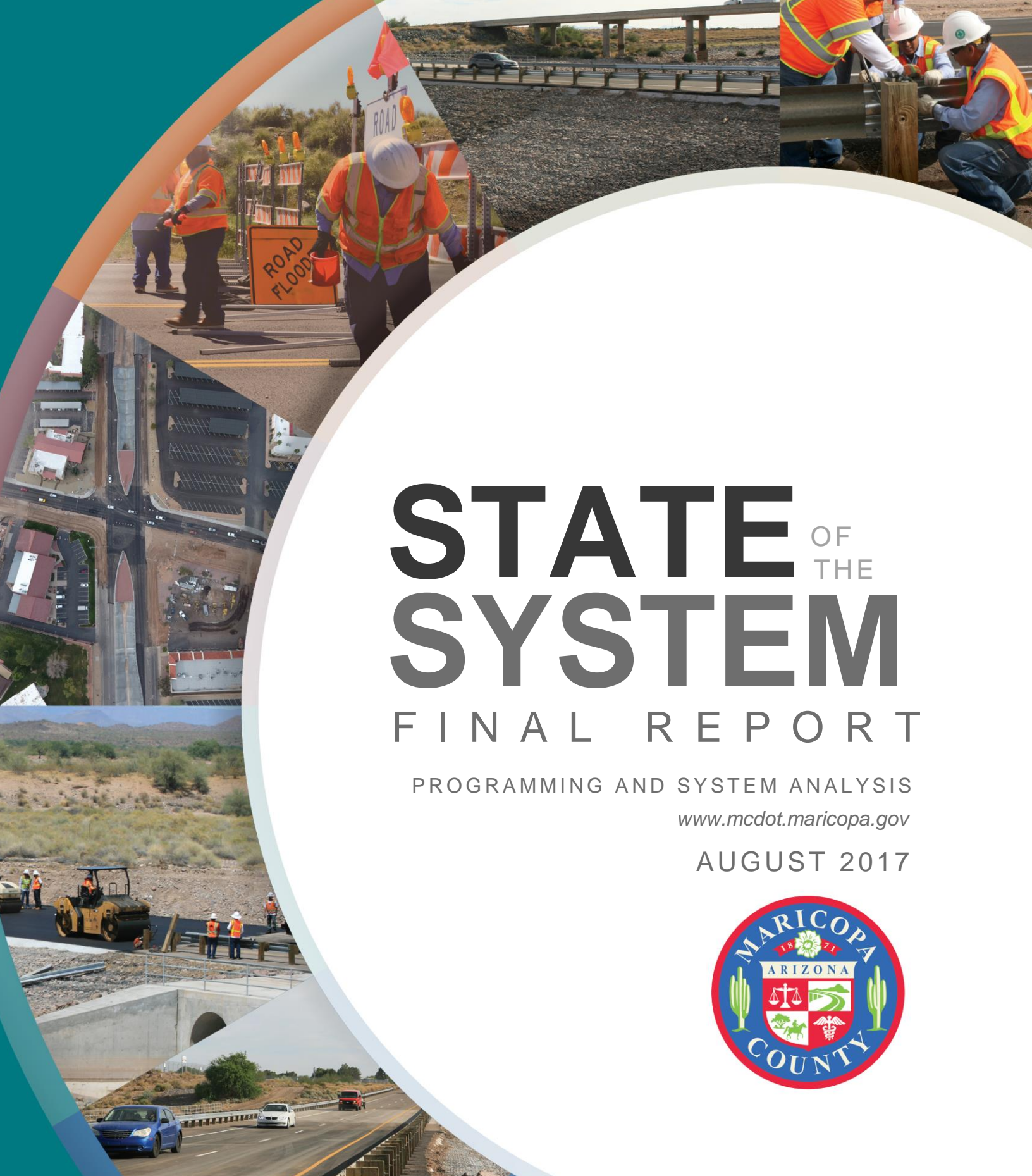


FISCAL YEAR
2016



STATE OF THE SYSTEM

FINAL REPORT

PROGRAMMING AND SYSTEM ANALYSIS

www.mcdot.maricopa.gov

AUGUST 2017



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Overview

Maricopa County is the fourth most populous county in the nation according to the 2010 Census, covering more than 9,000 square miles. Maricopa County Department of Transportation (MCDOT) focuses on more than 7,000 square miles of unincorporated area. The following section provides a brief overview of MCDOT and the State of the System Report (Report).

About MCDOT

Core Purpose and Values

MCDOT is guided by its core purpose and values, to provide connections that improve people's lives and be service-minded team builders who get it done with a smile. MCDOT plans, designs, builds, maintains, and operates roads within unincorporated Maricopa County.

Organizational Overview

MCDOT has four divisions that focus on new infrastructure, maintenance, and operations. **Figure 1** shows the MCDOT organizational chart for these divisions and their branches.

Purpose of the State of the System Report

The Report is a compilation of the physical inventory and status of the MCDOT transportation system infrastructure. The transportation system includes roads, bridges, bicycle and pedestrian facilities, traffic signals, Intelligent Transportation Systems (ITS), and other facilities. The Report documents the performance and condition of various components of the transportation system. A context map of Maricopa County showing unincorporated areas, major regional roads, municipal boundaries, and other existing features is provided as **Figure 2**.

Sections of the State of the System Report

The Report discusses the following system components:

- Traffic Management
- Safety Management
- Bridge Management
- Road Management

Timeframe of the State of the System Report

The Report focuses on Fiscal Year 2016 (FY 2016) (July 1, 2015 to June 30, 2016) but also includes limited information on previous fiscal years in sections to provide comparison. The Report is prepared annually.

Most of the data analyzed in the 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 Report, unless the year is noted as a fiscal year (e.g., FY 2016), the year referenced is a calendar year.

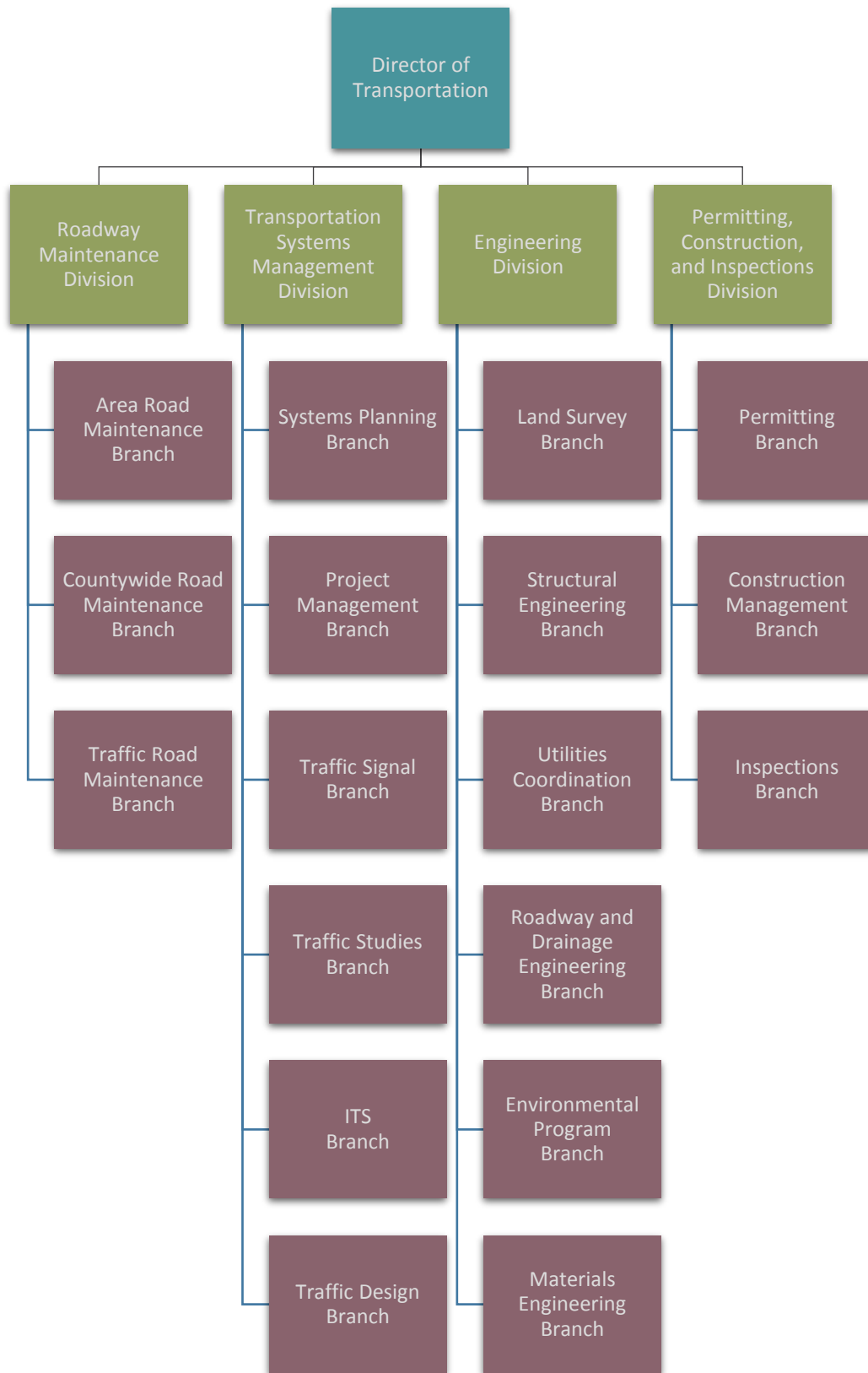
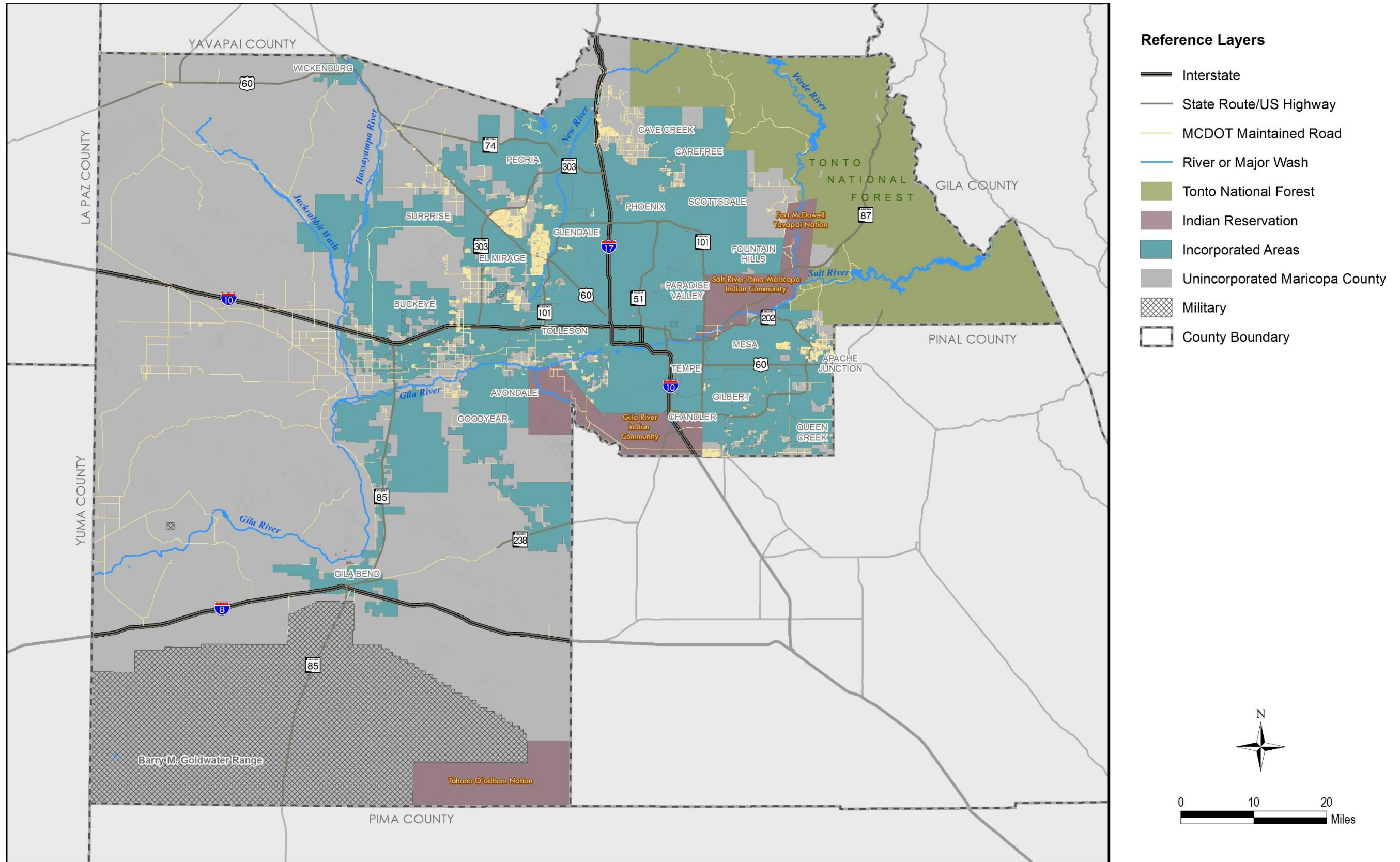


Figure 1: MCDOT Organizational Chart



Reference Layers

- Interstate
- State Route/US Highway
- MCDOT Maintained Road
- River or Major Wash
- Tonto National Forest
- Indian Reservation
- Incorporated Areas
- Unincorporated Maricopa County
- Military
- County Boundary

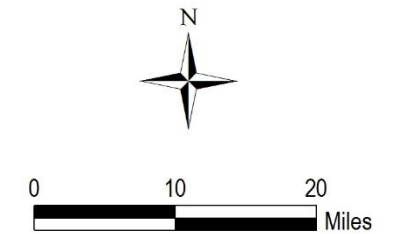


Figure 2: Maricopa County Context Map



FY 2016 Year in Review

MCDOT Statistics

MCDOT inventories and monitors the transportation system to track performance from year to year. The following bulleted list summarizes statistics for FY 2016 as reported by the four MCDOT Divisions:

- Miles of paved roads – 2,001
 - Local roads – 921 centerline miles (1,890 lane miles)
 - Major roads (arterial and collector) – 1,080 centerline miles (2,589 lane miles)
- Miles of unpaved roads – 415 centerline miles
- Miles of bicycle lanes and paved shoulders – 176 centerline miles
- Traffic volume growth from 2014 to 2015 – 1.8 percent
- Road with highest counted daily traffic volume – Bell Road west of Del Webb Boulevard (57,000 vehicles per day)
- Bridges – 436
- Traffic signals – 159 (147 owned and operated by MCDOT; 12 owned by another agency and operated by MCDOT)
- Pedestrian hybrid beacons – 4
- Other pedestrian crossings with flashing lights – 6
- Closed Circuit Television (CCTV) traffic cameras – 61
- Dynamic Message Signs (DMS) for traveler information – 5
- Traveler information messages posted – 6,806
- Calls for incident response assistance – 179
- Twitter followers – 2,975
- Tweets – 41 average monthly messages and 303 average monthly retweets
- Facebook page followers – 424
- Project line phone calls – approximately 1,200
- Door hangers and mailers – more than 100,000

MCDOT jurisdiction is focused within the unincorporated area of Maricopa County, which covered an area of 7,047 square miles and a population of 293,878 in FY 2016 according to data provided by the Maricopa County Office of Enterprise Technology and the Arizona Department of Administration.



Summary of Major Projects

MCDOT completed 15 major projects in FY 2016 at a total cost of \$23.75 million. Information on these projects is in **Table 1**.

Table 1: Major MCDOT Projects Completed in FY 2016

Location	Project Number	Project Type	Improvement	Cost
Elliot Road at Sossaman Road	TT0333	Safety	Traffic Signal	\$1,899,000
MC 85: Litchfield Road to 83rd Avenue	TT0352	ITS	Fiber Optic Cable and Wireless Connections	\$802,800
Mountain Road: University Drive to Cholla Street	TT0365	Safety	Speed Cushions	\$200,000
29th Avenue: Irvine Road to Desert Hills Drive	TT0410	Dust Mitigation	Dirt Road Paving	\$5,455,000
59 th Street				
26th Street: Old New River Rd to Carlise Road				
121st Avenue: Beginning of Maintenance to Southern Avenue				
Planada Lane: 87th Avenue to 83rd Avenue	TT0411	Dust Mitigation	Dirt Road Paving	\$2,070,000
McDowell Road: 76 th Street to Usery Pass	TT0432	Paved Shoulders	Bike Lane	\$527,000
Aguila Road: Western Area Power Administration (WAPA) Towers	TT0444	Safety	Road Realignment	\$120,000
New River Road at Linda Lane	TT0445	Safety	Trail Crossing	\$260,000
RH Johnson Boulevard and Meeker Boulevard	TT0448	ITS	Communication System	\$578,000
Anthem Box Culverts	TT0459	Maintenance	Erosion Protection	\$1,220,000
East Mesa Local Road Rehabilitation, Phase 1	TT0473	Pavement Preservation	Mill and Overlay	\$7,910,000
East Mesa Local Road Rehabilitation, Phase 2				
Local Road Rehab at Curtis Park				
SE/SW Rehab Local Road Rehabilitation				
Asphalt Rubber Overlay NW Area Arterials	TT0474-2	Pavement Preservation	Mill and Overlay	\$1,463,000
Asphalt Rubber Overlay SW Area Arterials	TT0476	Pavement Preservation	Mill and Overlay	\$608,000
University Drive at 96th Street	TT0482	Safety	Traffic Signal	\$445,000
99 th Avenue at Cameo Drive	TT0489	Safety	Advanced Intersection Warning System	\$188,000

Source: MCDOT Transportation Improvement Program Fiscal Year 2016-2020



Traffic Management System

Introduction

MCDOT's Traffic Management System – also known as Transportation System Management and Operations (TSMO) – includes the operations and management of traffic on MCDOT roads. For purposes of this Report, MCDOT 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 future traffic growth and congestion on MCDOT roads as well as information about traffic growth and congestion shared with other agencies and the traveling public. This section incorporates and expands upon information provided in previous 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 MCDOT roads
- Identify and measure MCDOT improvements to traffic operations through innovation, ITS devices, incident management, and traveler information

Traffic Growth and Congestion

2015 Traffic Volumes

Traffic growth and congestion are evaluated on all MCDOT arterial roads using data from MCDOT's Traffic Count Program. In 2015, rural area traffic volumes were generally less than 15,000 vehicles per day. In urban areas, traffic volumes were generally less than 30,000 vehicles per day. Bell Road is a notable exception at approximately 57,000 vehicles per day. Based on MCDOT's traffic volume data, the MCDOT arterial road network experienced an overall traffic growth increase of 1.8 percent from 2014 to 2015.

Traffic Congestion Performance Measures

MCDOT has developed a traffic congestion performance measure known as the Volume to Service Volume Threshold (V/SVT). In contrast to the industry standard Volume to Capacity (V/C) ratio, which compares traffic volumes to road capacity, the V/SVT ratio compares the volume to the maximum volume considered acceptable by MCDOT for the characteristics of the road. A V/SVT ratio value over 1.0 is considered to have exceeded the service volume threshold. Most MCDOT traffic volume count locations have V/SVT ratios well below 1.0 but there are some with a V/S ratio that exceed 1.0. **Table 2** lists the locations with V/SVT ratios over 1.0.



Table 2: Traffic Count Locations with 2015 V/SVT Ratios Over 1.0

Rank	Traffic Count Location	Number of Lanes	Daily Volume (2014)	Daily Volume (2015)	2014-2015 Daily Volume Annual Growth Rate	2015 Daily V/SVT Ratio
1	Southern Avenue east of 51st Avenue	2	19,033	21,700	14.0%	2.284
2	Lower Buckeye Road west of 67th Avenue	2	18,901	19,179	1.5%	2.019
3	67th Avenue south of Broadway Road	2	17,679	18,730	5.9%	1.972
4	51st Avenue south of La Mirada Drive	2	15,004	19,041	26.9%	1.796
5	67th Avenue north of Broadway Road	2	12,674	16,654	31.4%	1.753
6	51st Avenue south of Estrella Drive	2	15,938	18,261	14.6%	1.723
7	Northern Avenue east of Litchfield Road	2	15,374	17,669	14.9%	1.667
8	Southern Avenue east of 43rd Avenue	2	17,471	15,327	-12.3%	1.613
9	Val Vista Drive north of Chandler Heights Road	2	15,324	15,074	-1.6%	1.422
10	Litchfield Road north of Olive Avenue	2	15,465	13,818	-10.6%	1.304
11	Indian School Road west of 99th Avenue	4	31,204	29,344	-6.0%	1.281
12	67th Avenue north of Baseline Road	2	9,975	12,252	22.8%	1.213
13	7th Avenue north of Carefree Highway	2	5,558	6,740	21.3%	1.204
14	Southern Avenue east of 67th Avenue	2	9,836	10,936	11.2%	1.151
15	51st Avenue south of Pecos Road	2	8,786	11,798	34.3%	1.113
16	Elliot Road east of Ellsworth Road	2	14,460	12,203	-15.6%	1.090
17	Granite Valley Drive west of Meeker Boulevard	2	12,901	11,693	-9.4%	1.083
18	Power Road north of Warner Road	4	24,435	26,322	7.7%	1.079
19	Jackrabbit Trail south of I-10	2	8,739	11,428	30.8%	1.078
20	Southern Avenue west of Meridian Road	2	10,975	11,131	1.4%	1.050
21	51st Avenue south of Saint Johns Road	2	9,568	11,612	21.4%	1.037
22	Bell Road west of Del Webb Boulevard	6	57,428	56,814	-1.1%	1.037
23	Camelback Road west of Litchfield Road	2	10,992	10,664	-3.0%	1.006

Source: MCDOT Transportation Systems Management Division

Transportation Systems Management and Operations

Intelligent Transportation Systems

ITS includes various forms of technology to provide traffic management services. A network of ITS devices such as traffic signals, CCTV cameras mounted on traffic signals, DMS, traffic detection, and communications infrastructure allows the MCDOT Traffic Management Center (TMC) the ability to manage traffic on MCDOT roads. The operators at the MCDOT TMC use ITS devices to monitor traffic conditions and develop signal timing plans to help relieve congestion, post messages on DMS to alert motorists to road conditions, and dispatch the MCDOT arterial incident response team known as REACT. The real-time services enabled through ITS help in reducing delays and enhancing safety.

The MCDOT TMC has access to other jurisdictions' ITS devices through the AZTech Regional Partnership, a joint agency partnership to manage traffic and support incident and event management on a regional basis. 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 traffic signals and changes/implements traffic signal timing in response to real time conditions. **Table 3** compares the FY 2015 and FY 2016 levels of deployment for ITS infrastructure to show growth in ITS devices.



Table 3: Growth of ITS Devices for FY 2015 and FY 2016

ITS Feature	FY 2015 Amount	FY 2016 Amount	% Growth FY 2015 - FY 2016
CCTV Cameras	56	61	9%
DMS with Travel Time Posting Capabilities	5	5	0%
Traffic Signals with Communication to TMC	120	120	0%

Source: MCDOT ITS Branch

The MCDOT TMC operates ITS devices to manage congestion, incidents, and events on MCDOT roads. The amount of uptime for ITS devices and communications to support those activities is an important measure as it reflects the availability of the ITS infrastructure to support the management of traffic. The MCDOT 2006 ITS Business Plan established a goal of having TMC device communications to 95 percent of ITS field devices within 10 years. As of the end of FY 2016, 87 percent of field devices are connected to the TMC.

The following bulleted list summarizes major ITS events for the year:

- Reviewed and implemented 130 timing plans; 98 percent of MCDOT signalized intersections have up to date timings
- Exceeded the goal of 95 percent systems operational for system performance of the ITS field and TMC devices
- Completed the Bell Road Adaptive Signal Project design phase
- Completed AZTech Regional Information System upgrades
- Completed pilot integration of City of Mesa and City of Glendale construction event data to the Regional Archive Data Server (RADS) and the statewide 511 travel information alerting system
- Completed the concept for implementing arterial Smarter Work Zones (SWZ)
- Expanded the SMARTDrive Program Anthem Test Bed to include 11 equipped intersections and several equipped vehicles to demonstrate the capabilities the system supports

Incident Management

REACT The MCDOT Regional Emergency Action Coordinating Team (REACT) is a team of personnel that is dispatched to incident scenes on arterial roads when an incident is expected to last more than two hours. REACT provides traffic control assistance so first responder emergency services (e.g., police, fire, medical) can focus on their responsibilities and clear incidents quickly, thereby reducing the number of secondary crashes. REACT has intergovernmental agreements (IGAs) with the following agencies in the Phoenix metropolitan region:

- ADOT
- Glendale
- Peoria
- Avondale
- Scottsdale
- Tolleson



In FY 2016, the REACT Team responded to 179 incident callouts and met the response time goal of arriving at the incident scene within 30 minutes for a maximum 20 mile responder distance. **Figure 3** shows the jurisdictional distribution of REACT callouts for FY 2016. To date, there have been no secondary crashes while REACT is present and/or has established traffic control at an incident site.

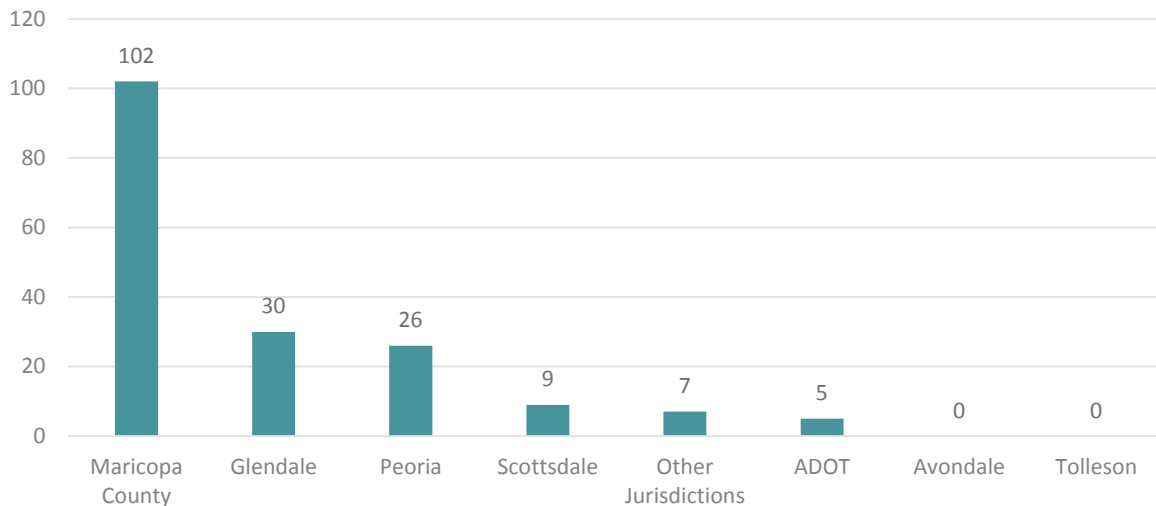


Figure 3: Jurisdictional Distribution of REACT Callouts (FY 2016)

Traveler Information

The TMC provides traveler information services to both unincorporated Maricopa County residents and regional travelers. Information is provided to travelers via e-mail traffic alerts, tweets, and text alerts. In addition, data is entered into MCDOT's Advanced Traveler Information System (ATIS) program for arterial incidents and events for automated posting to the statewide 511 travel information alerting system. Travel time messages are also posted on DMS (including five owned/operated by MCDOT). **Table 4** shows the number of traveler information messages posted from the MCDOT TMC between FY 2015 and FY 2016.

Table 4: Traveler Information Message Posts (FY 2015 - FY 2016)

Year	Traveler Information Messages Posted	% Growth FY 2015 - FY 2016
FY 2015	6,879	-
FY 2016	6,806	-1%

Source: MCDOT Communications Branch

MCDOT's Communications Branch reported in FY 2016 that MCDOT's Twitter account @MCDOTNEWS had 3,185 followers and followed 240 other agencies. Media Twitter feeds for tweets and retweets averaged 41 monthly messages. Information is regularly retweeted from @ArizonaDOT and @PhxTrafficAlert. In addition to Twitter, MCDOT also has a Facebook page on which it can provide additional traveler information. In FY 2016, the MCDOT Facebook page had 424 followers.



Safety Management System

Introduction

The MCDOT Safety Management System is a systematic process with the following three goals:

- Document the road safety improvements made by MCDOT during the previous fiscal year
- Identify the location, type, and severity of traffic crashes on MCDOT roads
- Report trends in traffic crashes and recommend improvements to reduce the number and frequency of crashes

Evaluation of Safety

MCDOT's Transportation Systems Management Division continues to identify and evaluate locations with potential safety concerns, including the prioritization and scheduling of 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 MCDOT roads to identify locations with potential safety concerns. At these locations, crash history is used to evaluate the road and determine recommended improvements. Crash locations are determined using ADOT's statewide crash dataset. If five or more correctable crashes are detected within a road segment or intersection 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 for, or 'warrants', 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 or when improvements are recommended.

Spot Safety Improvement Project Accomplishments

In FY 2016, the MCDOT Transportation Systems Management Division implemented six safety improvement projects. Information on these projects can be found in **Table 1** of the Report.

Crash Statistics

MCDOT monitors reported crashes that occur on MCDOT owned, operated, and maintained roads. In 2016 MCDOT modified the methodology for how crashes were identified as being on MCDOT owned, operated, or maintained roads. This modification in methodology results in slightly different values for 2011-2014 in this Report than were reported in prior years' Reports.

Crash data was obtained from the Arizona Department of Transportation (ADOT) Safety Datamart crash database and may include crashes that occurred in intersections or on adjoining roads that are not owned, operated, or maintained by MCDOT.

The MCDOT crash rate measures the annual number of crashes per million vehicle miles of travel (MVMT) on the road network. As shown in **Table 5**, the 2015 MCDOT crash rate was above its five year historical average. MCDOT also tracks crash rates for crashes involving bicycles, pedestrians, and work zones. As shown in **Table 5**, the 2015 bicycle, pedestrian, and work zone crash rates were all below their five year historical average crash rates.



Table 5: MCDOT Crash Rates 2011 – 2015

Factors	2011	2012	2013	2014	2015	2011-2015 5-Year Average	2015 vs. 5-Year Average
Crash Rate*	0.96	1.06	1.05	0.96	1.09	1.02	7%
Bicycle Crash Rate*	0.013	0.014	0.015	0.016	0.014	0.015	-1%
Pedestrian Crash Rate*	0.009	0.010	0.011	0.010	0.009	0.010	-8%
Work Zone Related Crash Rate*	0.018	0.023	0.017	0.011	0.011	0.016	-31%

*Crashes per MVMT

Source: MCDOT Analysis of Crash Data from ADOT Safety Datamart

The MCDOT fatality rate measures the annual number of crash related fatalities per 100 million vehicle miles of travel (MVMT) on the MCDOT road network. As shown in **Table 6**, the fatality rate increased in 2015 compared to 2014 and was above its five year historical average. A similar trend occurred in 2015 with the Arizona fatality rate and the U.S. fatality rate, as shown in **Table 6**.

Table 6: Fatality Rates 2011 – 2015

Factors	2011	2012	2013	2014	2015	2011-2015 5-Year Average	2015 vs. 5-Year Average
MCDOT Fatality Rate**	1.42	1.26	1.65	1.25	1.44	1.40	2%
Arizona Fatality Rate**	1.39	1.37	1.39	1.24	1.38	1.35	2%
U.S. Fatality Rate**	1.10	1.14	1.10	1.07	1.12	1.11	1%

**Fatalities per 100 MVMT

Sources: MCDOT Analysis of Crash Data from ADOT Safety Datamart and ADOT 2015 Motor Vehicle Crash Facts

MCDOT identified four main Focus Areas based on the 12 Emphasis Areas established in the 2014 Arizona Strategic Highway Safety Plan (AZSHSP) and the six Action Areas for the 2015 MAG Strategic Transportation Safety Plan (STSP). 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
- Work zone related crashes

Intersection Crashes

There were 2,966 reported crashes on MCDOT roads in 2015, 1,739 (59 percent) of which were intersection related. Of the intersection crashes, 20 were fatal crashes while 59 were incapacitating injury crashes. The most prevalent types of intersection crashes in 2015 were rear end (28 percent), angle (25 percent), and left turn (25 percent) crashes.

Fatal and Incapacitating Injury Crashes

There were 37 fatal crashes and 118 incapacitating injury crashes on MCDOT roads in 2015, comprising 1 percent and 4 percent of total crashes respectively. The most prevalent types of fatal crashes in 2015 were single vehicle (30 percent), angle (16 percent), and left turn (11 percent) crashes. The most prevalent types of incapacitating injury crashes in 2015 were single vehicle (28 percent), left turn (24 percent), and angle (17 percent) crashes.



Figure 4 shows the location of the 37 fatal crashes reported in 2015. **Figure 5** contains insets of **Figure 4** that more clearly show the locations of fatal crashes in areas where there are several fatal crashes near each other. While fatal crashes represent a small percentage of total crashes, they represent a large percentage of the societal cost in terms of medical expense and lost wages. Reducing the frequency of these high-severity crashes is a priority at the federal, state, regional, and local level.

Non-Motorized (Bicycle and Pedestrian) Crashes

Figure 4 also shows the location of the six fatal crashes in 2015 that involved bicyclists or pedestrians on MCDOT 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 2015, three of the 39 bicycle related crashes were fatal crashes and three of the 25 pedestrian related crashes were fatal crashes.

Work Zone Crashes

MCDOT places a high priority on safety in and around work zones. In 2015, there were 30 reported work zone related crashes on MCDOT facilities, none of which was a fatal crash.

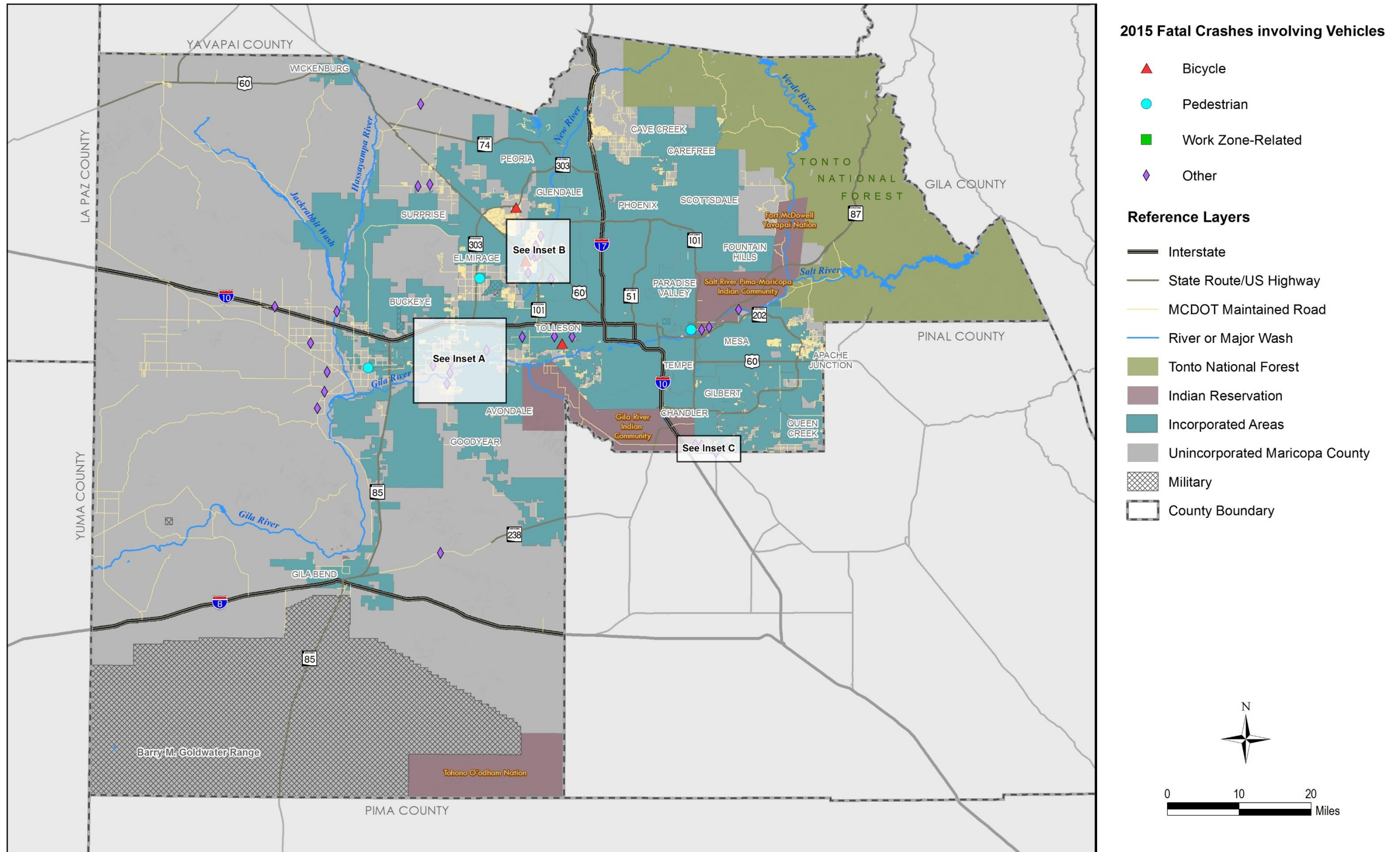


Figure 4: 2015 Fatal Crashes Involving Vehicles on MCDOT Roads by Type

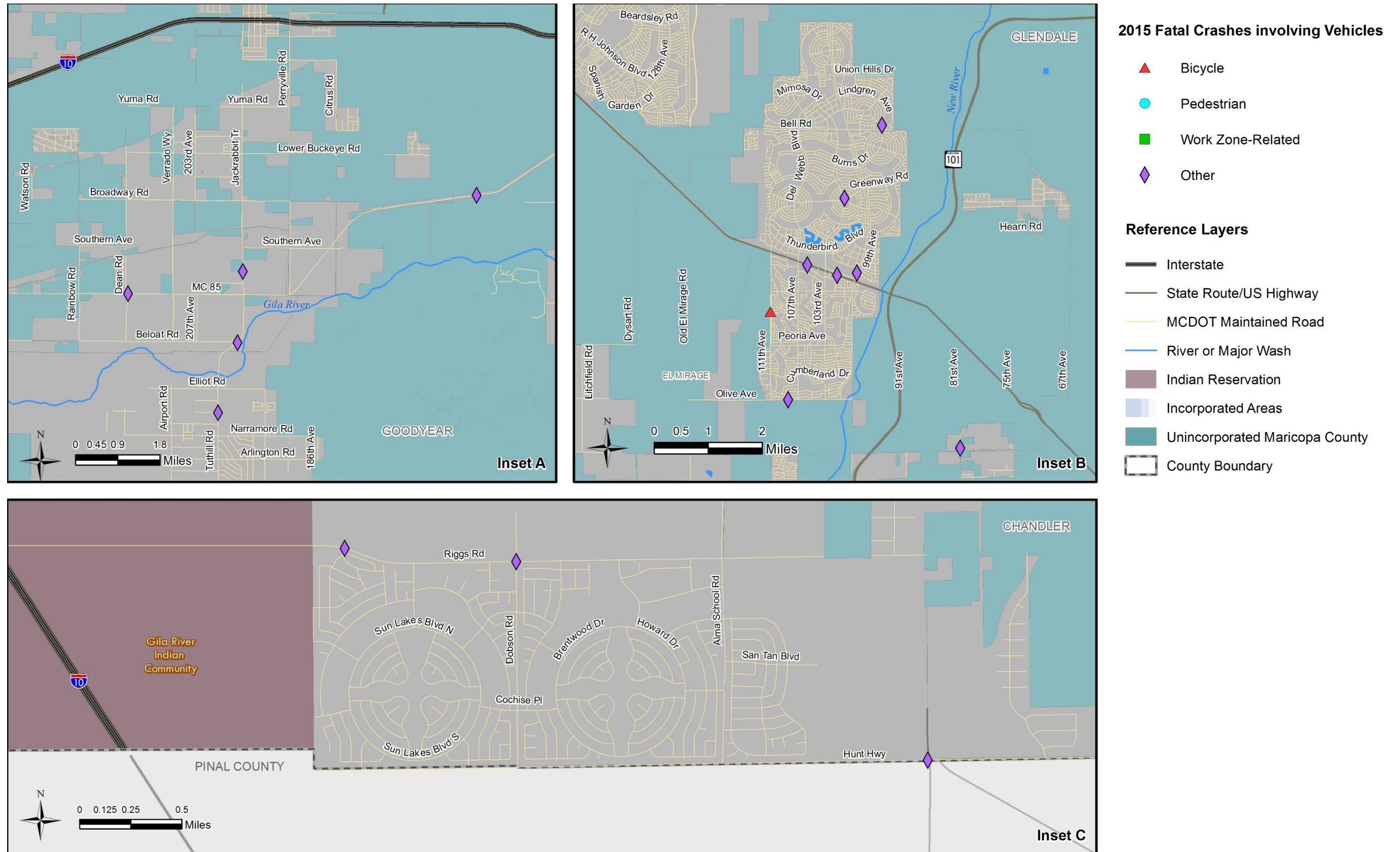


Figure 5: 2015 Fatal Crashes Involving Vehicles on MCDOT Roads by Type – Insets



Bridge Management System

Introduction

The MCDOT Structural Engineering Branch reported in July 2016 that MCDOT maintains and inspects a total of 436 bridges on public roads. By the Federal Highway Administration (FHWA) definition, 287 of these bridges are qualified as “federal” bridges, meaning the bridge has a length greater than 20 feet and is eligible to receive federal aid for improvements. The remaining 149 bridges are “non-federal” bridges with lengths of 20 feet or less.

Federal and Non-Federal Bridges

Every bridge under MCDOT’s maintenance is inspected in accordance with the FHWA’s National Bridge Inspection Standards Recording and Coding Guide. This procedure allows MCDOT to maintain thorough and consistent records for each bridge in the system. The decision to maintain and inspect all of MCDOT’s bridges enables MCDOT to consider how best to appropriate funding and prioritize in house projects.

Summary of FY 2016 MCDOT Bridges

- Total number of bridges in inventory – 436:
 - Number of federal bridges – 287
 - Number of non-federal bridges – 149
 - Number of bridge inspections conducted in FY 2016 – 197
 - Number of span bridges – 76
 - Number of culverts – 360
- Total number of new/existing bridges added to the inventory this year – 14:
 - Total number of federal bridges added to the inventory this year – 5
 - Total number of non-federal bridges added to the inventory this year – 9
- Total number of bridge replacements made this year – 0
- Total number of bridges removed/annexed from the inventory this year – 2
- Total number of structurally deficient bridges in the inventory – 0
- Number of scour-critical bridges in the inventory – 1:
 - *Gilbert Road Bridge over the Salt River - Structure Number 7780*
- Number of fracture-critical bridges in the inventory – 1:
 - *Old US 80 Bridge over the Gila River - Structure Number 8021*

Notable FY 2016 Bridge Events

Union Hills Drive Reinforced Concrete Box Culvert Extension at 99th Avenue

The intersection improvement project at Union Hills Drive and 99th Avenue required the concrete lined channel along the median of 99th Avenue to be closed between the northbound and southbound lanes. To close the median and support new traffic turn lanes on 99th Avenue, the existing reinforced concrete box was extended on both the north and south ends of the intersection. The construction began in FY 2016 and will be completed in FY 2017.



Anthem Scour Protection

Anthem had six culverts that required head-cutting scour protection at the outlet end of each culvert. A combination of concrete structures and riprap was installed during FY 2016 to correct and prevent any further scour issues at these six culvert outlets. Construction was completed in the latter part of FY 2016.

MCDOT's Current and Anticipated Bridge Projects

The bridge projects listed in **Table 7** had funding allocated in FY 2016.

Table 7: Current and Anticipated MCDOT Bridge Projects

Project Location and Description	Project Number	Phase
Deer Valley Road: El Mirage Road to 109 th Avenue – Five lane road with two bridges	TT0248	Design
Gilbert Road at Salt River – Build four-lane bridge to replace current structures	TT0339	Design
Northern Parkway over Dysart Road – New six lane overpass	TT0427	Design
Rittenhouse Road at Queen Creek Wash – Replace two lane bridge with four lane culvert	TT0430	Design
Union Hills Drive at 99 th Avenue – Intersection improvements which include extending an existing culvert	TT0463	Construction
Northern Parkway over El Mirage Road – New six lane overpass	TT0499	Design
Camelback Road at Beardsley Canal – Build bridge over canal to connect Camelback Road	TT0520	Design
Palo Verde Road over the RID Canal – Repair or replace bridge	TT0549	Scoping

Source: MCDOT Transportation Improvement Program Fiscal Year 2016-2020



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. 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 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 MCDOT jurisdiction are maintained at a high level of service by implementing 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
- Develop annual and long term maintenance plans and implement the plans as funding permits

Summary of MCDOT Paved Facilities

In FY 2016, MCDOT had jurisdiction over 921 miles (1,890 lane miles) of local roads and 1,080 miles (2,589 lane miles) of major roads (arterial and collector). This breakdown can be seen in **Table 8**, which compares the MCDOT road composition between FY 2015 and FY 2016. In total, MCDOT maintained 2,001 centerline miles of local and major roads in FY 2016, which equates to 4,479 lane miles. For comparison, in FY 2015, MCDOT maintained 4,481 lane miles of road.

Table 8: Miles of MCDOT Paved Roads FY 2015 - FY 2016

Road Classification	FY 2015	FY 2016	Difference FY 2015 - FY 2016
Local	922	921	-1
Minor Collector	310	314	4
Major Collector	265	265	0
Minor Arterial	338	338	0
Principal Arterial	164	163	-1
TOTAL	1,999	2,001	2

Source: MCDOT Roadway Maintenance Division

Road and Pavement Evaluation Ratings

The MCDOT Roadway Maintenance Division conducts pavement evaluations and assigns ratings to MCDOT roads as part of routine pavement maintenance. The following section provides a description of each type of evaluation and compares the ratings between FY 2015 and FY 2016.

Pavement Condition Rating

Pavement Condition Ratings (PCR) 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. MCDOT utilizes PCR ratings to forecast preventive maintenance programs and for TIP planning. PCR values are categorized by performance subgroups, and the percentage of each group for arterial roads for the years



between FY 2015 and FY 2016 can be seen in **Figure 6**. In FY 2016, approximately 62 percent of MCDOT arterial roads had an “Excellent” PCR and 28 percent had a “Very Good” PCR.

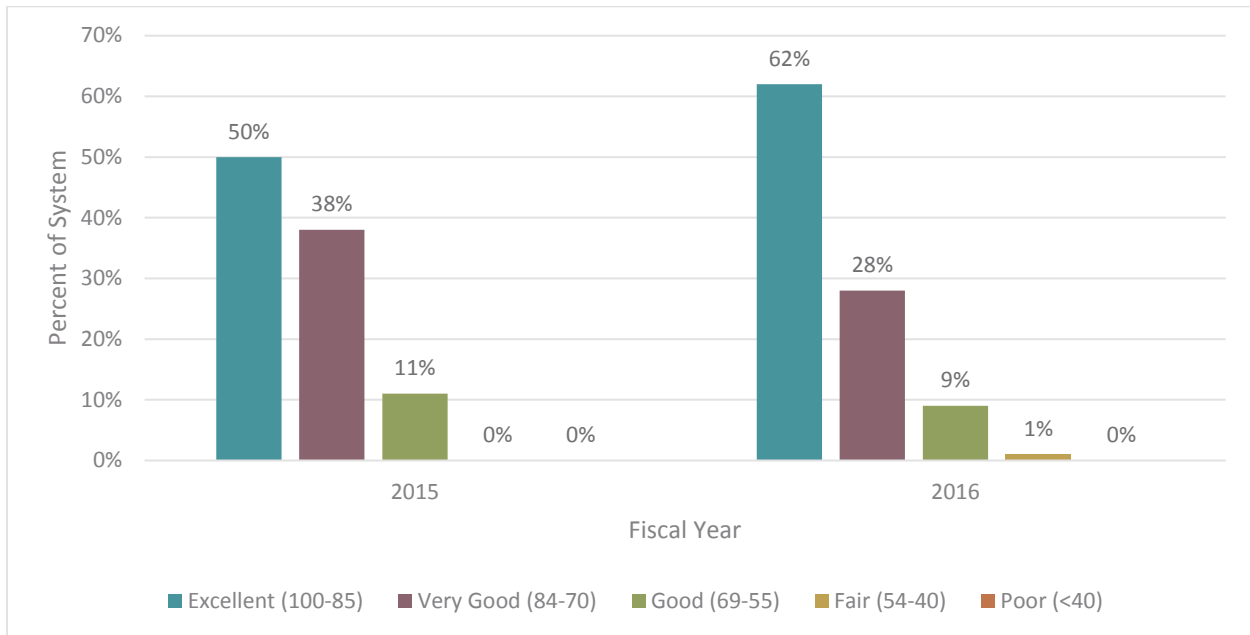


Figure 6: FY 2015 - FY 2016 PCR for MCDOT Arterial Roads

International Roughness Index Rating

The International Roughness Index (IRI) ratings are determined for each road segment on a scale from 1 to 500 with 500 representing an extremely rough road. MCDOT utilizes the IRI ratings to forecast preventive maintenance programs and TIP planning. IRI values are categorized by performance subgroups, and the percentage of each group for the years between FY 2015 and FY 2016 can be seen in **Figure 7**. In FY 2016, approximately four percent of MCDOT arterial roads had a “Very Smooth” IRI rating and 18 percent had a “Smooth” IRI rating.

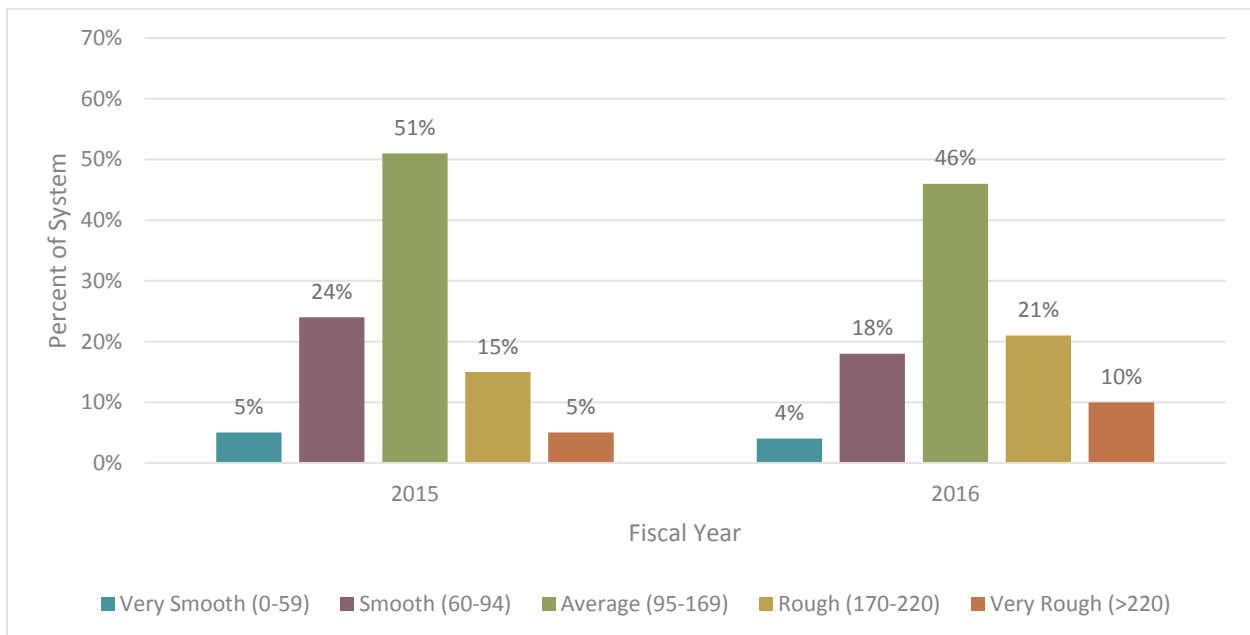


Figure 7: FY 2015 - FY 2016 IRI for MCDOT Arterial Roads



Sufficiency Rating

A Sufficiency Rating for each arterial road segment is identified when it is initially constructed, which 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 the MCDOT arterial road network between FY 2015 and FY 2016 are provided in **Figure 8**. In FY 2016, approximately 60 percent of MCDOT arterial roads had an “Excellent” Sufficiency Rating and 28 percent had a “Very Good” Sufficiency Rating.

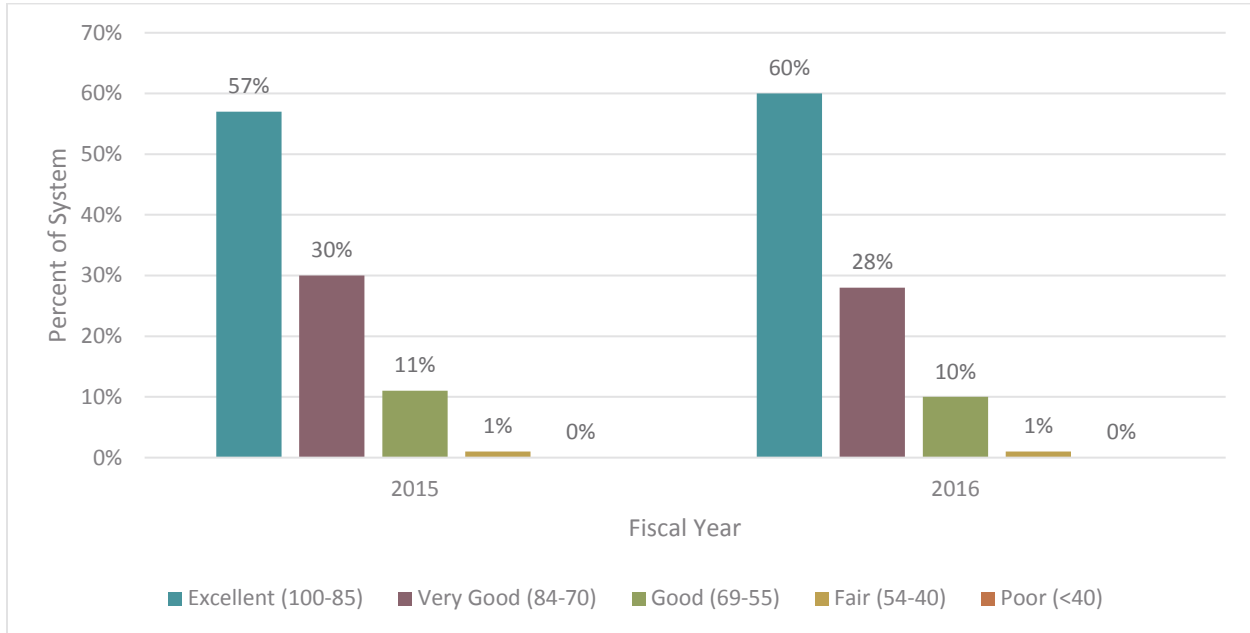


Figure 8: FY 2015 - FY 2016 Sufficiency Ratings for MCDOT Arterial Roads

Preventive Maintenance Plan

The FY 2016 Maintenance Plan was established to identify major projects needed to maintain the integrity of the MCDOT transportation system in FY 2016. MCDOT identified and completed 20 projects covering the maintenance and rehabilitation of 938 lane miles of road as part of the FY 2016 Maintenance Plan. The cost to complete the FY 2016 Maintenance Plan was approximately \$16.58 million. As a comparison, MCDOT spent \$17.16 million on 18 projects covering 767 lane miles to complete the FY 2015 Maintenance Plan.

Low Volume Road Program

In FY 2000, MCDOT initiated a multi-year capital improvement program for paving Low Volume Roads (LVRs) within the PM-10 (federal dust abatement) area. Beginning in 2004, MCDOT refined the program to systematically identify LVRs that meet or exceed the federal criteria for paving under the PM-10 program. All unpaved roads with high or increasing traffic volumes, safety issues, or other significant concerns were considered for paving. The Transportation Advisory Board recommended to the Board of Supervisors that an annual allocation be set aside in the MCDOT budget to pave roads identified in the program. This section documents the number and miles of roads that were paved by MCDOT in FY 2016.



In FY 2016, MCDOT maintained 415 centerline miles of unpaved roads. Approximately 2.20 miles of unpaved roads were paved in FY 2016. **Table 9** shows a summary of the number of centerline miles of roads that were paved from FY 2015 to FY 2016 under the program.

Table 9: Low Volume Road Program FY 2015 - FY 2016

Fiscal Year	Roads Paved (centerline miles)
FY 2015	1.87
FY 2016	2.20
TOTAL	9.65

Source: MCDOT Transportation Systems Management Division