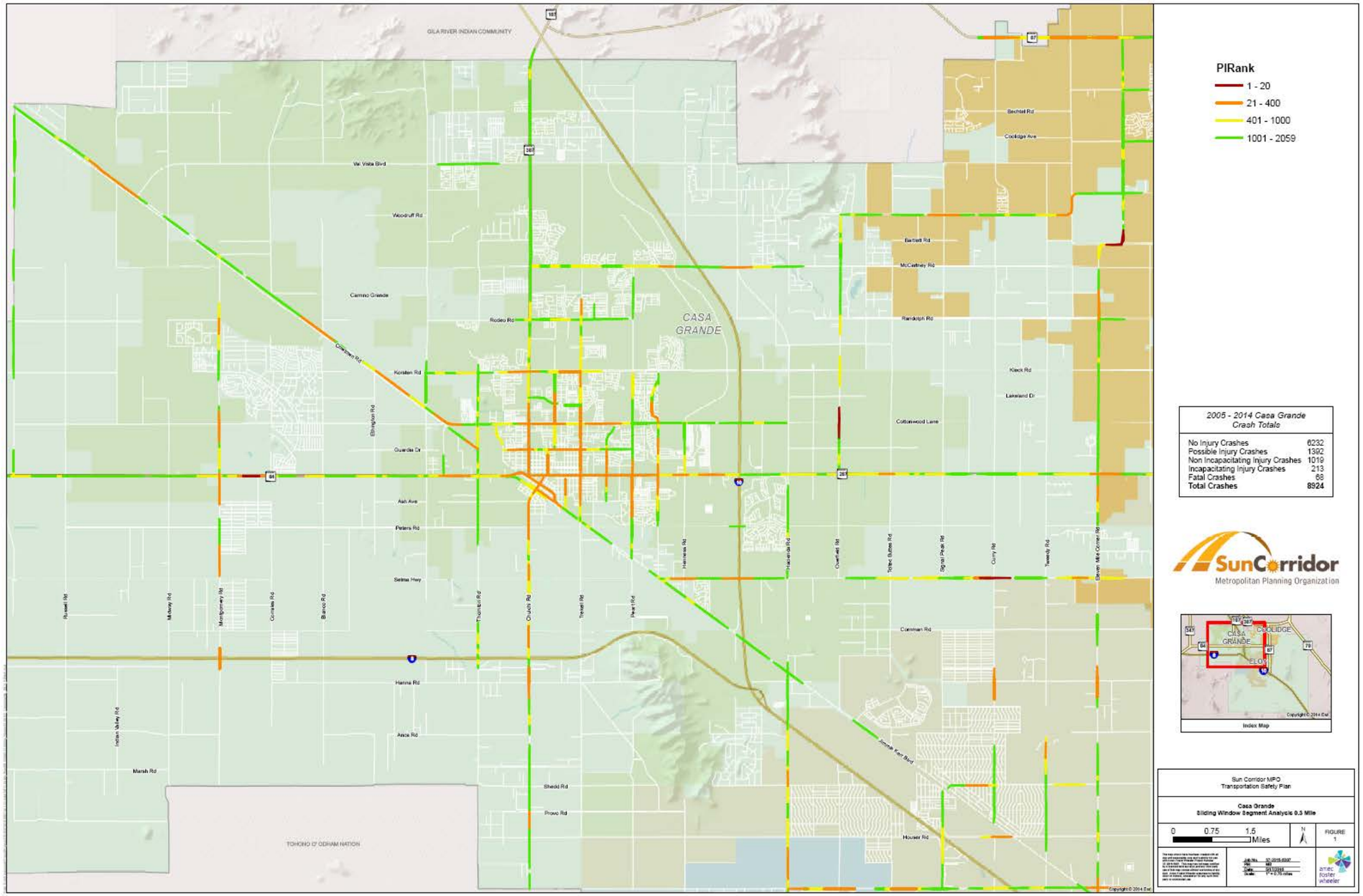


Figure 8-2: Priority Segments – Coolidge

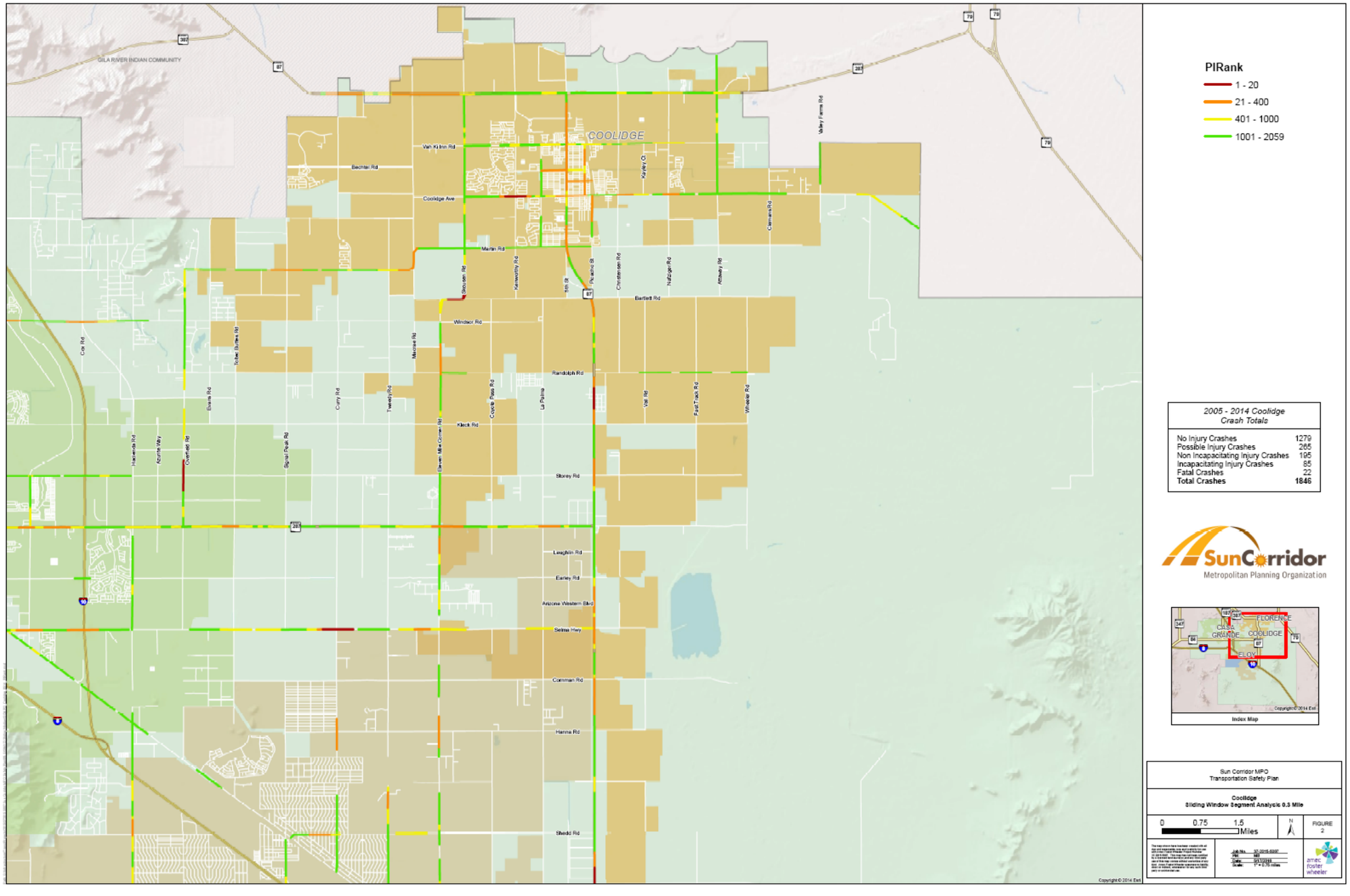


Figure 8-3: Priority Segments – Eloy

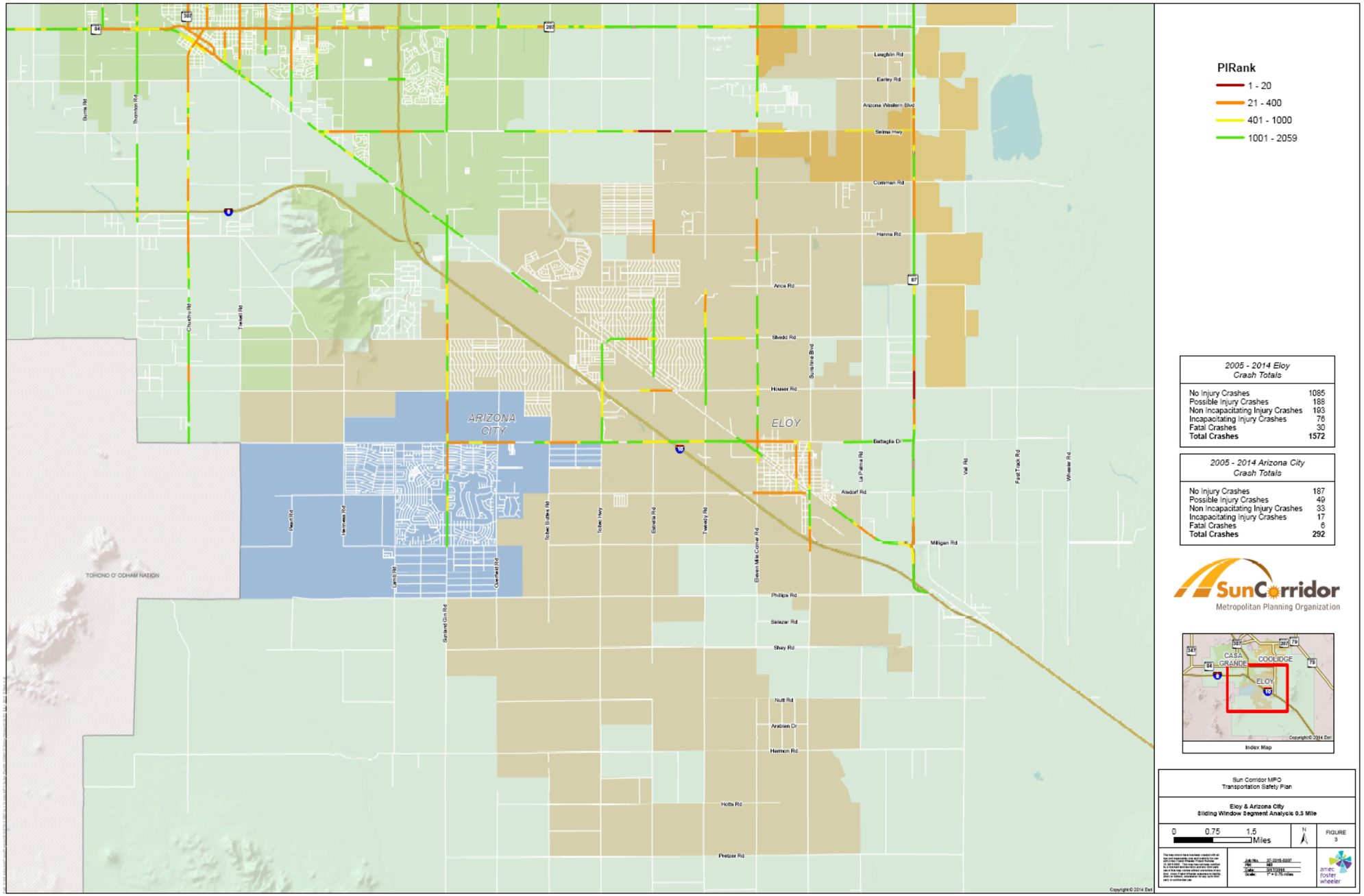


Figure 8-4: Unlawful Speeding Heat Map, Casa Grande

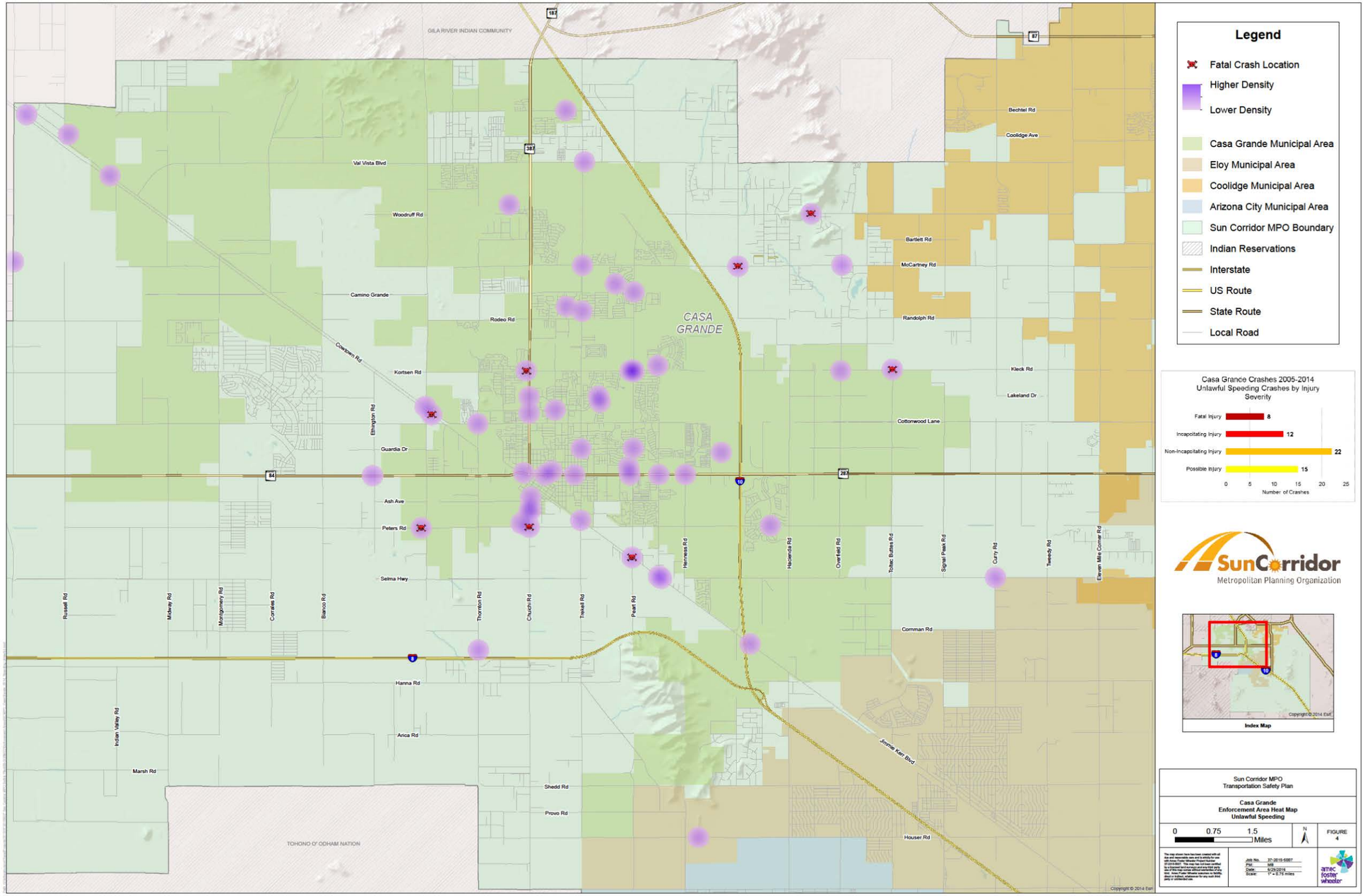


Figure 8-5: Unlawful Speeding Heat Map, Coolidge

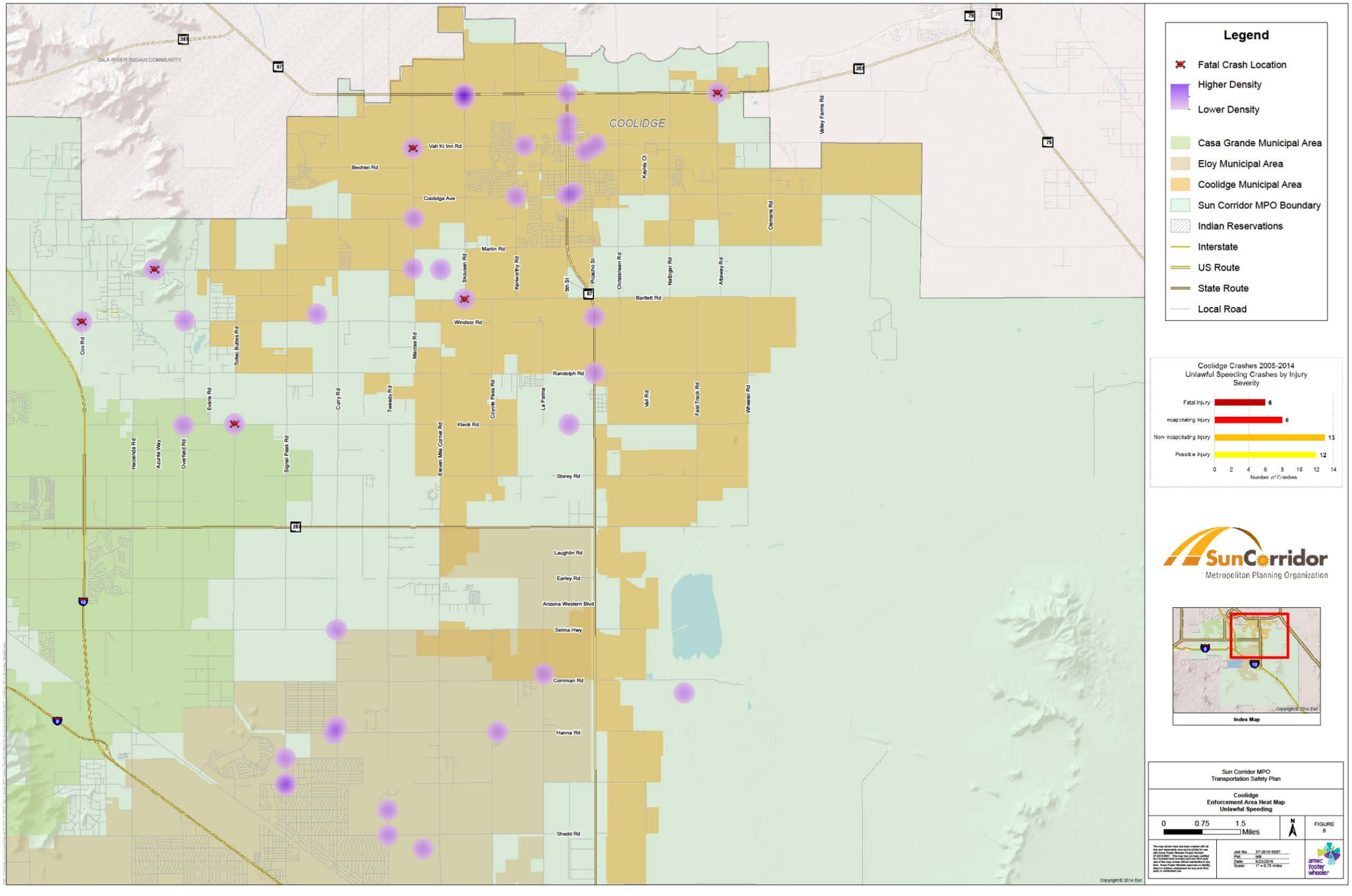


Figure 8-6: Unlawful Speeding Heat Map, Eloy

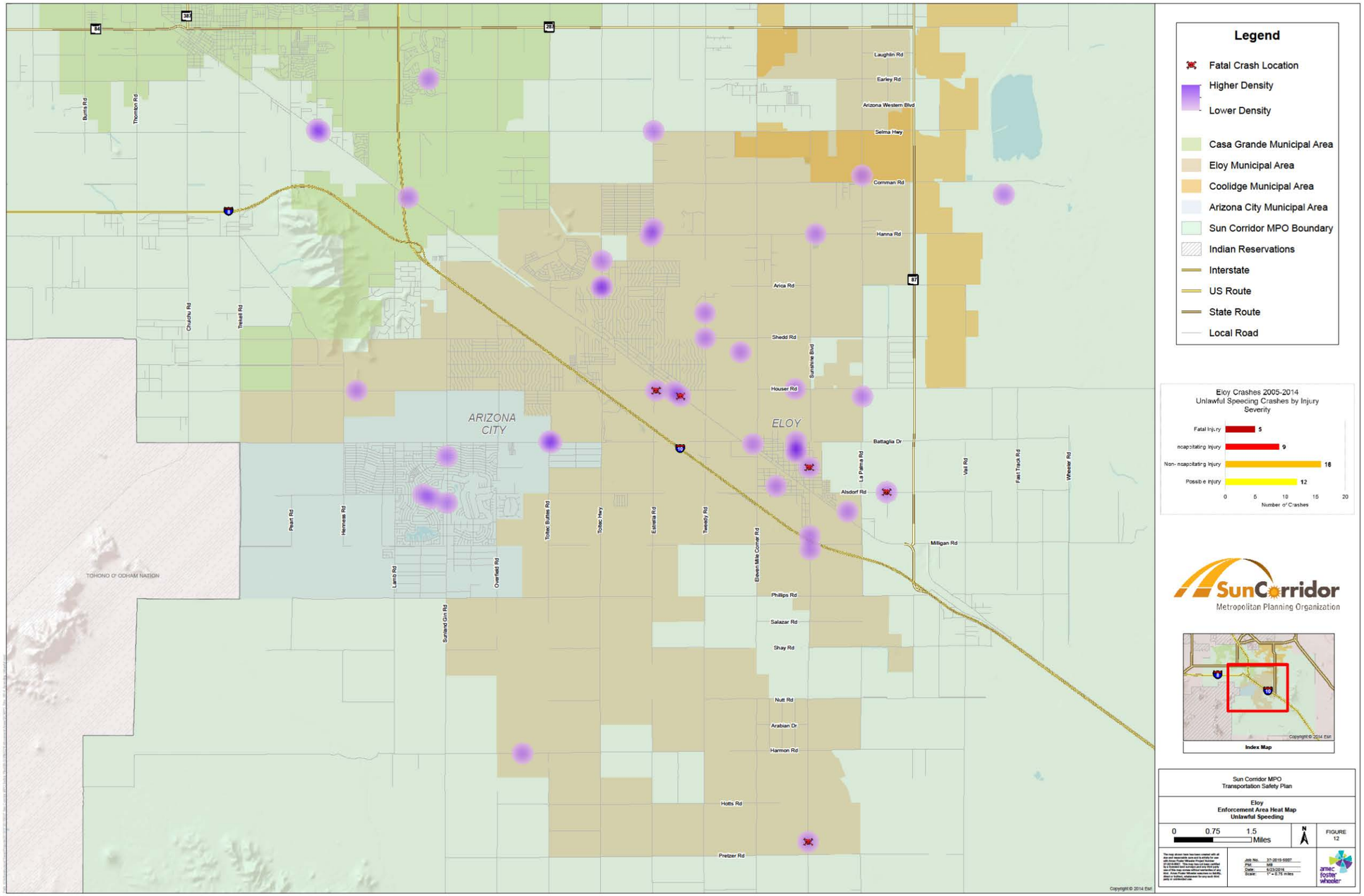


Figure 8-7: Speed too Fast for Condition Heat Map, Casa Grande

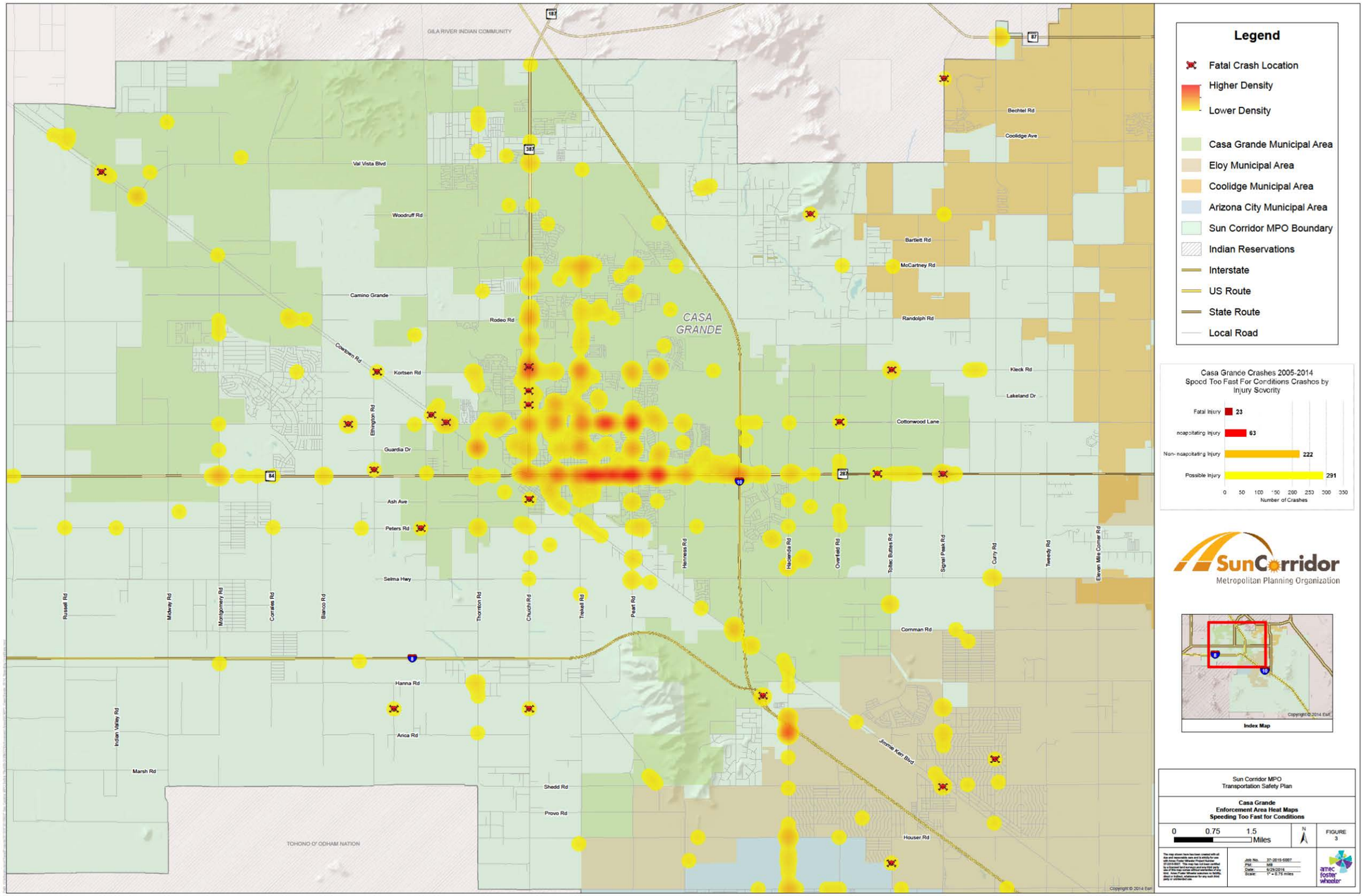


Figure 8-8: Speed too Fast for Condition Heat Map, Coolidge

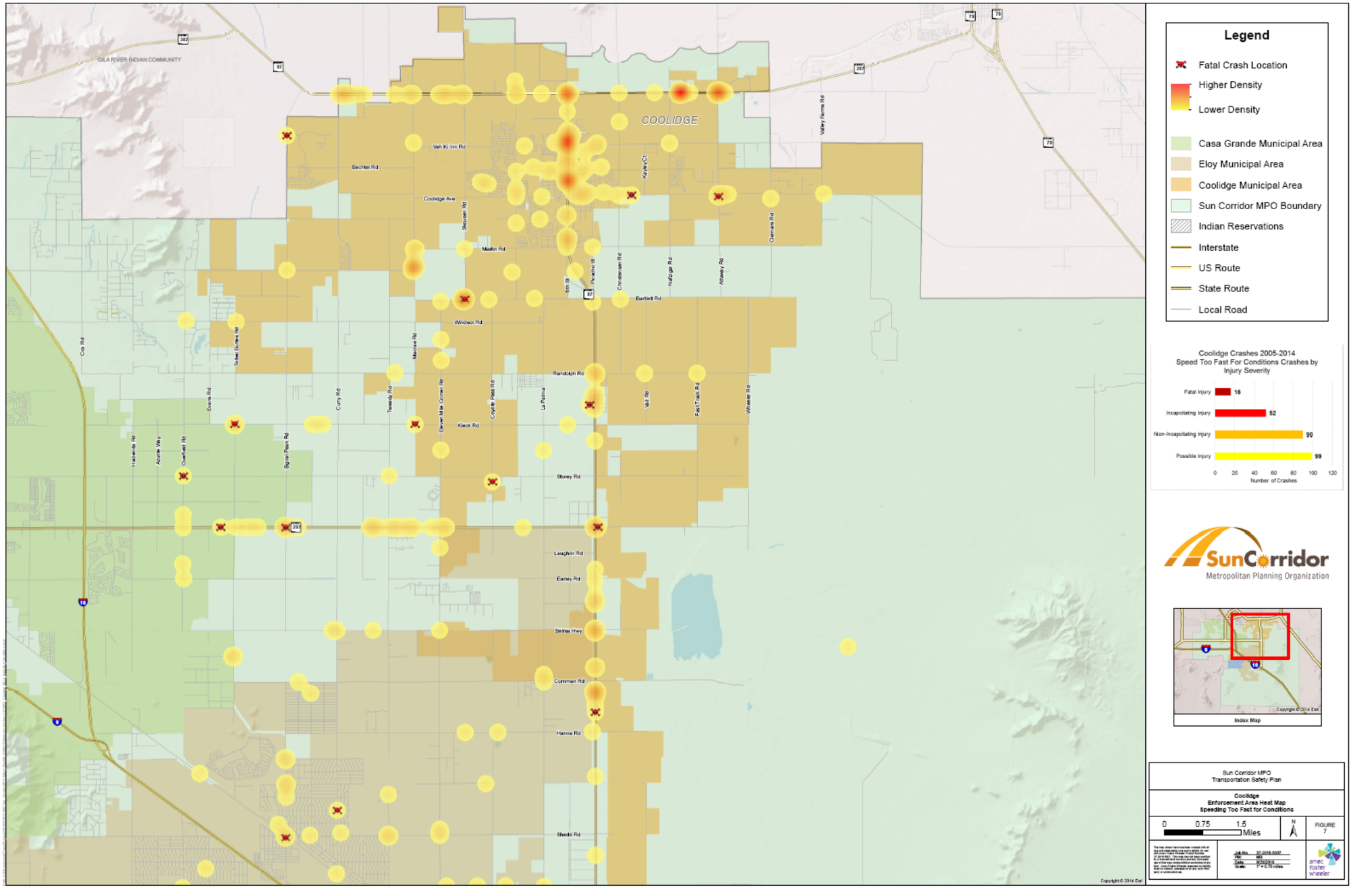


Figure 8-9: Speed too Fast for Condition Heat Map, Eloy

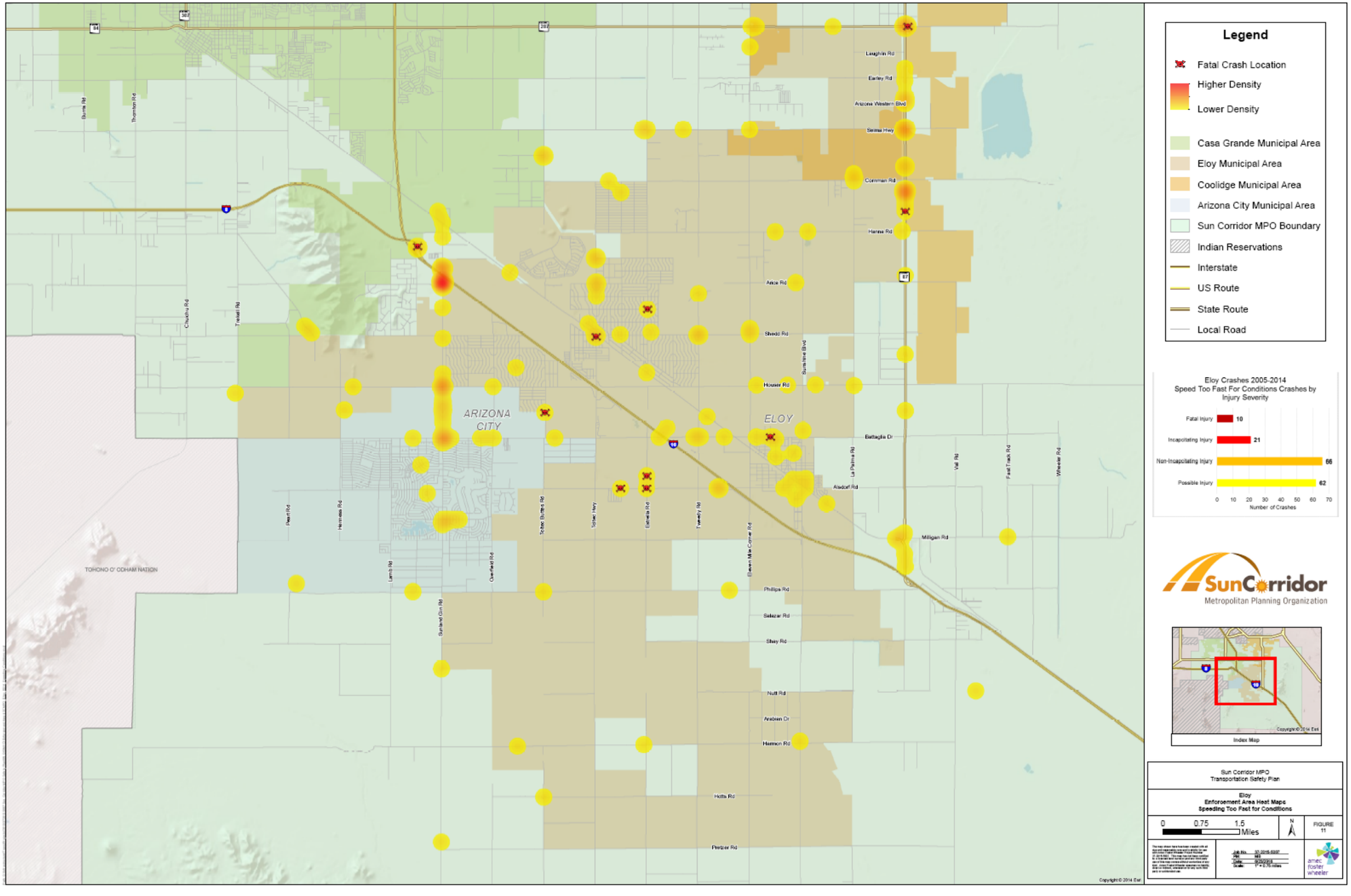


Figure 8-10: Driver Impairment Heat Map, Casa Grande

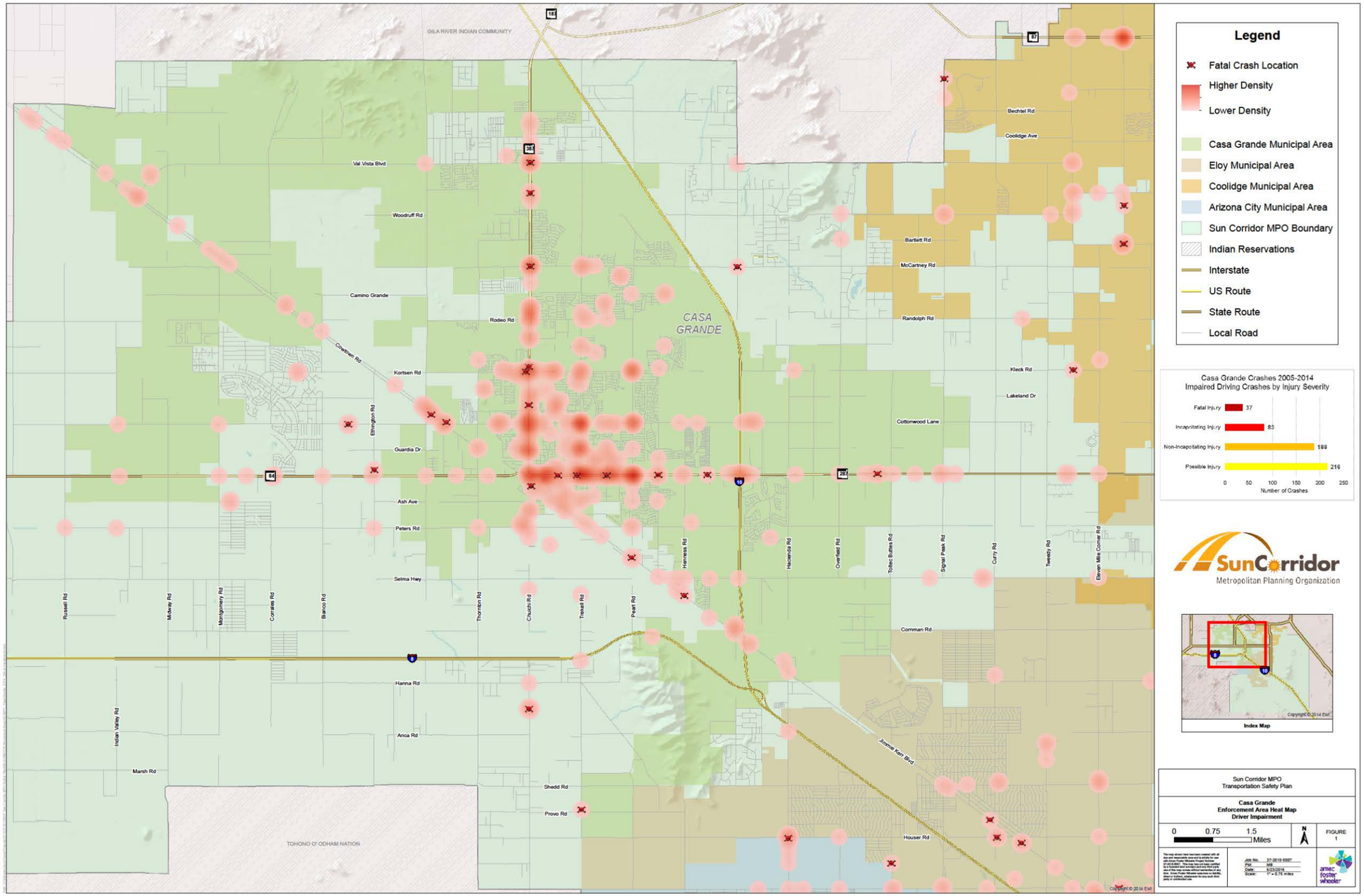


Figure 8-11: Driver Impairment Heat Map, Coolidge

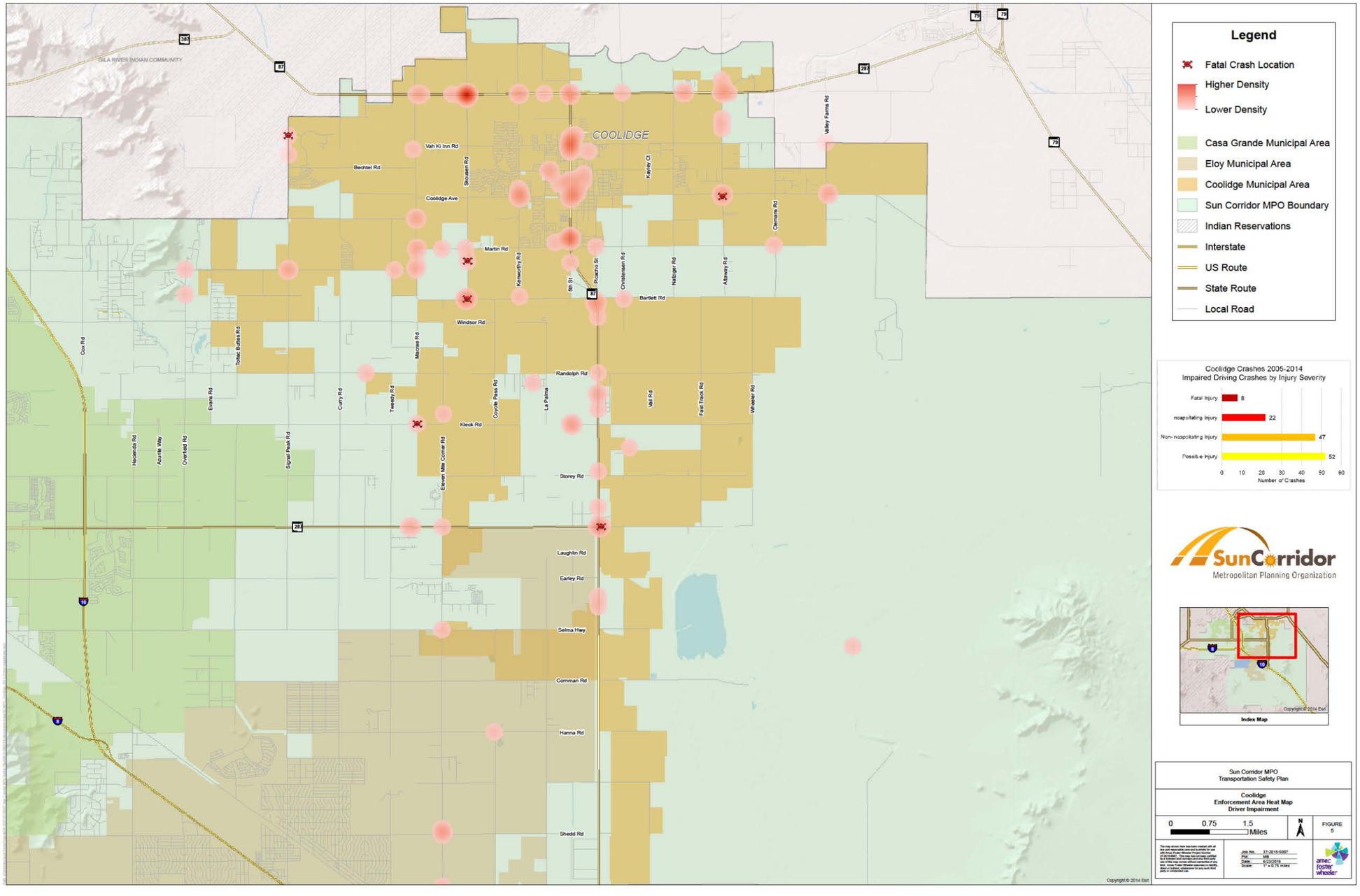


Figure 8-12: Driver Impairment Heat Map, Eloy

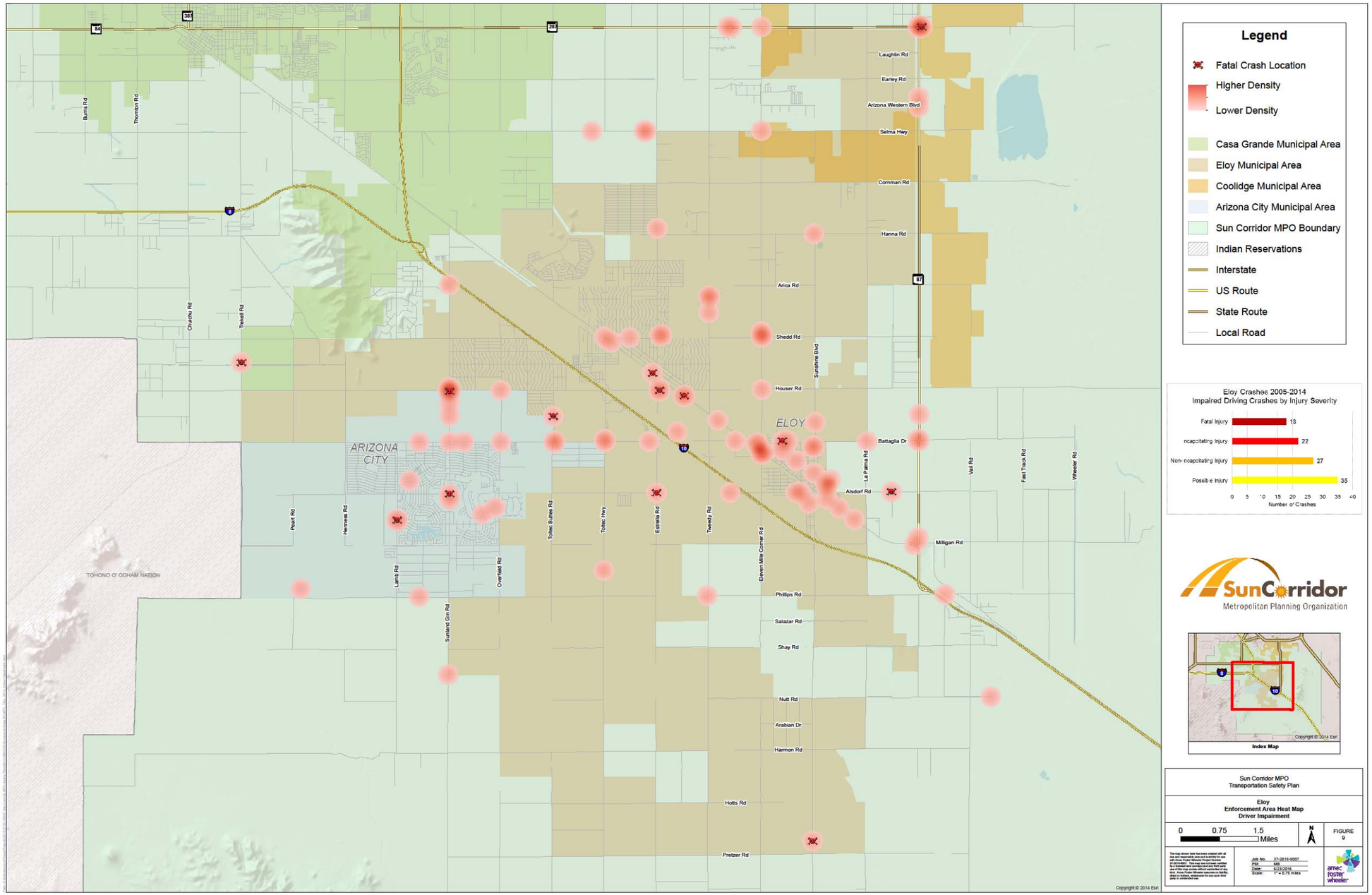


Figure 8-13: Unrestrained Motorist Heat Map, Casa Grande

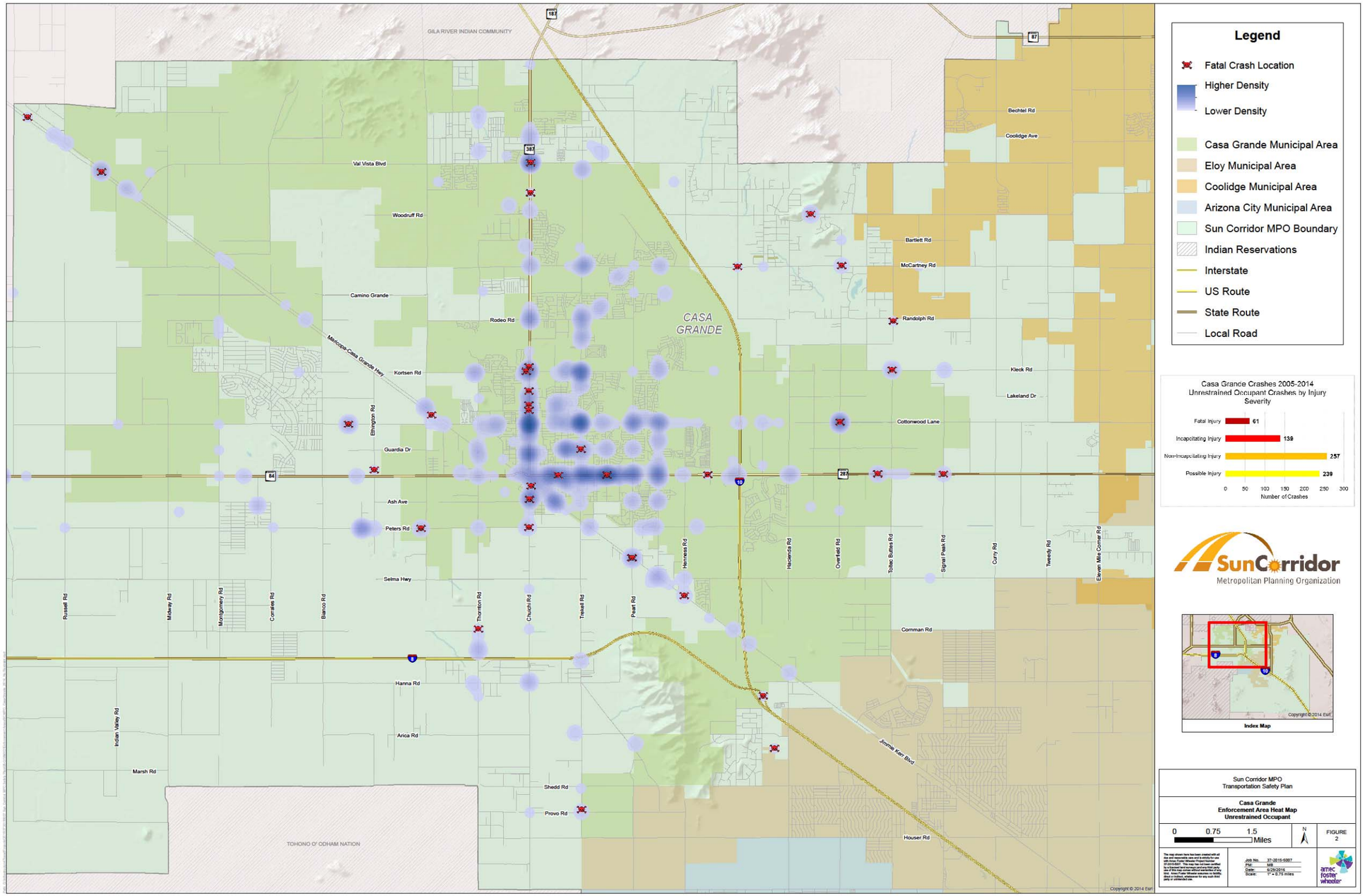


Figure 8-14: Unrestrained Motorist Heat Map, Coolidge

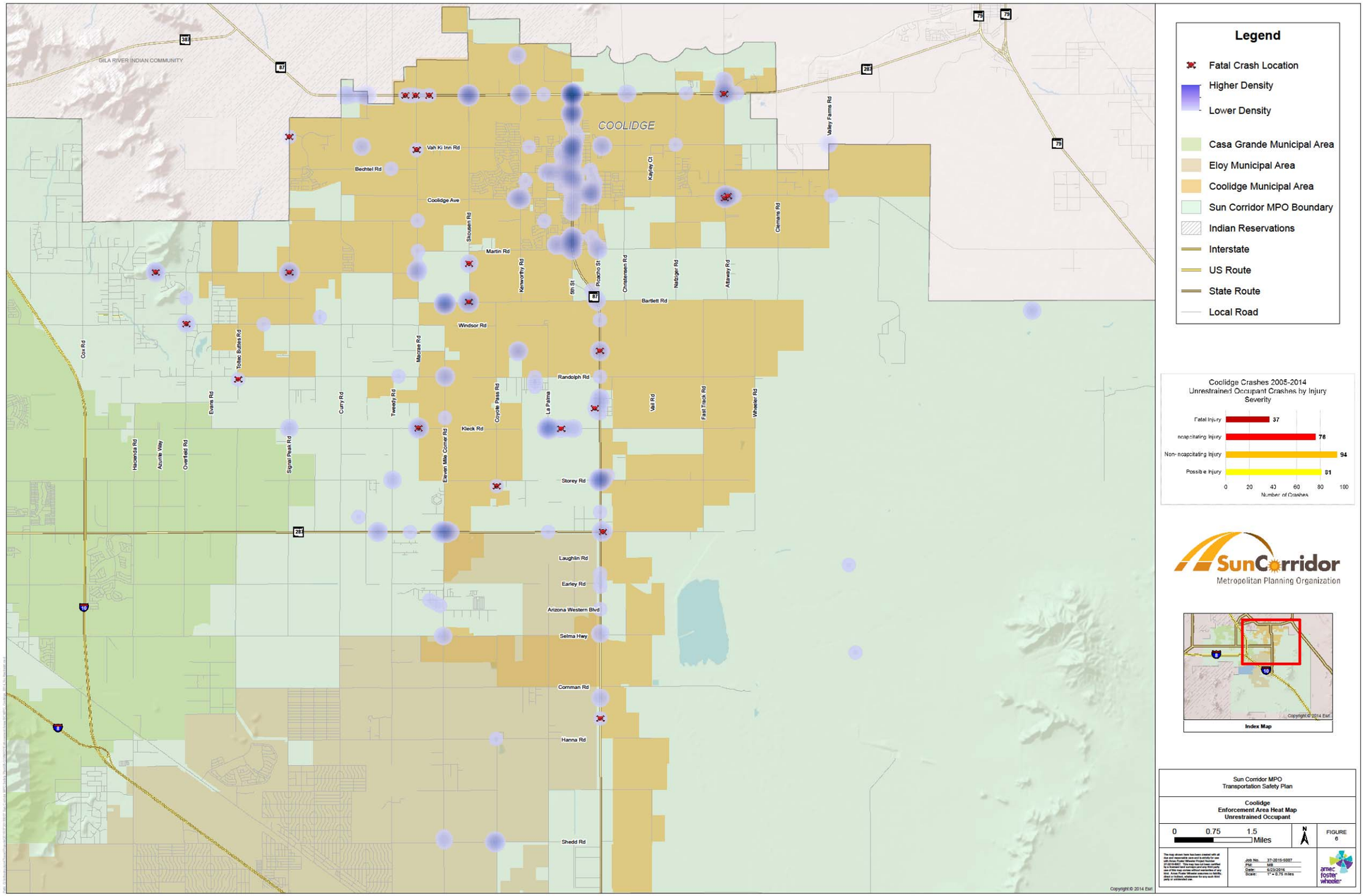
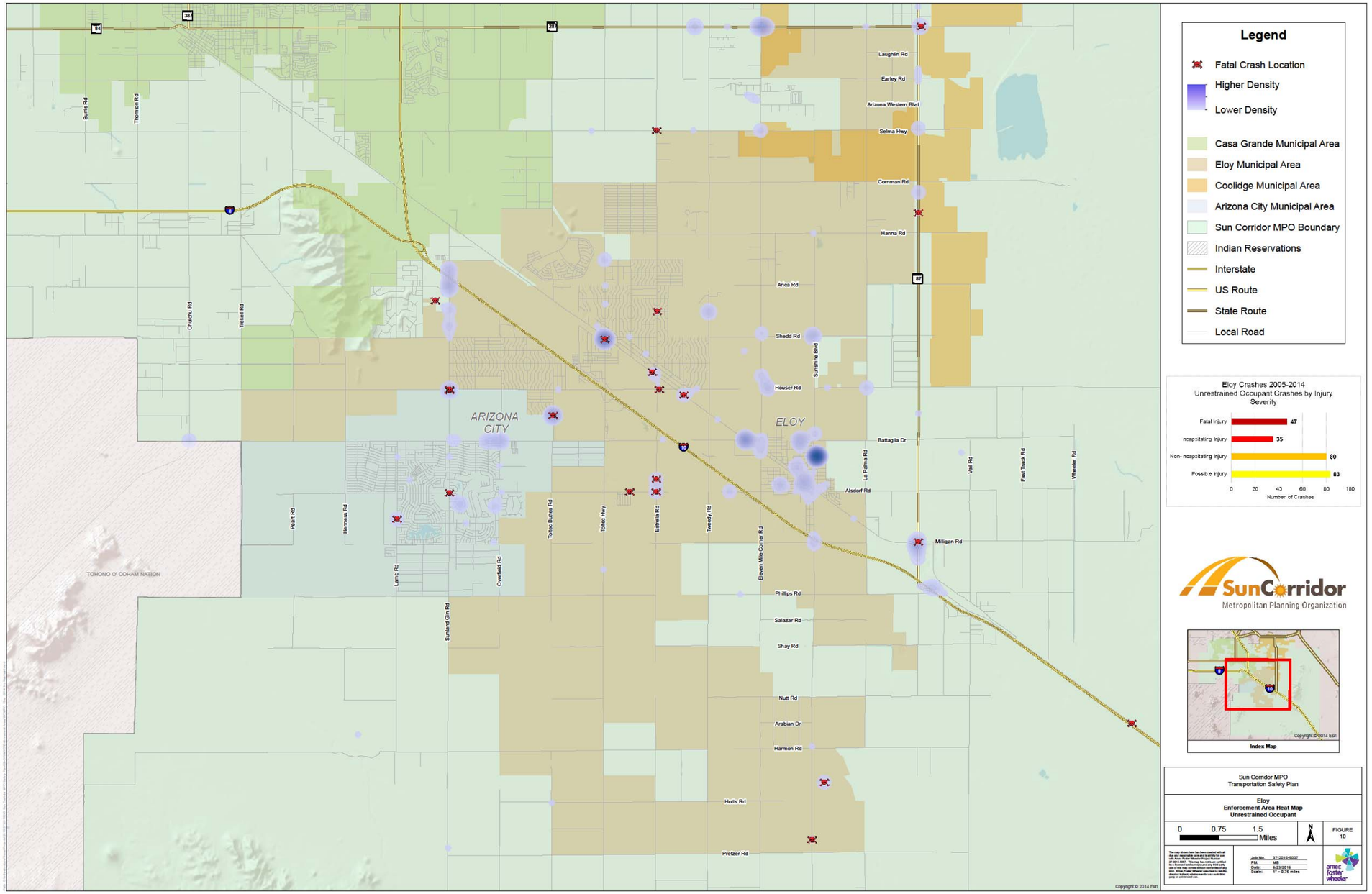


Figure 8-15: Unrestrained Motorist Heat Map, Eloy



9 SAFETY ENHANCEMENTS IN PROJECTS

Safety is often viewed as an "extra" or "add-on" or even a nuisance to incorporate into a project, when in fact it should be mainstreamed and explicitly considered on every project.

Traffic safety programs, projects, and policies included in the Transportation Improvement Program (TIP) have a higher likelihood of being implemented. The following should be considered for inclusion in the future TIPs and Regional Transportation Plan updates:

- Develop evaluation criteria to explicitly consider safety in project programming
    - Give higher priority to projects that address STSP Emphasis Areas
    - Give higher priority to locations experiencing fatal and serious injury crashes
- Include systematic safety improvements in projects, e.g. shoulders, rumble strips, sidewalks, lighting
- Conduct Road Safety Assessments (RSA) during:
    - Project design stage submittals
    - Evaluation of high priority locations

The SCMPO Regional Transportation Plan 2040, adopted in March 2016, includes safety in its Project Scoring and Prioritization Criteria. The RTP project scoring criteria assigns up to 20 points (out of 100) to a project that improves safety by implementing an FHWA proven safety countermeasure or a recommendation from this STSP.

10 ROAD SAFETY PERFORMANCE REPORTING

On April 14, 2016, the FHWA final rule for "National Performance Management Measures: Highway Safety Improvement Program" went into effect. This rule established the procedures, data, reporting requirements, and potential consequences for safety performance at State DOT and MPO levels. In general, this rule is designed to further the use of data to better inform transportation planning and programming with the aim of reducing fatalities and serious injuries. Key provisions in the rule include:

- 5 Performance Measures are required:
    1. Number of Fatalities
    2. Rate of Fatalities per 100 million vehicle miles traveled (VMT)
    3. Number of Serious Injuries
    4. Rate of Serious Injuries per 100 million VMT
    5. Number of Non-motorized Fatalities and Serious Injuries
- Annual update frequency
- A target must be set for each of the 5 performance areas by February 27, 2018 (the MPO may adopt the State's targets)
- 5-year rolling averages are used to soften variability in data
- States have "met" or "made" significant progress if four out of five targets are met, or performance is better than baseline
- MPOs are to report their targets to the State in an agreed upon manner

- Fatality Analysis Reporting System (FARS) is to be used for fatal data
- State crash database is to be used for serious injury data

Figure 10-1 through Figure 10-5 show SCMPO crash performance for the most recent crash data to provide an example of how these performance measures can be utilized. The vertical bars show the 5-year rolling averages, the points on the lines show the crash numbers for each year, and the points on the extended lines on the right side of the graphs indicate the targets for future years to reach either a 3% reduction goal or a 7% reduction goal.

Figure 10-1: SCMPO Fatalities Performance

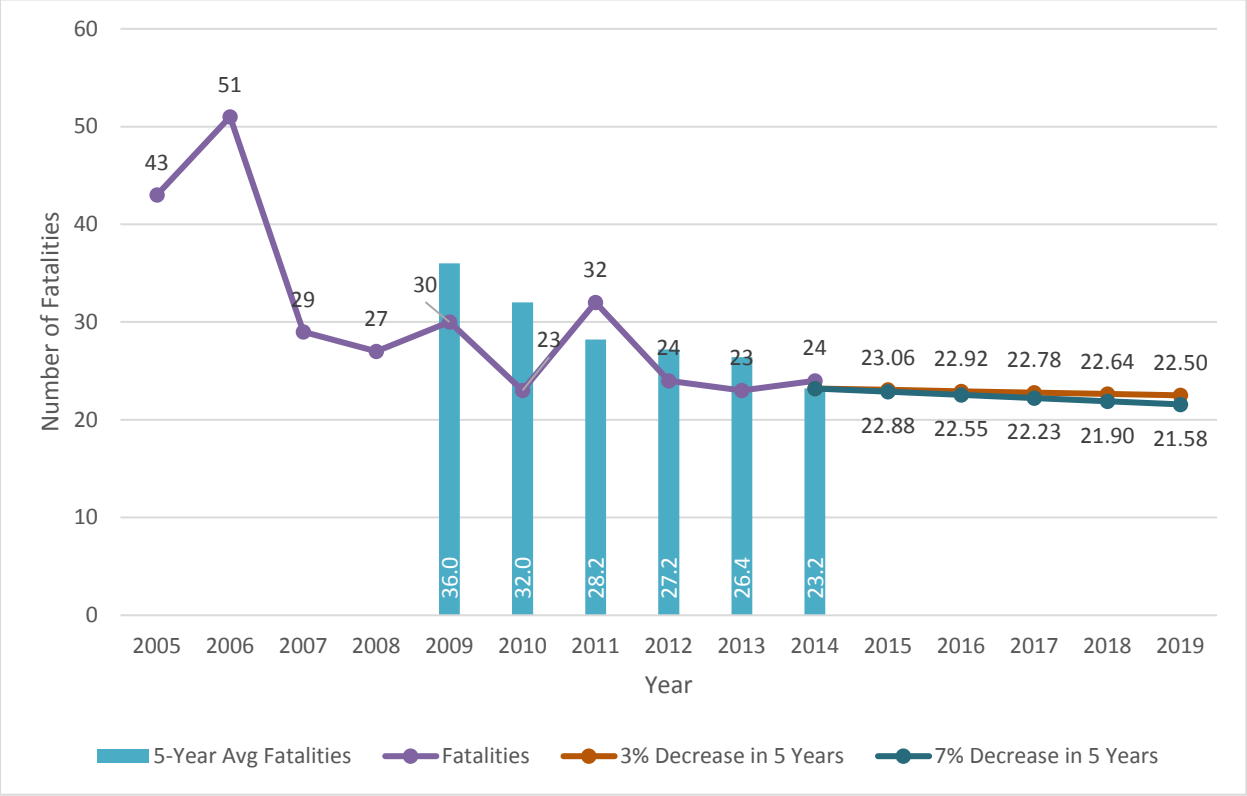


Figure 10-2: SCMPO Fatality Rate Performance

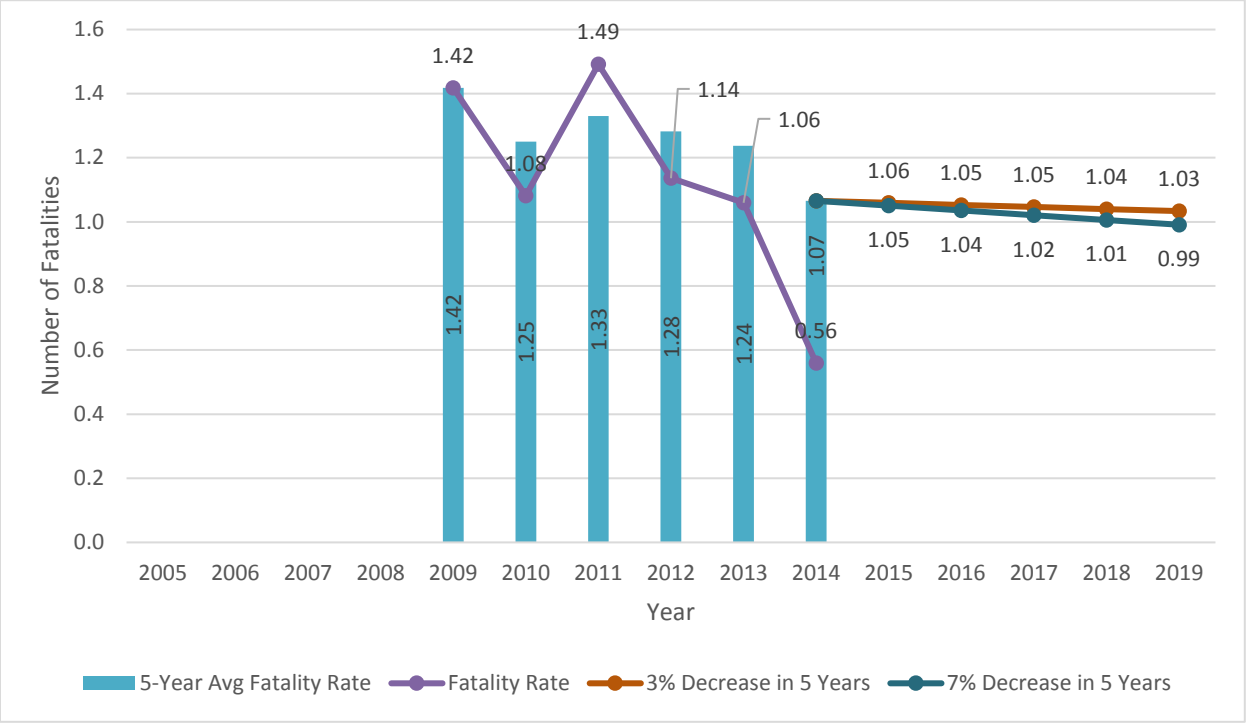


Figure 10-3: SCMPO Serious Injuries Performance

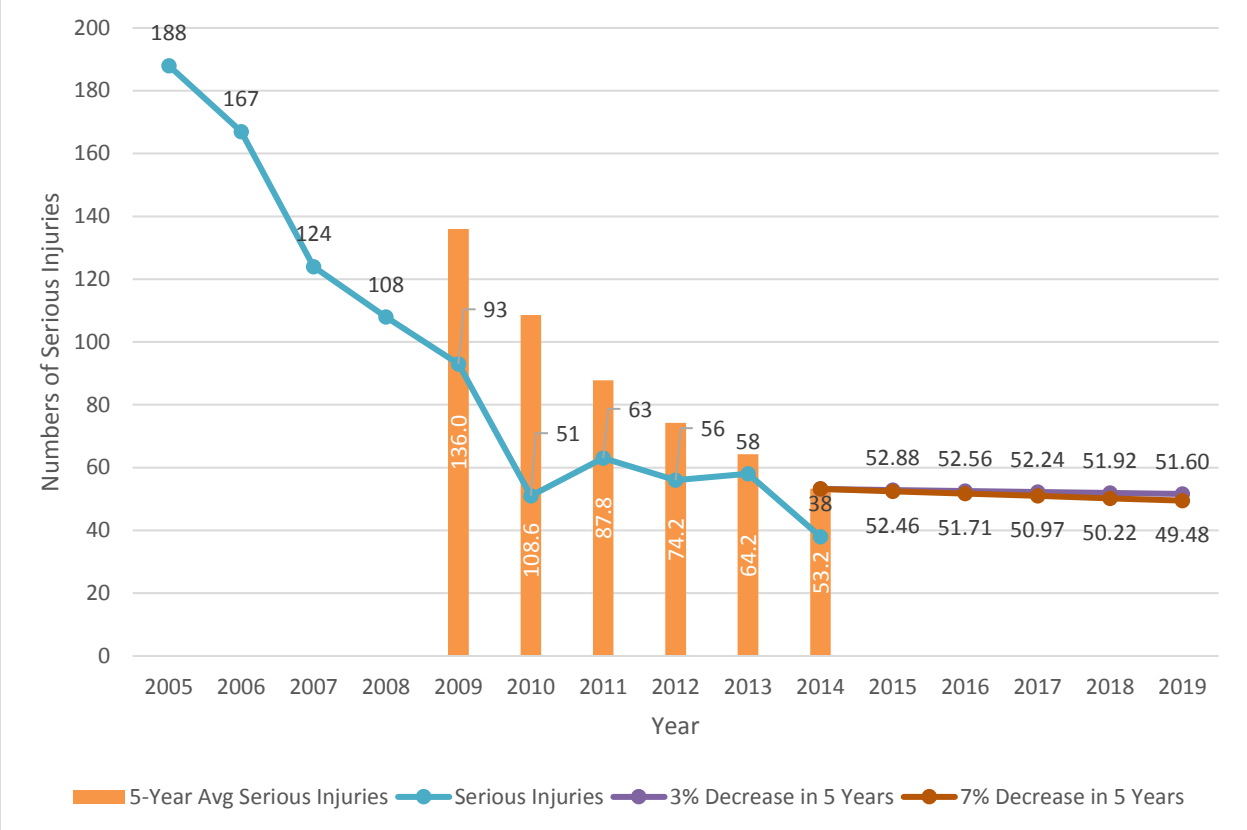


Figure 10-4: SCMPO Serious Injury Rate Performance

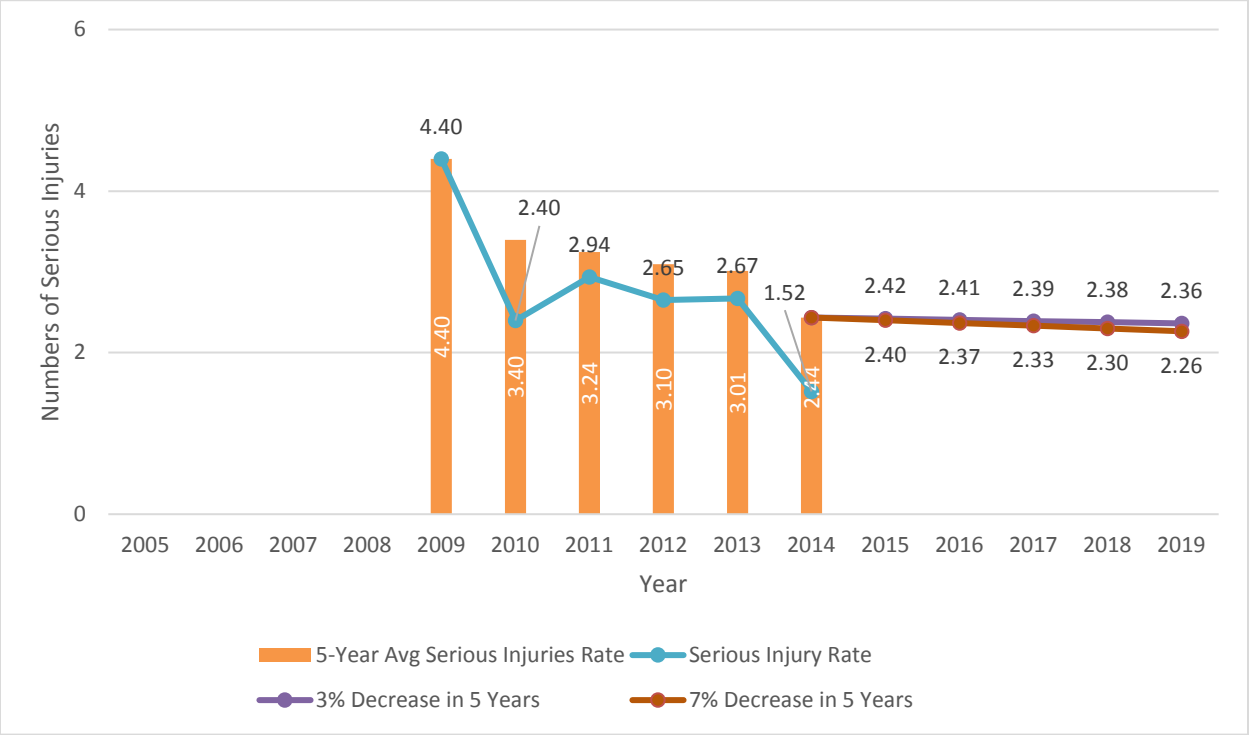
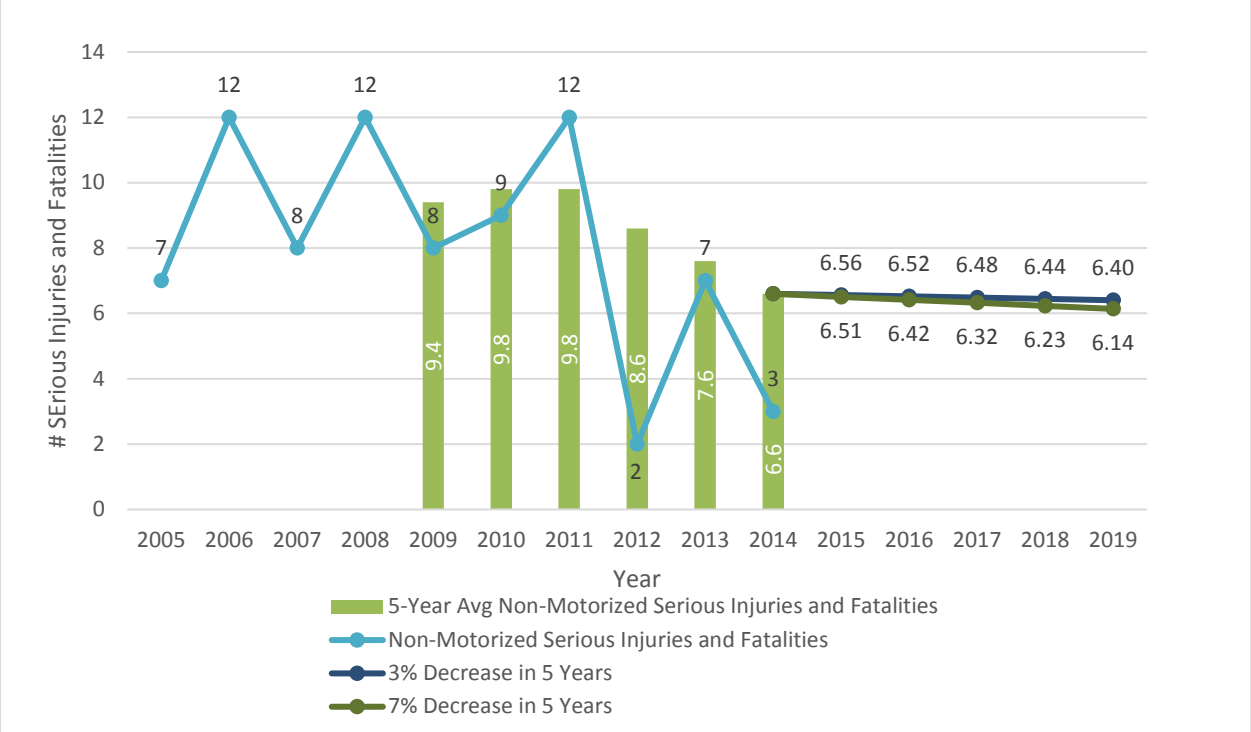


Figure 10-5: SCMPO Non-Motorized Serious Injuries & Fatalities Frequency



In addition to the required performance measures, SCMPO may also want to track output performance measures, examples of which include:

- High-visibility enforcement campaigns
- Public Service Announcements
- Cost spent on safety projects
- Intersections with improved pavement markings
- Miles of rumble strips installed
- Miles of bike lanes installed
- Before/After safety evaluations
- Total RSAs conducted

The Regional Transportation Plan 2040 also includes safety performance measures for fatalities and serious injuries, with the goal of reducing the five year rolling averages for each.

11 Implementation Plan

11.1 Candidate HSIP Projects

Beginning in 2019, HSIP funds will no longer be allocated to the MPOs and COGs in Arizona; all agencies will compete statewide for HSIP funding for safety projects. It will be difficult for spot improvement projects to generate a sufficiently high benefit/cost ratio due to not experiencing enough fatal and serious injury crashes. To improve the odds of receiving these federal funds, SCMPO should focus on corridor or systemic projects that have a significant number of fatal and serious injury crashes. Systemic projects address a particular crash type or road user, for example pedestrian crashes or road departure crashes. ADOT's updated HSIP guidelines include the following requirements for a project to be considered for HSIP funds:

- Minimum benefit/cost ratio of 1.5
- Only fatal and serious injury crashes can be used to calculate benefits
- Minimum project cost of $250,000
- Most recent 5 years of crash data must be used
- Project must address emphasis area(s) in the state SHSP

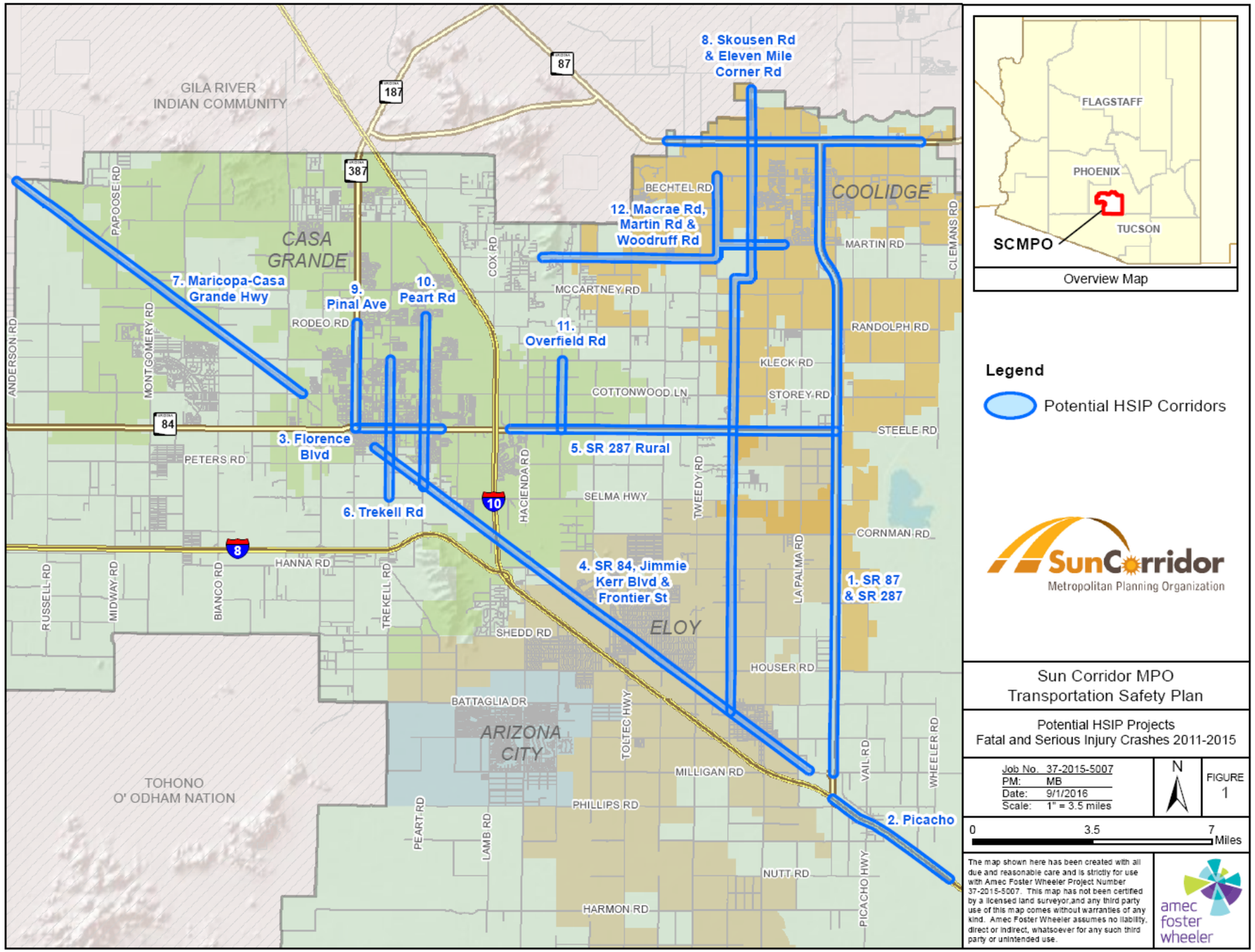
High priority intersections and segments identified in the network screening analysis were combined to develop candidate HSIP projects in the region, with added weight given to locations with multiple fatal and/or serious injury crashes. TAC members reviewed the projects and provided input on existing conditions, safety concerns, and suggestions for alternative or additional corridors. Figure 11-1 shows the HSIP corridors for the region. Projects analyzed for potential HSIP funding requests included:

- Corridors
    1. SR 87/SR 287 in Coolidge
    2. I-10 Picacho (Milepost 211 to 215)
    3. Florence Boulevard; Pinal Avenue to Arizola Road
    4. Jimmie Kerr Boulevard/Frontier Street; Casa Grande Avenue to Milligan Road

5. SR 287; I-10 to SR 87
6. Trekell Road; Selma Highway to Kortsen Road
7. Maricopa – Casa Grande Highway; Clayton Road to Anderson Road
8. Skousen Road/Eleven Mile Corner Road in Coolidge
9. Pinal Avenue; Florence Boulevard to Rodeo Road
10. Peart Road; Jimmie Kerr Boulevard to Avenida Ellena
11. Overfield Road; SR 287 to Kleck Road
12. Macrae Road/Martin Road/Woodruff Road in Coolidge

- Systemic
    13. Lane Departures

Figure 11-1: HSIP Corridors in SCMPO Region



Crash data for 2015 became available in June 2016; therefore, the most recent 5 years of data used in the ADOT HSIP benefit/cost analysis was 2011-2015. Fatal and serious injury crashes were analyzed based on location, crash type, lighting conditions, and driver violations to determine appropriate safety countermeasures. A summary of the crash data for the potential HSIP projects is provided in Table 11-1.

Table 11-1: Crash Data for Potential HSIP Projects

HSIP Project Corridor	Number of Collisions Resulting in:	
	Serious Injury	Fatal
SR 87 & SR 287	21	8
I-10, Picacho	13	6
Florence Boulevard	12	5
Jimmie Kerr Blvd / Frontier St	11	4
SR 287 Rural	10	3
Trekell Rd	9	2
Maricopa-Casa Grande Hwy	7	3
Skousen Rd & Eleven Mile Corner Rd	7	2
Pinal Avenue (SR 387)	7	1
Peart Rd	5	4
Overfield Rd	4	3
Macrae Rd, Martin Rd & Woodruff Rd	5	1
Systemic Lane Departures	61	26

The ADOT Crash Reduction Factors (CRF) from the Application for HSIP Projects were used to determine appropriate countermeasures that address specific problems within the study areas. Only CRFs with a 4 or 5 star rating were used in the development of Benefit/Cost ratios. Since the corridor projects involved multiple safety improvements with multiple CRFs, a combined CRF (CCRF) was determined by using the 3 highest and/or most appropriate CRFs associated with the safety countermeasures, using the following methodology:

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

Table 11-2 summarizes the benefit/cost analysis for each corridor. Detailed summaries of the preliminary planning level cost estimates and BC Ratio Worksheets are included in Appendix B.

Table 11-2: Benefit/Cost Analysis Summary

HSIP Project Corridor	Benefit / Cost Ratio	5-Year Reduction in Fatal Crashes	5-Year Reduction in Serious Injury Crashes
SR 87 & SR 287	8.7	5.50	14.50
I-10, MP 211 – MP 215	17.4	3.35	7.30
Florence Boulevard	11.2	2.30	5.50
Jimmie Kerr Blvd / Frontier St	9.8	3.35	9.25
SR 287 Rural	14.7	2.05	6.80
Trekell Rd	6.1	1.00	4.40
Maricopa-Casa Grande Hwy	2.9	2.20	5.10
Skousen Rd & Eleven Mile Corner Rd	4.8	1.45	4.90
Pinal Avenue (SR 387)	9.6	0.50	3.65
Peart Rd	25.7	1.95	2.45
Overfield Rd	14.3	2.05	2.70
Macrae Rd, Martin Rd & Woodruff Rd	6.8	0.75	3.75
Systemic Lane Departures	19.1	9.90	23.20

11.2 Implementing an Effective STSP

An effective strategic transportation safety plan is feasible, living, and regularly updated and embraced by safety stakeholders. Figure 11-2 highlight FHWA's eight elements of a STSP Implementation Process Model.

Figure 11-2: STSP Implementation Process Model, FHWA

These elements and the following components are key factors in the Implementation Plan:

- Document measureable objectives and performance measures for each emphasis area
- Determine the data requirements for each performance measure

- Identify the required resources and action steps for implementing each countermeasure
- Identify a process to track countermeasure and action step implementation
- Integrate the STSP with other transportation safety plans
- Market STSP through branding, news events, web sites, and newsletters
- Track regularly the extent to which emphasis area strategies are being implemented

The owner and main point of contact for the STSP is the SCMPO Director. In addition to the SCMPO Director, the following will also need to be involved in tracking and implementing the STSP recommendations:

- City of Casa Grande Traffic Engineer
- City of Eloy Public Works Superintendent
- City of Coolidge City Engineer/Public Works Director
- Pinal County Senior Transportation Planner

Recommendations to implement, evaluate, and update the STSP and to encourage stakeholder participation in implementing the plan include:

- Form a STSP Champions Working Group of key safety stakeholders to identify issues affecting the implementation of the plan, celebrate successes, and identify emerging safety issues and discuss new safety strategies
- Hold quarterly meetings of law enforcement, engineering, and planning to discuss safety issues and any new crash patterns
- Keep key advocacy groups such as the Coolidge Youth Coalition involved by inviting them to participate in safety meetings and TAC meetings
- Host an annual Regional Traffic Safety Conference to promote traffic safety for all stakeholders
- Form a fatal crash investigation team of engineering, law enforcement, and risk management to analyze fatal crashes in the region
- Update the STSP on a regular cycle, e.g. every 3 to 5 years
- Update crash data and performance measures annually
- Update intersection and segment crash analysis annually to determine high priority locations
- Collect traffic volumes to generate updated crash rates and performance measures

Updated crash data for the previous year is typically made available by ADOT in June, i.e. crash data for all of 2016 should be available in June 2017 for updating regional crash data.