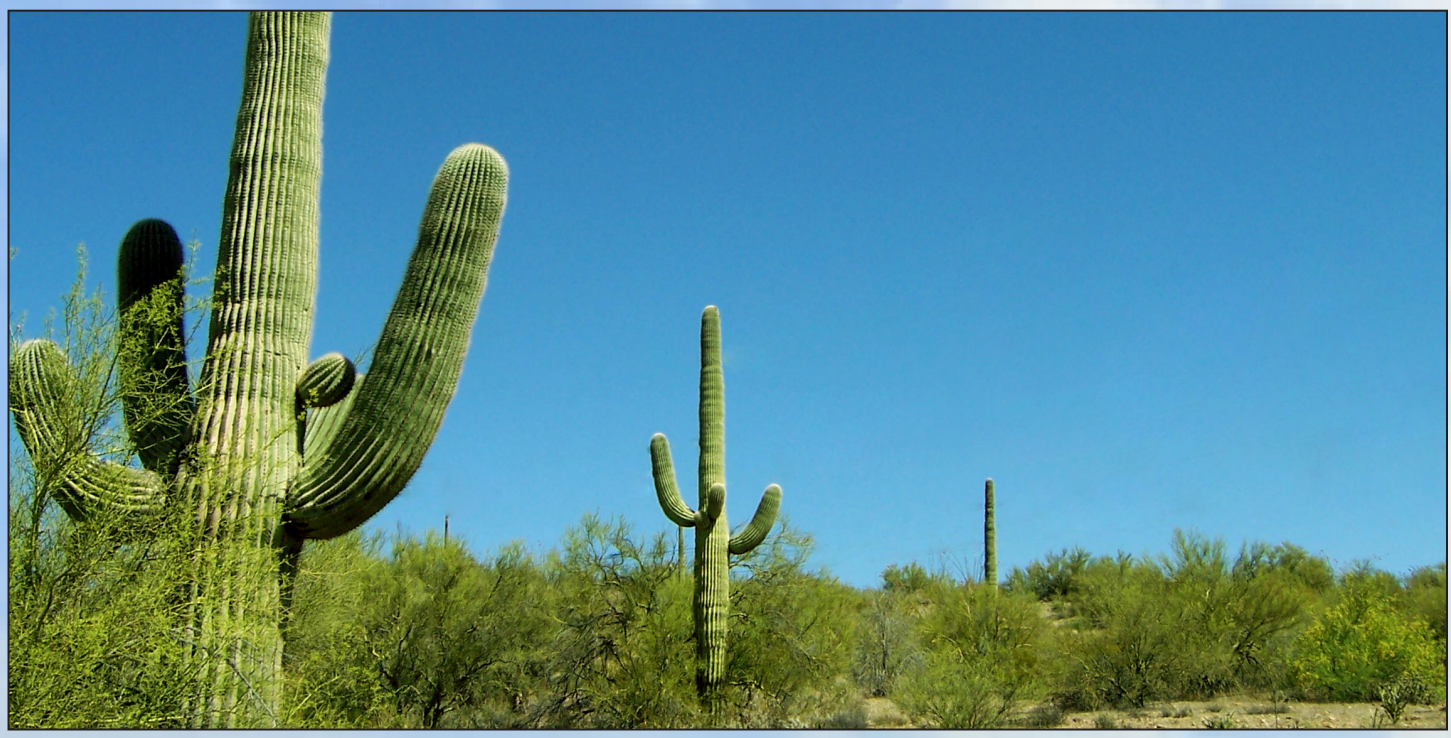

50th Anniversary

MARICOPA ASSOCIATION of GOVERNMENTS

1967–2017

CONFORMITY ANALYSIS

FOR THE FY 2018-2022 MAG TRANSPORTATION IMPROVEMENT PROGRAM AND THE 2040 REGIONAL TRANSPORTATION PLAN

ON THE MOVE

PARTNERS IN PROGRESS

June 2017

REGIONAL TRANSPORTATION PLAN

2017 MAG CONFORMITY ANALYSIS

FOR THE

FY 2018-2022 MAG TRANSPORTATION IMPROVEMENT PROGRAM

AND THE

2040 MAG REGIONAL TRANSPORTATION PLAN

June 2017

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EXECUTIVE SUMMARY

This report presents the 2017 MAG Conformity Analysis for the FY 2018-2022 MAG Transportation Improvement Program and the 2040 MAG Regional Transportation Plan. The Maricopa Association of Governments is the designated Metropolitan Planning Organization (MPO) for Maricopa County and portions of Pinal County including Apache Junction, Florence, and Maricopa. As a result of this designation, MAG prepares the Transportation Improvement Program and Regional Transportation Plan, and the associated conformity analyses. The FY 2018-2022 MAG Transportation Improvement Program serves as a detailed guide for preservation, expansion, and management of public transportation services. The 2040 MAG Regional Transportation Plan covers FY 2018 through FY 2040 providing the blueprint for future transportation investments in the region. The Regional Transportation Plan includes funding for freeways and highways, streets, regional bus and high capacity transit, as well as bicycle and pedestrian facilities, commensurate with available funding. This conformity analysis supports a finding of conformity on the FY 2018-2022 MAG Transportation Improvement Program and 2040 Regional Transportation Plan for the Maricopa Association of Governments metropolitan planning area.

On May 9, 2013, the MAG Metropolitan Planning Area Boundary was expanded due to the 2010 Census urbanized area updates. For transportation planning and programming purposes, the Federal Highway Administration regulations state that at a minimum, the Metropolitan Planning Area must encompass the entire existing urbanized area boundary as well as the contiguous geographic area(s) likely to become urbanized within the next 20 years. The updated urbanized area boundary for the MAG region included areas within Pinal County. Due to this expansion, the MAG Regional Council amended the MAG By-laws to recognize the Metropolitan Planning Area Boundary and to provide for members from Pinal County within the boundary. The MAG Metropolitan Planning Area Boundary now includes the Town of Florence, City of Maricopa, the portion of the Gila River Indian Community within Pinal County, and unincorporated areas within Pinal County.

Also, on May 6, 2013, the Sun Corridor Metropolitan Planning Organization was designated in the Pinal County area. The Sun Corridor Metropolitan Planning Area Boundary includes the cities of Casa Grande, Eloy, Coolidge, and unincorporated areas of Pinal County.

Both the MAG Metropolitan Planning Area Boundary and the Sun Corridor Metropolitan Planning Area Boundary include portions of the West Pinal PM-10 Nonattainment Area and West Central Pinal PM-2.5 Nonattainment Area located in Pinal County. Both nonattainment areas are covered by the boundaries of the two metropolitan planning organizations. Consequently, transportation conformity is required to be demonstrated for

both nonattainment areas by both metropolitan planning organizations. Please refer to Figure ES-1.

To provide assistance to the Sun Corridor Metropolitan Planning Organization, MAG has offered to prepare conformity analyses for the PM-10 and PM-2.5 nonattainment areas in Pinal County, to enable transportation projects in both metropolitan planning organizations to proceed. At a June 17, 2013 meeting with the Arizona Department of Transportation, Sun Corridor Metropolitan Planning Organization and MAG, there was general concurrence that MAG would prepare the initial conformity analysis. The Maricopa Association of Governments works through a cooperative effort with the Arizona Department of Transportation, Arizona Department of Environmental Quality, and Sun Corridor Metropolitan Planning Organization on the coordination of transportation planning activities and conformity analyses consistent with the Memorandum of Understanding among the agencies.

The 2017 MAG Conformity Analysis for the FY 2018-2022 MAG Transportation Improvement Program and the 2040 MAG Regional Transportation Plan includes results of the regional emissions analysis for carbon monoxide, eight-hour ozone, and PM-10 for the Maricopa County region as well as PM-10 for the West Pinal PM-10 Nonattainment Area and PM-2.5 and NOx for the West Central Pinal PM-2.5 Nonattainment Area located in Pinal County. Summarized below are the applicable federal criteria or requirements for conformity determinations, the conformity tests applied, regional emissions analysis results, and an overview of the organization of this report. Figures presenting the conformity test results and transportation control measure funding in the FY 2018-2022 MAG Transportation Improvement Program are provided at the end of the Executive Summary.

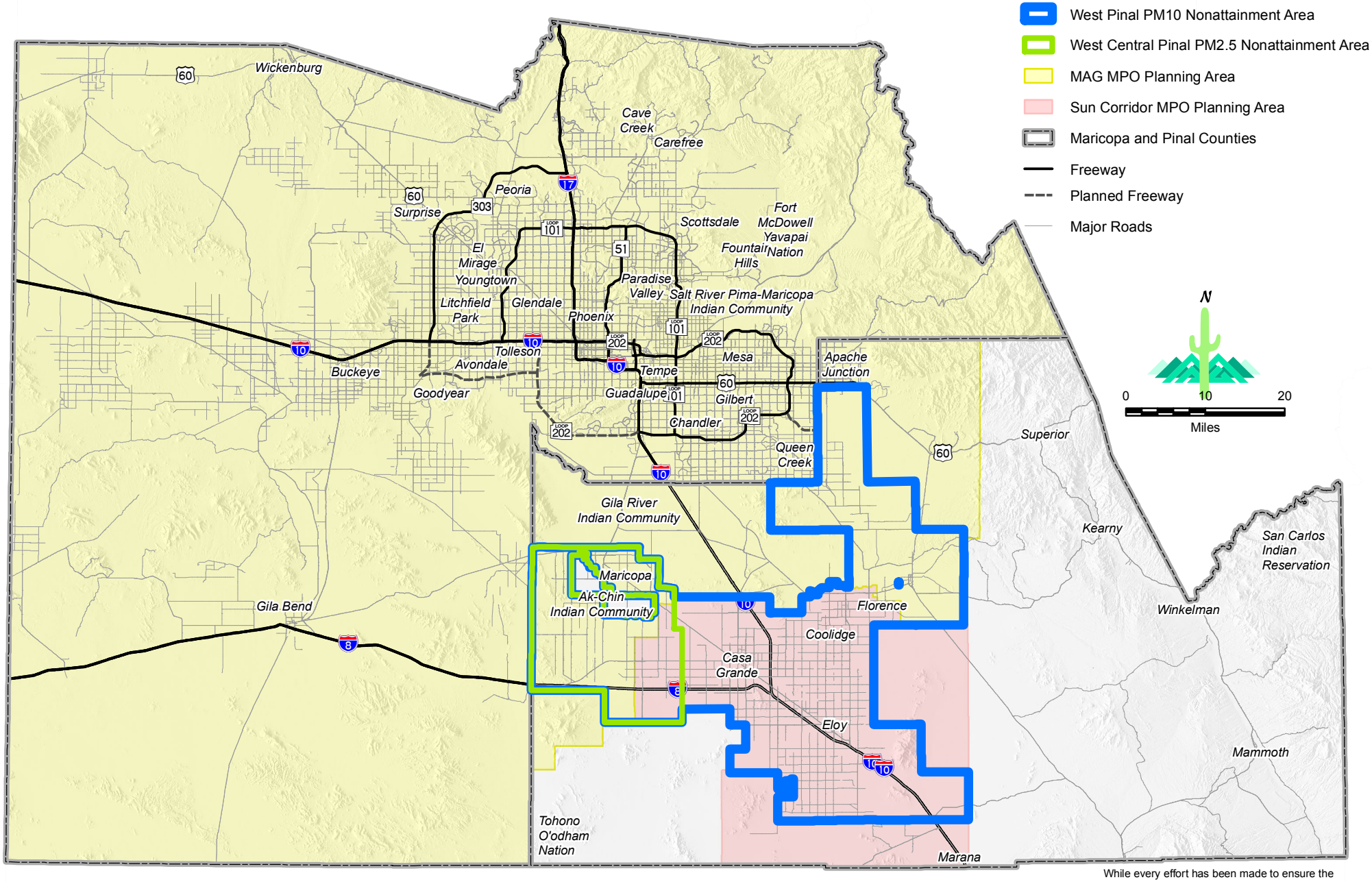
CONFORMITY REQUIREMENTS

The federal transportation conformity rule (40 Code of Federal Regulations Parts 51 and 93) specifies criteria and procedures for conformity determinations for transportation plans, programs, and projects and their respective amendments. The federal transportation conformity rule was first promulgated in 1993 by EPA, following the passage of amendments to the federal Clean Air Act in 1990. The federal transportation conformity rule has been revised several times since its initial release to reflect both EPA rule changes and court opinions. The transportation conformity rule and court opinions are summarized in Chapter 1.

The conformity rule applies nationwide to “all nonattainment and maintenance areas for transportation-related criteria pollutants for which the area is designated nonattainment or has a maintenance plan” (40 CFR 93.102). At this time, portions of Maricopa County are designated as a nonattainment or maintenance area with respect to federal air quality standards for three criteria pollutants, carbon monoxide (CO), eight-hour ozone, and particulate matter less than or equal to ten microns in diameter (PM-10), and portions of Pinal County are designated as a nonattainment area with respect to PM-10 and particulate matter less than or equal to 2.5 microns in diameter (PM-2.5). Metropolitan

Figure ES-1: MAG and Sun Corridor MPO Planning Areas and Air Quality Nonattainment Areas for the Pinal County Area, Arizona

MARICOPA ASSOCIATION of GOVERNMENTS



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Source: U.S. Environmental Protection Agency

Date: December 2016

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transportation plans, programs, and projects in the nonattainment or maintenance areas of both counties must satisfy the requirements of the federal transportation conformity rule. Under the federal transportation conformity rule, the principal criteria for a determination of conformity for transportation plans and programs are:

(1) the TIP and Regional Transportation Plan must pass an emissions budget test with a budget that has been found to be adequate or approved by EPA for transportation conformity purposes, or interim emissions tests;

(2) the latest planning assumptions and emission models in force at the time the conformity analysis begins must be employed;

(3) the TIP and RTP must provide for the timely implementation of transportation control measures (TCMs) specified in the applicable air quality implementation plans; and,

(4) consultation.

Consultation generally occurs at the beginning of the conformity analysis process, on the proposed models, associated methods, and assumptions for the upcoming analysis and the projects to be assessed, and at the end of the process, on the draft conformity analysis report. The final determination of conformity for the TIP and RTP is the responsibility of the Federal Highway Administration and the Federal Transit Administration.

The conformity tests specified in the federal transportation conformity rule are: (1) the emissions budget test, and (2) interim emissions tests. For the emissions budget test, predicted emissions for the TIP and RTP must be less than or equal to the motor vehicle emissions budget specified in the approved air quality implementation plan or the emissions budget found by EPA to be adequate for transportation conformity purposes. If there is no approved air quality plan for a pollutant for which the region is in nonattainment or no emissions budget found to be adequate for transportation conformity purposes, interim emissions tests apply.

MARICOPA COUNTY NONATTAINMENT AND MAINTENANCE AREAS

For the Maricopa County nonattainment and maintenance areas, separate tests were conducted for carbon monoxide (CO), volatile organic compounds (VOC), nitrogen oxides (NOx), and PM-10. Budget tests were performed for the Maricopa County nonattainment and maintenance areas using EPA-approved budgets for transportation conformity purposes. On March 3, 2016, EPA published the final rule in the *Federal Register* approving the MAG 2013 Carbon Monoxide Maintenance Plan, including the conformity budget, effective April 4, 2016. On June 13, 2012, EPA approved the MAG 2007 Eight-Hour Ozone Plan including the conformity budgets, effective July 13, 2012. In addition, on September 17, 2014, EPA approved the MAG 2009 Eight-Hour Ozone Maintenance Plan and conformity budgets, effective October 17, 2014. On June 10, 2014, EPA published the final rule approving the MAG 2012 Five Percent Plan for PM-10 and conformity budget,

effective July 10, 2014. On July 25, 2002, EPA approved the Revised MAG 1999 Serious Area Particulate Plan for PM-10 and conformity budget, effective August 26, 2002.

Chapter 1 summarizes the applicable air quality implementation plans and conformity tests for carbon monoxide, eight-hour ozone, and PM-10. For the 2017 MAG Conformity Analysis for the FY 2018-2022 MAG TIP and 2040 MAG RTP, the emissions budget test was applied using the approved conformity budgets from the MAG 2013 Carbon Monoxide Maintenance Plan. For eight-hour ozone, the emissions budget tests were performed for volatile organic compounds (VOC) and nitrogen oxides (NOx) using the approved conformity budgets from the MAG 2007 Eight-Hour Ozone Plan and MAG 2009 Eight-Hour Ozone Maintenance Plan. For PM-10, the emissions budget test was applied using both the approved conformity budget from the MAG 2012 Five Percent Plan for PM-10 and the approved conformity budget from the Revised MAG 1999 Serious Area Particulate Plan for PM-10.

Results of the Conformity Analysis

For the 2017 MAG Conformity Analysis, a regional emissions analysis was conducted for carbon monoxide and PM-10 for the years 2025, 2035, and 2040. For the eight-hour ozone precursors (volatile organic compounds and nitrogen oxides), a regional emissions analysis was conducted for the years 2018, 2025, 2035, and 2040. All analyses were conducted using the latest planning assumptions and emissions models in force at the time the conformity analysis started on March 18, 2017. The major conclusions of the 2017 MAG Conformity Analysis are:

- For carbon monoxide, the total vehicle-related emissions associated with implementation of the TIP and Regional Transportation Plan for the analysis years 2025, 2035, and 2040 are projected to be less than the approved 2025 emissions budget. The applicable conformity test for carbon monoxide is therefore satisfied. The results of the regional emissions analysis for carbon monoxide are presented in Figure ES-2.

- For eight-hour ozone, the total vehicle-related volatile organic compound and nitrogen oxide emissions associated with implementation of the TIP and Regional Transportation Plan for the analysis year of 2018 are projected to be less than the approved 2008 emissions budgets and the VOC and NOx emissions for the analysis years of 2025, 2035, and 2040 are projected to be less than the approved 2025 emissions budgets. The applicable conformity tests for eight-hour ozone are therefore satisfied. The results of the regional emissions analysis for eight-hour ozone are presented in Figures ES-3 and ES-4.

- For PM-10, the total vehicle-related emissions associated with implementation of the TIP and Regional Transportation Plan for the analysis years of 2025, 2035, and 2040 are projected to be less than the approved 2012 emissions budget and the approved 2006 emissions budget. The conformity test for PM-10 is therefore satisfied. The results of the regional emissions analysis for PM-10 are presented in Figure ES-5.

- A review of the implementation status of TCMs in applicable air quality plans has indicated that the TIP and Regional Transportation Plan will provide for the timely implementation of the TCMs and there are no obstacles to the implementation of any TCM. The current status of TCMs identified in applicable air quality implementation plans is documented in Chapter 5 of this report. Figure ES-6 presents the total funding programmed in the TIP for transportation projects and programs that implement transportation control measures and other air quality measures.

- Consultation has been conducted in accordance with federal requirements.

Figure ES-2: Carbon Monoxide Results for Conformity Budget Test
Maricopa County Nonattainment and Maintenance Areas

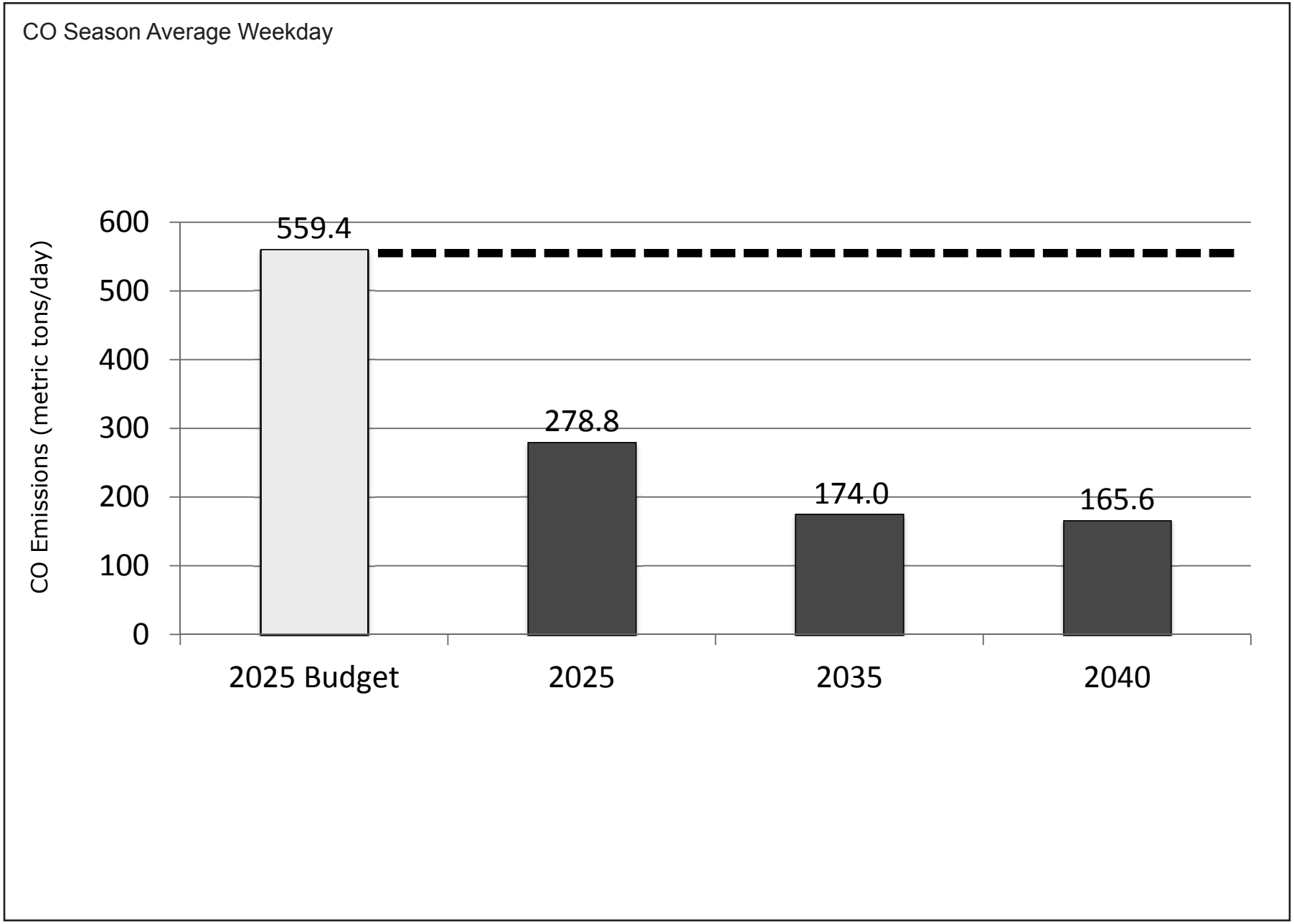


Figure ES-3: Eight-Hour Ozone: Volatile Organic Compounds (VOC) Results for Conformity Budget Test
Maricopa Nonattainment and Maintenance Areas

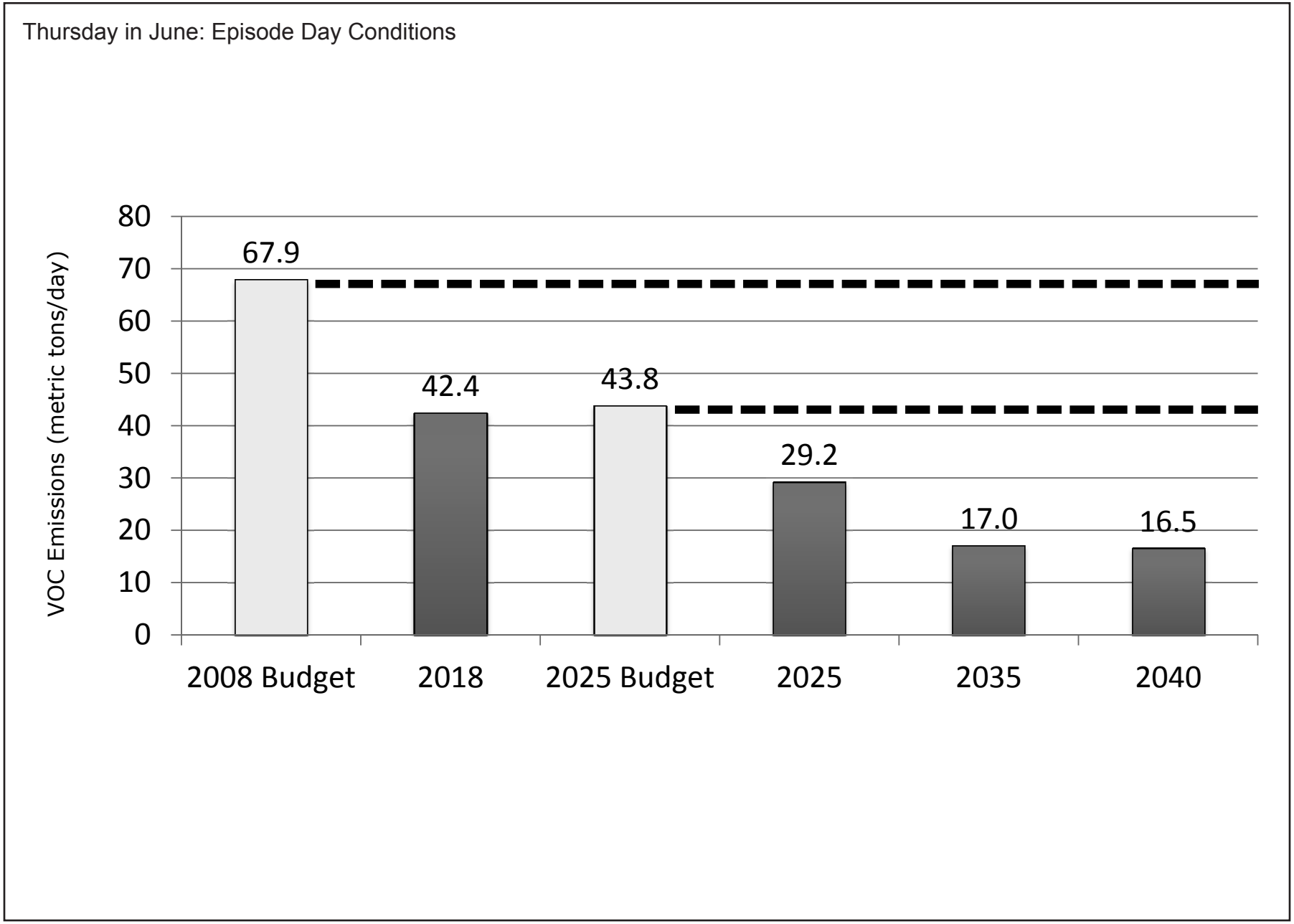


Figure ES-4: Eight-Hour Ozone: Nitrogen Oxides (NOx) Results for Conformity Budget Test
Maricopa Nonattainment and Maintenance Areas

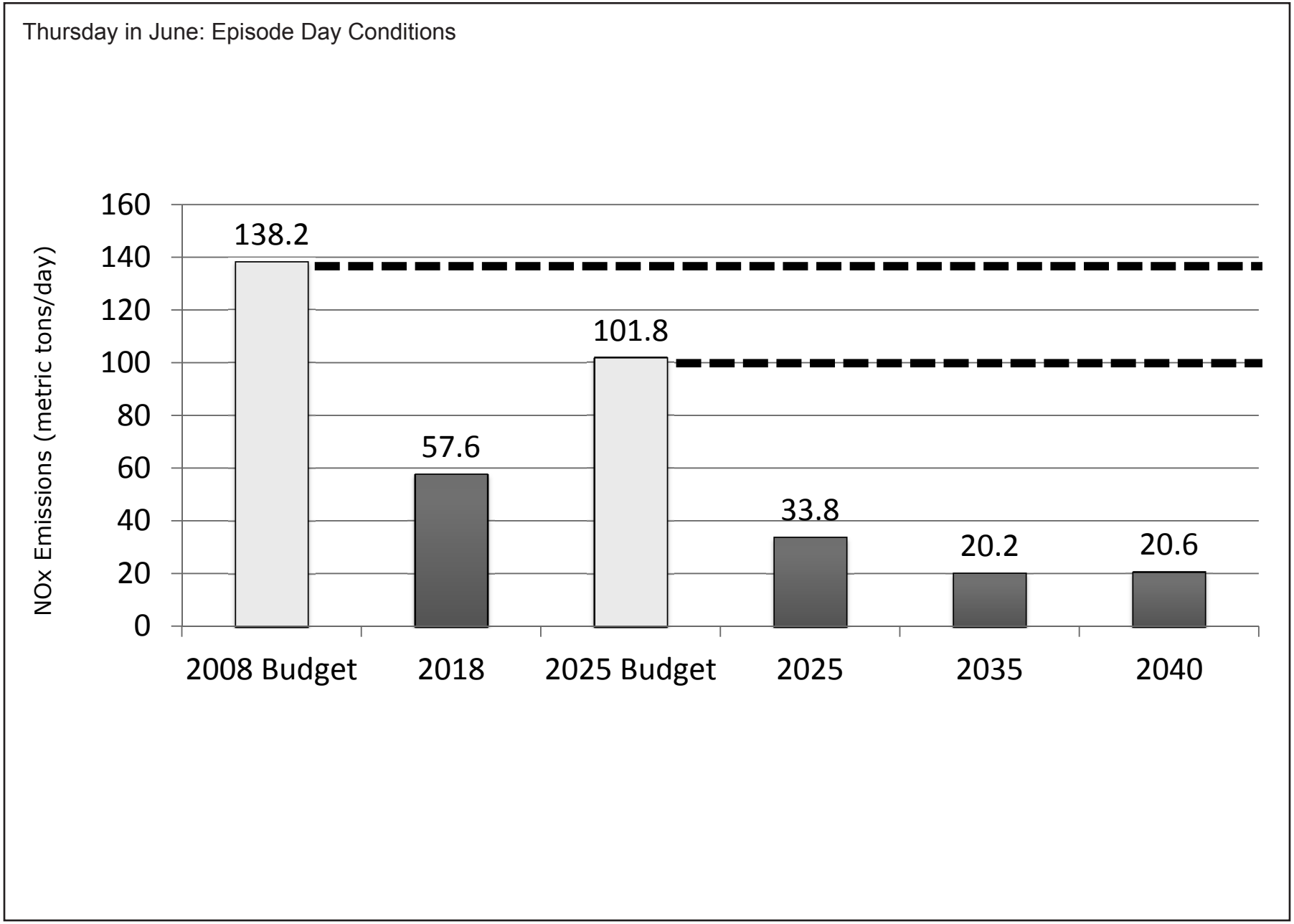
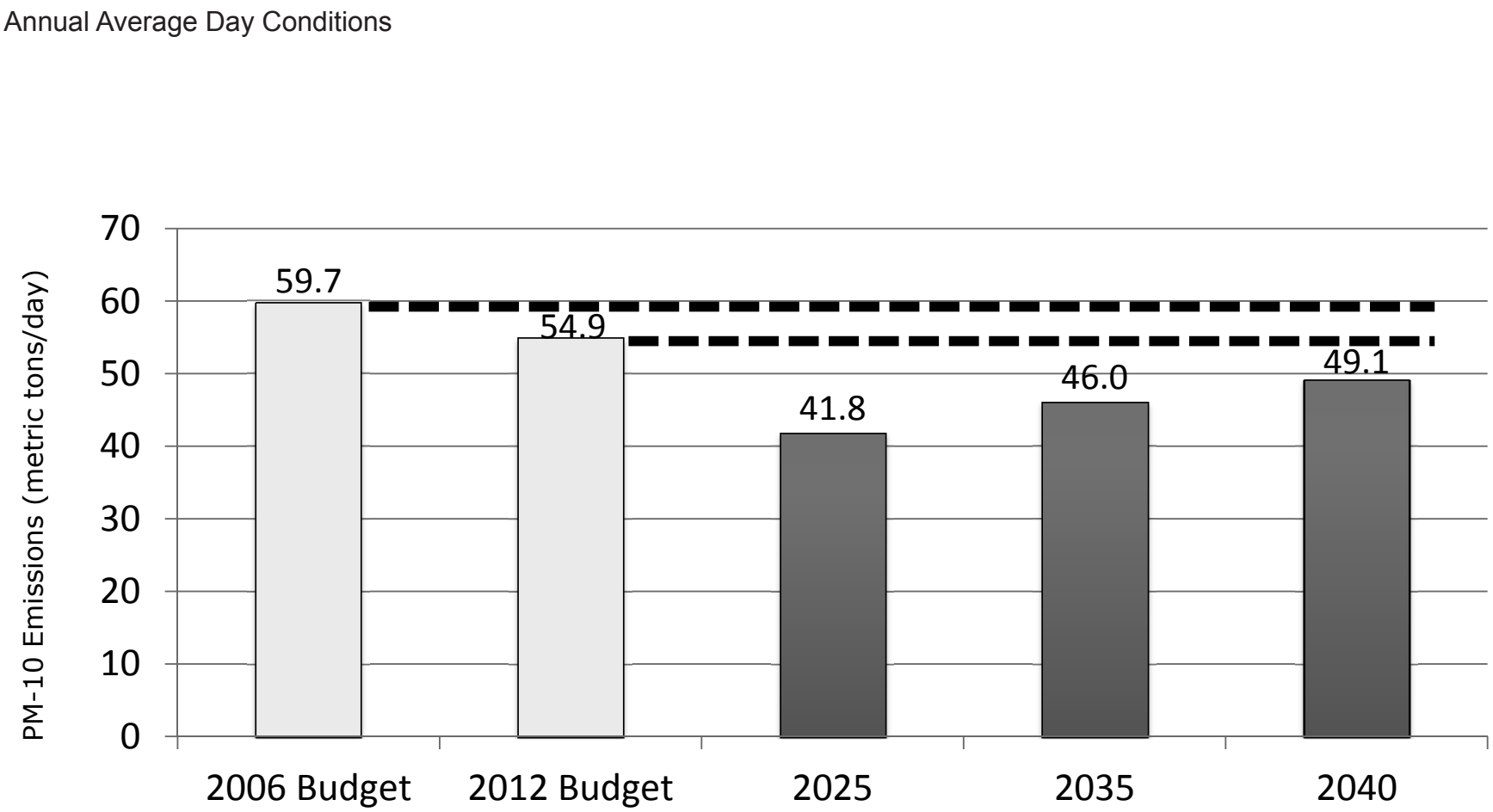
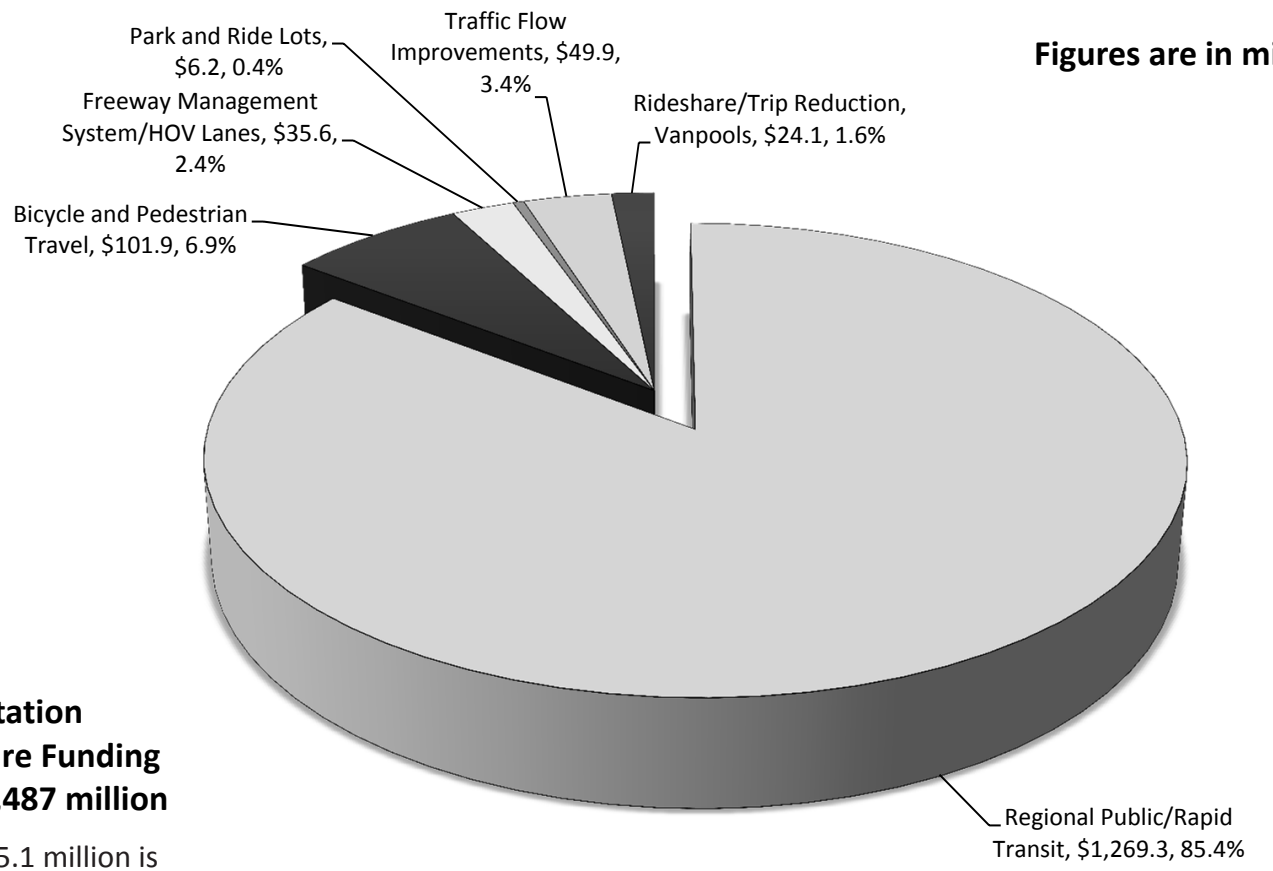


Figure ES-5: PM-10 Results for Conformity Budget Test
Maricopa County Nonattainment and Maintenance Areas



The conformity results are shown compared with the 2006 budget from the *Revised MAG 1999 Serious Area Particulate Plan for PM-10* approved by the EPA on July 25, 2002 and the 2012 budget from the *MAG 2012 Five Percent Plan for PM-10* approved by the EPA on June 10, 2014.

Figure ES-6: Transportation Control Measure Funding in the FY 2018-2022 MAG Transportation Improvement Program



Figures are in millions of dollars

Total Transportation Control Measure Funding in the TIP = $1,487 million

An additional $45.1 million is programmed for paving unpaved roads and street sweepers.

PINAL COUNTY NONATTAINMENT AREAS

For the Pinal County nonattainment areas, there are no adequate or approved motor vehicle emissions budgets for conformity. Therefore, the conformity interim emissions tests were applied. The action/baseline tests were conducted for PM-10 for the West Pinal PM-10 Nonattainment Area and for PM-2.5 and NOx for the West Central Pinal PM-2.5 Nonattainment Area for the analysis years of 2018, 2025, 2035, and 2040. For each test, the required emissions estimates were developed using the transportation and emission modeling approaches required under the federal transportation conformity rule and summarized in this document.

For PM-10, for each analysis year the projected emissions for the action scenario are not greater than the projected emissions for the baseline scenario. Since the PM-10 emissions projected for the action scenarios are not greater than the PM-10 emissions projected for the baseline scenarios, the conformity interim emission test is satisfied. It is also reasonable to expect the action emissions would not exceed the baseline emissions for the time periods between the analysis years. The results of the regional emissions analysis for PM-10 are presented in Figure ES-7.

For PM-2.5, for each analysis year the projected emissions for the action scenario are not greater than the projected emissions for the baseline scenario. Since the PM-2.5 emissions projected for the action scenarios are not greater than the PM-2.5 emissions projected for the baseline scenarios, the conformity interim emission tests are satisfied. It is also reasonable to expect the action emissions would not exceed the baseline emissions for the time periods between the analysis years. The results of the regional emissions analysis for PM-2.5 are presented in Figure ES-8.

For NOx, for each analysis year the projected emissions for the action scenario are not greater than the projected emissions for the baseline scenario. Since the NOx emissions projected for the action scenarios are not greater than the NOx emissions projected for the baseline scenarios, the conformity interim emission tests are satisfied. It is also reasonable to expect the action emissions would not exceed the baseline emissions for the time periods between the analysis years. The results of the regional emissions analysis for NOx are presented in Figure ES-9.

Figure ES-7: PM-10 Results for Conformity Interim Emission (Action/Baseline) Test
Pinal County PM-10 Nonattainment Area

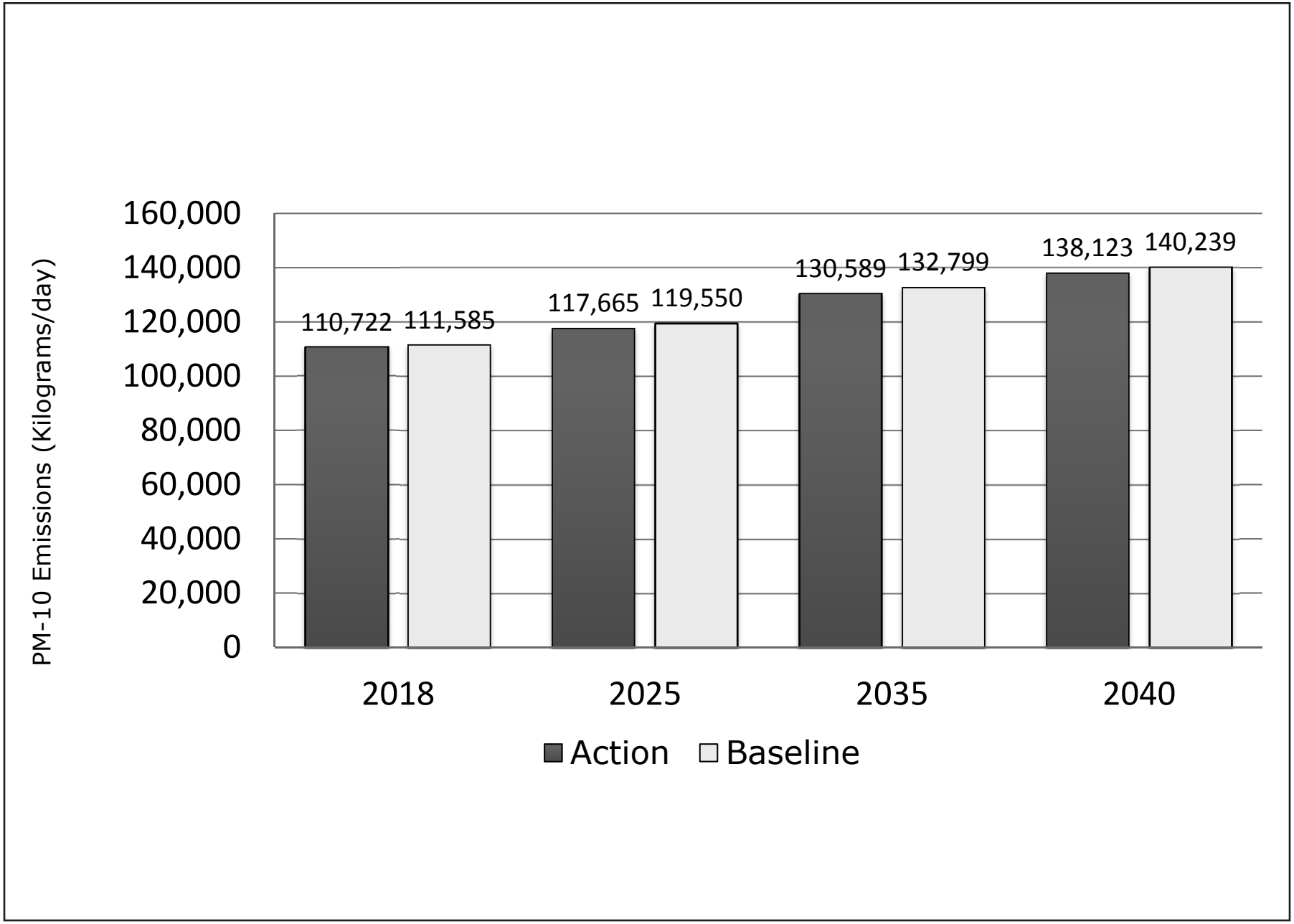


Figure ES-8: PM-2.5 Results for Conformity Interim Emission (Action/Baseline) Test
Pinal County PM-2.5 Nonattainment Area

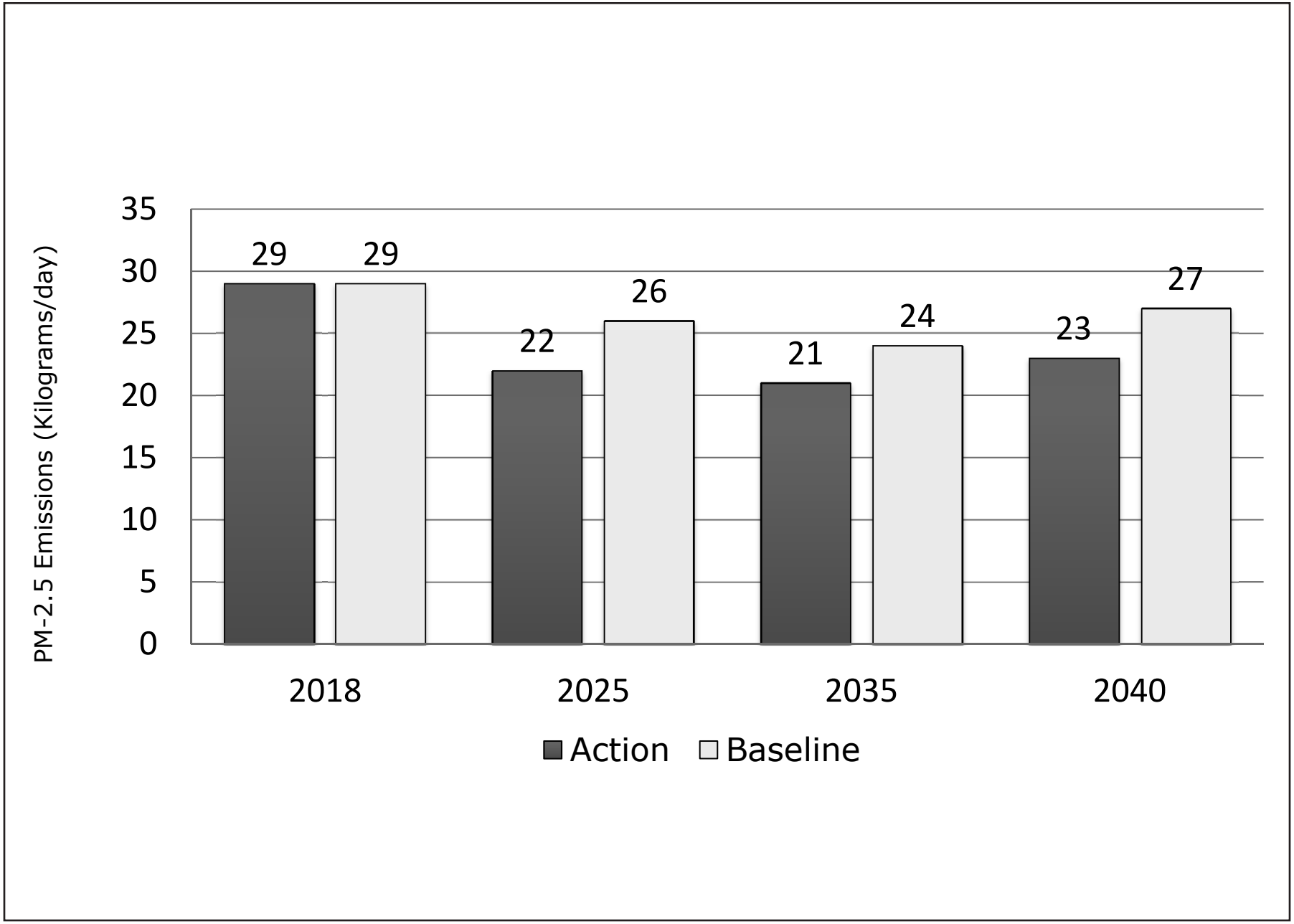
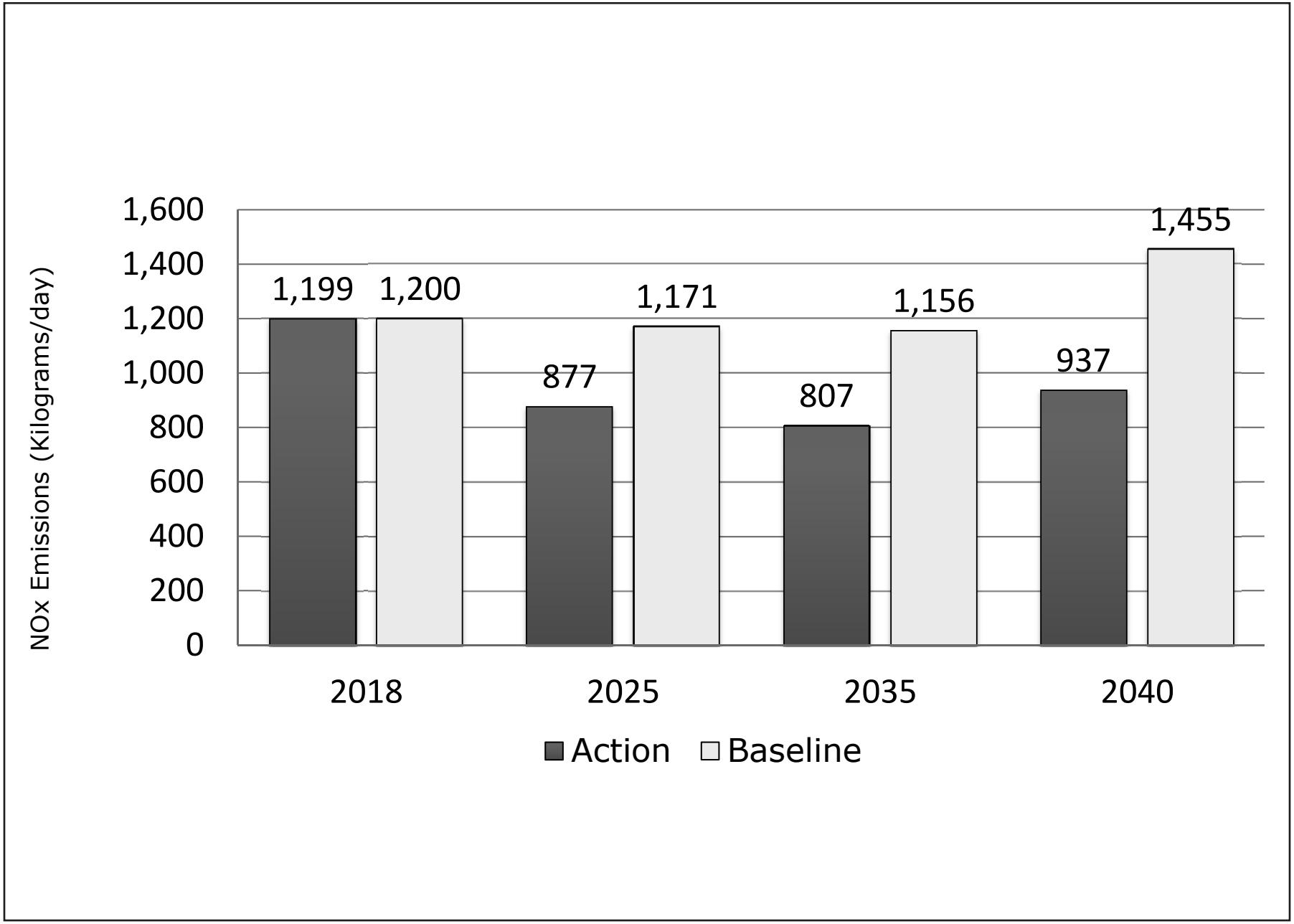


Figure ES-9: NOx Results for Conformity Interim Emission (Action/Baseline) Test
Pinal County PM-2.5 Nonattainment Area



REPORT ORGANIZATION

The report is organized into six chapters. Chapter 1 provides an overview of the applicable federal and state conformity rules and requirements, air quality implementation plans, and conformity test requirements. Chapter 2 contains a discussion of the latest planning assumptions. Chapter 3 includes a summary of the transportation model characteristics, key socioeconomic data, and other data related to the land use and transportation system forecasts, and Chapter 4 describes the air quality modeling used to estimate emission factors and mobile source emissions. Chapter 5 contains the documentation required under the federal transportation conformity rule for transportation control measures. The results of the conformity analysis for the MAG FY 2018-2022 Transportation Improvement Program and 2040 MAG Regional Transportation Plan are provided in Chapter 6.

Excerpts from the applicable air quality plans, consultation documentation, and other related information are contained in the appendices. The transcript of the public hearing conducted on the draft report as well as the MAG responses to the comments received on the conformity analysis during the 30-day consultation period on the draft report are provided in the appendices.

1 FEDERAL AND STATE REGULATORY REQUIREMENTS

The Maricopa Association of Governments is the designated Metropolitan Planning Organization (MPO) for Maricopa County and portions of Pinal County. As a result of this designation, MAG prepares the Transportation Improvement Program and Regional Transportation Plan, and the associated conformity analyses. The FY 2018-2022 MAG Transportation Improvement Program serves as a detailed guide for preservation, expansion, and management of public transportation services. The 2040 MAG Regional Transportation Plan covers FY 2018 through FY 2040 providing the blueprint for future transportation investments in the region. The Regional Transportation Plan includes funding for freeways and highways, streets, regional bus and high capacity transit, as well as bicycle and pedestrian facilities, commensurate with available funding. In addition, this conformity analysis supports a finding of conformity on the FY 2018-2022 MAG Transportation Improvement Program and 2040 MAG Regional Transportation Plan for the Maricopa Association of Governments metropolitan planning area.

On May 9, 2013, the MAG Metropolitan Planning Area Boundary was expanded due to the 2010 Census urbanized area updates. For transportation planning and programming purposes, the Federal Highway Administration regulations state that at a minimum, the Metropolitan Planning Area must encompass the entire existing urbanized area boundary as well as the contiguous geographic area(s) likely to become urbanized within the next 20 years. The updated urbanized area boundary for the MAG region included areas within Pinal County. Due to this expansion, the MAG Regional Council amended the MAG By-laws to recognize the Metropolitan Planning Area Boundary and to provide for members from Pinal County within the boundary. The MAG Metropolitan Planning Area Boundary now includes the Town of Florence, City of Maricopa, the portion of the Gila River Indian Community within Pinal County, and unincorporated areas within Pinal County.

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Both the MAG Metropolitan Planning Area Boundary and the Sun Corridor Metropolitan Planning Area Boundary include portions of the West Pinal PM-10 Nonattainment Area and West Central Pinal PM-2.5 Nonattainment Area located in Pinal County. Both nonattainment areas are covered by the boundaries of the two metropolitan planning organizations. Consequently, transportation conformity is required to be demonstrated for both nonattainment areas by both metropolitan planning organizations. Please refer to Figure 1.

Figure 1: MAG and Sun Corridor MPO Planning Areas and Air Quality Nonattainment Areas for the Pinal County Area, Arizona

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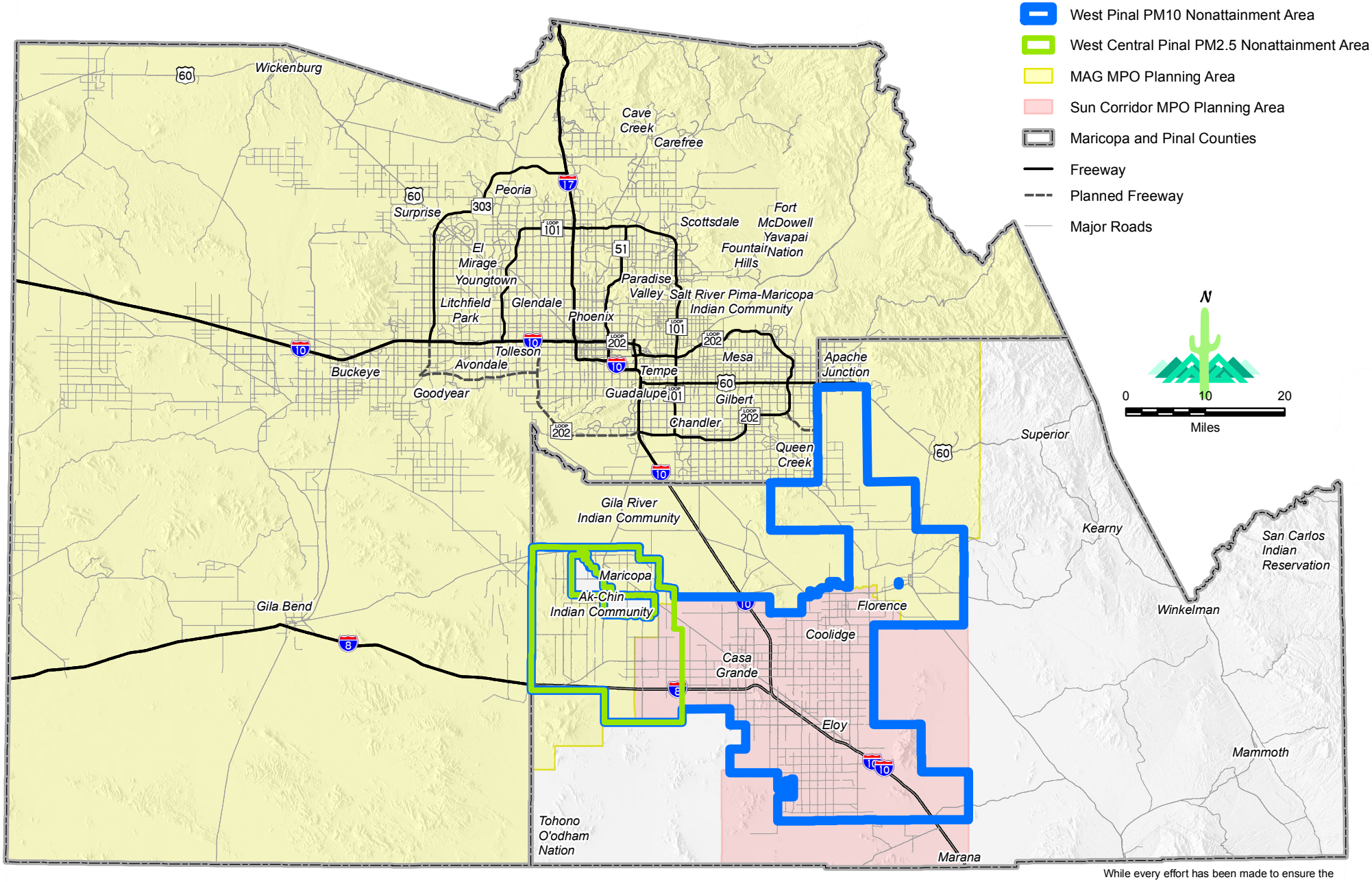

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Source: U.S. Environmental Protection Agency

Date: December 2016

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To provide assistance to the Sun Corridor Metropolitan Planning Organization, MAG has offered to prepare the conformity analyses for the PM-10 and PM-2.5 nonattainment areas in Pinal County, to enable transportation projects in both metropolitan planning organizations to proceed. At a June 17, 2013 meeting with the Arizona Department of Transportation, Sun Corridor Metropolitan Planning Organization and MAG, there was general concurrence that MAG would prepare the initial conformity analysis. The Maricopa Association of Governments works through a cooperative effort with the Arizona Department of Transportation, Arizona Department of Environmental Quality, and Sun Corridor Metropolitan Planning Organization on the coordination of transportation planning activities and conformity analyses consistent with the Memorandum of Understanding among the agencies.

The criteria for determining conformity of transportation programs and plans under the federal transportation conformity rule (40 Code of Federal Regulations Parts 51 and 93) and the applicable conformity tests for the Maricopa County nonattainment and maintenance areas and Pinal County nonattainment areas are summarized in this chapter. The 2017 MAG Conformity Analysis for the FY 2018-2022 MAG Transportation Improvement Program (TIP) and the 2040 MAG Regional Transportation Plan (RTP) was prepared based on these criteria and tests. Presented first is a review of the development of the applicable conformity rule and guidance procedures, followed by a summary of conformity rule requirements, air quality designation status, conformity test requirements, and analysis years.

FEDERAL AND STATE CONFORMITY RULES

Clean Air Act Amendments

Section 176(c) of the Clean Air Act (CAA, 1990) requires that Federal agencies and Metropolitan Planning Organizations (MPOs) not approve any transportation project, program, or plan which does not conform with the approved State Implementation Plan (SIP). The 1990 amendments to the Clean Air Act expanded Section 176(c) to more explicitly define conformity to an implementation plan to mean:

> Conformity to the plan's purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards and achieving expeditious attainment of such standards; and that such activities will not (i) cause or contribute to any new violation of any standard in any area; (ii) increase the frequency or severity of any existing violation of any standard in any area; or (iii) delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

The expanded Section 176(c) also provided conditions for approval of transportation plans, programs, and projects; requirements that the Environmental Protection Agency (EPA) promulgate conformity determination criteria and procedures no later than

November 15, 1991; and a requirement that States submit their conformity procedures to EPA by November 15, 1992. The initial November 15, 1991 deadline for conformity criteria and procedures was not met by EPA.

Federal Rule

Supplemental interim conformity guidance was issued on June 7, 1991 (EPA/U.S. DOT, 1991a and 1991b) for carbon monoxide, ozone, and particulate matter less than or equal to ten microns in diameter. The applicable period of this guidance was designated as Phase 1 of the interim period. EPA subsequently promulgated the Conformity Final Rule, in the November 24, 1993 *Federal Register* (EPA, 1993). The Rule became effective on December 27, 1993. The federal Transportation Conformity Final Rule has been revised several times since its initial release. The first set of amendments, finalized on August 7, 1995, (EPA, 1995a) aligned the dates of conformity lapses due to SIP failures with the application of Clean Air Act highway sanctions for certain ozone areas and all areas with disapproved SIPs with a protective finding.

The second set of amendments was finalized on November 14, 1995 (EPA, 1995b). This set allowed any transportation control measure (TCM) from an approved SIP to proceed during a conformity lapse, and aligned the date of conformity lapses with the date of application of Clean Air Act highway sanctions for any failure to submit or submissions of an incomplete control strategy SIP. The second set also corrected the nitrogen oxides provisions of the transportation conformity rule consistent with the Clean Air Act and previous commitments made by EPA. Finally, the amendments extended the grace period for areas to determine conformity to a submitted control strategy SIP, and established a grace period for determining conformity on transportation plans and programs in recently designated nonattainment areas. This grace period was later overturned in *Sierra Club v. EPA* in November 1997.

The third set of amendments was finalized August 15, 1997 (EPA, 1997a). These amendments streamlined the conformity process by eliminating the reliance on the classification system of “Phase II interim period,” “transitional period,” “control strategy period,” and “maintenance period” to determine whether the budget test and/or emission reduction tests apply. The amendments also changed the time periods during which the budget test and the “Build/No Build” test are required.

To incorporate provisions from the *Sierra Club v. EPA* court decision, EPA promulgated an amendment to the transportation conformity rule on April 10, 2000 that eliminated a one-year grace period for new nonattainment areas before conformity applies (EPA, 2000). Then on August 6, 2002, the EPA promulgated an amendment to the transportation conformity rule which requires conformity to be determined within 18 months of the effective date of the EPA *Federal Register* notice on an budget adequacy finding in an initial SIP submission and established a one-year grace period before conformity is required in areas that are designated nonattainment for a given air quality standard for the first time (EPA, 2002b).

On July 1, 2004, EPA published the final rule, Transportation Conformity Rule Amendments for the New Eight-Hour Ozone and PM-2.5 National Ambient Air Quality Standards and Miscellaneous Revisions for Existing Areas; Transportation Conformity Rule Amendments - Response to Court Decision and Additional Rule Changes (EPA, 2004a). The rule describes transportation conformity requirements for the new eight-hour ozone and fine particulate matter (PM-2.5) standards. The rule also incorporates existing EPA and United States Department of Transportation (U.S. DOT) guidance that implements the March 2, 1999, court decision and provides revisions that clarify the existing regulation and improve its implementation. On July 20, 2004, EPA issued a *Federal Register* notice that corrects two errors in the preamble to the July 1, 2004 final rule.

On February 14, 2006, EPA and U.S. DOT jointly issued guidance on the implementation of the transportation conformity-related provisions from the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). The transportation bill, which became law on August 10, 2005, made several changes to the transportation conformity provisions in Section 176(c) of the Clean Air Act. On January 24, 2008, EPA issued a final rule on the transportation conformity amendments to implement the conformity provisions contained in SAFETEA-LU (EPA, 2008a). A summary of the key conformity provisions are:

- Additional time is provided for areas to redetermine conformity of existing transportation plans and programs from 18 months to two years after the date that EPA finds a motor vehicle emissions budget to be adequate or approves an implementation plan that establishes a motor vehicle emissions budget, or when EPA promulgates an implementation plan that establishes or revises a motor vehicle emissions budget.

- The requirement for frequency of conformity determinations on updated transportation plans and programs is changed from three to four years, except when the MPO elects to update a transportation plan or program more frequently, or when the MPO is required to determine conformity after EPA finds a motor vehicle emissions budget to be adequate or approves an implementation plan that establishes a motor vehicle emissions budget, or when EPA promulgates an implementation plan that establishes or revises a motor vehicle emissions budget.

- Conformity determinations for transportation plans shall include the final year of the transportation plan as a horizon year, or optionally, after consultation with the air pollution control agency and the public and consideration of comments, the MPO may elect the longest of the following periods: the first 10-year period of the transportation plan; the latest year in the implementation plan that contains a motor vehicle emissions budget; the year after the completion date of a regionally significant project if the project is included in the transportation improvement program or the project requires approval before the subsequent conformity determination.

In addition, if the MPO elects to determine conformity for a period less than the last horizon year of the transportation plan, the conformity determination must include a regional emissions analysis for the last year of the transportation plan and for any year shown to exceed emission budgets from a previous conformity determination, for information only. The analysis years selected for the 2017 MAG Conformity Analysis are described later in this section, and include the last year of the 2040 MAG Regional Transportation Plan.

- Allows the substitution of transportation control measures in an implementation plan that achieve equivalent or greater emissions reductions than the control measure to be replaced and that are consistent with the schedule provided for control measures in the plan. The substitution or addition of a transportation control measure shall not require a new conformity determination for the transportation plan or a revision of the implementation plan.

- An additional 12 month grace period is provided after a missed deadline before conformity lapses on a transportation plan or program. This provision applies to two types of conformity determination deadlines: the deadline resulting from the requirement to determine conformity for the transportation plan and program at regular intervals and the deadlines resulting from the requirement for a conformity redetermination within two years of an EPA action approving or finding a motor vehicle emissions budget adequate.

- Requires a conformity SIP amendment addressing requirements from Title 40 CFR sections 93.105, 93.122(a)(4)(ii), and 93.125(c) of the federal transportation conformity regulations.

On March 14, 2012, EPA published the Transportation Conformity Rule Restructuring Amendments. This rule restructured sections 40 CFR 93.109 and 93.119 so that they apply to any new or revised federal air quality standard. The rule also allows any nonattainment area that EPA determines has clean air quality data to satisfy transportation conformity test requirements by using on-road emissions from the most recent year of clean data as the budgets for that standard rather than using the interim emissions tests per 40 CFR 93.119 (EPA, 2012a).

State Rule

State rules for transportation conformity were adopted on April 12, 1995, by the Arizona Department of Environmental Quality (ADEQ), in response to requirements in Section 176(c)(4)(C) of the Clean Air Act as amended in 1990 (ADEQ, 1995). These rules became effective upon their certification by the Arizona Attorney General on June 15, 1995 and, as required by the federal conformity rule, were submitted to EPA as a revision to the State transportation conformity SIP.

To date, a State transportation conformity SIP has not received approval by EPA. Section 51.390(b) of the federal conformity rule states: "Following EPA approval of the State conformity provisions (or a portion thereof) in a revision to the applicable implementation plan, conformity determinations would be governed by the approved (or approved portion of the) State criteria and procedures." The federal transportation conformity rule therefore still governs, as a State transportation conformity SIP has not yet been approved for this area.

The State rule specifies that MPOs (i.e., MAG, for this region) must develop specific conformity guidance and consultation procedures and processes. MAG has developed and adopted two conformity guidance documents to meet State requirements. MAG developed the "Transportation Conformity Guidance and Procedures" document, which was adopted initially on September 27, 1995 by the MAG Regional Council. The document was revised by the MAG Regional Council on March 27, 1996 (MAG, 1996b). This guidance document addresses both the determination of "regional significance" status for individual transportation projects, and the process by which regionally significant projects may be approved.

MAG also developed the "Conformity Consultation Processes" document, which was adopted on February 28, 1996 by the MAG Regional Council (MAG, 1996a). This guidance document details the public and interagency consultation processes to be used in the development of regional transportation plans, programs, and projects within the Maricopa County nonattainment and maintenance areas.

Case Law

On November 14, 1997, the U.S. Court of Appeals for the District of Columbia issued an opinion in *Sierra Club v. EPA* involving the 1995 transportation conformity amendment that allowed new nonattainment areas a one-year grace period. Under this ruling, conformity applied as soon as an area was designated nonattainment. The EPA issued a final rule on April 10, 2000 in the *Federal Register* deleting 40 CFR 93.102(d) that allowed the grace period for new nonattainment areas (EPA, 2000). Then, on October 27, 2000, the FY 2001 EPA Appropriations bill included an amendment to Section 176(c) of the Clean Air Act that adds the one-year grace period to the statutory language.

On March 2, 1999, the U.S. Court of Appeals for the District of Columbia issued an opinion in *Environmental Defense Fund v. EPA* involving the 1997 transportation conformity amendments. In general, the court struck down 40 CFR 93.120(a)(2) which permitted a 120-day grace period after disapproval of a SIP; determined that the EPA must approve a "safety margin" prior to its use for conformity in 40 CFR 93.124(b); concluded that a submitted SIP budget must be found by EPA to be adequate, based on criteria found in 40 CFR 93.118(e)(4) before it can be used in a conformity determination; and ended a provision that allowed "grandfathered" projects to proceed during a conformity lapse.

Following the court ruling, the EPA and U.S. DOT issued guidance to address implementation of conformity requirements based on the court findings. The EPA issued guidance contained in a May 14, 1999 memorandum (EPA, 1999b). In addition, the U.S. DOT issued guidance on June 18, 1999 that incorporates all U.S. DOT guidance in response to the court decision in a single document (U.S. DOT, 1999). On July 1, 2004, transportation conformity rule amendments were published in the *Federal Register* to incorporate provisions of the *Environmental Defense Fund v. EPA* court decision.

On October 20, 2006, the U.S. Court of Appeals for the District of Columbia filed an opinion vacating a provision of the transportation conformity rule at 40 CFR 93.109(e)(2)(v) that allowed areas to use the interim emission tests instead of the one-hour budgets. All other provisions regarding the use of the interim emissions tests remain unaffected by the court decision. Table 1 summarizes the criteria for conformity determinations for transportation projects, programs, and plans, as specified in amendments to the federal conformity rule.

CONFORMITY RULE REQUIREMENTS

The federal regulations identify general criteria and procedures that apply to all transportation conformity determinations, regardless of pollutant and implementation plan status. These include:

1) Conformity Tests — Sections 93.118 and 93.119 specify emission tests (budget and interim emissions) that the TIP and RTP must satisfy in order for a determination of conformity to be found. The final transportation conformity rule requires a submitted SIP motor vehicle emissions budget to be affirmed as adequate by EPA prior to use for making conformity determinations. The budget must be used on or after the effective date of EPA's finding of adequacy.

2) Methods / Modeling:

   Latest Planning Assumptions — Section 93.110 specifies that conformity determinations must be based upon the most recent planning assumptions in force at the time the conformity analysis begins, which is "the point at which the MPO or other designated agency begins to model the impact of the proposed transportation plan or TIP on travel and/or emissions. New data that becomes available after an analysis begins is required to be used in the conformity determination only if a significant delay in the analysis has occurred, as determined through interagency consultation". This section of the conformity rule also requires reasonable assumptions to be made regarding transit service and changes in projected fares. All analyses were conducted using the latest planning assumptions and emissions models in force at the time the conformity analysis started on March 18, 2017.

TABLE 1.
CONFORMITY CRITERIA FROM THE FINAL RULE

Applicability	Pollutant	Section	Requirement
All Actions at All Times	CO, Ozone, PM-10	93.110	Latest Planning Assumptions
		93.111	Latest Emissions Model
		93.112	Consultation
Transportation Plan (RTP)	CO, Ozone, PM-10	93.113(b)	TCMs
		93.118 and/or 93.119	Emissions Budget and/or Interim Emissions
TIP	CO, Ozone, PM-10	93.113(c)	TCMs
		93.118 and/or 93.119	Emissions Budget and/or Interim Emissions
Project (From a Conforming Plan and TIP)	CO, Ozone, PM-10	93.114	Currently Conforming Plan and TIP
		93.115	Project From a Conforming Plan and TIP
	CO and PM-10	93.116	CO, PM-10, and PM-2.5 Hot Spots
	PM-10	93.117	PM-10 and PM-2.5 Control Measures
Project (Not From a Conforming Plan or TIP)	CO, Ozone, PM-10	93.113(d)	TCMs
		93.114	Currently Conforming Plan and TIP
	CO and PM-10	93.116	CO, PM-10, and PM-2.5 Hot Spots
	PM-10	93.117	PM-10 and PM-2.5 Control Measures
	CO, Ozone, PM-10	93.118 and/or 93.119	Emissions Budget and/or Interim Emissions

Source: Adapted from (EPA, 2012b), Section 93.109(b), “Table 1 - Conformity Criteria”.

Latest Emissions Models — Section 93.111 requires that the latest emission estimation models specified for use in SIPs must be used for the conformity analysis.

3) Timely Implementation of TCMs — Section 93.113 provides a detailed description of the steps necessary to demonstrate that the TIP and RTP are providing for the timely implementation of TCMs, as well as demonstrate that the plan and/or program is not interfering with this implementation. TCM documentation is included in Chapter Five of the Conformity Analysis.

4) Consultation — Section 93.105 requires that the conformity determination be made in accordance with the consultation procedures outlined in the federal regulations. These include:

   - MAG is required to provide reasonable opportunity for consultation with local air quality and transportation agencies, state air and transportation agencies, the U.S. DOT and EPA (Section 93.105(c)(1)).

   - MAG is required to establish a proactive public involvement process which provides opportunity for public review and comment prior to taking formal action on a conformity determination (Section 93.105(e)).

Under the interagency consultation procedures, the RTP is prepared by MAG staff with guidance from the MAG Transportation Policy Committee, the MAG Management Committee, and the MAG Regional Council. Copies of the final Draft are provided to MAG member agencies and others, including the Federal Transit Administration (FTA), Federal Highway Administration (FHWA), Arizona Department of Transportation (ADOT), ADEQ, Valley Metro/RPTA, City of Phoenix Public Transit Department, Pinal County Air Quality Control District (PCAQCD), Central Arizona Governments (CAG), Sun Corridor Metropolitan Planning Organization, Maricopa County Air Quality Department (MCAQD), and EPA. The RTP is required to be publicly available and an opportunity for public review and comment is provided.

The TIP is prepared by MAG staff with the assistance of the MAG modal committees, Transportation Review Committee, and Transportation Policy Committee. Copies of the Draft TIP are provided to MAG member agencies and others, including FTA, FHWA, ADOT, ADEQ, Valley Metro/RPTA, City of Phoenix Public Transit Department, MCAQD, CAG, PCAQCD, Sun Corridor Metropolitan Planning Organization, and EPA for review. As with the RTP, the TIP is required to be publicly available and an opportunity for public review and comment is provided.

AIR QUALITY PLANS AND DESIGNATIONS

Maricopa County Nonattainment and Maintenance Areas

Portions of Maricopa County are currently designated as nonattainment or maintenance for the National Ambient Air Quality Standards (NAAQS) for carbon monoxide (CO), eight-hour ozone, and particulate matter less than or equal to ten microns in diameter (PM-10). Air quality plans have been prepared to address carbon monoxide, one-hour ozone, eight-hour ozone, and PM-10:

- The Revised MAG 1999 Serious Area Carbon Monoxide Plan, reflecting the repeal of the remote sensing program by the Arizona Legislature in 2000, was submitted to EPA in March 2001. On March 9, 2005, EPA approved the Revised MAG 1999 Serious Area Carbon Monoxide Plan, effective April 8, 2005;

- The MAG 2003 Carbon Monoxide Redesignation Request and Maintenance Plan for the Maricopa County Nonattainment Area was submitted to EPA in June 2003. On March 9, 2005, EPA approved the MAG 2003 Carbon Monoxide Redesignation Request and Maintenance Plan, effective April 8, 2005;

- The MAG 2013 Carbon Monoxide Maintenance Plan for the Maricopa County Area was submitted to EPA in April 2013. On March 3, 2016, EPA approved the MAG 2013 Carbon Monoxide Maintenance Plan, effective April 4, 2016;

- On July 6, 1999, EPA approved and promulgated a Revised 1998 15 Percent Rate of Progress Plan for Ozone (Revised ROP FIP) for the Maricopa County nonattainment area, effective August 5, 1999;

- The Serious Area Ozone State Implementation Plan for Maricopa County was prepared by ADEQ and submitted to EPA in December 2000 to meet the Serious Area requirements. No budget is contained in the Serious Area Ozone Plan. On June 14, 2005, EPA approved the Serious Area Ozone Plan, effective June 14, 2005;

- The MAG 2004 One-Hour Ozone Redesignation Request and Maintenance Plan for the Maricopa County Nonattainment Area was submitted to EPA in May 2004. On June 14, 2005, EPA approved the MAG 2004 One-Hour Ozone Redesignation Request and Maintenance Plan, effective June 14, 2005;

- The MAG 2007 Eight-Hour Ozone Plan for the Maricopa Nonattainment Area was submitted to EPA by June 15, 2007. On June 13, 2012, EPA approved the MAG 2007 Eight-Hour Ozone Plan, effective July 13, 2012;

- The MAG 2009 Eight-Hour Ozone Redesignation Request and Maintenance Plan for the Maricopa Nonattainment Area was submitted to EPA in March 2009.

On September 17, 2014, EPA approved the MAG 2009 Eight-Hour Ozone Redesignation Request and Maintenance Plan, effective October 17, 2014;

- The MAG 2014 Eight-Hour Ozone Plan - Submittal of Marginal Area requirements for the Maricopa Nonattainment Area was submitted to EPA in July 2014. On October 16, 2015, EPA approved the MAG 2014 Eight-Hour Ozone Plan, effective December 15, 2015;

- The MAG 2017 Eight-Hour Ozone Moderate Area Plan for the Maricopa Nonattainment Area was submitted to EPA in December 2016;

- The Revised MAG 1999 Serious Area Particulate Plan for PM-10 was submitted to EPA in February 2000. On July 25, 2002, EPA approved the Revised MAG 1999 Serious Area Particulate Plan for PM-10, effective August 26, 2002;

- The MAG 2012 Five Percent Plan for PM-10 for the Maricopa County Nonattainment Area was submitted to EPA on May 25, 2012. On June 10, 2014, EPA approved the MAG 2012 Five Percent Plan for PM-10, effective July 10, 2014.

On July 29, 2014, the Arizona Center for Law in the Public Interest filed a lawsuit against EPA to challenge the approval of the MAG 2012 Five Percent Plan for PM-10. On September 12, 2016, the U.S. Ninth Circuit Court of Appeals issued a ruling in the lawsuit filed by the Arizona Center for Law in the Public Interest to challenge the Environmental Protection Agency approval of the MAG 2012 Five Percent Plan for PM-10. The Court upheld EPA's determination that the control measures in the Five Percent Plan did not need to be updated. The Court also upheld EPA's exclusion of all of the exceptional events. The Court remanded the contingency measures to EPA for further consideration, since they had been implemented early. The Court held that contingency measures cannot be implemented early under the plain language of the Clean Air Act. One of the three judges on the panel dissented on the contingency measure portion of the opinion and agreed with EPA that contingency measures could be implemented early.

On October 26, 2016, the Arizona Center for Law in the Public Interest filed a petition for rehearing by the panel contending that EPA should have required the plan to include updated Best Available Control Measures and Most Stringent Measures. On October 27, 2016, the Environmental Protection Agency filed a petition for rehearing en banc contending that the divided court panel incorrectly held that contingency measures cannot be implemented early under the Clean Air Act. The petition indicates that the Ninth Circuit's ruling on contingency measures directly conflicts with the decision of the Fifth Circuit Court and affects the national application of the Clean Air Act requirements in which there is an

overriding need for national uniformity. On October 27, 2016, the State of Arizona filed a petition for rehearing en banc in support of EPA.

The boundaries of the nonattainment and maintenance areas are identified below, followed by a summary of the attainment status for each pollutant for the Maricopa County region.

Nonattainment and Maintenance Boundaries

Maricopa County nonattainment and maintenance areas are shown in Figure 2. The carbon monoxide maintenance area boundary encompasses 1,814 square miles (approximately 20 percent) of the County. This boundary was originally defined in 1974.

On March 9, 2005, EPA published a final rule redesignating portions of Maricopa County to attainment for carbon monoxide and also removed the Gila River Indian Community from the Maricopa County maintenance area, effective April 8, 2005 (EPA, 2005a). Portions of the Maricopa County area, including the Gila River Indian Community, were designated nonattainment for one-hour ozone in September 1979. On June 14, 2005, EPA redesignated the area to attainment for one-hour ozone. The associated designations and classifications for the one-hour standard were revoked on June 15, 2005. On November 10, 2005, EPA published a direct final rule to correct the boundary of the Phoenix metropolitan one-hour ozone nonattainment area to exclude a portion of the Gila River Indian Community, effective January 9, 2006.

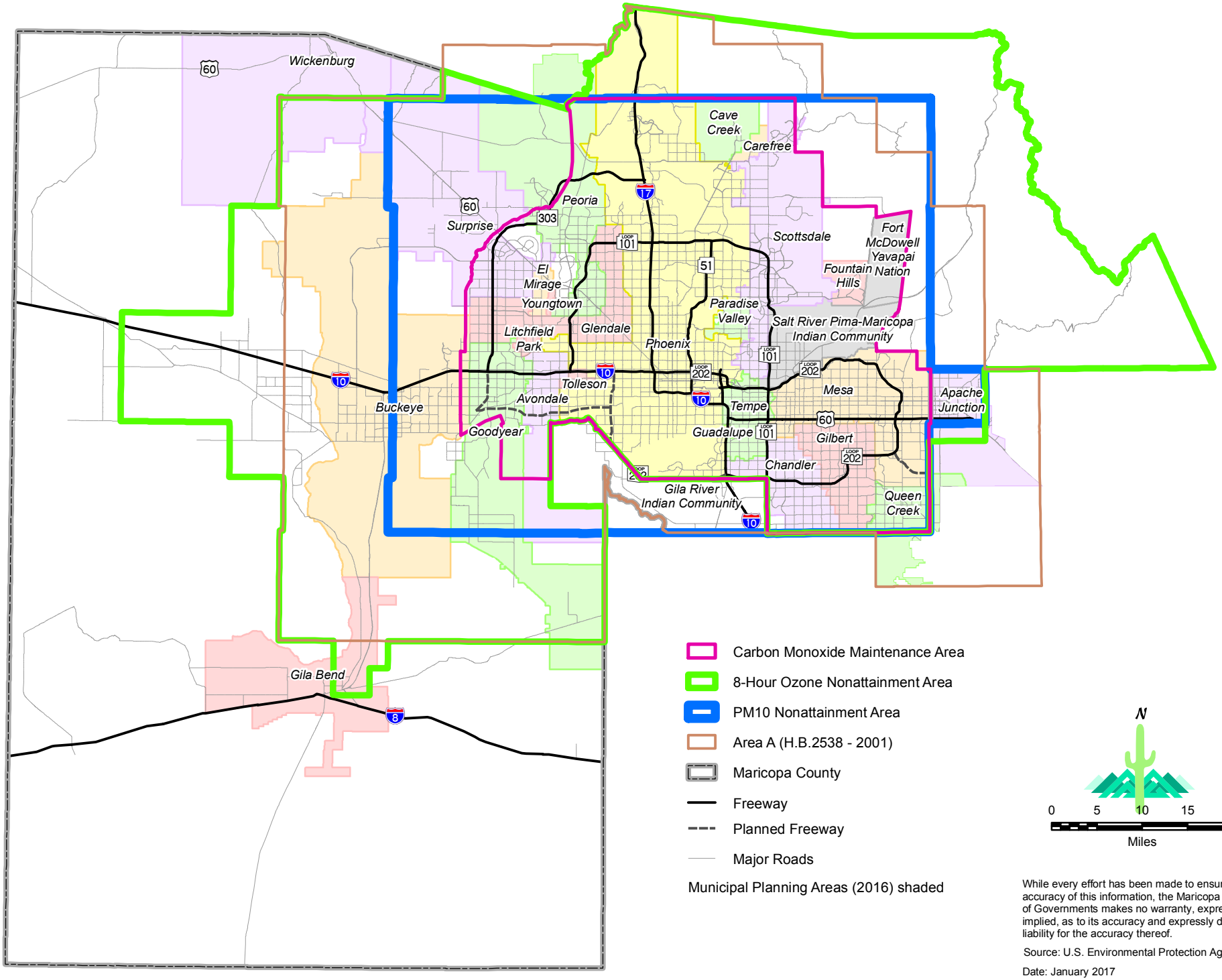
On April 15, 2004, EPA designated an eight-hour ozone nonattainment area located mainly in Maricopa County and Apache Junction in Pinal County. On April 30, 2004, EPA published the air quality designations and classifications for the 1997 eight-hour ozone standard that includes T1N, R8E and sections 1 through 12 of T1S, R8E in Pinal County (EPA, 2004b). The 1997 eight-hour ozone nonattainment area covered approximately 4,880 square miles.

In 2008, EPA strengthened the eight-hour ozone standard from 0.080 parts per million to 0.075 parts per million. On April 30, 2012, EPA published the final rule designating nonattainment areas for the 2008 eight-hour ozone standard. For the 2008 eight-hour ozone nonattainment area, the nonattainment area boundary for the 1997 eight-hour ozone standard for the Maricopa County nonattainment area was expanded to the west and southwest, as shown in Figure 2. The 2008 eight-hour ozone nonattainment area covers approximately 5,017 square miles.

On October 1, 2015, EPA issued a final rule to strengthen the eight-hour ozone standard from 0.075 parts per million to 0.070 parts per million. On November 17, 2016, EPA proposed implementation requirements for the new eight-hour ozone standard. By October 1, 2017, EPA anticipates finalizing the designations, classifications, and attainment dates. Transportation conformity will apply one year after the effective date of nonattainment designations for the 2015 eight-hour ozone standard. Within one year after

Figure 2: Air Quality Nonattainment and Maintenance Areas for the Maricopa County Area, Arizona

MARICOPA ASSOCIATION of GOVERNMENTS



While every effort has been made to ensure the accuracy of this information, the Maricopa Association of Governments makes no warranty, expressed or implied, as to its accuracy and expressly disclaims liability for the accuracy thereof.

Source: U.S. Environmental Protection Agency

Date: January 2017

the effective date of the initial nonattainment designation, MPOs and DOT must make a conformity determination on the TIP and transportation plan with regard to the new eight-hour ozone standard using the latest approved or adequate emissions budgets for a prior ozone standard until emission budgets are established and found adequate or are approved for the 2015 eight-hour ozone standard.

Following promulgation of the PM-10 standard in 1987, EPA identified a larger PM-10 nonattainment area in 1990. The PM-10 nonattainment area encompasses 2,916 square miles, consisting of a 48 by 60 mile rectangular grid encompassing eastern Maricopa County, plus a six by six mile section that includes a portion of the City of Apache Junction in Pinal County.

Attainment Status

Following the requirements of the 1990 Clean Air Act Amendments, EPA initially classified the MAG region as a "Moderate" nonattainment area for the eight-hour CO standard, with a design value of 12.6 parts per million (ppm), exceeding the current NAAQS of 9.0 ppm. The standard was not achieved by the Clean Air Act deadline of December 31, 1995. The area was reclassified to "Serious" by operation of law with an effective date of August 28, 1996 (EPA, 1996b). The new carbon monoxide attainment date was December 31, 2000. No violations of the carbon monoxide standard have occurred since 1996. The State, in a July 23, 1999 letter, requested a carbon monoxide attainment determination from EPA.

In June 2003, the MAG 2003 Carbon Monoxide Redesignation Request and Maintenance Plan for the Maricopa County Nonattainment Area was submitted to EPA. The CO Maintenance Plan demonstrated that all Clean Air Act requirements have been met and requested that EPA redesignate the area to attainment for carbon monoxide. On September 22, 2003, EPA published a final attainment determination for the carbon monoxide standard (EPA, 2003). On March 9, 2005, EPA published the final rule in the *Federal Register* approving the Revised MAG 1999 Serious Area Carbon Monoxide Plan and the Carbon Monoxide Maintenance Plan and designating the carbon monoxide area to attainment, effective April 8, 2005 (EPA, 2005a).

In April 2013, the MAG 2013 Carbon Monoxide Maintenance Plan for the Maricopa County Area was submitted to EPA. This plan satisfies Section 175A(b) of the Clean Air Act that requires an additional plan revision for maintaining the primary air quality standard for ten years after the expiration of the initial ten-year period be submitted to EPA eight years after redesignation of the area to attainment. On March 3, 2016, EPA published the final rule in the *Federal Register* approving the MAG 2013 Carbon Monoxide Maintenance Plan, effective April 4, 2016 (EPA, 2016).

Under the 1990 Clean Air Act Amendments, the Maricopa County nonattainment area was classified as "Moderate" for the one-hour ozone standard. The standard was not achieved by the deadline of November 19, 1996. On November 6, 1997, EPA reclassified the area

to “Serious” for ozone (EPA, 1997b), effective February 13, 1998 (EPA, 1998a). The new ozone attainment date was November 19, 1999. Prior to EPA’s revocation of the one-hour ozone standard in 2005, no violations of the one-hour ozone standard had occurred since 1996. The State, in a February 21, 2000 letter, requested an ozone attainment determination. On May 30, 2001, the Environmental Protection Agency published a final attainment determination for the one-hour ozone standard (EPA, 2001).

The MAG 2004 One-hour Ozone Redesignation Request and Maintenance Plan for the Maricopa County Nonattainment Area was submitted to EPA in May 2004. The MAG One-Hour Ozone Maintenance Plan demonstrated that all Clean Air Act requirements had been met and requested that EPA redesignate the area to attainment for one-hour ozone. On June 14, 2005, EPA published the final rule in the *Federal Register* approving the One-Hour Ozone Maintenance Plan and redesignating the one-hour ozone area to attainment (EPA, 2005b). EPA revoked the one-hour ozone standard on June 15, 2005.

On April 30, 2004, EPA published the final rule designating eight-hour ozone nonattainment areas, effective June 15, 2004. The eight-hour ozone nonattainment area in Maricopa and Pinal Counties is classified under Section D, Subpart 1, of the Clean Air Act, referred to as “Basic” nonattainment, with an attainment date of June 15, 2009. The MAG 2007 Eight-Hour Ozone Plan for the Maricopa Nonattainment Area was submitted to EPA by June 15, 2007. On June 13, 2012, the EPA approved the MAG 2007 Eight-Hour Ozone Plan, including the emissions budgets, effective July 13, 2012 (EPA, 2012c). The MAG 2009 Eight-Hour Ozone Redesignation Request and Maintenance Plan for the Maricopa Nonattainment Area was submitted to EPA in March 2009. EPA approved the MAG 2009 Eight-Hour Ozone Redesignation Request and Maintenance Plan, including the emissions budgets, effective October 17, 2014 (EPA, 2014a).

In 2008, EPA strengthened the eight-hour ozone standard from 0.080 parts per million to 0.075 parts per million. On April 30, 2012, EPA published the final rule designating nonattainment areas for the 2008 eight-hour ozone standard. For the 2008 eight-hour ozone nonattainment area, the nonattainment area boundary for the 1997 eight hour ozone standard for the Maricopa County nonattainment area was expanded to the west and southwest.

The MAG 2014 Eight-Hour Ozone Plan-Submittal of Marginal Area Requirements for the Maricopa Nonattainment Area has been prepared in accordance with Section 182(a) of the Clean Air Act. On May 21, 2012, the Environmental Protection Agency (EPA) designated the Maricopa nonattainment area as a Marginal Area for the 2008 eight-hour ozone standard of 0.075 parts per million. The plan addresses the Marginal Area requirements, such as an Emissions Statement, Baseline Emissions Inventory, Periodic Emissions Inventory, Corrections to Pre-1990 Reasonably Available Control Technology, New Source Review, Corrections to Pre-1990 Previously Required Vehicle Inspection and Maintenance Programs, and Transportation Conformity. On October 16, 2015, EPA approved the MAG 2014 Eight-Hour Ozone Plan, effective December 15, 2015.

The MAG 2017 Eight-Hour Ozone Moderate Area Plan has been prepared to meet the requirements in Section 182(b) of the Clean Air Act and improve air quality in the Maricopa eight-hour ozone nonattainment area. The attainment date for Moderate Areas is July 20, 2018. A Moderate Area Plan was due by January 1, 2017. The Moderate Area Plan is required to include reasonable further progress; reasonably available control technology; reasonably available control measures; new source review; emissions inventories; modeling attainment demonstration for 2017 (ozone season prior to the attainment date); contingency measures; and motor vehicle emissions budgets for transportation conformity. Moderate Areas are also required to make the submissions for Marginal Areas.

Under Section 107(d)(4) of the 1990 Clean Air Act Amendments, the PM-10 nonattainment area was initially classified as "Moderate," with an attainment deadline of December 31, 1994. The standard was not achieved by that date. EPA reclassified the region to "Serious" in May 1996, with an effective date of June 10, 1996 (EPA, 1996a). The new attainment date for PM-10 was December 31, 2001 for Serious areas; however, the Revised MAG 1999 Serious Area Particulate Plan for PM-10 for the Maricopa County Nonattainment Area contained a request to extend the attainment date to December 31, 2006, as allowed in the Clean Air Act Amendments (MAG, 2000). In the July 25, 2002 *Federal Register*, the Environmental Protection Agency published the final approval of the Revised MAG 1999 Serious Area Particulate Plan for PM-10, including the request to extend the attainment date to December 31, 2006 (EPA, 2002a).

On May 25, 2007, EPA issued a final rule finding that the Maricopa County nonattainment area did not attain the PM-10 standard by December 31, 2006. In accordance with Section 189(d) of the Clean Air Act, MAG prepared a Five Percent Plan for PM-10 that was submitted to EPA by December 31, 2007 (MAG, 2007b). On September 9, 2010, EPA proposed to partially approve and partially disapprove the Five Percent Plan. On January 25, 2011, prior to any final EPA action, Arizona withdrew the Five Percent Plan from EPA consideration. On February 9, 2011, EPA published a notice of withdrawal of the May 30, 2008 adequacy finding on the PM-10 motor vehicle missions budget from the Five Percent Plan, effective January 31, 2011. On February 14, 2011, EPA made a finding that Arizona failed to submit the plan as required under the Clean Air Act, which triggered the sanctions clocks and obligation to impose a federal implementation plan if a new complete plan is not submitted. This EPA finding began an 18-month clock for mandatory application of sanctions and a two-year clock for a Federal Implementation Plan. The EPA published a corrected notice of withdrawal on February 28, 2011.

The MAG 2012 Five Percent Plan for PM-10 for the Maricopa County Nonattainment Area was submitted to EPA on May 25, 2012. On July 20, 2012, EPA issued a completeness finding that stopped the 18-month clock for mandatory application of sanctions. On June 10, 2014, EPA published the final rule approving the MAG 2012 Five Percent Plan for PM-10, effective July 10, 2014.

In addition, on July 18, 1997 EPA promulgated federal air quality standards for PM-2.5. On January 5, 2005, EPA published a notice designating the Maricopa County area as an attainment area for PM-2.5, effective April 5, 2005.

Pinal County Nonattainment Areas

On February 3, 2011, EPA published the final rule designating a portion of Pinal County as nonattainment for the 2006 24-hour PM-2.5 standard based on 2006-2008 data, effective March 7, 2011. The West Central Pinal PM-2.5 Nonattainment Area covers approximately 323 square miles in the west central part of Pinal County.

Also, on May 31, 2012, EPA published the final rule designating the West Pinal PM-10 nonattainment area, effective July 2, 2012. EPA classified the nonattainment area as moderate. The West Pinal PM-10 Nonattainment Area covers approximately 1,326 square miles in the western half of Pinal County.

Nonattainment Boundaries

As shown in Figure 3, portions of the West Pinal PM-10 Nonattainment Area and West Central Pinal PM-2.5 Nonattainment Area are located within the metropolitan planning area boundaries of both MAG and the Sun Corridor Metropolitan Planning Organization.

Attainment Status

At the time of designation, EPA indicated that the State of Arizona is required to submit a SIP for the West Central Pinal PM-2.5 Nonattainment Area within three years following the March 7, 2011 effective date. On September 4, 2013, EPA published in the *Federal Register* a determination that the West Central Pinal PM-2.5 Nonattainment Area has attained the 2006 24-hour PM-2.5 standard based on clean data at the monitor during the 2010-2012 monitoring period and issued a clean data finding, effective October 4, 2013.

In the May 31, 2012 final rulemaking, EPA indicated that the State of Arizona is required to submit a revision to the SIP for the West Pinal PM-10 Nonattainment Area within 18 months following the July 2, 2012 effective date. On December 21, 2015, the Arizona Department of Environmental Quality submitted the 2015 West Pinal Moderate PM-10 Nonattainment Area SIP to EPA. Also, on January 9, 2017, EPA proposed to approve SIP revisions that concern particulate matter emissions from construction sites, agricultural activity, and other fugitive dust sources.

Figure 3: Air Quality Nonattainment Areas for the Pinal County Area, Arizona

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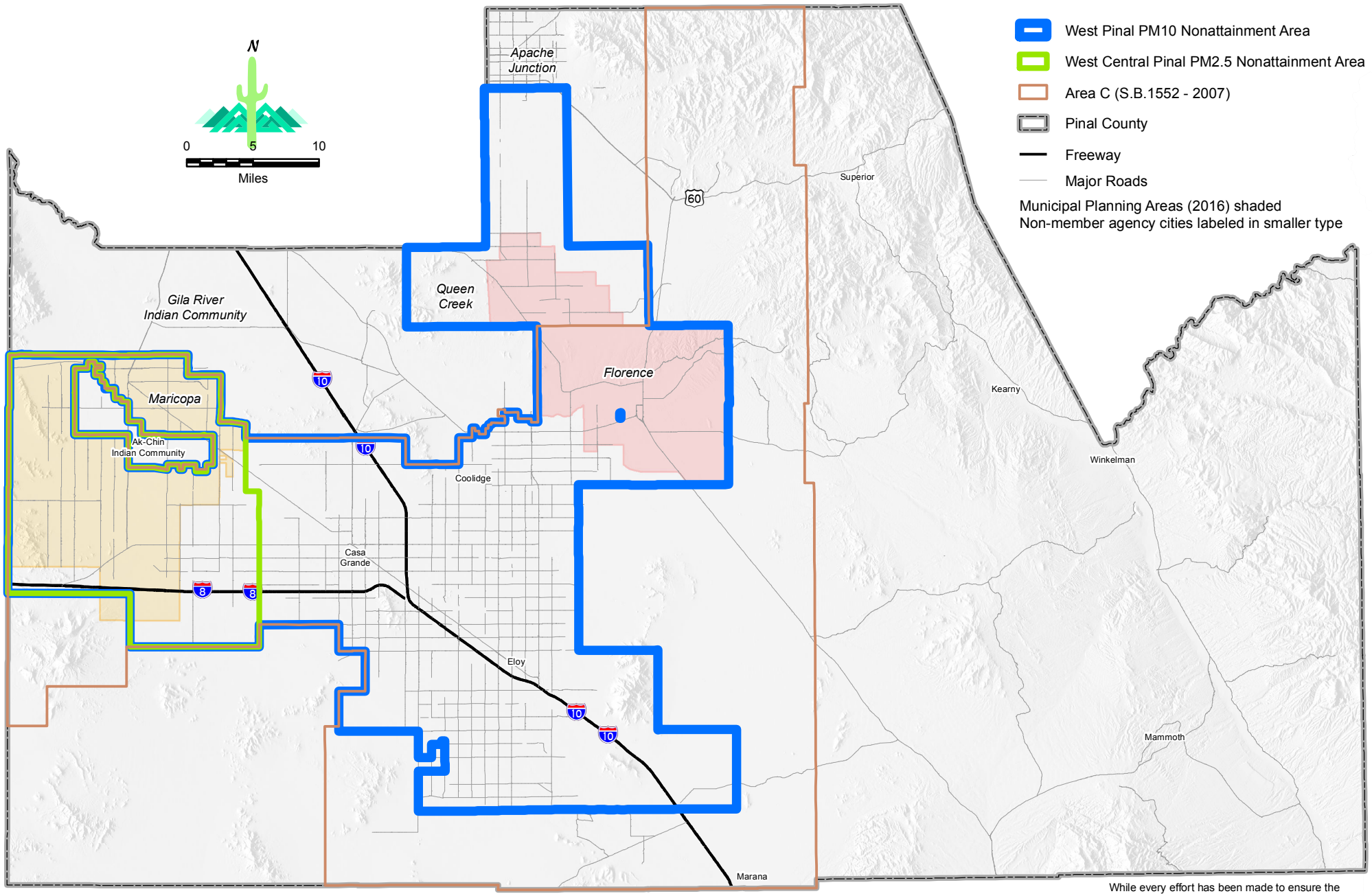

While every effort has been made to ensure the accuracy of this information, the Maricopa Association of Governments makes no warranty, expressed or implied, as to its accuracy and expressly disclaims liability for the accuracy thereof.

Source: U.S. Environmental Protection Agency

Date: December 2016

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CONFORMITY TEST REQUIREMENTS

Maricopa County Nonattainment and Maintenance Areas

The descriptions of the conformity tests that were performed for carbon monoxide, eight-hour ozone, and PM-10, as part of the 2017 MAG Conformity Analysis, are detailed below.

Carbon Monoxide

In April 2013, the MAG 2013 CO Maintenance Plan for the Maricopa County Area was submitted to EPA (MAG, 2013). The MAG 2013 CO Maintenance Plan is the second maintenance plan. The MAG 2013 CO Maintenance Plan used the EPA-approved MOVES model to develop a 2025 mobile source emissions budget of 559.4 metric tons per day. On March 3, 2016, EPA published the final rule approving the MAG 2013 Carbon Monoxide Maintenance Plan and 2025 budget of 559.4 metric tons per day, effective April 4, 2016. A copy of this final rule and other EPA actions are provided in Appendix A. The EPA-approved 2015 budget applies to horizon years from 2015 through 2024 and the EPA-approved 2025 budget, to horizon years after 2024.

Eight-Hour Ozone

On May 21, 2012, EPA published the final rule implementing the 2008 eight-hour ozone standard and also revoking the 1997 eight-hour ozone standard for transportation conformity purposes one year after the effective date of designations for the 2008 ozone standard (i.e., July 20, 2013). No backsliding will result from the revocation for purposes of transportation conformity, as areas designated nonattainment for the 2008 ozone standard will be required to use any existing adequate or approved motor vehicle emissions budgets for a prior ozone standard when determining conformity for the 2008 ozone standard until budgets for the 2008 ozone standard are either found adequate or are approved. This section discusses the conformity test requirements for the Maricopa nonattainment area for the 2008 eight-hour ozone standard. Ozone is a secondary pollutant, generated by chemical reactions in the atmosphere involving volatile organic compounds (VOC) and nitrogen oxides (NOx). The MAG 2007 Eight-Hour Ozone Plan for the Maricopa Nonattainment Area (MAG, 2007a) addresses the 1997 eight-hour ozone standard of 0.08 parts per million and establishes conformity budgets for VOC and NOx in the modeled attainment year of 2008. The 2008 emissions budgets for the eight-hour ozone nonattainment area are 67.9 metric tons per day for VOC and 138.2 metric tons per day for NOx. EPA published a *Federal Register* notice finding these budgets to be adequate, effective November 9, 2007. On June 13, 2012, EPA approved the MAG 2007 Eight-Hour Ozone Plan including the emissions budgets, effective July 13, 2012 (EPA, 2012c).

The MAG 2009 Eight-Hour Ozone Redesignation Request and Maintenance Plan for the Maricopa Nonattainment Area (MAG, 2009) was submitted to EPA in March 2009 and addresses the 1997 eight-hour ozone standard of 0.08 parts per million. The Maintenance

Plan establishes conformity budgets for VOC and NOx in the modeled maintenance year of 2025. The 2025 emissions budgets for the eight-hour ozone nonattainment area are 43.8 metric tons per day for VOC and 101.8 metric tons per day for NOx. On September 17, 2014, EPA approved the MAG 2009 Eight-Hour Ozone Plan including the emissions budgets, effective October 17, 2014.

For the 2008 eight-hour ozone nonattainment area, the nonattainment area boundary for the 1997 eight-hour ozone standard for the Maricopa County nonattainment area was expanded to the west and southwest. Consistent with conformity test requirements at 40 CFR 93.109(c)(2)(iii)(B), the regional emissions analysis compares the projected emissions from the 2008 eight-hour ozone nonattainment area for each analysis year with the 2008 emissions budgets from the EPA-approved MAG 2007 Eight-Hour Ozone Plan and the 2025 emissions budgets from the EPA-approved MAG 2009 Eight-Hour Ozone Plan.

The 2008 budgets apply to horizon years from 2008 through 2024 and the 2025 budgets, to horizon years after 2024.

The MAG 2017 Eight-Hour Ozone Moderate Area Plan was submitted to EPA in December 2016. The MAG 2017 Eight-Hour Ozone Moderate Area Plan addresses the 2008 eight-hour ozone standard of 0.075 parts per million and establishes 2017 conformity budgets for VOC and NOx. Since EPA may find the ozone precursor budgets to be adequate or approve the MAG 2017 Eight-Hour Ozone Moderate Area Plan prior to FHWA's approval of the 2017 MAG Conformity Analysis, the 2017 VOC and NOx budgets are used in the 2017 MAG Conformity Analysis, in addition to the 2008 and 2025 budgets approved by EPA in prior MAG Eight-Hour Ozone Plans. On September 10, 2013, EPA advised that MAG should include in conformity analyses the budgets from submitted plans, so that an adequacy finding on a submitted budget does not interfere with the conformity process.

PM-10

The Revised MAG 1999 Serious Area Particulate Plan for PM-10 for the Maricopa County Nonattainment Area was submitted to EPA in February, 2000. This Plan established a PM-10 conformity budget of 59.7 metric tons per day for the attainment year of 2006. EPA approved the Revised MAG 1999 Serious Area PM-10 Plan, effective August 26, 2002.

On May 25, 2012, the MAG 2012 Five Percent Plan for PM-10 for the Maricopa County Nonattainment Area was submitted to EPA. The 2012 budget established in this Plan is 54.9 metric tons per day. On June 10, 2014, EPA published the final rule approving the MAG 2012 Five Percent Plan for PM-10 and the 2012 emissions budget of 54.9 metric tons per day, effective July 10, 2014. The conformity test includes using the budget from the approved Revised MAG 1999 Serious Area Particulate Plan. Both the EPA-approved 2006 and 2012 PM-10 budgets were applied to horizon years in the MAG 2017 Conformity Analysis for the Maricopa County PM-10 Nonattainment Area.

Section 93.122(e)(2) of the federal conformity rule requires that PM-10 from construction-related fugitive dust be included in the regional PM-10 emissions analysis, if it is identified as a contributor to the nonattainment problem in a PM-10 plan. The motor vehicle emissions budget established in the Revised MAG 1999 Serious Area PM-10 Plan includes vehicle exhaust, tire wear, brake wear, reentrained dust from travel on paved roads, travel on unpaved roads, and road construction. Therefore, emissions from road construction are included as part of the PM-10 estimates developed for this conformity analysis.

Pinal County Nonattainment Areas

On May 31, 2012, EPA designated the West Pinal PM-10 nonattainment area in Pinal County, effective July 2, 2012. The ADEQ prepared and submitted the 2015 West Pinal Moderate PM-10 Nonattainment Area SIP to EPA on December 21, 2015. In January 2017, EPA indicated they will not find to be adequate or approve the 2018 emissions budget in the 2015 West Pinal Moderate PM-10 Nonattainment Area SIP. Therefore, the 2018 PM-10 budget in that SIP was not included in the 2017 MAG Conformity Analysis.

Since there is no emissions budget that has found to be adequate or approved by EPA, an action/baseline analysis was performed in accordance with the latest EPA conformity guidance (EPA, 2012b). The baseline network includes regionally significant highways open to traffic and transit service in operation by December 31, 2016. In accordance with Section 93.119(h) of EPA conformity regulations, the baseline network also includes all regionally significant projects, regardless of funding source, which are currently under construction or undergoing right-or-way acquisition, are MAG TIP or Sun Corridor MPO projects that were coded in the 2015 traffic assignment for the 2016 Conformity Analysis, but are no longer included in the 2016 assignment to be used in the 2017 Conformity Analysis, or have completed the NEPA process. The action networks include MAG TIP and RTP projects in the portion of the nonattainment area located within the MAG MPA, as well as regionally significant highway and transit projects in the remainder of the West Pinal nonattainment area, that are scheduled to be open to the public by 2025, 2035, and 2040.

On February 3, 2011, EPA also designated the West Central Pinal PM-2.5 Nonattainment Area in Pinal County, effective March 7, 2011. On September 4, 2013, EPA published in the *Federal Register* a determination that the West Central Pinal nonattainment area has attained the 2006 24-hour PM-2.5 standard based on clean data at the monitor during the 2010-2012 period. Conformity analyses must also be performed for the PM-2.5 nonattainment area, even if EPA issues a clean data finding. For the 2017 Conformity Analysis, an action/baseline analysis was performed by applying the assumptions described above to the smaller Pinal PM-2.5 nonattainment area. Since EPA or the Arizona Department of Environmental Quality have not determined that nitrogen oxide (NOx) emissions are an insignificant contributor to the PM-2.5 attainment problem, per Section 93.119(f)(9) of EPA conformity regulations, NOx, as well as PM-2.5 emissions from

onroad mobile sources, were included in the action/baseline analysis for the Pinal PM-2.5 nonattainment area.

ANALYSIS YEARS

Maricopa County Nonattainment and Maintenance Areas

In selecting analysis years for the Maricopa County nonattainment and maintenance areas, which have mobile source emissions budgets that EPA has found to be adequate or approved, the conformity rule (Section 93.118(d)) requires that: (1) if the attainment year is in the time frame of the transportation plan and conformity determination, it must be modeled; (2) the last year forecast in the transportation plan must be an analysis year; and (3) analysis years may not be more than ten years apart. For the 2017 MAG Conformity Analysis, onroad mobile source emissions of carbon monoxide (CO) and PM-10 were estimated for the analysis years 2025, 2035, and 2040. In addition, the onroad mobile source emissions of volatile organic compounds (VOC) and nitrogen oxides (NOx) were estimated for the analysis years 2018, 2025, 2035, and 2040. These analysis years are used to compare mobile source emissions with EPA-approved or adequate budgets for CO, VOC, NOx and PM-10.

The year 2018 was modeled for VOC and NOx since it is the first year of the FY 2018-2022 MAG Transportation Improvement Program and overlaps with the attainment year in the MAG 2017 Eight-Hour Ozone Moderate Area Plan (MAG, 2016). The year 2025 was modeled for CO, since it is the maintenance year in the MAG 2013 Carbon Monoxide Maintenance Plan (MAG, 2013). Also, the year 2025 was modeled for VOC and NOx, because it is the maintenance year in the Eight-Hour Ozone Redesignation Request and Maintenance Plan (MAG, 2009). The year 2035 was also be modeled for all pollutants since it is an intermediate year that meets the federal conformity requirement that analysis years be no more than ten years apart. The year 2040 was modeled for all pollutants, since it is the last year of the MAG 2040 Regional Transportation Plan.

Pinal County Nonattainment Areas

In selecting action/baseline analysis years for the Pinal County nonattainment areas, which do not have approved or adequate mobile source emissions budgets, the conformity rule (Section 93.119(g)) indicates that the years must be no more than ten years apart, the first year must be no more than five years beyond the year in which the conformity determination is being made, and the last year must be aligned with the transportation plan (i.e., the MAG 2040 RTP and the Sun Corridor MPO Regional Transportation Plan 2040, both of which contain projects in the Pinal nonattainment areas). These three criteria are met by the years 2018, 2025, 2035, and 2040. For the 2017 MAG Conformity Analysis, onroad mobile source emissions were estimated for the action/baseline scenarios for 2018, 2025, 2035, and 2040. PM-10 emissions were estimated for the West Pinal PM-10

nonattainment area, while PM-2.5 and nitrogen oxide (NOx) emissions were estimated for the West Central Pinal PM-2.5 nonattainment area.

2 LATEST PLANNING ASSUMPTIONS

The Clean Air Act states that "the determination of conformity shall be based on the most recent estimates of emissions, and such estimates shall be determined from the most recent population, employment, travel, and congestion estimates as determined by the MPO or other agency authorized to make such estimates." On January 18, 2001, the U. S. DOT issued guidance developed jointly with EPA to provide additional clarification concerning the use of latest planning assumptions in conformity determinations (U.S. DOT, 2001). In December 2008, EPA published revisions to the 2001 guidance entitled, "Guidance for the Use of Latest Planning Assumptions in Transportation Conformity Determinations" (EPA, 2008b).

Key elements of this guidance are identified below:

- Areas are strongly encouraged to review and strive towards regular five-year updates of planning assumptions, especially population, employment, and vehicle registration assumptions.

- The latest planning assumptions must be derived from the population, employment, travel and congestion estimates that have been most recently developed by the MPO (or other agency authorized to make such estimates) and approved by the MPO.

- Conformity determinations that are based on information that is older than five years should include written justification for not using more recent information. For areas where updates are appropriate, the conformity determination should include an anticipated schedule for updating assumptions.

The latest planning assumptions for MAG conformity determinations including the MAG 2017 Conformity Analysis, for the MAG transportation modeling domain covering Maricopa and Pinal counties are summarized in Table 2. The methodology and scheduled updates for the planning assumptions are discussed below.

The conformity regulations (EPA, 2012b) indicate that "the conformity determination...must be based upon the most recent planning assumptions in force at the time the conformity analysis begins...as determined through the interagency consultation process." It has been determined through the consultation process that the "time that the conformity analysis begins" will be the day that the first traffic assignment is submitted for travel demand modeling for the 2017 MAG Conformity Analysis. For this conformity analysis, "time that the conformity analysis begins" was March 18, 2017.

TABLE 2. LATEST PLANNING ASSUMPTIONS FOR MAG CONFORMITY DETERMINATIONS FOR THE MAG TRANSPORTATION MODELING DOMAIN COVERING MARICOPA AND PINAL COUNTIES

Assumption	Source	MAG Models	Next Scheduled Update
Population and Employment	Under the Governor's Executive Order 2011-04, official County projections are updated every 3 to 4 years. These official projections are used by all agencies for planning purposes. The Arizona Department of Administration (ADOA) prepared a new set of Maricopa County projections based on the 2010-2014 American Community Survey in December 2015. MAG developed a set of subcounty population and employment projections for Maricopa County that are consistent with the ADOA population projections. The MAG Regional Council approved the subcounty socioeconomic projections in June 2016. In addition, Central Arizona Governments (CAG) approved the Pinal County subcounty socioeconomic projections, based on the ADOA Pinal County projections, in June 2016. The MAG Traffic Analysis Zone System was updated and expanded to reflect the latest socioeconomic changes in 2016.	AZ-SMART (UrbanSim/ OPUS)	Under the Governor's Executive Order 2011-04, official county socioeconomic projections will be developed by the Arizona Department of Administration. It is anticipated that ADOA will complete the county level projections in 2018 and MAG will prepare subcounty socioeconomic projections for approval by the MAG Regional Council within six months after receipt of the ADOA county level projections.
Traffic Counts	The highway models were validated in 2016 for the 2015 base year, using approximately 3,000 traffic counts collected by MAG in 2014-2015.	TransCAD	Region-wide traffic counts are typically collected by MAG every 2-4 years, if funds are available.
Vehicle Miles of Travel	The passenger travel demand models were calibrated in 2012-2013 using data from the 2008-2009 home interview survey, 2009 Transearch data, 2010-2011 regional transit on-board survey, 2011 Truck GPS data, and 2012 Airport and ASU surveys. The recalibration effort included a complete update of the regional travel demand model based on the relevant data sets listed above. Trip generation and trip distribution were recalibrated based on the 2008-2009 National Household Travel Survey Arizona Add-On sample and 2006-2009 American Community Survey and Public Use Microdata Sample data sets. Mode choice was recalibrated based on the 2010 on-board survey. The truck model was recalibrated based on the new 2009 Transearch data and 2011 Truck GPS data from ATRI. Special generator sub-models were recalibrated based on 2012 regional airports and ASU travel surveys. The external travel model was recalibrated in 2011 based on the 2008 external travel study. Volume-delay functions were recalibrated in 2012-2013 based on the 2011 commercial speed data. Incremental updates and improvements were introduced to the model to reflect network changes, socioeconomic forecast changes, and changes in the traffic zone system. The model was comprehensively revalidated in 2015-2016 using 2014-2015 traffic counts and speed data. The overall calibration year for the model is 2011 and the latest base year based on a comprehensive validation is 2015.	TransCAD	MAG has completed a major update, development and recalibration of the regional transportation model in FY 2013. The FY 2014 Unified Planning Work Program (UPWP) included funding for the initiation of the next series of travel surveys in calendar years 2014-2016. These surveys are currently ongoing. The data from the surveys will form a foundation for the next round of model development and updates. Various commercial data sources have been used to maintain and incrementally update the models in between the major recalibration updates. The model is currently being recalibrated using the 2015 Transit On-board Survey and 2014-2016 truck and speed data. The main travel surveys and related data analysis and processing are expected to be completed in FY 2018.
Speeds	The highway models were validated using 50 million traffic speed records purchased from HERE for calendar year 2014 and also compared to a similar data set purchased in 2015.	TransCAD	Travel speed data are purchased periodically to validate the transportation models. MAG also utilizes commercial speed data for future estimation and model calibration purposes.
Vehicle Registrations	July 2016 vehicle registrations were provided by ADOT.	MOVES2014a	When newer data become available from ADOT.
Implementation Measures	Latest implementation status of commitments in prior SIPs.	N/A	Updated for every conformity analysis.

POPULATION AND EMPLOYMENT

In accordance with the Governor's Executive Order 2011-04, official county socioeconomic projections based on the 2010-2014 American Community Survey have been developed by the Arizona Department of Administration (ADOA). ADOA completed the county level projections in December 2015. MAG prepared subcounty socioeconomic projections for Maricopa County that were adopted by the MAG Regional Council in June 2016. The Central Arizona Governments (CAG) also approved subcounty population projections for Pinal County, based on the official ADOA projections, in June 2016.

The travel and speed estimates produced by the MAG transportation models for the analysis years in the 2017 MAG Conformity Analysis are based on the MAG and CAG subcounty population and employment projections that are consistent with the 2010-2014 American Community Survey.

Methodology

ADOA prepared the official Arizona population projections by county, using the 2010-2014 American Community Survey as the base. MAG used official ADOA population projections consistent with the 2010-2014 American Community Survey. These projections for Maricopa County were distributed to smaller geographic areas by MAG using the latest available data and a state-of-the-art land use model system called AZ-SMART. The nationally-recognized UrbanSim microsimulation model was integrated into AZ-SMART and used to allocate county projections of households and employment to regional market areas based upon the pre-existing location of these activities, land consumption, and transportation system accessibility. The allocation of population and employment from market areas to land use parcels was accomplished with UrbanSim, which simulates real-estate development and locates population and employment based on measures such as accessibility to employment, adjacent land uses, highway access, and proximity to other development, et cetera.

Population and employment at the land use parcel level in the MAG planning area were aggregated to TAZs using AZ-SMART. The subcounty socioeconomic projections developed with the AZ-SMART model were approved by the MAG Regional Council in June 2016.

Since the MAG transportation modeling area includes Pinal County, in collaboration with the Central Arizona Governments (CAG), MAG has also prepared socioeconomic projections for Pinal County. MAG prepared the projections at the traffic analysis zone (TAZ) level by controlling to the County control totals approved by CAG. AZ-SMART, the MAG socioeconomic modeling system, was utilized to produce the MPA and TAZ projections for Pinal County. The TAZ projections were reviewed and approved by the CAG Regional Council in June 2016.

Next Scheduled Update

In June 2011, the Arizona Department of Administration (ADOA) was designated as the State agency responsible for preparing official population estimates and projections for the State of Arizona. The next update of the TAZ socioeconomic projections for Maricopa County will be based on the official ADOA county-level projections, required by Executive Order 2011-04. It is anticipated that ADOA will provide the next set of county level projections, based on Census data, to MAG in December 2018 and MAG will prepare the subcounty level projections for Maricopa County for approval by the MAG Regional Council within six months after receiving the county level projections from ADOA.

TRAFFIC COUNTS

The highway traffic volumes estimated by the MAG transportation models were validated in 2016 for the 2015 base year, using over 3,000 traffic counts collected by MAG in 2014-2015 in Maricopa and Pinal counties. MAG transportation models have been re-calibrated in 2012-2013 based on the travel surveys conducted in 2008-2012. New model validations are based on the model runs with updated socioeconomic input files and recalibrated transportation models. Use of the most recent traffic counts to validate the models is consistent with the federal conformity guidance which strongly encourages areas to update the planning assumptions for network-based travel models at least every five years (EPA, 2008b).

Methodology

MAG uses TransCAD software, as well as custom developed programs, to perform travel demand modeling. TransCAD provides a geographic information systems (GIS) interface that facilitates transportation modeling. The MAG transportation models follow a traditional four-step process: trip generation, trip distribution, mode choice, and traffic/transit assignment. Trip generation determines the number of person trips produced and attracted by traffic analysis zone. Trip distribution links the productions and attractions by TAZ. The nested logit mode choice model determines the number of person trips allocated to automobile and transit modes. The mode choice model is sensitive to highway and transit travel times, as well as pricing variables. Highway and transit route choice is determined in the assignment step, based on operating costs, travel times, and distances. Capacity-restrained traffic assignments are performed for the AM peak period, midday, the PM peak period, and nighttime. A feedback loop between traffic assignment and trip distribution is utilized to achieve near-equilibrium highway speeds.

Next Scheduled Update

Region-wide traffic counts are typically collected by MAG every 2-4 years and commercial speed data is normally purchased every 1-2 years, if funding is available. New travel surveys are currently ongoing and are scheduled for completion in 2017. Complete model recalibration will be conducted upon completion of the surveys. MAG conducts incremental

updates, recalibration and validation of the regional model on an on-going basis in order to maintain relevancy of the regional forecast and as new data sets become available. Recalibration of the transit part of the model is currently ongoing based on the 2015 transit on-board survey. New 2015 commercial speed data has been purchased in order to validate the model and review volume delay functions. MAG was commended at the recent Federal Transit Administration review of the best regional models as the only agency that conducts validation to commercial speed data by time period. Rapid changes in technology and transportation data field change the ways regional models are developed and maintained. MAG model development plans reflect these changes and capitalize on the most recent offerings in the transportation data.

VEHICLE MILES OF TRAVEL

MAG completed recalibration of the regional transportation model in 2013. The models were recalibrated using new socioeconomic data based on the latest Arizona Department of Administration (ADOA) population projections and 2010-2014 American Community Survey. The recalibration of the models is based on data from a 2008-2009 household travel survey, 2010-2011 regional transit on-board survey, and two 2012 special generator travel surveys (ASU and regional airports).

The transportation models simulate peak and daily traffic volumes on more than 30,000 highway links, as well as the transit trips on bus and light rail routes in the MAG transportation modeling domain covering Maricopa and Pinal counties. Vehicle miles of travel (VMT) by link, output by the highway assignment process, are input to the MAG MOVESLink model used to estimate onroad mobile source emissions for conformity analyses.

Transportation model estimates of vehicle volumes are validated using actual traffic counts. The MAG transportation models were validated against over 3,000 traffic counts collected in 2014-2015 for the 2015 base year. Table 3 summarizes the validation results by area type for freeways and arterials. Both the R-squared (R2) and Root Mean Square Error (RMSE) statistics indicate that there is a good fit between transportation model-estimated 2015 weekday traffic volumes and traffic count data.

In previous MAG conformity analyses, transportation model estimates of VMT were reconciled with the VMT reported by the Highway Performance Monitoring System (HPMS) in order to comply with Section 93.122(b) of the Transportation Conformity Regulations. These regulations require that regional emissions analyses in serious, severe, and extreme ozone nonattainment areas and serious carbon monoxide nonattainment areas, with urbanized area populations over 200,000, meet certain network-based modeling requirements, including reconciliation of modeled VMT with HPMS.

Since EPA approved the MAG Carbon Monoxide and One-Hour Ozone Redesignation Request and Maintenance Plans in 2005, the Maricopa area is no longer a serious

TABLE 3.
AGGREGATED MODEL VALIDATION RESULTS
MODEL-ESTIMATED 2015 WEEKDAY VOLUMES VS. 2015 TRAFFIC COUNTS

	Freeways and Arterials	
Area Type	**R^2**	**% RMSE**
CBD	0.985	19.4%
Outlying CBD	0.977	20.4%
Mixed Urban	0.965	21.1%
Suburban	0.936	32.1%
Rural	0.943	38.3%
All	0.973	23.9%

nonattainment area for carbon monoxide or one-hour ozone. In addition, the area was not classified as a serious, severe or extreme nonattainment area for the 1997 eight-hour ozone standard and has not violated this standard since 2005. Effective July 20, 2012, the Maricopa area was classified as a marginal nonattainment area for the new, more stringent, 2008 eight-hour ozone standard. In addition, on May 4, 2016, the EPA reclassified the area to Moderate since the Maricopa Nonattainment Area did not attain the 2008 standard by the attainment date. In the future, if the Maricopa area is classified as serious, severe or extreme for a more stringent eight-hour ozone standard, the VMT estimated by the transportation models will be reconciled against HPMS VMT for the most recent model calibration year.

The requirement to reconcile travel demand model output to HPMS traffic volumes does not apply to the Pinal County nonattainment areas, because the urbanized area population is less than 200,000. In addition, the areas are in nonattainment for particulates, rather than ozone or carbon monoxide.

As indicated above, the requirements of Section 93.122(b) do not apply to the Maricopa County nonattainment or maintenance areas or the Pinal County nonattainment areas. Therefore, reconciliation of modeled VMT with HPMS is not required for the 2017 MAG Conformity Analysis. However, it is important to note that the most recent comparison of model-estimated and HPMS VMT for the travel demand model calibration year of 2011 concluded that the model and HPMS VMT estimates were nearly identical.

Next Scheduled Update

MAG is currently recalibrating and updating the regional travel demand forecasting model to the new 2015 On-board survey data and new information about regional road and transit infrastructure. Parallel to that work, MAG is conducting regional travel surveys that are scheduled to complete in FY 2018. Once survey data is available, the regional travel demand model will be updated to the new survey data.

SPEEDS

Speeds obtained from the capacity-restrained traffic assignments are “fed-back” in the travel demand modeling chain. The trip distribution, mode choice, and traffic assignment steps of the chain are executed until PM peak period trip tables and link volumes are in equilibrium. In addition to vehicle miles of travel, the MAG transportation models calculate system performance measures such as vehicle hours of travel and volume to capacity ratios.

Periodically, MAG conducts speed studies or purchases commercial speed data to compare model-estimated speeds with empirical data. MAG purchased 2015 speed data from HERE that was used to update the speeds estimated by the MAG transportation models in 2016, as discussed in the Methodology section below.

Methodology

MAG used the 2015 HERE region-wide speed data to improve the speed estimates produced by the transportation models. In the transportation modeling area covering Maricopa and Pinal counties, the TransCAD-estimated speeds for arterials and freeways are on average 0.9 percent higher than the observed peak and off-peak speeds for all area types. The differences in speed by time period, functional class, and area type demonstrate that the model-estimated speeds are in reasonable agreement with observed arterial and freeway speeds during the peak and off-peak periods.

Next Scheduled Update

MAG purchases commercial speed data on a regular basis, every one or two years. The model is scheduled for recalibration once ongoing travel surveys are completed. The recalibrated model will be validated with new speed and traffic count data as appropriate.

VEHICLE REGISTRATIONS

Vehicle registrations for Maricopa and Pinal counties in July 2016 are the latest provided to MAG by the Motor Vehicle Division of the Arizona Department of Transportation (ADOT). In the 2017 MAG Conformity Analysis, the July 2016 registrations will be input to the latest version of MOVES to estimate onroad mobile source emissions. MOVES will derive the vehicle population and age distribution for estimating wintertime CO emissions from the

July 2016 registrations. The vehicle registration data provided by ADOT has been converted to MOVES2014a format. MAG will use newer vehicle registration data when provided by ADOT.

IMPLEMENTATION MEASURES

Maricopa County Nonattainment and Maintenance Areas

For the Maricopa County nonattainment and maintenance areas, emission reduction credit will be assumed for the committed measures in the applicable SIPs, including the measures shown in Table 4. The emission reductions assumed for these committed measures will reflect the latest implementation status of all measures for which emission reduction credits were assumed in the applicable SIPs. As required by the conformity rule, the applicable transportation control measures (TCMs) are fully documented in Chapter 5.

Emission reduction credit will be applied for committed control measures and committed contingency measures contained in the applicable MAG air quality plans. Credit may also be taken for Congestion Mitigation and Air Quality Improvement (CMAQ) projects in the MAG Transportation Improvement Program, if credit for these measures was not quantified in the air quality plans. In addition, emission reduction credit for strengthening of existing control measures or implementation of new control measures, specifically identified in the MAG TIP or RTP, will be incorporated into the analysis, where appropriate. Chapter 4 describes the assumptions made in calculating emission reduction credit for committed measures in the MAG air quality plans.

Pinal County Nonattainment Areas

Since EPA has not approved State Implementation Plan (SIP) revisions for the Pinal County nonattainment areas, emission reductions will be assumed for sources in these areas that are currently controlled by Arizona state laws. For the 2017 MAG Conformity Analysis, a six percent reduction will be applied to PM-10 emissions from vehicles traveling on agricultural unpaved roads in the Pinal PM-10 nonattainment area. This reduction reflects requirements of the Arizona Agricultural Best Management Practices (BMPs) that apply to all moderate PM-10 nonattainment areas in the state. The Agricultural BMPs went into effect when EPA designated West Pinal to be a moderate PM-10 nonattainment area, effective July 2, 2012.

The six percent reduction is based on assumptions used in calculating agricultural unpaved road emissions in the 2008 Periodic Emissions Inventory for PM-10 prepared by the Maricopa County Air Quality Department (MCAQD, 2011). The six percent reduction will be applied in each conformity analysis year for both the action and baseline scenarios in the Pinal PM-10 nonattainment area.

In addition, PM-10 emission reduction credit will be taken in the Pinal PM-10 nonattainment area for projects to pave unpaved roads that are included in the FY 2018-2022 MAG TIP

TABLE 4.
COMMITTED MEASURES IN THE
MARICOPA COUNTY NONATTAINMENT AND MAINTENANCE AREAS

Measure #	Reference	Measure Description	Pollutant(s)
1	CO Maintenance Plan[1]	CARB Phase 2 with 3.5 Percent Oxygenate in Winter	CO
1	Eight-Hour Ozone Maintenance Plan[2]	Summer Fuel Reformulation with 7 psi from May 1 through September 30	VOC, NOx
2 2	CO Maintenance Plan Eight-Hour Ozone Maintenance Plan	Phased-In Emission Test Cutpoints	CO, VOC, NOx
3 3	CO Maintenance Plan Eight-Hour Ozone Maintenance Plan	One-Time Waiver from Vehicle Emissions Test	CO, VOC, NOx
5 4C 16	CO Maintenance Plan Eight-Hour Ozone Maintenance Plan Serious Area PM-10 Plan[3]	Coordinate Traffic Signal Systems	CO, VOC, NOx, PM-10
6 5C	CO Maintenance Plan Eight-Hour Ozone Maintenance Plan	Develop Intelligent Transportation Systems	CO, VOC, NOx
7 4	CO Maintenance Plan Eight-Hour Ozone Maintenance Plan	Tougher Enforcement of Vehicle Registration and Emission Test Compliance	CO, VOC, NOx
1C 6	CO Maintenance Plan Eight-Hour Ozone Maintenance Plan	Expansion of Area A Boundaries (HB 2538)	CO, VOC, NOx
2C 1C	CO Maintenance Plan Eight-Hour Ozone Maintenance Plan	Gross Polluter Option for I/M Program Waivers	CO, VOC, NOx
3C 2C	CO Maintenance Plan Eight-Hour Ozone Maintenance Plan	Increase Waiver Repair Limit Options	CO, VOC, NOx
3C	Eight-Hour Ozone Maintenance Plan	Federal Heavy Duty Diesel Vehicle Emissions Standards	VOC, NOx

[1] *MAG 2003 Carbon Monoxide Redesignation Request and Maintenance Plan for the Maricopa County Nonattainment Area*, May 2003 (MAG, 2003).

[2] *MAG 2009 Eight-Hour Ozone Redesignation Request and Maintenance Plan for the Maricopa Nonattainment Area*, February 2009 (MAG, 2009).

[3] *Revised MAG 1999 Serious Area Particulate Plan for PM-10 for the Maricopa County Nonattainment Area*, February 2000 (MAG, 2000).

and 2040 RTP, as well as projects in the Sun Corridor MPO FY 2016-2025 TIP and RTP 2040. These projects are identified in Chapter 4. The emission reductions due to BMPs and paving projects were not applied to the Pinal PM-2.5 nonattainment area, because unpaved road emissions are not part of the conformity analysis for that area.

3 TRANSPORTATION MODELING

The transportation modeling performed for the 2017 MAG Conformity Analysis for the FY 2018-2022 MAG Transportation Improvement Program and 2040 MAG Regional Transportation Plan is based on the latest planning assumptions, as required in the federal conformity rule (40 CFR 93.110) and documented in Chapter 2. A summary of the transportation model characteristics, key socioeconomic data, and other data related to the land use and transportation system forecasts is provided in this chapter.

TRANSPORTATION MODELS

MAG regional transportation modeling is performed using TransCAD software for both highway and transit network assignments. The transportation models forecast AM peak period, mid-day, PM peak period, and night time vehicle traffic, as well as daily transit ridership, for the MAG transportation modeling area. The transportation modeling area currently contains approximately 3,000 traffic analysis zones and covers an area of approximately 16,000 square miles. The latest calibration of the highway models was completed in 2013, using data from the 2008-2009 household travel survey. The base year for the validations was 2015. The latest validation of the highway models was completed using approximately 3,000 traffic counts collected for the validation year. The transit models were re-calibrated in 2013 based on data from the 2010-2011 on-board bus survey. MAG is currently in the process of recalibrating transit components of the model to the 2015 on-board transit survey. MAG has acquired 2015 commercial speed data from HERE and is conducting speed data validations with the 2015 speed data set. MAG has also acquired new truck GPS data that will be used to recalibrate truck models. MAG is conducting regional household and establishment surveys. Surveys will be completed in 2017 and MAG will initiate recalibration of the entire regional travel demand forecasting model upon completion of the surveys. Incremental updates and improvements are normally carried out on an ongoing basis where possible.

The MAG transportation models exhibit the following characteristics, which are consistent with the federal transportation conformity rule (Section 93.122(b)):

- The traffic volumes simulated by the MAG transportation models were validated in 2015 against over 3,000 traffic counts. This validation demonstrated a good statistical fit between actual and model-estimated daily traffic volumes.

- The population, households, and employment inputs to the travel demand models are based on the Arizona Department of Administration (ADOA) population projections consistent with the 2010-2014 American Community Survey. The official Maricopa County socioeconomic projections based on ADOA county projections were approved by the MAG Regional Council in June 2016. The Pinal County subcounty population projections were approved by the Central Arizona Governments (CAG) Regional Council in June 2016. These projections were prepared using the AZ-SMART land use model system and UrbanSim.

- The population and employment projections used in the conformity analysis are consistent with the transportation system alternatives considered. In the MAG land use models, transportation system accessibility influences the allocation of population and employment to smaller geographic areas. The UrbanSim model was integrated into AZ-SMART and used to allocate county projections of households and employment to regional market areas based upon the pre-existing location of these activities, land consumption, and transportation system accessibility. These congested travel times are derived from an appropriate capacity-restrained traffic assignment for each forecast year. The allocation of population and employment from market areas to land use parcels is accomplished with UrbanSim. UrbanSim uses transportation system accessibility measures, such as proximity to the closest highway, in determining the likelihood that a land use parcel will develop during a given forecast interval. AZ-SMART also aggregates population, households, and employment projections by land use parcel to the TAZ-level for input to the transportation models. Congested travel times output by the transportation models are "fed-back" into the land use models to ensure that there is consistency between the transportation system assumptions and the land use projections.

- The transportation models perform capacity-restrained traffic assignments. Restrained assignments are produced for the AM peak period, mid-day, PM peak period, and night time, with volumes and congestion estimated for each period.

- Speeds obtained from the capacity-restrained traffic assignments are "fed-back" in the travel demand modeling chain. The trip distribution, mode choice, and traffic assignment steps of the chain are executed until a convergence criteria is met. MAG convergence criteria is based on the recommendations produced by the Federal Transit Administration (FTA).

- The travel impedances used in the trip distribution and traffic assignment steps of the MAG travel demand modeling are a composite function of highway travel times and costs. The nested logit mode choice model is sensitive to highway and transit travel times, as well as pricing variables.

- As a result of the feedback loop in the MAG travel demand modeling process, the final peak and off-peak speeds are sensitive to the capacity-restrained volumes on each highway segment represented in the network. As was mentioned at the recent FTA review of the best regional models, MAG is the only agency that routinely validates model outputs with commercial speed data by time period. MAG has recently purchased 2015 HERE data for the 2015 base year validations.

SOCIOECONOMIC PROJECTIONS

Section 93.110 of the federal conformity rule requires that the population and employment projections used in the conformity analysis be the most recent estimates that have been officially approved by the Metropolitan Planning Organization (i.e., MAG for the Maricopa County nonattainment and maintenance areas). The 2017 Conformity Analysis will be based on socioeconomic projections that were approved by the MAG Regional Council and Central Arizona Governments (CAG) in June 2016.

In accordance with the Arizona Governor's Executive Order 2011-04, the population projections used for all State agency planning purposes were updated by the Arizona Department of Administration (ADOA) consistent with the 2010-2014 American Community Survey. MAG then prepared socioeconomic projections by traffic analysis zone (TAZ), based on the ADOA county-level population projections. MAG allocated the projections for Maricopa County to traffic analysis zones (TAZs) using the AZ-SMART model system. The official Maricopa County socioeconomic projections based on ADOA county projections were approved by the MAG Regional Council in June 2016.

In addition, socioeconomic projections for Pinal County were prepared by MAG utilizing AZ-SMART and were approved in collaboration with Central Arizona Governments (CAG). The projections by Municipal Planning Area (MPA) for Pinal County were approved by the CAG Regional Council in June 2016 and the TAZ projections are based upon the approved MPA projections.

The TAZ population, households and employment projections take into account the transportation improvements contained in the conforming TIP (FY 2017-2021) and RTP (including amendments through December 2015) in effect at the time the projections were approved. For the 2017 MAG Conformity Analysis, the projections of population, households, and employment by TAZ will be input to the MAG transportation models to estimate auto and transit trips, VMT, and speeds for each analysis year.

TRAFFIC ESTIMATES

This section describes the development of the highway and transit networks that will be used to perform the 2017 MAG Conformity Analysis for the FY 2018-2022 MAG Transportation Improvement Program and 2040 MAG Regional Transportation Plan. A

summary of the population, employment, and travel characteristics for the MAG transportation modeling area for each action scenario in the 2017 MAG Conformity Analysis is presented in Table 5. The vehicle miles of travel forecasts for each of the pollutant specific modeling areas for Maricopa and Pinal counties are presented in Appendix C.

Transportation Network Assumptions

Not all of the street and freeway projects included in the TIP qualify for inclusion in the highway network. Projects which call for study, design, right-of-way acquisition, or non-capacity improvements are not included in the networks. When these projects result in actual facility construction projects, the associated capacity changes are coded into the network, as appropriate. Since the networks define capacity in terms of the number of through traffic lanes, only construction projects that increase the lane-miles of through traffic are included. Generally, MAG highway networks include only the one-mile grid system of streets, plus freeways. This includes all streets classified as arterials, as well as some collectors.

Traffic on collectors and local streets not explicitly coded on the highway network are simulated in the models by use of abstract links called “centroid connectors”. These represent collectors, local streets and driveways which connect a neighborhood to a regionally significant roadway. Centroid connectors also include travel occurring on public and private unpaved roads and alleys.

Highway Networks

The network used in the 2018, 2025, 2035, and 2040 baseline scenarios for the Pinal County nonattainment areas contains regionally significant highways open to traffic by December 31, 2016. In addition, the baseline network includes regionally significant projects in the Pinal County PM-10 nonattainment area, regardless of funding source, that meet one of the following criteria: are under construction, undergoing right of way acquisition, programmed in FY 2017 of the conforming MAG TIP, or have completed the National Environmental Policy Act (NEPA) process. These criteria comply with Section 93.119(h) of EPA conformity regulations.

The 2018, 2025, 2035, and 2040 networks used in the conformity budget analyses for the Maricopa nonattainment and maintenance areas and as the action scenarios for the Pinal County nonattainment areas assume implementation of all qualifying highway projects in the FY 2018-2022 MAG Transportation Improvement Program (TIP) and 2040 MAG Regional Transportation Plan (RTP), as well as other regionally significant projects to be implemented in the Pinal County area.

TABLE 5.
TRAFFIC NETWORK COMPARISON FOR ACTION SCENARIOS EVALUATED FOR THE 2017 MAG CONFORMITY ANALYSIS

Year	Total Population[a] (thousands)	Total Employment[a] (thousands)	Average Weekday VMT[b] (millions)	Average PM Peak Period Speed[c]	Freeway Lane Miles[d]
2018	5,191	2,168	116.4	32.4	4,847
2025	5,910	2,422	134.0	32.3	5,252
2035	6,949	2,827	162.0	31.5	5,844
2040	7,462	3,059	175.8	30.9	5,890

[a] Population and employment estimates are for the 16,000 square mile transportation modeling area in Maricopa and Pinal Counties. Total population includes resident population in households and group quarters, transient population and seasonal population. Total employment includes number of workers in public, retail, office, industrial, work-at-home, construction, non-site based and other land use employees.

[b] Vehicle miles of travel (VMT) is obtained from the summation of VMTs in the AM, Mid-Day, PM and Night Time from the action traffic assignments for the transportation modeling area.

[c] Average speed on freeways, HOV lanes, expressways, arterials, ramps and collector-distributor roads in the transportation modeling area during the P.M. peak period.

[d] Freeways, expressways, ramps, HOV lanes are included in the lane miles reported for freeways in the transportation modeling area.

The 2018 network includes highway projects in the TIP scheduled to be open to traffic by December 31, 2018. The 2025 network includes highway projects in the RTP through the year 2025, as well as projects in the TIP. The 2035 network includes highway projects in the RTP through the year 2035, as well as projects in the TIP. The 2040 assumes implementation of all highway projects in the RTP, as well as all qualifying highway projects in the TIP. It is important to note that the action transportation modeling networks include the regionally significant highway projects in the Maricopa County nonattainment and maintenance areas, as well as the Pinal County nonattainment areas.

Coding Conventions

Specific coding conventions or criteria are applied to determine whether a project qualifies for highway network coding. This results in coding of all arterial streets and some collectors. The coding conventions are:

(1) Capacity-related projects on existing links or extensions of existing links on the base highway network are coded in future networks. This includes projects on freeways, the mile-street grid, and half-mile streets already on the base network.

(2) Capacity-related projects which are not on links or extensions of links in the base network are coded, if the street is considered a logical part of the one-mile street grid system. If the project is on a half-mile street, it is considered for inclusion on a case-by-case basis. The key factors considered in making this assessment include:

- the density of current and future development and travel in the area of the project;
- whether the change may be accommodated without increasing the number of zones; and
- whether the change is consistent with standard network coding practices.

Transit Networks and Operations

Transit networks are input to the mode choice step of the MAG transportation models to determine the number of person trips made by transit, which in turn, removes vehicle trips from the highways. For all analysis years, the bus and rail networks reflect the latest planning information available at the time the conformity analysis began.

Maricopa Nonattainment and Maintenance Areas

The most recent information on transit ridership and operating policies is provided by Valley Metro/Regional Public Transportation Authority (Valley Metro/RPTA, 2017). Information on current transit fares is provided in Table 6 (Valley Metro/RPTA, 2016b).

TABLE 6.
SUMMARY OF TRANSIT FARES FOR
VALLEY METRO SERVICE

Valley Metro Service	Fares
Local Bus/Light Rail	
1-Ride	$2.00
All Day Pass	$4.00
All Day Pass (purchased on-board)	$6.00
7-Day	$20.00
15-Day	$33.00
31-Day	$64.00
Semester Pass	$230.00
Express/Rapid Bus	
1-Ride	$3.25
All Day Pass	$6.50
All Day Pass (purchased on-board)	$8.50
31-Day	$104.00

Note: Reduced fares are available to persons with disabilities, seniors age 65 and older, Medicare cardholders, and youths ages 6 through 18. Youths age 5 and under ride for free when accompanied by a fare-paying responsible person who can directly supervise the child (Valley Metro/RPTA, 2016b).

The information on fares and transit operations in this section of the conformity analysis is provided to address federal transportation conformity requirements.

Current Fixed Route Service

Valley Metro bus service is provided to an area of approximately 513 square miles within the MAG region. In addition, the METRO 26-mile light rail system connects the cities of Phoenix, Tempe, and Mesa. According to Valley Metro, there were 61 local routes providing fixed route service, 14 express bus routes, six RAPID commuter express routes, and 18 circulator routes located in Avondale, Glendale, Mesa, Phoenix, Scottsdale, and Tempe. Based on the FY 2016 Transit Performance Report for the period ending June 30, 2016, there were 51,778,088 fixed route boardings and 15,574,737 light rail boardings. In FY 2016, there were 69,585,041 system total boardings including fixed route, light rail, paratransit (1,074,939 boardings) and vanpools (1,157,277 boardings), a decrease of 4.5 percent from FY 2015.

Other Existing Transit Services

Nine paratransit systems operate within Maricopa County, including Glendale Dial-A-Ride, Peoria Dial-A-Ride, Phoenix Dial-A-Ride, Phoenix Taxi, Scottsdale Taxi, East Valley Dial-A-Ride, Northwest Dial-A-Ride, Regional Dial-A-Ride and RideChoice. These services generally operate within the area with fixed route bus service.

In addition, 18 shuttle and circulator transit services have been implemented across the region with different operating schedules, including: Avondale Circulator ZOOM, Tempe Orbit serving various neighborhoods in the city including the Arizona State University campus area; Phoenix Business Circulator 19th Avenue Connector, Phoenix Downtown Area Shuttle (DASH) serving the Downtown Phoenix-State Capitol area; Ahwatukee Local Explorer (ALEX) serving Ahwatukee and west Chandler areas; Phoenix Maryvale Area Ride for You (MARY) serving the Maryvale area of Phoenix; Sunnyslope Neighborhood Circulator (SMART) serving the Sunnyslope area of Phoenix, Glendale Urban Shuttle (GUS) providing transit in the Glendale Central Corridor; Mesa Downtown BUZZ, and the Scottsdale Miller Road Trolley, Scottsdale Downtown Trolley, and Scottsdale Neighborhood Trolley.

Recent Transit Service Changes

Valley Metro/Regional Public Transportation Authority reports a number of transit service changes in FY 2016. The changes are as follows:

- Service modifications on Local Routes 1, 10, 19, 48, 50, 60, 81, and 104, Circulator Route BUZZ, and on LINK on Main Street and Arizona Avenue;

- Service increases on Local Routes 19, 61, 72, and 156, Express Route 542, and Circulator Route FLASH Back;

- Route eliminations on Circulator Routes FLASH and McAllister and 19th Avenue Connector;

- New routes included Local Route 32 and Circulator Route - Camelback Trolley.

Pinal Nonattainment Areas

The City of Coolidge operates the Cotton Express that provides fixed route bus service and curb-to-curb paratransit service in Coolidge. The Cotton Express is a local circulator that provides bus service between neighborhoods and business, schools, and government offices. Fares range from $1.25 for one-way, $2.50 for daily, and $45.00 for monthly fare for age 12 to adult.

The City of Coolidge also operates the Central Arizona Regional Transit (CART) bus system that provides regional transportation services in central Pinal County including Florence, Coolidge, and Casa Grande. Fares range from $2.00 for one-way, $4.00 for daily, $60.00 for monthly, and $90.00 for local and regional month fare for ages 13 to 54. Table 7 provides a summary of the transit fares for the Cotton Express and the Central Arizona Regional Transit bus system.

The MAG transportation models and the highway and transit networks described above are utilized to estimate daily vehicle travel and transit ridership in the MAG transportation modeling area. The primary input to the air quality modeling process is transportation model estimates of daily vehicle traffic and speeds on each highway link, along with the attendant link lengths and coordinate data, for each nonattainment and maintenance area. A detailed description of the MAG emissions models is provided in Chapter 4.

TABLE 7.
SUMMARY OF TRANSIT FARES FOR
COTTON EXPRESS AND CENTRAL ARIZONA REGIONAL TRANSIT SERVICES

Fixed Route Transit Services in Pinal County	**Fares**
Cotton Express	
One-way	$1.00
Daily	$2.00
Monthly	$30.00
Central Arizona Regional Transit	
One-way	$2.00
Daily	$4.00
Monthly	$60.00
Local & Regional Monthly	$90.00

Note: Demand and deviated route fares are available for the Cotton Express. For the Central Arizona Regional Transit service, lower fares apply to children 12 and under or students.

4 AIR QUALITY MODELING

For the 2017 MAG Conformity Analysis, the models which have been used to estimate carbon monoxide (CO), volatile organic compounds (VOC), nitrogen oxides (NOx), and particulates (PM-10 and PM-2.5) are MOVES2014a, for motor vehicle emission factors; AP-42, for emission factors from reentrained dust produced by vehicles traveling on paved and unpaved roads; and MOVESLink, for the calculation of spatially and temporally allocated onroad vehicle emissions using the emission factors from the above models and travel and speed data from the TransCAD transportation model.

On October 7, 2014, EPA published a notice of availability of the MOVES2014 mobile source emissions model which began a two-year grace period that ended on October 7, 2016, after which MOVES2014 is required to be used for transportation conformity (EPA, 2014b). On November 4, 2015, EPA released a revised version, MOVES2014a. Since the differences between MOVES2014 and MOVES2014a were small, EPA did not consider MOVES2014a a new emissions model for transportation conformity purposes. A new grace period was not given for either regional or project-level conformity analyses. Therefore, the MOVES2014 grace period for conformity analyses applies to MOVES2014a as well. The two-year grace period for MOVES2014 and MOVES2014a ended on October 7, 2016. Conformity analyses that begin after October 7, 2016 are required to use MOVES2014a for new transportation plan and TIP conformity determinations and regional emissions analyses. Since the 2017 MAG Conformity Analysis began after October 7, 2016, MOVES2014a was used to estimate motor vehicle emission factors.

In the 2017 MAG Conformity Analysis, modeling assumptions from the latest air quality plans submitted to EPA have been used to perform the 2017 MAG Conformity Analysis. The latest planning assumptions have been substituted for modeling inputs used in these air quality plans, as appropriate. In the Maricopa County nonattainment and maintenance areas regional emissions have been estimated for carbon monoxide and PM-10 for the conformity analysis years of 2025, 2035, and 2040 and for eight-hour ozone for the conformity analysis years of 2018, 2025, 2035, and 2040. In the Pinal County nonattainment area regional emissions have been estimated for PM-10, PM-2.5, and NOx for 2018, 2025, 2035, and 2040. The conformity rule requirements for the selection of the analysis years are summarized in Chapter 1.

MAG conducted interagency consultation in January 2017 on the transportation conformity processes, including the models, associated methods, and assumptions to be applied in

the 2017 MAG Conformity Analysis. A copy of the consultation correspondence is provided in Appendix B.

Air quality modeling for the 2017 MAG Conformity Analysis was performed for two different sets of nonattainment and maintenance areas: the Maricopa County nonattainment and maintenance areas and the Pinal County nonattainment areas. The conformity analysis for the Maricopa County carbon monoxide maintenance area and PM-10 nonattainment area involves the comparison of projected 2025, 2035 and 2040 emissions with EPA-approved budgets for the Carbon Monoxide Maintenance and PM-10 Nonattainment areas. The conformity analysis for the Maricopa County ozone nonattainment area involves the comparison of projected 2018, 2025, 2035 and 2040 emissions with EPA-approved budgets for the ozone nonattainment area.

The conformity analysis for the Pinal County nonattainment areas involves a comparison of action and baseline scenario emissions in 2018, 2025, 2035, and 2040 for the West Pinal PM-10 Nonattainment Area and West Central Pinal PM-2.5 Nonattainment Area. In January 2017, EPA indicated that they will not find to be adequate or approve the 2018 emissions budget in the 2015 West Pinal Moderate PM-10 Nonattainment Area SIP prepared by ADEQ and submitted to EPA in December 2015. Therefore, the 2018 PM-10 budget in that SIP will not be included in the 2017 MAG Conformity Analysis. The air quality modeling assumptions for the Maricopa and Pinal areas are described separately in this chapter.

MARICOPA COUNTY NONATTAINMENT AND MAINTENANCE AREAS

For the Maricopa County nonattainment and maintenance areas, air quality modeling inputs not dependent on the MAG Transportation Improvement Program or Regional Transportation Plan or the latest planning assumptions were derived from the MAG 2013 Carbon Monoxide Redesignation Request and Maintenance Plan (MAG, 2013) for CO; the MAG 2009 Eight-Hour Ozone Redesignation Request and Maintenance Plan (MAG, 2009) for VOC and NOx; and the MAG 2012 Five Percent Plan (MAG, 2012) for PM-10. The modeling efforts have been kept as consistent as possible among the pollutants modeled. Some differences in the modeling assumptions are necessary due to the different time periods modeled for different pollutants (e.g., temperatures, fuel properties).

On January 18, 2001, the U.S. DOT issued guidance developed jointly with EPA to provide additional clarification concerning the use of latest planning assumptions in conformity determinations. In December 2008, EPA published revisions to the 2001 guidance entitled "Guidance for the Use of Latest Planning Assumptions in Transportation Conformity Determinations" (EPA, 2008b). The guidance indicates that periodic inventory updates may be used as a source for recent modeling data.

The most recent periodic inventory available for carbon monoxide is the 2008 Periodic Emissions Inventory for Carbon Monoxide for the Maricopa County, Arizona,

Nonattainment Area (MCAQD, 2012). This inventory represents an average CO season day rather than the CO season average weekday that is used in the CO attainment and maintenance plan. Since the conformity budgets were established using CO season average weekday emissions, it is more appropriate to use the 2013 CO Maintenance Plan modeling assumptions in the conformity analysis.

The most recent periodic inventory available for ozone is the 2014 Periodic Emissions Inventory for Ozone Precursors for the Maricopa County, Arizona, Eight-Hour Ozone Nonattainment Area (MCAQD, 2016a). The periodic inventory provides VOC and NOx emissions for the eight-hour ozone nonattainment area. The periodic inventory represents an ozone season average day rather than the episode days used in the 2009 Eight-Hour Ozone Maintenance Plan. Since the conformity budgets were established using these episode days, it is more appropriate to use the 2009 Eight-Hour Ozone Maintenance Plan modeling assumptions in the conformity analysis.

The most recent periodic inventory available for PM-10 is the 2014 Periodic Emissions Inventory for PM-10 for the Maricopa County, Arizona, PM-10 Nonattainment Area (MCAQD, 2016b). A previous inventory, the Revised 2008 Periodic Emission Inventory for PM-10 for the Maricopa County, Arizona, Nonattainment Area was used in developing the 2008 base case emissions for the MAG 2012 Five Percent Plan for PM-10 (MCAQD, 2011). Assumptions from the MAG 2012 Five Percent Plan that were used in estimating PM-10 emissions for the MAG 2017 Conformity Analysis are documented in the PM-10 section below.

The MOVES2014a and MOVESLink models and input assumptions used in estimating onroad vehicle emissions for the Maricopa County maintenance and nonattainment areas are described in the next two sections.

MOVES2014a

MOVES2014a is a model developed by EPA for the purpose of estimating motor vehicle emission factors for specified vehicle fleet, fuel, temperature, and speed conditions. This model is used to estimate carbon monoxide, ozone precursor, and particulate (exhaust, tire wear, and brake wear) motor vehicle emission factors for the Maricopa County nonattainment and maintenance areas.

The MOVES2014a model generates estimates of motor vehicle emission factors in units of grams of pollutant emitted per vehicle mile of travel. MOVES2014a uses a locally-derived motor vehicle registration distribution (by model year) of 30 years. For the 2017 MAG Conformity Analysis, July 2016 vehicle registrations for Maricopa County, obtained from the Arizona Department of Transportation, were used as input to MOVES2014a. MOVES2014a also incorporates fleet turnover to newer, cleaner vehicles over time, which counters the increase in regional emissions that occur with growth in vehicle miles of travel. Other factors, such as fuel quality and vehicle speed, are also important.

Inspection and maintenance (I/M) program benefits were assumed in the modeling. The I/M runs reflect the provisions of the enhanced inspection program which was implemented in January 1995 and the measure "Phased-in I/M Cutpoints" (see Table 4), implemented in January 2000. The cutpoint values used are the MOVES2014a default Phase 2 cutpoints. For the four horizon years modeled in this analysis, it was assumed that the onboard diagnostic (OBD) test would be used for the model year 1996 and newer vehicles with an exemption for all vehicles of the current plus four model years.

MOVES2014a runs were weighted to account for vehicles driving in the modeling area that do not participate in the I/M program. Therefore, each modeled scenario required runs with and without the I/M program benefits. For this analysis, it was assumed that 91.6 percent of eligible onroad vehicles participate in the I/M program. This fraction reflects an increase in the participation in the I/M program due to implementation of the measure, "Tougher Registration Enforcement" (see Table 4). For all scenarios modeled for this analysis, the inputs for each run included oxygenated gasoline with an assumed market share of 100 percent ethanol. The gasoline volatility and average oxygen content of the ethanol blend gasoline were based on fuel inspection data provided to MAG by the Arizona Department of Weights and Measures.

The MOVES2014a runs that reflected the I/M program assumed vehicle waiver rates of 1.3 percent or 1.0 percent, dependent upon model year. These fractions reflected the lower waiver rates resulting from the implementation of the measure, "One Time I/M Waiver" (see Table 4). The output from the MOVES2014a model includes emission factors by hour, roadway facility type, pollutant, and area type.

The MOVES2014a input files shown in Appendix P were used to calculate carbon monoxide emission factors for the conformity analysis year of 2025. This represents one example of the MOVES2014a input files which vary by pollutant and analysis year.

MOVESLink

MOVESLink is software developed by MAG that processes link data files output by the MAG transportation model, TransCAD. The program calculates emissions for roadway links in the MAG highway networks. Traffic volumes for four time periods (AM peak, mid-day, PM peak, and night time) for each link are converted into hourly volumes based upon traffic count data collected in Maricopa County in 2007. Hourly emission factors are developed by running MOVES2014a for each facility type, area type, and vehicle class using link speeds by time of day.

The transportation models are designed to model average weekday traffic patterns, which typically do not represent conditions on the specific episode day for ozone, or season average weekday for carbon monoxide, used to demonstrate attainment or maintenance and establish the conformity budget. As a result, MOVESLink applies day of the week and month of the year conversion factors that are consistent with the MAG 2013 Carbon Monoxide Maintenance Plan for CO and the 2009 Eight-Hour Ozone Redesignation

Request and Maintenance Plan for VOC and NOx. PM-10 emissions are assumed to represent an annual average day.

The transportation model inputs to MOVESLink consist of database formatted files that contain link-specific data and a node coordinate definitions file. MOVESLink also requires as input:

- A table containing adjustment factors used to allocate traffic volumes for four time periods to hourly traffic volumes.
- A matrix of emission factors for a range of hours, facility types, area types, and vehicle classes (generated by the MOVES model).
- The ratio of vehicles participating in the I/M program.
- The year being modeled.

The next three sections discuss the air quality modeling assumptions for each pollutant for which conformity in the Maricopa County maintenance and nonattainment areas has been performed. These pollutants are carbon monoxide, ozone (VOC and NOx) and PM-10.

Carbon Monoxide

For the 2017 MAG Conformity Analysis for the Maricopa area, the applicable test for carbon monoxide consists of the emissions budget test, as discussed in Chapter 1. The MAG 2013 Carbon Monoxide Maintenance Plan includes a 2025 budget of 559.4 metric tons per day. This budget represents the motor vehicle emissions for carbon monoxide based on carbon monoxide season average weekday conditions. On March 3, 2016, EPA published the final rule in the *Federal Register* approving the 2013 Carbon Monoxide Maintenance Plan including the emissions budget, effective April 4, 2016. For the 2017 MAG Conformity Analysis, the CO emissions estimated for 2025, 2035 and 2040 are compared with the EPA-approved 2025 CO budget of 559.4 metric tons per day.

Vehicle registrations from July 2016, obtained from the Arizona Department of Transportation, were used as input to MOVES2014a for CO. Regional onroad emissions were modeled using the TransCAD (traffic), MOVES2014a (emission factors), and MOVESLink (emissions allocation) models.

The overall modeling approach used in this analysis is consistent with that used to develop the 2025 CO emissions budget in the 2013 Carbon Monoxide Maintenance Plan. The MOVES2014a model was used to estimate carbon monoxide emission factors. Traffic data (vehicle miles of travel and speeds by link) were generated by the TransCAD transportation model. The MOVESLink program was used to derive VMT by link for the CO maintenance area from the TransCAD transportation model output and calculate emissions using MOVES2014a emission factors and the traffic assignment data. Committed control

measures from the 2003 CO Maintenance Plan were included in the conformity analysis, as appropriate. These measures are listed in Table 4 and detailed descriptions can be found in the 2003 CO Maintenance Plan (MAG, 2003).

The CO outputs from MOVESLink include an hourly, gridded onroad mobile source emissions file and several summary files containing emissions and traffic data in the maintenance area. The CO analysis reflects the CO season average weekday, consistent with the analysis used to set the CO budgets.

Eight-Hour Ozone

For the 2017 MAG Conformity Analysis, the applicable test for eight-hour ozone consists of the emissions budget tests for volatile organic compounds (VOC) and nitrogen oxides (NOx), as discussed in Chapter 1. The MAG 2007 Eight-Hour Ozone Plan for the Maricopa Nonattainment Area (MAG, 2007a) establishes conformity budgets for VOC and NOx in the modeled attainment year of 2008. The 2008 emission budgets for the eight-hour ozone nonattainment area are 67.9 metric tons per day for VOC and 138.2 metric tons per day for NOx. EPA published a *Federal Register* notice finding these budgets to be adequate, effective November 9, 2007. On June 13, 2012, EPA approved the MAG 2007 Eight-Hour Ozone Plan, including the emissions budgets, effective July 13, 2012.

In addition, the MAG 2009 Eight-Hour Ozone Redesignation Request and Maintenance Plan for the Maricopa Nonattainment Area established conformity budgets for VOC and NOx in the modeled maintenance year of 2025. EPA approved the 2025 VOC and NOx conformity budgets, effective October 17, 2014. For the 2017 MAG Conformity Analysis, the VOC and NOx emissions estimated for 2018 are compared with the EPA-approved 2008 VOC budget of 67.9 metric tons per day and NOx budget of 138.2 metric tons per day from the MAG 2007 Eight-Hour Ozone Plan. The VOC and NOx emissions estimated for 2025, 2035, and 2040 are compared with the EPA-approved 2025 VOC budget of 43.8 metric tons per day and 2025 NOx budget of 101.8 metric tons per day.

MAG also submitted the MAG 2017 Eight-Hour Ozone Moderate Area Plan to EPA in December 2016 (MAG, 2016). The Eight-Hour Ozone Moderate Area Plan establishes 2017 budgets for VOC (45.7 metric tons per day) and NOx (62.7 metric tons per day). If EPA takes action to find these budgets to be adequate or approves the 2017 Eight-Hour Ozone Moderate Area Plan before the 2017 MAG Conformity Analysis is approved by the U.S. DOT, conformity with the new 2017 budget would be required. To ensure that this conformity analysis is approvable, Table 12 shows that the 2018, 2025, 2035, and 2040 VOC and NOx emissions are also less than the 2017 budget proposed in the 2017 Eight-Hour Ozone Moderate Area Plan.

EPA published the final rule designating boundaries for the 2008 eight-hour ozone standard on April 30, 2012. This rule expanded the boundary of the Maricopa eight-hour ozone nonattainment area by approximately 138 square miles. The VOC and NOx emissions calculated for all conformity analysis years represent the larger 2008 eight-hour ozone area.

The MOVES2014a model was used to estimate VOC and NOx emission factors. Traffic data (vehicle miles of travel and speeds by link) were generated by the TransCAD transportation model. The MOVESLink program was used to derive VMT by link for the eight-hour ozone nonattainment area from the TransCAD transportation model output and calculate emissions using MOVES2014a emission factors and the traffic assignment data. Committed control measures were included in the conformity analysis, as appropriate. These measures are listed in Table 4 and detailed descriptions can be found in the 2007 Eight-Hour Ozone Plan.

Vehicle registrations from July 2016 obtained from the Arizona Department of Transportation were used as input to MOVES2014a. Temperatures and various adjustment factors from the 2009 Eight-Hour Ozone Maintenance Plan were also used for consistency. The MOVES2014a runs performed for the ozone analysis were very similar to those performed for the CO analysis, except that conditions were changed to reflect the summer of the given year rather than winter. Differences included temperature, fuel data, and the season modeled.

The outputs from the MOVES2014a model include emission factors specific to hour of the day, area type, facility type, and domain temperatures. VOC and NOx emissions were also output by MOVES2014a separately depending upon the source type, such as exhaust running, evaporative resting, and crankcase evaporative emissions. These emission factors were used by the MOVESLink program to estimate the motor vehicle emissions for the eight-hour ozone nonattainment area. The VOC and NOx analysis reflects a Thursday in June, consistent with the analysis used to set the 2007 Eight-Hour Ozone Plan budgets and the 2009 Eight-Hour Ozone Maintenance Plan budgets.

PM-10

For the 2017 MAG Conformity Analysis, the applicable conformity test for PM-10 is the emissions budget test, as discussed in Chapter 1. Conformity is being demonstrated using the motor vehicle emissions budgets from two EPA-approved PM-10 plans. The MAG 2012 Five Percent Plan for PM-10 established a 2012 conformity budget of 54.9 metric tons per day for the PM-10 nonattainment area (MAG, 2012). EPA approved this 2012 conformity budget, effective July 10, 2014. The Revised MAG 1999 Serious Area Particulate Plan for PM-10 established a 2006 motor vehicle emissions budget of 59.7 metric tons per day for the PM-10 nonattainment area (MAG, 2000). On July 25, 2002, EPA approved the Revised MAG 1999 Serious Area PM-10 Plan, effective August 26, 2002. The motor vehicle emissions budget includes PM-10 emissions from exhaust, tire wear, brake wear, unpaved roads, paved roads and road construction.

July 2016 vehicle registrations obtained from the Arizona Department of Transportation were used as input to MOVES2014a for PM-10. MOVES2014a and MOVESLink were applied to estimate PM-10 emissions from vehicle exhaust, tire wear, and brake wear. AP-42 equations were applied to estimate PM-10 emissions from vehicles traveling on paved and unpaved roads. In addition, PM-10 emissions from road construction were

calculated for each analysis year.

The assumptions used in calculating PM-10 emissions from these sources are described in the subsections that follow. The final subsection discusses the emission reductions that have been assumed for the Maricopa County PM-10 nonattainment area in the 2017 MAG Conformity Analysis.

Exhaust, Tire Wear and Brake Wear

The MOVES2014a model was used to estimate PM-10 emission factors from exhaust, tire wear, and brake wear. Traffic data (vehicle miles traveled and speeds by link) were generated by the TransCAD transportation model. GIS was used to derive VMT by link for the PM-10 nonattainment area. The MOVESLink model was used to calculate emissions for the PM-10 nonattainment area using MOVES2014a emission factors and the traffic data.

The MOVESLink system processes emissions for the PM-10 nonattainment area by combining the link and node data (i.e., volumes, speeds, link locations, facility type, area type) from the TransCAD transportation model with the PM-10 emission factors (specific to facility type, hour, etc.) generated by the MOVES2014a model. Other inputs to MOVESLink include the ratios for weighting the I/M and non-I/M emission factors and optional flags to apply control measure effects. The PM-10 analysis reflects an annual average day, consistent with the analysis performed to establish the budget in the Revised MAG 1999 Serious Area PM-10 Plan.

On May 19, 2004, EPA issued a *Federal Register* notice requiring the use of AP-42 in SIPs and conformity determinations that start on or after the two-year grace period of May 19, 2006 (EPA, 2004c). The EPA AP-42 equations were used to estimate PM-10 emissions due to reentrained dust from unpaved and paved roads.

PM-10 emission factors for reentrained dust from vehicles traveling on unpaved and paved roads in the Maricopa County PM-10 nonattainment area are calculated using the latest equations found in Sections 13.2.2 and 13.2.1.3, respectively, of AP-42, EPA Compilation of Air Pollutant Emission Factors. The AP-42 equation for paved roads was revised by EPA in January 2011.

The AP-42 equations for unpaved and paved roads are used to estimate PM-10 emission factors in grams per vehicle miles of travel (VMT). These emission factors are multiplied by unpaved and paved road VMT in the Maricopa County PM-10 nonattainment area to estimate uncontrolled PM-10 emissions from unpaved and paved roads. The assumptions used to estimate AP-42 emission factors and VMT for unpaved and paved roads are described in the next two sections.

Unpaved Roads

The AP-42 equation that calculates PM-10 emission factors for unpaved road fugitive dust requires as input the road surface material silt content, road surface moisture content, average vehicle speeds, and the annual number of wet days (with at least 0.01 inch of precipitation). For unpaved roads in the Maricopa County PM-10 nonattainment area, the silt content is 11.9 percent, the moisture content is 0.5 percent, and the average vehicle speeds are 25 mph for public unpaved roads, 20 mph for private unpaved roads, and 10 mph for unpaved alleys. These inputs to AP-42 are also described in Appendix R. These inputs to the AP-42 equations for unpaved roads are consistent with the assumptions used in the MAG 2012 Five Percent Plan for PM-10 (MAG, 2012).

During the period 2008-2012, there was an annual average of 32 days with at least 0.01 inch of precipitation in the Maricopa County area. This annual number of wet days, derived from National Weather Service data collected at Sky Harbor Airport, is also input to the AP-42 equation to calculate unpaved road emission factors.

The AP-42 emission factors for unpaved roads are multiplied by the VMT on public and private unpaved roads and alleys in the Maricopa County PM-10 nonattainment area. The vehicle miles of travel for public unpaved roads are derived from the 2009 MAG Unpaved Road Inventory (URI) (MAG, 2010). According to the URI, there were 613.4 miles of public unpaved roads in the PM-10 nonattainment area in 2009. MAG utilized 2009 traffic counts on unpaved roads, supplemented by Geographic Information Systems (GIS) image recognition techniques, to estimate the daily VMT on public unpaved roads in 2009.

In February 2011, MAG conducted additional traffic counts on a random sample of unpaved roads and alleys in the PM-10 nonattainment area. MAG also conducted a comprehensive inventory of private unpaved roads in the PM-10 nonattainment area that was completed in September 2011. The 2011 inventory indicated that there were 461.1 miles of public unpaved roads in the PM-10 nonattainment area.

The 2011 inventory indicated that there were 927.3 miles of private unpaved roads in the PM-10 nonattainment area. Based on updated information received in August 2012, the private unpaved road inventory was increased to 974.6 miles. The 2011 inventory indicated that 28 percent of the private unpaved roads were stabilized. In addition, the 2011 traffic counts indicated that 26 vehicles travel on private unpaved roads on an average weekday. This value is multiplied by 0.93 to convert to annual average daily traffic (AADT).

MAG has conducted updated private unpaved road inventories every year since 2011. Therefore, private unpaved road miles have been updated annually through 2015. Using GIS data for the period 2002-2013, MAG has determined the historical rate at which new private unpaved roads have been created is 0.9 percent per year. Therefore, the 2017 MAG Conformity Analysis assumes that private unpaved road mileage is increased by 0.9 percent per year after 2015.

MAG also used GIS to estimate that there were 650 miles of unpaved alleys in the PM-10 nonattainment area in 2009. The VMT on unpaved alleys is obtained by multiplying the miles of unpaved alleys by the average daily traffic. The average daily traffic for unpaved alleys, obtained from 2011 alley traffic counts, is four vehicles per day, which is used to estimate uncontrolled emissions (i.e., before applying reductions attributable to alley paving projects). The VMT on unpaved alleys is held constant for all conformity analysis years.

The VMT on public unpaved roads is also held constant for all conformity analysis years to estimate uncontrolled emissions (i.e., before applying reductions attributable to paving projects). The PM-10 emissions produced by public unpaved roads with 150 ADT or more is reduced by 50 percent to reflect the Maricopa County Rule 310.01 requirement that these roads needed to be paved or stabilized by June 10, 2004. It is assumed that these high volume dirt roads are being stabilized with dust suppressants that have a control efficiency of 50 percent.

Paved Roads

The AP-42 equation that calculates PM-10 emission factors for paved road fugitive dust requires as input the road surface silt loading, the average weight of vehicles traveling on paved roads, and the annual number of wet days (with at least 0.01 inch of precipitation). For the silt loadings, paved roads are split into three classes: freeways, with a silt loading of 0.02 grams per square meter; high-traffic arterials (non-freeways carrying 10,000 vehicles or more per average weekday), with a silt loading of 0.067 grams per square meter; and low-traffic arterials (non-freeways carrying less than 10,000 vehicle per average weekday), with a silt loading of 0.23 grams per square meter. These inputs to AP-42 are also described in Appendix R. These silt loadings are consistent with the MAG 2012 Five Percent Plan for PM-10.

Since the silt loadings are stratified by road type, vehicle weights are estimated separately for freeways and arterials for each conformity year. The average vehicle weights for freeways and arterials were calculated using MOVES2014a Regulatory Class output, based on July 2016 vehicle registrations for Maricopa County and the latest traffic assignment data for each year. The average vehicle weights for freeways are 3.16 tons in 2025, 3.19 tons in 2035, and 3.23 tons in 2040. The average vehicle weights for arterials are 2.32 tons in 2025, 2.31 tons in 2035, and 2.32 tons in 2040.

During the period 2008-2012, there were an average of 32 days with at least 0.01 inch of precipitation in Maricopa County. This annual number of wet days, derived from National Weather Service data collected at Sky Harbor Airport, is also input to the AP-42 equation to calculate paved road emission factors.

The AP-42 equation for paved roads uses the assumptions above to estimate PM-10 emission factors in grams per vehicle mile of travel (VMT). The AP-42 emission factors for paved roads are multiplied by the VMT for freeways, high-traffic arterials, and low-traffic arterials to calculate uncontrolled paved road emissions. The VMTs for freeways and high

and low traffic arterials in the Maricopa County PM-10 nonattainment area are derived from the MAG TransCAD transportation model for each conformity analysis year.

Road Construction

As required by Section 93.122(e) of the federal transportation conformity rule, PM-10 emissions from road construction were estimated for each conformity analysis year. Road construction emissions were estimated using the methodology in the MAG 2012 Five Percent Plan, with the exception of an updated rule effectiveness rate. The methodology for calculating rule effectiveness, developed by the Maricopa County Air Qualify Department (MCAQD) in coordination with EPA Region IX staff, is documented in Appendix 3 of the 2008 PM-10 Periodic Emissions Inventory (MCAQD, 2011). MCAQD reported to MAG in May 2013 that the rule effectiveness for Rule 310 had declined from 94 to 93 percent between 2011 and 2012. The 2012 road construction emissions in the Maricopa PM-10 nonattainment area, estimated using a 93 percent rule effectiveness rate, are held constant for all conformity analysis years.

Emission Reductions

The 2017 MAG Conformity Analysis for the Maricopa County PM-10 nonattainment area includes credit for measures and projects that reduce PM-10 emissions. The PM-10 reductions assumed in the 2017 MAG Conformity Analysis are described below.

PM-10 Certified Street Sweepers - In the 2017 MAG Conformity Analysis, emission reduction credit is taken for PM-10 certified street sweepers purchased with MAG Congestion Mitigation and Air Quality Improvement (CMAQ) funds between January 1, 2001 and December 31, 2009. During this nine-year period, MAG member agencies purchased 123 PM-10 certified sweepers to replace conventional sweepers, increase the frequency of sweeping, and expand the area swept in the PM-10 nonattainment area. An inventory conducted by MAG for the period ending June 30, 2010 indicated that 23 of these sweepers were no longer in service as of December 31, 2009. The methodology used in calculating the benefit of these 100 sweepers in 2010 is consistent with that used in the MAG 2012 Five Percent Plan for PM-10. In conformity years after 2010, the benefit of PM-10 certified sweepers is increased based on the growth in VMT on non-freeways located in the PM-10 nonattainment area.

In addition, an ADOT contract, effective February 20, 2010, identifies the specific freeways, ramps and frontage roads in the PM-10 nonattainment area that are being swept with PM-10 certified sweepers, as well as the required sweeping frequency. The emission reduction credit for sweeping the roads identified in the ADOT contract was calculated for 2012. For all conformity analysis years after 2012, the credit is increased proportionally to the growth in VMT on the roads in the PM-10 nonattainment area that are being swept by the ADOT contractor. The VMT on these roads is derived from the TransCAD model output for each conformity analysis year.

In every year since 2001, MAG has funded PM-10 efficient street sweepers using Congestion Mitigation and Air Quality Improvement (CMAQ) funds. By 2010, virtually all conventional sweepers had been replaced with PM-10 efficient sweepers in the Maricopa County PM-10 nonattainment area. Therefore, the PM-10 emission reduction benefit of the PM-10 certified sweepers that had been purchased and were still active on December 31, 2009 was used in calculating the 2010 base case emissions in Appendix B, Exhibit 2: Calculation of Benefits from PM-10 Certified Street Sweepers Purchased with CMAQ Funds in 2001-2009, of the MAG 2012 Five Percent Plan for PM-10. Since 2010, CMAQ funding in the MAG TIP has continued to be used every year to replace older PM-10 certified sweepers, expand the area swept, and increase sweeping frequency. There is $6.8 million in CMAQ funds currently programmed in the MAG FY 2018-2022 TIP to purchase future PM-10 efficient street sweepers. After the FY 2018-2022 TIP, it will be assumed in the conformity analysis that MAG will continue to fund PM-10 certified sweepers annually through the RTP year of 2040. For all conformity analysis years, the benefit of the CMAQ-funded sweepers is increased in direct proportion to the annual growth in VMT on arterials in the PM-10 nonattainment area; this reflects the fact that arterials being swept with PM-10 efficient sweepers are projected to continue having higher traffic volumes in future years.

Unpaved Road and Alley Projects - For the 2017 MAG Conformity Analysis, reduction credit was also taken for projects completed between January 1, 2008 and December 31, 2012 that paved or reduced speed limits on unpaved roads and alleys in the PM-10 nonattainment area. The emission reductions for projects completed by December 31, 2012 are consistent with those used in the MAG 2012 Five Percent Plan for PM-10. Credit for these projects is applied to all conformity analysis years.

In addition, the 2017 MAG Conformity Analysis takes credit for paving projects programmed in the MAG Transportation Improvement Program (TIP). Credit for TIP projects that pave unpaved roads and alleys programmed in FY 2011-2022 is taken in the 2025, 2035, and 2040 conformity analysis years.

Chapter Ten of the 2040 MAG Regional Transportation Plan (RTP) indicates that ten miles of unpaved roads will be paved each year in the PM-10 nonattainment area. The 2017 MAG Conformity Analysis assumes that ten miles will be paved each year beginning in 2023 and continuing through 2040, the last year of the RTP.

Paved Road Projects - For the 2017 MAG Conformity Analysis, reduction credit was taken for projects completed between January 1, 2008 and December 31, 2012 that paved unpaved shoulders and overlaid roads with rubberized asphalt in the PM-10 nonattainment area. The emission reductions for projects completed by December 31, 2012 are consistent with those used in the MAG 2012 Five Percent Plan for PM-10. Credit for these projects is applied to all conformity analysis years.

PINAL COUNTY PM-10 AND PM-2.5 NONATTAINMENT AREAS

MOVES2014a

MOVES2014a is a model developed by EPA for the purpose of estimating motor vehicle emission factors for specified vehicle fleet, fuel, temperature, and speed conditions. This model is used to estimate particulate (exhaust, tire wear, and brake wear) emission factors for the Pinal PM-10 and PM-2.5 nonattainment areas and nitrogen oxide (NOx) exhaust emission factors for the Pinal PM-2.5 nonattainment area.

The MOVES2014a model generates estimates of motor vehicle emission factors in units of grams of pollutant emitted per vehicle mile of travel. MOVES2014a uses a locally-derived motor vehicle registration distribution (by model year) of 30 years. For the 2017 MAG Conformity Analysis, July 2016 vehicle registrations for Pinal County, obtained from the Arizona Department of Transportation, were used as input to MOVES2014a. MOVES2014a also incorporates fleet turnover to newer, cleaner vehicles over time, which counters the increase in regional emissions that occur with growth in vehicle miles of travel. Other factors, such as fuel quality and vehicle speed, are also important.

Inspection and maintenance (I/M) program benefits were assumed for the portion of Area A which is located in the Pinal PM-10 nonattainment area. The I/M runs reflect the provisions of the enhanced inspection program which was implemented in January 1995 and the measure "Phased-in Emission Test Cutpoints" (see Table 4), implemented in January 2000. The cutpoint values used are the MOVES2014a default Phase 2 cutpoints. For the four horizon years modeled in this analysis, it was assumed that the onboard diagnostic (OBD) test would be used for the model year 1996 and newer vehicles with an exemption for all vehicles of the current plus four model years.

MOVES2014a outputs were weighted to account for vehicles driving in the Pinal PM-10 nonattainment area that do not participate in the I/M program. Therefore, each modeled scenario required runs with and without the I/M program benefits. For this analysis, it was assumed that 91.6 percent of eligible onroad vehicles participate in the I/M program within the Area A portion of the Pinal PM-10 nonattainment area. This fraction reflects an increase in the participation in the I/M program due to implementation of the measure, "Tougher Enforcement of Vehicle Registration and Emission Test Compliance" (see Table 4). For all scenarios modeled for this analysis, the inputs for each run included oxygenated gasoline with an assumed market share of 100 percent ethanol. The gasoline volatility and average oxygen content of the ethanol blend gasoline were based on fuel inspection data provided to MAG by the Arizona Department of Weights and Measures.

The MOVES2014a runs that reflected the I/M program in Area A assumed vehicle waiver rates of 1.3 percent or 1.0 percent, dependent upon model year. These fractions reflected the lower waiver rates resulting from the implementation of "One Time Waiver from Vehicle Emissions Test" (see Table 4). The output from the MOVES2014a model includes emission factors by hour, roadway facility type, pollutant, and area type.

MOVESLink

MOVESLink software processes link data files output by the MAG transportation model, TransCAD. The program calculates emissions for roadway links in the MAG highway networks, which include all of Maricopa and Pinal County. Traffic volumes for four time periods (AM peak, mid-day, PM peak, and night time) for each link are converted into hourly volumes based upon traffic count data collected in Maricopa County in 2007. Hourly emission factors are developed by running MOVES2014a for each facility type, area type, and vehicle class using link speeds by time of day.

The transportation model inputs to MOVESLink consist of database formatted files that contain link-specific data and a node coordinate definitions file. MOVESLink also requires as input:

- A table containing adjustment factors used to allocate traffic volumes for four time periods to hourly traffic volumes.
- A matrix of emission factors for a range of hours, facility types, area types, vehicle classes, and vehicle ages (generated by the MOVES model).
- The ratio of vehicles participating in the I/M program.
- The year being modeled.

The air quality modeling assumptions for the three pollutants for which conformity in the PInal County nonattainment areas has been performed are discussed below. These pollutants are PM-10, PM-2.5 and NOx.

For the 2017 MAG Conformity Analysis, the applicable conformity tests for PM-10 in the Pinal PM-10 nonattainment area and PM-2.5 and NOx in the Pinal PM-2.5 nonattainment area are the action/baseline scenario analyses for 2018, 2025, 2035, and 2040 as discussed in Chapter 1. Pinal County vehicle registrations for July 2016, obtained from the Arizona Department of Transportation, were used as input to MOVES2014a for all three pollutants. MOVES2014a and MOVESLink were applied to estimate vehicle emissions for PM-10, PM-2.5 and NOx. AP-42 equations were applied to estimate PM-10 emission factors from vehicles traveling on paved and unpaved roads in the Pinal PM-10 nonattainment area.

Paved and unpaved road emissions were not estimated for the Pinal PM-2.5 nonattainment area, because Section 119(f)(8) of the EPA Conformity Regulations indicates that reentrained road dust only needs to be included in the conformity analysis for PM-2.5 nonattainment areas if EPA or the Arizona Department of Environmental Quality have made a finding and notified MAG and the U.S. Department of Transportation that these sources are a significant contributor to the PM-2.5 problem.

Road construction emissions were not included in the conformity analysis for the PM-10 nonattainment area, because the 2008 Pinal County PM-10 emissions of 185.31 tons per year from road construction (Edwards, 2010) represent less than one percent of the total low wind emissions reported in the Draft Pinal County PM10 Nonattainment Area 2008 Base Year Emissions for Selected Design Days and Modeling Domains (Sierra Research, 2013).

Traffic data (vehicle miles of travel and speeds by link) were generated with the TransCAD transportation model. GIS was used to derive VMT by link for the Pinal PM-10 and PM-2.5 nonattainment areas. The MOVESLink model was used to calculate emissions for each nonattainment area using MOVES2014a emission factors and the traffic data. The analysis for both the Pinal PM-10 and PM-2.5 nonattainment areas reflects data on an annual average day.

The MOVES2014a and MOVESLink models used in estimating onroad vehicle emissions for the Pinal County nonattainment areas are described in the next two sections. For the West Pinal PM-10 nonattainment area, output of the MOVESLink model represents PM-10 emissions from vehicle exhaust, tire wear and brake wear. For the West Central Pinal PM-2.5 nonattainment area, the MOVESLink output represents vehicle exhaust emissions for nitrogen oxides (NOx) and exhaust, tire wear and brake wear emissions for PM-2.5.

PM-10 emission factors for reentrained dust from vehicles traveling on unpaved and paved roads in the Pinal PM-10 nonattainment area are calculated using the latest equations found in Sections 13.2.2 and 13.2.1.3, respectively, of AP-42, EPA Compilation of Air Pollutant Emission Factors. The AP-42 equation for paved roads was revised by EPA in January 2011. The unpaved and paved road emission factors are multiplied by vehicle miles of travel to estimate unpaved and paved road emissions. The last two sections discuss the assumptions used to calculate particulate emissions from unpaved and paved roads in the Pinal PM-10 nonattainment area.

Unpaved Roads

The AP-42 equation that calculates PM-10 emission factors for unpaved road fugitive dust requires as input the road surface material silt content, road surface moisture content, average vehicle speed, and the annual number of wet days (with at least 0.01 inch of precipitation). The unpaved roads in the Pinal PM-10 nonattainment area are stratified by four categories (agricultural, public, private and trails) and a number of subcategories. The silt content, moisture content and speeds shown in Table 8 are inputs to the AP-42 equation for unpaved roads. This 2018 data was provided to MAG in January 2016 by the Arizona Department of Environmental Quality, based on their 2018 unpaved road emission calculations in the 2015 West Pinal Moderate PM10 Nonattainment Area SIP, submitted to EPA on December 21, 2015.

Based on 2008 precipitation data, there was an annual average of 33 days with at least 0.01 inch of precipitation in Pinal County. This annual number of wet days, reported by the

National Weather Service station located in Casa Grande, is also input to the AP-42 equation to calculate unpaved road emission factors for the Pinal PM-10 nonattainment area.

The annual average daily traffic (AADT) and miles of unpaved roads by subcategory in the Pinal PM-10 nonattainment area are shown in Table 8. The AADT and miles represent 2008 data provided to MAG by the Pinal County Air Quality Control District in July 2013.

TABLE 8.
DATA USED TO CALCULATE EMISSIONS FROM UNPAVED ROADS
IN THE PINAL PM-10 NONATTAINMENT AREA

Categories/Subcategories		Silt Content	Moisture Content	Speed	AADT	Miles
Agricultural		14.9%	0.8%			
	Non-Harvest			28 mph	11.3	922.7
	Inspection			28 mph	11.3	2,830.7
	Harvest			21 mph	19.3	421.7
Public		7.1%	0.3%			
	Class A			29 mph	28.0	89.7
	Class B			44 mph	96.4	239.2
	Class C			37 mph	108.8	89.7
	Class D			47 mph	181.7	119.6
	Class E			40 mph	619.0	59.8
Private		14.4%	0.3%			
	Non-Irrigation			25 mph	28.0	893.2
	Principal Canal			25 mph	16.8	148.2
	Secondary Canal			15 mph	3.4	743.6
Trails		14.4%	0.3%	15 mph	2.0	1,244.0

The AADT is multiplied by the miles to calculate VMT. The VMT is multiplied by the AP-42 emission factor to obtain the PM-10 unpaved road emissions for trails and each agricultural, public and private unpaved road subcategory. The daily unpaved road emissions calculated using AP-42 represent uncontrolled PM-10 emissions. The uncontrolled 2008 unpaved road emissions are held constant for all conformity analysis years.

Emission reductions are assumed for sources in Pinal County that are currently controlled by Arizona state laws. For the 2017 MAG Conformity Analysis, a six percent reduction has been applied to fugitive dust emissions from agricultural unpaved roads for the action and baseline scenarios in all conformity analysis years. This reduction reflects requirements of

the state Agricultural Best Management Practices (BMPs) that apply to all moderate PM-10 nonattainment areas in Arizona. The Agricultural BMPs went into effect when EPA designated the West Pinal area to be a moderate nonattainment area for PM-10, effective July 2, 2012.

The six percent reduction in agricultural unpaved road emissions is consistent with assumptions in the 2008 PM-10 Periodic Emissions Inventory for the Maricopa County, Arizona, Nonattainment Area, prepared by the Maricopa County Air Quality Department (MCADQ, 2011). This reduction is applied to both the action and baseline scenarios in each conformity analysis year (i.e., 2018, 2025, 2035, and 2040).

The emissions from public unpaved roads are reduced in the action scenario to take credit for paving projects scheduled for implementation in the Pinal PM-10 nonattainment area. These twelve paving projects and their implementation years are listed in Table 9.

The benefit of these projects is calculated using the AP-42 emission factor for public unpaved roads multiplied by the length and average daily traffic (ADT) of the road to be paved. The mileage and ADT for each paving project are shown in Table 9. The ADT is multiplied by 0.93 to convert to annual average daily traffic (AADT).

TABLE 9.
PAVING PROJECTS IN THE PINAL COUNTY PM-10 NONATTAINMENT AREA

Agency	Fiscal Year	Location	Miles	ADT
Coolidge	2022	Bartlett Rd: Hwy 87 to 5th Street	0.46	31
Coolidge	2023	Randolph Rd: Hwy 87 to Vail Rd	1.00	140
Coolidge	2027	Macrae Rd: Coolidge Ave to Martin Rd	1.08	118
Coolidge	2027	Macrae Rd: Coolidge Ave to Vah Ki Inn Rd	1.01	174
Coolidge	2027	McCartney Rd: La Palma Rd to Sunshine Blvd	1.01	140
Coolidge	2027	Signal Peak Rd: Woodruff Rd to McCartney Rd	1.00	140
Coolidge	2028	McCartney Rd: Sunshine Blvd to Eleven Mile Corner	1.00	140
Coolidge	2030	Macrae Rd: Vah Ki Inn Rd to Hwy 87	1.02	130
Coolidge	2030	Val Vista Rd: Signal Peak Rd to 1/4 mi east of Curry Rd	1.28	57
Coolidge	2031	Val Vista Rd: Macrae Rd to 1/4 mi east of Curry Rd	1.21	67
Eloy	2015	Houser Rd: Frontier to Eleven Mile Corner	1.60	140
Maricopa	2018	Bolwin Rd: Hartman Rd to Murphy Rd	1.00	140

The AP-42 unpaved road emission benefit for each project is reduced by 1.47 grams per mile to account for the paved road emission rate of vehicles traveling on the newly paved road. To be conservative, this rate assumes that the newly-paved road does not have a paved shoulder or curb and gutter. If a traffic count has not been performed on the unpaved road, an ADT of 140 vehicles per day is assumed. This represents the average ADT for all public unpaved roads in the Pinal PM-10 nonattainment area in 2008.

The total PM-10 emissions reduction due to the paving projects is applied to the 2018, 2025, 2035, and 2040 action scenarios, based on the year of implementation. Credit for the paving projects implemented in FY 2016-2017 is applied in 2018. Credit for the paving projects implemented in FY 2016-2024 is applied in 2025; credit for the projects implemented in FY 2016-2034 is applied in 2035 and 2040.

Paved Roads

The AP-42 equation that calculates PM-10 emission factors for paved road fugitive dust requires as input the road surface silt loading, the average weight of vehicles traveling on paved roads, and the number of wet days (with at least 0.01 inch of precipitation). The road surface silt loadings used for the Pinal PM-10 nonattainment area are 0.02 g/m^2 for freeways, 0.067 g/m^2 for high-traffic arterials, and 0.23 g/m^2 for low-traffic arterials.

The average vehicle weights for the baseline scenarios are 7.20 tons for freeways and 2.45 tons for arterials in 2018, 7.51 tons for freeways and 2.43 tons for arterials in 2025, 7.87 tons for freeways and 2.42 tons for arterials in 2035, and 8.12 tons for freeways and 2.42 tons for arterials in 2040. The average vehicle weights for the action scenarios are 7.23 tons for freeways and 2.46 tons for arterials in 2018, 7.40 tons for freeways and 2.47 tons for arterials in 2025, 7.65 tons for freeways and 2.48 tons for arterials in 2035, and 7.83 tons for freeways and 2.49 tons for arterials in 2040.

Based on 2008 precipitation data, there was an annual average of 33 days with at least 0.01 inch of precipitation in Pinal County. This annual number of wet days, reported by the National Weather Service station located in Casa Grande, is also input to the AP-42 equation to calculate paved road emission factors for the Pinal PM-10 nonattainment area.

The resulting AP-42 emission factors are multiplied by the 2008 VMT for the Pinal PM-10 nonattainment area produced by the Arizona Department of Transportation using the TransCAD model. The TransCAD output is multiplied by 0.92 for freeways and by 0.93 for arterials to convert from average weekday to annual average daily traffic. The total VMT is stratified by freeway, high-traffic arterials and low-traffic arterials using the percent of VMT for each of these categories in the Pinal PM-10 nonattainment area, obtained by applying GIS to a MAG 2011 traffic assignment. The resultant 2008 paved road emissions are consistent with the estimate in the Draft 2008 Periodic Emissions Inventory for PM-10, currently being developed by the Arizona Department of Environmental Quality for the Pinal PM-10 nonattainment area (Sierra Research, 2013).

For the conformity analysis years of 2018, 2025, 2035, and 2040 paved road emissions for the action and baseline scenarios are increased based on the growth in VMT estimated by the MAG TransCAD model for the Pinal PM-10 nonattainment area, relative to 2008. In all analysis years the paved road emissions for the action scenario are higher than the baseline scenario. This increase is more than offset by the emission reductions attributable to the projects in Table 9 that pave unpaved roads in the Pinal PM-10 nonattainment area.

5 TRANSPORTATION CONTROL MEASURES

This chapter provides an update of the current status of transportation control measures identified in applicable implementation plans. Requirements of the federal conformity rule relating to transportation control measures (TCMs) are presented first, followed by a review of the applicable air quality implementation plans and TCM findings for the FY 2018-2022 MAG Transportation Improvement Program (TIP) and 2040 MAG Regional Transportation Plan. A review of the funding and current status of TCM implementation is presented. The chapter concludes with a measure-by-measure assessment of the current status of each transportation control measure.

FEDERAL CONFORMITY RULE REQUIREMENTS FOR TCMs

The federal conformity rule (40 CFR 93.113) requires that the TIP and Regional Transportation Plan "must provide for the timely implementation of TCMs in the applicable implementation plan." The federal definition for the term "transportation control measure" is provided in 40 CFR 93.101:

> "any measure that is specifically identified and committed to in the applicable implementation plan that is either one of the types listed in Section 108 of the CAA [Clean Air Act], or any other measure for the purpose of reducing emissions or concentrations of air pollutants from transportation sources by reducing vehicle use or changing traffic flow or congestion conditions. Notwithstanding the first sentence of this definition, vehicle technology-based, fuel-based, and maintenance-based measures which control the emissions from vehicles under fixed traffic conditions are not TCMs for the purposes of this subpart."

In the federal conformity rule, the definition provided for the term "applicable implementation plan" is:

> "Applicable implementation plan is defined in section 302(q) of the CAA and means the portion (or portions) of the implementation plan, or most recent revision thereof, which has been approved under section 110, or promulgated under section 110(c), or promulgated or approved pursuant to regulations promulgated under section 301(d) and which implements the relevant requirements of the CAA."

Section 108(f)(1) of the Clean Air Act as amended in 1990 lists the following transportation control measures and technology-based measures:

(i) programs for improved public transit;
(ii) restriction of certain roads or lanes to, or construction of such roads or lanes for use by, passenger buses or high occupancy vehicles;
(iii) employer-based transportation management plans, including incentives;
(iv) trip-reduction ordinances;
(v) traffic flow improvement programs that achieve emission reductions;
(vi) fringe and transportation corridor parking facilities serving multiple occupancy vehicle programs or transit service;
(vii) programs to limit or restrict vehicle use in downtown areas or other areas of emission concentration particularly during periods of peak use;
(viii) programs for the provision of all forms of high-occupancy, shared-ride services;
(ix) programs to limit portions of road surfaces or certain sections of the metropolitan area to the use of non-motorized vehicles or pedestrian use, both as to time and place;
(x) programs for secure bicycle storage facilities and other facilities, including bicycle lanes, for the convenience and protection of bicyclists, in both public and private areas;
(xi) programs to control extended idling of vehicles;
(xii) programs to reduce motor vehicle emissions, consistent with title II, which are caused by extreme cold start conditions;
(xiii) employer-sponsored programs to permit flexible work schedules;
(xiv) programs and ordinances to facilitate non-automobile travel, provision and utilization of mass transit, and to generally reduce the need for single-occupant vehicle travel, as part of transportation planning and development efforts of a locality, including programs and ordinances applicable to new shopping centers, special events, and other centers of vehicle activity;
(xv) programs for new construction and major reconstructions of paths, tracks or areas solely for the use by pedestrian or other non-motorized means of transportation when economically feasible and in the public interest. For purposes of this clause, the Administrator shall also consult with the Secretary of the Interior; and
(xvi) program to encourage the voluntary removal from use and the marketplace of pre-1980 model year light duty vehicles and pre-1980 model light duty trucks.

<u>TCM Requirements For A Transportation Plan</u>

The EPA regulations in 40 CFR 93.113(b) indicate that transportation control measure requirements for transportation plans are satisfied if two criteria are met:

"(1) The transportation plan, in describing the envisioned future transportation

system, provides for the timely completion or implementation of all TCMs in the applicable implementation plan which are eligible for funding under Title 23 U.S.C. or the Federal Transit Laws, consistent with schedules included in the applicable implementation plan.

(2) Nothing in the transportation plan interferes with the implementation of any TCM in the applicable implementation plan."

TCM Requirements For A Transportation Improvement Program

Similarly, in 40 CFR Section 93.113(c), EPA specifies three TCM criteria applicable to a transportation improvement program:

"(1) An examination of the specific steps and funding source(s) needed to fully implement each TCM indicates that TCMs which are eligible for funding under title 23 U.S.C. or the Federal Transit Laws are on or ahead of the schedule established in the applicable implementation plan, or, if such TCMs are behind the schedule established in the applicable implementation plan, the MPO and DOT have determined that past obstacles to implementation of the TCMs have been identified and have been or are being overcome, and that all state and local agencies with influence over approvals or funding for TCMs are giving maximum priority to approval or funding of TCMs over other projects within their control, including projects in locations outside the nonattainment or maintenance area;

(2) If TCMs in the applicable implementation plan have previously been programmed for federal funding but the funds have not been obligated and the TCMs are behind the schedule in the implementation plan, then the TIP cannot be found to conform:

- if the funds intended for those TCMs are reallocated to projects in the TIP other than TCMs, or

- if there are no other TCMs in the TIP, if the funds are reallocated to projects in the TIP other than projects which are eligible for federal funding intended for air quality improvement projects, e.g., the Congestion Mitigation and Air Quality Improvement Program; and

(3) Nothing in the TIP may interfere with the implementation of any TCM in the applicable implementation plan."

APPLICABLE AIR QUALITY IMPLEMENTATION PLANS

Only transportation control measures from applicable implementation plans for the MAG region are required to be updated for this analysis. For the 2017 MAG Conformity Analysis, the applicable implementation plans, according to the definition provided at the start of this chapter, are the:

- Revised MAG 1999 Serious Area Carbon Monoxide Plan approved by EPA on March 9, 2005;
- MAG 2003 Carbon Monoxide Redesignation Request and Maintenance Plan approved by EPA on March 9, 2005;
- MAG 2013 Carbon Monoxide Maintenance Plan approved by EPA on March 3, 2016;
- Serious Area Ozone State Implementation Plan for Maricopa County was prepared by ADEQ and approved by EPA on June 14, 2005;
- MAG 2004 One-Hour Ozone Redesignation Request and Maintenance Plan approved by EPA on June 14, 2005;
- MAG 2007 Eight-Hour Ozone Plan approved by EPA on June 13, 2012;
- MAG 2009 Eight-Hour Ozone Redesignation Request and Maintenance Plan approved by EPA on September 17, 2014;
- MAG 2014 Eight-Hour Ozone Plan - Submittal of Marginal Area Requirements approved by EPA on October 16, 2015;
- Revised MAG 1999 Serious Area Particulate Plan for PM-10 approved by EPA on July 25, 2002; and
- MAG 2012 Five Percent Plan for PM-10 approved by EPA on June 10, 2014.

In addition, the Revised 1998 15 Percent Rate of Progress (ROP) Federal Implementation Plan (FIP) for ozone and the Moderate Area Federal Implementation Plan for PM-10 are applicable plans. However, neither of these plans contained TCMs.

Although not approved and therefore not applicable by definition, TCMs in previous air quality plans submitted to EPA are discussed in this chapter for informational purposes. A summary of the commitments from the submitted plans are also included for informational purposes.

Applicable Implementation Plans for Carbon Monoxide

Since EPA has approved the Revised MAG 1999 Serious Area Carbon Monoxide Plan, this plan is applicable and the transportation control measures contained in the plan are discussed. The TCMs in the Serious Area Carbon Monoxide Plan are the same as those in the approved Serious Area PM-10 Plan. The Revised MAG 1999 Serious Area CO Plan provides a comprehensive implementation schedule for all of the control measures in Chapter Eight (pages 8-1 through 8-146). An assessment of the expected effectiveness of each measure is located in Chapter V of the Technical Support Document (TSD) of the Revised MAG 1999 Serious Area CO Plan. These chapters are contained in Appendix G of the conformity analysis. All TCMs for which emission reduction credit was taken in the Serious Area CO Plan have been implemented and are incorporated into the base year traffic assignment for the conformity analysis.

In addition, on March 9, 2005, the EPA approved the MAG 2003 Carbon Monoxide Redesignation Request and Maintenance Plan for the Maricopa County Nonattainment Area. The MAG 2013 Carbon Monoxide Maintenance Plan for the Maricopa County Area was approved by EPA on March 3, 2016. The Carbon Monoxide Maintenance Plans do not introduce any new TCMs; however, two TCMs, “Coordinate Traffic Signal Systems” and “Develop Intelligent Transportation Systems”, will continue to be implemented through the maintenance year of 2025. However, no emission reduction credit is taken for these TCMs in conformity.

Submitted Implementation Plans for Carbon Monoxide

Two other submitted carbon monoxide plans provide information on additional transportation control measures. All TCMs for which emission reduction credit was taken in submitted carbon monoxide plans have been incorporated into the base year traffic assignment for the conformity analysis.

The MAG 1987 Carbon Monoxide Plan provides a comprehensive implementation schedule in Chapter Seven (pages 7-1 through 7-84) for all of the control measures of that Plan. Chapter Eight of the MAG 1987 CO Plan assessed the expected effectiveness of each measure. These chapters are located in Appendix D of the conformity analysis.

In the MAG 1993 Carbon Monoxide Plan, the control measures and implementation schedule are contained in Chapter Eight (pages 8-1 through 8-68). Chapter Nine of the MAG 1993 CO Plan presents an assessment of the expected effectiveness of each measure. These chapters are located in Appendix E. Similarly, Chapter Two of the MAG 1993 Carbon Monoxide Plan Addendum contains a description of additional measures provided under Arizona House Bill 2001 (see Appendix F).

Applicable Implementation Plans for Ozone

The MAG One-Hour Ozone Redesignation Request and Maintenance Plan, approved by

EPA on June 14, 2005, contains measures from the Revised MAG 1999 Serious Area Carbon Monoxide Plan and Carbon Monoxide Redesignation Request and Maintenance Plan, since most of those measures also reduce ozone. Therefore, no new TCMs are introduced. The Serious Area Ozone State Implementation Plan for Maricopa County, submitted by the Arizona Department of Environmental Quality (ADEQ, 2000), was approved by EPA on June 14, 2005. This Plan contains a list of control measures; however no new TCMs are introduced on this list.

In addition, on June 13, 2012, EPA approved the MAG 2007 Eight-Hour Ozone Plan for the Maricopa Nonattainment Area, effective July 13, 2012. On September 17, 2014, EPA approved the MAG 2009 Eight-Hour Ozone Redesignation Request and Maintenance Plan for the Maricopa Nonattainment Area. These Plans do not introduce any new TCMs; however, two TCMs, "Coordinate Traffic Signal Systems" and "Develop Intelligent Transportation Systems", will continue to be implemented through the maintenance year of 2025. No emission reduction credit is taken for these TCMs in conformity. Also, the MAG 2014 Eight-Hour Ozone Plan - Submittal of Marginal Area Requirements did not include any measures.

The other applicable ozone plan is the 15 Percent Rate of Progress (ROP) Federal Implementation Plan (FIP) promulgated by EPA on May 27, 1998 for the Maricopa County nonattainment area, effective June 26, 1998. On July 6, 1999, EPA issued the Final Rule for changes to the control strategy used in developing the Revised ROP FIP (EPA, 1999a). However, the Revised ROP FIP did not introduce any TCMs.

Submitted Implementation Plans for Ozone

Although there is no applicable implementation plan for ozone that specifies TCMs for this region, measures included in submitted plans for ozone are reviewed for informational purposes in this report. These measures have been implemented and any resulting creditable emission reduction benefits have been incorporated into the base year traffic assignment for the conformity analysis.

The selected control strategies in the 1978 Nonattainment Area Plan for CO and Photochemical Oxidants in the Maricopa County Urban Planning Area (ADHS, 1978) are contained in Chapter Four (pages 4-1 through 4-18) of that document. Chapter Five of that Plan addressed the expected impact of the selected control strategies. These chapters are provided in Appendix H. The 1978 Plan contained five transportation-related measures, of which only two would be considered TCMs under the EPA definition: Carpooling - Voluntary Program; and Modified Work Schedules - Voluntary Program.

TCMs from the 1987 MAG Ozone Plan for the Maricopa County Area have been documented in Appendix I of the conformity analysis. The MAG 1993 Ozone Plan and 1993 Ozone Plan Addendum contain additional TCMs that would reduce ozone related emissions, and these measures are documented in Appendices J and K.

The MAG 2017 Eight-Hour Ozone Moderate Area Plan was submitted to EPA in December 2016. The MAG 2017 Eight-Hour Ozone Moderate Area Plan addresses the 2008 eight-hour ozone standard of 0.075 parts per million and contains existing control measures from the Serious Area Ozone Plan, Revised MAG 1999 Serious Area Carbon Monoxide Plan, 2003 Carbon Monoxide Maintenance Plan, One-Hour Ozone Maintenance Plan, 2007 Eight-Hour Ozone Plan, and 2009 Eight-Hour Ozone Maintenance Plan.

Applicable Implementation Plans for PM-10

On July 25, 2002, the EPA took final action to approve the Revised MAG 1999 Serious Area Particulate Plan for PM-10. A measure-by-measure review of TCMs contained in the Revised MAG 1999 Serious Area PM-10 Plan is provided later in this chapter. A comprehensive implementation schedule for all of the transportation control measures is provided in Chapter Seven (pages 7-1 through 7-285) of the Revised MAG 1999 Serious Area PM-10 Plan. An assessment of the expected effectiveness of each measure is located in Chapter V of the Technical Support Document of the Revised MAG 1999 Serious Area Particulate Plan for PM-10. The TCMs in the approved MAG 1999 Serious Area PM-10 Plan are the same as those in the Serious Area Carbon Monoxide Plan. These chapters are contained in Appendix M. The only TCM for which emission reduction credit was taken in the MAG 1999 Serious Area PM-10 Plan was “Coordinate Traffic Signal Systems”.

In accordance with Section 189(d) of the Clean Air Act, the MAG 2007 Five Percent Plan for PM-10 was submitted to EPA by December 31, 2007. On September 9, 2010, EPA proposed to partially approve and partially disapprove the Five Percent Plan. On January 25, 2011, prior to any final EPA action, Arizona voluntarily withdrew the Five Percent Plan from EPA consideration.

On May 25, 2012, the MAG 2012 Five Percent Plan for PM-10 for the Maricopa County Nonattainment Area was submitted to EPA. The MAG 2012 Five Percent Plan for PM-10 contains a wide variety of existing control measures and projects that have been implemented to reduce PM-10 and a new measure designed to reduce PM-10 during high risk conditions, including high winds. While the 2007 Five Percent Plan was withdrawn, a wide range of control measures in that plan continue to be implemented to reduce PM-10 and have been resubmitted (see Appendix L). The MAG 2012 Five Percent Plan does not include any TCMs. On June 10, 2014, EPA approved the MAG 2012 Five Percent Plan for PM-10, effective July 10, 2014.

Submitted Implementation Plans for PM-10

In addition, three submitted plans for PM-10, described below, are reviewed for information on transportation control measures. All TCMs in the submitted and applicable PM-10 plans have been implemented and any resulting creditable emissions reduction benefits have been incorporated into the base year traffic assignment for the conformity analysis.

On August 3, 1998, EPA promulgated a PM-10 Moderate Area Federal Implementation Plan (EPA, 1998b), effective September 2, 1998, but this Plan did not introduce any TCMs. The MAG 1988 Particulate Plan For PM-10, provides a comprehensive implementation schedule in Chapter Seven (pages 7-1 through 7-108) for all of the control measures of that Plan. Chapter Eight of the MAG 1988 PM-10 Plan assessed the expected effectiveness of each measure. These chapters are located in Appendix N. In the MAG 1991 Particulate Plan for PM-10 for the Maricopa County Area and 1993 Revisions, the control measures and implementation schedule are contained in Chapter Seven (see Appendix O).

TCM FINDINGS FOR THE TIP AND REGIONAL TRANSPORTATION PLAN

Currently, MAG estimates that all TCMs in the applicable SIPs have been implemented for several years and any ongoing TCMs are on schedule and there are no obstacles to implementation of the TCMs. In addition, Table 10 confirms that considerable resources are being allocated to projects above and beyond the TCMs and other committed measures from applicable Plans. Therefore, the TIP and Regional Transportation Plan provide for the timely implementation of the TCMs in the applicable air quality plans and nothing in the TIP or RTP interferes with the implementation of any TCM in an applicable implementation plan.

A measure-by-measure assessment of individual transportation control measures in the applicable and other submitted plans is provided below. Some of the TCMs in the plans were implemented in the short term and have been fully implemented for several years. Their completed implementation is therefore assumed in the base year set of assumptions in the traffic assignments for the FY 2018-2022 MAG TIP and 2040 MAG Regional Transportation Plan. The TIP provides continued funding for many such TCMs (e.g. trip reduction, transit, bikeway improvements, ridesharing, and freeway management systems), which now have been implemented to a significantly greater degree than committed originally.

TABLE 10. PROGRAMMED TRANSPORTATION PROJECTS THAT IMPLEMENT TCMS AND OTHER AIR QUALITY MEASURES

SIP CATEGORY	FY 2018 FUNDING ($ MILLIONS)	FY 2018-2022 FUNDING ($ MILLIONS)	MEASURE DESCRIPTION
Regional Public/Rapid Transit	Capital $164.6 Operating $4.8*	Capital $1,230.1 Operating $39.2*	FY 2018 includes 37 proposed capital transit projects. The entire TIP includes 199 proposed capital transit projects.
Areawide Ridesharing, Travel Reduction, Education and Outreach Programs, and Vanpools	4.4	24.1	Rideshare and Trip Reduction programs are funded for each year of the FY 2018 - 2022 TIP including: the Valley Metro/RPTA Regional Rideshare and Telework Program, Maricopa County Trip Reduction Program, and the Arizona Department of Administration Travel Reduction Program. The TIP also funds 323 new and replacement vehicles for vanpools.
Park and Ride Lots	6.2	6.2	Site identification, design and construction for 2 park and ride lots.
Freeway Management System	9.6	35.6	The TIP contains 21 ADOT Freeway Management System projects.
Traffic Flow Improvements	31.5	49.9	The TIP includes 19 traffic signal synchronization and Intelligent Transportation System (ITS) projects and 8 intersection improvement projects.
Bicycle and Pedestrian Travel	54.2	101.9	The TIP includes 58 bicycle, pedestrian, and multiuse path projects.
Paving of Streets, Shoulders, and Alleys	11.9	37.9	The TIP includes 35 projects for the design and paving of dirt roadways, shoulders, alleys, and access points.
PM-10 Efficient Street Sweepers	1.8	7.2	The TIP includes $7.2 million to purchase PM-10 Efficient Street Sweepers to reduce dust on paved roads.

* This amount includes only the funding for transit operation projects listed in the FY 2018-2022 MAG Transportation Improvement Program.

In addition, the transportation plan assumes or specifically calls for TCM implementation at current or expanded levels, consistent with adopted TCM commitments. The plan specifically addresses transit service, high occupancy vehicle lanes, demand management programs, and bicycle and pedestrian facility needs. Moreover, continued reliance on alternative modes of travel is reflected in the projected levels of vehicle traffic used in the determination of facility needs and funding priorities.

A listing of projects and programs from the TIP which implement transportation control measures and other air quality measures is provided in Table 10. It should be noted that not all of the projects listed in the table correspond to specific implementation of commitments, because additional TCM implementation over and above SIP committed levels will be taking place.

Throughout the process of preparing the 2017 MAG Conformity Analysis for the FY 2018-2022 TIP and 2040 RTP, no impediments to the timely implementation of adopted TCMs have been identified. With respect to funding, the MAG region obligates approximately 100 percent of its available federal Congestion Mitigation and Air Quality (CMAQ) Improvement budget. In addition, the information provided in Table 10 provides an indication that considerable resources are being allocated to TCMs and other measures that will result in significant air quality benefits, beyond those represented by TCM commitments in applicable Plans.

MEASURE-BY-MEASURE TCM ASSESSMENT

Transportation control measure documentation used in conjunction with the conformity assessment of the TIP and Regional Transportation Plan is provided below. The numbering system used to identify control measures is consistent with the list of TCMs in Section 108 of the Clean Air Act.

(i) Programs for Improved Public Transit

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measures 3, 4, and 10
1993 Carbon Monoxide Plan*, measures 1a, 1b, and 1c
1993 Carbon Monoxide Plan Addendum*, measure I-1
Revised 1999 Serious Area Carbon Monoxide Plan, measure 24
2003 Carbon Monoxide Maintenance Plan
2013 Carbon Monoxide Maintenance Plan

1987 Ozone Plan*, measures 3, 4, and 10
1993 Ozone Plan*, measures 1a, 1b, and 1c
1993 Ozone Plan Addendum*, measure I-1

One-Hour Ozone Maintenance Plan
2007 Eight-Hour Ozone Plan
2009 Eight-Hour Ozone Maintenance Plan
2017 Eight-Hour Ozone Moderate Area Plan*

1988 PM-10 Plan, measures 18, 19, and 25
1991 PM-10 Plan with 1993 Revisions, measures 18, 19, and 25
Revised 1999 Serious Area PM-10 Plan, measure 25
2012 Five Percent Plan for PM-10

* = EPA approval pending

Measure Status:

Local commitments in the MAG 1987 CO Plan and 1987 Ozone Plan demonstrated widespread support for short- and long-range transit improvements, including park and ride lot improvements coordinated through the RPTA. The MAG 1993 CO Plan and 1993 Ozone Plan includes commitments for programs for improved public transit and local commitments for an expansion of public transportation services. New funding sources for transit improvements represented approximately a seven percent increase to base service levels. In addition, several jurisdictions advocated park-and-ride lots to support the public transit network.

The commitments from local governments for the Serious Area plans include initiatives addressing mass transit alternatives. For example, a number of cities worked in a cooperative effort with MAG, RPTA, and FTA to conduct feasibility studies for high capacity transit corridors within the metropolitan area. The studies evaluated the feasibility of options such as light rail, bus ways, and commuter rail.

Several local governments have made public transit improvements beyond commitments made in air quality plans. For example, in September 1996, Tempe voters approved a sales tax referendum to fund improved transit service. In 2000, the Phoenix voters approved the Transit 2000 Plan increasing the local sales tax by 0.4 percent over 20-years. The Transit 2000 Plan provides for light rail rapid transit, extended hours of local bus service, increased dial-a-ride service, additional express bus service, and other transit improvements. In November 2001, Glendale voters approved a half-cent sales tax for transportation improvements including increased bus service, light rail transit, and dial-a-ride. Also, in September 2005, Peoria voters approved a sales tax increase of 0.3 percent that will be dedicated to transportation improvements, including the addition of fixed route bus lines.

On November 2, 2004, voters approved Proposition 400 that extends the half-cent sales tax for transportation improvements. The 2040 Regional Transportation Plan provides the blueprint for the implementation of Proposition 400, including future public transit improvements.

In December 2008, the 20-mile Light Rail Transit (LRT) Minimum Operating Segment began service from Bethany Home Road and 19th Avenue into downtown Phoenix and from downtown Phoenix to downtown Tempe and Arizona State University, and continuing to the intersection of Main Street and Sycamore in Mesa. Since 2008, two Light Rail Extensions have opened for service. In late 2015, a 3.1 mile Central Mesa project extended light rail to Mesa Drive in Mesa and in spring 2016, a 3.2 mile Northwest Phase I project extended light rail to Dunlap Avenue in Phoenix.

On August 25, 2015, Phoenix voters approved Transportation 2050 that will provide funding for transportation improvements including bus and light rail. Funding for Transportation 2050 is being generated by a 0.7 percent sales tax over a 35 year period.

In addition, for the Conformity Analysis, MAG reports on the recent changes to the transit system. Chapter 3 provides a list of transit service changes reported by Valley Metro/RPTA in FY 2016.

Impact of TIP and RTP:

The FY 2018-2022 MAG Transportation Improvement Program contains a listing of 199 proposed capital transit projects estimated to cost a total of $1,230.1 million. The funding for proposed capital transit projects programmed for FY 2018 is approximately $164.6 million. Also, an additional $39.2 million is programmed in the TIP to fund transit operations. It is concluded that implementation of the TIP will directly support transit improvements. A description of the planned transit facilities is located in Chapter Eleven of the RTP.

(ii) Restriction of Certain Roads or Lanes to, or Construction of Such Roads or Lanes for Use by, Passenger Buses or High Occupancy Vehicles

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measures 5, 14, 15, and 16
1993 Carbon Monoxide Plan*, measures 2a, 2b, and 2c
1993 Carbon Monoxide Plan Addendum*, measure I-17
Revised 1999 Serious Area Carbon Monoxide Plan, measure 55
2003 Carbon Monoxide Maintenance Plan
2013 Carbon Monoxide Maintenance Plan

1987 Ozone Plan*, measures 5, 14, 15, and 16
1993 Ozone Plan*, measures 2a, 2b, and 2c
1993 Ozone Plan Addendum*, measure I-20
One-Hour Ozone Maintenance Plan

2007 Eight-Hour Ozone Plan
2009 Eight-Hour Ozone Maintenance Plan
2017 Eight-Hour Ozone Moderate Area Plan*

1988 PM-10 Plan, measures 20, 29, 30, and 31
1991 PM-10 Plan with 1993 Revisions, measures 20, 29, 30, and 31
Revised 1999 Serious Area PM-10 Plan, measure 76
2012 Five Percent Plan for PM

* = EPA approval pending

Measure Status:

The Arizona Department of Transportation, in cooperation with local jurisdictions, is responsible for the construction of the planned MAG Freeway System. An implementation schedule for High Occupancy Vehicle (HOV) lanes and ramps on freeways was specified in the MAG 1987 CO Plan and 1987 Ozone Plan. The MAG 1993 CO Plan and 1993 Ozone Plan identified additional HOV lanes and ramps programmed by ADOT.

The 1993 CO Plan and the 1993 Ozone Plan both indicate that State and local governments will analyze traffic projections and bus frequency on a periodic basis to determine the feasibility of the restriction of certain roads or lanes to provide a higher level of transit service, or the construction of roads or lanes for use by passenger buses or high occupancy vehicles. This measure could include fixed lanes for buses and carpools on arterial streets, fixed lanes for buses and carpools on freeways, and high occupancy vehicle ramps which by-pass freeway ramp meter signals.

In the Serious Area plans, the commitments from the State and local governments include the promotion of high occupancy vehicle lanes and by-pass ramps through rideshare activities. The Regional Public Transportation Authority indicated that as new facilities open, rideshare activities will be coordinated with employers affected by the Maricopa County Trip Reduction Program and the general public.

High occupancy vehicle lane improvements continue to be implemented beyond the commitments made in air quality plans. There are approximately 232 centerline miles of High Occupancy Vehicle facilities on regional freeways. As new HOV facilities open, Valley Metro/RPTA continues to coordinate the promotion of park-and-ride and rideshare activities.

Impact of TIP and RTP:

The 2040 MAG Regional Transportation Plan directly contributes to the implementation of this measure by providing funds for the construction of HOV

lanes. Chapter Nine of the Regional Transportation Plan contains specific HOV policies and priorities that have been adopted to support this measure.

(iii) Employer-Based Transportation Management Plans, Including Incentives

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measures 12 and 13
1993 Carbon Monoxide Plan*, measures 3a, 3b, 3c, 3d, 3e, 3f and 3g
Revised 1999 Serious Area Carbon Monoxide Plan, measures 38 and 52
2003 Carbon Monoxide Maintenance Plan
2013 Carbon Monoxide Maintenance Plan

1987 Ozone Plan*, measures 12 and 13
1993 Ozone Plan*, measures 3a, 3b, 3c, 3d, 3e, 3f and 3g
One-Hour Ozone Maintenance Plan
2007 Eight-Hour Ozone Plan
2009 Eight-Hour Ozone Maintenance Plan
2017 Eight-Hour Ozone Moderate Area Plan*

1988 PM-10 Plan, measures 27 and 28
1991 PM-10 Plan with 1993 Revisions, measure 22
Revised 1999 Serious Area PM-10 Plan, measures 56 and 73
2012 Five Percent Plan for PM-10

* = EPA approval pending

Measure Status:

For the MAG 1987 CO Plan and 1987 Ozone Plan, several local governments made commitments to either review the results, consider, or support preferential parking for carpools and vanpools from the MAG Model Trip Reduction Study.

In the MAG 1993 CO Plan and 1993 Ozone Plan, several jurisdictions indicated an ongoing commitment to employer rideshare incentives including passage of ordinances and expanded training at employer sites. Several cities indicated an ongoing commitment to mandatory employee parking fees and preferential parking for carpools and vanpools. Maricopa County and the Arizona Department of Transportation provide preferential parking for carpools and vanpools. Commitments also included the encouragement of vanpools for County and State employees.

In the Serious Area plans, the commitments from the State and local governments include measures supporting employer rideshare program incentives and the trip

reduction program. To encourage municipal employees to use alternative modes of transportation, several local governments indicated that they would be offering incentives such as preferential parking, gift drawings, and subsidized bus passes, and emergency ride home service, and telecommuting options. In addition, the Regional Public Transportation Authority (RPTA) indicated that the agency would provide formal training, employer assistance, facilitate transportation coordinator associations, and provide information to Trip Reduction Program employers.

The Trip Reduction Program was mandated by Arizona legislation in 1988 and is administered by Maricopa County. All employers with 50 or more employees are required to participate in the Trip Reduction Program. Elements of the Trip Reduction Program include employer training and facilitation of Transportation Coordinators Associations conducted by Regional Public Transportation Authority. MAG increased the annual allocation of federal funding for the program from $250,000 in FY 1988 to $420,000 in FY 1991, and to $460,000 annually beginning in FY 1993. Then, beginning in FY 2000, an additional $200,000 was added for an expanded Regional Rideshare and Telework Program of $660,000. In fiscal years 2018 through 2022 of the TIP, the amount programmed for Regional Rideshare is $650,000.

In the most recent Maricopa County Trip Reduction Program Annual Report for the fiscal year ending June 30, 2015, the Trip Reduction Program applied to 1,158 companies with over 796,000 employees and students participating in the survey at 2,985 sites across Maricopa County. Valley Metro/RPTA staff have played an important role in the success of the Maricopa County Trip Reduction Program through the training of employer transportation coordinators. There are five Transportation Coordinator Associations in the region. In addition, Valley Metro\RPTA services include a web-based trip matching service at ShareTheRide.com that provides online ridematching and commute tracking. The online tool connects commuters to a secure online matching program that displays carpooling, vanpooling, transit, and bicycle options. The Arizona Department of Administration conducts the Travel Reduction Program to approximately 23,000 non-university state employees in Maricopa County.

Impact of TIP and RTP:

A major portion of funding for this TCM is through the FY 2018-2022 MAG Transportation Improvement Program that includes an annual amount of $962,347 for the Trip Reduction Program and $135,000 for the state Travel Reduction Program. In fiscal years 2018 through 2022 of the TIP, the Regional Rideshare and Telework Program amount is $650,000. The amounts indicated above include only monies specified in the TIP and not funds that the programs may receive from other sources. Chapter Nineteen of the Regional Transportation Plan provides for continued consideration of demand management programs. A copy of the latest Maricopa County Regional Travel Reduction Program Annual Report for the period

July 1, 2014 - June 30, 2015 (MCAQD, 2015) and the 2016 Transportation Demand Management Survey Results (Valley Metro/RPTA, 2016a) are provided in Appendix Q.

(iv) Trip Reduction Ordinances

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measure 7
1993 Carbon Monoxide Plan*, measure 4
1993 Carbon Monoxide Plan Addendum*, measure I-3
Revised 1999 Serious Area Carbon Monoxide Plan, measures 38 and 52
2003 Carbon Monoxide Maintenance Plan
2013 Carbon Monoxide Maintenance Plan

1987 Ozone Plan*, measure 7
1993 Ozone Plan*, measure 4
1993 Ozone Plan Addendum*, measure I-3
One-Hour Ozone Maintenance Plan
2007 Eight-Hour Ozone Plan
2009 Eight-Hour Ozone Maintenance Plan
2017 Eight-Hour Ozone Moderate Area Plan*

1988 PM-10 Plan, measure 22
1991 PM-10 Plan with 1993 Revisions, measure 22
Revised 1999 Serious Area PM-10 Plan, measures 56 and 73
2012 Five Percent Plan for PM-10

* = EPA approval pending

Measure Status:

The Maricopa County Travel Reduction Program was established by the Arizona Legislature in 1988, with the goal of reducing the number of single occupant vehicle trips by five percent annually. Originally, the program affected employers with 100 or more employees at a work site. In 1992, the program was expanded to include employers with 75 or more employees at a site. Arizona House Bill 2001, enacted in November 1993, required Maricopa County to adopt and enforce a strengthened Travel Reduction Program Ordinance by May 31, 1994. The strengthened ordinance applies to all employers with 50 or more employees at a single worksite throughout the Maricopa County area. The annual goals are increased from a five percent to a ten percent reduction in employee single occupant vehicle trips or commuter vehicle miles of travel. The ordinance contains annual goals for five years. More recently, the ordinance has been modified to provide employers with

opportunities to accomplish equivalent reductions through alternative means.

The commitments from the State and local governments for the Serious Area plans include measures supporting employer rideshare program incentives and the trip reduction program. Several commitments indicate incentives and promotional activities to increase awareness and participation in alternative modes of transportation and work schedules. The Regional Public Transportation Authority indicated efforts to provide training and promotional materials to employers required to participate in the Maricopa County Trip Reduction Program.

According to the latest annual report available, in FY 2015 the Trip Reduction Program applied to over 1,100 companies with over 796,000 employees and students participating in the survey at 2,985 sites across Maricopa County.

Impact of TIP and RTP:

This TCM receives strong support through funding in the FY 2018-2022 MAG Transportation Improvement Program for the Regional Rideshare and Telework Program, the Maricopa County Trip Reduction Program, and the state Travel Reduction Program. Combined, the programs have been allocated funds totaling $8.7 million for fiscal years 2018-2022 in the TIP. This total only includes funding specified in the TIP and not funds that the programs may receive from other sources. Chapter Nineteen of the Regional Transportation Plan provides for continued consideration of demand management programs.

(v) Traffic Flow Improvement Programs That Achieve Emission Reductions

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measures 17, 18, 19, 20, 21, 22, 24, 25 and 26
1993 Carbon Monoxide Plan*, measures 5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j and 5k
1993 Carbon Monoxide Plan Addendum*, measures I-2, I-16, and I-18
Revised 1999 Serious Area Carbon Monoxide Plan, measures 25, 40, and 41
2003 Carbon Monoxide Maintenance Plan
2013 Carbon Monoxide Maintenance Plan

1987 Ozone Plan*, measures 17, 18, 19, 20, 21, 22, 24, 25 and 26
1993 Ozone Plan*, measures 5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j and 5k
1993 Ozone Plan Addendum*, measures I-2 and I-19
One-Hour Ozone Maintenance Plan
2007 Eight-Hour Ozone Plan
2009 Eight-Hour Ozone Maintenance Plan
2017 Eight-Hour Ozone Moderate Area Plan*

1988 PM-10 Plan, measures 32, 33, 34, 35, 36, 37, 38, 39, 40, and 41
1991 PM-10 Plan with 1993 Revisions, measures 33, 34, 35, 39, and 40
Revised 1999 Serious Area PM-10 Plan, measures 26, 58, and 59
2012 Five Percent Plan for PM-10

* = EPA approval pending

Measure Status:

This TCM includes a number of measures that were identified in previous air quality plans including the 1987 CO and Ozone Plans and the 1993 CO and Ozone Plans which contained measures for mitigation of freeway construction impacts; freeway surveillance; ramp metering, and signage; computerized synchronization of traffic signals; reversible lanes on arterials; one way streets; truck restrictions during peak periods; intersection improvements; on-street parking restrictions; and bus pullouts.

In April 2001, MAG approved the first comprehensive ITS Strategic Plan and ITS Architecture for the region. This Plan has provided direction for ITS implementation within the region. The Regional ITS Architecture, which is part of the Plan, played a direct role in the identification of ITS projects for programming in the five-year Transportation Improvement Program.

The TCMs "Coordinate Traffic Signal Systems" and "Develop Intelligent Transportation Systems" are supported by several jurisdictions in the Serious Area plans. Commitments include the development of Intelligent Transportation Systems (ITS), the coordination of traffic signal systems, and other intersection improvements to reduce traffic congestion. A general summary of the commitments, and current projects that implement the TCM above the level committed to in the plans, are provided below.

ITS Projects and Freeway Management System Improvements

Several municipalities mentioned the effort to coordinate local traffic signals with the Freeway Management System (FMS) implemented by ADOT, the responsible agency for traffic management on MAG-area freeways. The FMS consists of electronic variable message signs, signals for metering traffic flow at ramps, closed circuit television cameras, vehicle detectors, and a telecommunication network that links all these devices to a Traffic Operations Center. According to the 2040 MAG Regional Transportation Plan, as of late 2016 the coverage of the regional FMS is approximately 200 miles. It is estimated that by 2020 the total FMS coverage of regional freeways will be approximately 290 miles.

Traffic Signal System Coordination

Effective December 31, 1988, traffic signal synchronization has been required by

Arizona law for municipalities and for ADOT roadways with traffic volumes exceeding 15,000 vehicles per day. AzTech, a federally funded ITS project launched by the region in 1996, has integrated a number of local traffic management systems. Most of the larger cities and towns in the region have installed computerized traffic management systems that are managed and operated from that jurisdiction's Traffic Management Center. Currently, there are 13 Traffic Management Centers in the region.

Intersection Improvements

Implementation of intersection improvements have continued at major intersections as a method to reduce traffic congestion and improve traffic flow. Some jurisdictions reported other traffic control techniques such as bus pull-outs to reduce congestion at major intersections.

Impact of TIP and RTP:

Implementation of this measure is supported through the FY 2018-2022 MAG Transportation Improvement Program. For FY 2018, a total of $31.5 million for traffic flow improvements is included in the TIP. For the period covered by the TIP, a total of $49.9 million is programmed for these projects. In addition, the TIP includes funds totaling $9.6 million in FY 2018 and $35.6 million over the next five years for traffic flow improvements on freeways, including FMS projects. Chapter Eighteen of the 2040 MAG Regional Transportation Plan provides for continued consideration of transportation systems management and operations. On November 2, 2004, voters approved Proposition 400 that extends the half-cent sales tax for improvements identified in the Regional Transportation Plan, including arterial and freeway operation improvements.

(vi) Fringe and Corridor Parking Facilities Serving Multiple Occupancy Vehicle Programs or Transit Service

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measure 10
1993 Carbon Monoxide Plan*, measure 6
Revised 1999 Serious Area Carbon Monoxide Plan, measure 53
2003 Carbon Monoxide Maintenance Plan
2013 Carbon Monoxide Maintenance Plan

1987 Ozone Plan*, measure 10
1993 Ozone Plan*, measure 6
One-Hour Ozone Maintenance Plan
2007 Eight-Hour Ozone Plan

2009 Eight-Hour Ozone Maintenance Plan
2017 Eight-Hour Ozone Moderate Area Plan*

1988 PM-10 Plan, measure 25
1991 PM-10 Plan with 1993 Revisions, measure 25
Revised 1999 Serious Area PM-10 Plan, measure 74
2012 Five Percent Plan for PM-10

* = EPA approval pending

Measure Status:

The 1987 CO and Ozone Plans contain commitments from many jurisdictions agreeing to assist and cooperate in the location of park-and-ride lots. Similarly, in the 1993 CO and Ozone Plans, State and several local jurisdictions committed to promote and expand park-and-ride lots and to seek out agreements with owners of major facilities such as shopping centers and institutions for the placement of park-and-ride lots.

The commitments from the State and local governments for the Serious Area CO and PM-10 plans include measures in which the RPTA will continue to work with member jurisdictions, private entities, and employers in the development, design, and implementation of new park-and-ride facilities.

A large number of park-and-ride lots are already operational in the Maricopa County area. There are approximately 13 transit centers and 40 publicly owned park-and-ride facilities that support public transit. The RPTA works with employers and Transportation Management Associations to promote park-and-ride lots as a means to encourage ridesharing and use of public transit.

In addition, implementation of park-and-ride lots continues to occur beyond commitments made in the air quality plans. In January 2001, MAG completed the MAG Park and Ride Site Selection Study to identify a regional system of park-and-ride lots to support the regional express bus system, carpooling, and vanpooling. The recommended system included ten sites for near-term development and ten sites for long-term development. Additional recommendations addressed design guidelines and criteria for lot development, a management and operations plan for the lots, and programming and implementation strategies.

Impact of TIP and RTP:

The FY 2018-2022 MAG Transportation Improvement Program has programmed $6.2 million for the implementation of two park-and-ride lots. In support of park-and-ride facilities, Chapter Eleven of the Regional Transportation Plan provides for

continued consideration of public transit, including planned bus facilities and service improvements.

(vii) Programs to Limit or Restrict Vehicle Use in Downtown Areas or Other Areas of Emission Concentrations, Particularly During Periods of Peak Use

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measure 23
1993 Carbon Monoxide Plan*, measures 7a and 7b

1987 Ozone Plan*, measure 23
1993 Ozone Plan*, measures 7a and 7b

1988 PM-10 Plan, measure 38

* = EPA approval pending

Measure Status:

In the 1987 CO Plan, 1988 PM-10 Plan, and MAG 1993 CO and Ozone Plans, several jurisdictions in the MAG region indicated they would agree to consider the implementation of truck restrictions during peak periods. In the 1993 CO Plan, a jurisdiction indicated that it restricted truck loading operations on downtown streets during peak hours would continue to enforce its existing restrictions on deliveries into the downtown area during peak hours (7:00 to 9:00 am, and 4:00 to 6:00 pm). Also, another jurisdiction indicated that it currently has an ordinance in place to restrict truck deliveries by place. There are approximately 16 miles of city streets with truck use restrictions in cities in Maricopa County.

Impact of TIP and RTP:

The construction of transportation facilities and provisions of transportation services which are programmed in the FY 2018-2022 MAG Transportation Improvement Program will not affect the schedule or effectiveness of this measure. Chapters Eighteen and Nineteen of the Regional Transportation Plan provide for continued consideration of Systems Management and Operations and Demand Management, respectively.

(viii) Programs for the Provision of All Forms of High-Occupancy, Shared Ride Services

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measures 6 and 11
1993 Carbon Monoxide Plan*, measures 8a, 8b, and 8c
1993 Carbon Monoxide Plan Addendum*, measure II-9
Revised 1999 Serious Area Carbon Monoxide Plan, measures 39 and 51
2003 Carbon Monoxide Maintenance Plan
2013 Carbon Monoxide Maintenance Plan

1987 Ozone Plan*, measures 6 and 11
1993 Ozone Plan*, measures 8a, 8b, and 8c
1993 Ozone Plan Addendum*, measure II-9
One-Hour Ozone Maintenance Plan
2007 Eight-Hour Ozone Plan
2009 Eight-Hour Ozone Maintenance Plan
2017 Eight-Hour Ozone Moderate Area Plan*

1988 PM-10 Plan, measures 21 and 26
Revised 1999 Serious Area PM-10 Plan, measures 57 and 72
2012 Five Percent Plan for PM-10

* = EPA approval pending

Measure Status:

The MAG 1987 CO Plan and the MAG 1993 CO and Ozone Plans contain commitments requiring the expansion of the Valley Metro Regional Rideshare Program, Park-and-Ride Programs, and Financial Incentives Including Zero Bus Fares. Several jurisdictions indicated that park-and-ride lots would be coordinated with the Arizona Department of Transportation, Regional Public Transportation Authority, and local businesses. The 1993 CO Plan Addendum includes a measure to pay for the administrative cost associated with the public transportation subsidy program for state employees. A description of Park-and-Ride Programs are reviewed in Transportation Control Measure number “vi”. A description of each measure is provided below.

Ridesharing programs in the Maricopa County area include the Regional Rideshare and Telework Program and Travel Reduction Program. The Regional Rideshare and Telework Program, conducted by Valley Metro/Regional Public Transportation Authority, maintains an internet-based service for instant carpool matching for the general public and for employers required to participate in the Trip Reduction Program. In addition, the Regional Rideshare and Telework Program emphasizes the need to reduce emissions through using alternative transportation modes and

alternative work schedules.

The commitments from State and local governments for the Revised Serious Area CO and PM-10 Plans include measures supporting preferential parking for carpools and vanpools and encouraging the use of vanpooling.

MAG increased the annual allocation of federal funding for the program from $250,000 in FY 1988 to $420,000 in FY 1991, and to $460,000 annually beginning in FY 1993. Beginning in FY 2000, an additional $200,000 was added for expansion of the Regional Rideshare Program. RPTA has also expanded program marketing to employers as part of the existing Trip Reduction Program administered by Maricopa County. This involves organizations with 50 or more employees or students, affecting an estimated 1,158 companies and 2,985 sites in FY 2015 (MCAQD, 2015). The RPTA also provides assistance to five Transportation Coordinators Associations operating in the region. In addition, Maricopa County has reported that approximately 45 employers in the Trip Reduction Program were subsidizing employee participation in vanpool programs for the year ending September 2016.

As of January 2017, the ADOA provided a 50 percent public transit subsidy to approximately 3,589 state employees who participated in the Platinum Plus Bus Card Program. In addition, through the Travel Reduction Program, the Arizona Department of Administration encourages all non-university state employees in Maricopa County to use carpools, vanpools, public transit, and alternative work schedules.

Impact of TIP and RTP:

The FY 2018-2022 MAG Transportation Improvement Program provides federal Congestion Mitigation and Air Quality Improvement (CMAQ) funding for implementation of the Regional Rideshare and Telework Program and the Travel Reduction Program. An amount of $650,000 is programmed for the Regional Rideshare and Telework Program for fiscal year 2018 through 2022. The Travel Reduction Program is programmed at $135,000 annually in the TIP. In addition, the TIP includes $15.4 million to provide capital funding for vanpooling. Ride sharing is promoted by the provision of HOV lanes, implemented through the TIP. Chapter Nineteen of the Regional Transportation Plan provides for continued consideration of demand management programs.

(ix) Programs to Limit Portions of Road Surfaces or Certain Sections of the Metropolitan Area to the Use of Non-Motorized Vehicles or Pedestrian Use, Both as to Time and Place

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measure 42
1993 Carbon Monoxide Plan*, measure 9
Revised 1999 Serious Area Carbon Monoxide Plan, measure 47
2003 Carbon Monoxide Maintenance Plan
2013 Carbon Monoxide Maintenance Plan

1987 Ozone Plan*, measure 42
1993 Ozone Plan*, measure 9
One-Hour Ozone Maintenance Plan
2007 Eight-Hour Ozone Plan
2009 Eight-Hour Ozone Maintenance Plan
2017 Eight-Hour Ozone Moderate Area Plan*

1988 PM-10 Plan, measure 55
Revised 1999 Serious Area PM-10 Plan, measure 65
2012 Five Percent Plan for PM-10

* = EPA approval pending

Measure Status:

The 1987 CO and Ozone Plan as well as the 1993 CO Plan indicated that pedestrian malls were being considered in the downtown plans for various cities and towns in the MAG area. Auto free zones and pedestrian malls can be used to reduce traffic congestion and air pollution on a localized basis. The successful establishment of auto free zones and pedestrian malls is dependent upon high transit accessibility, good circulation design of adjacent arterials, and parking management.

The commitments from the state and local governments for the Revised Serious Area CO and PM-10 Plans include strengthening of initiatives to encourage pedestrian travel. Several jurisdictions have supported this measure through: linkage of activity centers with sidewalks; establishing pedestrian routes in residential areas, and creating links between subdivisions and commercial development.

The MAG Regional Off-Street System (ROSS) Plan was adopted by the MAG Regional Council in February 2001. The ROSS Plan provides guidance to MAG member agencies in creating an off-street non-motorized transportation system utilizing an extensive number of canal banks, utility line easements, and flood control channels.

In 2007, MAG developed the MAG Regional Bikeway Master Plan, which incorporates a 1999 MAG Regional Bicycle Plan, Alternative Solutions to Pedestrian Mid-block Crossings at Canals, and the 2001 ROSS Plan. With these planning

efforts, many improvements have taken place beyond commitments made in air quality plans.

Impact of TIP and RTP:

The construction of transportation facilities and provisions of transportation services which are programmed in the FY 2018-2022 MAG Transportation Improvement Program will not affect the schedule or effectiveness of this measure. Chapter Thirteen of the Regional Transportation Plan, Bicycles and Pedestrians, provides for continued consideration of this measure.

(x) Programs for Secure Bicycle Storage Facilities and Other Facilities Including Bicycle Lanes, for the Convenience and Protection of Bicyclists, in Both Public and Private Areas

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measures 27 and 28
1993 Carbon Monoxide Plan*, measures 10a and 10b
1993 Carbon Monoxide Plan Addendum*, measure II-7
Revised 1999 Serious Area Carbon Monoxide Plan, measures 43 and 44
2003 Carbon Monoxide Maintenance Plan
2013 Carbon Monoxide Maintenance Plan

1987 Ozone Plan*, measures 27 and 28
1993 Ozone Plan*, measures 10a and 10b
1993 Ozone Plan Addendum*, measure II-7
One-Hour Ozone Maintenance Plan
2007 Eight-Hour Ozone Plan
2009 Eight-Hour Ozone Maintenance Plan
2017 Eight-Hour Ozone Moderate Area Plan*

1988 PM-10 Plan, measures 42 and 43
1991 PM-10 Plan with 1993 Revisions, measures 42 and 43
Revised 1999 Serious Area PM-10 Plan, measures 61 and 62
2012 Five Percent Plan for PM-10

* = EPA approval pending

Measure Status:

In the 1993 CO and Ozone Plans, a number of jurisdictions indicated a commitment to improve bicycle facilities through the construction of additional miles of bike paths, striping of bike lanes on arterial and collector streets, and installation of

additional bike racks and lockers to encourage bicycle use.

The commitments from the state and local governments for the Serious Area CO and PM-10 Plans include initiatives by most cities and towns in the region to encourage bicycle travel and develop bicycle travel facilities. Several jurisdictions indicated that bicycle travel would be encouraged through establishing bike lanes with new road development and by signing and striping bikeway routes along arterials, collectors, and local routes, by promoting bicycle use newsletters and Bike-to-Work Weeks, by encouraging private developers and businesses to include bike racks, lockers, and showers at work sites and other facilities.

The general level of planning and commitment for encouraging bicycle use and providing bicycle support facilities has increased substantially beyond the commitments made in the air quality plans. The City of Phoenix, for example, has expanded its bikeway system to approximately 500 miles in 2007.

At the regional level, MAG established a Regional Bicycle Task Force in 1990. This task force guided the development of the Regional Bicycle Plan, which was adopted as part of the MAG Long Range Regional Transportation Plan in July 1992. The *MAG Regional Bicycle Plan* was updated in 1999. Creating a regional off-street multi-use path/trail plan was identified as an important future planning activity during the Regional Bicycle Plan Update in 1999. The MAG Regional Off-Street System (ROSS) Plan reveals a region-wide system of off-street paths/trails for non-motorized transportation along existing rights-of-ways and easements, such as canal banks, utility line easements and flood control channels. These types of rights-of-way and easements intersect numerous arterial streets where local daily destinations are typically located. The goal of the ROSS Plan is to help make bicycling and walking viable options for daily travel trips using off-street opportunities.

To further encourage safe bicycling, the Regional Bicycle Task Force oversees the update of the Regional Bikeways Map. Updated in alternating years, the map shows existing, locally-designated bicycling facilities, and is provided for free distribution. The first map was created in 1994. Several hundred thousand maps have been distributed. The map includes bicycle lanes and paths, designated bicycle routes on roadways, popular undesignated routes, and off-street transportation trails.

In 2012, the MAG Bicycle and Pedestrian Committee completed an update of the Regional Bikeways Map. Of the approximately 23,000 miles of roadway in the region, the map shows 1,541 miles of bicycle lanes, 532 miles of bicycle routes, 342 miles of paved shoulders, and 900 miles of paved and unpaved transportation trails. The *MAG Regional Bicycle Plan* also encourages the development of bicycle parking and shower facilities at appropriate daily trip destinations.

Impact of TIP and RTP:

The implementation of the FY 2018-2022 MAG Transportation Improvement Program will directly support the goal of increased bicycle use. Funding for bicycle and multiuse path projects totals $54.2 million in FY 2018 and $101.9 million over the period of the TIP. Specific projects to be funded each year are recommended to the MAG Management Committee by the MAG Bicycle and Pedestrian Committee, for approval by the MAG Regional Council.

In addition, the provision of new bicycle lanes or facilities is often included as part of various road improvement projects, rather than being implemented and programmed separately as a bicycle project. Chapter Thirteen of the Regional Transportation Plan provides an overview of bicycle transportation and the continued development of bicycle facilities.

(xi) Programs to Control Extended Idling of Vehicles

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measure 41
1993 Carbon Monoxide Plan*, measure 11
Revised 1999 Serious Area Carbon Monoxide Plan, measure 33
2003 Carbon Monoxide Maintenance Plan
2013 Carbon Monoxide Maintenance Plan

1987 Ozone Plan*, measure 41
1993 Ozone Plan*, measure 11
One-Hour Ozone Maintenance Plan
2007 Eight-Hour Ozone Plan
2009 Eight-Hour Ozone Maintenance Plan
2017 Eight-Hour Ozone Moderate Area Plan*

1988 PM-10 Plan, measure 54
1991 PM-10 Plan with 1993 Revisions, measure 54
Revised 1999 Serious Area PM-10 Plan, measure 34
2012 Five Percent Plan for PM-10

* = EPA approval pending

Measure Status:

In the MAG 1993 CO Plan, Carefree and Tolleson indicated that they would take steps to address emissions from idling at drive-up window facilities. Information provided to MAG by Sierra Research, a leading consultant in the field of vehicular emissions, indicates that vehicles with catalytic converters may produce more

emissions during engine start-up than engine idling for brief periods. The Sierra Research report concluded that banning the use of drive-up window facilities would not significantly increase or decrease emissions of CO or oxides of nitrogen, and would potentially increase emissions of volatile organic compounds. It is important to note that the report was completed in 1991, based upon emission data from vehicles in Southern California.

The commitments from the state and local governments for the Serious Area CO and PM-10 Plans include an initiative by RPTA to follow guidelines developed by that agency in June 1996 to reduce idling of engines. The guideline specifies that, for temperatures below 90 degrees Fahrenheit and over three minutes layover, the operator should turn the engine off. If the vehicle is located within 100 yards of any residence, for temperatures below 90 degrees Fahrenheit, the engine is to be turned off regardless of layover time. Further, Valley Metro/RPTA will continue to work with member jurisdictions to promote environmentally sensitive transit operations practices and policies.

Impact of TIP and RTP:

The construction of transportation facilities and provisions of transportation services which are programmed in the FY 2018-2022 MAG Transportation Improvement Program will not affect the schedule or effectiveness of this measure. In addition, the Regional Transportation Plan will not affect this measure.

(xii) Programs to Reduce Motor Vehicle Emissions, Consistent with Title II, Which Are Caused by Extreme Cold Start Conditions

This measure is not applicable in the MAG region.

(xiii) Employer-Sponsored Programs to Permit Flexible Work Schedules

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measures 35 and 36
1993 Carbon Monoxide Plan*, measures 13a, 13b, 13c, and 13d
1993 Carbon Monoxide Plan Addendum*, measure I-12
Revised 1999 Serious Area Carbon Monoxide Plan, measure 45
2003 Carbon Monoxide Maintenance Plan
2013 Carbon Monoxide Maintenance Plan

1978 Ozone Plan, measure "Modified Work Schedules"
1987 Ozone Plan*, measures 35 and 36
1993 Ozone Plan*, measures 13a, 13b, 13c, and 13d

One-Hour Ozone Maintenance Plan
2007 Eight-Hour Ozone Plan
2009 Eight-Hour Ozone Maintenance Plan
2017 Eight-Hour Ozone Moderate Area Plan*

1988 PM-10 Plan, measures 48 and 49
1991 PM-10 Plan with 1993 Revisions, measure 48
Revised 1999 Serious Area PM-10 Plan, measure 63
2012 Five Percent Plan for PM-10

* = EPA approval pending

Measure Status:

The 1978 Ozone Plan indicated that modified work schedules were to be implemented on a voluntary basis with emphasis on the winter period of maximum temperature inversions. The effect of this measure in reducing ozone was not calculated in the 1978 Ozone Plan.

In the 1987 CO and Ozone Plans, a number of jurisdictions supported the use of alternative work hours and work weeks for their employees. Since 1987, this measure has been implemented on a formal basis as mandated by Arizona legislation. SB 1360 established requirements for the use of adjusted work hours by at least 85 percent of State employees with offices located in a nonattainment area. Beginning in 1987, this requirement became applicable for the period between October 1 and March 31 of each year. Beginning in 1989, the requirement was also applied to county employees and to the employees of cities and towns which have a population of 50,000 or more. The 1987 legislation also required businesses with 500 or more employees at one site within a nonattainment area to prepare an adjusted work hour proposal for submission to ADEQ by October 1 of each year.

In the MAG 1993 CO Plan and 1993 Ozone Plan, numerous MAG member agencies indicated that this measure was ongoing through the use of compressed or staggered work schedules to lessen the number of commuting trips. Also, several agencies indicated that telecommuting and teleconferencing options would be investigated and/or expanded. MAG initiated a telecommuting and teleconferencing program for its member agencies, with planning for the program initiated in FY 1998.

As specified in the 1993 CO Plan Addendum, measure I-12 “Air Pollution Emergency”, enacted by Arizona HB 2001 in November 1993, authorized the Governor of Arizona to declare air emergencies on days when the National Ambient Air Quality Standards are likely to be exceeded. The Governor will prohibit, restrict, or condition the employment schedules for employees of the state and its political

subdivisions (includes the county and local governments) in order to reduce vehicle emissions during air pollution emergencies. The Governor has developed a plan for implementation of this measure. Under these provisions, state employees were sent home early due to elevated carbon monoxide concentrations on one occasion in late 1994.

In 1996, the Governor issued a proclamation which requires the cities, towns and county meet a 75 percent employee compliance of three options to reduce hydrocarbon emissions from mobile sources during June 1 to September 30, 1996. The options are: work schedules that avoid workday start and ending in the peak traffic hours; compressed work week schedules; travel to and from work by alternate mode including bus, carpool, vanpool, bicycle, or walking.

This measure also responds to Clean Air Act Section 108(f)(1)(B): Additional methods or strategies that will contribute to the reduction of mobile source related pollutants during periods in which any primary air quality standard will be exceeded and during episodes for which an air pollution alert, warning, or emergency has been declared.

The commitments from the state and local governments for the Serious Area CO and PM-10 Plans include initiatives supporting alternative work schedules and the use of off-peak driving, ridesharing, and the use of transit. As part of the Trip Reduction Program, Valley Metro/RPTA facilitates formal training on compressed or alternative work schedules and provides onsite assistance to individual employers on an as-needed basis.

Impact of TIP and RTP:

The FY 2018-2022 MAG Transportation Improvement Program contains funding for Trip Reduction Program and Regional Rideshare and Telework Program in the amount of $8.7 million. The construction of other transportation or related facilities and other provisions of transportation services that are programmed in the TIP will not affect the schedule or effectiveness of this measure. Chapter Nineteen of the Regional Transportation Plan includes a description of demand management programs in support of this measure.

(xiv) Programs and Ordinances to Facilitate Non-Automobile Travel, Provision and Utilization of Mass Transit, and to Generally Reduce the Need for Single-Occupant Vehicle Travel, as Part of Transportation Planning and Development Efforts of a Locality, Including Programs and Ordinances Applicable to New Shopping Centers, Special Events, and Other Centers of Vehicle Activity

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measures 8, 9, 39, and 40
1993 Carbon Monoxide Plan*, measures 14a, 14b, 14c, and 14d
Revised 1999 Serious Area Carbon Monoxide Plan, measures 46, 50, and 54
2003 Carbon Monoxide Maintenance Plan
2013 Carbon Monoxide Maintenance Plan

1987 Ozone Plan*, measures 8, 9, 39, and 40
1993 Ozone Plan*, measures 14a, 14b, 14c, and 14d
One-Hour Ozone Maintenance Plan
2007 Eight-Hour Ozone Plan
2009 Eight-Hour Ozone Maintenance Plan
2017 Eight-Hour Ozone Moderate Area Plan*

1988 PM-10 Plan, measures 23, 24, 52, and 53
1991 PM-10 Plan with 1993 Revisions, measures 23 and 24
Revised 1999 Serious Area PM-10 Plan, measures 64, 68, and 75
2012 Five Percent Plan for PM-10

* = EPA approval pending

Measure Status:

In the MAG 1993 CO Plan, numerous MAG member jurisdictions indicated that new developments are encouraged through their General Plan to support alternative modes of transportation. In 1995, the Maricopa Association of Governments completed an Urban Form Study which examines the transportation and air quality impacts of land use development within the region.

Arizona legislation enacted in 1987 requires every State agency, board, and commission to submit an air quality impact report to ADEQ on any State-funded transportation related project that it determines may impact air quality. In 1988, the Arizona Legislature required Maricopa County to establish a Voluntary No Drive Days Program. The Clean Air Campaign urges the public not to drive on a given day each week, as well as on alert days when severe pollution concentrations are expected. The program is in effect from October through March when atmospheric conditions may lead to increased carbon monoxide levels.

The commitments from the State and local governments for the Serious Area CO and PM-10 plans include initiatives from a number of municipalities in support of Land Use/Development Alternatives. For example, some municipalities implement general land use planning and development administration to improve the quality of life, promote land use compatibility, reduce infrastructure costs, promote accessibility, and reduce traffic congestion. Promotion of air quality is an integral part of these efforts and a natural by-product. Another example of general plan support of this measure is through the promotion of land development that

integrates multiple modes of transportation, including transit, pedestrians, and bicycles, and the creation of ordinances, policies, or design guidelines that encourage mixed-use development and promote non-polluting modes of travel into urban design.

Impact of TIP and RTP:

The construction of transportation facilities and provision of transportation services as programmed in the FY 2018-2022 MAG Transportation Improvement Program will not affect the schedule or effectiveness of this measure.

(xv) Programs for New Construction and Major Reconstruction of Paths, Tracks or Areas Solely for Use by Pedestrian or Other Non-motorized Means of Transportation When Economically Feasible and in the Public Interest

Submitted Plans and Measures:

1987 Carbon Monoxide Plan, measures 29 and 30
1993 Carbon Monoxide Plan*, measures 15a and 15b
1993 Carbon Monoxide Plan Addendum*, measure II-7
Revised 1999 Serious Area Carbon Monoxide Plan, measures 43 and 44
2003 Carbon Monoxide Maintenance Plan
2013 Carbon Monoxide Maintenance Plan

1987 Ozone Plan, measures 29 and 30
1993 Ozone Plan*, measures 15a and 15b
1993 Ozone Plan Addendum*, measure II-7
One-Hour Ozone Maintenance Plan
2007 Eight-Hour Ozone Plan
2009 Eight-Hour Ozone Maintenance Plan
2017 Eight-Hour Ozone Moderate Area Plan*

1988 PM-10 Plan, measures 44 and 45
1991 PM-10 Plan with 1993 Revisions, measures 44 and 45
Revised 1999 Serious Area PM-10 Plan, measures 61 and 62
2012 Five Percent Plan for PM-10

* = EPA approval pending

Measure Status:

In the 1987 CO and Ozone Plans and the 1993 CO Plan, a number of jurisdictions indicated that encouragement of pedestrian travel is an ongoing measure. In November 1993, House Bill 2001 authorized ADOT to make grants from its portion

of the State Air Quality Fund for intermodal transportation, pedestrian, and bicycle projects and activities.

The commitments from the state and local governments for the Serious Area CO and PM-10 plans include initiatives by most cities and towns in the region to encourage bicycle travel and development of bicycle travel facilities. Several municipalities have encouraging the construction of bike lanes and the installation of bike facilities at activity centers. Demonstration programs will also be explored to promote bicycle use. A pilot program to provide free bikes (Purple People Movers) was identified for use in the downtown area. Over 100 purple bikes and 30 purple bike racks were made available. After implementation of this demonstration project, the Program was ended.

Several local governments have made bicycle and pedestrian improvements beyond commitments made in air quality plans. As an example of the improvements made a few are listed here. Phoenix is developing a Bikeway Master Plan and is painting shared lane markings on streets to create bike boulevards. In addition, Phoenix has developed a "bike sharing" program to encourage bicycle travel in proximity to light rail. Mesa has finished a Bikeway Masterplan and has completed 17 miles of pathway along the Consolidated Canal. Also, Scottsdale completed construction on the Upper Camelback Wash along the Arizona Canal that connects 22 miles of pathway.

Impact of TIP and RTP:

The provision of new sidewalks (and supporting amenities such as lighting and landscaping) is often included as part of various road improvement projects, rather than being implemented and programmed separately. It should also be noted that sidewalk provisions are often required of the private sector as a condition for property development. The FY 2018-2022 MAG Transportation Improvement Program contains 50 projects that incorporate pedestrian improvements. Funding for pedestrian projects totals $45.2 million in FY 2018 and $92.4 million over the period of the TIP. Chapter Thirteen of the Regional Transportation Plan provides an overview on pedestrian travel in support of these measures.

(xvi) Program to Encourage Voluntary Removal from Use and the Marketplace of Pre-1980 Model Year Light Duty Vehicles and Pre-1980 Model Light Duty Trucks

Submitted Plans and Measures:

Revised 1999 Serious Area Carbon Monoxide Plan, measures 8 and 22
2003 Carbon Monoxide Maintenance Plan
2013 Carbon Monoxide Maintenance Plan

One-Hour Ozone Maintenance Plan
2007 Eight-Hour Ozone Plan
2009 Eight-Hour Ozone Maintenance Plan
2017 Eight-Hour Ozone Moderate Area Plan*

Revised 1999 Serious Area PM-10 Plan, measures 8 and 23
2012 Five Percent Plan for PM-10

*= EPA approval pending

Measure Status:

This Transportation Control Measure is a committed measure in the Serious Area CO and PM-10 Plans. This measure includes the Voluntary Vehicle Repair and Retrofit Program and the Voluntary Gasoline Vehicle Retirement Program/Maricopa County Travel Reduction Program as described below.

Voluntary Vehicle Repair and Retrofit Program

According to the Arizona Revised Statutes 49-474.03, Maricopa County is required to operate and administer a Voluntary Vehicle Repair and Retrofit Program. Beginning in January 1999, the program is designed to provide for real and quantifiable emissions reductions based on actual emissions testing performed on the vehicle before repair or retrofit. The County is also required to coordinate the program with the Arizona Department of Environmental Quality and Arizona Department of Transportation.

A vehicle owner may participate in the program if all of the following criteria are met:

- The owner is willing to participate in the program.
- The vehicle is functionally operational.
- The vehicle is titled in this state, has taken the emissions inspection test, has been registered during the immediately preceding twelve months and has not been unregistered for more than sixty days.
- The vehicle is at least twelve years older than the current calendar year.
- The vehicle is required to take the emissions inspection test and the vehicle fails the emissions test in the emissions inspection results portion of the test. The vehicle owner is required to apply to the program not more that sixty days after failing the test.
- The emissions control system has not been tampered with.

- The emissions control system has not been removed or disabled, in whole or in part.

- The vehicle is taken to a participating repair facility. Any repairs performed at an unauthorized repair facility are not eligible for payment.

- Participation in the program is limited to one vehicle per owner.
- Motor homes, motorcycles, salvage vehicles and fleet vehicles are not eligible to participate in the program.

In addition, the Voluntary Vehicle Repair and Retrofit Program provides that:

- Vehicle owners who qualify for the repair and retrofit program pay the first $150 as a copayment.

- Vehicles that require more than $700 in repair costs are not eligible unless the vehicle owner chooses to pay additional costs.

- A vehicle that is able to accept a retrofit kit is required to have the retrofit kit installed. A vehicle that requires more than $800 in aggregated retrofit parts and labor costs is not eligible for the program unless the vehicle owner pays the additional costs.

From its introduction in January 1999 through June 2010, the Voluntary Vehicle Repair and Retrofit Program has helped over 11,164 vehicles meet Arizona emissions standards, resulting in the reduction of over 1,901 metric tons of pollution. According to Maricopa County, the program is very cost effective. For the FY 2010 program, the cost to Maricopa County was $1,643 per metric ton, annualized over two years. According to the Maricopa County Voluntary Vehicle Repair and Retrofit Program Annual Report, in FY 2010 the program resulted in a reduction of 68.9 metric tons per year in hydrocarbons, carbon monoxide, and nitrogen oxides.

The Voluntary Vehicle Repair and Retrofit Program was grant funded by the State of Arizona from July 2000 through June 2009. According to the Maricopa County Air Quality Department, Program repair services were suspended on June 27, 2009 when FY 2009 funding was exhausted. Due to budget constraints, the State eliminated program funding for FY 2010. Repair services were resumed on November 20, 2009, when U.S. Department of Energy, Energy Efficiency and Conservation Block Grant funding became available via the American Recovery and Reinvestment Act of 2009. The program is currently suspended. The Voluntary Vehicle Repair and Retrofit Program is acknowledged as a voluntary program with no emissions credits taken for regional maintenance modeling.

Voluntary Gasoline Vehicle Retirement Program/Maricopa County Travel Reduction Program

This measure was also included as part of an initiative entitled "Voluntary Gasoline Vehicle Retirement Program/Maricopa County Travel Reduction Program". Maricopa County indicates that the implementation of this measure involves a program to purchase and retire vehicles that produce excessive emissions, particularly pre-1980 model year light duty automobiles and trucks. Maricopa County revised its Trip Reduction Ordinance to include flexibility provisions, also called Equivalent Emission Reduction Credit, authorized under A.R.S. Section 49-588 which includes voluntary vehicle trade-outs. This revision will allow trade-outs completed after October 16, 1996 to be used to achieve the emission reduction goals established under the ordinance.

Impact of TIP and RTP:

The transportation projects in the FY 2018-2022 MAG Transportation Improvement Program and Regional Transportation Plan are not anticipated to impact the schedule or effectiveness of this measure.

6 TIP AND REGIONAL TRANSPORTATION PLAN CONFORMITY

The principal requirements of the federal transportation conformity rule for TIP and Regional Transportation Plan assessments are: (1) the TIP and Regional Transportation Plan (RTP) must pass an emissions budget test with a budget that has been found to be adequate or approved by EPA for transportation conformity purposes, or interim emissions tests; (2) the latest planning assumptions and emission models in force at the time the conformity analysis begins must be employed; (3) the TIP and RTP must provide for the timely implementation of transportation control measures (TCMs) specified in the applicable air quality implementation plans; and (4) consultation. Consultation generally occurs both at the beginning of the process of preparing the conformity analysis, on the proposed models, associated methods, and assumptions for the upcoming analysis and the projects to be assessed, and at the end of the process, on the draft conformity analysis report. The final determination of conformity for the TIP and Regional Transportation Plan is the responsibility of the Federal Highway Administration and the Federal Transit Administration.

The previous chapters and the appendices present the documentation for all of the requirements listed above for conformity determinations, except for the conformity test results. Prior chapters have also addressed the updated documentation required under the federal transportation conformity rule for the latest planning assumptions and the implementation of transportation control measures specified in the applicable air quality implementation plans. Consultation correspondence on the 2017 MAG Conformity Analysis is included in Appendix B. Appendix S includes the public hearing notice and a transcript of the public hearing. Any comments received and responses made as part of the public comment process are included in Appendix T.

This chapter presents the results of the conformity tests, satisfying the remaining requirement of the federal transportation conformity rule. Budget tests were performed for the Maricopa County nonattainment and maintenance areas, while Action/Baseline tests were performed for the Pinal County nonattainment areas. The results of the Maricopa and Pinal County conformity analyses are described in separate sections below.

MARICOPA COUNTY NONATTAINMENT AND MAINTENANCE AREAS

For the Maricopa County nonattainment and maintenance areas, separate tests were conducted for carbon monoxide (CO), volatile organic compounds (VOC), nitrogen oxides

(NOx), and particulate matter less than or equal to ten microns in diameter (PM-10). For each test, the required emissions estimates were developed using the transportation and emission modeling approaches required under the federal transportation conformity rule and summarized in Chapters 3 and 4. The applicable conformity tests were reviewed in Chapter 1. The results are summarized below, followed by a more detailed discussion of the findings for each pollutant. Table 11 and Figures 12 through 15 present results for CO, VOC, NOx, and PM-10, respectively, in metric tons per day for each of the analysis years tested.

For carbon monoxide, the applicable conformity test is the emissions budget test, using the 2025 conformity budget established in the MAG 2013 Carbon Monoxide Maintenance Plan. On March 3, 2016, EPA approved the MAG 2013 Carbon Monoxide Maintenance Plan and conformity budget, effective April 4, 2016. The modeling results indicated that the CO emissions projected for 2025, 2035, and 2040 are less than the 2025 emissions budget. The TIP and Regional Transportation Plan therefore satisfy the conformity emissions test for carbon monoxide.

For volatile organic compounds and nitrogen oxides for the eight-hour ozone standard, the applicable conformity test for 2018 is the emissions budget test, using the 2008 conformity budgets for VOCs and NOx established in the MAG 2007 Eight-Hour Ozone Plan. In addition, the applicable conformity test for 2025, 2035, and 2040 is the emissions budget test, using the 2025 conformity budgets for VOCs and NOx established in the MAG 2009 Eight-Hour Ozone Plan. On June 13, 2012, EPA approved the MAG 2007 Eight-Hour Ozone Plan including the emissions budgets, effective July 13, 2012. On September 17, 2014, EPA approved the MAG 2009 Eight-Hour Ozone Plan and the emissions budgets, effective October 17, 2014. The modeling results indicated that the VOC emissions projected for 2018 are less than the 2008 VOC emissions budget established in the MAG 2007 Eight-Hour Ozone Plan and the NOx emissions projected for 2018 are less than the 2008 NOx emissions budget established in the MAG 2007 Eight-Hour Ozone Plan. In addition, the modeling results indicated that the VOC emissions projected for 2025, 2035, and 2040 are less than the 2025 VOC emissions budget established in the MAG 2009 Eight-Hour Ozone Plan and the NOx emissions projected for 2025, 2035, and 2040 are less than the 2025 NOx emissions budget established in the MAG 2009 Eight-Hour Ozone Plan. The TIP and Regional Transportation Plan therefore satisfy the conformity emissions tests for eight-hour ozone.

Table 11 also shows that the projected emissions for 2018, 2025, 2035, and 2040 are less than the 2017 budgets of 45.7 metric tons per day for VOC and 62.7 metric tons per day for NOx. These budgets were established by the MAG 2017 Eight-Hour Ozone Moderate Area Plan (MAG, 2016), but EPA has not yet approved this Plan or found the budgets to be adequate.

For PM-10, the applicable conformity test is the emissions budget test, using the approved budgets from both the MAG 2012 Five Percent Plan for PM-10 and the Revised MAG 1999 Serious Area Particulate Plan for PM-10. On June 10, 2014, EPA approved the MAG 2012

Five Percent Plan for PM-10 including the 2012 PM-10 conformity budget, effective July 10, 2014. Also, on July 25, 2002, EPA approved the Revised MAG 1999 Serious Area Particulate Plan for PM-10 including the 2006 PM-10 motor vehicle emissions budget, effective August 26, 2002. The modeling results indicated that the PM-10 emissions projected for 2025, 2035, and 2040 are less than the 2012 PM-10 emissions budget and the 2006 PM-10 emissions budget. The TIP and Regional Transportation Plan therefore satisfy the conformity tests for PM-10.

As all requirements of the federal conformity rule have been satisfied, a finding of conformity for the FY 2018-2022 MAG Transportation Improvement Program and 2040 MAG Regional Transportation Plan is supported.

Conformity Test Results for Carbon Monoxide

The conformity modeling results for carbon monoxide are presented in Table 11 and graphed in Figure 12. Emissions were calculated for the carbon monoxide nonattainment area for a 24-hour period based on episode day conditions for a Friday in December. The projected CO emissions for 2025, 2035, and 2040 are 278.8, 174.0, and 165.6 metric tons per day, respectively, which are less than the 2025 CO budget of 559.4 metric tons per day.

Since the projected carbon monoxide emissions for the TIP and Regional Transportation Plan are less than the approved 2025 budget in the MAG 2013 Carbon Monoxide Maintenance Plan, the results support a finding of conformity.

Conformity Test Results for Eight-Hour Ozone

The conformity modeling results for eight-hour ozone are presented in Table 11 and graphed in Figure 13 and Figure 14. The volatile organic compound and nitrogen oxides emissions were calculated to reflect episode day conditions for a Thursday in June. The projected VOC emissions in 2018 are 42.4 metric tons per day which are less than the 2008 VOC budget of 67.9 metric tons per day and the projected NOx emissions in 2018 are 57.6 metric tons per day which are less than the 2008 NOx budget of 138.2 metric tons per day. In addition, the projected VOC emissions in 2025, 2035, and 2040 are 29.2, 17.0, and 16.5 metric tons per day, respectively, which are all less than the 2025 VOC budget of 43.8 metric tons per day and the projected NOx emissions in 2025, 2035, and 2040 are 33.8, 20.2, and 20.6 metric tons per day, respectively, which are all less than the 2025 NOx budget of 101.8 metric tons per day.

In addition, as presented in Table 12, the 2018, 2025, 2035, and 2040 emissions are less than the 2017 budgets of 45.7 metric tons per day for VOC and 62.7 metric tons per day of NOx established in the MAG 2017 Eight-Hour Ozone Moderate Area Plan submitted to EPA by January 1, 2017. However, as of the date this conformity analysis began, these new 2017 budgets have not been found adequate or approved by EPA.

Since the projected 2018 VOC and NOx emissions for the TIP and Regional Transportation Plan are less than the approved 2008 budgets in the MAG 2007 Eight-Hour Ozone Plan and the 2025, 2035, and 2040 VOC and NOx emissions are less than the approved 2025 budgets in the MAG 2009 Eight-Hour Ozone Plan, the results support a finding of conformity.

Conformity Test Results for Particulate Matter

The conformity modeling results for PM-10 are listed in Table 11 and graphed in Figure 15. The PM-10 emissions were calculated for the PM-10 nonattainment area for an annual average day. The projected PM-10 emissions in 2025, 2035, and 2040 are 41.8, 46.0, and 49.1 metric tons per day, respectively, which are all less than the 2012 budget of 54.9 metric tons per day and the 2006 budget of 59.7 metric tons per day.

Since the projected PM-10 emissions for the TIP and Regional Transportation Plan are less than the approved 2012 budget established in the MAG 2012 Five Percent Plan for PM-10 and the approved 2006 budget established in the Revised MAG 1999 Serious Area Particulate Plan for PM-10, the results support a finding of conformity.

TABLE 11.
CONFORMITY BUDGET TEST RESULTS FOR CO, VOC, NOx, AND PM-10
(METRIC TONS/DAY)
MARICOPA COUNTY NONATTAINMENT AND MAINTENANCE AREAS

Pollutant	Carbon Monoxide	Eight-Hour Ozone				PM-10	
Year	2025 [a]	2008 [b] VOC	2008 [b] NOx	2025 [c] VOC	2025 [c] NOx	2012 [d]	2006 [e]
Budget Test	*559.4*	*67.9*	*138.2*	*43.8*	*101.8*	*54.9*	*59.7*
2018		42.4	57.6				
2025	278.8			29.2	33.8	41.8	41.8
2035	174.0			17.0	20.2	46.0	46.0
2040	165.6			16.5	20.6	49.1	49.1

a. The MAG 2013 Carbon Monoxide Maintenance Plan established a 2025 emissions budget. The onroad mobile source emissions correspond to a Friday in December episode day conditions.

b. The MAG 2007 Eight-Hour Ozone Plan established 2008 budgets for volatile organic compounds (VOCs) and nitrogen oxides (NOx). The onroad mobile source emissions correspond to a Thursday in June episode day conditions.

c. The MAG 2009 Eight-Hour Ozone Plan established 2025 budgets for volatile organic compounds (VOCs) and nitrogen oxides (NOx). The onroad mobile source emissions correspond to a Thursday in June episode day conditions.

d. The MAG 2012 Five Percent Plan for PM-10 established a 2012 emissions budget corresponding to an annual average day.

e. The Revised MAG1999 Serious Area Particulate Plan for PM-10 established a 2006 emissions budget corresponding to an average annual day.

TABLE 12.
CONFORMITY TEST RESULTS USING SUBMITTED
BUDGETS FOR VOC AND NOx FOR INFORMATION PURPOSES
(METRIC TONS/DAY)
MARICOPA NONATTAINMENT AND MAINTENANCE AREAS

Pollutant	Eight-Hour Ozone	
Year	2017 [a] VOC	2017 [a] NOx
Budget Test	*45.7*	*62.7*
2018	43.3	52.4
2025	29.7	30.5
2035	17.0	18.0
2040	16.5	18.3

a. The submitted MAG 2017 Eight-Hour Ozone Moderate Area Plan established a 2017 volatile organic compounds (VOCs) budget of 45.7 metric tons/day and a 2017 nitrogen oxides (NOx) budget of 62.7 metric tons/day. On September 10, 2013, EPA advised that MAG should include in this conformity analysis the budgets from submitted plans so that an adequacy finding on a submitted SIP does not interfere with the conformity process.

Figure 4: Carbon Monoxide Results for Conformity Budget Test
Maricopa County Nonattainment and Maintenance Areas

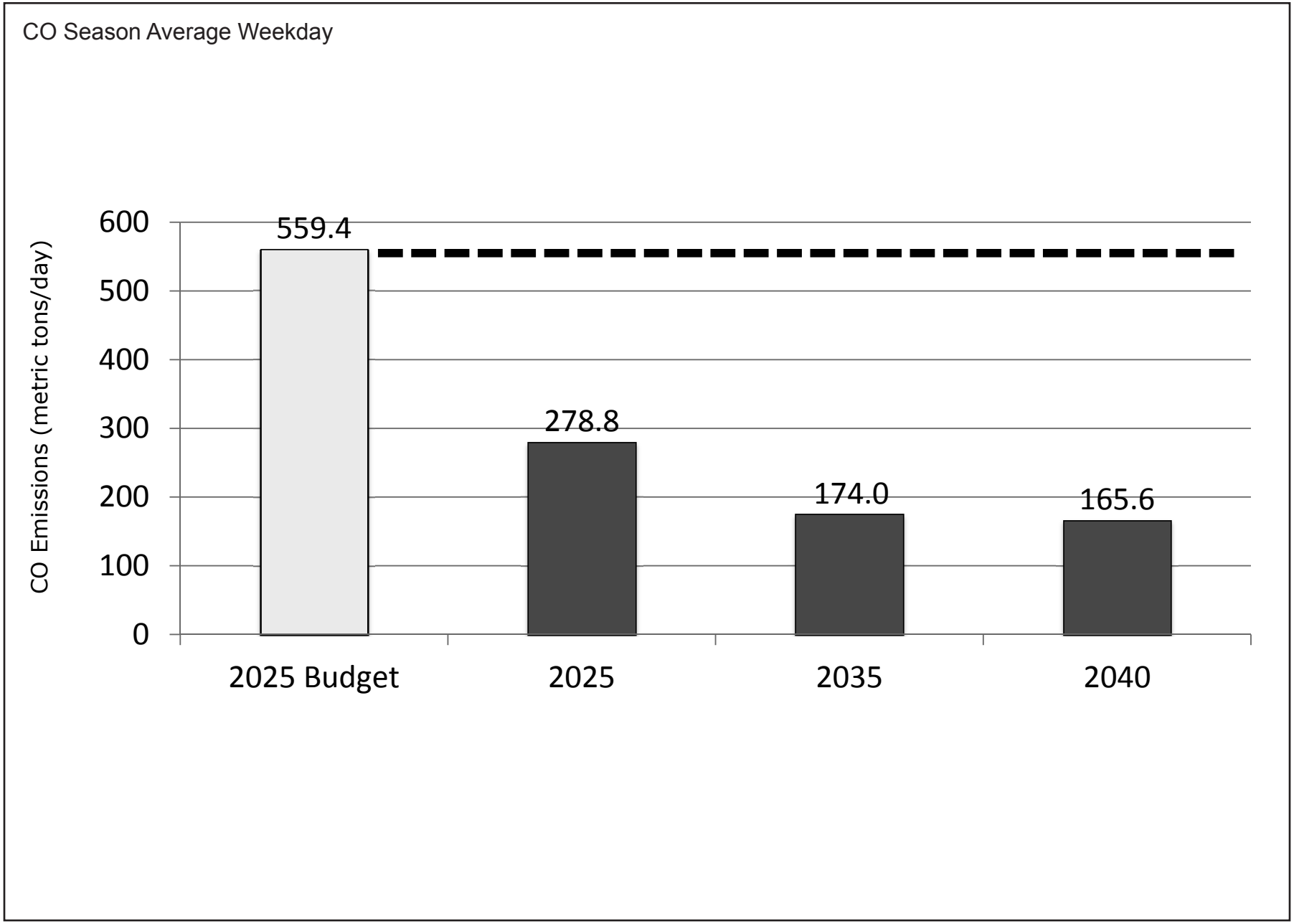


Figure 5: Eight-Hour Ozone: Volatile Organic Compounds (VOC) Results for Conformity Budget Test
Maricopa Nonattainment and Maintenance Areas

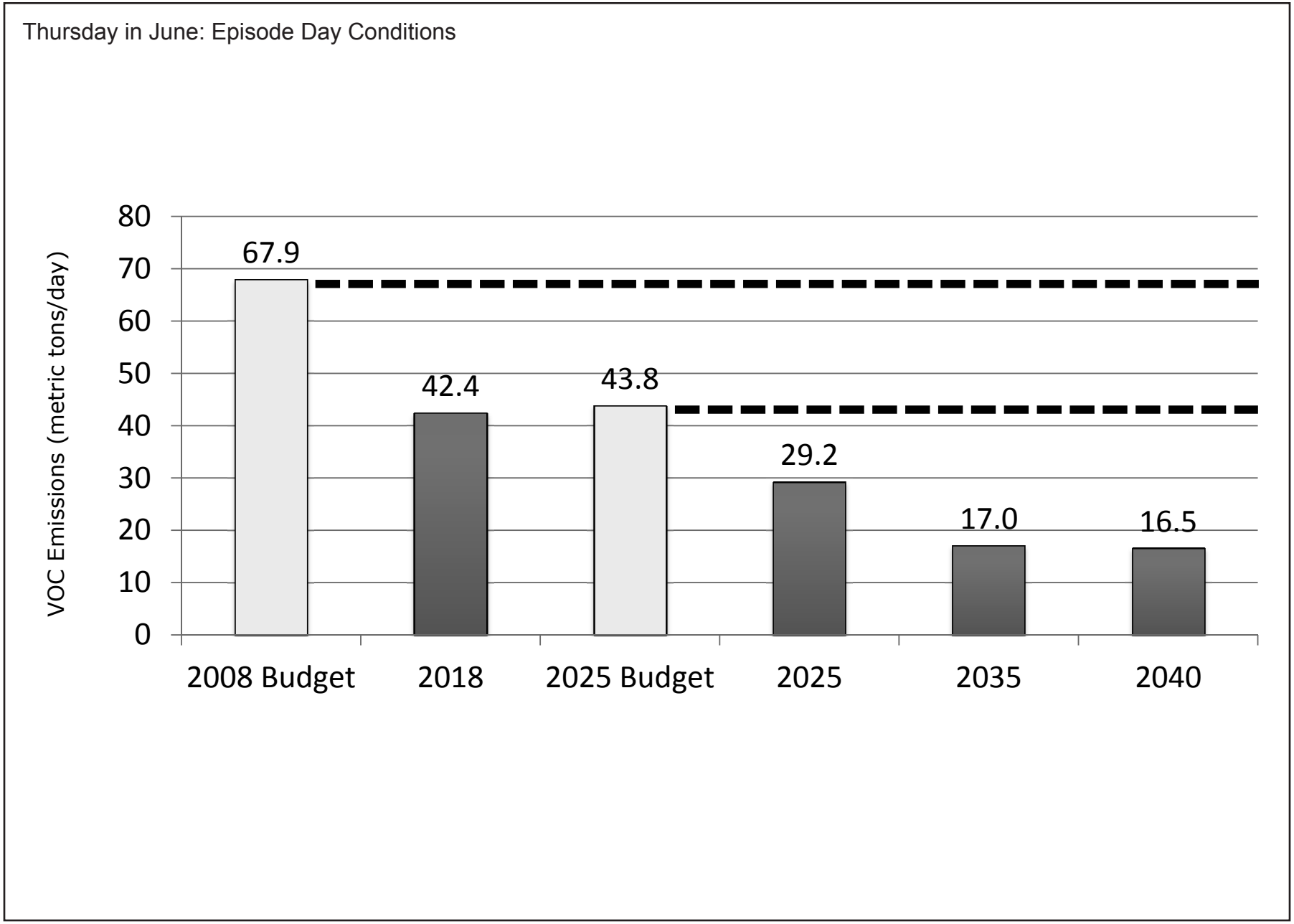


Figure 6: Eight-Hour Ozone: Nitrogen Oxides (NOx) Results for Conformity Budget Test
Maricopa Nonattainment and Maintenance Areas

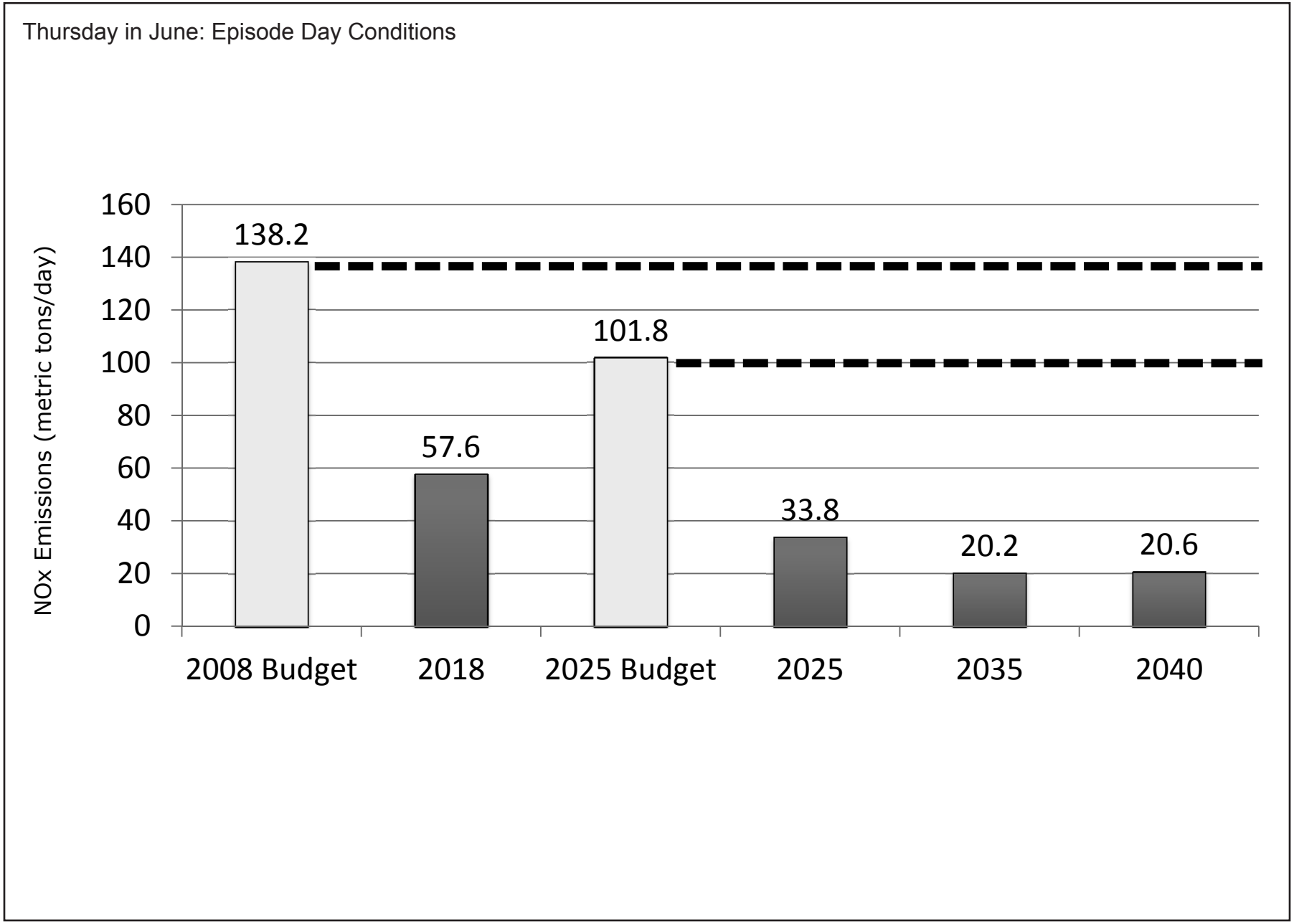
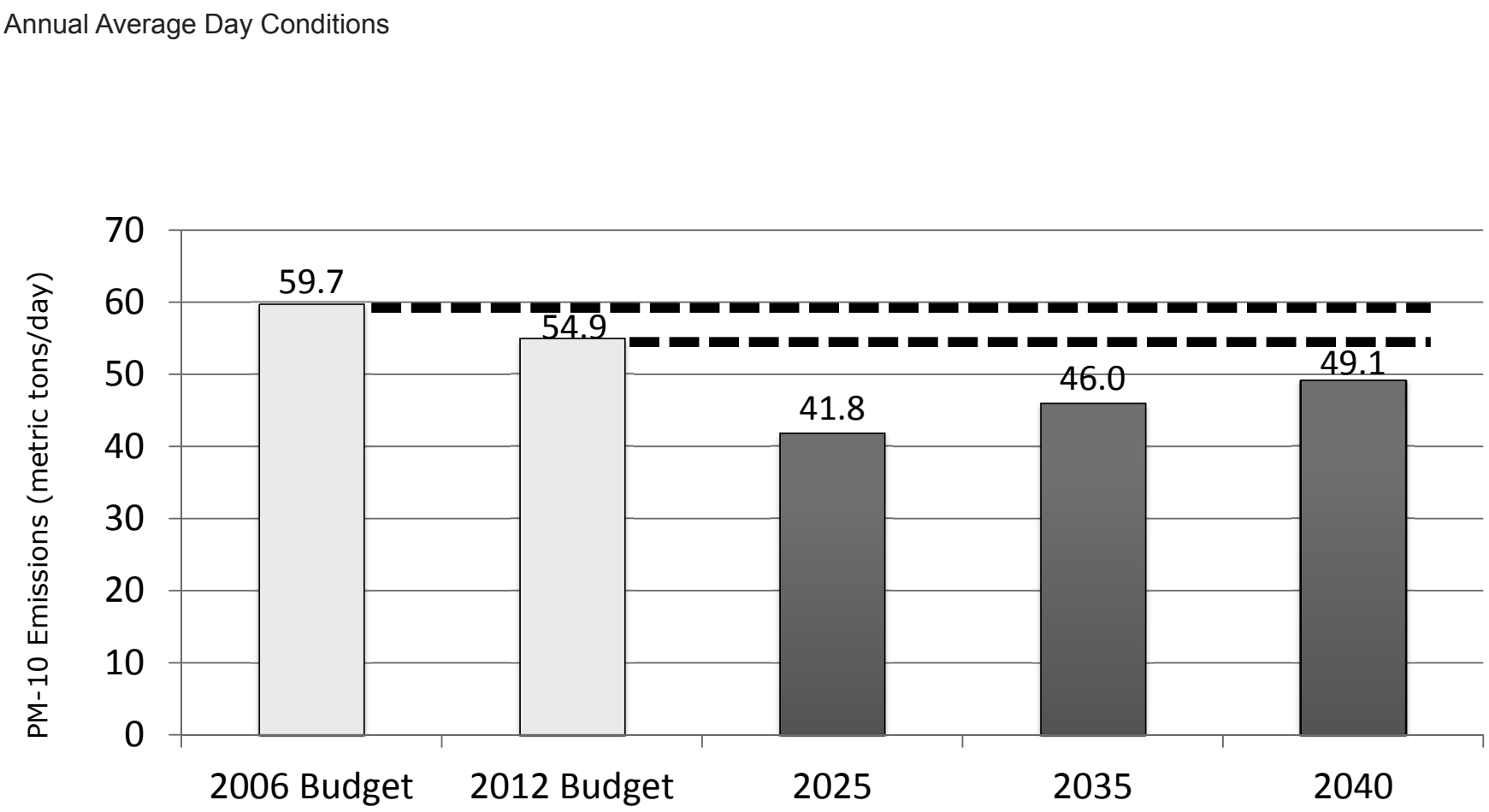


Figure 7: PM-10 Results for Conformity Budget Test
Maricopa County Nonattainment and Maintenance Areas



The conformity results are shown compared with the 2006 budget from the *Revised MAG 1999 Serious Area Particulate Plan for PM-10* approved by the EPA on July 25, 2002 and the 2012 budget from the *MAG 2012 Five Percent Plan for PM-10* approved by the EPA on June 10, 2014.

PINAL COUNTY NONATTAINMENT AREAS

For the Pinal County nonattainment areas, action/baseline tests were conducted for particulate matter (PM-10) for the PM-10 nonattainment area and particulate matter (PM-2.5) and nitrogen oxides (NOx) for the PM-2.5 nonattainment area. For each test, the required emissions estimates were developed using the transportation and emission modeling approaches required under the federal transportation conformity rule and summarized in Chapters 3 and 4. The applicable conformity tests were reviewed in Chapter 1. The results are summarized below. Table 13 and Figures 16 through 18 present the conformity results for the PM-10 and PM-2.5 nonattainment areas for each of the analysis years tested.

Conformity Test Results for the Pinal PM-10 Nonattainment Area

The conformity modeling results for PM-10 are listed in Table 13 and graphed in Figure 16. The PM-10 emissions were calculated for the PM-10 nonattainment area for an annual average day.

The projected PM-10 emissions in 2018, 2025, 2035, and 2040 for the action scenarios are 110,722, 117,665, 130,589, and 138,123 kilograms per day, respectively. The projected PM-10 emissions in 2018, 2025, 2035, and 2040 for the baseline scenarios are 111,585, 119,550, 132,799, and 140,239 kilograms per day, respectively.

Since the PM-10 emissions projected for the action scenarios are not greater than the PM-10 emissions projected for the baseline scenarios in all conformity analysis years, it is also reasonable to expect the build emissions would not exceed the baseline emissions for the time periods between the analysis years.[1] These results support a finding of conformity.

Conformity Test Results for the Pinal PM-2.5 Nonattainment Area

The conformity modeling results for PM-2.5 and NOx are listed in Table 13 and graphed in Figures 17 and 18. The PM-2.5 and NOx emissions were calculated for the PM-2.5 nonattainment area for an annual average day.

The projected PM-2.5 emissions in 2018, 2025, 2035, and 2040 for the action scenario are 29, 22, 21, and 23 kilograms per day, respectively. The projected PM-2.5 emissions in 2018, 2025, 2035, and 2040 for the baseline scenario are 29, 26, 24, and 27 kilograms per day, respectively.

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[1]Section 93.119(d)(1) of the Transportation Conformity Regulations (EPA, 2012c), refers to “build” as the “action” scenario and “no-build” as the “baseline” scenario.

The projected NOx emissions in 2018, 2025, 2035, and 2040 for the action scenario are 1,199, 877, 807, and 937 kilograms per day, respectively. The projected NOx emissions in 2018, 2025, 2035, and 2040 for the baseline scenario are 1,200, 1,171, 1,156, and 1,455 kilograms per day, respectively.

Since the PM-2.5 and NOx emissions projected for the action scenarios are not greater than the PM-2.5 and NOx emissions projected for the baseline scenarios in all conformity analysis years, it is also reasonable to expect the build emissions would not exceed the baseline emissions for the time periods between the analysis years.[1] These results support a finding of conformity.

TABLE 13.
CONFORMITY INTERIM EMISSION (ACTION/BASELINE) TEST RESULTS
(KILOGRAMS/DAY)
PINAL COUNTY NONATTAINMENT AREAS

	PM-10 Nonattainment Area	**PM-2.5 Nonattainment Area**	
Pollutant	*PM-10*	*PM-2.5*	*NOx*
2018			
- Action	110,722	29	1,199
- Baseline	111,585	29	1,200
2025			
- Action	117,665	22	877
- Baseline	119,550	26	1,171
2035			
- Action	130,589	21	807
- Baseline	132,799	24	1,156
2040			
- Action	138,123	23	937
- Baseline	140,239	27	1,455

Figure 8: PM-10 Results for Conformity Interim Emission (Action/Baseline) Test
Pinal County PM-10 Nonattainment Area

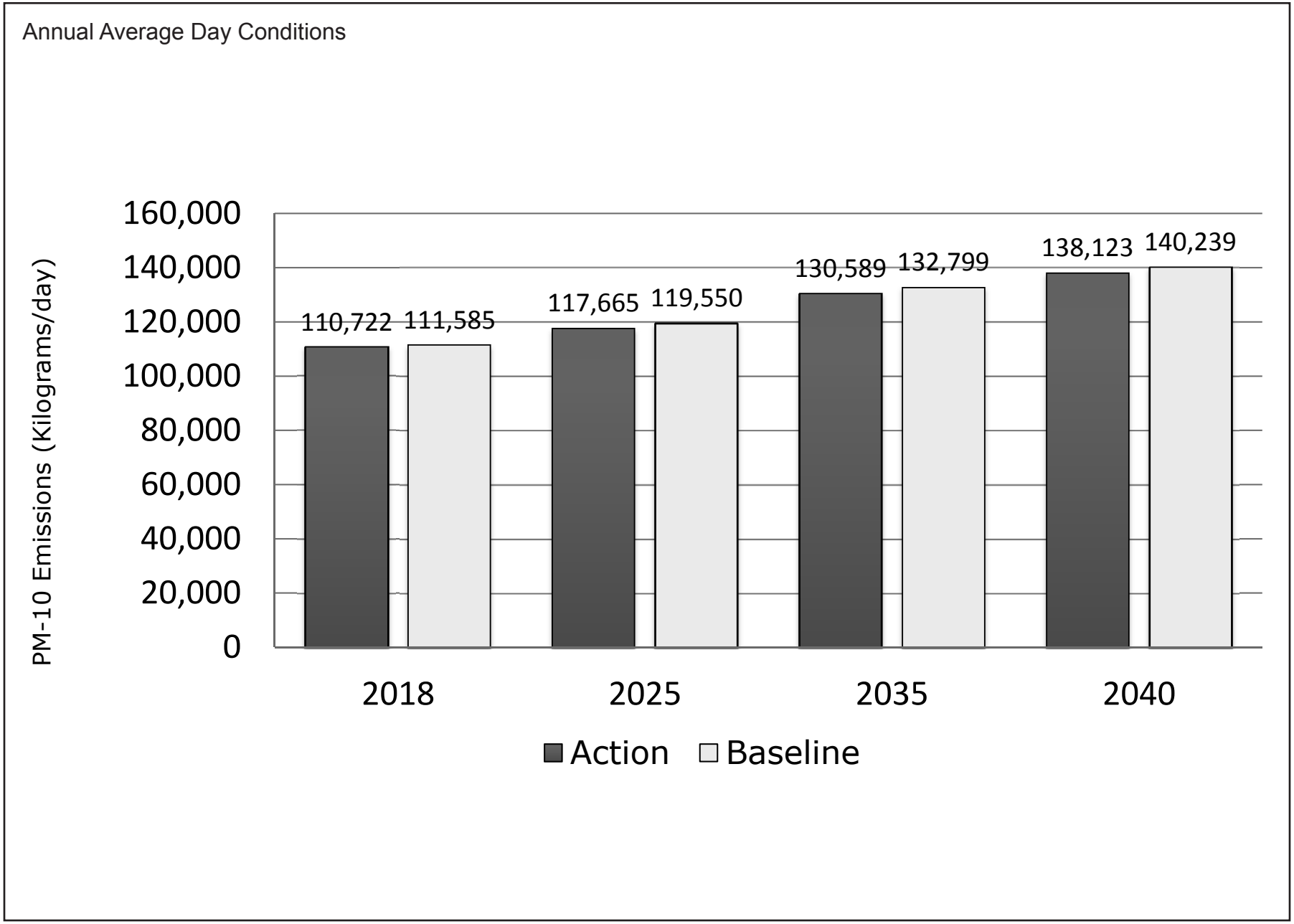


Figure 9: PM-2.5 Results for Conformity Interim Emission (Action/Baseline) Test
Pinal County PM-2.5 Nonattainment Area

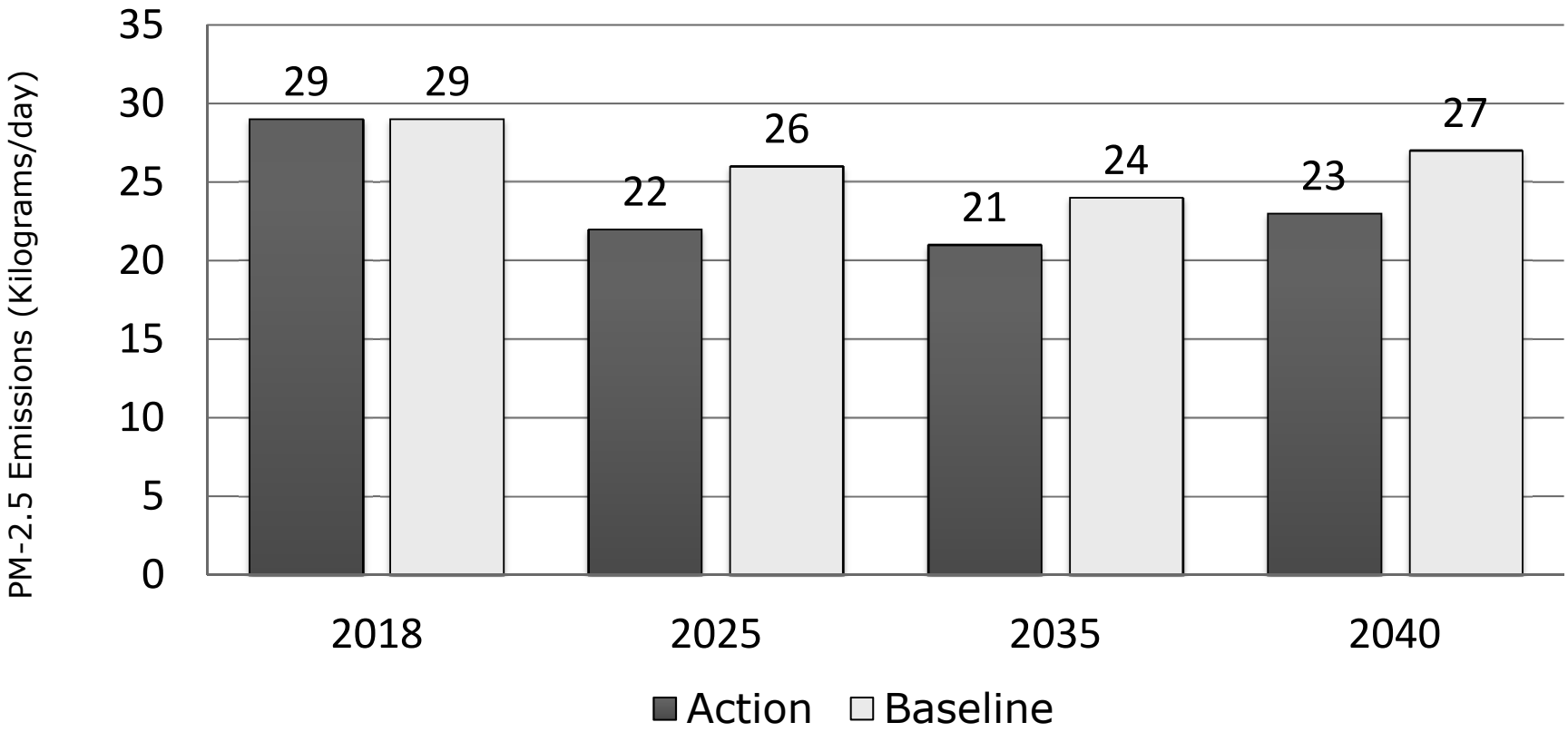
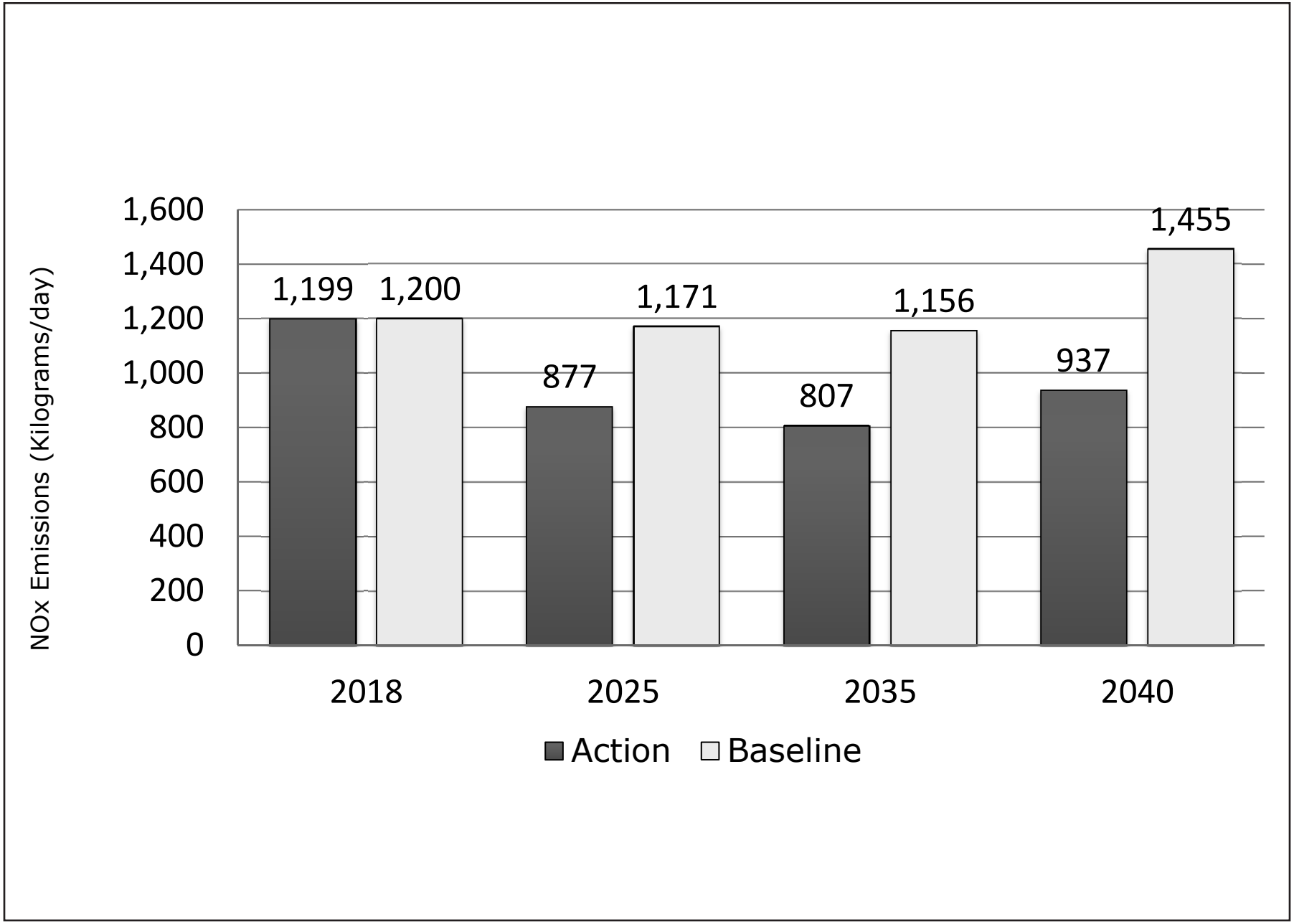


Figure 10: NOx Results for Conformity Interim Emission (Action/Baseline) Test
Pinal County PM-2.5 Nonattainment Area



GLOSSARY

40 CFR Parts 51 and 93	Sections 51 and 93 from Title 40 of the Code of Federal Regulations describing the transportation conformity rule.
ADEQ	Arizona Department of Environmental Quality.
ADOT	Arizona Department of Transportation.
AP-42	AP-42, Fifth Edition, provides PM-10 emission factors. Common name for the EPA Compilation of Air Pollutant Emission Factors.
Applicable Plan	An air quality plan that has been approved by EPA for a specific air pollutant.
A.R.S.	Arizona Revised Statutes. The codified laws of the State of Arizona.
Arterial Roadway	A major urban street serving through traffic and also providing access to adjacent land.
Attainment	The status of having air quality that is below (i.e., cleaner air) the allowable national standard for a particular pollutant.
AZ-SMART	Arizona Socioeconomic Modeling, Analysis, and Reporting Toolbox is the MAG socioeconomic model used to develop population and employment projections.
Action/Baseline	Action or Build refers to the action scenario which assumes the Baseline or No-Build scenario and the implementation of the proposed action (included in the TIP or RTP) for each of the years to be analyzed. The Baseline scenario assumes the future transportation network without implementation of the proposed action (included in the TIP or RTP) for the years to be analyzed.

CAA	The U.S. Clean Air Act, referring to the Air Pollution Control Act of 1955, as subsequently amended in 1963, 1967, 1970, 1974, 1977, and 1990.
Capacity	The maximum number of vehicles that a roadway can carry in a given time period under prevailing roadway, traffic, and control conditions.
Centroid Connector	An abstract representation of the local street system, as used in MAG travel demand models. These links connect the centroids of zones, where trips begin or end, to arterial or collector roadways on the modeled road network.
CMAQ	Congestion Mitigation and Air Quality Improvement Program.
CO	Carbon monoxide. A colorless, odorless, poisonous gas that results from the incomplete combustion of carbon-based fuels, such as gasoline.
Collector Roadway	A minor urban street providing access to and from local streets and serving adjacent land use.
Concentration	The relative content of a pollutant in the air, expressed as a volume unit to volume unit often expressed as an average for a specified time interval. For example, the national standard for ambient carbon monoxide concentration is an eight-hour average of 9.0 parts per million.
Conformity	An analysis which demonstrates that a transportation plan, program, or project conforms with the State Implementation Plan purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards and achieving expeditious attainment of such standards; and that such activities will not cause or contribute to any new violation of any standard in any area; increase the frequency or severity of any existing violation of any standard in any area; or delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.
Congestion	Traffic congestion is a condition in which vehicles experience undue delay. It is quantified in the MAG travel demand models by the ratio of traffic volume to capacity

	(V/C). A V/C ratio of 1.00 or more is considered severe congestion.
Emission Factor	The rate at which a pollutant is emitted from a given source (example: grams per mile) for given conditions (e.g., vehicle type and model year, vehicle speed, fuel type, and ambient air temperature).
Episode Day	A day selected to represent conditions (meteorology, etc.) under which violations of the air quality standard for a particular pollutant are likely to occur.
EPA	United States Environmental Protection Agency.
Exceedance	A term used to refer to an episode during which ambient concentrations of an air pollutant in a region are higher than the allowable national standard.
FHWA	Federal Highway Administration.
FIP	Federal Implementation Plan.
FMS	Freeway Management System. Infrastructure such as cameras, variable message signs, and ramp metering systems to improve the flow of people and goods on limited access facilities.
FTA	Federal Transit Administration.
Freeway	A divided highway with two or more lanes for the exclusive use of traffic in each direction, and with full control of access and egress.
FY	Fiscal Year. The federal fiscal year extends from October 1 to September 30. For example, FY 2017 begins on October 1, 2016.
Hot Spot	Localized area with the potential to cause or contribute to a violation of an air quality standard. For example, a busy intersection where vehicular traffic may cause or contribute to increased emissions of carbon monoxide may attribute to a violation of the standard.
HOV	High Occupancy Vehicle. Multi-occupant vehicles such as a carpool, vanpool, or bus.

HOV Lane	A roadway lane available for use by High Occupancy Vehicles.
HPMS	Highway Performance Monitoring System. Summary information for urbanized areas provides detailed data for a sample of the arterial and collector functional systems to assess highway condition, performance, air quality trends, and future investment requirements.
I/M	Vehicle Inspection/Maintenance Program.
ITS	Intelligent Transportation System. The deployment of advanced electronics and information technologies to improve the performance of freeways and arterial roadways.
Link	A computer record describing a section of roadway in the MAG transportation models.
Local Roadway	A road, usually with low traffic volume, designed solely to serve adjacent development rather than through traffic.
MAG	Maricopa Association of Governments. The Maricopa Association of Governments was designated the metropolitan planning agency for Maricopa County, Arizona, by Governor Jack Williams on December 14, 1973.
MCAQD	Maricopa County Air Quality Department.
Metric Ton	A unit of mass equal to 1000 kilograms, or approximately 2203 pounds.
Mode Choice Model	A computer model which determines mode choice, such as transit, auto driver, and auto passenger, based on variables such as travel times, costs, and income of travelers.
MOVES2014a	MOVES2014a is a currently approved EPA model for estimating onroad vehicle emission factors. This model is used to estimate the emission factors for CO, VOC, NOx, and PM-10 exhaust, tire wear, and brake wear emissions.
MOVESLink	A MAG software program that combines emission factors (such as from MOVES2014a) with link-level transportation data to produce onroad mobile emission inventories.

MPO	Metropolitan Planning Organization. A body of elected public officials responsible for regional transportation decision-making, as required under federal transportation planning regulations.
NAAQS, or National Standard	Refers to the National Ambient Air Quality Standards (NAAQS) which are the maximum pollutant levels which may not be exceeded in the ambient air to protect the public from adverse health effects.
Network	A computer readable representation of a specific urban street and highway system.
Nonattainment Area	An area designated by the U.S. Environmental Protection Agency as not being in attainment of the national standard for a specified pollutant.
Node	A point identifying one end of a link in the MAG transportation models.
NO_x	Nitrogen Oxides includes nitric oxide (NO) and nitrogen dioxide (NO_2). These gaseous air pollutants combine with volatile organic compounds (i.e. hydrocarbons) in the presence of sunlight to produce ozone.
O_3	Ozone is a secondary pollutant formed by the combination of VOCs and NO_x in the presence of sunlight.
OBD	On-Board Diagnostics. A computer based system built into all model year 1996 and newer light-duty cars and trucks. OBD monitors the performance of some of the engines' major components, including individual emission controls.
Phased in I/M Cutpoints	Cutpoints are the maximum emission level, by pollutant, used to determine if a vehicle passes or fails the emissions test administered through the vehicle inspection and maintenance program. The phased-in I/M cutpoints are the cutpoints currently enacted into legislation for vehicles subject to the enhanced emissions test.
PM-10	Particulate Matter less than or equal to ten microns in diameter.
ppm	Parts per million, a measure of pollution concentration.

psi	Pounds per square inch, a measure of pressure.
Reentrained Dust	Dust deposited on the roadway that is subsequently projected into the air by the passage of motor vehicles.
Regional Rideshare Program	The MAG sponsored program which provides free technical assistance to individuals, companies, and public sector entities interested in carpooling, vanpooling, or other transportation alternatives to drive-alone motor vehicle use.
ROSS Plan	Regional Off-Street System Plan. A plan describing a region-wide system of off-street paths/trails for non-motorized transportation.
RPTA	Regional Public Transportation Authority. A political subdivision of the State of Arizona established in 1985 to conduct regional transit planning and to develop and operate a regional transit system in Maricopa County.
RTP	Regional Transportation Plan.
SIP	State Implementation Plan. Mandated by the Clean Air Act, SIPs contain details to monitor, control, maintain, and enforce compliance with National Ambient Air Quality Standards.
Socioeconomic Data	Data consists primarily of TAZ-level household projections of population and employment by type which are input to the MAG travel demand models.
TAZ	Traffic Analysis Zone. A small geographic area for which socioeconomic data is estimated in the MAG travel demand models.
TCM	Transportation Control Measure. A TCM as defined in CAA Section 108(f)(1)(A) includes any measure in an applicable implementation plan which is intended to reduce emissions from transportation sources by reducing vehicle use or changing traffic flow or congestion conditions (e.g., transit improvements).
TIP	Transportation Improvement Program. An annual or biennial document listing transportation projects to be funded in upcoming years.

TMA	Transportation Management Association. A group comprised generally of businesses to identify and develop solutions to shared transportation problems.
TOG	Total Organic Gases. Gaseous emissions that lead to the formation of ozone.
TransCAD	Software programs which are used to perform the MAG travel demand modeling.
Travel Reduction Program (TRP)	A program administered by Maricopa County, pursuant to the provisions of Arizona House Bill 2206 (1988), as subsequently strengthened by adoption of the Maricopa County Trip Reduction Ordinance.
U.S. DOT	United States Department of Transportation.
V/C Ratio	Volume to Capacity Ratio. A parameter used to measure congestion. For a given roadway link, it is calculated as total traffic volume divided by capacity.
Violation	A term used to define the number of exceedances that result in noncompliance with the national standard.
VMT	Vehicle Miles of Travel. A measure of total vehicle travel within a specified area and time frame.
VOC	Volatile Organic Compounds. VOCs are emitted in the storage and use of fuel, solvents, and many industrial and consumer chemicals, as well as from vegetation. VOCs and nitrogen oxides, when emitted in the presence of sunlight, undergo chemical reactions which result in the formation of ozone.

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