

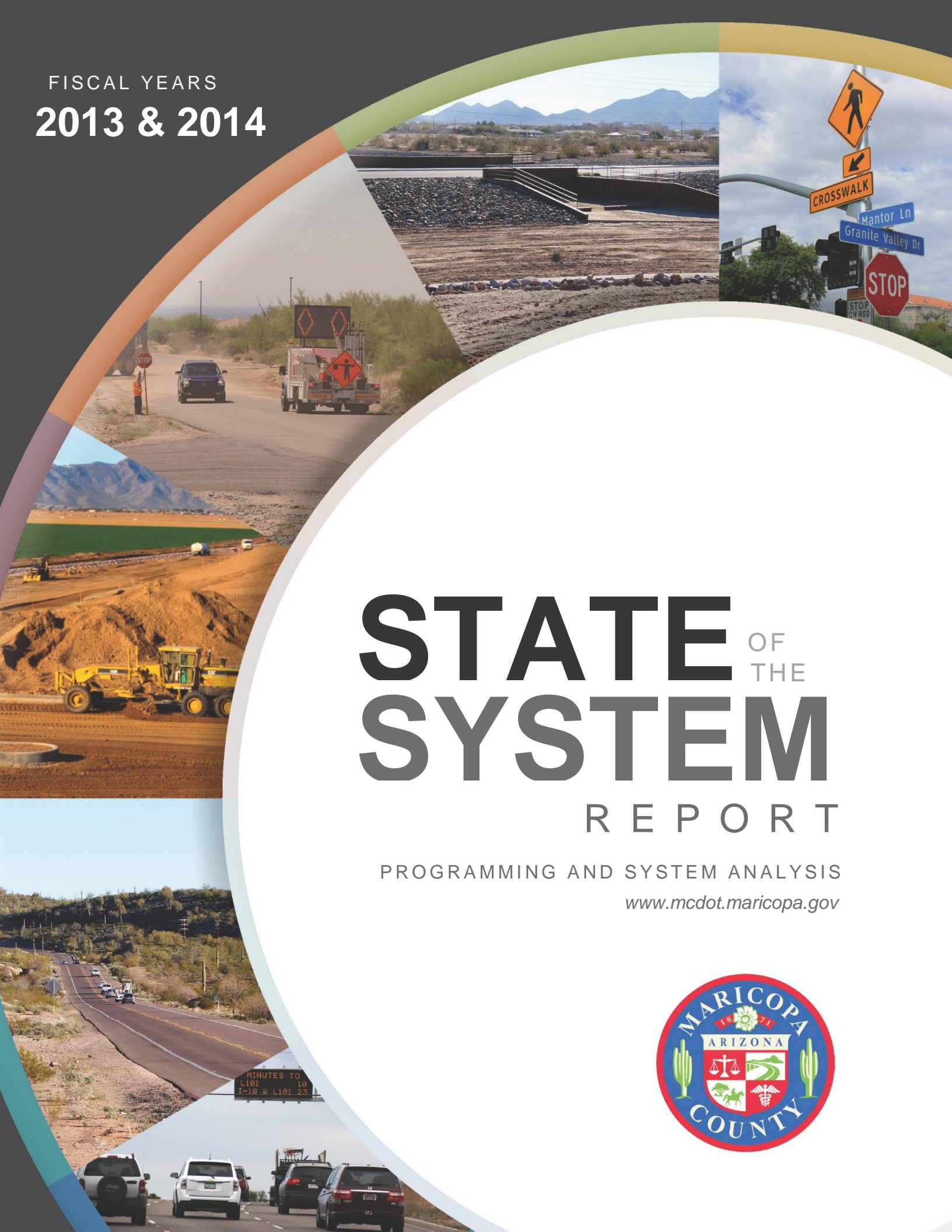
FISCAL YEARS  
**2013 & 2014**

# STATE OF THE SYSTEM

## REPORT

PROGRAMMING AND SYSTEM ANALYSIS

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## *List of Acronyms*

ADOT – Arizona Department of Transportation	MMITSS – Multi Modal Intelligent Traffic Signal System
ALERT – Arizona Local Emergency Response Team	MUTCD – Manual on Uniform Traffic Control Devices
AR – Asphalt Rubber	MVMT – Million Vehicle Miles of Travel
ARHM – Asphalt Rubber Hot Mix	NUG – National Unified Goal
ATIS – Advanced Traveler Information System	O&D – Open and Declared
BIS – Bridge Investment Study	PCR – Pavement Condition Rating
BSR – Bridge Sufficiency Rating	RADS – Regional Archived Data Server
CAD – Computer Aided Dispatch	RDM – Roadway Design Manual
Chip Seal HV – Chip Seal High Volume	REACT – Regional Emergency Action Coordinating Team
Chip Seal LV – Chip Seal Low Volume	RMS – Road Management System
CCTV – Closed Circuit Television Cameras	SHSP – Strategic Highway Safety Plan
DCR – Design Concept Report	SMS – Safety Management System
DMS – Dynamic Message Sign	SOS Report – State of the System Report
DPS – Department of Public Safety	STSP – Strategic Transportation Safety Plan
DSRC – Dedicated Short-Range Communications	TAB – Transportation Advisory Board
FHWA – Federal Highways Administration	TIM Coalition – Traffic Incident Management Coalition
FMS – Freeway Management System	TIP – Transportation Improvement Program
FY – Fiscal Year	TMC – Traffic Management Center
GAAP – Generally Accepted Accounting Principles	TOC – Traffic Operations Center
GASB – Governmental Accounting Standards Board	TSMO – Traffic Systems Management and Operations
ICM – Integrated Corridor Management	TSP – Transportation System Plan
IGA – Intergovernmental Agreement	USDOT – United States Department of Transportation
IRI – International Roughness Index	V/C Ratio – Volume-to-Capacity Ratio
ITS – Intelligent Transportation Systems	V/S Ratio – Volume-to-Service Ratio
LRP – Laser Road Profiler	VMT – Vehicle Miles of Travel
LVR – Low Volume Roads	
M&R – Mill and Replace	
MAG – Maricopa Association of Governments	
MAP-21 – Moving Ahead for Progress in the 21st Century	
MCDOT – Maricopa County Department of Transportation	
MDI – Model Deployment Initiative	



## Overview

### Purpose of the State of the System Report

The State of the System (SOS) Report is a compilation of the physical inventory and status of the Maricopa County Department of Transportation's (MCDOT's) transportation system infrastructure. The transportation system include roads, bridges, bicycle facilities, traffic signals, and other facilities. The SOS Report documents the performance and condition of the various components of MCDOT's transportation system.

### Components of the State of the System Report

The SOS Report includes the following components:

- Traffic Management System;
- Safety Management System;
- Low Volume Road Management System;
- Bridge Management System;
- Road Management System; and
- Asset Management System.

### Timeframe of the State of the System Report

The last SOS Report was completed for the timeframe from July 1, 2011 to June 30, 2012 which is known as Fiscal Year (FY) 2012. No SOS Report was prepared for FY 2013 (July 1, 2012 to June 30, 2013). This document focuses on FY 2014 (July 1, 2013 to June 30, 2014) but also includes limited information for FY 2013 in sections that discuss trends over the last several years. A SOS Report for FY 2015 (July 1, 2014 to June 30, 2015) will be prepared in late calendar year 2015. It is anticipated that the SOS Report will be prepared annually moving forward.

Most of the data analyzed in the SOS Report is aggregated by fiscal year. Notable exceptions are traffic volume count data and traffic crash data, both of which are aggregated by calendar year per industry standards. For timeframe references throughout the document, unless the year is noted as a fiscal year (e.g., FY 2014), the year referenced is a calendar year.

## County Goals and Objectives for Transportation

### *Comprehensive Plan Guidance*

The Maricopa County Comprehensive Plan was adopted in 1997 and revised in 2002 and directs the management of MCDOT. The Comprehensive Plan helps set direction for the County's transportation system investment, and the following objectives related to the transportation system are set forth in the Comprehensive Plan:

1. Employ technology to improve the use of transportation facilities;
2. Identify and accommodate transportation corridors;
3. Optimize public investments;
4. Minimize travel times;
5. Reduce crashes; and
6. Minimize and mitigate impacts of construction and operation.



## *Transportation System Plan Guidance*

The Maricopa County Transportation System Plan (TSP) was adopted in 2007 and sets the overall policies, goals, and fundamental considerations for MCDOT decisions concerning current and future transportation needs and investments. The TSP recommends investment priorities based on three types of routes: primary, secondary, and local. Much of the content of the TSP reflects the County's Comprehensive Plan guidelines for transportation.

**Figure 1** provides an overview of the three General Areas that are delineated in the TSP. Throughout this document, all maps that are presented are done so in sets of three, with one map for each area depicted in Figure 1.



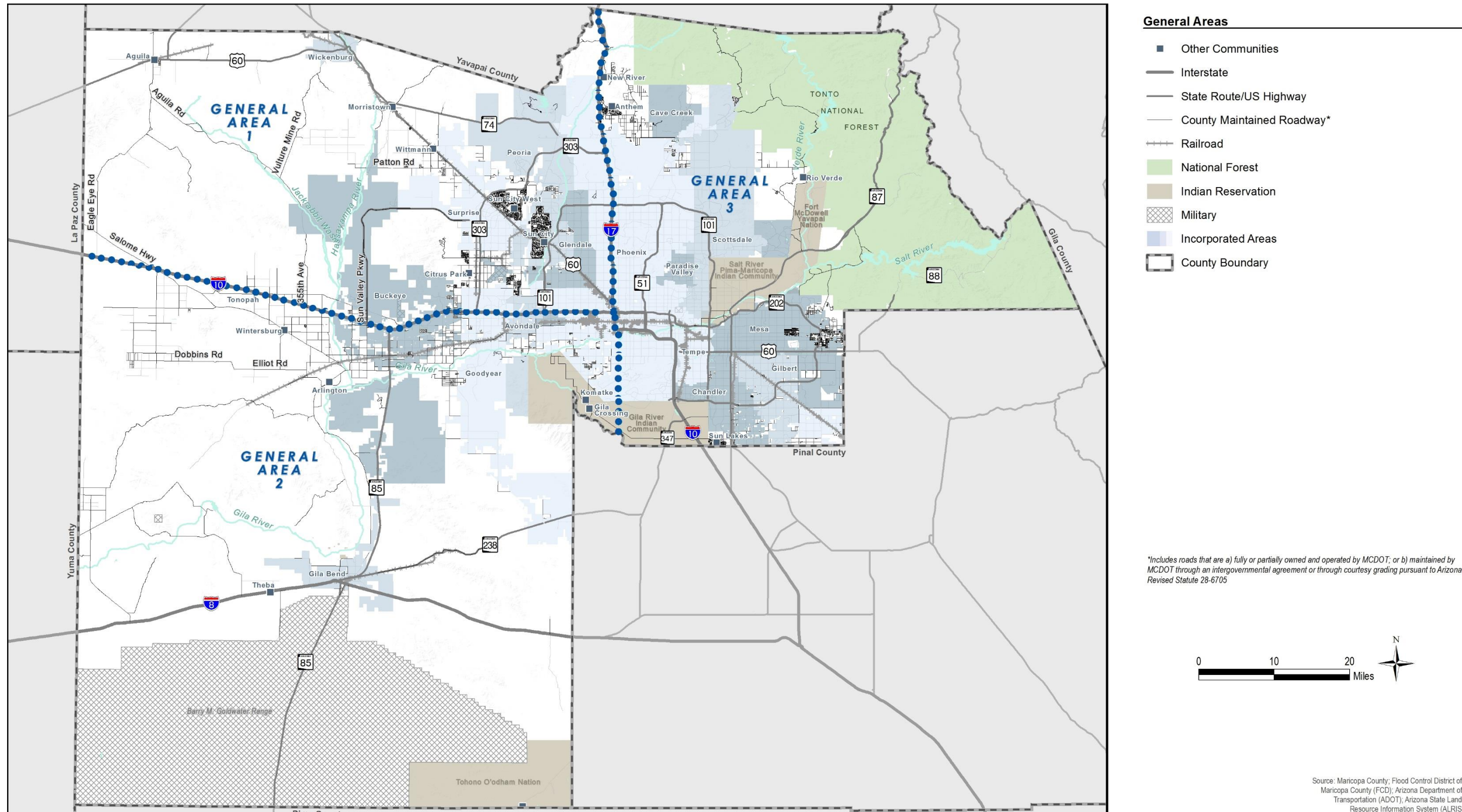


Figure 1: Overview of General Areas of the County as Presented in the TSP





## Traffic Management System

### Overview and Background

MCDOT's Traffic Management System – also known as Traffic System Management and Operations (TSMO) – includes the operations and management of traffic on Maricopa County (County) roads. For purposes of this document, County roads are roads that are fully or partially owned and operated by MCDOT or maintained by MCDOT through an intergovernmental agreement (IGA) or through courtesy grading pursuant to Arizona Revised Statute 28-6705.

MCDOT's traffic management system includes the infrastructure, policies, and procedures in place to manage existing and potential traffic congestion on County roads as well as information about traffic congestion shared with other agencies and the traveling public. This section incorporates and expands upon information provided in previous SOS reports in the Congestion Management System section.

### Purpose of the Traffic Management System

The purpose of the traffic management system is to:

- Identify and measure traffic growth and congestion on County roads; and
- Identify and measure how MCDOT improves traffic operations through innovation, intelligent transportation system (ITS) devices, incident management, and traveler information,

### Transportation System Plan Guidance

The TSP includes several objectives related to traffic management to ease traffic congestion, which include:

1. Intersection improvements;
2. Alternate route enhancement;
3. Provide for both current and future traffic volume needs;
4. Monitor and measure congestion;
5. Inform decisions regarding what improvements are needed;
6. Identify alternative actions;
7. Recommend cost-effective mitigation measures; and
8. Evaluate actions related to congestion management.

The TSP is currently in the process of being updated.

## Traffic Growth and Congestion

### *Existing Traffic Volumes and Historical Growth*

Traffic growth and congestion are evaluated on all County roads for which traffic volume information is available from MCDOT's traffic count program. Traffic counts from 2013 are considered "existing" traffic volumes for the purpose of the FY 2014 SOS Report.

Maps labeled **Figure 2** show the two-way daily traffic volume counts conducted by MCDOT on County roads in 2013. At locations where no count was taken in 2013, the most recent prior year's count is reported. In locations where only one directional count was taken, the count was doubled to represent a two-way count. In rural areas, traffic volumes on County roads are generally less than 12,000 vehicles per day. In urban areas, traffic volumes on County roads are generally less than 30,000 vehicles per day. Bell Road is a notable exception at nearly 60,000 vehicles per day.

Maps labeled **Figure 3** show the average annual growth rate of the two-way daily traffic volume counts on County roads between 2010 and 2013. At locations where no traffic counts were taken in 2010 or 2013,



the most recent prior year's count was utilized. Traffic volume growth rates vary widely across the County but are generally highest in the areas currently experiences rapid land development.

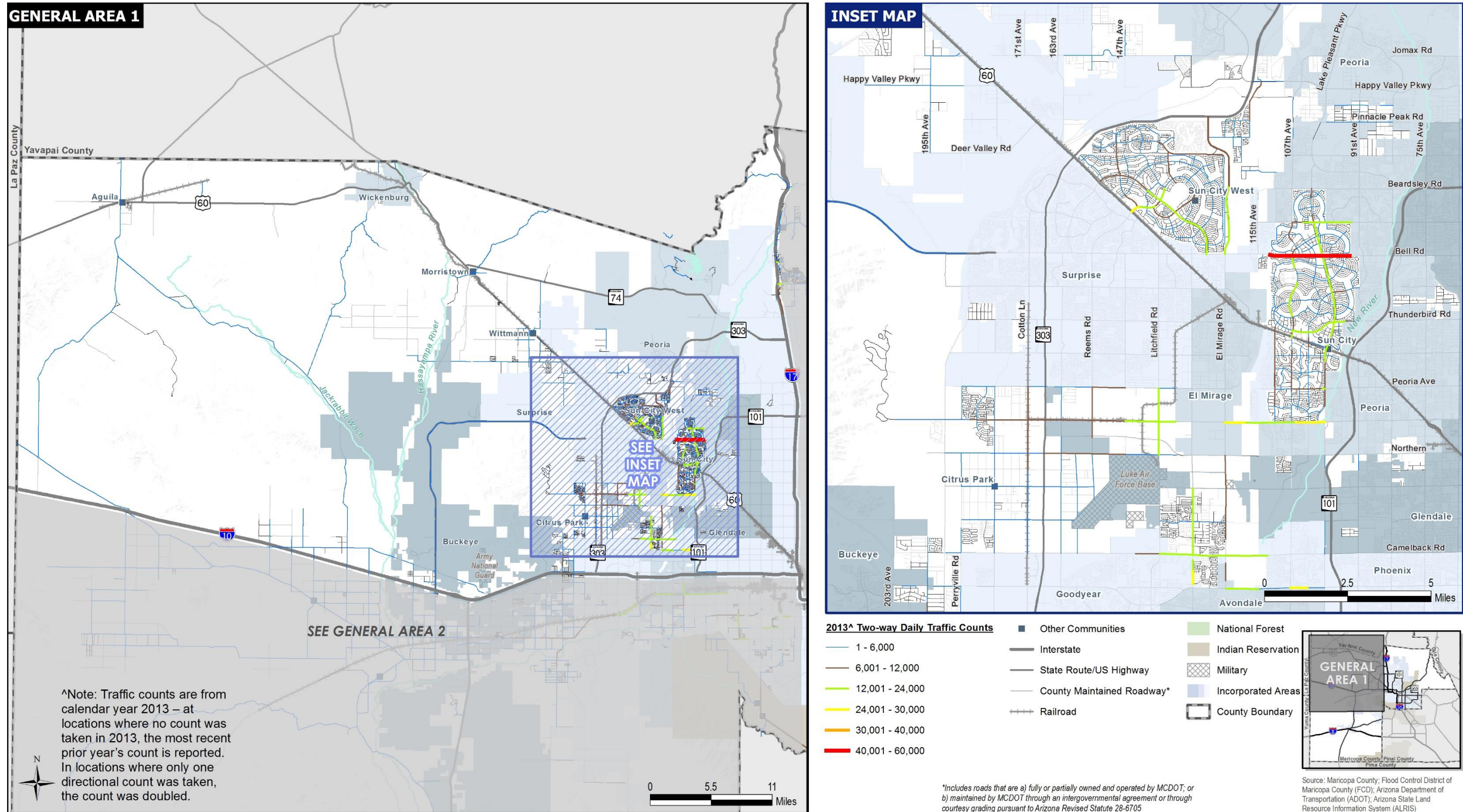
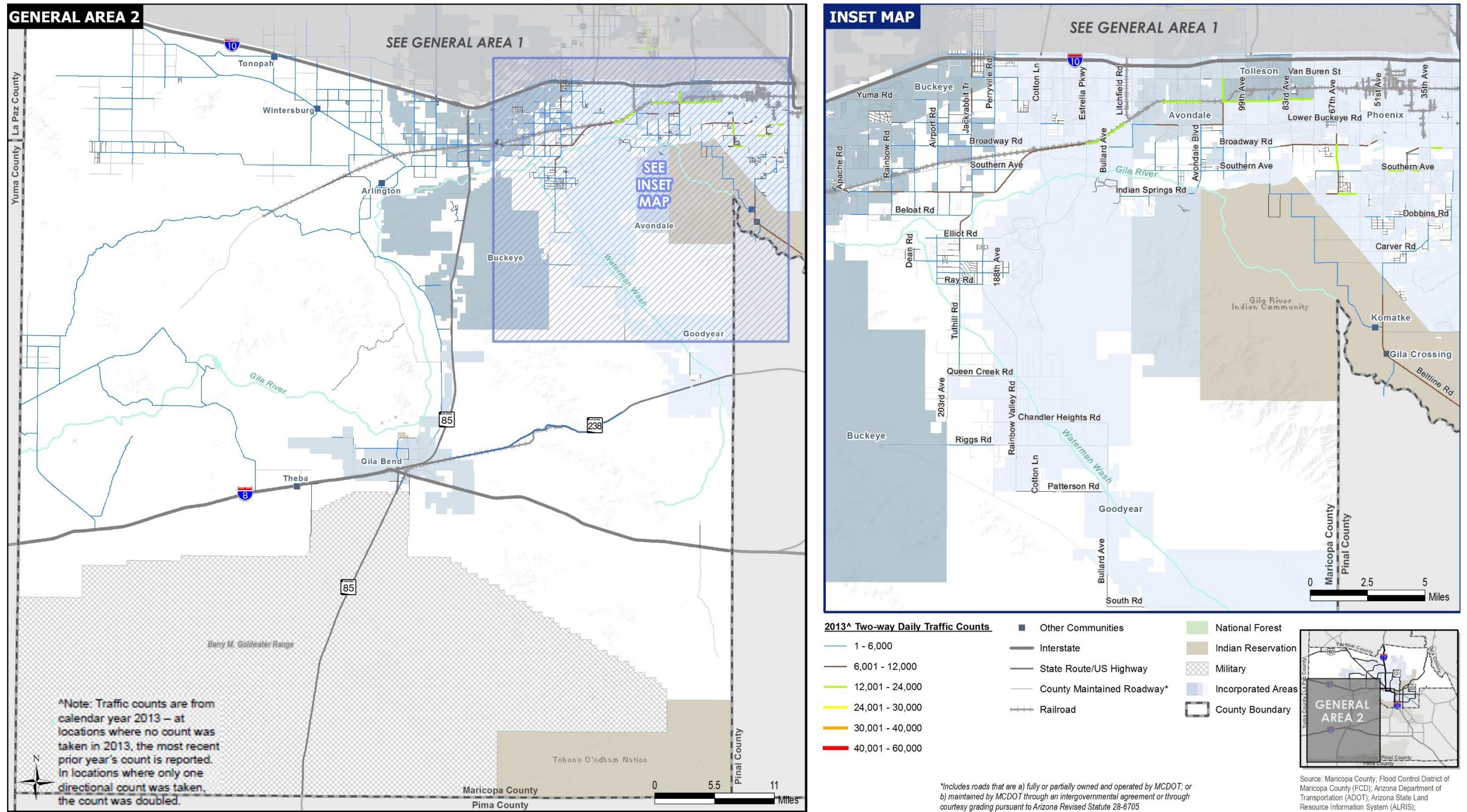


Figure 2: 2013 Two-way Daily Traffic Counts  
Area 1





**Figure 2: 2013 Two-way Daily Traffic Counts**  
Area 2



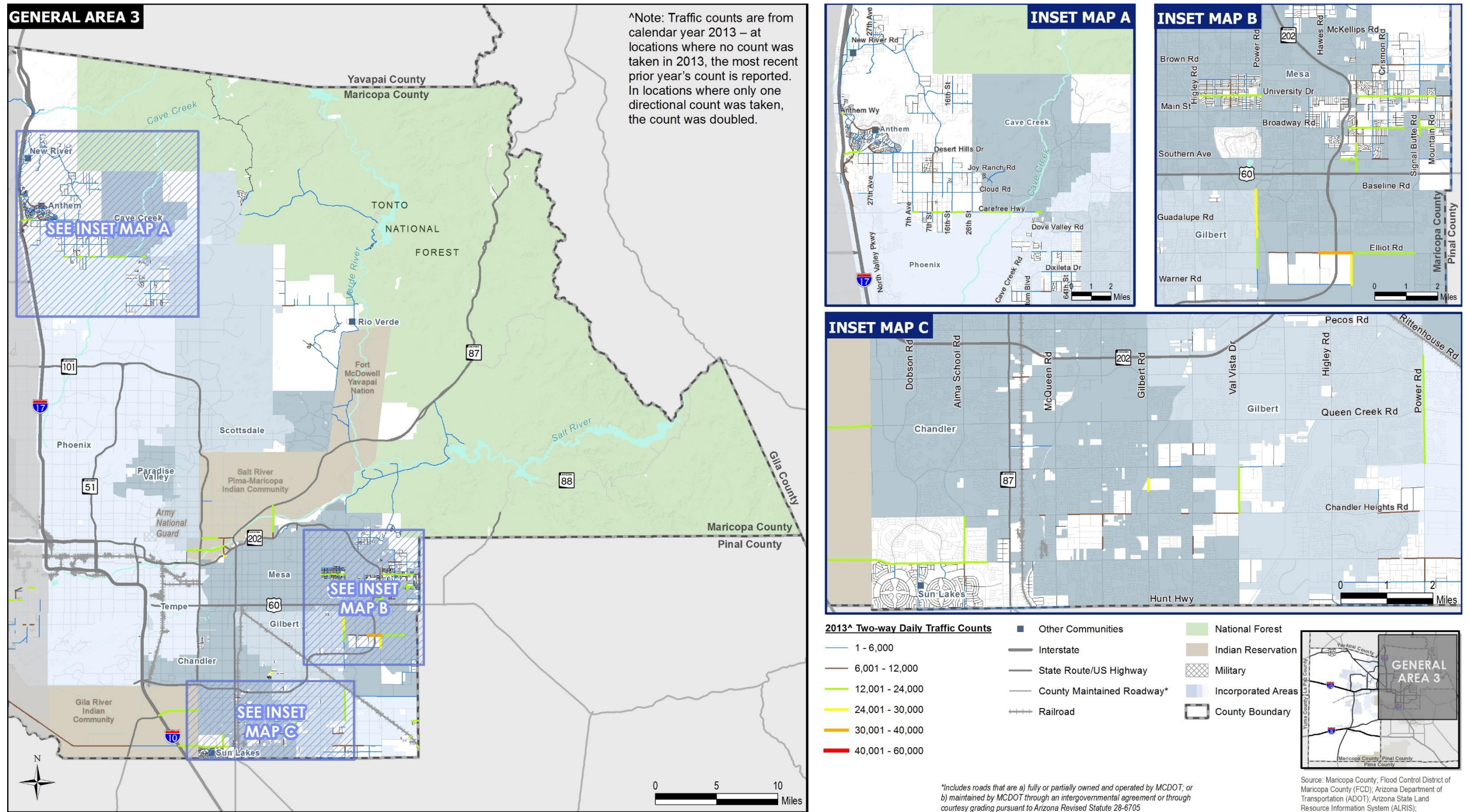
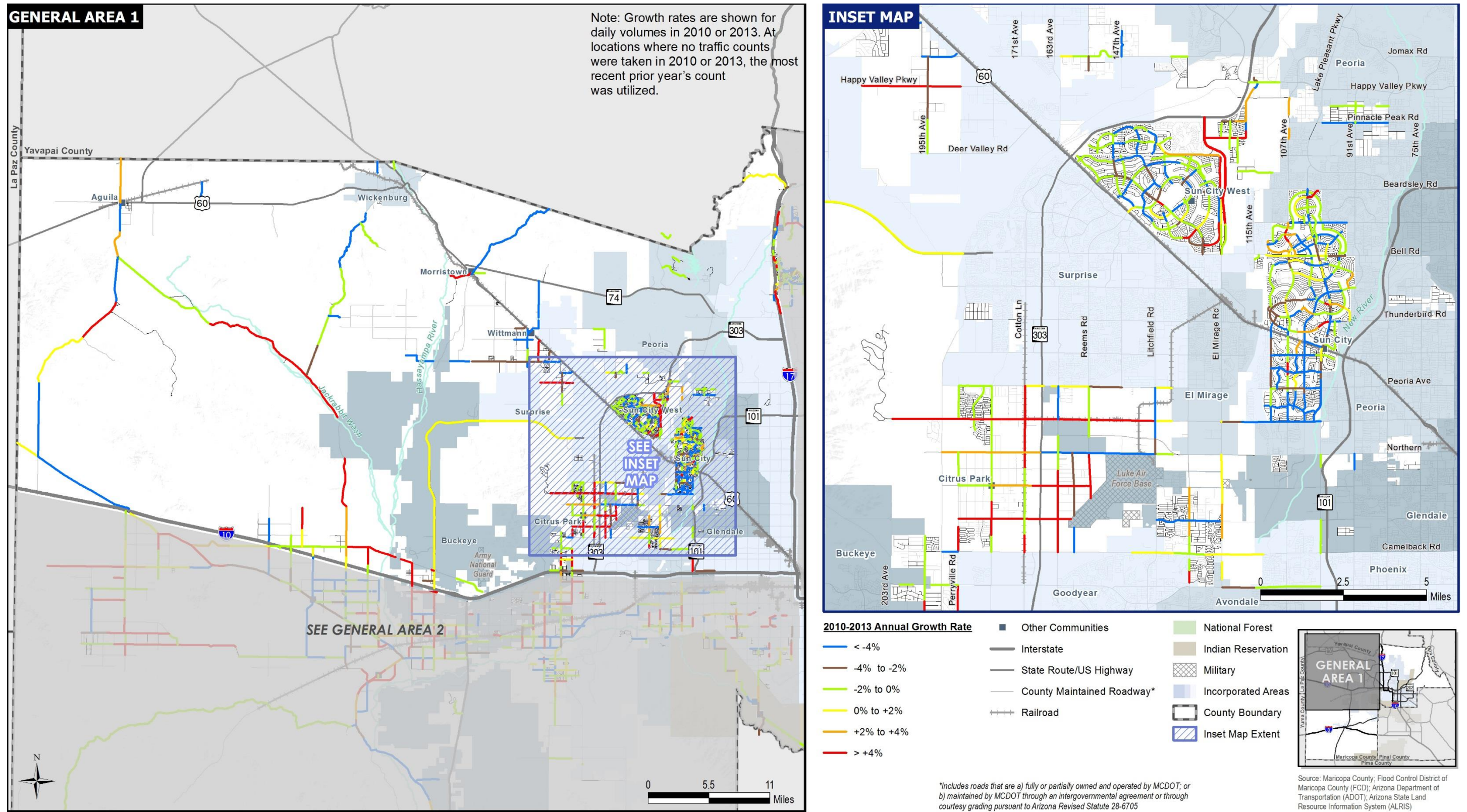


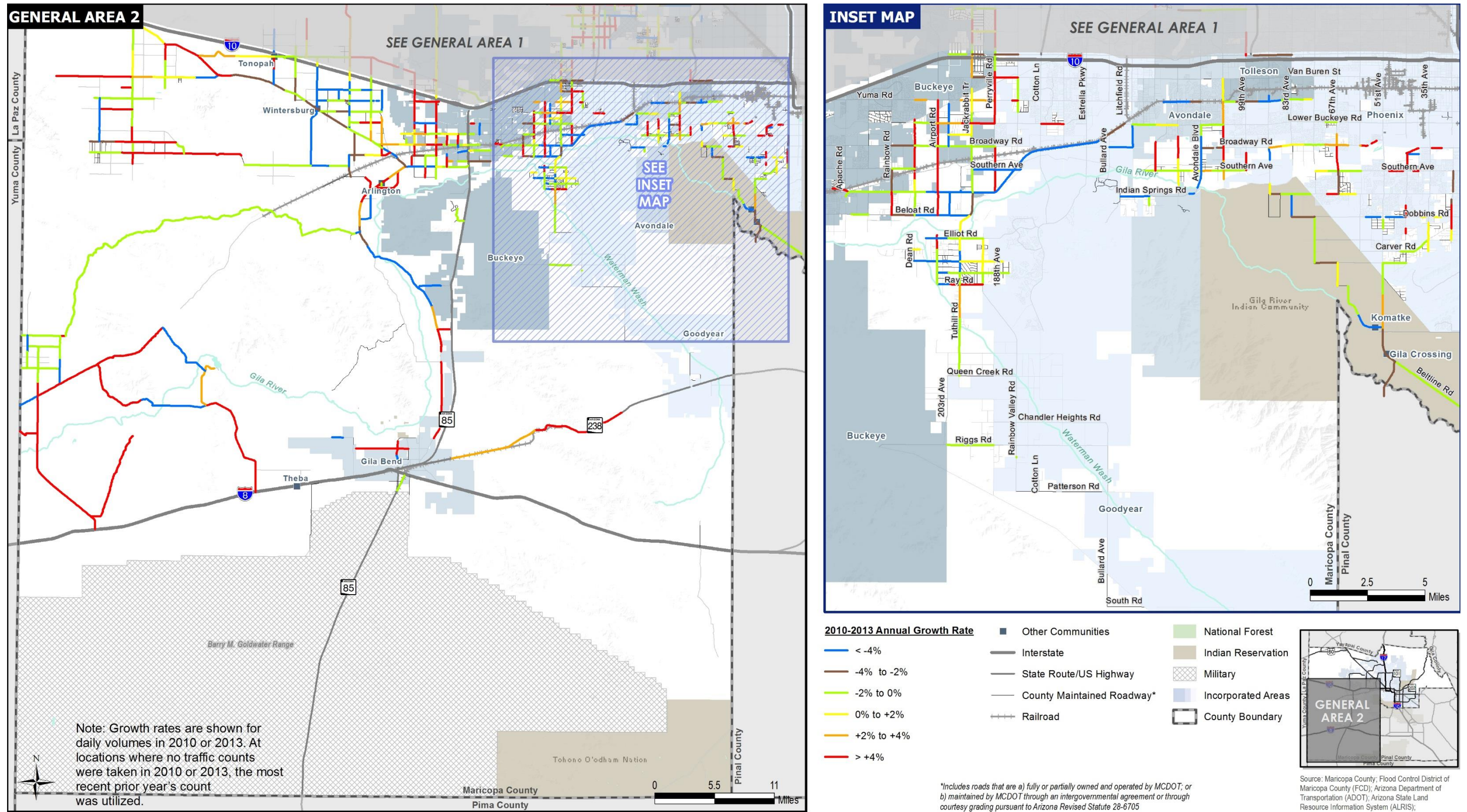
Figure 2: 2013 Two-way Daily Traffic Counts  
Area 3





**Figure 3: 2010-2013 Daily Traffic Volume Growth Rates  
Area 1**





**Figure 3: 2010-2013 Daily Traffic Volume Growth Rates**  
Area 2



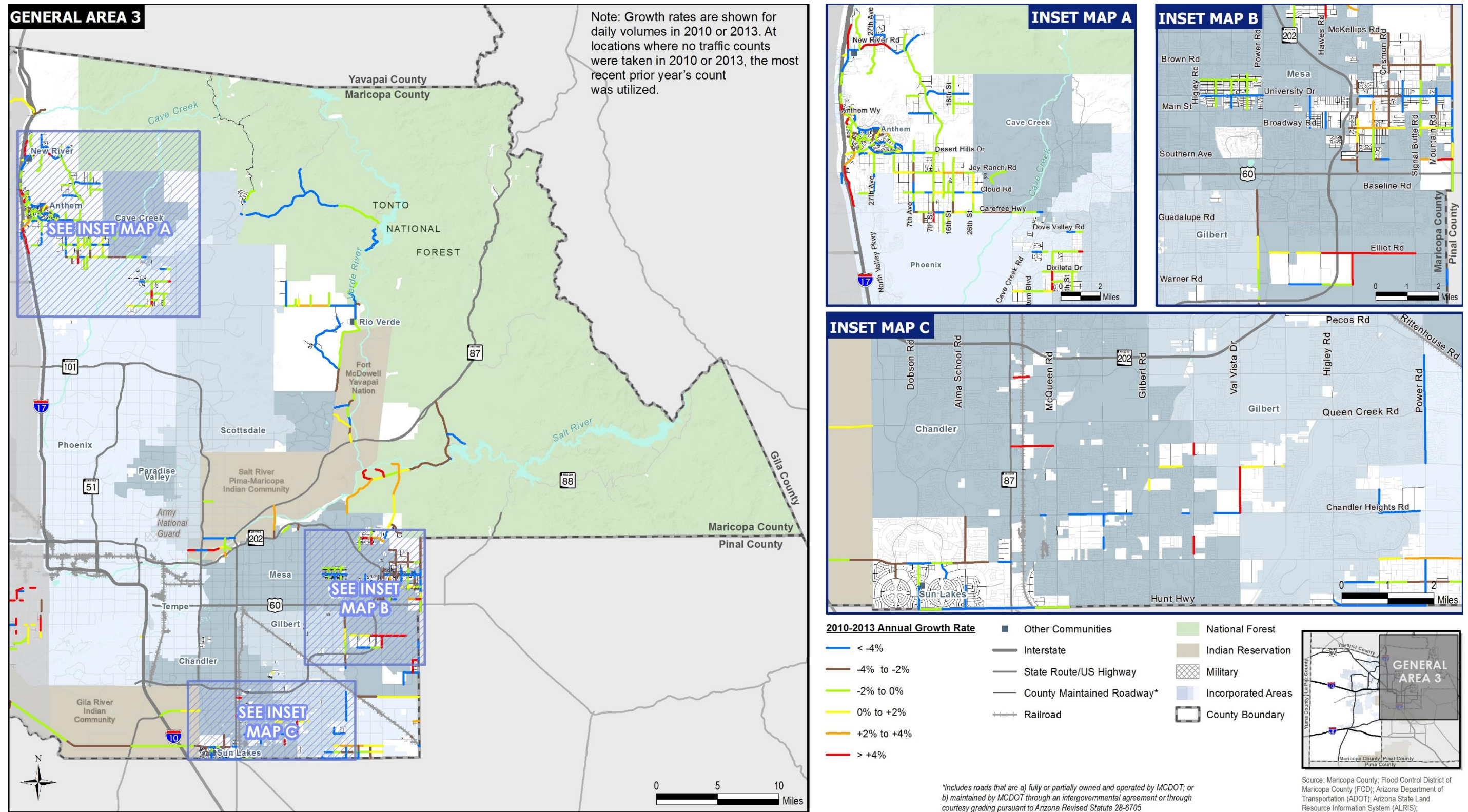


Figure 3: 2010-2013 Daily Traffic Volume Growth Rates  
Area 3



## *Traffic Congestion Performance Measures*

MCDOT has recently developed a traffic congestion performance measure known as the volume-to-service-standard-threshold (V/S) ratio. In contrast to the standard volume-to-capacity (V/C) ratio, which compares traffic volumes to road capacity, the V/S ratio compares the volume on a given road segment to the maximum volume considered acceptable by MCDOT for the characteristics of that road segment. A road segment with a V/S ratio value over 1.0 is considered to have unacceptable levels of congestion.

**Table 1** lists the 50 County road segments with the highest V/S ratios. Maps labeled **Figure 4** show the V/S ratio for the road segments for which 2013 traffic volume counts were available. It should be noted that the table and the figures exclude local roads. Most of the County's roads have V/S ratios well below 1.0 but there are some road segments with a V/S ratio that approaches or exceeds 1.0.

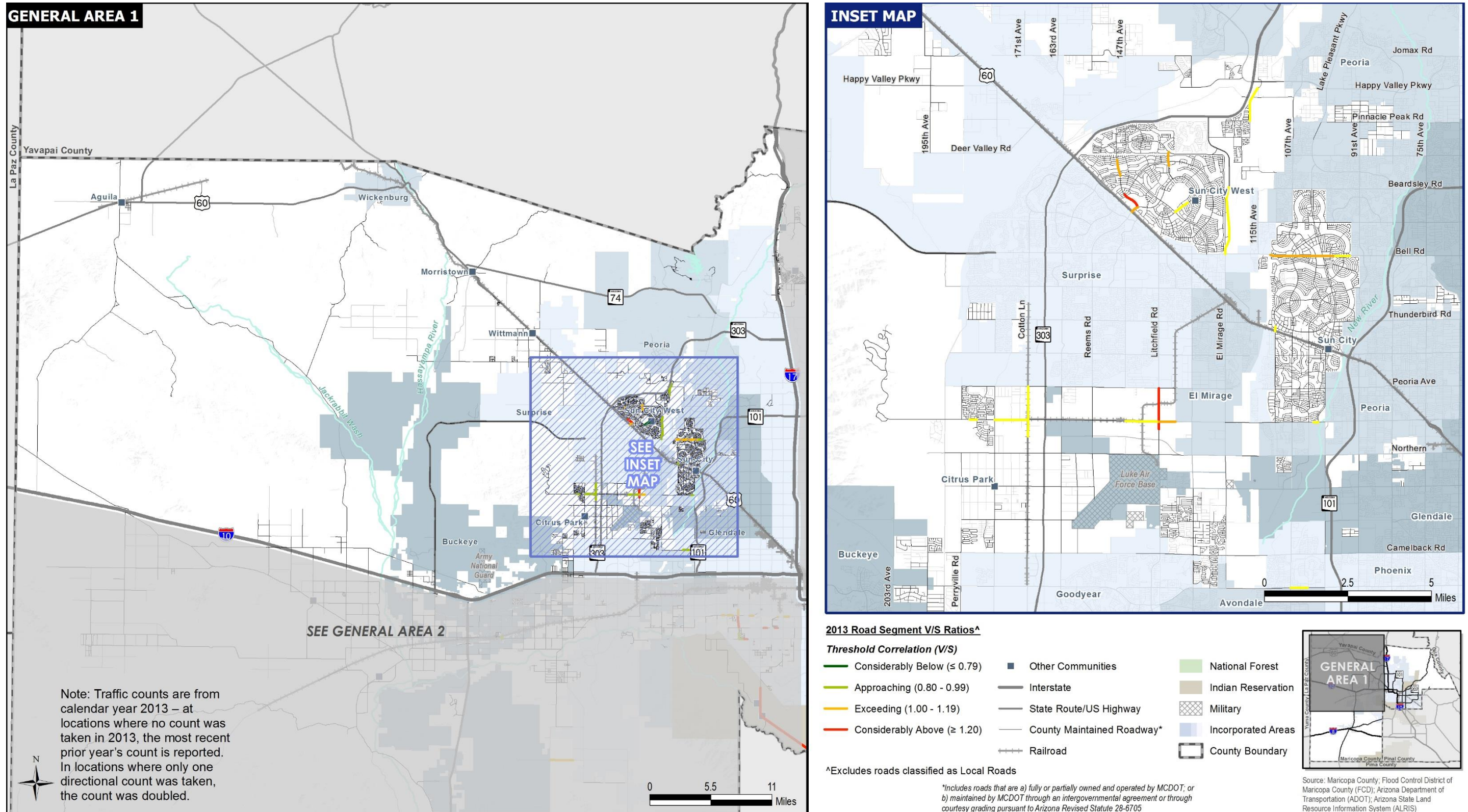




**Table 1: Highest 50 2013 Road Segment V/S Ratios**

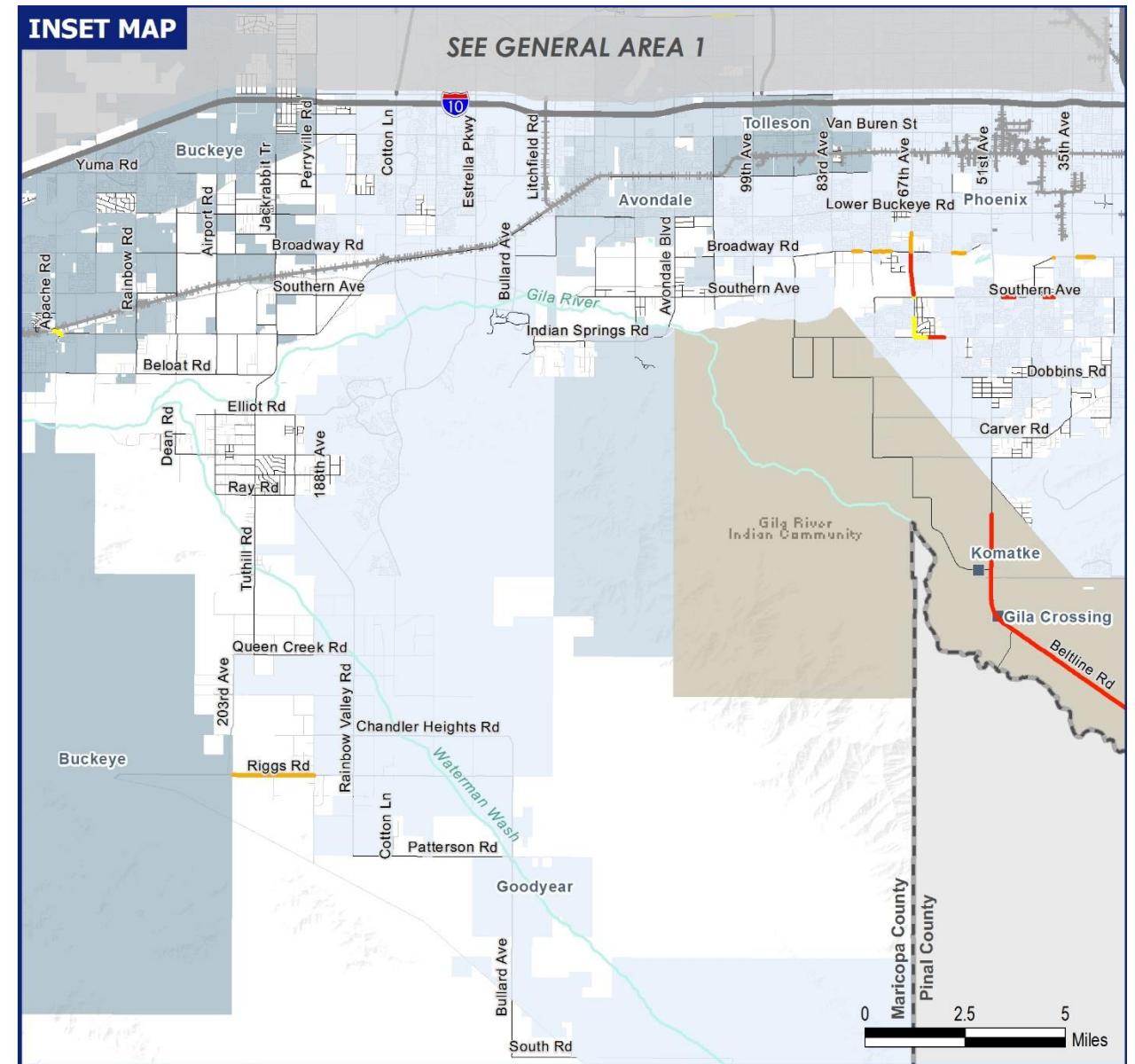
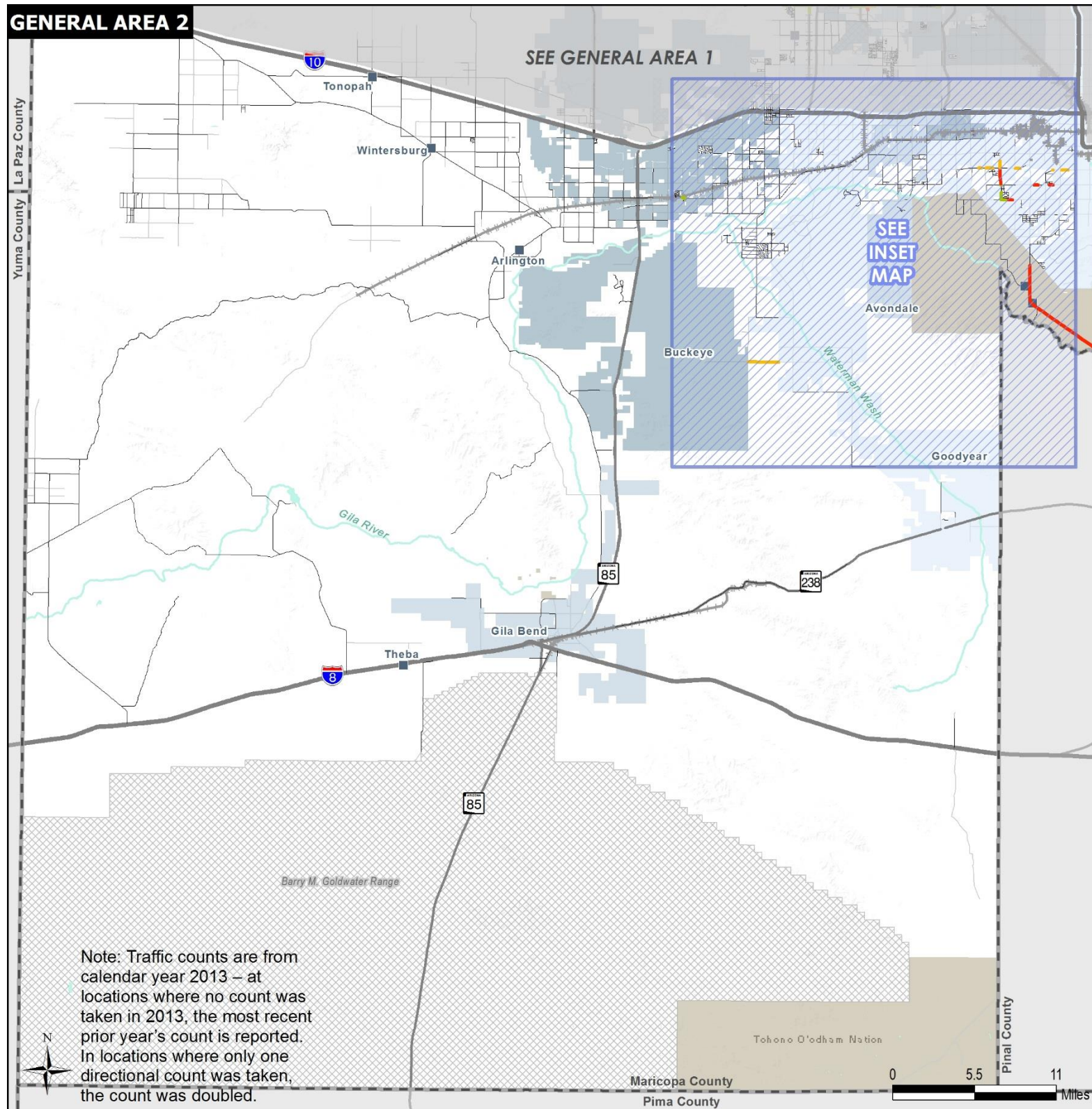
Rank	On Road	Reference Road	Number of Lanes	Daily Volume (2010)	Daily Volume (2013)	2010-2013 Daily Volume Annual Growth Rate	2013 Daily V/S Ratio
1	Litchfield Rd	N. of Olive Ave	2	20,771	16,540	-5.54%	1.798
2	Rittenhouse Rd	S. of Combs Rd	2	29,611	21,777	-7.39%	1.701
3	Baseline Rd	E. of 64th Ave	2	16,145	16,957	1.23%	1.662
4	Gilbert Rd	N. of Brooks Farm Rd	2	22,568	24,233	1.80%	1.616
5	Elliot Rd	E. of Ellsworth Rd	2	11,170	14,804	15.12%	1.609
6	51st Ave	N. of Pecos Rd	2	8,022	8,892	2.61%	1.588
7	67th Ave	S. of Broadway Rd	2	13,092	15,714	4.67%	1.541
8	Ocotillo Rd	W. of Meridian Rd	2	17,963	19,215	2.25%	1.501
9	Southern Ave	W. of 47th Ave	2	12,621	18,276	9.70%	1.428
10	Rittenhouse Rd	S. of Via de Palmas	2	20,491	18,184	-2.94%	1.421
11	51st Ave	S. of Pecos Rd	2	8,546	7,666	-2.68%	1.369
12	Granite Valley Dr	N. of Meeker Blvd	2	16,434	11,906	-7.74%	1.294
13	Beltline Rd	S. of Santa Cruz Rd	2	7,222	7,092	-0.45%	1.266
14	Southern Ave	W. of 39th Ave	2	8,064	15,772	18.26%	1.232
15	Broadway Rd	E. of 35th Ave	2	11,526	12,816	5.45%	1.187
16	Carefree Hwy	W. of 52nd Ave	2	21,932	18,462	-4.22%	1.161
17	Broadway Rd	E. of 59th Ave	2	6,793	11,798	14.80%	1.157
18	Val Vista Dr	S. of Thomas Rd	2	7,297	6,535	-3.09%	1.149
19	Hunt Hwy	W. of Sossaman Rd	2	9,059	6,530	-8.21%	1.148
20	Beltline Rd	W. of SR-347	2	6,980	6,308	-2.50%	1.126
21	151st Ave	N. of Johnson Blvd	2	11,358	10,290	-2.44%	1.118
22	67th Ave	N. of Broadway Rd	2	9,886	11,238	3.26%	1.102
23	Carefree Hwy	E. of 7th Ave	2	19,486	17,219	-4.00%	1.083
24	Broadway Rd	E. of 79th Ave	2	11,496	11,038	-1.01%	1.082
25	135th Ave	S. of Deer Valley Rd	2	10,067	9,793	-0.69%	1.064
26	Val Vista Dr	S. of Ocotillo Rd	2	9,294	13,547	9.88%	1.058
27	Riggs Rd	W. of 187th Ave	2	4,907	5,285	-0.85%	1.057
28	Bell Rd	E. and W. of Del Webb Blvd	6	53,830	56,578	1.25%	1.032
29	Bell Rd	E. of 99th Ave	6	55,817	56,238	0.19%	1.026
30	Carefree Hwy	E. and W. of 36th Ave	2	19,025	16,191	-3.95%	1.018
31	Meeker Blvd	N. of Grand Ave	5	23,911	25,602	1.72%	1.016
32	Bell Rd	W. of 99th Ave	6	56,350	55,403	-0.42%	1.011
33	Olive Ave	E. of Litchfield Rd	2	14,669	15,064	0.67%	1.004
34	67th Ave	N. of Baseline Rd	2	10,891	9,937	-2.27%	0.974
35	Bell Rd	E. and W. of Burns Rd	6	59,994	53,206	-2.96%	0.971
36	Indian School Rd	E. of 107th Ave	4	30,103	28,239	-1.59%	0.914
37	Carefree Hwy	E. of 7th St	2	17,229	14,296	-4.56%	0.899
38	Baseline Rd	N. of US-85	2	6,614	8,235	5.63%	0.895
39	El Mirage Rd	N. of Bell Rd	2	11,499	13,331	7.67%	0.889
40	Olive Ave	W. of Cotton Ln	2	7,029	9,024	6.45%	0.885
41	Baseline Rd	E. of 67th Ave	3	16,145	16,957	1.23%	0.874
42	Riggs Rd	E. of I-10	2	13,791	12,922	-1.61%	0.861
43	Carefree Hwy	E. of 16th St	2	12,953	13,640	1.72%	0.858
44	111th Ave	N. of US-60	2	1,107	48,712	-5.82%	0.854
45	Cotton Ln	N. of Olive Ave	2	6,044	10,712	15.38%	0.837
46	117th Ave	N. of Pinnacle Peak Rd	2	7,470	8,002	3.50%	0.817
47	Olive Ave	W. of Litchfield Rd	2	8,337	12,252	10.10%	0.817
48	Olive Ave	W. of 99th Ave	4	37,576	29,427	-5.93%	0.811
49	Fort McDowell Rd	N. of SR-87	2	5,637	4,050	0.06%	0.810
50	Camino Del Sol	NW. of Johnson Blvd	2	11,115	7,415	-9.62%	0.806





**Figure 4: 2013 Road Segment V/S Ratios**  
Area 1





**2013 Road Segment V/S Ratios<sup>A</sup>**

**Threshold Correlation (V/S)**

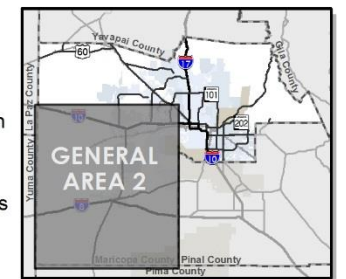
- Considerably Below ( $\leq 0.79$ )
- Approaching (0.80 - 0.99)
- Exceeding (1.00 - 1.19)
- Considerably Above ( $\geq 1.20$ )

- Other Communities
- Interstate
- State Route/US Highway
- County Maintained Roadway\*
- Railroad

- National Forest
- Indian Reservation
- Military
- Incorporated Areas
- County Boundary

<sup>A</sup>Excludes roads classified as Local Roads

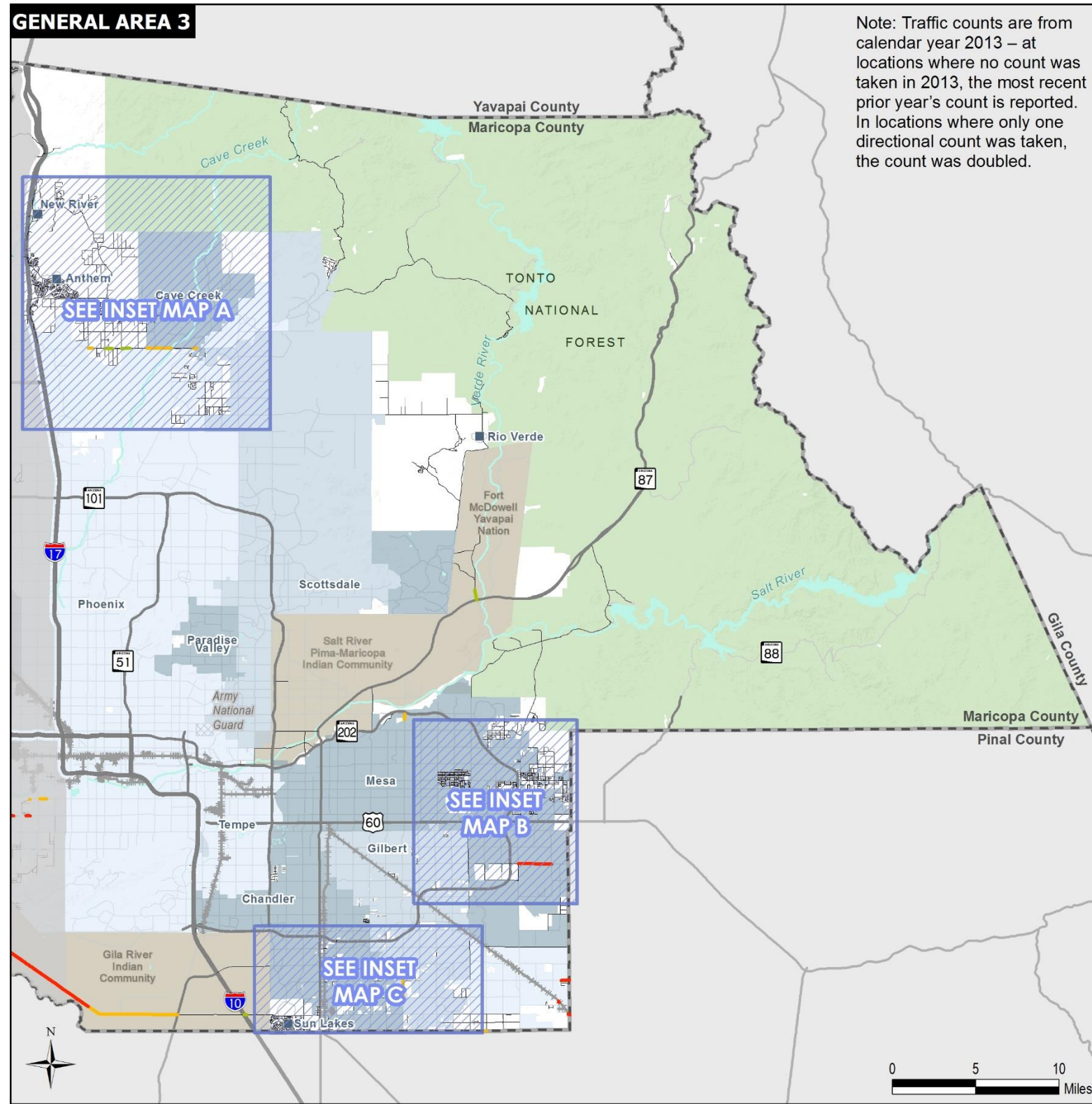
\*Includes roads that are a) fully or partially owned and operated by MCDOT; or b) maintained by MCDOT through an intergovernmental agreement or through courtesy grading pursuant to Arizona Revised Statute 28-6705



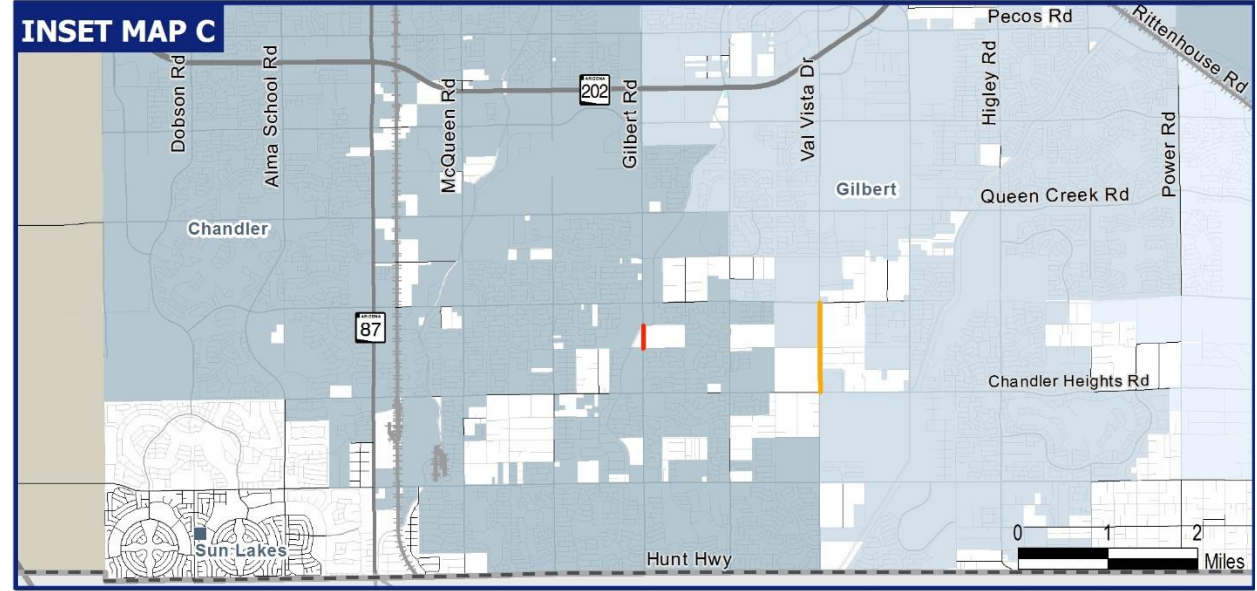
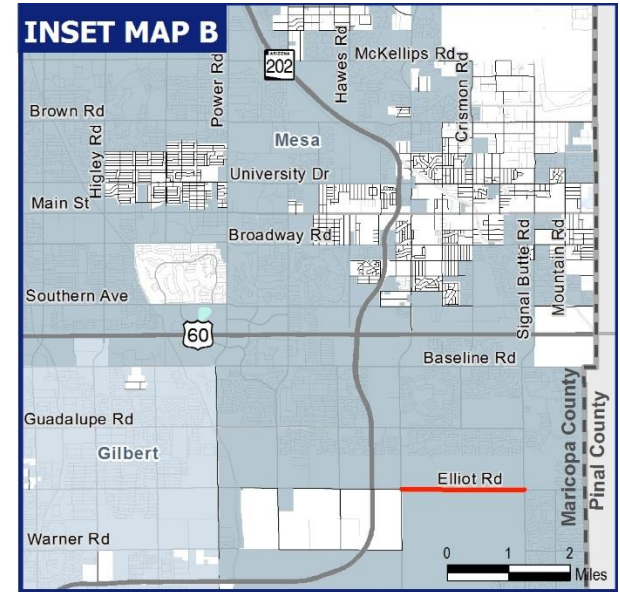
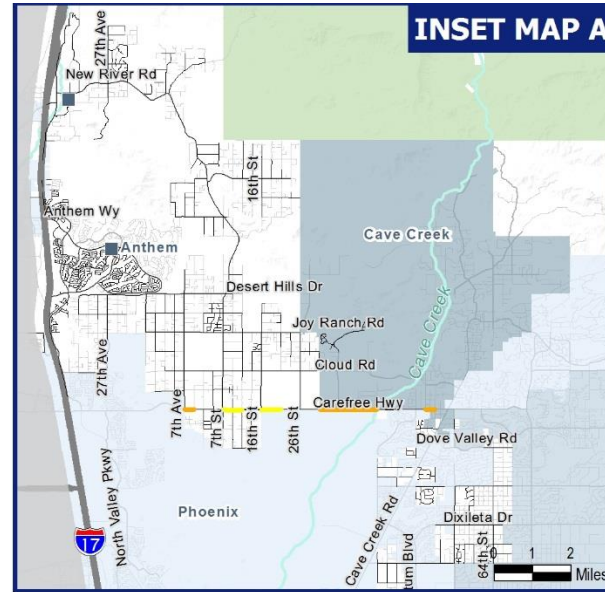
Source: Maricopa County; Flood Control District of Maricopa County (FCD); Arizona Department of Transportation (ADOT); Arizona State Land Resource Information System (ALRIS);

**Figure 4: 2013 Road Segment V/S Ratios Area 2**





Note: Traffic counts are from calendar year 2013 – at locations where no count was taken in 2013, the most recent prior year’s count is reported. In locations where only one directional count was taken, the count was doubled.



**2013 Road Segment V/S Ratios<sup>^</sup>**

**Threshold Correlation (V/S)**

- Considerably Below ( $\leq 0.79$ )
- Approaching (0.80 - 0.99)
- Exceeding (1.00 - 1.19)
- Considerably Above ( $\geq 1.20$ )

**Other Communities**

- Other Communities
- Interstate
- State Route/US Highway
- County Maintained Roadway\*
- Railroad

**National Forest**

- National Forest
- Indian Reservation
- Military
- Incorporated Areas
- County Boundary

<sup>^</sup>Excludes roads classified as Local Roads



Source: Maricopa County; Flood Control District of Maricopa County (FCD); Arizona Department of Transportation (ADOT); Arizona State Land Resource Information System (ALRIS);

Figure 4: 2013 Road Segment V/S Ratios Area 3



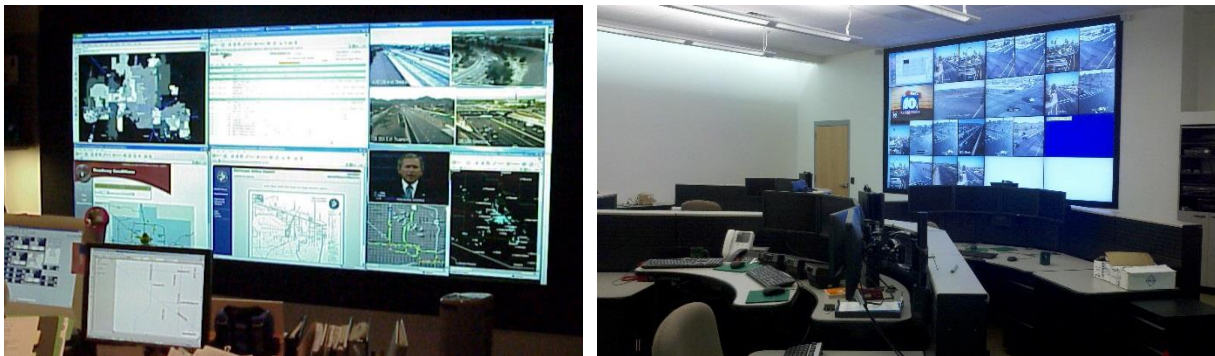
## Improving Traffic Systems Management and Operations

### Data Gathering and Analysis

Graphs, tables, and figures provided in this section are derived from established MCDOT reporting programs and are summarized herein. Some data sets have established goals associated with the annual collection of information while some data sets are simply reporting activity showing trending of data rather than performance compared to a specified goal. Data applies to FY 2014 unless otherwise noted.

### Intelligent Transportation Systems

A network of ITS devices such as traffic signals, closed-circuit television cameras (CCTV) mounted on traffic signals, dynamic message signs (DMS), traffic detection, and communications infrastructure allows the MCDOT Traffic Management Center (TMC) to manage traffic on County roads. The operators at the MCDOT TMC use the ITS devices to monitor traffic conditions and develop final timing plans as warranted to relieve congestion, post messages on DMS to alert motorists to road conditions, and dispatch the County incident response team. The real-time services enabled through ITS help in reducing delays and enhancing safety. The MCDOT TMC was initially built in 1998 and moved in 2012 to a larger facility that allowed for more operational capabilities. **Figure 5** shows the original TMC and the new TMC.



**Figure 5: Original MCDOT TMC (left) and New TMC (right)**

The MCDOT TMC has access to other jurisdictions' ITS devices based on permissions agreed to by MCDOT and those jurisdictions to manage traffic and support incident and event management. MCDOT actively manages the signal system operations, provides regional monitoring of CCTV and DMS on freeways and arterials, and collects and processes data feeds for arterial and freeway traffic movement. The TMC also develops signal timing plans for MCDOT-owned traffic signals and changes/implements traffic signal timing using pre-set timing plans in response to real-time conditions. **Table 2** compares the FY 2006 and FY 2014 levels of deployment for ITS infrastructure to measure growth in having and operating ITS devices.

**Table 2: Growth of ITS Features for FY 2006 and FY 2014**

ITS Feature	FY 2006 Amount	FY 2014 Amount	% Growth 2006-2014
CCTV Cameras	32	60	187%
DMS with Travel Time Posting Capabilities	0	5	-
Traffic Signals with Communication to TMC	36	111	208%

The MCDOT TMC operates ITS devices to manage congestion, incidents, and events on County roads. The percentage of uptime of ITS devices and communications to support those activities is an important measure the TMC tracks because it reflects the availability of the ITS infrastructure to support management of traffic. The MCDOT 2006 ITS Business Plan established a goal of having TMC-device communications to 95% of ITS field devices within 10 years. In 2006, 30% of field devices had communications connections to the TMC. As of the end of FY 2014, 93% of field devices are connected to the TMC.



Performance of systems is critical to effective traffic management. TMC staff routinely performs system health checks and logs the status of devices and systems on the MCDOT TMC Performance Activity Log. The operators notify technical staff for troubleshooting support, if needed.

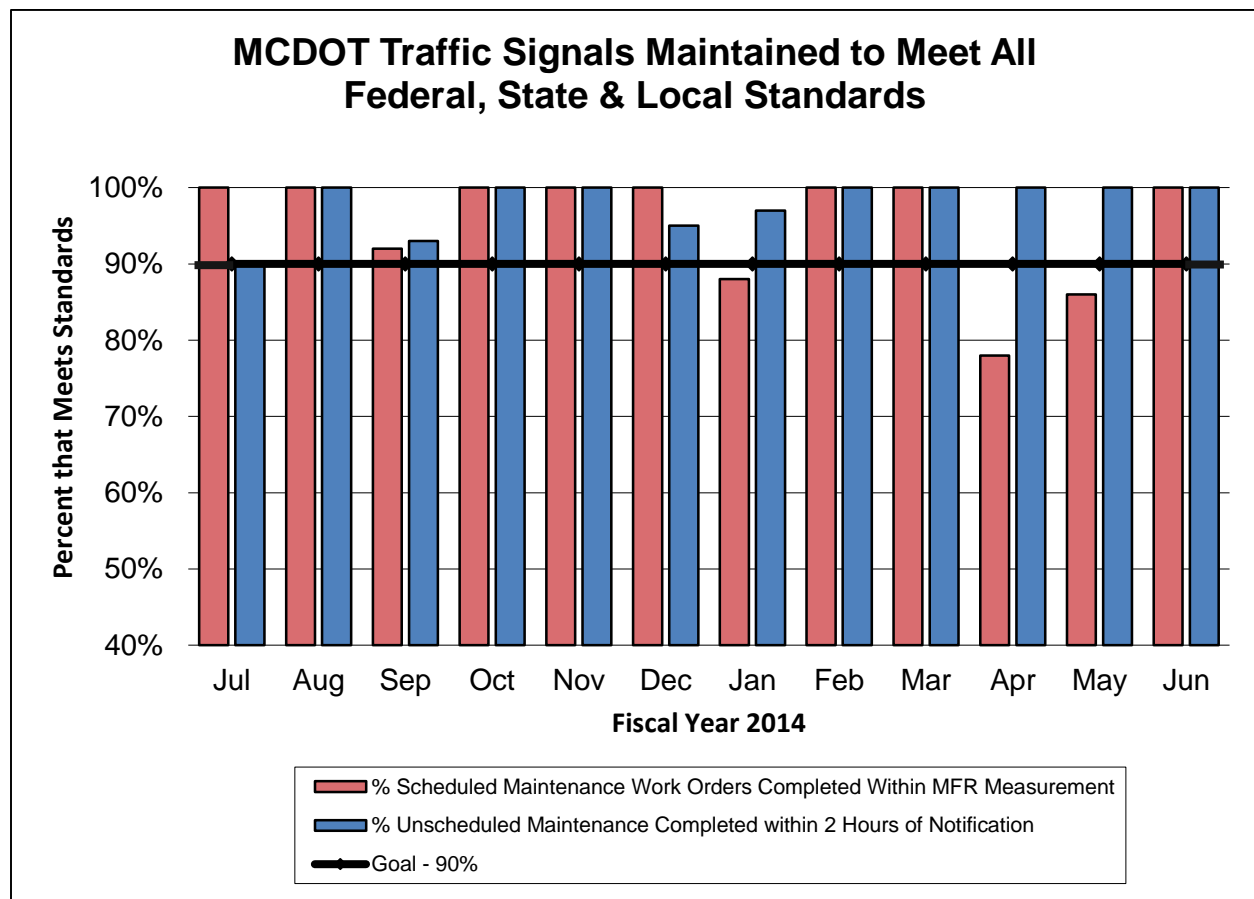
MCDOT collects data to support performance metrics established for the TMC as well as the analysis of incidents and other as-needed requests for performance reporting.

MCDOT tracks scheduled and unscheduled maintenance of MCDOT-owned traffic signals with the following goals:

- Complete preventative maintenance for 90% of all traffic signals within the monthly preset schedules; and
- Respond to 90% of unscheduled repair work within two hours of notification.

Both include a level of maintenance to traffic signals that meets all federal, state, and local standards.

**Figure 6** highlights the FY 2014 performance of MCDOT signal maintenance staff in meeting the aforementioned 90% goal.



**Figure 6: MCDOT FY 2014 Traffic Signal Maintenance Activities Compared to Goal**

### Bell Road

Bell Road has been a priority corridor for MCDOT since 2000 when a Traffic Management Study was completed between Loop 303 and Loop 101. In 2004, a Concept of Operations and ITS Operations Plan were completed that defined the roles and responsibilities of traffic, incident, and traveler information management along the corridor across the multiple jurisdictions of Surprise, the County, and Peoria. Since 2004, ITS devices including CCTV, DMS, fiber communications to all devices and traffic signals were designed and installed in a series of three phases. In 2013, the ITS Operations Plan was updated to





reflect current operating conditions as well as incorporate the Arizona Department of Transportation (ADOT) roles and responsibilities for the corridor.

Although the corridor has experienced increased average daily traffic volumes, travel times have been reduced, as shown in **Table 3** over multiple years since 2007.

**Table 3: Bell Road Travel Time Performance for 2007-2013**

Direction	% Change in Travel Time						
	2007	2008	2009	2010	2011	2012	2013
AM – Eastbound (EB)*	-	-7.3%	0.0%	-6.2%	0.0%	0.0%	0.0%
PM – Westbound (WB)*	-	-3.5%	0.0%	-24.8%	0.0%	0.0%	-9.7%
Combined EB & WB	-	-5.0%	0.0%	-17.4%	0.0%	0.0%	-5.3%
<b>Cumulative Change</b>	-	<b>-5.0%</b>	<b>-5.0%</b>	<b>-22.5%</b>	<b>-22.5%</b>	<b>-22.5%</b>	<b>-27.8%</b>

\* Peak Hour - Direction

Bell Road runs through six jurisdictions over a 25-mile corridor: Surprise, the County, Peoria, Glendale, Phoenix, and Scottsdale. The partner agencies along Bell Road have been planning for multiple years for an adaptive system(s) to be implemented along strategic sections of Bell Road. A Concept of Operations and System Requirements for four different segments along Bell Road have been developed to outline the deployment of signal control technology to the existing signal system.

In 2013, the Bell Road corridor began providing arterial travel times. The Bell Road corridor is using third party and probe data as well as integrating freeway detection information to collect and post travel times eastbound as a pilot program in the County jurisdiction. The pilot program is being planned to expand along the entire Bell Road corridor across the Valley.

## Incident Management

The MCDOT Regional Emergency Action Coordinating Team (REACT) is a team of personnel that dispatch to an incident scene on arterials throughout the County to provide first-responder emergency services (e.g., police, fire, medical) with traffic management and control assistance so the responders can focus on their responsibilities and clear incidents quickly, thereby reducing the likelihood of secondary crashes. REACT has six IGAs with agencies throughout the Phoenix Metropolitan region that cover 1,054 miles of road. These agencies include:

- ADOT;
- Glendale;
- Peoria;
- Avondale;
- Scottsdale; and
- Salt River Pima-Maricopa Indian Community.



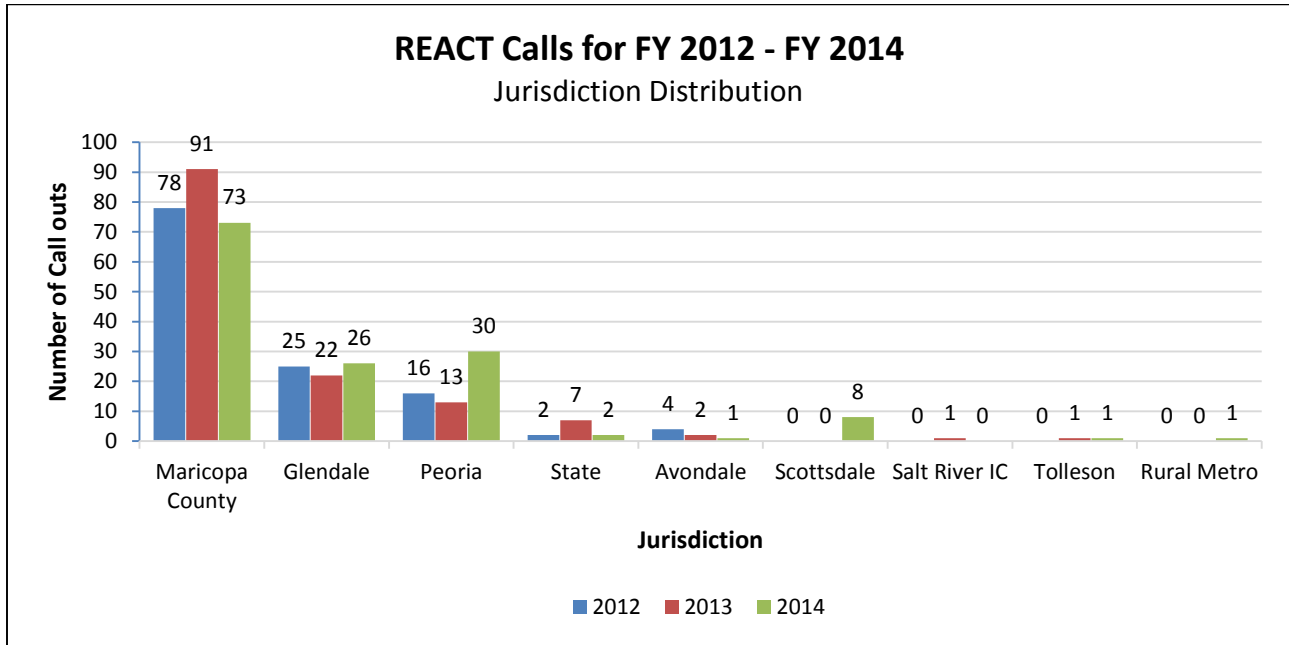
The MCDOT TMC has access to incident data on freeways from the Arizona (DPS) and Phoenix Fire (arterial incidents) Computer-Aided Dispatch (CAD) systems. Incident management is one of the primary functions of the MCDOT TMC. For incidents occurring on County-owned roads and local agency-owned roads, the TMC supports the County Sheriff's Office, DPS, and local public safety agencies via alerts, closure reporting, scene monitoring through camera images (where available), and media relations (if needed).

For all incidents that have requested REACT Team response, the TMC serves as the contact in actively

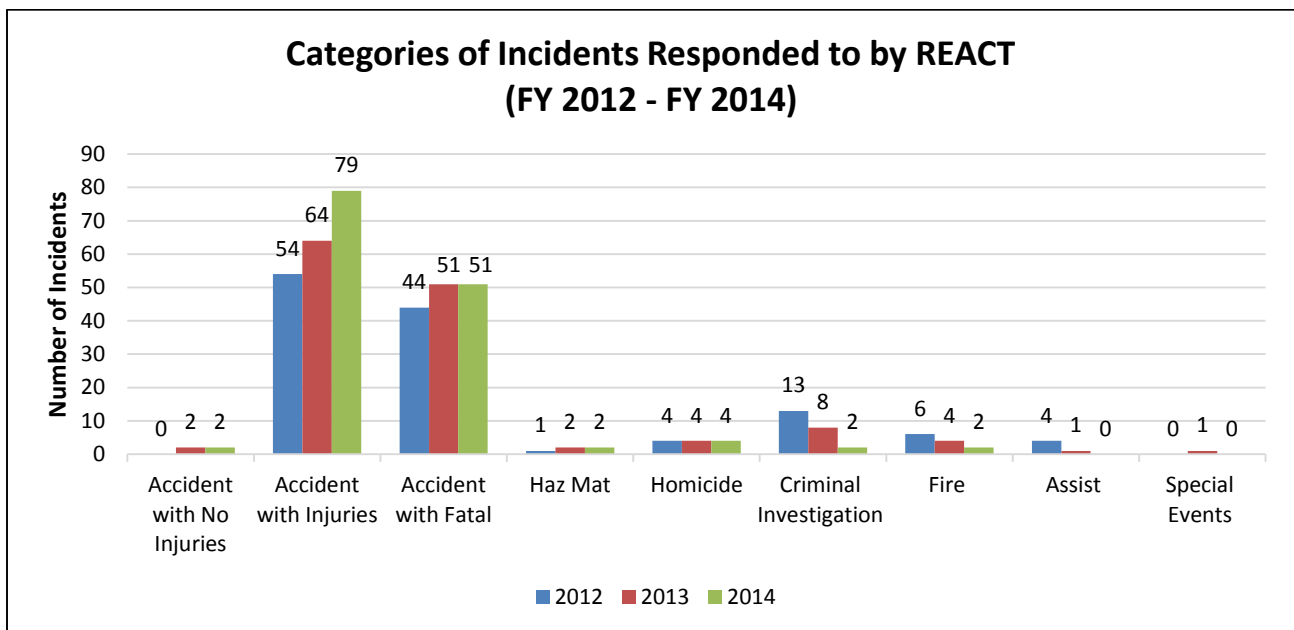


supporting REACT personnel as well as supporting the local agency that requested REACT support. For larger freeway incidents, REACT may be called upon to coordinate with ALERT.

**Figure 7** and **Figure 8** show data tracking completed by MCDOT for REACT team activity. To date, there have been no secondary crashes while REACT is present and established at the incident site.



**Figure 7: REACT Calls for FY 2012 - FY 2014 by Jurisdiction**



**Figure 8: Categories of Incidents Responded to by REACT (FY 2012 - FY 2014)**

## Traveler Information

The activities that MCDOT performs have a regional impact as the County has jurisdiction in

unincorporated areas within and surrounding the Phoenix metropolitan area.

The MCDOT TMC provides various traveler information functions for the County as well as regionally. This includes e-mail traffic alerts, tweets, text alerts, data entry into MCDOT's Advanced Traveler Information System (ATIS) program for arterial incidents and events for automated posting to the statewide 511 traveler information system, and travel time messages to DMS.

As part of the Regional Rental Car Center implementation for the Phoenix Sky Harbor International Airport (shown in **Figure 9**), MCDOT developed a travel time and congestion information display system for travelers that need information to key locations in the metropolitan area. There are currently eight travel displays as part of this system located at the Rental Car Center and some key downtown public facilities.



**Figure 9: Regional Rental Car Center at Phoenix Sky Harbor International Airport**

MCDOT also operates and maintains nine DMS along Bell Road, MC-85, and McDowell Road that provide traveler information to the traveling public. **Table 4** shows the number of traveler information messages posted from the MCDOT TMC between FY 2011 and FY 2014.

**Table 4: Traveler Information Message Posts (FY 2011 - FY 2014)**

Year	Traveler Information Messages Posted	Year-to-Year % Growth
FY 11	5,170	-
FY 12	5,865	14%
FY 13	6,204	6%
FY 14	6,763	9%

In an effort to broaden the scope, reach and timeliness of MCDOT's overall public outreach efforts, it was formally announced on May 14, 2013 that the MCDOT TMC and REACT traffic incident management team have joined the MCDOT Public Affairs Office News Twitter feed. In addition to important news about MCDOT projects, @MCDOTNEWS Twitter followers now receive major TMC Traffic Alerts and are notified in "real time" of major incidents on Valley roads that could impact their commutes.

The Twitter account @MCDOTNEWS has 1,473 followers, follows 111 other agencies and media Twitter feeds for retweets, and tweets 5-25 times each day depending on the amount of incidents or news reports happening that day. Information is regularly retweeted from @ArizonaDOT and @PhxTrafficAlert.

## Traffic Management Serving Regional Travel

### *AZTech*

MCDOT serves as a program leader for the AZTech Regional Transportation Partnership. Through regional collaboration, this partnership aims to integrate and improve regional traffic management. Individual cities and towns deploy, operate, and maintain their ITS systems and equipment, and MCDOT



helps to integrate these efforts to facilitate better regional traffic management and coordination. The regional AZTech activities that are coordinated through MCDOT Traffic Management Division include:

- Institutional collaboration and public-private partnerships;
- Center-Center communications infrastructure development;
- Inter-agency operations;
- Regional traveler information support; and
- Incident management.

AZTech was initially established in 1996 as one of four metropolitan areas selected by USDOT for the ITS Metropolitan Model Deployment Initiative (MDI). The AZTech partnership was formed as a result of this MDI to integrate the region's transportation system and give travelers up-to-the-minute traffic information through innovative partnerships among public sector and private sector technology companies. AZTech successfully completed the MDI in 2000 and has transitioned into a permanent partnership that continues to serve as a forum for innovation in transportation systems operations and management in the County.

AZTech brings together decision makers and practitioners with a consensus-based approach to traffic management. ADOT and MCDOT provide joint leadership for the AZTech program. Members include ADOT, Maricopa Association of Governments (MAG), Valley Metro, DPS, the County, cities, towns, and private partners. Members represent state and county traffic management and operations, regional transit operations, regional planning, municipal traffic and transportation agencies, state and regional law enforcement and public safety and emergency services.

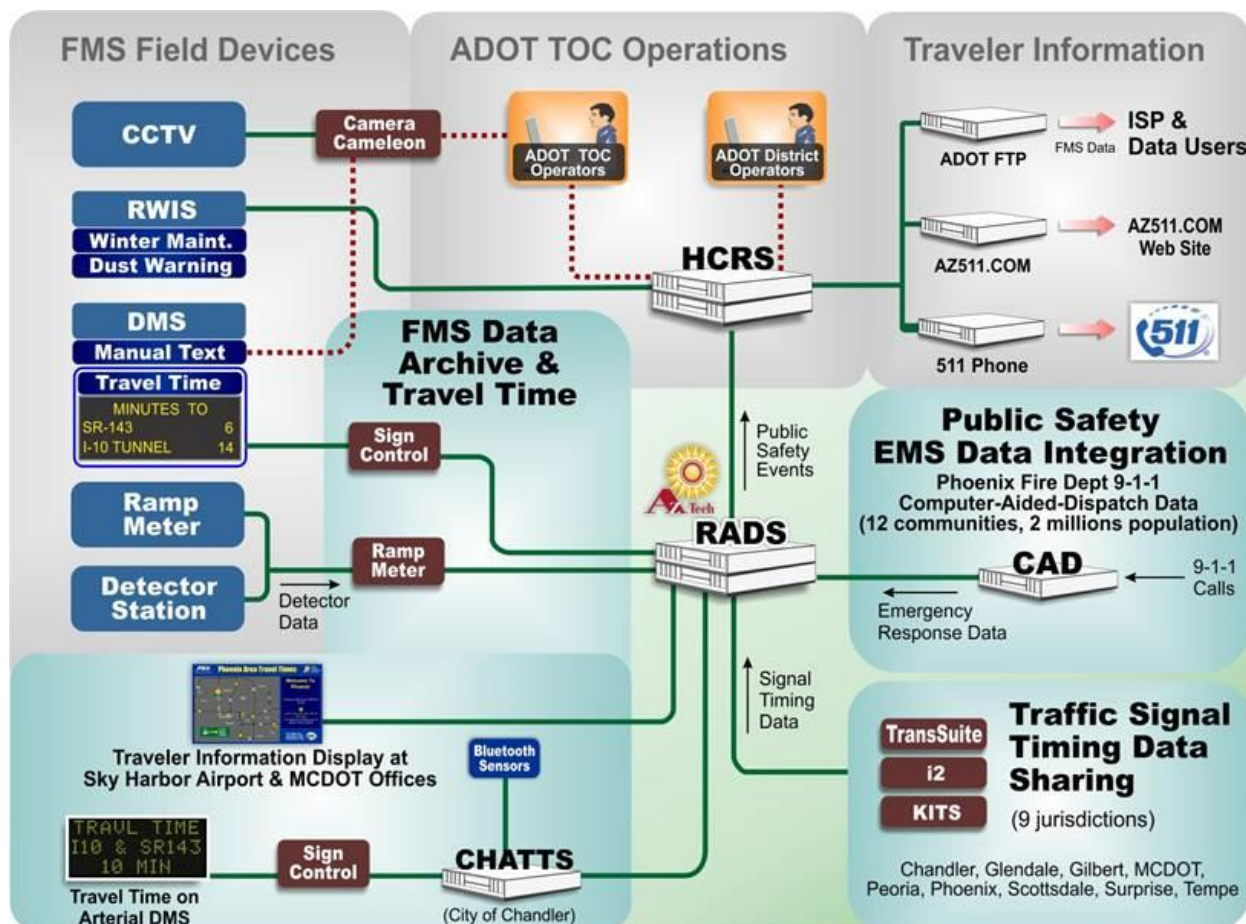
MCDOT and ADOT continue their leadership roles chairing the AZTech Executive Committee, which sets strategic direction for the AZTech partnership. The AZTech Strategy Task Force is a subgroup of the Executive Committee, and is comprised of senior staff from member agencies across the region. AZTech also includes the following committees and working groups, which meet regularly and include representation from multiple partner agencies. These committees include:

- Operations Committee;
- Traffic Incident Management Coalition;
- Advanced Traveler Information Systems Working Group; and
- TMC Operators Working Group.

## *RADS*

In 2003, MCDOT, ADOT, and the Federal Highway Administration (FHWA) developed and implemented an innovative archive and retrieval system for ITS data. The Regional Archived Data Server (RADS) was designed to provide and maintain valid, classified ITS-derived data for use in transportation system planning and modeling. MCDOT is responsible for management and oversight of RADS, and local jurisdictions provide data as appropriate to the RADS server as shown in **Figure 10**. The RADS server is housed in the ADOT traffic operations center (TOC) and ADOT provides technical support for maintenance activities to the server. RADS has become a critical part of the region's data-sharing strategy.





**Figure 10: AZTech Regional Archived Data Center (RADS)**

The system is linked with ADOT’s Highway Condition Reporting System (HCRS) to provide real-time traffic data to support speed maps on the AZ511 website as well as supplemental road condition information collected from public safety agencies and local agencies not already provided through the HCRS system. RADS takes ITS data from systems throughout the Phoenix metropolitan area, stores the data in a centralized archived data server, and then makes the data available for a variety of users through a common Internet interface. Processes incorporated into the RADS system includes:

- ADOT freeway management system (FMS) detector station data;
- Travel times based on FMS detector station data that are displayed on freeway DMS, at the Sky Harbor International Airport Rental Car Center, and at County buildings in downtown Phoenix;
- ADOT HCRS events;
- Phoenix Fire incident data; and
- Traffic signal timing and traffic characteristic data from local jurisdictions.

A summary of RADS implementation for years 2013 and 2014 is provided below.

*Integration of third-party travel time data*

- 2013: integrated third-party travel time data (Nokia/HERE) in RADS. The third-party travel time data is provided based on the Traffic Message Channel, which contains pre-defined

segments of road of the County. The travel time data is updated every minute and archived in RADS.

### Expansion of travel time display on DMS using RADS travel time module

- 2013: freeway DMS travel time expansion processed by RADS.
- 2013-2014: implemented DMS travel time in several jurisdictions along the Bell Road corridor. The third-party travel time data was used to compute the travel time of the corridors advised on the respective DMS. The jurisdictions include Surprise, Peoria, Glendale, and Sun City (managed by the County).

### Assessment of RADS IT architecture

- 2013: a study was conducted to assess the IT architecture of RADS in anticipation of future growth. The study assessed the needs of RADS in terms of communications, data storage, security, and processing.

### Implementation of AZTech Regional Information System (ARIS)

- 2014: MCDOT developed an advanced tool for operators for notification and monitoring during incidents in the metropolitan area. The ARIS system uses information from RADS to display current speeds on freeways and arterials (where instrumented with detection), traffic volumes, freeway and arterial cameras, and incident status updates based on the Phoenix Fire CAD system. This helps operators receive timely notifications and understand the breadth of impact surrounding the incident location and provides a tool to manage in a cross-jurisdictional manner.

### Loop 101 ICM

In 2014, ADOT, DPS, MCDOT, Scottsdale, ALERT, REACT, Salt River Pima Maricopa Indian Community and MAG jointly completed an Integrated Corridor Management (ICM) Program for the Loop 101 corridor in Scottsdale. The plan includes traffic management protocols between operating and responding agencies involved in freeway detour of traffic and specific alternate routing options through the arterial network of Scottsdale. This Program uses a strategic combination of Scottsdale arterial signal and infrastructure control, ADOT freeway DMS messaging, ALERT freeway traffic control support, REACT arterial traffic control support, and other responding services. This ICM Program also produced a Detour Guidebook that provided specific detour planning for segments of Loop 101 through Scottsdale and roles for each specific detour for each responding/operating agency involved in freeway closure impacts, as shown in **Figure 11**.

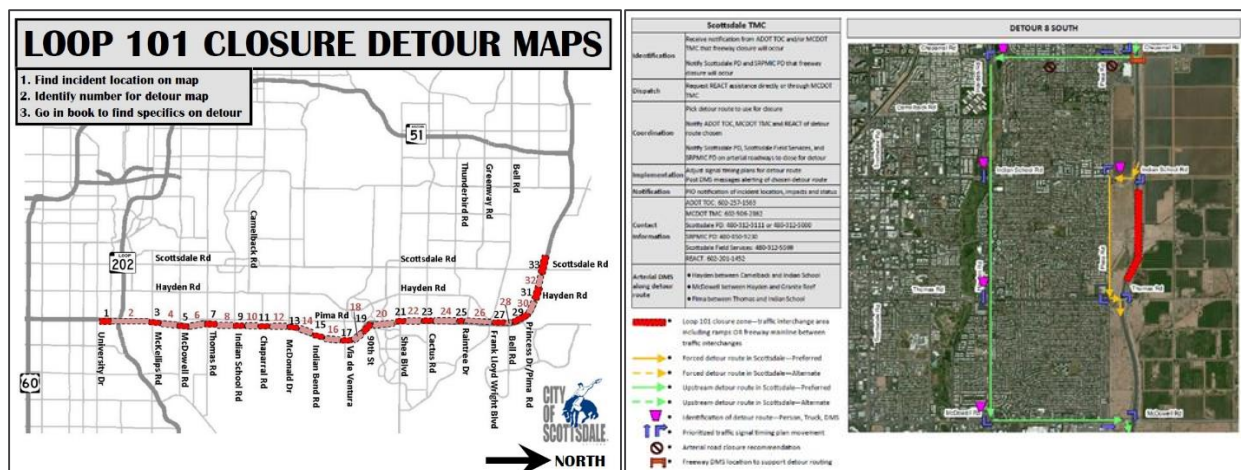


Figure 11: Example of Loop 101 Detour Maps



In early January 2014, the southbound Loop 101 freeway was shut down for a period of 4 hours due to an officer-involved incident while an investigation was completed. The partners successfully implemented the ICM plan and traffic was diverted to an arterial that was efficiently managed.

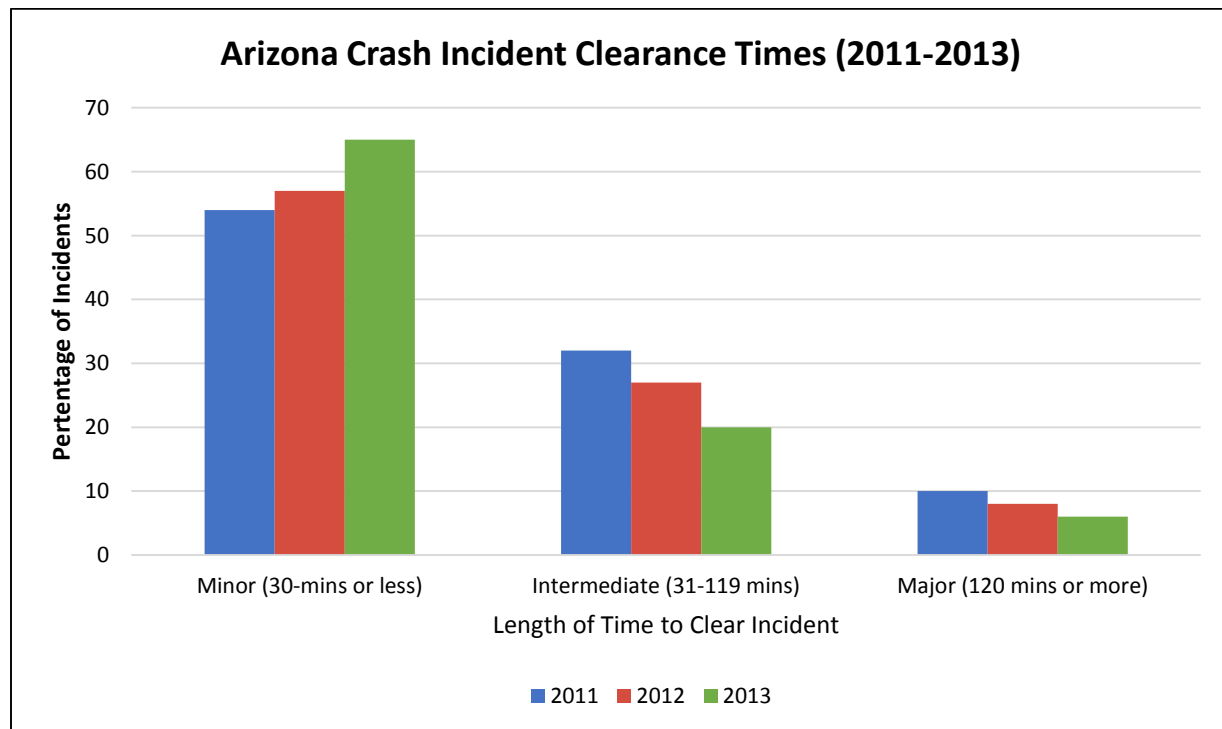
### Traffic Incident Management

The AZTech Traffic Incident Management (TIM) Coalition was initiated in 2011 following TIM workshops in 2010 that addressed the need for a TIM Coalition in Arizona. Arizona DPS is the lead of the TIM Coalition and its members include FHWA, ADOT, MAG, first responders, medical examiners, towing and recovery entities, and Public Information Officers. The focus is to achieve the TIM National Unified Goal (NUG). NUG priorities include:

- Responder safety;
- Safe, quick clearance; and
- Prompt, reliable, interoperable communications.

The TIM Coalition has helped to improve cross-discipline communications, increase exposure to TIM training courses to attend in Arizona, debrief secondary incidents, and conduct joint training and planning. As of July 2014, the TIM Coalition had conducted 108 TIM 4-hour classes with 2,815 first responders and produced two training videos to educate how traffic reporters play a critical role in reducing congestion and improve safety.

**Figure 12** provides a comparison of incident clearance times over a three-year period, as reported by DPS. While the clearance times of minor incidents increased between 2009 and 2011, the clearance times for intermediate and major incidents decreased. Additionally, a major performance metric is the percentage of secondary crashes that occur in the state: Arizona is experiencing a 7% secondary crash rate compared to a near 20% average rate nationally.



**Figure 12: Arizona Crash Incident Clearance Times (2011-2013)**



## *AZTech TM&O Performance Indicator Book*

Moving Ahead for Progress in the 21st Century (MAP-21), the current highway authorization, emphasizes performance management and monitoring across multiple transportation modes. MCDOT completed an AZTech Traffic Management and Operations Performance Indicators Book (Book) in year 2011. The Book combines key regional traffic management, traffic operations, and transit performance measures that are tracked and reported throughout the Phoenix metropolitan region. The Book has been completed for years 2011 and 2013 and is underway in 2015 with the goal being to publish it every two years. The 2013 Book identified data collection corridors in the region for measuring travel time data year-to-year. An example of the Book is shown in **Figure 13**. The Book is available for download and distributed electronically to a statewide and nationwide group of individuals with influence in national committees and activities.

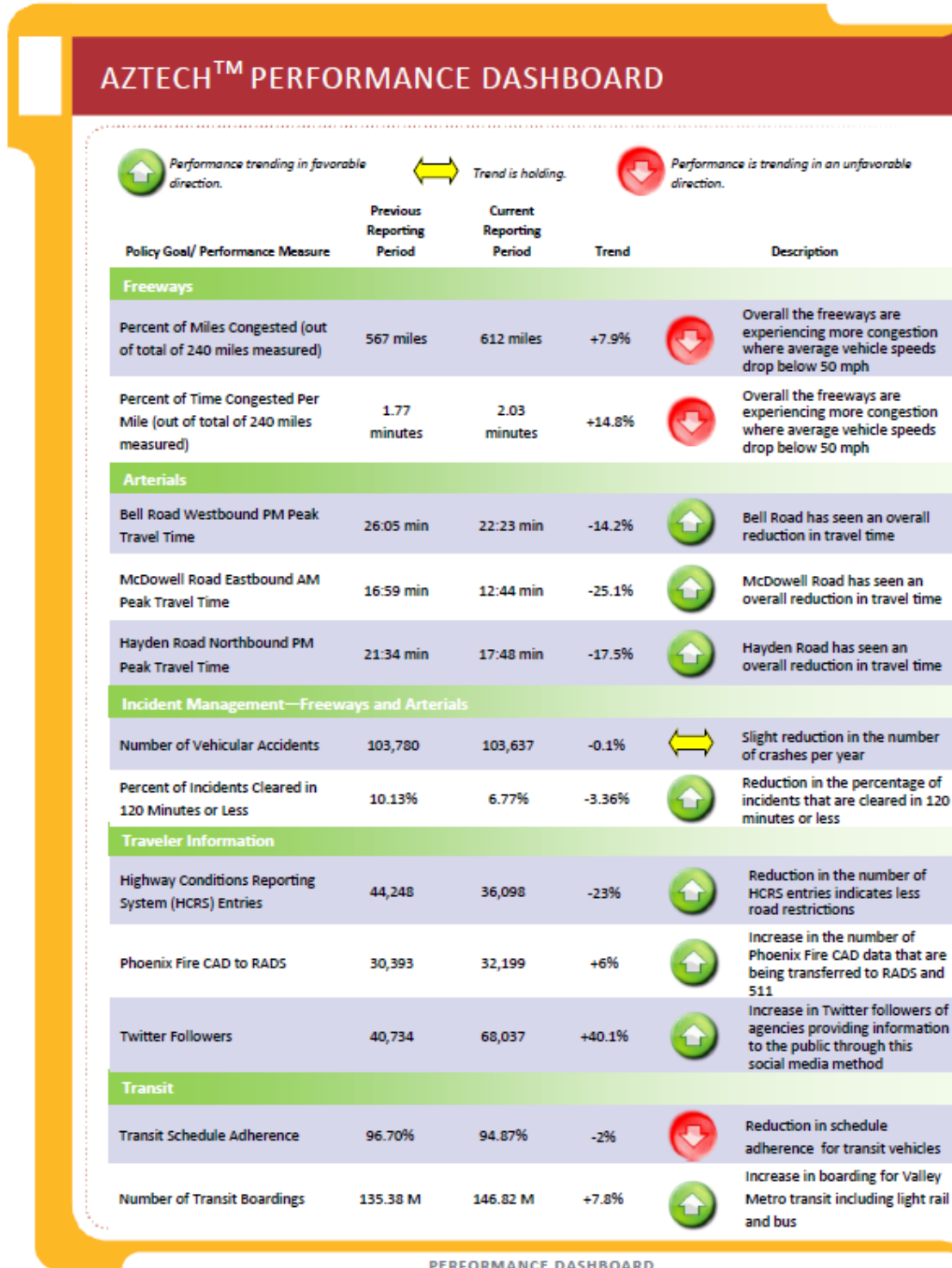


Figure 13: Example of the AZTech Performance Indicator Book



## Innovation

MCDOT has strived to be at the leading edge of innovation in transportation both locally and nationally. This section provides a brief status update of MCDOT's lead or involvement with innovative projects and programs.



Through a federal initiative called "Connected Vehicles", the U.S. Department of Transportation (USDOT) is working to leverage ITS technology to improve traffic operations to support public safety and surface transportation mobility. MCDOT and its partners at ADOT, the FHWA, and the University of Arizona are moving this initiative forward to develop and demonstrate advanced ITS applications that integrate vehicles together with road systems in the County.

MCDOT's SMARTDrive Program<sup>SM</sup>, which originated in 2007, represents an evolution of connected vehicle research, testing and implementation in Anthem in unincorporated County. Initiated as a research project through the Arizona Transportation Research Center, SMARTDrive has successfully demonstrated live operations and connectivity in a test bed environment, and has been established as a formal test bed for other connected vehicle technology and application developers to use. A map of the existing national test beds is shown in **Figure 14**.



Source: U.S. Department of Transportation

**Figure 14: National Connected Vehicle Test Beds**

The MCDOT SMARTDrive Test bed will continue to focus on traffic signal operations safety and mobility applications. MCDOT has deployed applications under the USDOT and Connected Vehicle Pooled Fund Program Multi Modal Intelligent Traffic Signal System (MMITSS) initiative. The test bed in Anthem will continue to be expanded on in the upcoming years and demonstrated to local, state, and national stakeholders.

Key components of the SMARTDrive demonstrations include:

- Six signalized intersections equipped with Dedicated Short-Range Communications (DSRC) Radios, WiFi and Bluetooth readers;
- Traffic signal priority application installed;
- Representative emergency vehicle and transit vehicle used to test application priority logic;



- Field test for emergency and transit applications;
- Pedestrian crosswalk application using smartphones to display crossing status; and
- Collection of detailed vehicle and traffic operations data for post-operational analysis.

As a result of these achievements and the County's commitment to ongoing innovative research, testing and implementation, the County is recognized by USDOT as one of six Connected Vehicle test beds in the nation. The USDOT announced in late 2014 that in early 2015 it will release a federal grant funding opportunity to advance Connected Vehicle implementation. MCDOT has worked in recent years to position itself and the region for pursuing federal funding for Connected Vehicle initiatives. MCDOT is proactively developing potential concepts and applications that would be the basis of a competitive proposal once the USDOT releases a formal request.







## Safety Management System

### Purpose of the Safety Management System

The County Safety Management System (SMS) is a systematic process that has three goals. These include:

- Document the road safety improvements made by the County during the previous fiscal year;
- Identify the location, type, and severity of traffic crashes in the unincorporated portions of the County; and
- Report trends in traffic crashes and recommend improvements to reduce the number and rate of crashes.

### MCDOT Safety Management Procedures

MCDOT makes every effort to respond quickly to identify safety problems. These problems are frequently identified through public complaints about unsafe road conditions, first-hand observation by County staff members, and reviews of recent crash records for County roads. When an actual problem or potential problem is encountered, a detailed engineering analysis may be conducted and recommendations are made to correct the situation. These recommendations are handled in one of three ways based on the recommendation:

- Relatively simple and inexpensive solutions are handled through the MCDOT maintenance process.
- More complex problems are handled by the MCDOT Traffic Engineering Division.
- Complex problems involving significant changes that require substantial funding amounts are handled through the MCDOT Transportation Improvement Program (TIP).

### Evaluation of Safety

MCDOT Traffic Engineering is continuing its program to identify and evaluate locations with potential safety concerns and prioritize and schedule improvements for upcoming years. The initial step each year is to examine the location and number of crashes, crash rates, injury severity, and the types of crashes occurring on County roads to identify locations with potential safety concerns. At these locations, crash history is used to evaluate the road and determine if improvements are required. Crash locations are plotted as indicated on ADOT crash reports. If five or more correctable crashes are detected within a road segment or intersection and occur within a 12-month period, an engineering evaluation is conducted to determine if an action should be taken.

The Manual on Uniform Traffic Control Devices (MUTCD) provides guidance to determine if an identified safety problem meets the criteria ('warrants') for the installation of multi-way stop control or traffic signals. There are additional warrant factors that may also be used to determine if an intersection needs improvements such as additional turn lanes or other safety items. Projects that meet the 'warrant' criteria are typically implemented in the order in which they are identified. The average daily traffic, road function, posted speed, and scheduled transportation improvement projects are also used to help determine if and when improvements are required.

### Spot Safety Improvement Project Accomplishments

The safety improvement projects that were completed in FY 2013 can be found in **Figure 15**. In FY 2014, twelve safety improvement projects were completed; the location of these projects can be found in **Figure 16**. These were implemented by the MCDOT Traffic Engineering Division.

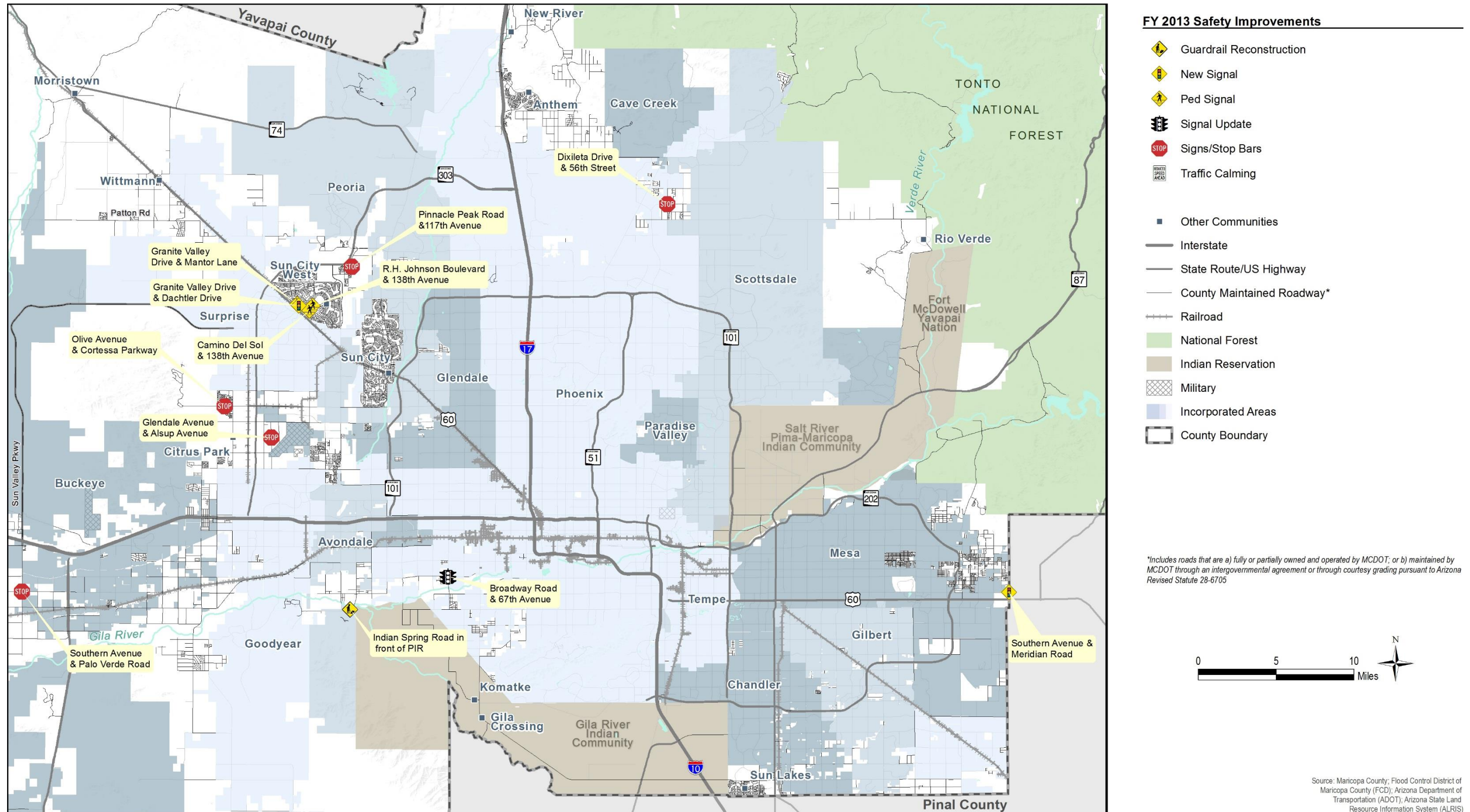
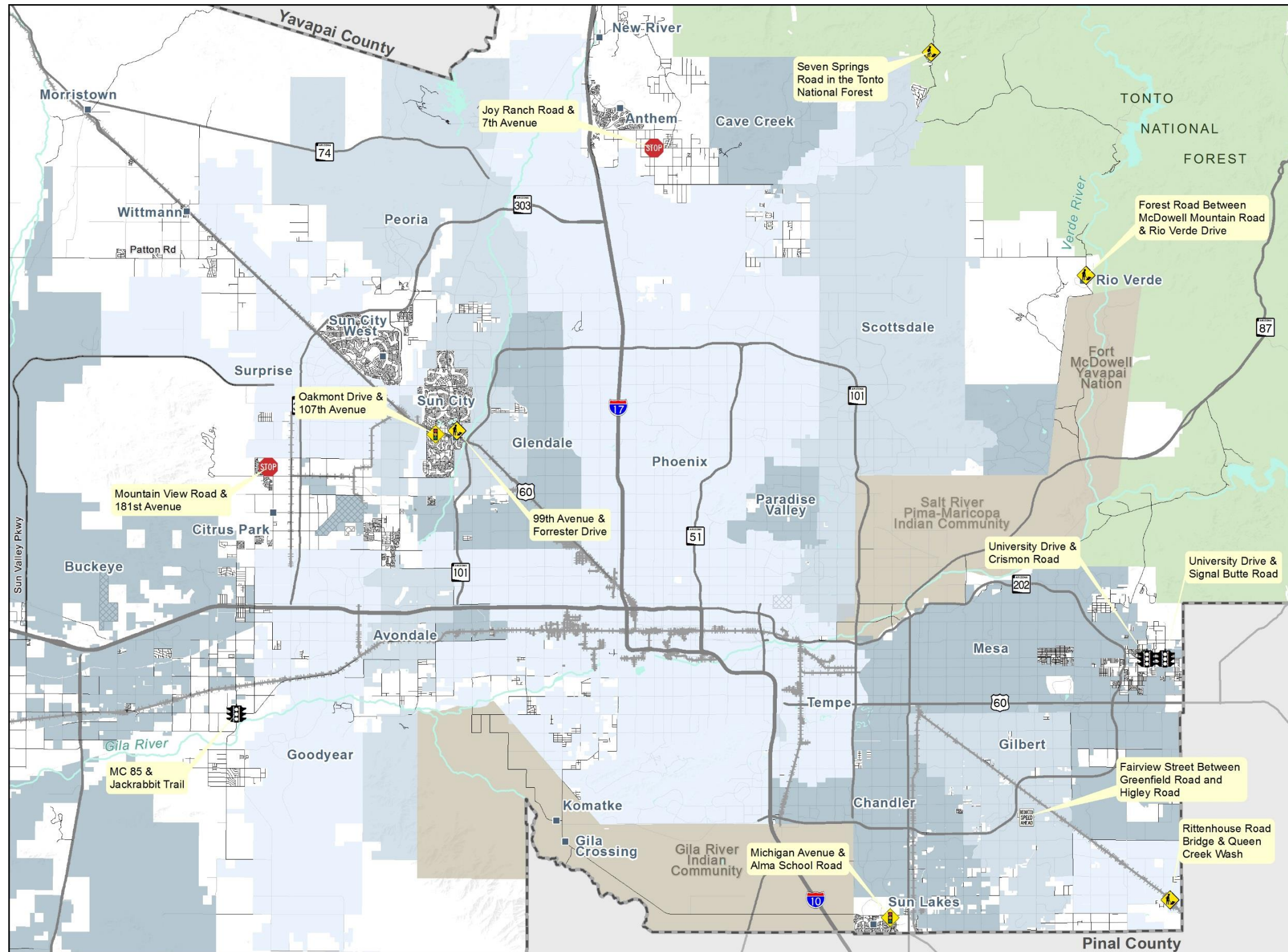


Figure 15: FY 2013 Safety Improvements on County Roads





**FY 2014 Safety Improvements**

- Guardrail Reconstruction
- New Signal
- Signal Update
- Signs/Stop Bars
- Traffic Calming

- Other Communities
- Interstate
- State Route/US Highway
- County Maintained Roadway\*
- Railroad
- National Forest
- Indian Reservation
- Military
- Incorporated Areas
- County Boundary

*\*Includes roads that are a) fully or partially owned and operated by MCDOT; or b) maintained by MCDOT through an intergovernmental agreement or through courtesy grading pursuant to Arizona Revised Statute 28-6705*



Source: Maricopa County; Flood Control District of Maricopa County (FCD); Arizona Department of Transportation (ADOT); Arizona State Land Resource Information System (ALRIS)

**Figure 16: FY 2014 Safety Improvements on County Roads**



## County Crash Statistics

The County crash rate summarizes the historical safety performance of the entire County-owned or maintained road system. The County crash rate measures the annual number of crashes per million vehicle miles of travel (MVMT) on the County road system. **Table 5** shows that the County crash rate increased in 2013 compared to 2012 and is above the 2009-2013 5-year average.

MCDOT also tracks crash rates for crashes involving fatalities, single vehicles, pedestrians, bicycles, injuries, and work zones. Most of these crash rates increased in 2013 compared to 2012 and are above the 5-year average. The only exception is the work zone crash rate, which in 2013 was lower than the 5-year average.

Table 5 also compares the number of crashes to the population in unincorporated portions of the County. While the total number of crashes in the unincorporated County increased in 2013 compared to 2012, the unincorporated County population also increased, resulting in a net decrease in the number of crashes per 100,000 population. Most other types of crashes declined in 2013 compared to 2012 on a per 100,000 population, with crashes involving fatalities and pedestrians being the exceptions.

## Safety Focus Areas

The state of Arizona has established twelve Emphasis Areas within the Arizona Strategic Highway Safety Plan (SHSP) that indicate the areas that ADOT and other state agencies are focused on in order to improve safety in the state. The twelve Arizona SHSP Emphasis Areas are:

- Speeding and Aggressive Driving;
- Impaired Driving;
- Occupant Protection;
- Motorcycles;
- Distracted Driving;
- Roadway Infrastructure and Operations Improvement;
- Age-related;
- Heavy Vehicles/Buses/Transit;
- Non-Motorized Users;
- Natural Risks;
- Traffic Incident Management;
- Inter-jurisdictional Coordination;
- Data Analysis Improvements; and
- Policy Initiatives.

Based on the Arizona SHSP initiatives, MAG developed its own set of Action Areas for the MAG Strategic Transportation Safety Plan (STSP). These Action Areas were developed to work with and supplement the statewide Emphasis Areas, recognizing that the MAG planning area is largely urbanized while most of the State highway system traverses areas that are more rural.





**Table 5: County Crash Rates 1998 - 2013**

Factors	2009	2010	2011	2012	2013	2009-2013 5-Year Average	2013 vs. 5-Year Average
County Crash Rate*	1.43	1.30	1.01	1.12	1.37	1.25	+10%
County Fatality Rate**	1.62	1.13	1.49	1.26	1.98	1.50	+32%
Arizona Fatality Rate**	1.34	1.27	1.39	1.37	1.39	1.35	+3%
U.S. Fatality Rate**	1.15	1.11	1.10	1.14	1.10	1.12	-2%
Single Vehicle Crash Rate*	0.318	0.255	0.214	0.238	0.281	0.261	+8%
Pedestrian Crash Rate*	0.009	0.014	0.010	0.008	0.014	0.011	+27%
Bicycle Crash Rate*	0.011	0.018	0.015	0.015	0.017	0.015	+12%
Injury Crash Rate*	0.254	0.204	0.160	0.200	0.235	0.211	+12%
Work Zone Related Rate*	0.044	0.036	0.022	0.025	0.021	0.030	-29%
Total County Crashes	2,913	2,865	2,641	2,841	2,901	2,832	+2%
Miles of County Owned Roads That Have Traffic Counts	1,622	1,616	1,259	1,249	1,259	1,401	-10%
Total County Road Miles	2,419	2,353	2,393	2,392	1,999	2,311	-14%
Million Vehicle Miles/Day	5.5903	6.0543	7.1479	6.9488	5.8111	6.3105	-8%
Vehicle Miles of Travel (VMT)/Mile	2,311	2,573	2,987	2,905	2,907	2,737	+6%
% Network with Traffic Counts	67.05%	68.68%	52.61%	52.22%	62.98%	60.71%	+2%
County Population	244,700	245,801	274,673	276,634	288,366	266,035	+8%
Crashes Per 100K Pop	1,190.4	1,165.6	961.5	1,027.0	1,006.0	1,070.1	-6%
Fatal Crashes	29	24	34	27	40	31	+30%
Fatal/100K Pop	11.85	9.76	12.38	9.76	13.87	11.52	+20%
County Fatalities	33	25	39	32	42	34	+23%
County Fatalities/100K Pop	13.49	10.17	14.20	11.57	14.56	12.80	+14%
Single Vehicle Crashes	649	563	558	604	597	594	+0.5%
Single Vehicle/100K Pop	265.22	229.05	203.15	218.34	207.03	224.56	-8%
Pedestrian Crashes	18	30	27	21	30	25	+19%
Pedestrian/100K Pop	7.36	12.20	9.83	7.59	10.40	9.5	+10%
Bicycle Crashes	23	39	38	38	37	35	+6%
Bicycle/100K Pop	9.40	15.87	13.83	13.74	12.83	13.13	-2%
Injury Crashes	518	451	417	506	499	478	+4%
Injury/100K Pop	211.69	183.48	151.82	182.91	173.04	180.59	-4%
Work Zone Related	90	79	57	64	45	67	-33%
Work Zone/100K Pop	36.78	32.14	20.75	23.14	15.61	25.68	-39%

Source: Crash data is from ADOT, modified by MCDOT. Only crashes on County-owned or maintained roads are included.

\*Crashes per MVMT

\*\*Fatalities per 100 MVMT



MAG established the following Action Areas:

- Eliminate Death and Injury from Speeding and Aggressive Driving Behavior;
- Eliminate Impaired Driving;
- Eliminate Death and Injury Related to Intersections;
- Eliminate Death and Injury Involving Young Roadway Users;
- Eliminate Death and Injury Involving Vulnerable Road Users – Bicyclists, Pedestrians, Persons with Disabilities; and
- Improve Data Collection, Quality, Availability, Integration, and Analysis for Decision-Making.

Based on these two sets of emphasis/action areas, MCDOT has identified four main Focus Areas for its safety program. These Focus Areas were identified as those that MCDOT, as a transportation agency, could most directly influence and take actions to improve. The MCDOT Focus Areas are:

- Intersection Crashes;
- Fatal and Incapacitating Injury Crashes;
- Non-motorized (Bicycle and Pedestrian) Crashes; and
- Work Zone Crashes.

### *Intersection Crashes*

**Table 6** provides a summary of crashes that have occurred on County roads between 2009 and 2013. Crashes include those that occur within intersections as well as those that were not related to intersections. In total, there were 456 reported intersection crashes and 85 non-intersection crashes over the 5-year period.

The table also delineates those crashes that were fatal and those that resulted in incapacitating injuries. For intersection crashes, the most prevalent type of crash was single vehicle crashes, with 30% of fatal crashes and 31% of crashes resulting in incapacitating injuries were a result of single vehicle crashes. The most prevalent type of non-intersection crash was also single vehicle crashes, which accounted for 57% of fatal crashes and 46% of crashes resulting in incapacitating injuries.

With intersection crashes being such a large percentage of total crashes, MCDOT will continue to take actions such as the current process for performing safety analyses on intersections that experience five or more reported crashes over a 12-month period.

**Table 6: Intersection and Non-Intersection Crashes**

Type of Crash	Intersection Crashes		Non-Intersection Crashes	
	Fatal (% of Total)	Incapacitating Injury (% of Total)	Fatal (% of Total)	Incapacitating Injury (% of Total)
Angle	24%	26%	0%	10%
Head On	8%	4%	0%	3%
Left Turn	13%	14%	0%	8%
Rear End	4%	15%	7%	17%
Sideswipe	1%	4%	0%	10%
Single Vehicle	30%	31%	57%	46%
Other	20%	6%	36%	6%
Total	100%	100%	100%	100%





## *Fatal and Incapacitating Injury Crashes*

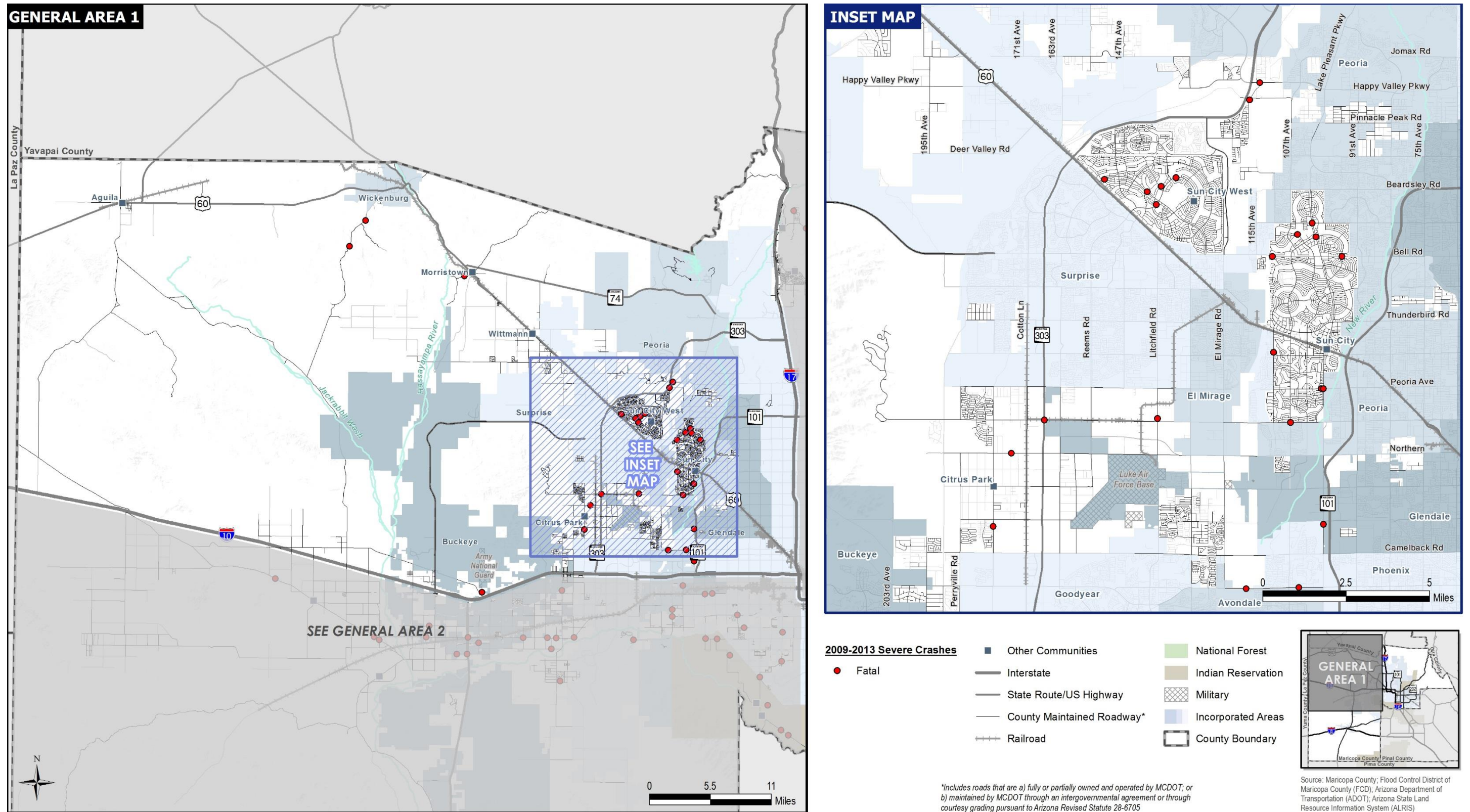
Maps labeled **Figure 17** show the number and location of fatal crashes reported between 2009 and 2013. While fatal crashes represent a small percentage of total crashes, they represent a large percentage of the societal cost of crashes in terms of medical expense and lost wages. Reducing the frequency of these high-severity crashes has become a priority at the federal, state, and local level. The County fatality rate increased in 2013 to 1.98 fatalities per 100 MVMT compared to 1.26 in 2012, but this value is still below the historical average fatality rate of 2.18.

## *Bicycle and Pedestrian Crashes*

Maps labeled **Figure 18** show the number and location of fatal bicycle and pedestrian crashes on County roads. While bicycle and pedestrian crashes represent a small percentage of total crashes, the likelihood of severe injury or death is high when a vehicle hits a bicyclist or pedestrian. In 2013, the bicycle crash rate for the County was 0.017 crashes per MVMT and the pedestrian crash rate was 0.014. These rates are higher than the 2012 rates. The 2013 pedestrian crash rate is higher than the historical average while the 2013 bicycle crash rate matches the historical crash rate.

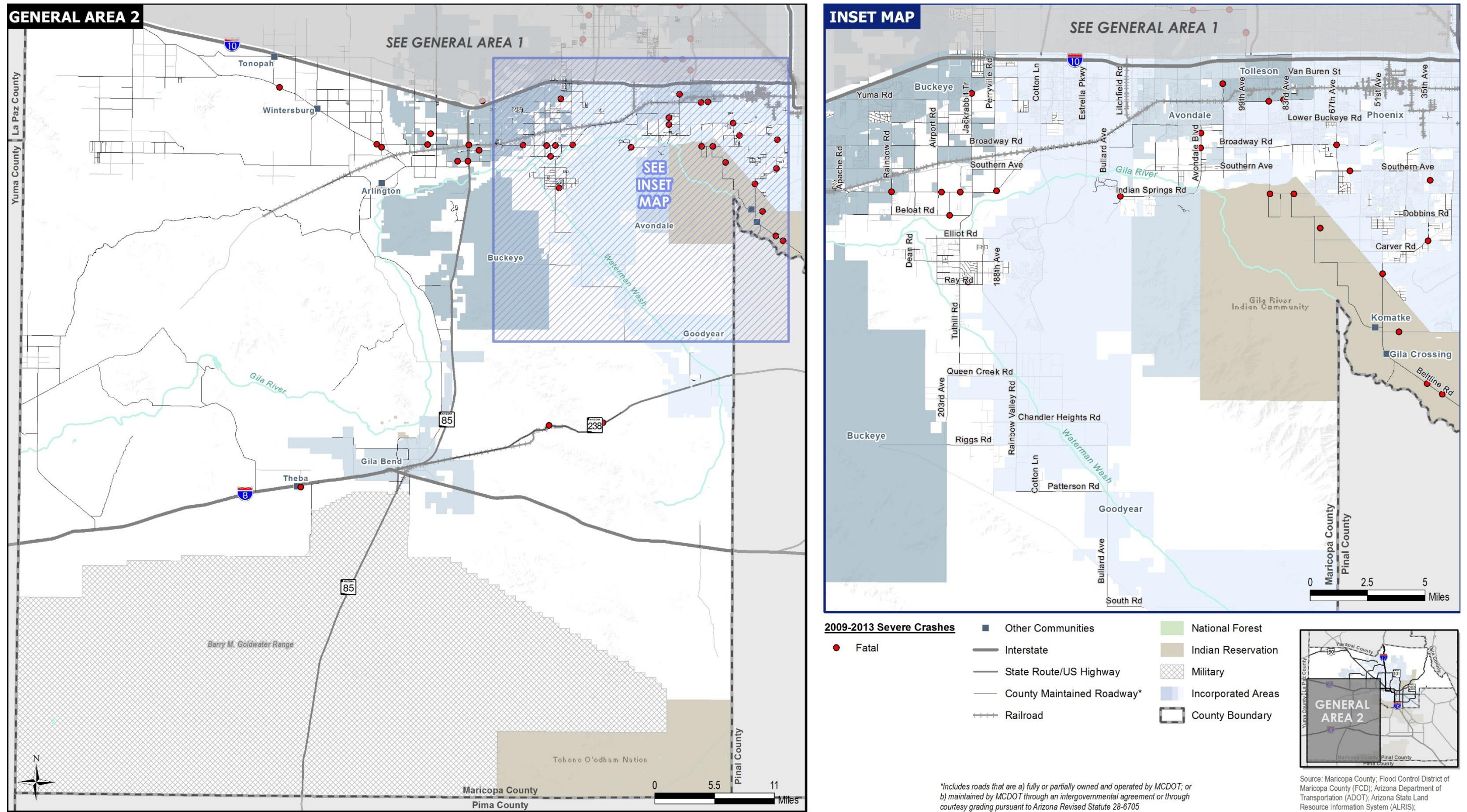
## *Work Zone Crashes*

**Figure 19** depicts fatal work zone crashes between 2009 and 2013. MCDOT places a high priority on safety in and around work zones. There were 45 reported work zone-related crashes on MCDOT facilities in 2013. This is significantly fewer than in 2012, when 64 work zone crashes were reported. Between 2012 and 2013, the work zone related crash rate was reduced from 0.025 to 0.021, which is much lower than the historical average of 0.052 and represents the lowest rate since MCDOT began tracking this statistic.



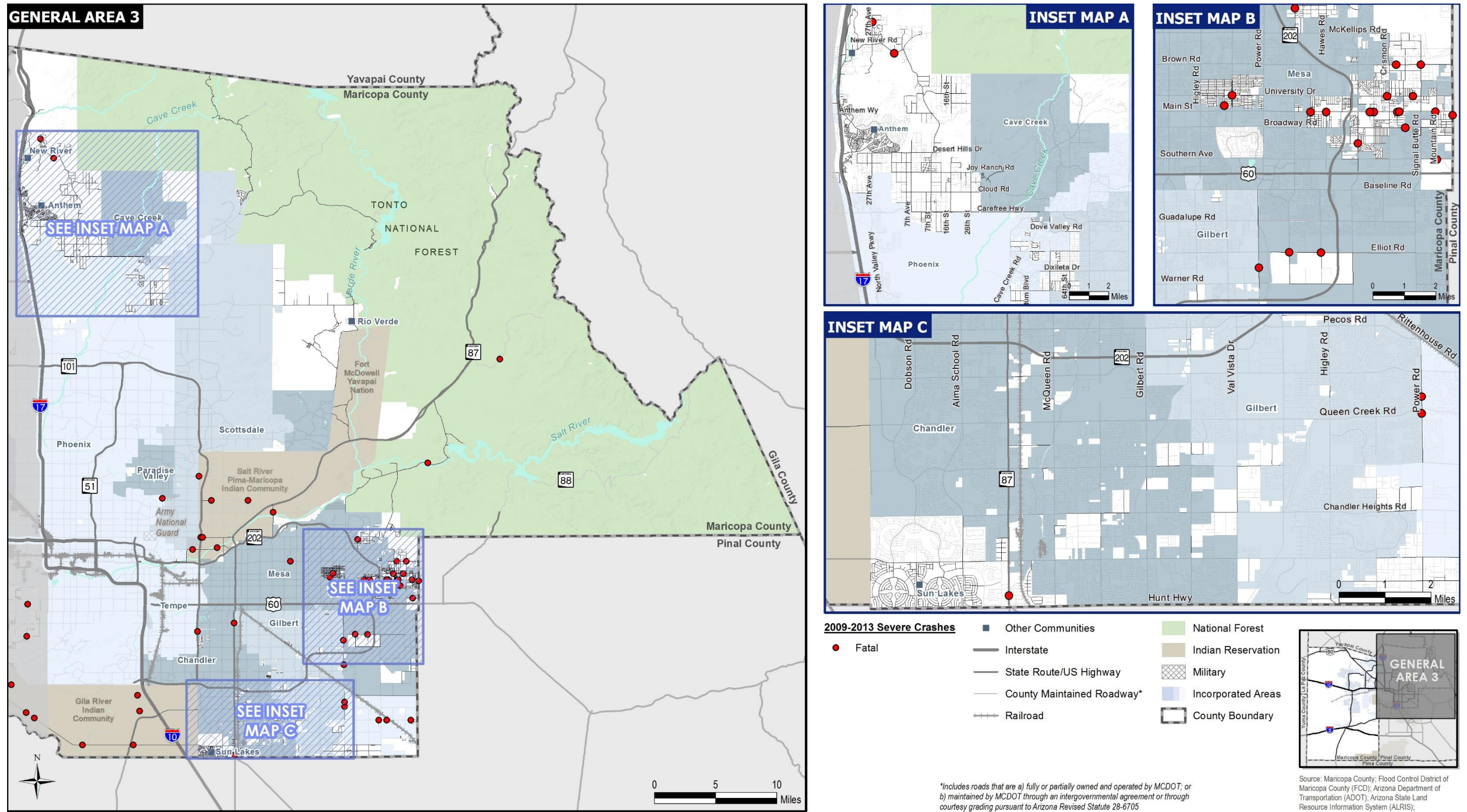
**Figure 17: Fatal Crashes on County Roads 2009-2013**  
Area 1





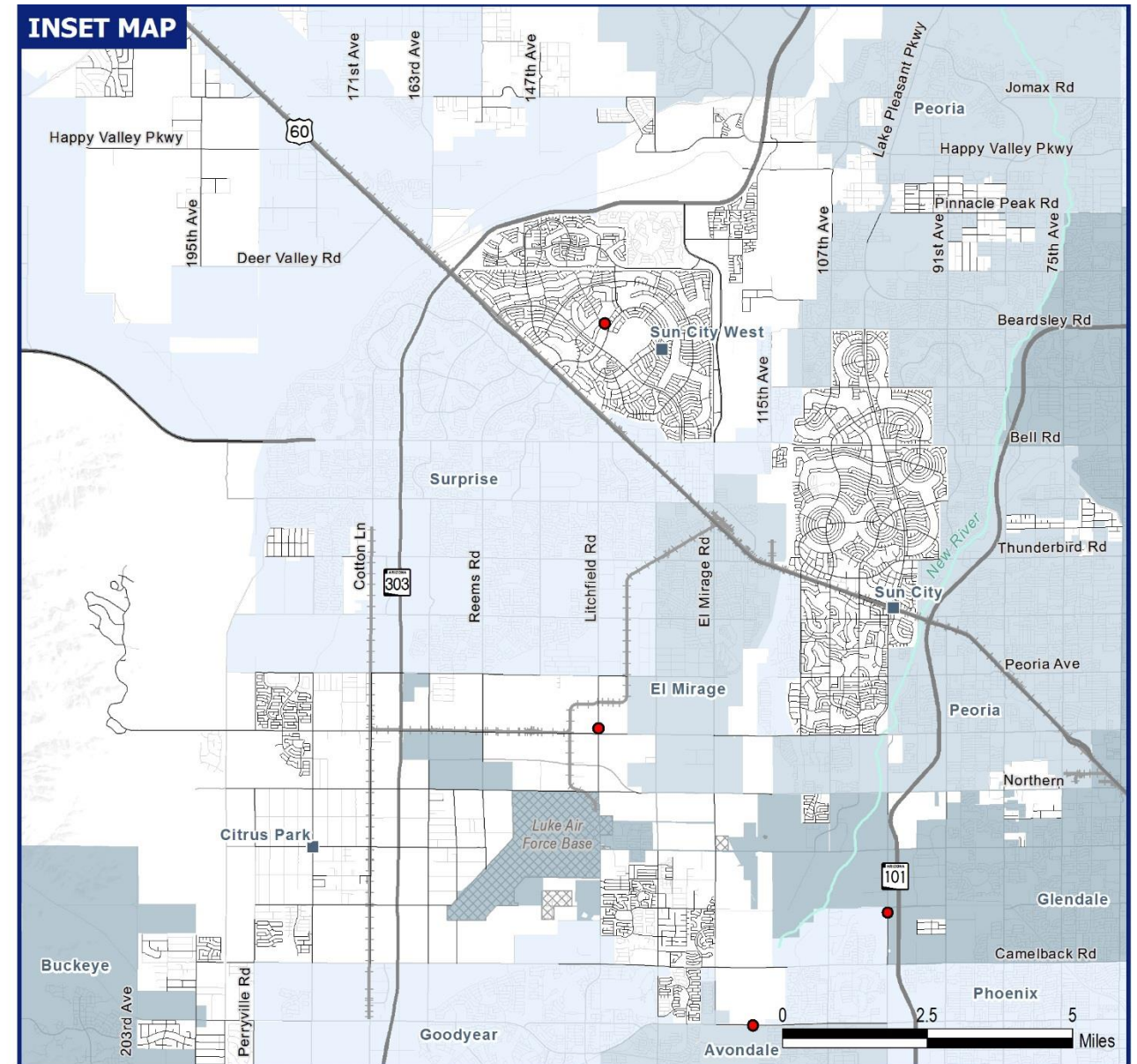
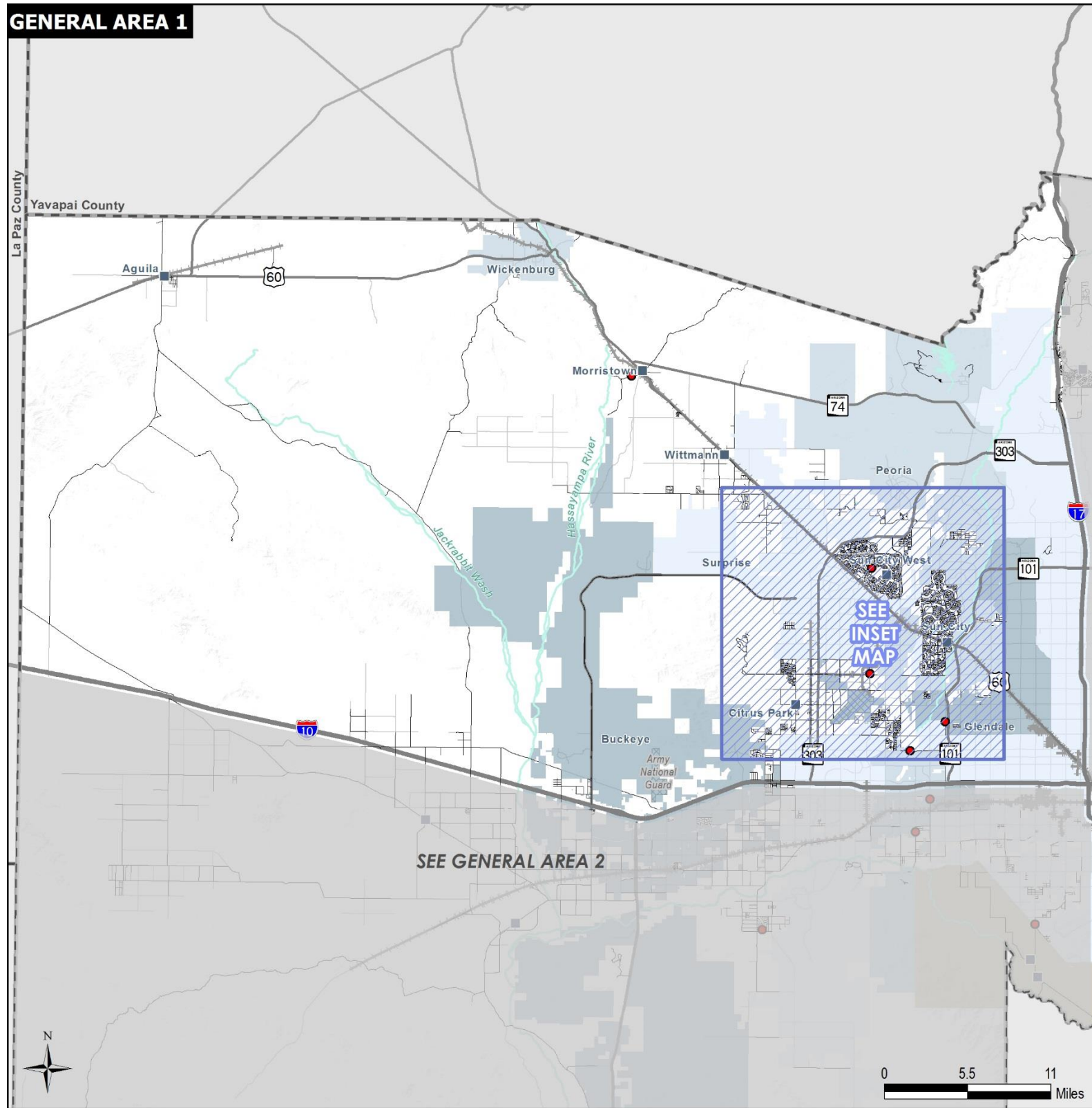
**Figure 17: Fatal Crashes on County Roads 2009-2013**  
Area 2





**Figure 17: Fatal Crashes on County Roads 2009-2013**  
Area 3

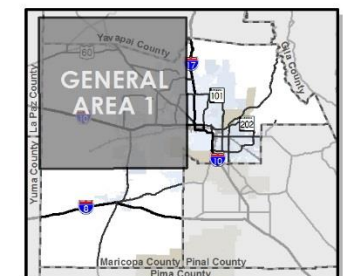




**2009-2013 Bicycle and Pedestrian Crashes**

- |                           |                              |                      |
|---------------------------|------------------------------|----------------------|
| <b>Pedestrian Crashes</b> | ■ Other Communities          | ■ National Forest    |
| ● Fatal                   | — Interstate                 | ■ Indian Reservation |
| <b>Bicycle Crashes</b>    | — State Route/US Highway     | ■ Military           |
| ● Fatal                   | — County Maintained Roadway* | ■ Incorporated Areas |
|                           | — Railroad                   | ■ County Boundary    |

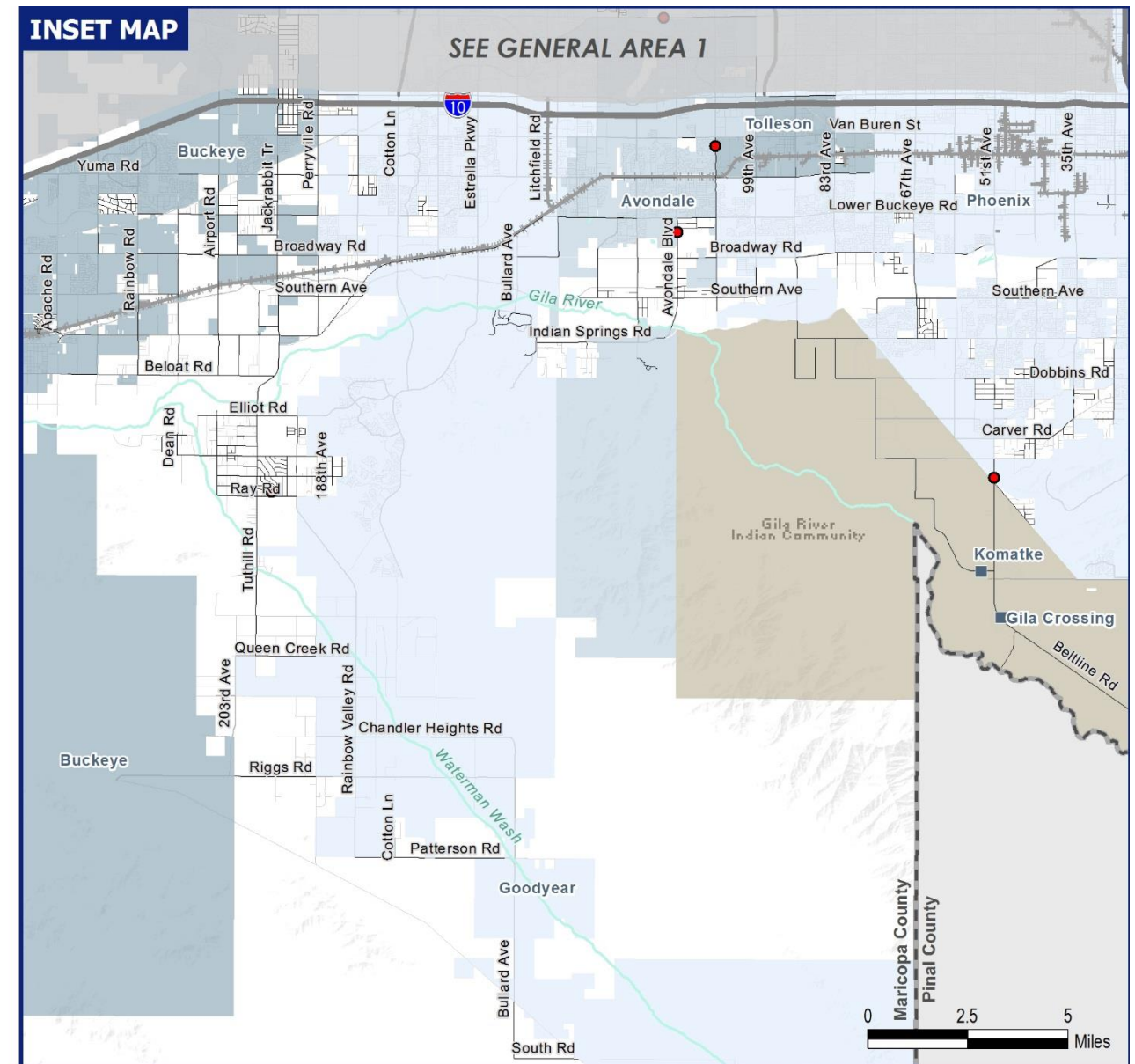
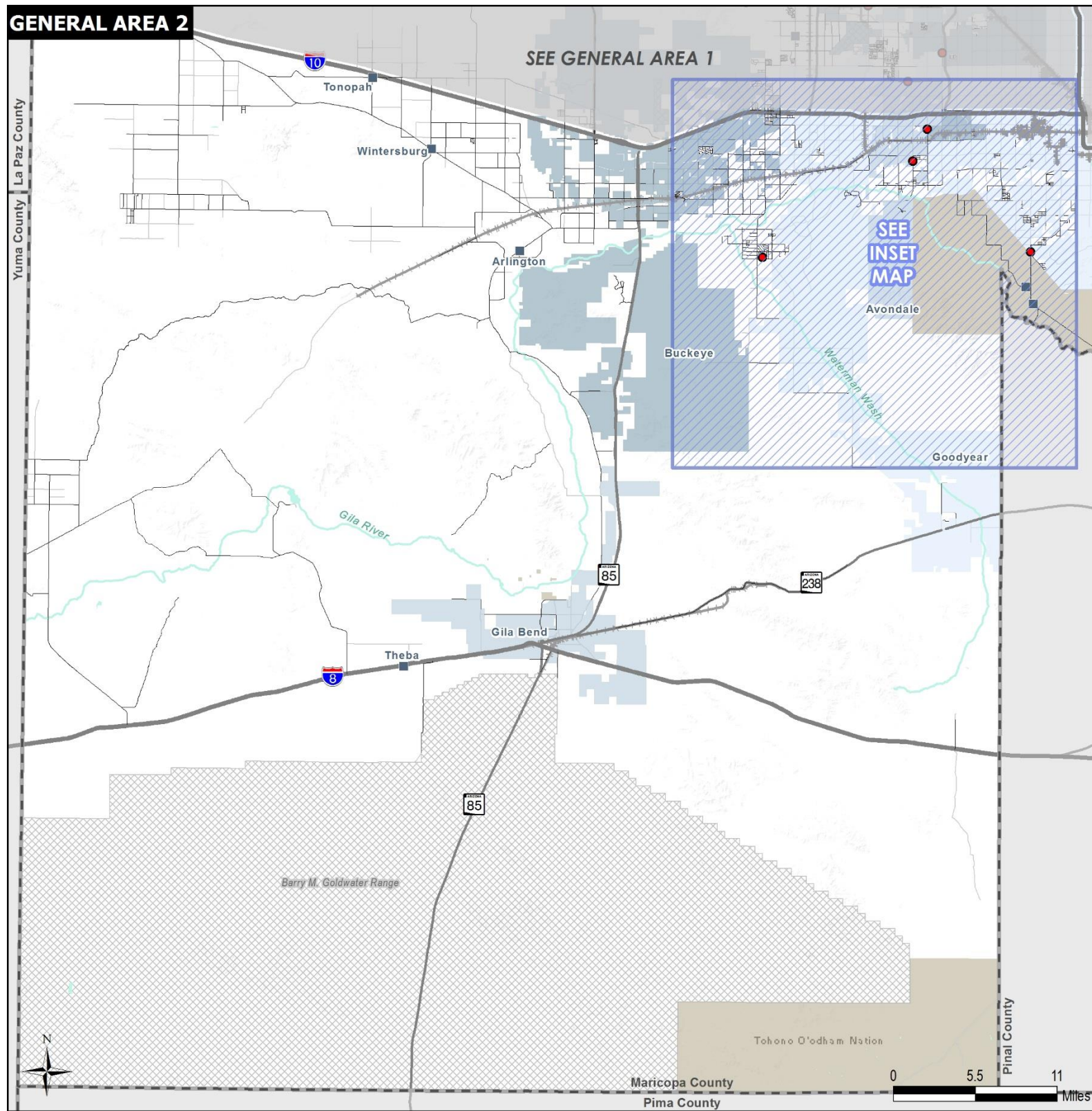
\*Includes roads that are a) fully or partially owned and operated by MCDOT; or b) maintained by MCDOT through an intergovernmental agreement or through courtesy grading pursuant to Arizona Revised Statute 28-6705



Source: Maricopa County; Flood Control District of Maricopa County (FCD); Arizona Department of Transportation (ADOT); Arizona State Land Resource Information System (ALRIS)

**Figure 18: Bicycle and Pedestrian Crashes on County Roads 2009-2013**  
Area 1

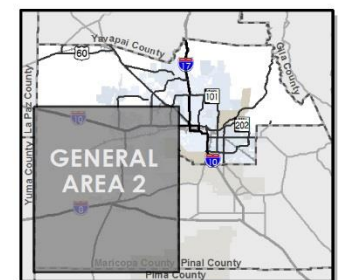




**2009-2013 Bicycle and Pedestrian Crashes**

- |                           |                              |                      |
|---------------------------|------------------------------|----------------------|
| <b>Pedestrian Crashes</b> | ■ Other Communities          | ■ National Forest    |
| ● Fatal                   | — Interstate                 | ■ Indian Reservation |
| <b>Bicycle Crashes</b>    | — State Route/US Highway     | ▨ Military           |
| ● Fatal                   | — County Maintained Roadway* | ■ Incorporated Areas |
|                           | — Railroad                   | □ County Boundary    |

\*Includes roads that are a) fully or partially owned and operated by MCDOT; or b) maintained by MCDOT through an intergovernmental agreement or through courtesy grading pursuant to Arizona Revised Statute 28-6705

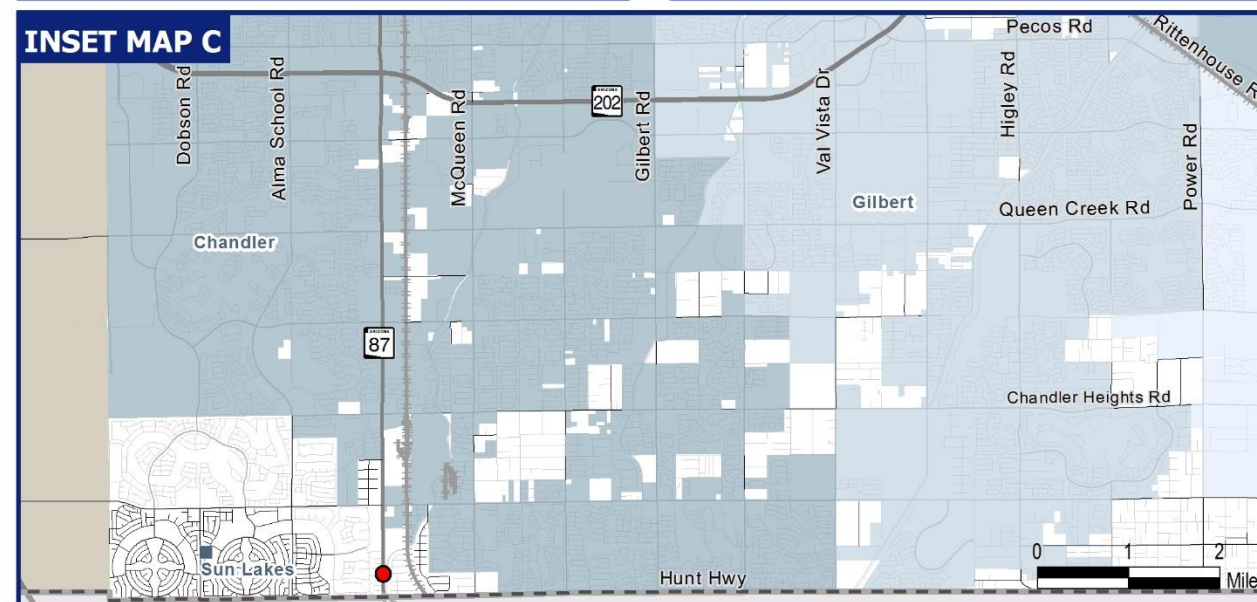
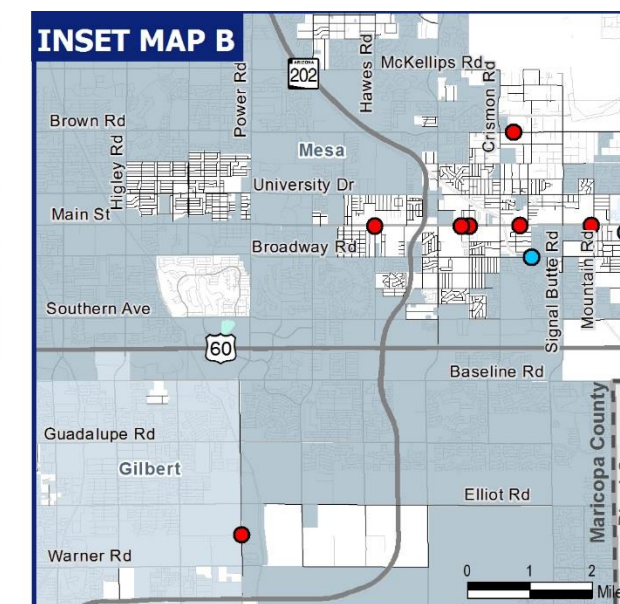
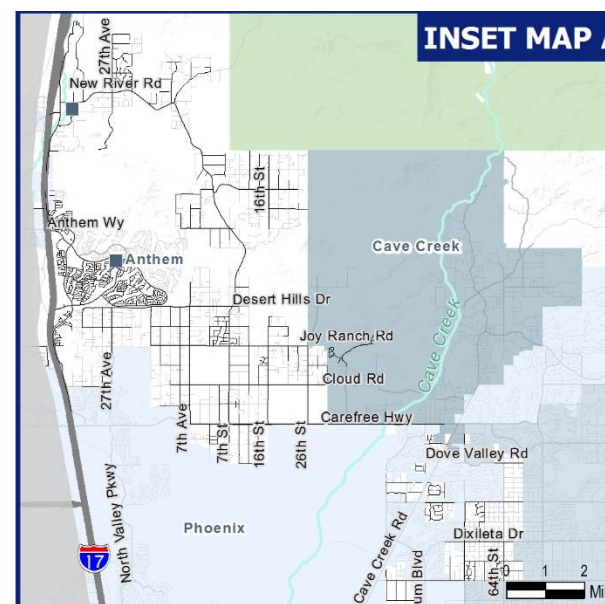
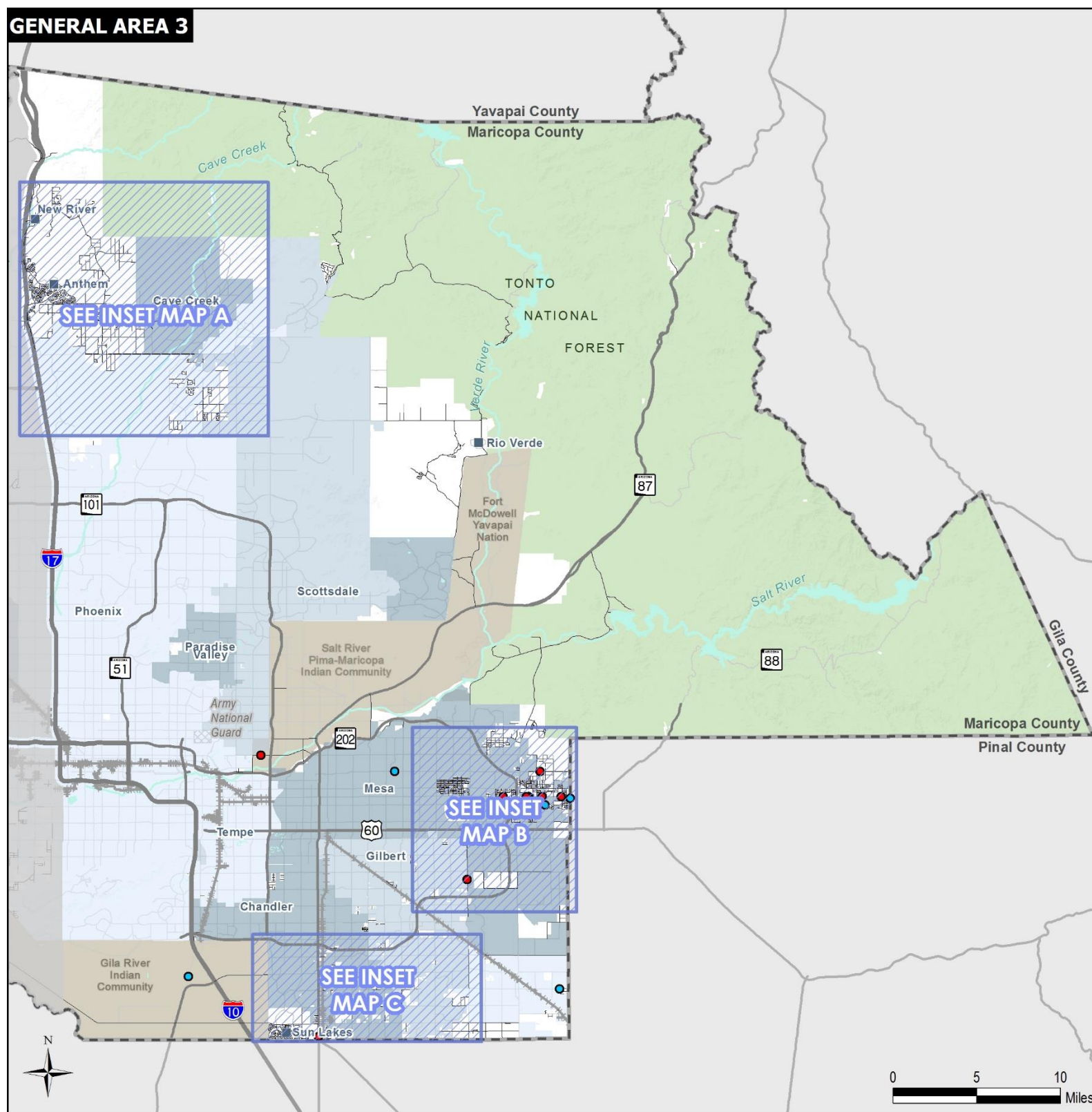


Source: Maricopa County; Flood Control District of Maricopa County (FCD); Arizona Department of Transportation (ADOT); Arizona State Land Resource Information System (ALRIS);

**Figure 18: Bicycle and Pedestrian Crashes on County Roads 2009-2013**

**Area 2**





**2009-2013 Bicycle and Pedestrian Crashes**

- |                           |                              |                      |
|---------------------------|------------------------------|----------------------|
| <b>Pedestrian Crashes</b> | ■ Other Communities          | ■ National Forest    |
| ● Fatal                   | — Interstate                 | ■ Indian Reservation |
| <b>Bicycle Crashes</b>    | — State Route/US Highway     | ■ Military           |
| ● Fatal                   | — County Maintained Roadway* | ■ Incorporated Areas |
|                           | — Railroad                   | ■ County Boundary    |

\*Includes roads that are a) fully or partially owned and operated by MCDOT; or b) maintained by MCDOT through an intergovernmental agreement or through courtesy grading pursuant to Arizona Revised Statute 28-6705

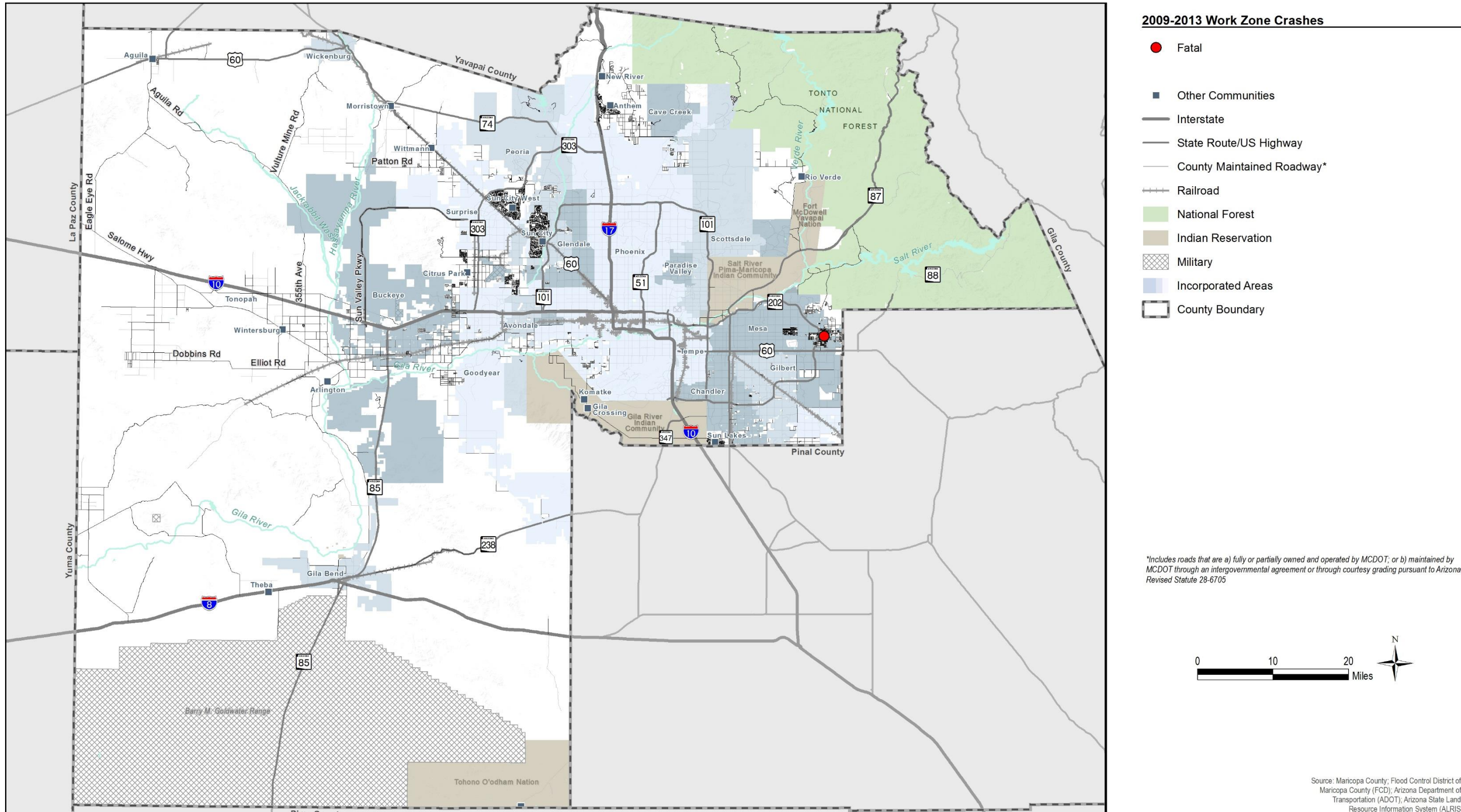


Source: Maricopa County; Flood Control District of Maricopa County (FCD); Arizona Department of Transportation (ADOT); Arizona State Land Resource Information System (ALRIS);

**Figure 18: Bicycle and Pedestrian Crashes on County Roads 2009-2013**

**Area 3**





**Figure 19: Work Zone Crashes on County Roads 2009-2013**





## Low Volume Road Management System

### Introduction

MCDOT in FY 2000 initiated a formal program to pave low volume roads (LVR) in the County. A multi-year capital improvement program for paving low traffic volume unpaved roads was then created and implemented. This section documents the number and miles of unpaved LVRs that were paved by MCDOT in FY 2014.

### Background

Prior to 2004, MCDOT paved LVRs primarily based on citizen complaints and field observations by MCDOT staff. However, beginning in 2004, MCDOT initiated a program to systematically identify low volume unpaved roads for paving. Unpaved roads with high or increasing traffic volumes, safety issues, or other significant concerns were to be considered for paving. This program was developed to specifically address unpaved roads that do not meet federal criteria for paving under the PM-10 (federal dust abatement) program. The County Transportation Advisory Board (TAB) recommended to the Board of Supervisors that an annual allocation be set aside in the MCDOT budget to pave selected LVRs.

### Unpaved County Road System

In FY 2014, the County owned or maintained 2,466 centerline miles of roads, of which 400 miles are unpaved. These roads are located in the unincorporated parts of the County, which includes both urban or near-urban conditions as well as rural locations.

There are five different types of unpaved roads in the County:

1. Roads that are owned by the County and identified as open and declared (O&D) - This means the County owns right-of-way for these segments of road and has accepted the road into the County System;
2. Roads that are partially opened and declared: These are roads where part of the right-of-way is owned by the County;
3. Primitive roads, or roads that are usually located in remote parts of the County and are accessing wilderness areas and are typically less developed than other areas;
4. Courtesy grade roads, which are existing, unpaved roads with little or no County owned right-of-way, but maintained by MCDOT through historical precedent and allowed by state statute; and
5. Unpaved roads not owned or maintained by the County.

**Table 7** lists the details of each of the LVRs that were paved in FY 2013 and FY 2014.

Maps labeled **Figure 20** show the surface type (paved or unpaved) of County roads as of FY 2014 as well as the PM-10 air quality dust abatement program boundary. Most of the unpaved County roads are outside of the PM-10 area.



**Table 7: Low Volume Roads Completed in 2013 and 2014**

Road Name	From	To	Length (feet)	Notes
<i>Projects Completed in FY 2013</i>				
43rd Avenue	Choppo Road	Galveston Street	582	Project T423 - Completed April 2013
45th Avenue	Dusty Lane	Monterey Street	486	
45th Avenue	Monterey Street	Ivanhoe Street	667	
45th Ave Avenue	Ivanhoe Street	Ivanhoe Street	528	
Choppo Road	Dusty Lane	43rd Avenue	697	
Dusty Lane	Galveston Street	Choppo Road	798	
Galveston Street	Dusty Lane	43rd Avenue	1,197	
Ivanhoe Street	45th Avenue	End Road	1,232	
Monterey Street	45th Avenue	End Road	930	
17th Avenue	Maddock Road	Joy Ranch Road	2,640	Project T397 - Completed May 2013
Sabrosa Drive	New River Road	6th Street	2,930	Project T409 'A' - Completed June 2013
Perdiz Drive	530' West of New River Road	New River Road	560	
16th Street	1080' North of Honda Bow Road	Cavalry Road	1,525	
22nd Street	Cavalry Road	825' North of Cavalry Road	825	
7th Avenue	Saddle Mountain Road	675' North of Saddle Mountain Road	730	Project T409 'B' - Completed June 2013
Watkins Street	Airport Rd Road	203rd Avenue	2,460	Project T409 'C' - Completed June 2013
Jomax Road	207th Avenue	203rd Avenue	2,615	
203rd Avenue	Jomax Road	Morning Star Lane	425	
Mitchell Road (207th Avenue)	Bradley Road	Radford Road	1,240	
191st Avenue	Jomax Road	Roadrunner Road	1,270	
Roadrunner Road	193rd Avenue	191st Avenue	1,320	
TOTAL MILES =			4.86	
<i>Projects Completed in FY 2014</i>				
105th Street	Jensen Street	McKellips Road	1,277	Project T410 - Completed June 2014
Circle Mountain Road	I-17 Frontage Road	End of Maintenance	1,239	
McKellips Road	103rd Street	105th Street	1,285	
TOTAL MILES =			0.72	



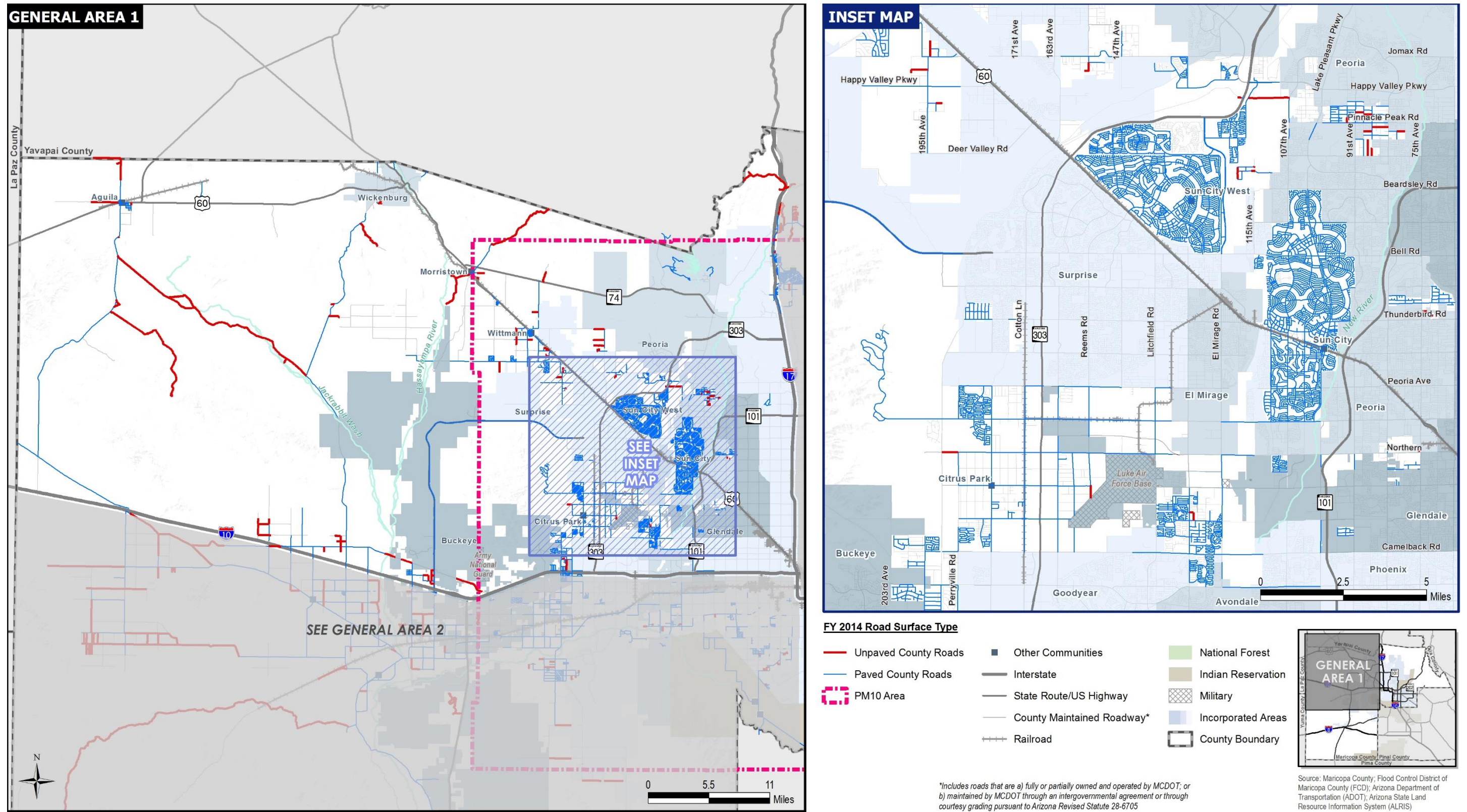
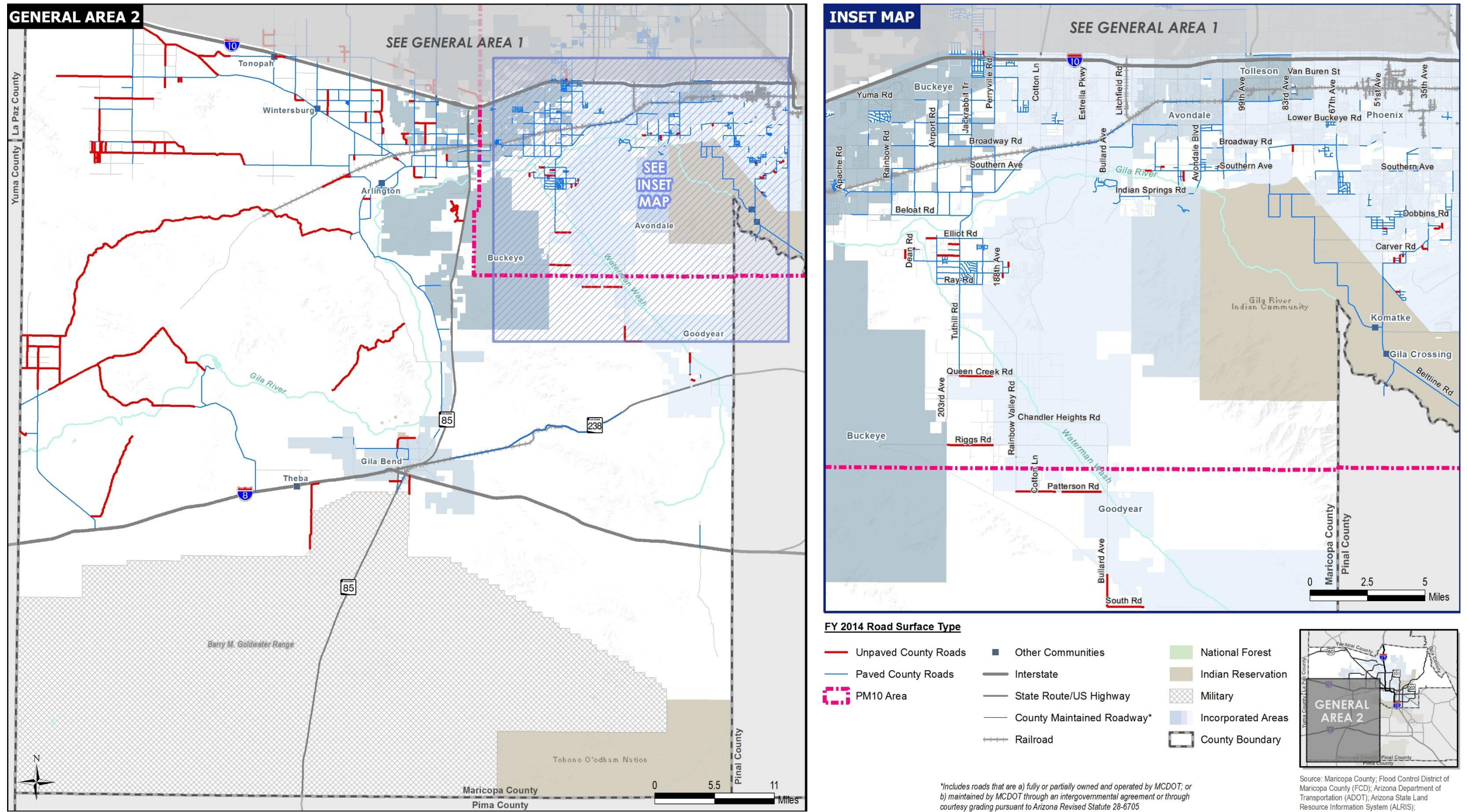


Figure 20: Road Surface Types as of 2014  
Area 1





**Figure 20: Road Surface Types as of 2014**  
**Area 2**



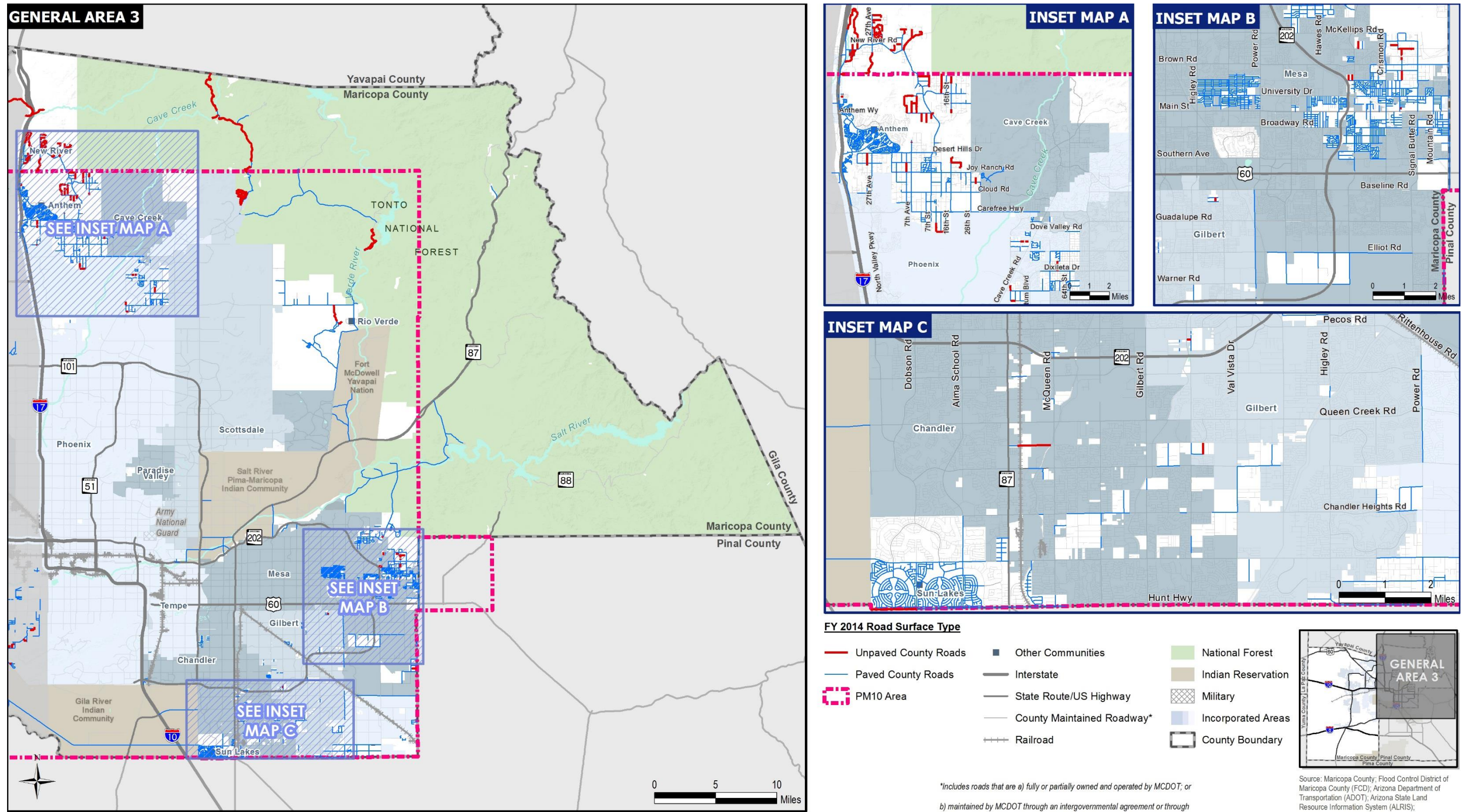


Figure 20: Road Surface Types as of 2014  
Area 3





## Bridge Management System

### Introduction

As of April 2014, the County maintains and inspects a total of 418 structures on public roads. By the Federal Highway Administration definition, 279 of these structures are qualified to be called “bridges”, meaning the structure has a length greater than 20 feet and is qualified to receive federal aid for its maintenance. The remaining 139 are called “minor” structures with lengths of 20 feet or less.

### Data Gathering and Analysis

#### “Bridges” and “Minor” Structures

Every structure (bridge and minor) within MCDOT’s jurisdiction is inspected in accordance with the FHWA’s National Bridge Inspection Standards Recording and Coding Guide. This procedure allows MCDOT to maintain thorough, consistent records on each bridge and structure in the County system. The decision to maintain and inspect all of MCDOT’s structures enables MCDOT to include minor structures when considering how best to appropriate funds and prioritize in-house projects. Due to the comprehensive data MCDOT maintains on all structures, MCDOT is readily able to evaluate its inventory as a whole for both bridges and minor structures.

#### Summary of FY 2014 Structures

Total number of structures in inventory:	418	
Number of Federal Structures:	279	
Number of Non-Federal Structures:	139	
Number of bridges:	78	
Number of culverts:	340	
<b>Total number of new structures added to the inventory this year:</b>		<b>1</b>
<b>Total number of federal structures added to the inventory this year:</b>		<b>1</b>
<i>231<sup>st</sup> Avenue RCB 0.25 miles north of Patton Road (Peak View Ranch TC 20040379)</i>		
<i>11327</i>		
<b>Total number of non-federal structures added to the inventory this year:</b>		<b>0</b>
<b>Total number of structure replacements made this year:</b>		<b>0</b>
<b>Total number of structures removed/annexed from the inventory this year:</b>		<b>1</b>
<i>Southern Avenue RCB 0.5 miles east of Crismon Road – Structure Number 990222</i>		
<b>Number of scour critical bridges in the MCDOT Structure Inventory:</b>		<b>1</b>
<i>Gilbert Road Bridge over the Salt River - Structure Number 7780</i>		
<b>Number of fracture critical bridges in the MCDOT Structure Inventory:</b>		<b>1</b>
<i>Old US 80 Bridge over the Gila River - Structure Number 8021</i>		

### Evaluation Criteria

In 1997, the County Bridge Investment Study (BIS) recognized the need to evaluate bridges separately from road projects. The following information identifies MCDOT’s method of scoring and prioritizing bridge projects.

The following categories of bridge projects were chosen for evaluation and prioritization:





1. Replacement Projects;
2. Replacement of Dip Sections with New Structures;
3. Scour Protection Projects; and
4. New Bridge Projects (not included in major road projects).

A bridge should be considered for replacement if all of the following conditions are met:

1. The cost of rehabilitation is 50% or more than the cost of a new bridge; and
2. The Bridge Engineer agrees replacement is justifiable.

## Recommendations for TIP Programming Procedures

Each year, MCDOT reviews the highest rated bridge projects from the following subcategories:

1. TIP Projects;
2. Replacement of Existing Bridges;
3. Replace Dip Sections with New Structures; and
4. New Bridge Projects (not included in major road projects).

In any given year, the budget allocation may not support inclusion of all top rated bridge projects in the TIP Program. When this occurs, decisions are made based on the rating criteria and professional engineering judgment.

## Current Status of the MCDOT Bridge Management System

The MCDOT Bridge Management System is up-to-date, complete, and meets or exceeds all current Federal National Bridge Inspection Standards. The MCDOT Bridge Management System is included in the ADOT AASHTOWare BrM electronic database.

## Asset Management for Structures

In 2002, MCDOT began an Asset Management program for its structure inventory. Through FY 2014, MCDOT's structure inventory asset valuation is estimated at approximately \$139 million and consists of 279 bridges and 139 minor structures. In FY 2014, there was one new bridge added to and one minor structure removed from the MCDOT structure inventory.

## Federal Funding Eligibility Comparisons

### *Structures Eligible for Federal Replacement Funds (Sufficiency Rating (SR) < 50)*

The Bridge Sufficiency Rating (BSR) is a rating based on multiple technical factors that measure how well a bridge performs its intended duty. Ratings range from 0 to 100, with 100 being the highest. The FHWA guidelines stipulate that when a bridge's sufficiency rating falls below a score of 50, the bridge becomes eligible for Federal replacement funds. As of July 2014, the County had no structures with a rating below 50.

### *Structures Eligible for Federal Rehabilitation Funds (SR between 50 and 80)*

As a general rule of thumb, if a BSR falls between a score of 50 and 80, the bridge/structure is a good candidate for federal rehabilitation funds. Currently, there are twenty-four structures in MCDOT's inventory that have sufficiency ratings between 50 and 80.

After each inspection cycle, the Bridge Engineer pays specific attention to all structures that showed a significant change in the sufficiency rating (ten points or more) from the previous year in order to determine what caused the change. Remedial action is taken as necessary. **Table 8** lists the bridges in MCDOT's inventory that have sufficiency ratings between 50 and 80. It also indicates if a structure has a deficiency, meaning that it is considered either functionally obsolete (not built to current standards) or structurally deficient (has a defect that requires attention).



**Table 8: Structures with Sufficiency Ratings between 50 and 80**

Structure No	Structure Name	Feature Carried by Structure	Deficiency	Sufficiency Rating
10516	Olive Avenue	Olive Ave Avenue RCB	-	80.00
9825	Carefree Hwy Highway WB	Cave Creek Bridge	-	79.92
990276	Olive Avenue	Olive Ave Avenue RCB	-	79.79
7780	Gilbert Road-FAS 229	Salt River Bridge	-	79.72
10061	Old US 80	Arlington Valley Wash RCB	-	78.85
11009	Olive Avenue & BNSFRR	Reems Road Channel RCB	Functional	78.38
9859	Camelback Road	Agua Fria River Bridge	-	77.63
9145	Indian School Road	Agua Fria River Bridge	-	77.56
9126	Bell Road	Drainage Ditch RCB	-	76.92
9289	91st Avenue	RID Canal RCB	-	76.76
990158	Camelback Road	Agua Fria Drain RCB	-	76.63
9927	Power Road	RWCD Canal Bridge	-	76.20
9928	Power Road	East Maricopa Floodway	-	76.20
990164	Cotton Lane	Drainage Ditch RCB	-	75.38
9375	Broadway Rd Road EB	Tempe Canal Bridge EB	Functional	75.27
9384	Broadway Rd Road WB	Tempe Canal Bridge WB	Functional	75.27
8553	Alma School Road	Salt River Bridge NB	-	74.68
8554	Alma School Road	Salt River Bridge SB	-	74.68
9503	Higley Road	RWCD Canal Bridge	-	73.49
10405	Anthem Way	Anthem Way RCB	-	73.26
990143	Sun Valley PkwyParkway-29	Wash RCB	-	70.67
990169	El Mirage Road	Drainage Ditch RCB	-	67.67
8570	RH Johnson Boulevard	Drainage Ditch RCB	-	65.72
8021	Old US 80	Gila River Bridge	-	60.58

**Figure 21** shows the trends from FY 2012 - FY 2014 with respect to the number of structures that have sufficiency rates less than 80. Maps labeled **Figure 22** show the location and bridge sufficiency rating of all MCDOT structures.



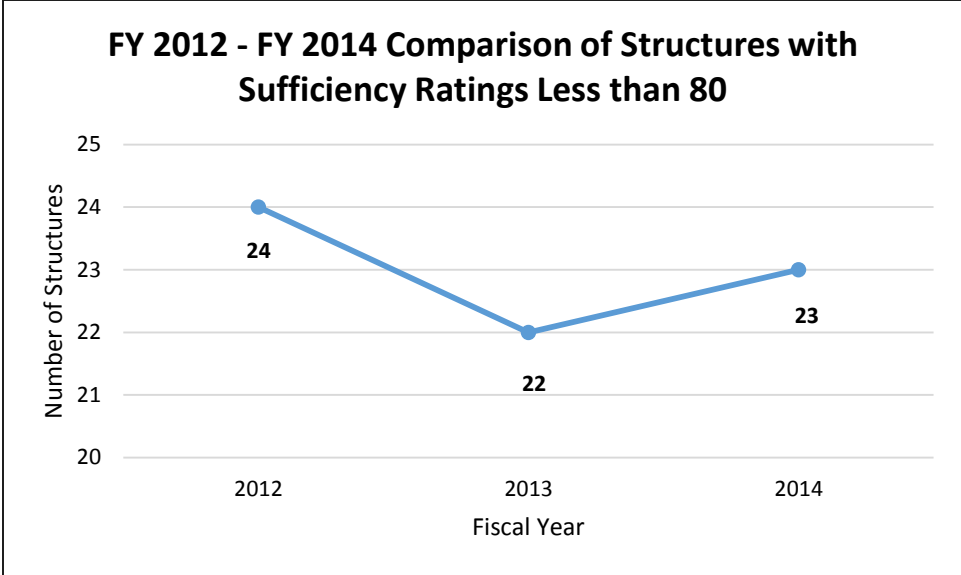


Figure 21: FY 2012 - FY 2014 Comparison of Structures with Sufficiency Rating Less than 80

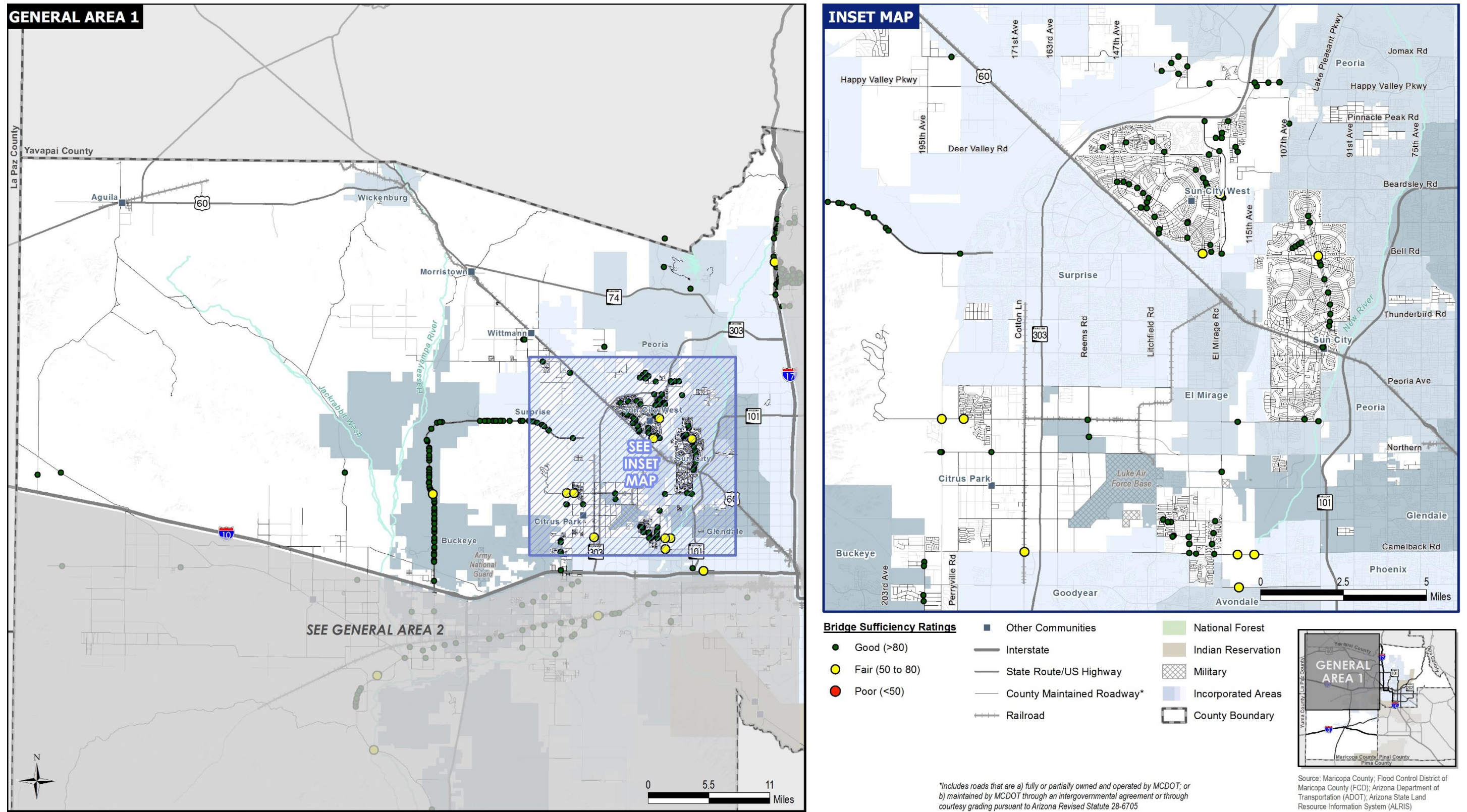


Figure 22: 2014 Bridge Sufficiency Ratings  
Area 1



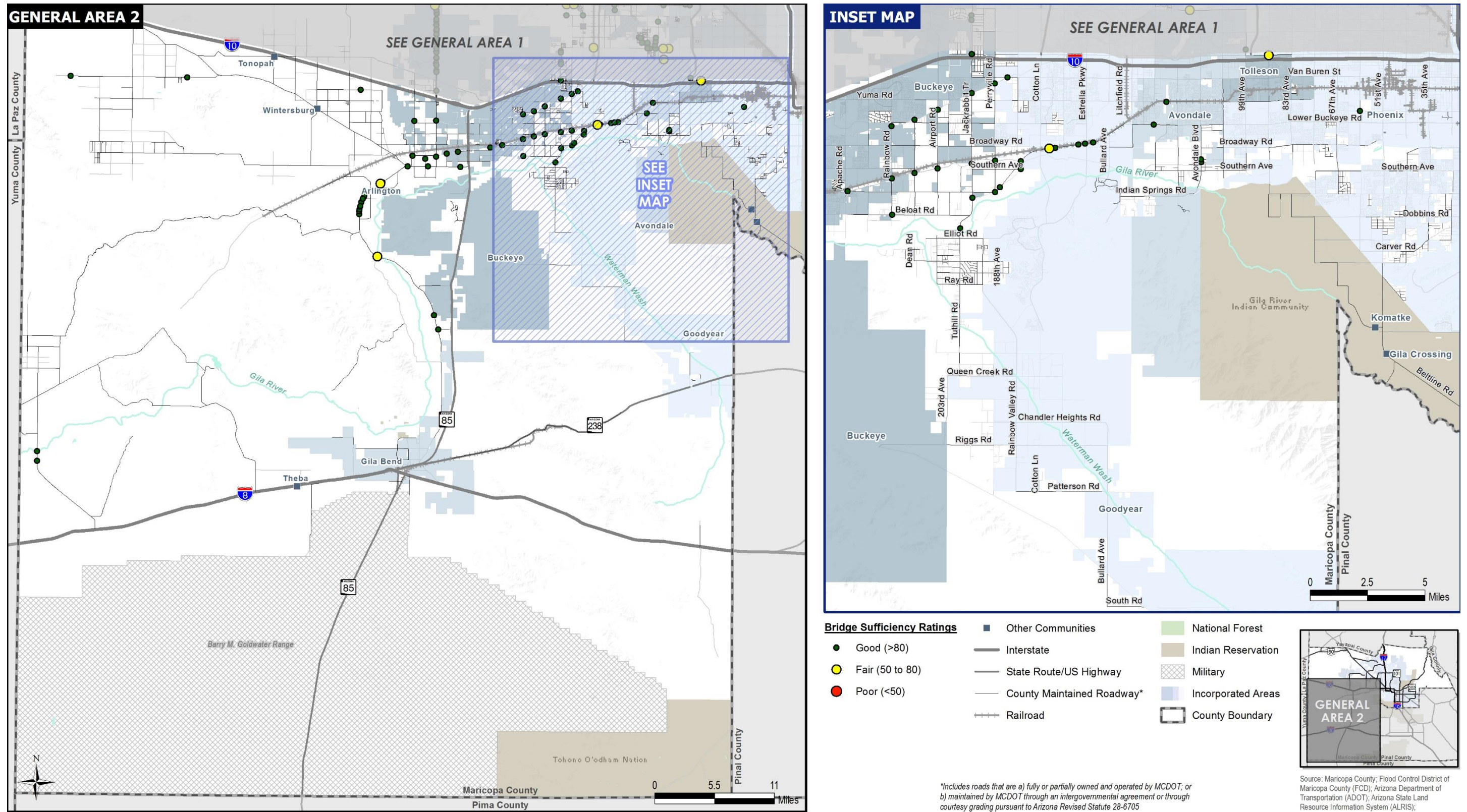


Figure 22: 2014 Bridge Sufficiency Ratings  
Area 2



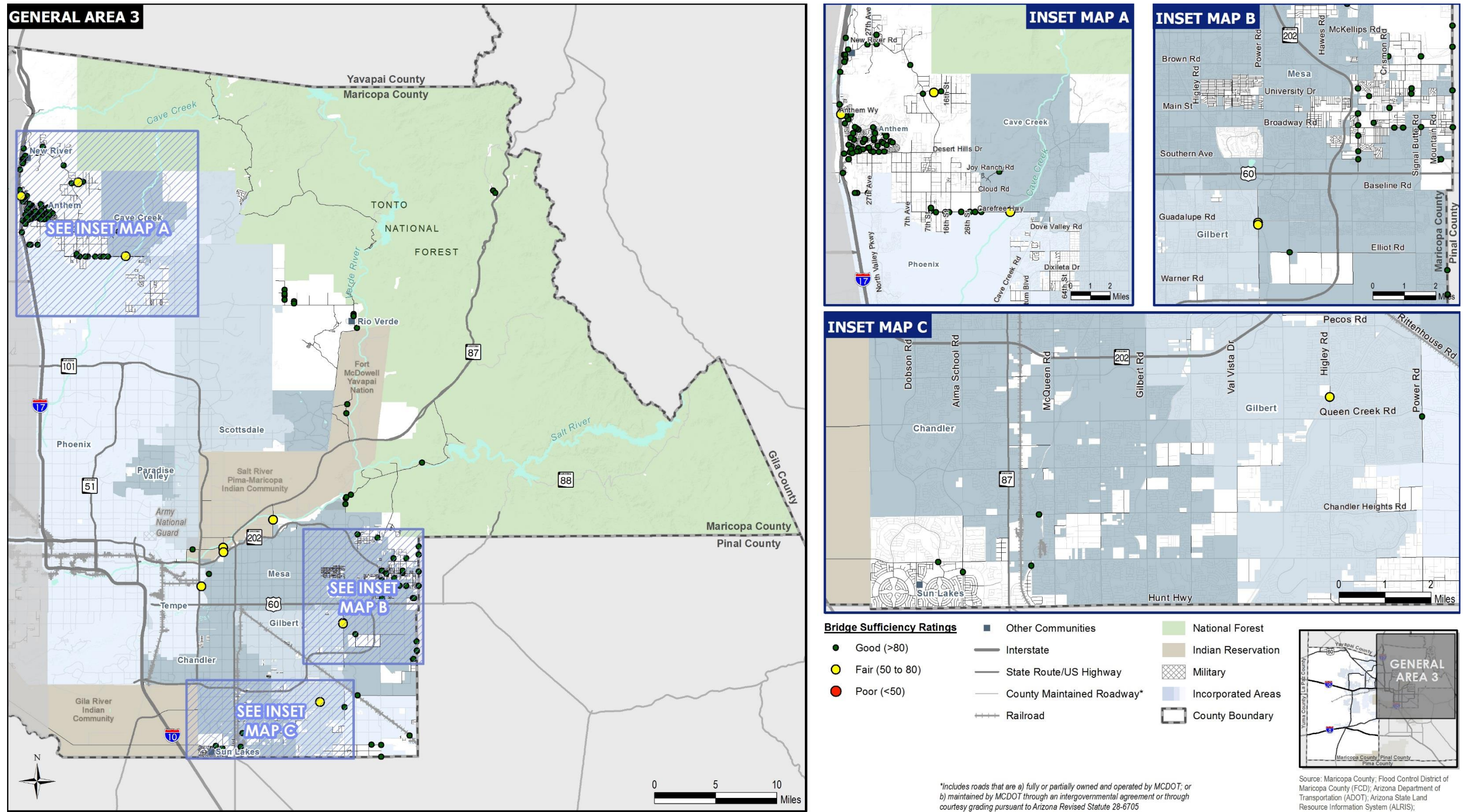


Figure 22: 2014 Bridge Sufficiency Ratings  
Area 3





## Notable FY 2014 Bridge Events

### *Bridge Inspector Certification*

MCDOT bridge engineering staff completed required certification training in compliance with the National Bridge Inspection Standards as published in the Code of Federal Regulations, 23 CFR 650, Subpart C and the ADOT Bridge Inspection Guidelines, 2011. Two staff members attended a two-week, FHWA-approved comprehensive bridge inspection course and both passed the required exam to become a certified Bridge Inspector. The three staff members who were already certified Bridge Inspectors attended a National Highway Institute three-day refresher bridge inspection course and passed the exams required in order to maintain their inspection credentials.

### *Miller Road Bridge*

The completion of the Miller Road Bridge widening project was the most notable accomplishment during FY 2014. The structural improvements made to the bridge increased its load-carrying capacity, provided improved pedestrian crossing accommodations, and provided additional width to accommodate the future widening of Miller Road.

### *Northern Parkway Program – Phase I*

MCDOT managed the design and construction of three new overpass bridges and one reinforced box culvert that were completed in FY 2014 as Phase I of a 20-year multi-phase Northern Parkway Program in partnership with MAG, El Mirage, Glendale, and Peoria. In the next phase of this project, two additional overpass bridges should be completed by FY 2016. The MCDOT Bridge Group conducted initial inspections and inventories of the structures upon completion of Phase I. In accordance with the IGA terms, Glendale will eventually take over ownership and maintenance responsibilities of all of the structures constructed along Northern Parkway upon final acceptance and conveyance of rights-of-way.

## Synopsis of MCDOT’s Bridge Projects

### *Bridge Projects in the MCDOT FY 2013 - FY 2017 TIP*

Currently, MCDOT has eight bridge and structure projects in the TIP. These projects include bridge project scoping and new bridge designs. **Table 9** provides a list of these projects currently in the TIP.

**Table 9: Bridge Projects in the MCDOT FY 2013 - FY 2017 TIP**

Feature	Facility/Facilities	Location	Current Improvement Stage
Salt River	Gilbert Road Bridge	At Salt River	Bridge Replacement Final Design
BID Canal	Miller Road Bridge	At BID Canal	Construction
Salt River	Dobson Road, McKellips Road, and Gilbert Road Bridges	At Salt River	Design Concept Report (DCR)
Salt River	75th Avenue Bridge	At Salt River	Initial Scoping
Loop 101	Northern Avenue Parkway Phase II Overpass at Loop 101	Over Loop 101 south of current Northern Ave Loop 101 interchange	Construction
Agua Fria River	Northern Avenue Parkway Bridge	Northern Parkway between Dysart Rd and 111th Avenue	Construction
Reems Road and Litchfield Road	Northern Avenue Parkway Overpasses	Northern Ave at Reems Road and Litchfield Road intersections	Construction
Dysart Road	Dysart Road Overpass at Northern Ave	Dysart Road at Northern Avenue	Design



The status of the Bridge/Structure work completed in FY 2014 is shown in **Table 10**. The bridges anticipated to be under construction in FY 2015 are shown in **Table 11** below.

**Table 10: New Bridges and Bridge Improvements Completed in FY 2014**

Structure No.	Project Location	Description of Work Completed
8021	Old US80 at the Gila River	Bridge rehabilitation and erosion control project completed
9593	Miller Road at the BWCDD Canal	Bridge replacement and widening completed
N/A	Northern Parkway at Sarival Avenue WB	Grade separation overpass completed
N/A	Northern Parkway at Sarival Avenue EB	Grade separation overpass completed
N/A	Northern Parkway at the BNSF Spur Track	Bridge completed
N/A	Northern Parkway at the 135th Avenue Drainage Channel	New RCB completed

**Table 11: Bridges Anticipated to Be Under Construction by MCDOT in FY 2015**

Structure No.	Project Location	Description of Work
N/A	Northern Parkway at Reems Road	New overpass under construction
N/A	Northern Parkway at Litchfield Road	New overpass under construction

### *Status of Bridge and Structure Projects Currently Being Designed*

There are currently nine bridge projects in various stages of design by MCDOT as well as numerous structure projects within private developments in the design phase. **Table 12** lists the bridge projects currently under design or in the Design Concept Report (DCR) or scoping process.

**Table 12: Projects Currently in the Design Phase by MCDOT**

Name	Facility	Status
Deer Valley Road Bridge	Agua Fria River	Construction Plans in progress
Dobson Road Bridge and McKellips Road Bridge	Salt River	DCR completed
Gilbert Road Bridge	Salt River	Identified for Replacement
75th Avenue Bridge	Salt River	Initial Scoping in progress
Northern Parkway/Loop 101	Parkway Overpass	Design in progress
Northern Parkway Overpass	Overpass at Dysart Road	Design finalized
Northern Parkway Bridge	Agua Fria River	Design in progress
Eagle Eye Road Bridge	Tiger Wash	Bridge Selection Report completed
Meridian Road Bridge	Queen Creek Wash	DCR completed
Rittenhouse Road Bridge	Queen Creek Wash	Bridge Selection Report completed

### *Summary of Inspection Activity for FY 2014*

Each year MCDOT must submit a report to the County Board of Supervisors concerning the physical condition of its bridges and minor structures as compared to the adopted criteria as required by the Governments Accounting Standards Board (GASB) Statement 34. The latest ratings of the County's bridges and structures along with the BSR are shown below in **Table 13**:





**Table 13: Summary of FY 2014 Inspection Results**

Criteria	Target Value	Actual Value
% of Bridges and Structures with BSR > 70	min. 90%	98.8%
% of Bridges and Structures with BSR < 50	max. 3%	0.0%

**Table 14** through **Table 17** provide a list of County bridges based on their overall length. The tables include information on each structure's sufficiency rating. An alphabetical list of all structures within the MCDOT Bridge inventory can be found in **Appendix A**.

**Table 14: Listing of Span Bridges Over 600' in Overall Length**

Structure No.	Road	Location	Feature Intersected	Sufficiency Rating	Length (ft.)	Structure Name
8584	Tuthill Rd	0.5 mi S/ Beloat Rd	Gila River	96.18	1,770	Gila River Bridge
9859	Camelback Rd	1.0 mi E/ El Mirage Rd	Agua Fria River	77.63	1,725	Agua Fria River Bridge
8021	Old US 80	S/ Gillespie Dam	Gila River	60.58	1,662	Gila River Bridge
9145	Indian School Rd	0.5 mi E/ El Mirage	Agua Fria River	77.56	1,623	Agua Fria River Bridge
8981	Olive Ave	0.8 mi E/ El Mirage Rd	Agua Fria River	92.74	1,504	Agua Fria River Bridge
7780	Gilbert Rd-FAS 229	0.5 mi N/ Thomas Rd	Salt River	79.72	1,302	Salt River Bridge
10396	Happy Valley Pkwy	1.5 mi W/Lake Pleasant Rd	Agua Fria River	88.34	1,256	Agua Fria River Bridge
7819	MC-85 Hwy	0.5 mi W/ El Mirage	Agua Fria River	93.94	1,203	Agua Fria River Bridge
8553	Alma School Rd	300' S/ McKellips	Salt River (N. Channel)	74.68	936	Salt River Bridge NB

**Table 15: Listing of Span Bridges between 300' and 600' in Overall Length**

Structure No.	Road	Location	Feature Intersected	Sufficiency Rating	Length (ft.)	Structure Name
9999	Old US 80	500' E/ Salome Hwy	Hassayampa River	99.65	486	Hassayampa River Bridge
9849	Bush Hwy	at Blue Point-Salt River	Salt River	92.63	480	Blue Point Bridge
8554	Alma School Rd	0.25 mi N/ McLellan	Salt River (S. Channel)	74.68	410	Salt River Bridge SB
10106	New River Road	0.25 mi E/ I 17	New River	96.61	407	New River Bridge
10085	I-17 Frontage Rd	1000' S/ New River Rd	New River	99.59	401	New River Bridge
10021	New River Rd	0.25 mi W/ 7th Ave	Skunk Creek	98.66	367	Skunk Creek Bridge
9825	Carefree Hwy WB	1 mi W/ Cave Creek Rd	Cave Creek Wash	79.92	354	Cave Creek Bridge
10162	Carefree Hwy EB	1 mi W/ Cave Creek Rd	Cave Creek Wash	84.78	354	Cave Creek Wash Bridge
9588	Olive Avenue	E/ of 99th Ave	New River	82.69	302	New River Bridge



**Table 16: Listing of Span Bridges between 100' and 300' in Overall Length**

Structure No.	Road	Location	Feature Intersected	Sufficiency Rating	Length (ft.)	Structure Name
10582	Gavilan Peak Pkwy	Just S of Daisy Mtn Dr	Deadman Wash	94.08	270	Gavilan Peak Pkwy Bridge
7548	571st Ave	9.75 mi N/ I-8 via ACRd	Gila River	98.88	257	Gila River Bridge
9928	Power Rd	S/ Guadalupe Rd	East Maricopa Fldwy	76.20	226	E Maricopa Fldwy Bridge
10083	New River Road	350' N/ Circle Mtn Rd	Cline Creek Wash	99.67	221	Cline Creek Bridge
11160	Northern Parkway	at Sarival Avenue	Sarival Avenue	100.00	203	Sarival Ave OP EB
11161	Northern Parkway	at Sarival Avenue	Sarival Avenue	100.00	201	Sarival Ave OP WB
10390	Power Road	.2 mi S/ Queen Creek Rd	Queen Creek	81.41	193	Queen Creek Bridge
11108	Riggs Rd	.2 mi E of Hawes Rd	Sonoqui Wash	97.22	191	Riggs Rd Bridge
8038	Rittenhouse Rd	.25 mi N/ Cloud	Queen Creek Wash	85.54	180	Queen Creek Wash Bridge
8862	University Drive	.5 mi E/ Ellsworth Rd	CAP Canal	98.58	146	CAP Canal Bridge
8884	Southern Ave	.6mi E/ Signal Butte Rd	CAP Canal (Mesa)	97.41	145	CAP Canal Bridge
11164	BNSF Spur Track	at BNSF Railroad	Northern Parkway	99.44	144	BNSF OP
9832	Salome Rd	8 mi W/ Harquahala Valley Rd	CAP Canal	94.46	124	CAP Canal Bridge
8569	Patton Rd	1 mi W/ Grand Ave	CAP Canal	94.08	119	CAP Canal Bridge
8856	Crismon Rd	500' N/ Apache Rd	CAP Canal	94.70	109	CAP Canal Bridge
9895	Ellsworth Rd	.25 mi N/ University Rd	CAP Canal	99.25	106	CAP Canal Bridge
9824	Bush Hwy	1.7 mi N/ Thomas	FanninMcFar CAP Aqueduct	97.09	105	CAP Canal Bridge
10230	MC-85 Hwy	.3 mi E/ Estrella Pkwy	Bullard Wash	91.01	103	MC-85 Bridge





**Table 17: Listing of Span Bridges Under 100' in Overall Length**

Structure No.	Road	Location	Feature Intersected	Sufficiency Rating	Length (ft.)	Structure Name
8576	355th Avenue	7 mi N/ Indian School Rd	CAP Canal	95.79	90	CAP Canal Bridge
8571	163rd Avenue	5 mi N/ US 60_Grand Ave	HaydenRhodes CAP Aqueduct	93.80	88	CAP Canal Bridge
7883	Dysart Rd-FAS 547	0.25 mi N/ Camelback Rd	Colter Channel	98.41	86	Colter Channel Bridge
8560	Eagle Eye Rd	2 mi S/ Salome Hwy	CAP Canal	96.88	86	CAP Canal Bridge
8881	Van Buren St	0.5 mi W/ Citrus Rd	RID Canal	98.43	85	RID Canal Bridge
10061	Old US 80	0.3 mi S/ 331th Ave	Arlington Valley Wash	78.85	84	Arlington Valley Bridge
9834	Old US 80	1 mi W/ Jct SR-85	Buckeye Drain	98.65	82	Buckeye Drain Bridge
7898	Cave Creek Pkwy	1.5 mi N/32nd St/Cloud Rd	Wash	98.84	80	Wash Bridge
10787	Dysart Road	0.25 mi. S/ Jomax Rd	Beardsley Canal	99.99	76	Dysart Road Bridge
9949	El Mirage Rd	0.5 mi N/ Glendale Ave	Dysart Drain	97.41	73	El Mirage Drain Bridge
9927	Power Rd	S/ Guadalupe Rd	RWCD Canal N. Crossing)	76.20	69	RWCD Canal (N) Bridge
10786	El Granada Blvd	0.4 mi. N/ Happy Valley Rd	Beardsley Canal	99.99	65	El Granada Blvd Bridge
7901	MC 85 Hwy	0.5 mi W/ Perryville	Buckeye Canal	97.26	56	Buckeye Canal Bridge
8000	Baseline Rd	200' NW MC-85	Buckeye Canal	93.68	56	Buckeye Canal Bridge
7557	Meridian Rd	0.5 mi N/ Brown Rd	Bulldog Floodway	97.37	54	Bulldog Fldwy Bridge
9375	Broadway Rd EB	0.2 mi E/ Price Rd	Tempe Canal	75.27	50	Tempe Canal Bridge EB
9384	Broadway Rd WB	0.2 mi E/ Price Rd	Tempe Canal	75.27	50	Tempe Canal Bridge WB
10776	Rainbow Road	0.5 mi S/ Southern Avenue	Buckeye Canal	98.23	48	Rainbow Road Bridge
9503	Higley Rd	0.5 mi S/ Germann	RWCD Canal	73.49	44	RWCD Canal Bridge
9919	Woods Rd	E/ Old US-80	Gila Bend Canal	98.43	44	Gila Bend Canal Bridge
10051	7th St	450' N/ Carefree Hwy	Desert Lk Wash S Branch	98.34	44	Desert Lake S/Branch
8001	Airport Rd	0.5 mi N/ Lower Buckeye	RID Canal	94.71	43	RID Canal Bridge
10126	Airport Rd	1 mi N/ MC85	Buckeye Canal	98.61	42	Buckeye Canal Bridge
8044	Perryville Rd	0.5 mi N/ Southern	Buckeye Canal	98.86	40	Buckeye Canal Bridge
9593	Miller Rd	0.25 mi N/ SR-85	Buckeye Canal	86.34	40	Buckeye Canal Bridge
7582	309th Avenue	S of Lower River Rd	Buckeye Canal	94.95	39	Buckeye Canal Bridge
8638	Dean Rd	0.75 mi N/ MC-85	Buckeye Canal	98.82	39	Buckeye Canal Bridge
10847	Meridian Rd (Mesa)	0.5 mi S of Warner Road	Power Line Fldwy Chnl	93.10	39	Meridian Rd Bridge
8043	Perryville Rd	1/3 mi S/ Van Buren	RID Canal	98.72	38	RID Canal Bridge
7551	Dean Rd	600' N/ Lower Buckeye Rd	RID Canal	98.72	37	RID Canal Bridge



Structure No.	Road	Location	Feature Intersected	Sufficiency Rating	Length (ft.)	Structure Name
7782	Palo Verde Rd	0.75 mi N/ Old US80 Hwy	Buckeye Canal	98.70	37	Buckeye Canal Bridge
9672	99th Ave	0.5 mi N/ McDowell Rd	RID Canal	97.24	37	RID Canal Bridge
9831	Jackrabbit Trail	1000' N/ Southern Ave	Buckeye Canal	98.31	37	Buckeye Canal Bridge
9374	University Dr	900' W/ Dobson	Tempe Canal	95.40	36	Tempe Canal Bridge
10088	Jackrabbit Trail	0.25 mi N/ Yuma	RID Canal	97.32	35	RID Canal Bridge
8583	59th Ave	0.5 mi S/ Buckeye Rd	RID Canal	97.15	34	RID Canal Bridge
8629	Turner Rd	0.5 mi S/ Baseline Rd	Buckeye Canal	99.88	34	Buckeye Canal Bridge
8681	Rainbow Rd	1 mi N/ Broadway	RID Canal	98.49	34	RID Canal Bridge
10239	Roeser Rd	0.5 mi S/ Broadway Rd	Buckeye Feeder Ditch	93.83	34	Roeser Rd Bridge
10240	Chambers Street	0.6 mi S/ Broadway Rd	Buckeye Feeder Ditch	93.84	34	Chambers St Bridge
8578	Wilson (283rd) Ave	1 mi S/ Baseline	Buckeye Canal	98.65	32	Buckeye Canal Bridge
11111	Centennial Rd	5.7 mi W/ Harqua. Val. Rd	CAP Aux Canal	94.90	32	Centennial Rd Bridge
9426	Palo Verde Rd	0.25 mi N/ Broadway	RID Canal	98.22	31	RID Canal Bridge
8680	Johnson Rd	0.25 mi N/ Broadway	RID Canal	98.86	28	RID Canal Bridge
8855	Bruner Rd	0.75 mi N/ Old US-80	Buckeye Canal	98.99	28	Buckeye Canal Bridge
990181	Old US 80	0.25 mi S/ Cactus Rose	Arlington Valley Wash	83.84	18	Arlington V Wash Bridge





## Road Management System

### Introduction

Pavement maintenance is broadly identified as work accomplished to preserve or extend the functional life of a pavement surface until major rehabilitation or complete reconstruction is performed. Maintenance is classified by function as either routine or preventive.

Preventive maintenance preserves rather than improves the capacity or strength of the pavement. In order for preventive maintenance to be effective, it should be applied to structurally sound pavement before the pavement displays significant environmental distress such as raveling, oxidation and block cracking. Timely treatments prove to be the most cost effective.

Routine maintenance more typically consists of pothole repair, patching, sweeping and/or striping of pavement.

All roads deteriorate over time due to environmental conditions and the volume and type of traffic using the road. However, the roads within the jurisdiction of MCDOT are maintained at a high level of service because of a County program that includes the following procedures:

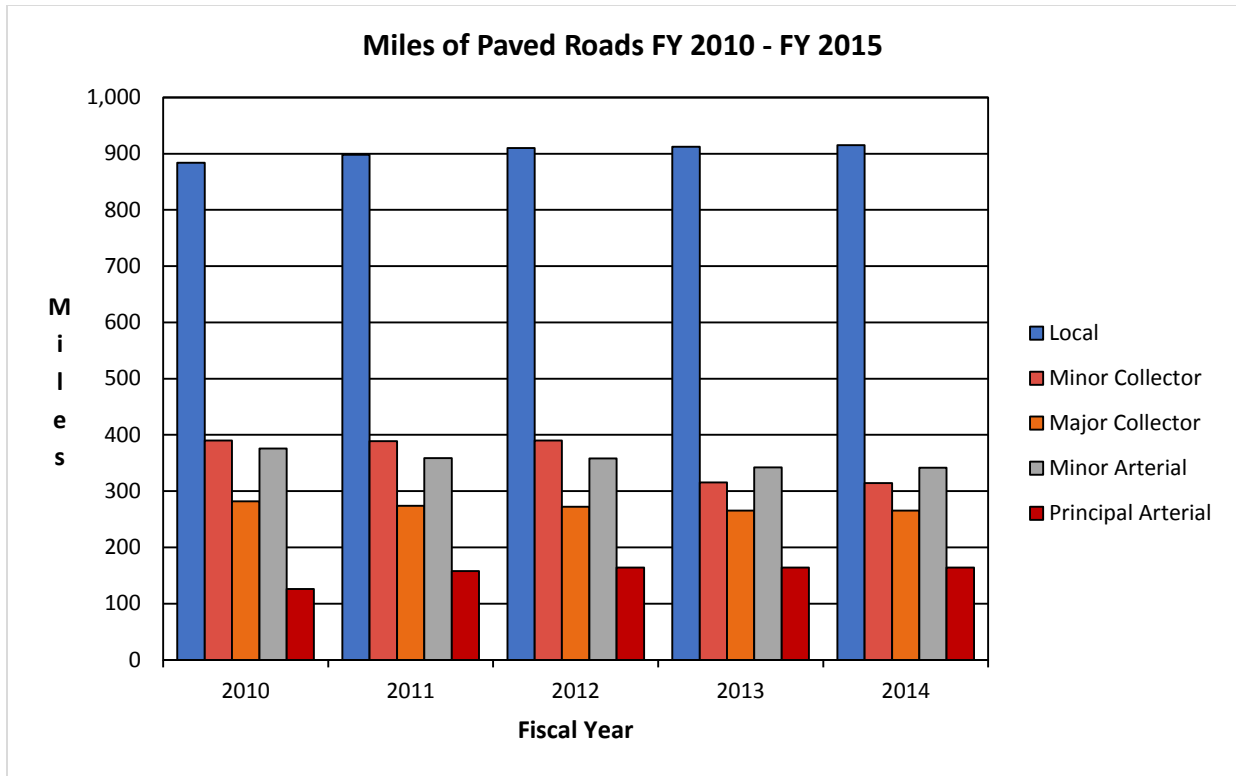
- Continuously monitor and evaluate road conditions – road evaluation ratings are stored in the Road Management System (RMS) database;
- Report road conditions to decision makers via annual reports;
- Model pavement conditions and maintenance strategies; and
- Develop annual and long-term maintenance plans and implement the plans as funding permits.

### Summary of MCDOT Paved Facilities

In 2014 MCDOT had jurisdiction of 915 miles (1,872 lane miles) of local roads and 1,086 miles (2,600 lane miles) of major roads (arterial and collector). This breakdown can be seen in **Table 18** and **Figure 23**, which compare the MCDOT road composition between FY 2010 and FY 2014. In total, MCDOT owned and maintained 2,001 centerline miles of local and major roads in FY 2014, which equates to 4,471.50 lane miles. For comparison, in FY 2013, MCDOT maintained 4,469.50 lane miles of road.

**Table 18: Miles of MCDOT Paved Roads FY 2010 - FY 2014**

Road Classification	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	Difference 2010-2014
Local	884	889	910	912	915	31
Minor Collector	390	389	390	315	314	-76
Major Collector	282	274	272	266	266	-16
Minor Arterial	376	359	358	342	342	-34
Principal Arterial	126	158	164	164	164	38
TOTAL	2,058	2,070	2,094	1,999	2,001	-57



**Figure 23: Miles of Paved Roads owned by MCDOT (FY 2010 - FY 2014)**

## Road and Pavement Evaluation Ratings

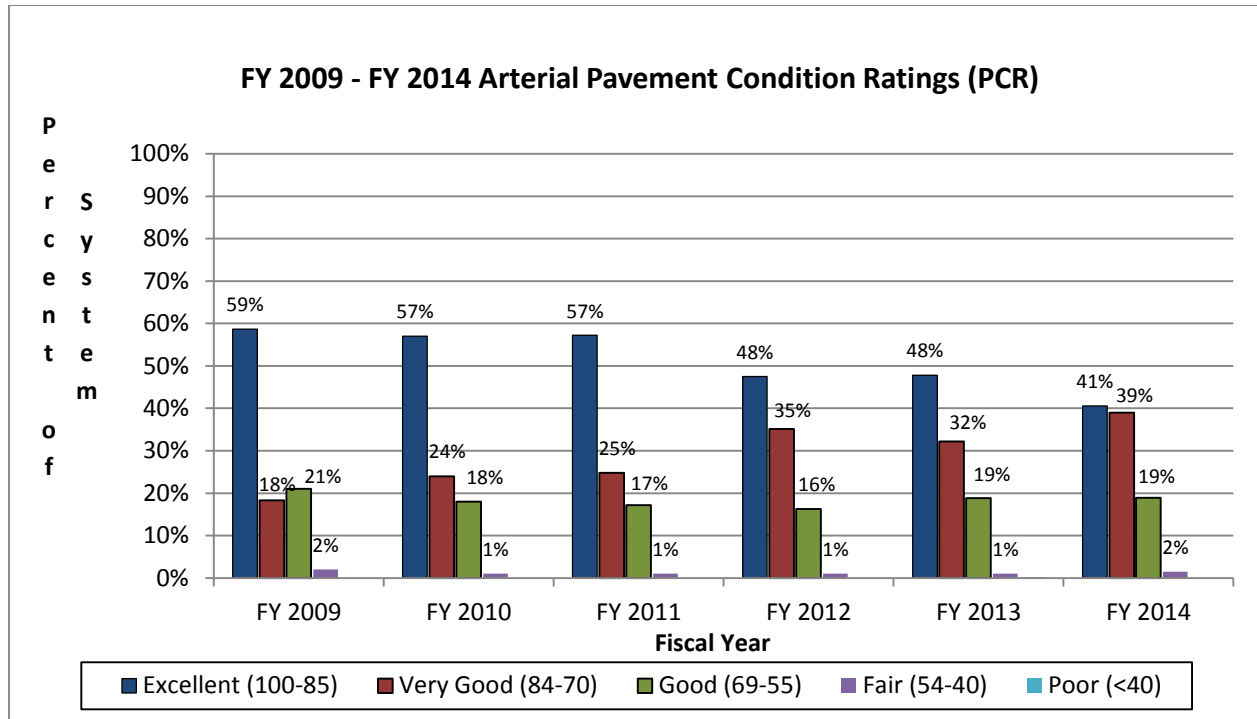
The following section describes the type of pavement evaluations and ratings that are conducted as part of MCDOT’s routine pavement maintenance.

### *Pavement Condition Ratings (PCR)*

The Road Management Section evaluates pavement conditions for surface distress every 12-18 months for arterial and collector roads and every other year for local roads, with half of the local roads evaluated each year. The resulting ratings range from 0 to 100 with 100 being new pavement or pavement with no distress. The results help to quantify the overall pavement condition of the road network.

The consistently positive results of implementing preventive maintenance on MCDOT roads is evident in **Figure 24**, which shows the FY 2009-2014 PCR quality by percentage ranking of all arterial roads in the County, and maps labeled **Figure 25**, which show the PCR for every County road. The PCR data is also presented as part of the Annual Network Rating Summary, which is found later in this Section. MCDOT utilizes the PCR ratings to forecast preventive maintenance programs and TIP planning.





**Figure 24: FY 2009 - FY 2014 PCRs for Arterial County Roads**

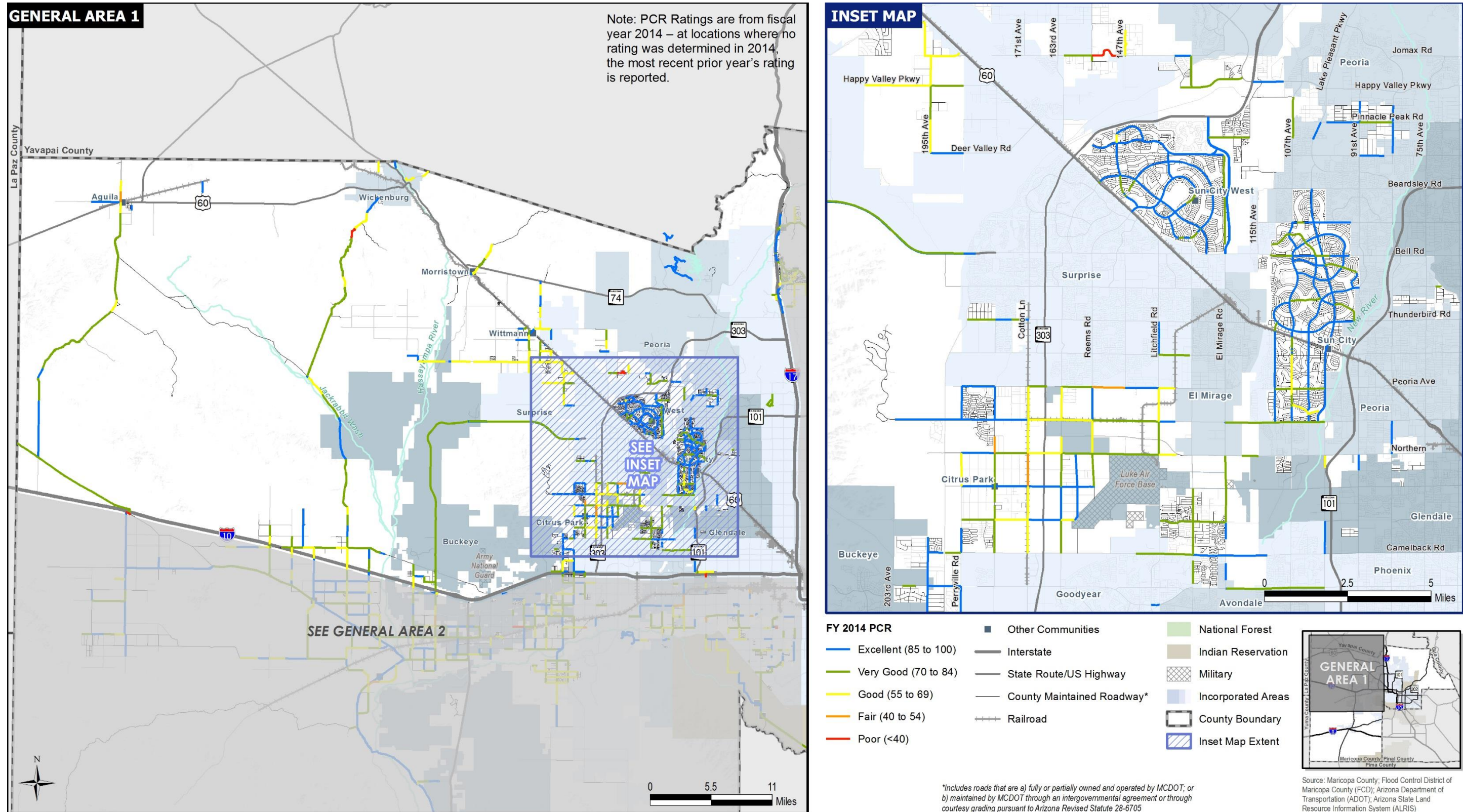
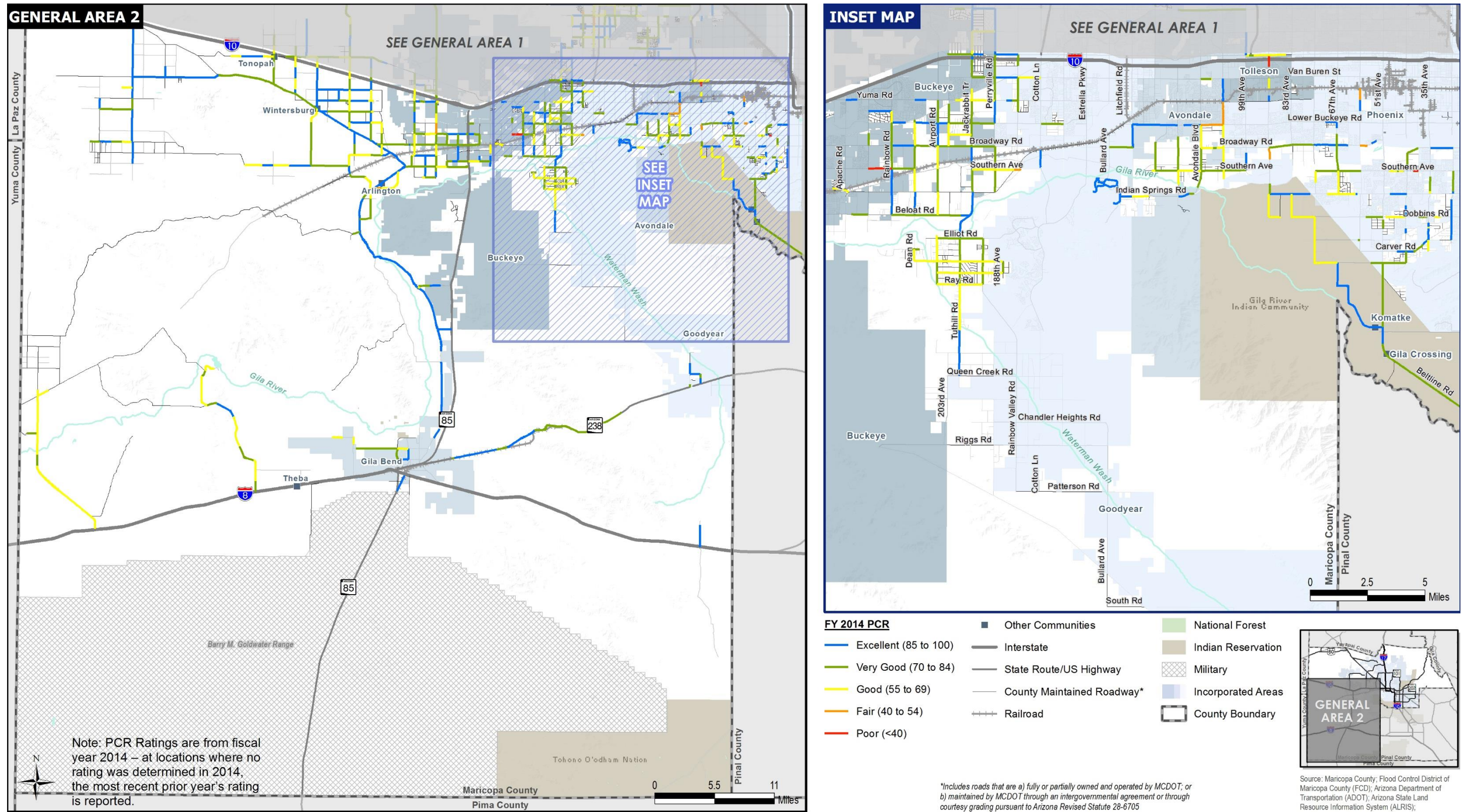


Figure 25: FY 2014 PCR for County Roads  
Area 1





**Figure 25: FY 2014 PCR for County Roads Area 2**



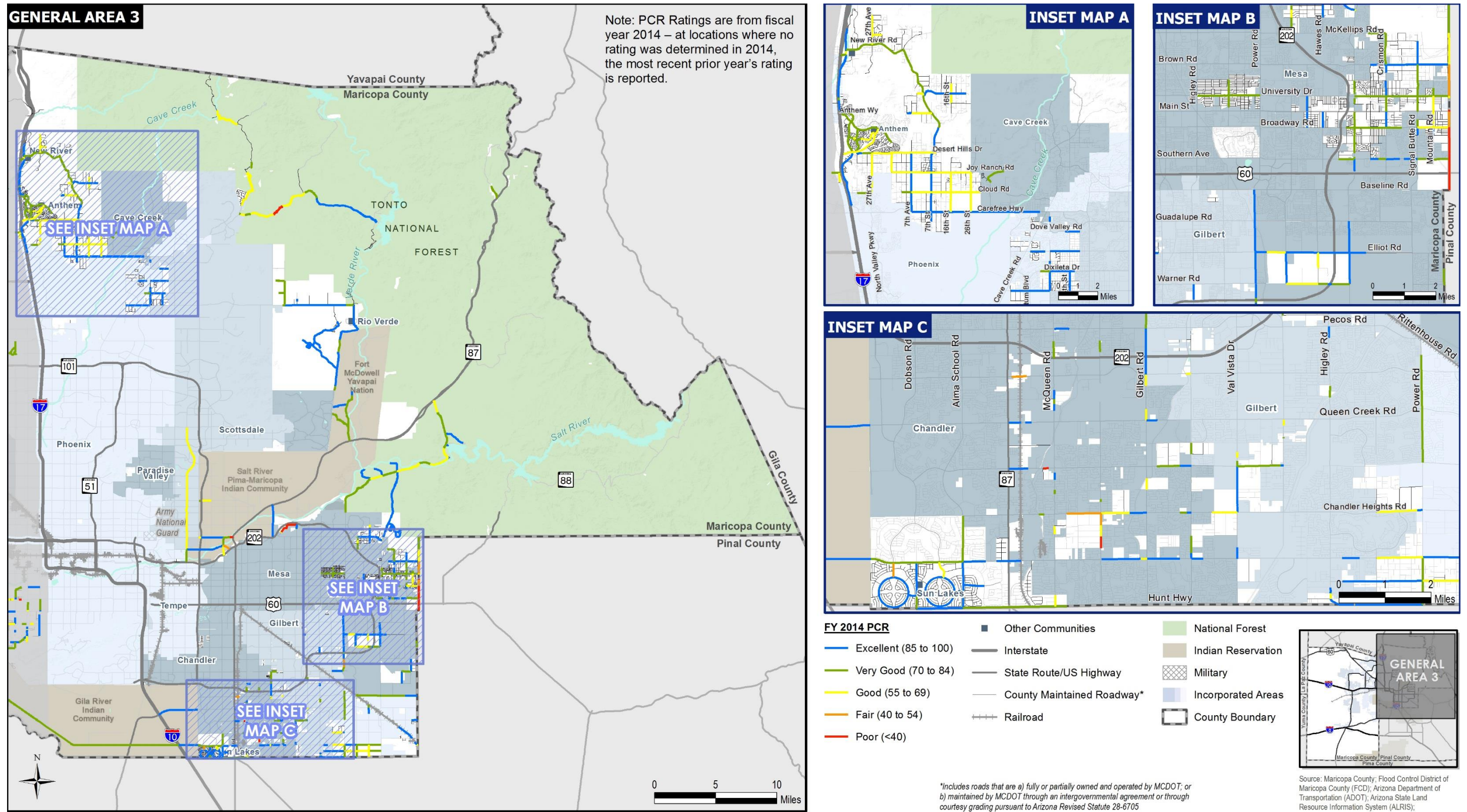


Figure 25: FY 2014 PCR for County Roads

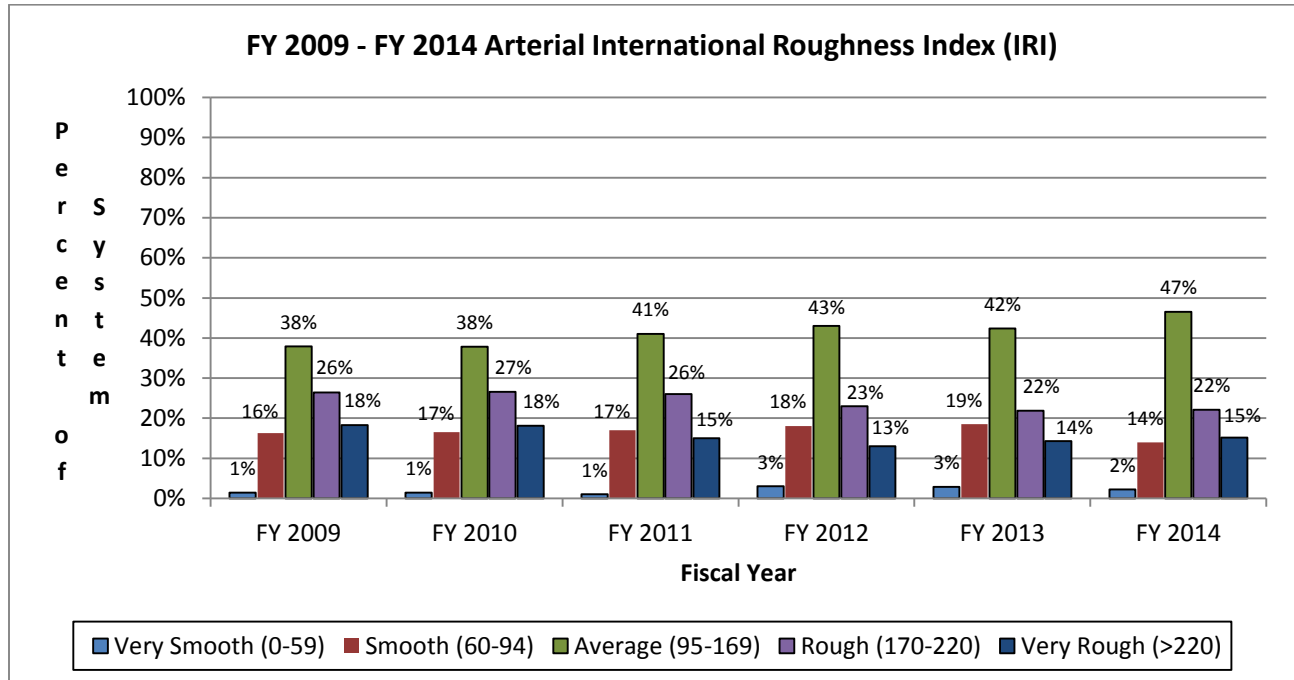
Area 3





## International Roughness Index (IRI)

MCDOT uses a Laser Road Profiler (LRP) equipped with three lasers, one in each wheel track and one in the mid-lane, to collect IRI data. Annually, the MCDOT Road Management Section collects the IRI for each arterial road segment with a length greater than a quarter mile. The IRI values are determined for each road segment on a scale from 1 to 500 with 500 representing an extremely rough road. IRI values are categorized by performance subgroups, and the percentage of each group for the years between FY 2009 and FY 2014 can be seen in **Figure 26**. Maps labeled **Figure 27** show the IRI for each County-owned road. MCDOT utilizes the IRI ratings to forecast preventive maintenance programs and TIP planning.



**Figure 26: FY 2009 - FY 2014 IRI for County Arterial Roads**

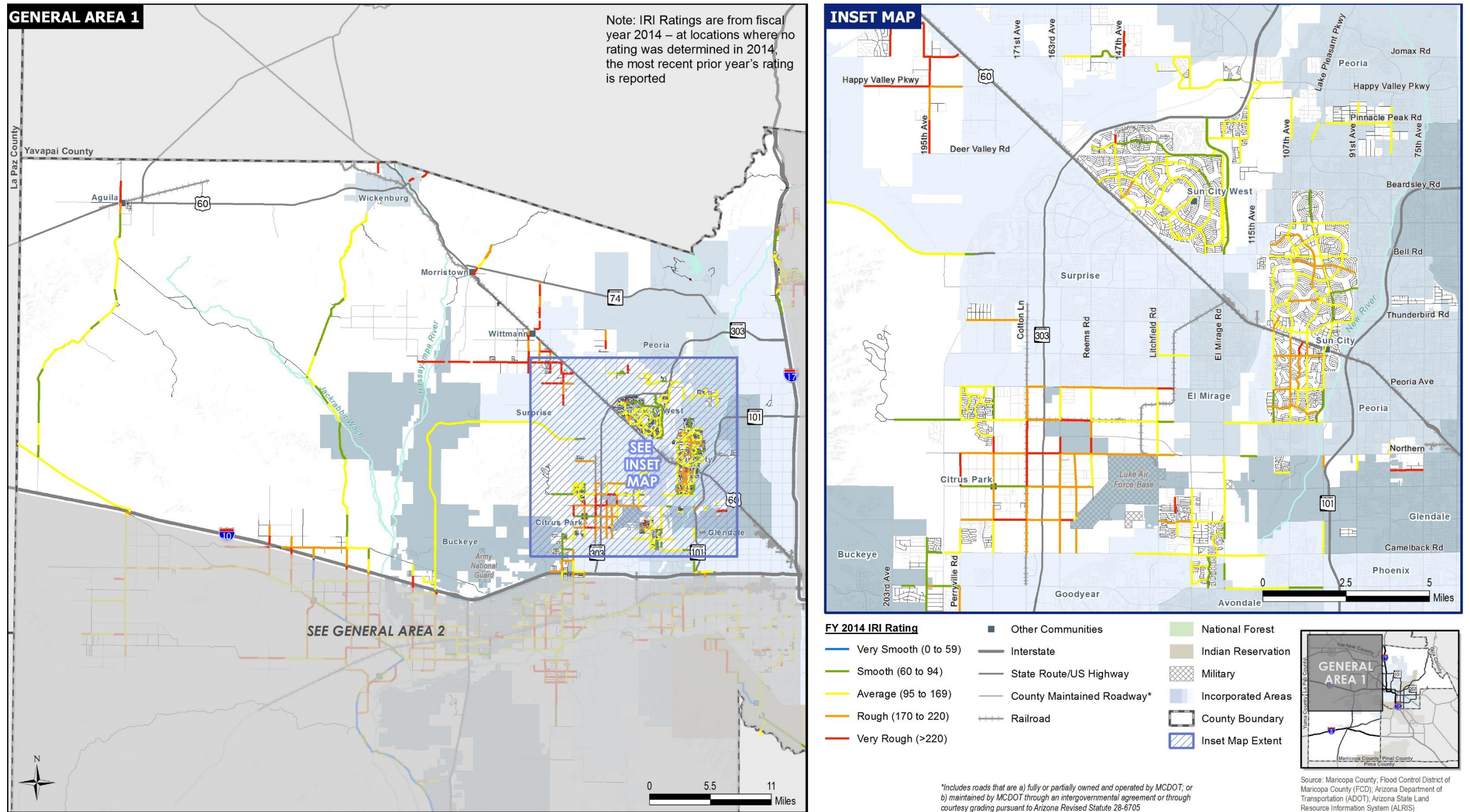


Figure 27: FY 2014 IRI for County Roads Area 1



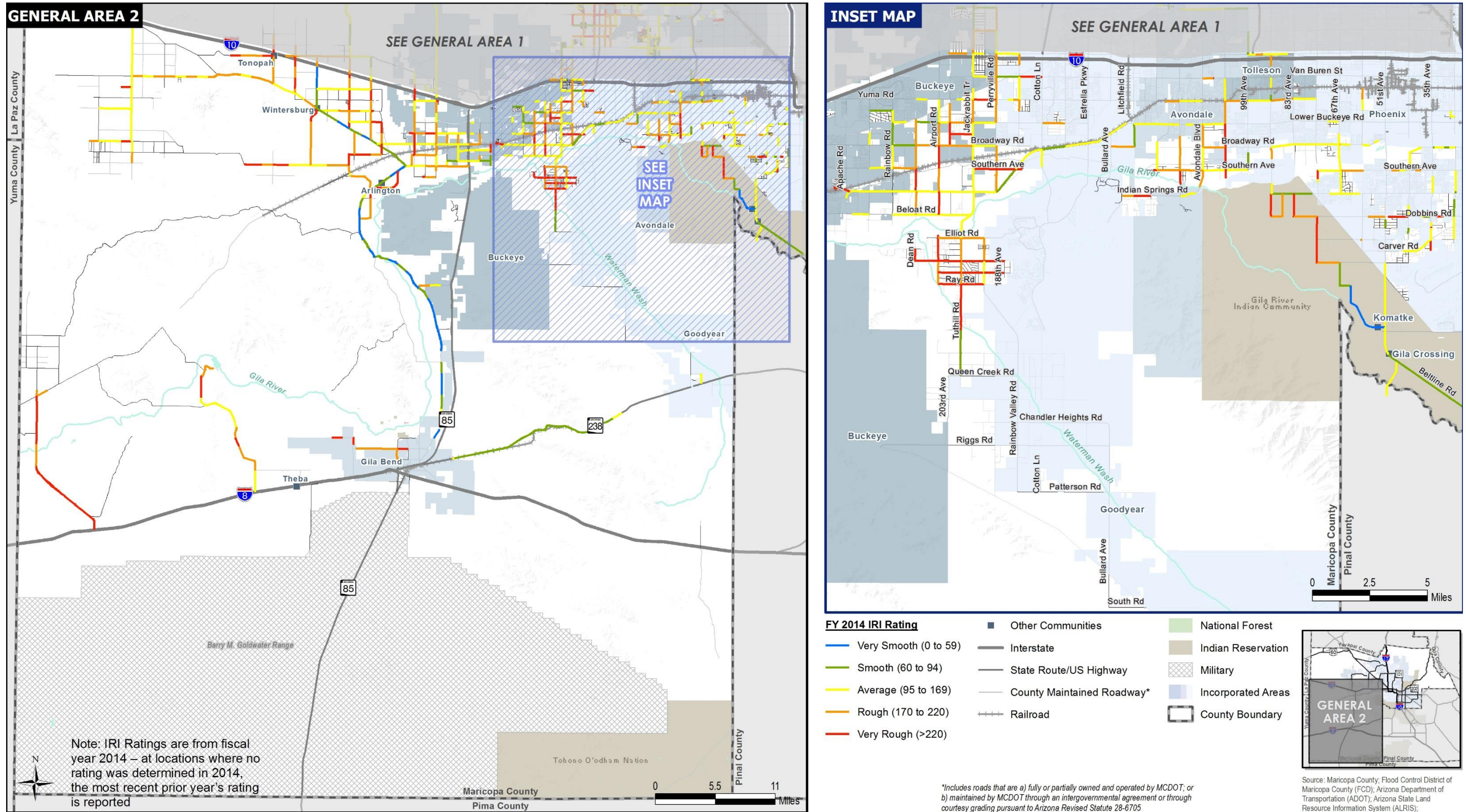


Figure 27: FY 2014 IRI for County Roads  
Area 2



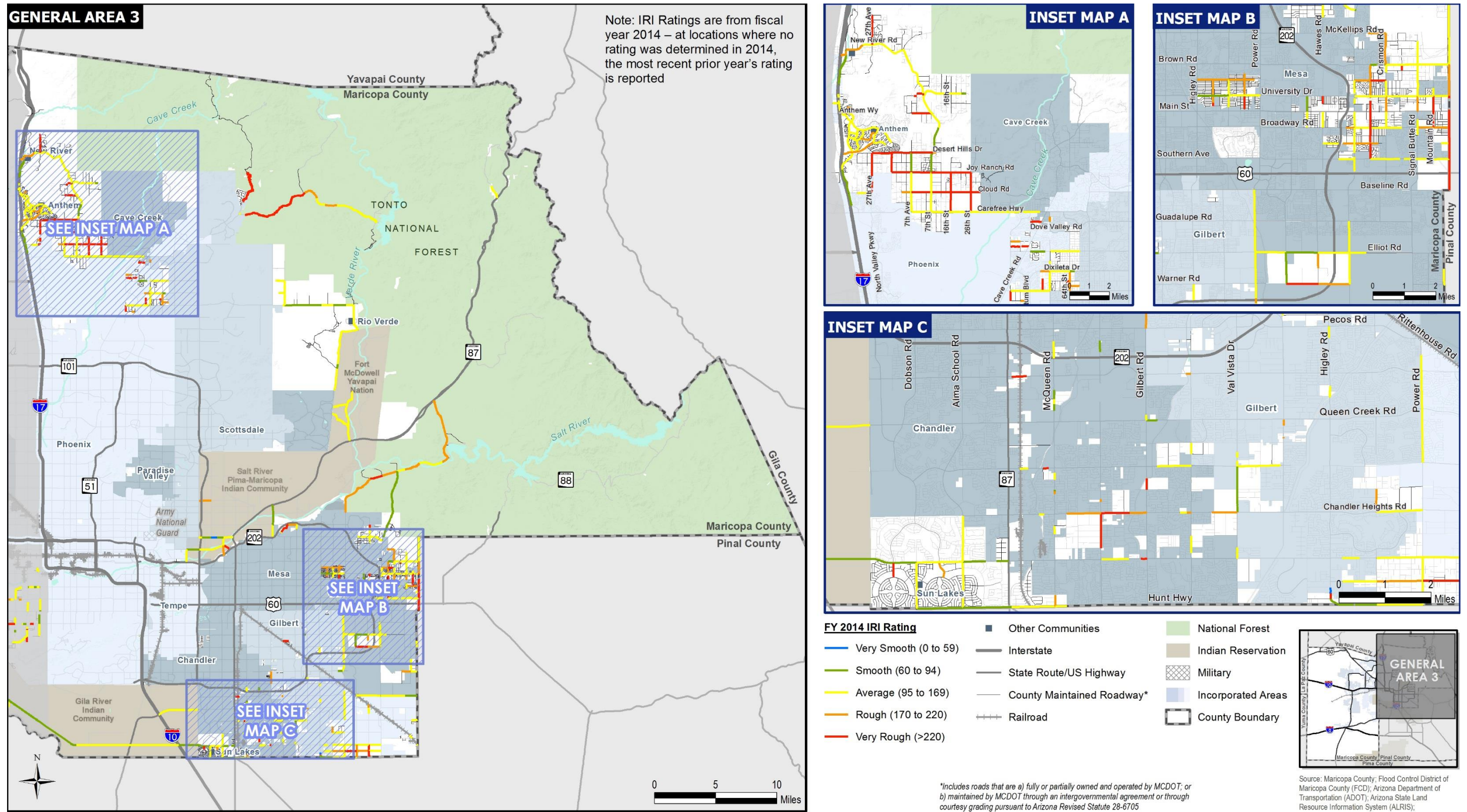


Figure 27: FY 2014 IRI for County Roads  
Area 3

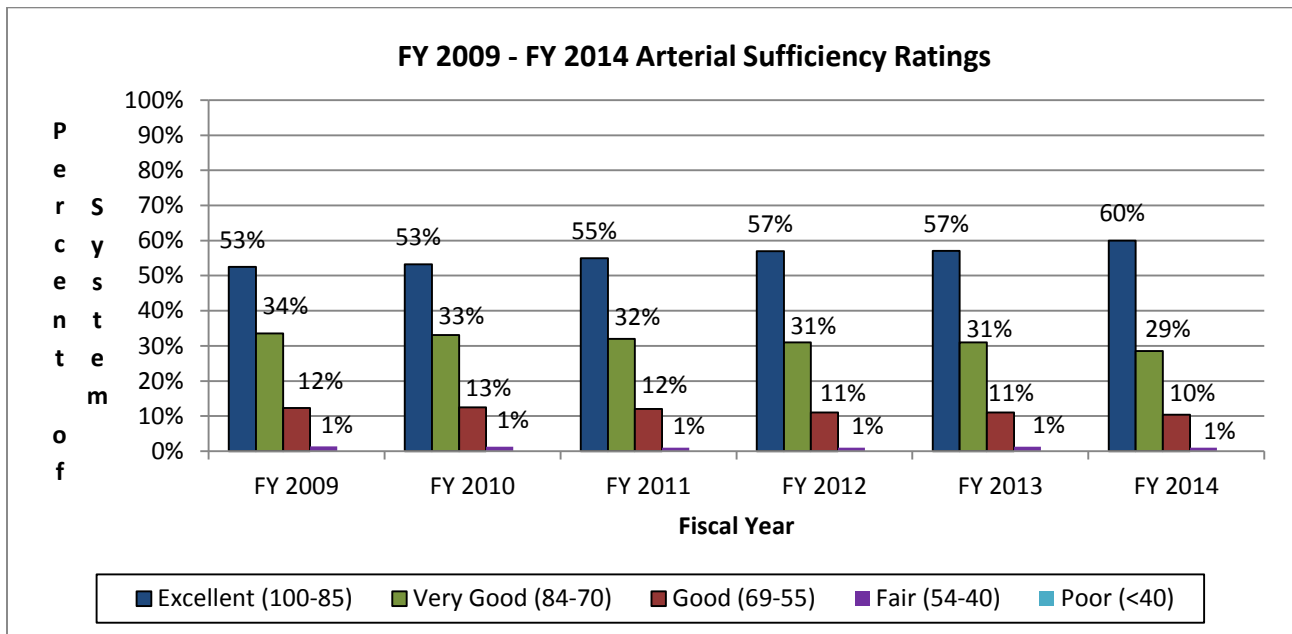




## Sufficiency Ratings

The Road Management Section identifies a sufficiency rating for each arterial road segment when it is initially constructed. The rating identifies how well each road segment compares to the MCDOT Roadway Design Manual (RDM) standards. Ratings for each category are combined per road segment and scored on a scale from 0 to 100 with 100 representing a road in compliance with the RDM standards.

The sufficiency ratings of arterial roads are updated only after major improvements are made to the road or the road is reconstructed. New construction, widening, or significant improvements to address safety issues such as bottlenecks, drainage, and vertical and horizontal sight distance will all impact the road's sufficiency rating. The Sufficiency Ratings of the MCDOT road network between FY 2009 and FY 2014 are provided in **Figure 28**. Maps labeled **Figure 29** below show the sufficiency ratings of County roads.



**Figure 28: FY 2009 - FY 2014 Sufficiency Ratings for County Arterial Roads**

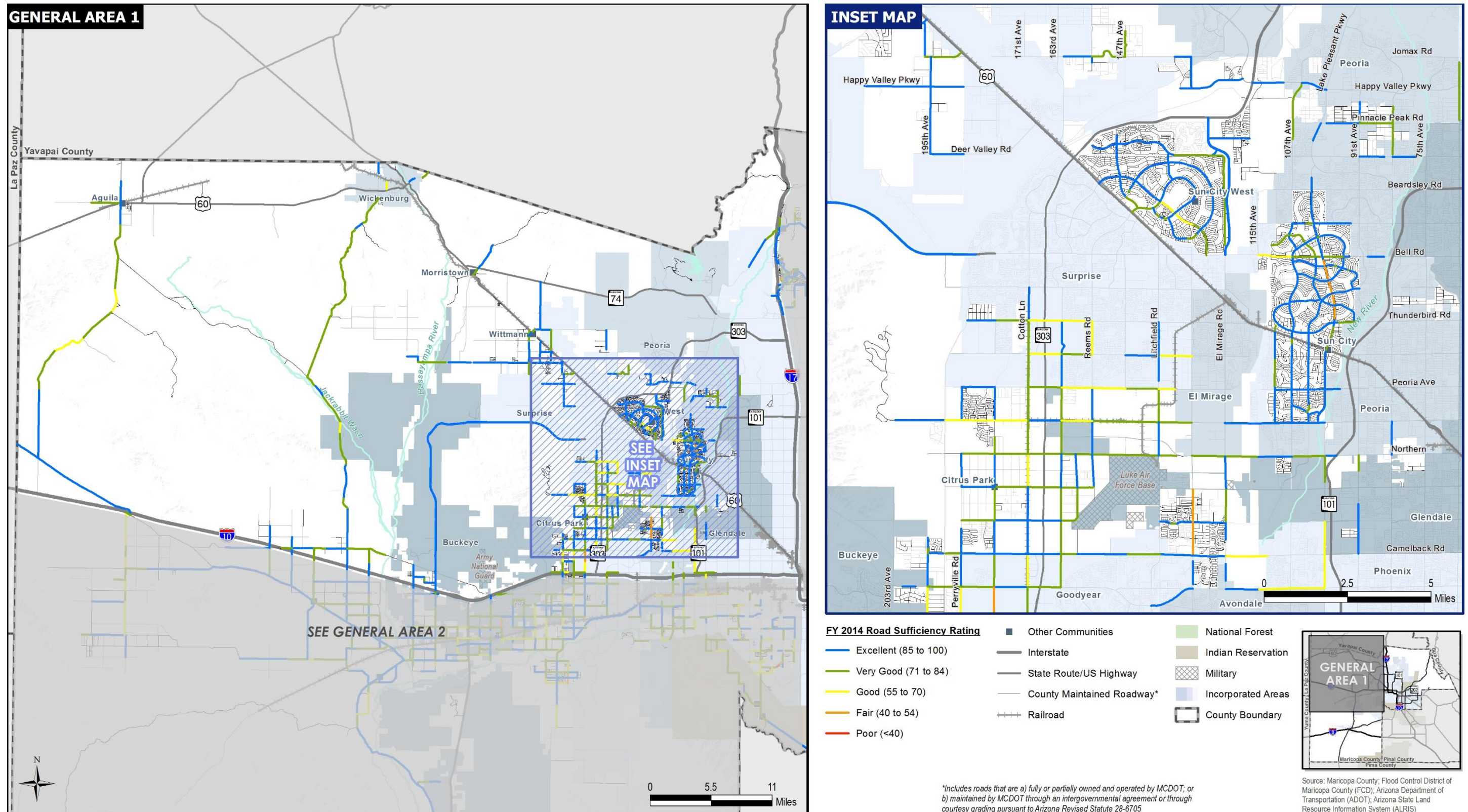
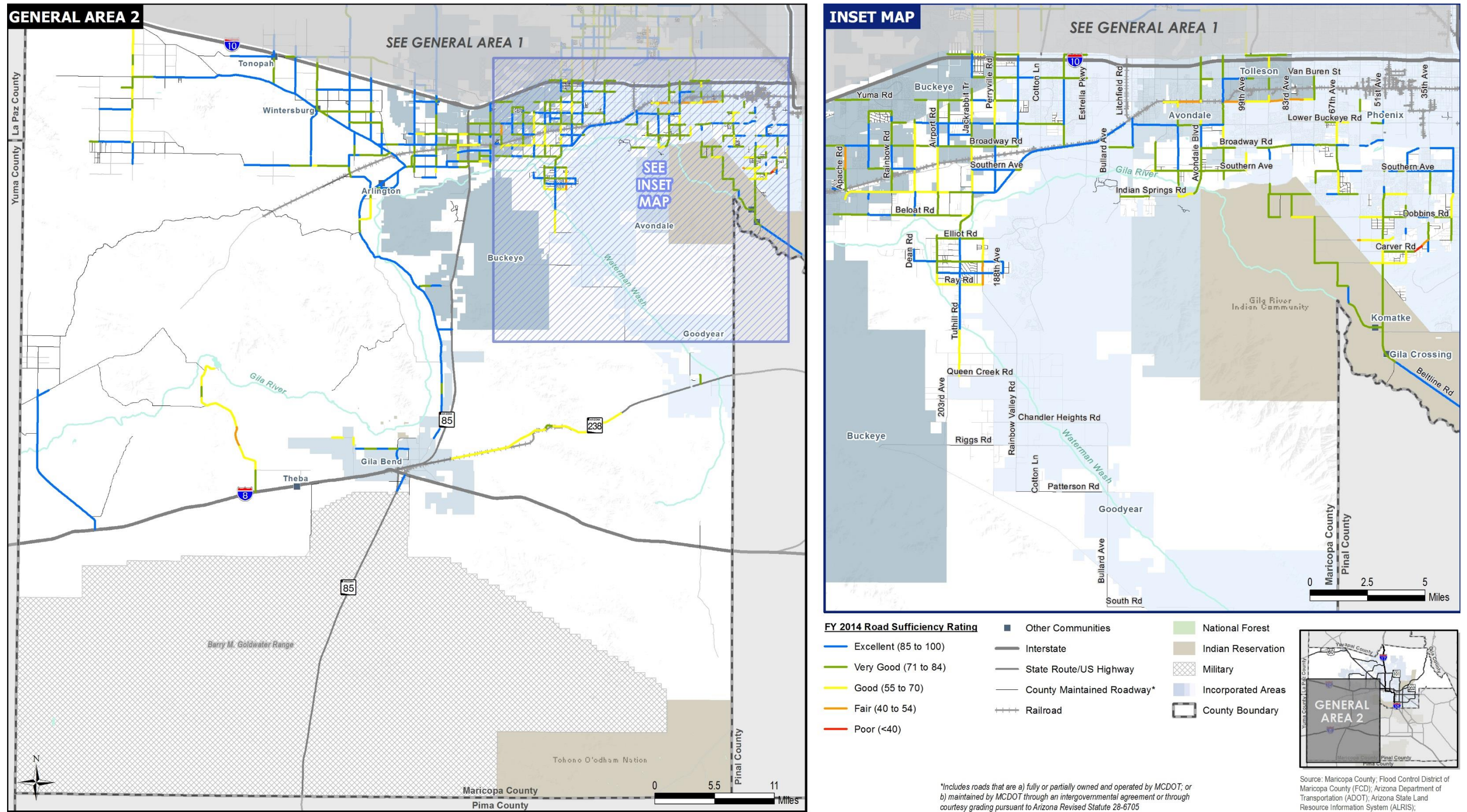


Figure 29: FY 2014 Sufficiency Ratings for County Roads  
Area 1





**Figure 29: FY 2014 Sufficiency Ratings for County Roads Area 2**



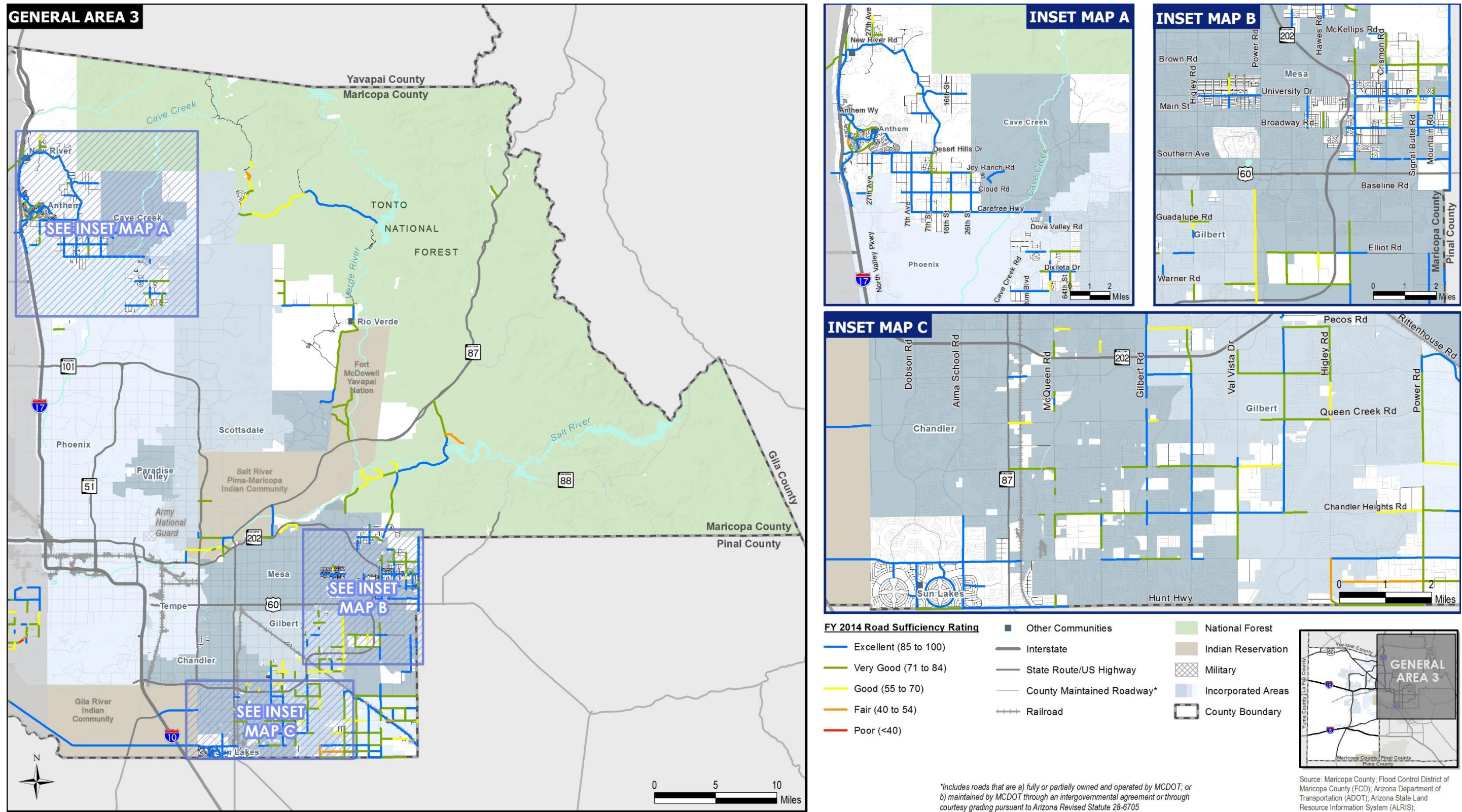


Figure 29: FY 2014 Sufficiency Ratings for County Roads

Area 3





## Preventive Maintenance Procedures

Preventive maintenance extends the life of the pavement and provides for better road performance. The majority of treatments for pavement involves sealing the existing surface and providing a new wearing surface for traffic.

MCDOT has used preventive maintenance practices for decades with excellent results. **Table 19** shows the breakdown of each treatment that is typically used, the frequency of application and the observed increase in pavement life per application.

**Table 19: Preventive Maintenance Treatment Longevity**

Treatment	Pavement Age at Time of First Application (year)	Frequency of Application (year)	Observed Increase in Pavement Life (year)
Fog Seal/ Rejuvenate	3 to 4	3 to 4	3 to 4
Crack Filling/Sealing	8 to 10	4 to 5	4 to 5
Single Chip Seal	10 to 12	5 to 6	5 to 6
Double Chip Seal	10 to 12	5 to 6	5 to 6
Micro Surfacing	10 to 12	5 to 6	5 to 6
Slurry Seal	10 to 12	5 to 6	5 to 6
Arterial—Thin Overlay— 1.5"- 2" Asphalt Rubber Hot Mix (ARHM)	12 to 15	12 to 15	12
Local—Mill & Resurface 1.5" ARHM	35+	To be determined	To be determined

## FY 2014 Pavement Preservation Results

A maintenance plan was established that identified the major projects that were needed to maintain the integrity of the MCDOT owned roads in 2014. In FY 2014, there was a projected \$7 million of pavement rehabilitation projects, \$6 million for arterial mill and replace (M&R), \$1 million for crack sealing, \$3.65 million for chip seal, \$1.14 million for preservative seal, and \$0.56 million for slurry seal.

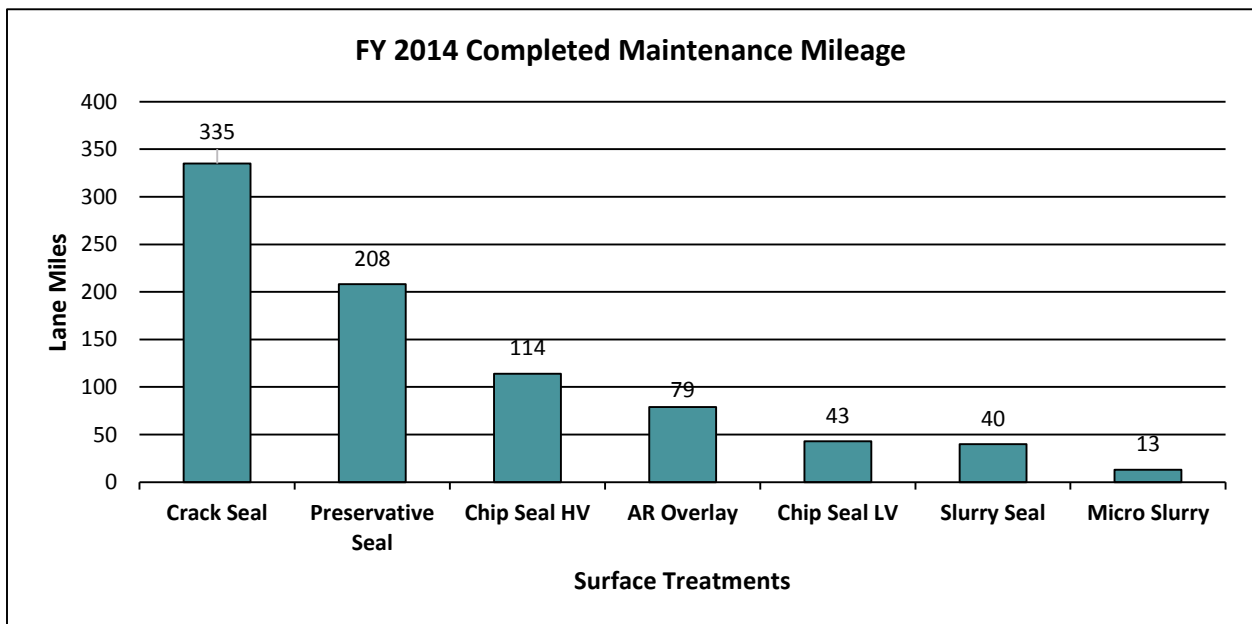
A summary of the completed maintenance projects in FY 2014 can be found in **Table 20**. The cost to complete the FY 2014 maintenance plan was approximately \$12.68 million. As a comparison, MCDOT spent \$7.86 million in FY 2013 to complete the FY 2013 maintenance plan.



**Table 20: FY 2014 Completed Maintenance Plans**

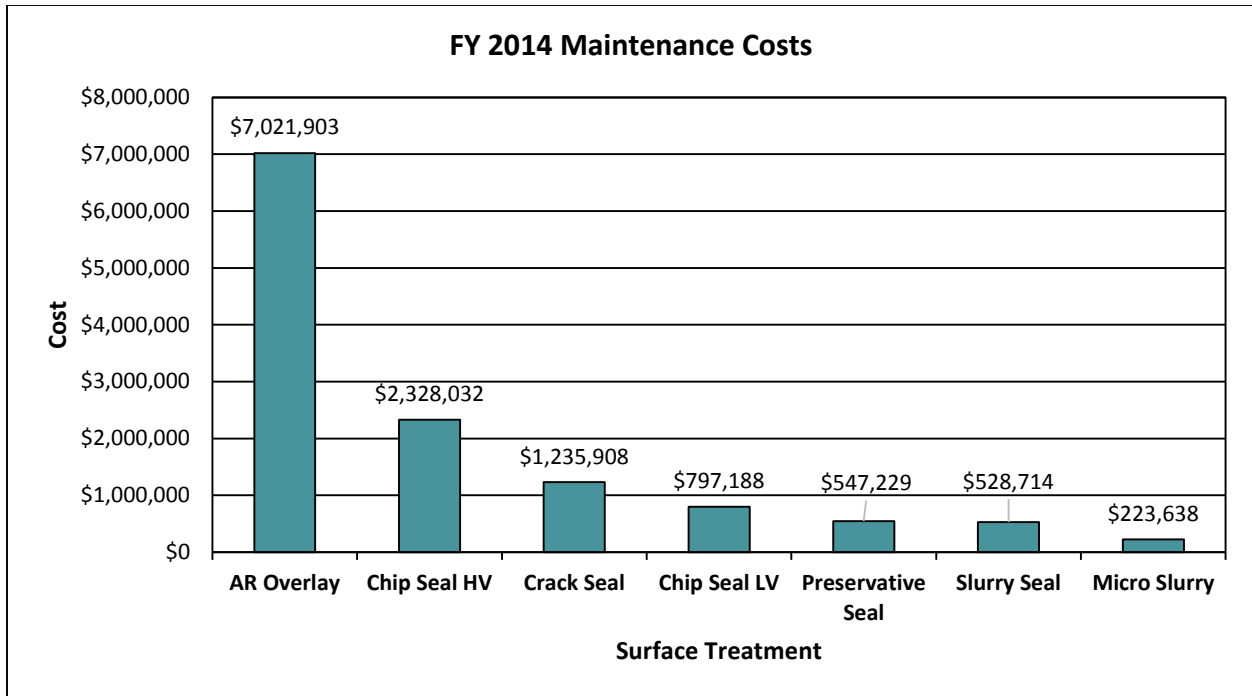
Project Name	WO#	Cost per Square Yard (SY)	Square Yards (SY)	Lane Miles	Total Cost
2014 - Profile & Asphalt Rubber (AR) Overlay - Eagle Eye Rd	MP067	\$17.66	48,885	5.95	\$863,309.10
2014 - Crack Seal - \$1.2m - MPC14	MPC13	\$0.45	12,314	1.5	\$5,541.20
2014 - Crack Seal - \$1.2m - MPC14	MPC14	\$0.45	2,734,148	332.9	\$1,230,366.55
2014 - Chip Seal Low Volume (LV) - MPH14 - \$850k	MPH14	\$2.25	354,306	43.14	\$797,187.51
2014 - Chip Seal High Volume (HV) - Article 5 - \$2.25m - MPH14	MPH14	\$2.50	866,742	105.53	\$2,166,855.00
2014 - Preservative Seal - \$700k - MPP14	MPP14	\$0.32	1,710,090	208.23	\$547,228.83
2014 - Slurry Seal - MPS14 - \$530k	MPS13	\$1.59	731	0.09	\$1,162.46
2014 - Slurry Seal - MPS14 - \$530k	MPS14	\$1.59	331,794	40.4	\$527,551.73
2014 - Micro Slurry - MPS14 - \$355k	MPS14	\$2.10	106,494	12.97	\$223,638.09
2014 - AR M&R - TT435 - \$6.9m	TT435	\$10.21	603,192	73.44	\$6,158,594.10
2014 - Chip Seal HV - Article 5 - \$2.25m - MPH14	TTTMP032	\$2.48	64,991	7.91	\$161,177.38
Project Maintenance Totals			6,833,687	832.06	\$12,682,611.95
				TIP Funding:	\$6,158,594.10
				Operations Funding:	\$5,660,708.75

In FY 2014, MCDOT’s pavement preservation group and the Operations Division completed 11 programs this year with an expenditure of \$12,682,612. **Figure 30** and **Figure 31** break down the FY 2014 completed projects and costs by the type of surface treatment that was performed. As can be seen in Figure 29, the most prevalent road improvement undertaken in 2014 was the crack seal, with 334 miles of road undergoing a crack seal treatment. However, the type of surface treatment that resulted in the largest cost in FY 2014 was the Asphalt Rubber (AR) Overlay, which cost MCDOT more than \$7 million. This is despite the fact that there were only 79 miles of road that underwent AR Overlay treatment.



**Figure 30: FY 2014 Completed Maintenance Mileage**





**Figure 31: FY 2014 Maintenance Costs**

**Table 21** shows the overall Network Rating Summary for FY 2014, which shows the results of the preventive maintenance efforts by evaluating the road system’s PCR and comparing it to previous years. The results of the FY 2014 pavement preservation program show that the network is being successfully maintained. It can be seen that the effort in FY 2014 resulted in maintenance of the network, as the 2014 average PCR value remained the same as the value in FY 2013 for local and park roads (93.27 and 89.63 respectively) and the average PCR of arterials showed minimal decline (79.40 in FY 2014 from 80.67 in FY 2013). If additional funding becomes available, MCDOT can consider accelerating the preventative maintenance plans for more crack seal, slurry seal, chip seal and mill and overlay projects to improve the quality of MCDOT roads and reduce more costly maintenance in the future.

Maps labeled **Figure 32** show the pavement maintenance activities that have been undertaken on County roads in FY 2014. These maps also show the MCDOT-delineated maintenance areas.



**Table 21: FY 2010 - FY 2014 Annual Network Rating Summary**

Arterial					
Fiscal Year	2010	2011	2012	2013	2014
Average PCR	82.39	81.96	81.84	80.67	79.40
Average IRI	163.09	157.08	149.9	150.52	154.44
Mileage	1112.54	1119.18	1123.14	1087.43	1084.28
PCR 100-85	627.5	631.09	517.28	519.82	438.75
PCR 84-70	264.45	273.28	387.14	349.61	423.64
PCR < 55	6.77	8.03	12.28	12.36	17.02
Miles above 70	891.95	904.37	904.42	869.43	862.39
% above 70	81.00%	82.00%	83.00%	79.90%	79.50%
% below 55	1.00%	1.00%	1.10%	1.10%	1.60%
Local					
Fiscal Year	2010	2011	2012	2013	2014
Average PCR	91.93	92.53	93.62	93.26	93.27
Mileage	884.09	897.68	910.02	912.27	920.97
PCR 100-85	724.48	751.23	815.22	834.21	852.88
PCR 84-70	119.62	103.18	61.99	51.98	42.22
PCR < 55	5.1	5.03	1.26	1.24	0
Miles above 70	844.1	854.41	877.21	886.19	895.1
% above 70	98.50%	98.70%	98.40%	99.00%	99.40%
% below 55	0.60%	0.60%	0.10%	0.10%	0.00%
Park					
Fiscal Year	2010	2011	2012	2013	2014
Average PCR	89.39	89.61	89.63	89.63	89.63
Mileage	52.11	54.97	56.54	56.36	58.18
PCR 100-85	44.97	45.22	44.97	44.97	44.97
PCR 84-70	5.46	5.46	5.46	5.46	5.46
PCR < 55	1.3	1.3	1.3	1.3	1.3
Miles above 70	50.43	50.68	50.43	50.43	50.43
% above 70	97.00%	97.00%	97.50%	97.50%	97.50%
% below 55	3.00%	3.00%	2.50%	2.50%	2.50%
Network Totals					
Fiscal Year	2010	2011	2012	2013	2014
Network Avg PCR	86.68	86.74	87.18	86.5	85.88
Network % above 70	87.20%	87.34%	87.67%	87.84%	87.62%
Network % below 55	0.64%	0.69%	0.71%	0.72%	0.89%

Note: FY data is typically selected from June 30th or the last work day of the FY.



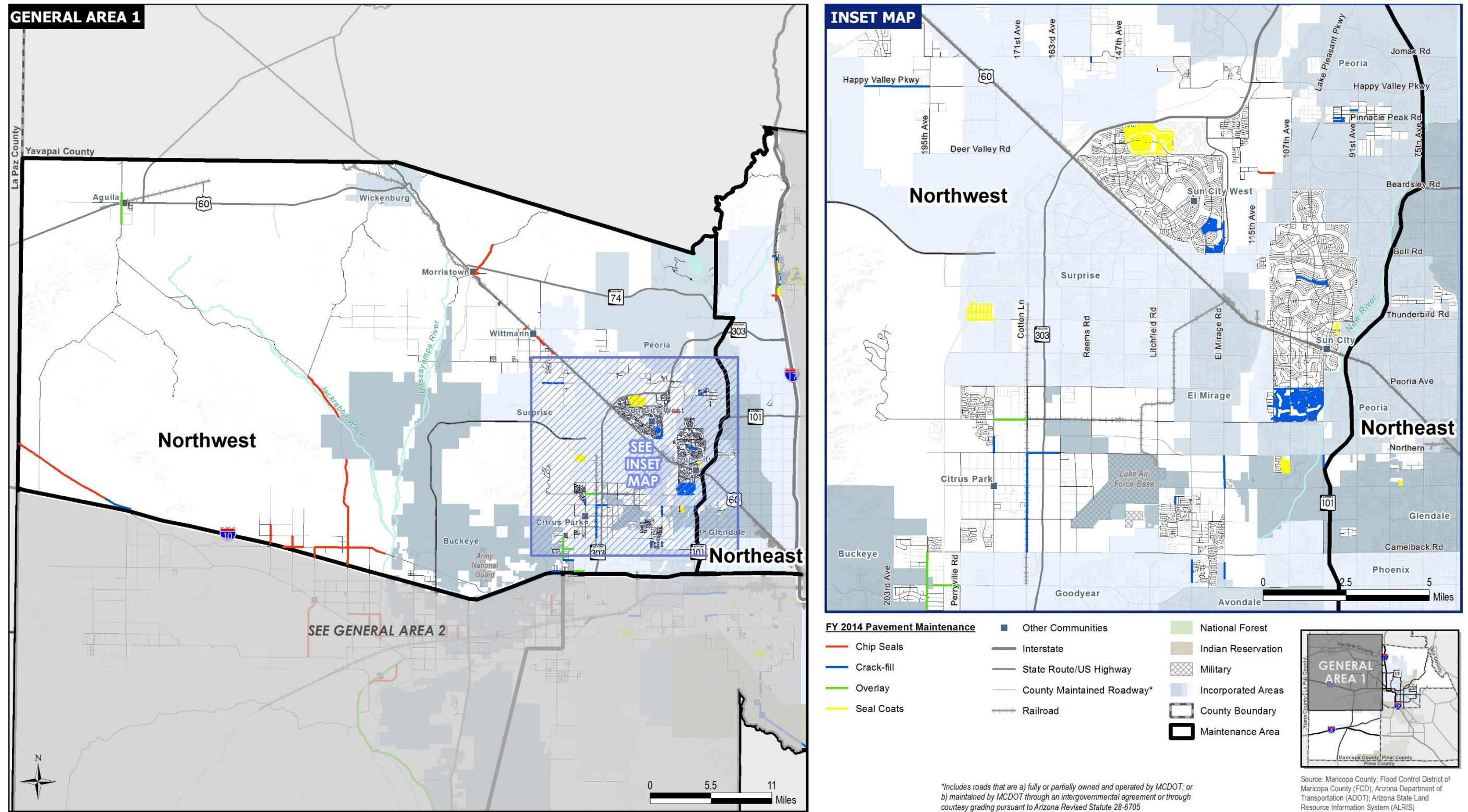


Figure 32: FY 2014 Pavement Maintenance Activities  
Area 1



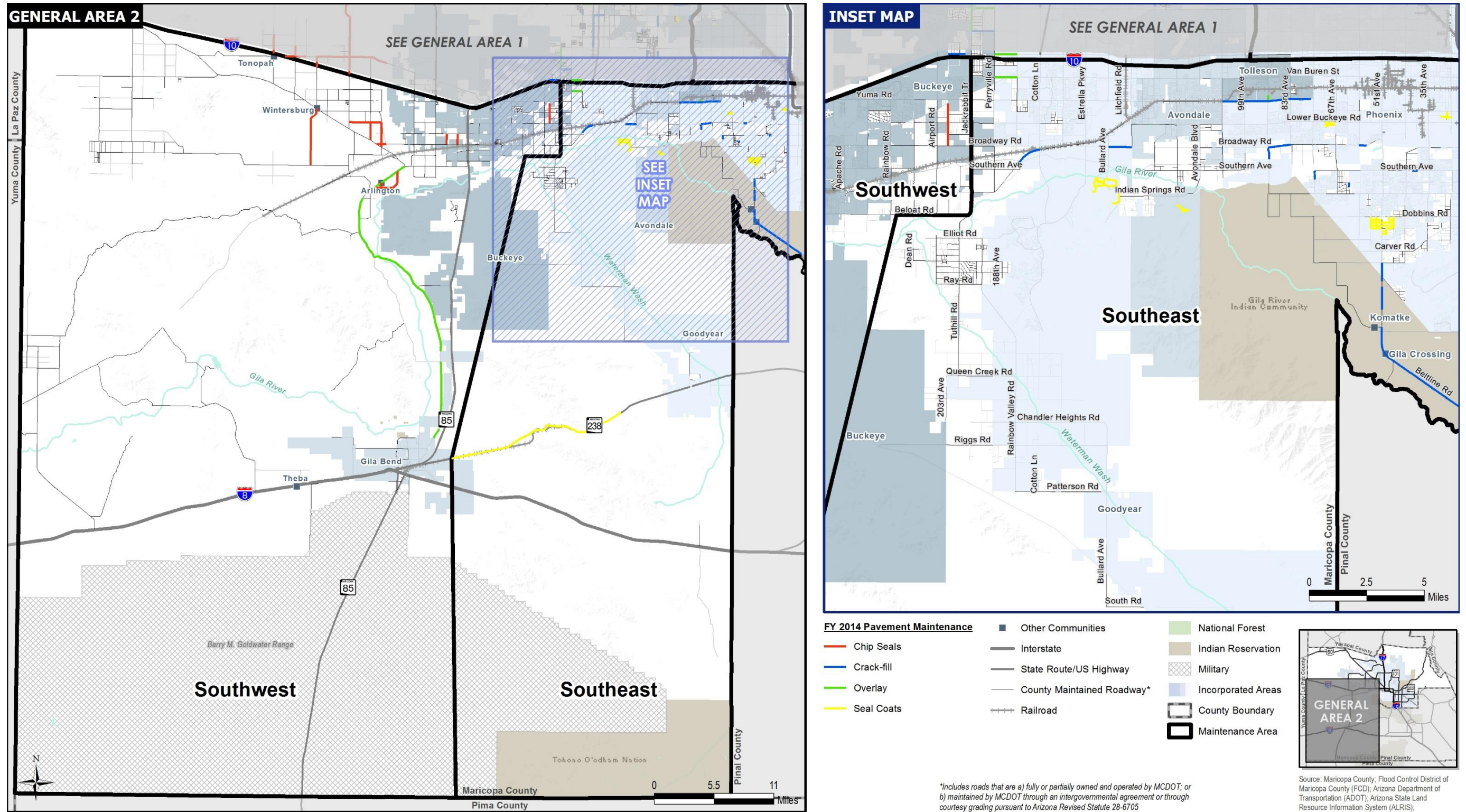


Figure 32: FY 2014 Pavement Maintenance Activities  
Area 2



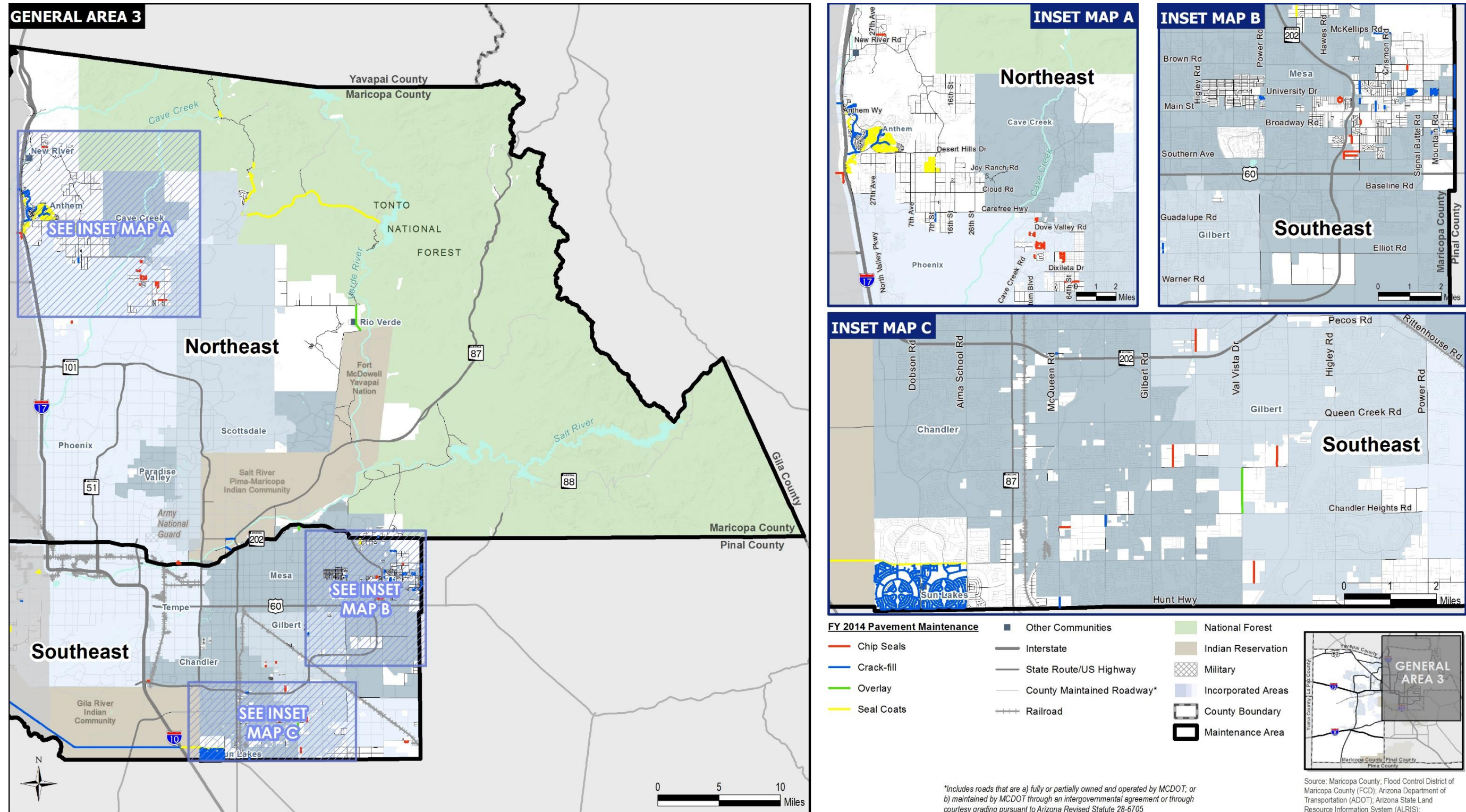


Figure 32: FY 2014 Pavement Maintenance Activities  
Area 3



## 5-Year Pavement Preservation Plan

Pavement preservation plans are generated by application of the preservation strategy flow charts to the current pavement ratings in the database. Per **Figure 33**, in 2013 it was projected that the pavement preservation and preventative maintenance needs for the five-year period of FY 2013 - FY 2017 would be \$75.6 million to keep the County road system at the then existing serviceability level. In the past two fiscal years, FY 2013 and 2014, MCDOT has completed pavement preservation and preventative maintenance projects for a total amount of \$20.5 million, or 27 percent of the projected five-year expenditures. The projected needs for pavement preservation and preventative maintenance were identified to be \$86.1 million for the next cycle of five fiscal years, FY 2015 to FY 2019.

Preservation Type	FY 2013 – FY 2017		FY 2013 – FY 2014		
	5 Yr. Projection -		Completed		
	Lane Miles	Cost	Lane Miles	Cost	%
Reconstruction	12.18	\$2,525,000	12.03	\$2,033,167.39	81%
Arterial AR Overlay	187.26	\$16,045,000	5.95	\$863,309.10	5%
Local M&R	174.11	\$23,410,000	76.36	\$6,362,242.80	27%
Chip Seal HV	560.09	\$12,500,000	218.49	\$4,484,960.43	36%
Chip Seal LV	217.53	\$4,883,125	78.03	\$1,442,002.34	3%
Slurry Seal	215.51	\$4,800,000	82.86	\$1,259,512.32	26%
Micro Slurry	0.00	\$0	12.97	\$223,638.09	
Preservative Seal	1,112.67	\$4,812,500	465.06	\$1,496,382.34	31%
Crack Seal	1,317.06	\$6,656,050	612.86	\$2,379,316.28	36%
<b>Pavement Preservation Totals:</b>	<b>3,907.41</b>	<b>\$75,583,675</b>	<b>1,564.61</b>	<b>\$20,544,531.09</b>	<b>27%</b>

Preservation Type	FY 2015 – FY 2019	
	Lane Miles	Cost
Reconstruction		
Arterial AR Overlay	259.30	\$31,635,823.65
Local M&R	167.52	\$23,388,906
Hot In Place Recycling (HIPR)	0.00	\$0
Nova Chip	0.00	\$0
Chip Seal HV	487.03	\$10,502,500
Chip Seal LV	284.31	\$5,950,000
Slurry Seal	305.61	\$5,140,000
Micro Slurry	0.00	\$0
Preservative Seal	982.71	\$4,589,050
Crack Seal	1,278.46	\$4,900,000
<b>Pavement Preservation Totals:</b>	<b>3,764.94</b>	<b>\$86,106,280</b>

**Figure 33: FY 2014 Pavement Preservation 5-Year Summary Report**





## FY 2015 Pavement Preservation Plan

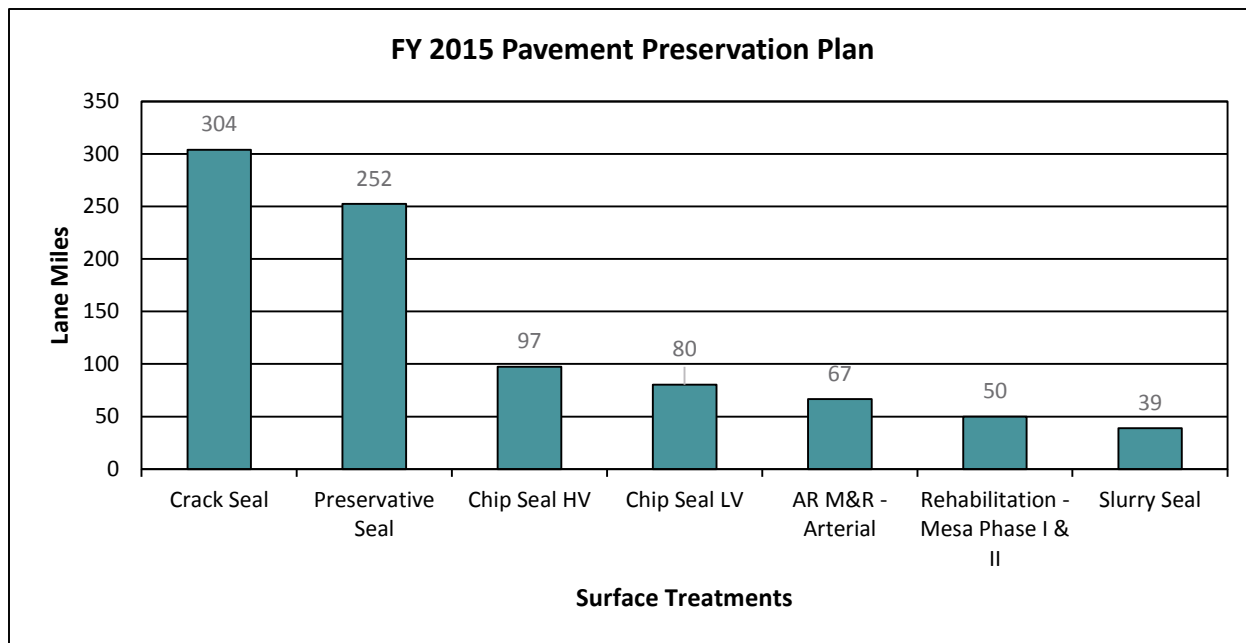
**Table 22** shows the FY 2015 Pavement Preservation Plan that was developed in FY 2014. Implementation of the projected maintenance plan will cost \$19.3 million to apply all the recommended surface treatments and existing pavement rehabilitation.

**Table 22: FY 2015 Pavement Preservation Plan**

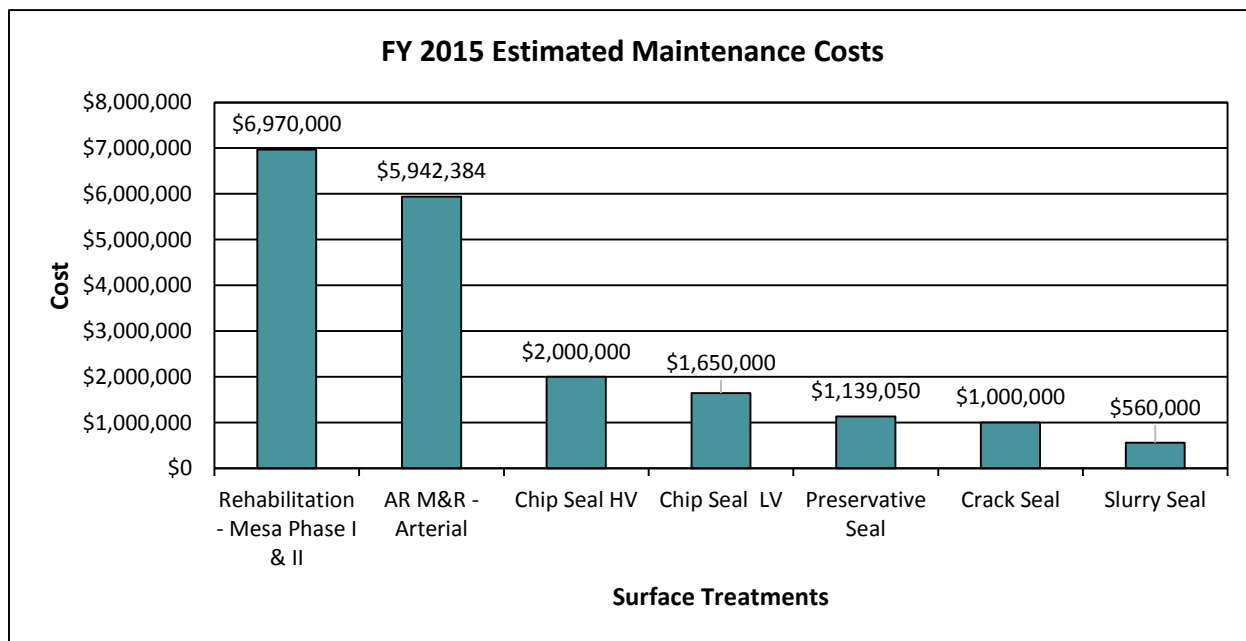
Project Name	WO #	Cost/SY	SY	Lane Miles	Needs Cost
Rehabilitation - Mesa - Phase II - Superstition Country, Broadview, Glenrose, Knolls, Palo Verde	T434	\$18.50	350,000	42.62	\$6,475,000
Rehabilitation - Mesa Phase I - Superstition & Var. Extended to FY 2014-15	T434	\$18.50	60,000	7.31	\$1,110,000
AR M&R – McDowell Rd	MP073	\$13.00	31,450	3.83	\$408,850
AR Overlay - Meridian Rd - IGA w/Apache Junction	T468	\$12.87	55,745	6.79	\$717,438
AR Overlay - Loop 303/Northern Pkwy Area	T472	\$10.50	320,700	39.05	\$3,367,350
AR M& R - Arterial +1000 ADT	T469/470	\$12.50	140,396	17.09	\$1,754,950
AC Overlay - 2" Superpave - Germann Rd	MP071	\$16.60	30,675	3.73	\$509,205
Chip Seal LV - Meridian Rd	T468	\$2.50	35,000	4.26	\$87,500
Chip Seal - HV -		\$2.50	800,000	97.41	\$2,000,000
Chip Seal - LV -		\$2.00	625,000	76.10	\$1,250,000
Micro Seal – Cape Seal		\$2.92	232,574	28.32	\$679,116
Slurry Seal		\$1.75	320,000	38.96	\$560,000
Preservative Seal – Arterial		\$0.35	1,300,000	158.29	\$455,000
Preservative Seal - Local - TRMSS MC		\$0.35	771,000	93.88	\$269,850
Crack Seal		\$0.32	2,500,000	304.40	\$800,000
Pavement Preservation Totals:			7,131,090	922.02	\$20,444,259
TIP Funding:					\$13,512,238
Operations Funding:					\$6,932,021
Additional Funding Required:					\$0

**Figure 34** and **Figure 35** break down the planned FY 2015 projected maintenance projects and project costs by the type of surface treatment that will be performed. Similar to FY 2014, the 14 projects in the FY 2015 plan will result in the highest number of lane miles being treated by crack seal. However, the FY 2015 plan projects a significantly higher proportion of miles being treated by preservative seal than was seen in FY 2014.

For costs, in FY 2014, the treatment that was generating the highest cost was AR Overlay. In FY 2015, the treatment with the highest projected cost is a rehabilitation project, which is estimated to cost just under \$7 million. AR Overlays are the next highest costs, with projections just under \$6 million.



**Figure 34: FY 2015 Pavement Preservation Plan Summary**



**Figure 35: FY 2015 Estimated Maintenance Costs**





## Asset Management System

### Introduction

It is the policy of MCDOT to maintain effective internal controls to manage its infrastructure assets and maintain proper records regarding the use and disposition of those assets.

There is a necessity for MCDOT to safeguard and maintain assets in order to receive the maximum benefit, comply with state and federal requirements regarding their use and disposition, and properly account for infrastructure assets for financial statement purposes.

An effort is taking place to provide transparency in how MCDOT provides services within the organization and to the County’s constituents. As a result, Divisions have a better understanding of their roles in relation to the development and maintenance of an Infrastructure Inventory.

Government entities were encouraged to adopt the model of GASB Statement 34, titled Financial Statements and Management’s Discussion and Analysis for State and Local Governments, to be in compliance with Generally Accepted Accounting Principles (GAAP) by June 15, 2001.

### Background

GASB is responsible for establishing GAAP for both state and local governments. GAAP sets the criteria that governments must follow in order to obtain a “clean opinion” from auditors. A clean opinion means one has good credit, which is very important when a state or local government wants to issue bonds, obtain financing for long-term construction projects, and obtain performance bonds.

GASB approved GASB 34 in June 1999, and it was the first time government entities were required to report the value of their infrastructure assets and develop methods and procedures for Financial Management Systems. The goal of GASB 34 was to have an agency’s financial statements reflect the financial health of government entities.

Governments that do not comply with GAAP might end up paying more to issue debt because the bonding agency will not be able to determine the financial health of the government entity. In addition, it would be increasingly difficult for the agency to obtain loans for capital projects because of poor bond ratings.

The County has received three consecutive “adverse opinions” as a direct result of three things: the method for recording infrastructure by MCDOT and Flood Control; lack of internal controls; and the assessment of value for non-TIP-related assets.

### Transportation Improvement Program (TIP)

The TIP is a collaborative effort of the Planning, Project Management and Finance Divisions. Within the TIP program, projects are identified, and budgets and timelines are created for major construction projects led by MCDOT. Projects are added to the TIP based on evaluations of scope, schedule, and budget and are presented to the TAB for recommendations to the Board of Supervisors.

Projects can include transportation studies, improvements to structures, traffic signals, low volume road paving and reconstruction of roads. **Table 23** and **Figure 36** show the results of TIP projects for FY 2014. Additionally, **Figure 37** highlights the amount and percentage of each type of Asset category (Land, Roads, Traffic Signals, or Structures/Bridges) that was added to the MCDOT inventory in FY 2014.

**Table 23: FY 2014 TIP Summary**

Completed Infrastructure	Preservation	Non-Capital Expenses	Construction In Progress
6 Projects	19 Projects	45 Projects	1 Project
\$5,525,107 Spent	\$10,714,712 Spent	\$12,856,157 Spent	\$364,215 Spent

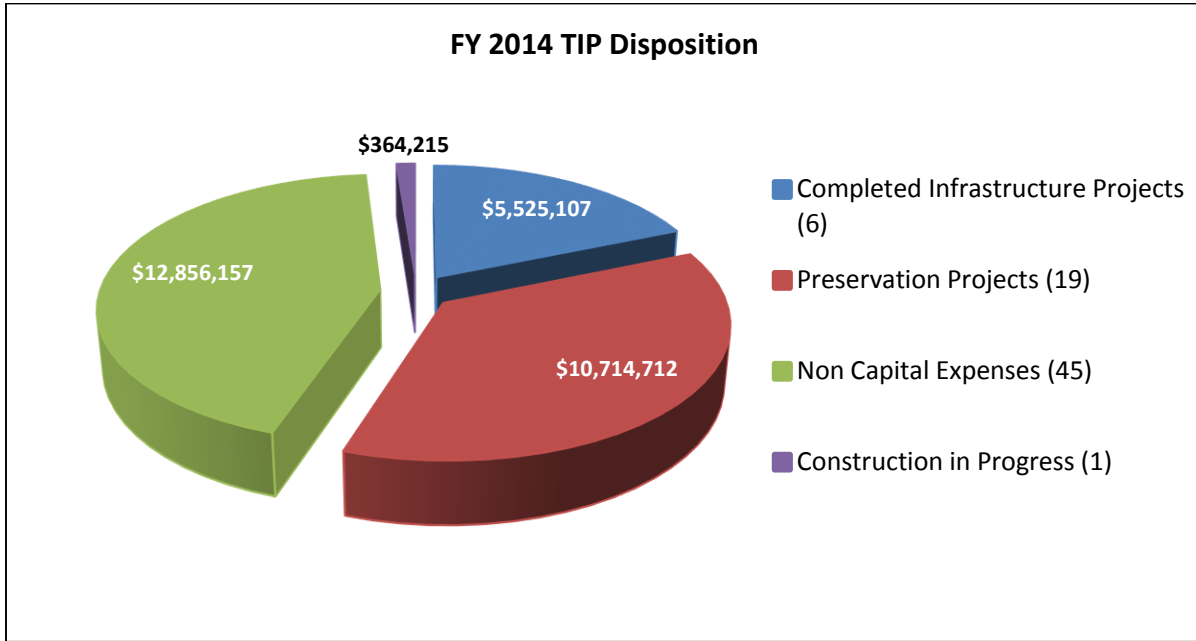


Figure 36: FY 2014 TIP Disposition

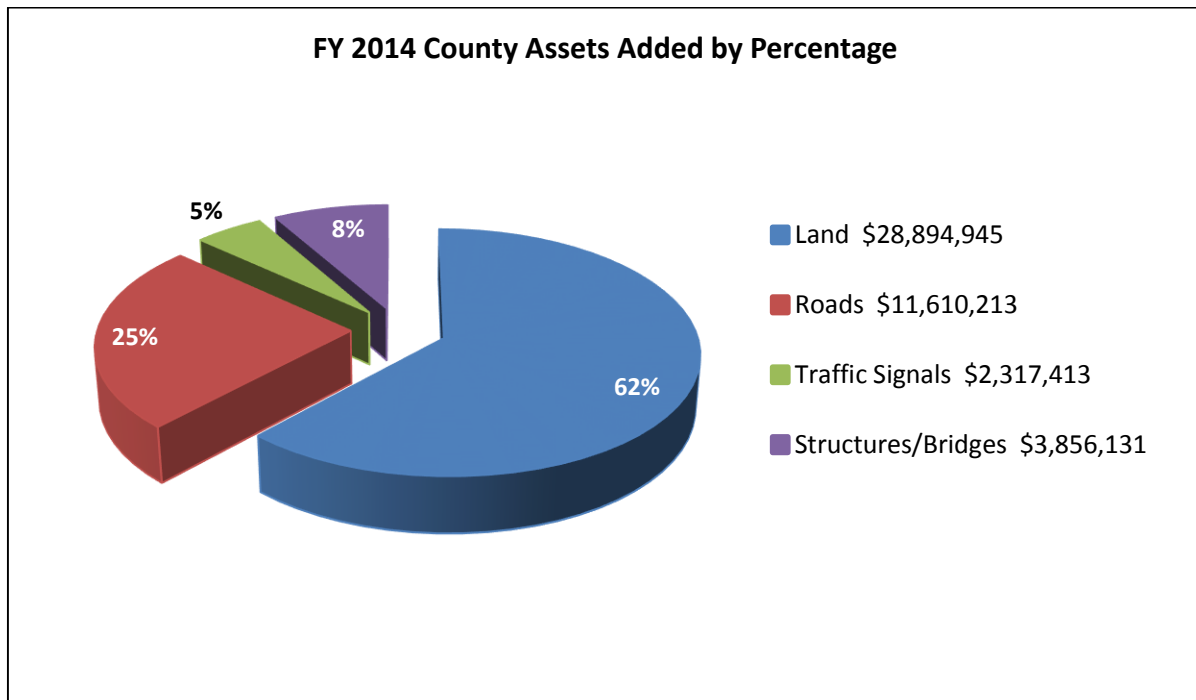


Figure 37: FY 2014 MCDOT Assets Added by Percentage

Not all of the projects result in additions to the MCDOT Infrastructure Inventory. Some are expensed while others can be a part of an IGA where MCDOT recoups funds that are expended and a municipality





assumes jurisdiction over the completed project. The future ownership/jurisdiction is typically identified through IGAs.

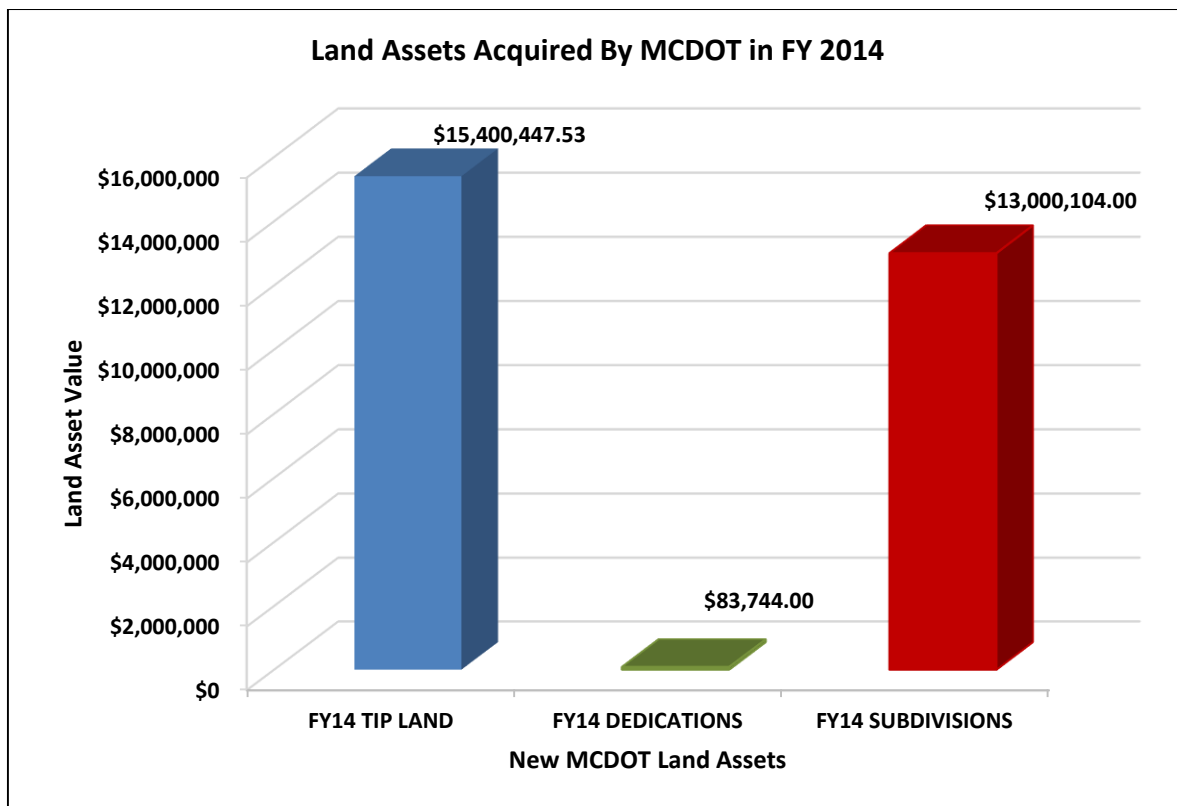
Once a project is complete, MCDOT staff prepares correspondence to the contractor and internally to relevant MCDOT staff that the project is complete and accepted into MCDOT Inventory. There is a one-year warranty period for newly completed project during which contractors are obligated to make any repairs as required by MCDOT.

### Real Estate

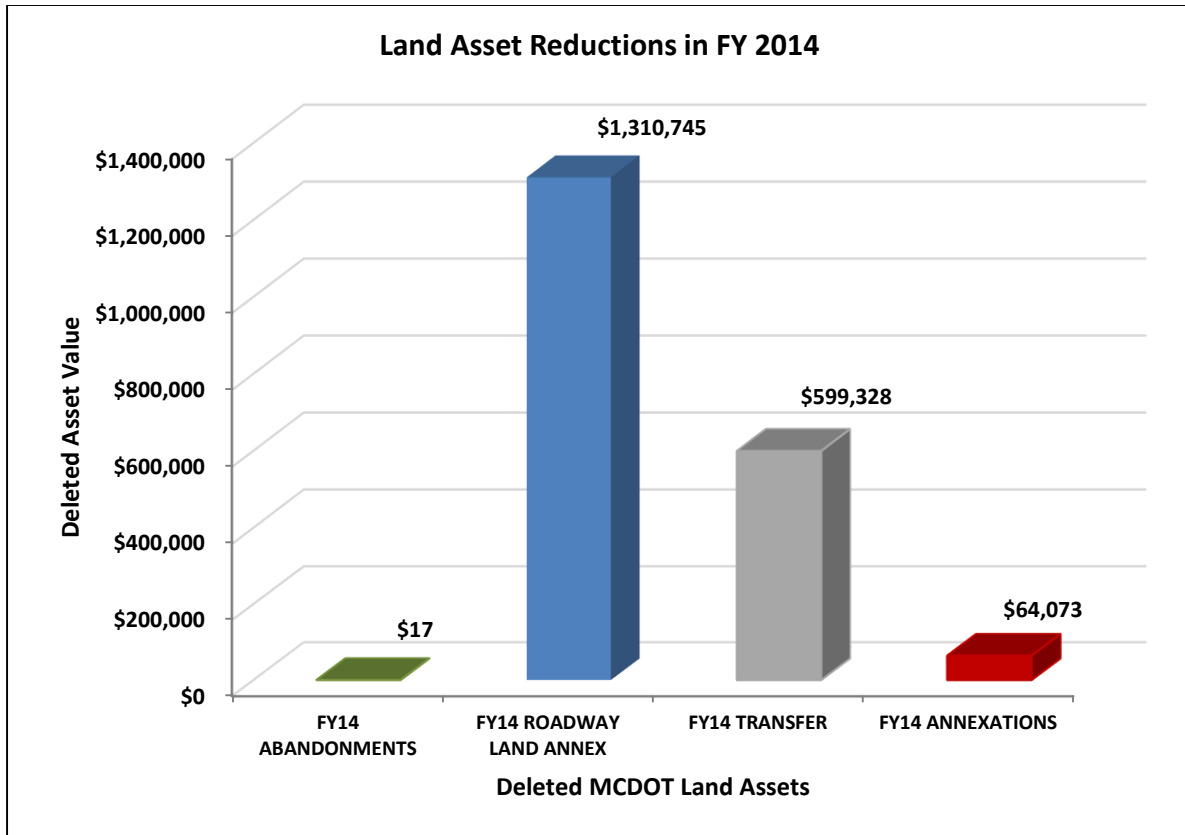
The Real Estate Division is responsible for Property Management, Acquisitions, and Property Engineering. The Real Estate Division plays an important role by providing the detailed account of land rights dispositions associated with MCDOT projects. All land rights activity is validated by resolutions, deeds, or approval by the Board of Supervisors and is referenced within the Real Estate database.

While much of this Division's activity is associated with acquisitions of right-of-way for TIP projects and Flood Control Capital Improvement Projects (CIP), the Real Estate Division also processes municipal annexations, road declarations, road abandonment, and excess land sales. The Division also maintains the records and documentation of these activities. The Board of Supervisors authorizes Transportation and Flood Control projects by adopting resolutions that authorize the departments to spend money to acquire right-of-way and to construct and maintain projects. These projects are then added to the Asset Management Inventory.

In FY 2014, the County added a net \$26.9 million in land assets to the County Infrastructure Inventory (\$28.9 Million in additions and \$2 million in deletions). As seen in **Figure 38**, the most common means for adding to County Assets has been through purchasing it through the TIP; 54 percent of the additional land added to the MCDOT Inventory was acquired this way. The primary means of land asset reduction to MCDOT's Inventory in 2014 came from annexation of roads by other municipalities, as shown in **Figure 39**.



**Figure 38: FY 2014 Land Assets Acquired by MCDOT**



**Figure 39: FY 2014 Land Asset Reductions**

### Traffic Signals

Traffic signals are either part of a TIP project or acquired via O&D subdivisions of a private development. When part of a TIP project, a signal light is added into the MCDOT Inventory on the date that it is switched on; a designated MCDOT employee then provides a letter of completion. Traffic signals added by subdivision O&D are done so after the Board of Supervisors approves the development's acceptance into MCDOT Inventory and the signal is subsequently turned on. Deletions of traffic signals from the inventory list occur via municipal annexation of a road associated with a signal.

### Structures

The Structure Division's primary responsibilities are the design and safety of the structures throughout the County. State and Federal Mandates require MCDOT to track and inspect 407 structures; however, not all 407 structures are included in the Infrastructure Management System.

Inclusion in the Infrastructure Management System can occur in one of two ways: as a project in the TIP; or as an O&D. TIP projects are scoped, designed and managed by MCDOT, and the structures' values are determined by their actual costs. Structures acquired via an O&D process are mostly from O&D subdivisions and are valued based on current unit cost calculation (updated every two years).

Until a more effective system is implemented, a coordinated effort between Development Services, Structures, Project Management and Planning is needed to identify and extract information for inclusion into the Asset Management System.

Because the Structures Division reports on a Federal Year End, it is important that the time parameters are clearly outlined for staff. Timing is particularly important when annexations occur.





## Appendix A – Alphabetical Listing of All Structures in the MCDOT Bridge Inventory

Structure No.	Road	Location	Feature Intersected	Sufficiency Rating
10050	007th St	0.2 mi N/ 7th St/Carefree	Desert Lake Wash	97.98
10051	007th St	450' N/ Carefree Hwy	Desert Lk Wash S Branch	97.98
10553	012th Street	N of Circle Mtn Rd	Wash	99.98
8583	059th Ave	0.5 mi S/ Buckeye Rd	RID Canal	97.65
9289	091st Ave	at McDowell Rd	RID Canal	78.08
10444	096th Street	1/8 mi N/ Broadway Road	Wash	99.64
990151	099th Ave	200' N/ Grand	Drainage Ditch	95.73
990153	099th Ave	at Concho Circle	Drainage Ditch	96.02
9666	099th Ave	250' N Grand Ave	Drainage Ditch	96.41
9672	099th Ave	0.5 mi N/ McDowell Rd	RID Canal	98.08
990154	103th Ave NB	325' N/ Olive	Drainage Ditch	96.72
9677	105th Ave	at Del Webb Blvd Median	Drainage Ditch	96.94
990234	105th Place	Quarterline Rd to Contess	Drain Ditch	96.94
9678	106th Ave	at Del Webb Blvd Median	Drainage Ditch	96.94
9679	107th Ave	at Del Webb Blvd Median	Drainage Ditch	96.62
990257	107th Avenue	0.5 mi. N of Williams Rd	Wash	98.62
990280	116th Street	600' S of Riggs Rd	Consolidated Canal	93.59
10783	117th Avenue	620' S/ Aqua Fria Blvd	Wash	92.42
990265	119th Avenue	0.5 mi s/ Williams Drive	Drainage Ditch	90.5
10368	129th Avenue	N/ Camelback Rd	Drainage Channel	96.93
7561	138th Ave	200' W/ Camino del Sol	Drainage Ditch	96.95
990202	141st Ave	200' W/ Yosemite Dr	Drainage Ditch	96.95
10552	144th St-Rio Verde	120' S of Dixileta Dr	Wash	81.82
10554	144th St-Rio Verde	350' S of Peakview Rd	Wash	81.82
10555	144th St-Rio Verde	1250' S of Dixileta Dr	Wash	81.82
10556	144th St-Rio Verde	at Windstone Trail	Wash	81.82
990203	145th Drive	200' W/ Yosemite Dr	Drainage Ditch	96.95
990204	147th Drive	200' N/ Antelope	Drainage Ditch	96.95
10849	150th Street	765' N of Rio Verde Drive	Wash	86.83
10850	150th Street	1610' N of Rio Verde Dr	Wash	86.83
8571	163rd Avenue	5 mi N/ US 60 Grand Ave	HaydenRhodes CAP Aqueduct	89.21
11109	203rd Place		Sonoqui Wash	NEW
7582	309th Avenue	S of Lower River Rd	Buckeye Canal	94.85
8576	355th Avenue	7 mi N/ Indian School Rd	CAP Canal	96.99
7548	571st Ave AquaCal	9.75 mi N/ I-8 via ACRd	Gila River	98.55
990156	571st Ave AquaCalR	8.5 mi N/ I-8 via AquaCal	Wash	95.55
8001	Airport Rd	0.5 mi N/ Lower Buckeye	RID Canal	94.84
10126	Airport Rd	1 mi N/ MC85	Buckeye Canal	98.60
7549	Aleppo Drive	200' N/136th Dr W/SpnGrdn	Drainage Ditch	96.73
8553	Alma School Rd	300' S/ McKellips	Salt River(N.Channel)	77.60
8554	Alma School Rd	0.25 mi N/ McLellan	Salt River(S.Channel)	77.60
990117	Alma School Rd	0.5 mi S/ Riggs Rd	Golf Cart Underpass	99.63
990187	Amigo Dr (SCW)	at Stardust Blvd Median	Drainage Ditch	95.06
10405	Anthem Way	East of I-17	Wash	73.05
990230	Anthem Way	350' W/ Anthem Club Dr	Ped X	80.67
990228	Anthem Way	475' E/ Venture Court	Wash	95.53
990227	Anthem Way	530' E/ Navigation Way	Wash	95.90
990229	Anthem Way	200' W of Anthem Club Dr	Wash	95.90
990231	Anthem Way	220' E/ Freedom Way	Wash	95.90
990232	Anthem Way	.25 mi W/ Daisy Mtn Dr	Wash	96.44
990250	Anthem Way	370' NW of LibertyBellWay	Wash	96.44
990258	Anthem Way	0.53 mi E/ Daisy Mtn Dr	Wash	96.51
990259	Anthem Way	0.4 mi E/ Daisy Mtn Dr	Wash	96.51
10551	Anthem Way	0.89 mi E/ Daisy Mtn Dr	Wash	99.51
990184	Aurora Dr	at Stardust Blvd Median	Drainage Ditch	97.84
10163	Avondale Blvd	0.75 mi S/ Southern Ave	Gila River	84.63



Structure No.	Road	Location	Feature Intersected	Sufficiency Rating
990185	Ballad Dr	at Stardust Blvd Median	Drainage Ditch	97.84
8000	Baseline Rd	200' NW MC-85	Buckeye Canal	93.68
8555	Beardsley Rd	100' E/ 125th Ave	Drainage Ditch	97.36
990272	Belfair Way	just N of Meridian Drive	Wash	89.38
9126	Bell Rd	at 99th Ave	Drainage Ditch	76.43
9686	Bell Rec Center Dr	at 99th Ave Median	Drainage Ditch	96.63
990157	Beloat Rd	E/ Rainbow Rd	Buckeye Canal S. Branch	88.93
990243	Bethany Home Rd	350' E of 137th Ave	Wash	85.53
990244	Bethany Home Rd	418' W of 135th Ave	Wash	85.53
10512	Bethany Home Rd	200' E of 125th Ave	Wash	96.81
9676	Boswell Blvd	at Del Webb Blvd Median	Drainage Ditch	96.76
9687	Boswell Blvd	at 99th Avenue Median	Drainage Ditch	99.81
990101	Broadway Rd	at Meridian Rd.	Drainage Ditch	96.21
990102	Broadway Rd	1000' E/ Crismon Rd	Drainage Ditch	96.21
8975	Broadway Rd	400' W/ FanninMcFar CAP	Drainage Ditch	97.33
9375	Broadway Rd EB	0.2 mi E/ Price Rd	Tempe Canal	76.31
9384	Broadway Rd WB	0.2 mi E/ Price Rd	Tempe Canal	76.31
8855	Bruner Rd	0.75 mi N/ Old US-80	Buckeye Canal	98.98
9688	Burns Drive	at 99th Avenue Median	Drainage Ditch	99.57
9763	Bush Hwy	3.2 mi N/ McDowell Rd	Spook Hill Fldwy	86.21
9849	Bush Hwy	at Blue Point-Salt River	Salt River	91.77
990113	Bush Hwy	3.25 mi N/ McDowell Rd	Wash	95.63
9824	Bush Hwy	1.7 mi N/ Thomas	FanninMcFar CAP Aqueduct	96.96
7779	Bush Hwy-FAS 388	3.5 mi N/ McDowell Rd	Wash	95.63
990158	Camelback Rd	0.5 mi E/ El Mirage Rd	Drainage Ditch	76.51
9859	Camelback Rd	1.0 mi E/ El Mirage Rd	Aqua Fria River	77.51
9689	Cameo Dr	at 99th Avenue Median	Drainage Ditch	96.86
10159	Carefree Highway	0.5 mi W/ 24th Street	Wash	96.78
10160	Carefree Highway	0.25 mi E/ 24th Street	Wash	96.78
10161	Carefree Highway	0.5 mi E/ 24th Street	Apache Wash	96.78
10158	Carefree Highway	W/ 16th Street	Wash	98.93
9891	Carefree Hwy	at 10th St	Wash	98.54
9892	Carefree Hwy	200' W/ 12th St	Wash	98.54
9893	Carefree Hwy	200' W/ 24th St	Wash	98.54
10162	Carefree Hwy EB	1 mi W/ Cave Creek Rd	Cave Creek Wash	97.40
9825	Carefree Hwy WB	1 mi W/ Cave Creek Rd	Cave Creek Wash	79.92
990269	Carlota Lane	313' W of 119th Avenue	Drainage Ditch	98.89
990256	Castano Drive	just N. of Bethany Home R	Wash	96.81
7550	Cavalcade Drive	200' E/ 141th Ave	Drainage Ditch	96.73
7898	Cave Creek PKWY	1.5 mi N/32nd St/Cloud Rd	Wash	98.84
11111	Centennial Rd	5.7 mi W/ Harqua. Val. Rd	CAP Aux Canal	98.84
10240	Chambers Street	0.6 mi S/ Broadway Rd	Buckeye Feeder Ditch	98.99
990116	Chandler Hts Rd	0.5 mi E/ SR-87 (AZ Ave)	Consolidated Canal	97.20
990218	Cicero Street	E/ 105 St & N/ Univ Dr	Drain Ditch	96.95
10084	Circle Mtn Road	3437' E/ New River Rd	Wash	73.63
10229	Citrus Road	just N/ Northern Ave	Wash	80.68
10520	Clarendon Avenue	just W/ 195th Ave	Drain Ditch	92.34
990261	Clearview Trail	just N/ Meridian Dr	Wash	81.73
990236	Cloud Rd	1000' W/ 32nd Dr	Wash	84.82
990235	Cloud Rd	just E/ Via Puzzola	Wash	87.46
10443	Cloud Road	500' W of 32nd Drive	Wash	86.72
990163	Conquistador Dr	200' S/ Beechwood	Drainage Ditch	86.9
990162	Conquistador Dr	200' E/ Regal	Drainage Ditch	96.86
990107	Coralbell Ave	E/ Ellsworth & S/Broadway	Drainage Ditch (Wash)	96.85
990164	Cotton Lane	N/ Camelback Rd	Drainage Ditch	74.97
10630	Cotton Lane	0.25 mi S/ MC-85	Buckeye Canal	98.91
10629	Cotton Lane	1mi. S/ MC-85	Gila River	99.91





Structure No.	Road	Location	Feature Intersected	Sufficiency Rating
10062	Cottonwood Rd	N Entrance Lk Plsnt Pk	Cottonwood Creek	87.58
9736	Courthouse Rd	3 mi W/ Salome Rd	Saddleback Diversn Chn	98.49
8761	Crismon Rd	0.25 mi N/ Brown Rd	Signal Butte Fldwy	84.74
8856	Crismon Rd	500' N/ Apache Rd	CAP Canal	94.47
990247	Daisy Mtn Dr RCB	0.52 mi S of Anthem Way	Wash	91.48
10557	Daisy Mtn Drive	92' E of Dedication Trail	Wash	83.38
10558	Daisy Mtn Drive	750' E/ Dedication Trail	Wash	83.38
10559	Daisy Mtn Drive	0.36 mi NE/ Dedication Tr	Wash	83.38
10519	Daisy Mtn Drive	0.6 mi S of Anthem Way	Wash	91.48
10627	Daisy Mtn Drive	0.4mi W/Gavilan Pk Pkwy	Wash	95.67
10628	Daisy Mtn Drive	520' W/GavilanPk Pkwy	Wash	95.67
990266	Daley Lane	just e/ 123rd Avenue	Drainage Channel	96.89
7551	Dean Rd	600' N/ Lower Buckeye Rd	RID Canal	98.66
8638	Dean Rd	0.75 mi N/ MC-85	Buckeye Canal	98.80
10044	Deer Valley Dr	W/ 135th Ave	Golf Cart Path (SCW)	85.28
990166	Deer Valley Dr	E/ Veterans	Golf Cart Path	85.63
990165	Deer Valley Dr	W/ Dustrytrail Blvd (SCW)	Golf Cart Path	96.37
990167	Deer Valley Dr	W/ Acapulco Drive	Golf Cart Path	96.67
11071	Deer Valley Drive	Just N/ exist Deer Valley Dr	Deer Valley Channel	81.61
990168	Desert Glen Dr	100' N/ 132nd Ave	Drainage Ditch	82.86
990224	Dysart Rd	N/ Camelback Rd	Drain Channel	95.38
7883	Dysart Rd-FAS 547	0.25 mi N/ Camelback Rd	Colter Channel	98.38
10787	Dysart Road	0.25 mi. S/ Jomax Rd	Beardsley Canal	99.92
8560	Eagle Eye Rd	2 mi S/ Salome Hwy	CAP Canal	97.90
10784	El Granada Blvd	0.18 mi. S/ Jomax Rd	Drainage Channel	96.93
10785	El Granada Blvd	0.42 mi. N/HappyValley Rd	Drainage Channel	99.96
10786	El Granada Blvd	0.4 mi. N/ HappyValley Rd	Beardsley Canal	99.96
990169	El Mirage Rd	0.25 mi S/ Beardsley	Drainage Ditch	69.86
990279	El Mirage Rd	600' S. of Loop 303	Pinnacle Pk Drain Channel	81.00
8561	El Mirage Rd	N/ Bell Rd	Drainage Ditch	83.36
11105	El Mirage Rd	1.7 mi N. of Bell Road	McMicken Dam Outlet Wash	94.05
11106	El Mirage Rd	3.4 mi. N. of Bell Road	McMicken Dam Outlet Wash	94.05
9949	El Mirage Rd	0.5 mi N/ Glendale Ave	Dysart Drain	97.34
9586	Elliot Rd	at Sossaman	Sossaman Ditch	94.20
9842	Ellsworth	200' S/ Apache Trail	Drainage Ditch	99.04
11107	Ellsworth Rd		Sonoqui Wash East Branch	84.00
9138	Ellsworth Rd	Empire Blvd PinalCo Line	Sonoqui Wash	93.25
9895	Ellsworth Rd	0.25 mi N/ University Rd	CAP Canal	99.15
7899	Ellsworth-FAU 7077	400' N/ Broadway	Wash	99.04
10367	Forest Rd	1.4 mi N/ McDowell Mtn Rd	Small Wash	93.85
10366	Forest Rd	1.3 mi N/ McDowell Mtn Rd	Large Wash	95.74
990223	Forest Road	1.3 mi N/McDowell Mtn Rd	Golf Cart Crossing	84.41
10104	Fort McDowell Road	just N/ Yavapai Rd	Wash	99.59
8019	Ft McDowell Rd	2.25 mi N/ SR 87	Wash	86.57
10397	Gavilan Peak Pkwy	W/ Navigation Way	Wash	81.61
990233	Gavilan Peak Pkwy	1600' E/ Navigation Way	Wash	83.54
10582	Gavilan Peak Pkwy	just S of Daisy Mtn Dr	Deadman Wash	94.19
10855	Gavilan Peak Pkwy	840' N of Daisy Mtn Drive	Wash	95.96
10384	Gavilan Peak Pkwy	300 ' N. King Drive	Wash	96.37
11005	Gavilan Peak Pkwy	0.5 mi N of Pioneer Rd	Wash	97.27
11070	Gavilan Peak Pkwy	just N. of Jordan Lane	Wash	98.66
7554	Gemstone Drive	200' W/ 136th Dr SCW	Drainage Ditch	89.29
10276	Germann Road	.25 mi E/ Sossaman Rd	Drainage channel	89.84
7780	Gilbert Rd-FAS 229	0.5 mi N/ Thomas Rd	Salt River	72.63
990170	Granite Valley Dr	200' N/ Antelope Dr (SCW)	Drainage Ditch	96.41
8562	Greenway Rd	at 99th Ave	Drainage Ditch	88.41
10396	Happy Valley Pkwy	1.5 mi W/LkPleasant Rd	Aqua Fria River	85.78



Structure No.	Road	Location	Feature Intersected	Sufficiency Rating
10457	Happy Valley Pkwy	2.06 mi w/ Lake Pleasant Rd	Wash	91.32
10458	Happy Valley Pkwy	1.65 mi W/Lake Pleasant Rd	Wash	91.32
11006	Happy Valley Road	0.7 mi E of Dysart Rd	Trilby Wash	96.55
990249	Hastings Way	250' SE of Hickcock Trail	Wash	96.78
990254	Hastings Way	250' SW of Blaze Court	Wash	96.78
990255	Hastings Way	277' NW of Blaze Court	Wash	96.78
10518	Hemingway Lane	just E of Dedication Trail	Wash	89.34
10581	High Noon Way	just N of Kuralt Drive	Wash	96.89
9503	Higley Rd	0.5 mi S/ Germann	RWCD Canal	92.31
9668	Hutton Drive	at 99th Ave Median SCW	Drainage Ditch	99.68
10085	I-17 Frontage Rd	1000' S/ New River Rd	New River	88.32
8640	I-17 Frontage Rd	0.7 mi S/ New River	Wash	96.62
990213	I-17 Frontage Rd	S/ Meander Rd	Wash	99.58
990172	Indian School Rd	at 191st Ave	Beardsley Canal	68.87
9145	Indian School Rd	0.5 mi E/ El Mirage	Agua Fria River	76.86
990225	Indian Springs Rd	W/ El Mirage Rd	Wash	97.72
990260	Iron Horse Way	just N/ Meridian Dr	Wash	89.38
10088	Jackrabbit Trail	0.25 mi N/ Yuma	RID Canal	97.12
990175	Jackrabbit Trail	0.25 mi S/ SR-85	Buckeye Canal S. Branch	97.76
9831	Jackrabbit Trail	1000' N/ Southern Ave	Buckeye Canal	98.33
8680	Johnson Rd	0.25 mi N/ Broadway	RID Canal	98.88
990268	Jomax Road	0.25 mi. W of Dysart Rd	Drainage Channel	96.47
10274	Jomax Road	.25 mi W/ Grand Ave	Wash	99.94
10511	King Drive	180' W of Opportunity Way	Wash	89.40
990248	Laurel Valley Way	just N of Keller Drive	Wash	96.89
990177	Lk Pleasant Ent Rd	0.2 mi E/ Castle HSpr Rd	Wash	93.87
10052	Lone Mountain Rd	0.75 mi E/ 227th Ave	Wash	98.96
10053	Lone Mountain Rd	0.65 mi E/ 227th Ave	Wash	98.96
7556	Lower Buckeye Rd	1 mi W/ El Mirage Rd	AFR Diversion Channel	83.14
11110	Marsh Rd		Drainage Ditch	NEW
7901	MC 85 Hwy	0.5 mi W/ Perryville	Buckeye Canal	97.06
990128	MC-85	0.25 mi E/ Cotton Lane	Drainage Ditch	79.81
990214	MC-85	0.25 mi E/ Perryville Rd	Buckeye Canal S Branch	81.65
990215	MC-85	Just E/ Perryville Rd	Buckeye Canal S Branch	81.65
990219	MC-85	335' W/ Estrella Pkwy	Dirt Irr Ditch	90.16
990220	MC-85	0.3 mi W/Estrella Pkwy	Dirt Irr Ditch	90.16
990127	MC-85	0.5 mi W/ Sarival	Drainage Ditch	93.55
10230	MC-85	0.3 mi E/ Estrella Pkwy	Bullard Wash	94.23
7819	MC-85 Hwy	0.5 mi W/ El Mirage	Agua Fria River	94.86
7583	McDowell Rd	W/ Jackrabbit Tr 195th Av	Wash	99.88
990262	McDowell Road	0.5 mi E of Hawes Rd Mesa	Drainage Ditch	96.74
10105	McKellips Road	0.5 mi W/ Loop 101	Granite Reef Wash	98.61
10242	Meadowbrook Ave	W/ Jackrabbit Tr (195Ave)	Wash	92.94
8797	Meeker Blvd	0.5 mi S/ RH Johnson Rd	Drainage Ditch	96.24
990179	Meeker Blvd	0.75 mi S/ RH Johnson	Golf Cart Underpass	96.24
990226	Memorial Drive	170' E of Republic Way	Split Flow Wash	81.61
10385	Memorial Drive	600' E of Gavilan Pk Pkwy	Wash	81.78
10386	Memorial Drive	1700' E of Gavilan Pk Pkwy	Wash	81.78
10388	Memorial Drive	350' E of Republic Way	Split Flow Wash	81.78
990275	Memorial Drive	270' W of Daisy Mtn Drive	Wash	96.66
10560	Meridian Drive	480' S/ Daisy Mtn Dr	Wash	99.33
10561	Meridian Drive	0.3 mi S/ Daisy Mtn Dr	Wash	99.33
10108	Meridian Rd	0.25 mi N/ McKellips Rd	Wash	81.2
7557	Meridian Rd	0.5 mi N/ Brown Rd	Bulldog Floodway	85.24
990217	Meridian Rd	1/8 mi N/ University	Drainage Ditch	96.54
10846	Meridian Rd (Mesa)	0.5 mi S of Warner Rd	Drainage Channel	96.06
10847	Meridian Rd (Mesa)	0.5 mi S of Warner Road	Power Line Fldwy Channel	96.06





Structure No.	Road	Location	Feature Intersected	Sufficiency Rating
10442	Meridian Road	0.45 mi N/ Warner Rd	Wash	99.82
9593	Miller Rd	0.25 mi N/ SR-85	Buckeye Canal	86.24
10778	Mingus Road	just E/ 25th Avenue	White Spar Wash	99.96
10241	Minnesota Ave	W/ Jackrabbit Trl	Wash	96.96
990246	Missouri Ave	just W of Dysart	Wash	84.28
990245	Missouri Ave	S/ Marshall Ave near 135	Wash	84.37
10510	Missouri Ave	N/ Marshall Ave 135thAve	Wash	84.39
10086	New River Rd	100' E/ I 17 Frontage	Wash	86.55
8011	New River Rd	0.25 mi E/ I 17	Wash	97.87
10021	New River Rd	0.25 mi W/ 7th Ave	Skunk Creek	98.65
7642	New River Rd	at 29th Ave	Wash	99.76
7643	New River Rd	0.25 mi E/ 27th Ave	Wash	99.76
10106	New River Road	0.25 mi E/ I 17	New River	97.87
10083	New River Road	350' N/ Circle Mtn Rd	Cline Creek Wash	99.65
10781	Northern Avenue	1 mi W/ Perryville Rd	FRS#3 Dvrn Chnl	83.91
10780	Northern Avenue	1 mi. W/ Perryville Rd	Beardsley Wash	89.87
8565	Old Lk Plsnt AccRd	1 mi N/ SR-74	Wash	88.91
10507	Old SR 87	0.8 mi NW of New SR87Junc	Wash	94.26
10521	Old SR 87	1.0 mi NW of New SR87Junc	Wash	94.26
990114	Old Stage Road	0.6 mi N/ New River Rd	Wash	86.93
8021	Old US 80	S/ Gillespie Dam	Gila River	46.50
990181	Old US 80	0.25 mi S/ Cactus Rose	Arlington Valley Wash	64.79
990207	Old US 80	1 mi S/ Cactus Rose	Arlington Valley Wash	85.85
10061	Old US 80	0.3 mi S/ 331th Ave	Arlington Valley Wash	89.35
990209	Old US 80	1.5 mi S/ Cactus Rose	Arlington Valley Wash	94.86
8025	Old US 80	600' N/ 331st Ave	Arlington Valley Wash	95.16
8023	Old US 80	1 mi S/ Arlington Sch Rd	Arlington Valley Wash	95.81
990180	Old US 80	50' S/ Cactus Rose	Arlington Valley Wash	96.86
990205	Old US 80	0.75 mi S/ Cactus Rose	Arlington Valley Wash	96.87
990206	Old US 80	7/8 mi S/ Cactus Rose	Arlington Valley Wash	96.87
9834	Old US 80	1 mi W/ Jct SR-85	Buckeye Drain	98.68
990155	Old US 80	0.5 mi W/ Palo Verde Rd	Buckeye Lateral	98.89
11007	Old US 80	3.5 mi S of Patterson Rd	Layton Wash	99.51
9999	Old US 80	500' E/ Salome Hwy	Hassayampa River	99.68
990208	Old US 80	1.25 mi S/ Cactus Rose	Arlington Valley Wash	99.87
8981	Olive Ave	0.8 mi E/ El Mirage Rd	Aqua Fria River	91.08
11009	Olive Ave & BNSFRR	just W of Reems Road	Reems Road Channel	82.38
990276	Olive Avenue	800' E of Perryville Rd	Wash	79.52
10516	Olive Avenue	.5 mi W/ Perryville Rd	Wash W/ Beardsley Canal	80.00
9588	Olive Avenue	E/ of 99th Ave	New River	80.85
10779	Olive Avenue	0.49 mi. W/ Perryville Rd	Waterfall Wash	84.77
10517	Osborn Road	just W of 195th Avenue	Drain Ditch	84.73
990251	Owens Drive	E of Capra Way	Wash	89.38
9426	Palo Verde Rd	0.25 mi N/ Broadway	RID Canal	98.17
7782	Palo Verde Rd	0.75 mi N/ Old US80 Hwy	Buckeye Canal	98.77
10580	Patagonia Way	N of Honor Court (Anthem)	Wash	96.89
8569	Patton Rd	1 mi W/ Grand Ave	CAP Canal	93.98
8043	Perryville Rd	1/3 mi S/ Van Buren	RID Canal	98.78
8044	Perryville Rd	0.5 mi N/ Southern	Buckeye Canal	98.88
990264	Pinnacle Peak Rd	70' w/ 121st Avenue	Drainage Ditch	83.74
990271	Plymouth Drive	just E of Gavilan Pk Pkwy	Drainage Channel	81.73
9928	Power Rd	S/ Guadalupe Rd	East Maricopa Fldwy	80.65
9927	Power Rd	S/ Guadalupe Rd	RWCD Canal (N. Crossing)	92.60
10390	Power Road	0.2 mi S/ Queen Creek Rd	Queen Creek	94.96
990121	Queen Creek Rd	0.3 mi W/ Higley	RWCD Canal (Gilbert)	65.77
8681	Rainbow Rd	1 mi N/ Broadway	RID Canal	98.50
10776	Rainbow Road	0.5 mi S/ Southern Avenue	Buckeye Canal	98.24



Structure No.	Road	Location	Feature Intersected	Sufficiency Rating
990277	Ray Road	1200' E of Mountain Rd	Wash	96.98
990278	Ray Road	900' E of Mountain Rd	Wash	96.98
11008	Reems Rd	0.5 mi N of Northern Ave	Reems Road Channel	82.58
8570	RH Johnson Blvd	N/ Bell Rd	Drainage Ditch	69.65
990182	RH Johnson Blvd	100' E/ 132nd Ave	Drainage Ditch	81.25
11108	Riggs Rd		Sonoqui Wash	NEW
990270	Riggs Road	160' W of Robson Blvd	Golf Cart Underpass	91.64
8038	Rittenhouse Rd	0.25 mi N/ Cloud	Queen Creek Wash	86.00
10239	Roeser Rd	0.5 mi S/ Broadway Rd	Buckeye Feeder Ditch	98.98
9669	Royal Oak Rd	at 99th Avenue Median	Drainage Ditch	96.85
9670	Royal Ridge Rd	at 99th Avenue Median	Drainage Ditch	85.83
9832	Salome Rd	8 mi W/ Harquahala Val Rd	CAP Canal	94.52
990112	Signal Butte Rd	0.5 mi N/ Brown Rd	Signal Butte Floodway	97.90
8982	Signal Butte Rd	N/ Broadway Rd	Drainage Ditch	98.84
990186	Skylark Dr	at Stardust Blvd Median	Drainage Ditch	97.84
990252	Sossaman Rd	980' N of McDowell Rd	Wash	89.38
990253	Sossaman Rd	0.3 mi N of McDowell Rd	Drain Ditch	89.38
990211	Southern Ave	0.5 mi E/ MC-85 (unpaved rd)	Buckeye Canal S Branch	93.63
990222	Southern Ave	0.5 mi E/ Crismon Rd	Drainage Channel	94.50
990108	Southern Ave	E/ Ellsworth (Mesa)	Drainage Ditch	95.93
7716	Southern Ave	.6mi E of Signal Butte Rd	CAP Drainage Channel	97.55
8884	Southern Ave	.6mi E/ Signal Butte Rd	CAP Canal (Mesa)	97.55
8573	Spanish Garden Dr	200' E/ 132nd Ave	Drainage Ditch	97.74
990183	Stardust Blvd	165' S/ Yosemite Rd	Drainage Ditch	96.78
7644	Sun Valley Pkwy	300' W/ McMicken Dam	McMicken Dam Channel	99.46
7645	Sun Valley Pkwy-01	0.7 mi N/ McDowell Rd	Wash	93.85
7646	Sun Valley Pkwy-02	0.8 mi N/ McDowell Rd	Wash	93.85
7647	Sun Valley Pkwy-03	1.3 mi N/ McDowell Rd	Wash	93.85
7648	Sun Valley Pkwy-04	1.5 mi N/ McDowell Rd	Wash	93.85
7649	Sun Valley Pkwy-05	1.9 mi N/ McDowell Rd	Wash	93.85
7650	Sun Valley Pkwy-06	2.0 mi N/ McDowell Rd	Wash	93.85
7651	Sun Valley Pkwy-07	2.5 mi N/ McDowell Rd	Wash	93.85
7652	Sun Valley Pkwy-08	2.6 mi N/ McDowell Rd	Wash	93.85
7653	Sun Valley Pkwy-09	2.6 mi N/ McDowell Rd	Wash	93.85
990134	Sun Valley Pkwy-10	2.9 mi N/ McDowell Rd	Wash	93.85
7655	Sun Valley Pkwy-12	3.4 mi N/ McDowell Rd	Wash	93.85
7656	Sun Valley Pkwy-13	3.6 mi N/ McDowell Rd	Wash	93.85
990135	Sun Valley Pkwy-14	3.7 mi N/ McDowell Rd	Wash	93.85
990136	Sun Valley Pkwy-15	4.2 mi N/ McDowell Rd	Wash	93.85
7657	Sun Valley Pkwy-16	4.4 mi N/ McDowell Rd	Wash	93.85
7658	Sun Valley Pkwy-17	4.5 mi N/ McDowell Rd	Wash	93.85
7659	Sun Valley Pkwy-18	4.6 mi N/ McDowell Rd	Wash	93.85
990137	Sun Valley Pkwy-19	4.6 mi N/ McDowell Rd	Wash	93.85
990138	Sun Valley Pkwy-20	5.0 mi N/ McDowell Rd	Wash	93.85
7660	Sun Valley Pkwy-21	5.1 mi N/ McDowell Rd	Wash	93.85
7661	Sun Valley Pkwy-22	5.3 mi N/ McDowell Rd	Wash	93.85
990139	Sun Valley Pkwy-23	5.6 mi N/ McDowell Rd	Wash	90.85
7662	Sun Valley Pkwy-24	6.1 mi N/ McDowell Rd	Wash	93.85
7663	Sun Valley Pkwy-25	6.1 mi N/ McDowell Rd	Wash	93.85
990140	Sun Valley Pkwy-26	6.4 mi N/ McDowell Rd	Wash	89.79
990141	Sun Valley Pkwy-27	6.6 mi N/ McDowell Rd	Wash	90.85
990142	Sun Valley Pkwy-28	6.7 mi N/ McDowell Rd	Wash	90.85
990143	Sun Valley Pkwy-29	6.8 mi N/ McDowell Rd	Wash	78.99
990144	Sun Valley Pkwy-30	7.0 mi N/ McDowell Rd	Wash	90.85
990145	Sun Valley Pkwy-31	7.2 mi N/ McDowell Rd	Wash	90.85
990146	Sun Valley Pkwy-32	7.3 mi N/ McDowell Rd	Wash	90.85
7664	Sun Valley Pkwy-33	7.3 mi N/ McDowell Rd	Wash	93.85





Structure No.	Road	Location	Feature Intersected	Sufficiency Rating
7665	Sun Valley Pkwy-34	7.4 mi N/ McDowell Rd.	Wash	93.85
7666	Sun Valley Pkwy-35	7.4 mi N/ McDowell Rd	Wash	92.85
990147	Sun Valley Pkwy-36	7.6 mi N/ McDowell Rd	Wash	90.85
7667	Sun Valley Pkwy-37	8.0 mi N/ McDowell Rd	Wash	92.85
7668	Sun Valley Pkwy-38	8.1 mi N/ McDowell Rd	Wash	93.85
990148	Sun Valley Pkwy-39	8.5 mi N/ McDowell Rd	Wash	90.85
990149	Sun Valley Pkwy-40	8.6 mi N/ McDowell Rd	Wash	90.85
990150	Sun Valley Pkwy-41	8.9 mi N/ McDowell Rd	Wash	90.85
7669	Sun Valley Pkwy-42	9.2 mi N/ McDowell Rd	Wash	93.85
7670	Sun Valley Pkwy-43	9.2 mi N/ McDowell Rd	Wash	93.85
7671	Sun Valley Pkwy-44	10.0 mi N/ McDowell Rd	Wash	81.99
7672	Sun Valley Pkwy-45	10.2 mi N/ McDowell Rd	Wash	90.85
7673	Sun Valley Pkwy-46	10.2 mi N/ McDowell Rd	Wash	90.85
990189	Sun Valley Pkwy-47	10.5 mi N/ McDowell Rd	Wash	90.85
990190	Sun Valley Pkwy-48	10.8 mi N/ McDowell Rd	Wash	90.85
7674	Sun Valley Pkwy-49	11.1 mi N/ McDowell Rd	Wash	90.85
7675	Sun Valley Pkwy-50	11.2 mi N/ McDowell Rd	Wash	90.85
7676	Sun Valley Pkwy-51	11.8 mi N/ McDowell Rd	Wash	90.85
7677	Sun Valley Pkwy-52	11.8 mi N/ McDowell Rd	Wash	90.85
7678	Sun Valley Pkwy-53	11.9 mi N/ McDowell Rd	Wash	90.85
7679	Sun Valley Pkwy-54	11.9 mi N/ McDowell Rd	Wash	90.85
7680	Sun Valley Pkwy-55	11.9 mi N/ McDowell Rd	Wash	90.85
7681	Sun Valley Pkwy-56	11.9 mi N/ McDowell Rd	Wash	90.85
7682	Sun Valley Pkwy-57	12.0 mi N/ McDowell Rd	Wash	90.85
990191	Sun Valley Pkwy-58	13.1 mi N/ McDowell Rd	Wash	90.85
7683	Sun Valley Pkwy-59	13.9 mi N/ McDowell Rd	Wash	90.85
7684	Sun Valley Pkwy-60	14.1 mi N/ McDowell Rd	Wash	90.85
7685	Sun Valley Pkwy-61	14.3 mi N/ McDowell Rd	Wash	90.85
990192	Sun Valley Pkwy-63	17.7 mi N/ McDowell Rd	Wash	90.85
990193	Sun Valley Pkwy-64	18.1 mi N/ McDowell Rd	Wash	90.85
7687	Sun Valley Pkwy-65	18.3 mi N/ McDowell Rd	Wash	90.85
7688	Sun Valley Pkwy-66	18.4 mi N/ McDowell Rd	Wash	90.85
990194	Sun Valley Pkwy-67	18.5 mi N/ McDowell Rd	Wash	90.85
7689	Sun Valley Pkwy-68	18.9 mi N/ McDowell Rd	Wash	90.85
7690	Sun Valley Pkwy-69	18.9 mi N/ McDowell Rd	Wash	90.85
7691	Sun Valley Pkwy-70	19.1 mi N/ McDowell Rd	Wash	90.85
990195	Sun Valley Pkwy-71	19.1 mi N/ McDowell Rd	Wash	90.85
7692	Sun Valley Pkwy-72	19.3 mi N/ McDowell Rd	Wash	90.85
990196	Sun Valley Pkwy-73	19.5 mi N/ McDowell Rd	Wash	90.85
7693	Sun Valley Pkwy-74	19.6 mi N/ McDowell Rd	Wash	90.85
7694	Sun Valley Pkwy-75	19.7 mi N/ McDowell Rd	Wash	90.85
7695	Sun Valley Pkwy-76	19.7 mi N McDowell Rd	Wash	90.85
990197	Sun Valley Pkwy-77	19.8 mi N/ McDowell Rd	Wash	90.85
7696	Sun Valley Pkwy-78	20.4 mi N/ McDowell Rd	Wash	90.85
7697	Sun Valley Pkwy-79	21.4 mi N/ McDowell Rd	Wash	90.85
7698	Sun Valley Pkwy-80	21.6 mi N/ McDowell Rd	Wash	90.85
7699	Sun Valley Pkwy-81	22.1 mi N/ McDowell Rd	Wash	90.85
7700	Sun Valley Pkwy-82	22.5 mi N/ McDowell Rd	Wash	90.85
7701	Sun Valley Pkwy-83	22.6 mi N/ McDowell Rd	Wash	90.85
7702	Sun Valley Pkwy-84	22.9 mi N/ McDowell Rd	Wash	90.85
7703	Sun Valley Pkwy-85	23.4 mi N/ McDowell Rd	Wash	90.85
990198	Sun Valley Pkwy-86	23.6 mi N/ McDowell Rd	Wash	90.85
7704	Sun Valley Pkwy-87	24.1 mi N/ McDowell Rd	Wash	90.85
7705	Sun Valley Pkwy-88	24.2 mi N/ McDowell Rd	Wash	90.85
990110	Sunland Ave	E/ Ellsworth	Drainage Ditch	96.89
9683	Thunderbird Rd	at 99th Ave Median	Drainage Ditch	87.58
990200	Trail Ridge Dr	200' W/ Yosemite Dr	Drainage Ditch	96.83



Structure No.	Road	Location	Feature Intersected	Sufficiency Rating
8629	Turner Rd	0.5 mi S/ Baseline Rd	Buckeye Canal	99.94
8584	Tuthill Rd	0.5 mi S/ Beloat Rd	Gila River	96.28
990152	Union Hills Dr	at 99th Ave	Drainage Ditch	95.65
9374	University Dr	900' W/ Dobson	Tempe Canal	95.43
8862	University Drive	0.5 mi E/ Ellsworth Rd	CAP Canal	98.41
8882	Van Buren St	1 mi W/ 339th Ave	Dickey Wash	91.13
8881	Van Buren St	0.5 mi W/ Citrus Rd	RID Canal	98.55
7706	Van Buren St	E/ SVP-Palo Verde Rd	Drainage Ditch	99.88
990273	Venture Drive	0.46 mi. SW of Anthem Way	Wash	84.25
8983	Via Hermosa	W/ Forest Rd (Rio Verde)	Wash	99.70
990274	White Tanks Mnt Blvd	460' W of 183rd Ave	Drainage Channel	96.85
10369	Whitman Drive	600' E/ Galvin Peak Pkwy	Wash	99.86
10514	Wigwam Creek Blvd	550' NW of Orange Drive	Drain Ditch	81.45
10515	Wigwam Creek Blvd	just N of Camelback Rd	Drain Ditch	81.45
10513	Wigwam Creek Blvd	200' SW of 124th Lane	Drain Channel	96.55
8577	Wildwood Drive	200' W/ 125th Ave	Drainage Ditch	97.96
10782	Williams Drive	0.3 mi. E/ El Mirage Rd	McMicken Outfall Wash	83.63
990263	Williams Drive	at 123rd Avenue	Drainage Ditch	89.34
8578	Wilson (283rd) Ave	1 mi S/ Baseline	Buckeye Canal	98.72
9919	Woods Rd	E/ Old US-80	Gila Bend Canal	98.51
990267	Yearling Road	0.2 mi. e/ Litchfield Rd	Drainage Channel	85.62