Arizona Department of Transportation

Environmental Planning

Air Quality Technical Report

Pima Freeway (SR 101), Princess Drive to Shea Boulevard

Federal Project No. 101-B(210)T

ADOT Project No. 101 MA 036 F0123 01C

May 2023
Revised July 2023

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by the Arizona Department of Transportation pursuant to 23 United States Code 327 and a Memorandum of Understanding dated April 16, 2019 and executed by the Federal Highway Administration and Arizona Department of Transportation.

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EXECUTIVE SUMMARY

This Air Quality Technical Report supports the Pima Freeway (State Route [SR] 101), Princess Drive to Shea Boulevard project. The report evaluates the project's potential air quality impacts within the study area. This includes an analysis of whether the project would cause or contribute to a new localized exceedance of carbon monoxide (CO) or particulate matter (PM_{10}) ambient air quality standards, or increase the frequency or severity of any existing exceedance; the mobile source air toxic (MSAT) impacts of the project; and the greenhouse gas (GHG) impacts of the project.

According to this analysis, the project is not predicted to cause or exacerbate a violation of any National Ambient Air Quality Standards (NAAQS). It is also predicted to have no measurable effect on MSAT emissions.

1.0 *INTRODUCTION*

This Air Quality Technical Report has been prepared in support of the Pima Freeway (State Route [SR] 101), Princess Drive to Shea Boulevard project in Maricopa County, Arizona. The air quality impacts were evaluated based on traffic data presented in the Final Design Concept Report Update (Kimley Horn, 2021) with additional modeling updates for consistency with the most recent Maricopa Association of Governments (MAG) July 2022 Conformity modeling performed for the Air Quality Conformity Analysis and to provide data for an analysis year of 2050.

The Arizona Department of Transportation (ADOT), in cooperation with the Federal Highway Administration (FHWA), is preparing a Categorical Exclusion Determination of the proposed improvements to a segment of State Route (SR) 101L. The proposed project would construct additional general-purpose lanes (GPL) along SR 101L between milepost (MP) 36.6 (intersection of Pima Road and Princess Drive) and MP 41.1 (Shea Boulevard). This project is located within the City of Scottsdale, Maricopa County, Arizona (see Figures 1, 2, and 3).

This segment of the Pima Freeway (SR 101L) currently consists of 3 GPL and 1 high-occupancy vehicle (HOV) lane in each direction. It accommodates traffic from the Red Mountain Freeway (SR 202L), Price Freeway (SR 101L), State Route 51 (SR 51), and Interstate 17 (I-17). The project is adjacent to Scottsdale Airport and Scottsdale Community College.

With over 4.3 million residents, Maricopa County is the fourth most populous county in the nation. It has been one of the fastest growing regions in the United States. The growing traffic demand has caused the SR 101L corridor to become increasingly congested during the morning and evening peak travel periods, and growth projections indicate the congestion will worsen in the future. Additional GPL would increase the freeway capacity and help alleviate increased levels of traffic congestion in the future.

The scope of work for the project consists of:

- Adding one GPL to southbound (SB) SR 101L
- Adding one GPL to northbound (NB) SR 101L
- Reconstructing and/or widening entrance and/or exit ramps
- Modifying curb ramps and/or sidewalks on crossroads
- Widening bridge structures on both the NB and SB sides

Details of the interchange improvements are shown in Figures 4 through 7.

The project would occur within the existing ADOT right-of-way (R/W) through private lands, and ADOT easement through land held in trust by the Arizona State Land Department, and public lands under the management of the US Bureau of Reclamation.

Approximately one acre of new R/W and temporary construction easements (TCEs) would be required to construct the improvements. The improvements would be constructed in phases. This project would require temporary lane closures along SR 101L and the crossroads, night and/or weekend full freeway closures, and temporary ramp closures; however, access would be maintained to adjacent properties throughout construction.

The goal of this proposed project is to increase the capacity of SR 101L in order to alleviate increased levels of traffic congestion in the future. The proposed project is included in the Maricopa Association of Governments (MAG) 2050 Regional Transportation Plan (RTP). Construction is anticipated to begin in summer 2023, and it is expected to take approximately two years to complete.

The project is within the Phoenix carbon monoxide (CO) maintenance area and nonattainment area for particulate matter 10 microns in diameter or less (PM_{10}). The proposed project is included in the Maricopa Association of Governments (MAG) Regional Transportation Plan (RTP) MOMENTUM 2050. In addition, the project is included in the FY 2022-2025 MAG Transportation Improvement Program. The latest conformity determination for the FY 2022-2025 MAG Transportation Improvement Program and 2050 MAG Regional Transportation Plan for the area was made by the Federal Highway Administration and Federal Transit Administration on February 14, 2023.

Figure 1. Project Location Map

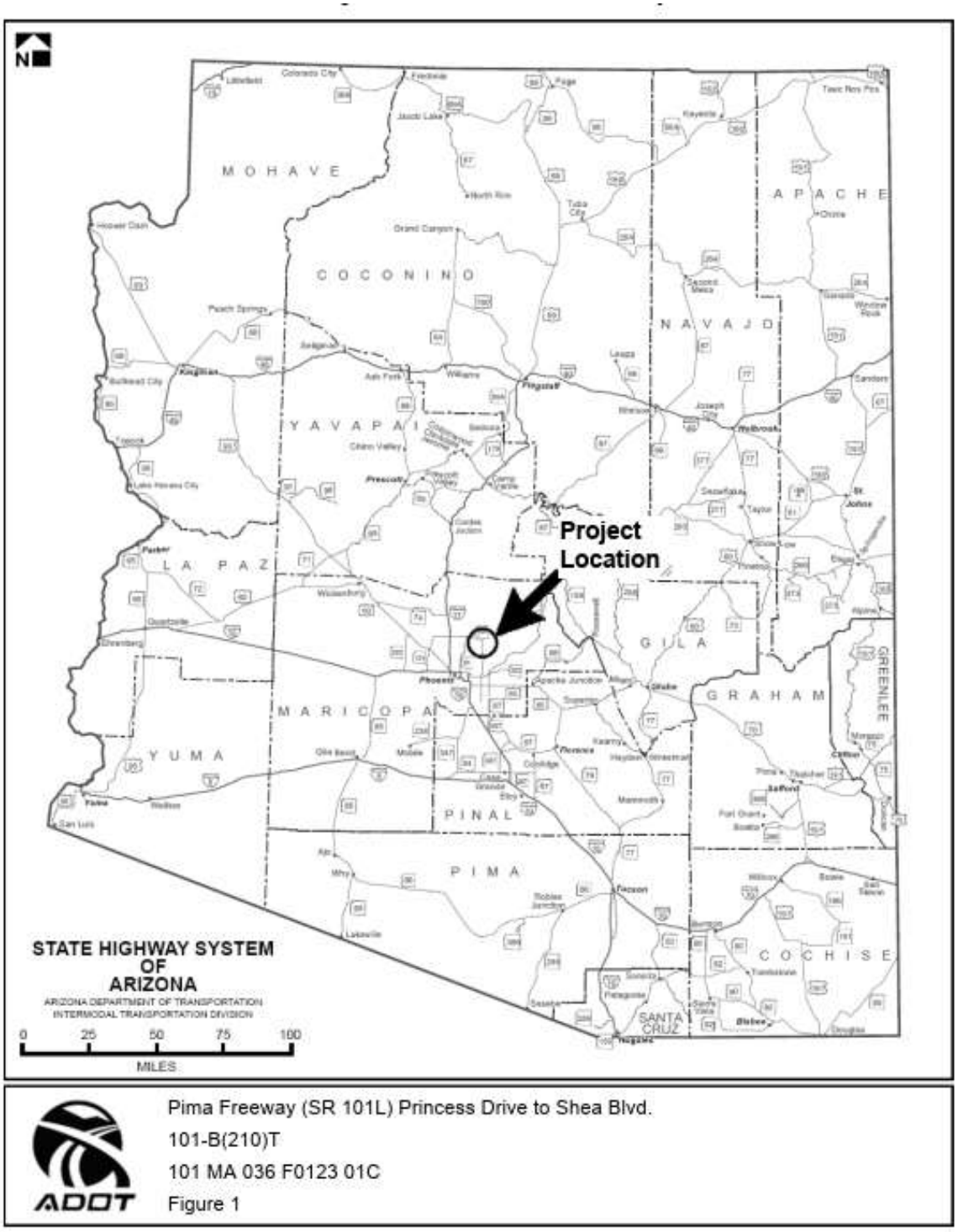


Figure 2. Project Map: Princess Drive to Raintree Drive

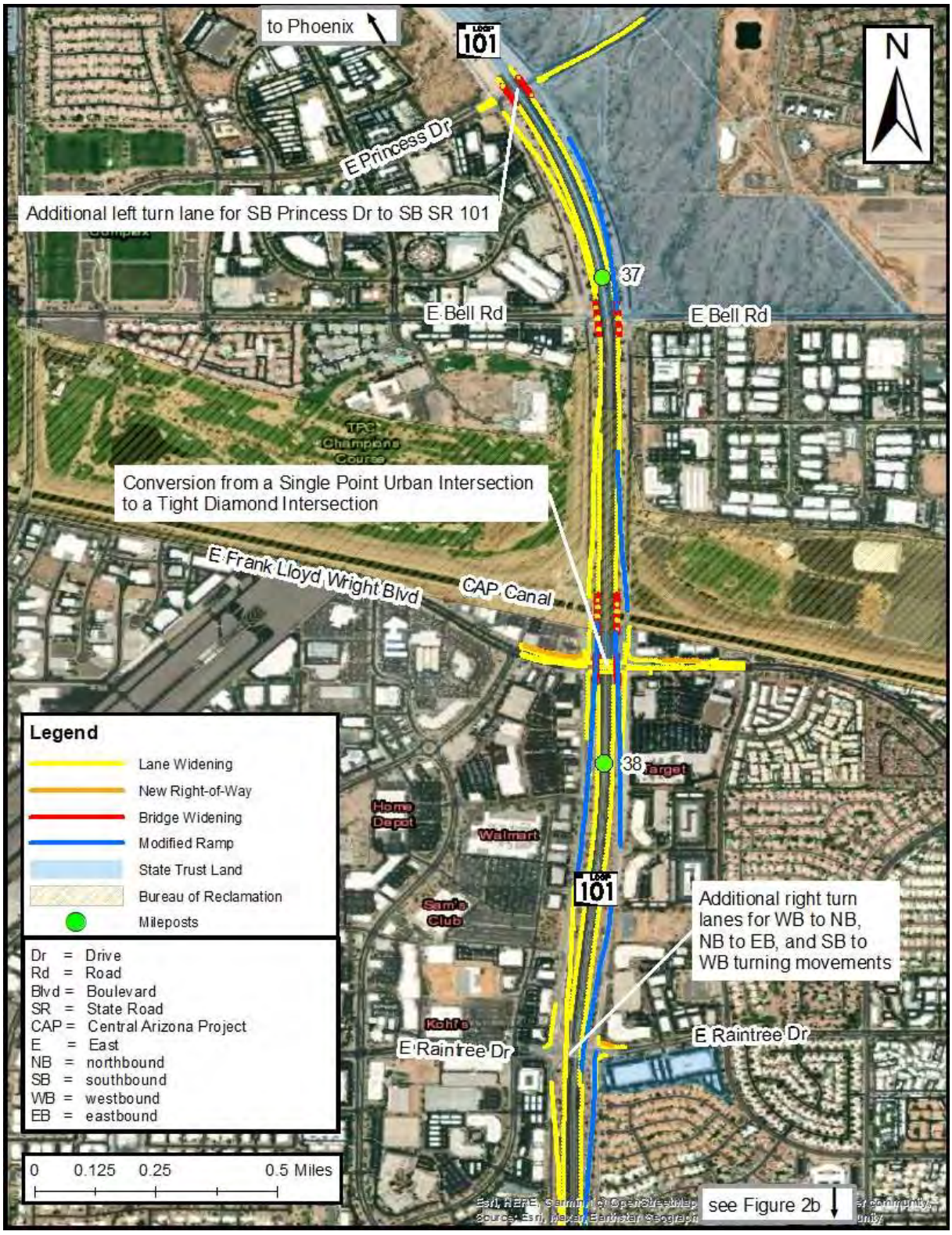


Figure 3. Project Map: Thunderbird Road to Shea Boulevard

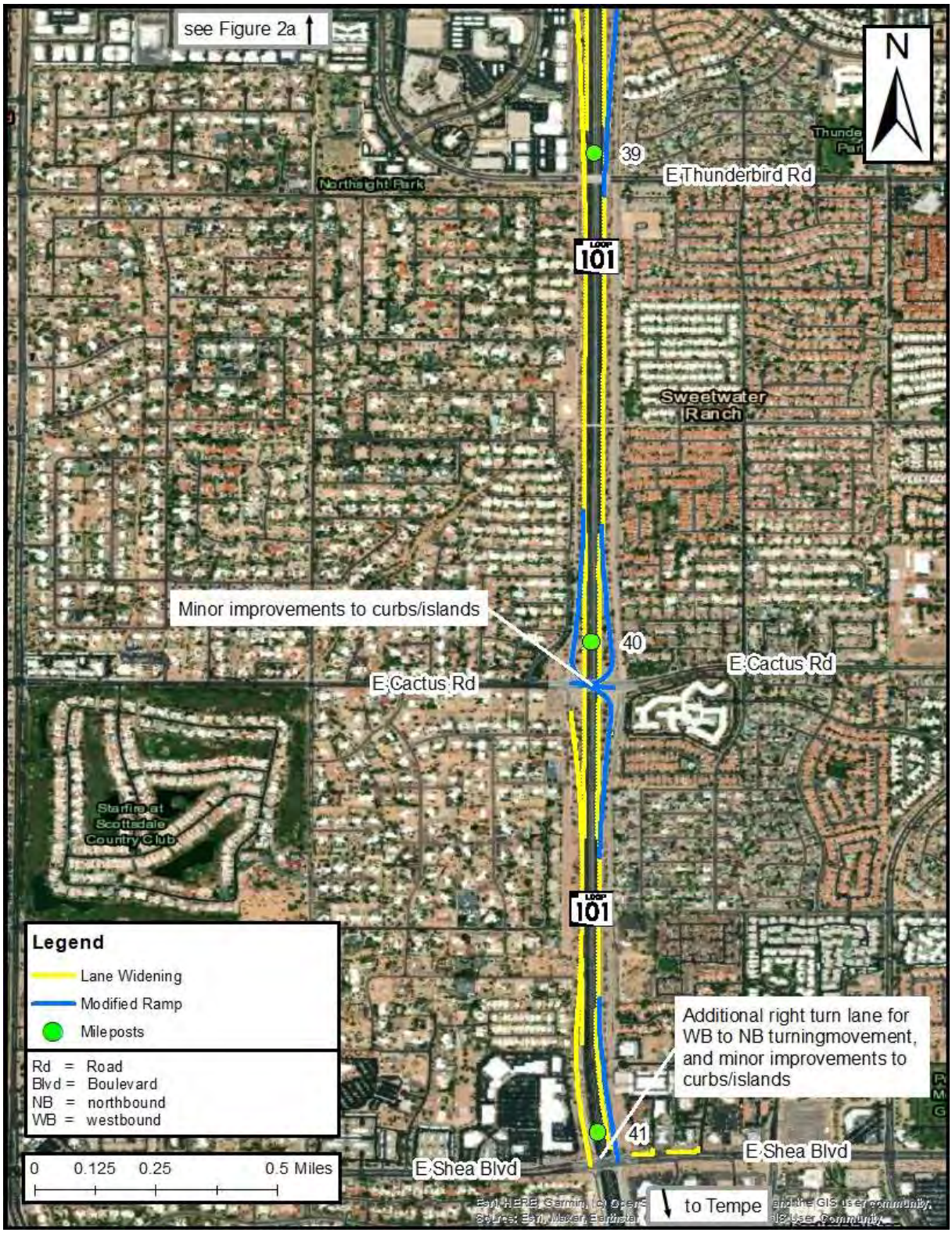


Figure 4. Princess Drive Interchange Design Concept

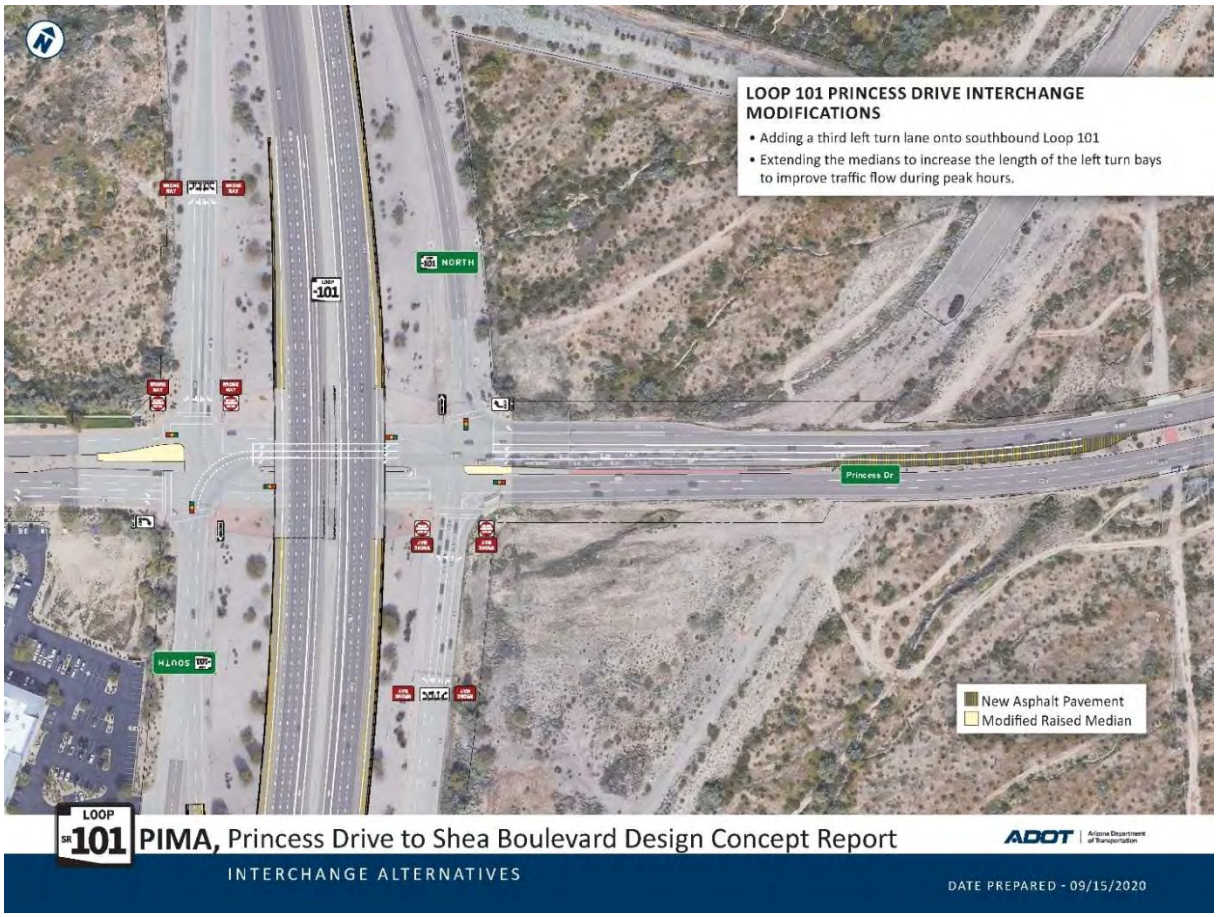


Figure 5. Frank Lloyd Wright Boulevard Interchange Design Concept

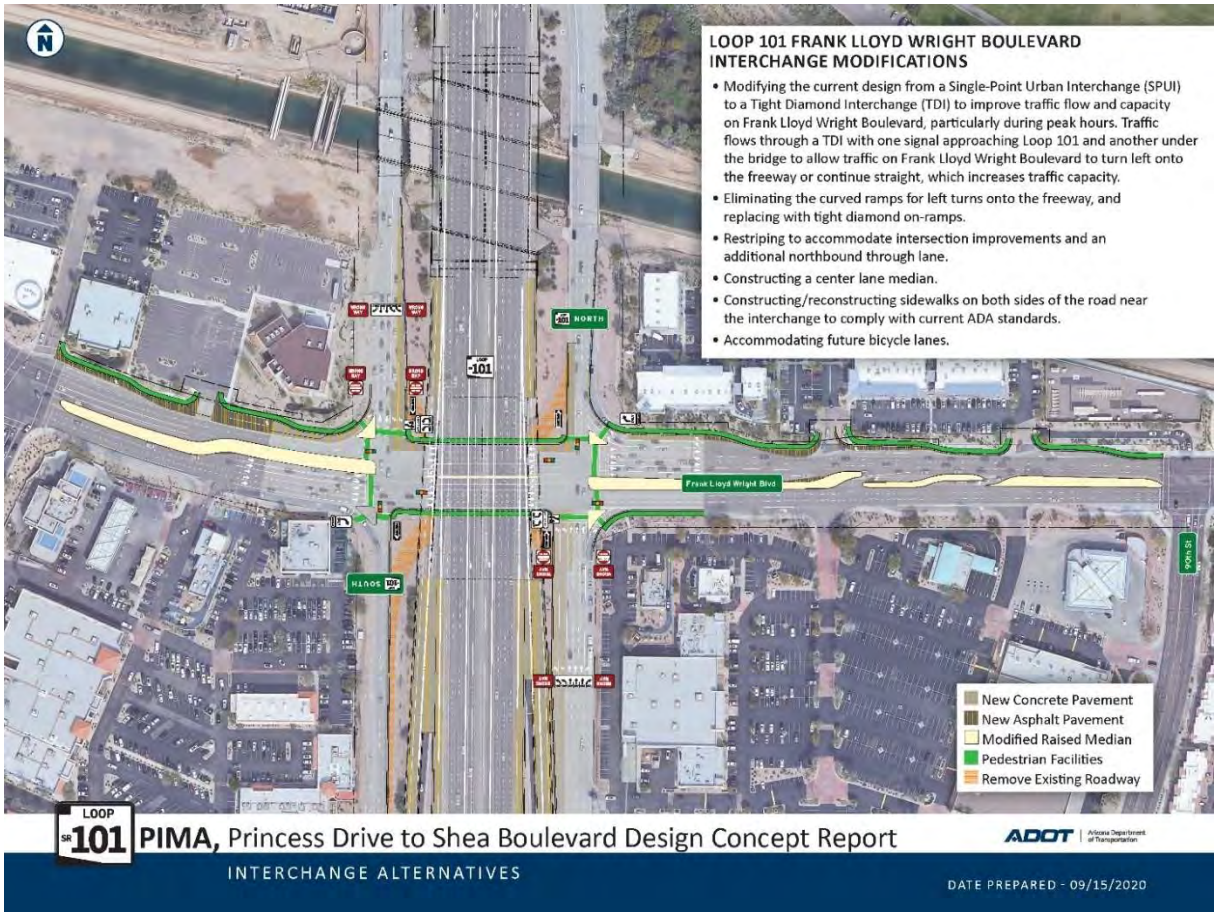


Figure 6. Raintree Drive Interchange Design Concept

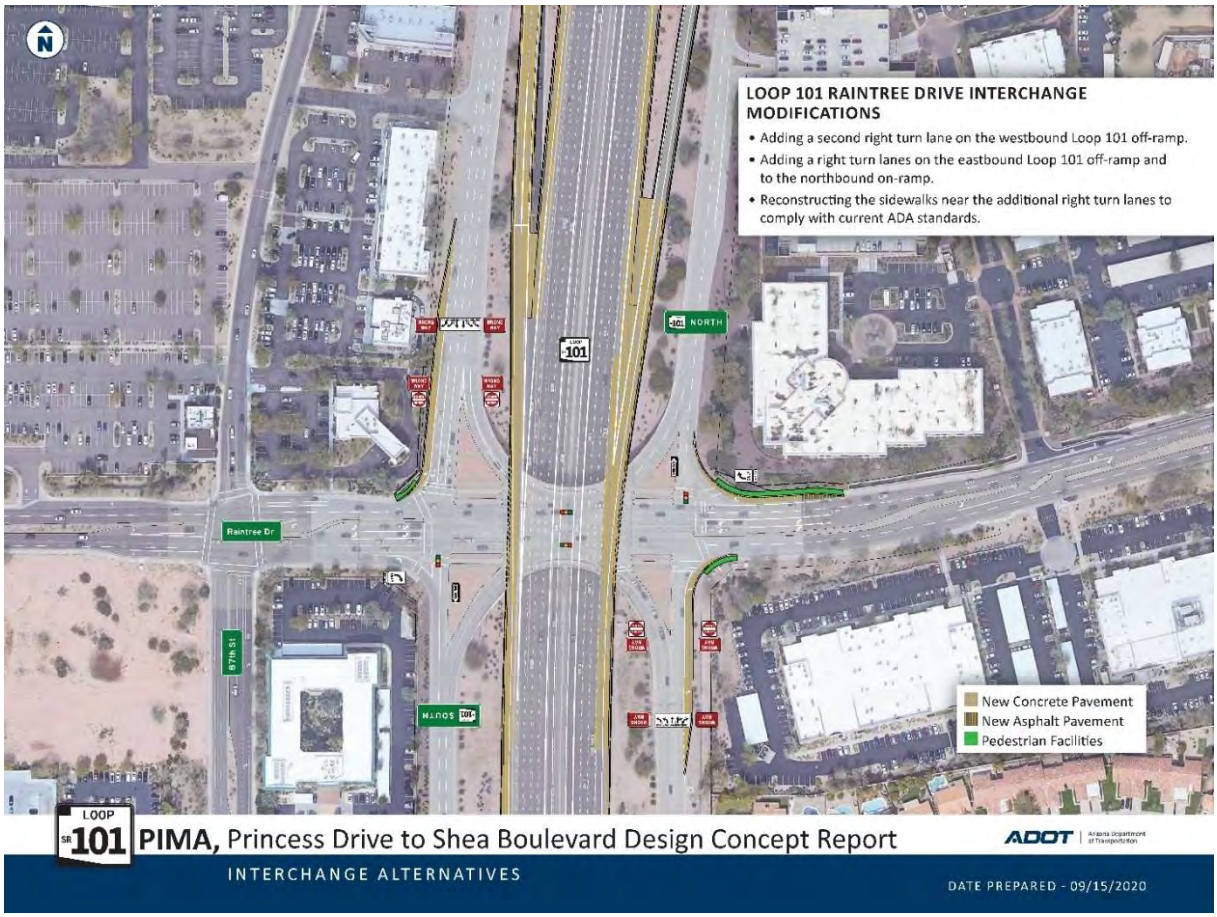
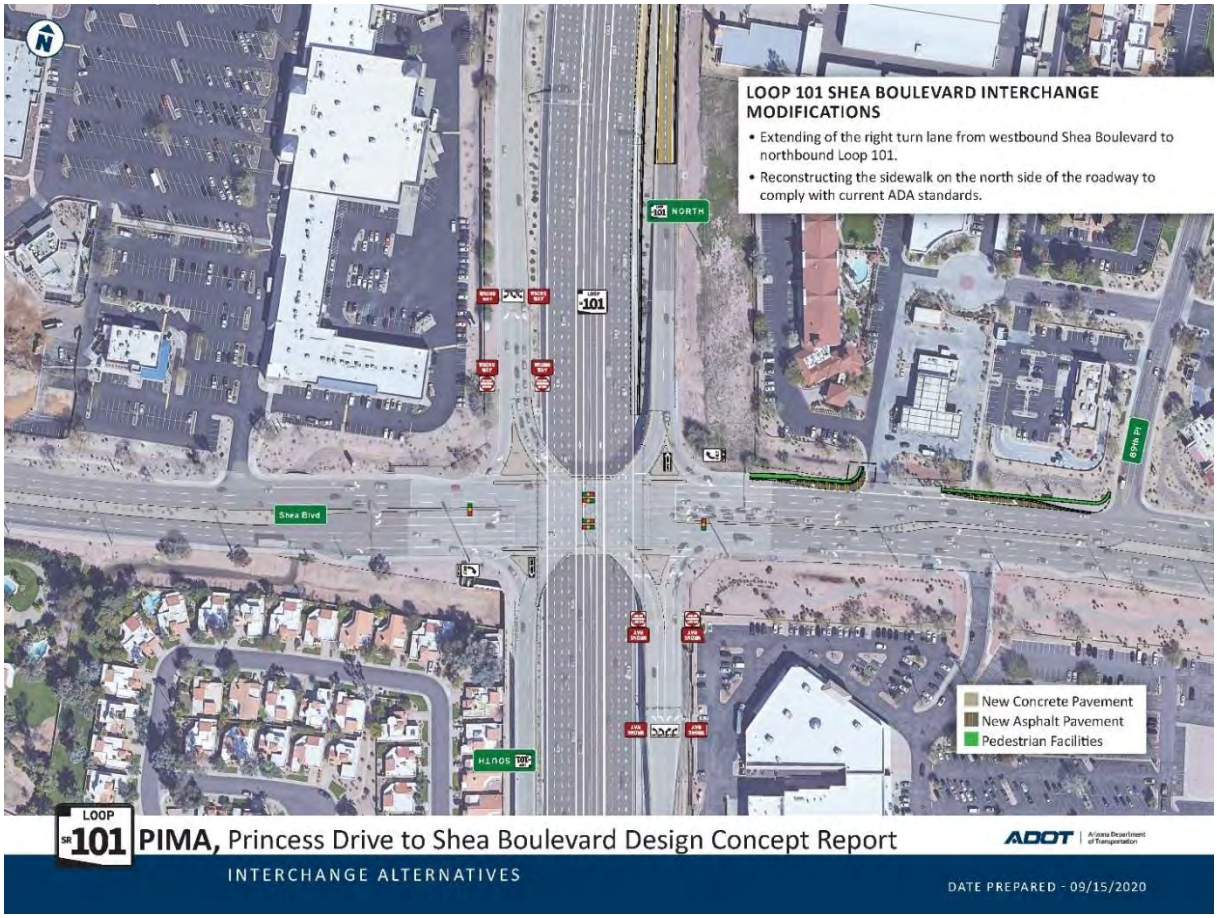


Figure 7. Shea Boulevard Interchange Design Concept



2.0 *AFFECTED ENVIRONMENT*

2.1 REGIONAL CLIMATE

The project is located in the Phoenix metropolitan area in the south-central portion of the state. Phoenix is located in the Salt River Valley, which is surrounded by low mountain ranges. A large portion of Arizona is classified as semiarid, and long periods of time often occur with little or no precipitation. The average annual precipitation in Phoenix is 7.53 inches. The air is generally dry and clear, with low relative humidity and a high percentage of sunshine. Phoenix has a hot desert climate with long, extremely hot summers and short, mild to warm winters. Temperatures of 90 degrees Fahrenheit are reached an average of 168 days per year, and it is common to see temperatures over 100 degrees Fahrenheit (WRCC).

2.2 NATIONAL AMBIENT AIR QUALITY STANDARDS

As required by the Clean Air Act (CAA), NAAQS have been established for six major air pollutants: carbon monoxide, nitrogen dioxide, ozone, particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide, and lead. These standards are summarized in Table 1. “Primary” standards have been established to protect the public health; “secondary” standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the general welfare.

Brief descriptions of those criteria pollutants relevant to transportation projects (ozone, carbon monoxide, and particulate matter) are provided in the following sections.

Table 1. National Ambient Air Quality Standards

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide		primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead (Pb)		primary and secondary	Rolling 3-month average	0.15 µg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide (NO_2)		primary	1-hour	100 ppb	98th percentile, averaged over 3 years
		primary and secondary	Annual	53 ppb (2)	Annual Mean
Ozone (O_3)		primary and secondary	8-hour	0.070 ppm(3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution	$PM_{2.5}$	primary	Annual	12.0 µg/m^3	Annual mean, averaged over 3 years
		secondary	Annual	15.0 µg/m^3	Annual mean, averaged over 3 years
		primary and secondary	24-hour	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24-hour	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		primary	1-hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

Source: EPA, https://www.epa.gov/criteria-air-pollutants/naaqs-table

(1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m^3 as a calendar quarter average) also remain in effect.

(2) The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards are not revoked and remain in effect for designated areas. Additionally, some areas may have certain continuing implementation obligations under the prior revoked 1-hour (1979) and 8-hour (1997) O_3 standards.

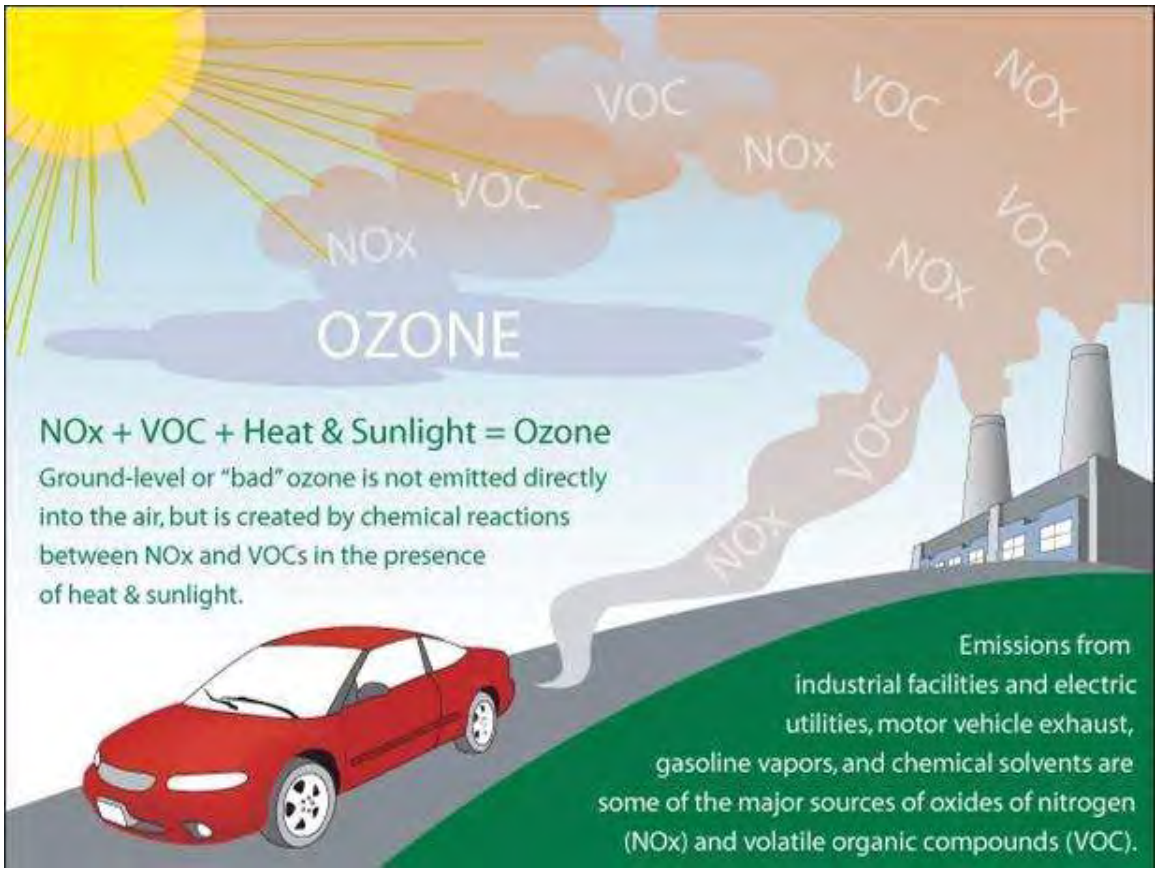
(4) The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: 1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and 2) any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a SIP call under the previous SO_2 standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

2.2.1.1 Ozone

Ozone (O_3) is a colorless toxic gas. As shown in Figure 8, O_3 is found in both the Earth's upper and lower atmospheric levels. In the upper atmosphere, O_3 is a naturally occurring gas that helps to prevent the sun's harmful ultraviolet rays from reaching the Earth. In the lower layer of the atmosphere, O_3 is human made. Although O_3 is not directly emitted, it forms in the lower atmosphere through a chemical reaction between hydrocarbons (HC), also referred to as Volatile Organic Compounds (VOC), and nitrogen oxides (NOx) emitted from industrial sources and from automobiles. HC are compounds comprised primarily of atoms of hydrogen and carbon.

Substantial O_3 formations generally require a stable atmosphere with strong sunlight; thus, high levels of O_3 are generally a concern in the summer. O_3 is the main ingredient of smog. O_3 enters the bloodstream through the respiratory system and interferes with the transfer of oxygen, depriving sensitive tissues in the heart and brain of oxygen. O_3 also damages vegetation by inhibiting its growth. The effects of changes in VOC and NOx emissions for the proposed project are examined on a regional and statewide level.

Figure 8. Ozone in the Atmosphere



Source: EPA: https://www.epa.gov/ground-level-ozone-pollution/ground-level-ozone-basics#wwh

2.2.1.2 Carbon Monoxide

Carbon monoxide (CO) is a colorless gas that interferes with the transfer of oxygen to the brain. CO is emitted almost exclusively from the incomplete combustion of fossil fuels. According to the 2014 National Emissions Inventory Report (EPA 2018), mobile sources (on-road motor vehicle exhaust) are the primary source of CO in both Gila County and in the U.S. In cities, 85 to 95 percent of all CO emissions may come from motor vehicle exhaust. Prolonged exposure to high levels of CO can cause headaches, drowsiness, loss of equilibrium, or heart disease. CO levels are generally highest in the colder months of the year when inversion conditions (where warmer air traps colder air near the ground) are more frequent.

CO concentrations can vary greatly over relatively short distances. Relatively high concentrations of CO are typically found near congested intersections, along heavily used roadways carrying slow-moving traffic, and in areas where atmospheric dispersion is inhibited by urban "street canyon" conditions. Consequently, CO concentrations must be predicted on a microscale basis.

2.2.1.3 Particulate Matter

Particulate pollution is composed of solid particles or liquid droplets that are small enough to remain suspended in the air. In general, particulate pollution can include dust, soot, and smoke; these can be irritating but usually are not poisonous. Particulate pollution also can include bits of solid or liquid substances that can be highly toxic. Of particular concern are those particles that are smaller than, or equal to, 10 microns (PM_{10}) or 2.5 microns ($PM_{2.5}$) in size.

PM_{10} refers to particulate matter less than 10 microns in diameter, about one-seventh the thickness of a human hair (Figure 9). Particulate matter pollution consists of very small liquid and solid particles floating in the air, which can include smoke, soot, dust, salts, acids, and metals.

Figure 9. Relative Particulate Matter Size

Source:https://www.epa.gov/pm-pollution/particulate-matter-pm-basics#PM

Particulate matter also forms when gases emitted from motor vehicles undergo chemical reactions in the atmosphere.

Major sources of PM_{10} include motor vehicles; wood-burning stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires and brush/waste burning; industrial sources; windblown dust from open lands; and atmospheric chemical and photochemical reactions. Suspended particulates produce haze and reduce visibility.

Data collected through numerous nationwide studies indicate that most of the PM_{10} comes from the following:

- Fugitive dust
- Wind erosion
- Agricultural and forestry sources

A small portion of particulate matter is the product of fuel combustion processes. In the case of $PM_{2.5}$, the combustion of fossil fuels accounts for a large portion of this pollutant. The main health effect of airborne particulate matter is on the respiratory system. $PM_{2.5}$ refers to particulates that are 2.5 microns or less in diameter, roughly 1/28th the diameter of a human hair. $PM_{2.5}$ results from fuel combustion (from motor vehicles, power generation, and industrial facilities), residential fireplaces, and wood stoves. In addition, $PM_{2.5}$ can be formed in the atmosphere from gases such as sulfur dioxide, nitrogen oxides, and volatile organic compounds. Like PM_{10}, $PM_{2.5}$ can penetrate the human respiratory system's natural defenses and damage the respiratory tract when inhaled. Whereas particles 2.5 to 10 microns in diameter tend to collect in the upper portion of the respiratory system, particles 2.5 microns or less are so tiny that they can penetrate deeper into the lungs and damage lung tissues. The effects of PM_{10} and $PM_{2.5}$ emissions from the project are examined on a localized, or microscale, basis and a regional basis.

2.3 MOBILE SOURCE AIR TOXICS

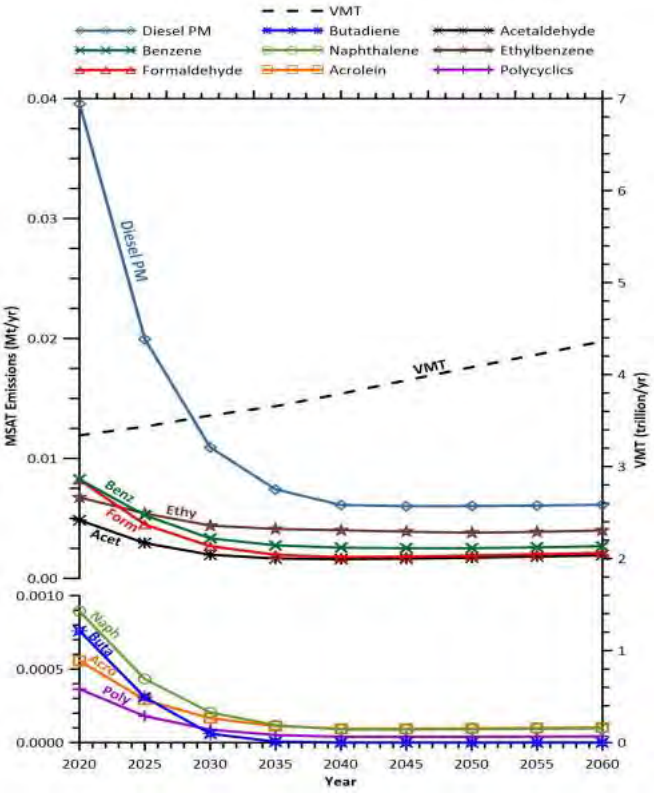
In addition to the criteria pollutants for which there are NAAQS, the EPA also regulates air toxics. Toxic air pollutants are those pollutants known or suspected to cause cancer or other serious health effects. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries).

Controlling air toxic emissions became a national priority with the passage of the CAA Amendments of 1990, whereby Congress mandated that EPA regulate 188 air toxics, also known as hazardous air pollutants. EPA has assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007) and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS) (http://www.epa.gov/iris/). In addition, EPA identified nine compounds with significant contributions from mobile sources that are among the

national- and regional-scale cancer risk drivers or contributors and non-cancer hazard contributors from the 2011 National Air Toxics Assessment (NATA) (https://www.epa.gov/national-air-toxics-assessment). These are 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules.

The 2007 EPA rule mentioned above requires controls that will dramatically decrease mobile source air toxic (MSAT) emissions through cleaner fuels and cleaner engines. Using EPA's MOVES3 model, as shown in Figure 10, FHWA estimates that even if VMT increases by 31 percent from 2020 to 2060 as forecast, a combined reduction of 76 percent in the total annual emissions for the priority MSAT is projected for the same time period.

Figure 10. National MSAT Emission Trends 2020 – 2060 For Vehicles Operating on Roadways Using EPA's MOVES3 Model



Note: Trends for specific locations may be different, depending on locally derived information representing vehicle-miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors

Source: EPA MOVES3 model runs conducted by FHWA in March 2021: https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/msat/fhwa_nepa_msat_memorandum_2023.pdf

2.4 ATTAINMENT STATUS

The CAA Amendments of 1977 and 1990 authorized EPA to designate areas that have not met the NAAQS as nonattainment area and to classify the severity of the nonattainment. Each nonattainment area requires a State Implementation Plan (SIP) that outlines actions to reduce air pollution to levels that comply with the NAAQS.

The SR101 Princess Drive to Shea Boulevard study area lies in the Phoenix maintenance area for CO and nonattainment area for ozone. In addition, the study area is located in the Phoenix nonattainment area for PM_{10} (see Figure 11). The Phoenix Ozone nonattainment area encompasses most of central and eastern Maricopa County, including the Phoenix metropolitan area and a portion of northern Pinal County, including Apache Junction. The Phoenix CO maintenance area is defined as the boundaries of the Maricopa Association of Governments (MAG) planning area, which includes the Phoenix metropolitan area but excludes Apache Junction in Pinal County. The Phoenix PM_{10} nonattainment area is defined as an area within eastern Maricopa County, approximately 60 miles long by 48 miles wide, and an additional area within Pinal County, 6 miles by 6 miles in size. It encompasses the Phoenix metropolitan area, including Apache Junction.

The Phoenix ozone nonattainment area was originally designated a “moderate” nonattainment area in 1991 for not meeting the 1-hour ozone NAAQS and was required to reach attainment by November 15, 1996. EPA reclassified the Phoenix area to “serious” nonattainment on February 13, 1998, for failing to attain the 1-hour ozone standard. The State of Arizona requested attainment redesignation in December 2000, after 3 years had passed with no ozone violation. On May 15, 2001, EPA determined that the Phoenix area had attained the 1-hour ozone standard. A maintenance plan and a redesignation request were submitted on April 21, 2004, and the area was redesignated to attainment on June 14, 2005.

However, the 1-hour standard was revoked on June 15, 2005, and replaced with the 8-hour standard (called the 1997 standard because it was proposed in 1997, but implementation was delayed by litigation). Many of the control measures included in the 1-hour ozone maintenance plan are required to remain in place to ensure progress toward the 8-hour standard. In 2008, EPA revised the eight-hour ozone standard to 0.075 parts per million (from 0.08 ppm). On May 21, 2012, EPA published a final rule to designate the Maricopa nonattainment area as a “marginal” area.

In 2015, based on EPA’s review of the air quality criteria for ozone and related photochemical oxidants and for ozone, EPA revised the levels of both standards. EPA revised the primary and secondary ozone standard levels to 0.070 parts per million (ppm), and retained their indicator (O_3), forms (fourth-highest daily maximum, averaged across three consecutive years) and averaging times (eight hours). On May 4, 2016, EPA published a final rule to determine that the Maricopa Eight-Hour Ozone Nonattainment Area did not attain the 2008 standard and reclassified the area from “marginal” to “moderate.” MAG submitted a 2017 Eight-Hour Ozone Moderate Area Plan for the 2008

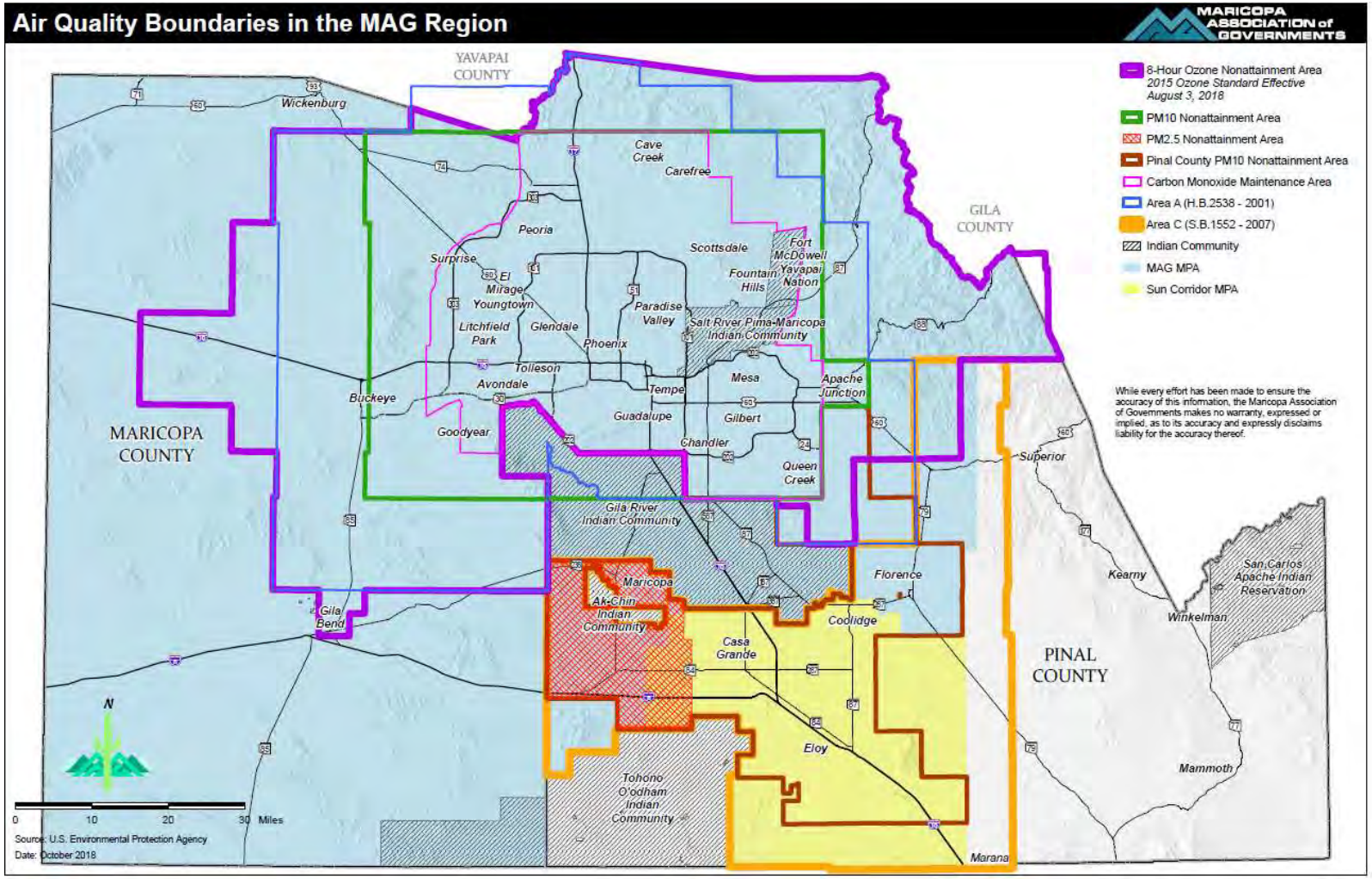
ozone standards on January 1, 2017. On June 2, 2020, EPA published a final rule to approve the portions of the MAG 2017 Eight-Hour Ozone Plan that address the requirements for emissions inventories, a demonstration of attainment by the applicable attainment date, reasonably available control measures, reasonable further progress, motor vehicle emission budgets for transportation conformity, vehicle inspection and maintenance programs, new source review rules, and offsets, effective July 2, 2020. The MAG 2020 Eight-Hour Ozone Plan – Submittal of Marginal Area Requirements for the Maricopa Nonattainment Area was submitted to EPA on June 29, 2020. The MAG 2020 Eight-Hour Ozone Plan – Submittal of Marginal Area Requirements addresses the 2015 eight-hour ozone standard of 0.070 parts per million.

The Phoenix CO maintenance area was originally classified as a "moderate" nonattainment area in November 1990 and attainment was required by December 1995. The Phoenix area did not attain the CO standard by that date, and the area was reclassified as a "serious" nonattainment area on June 10, 1996. The required SIP was submitted on July 8, 1999, with a revised submittal on April 18, 2001. On October 9, 2001, EPA determined that the plan was complete. On September 22, 2003, EPA found that the Phoenix area had attained the CO standard. In October 2004, EPA redesignated the Phoenix area to attainment with a maintenance plan. The maintenance plan requires many of the same restrictions as the SIP for the nonattainment designation and will remain in effect for a period of approximately 10 years to ensure that the NAAQS continue to be met. The MAG 2013 CO maintenance plan for the Maricopa County area was submitted to EPA in April 2013. On March 3, 2016, EPA approved the MAG 2013 CO maintenance plan, effective April 4, 2016.

The Phoenix PM_{10} nonattainment area was originally classified in November 1990 as "moderate." The area was reclassified in June 1996 to "serious," requiring attainment by 2001. The State of Arizona submitted a revised plan to achieve attainment and requested a 5-year extension of the attainment deadline for the 24-hour and annual PM_{10} standards for the Phoenix area. On January 10, 2002, EPA announced approval of the plan and granted the extension to December 2006. Despite the Most Stringent Measures and Best Available Control Measures adopted and implemented earlier, the Phoenix area failed to attain the PM_{10} standard by the December 2006 deadline. The failure triggered a special requirement under Section 189(d) of the CAA that SIP revisions provide for annual reductions of PM_{10} and PM_{10} precursors of not less than 5 percent of the most recent emissions inventory until the NAAQS is attained. The SIP revision was submitted to EPA in December 2007, demonstrating the necessary 5 percent annual reductions through revisions to county dust control regulations, new agriculture best management practices, and paving unpaved roads and shoulders, among other control measures. On September 9, 2010, EPA proposed to approve in part and disapprove in part the SIP revisions. However, on January 25, 2011, prior to EPA's final action on the SIP revisions, the State of Arizona withdrew the submitted plan from EPA's consideration to be able to make improvements on the plan. This withdrawal triggered EPA to find, on February 14, 2011, that Arizona failed to make the required submittal under Section 189(d) of the CAA. The failure triggered an 18-month clock for

mandatory application of sanctions (including loss of federal highway funds in 24 months) and a 2-year clock for a federal implementation plan. These sanctions clocks would stop when a new plan is submitted and EPA determines that the new plan is complete. The State of Arizona adopted and submitted the 2012 5% Plans on May 25, 2012, and submitted supplemental information June 22 and July 2, 2012. The EPA found the plans complete on July 20, 2012, stopping sanctions clocks. EPA concurred with Exceptional Events flags in letters dated September 6, 2012 and July 1, 2013. The EPA approved fugitive dust statutes for the plans on December 3, 2013. EPA published a Notice of Adequacy of the Motor Vehicle Emissions Budget on December 5, 2013.On June 10, 2014, EPA published the final rule approving the MAG 2012 5% Plan for PM_{10}.

Figure 11. Nonattainment and Maintenance Areas in Maricopa and Pinal Counties



2.5 AMBIENT POLLUTANT LEVELS

In cooperation with EPA and other governmental agencies, The Maricopa County Air Quality Department operates air quality monitoring sites and a mobile air monitoring program to measure criteria pollutants. Table 2 presents the last three years of available monitor data gathered at the monitoring stations in close proximity to or representative of the project area.

Table 2. Ambient Air Quality Monitor Data

Pollutant		Monitor Location	Monitor Value	2019	2020	2021
Carbon Monoxide (CO) [ppm]	1-Hour	1645 E Roosevelt St-Central Phoenix Station Phoenix, AZ	Maximum	2.5	2.4	2.8
			2nd Maximum	2.5	2.4	2.7
			# of Exceedances	0	0	0
	8-Hour	1645 E Roosevelt St-Central Phoenix Station Phoenix, AZ	Maximum	1.8	1.9	2
			2nd Maximum	1.8	1.9	2
			# of Exceedances	0	0	0
Particulate Matter [ug/m³]	PM_{10}	2857 N Miller Rd-S Scottsdale, AZ	Maximum 24-Hour	74	192	188
			Second Maximum	55	107	180
			# of Exceedances	0	1	2
	$PM_{2.5}$	10844 East Osborn Rd Scottsdale, AZ	24-Hour 98th Percentile	11	17	26
			Mean Annual	5.6	8.1	7.2
Ozone (O_3) [ppm]	8-Hour	24301 N Alma School Rd Scottsdale, AZ	First Highest	0.080	0.094	0.107
			Second Highest	0.076	0.086	0.086
			Third Highest	0.075	0.083	0.080
			Fourth Highest	0.074	0.083	0.079
			# of Days Standard Exceeded	17	13	24
Nitrogen Dioxide (NO_2) [ppb]		1645 E Roosevelt St-Central Phoenix Station Phoenix, AZ	1-Hour Maximum	61	61	60
			1-Hour Second Maximum	61	59	58
			98th Percentile	52	54	54
			Annual Mean	15.71	15.93	15.44
Sulfur Dioxide (SO_2) [ppb]		1645 E Roosevelt St-Central Phoenix Station Phoenix, AZ	1-Hour Maximum	5	6	26
			1-Hour 99th Percentile	5	5	7
			24-Hour Maximum	2.5	1.9	2.5
			# of Days Standard Exceeded	0	0	0

Sources: EPA AirData, https://www.epa.gov/outdoor-air-quality-data

3.0 ENVIRONMENTAL CONSEQUENCES

Project-level air quality analyses for proposed roadways typically focus on vehicle emissions of CO, PM_{10}, and MSATs. Although vehicle emissions include other pollutants, the concentrations of CO, PM_{10}, and MSATs are the most easily assessed and provide a convenient measure of the local air quality impacts from a proposed roadway. Other pollutants, such as O_3, nitrogen oxides, and hydrocarbons, are regional in nature, making a project-level evaluation not applicable. Project-level analyses can be completed using qualitative or quantitative methods, depending on the scale of the project, the level of design information available for the analysis, and the overall purpose of the analysis.

This section describes the methods, impact criteria, and results of air quality analyses of the proposed project. The analyses use guidelines and procedures provided in applicable air quality analysis protocols from EPA and FHWA. The Project Level CO Hot-Spot Analysis Questionnaire and interagency consultation determined that a hot-spot analysis was warranted for CO. The Project Level PM Quantitative Hot-Spot Analysis – Project of Air Quality Concern Questionnaire and interagency consultation determined that this project was a project of air quality concern and required a PM_{10} quantitative analysis. In addition, it is anticipated that this project does not have meaningful potential MSAT effects, and as a result, no MSAT quantitative analysis was warranted.

3.1 CO HOT-SPOT ANALYSIS

Microscale CO air quality modeling was performed using EPA guidance and interagency consultation, as described below and in Appendix A.

3.1.1 Methodology

To determine the project's impact on local CO levels, a detailed hot-spot analysis was conducted at four locations within the study area: SR 101 and Raintree, SB SR 101 and Frank Lloyd Wright, NB SR 101 and Pima, and SR 101 and Shea. These locations were chosen from a screening evaluation based upon overall level of service (LOS) and volumes. The locations chosen underwent detailed microscale modeling using emission factors developed through the use of EPA's MOVES3.1 emission factor program and dispersion modeling using EPA's CAL3QHC program.

3.1.1.1 MOVES3.1 Emissions Model

EPA's Motor Vehicle Emissions Simulator (MOVES) model version MOVES3.1 was used to estimate CO emissions from the roadway segments included in the CO modeling analysis. MOVES3.1 is the EPA's state-of-the-art tool for estimating emissions from highway vehicles. The model is based on analyses of millions of emission test results and considerable advances in the Agency's understanding of vehicle emissions. Compared to previous tools, MOVES3.1 incorporates the latest vehicle and emissions data, accounts for the impacts of the Heavy-Duty Greenhouse Gas Phase 2 rule and the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule and improves the user interface.

MOVES3.1 was used to estimate CO emissions from the roadway segments included in the CO modeling analysis. MOVES input files were provided by MAG consistent with their regional emissions analysis. MAG data was used to represent local fleet age distribution, and inspection and maintenance programs. MOVES defaults for Maricopa County were used for fuel specifications. Link-by-link traffic data was used to develop project-specific input files for each modeled link with that link's average speed for the worst-case build condition.

3.1.1.2 CAL3QHC Dispersion Model

Mobile source models are the basic analytical tools used to estimate CO concentrations expected under given traffic, roadway geometry, and meteorological conditions. The mathematical expressions and formulations that comprise the various models attempt to describe an extremely complex physical phenomenon as closely as possible. The dispersion modeling program used in this project for estimating pollutant concentrations near roadway intersections is the CAL3QHC (Version 2.0) dispersion model developed by EPA and first released in 1992.

CAL3QHC is a Gaussian model recommended in the EPA's Guidelines for Modeling Carbon Monoxide from Roadway Intersections (EPA 1992). Gaussian models assume that the dispersion of pollutants downwind of a pollution source follow a normal distribution from the center of the pollution source.

Different emission rates occur when vehicles are stopped (i.e., idling), accelerating, decelerating, and moving at different average speeds. CAL3QHC simplifies these different emission rates into two components:

- Emissions when vehicles are stopped (i.e., idling) during the red phase of a signalized intersection
- Emissions when vehicles are in motion during the green phase of a signalized intersection

The CAL3QHC (Version 2.0) air quality dispersion model has undergone extensive testing by EPA and has been found to provide reliable estimates of inert (i.e., nonreactive) pollutant concentrations resulting from motor vehicle emissions. A complete description of the model is provided in the User's Guide to CAL3QHC (Version 2.0): A Modeling Methodology for Predicting Pollutant Concentrations near Roadway Intersections (Revised) (EPA 1992a).

The transport and concentration of pollutants emitted from motor vehicles are influenced by three principal meteorological factors: wind direction, wind speed, and the atmosphere's profile. The values for these parameters were chosen to maximize pollutant concentrations at each prediction site to establish a conservative, reasonable worst-case scenario. A detailed summary of model inputs is outlined in the Project Level CO Quantitative Hot-Spot Analysis Consultation Document included in Appendix A. The values used for these parameters are:

- **Wind Direction**. Maximum CO concentrations normally are found when the wind is assumed to blow parallel to a roadway adjacent to the receptor location. At complex intersections, it is difficult to predict which wind angle will result in maximum concentrations. Therefore, the approximate wind angle that would result in maximum pollutant concentrations at each receptor location was used in the analysis. All wind angles from 0 to 355 degrees (in 5-degree increments) were considered.
- **Wind Speed**. The CO concentrations are greatest at low wind speeds. A conservative wind speed of one meter per second (2.2 miles per hour) was used to predict CO concentrations during peak traffic periods.
- **Profile of the Atmosphere**. A "mixing" height (the height in the atmosphere to which pollutants rise) of 1,000 meters, and neutral atmospheric stability (stability class D) conditions were used in estimating microscale CO concentrations.
- **Surface Roughness Length**. Surface roughness length is the height above ground at which the wind speed goes to zero. Surface roughness affects the height of the plume of emissions above the ground. A surface roughness length of 1.08 meters was used to represent single family residential land use, as directed by Table 1 of the CAL3QHC User's Guide.

One-hour average ambient CO concentrations were calculated to estimate the effect during peak-hour traffic conditions, and CO concentrations were estimated at a receptor height of 5.9 feet. The CO levels estimated by the model are the maximum concentrations which could be expected to occur at each air quality receptor site analyzed, given the assumed simultaneous occurrence of a number of worst-case conditions: peak-hour traffic conditions, conservative vehicular operating conditions, low wind speed, low atmospheric temperature, neutral atmospheric conditions, and maximizing wind direction.

3.1.1.3 Predicted Levels

Carbon monoxide concentrations were predicted for the worst case build condition were predicted. The worst-case build condition uses 2025 MOVES emission rates (highest CO emission rates) with the 2050 traffic data (maximum traffic volumes). At each receptor site, maximum one-hour CO concentrations were calculated. The one-hour CO levels were predicted for the peak hour of the day period. The 8-hour CO levels were predicted by applying a persistence factor of 0.7 to the 1-hour concentrations, as recommended in the EPA guidance (EPA 1992b).

3.1.1.4 Background Levels

Background levels for the study area were obtained from EPA-monitored data. The background level is the component of the total concentration that is not accounted for through the microscale modeling analysis. Background concentrations must be added to modeling results to obtain total pollutant concentrations at receptor locations. The data

from the Central Phoenix CO monitor located at 1645 East Roosevelt Street in Phoenix was approved during the interagency consultation process. Based on the last three years of monitoring data (2019-2021), the one-hour background of 2.8 ppm and the eight-hour background of 2.0 ppm were used for the existing and future year analyses.

3.1.1.5 Comparison to NAAQS

The results from the analysis for the worst-case build condition were compared to the NAAQS to determine the impacts of the proposed project and if the project is in conformance with the guidelines set forth in the New CAA Amendments of 1990.

3.1.2 Screening Evaluation

An intersection screening analysis based on changes in level of service (LOS) and overall intersection volumes between the No-Build and Build alternatives was performed, as described in EPA guidance (EPA 1992).

LOS describes the quality of traffic operating conditions, ranging from A to F, and it is measured as the duration of delay that a driver experiences at a given intersection. LOS A represents free-flow movement of traffic and minimal delays to motorists. LOS F generally indicates severely congested conditions with excessive delays to motorists. Intermediate grades of B, C, D, and E reflect incremental increases in congestion. As part of the procedure for determining critical intersections outlined in the EPA guidance, those intersections at LOS D, E, or F or those that have changed to LOS D, E, or F should be considered for modeling.

The intersections modeled were determined using the EPA guidance. Four intersection were selected for hot-spot analysis because they represented the greatest potential for elevated CO concentrations, based on congestion and traffic volumes in the 2050 build condition.

Modeling was performed for the peak hour of the day for the worst-case build condition using the 2025 MOVES emission rates (highest CO emission rates) with 2050 traffic data (maximum traffic volumes). It is assumed that if the selected worst-case intersections do not show an exceedance of the NAAQS, none of the intersections will. The CO Hot-Spot Analysis Questionnaire and Consultation form included in Appendix A has additional details about the model setup and options that were used in this analysis.

3.1.3 CO Hot-Spot Results

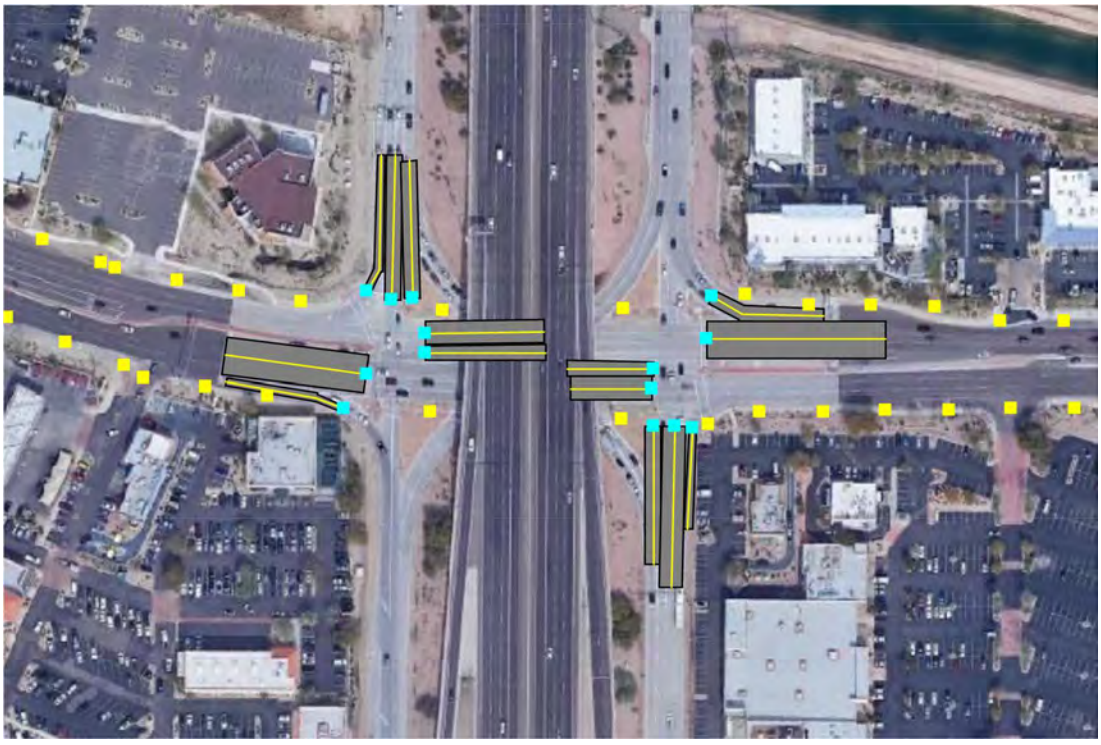
Maximum one-hour CO levels were predicted for the design year (2050) at the locations selected for analysis: SR101 and Raintree Boulevard, SR101 and Frank Lloyd Wright Boulevard, SR101 and Pima Road, and SR101 and Shea Boulevard. Figure 12 through Figure 15 show the receptor locations where concentrations were predicted at each intersection. Maximum one-hour CO concentrations are shown in Table 3 and maximum eight-hour CO concentrations are shown in Table 4. The CO levels estimated by the model are the maximum concentrations that could be expected to occur at each air quality receptor site analyzed. This assumes simultaneous occurrence of a number of worst-case conditions: peak hour traffic conditions, conservative vehicular operating

conditions, low wind speed, low atmospheric temperature, neutral atmospheric conditions, and maximizing wind direction. Predicted one-hour and eight-hour CO levels at all receptors are below NAAQS CO thresholds. Detailed analysis results by receptor are included in Appendix B. Due to the large volume of input and output files created for this analysis, they are available electronically upon request, as noted in Appendix B.

Figure 12. SR101 and Raintree Drive Receptor Locations and Queue Links

Note: Figures with free flow links included in Appendix A

Figure 13. SR101 and Frank Lloyd Wright Boulevard Receptor Locations and Queue Links



Note: Aerial photo is for informational purposes and does not show changes in interchange design. Figures with free flow links included in Appendix A

Figure 14. SR101 and Pima Road Receptor Locations and Queue Links

Note: Figures with free flow links included in Appendix A

Figure 15. SR101 and Shea Boulevard Receptor Locations and Queue Links

Note: Figures with free flow links included in Appendix A

Table 3. Predicted Worst-Case One-Hour CO Concentrations (ppm)

Interchange	Scenario	Maximum 1-hour CO Concentration (ppm)
SR101 and Raintree	2050 AM Build volumes with 2025 emission factors	4.4
SR101 and Frank Lloyd Wright	2050 PM Build volumes with 2025 emission factors	5.0
SR101 and Pima	2050 PM Build volumes with 2025 emission factors	5.4
SR101 and Shea	2050 PM Build volumes with 2025 emission factors	5.7

Concentrations = modeled results + 1-hour CO background.
1-hour CO background = 2.8 ppm; 1-hour CO standard = 35 ppm.
Abbreviations: AM = morning; PM = evening; ppm = parts per million.

Table 4. Predicted Worst-Case Eight-Hour CO Concentrations (ppm)

Interchange	Scenario	Maximum 8-hour CO Concentration (ppm)
SR101 and Raintree	2050 AM Build volumes with 2025 emission factors	3.12
SR101 and Frank Lloyd Wright	2050 PM Build volumes with 2025 emission factors	3.54
SR101 and Pima	2050 PM Build volumes with 2025 emission factors	3.82
SR101 and Shea	2050 PM Build volumes with 2025 emission factors	4.03

Concentrations = (modeled results x persistence factor [0.7]) + 8-hour CO background.
8-hour CO background = 2.0 ppm; 8-hour CO standard = 9 ppm.
Abbreviations: AM = morning; PM = evening; ppm = parts per million

The CO hot-spot analysis demonstrates that the project is not expected to cause or contribute to an exceedance of the NAAQS. Documentation of the interagency consultation process is included in Appendix A, including specific modeling details and assumptions.

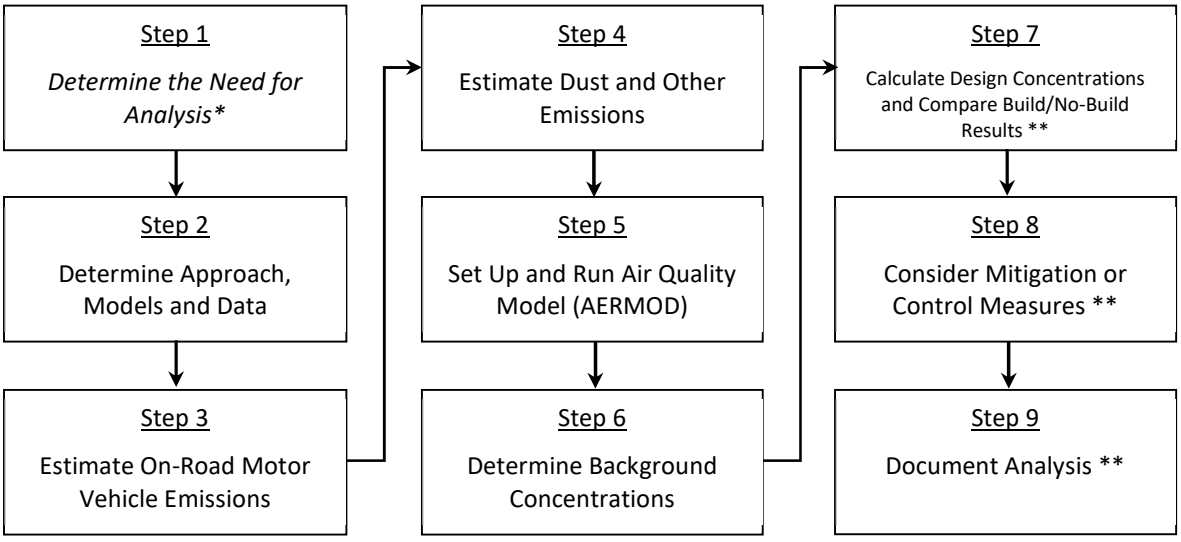
3.2 PM_{10} HOT-SPOT ANALYSIS

The project study area is located in Maricopa County, Arizona, which is currently classified as a nonattainment area for the PM_{10} 24-hour standard. The SR101 Princess Drive to Shea Boulevard project was presented to the MAG consultation partners, which classified the project as one of air quality concern. As such, a microscale 24-hour PM_{10} hot-spot analysis was conducted.

3.2.1 Methodology

The nine-step process described in EPA's *Transportation Conformity Guidance for Quantitative Hot-Spot Analysis in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas* (EPA 2021) is used for hot-spot PM_{10} analysis, see Figure 16. Each step is described below.

Figure 16. EPA's Nine-step Process for PM Analysis



Determine the Need for Analysis

Based on the ADOT PM_{10} interagency consultation process, this project is classified as the project of air quality concern for PM_{10} based on the high volumes of diesel traffic on SR101 projected for 2050. Therefore, project level hot-spot PM_{10} analysis is warranted.

Determine Approach, Models and Data

The PM_{10} analysis methodology was presented to the interagency consultation partners through multiple consultations throughout a period ending on May 12, 2023. Based on the EPA guidance, and in consultation with FHWA, EPA and other agencies, two

locations were chosen for the purpose of demonstrating project conformity because these locations have the greatest potential concentrations of PM_{10} due to congestion and traffic volumes in 2050. The interchange at Shea Blvd represents the location with the greatest vehicle and truck volumes on both the SR101 mainline and arterials. The interchange at Frank Lloyd Wright represents the location that will undergo the most physical changes in intersection alignment as part of the project, and the intersection experiences LOS F in all scenarios.

The AERMOD dispersion model requires meteorological data to predict pollutant concentrations at receptors within the project area. Five years of meteorological data files were provided by Arizona DEQ based on observed surface data from Phoenix Sky Harbor International Airport and upper air data from Tucson International Airport for the 5-year period from 2017 through 2021. This meteorological data was determined to be representative of the project area conditions because of its proximity to the project site (12 miles), similarity in land use and terrain, and the data meets the completeness requirements of Section 5.3.2 of EPA's Meteorological Monitoring Guidance for Regulatory Modeling Applications (EPA 2000). Information from ADEQ that describes the processing steps and summarizes completeness determination is included in Appendix A – Consultation Document for Project of Air Quality Concern as Attachment C.

All model inputs and assumptions are included in Appendix A – Consultation Document for Project of Air Quality Concern.

Estimate On-Road Vehicle Emissions

On-road vehicle emissions were estimated using MOVES3.1.0. Age distribution and vehicle mix were provided by MAG and, therefore, were consistent with the regional conformity analysis. Default fuel specifications were used per EPA. Temperature and relative humidity inputs were derived from the AERMET data provided by ADEQ to use in the dispersion model. Information from ADEQ that describes the preparation of AERMET data is included in Attachment C of Appendix A. MOVES input relies on link-specific data. Traffic data included link volume, speed, and average grade. A unique vehicle mix was calculated for each roadway segment based on the volumes of four vehicle type categories provided in the traffic data. Within each of the four vehicle type categories, the volumes were allocated to the associated MOVES source types using the regional distribution of vehicle population from MAG regional conformity modeling, as described in more detail in Appendix A.

PM_{10} emission factors were developed for an analysis year of 2050, which represents the year peak emissions from the project are expected. Vehicle emissions of PM_{10} are a combination of vehicle exhaust, brakewear, tirewear, and road dust. Road dust is the largest contributor to the overall emissions. Because road dust is highly dependent on vehicle volumes, the analysis year of 2050 was selected as the year of peak emissions because it was the year with the greatest vehicle volumes.

The PM_{10} emissions vary by time of day and by month. Volume and speed data for each link was obtained from the MAG travel demand model for A.M. peak, midday, P.M. peak, and overnight traffic conditions (MOVES Hour IDs 7, 10, 15, 19). A preliminary model run was conducted to determine the month of highest emissions rates, based on the seasonal fuel specifications, and the highest emissions occurred in July. For each analysis site, MOVES was run for each of the four time periods (A.M. peak, midday, P.M. peak, and overnight) for July conditions for a total of 4 MOVES runs per location. For every link, a set of 4 emission factors in units of grams per hour was developed for the project's analysis year of 2050.

The PM_{10} modeled links and receptors for the Shea Boulevard interchange are shown in Figure 17. The PM_{10} modeled links and receptors for the Frank Lloyd Wright interchange are shown in Figure 18.

Figure 17. SR101 and Shea Boulevard PM_{10} Receptor Locations

Figure 18. SR101 and Frank Lloyd Wright Boulevard PM_{10} Receptor Locations

Estimate Emissions from Road Dust, Construction and Additional Sources

Re-entrained road dust must be included in all PM_{10} hot-spot analyses. Section 13.2.1 of AP-42 provides a method for estimating emissions of re-entrained road dust using local values for precipitation, average vehicle weight, and silt loading.

The estimated road dust emission factors from the 2022 MAG Conformity Analysis for the analysis year 2050 were used for this PM hot-spot analysis, and the values are summarized in Table 5.

Table 5. MAG Road Dust Emission Factors

Facility Type	k	W (tons)	sL (g/m²)	E (g/VMT)
Freeway	1	4.08	0.02	0.116730948
High Volume Arterial (>10,000 AADT)	1	2.48	0.067	0.2110786

Source: MAG 2022
g/m² = grams per square meter
g/VMT = grams per vehicle mile traveled

Emission factors for road dust were added to the emission factors generated for each link by MOVES for use in the AERMOD dispersion model.

Construction emissions were not included because construction will not occur at any individual location for more than five years. EPA guidance requires nearby sources of PM_{10} emissions to be included in air quality modeling when those sources are not appropriately reflected in the background data or would be affected by the project. No additional sources of PM_{10} emissions were identified that would increase as a result of

the project. It is assumed that PM_{10} concentrations due to any other nearby emissions sources are included in the ambient monitor values used for background concentrations. In addition, this project is not expected to result in changes to emissions from nearby sources.

Set Up and Run Air Dispersion Model (AERMOD)

EPA's AERMOD air dispersion model was used to estimate concentrations of PM_{10} due to project operations. The model uses traffic data, emission factor data, and meteorological data to estimate ground-level concentrations of PM_{10} at a series of receptors. For each modeled scenario, the model setup included a series of sources representing the roadway segments in the vicinity of the intersections being modeled.

Roadway segments were represented in AERMOD using a series of area sources. Link-specific inputs included source location, source length and width, emission rate, release height, and initial vertical dimension.

AERMOD was run using five years meteorological data provided by ADEQ, based on observed surface data from Phoenix Sky Harbor International Airport and upper air data from Tucson International Airport for the 5-year period from 2017 through 2021. This data meets EPA completeness criteria for dispersion modeling and is considered representative of the project area. More details on the meteorological data characteristics are included in Attachment C of Appendix A.

Receptors were placed in order to estimate the highest concentrations of $PM_{10,}$ to determine any possible violations of the NAAQS. Highest concentrations are expected to occur near the areas with the highest-volume roadways and near areas where vehicles are restarting and/or idling. Receptors were placed five meters from the roadways, spaced with a spacing of 25 meters at a height of 1.8 meters. Receptors were not placed in locations where the public does not have access, as described in the EPA guidance. Areas with no public access include medians, right-of-way access on highways and ramps, locations restricted by fencing, and locations with hazardous terrain. Aerial photos were used to determine locations unlikely to have pedestrian access due to fencing or hazardous terrain.

Determine Background Concentrations

The South Scottsdale monitor was selected as the closest monitor to the project area with similar land use characteristics to the project area. There are three PM_{10} monitors in the vicinity of the project location, located within eight miles south of the project's southern terminus. Of these three monitor locations, the South Scottsdale monitor is located in an area that most closely represents the land use in the project area. Characteristics of the three nearby monitors area are summarized in Table 6.

Table 6. Characteristics of Nearby PM_{10} Monitors

Monitor Location	AQS Site ID	Distance from Project	Land Use	Data Completeness (Days)	Max 24-hour PM_{10} Concentration ($\mu g/m^3$)
South Scottsdale, 2857 N Miller Rd	04-013-3003	7.4	Residential/ Commercial	2021: 355/365 2020: 366/366 2019: 365/365	2021: 188 2020: 192 2019: 74
Highschool Air Monitoring Station, 4827 North Country Club Dr	04-013-7024	6.1	Rural/ Agricultural	2021: 360/365 2020: 365/366 2019:360/365	2021: 159 2020: 191 2019: 105
Senior Center Air Monitoring Station, 10844 East Osborn Rd	04-013-7020	6.9	Rural/ Agricultural	2021: 357/365 2020: 366/366 2019: 365/365	2021: 174 2020: 168 2019: 89

Source: EPA Outdoor Air Quality Data (https://www.epa.gov/outdoor-air-quality-data/monitor-values-report)

The fourth highest monitored concentration from the South Scottsdale monitor over three years from 2019 to 2021 is 107 $\mu g/m^3$. This selected monitor was approved during the interagency consultation process. Monitor site details, including a figure showing the distance to the monitor, are included in the materials in Appendix A.

The approved background value was added to the AERMOD modeled values for comparison to the PM_{10} NAAQS of 150 $\mu g/m^3$. The background values are conservative, because it is expected that ambient PM concentrations will be lower in future years as a result of State Implementation Plans and the general trend in declining vehicle emissions due to technological advances. It is assumed that emissions from other nearby sources are already included in the ambient monitoring data.

Calculate Design Values and Determine Conformity

The model results were added to the background concentrations for the Build alternative in order to calculate the design values. To determine the 24-hour PM_{10} design value, the following steps were used, as outlined in the guidance:

1. From the air quality modeling results from the build scenario, identify the sixth-highest 24-hour concentration for each receptor. AERMOD output provides the sixth-highest modeled concentration from the 5-year period for each receptor.

2. Identify the receptor with the highest sixth-highest 24-hour concentration.

3. Identify the appropriate 24-hour background concentration from the three most recent years of air quality monitoring data. This value is 107 µg/³, as described above.

4. For the receptor identified in Step 2, add the sixth-highest 24-hour modeled concentration to the appropriate 24-hour background concentration (from Step 3).

5. Round to the nearest 10 µg/m³. The result is the highest 24-hour PM_{10} design value in the build scenario. The final results are summarized in Table 6.

Consider Mitigation or Control Measures

If the total concentration of the highest 24-hour PM_{10} design value is greater than the PM_{10} NAAQS, mitigation or control measures are needed to be considered to reduce emissions in the project areas.

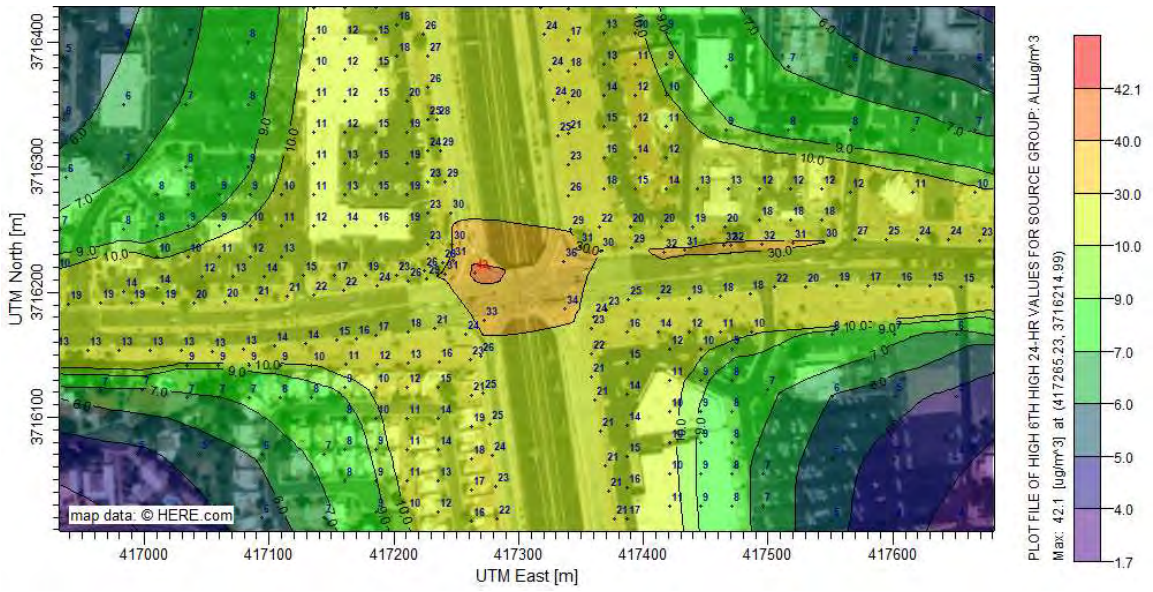
Document Analysis

This Air Quality Technical Report documents the PM hot-spot results.

3.2.2 PM_{10} Modeling Results

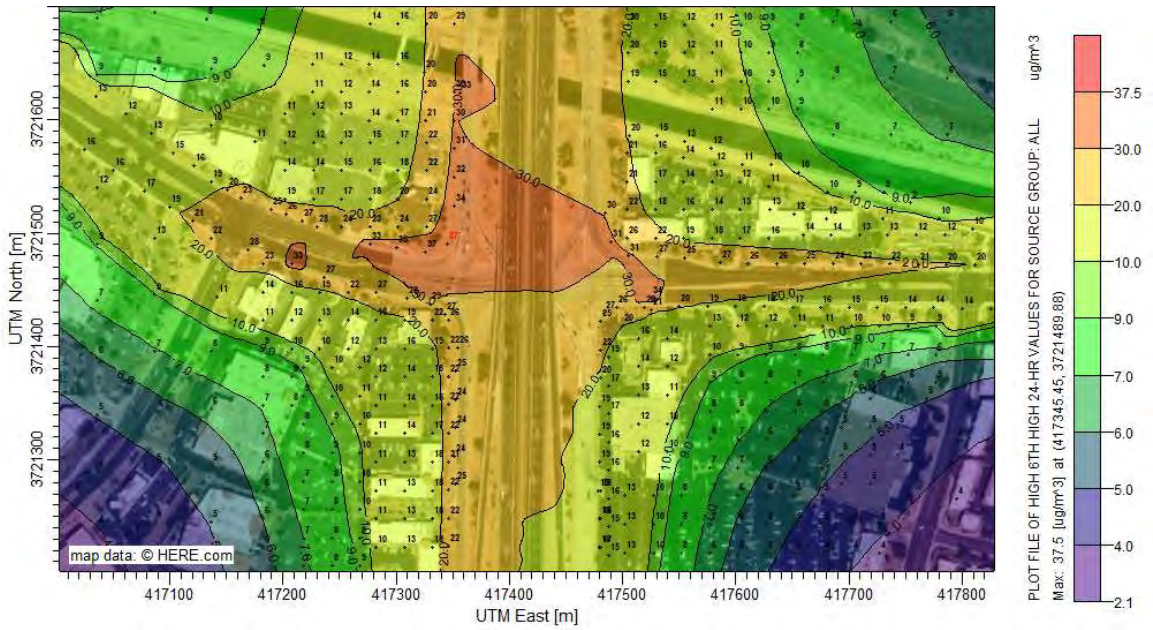
The modeled concentrations, including background, were compared to the applicable NAAQS. The receptor with the maximum 6th-highest concentration was located on the north side of the arterial, west of the southbound offramp. Figure 19 and Figure 20 show the receptor concentrations near the center of the project area with the maximum value shown in red.

Figure 19. SR101 and Shea Boulevard PM_{10} Model Results



Note: Values shown are modeled high-6th-high 24-hour concentrations of PM10, prior to the addition of background concentration. Maximum value shown in red.

Figure 20. SR101 and Frank Lloyd Wright Boulevard PM_{10} Model Results



Note: Values shown are modeled high-6th-high 24-hour concentrations of PM10, prior to the addition of background concentration. Maximum value shown in red.

Table 7 presents the values used to determine the maximum predicted 24-hour PM10 concentrations for each intersection. The total concentrations for the two selected locations do not exceed the PM_{10} NAAQS when rounded to the nearest 10 µg/m³. The project meets conformity requirements. Therefore, mitigation or control measures to reduce emissions in the project area do not need to be considered by the project sponsors.

Table 7. Predicted 24-Hour PM_{10} Concentrations (µg/m³)

Location	6th-Highest PM_{10} Value	Background PM_{10} Value	Total Concentration	Total Concentration Rounded to the nearest 10 µg/m³	PM_{10} NAAQS
SR101 and Shea Boulevard	42.05	107	149.05	150	150
SR101 and Frank Lloyd Wright Boulevard	37.46	107	144.46	140	150

µg/m³ = micrograms per cubic meter

Appendix B includes tables of the 50 highest modeled concentrations for each intersection. Due to the large volume of input and output files created for this analysis, they are available electronically upon request, as noted in Appendix C.

3.3 CONFORMITY

Section 176c of the CAA requires that transportation projects conform to the approved air quality State Implementation Plan (SIP) for meeting federal air quality standards. Conformity requirements were made substantially more rigorous in the CAA Amendments. The conformity determinations for federal actions related to transportation projects must meet the requirements of 40 CFR Parts 51 and 93. This project is not likely to cause or contribute to the severity or number of violations of the NAAQS. This project is included in the *Maricopa Association of Governments (MAG) MOMENTUM 2050* Regional Transportation Plan. In addition, the project is included in the FY 2022-2025 MAG Transportation Improvement Program. The latest conformity determination for the FY 2022-2025 MAG Transportation Improvement Program and 2050 MAG Regional Transportation Plan for the area was made by the Federal Highway Administration and Federal Transit Administration on February 14, 2023.

3.4 PUBLIC INVOLVEMENT

A public meeting was held November 2, 2022, to provide information on the project's major design elements based on the Stage III 60% design plans, including the general purpose lane widening and interchange improvements, results of the noise analysis, as well as the anticipated construction timeline and impacts. The meeting also provided opportunities for the public to ask questions and make comments. A total of 90 comments were received, including comments during the public meeting, emails, and online comment forms. No comments were received related to air quality.

A Draft Air Quality Report was published on ADOT's website on May 25, 2023, with the latest modeling assumptions in force on May 25th, with no additional modeling change. The the opportunity for the Interagency Consultation group and the public to provide comments on the air quality report through June 6, 2023. The Interagency Consultation group was notified by email with a link to the Draft Air Quality Report for their review. No comments or requests for additional information were received from the public. Refer to Appendix A.

4.0 *REFERENCES*

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APPENDIX A – INTERAGENCY CONSULTATION DOCUMENTATION

Interagency comments on 40 CFR 93.105 (c)(1)(i) Evaluating and choosing a model (or models) and associated methods and assumptions to be used in hot-spot analyses.
- The latest planning assumptions used for conformity analysis May 25th, 2023.

Project Level PM Quantitative Hot-Spot Analysis - Project of Air Quality Concern Questionnaire

Project Setting and Description

The Arizona Department of Transportation (ADOT), in cooperation with the Federal Highway Administration (FHWA), is preparing a Categorical Exclusion Determination of the proposed improvements to a segment of State Route (SR) 101L. The proposed project would construct additional general-purpose lanes (GPL) along SR 101L between milepost (MP) 36.6 (intersection of Pima Road and Princess Drive) and MP 41.1 (Shea Boulevard). This project is located within the City of Scottsdale, Maricopa County, Arizona (see Figures 1, 2a, and 2b).

This segment of the Pima Freeway (SR 101L) currently consists of 3 GPL and 1 high-occupancy vehicle (HOV) lane in each direction. It accommodates traffic from the Red Mountain Freeway (SR 202L), Price Freeway (SR 101L), State Route 51 (SR 51), and Interstate 17 (I-17). The project is adjacent to Scottsdale Airport and Scottsdale Community College.

With over 4.3 million residents, Maricopa County is the fourth most populous county in the nation. It has been one of the fastest growing regions in the United States. The growing traffic demand has caused the SR 101L corridor to become increasingly congested during the morning and evening peak travel periods, and growth projections indicate the congestion will worsen in the future. Additional GPL would increase the freeway capacity and help alleviate increased levels of traffic congestion in the future.

The scope of work for the project consists of:

- Adding one GPL to southbound (SB) SR 101L
- Adding one GPL to northbound (NB) SR 101L
- Reconstructing and/or widening entrance and/or exit ramps
- Modifying curb ramps and/or sidewalks on crossroads
- Widening bridge structures on both the NB and SB sides

Details of the interchange improvements are shown in Figures 4 through 7 at the end of this document.

The project would occur within the existing ADOT right-of-way (R/W) through private lands, and ADOT easement through land held in trust by the Arizona State Land Department, and public lands under the management of the US Bureau of Reclamation. Approximately one acre of new R/W and temporary construction easements (TCEs) would be required to construct the improvements. The improvements would be constructed in phases. This project would require temporary lane closures along SR 101L and the crossroads, night and/or weekend full freeway closures, and temporary ramp closures; however, access would be maintained to adjacent properties throughout construction.

The goal of this proposed project is to increase the capacity of SR 101L in order to alleviate increased levels of traffic congestion in the future. The proposed project is included in the Maricopa Association of Governments (MAG) 2050 Regional Transportation Plan (RTP). Construction is anticipated to begin in summer 2023, and is expected to take approximately two years to complete.

The project is in the Maricopa County (Phoenix) Nonattainment Area for particulates 10-microns in diameter or less (PM10), eight-hour ozone, maintenance area for carbon monoxide. The proposed project is included in the Maricopa Association of Governments (MAG) Regional Transportation Plan (RTP) MOMENTUM 2050. In addition, the project is included in the FY 2022-2025 MAG Transportation Improvement Program. The latest conformity determination for the FY 2022-2025 MAG Transportation Improvement Program and 2050 MAG Regional Transportation Plan for the area was made by the Federal Highway Administration and Federal Transit Administration on February 14, 2023.

Figure 1. Project Location Map

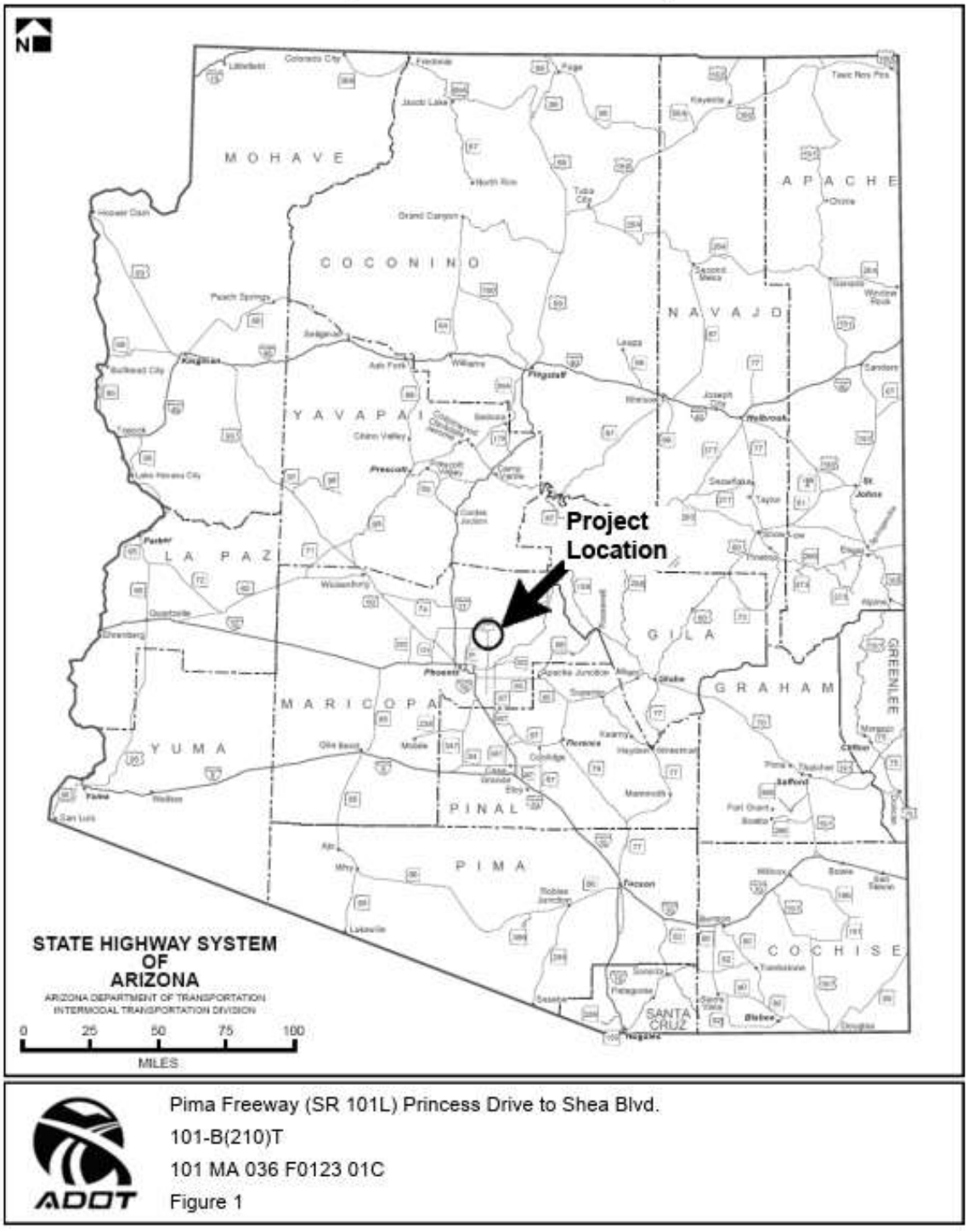
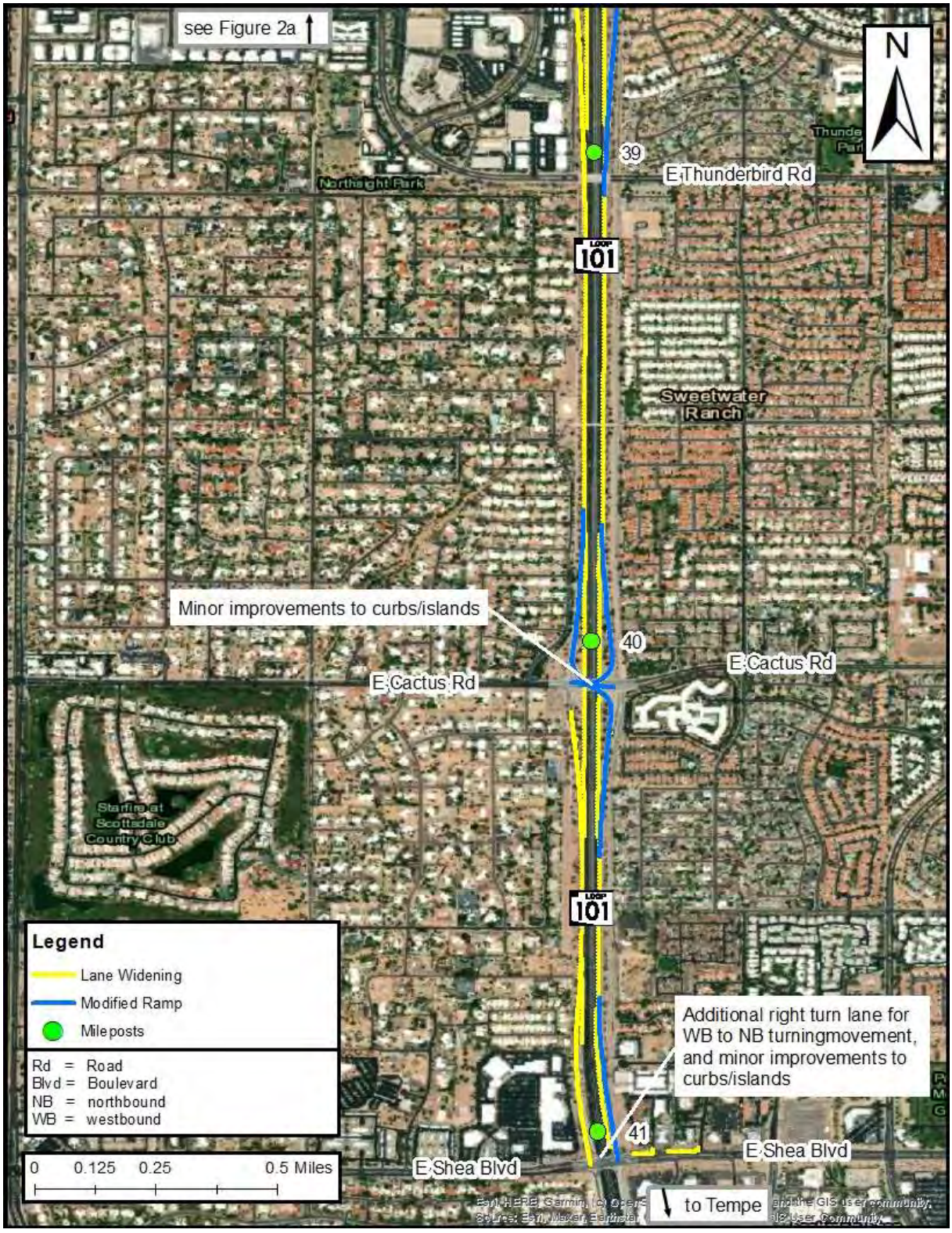


Figure 2a. Project Details

Figure 2b. Project Details



Project Assessment

The following questionnaire is used to compare the proposed project to a list of project types in 40 CFR 93.123(b) requiring a quantitative analysis of local particulate emissions (Hot-spots) in nonattainment or maintenance areas, which include:

i) New highway projects that have a significant number of diesel vehicles, and expanded highway projects that have a significant increase in the number of diesel vehicles;
ii) Projects affecting intersections that are at Level-of-Service D, E, or F with a significant number of diesel vehicles, or those that will change to Level-of-Service D, E, or F because of an increase in traffic volumes from a significant number of diesel vehicles related to the project;
iii) New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;
iv) Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; and
v) Projects in or affecting locations, areas, or categories of sites which are identified in the PM_{10} or $PM_{2.5}$ applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

If the project matches one of the listed project types in 40 CFR 123(b)(1) above, it is considered a project of local air quality concern, and the hot-spot demonstration must be based on quantitative analysis methods in accordance to 40 CFR 93.116(a) and the consultation requirements of 40 CFR 93.105(c)(1)(i). If the project does not require a PM hot-spot analysis, a qualitative assessment will be developed that demonstrates that the project will not contribute to any new localized violations, increase the frequency of severity of any existing violations, or delay the timely attainment of any NAAQS or any required emission reductions or milestones in any nonattainment or maintenance area.

On March 10, 2006, EPA published *PM2.5 and PM10 Hot-Spot Analyses in Project-Level Transportation Conformity Determinations for the New PM2.5 and Existing PM10 National Ambient Air Quality Standards; Final Rule* describing the types of projects that would be considered a project of air quality concern and that require a hot-spot analysis (71 FR 12468-12511). Specifically on page 12491, EPA provides the following clarification: "Some examples of *projects of air quality concern* that would be covered by § 93.123(b)(1)(i) and (ii) are: A project on a new highway or expressway that serves a significant volume of diesel truck traffic, such as facilities with greater than 125,000 annual average daily traffic (AADT) and 8% or more of such AADT is diesel truck traffic;" .." Expansion of an existing highway or other facility that affects a congested intersection (operated at Level-of-Service D, E, or F) that has a significant increase in the number of diesel trucks;" These examples will be used as the baseline for determining if the project is a project of air quality concern.

From the project types listed above, types "i" and "ii" describe the Pima Freeway (SR 101) Princess Drive to Shea Blvd Project because this project is an expanded highway project that has a significant number of diesel vehicles, and the project affects intersections with Level-of-Service D, E, or F with a significant number of diesel vehicles. Details to support this conclusion are described in the next section.

New Highway Capacity

Is this a new highway project that has a significant number of diesel vehicles?

Example: total traffic volumes ≥125,000 annual average daily traffic (AADT) and truck volumes ≥10,000 diesel trucks per day (8% of total traffic).

NO – This project is not a new highway project.

Expanded Highway Capacity

Is this an expanded highway projects that have a significant increase in the number of diesel vehicles?

Example: the build scenario of the expanded highway or expressway causes a significant increase in the number of diesel trucks compared with the no-build scenario, truck volumes > 8% of the total traffic.

YES – This expanded highway project includes a large volume of truck traffic.

A summary of the total annual average daily traffic (AADT) along the project corridor is summarized in Table 1, based on the Maricopa Association of Governments (MAG) travel demand model. The percentage of truck volumes projected for 2050 range from 13.87%-16.4% in the No Build scenario, and 14.04%-16.56% in the Build scenario. The example provided indicates that truck volumes less than 8% of the total would not be considered significant. The truck percentages associated with the project are greater than 8% and meet the criteria of having a large volume of truck traffic.

Table 1. AADT and Truck Percentage

AADT and Truck Volumes	2022 Existing			2050 No-Build			2050 Build			Difference (Build - No-Build)		
	Total AADT	Truck AADT	Truck Percent	Total AADT	Truck AADT	Truck Percent	Total AADT	Truck AADT	Truck Percent	Total AADT	Truck AADT	Truck Percent
Princess Drive to Bell Road	169,212	22,236	13.14%	235,440	32,678	13.87%	244,707	34,365	14.04%	9,267	1,707	0.17%
Bell Road to Frank Lloyd Wright Boulevard	134,589	19,521	14.5%	193,155	29,243	15.14%	203,558	31,233	15.34%	10,403	1,990	0.20%
Frank Lloyd Wright Boulevard to Raintree Drive	119,960	18,887	15.74%	173,045	28,386	16.40%	183,474	30,376	16.56%	10,429	1,990	0.15%
Raintree Drive to Cactus Road	179,912	23,434	13.03%	233,042	33,477	14.37%	245,987	35,783	14.55%	12,946	2,306	0.18%
Cactus Road to Shea Boulevard	187,861	24,754	13.18%	239,001	35,053	14.67%	254,385	37,420	14.71%	15,385	2,366	0.04%

Source: Based on 2040 projections from Final Design Concept Report (DCR) Update, 2021. Data from MAG Travel Demand Model (dated June 2022) was applied to evaluate 2050 traffic volumes.

Projects with Congested Intersections

Is this a project that affects a congested intersection (LOS D or greater) that has a significant number of diesel trucks, OR will change LOS to D or greater because of an increase in traffic volumes from a significant number of diesel trucks related to the project?

Yes – This project affects congested intersections of LOS D or greater which have a significant number of diesel trucks. Table 2 presents the intersection operation analysis. Table 2 shows that 7 out of 9 intersections in the study area are projected to have a LOS of D, E, or F in the 2050 Build scenario. As demonstrated in Table 1, truck percentages range from 13.87%-16.56% in 2050, which considered a significant number of diesel trucks.

Table 2. Intersection LOS Summary

Intersection	Existing (2022)		Interim (2025)		No-Build (2050)		Build (2050)	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
	LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS
SB SR 101 & Pima Road	D	F	D	D	F	F	D	E
NB SR 101 & Pima Road	C	E	C	E	D	F	D	F
SB SR 101 & Bell Road	C	C	C	C	C	C	C	C
NB SR 101 & Bell Road	C	C	C	C	C	C	C	C
SB SR 101 & Frank Lloyd Wright	D	F	D	F	D	F	C	F
NB SR 101 & Frank Lloyd Wright							C	E
Raintree & 87th Street	A	C	A	C	A	D	A	D
SR 101 & Raintree	F	E	F	D	F	F	F	E
SR 101 & Cactus	D	C	C	C	C	D	C	D
SR 101 & Shea Boulevard	D	D	C	D	C	D	C	D

Note: SR 101 & Frank Lloyd Wright is a Single Point Urban Intersection in the No Build condition with one signal, and it is a Tight Diamond Intersection in the Build condition with two signals.
Source: Intersection analysis using data acquired from MAG Travel Demand Model dated June 2022

New Bus and Rail Terminals

Does the project involve construction of a new bus or intermodal terminal that accommodates a significant number of diesel vehicles?

NO – These facilities are not included in the project.

Expanded Bus and Rail Terminals

Does the project involve an existing bus or intermodal terminal that has a large vehicle fleet where the number of diesel buses (or trains) increases by 50% or more, as measured by arrivals?

NO – These facilities are not included in the project.

Projects Affecting PM Sites of Violation or Possible Violation

Does the project affect locations, areas or categories of sites that are identified in the PM_{10} or $PM_{2.5}$ applicable plan or implementation plan submissions, as appropriate, as sites of violation or potential violation?

NO – None of these intersections are specifically identified in applicable plans as sites of violation potential violation.

Within the Maricopa County nonattainment area, the National Ambient Air Quality Standard has not yet been attained for PM_{10} particulate pollution. The area is classified as a Serious Area under the Clean Air Act. Consequently, the MAG 2012 Five Percent Plan for PM_{10} has been prepared to meet the requirements in Section 189(d) of the Clean Air Act and improve air quality in the Maricopa County nonattainment area. The plan is required to reduce PM_{10} emissions by at least five percent per year until the standard is attained as measured by the monitors. The plan presents a variety of control measures and projects that have been implemented to reduce PM_{10}. The plan does not identify specific locations or monitors as sites of potential violation.

PM_{10} monitoring stations are located throughout Maricopa County, none of which are located within five miles of the project footprint. It is not anticipated that the project would exacerbate any existing violations of the NAAQS at any of these monitors.

POAQC Determination

YES – As described above, this project is a Project of Air Quality Concern (POAQC) because it meets the following criteria:

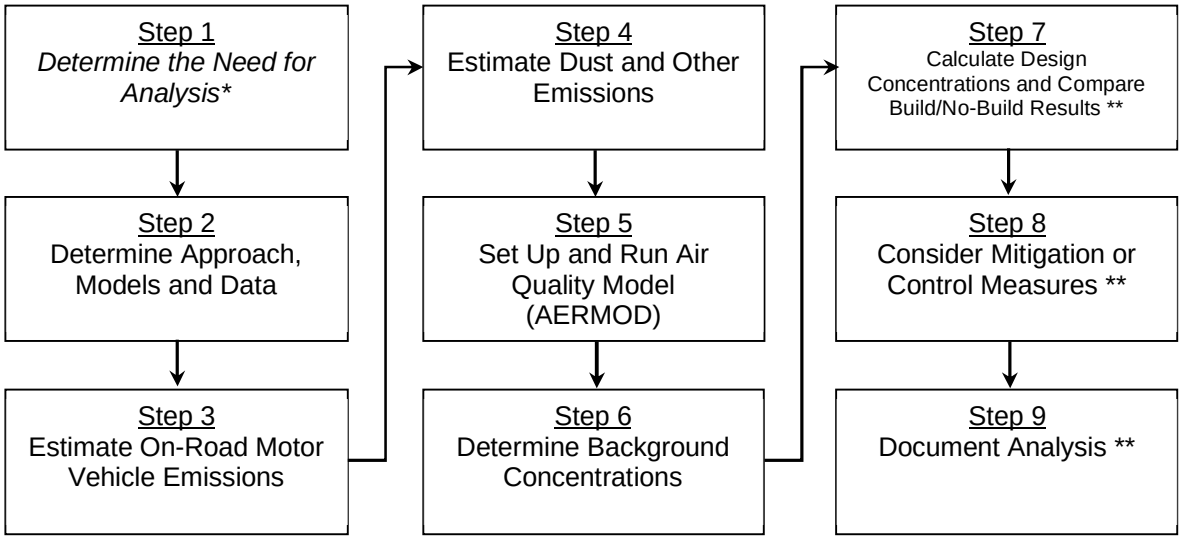
i. This an expanded highway projects that has a significant increase in the number of diesel vehicles
ii. This a project that affects a congested intersection (LOS D or greater) that has a significant number of diesel trucks

As a POAQC, a quantitative PM Hot-Spot analysis must be completed to demonstrate the project meets conformity requirements. The *Project Level PM Quantitative Hot-Spot Analysis – Consultation Document for Project of Air Quality Concern* has been completed and circulated through interagency consultation for review and comments prior to commencing any modeling activities. The interagency consultation group is comprised of participants from Arizona Department of Transportation, Federal Highway Administration, and the US Environmental Protection Agency.

Project Level PM Quantitative Hot-Spot Analysis – Consultation Document for Project of Air Quality Concern

Completing a Particulate Matter (PM) Hot-Spot Analysis

The general steps required to complete a quantitative PM hot-spot analysis are outlined below and described in detail in the EPA Office of Transportation and Air Quality guidance document "Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas" EPA-420-B-15-084, November 2015.



* Described in the previous section (Air Quality Concern Questionnaire).
** These Steps will be described and documented in a final air quality analysis report.

Step 2: Determine the Approach, Models, and Data

a. Describe the project area (area substantially affected by the project, 58 FR 62212) and emission sources.
b. Determine general approach and analysis year(s) – year(s) of peak emissions during the time frame of the transportation plan (69 FR 40056).
c. Determine National Ambient Air Quality Standards (NAAQS) and PM types to be evaluated.
d. Select emissions and dispersion models and methods to be used.
e. Obtain project-specific data (e.g., fleet mix, peak-hour volumes and average speed).

Step 3: Estimate On-Road Motor Vehicle Emissions

a. Estimate on-road motor vehicle emissions using MOVES.

Step 4: Estimate Dust and Other Emissions

a. Estimate road dust emissions using AP-42 Paved Roads.
b. Do emissions from other sources (e.g., locomotives) need to be considered?

Step 5: Set Up and Run Air Quality Model (AERMOD)

a. Obtain and input required site data (e.g., meteorological).
b. Input MOVES and AP-42 outputs (emission factors).
c. Determine number and location of receptors, roadway links, and signal timing.
d. Run air quality dispersion model and obtain concentration results.

Step 6: Determine Background Concentrations

a. Determine background concentrations from nearby and other emission sources excluding the emissions from the project itself.

Step 7: Calculate Design Concentrations and Compare Build/No-Build Results

a. Add step 5 results to background concentrations to obtain values for the Build scenario.
b. Determine if the design values allow the project to conform.

Step 8: Consider Mitigation or Control Measures

a. Consider measures to reduce emissions and redo the analysis. If mitigation measures are required for project conformity, they must be included in the applicable SIP and be enforceable.
b. Determine if the design values from allow the project to conform after implementing mitigation or control measures.

Step 9: Document Analysis

a. Determine if the project conforms or not based on the results of step 7 or step 8.
To support the conclusion that a project meets conformity under 40 CFR 93.116 and 93.123, at a minimum the documentation will include:

- *Description of proposed project, when it is expected to open, and projected travel activity data.*
- *Analysis year(s) examined and factors considering in determining year(s) of peak emissions.*
- *Emissions modeling data, model used with inputs and results, and how characterization of project links.*
- *Model inputs and results for road dust, construction emissions, and emissions from other source if needed.*
- *Air Quality modeling data, included model used, inputs and results and receptors.*
- *How background concentrations were determined.*
- *Any mitigation and control measures implemented, including public involvement or consultation if needed.*
- *How interagency and public participation requirements were met.*
- *Conclusion that the proposed project meets conformity requirements.*
- *Sources of data for modeling.*

Interagency Consultation

ADOT will circulate the following Tables along with the *Project Level Conformity – Particulate Matter Project of Air Quality Concern Questionnaire* to describe in detail how the steps listed in EPA hot spot guidance will be followed. It is requested that consulted parties provide comments or questions on the methods, models and assumptions within 30 business days, a non-response will be interpreted to mean that the party concurs with the planning assumptions as described in the Table.

Table 1. Methods, Models and Assumptions

Estimate On-Road Motor Vehicle Emissions (Step 3) – Modeling highways and/or intersections for PM10 (Contact ADOT if modeling off-network data such as terminals and parking lots or performing a PM2.5 analysis)		
MOVES3.1	Description	Reference
Scale	*Onroad, Project Scale and Inventory*	EPA Hot Spot Guidance Section 4.4.2
Time Spans	*For projects without gasoline start activity, 4-weekday runs for a month with the seasonal fuel that results in the highest PM emissions, split by Morning peak hours, Midday Emissions, Evening Peak and Overnight hours as defined by TDM model.*	EPA Hot Spot Guidance Sections 2.8, 4.3 & 4.4.3
Geographic Bounds	*County*	EPA Hot Spot Guidance Section 4.4.4
Onroad Vehicles	*All Fuels and Source Use Types will be selected.*	EPA Hot Spot Guidance Section 4.4.5
Road Type	*Based on the project location*	EPA Hot Spot Guidance Section 4.4.6
Pollutants and Processes	*Primary Exhaust PM10-Total (for Running Exhaust and Crankcase Running Exhaust), Break Wear Particulate, Tire Wear Particulate*	EPA Hot Spot Guidance Sections 2.5 & 4.4.7
General Output and Output Emissions Detail	*Database will be created, Grams, Million BTU, Miles, Distance Traveled will be selected. Output Aggregation is set to Hour and Link by default and the "for All Vehicle/Equipment Categories" and "Onroad" selections are optional in the Output Emissions Detail. After running MOVES3.1 for a particular hour/day/month scenario, the PM10_Grams_Per_Veh_Hour script (for Inventory mode) can be run on the output database.*	EPA Hot Spot Guidance Section 4.4.8, 4.4.9 & 4.6
Create Input Database	*Input database will be created and modified for Project level using required Regional Inputs from latest Regional Conformity Analysis.*	EPA Hot Spot Guidance Section 4.4.10 and See Project Data Manager below
Project Data Manager	*Database will be created and MOVES3.1 templates will be created to include local project data and information provided by MAG, e.g., Fuel, Age Distribution, Meteorology Data, to be consistent with the regional model. Links and Link Source Type will be specific to project as provided by the traffic study, any missing information will use default MOVES3.1 data.*	EPA Hot Spot Guidance Sections 4.5 &Appendix D
Meteorology	*Same for build and no-build scenarios. A minimum of four hours (AM, PM, MD & ON), for one day (weekday) and a month with the seasonal fuel that results*	EPA Hot Spot Guidance Section 4.5.1

	in the highest PM emissions is required. The County meteorology file provided by MAG and used in the latest regional conformity analysis will be used.	
Age Distribution	*Provided by MAG; same for build and no-build scenarios.*	EPA Hot Spot Guidance Section 4.5.2
Fuel	*Same for build and no-build scenarios. Fuel files provided by MAG and used in the latest regional conformity analysis will be used.*	EPA Hot Spot Guidance Section 4.5.3, PM hot-spot training slides Module 2
I/M Programs	*No impact on PM emissions.*	EPA Hot Spot Guidance Section 4.5.4
Retrofit Data	*If necessary; not needed for the project.*	Project specific modeling EPA Hot Spot Guidance Section 4.5.5
Links	*Unique inputs needed for each run. Requires information on each link's length (in miles), traffic volume (vehicle per hour), average speed (miles per hour) and road grade (percent).*	EPA Hot Spot Guidance Section 4.5.6 & Appendix D
Link Source Types	*Unique inputs needed for each run. Information provided by MAG and used in the latest regional conformity analysis will be used.*	EPA Hot Spot Guidance Section 4.5.7
Link Drive Schedules, Operating Mode Distribution	*Not used; average speed and road type will be provided through the Links Importer.*	EPA Hot Spot Guidance Section 4.5.8
Off-Network, Hoteling, Generic	*If necessary; not needed for the project.*	EPA Hot Spot Guidance Section 4.5.9
Estimate Dust and Other Emissions (Step 4) (AP-42 emission factors below should be based on SIP or Regional Conformity Analysis provided by ADEQ, MAG, PAG or YMPO depending on the project's location)		
AP-42, Fifth Edition, 2011	Description	Reference
Average Weight Vehicles	*Freeways 3.83 tons in 2025, 3.87 tons in 2030, 3.97 tons in 2040, and 4.08 tons in 2050. Arterials 2.48 tons in 2025, 2.49 tons in 2030, 2.48 tons in 2040, and 2.48 tons in 2050*	Conformity Analysis for the FY 2022-2025 MAG TIP and the Momentum 2050 RTP
Silt Loading	*Section 13.2.1 Paved Roads from AP 42 will be used, consistent with the regional analysis from MAG. Emission factors for road and construction dust should be added to the emission factors generated for each link by MOVES3.1. Ex. Silt loading – Freeways .02 g/m^2, Arterials >10,000 ADT .067g/m^2, Low traffic roads <10,000 ADT .23g/m^2.*	EPA Hot Spot Guidance Section 6, When estimating emissions of re-entrained road dust from paved roads, site-specific silt loading data must be consistent with the data used for the project's county in the regional emissions analysis (40 CFR 93.123(c)(3)).
Construction Dust	*Construction Dust is temporary and will not be included. There are no other sources (e.g., locomotives) that need to be considered.*	EPA Hot Spot Guidance Section 6.5

Precipitation	*An average of 32 days with at least .01 inch of precipitation (based on 2008-2012 precipitation data from Phoenix Sky Harbor Airport) will be used consistent with the regional conformity analysis.*	Conformity Analysis for the FY 2022-2025 MAG TIP and the Momentum 2050 RTP
Set Up and Run Air Quality Model (AERMOD) (Step 5)		
AERMOD v.22112	Description	Reference
Model Setup (CO Pathway)	*Control Pathway defines the primary model settings.*	EPA Hot Spot Guidance Section 7.1, 7.2 & Appendix J, AERMOD User's Guide Section 2.3.2 & 3.2
TITLEONE	*Model title*	
MODELOPT	*CONC FLAT*	Modeling Concentrations and Flat Terrain
AVERTIME	*24*	Average across each 24-hour period from the available met data
URBANOPT	*Population for Urban Area*	
FLAGPOLE	*1.8*	
POLLUTID	*PM10*	
Source Types and Characters (SO Pathway)	*A highway "line source" can be modeled using a series of adjacent area sources. A series of adjacent area sources will be used to represent the project.*	EPA Hot Spot Guidance Section 7.3, 7.4 & Appendix J.2, J.3, AERMOD User's Guide Section 2.3.3 & 3.3
LOCATION	*Srcid Srctyp Xs Ys (Zs)*	AREA Source parameters
SRCPARAM	*Srcid Aremis Relhgt Xinit (Yinit) (Angle) (Szinit)*	AREA Source parameters
URBANSRC	*Srcid*	Urban source IDs
EMISFACT	*Emission rate=1, Use SEASHR or HROFDY*	Total 16 MOVES run=4 seasons x 4 time periods to 96 factors (4 seasons / 24 hours) See PM hot-spot training slides (FHWA, 2022). This was updated in EPA Hot Spot Guidance Section 4.3.1. Project without gasoline start activity shall use 4 total MOVES runs=1 season x 4 time periods)
SRCGROUP	*GroupID or All*	
Meteorological Data (ME Pathway)	*The meteorological data will be based on pre-processed met files from ADEQ.*	EPA Hot Spot Guidance Section 7.5, Appendix J.4, AERMOD User's Guide Section 2.3.5 & 3.5
SURFFILE	*Surface file name*	*.sfc
PROFFILE	*Profile (upper air) file name*	*.pfl
SURFDATA	*Surface data station*	
UAIRDATA	*Upper air data station*	
PROFBASE	*Met data station elevation*	
Run Met Pre-Processor	*Not needed; pre-processed met files available from ADEQ.*	AERMET User's Guide (for AERMOD)
Urban or Rural Sources	*Specifications for URBANOPT (CO Pathway) and URBANSRC (SO Pathway)*	EPA Hot Spot Guidance Section 7.5.5 & Appendix J.4, AERMOD Implementation Guide,

		Section 7.2.3 of Appendix W to 40 CFR Part 51
Receptors (RE Pathway)	*Receptors should begin 5 m from roadway edge, extending up to 105 m (or further if needed). Spacing of 25 m is typically sufficient.*	EPA Hot Spot Guidance Section 7.6, AERMOD User's Guide Section 2.3.4 & 3.4, Section 7.2.2 of Appendix W to 40 CFR Part 51, See PM hot-spot training slides
DISCCART	*X Y (Z)*	Z is optional if FLAGPOLE is already defined in CO Pathway.
GRIDCART	*AERMOD View will be used.*	e.g., AERMOD View
Output (OU Pathway)	*PLOTFILE and/or POSTFILE will be generated if necessary.*	EPA Hot Spot Guidance Appendix J.6, AERMOD User's Guide Section 2.3.6 & 3.7
RECTABLE	*24 6th*	Since PM should be one or less exceedance per year, with 5 years of met data, the 6th highest concentration at each receptor
PLOTFILE	*Optional*	
POSTFILE	*Optional*	
Model Runs	*Use AERMOD User's Guide Appendix B to decode and correct errors.*	EPA Hot Spot Guidance Section 7.7, AERMOD User's Guide Section 2.3.7, 2.3.8, 3.8 & Appendix B
Determine Background Concentrations (Step 6)		
Source Type	Description	Reference
Nearby Sources	*If necessary; not needed for the project.*	EPA Hot Spot Guidance Section 8.2
Other Sources (Ambient Monitoring Data)	*Data from a single monitor will be used. The South Scottsdale monitor (04-013-3003) was selected because it is the closest monitor to the project site with similar land use (suburban, near freeway) and no significant terrain features between the monitor and the project site. The most recent three years of complete monitoring data (2019-2021), including Exceptional Events tagged in AQS, were used and the 4th highest reading was selected based on total number of sampling days of 1086 days. The 4th highest monitor value over these three years is 107 µg/m³. To estimate the sixth-highest concentration for each receptor, the six highest 24-hour modeled concentration will be added to the South Scottsdale monitor value.*	EPA Hot Spot Guidance Section 8.3, PM hot-spot training slides Module 5 & 6

Table 2. Proposed Inputs, Parameters and Data Sources

Estimate On-Road Motor Vehicle Emissions (Step 3)		
MOVES3.1	Input	Data Source/Detail
Scale	Onroad, Project Scale and Inventory	MAG June 2022 Regional Conformity Data (Published July 2022)
Time Spans	2050, 4 runs	July (worst-case month); 4 weekday time periods (5-8AM, 8AM-1PM, 1-5PM & 5PM-5AM), consistent with MAG regional model time periods
Geographic Bounds	Maricopa County	EPA Hot Spot Guidance Section 4.4.4
Onroad Vehicles	All Fuels and Source Use Types selected	EPA Hot Spot Guidance Section 4.4.5
Road Type	Urban Restricted and Urban Unrestricted access	EPA Hot Spot Guidance Section 4.4.6
Pollutants and Processes	Primary Exhaust PM10-Total (for Running Exhaust and Crankcase Running Exhaust), Break Wear Particulate, Tire Wear Particulate	EPA Hot Spot Guidance Sections 2.5, 4.4.7
General Output and Output Emissions Detail	Output database created, Grams, Million BTU, Miles, Distance Traveled selected.	EPA Hot Spot Guidance Section 4.4.8, 4.4.9, 4.6
Create Input Database	Input database for each run created and modified for Project level using required Regional Inputs from latest Regional Conformity Analysis.	MAG Regional Conformity Data (July 2022)
Project Data Manager		
Meteorology	MAG local specific data	MAG Regional Conformity Data (July 2022)
Age Distribution	MAG local specific data	MAG Regional Conformity Data (July 2022)
Fuel	MOVES defaults for Maricopa County	MAG Regional Conformity Data (July 2022)
I/M Programs	MAG local specific data	MAG Regional Conformity Data (July 2022)
Retrofit Data	Not used	
Links	Unique inputs were used for each run based on each link's length (in miles), traffic volume (vehicle per hour), average speed (miles per hour) and road grade (percent). See Attachment A for images that show the links proposed for the modeling analysis.	Project-specific data
Link Source Types	Unique inputs were be used for each run, based on project-specific data (option 2 from the guidance). Total volume and volume of light trucks, medium trucks, and heavy trucks was available for each link by time period. Passenger vehicle and bus volumes are assumed to be the volume that remains	Project-specific data

	when truck volumes are subtracted from total volume. The SourceTypePopulation distribution from the MAG regional conformity model was used to allocate volumes within each of these 4 vehicle type categories to the associated MOVES source types. This data was used to develop a unique link source type for each link by time period. A table that demonstrates how the traffic volumes were mapped to each MOVES source type is included in responses to FHWA comments.	
Link Drive Schedules, Operating Mode Distribution	Not used; average speed and road type will be provided through the Links Importer.	Project-specific data
Off-Network, Hoteling	Not used	
Estimate Dust and Other Emissions (Step 4)		
AP-42, Fifth Edition, 2011	Parameter	Data Source/Detail
Average Weight Vehicles	Freeways 3.83 tons in 2025, 3.87 tons in 2030, 3.97 tons in 2040, and 4.08 tons in 2050. Arterials 2.48 tons in 2025, 2.49 tons in 2030, 2.48 tons in 2040, and 2.48 tons in 2050	Conformity Analysis for the FY 2022-2025 MAG TIP and the Momentum 2050 RTP
Silt Loading	Freeways .02 g/m^2, Arterials >10,000 ADT .067g/m^2, Low traffic roads <10,000 ADT .23g/m^2	Conformity Analysis for the FY 2022-2025 MAG TIP and the Momentum 2050 RTP
Construction Dust	Construction Dust is temporary and was not included. There are no other sources (e.g., locomotives) that need to be considered.	EPA Hot Spot Guidance Section 6.5
Precipitation	In 2008-2012 SIP/Regional Conformity used average of 32 days with at least .01 inch of precipitation County	2008-2012 SIP/Regional Conformity Analysis
Set Up and Run Air Quality Model (AERMOD) (Step 5)		
AERMOD v.22112	Parameter	Data Source/Detail
Model Setup (CO Pathway)		
TITLEONE	SR101 and Shea Blvd SR101 and Frank Lloyd Blvd	Specific to each intersection modeled
MODELOPT	CONC FLAT	Modeling Concentrations and Flat Terrain
AVERTIME	1 24 PERIOD	Average across each 1-hour period, 24-hour period, and the full 5-year period from the available met data
URBANOPT	242753	Population of Scottsdale, AZ
FLAGPOLE	1.8	
POLLUTID	PM-10	
Source Types and Characters (SO Pathway)		
LOCATION	Srcid Srctyp Xs Ys (Zs)	AREA: Line source represented by a series of area sources

SRCPARAM	Srcid Aremis Relhgt Xinit (Yinit) (Angle) (Szinit)	AREA: Line source represented by a series of area sources
URBANSRC	ALL	All urban source
EMISFACT	Emission rate=1 g/s/m², Variable emission factor keyword HROFDY used to enter emission factors for hours 1-24.	Total 4 MOVES runs = worst case season x 4 time periods to 24 factors (24 hours)
SRCGROUP	ALL	
Meteorological Data (ME Pathway)		
SURFFILE	Phoenix2017-2021.sfc	*ADEQ Phoenix AERMET files*
PROFFILE	Phoenix2017-2021.pfl	*ADEQ Phoenix AERMET files*
SURFDATA	23183 2017 PHOENIX/SKY_HARBOR_INT'L_ARPT	*ADEQ Phoenix AERMET files from: https://azdeq.gov/node/2127*
UAIRDATA	23160 2017 TUCSON/INT'L_ARPT ADEQ provides meteorological data files for 11 locations in Arizona. Tucson upper air data is the recommended station for modeling analysis in the Phoenix area, as presented in ADEQ's Air Dispersion Modeling Guidelines: https://static.azdeq.gov/aqd/modeling_guidance_2019.pdf	*ADEQ Phoenix AERMET files from: https://azdeq.gov/node/2127*
PROFBASE	346.0 Meters	*ADEQ Phoenix AERMET files*
Run Met Pre-Processor	Not used	
Urban or Rural Sources	Specifications for URBANSRC (SO Pathway)	
Receptors (RE Pathway)	See Attachment A for receptor maps.	
DISCCART	*X Y (Z)*	
GRIDCART	Receptors begin on sidewalk adjacent to roadway or no greater than 5 m from roadway edge, extending up to 105 m at 25 m spacing and 350 m at 50 m spacing. Grid converted to discrete receptors.	
Output (OU Pathway)		
RECTABLE	ALLAVE 1ST; 1 1ST; 24 1ST 6TH	Since PM should be one or less exceedance per year, with 5 years of met data, the 6th highest concentration at each receptor is used.
PLOTFILE	Auto-generated	
POSTFILE	Not used	
Model Runs		
Determine Background Concentrations (Step 6)		
Source Type	Description	Data Source/Detail
Nearby Sources	No sources identified that change as a result of the project.	
Other Sources (Ambient Monitoring Data)	See Attachment B for details about South Scottsdale air monitor used as background for this analysis.	

References

PM Hot-spot guidance, EPA-420-B-21-037, October 2021.

User's Guide for the AMS/EPA Regulatory Model (AERMOD), EPA-454/B-21-001, April 2021.

AERMOD Implementation Guide, EPA-454/B-21-006, July 2021.

User's Guide for the AERMOD Meteorological Preprocessor (AERMET), EPA-454/B-22-006, June 2022.

Completing Quantitative PM Hot-spot Analyses: 3-Day Course, FHWA, October 2022.

Attachment A – Description of Modeling Domain

As described in the PM POAQC Questionnaire, the Pima Freeway (SR 101) Princess Drive to Shea Blvd Project meets the criteria of Project of Air Quality Concern (POAQC), and a quantitative PM Hot-Spot analysis must be completed to demonstrate the project meets conformity requirements.

Section 3.3.2 of EPA's PM Hot Spot Guidance indicates the geographic area to be covered by a PM hot-spot analysis is to be determined on a case-by-case basis. The guidance states that it may be appropriate to focus the PM hot-spot analysis only on locations of highest air quality concentrations, and that if conformity requirements are met at such locations, then it can be assumed that conformity is met throughout the project area.

Two locations in the project area were selected to represent the locations most likely to experience elevated PM_{10} concentrations. The interchange at Shea Blvd represents the location with the greatest vehicle and truck volumes on both the SR101 mainline and arterials. The interchange at Frank Lloyd Wright represents the location that will undergo the most physical changes in intersection alignment as part of the project, and the intersection experiences Level-of-Service (LOS) F in all scenarios.

As demonstrated in Table A-1, the highest total annual average daily traffic (AADT) and highest truck AADT in the project area are in the vicinity of the interchange at SR101 and Shea Boulevard in 2050. Concentrations of PM_{10} in the vicinity of this interchange are expected to be the greatest in the project area because it includes the highest emissions due to vehicle exhaust and re-entrained road dust.

Table A-1. Project AADT and Truck Percentage

AADT and Truck Volumes	2022 Existing			2050 No-Build			2050 Build		
	Total AADT	Truck AADT	Truck Percent	Total AADT	Truck AADT	Truck Percent	Total AADT	Truck AADT	Truck Percent
Princess Drive to Bell Road	169,212	22,236	13.14%	235,440	32,678	13.87%	244,707	34,365	14.04%
Bell Road to Frank Lloyd Wright Boulevard	134,589	19,521	14.5%	193,155	29,243	15.14%	203,558	31,233	15.34%
Frank Lloyd Wright Boulevard to Raintree Drive	119,960	18,887	15.74%	173,045	28,386	16.40%	183,474	30,376	16.56%
Raintree Drive to Cactus Road	179,912	23,434	13.03%	233,042	33,477	14.37%	245,987	35,783	14.55%
Cactus Road to Shea Boulevard	187,861	24,754	13.18%	239,001	35,053	14.67%	254,385	37,420	14.71%

Source: Based on 2040 projections from Final Design Concept Report (DCR) Update, 2021. Data from MAG Travel Demand Model (dated June 2022) was applied to evaluate 2050 traffic volumes.

As demonstrated in Table A-2, the interchange at SR101 and Frank Lloyd Wright Boulevard experiences LOS F in all scenarios. In addition to poor level of service, this intersection would see the greatest physical changes in roadway alignments due to the proposed project. For these reasons, a PM_{10} modeling analysis was performed to determine if estimated PM_{10}

concentrations are below the NAAQS. Table A-3 presents the total entering volume at each interchange for the 2050 Build scenario.

Table A-2. Intersection LOS Summary

Intersection	Existing (2022)		Interim (2025)		No-Build (2050)		Build (2050)	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
	LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS
SB SR 101 & Pima Road	D	F	D	D	F	F	D	E
NB SR 101 & Pima Road	C	E	C	E	D	F	D	F
SB SR 101 & Bell Road	C	C	C	C	C	C	C	C
NB SR 101 & Bell Road	C	C	C	C	C	C	C	C
SB SR 101 & Frank Lloyd Wright	D	F	D	F	D	F	C	F
NB SR 101 & Frank Lloyd Wright							C	E
Raintree & 87th Street	A	C	A	C	A	D	A	D
SR 101 & Raintree	F	E	F	D	F	F	F	E
SR 101 & Cactus	D	C	C	C	C	D	C	D
SR 101 & Shea Boulevard	D	D	C	D	C	D	C	D

Note: SR 101 & Frank Lloyd Wright is a Single Point Urban Intersection in the No Build condition with one signal, and it is a Tight Diamond Intersection in the Build condition with two signals.
Source: Intersection analysis using data acquired from MAG Travel Demand Model dated June 2022

Table A-3. 2050 Build Scenario Total Entering Volume Summary

Interchange	AM Peak (5am-8am)		MD (8am-1pm)		PM Peak (1pm-5pm)		NT (5pm-5am)	
	Total	Trucks	Total	Trucks	Total	Trucks	Total	Trucks
SR 101 & Pima Road	7,982	512	15,570	980	15,309	920	12,384	745
SR 101 & Bell Road	2,975	171	6,665	304	7,076	281	5,189	206
SR 101 & Frank Lloyd Wright	8,154	507	18,597	706	19,210	652	17,890	655
Raintree & 87th Street	4,773	453	9,724	637	8,014	435	7,385	440
SR 101 & Raintree	5,437	512	10,765	752	11,254	635	9,657	547
SR 101 & Cactus	5,225	364	10,098	737	9,896	666	8,620	447
SR 101 & Shea Boulevard	8,981	552	16,269	1,078	16,150	950	14,245	749

Note: Truck volume represents the total of heavy and medium truck volumes.
Source: Intersection analysis using data acquired from MAG Travel Demand Model dated June 2022

If conformity is met at these two modeled locations, it can be assumed that conformity is met throughout the project area, which has similar traffic activity with lower AADT and delay. See figures on the following pages that indicate the locations of sources and receptors used in the AERMOD modeling analysis.

These two locations will be modeled with the following conservative assumptions that should predict pollutant concentrations that are greater than what would be experienced in reality:

1. All sources and receptors with a base elevation of zero, ignoring the vertical distance between the overpasses and underpasses.
2. Road dust emissions do not take credit for street sweeping measures on freeways and arterials that are identified in the MAG 2012 Five Percent Plan.
3. Exhaust emissions for the year 2050 are based on current vehicle registration data and do not assume that any new electric or alternative fuel vehicles enter the fleet in the year 2050.

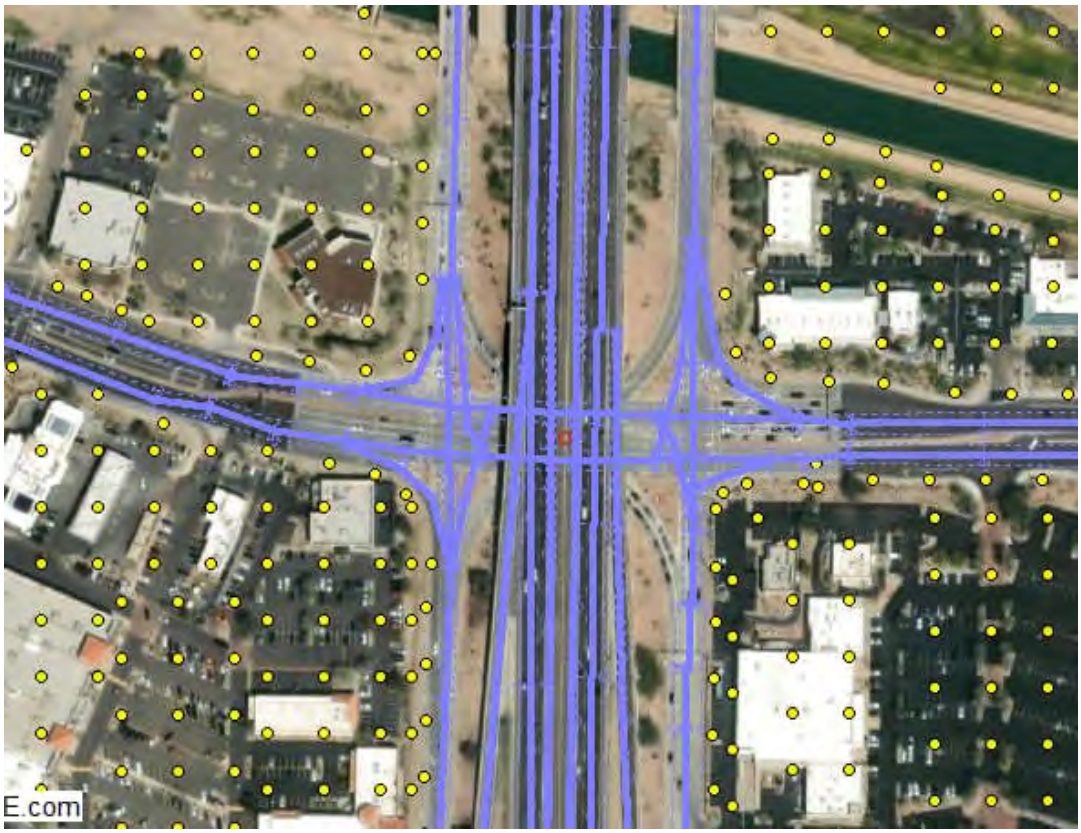
See figures on the following pages that indicate the locations of sources and receptors used in the AERMOD modeling analysis. Receptors were placed according to EPA guidance, no closer than 5 feet from the edge of the roadway.

Figure A-1. Links and Receptors Placement for Air Quality Modeling
(SR101 & Shea Boulevard)

Figure A-2. Zoomed In View of Links and Receptors Placement for Air Quality Modeling
(SR101 & Shea Boulevard)

Figure A-3. Links and Receptors Placement for Air Quality Modeling
(SR101 & Frank Lloyd Wright Boulevard)

Figure A-4. Zoomed In View of Links and Receptors Placement for Air Quality Modeling
(SR101 & Frank Lloyd Wright Boulevard)



Attachment B – Background Monitor Details

A series of PM_{10} monitors are operated by Maricopa County in the project vicinity. As shown in Figure B-1, the South Scottsdale monitor located at 2857 N Miller Rd is the closest monitor to the project limits with similar land use characteristics, as summarized in Table B-1. There are three PM_{10} monitors within nine miles of the project location, each located six to seven miles south of the southern project terminus. Of these three monitor locations, the South Scottsdale monitor is located in an area surrounded by residential and commercial land use, which is similar to the project area. The Highschool Air Monitoring Station and the Senior Center Air Monitor Station are located in areas with rural and agricultural land uses.

Table B-1. PM_{10} Monitor Characteristics

Monitor Location	AQS Site ID	Distance from Project	Land Use	Data Completeness (Days)	Max 24-hour PM_{10} Concentration ($\mu g/m^3$)
South Scottsdale, 2857 N Miller Rd	04-013-3003	7.4	Residential/ Commercial	2021: 355/365 2020: 366/366 2019: 365/365	2021: 188 2020: 192 2019: 74
Highschool Air Monitoring Station, 4827 North Country Club Dr	04-013-7024	6.1	Rural/ Agricultural	2021: 360/365 2020: 365/366 2019:360/365	2021: 159 2020: 191 2019: 105
Senior Center Air Monitoring Station, 10844 East Osborn Rd	04-013-7020	6.9	Rural/ Agricultural	2021: 357/365 2020: 366/366 2019: 365/365	2021: 174 2020: 168 2019: 89

Source: EPA Outdoor Air Quality Data (https://www.epa.gov/outdoor-air-quality-data/monitor-values-report)

Three years of daily data from the South Scottsdale monitor was retrieved from EPA's Outdoor Air Quality Data system. The fourth highest monitor value over the 3-year period will be used for design concentration calculations, as described in the PM Hot-Spot Guidance section 9.3.4. Note that Exceptional Events flagged in AQS were included in the data used to determine the background concentration. Table B-2 summarizes the maximum monitor values between 2019-2021. A wind rose and station information are provided as Figure B-2.

Table B-2. South Scottsdale PM10 Monitor Data

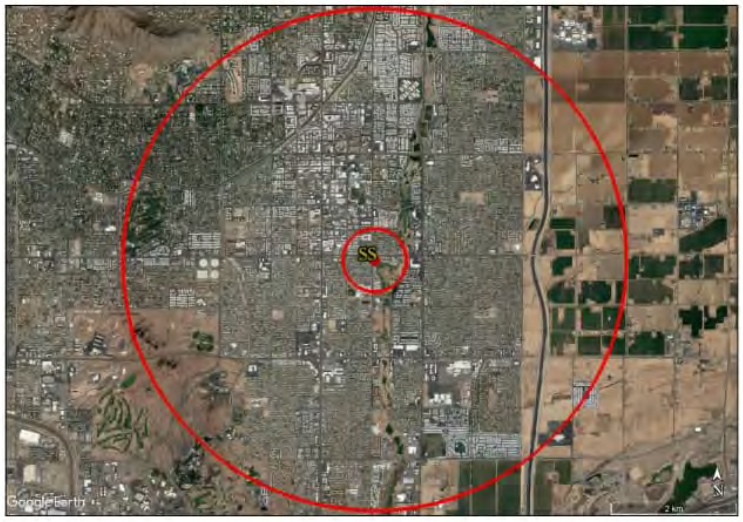
Year	1st Max 24-hour Concentration ($\mu g/m^3$)	2nd Max 24-hour Concentration ($\mu g/m^3$)	3rd Max 24-hour Concentration ($\mu g/m^3$)	4th Max 24-hour Concentration ($\mu g/m^3$)
2021	188 (second high)	180 (third high)	103	94
2020	192 (first high)	**107 (fourth high)**	77	65
2019	74	55	50	49

Source: EPA Outdoor Air Quality Data (https://www.epa.gov/outdoor-air-quality-data/monitor-values-report)

Figure B-1. PM10 Monitoring Sites Adjacent to the Project Area

Figure B-2. South Scottsdale Station Information

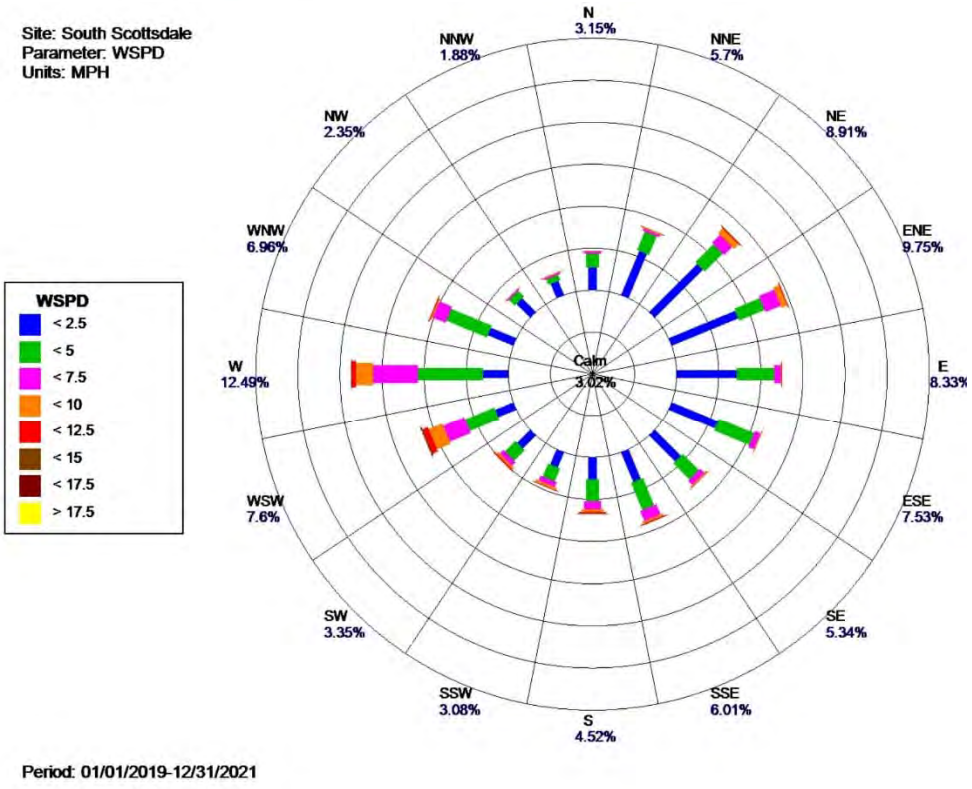
South Scottsdale (SS) (04-013-3003)



Site Location	Thomas Rd. & Miller Rd., Scottsdale
Spatial Scale	Neighborhood
Site Type	Population Exposure

Site Description: This site began operating in January 1974. This SLAMS location monitors for O_3 and PM_{10}. Meteorological monitoring includes ambient temperature, barometric pressure, relative humidity, and wind speed/direction.

The station is in a residential area.



Attachment C – Meteorological Data Processing Details

The Arizona Department of Environmental Quality (ADEQ) has compiled pre-processed AERMET meteorological data files that could be used for air quality permit applications for sources located in Arizona under ADEQ jurisdiction. Currently pre-processed AERMET meteorological data files are available for 11 National Weather Service (NWS) meteorological stations across Arizona. The following document provides an overview of the dataset specifically tailored to Phoenix Sky Harbor International Airport, hereinafter referred to as "Sky Harbor Airport."

Meteorological Data

The AERMET meteorological preprocessor requires input of hourly observations of wind speed, wind direction, cloud cover, and ambient temperature. A full morning upper air sounding (rawinsonde) is also required in order to calculate the convective mixing height throughout the day.

In the Phoenix metropolitan area, there are several NWS stations; however, among them, Sky Harbor Airport is the sole Automated Surface Observing Stations (ASOS) station that provides 1-minute or 5-minute wind data. This data is especially valuable because the EPA's AERMINUTE meteorological processor can process 1-minute and 5-minute wind data to reduce the occurrences of calms and missing wind observations. As such, the data from Sky Harbor Airport is considered the most comprehensive and dependable source of surface observations within the Phoenix metropolitan area.

AERMET utilizes upper air data sourced from the NWS Rawinsonde Network. In Arizona, there are two rawinsonde stations, Tucson and Flagstaff. The Tucson rawinsonde station is located in a similar climatic region and is most representative of upper air conditions at the Phoenix metropolitan area.

ADEQ obtained standard hourly weather observations from the National Centers for Environmental Information (NCEI) websites:

NCEI's Integrated Surface Hourly Data (ISHD) TD-3505
ftp://ftp.ncdc.noaa.gov/pub/data/noaa/
NCEI's 1-Minute ASOS Wind Data
ftp://ftp.ncdc.noaa.gov/pub/data/asos-onemin/

Upper air data are available at the Earth System Research Laboratory Global Systems Divisions web site:
http://esrl.noaa.gov/gsd

Completeness of Meteorological Data

Section 5.3.2 of "Meteorological Monitoring Guidance for Regulatory Modeling Applications" states that, to be acceptable for use in regulatory dispersion modeling, a meteorological dataset must be 90% complete on a quarterly basis. The 90% requirement applies to wind direction, wind speed, and temperature. The data completeness for each year of processed data for input to AERMOD is presented in Table 1.

Table 1 Meteorological Data Completeness

Year	Quarter	Wind Direction	Wind Speed	Temperature	Cloud Cover
2017	1	99.72%	100.00%	100.00%	100.00%
2017	2	99.86%	99.91%	100.00%	100.00%
2017	3	99.82%	100.00%	100.00%	100.00%
2017	4	99.82%	99.86%	99.68%	99.68%
2018	1	99.68%	100.00%	100.00%	100.00%
2018	2	99.95%	99.95%	100.00%	100.00%
2018	3	98.60%	100.00%	100.00%	100.00%
2018	4	99.68%	99.86%	99.68%	99.68%
2019	1	97.50%	100.00%	99.95%	100.00%
2019	2	99.50%	100.00%	100.00%	100.00%
2019	3	99.46%	99.95%	100.00%	100.00%
2019	4	99.50%	99.91%	99.64%	99.68%
2020	1	100.00%	100.00%	100.00%	100.00%
2020	2	99.91%	100.00%	100.00%	100.00%
2020	3	99.73%	100.00%	100.00%	100.00%
2020	4	99.41%	99.73%	99.68%	99.68%
2021	1	99.77%	100.00%	100.00%	100.00%
2021	2	99.36%	100.00%	100.00%	100.00%
2021	3	99.50%	100.00%	100.00%	100.00%
2021	4	99.59%	99.86%	99.68%	99.68%

Due to the missing data both in surface and upper air observations, the entire model-ready meteorological dataset (PFL and SFC files) has a completeness of 99.15%, which meets the completeness requirements for regulatory modeling purposes.

Meteorological Data Processing

ADEQ used AERMET (version 22112) and AERMINUTE (version 15272) to process five years (2017-2021) of surface meteorological data obtained from Sky Harbor Airport along with concurrent upper air radiosonde data obtained from Tucson. ADEQ also used the EPA's AERSURFACE tool (version 20060) to calculate surface characteristic parameters (albedo, Bowen ration and surface roughness) required by AERMET.

There are two stages of data processing in AERMET. Stage 1 extracts the meteorological data from the input data files (the NWS surface file and the upper air data file), processes the data through various quality assessment checks, and creates intermediate files in a standardized AERMET format. The second stage reads the output from Stage 1, calculates the boundary layer parameters required by AERMOD, and generates two AERMOD-ready meteorological data files. AERMINUTE processes 1-minute ASOS wind data to generate hourly average winds for input to AERMET in Stage 2. Based on the EPA's guidance for AERMINUTE, ADEQ applied a minimum wind speed threshold of 0.5 m/s to the hourly averaged wind speeds provided by AERMINUTE.

Stage 2 also requires the input of surface characteristic data that are used to estimate boundary layer parameters. National Land Cover Data 2016 (NLCD 2016) obtained from the U.S. Geological Survey was input to AERSURFACE. In addition to the NLCD 2016 data, the following inputs were used:

Method for determining surface roughness length – ZORAD;
Study radius for surface roughness (km) – 1 kilometer;
Number of sectors – 12;
Temporal resolution – Monthly;
Continuous snow cover most of the winter? – No;
Meteorological tower at an airport? – Yes;
Arid Region? – Yes;
Surface Moisture? - [Dry, Average or Wet, ***see below****]*
Month/Season assignments - User-specified
Transitional spring (partial green coverage, short annuals): 2 3 4 5 6
Midsummer with lush vegetation: 7 8 9 10
Autumn with unharvested cropland: 1 11 12

ADEQ determined the surface moisture inputs by comparing annual precipitation for a specific year to the 30-year climatological record of annual precipitation for Sky Harbor Airport. Per the EPA guidance for AERSURFACE, "Dry" is applied if the precipitation is below the 30th percentile of the 30-year climate record, "Wet" is applied if the precipitation is above the 70th percentile of the 30-year climate record, and "Average" is used if the precipitation is between the 30th and 70th percentiles. The resulting surface moisture inputs, as determined by this methodology, are summarized in Table 2.

Table 2 Surface Moisture Inputs

Year	Surface Moisture Inputs
2017	Dry
2018	Wet
2019	Average
2020	Dry
2021	Average

To address issues with model overprediction due to underprediction of the surface friction velocity (u*) during light wind/stable conditions, EPA has integrated the ADJ_U* option into the AERMET. Based on the EPA's evaluations, using the ADJ_U* option is appropriate when standard NWS data are used. Therefore, ADEQ incorporated the ADJ_U* option as a regulatory option in the data processing.

ADOT Environmental Planning

Project Level CO Hot-Spot Analysis Questionnaire

Project Setting and Description

The Arizona Department of Transportation (ADOT), in cooperation with the Federal Highway Administration (FHWA), is preparing a Categorical Exclusion Determination of the proposed improvements to a segment of State Route (SR) 101L. The proposed project would construct additional general-purpose lanes (GPL) along SR 101Lbetween milepost (MP) 36.6 (intersection of Pima Road and Princess Drive) and MP 41.1 (Shea Boulevard). This project is located within the City of Scottsdale, Maricopa County, Arizona (see Figures 1, 2a, and 2b).

This segment of the Pima Freeway (SR 101L) currently consists of 3 GPL and 1 high-occupancy vehicle (HOV) lane in each direction. It accommodates traffic from the Red Mountain Freeway (SR 202L), Price Freeway (SR 101L), State Route 51 (SR 51), and Interstate 17 (I-17). The project is adjacent to Scottsdale Airport and Scottsdale Community College.

With over 4.3 million residents, Maricopa County is the fourth most populous county in the nation. It has been one of the fastest growing regions in the United States. The growing traffic demand has caused the SR 101L corridor to become increasingly congested during the morning and evening peak travel periods, and growth projections indicate the congestion will worsen in the future. Additional GPL would increase the freeway capacity and help alleviate increased levels of traffic congestion in the future.

The scope of work for the project consists of:

- Adding one GPL to southbound (SB) SR 101L
- Adding one GPL to northbound (NB) SR 101L
- Reconstructing and/or widening entrance and/or exit ramps
- Modifying curb ramps and/or sidewalks on crossroads
- Widening bridge structures on both the NB and SB sides

Details of the interchange improvements are shown in Figures 4 through 7 at the end of this document.

The project would occur within the existing ADOT right-of-way (R/W) through private lands, and ADOT easement through land held in trust by the Arizona State Land Department, and public lands under the management of the US Bureau of Reclamation. Approximately one acre of new R/W and temporary construction easements (TCEs) would be required to construct the improvements. The improvements would be constructed in phases. This project would require temporary lane closures along SR 101L and the crossroads, night and/or weekend full freeway closures, and temporary ramp closures; however, access would be maintained to adjacent properties throughout construction.

The goal of this proposed project is to increase the capacity of SR 101L in order to alleviate increased levels of traffic congestion in the future. The proposed project is included in the Maricopa Association of Governments (MAG) 2050 Regional Transportation Plan (RTP).

Construction is anticipated to begin in summer 2023, and it is expected to take approximately two years to complete.

The project is in the Maricopa County (Phoenix) Nonattainment Area for particulates 10-microns in diameter or less (PM10), eight-hour ozone, maintenance area for carbon monoxide. The proposed project is included in the Maricopa Association of Governments (MAG) Regional Transportation Plan (RTP) MOMENTUM 2050. In addition, the project is included in the FY 2022-2025 MAG Transportation Improvement Program. The latest conformity determination for the FY 2022-2025 MAG Transportation Improvement Program and 2050 MAG Regional Transportation Plan for the area was made by the Federal Highway Administration and Federal Transit Administration on February 14, 2023.

Figure 1. Project Location Map

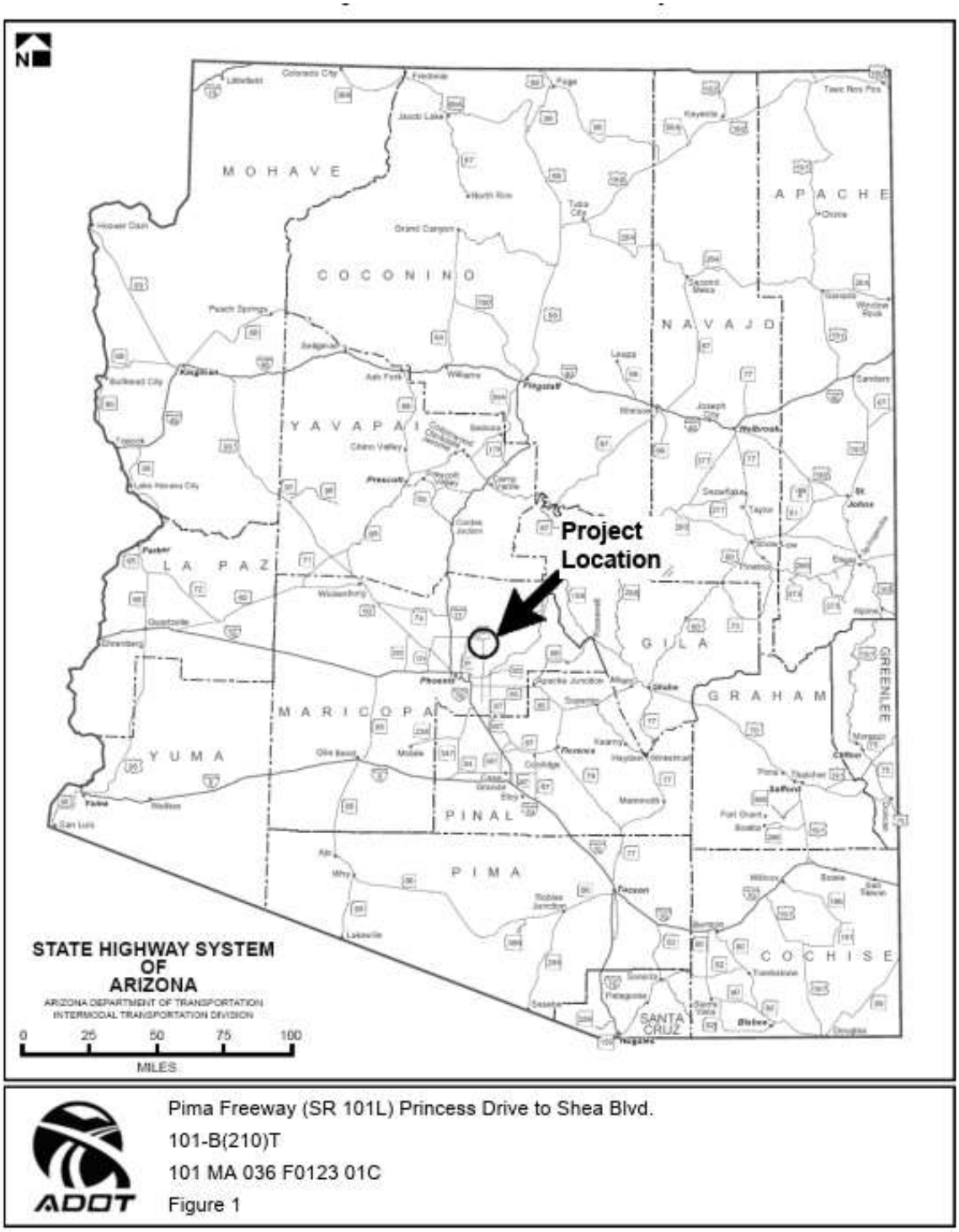
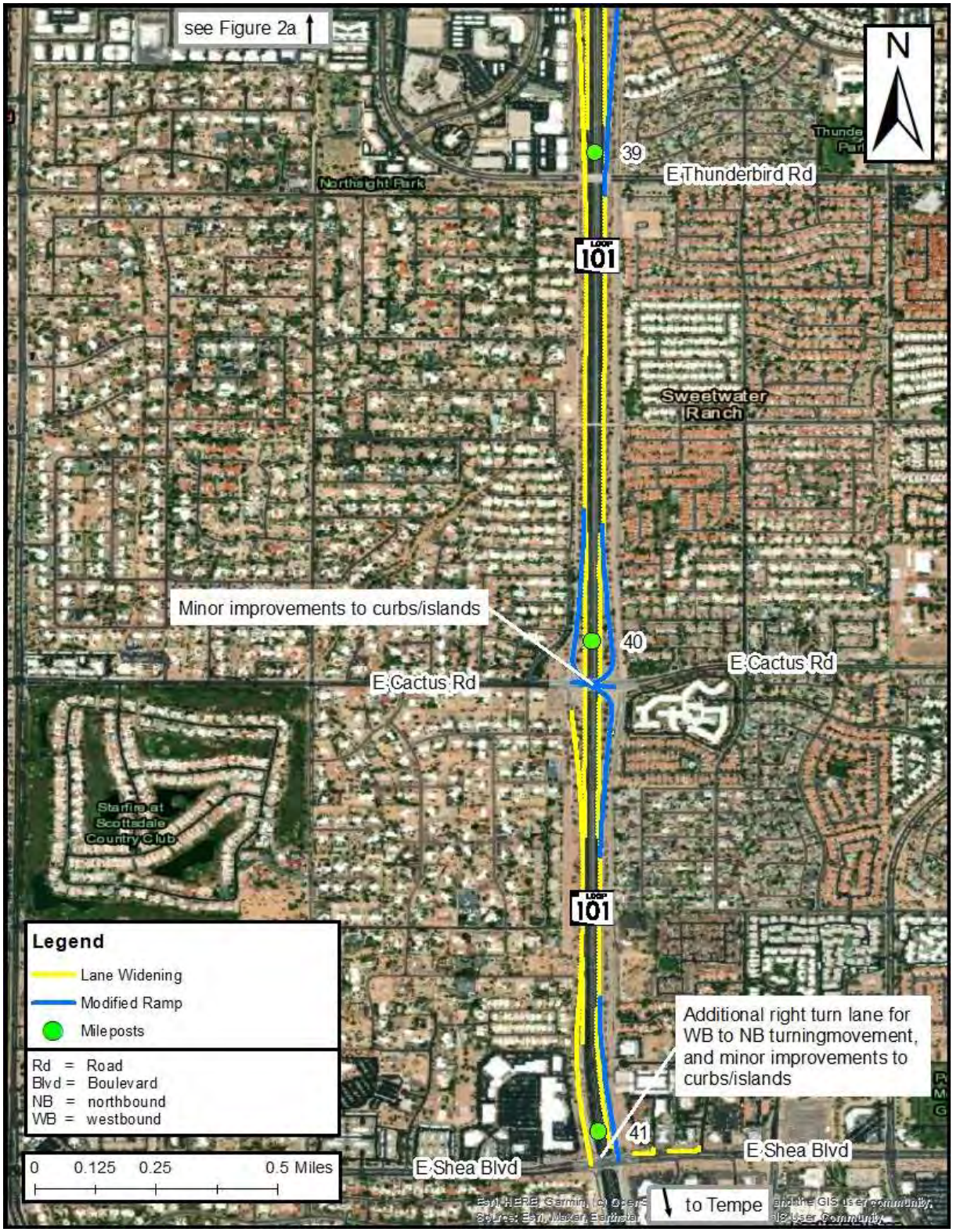


Figure 2a. Project Details

Figure 2b. Project Details



Project Assessment – Part A

The following questionnaire is used to compare the proposed project to a list of project types in 40 CFR 93.123(a) requiring a quantitative analysis of local CO emissions (Hot-spots) in nonattainment or maintenance areas, which include:

i) Projects in or affecting locations, areas, or categories of sites which are identified in the applicable implementation plan as sites of violation or possible violation;
ii) Projects affecting intersections that are at Level-of-Service D, E, or F, or those that will change to Level-of-Service D, E, or F because of increased traffic volumes related to the project;
iii) Any project affecting one or more of the top three intersections in the nonattainment or maintenance area with highest traffic volumes, as identified in the applicable implementation plan; and
iv) Any project affecting one or more of the top three intersections in the nonattainment or maintenance area with the worst level of service, as identified in the applicable implementation plan.

If the project matches one of the listed project types in 40 CFR 93.123(a)(1) above, it is considered a project of local air quality concern and the hot-spot demonstration must be based on quantitative analysis methods in accordance to 40 CFR 93.116(a) and the consultation requirements of 40 CFR 93.105(c)(1)(i).

From the project types listed above, type "ii" describes the Pima Freeway (SR 101) Princess Drive to Shea Blvd Project because this project affects intersection that are at Level-of-Service D, E, or F because of increased traffic volumes related to the project.

Projects Affecting CO Sites of Violation or Possible Violation

Does the project affect locations, areas or categories of sites that are identified in the CO applicable plan or implementation plan submissions, as appropriate, as sites of violation or potential violation?

NO – This project does not affect locations, areas or categories of sites that are identified in the MAG 2013 Carbon Monoxide Maintenance Plan for Maricopa County as sites of violation or potential violation.

Projects with Congested Intersections

Is this a project that affects a congested intersection (LOS D or greater) will change LOS to D or greater because of increased traffic volumes related to the project?

YES – The project area includes four interchanges, with a total of 9 signalized intersections in the no build scenario and 10 signalized intersections in the build scenario. The Final Design Concept Report evaluation identified that the project would result in LOS of D or better at all interchanges in the analysis year 2040. A more detailed evaluation of 2050 conditions showed that among the 10 intersections, there are 3 intersections in AM peak hour and 8 intersections

in PM peak hour would result in LOS D or worse in the 2050 no build scenario. While there are improvements in most locations, the LOS at 1 intersection would become worse from 2050 no build scenario to 2050 build scenario.

Design Concept Report Summary

In the project area, four interchanges were analyzed as part of the Final Design Concept Report (DCR). LOS, delay, and total entering volumes are provided in a series of tables and figures that are summarized in Table 1 below. The project design has been refined to one build alternative that consists of the tight diamond interchange at Frank Lloyd Wright and Loop 101, improvements to the single point urban interchange at Raintree and Loop 101, and improvements to the single point urban interchange at Shea Boulevard and Loop 101. Considering these options, all four intersections are projected to operate at LOS D or worse in the 2040 no build scenario. LOS conditions improve with the 2040 build condition with only three of the four intersections projected to operate at LOS D, as summarized in Table 1.

Table 1. 2040 LOS and Traffic Volumes

	2040 No Build						2040 Build					
	AM			PM			AM			PM		
Intersection	**LOS**	**Delay**	**Volume**	**LOS**	**Delay**	**Volume**	**LOS**	**Delay**	**Volume**	**LOS**	**Delay**	**Volume**
Frank Lloyd Wright Boulevard & Loop 101	E	68	7751	F	94	7964	C	47	7751	C	49	7964
Raintree Drive & Loop 101	F	110	5204	E	76	5815	D	55	5204	D	38	5815
Raintree Drive & 87th St	A	8	3154	F	158	3862	B	17	3154	D	55	3862
Shea Blvd & Loop 101	D	44	6873	D	38	7387	C	34	6873	D	40	7387

Source: Final Design Concept Report (DCR) Update, 2021
No Build LOS and delay from Tables 2.11 and 2.12 of DCR
Frank Lloyd Wright Boulevard Build LOS and delay from Tables 2.15 and 2.16 of DCR
Raintree Drive Build LOS and delay from Tables 2.13 and 2.14 of DCR
Shea Boulevard LOS and delay from Table 6.6 and 6.7 of DCR
No Build Entering Volumes from Figure 2.15 of DCR
Build Entering Volumes from Figure 2.17, 2.18, 2.19 of DCR

Updated 2050 Evaluation

According to 40 CFR 93.110, conformity determinations must be based upon the most recent planning assumptions in force at the time the conformity analysis begins. The most recent MAG regional conformity analysis was approved in December 2021 and included a horizon year of 2050. The most recent travel demand modeling revisions occurred in June 2022.

Data was requested from MAG to update the data in Table 1 to reflect the most recent planning assumptions and evaluate the intersections for 2050. The results of this update are summarized in Table 2. Multiple intersections are projected to have LOS D, E, or F in the 2050 build scenario.

Table 2. 2050 LOS and Traffic Volumes

	2050 No Build						2050 Build					
	AM			PM			AM			PM		
Intersection	**LOS**	**Delay**	**Volume**	**LOS**	**Delay**	**Volume**	**LOS**	**Delay**	**Volume**	**LOS**	**Delay**	**Volume**
SB SR 101 & Pima Road	F	88.5	4757	F	101.6	5344	D	42.9	4857	E	60.5	5348

	2050 No Build						2050 Build					
	AM			PM			AM			PM		
Intersection	LOS	Delay	Volume	LOS	Delay	Volume	LOS	Delay	Volume	LOS	Delay	Volume
NB SR 101 & Pima Road	D	35.2	5381	F	132.9	6701	D	37.6	5510	F	127.1	6665
SB SR 101 & Bell Road	C	30.5	2138	C	33.3	2598	C	29.5	2708	C	33.0	2567
NB SR 101 & Bell Road	C	30.9	2582	C	30.3	3102	C	30.7	2553	C	30.5	3101
SB SR 101 & Frank Lloyd Wright	D	53.1	7205	F	130.4	8371	C	32.4	5365	F	86.6	7007
NB SR 101 & Frank Lloyd Wright							C	32.0	4980	E	75.2	6536
Raintree & 87th Street	A	7.9	2298	D	35.7	4256	A	8.1	2290	D	37.0	4301
SR 101 & Raintree	F	75.0	4488	F	80.2	5944	F	83.9	4638	E	56.5	6165
SR 101 & Cactus	C	30.4	3582	D	40.8	5199	C	31.2	3691	D	37.0	4946
SR 101 & Shea Boulevard	C	38.6	5841	D	41.6	7365	C	34.7	5819	D	43.9	7548

Source: Files used to produce 2021 Final Design Concept Report (DCR) update were updated with June 2022 MAG data
Note: SR 101 & Frank Lloyd Wright is a Single Point Urban Intersection in the No Build condition with one signal, and it is a Tight Diamond Intersection in the Build condition with two signals.

Projects Affecting Intersections with Highest Traffic Volumes

Does the project affect one or more of the top three intersections in the CO maintenance area with highest traffic volumes identified in the CO applicable implementation plan?

*Three Highest Intersections in Current Plans

MAG[1]
16th St & Camelback Rd
107th Ave & Grand Ave
Priest Dr & Southern Ave

[1]MAG 2013 Carbon Monoxide Maintenance Plan for the Maricopa County Area

NO – This project does not affect one or more of the top three intersections in the carbon monoxide maintenance area with the highest traffic volumes identified in the MAG 2013 Carbon Monoxide Maintenance Plan for Maricopa County.

Projects Affecting Intersections with the Worst Level of Services

Does the project affect one or more of the top three intersections in the CO maintenance area with the worst level of services identified in the CO applicable implementation plan?

*Three Worst LOS Intersections in Current Plans

MAG[1]
7th Ave & Van Buren St
German Rd & Gilbert Rd
Thomas Rd & 27th Ave

[1]Same as above

NO – This project does not affect one or more of the top three intersections with the worst LOS in the MAG 2013 Carbon Monoxide Maintenance Plan for Maricopa County.

Project Assessment – Part B

Hot-Spot Determination

As detailed above, this project requires a quantitative analysis of local CO emissions (Hot-spots) because the project affects intersections with Level-of-Service D, E, or F. A CO Hot-spot analysis must be completed to demonstrate the project meets conformity requirements. The *Project Level CO Quantitative Hot-Spot Analysis – Consultation Document* has been completed and circulated through interagency consultation for review and comments prior to commencing any modeling activities. The interagency consultation group is comprised of participants from Arizona Department of Transportation, Federal Highway Administration, and the US Environmental Protection Agency.

Decide which type of hot-spot analysis is required for the project by choosing a category below.

☒ **If answered "Yes" to any of the questions in the Project Assessment – Part A**

- A quantitative CO hot-spot analysis is required under 40 CFR 93.123(a)(1).

☒ Check **If** a formal air quality report for conformity is required for this project.

- The applicable air quality models, data bases, and other requirements specified in 40 CFR part 51, Appendix W (Guideline on Air Quality Models) should be completed using **"Project Level CO Quantitative Hot-Spot Analysis – Consultation Document"** circulated through interagency consultation for review and comments for 30 days prior to commencing any modeling activities.

- **Or**

☐ Check **If** the project fits the condition of the "**CO Categorical Hot-Spot Finding"**.
In the January 24, 2008, Transportation Conformity Rule Amendments, EPA included a provision at 40 CFR 93.123(a)(3) to allow the U.S. DOT, in consultation with EPA, to make categorical hot-spot findings in CO nonattainment and maintenance areas if appropriate modeling showed that a type of highway or transit project would not cause or contribute to a new or worsened air quality violation of the CO NAAQS or delay timely attainment of the NAAQS or required interim milestone(s), as required under 40 CFR 93.116(a).

Projects Fitting the Condition of the CO Categorical Hot-Spot Finding (Updated 2/1/23)
If the project's parameters fall within the acceptable range of modeled parameters, use FHWA 2023 CO Categorical Hot-Spot Finding Spreadsheet Tool:
https://www.fhwa.dot.gov/environment/air_quality/conformity/policy_and_guidance/cmcf_2023/index.cfm

YES/NO – *If yes, perform an analysis by utilizing the CO Categorical Hot-Spot Finding tools described above. If no, develop an appropriate quantitative analysis method for the project by the interagency consultation process described above.*

☐ **If answered "No" to all of the questions in the Project Assessment – Part A**

- A qualitative CO analysis is required under 40 CFR 93.123(a)(2). The demonstrations required by 40 CFR 93.116 Localized CO, PM10, and PM2.5 violations (hot-spots) may be based on either:
- **(i) Quantitative methods that represent reasonable and common professional practice;**

  ☐ Check **If** an Air Quality Report includes CO modeling for NEPA EA/EIS use this report to satisfy option (i)

- **Or**

- **(ii) A qualitative consideration of local factors, if this can provide a clear demonstration that the requirements of 40 CFR 93.116 are met.**

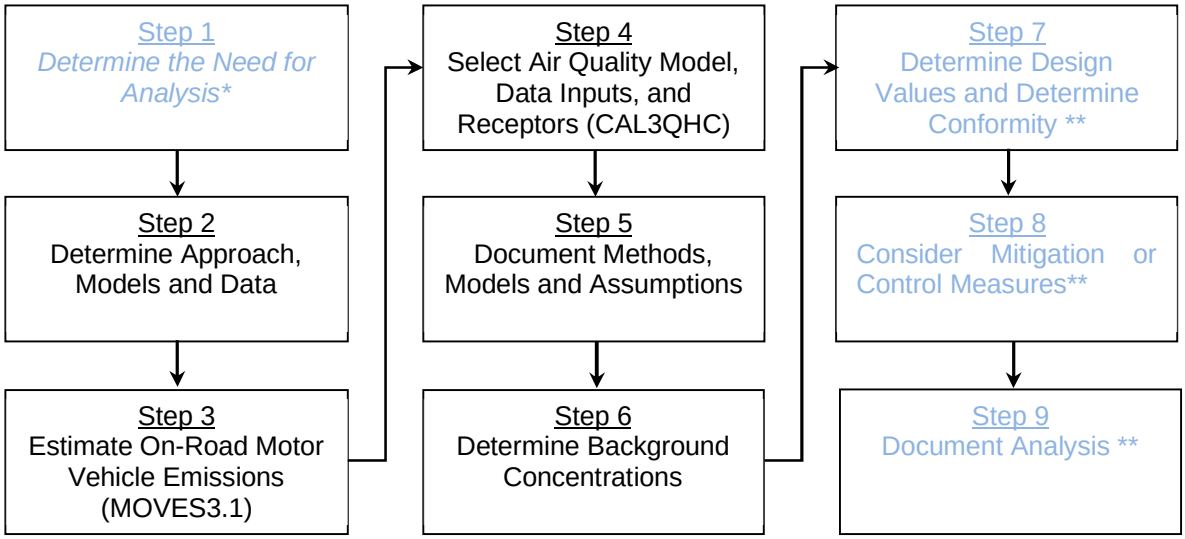
  ☐ Check **If** there is an Air Quality Report that does not include CO modeling for NEPA EA/EIS use this report to satisfy (ii)

  ☐ Check **If** the project is a CE under NEPA that does not require Air Quality Report for NEPA EA/EIS use this Questionnaire to add additional justification to satisfy (ii)

Project Level CO Quantitative Hot-Spot Analysis – Consultation Document

Completing a Carbon Monoxide (CO) Hot-Spot Analysis

The general steps required to complete a quantitative CO hot-spot analysis are outlined below and described in detail in the EPA Office of Transportation and Air Quality guidance document "Using MOVES3 in Project-Level Carbon Monoxide Analyses" EPA-420-B-21-047, December 2021, and "Guideline for Modeling Carbon Monoxide from Roadway Intersections" EPA-454/R-92-005, November 1992.



* Described in the previous section (Air Quality Concern Questionnaire).
** These Steps will be described and documented in a final air quality analysis report.

Step 2: Determine the Approach, Models, and Data

a. Describe the project area (area substantially affected by the project, 58 FR 62212) and emission sources.
b. Determine general approach and analysis year(s) – year(s) of peak emissions during the time frame of the transportation plan (69 FR 40056).
c. Determine CO National Ambient Air Quality Standards (NAAQS) to be evaluated.
d. Select emissions and dispersion models and methods to be used.
e. Obtain project-specific data (e.g., fleet mix, peak-hour volumes and average speed).

Step 3: Estimate On-Road Motor Vehicle Emissions with MOVES3.1

a. Generate RunSpec and enter project-specific data into Project Data Manager
b. Estimate on-road motor vehicle emissions.

Step 4: Select Air Quality Model, Data Inputs, and Receptors for CAL3QHC

a. Obtain and input required site data (e.g., meteorological).

b. Input MOVES outputs (emission factors).
c. Determine number and location of receptors, roadway links, and signal timing.
d. Run air quality dispersion model and obtain concentration results.

Step 5: Document Methods, Models and Assumptions

a. Summarize the methods, models and assumptions based on Step 3 & 4 (see the example in Table 1).
b. Submit the summary document to ADOT for review.

Step 6: Determine Background Concentrations

a. Determine background concentrations from nearby and other emission sources excluding the emissions from the project itself.

Step 7: Calculate Design Values and Determine Conformity

a. Add step 5 results to background concentrations to obtain values for the Build scenario.
b. Determine if the design values allow the project to conform.

Step 8: Consider Mitigation or Control Measures

a. Consider measures to reduce emissions and redo the analysis. If mitigation measures are required for project conformity, they must be included in the applicable SIP and be enforceable.
b. Determine if the design values from allow the project to conform after implementing mitigation or control measures.

Step 9: Document Analysis

a. Determine if the project conforms or not based on the results of step 7 or step 8.

To support the conclusion that a project meets conformity under 40 CFR 93.116 and 93.123, at a minimum the documentation will include:

- *Description of proposed project, when it is expected to open, and projected travel activity data.*
- *Analysis year(s) examined and factors considering in determining year(s) of peak emissions.*
- *Emissions modeling data, model used with inputs and results, and how characterization of project links.*
- *Model inputs and results for road dust, construction emissions, and emissions from other source if needed.*
- *Air Quality modeling data, included model used, inputs and results and receptors.*
- *How background concentrations were determined.*
- *Any mitigation and control measures implemented, including public involvement or consultation if needed.*
- *How interagency and public participation requirements were met.*
- *Conclusion that the proposed project meets conformity requirements.*
- *Sources of data for modeling.*

Approach, Models, and Data (Step 2)

This project requires a quantitative hot-spot analysis for carbon monoxide. The intersection modeling analysis will be performed for the following four intersections, as described in more detail below:

- SR 101 and Raintree (AM peak)
- SB SR 101 & Frank Lloyd Wright (PM peak)
- NB SR 101 & Pima (PM peak)
- SR 101 & Shea (PM peak)

EPA's Guideline for Modeling Carbon Monoxide from Roadway Intersections (EPA, 1992) provides a methodology to determine the worst-case intersections within a study area based on volume and delay.

The intersections with the highest volumes and longest delays were identified for the 2050 build alternative. The top three intersections ranked by volume are as follows:

- SR 101 & Shea Boulevard
- SB SR 101 & Frank Lloyd Wright
- NB SR 101 & Pima Road

The top three intersections ranked by LOS and delay are as follows:

- NB SR 101 & Pima Road
- SB SR 101 & Frank Lloyd Wright
- SR 101 & Raintree

The four intersections identified in this ranking exercise were selected to represent the worst-case conditions in the study area. Each intersection will be modeled for the peak build condition with the highest volume and longest delay, which is AM peak for SR 101 and Raintree and PM peak for the remaining intersections It is assumed that if these modeled conditions do not show an exceedance of the NAAQS, all the of intersections in the study area will comply with the NAAQS in all peak periods and build scenarios.

The emissions analysis will be conducted with the latest version of MOVES released at the time the analysis begins, which is MOVES version 3.1, as of the date this analysis began on January 5, 2023. Emission rates were developed for an analysis year of 2025.

The dispersion modeling analysis will use CAL3QHC to determine the maximum predicted concentrations of CO in the study area. CAL3QHC was run with emission rates from 2025 and vehicle volumes from 2050 to capture the worst-case impacts from the project to compare to demonstrate compliance with the NAAQS.

Methods, Models and Assumptions for CO

A detailed description of model inputs and assumptions are summarized in the following tables.

Table 1. Methods, Models and Assumptions		
Estimate On-Road Motor Vehicle Emissions (Step 3)		
MOVES3.1	Description	Data Source
Scale	On road, Project, Inventory	EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.3.2
Time Span	EPA 1992 Guideline conservatively uses a typical peak-hour traffic activity in one MOVES run to generate emission rates. Hour 7 will be used for AM peak runs, and hour 15 will be used for PM peak runs. These hours correspond to the first hour in the periods defined as AM and PM in MAG's model. Weekday option will be used. MOVES will be run for analysis year 2025. These emission rates will be used with traffic volumes from 2050 to capture the worst-case impacts from the project to compare to demonstrate compliance with the NAAQS.	EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.3.3
Geographic Bounds	Maricopa County	EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.3.4
Onroad Vehicles	All Fuels and Source Use Types will be selected	EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.3.5
Road Type	Urban Restricted and Urban Unrestricted access	EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.3.6
Pollutants and Processes	CO Running Exhaust, CO Crankcase Running Exhaust	EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.3.7
Output	Database will be created, Grams, Miles, Distance Traveled, Population will be selected. Emissions process will be selected in the Output Emissions Detail. Emission rates for each process can be appropriately summed to calculate aggregate CO emission rates for each link.	EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.3.8 and 2.3.9

Project Data Manager	Database and MOVES3.1 templates will be created to include local project data and information provided by MAG data which are consistent with the regional models. The average temperature and humidity in January for meteorology data and the default MOVES fuel data will be used. Links and Link Source Type will be specific to project as provided by the traffic analysis, any missing information will use default MOVES3.1 data. After running MOVES, the MOVES CO_CAL3QHC_EF post-processing script is run.	EPA 1992 Guideline, Section 4.7.1., Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.1, 2.4 for Links; the required data necessary to be consistent with regional emissions analysis (40 CFR 93.123(c)(3)). See Table 2 below for details.
Select Air Quality Model, Data Inputs, and Receptors (Step 4)		
CAL3QHC	Description	Data Source
Emissions Sources	Emissions Rates in grams/mile will be developed using the inputs described in MOVES3.1 section above. The free flow and queue links defined for modeling with MOVES3.1 will be used as input into CAL3QHC. No additional off-network sources are included because the potential emissions from nearby sources would not be significant to project emissions. Aerial photos were reviewed to identify potential off-network sources of emissions. A truck stop located 0.5 miles east of the northernmost interchange was determined to be of a distance and scale that would not be significant to the project analysis.	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, EPA-454/R-92-005, November 1992. Section 5.2.3 of Appendix W to 40 CFR Part 51, CO screening analyses of intersection projects should use the CAL3QHC dispersion model.
Receptor Locations	At least 3m from the roadways at a height of 1.8m, nearby occupied lot, vacant lot, sidewalks, and any locations near breathing height (1.8m) to which the general public has continuous access.	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, Section 2.2
Traffic and Geometric Design	Figures at the end of this consultation document provide a visual representation of the lane configuration, lane width, and turning movements that will be used to model each intersection. Peak hour traffic volumes, vehicle speeds, and signal timing data were provided by the traffic analysts. These details will be available for review in the CAL3QHC input files provided as part of the Air Quality Report.	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, Section 4.7.4
Meteorology	Wind Speed, Wind Direction, Atmospheric Stability Class, Mixing Heights and Surface Roughness were input according to the EPA guidance. Temperature is not input to CAL3QHC, and it was addressed when generating emission rates in MOVES as described in Table 2.	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, Section 4.7.1

Persistence Factor	EPA's default persistence factor of 0.7 will be used to estimate 8-hour concentrations.	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, Section 4.7.2
Determine Background Concentrations (Step 6)		
Background Monitor	The CO monitor located at 19th & Roosevelt in Central Phoenix has similar environment settings as the project corridor. Three years of monitoring data (2019--2021) show a maximum 1-hour value of 2.8 ppm and a maximum 8-hour value of 2.0 ppm. 2.8 ppm will be added to the maximum modeled hourly concentration for comparison to the NAAQS. 2.0 ppm will be added to the maximum 8-hour modeled concentration. More details about this monitoring station are included at the end of the document.	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, Section 4.7.3

Table 2. Project Data Manager Inputs		
Input	Level of Detail/notes	Possible Data Source
Meteorology	The average temperature and humidity were determined by averaging all hourly temperature values for January 2019, 2020, and 2021. The average temperature of 55.8 degrees F and the average relative humidity of 46.2% were used in all MOVES runs, regardless of analysis year or time of day.	ADEQ, MPO EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.1
Age Distribution	Data from MAG's June 2022 regional CO conformity analysis, which was the most recent regional analysis at the time project-level analysis began.	ADOT, MPO EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.2
Fuel	Default fuel information provided by MOVES3.1 will be used for all fuel inputs.	MOVES defaults EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.3
I/M Programs	Data from MAG's June 2022 regional CO conformity analysis, which was the most recent regional analysis at the time project-level analysis began.	MPO, MOVES defaults EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.4
Retrofit Data	Not applicable for this project.	Project specific modeling EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.5
Links	Four selected interchanges (at Raintree Dr, Frank Lloyd Wright Blvd, Pima Rd, and Shea Blvd) will be divided into links and each link's length (in miles), traffic volume (vehicle per hour), average speed (miles per hour) and road grade (percent) will be specified. Other roadway segments within 1000 feet of the intersection will be included. (See attachment for graphical representation of model setup)	Project specific modeling, ADOT, MPO EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.6

Link Source Types	Source type distribution will be determined using option 1 from the EPA guidance. The truck percentages in the project area are greater than the average values used in the regional modeling. Regional MAG travel demand model data was adjusted to account for a maximum truck percentage of 16.6% trucks on freeway and arterial links in the project area.	Project specific modeling, ADOT, MPO EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.7
Link Drive Schedules, Operating Mode Distribution	Average speed and road type (Option 1) will be used in the Links Importer based on posted speed limits. Data to develop project-specific drive schedules and operating mode distributions is not available.	Project specific modeling, ADOT, MPO EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.8, 2.4.9
Off-Network, Hotelling	This project analysis focuses on congested intersections, and there are no sources of off-network or hoteling emissions that are affected by the project. See CAL3QHC section for more details.	EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.10

Table 3. Construction Emissions *(Only if Applicable)*		
Construction Emissions	Construction Emissions need to be addressed if construction lasts longer than 5 years at any individual site. In the context of CO, this is usually excess CO emissions due to traffic delay and/or detours.	40CFR93.123(c)(5)"Each site which is affected by construction-related activities shall be considered separately, using established "Guideline" methods." If applicable, include analysis as an Appendix to the Air Quality Report.

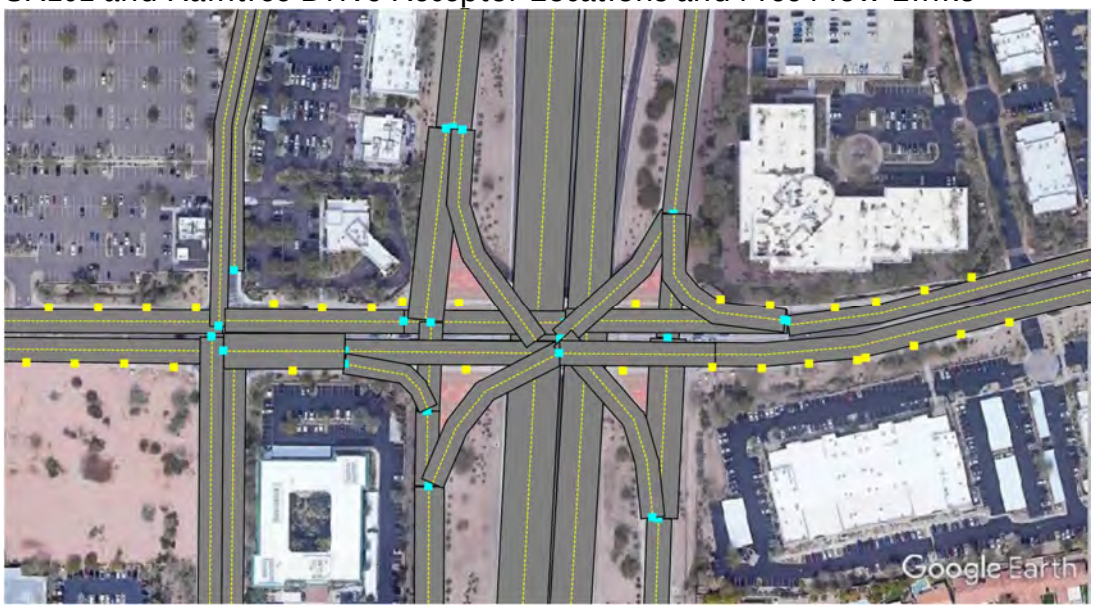
Preliminary Link Configurations and Receptor Placements for CO Hot-Spot Analysis

The following graphics present the preliminary link configurations and receptor placements for the
three intersections that will be modeled as part of the CO hot-spot analysis in CAL3QHC. The following applies to all figures:

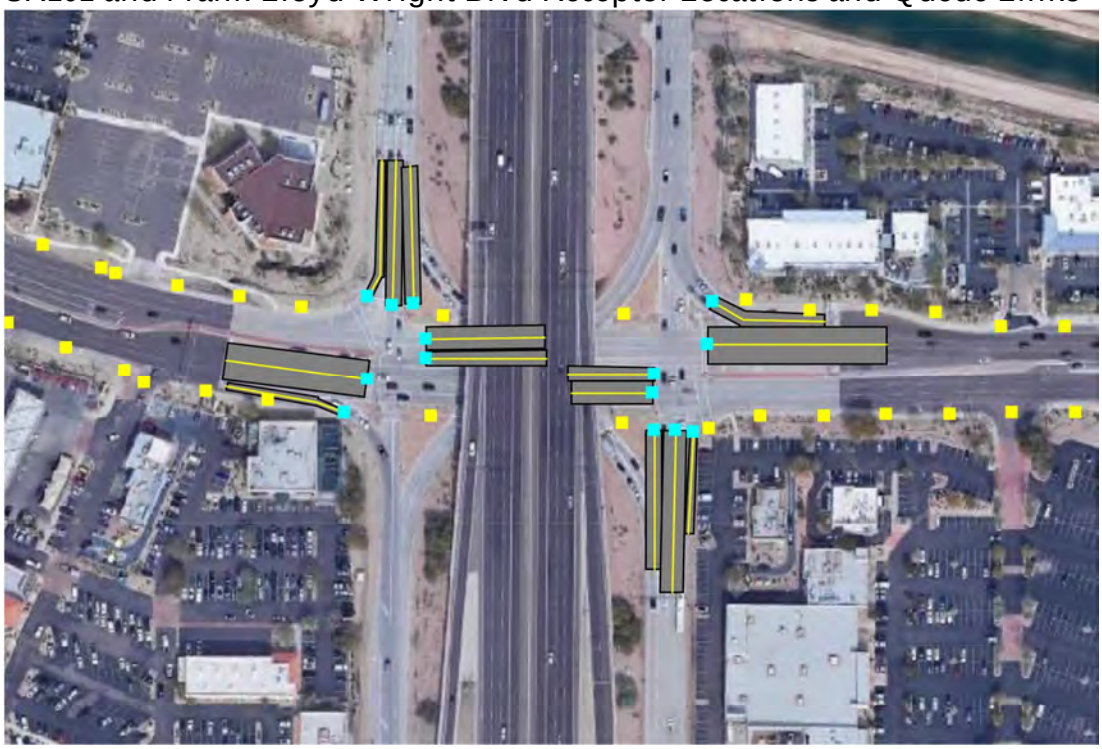
- Free flow links extend 1000 feet away from center of signalized intersection
- Graphic representation of free flow links includes 10-foot mixing zone
- Traffic activity within 1000 feet from intersections are included
- Yellow squares are receptors located on sidewalks adjacent to the east/west roadways and are no closer than 10 feet from the edge of the roadway. There are no sidewalks or public access along SR101, on-ramps, or-off ramps.
- Receptors are spaced at 25 meter intervals outside of the mixing zone.

SR101 and Raintree Drive Receptor Locations and Queue Links

SR101 and Raintree Drive Receptor Locations and Free Flow Links



SR101 and Frank Lloyd Wright Blvd Receptor Locations and Queue Links



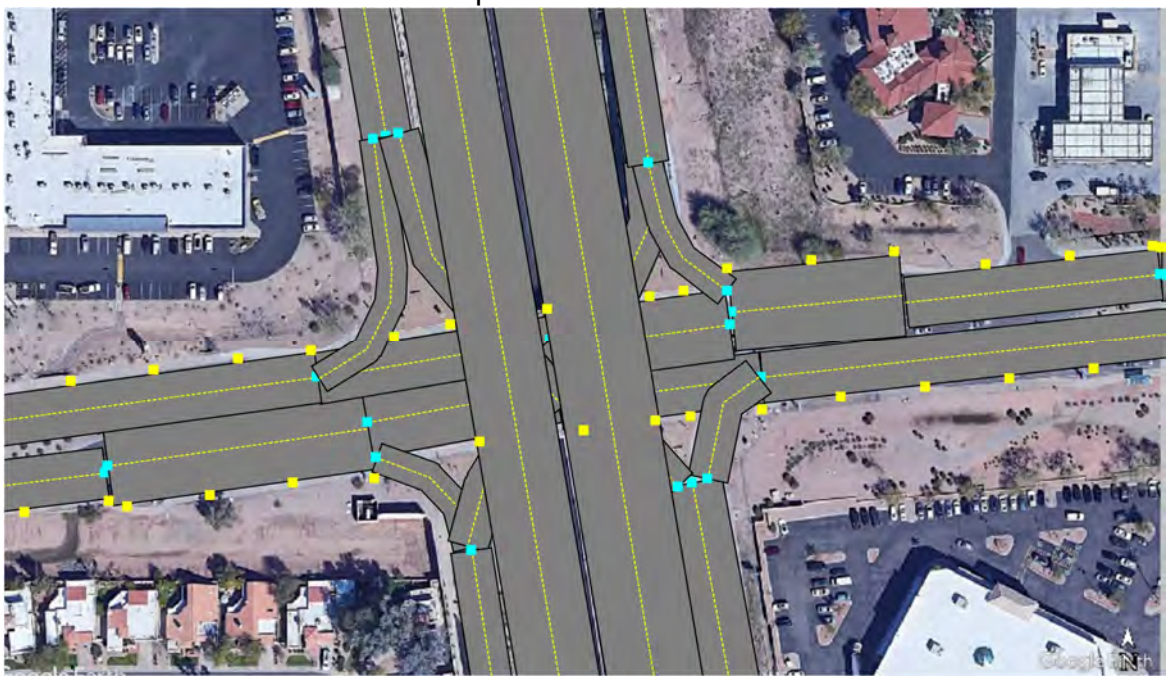
SR101 and Frank Lloyd Wright Blvd Receptor Locations and Free Flow Links

SR101 and Pima Road Receptor Locations and Queue Links

SR101 and Pima Road Receptor Locations and Free Flow Links

SR101 and Shea Boulevard Receptor Locations and Queue Links

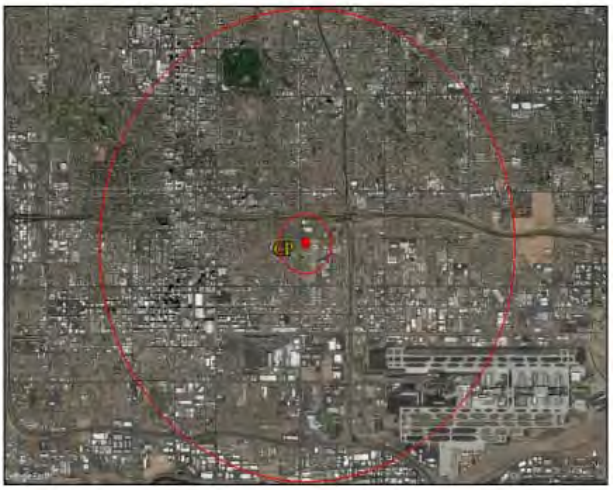
SR101 and Shea Boulevard Receptor Locations and Free Flow Links



Proposed Background Monitor Located in Central Phoenix

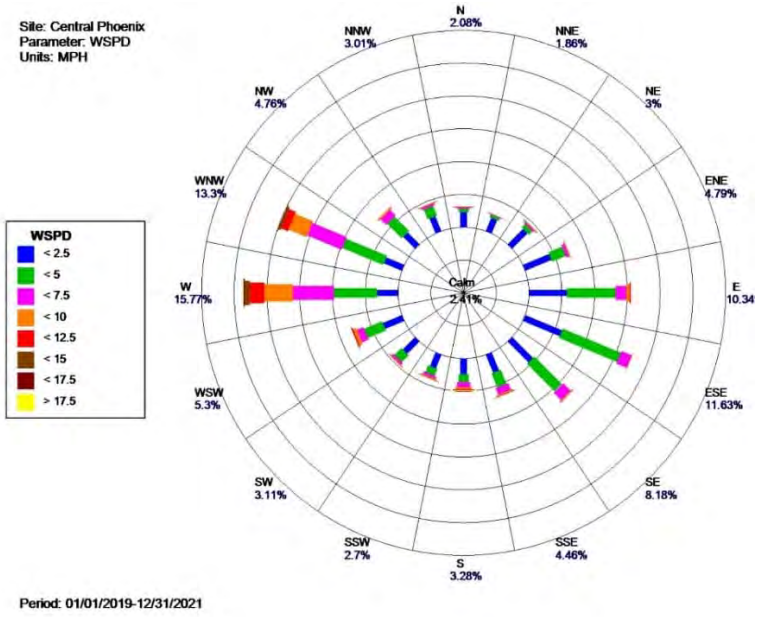
Four air monitors that measure carbon monoxide are located within 15 miles southeast of the project area, as shown in the graphic on the next page. Of those four, the monitor with the highest carbon monoxide concentrations was chosen to use as background for the modeling analysis. This monitor is located approximately 12 miles to the southeast of the southern project terminus. Information about the monitor site and a wind rose are shown below.

Central Phoenix (CP) (04-013-3002)



Site Location	19th St. & Roosevelt St., Phoenix
Spatial Scale	Neighborhood
Site Type	Population Exposure for CO, O_3, and PM_{10} Highest Concentration for NO_2 and SO_2

Site Description: The Central Phoenix site began operating in June 1962. This SLAMS location monitors for CO, PM_{10}, NO_2, O_3, and SO_2. Meteorological monitoring includes ambient temperature, barometric pressure, and wind speed/direction.




Project Location
Central Phoenix Monitor
Glendale
Scottsdale
PHOENIX
Tempe
Mesa
Gilbert
Chandler
PARADISE VALLEY
Fountain Hills
Sun City West
Surprise
El Mirage
Goodyear
Avondale
Apache Junction
Queen Creek
89
60
51
87
303
10
101
85
202

Response to Agency Comments from Consultation on April 18, 2023

EPA Comments Received May 10, 2023

Beverly Chenausky <bchenausky@azdot.gov>

RE: Project Level Interagency Consultation: 101-B(210)T | F0123 01C Pima Freeway (SR 101) Princess Drive to Shea Blvd

1 message

Wickersham, Lindsay (she/her/hers) <wickersham.lindsay@epa.gov> Wed, May 10, 2023 at 10:31 AM
To: Beverly Chenausky <bchenausky@azdot.gov>
Cc: "Meek, Clifton" <meek.clifton@epa.gov>, "Tsui, William" <Tsui.William@epa.gov>, "Halle, Greta (FHWA)" <greta.halle@dot.gov>, "rebecca.yedlin@dot.gov" <rebecca.yedlin@dot.gov>

Hi Beverly,

Thank you for the opportunity to review these consultation documents. We saw much improvement on this round of consultation documents and appreciate the written explanations that were included at the end of PM document. We also appreciate the inclusion of AERMOD and MOVES files. For the next round of consultation, we recommend including a written counterpart explaining and describing these modeling files to aid in our review.

At this time we have finished our review of the CO and PM Consultation documents, along with the AERMOD and Excel files transmitted to us on April 18, 2023. Our comments and suggestions are attached. We know this is short turn around time to the meeting tomorrow, but we would be happy to discuss any comments or questions you have!

Thank you and have a great rest of your day,

Lindsay

Lindsay Wickersham (she/hers) | 415-947-4192

Physical Scientist | Planning Section (AIR-2-1) | Air and Radiation Division | US EPA - Region 9

From: Beverly Chenausky <bchenausky@azdot.gov>
Sent: Tuesday, April 18, 2023 3:35 PM
To: Wickersham, Lindsay (she/her/hers) <wickersham.lindsay@epa.gov>; Johanna.Kuspert@maricopa.gov; Tim Franquist <tfranquist@azmag.gov>; rebecca.yedlin@dot.gov; Transportationconformity <transportationconformity@azdeq.gov>
Cc: Dena Whitaker <dwhitaker@azdot.gov>; Derek Boland <dboland@azdot.gov>; Joonwon Joo <jjoo@azdot.gov>; ADOTAirNoise - ADOT <adotairnoise@azdot.gov>; Dean Giles <dgiles@azmag.gov>; Halle, Greta (FHWA) <greta.halle@dot.gov>; Meek, Clifton <meek.clifton@epa.gov>; Oconnor, Karina (she/her/hers) <OConnor.Karina@epa.gov>; Berry, Laura <berry.laura@epa.gov>; Tsai, Sheila (she/her/hers) <Tsai.Sheila@epa.gov>; Kay, Rynda (she/her/hers) <Kay.Rynda@epa.gov>; Tsui, William <Tsui.William@epa.gov>
Subject: Re: Project Level Interagency Consultation: 101-B(210)T | F0123 01C Pima Freeway (SR 101) Princess Drive to Shea Blvd

To All:

Please find attached, a revised CO modeling assumptions document, a PM10 modeling assumptions document, and a response to prior comments received or discussed through ongoing monthly project conformity meetings. A separate ShareFile notification will be sent with the supporting run specs and draft modeling details. Please provide any additional requested changes in advance of the next project meeting for any discussions needed for the draft air quality report that will be developed for this project.

Meeting information for those interested:

Air Quality Monthly Meeting
Thursday, May 11 · 10:00 – 11:00am
Time zone: America/Phoenix
Google Meet joining info
Video call link: https://meet.google.com/kbp-jojp-cmk
Or dial: (US) +1 209-850-2317 PIN: 483 772 939#
More phone numbers: https://tel.meet/kbp-jojp-cmk?pin=8376833655633

Thanks,

Beverly

On Wed, Nov 9, 2022 at 7:11 PM Wickersham, Lindsay (she/her/hers) <wickersham.lindsay@epa.gov> wrote:

> Hi Beverly,
>
> I hope you doing well!
>
> Thank you for the opportunity to review the Pima Freeway (SR 101) Princess Drive to Shea Blvd for interagency consultation and all of the hard work that went into preparing these materials. At this time we have reviewed the PM-10 consultation and the CO Consultation and have a few comments and questions to share with you.
>
> **PM Consultation**
>
> Upon reviewing the *F0123_PM Consultation_Oct2022.pdf* we have determined that this project **should be** considered a project of Air Quality Concern for PM10, and therefore **will require** a quantitative PM10 hot-spot analysis. This interpretation is based on **40 CFR 93.123(b)(ii),** which states that a hot-spot demonstration is required for, "**Projects affecting intersections that are at Level-of-Service D, E, or F with a significant number of diesel vehicles**, or those that will change to Level-of-Service D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;"
>
> We made this determination based the information contained in Table 2. Intersection LOS Summary, which shows that 7 out of the 9 intersections in the study area are projected to have a LOS of D or lower, and on the information contained in Table 1. AADT and Truck Percentage. While the truck percentage does not largely increase from the build and no build scenario, we believe that the truck AADT from the build scenario should be considered a significant number of diesel vehicles (>30,000). We are happy to discuss further if you have any questions 😊
>
> **CO Consultation**
>
> Upon reviewing the *F0123_CO Consultation_Oct2022.pdf* the EPA has the following comments and suggested edits. We appreciate the hard work and effort that went into this analysis! As a general note we would like to suggest that more specific values be included in the tables provided so that we can double check the project specific values that will be used to run MOVES3 and ensure that they are appropriate.
>
> - On Page 1, in the second to last paragraph, it is stated that the improvements would be constructed in phases. We are curious to know how many phases are considered for this project and the duration of each phase.
> - Thank you for including the most recent data from 2050 in your analysis! On page 8, it is stated that "As shown in Table 2, all intersections are projected in improve delay in the 2050 No Build condition except for SR 101 & Raintree in the AM peak."
>
>   - Upon review of the table, there are many other intersections that also experience an increase in delay in the 2050 build scenario including but not limited to: SR 101 & Shea Blvd, Raintree & 87th Street, SR 101 & Cactus in the AM, NB SR 101 & Pima, and others. we recommend amending this text or addressing the other intersections with increased delays.
>   - On page 15 a similar statement is made, "The intersection at SR 101 and Raintree is the only intersection in the study area that is projected to degrade due to the project; therefore, it will be modeled to determine the air quality impacts." As discussed above there are other intersections that degrade due to the project. Please include rationale for why these projects were omitted from the modeling work or include them in the analysis of air quality impacts as appropriate.
>
> - Thank you for including photos of the roads and design concepts! This was very helpful for visualizing the project.
> - On page 18, in Table 1, row, "Time Spans" we would like more detail to be included on which values will be used as the "typical peak-hour traffic activity." Specifically whether this will be a weekday or weekend, what hour(s) will be modeled, etc. Please include the values that will be entered into the MOVES3 run.
> - On page 18, in Table 1, row "Project Data Management" a traffic study is referenced. Which traffic study is being referred to in this case? Is a particular one that ADOT is going to be pulling the missing information from or multiple studies?
> - On page 19, in Table 1, row "Emission Sources" there appears to be a duplication of this section directly below it. Additionally, there appears to be a missing reference to a MOVES3 section, "as described in MOVES3 section."
> - On page 19, in Table 1, rows "Traffic and Geometric Design" and "meteorology" we would like to see the values that ADOT intends to use for the modeling portion of this section and not just the descriptions. Please include the values that will be used for these parameters.
> - On page 19, in Table 1, row "Persistence Factor", please indicate whether the local persistence factor or if the default will be used in its place.
> - On page 19, in Table 1, row "Meteorology" there appears to be a typo, "temperature values for January 2019, 2019, and 2021."
> - On page 20, in Table 2, row "Age Distribution", which regional conformity analysis will be used: The one from December 2021 or from the June 2022 modeling?

- On page 20, in Table 2, row “Fuels”, EPA guidance **strongly recommends** that the default fuel information provided by MOVES be used for project-level CO analyses. If local data provided by MAG would like to be used instead, please contact us for consultation before doing so. We are happy to have a call!
- On page 20, in Table 2, row “Link Source Types”, please indicate which of the two options provided in the guidance will be used for the modeling in this scenario. Will project specific data be collected or used from an existing project, or can the source type distribution for the project be represented by the distribution of the regional fleet for the given road type?
- On page 20, in Table 2, row “ Off-Network, Hoteling” it is stated that this is not applicable for this project. Can you please elaborate on the analysis that was used to determine that there weren’t any spots used by trucks for hoteling in the project area?

Thank you for your time and this opportunity for consultation. We are happy to discuss any of our comments in more detail if there is interest.

Have a great rest of the night,

Lindsay

Lindsay Wickersham (she/hers) | 415-947-4192

Physical Scientist | Planning Office (ARD-2) | Air and Radiation Division | US EPA - Region 9

From: Beverly Chenausky <bchenausky@azdot.gov>
Sent: Monday, October 31, 2022 12:50 PM
To: Tim Franquist <tfranquist@azmag.gov>; Wickersham, Lindsay (she/her) <wickersham.lindsay@epa.gov>; Johanna.Kuspert@maricopa.gov; rebecca.yedlin@dot.gov; Transportationconformity <transportationconformity@azdeq.gov>
Cc: Dena Whitaker <dwhitaker@azdot.gov>; Derek Boland <dboland@azdot.gov>; Joonwon Joo <jjoo@azdot.gov>; ADOTAirNoise - ADOT <adotairnoise@azdot.gov>; Dean Giles <dgiles@azmag.gov>; Halle, Greta (FHWA) <greta.halle@dot.gov>; Meek, Clifton <meek.clifton@epa.gov>; OConnor, Karina (she/her) <OConnor.Karina@epa.gov>
Subject: Project Level Interagency Consultation: 101-B(210)T | F0123 01C Pima Freeway (SR 101) Princess Drive to Shea Blvd

ADOT, is presenting the following project, **Pima Freeway (SR 101) Princess Drive to Shea Blvd**, for interagency consultation, per 40 CFR 93.105 as a potential project that is **not** a project of Air Quality Concern for PM10, and thereby **will not** require a quantitative PM10 hot-spot analysis. ADOT is requesting responses to the attached *F0123_PM Consultation_Oct2022.pdf,* a non-response will be interpreted as concurrence that the project is not a project of air quality concern and does not require a quantitative hot-spot analysis. If any consulted party believes this project should be treated as a project of air quality concern that requires a Quantitative PM10 hot-spot analysis, please document the appropriate section under 40 CFR 93.123 (b) that applies to the project and describe why the project should be treated as a project of air quality concern, **within 10 business days**.

Additionally, ADOT has determined that the project may require a quantitative hot-spot analysis only for CO, the modeling assumptions are attached in the document *F0123_CO Consultation_Oct2022.pdf.* This document contains the combined Project Level CO Hot-Spot Analysis Questionnaire demonstrating the need for analysis for congested intersections identified. The Purpose of this document is to describe the methods, models and assumptions used for a quantitative hot-spot analysis as required in 40 CFR 93.105(c)(1)(i), 93.123, 93.116. It is requested that the consulted parties provide comments or questions on the methods, models and assumptions **within 30 days**, a non-response will be interpreted as concurrence with the planning assumptions as described in the attached CO document.

There is a Virtual Meeting Scheduled for November 2nd, details on this meeting and additional information on the project and how to subscribe to project updates can also be found on the project website (links for both are provided):

Nov. 2 virtual meeting set for Loop 101 project north of Shea Blvd | ADOT (azdot.gov)

Loop 101 (Pima Freeway), Princess Drive to Shea Boulevard Improvements | ADOT (azdot.gov)

If you have any additional questions or need additional information let me know, thank you.

Beverly T. Chenausky

Assistant Environmental Administrator

Air & Noise, Hazmat and Standards & Training

205 South 17th Avenue, MD EM02
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azdot.gov

EPA Comments on F0123 Documents submitted on April 18_Final.docx
33K

FHWA has reviewed the submitted documents and has the following comments:

- MOVES linksource input for PM hotspot shows no bus traffic on any links (school, transit, or other bus). Is that accurate? CO MOVES runs include bus activity.

Response: CO MOVES runs were based on the regional fleet mix, consistent with MAG regional conformity modeling because intersection queueing data was not available by vehicle type. PM MOVES runs were based on link-specific data provided by the MAG regional model, which provides vehicle volumes by four categories: passenger vehicle, light truck, medium truck, and heavy truck. Bus volumes are likely included in the medium and heavy truck categories. The project team did not have enough information to determine the amount of vehicle volume to allocate to the bus MOVES vehicle types. Buses were not excluded because they were assumed to be included in the other vehicle type categories.

- The passenger car vs. passenger truck mix seems variable throughout the project (fraction of 21s vs 31s). Make sure there's an explanation. Also, the long haul combination trucks represent less than 2% of activity on SR101 and we would have expected it to be higher for a highway. It would also be good to have a mapping of AZ traffic data categories ("heavy", "light", "medium", "passenger") to the MOVES source types.

Response: MAG data provides volumes for the following vehicle categories: passenger vehicles, light trucks, medium trucks, and heavy trucks. The mix of these 4 categories on each link is provided by the MAG regional model. The fraction of the MOVES source types within each of those categories was constant across the project, and based on the ratios of the vehicle types used for MAG's regional MOVES emissions analysis.

The traffic data taken from MAG's regional model shows low Heavy Truck activity: 1-10% for individual, non-HOV links on SR101. Medium and light trucks represent a higher percentage of the overall truck traffic on SR101 with percentages up to 15% and 56%, respectively. Long-haul combination trucks were assumed to equal 60% of the Heavy Truck volumes based on 2050 Maricopa County MOVES Inputs provided by MAG. We don't have insight into development of the regional model that would explain the low Heavy Truck percentages for SR-101.

Mapping is shown in "Project Level Link Input" spreadsheets, "Traffic All Time Periods" tab, Columns BH through BM. The MOVES Source Type breakdown is based on 2050 Maricopa County MOVES Inputs provided by MAG.

- Some receptors are closer than 5 m to edge of road at intersections – these should be placed at 5 m at the closest. Some areas should include additional receptors around intersections that appear to be accessible to the public.

Response: AERMOD modeling was revised in response to this comment with adjustments to some receptors that were previously located within 5 meters of the edge of a road.

- For both interchanges, arterial cross streets (with emissions) should extend beyond end of receptor grid to ensure all relevant emissions are captured. Extending to the next signalized

intersection in each direction should be sufficient and allow existing rates to be used for those new AERMOD sources (or existing AERMOD sources simply extended).

Response: AERMOD and MOVES modeling was revised in response to this comment to with additional roadway links to the east and west of the interchange.

- For 101 and Frank Lloyd Wright – add receptors on jogging path and playing field. Also add receptors to any other locations around interchange that are accessible to the public.

Response: AERMOD modeling was revised in response to this comment to with additional receptors placed as requested.

- Emissions by time period seems odd/not intuitive for certain sources (looking at EMISFACT tables) – PM peak is often equal or less than MD. Other links have MD higher than AM. Make sure this is accurate and has an explanation.

Response: Emissions were developed using volumes provided by the MAG regional model. In response to this comment, emissions were carefully reviewed and confirmed. In the project area, the PM volumes are generally higher than AM and midday volumes, which is typical for urban areas. As noted by the commenter, there are some exceptions where the midday volumes are higher than the AM or PM peak. This is primarily due to the high retail/commercial concentration between Frank Lloyd Wright and Raintree, which attracts both traffic in the vicinity as well as outside during the midday period.

- Looks like July fuels result in the highest emission rates and were assumed for all seasons. Please make sure to include a brief discussion indicating modeling was done to evaluate the worst-case season (and is allowed per guidance).

Response: Text is included in the Air Quality Technical Report to explain that MOVES was runs for all seasons (and their corresponding fuel conditions), and the July fuels resulted in the highest emission rates and therefore used for all seasons in the dispersion modeling.

- Also make sure to include discussion of AZ's analysis that determined that 2050 was the year of peak emissions (e.g., why not look at opening year of project? Road dust dominated, VMT highest in 2050, etc.)

Response: Text is included in the Air Quality Technical Report to explain why 2050 was the year of peak emissions.

- For the links input, please make sure the grade is entered as a whole percentage (not fraction). It looks like the values may have been entered as fractions.

Response: MOVES modeling was revised in response to this comment to correctly enter the grade as a whole percentage. AERMOD modeling was revised using the updated emission rates.

- Please clearly label and explain that the volumes shown on Table A3 (page 21) are Peak PERIOD volumes, and do not represent a single peak hour.

Response: You are correct that the volumes shown on Table A3 (page 21) are Peak PERIOD volumes, and do not represent a single peak hour. The consultation document has been updated.

Also FHWA has two additional items – 1) FHWA requests an interagency meeting (including EPA) to discuss the receptor placement; and 2) FHWA is available to support ADOT in your meetings with EPA regarding the background monitoring data (let us know if you would like us to participate).

Response: EPA has provided comments on receptor placement for CO and PM modeling, and the project team has responded accordingly. The project team will contact FHWA if further support is needed for background monitor data discussions.

EPA Comments on F0123 Documents submitted on April 18, 2023.

F0123_CO Consultation Revised April.pdf:

1. Table 1, Meteorology: Please provide some detail in how wind data, atmospheric stability class, mixing heights, and surface roughness were input. The correct guidance section is cited, but it would be helpful to provide some description.

Response: The following values were used in the CAL3QHC modeling inputs:

Wind Speed	1 meter/second
Wind Direction	0 degrees to 355 degrees in 5 degree increments
Stability Class	D
Mixing Height	1000 meters
Surface Roughness Length	1.08 meters

These values are described in more detail in the Air Quality Technical Report.

2. Table 1, Background Monitor: Please describe the environment settings of the project corridor, the chosen monitor, and any other nearby monitors.

Response: The last page of the consultation document provides information about the Central Phoenix monitor. The graphic below shows the location of active CO monitors in relationship to the project area.

3. Table 1, Background Monitor: It is stated in this row that "the same background values will be used for all analysis years." Please explain this assumption. Although this

assumption can be reasonably used to provide a conservative estimate of future background values if they are expected to decrease in the future, it is not clear if the background value is expected to increase, decrease, or remain the same. Section 4.7.3 of the 1992 Guideline states, "Background monitored data should be adjusted for the future. This can be accomplished by multiplying the present CO background by the ratio of the future MOBILE CO emission factor to the current MOBILE CO emissions factor and multiplying by the ratio of future to current traffic."

Response: CO modeling was performed for one worst-case scenario with the highest traffic volumes (2050), highest emission rate (2025), and the highest background concentration (2021). Adjusting the background CO concentration for future years would not be the worst case, as vehicle emissions generally decline over time due to the phasing in of emissions regulations. The consultation document was revised to remove the text referring to all analysis years because only one scenario was analyzed.

4. Table 1, Step 4, Emissions Sources: Please provide more detail on the off-network emissions sources. Where any other potential sources identified? The description provided includes a truck stop "determined to be of a distance and scale that would not be significant to the project analysis." While we know that this truck stop was discussed in interagency consultation, for future consultations it would be helpful to provide an estimate of the scale of this emission source as well as any other emissions source nearby.

Response: The truck stop in question is a parking lot for Tom Thumb Bakery, located approximately 2,700 feet from the nearest modeled intersection. EPA's Guideline for Modeling Carbon Monoxide from Roadway Intersections does not provide a methodology for evaluating off-network source types as part of the intersection analysis. The interagency consultation process has been used to document the concurrence that this parking lot does not need to be considered as part of the CO hotspot modeling analysis.

5. Page 21: Receptors are placed on the southwest corner of SR101 and Pima Road extending south/southeast. Why are receptors not placed on the other corners of this intersection in a similar way?

Response: Receptors were revised based on this comment. An updated figure is provided in the Air Quality Technical Report.

6. The air quality report should include a description of the CAL3QHC files, major results, and analysis of results. Consequently, we may have more comments on these files after receiving this accompanying text.

Response: The Air Quality Technical Report includes the information requested.

F0123_PM HotSpot Consultation Revised_April_rev1.pdf

1. There is little discussion of Step 2: Determine Approach, Models, and Data. Although there is some overlap with subsequent steps, more detail should be provided. There should be an explanation of the general analysis approach (PM Hot-spot Guidance Section 3.3.3) as well as an explanation of the analysis year chosen (PM Hot-spot Guidance Section 2.8). "2050, 4 runs" is written under Time Spans, but there should be more explanation justifying this year. We see that there is some explanation for this choice in Attachment A, however the choice of analysis year depends on several factors, such as expected peak emissions and background concentrations, as explained in the Guidance document. Furthermore, it is possible that more than one analysis year is appropriate based on how the project is developed. From the Guidance Section 2.8, "it may be useful to select a near-term year when emissions rates will be highest as well as a future year when vehicle volumes and/or vehicle miles traveled is highest." Section 2.8 also states the following:
   "The following factors (among others) should be considered when selecting the year(s) of peak emissions:
   - Changes in vehicle fleets;
   - Changes in traffic volumes, speeds, and vehicle miles traveled (VMT); and
   - Expected trends in background concentrations, including any nearby sources that are affected by the project."

   Thus, the choice of the analysis year(s) should be explained in the context of at least all of these considerations and expanded upon further in Attachment A.

Response: An explanation of the selection of 2050 as the analysis year is included in the Air Quality Technical Report. 2050 represents the year with the greatest vehicle volumes and the greatest emissions of PM10. While the greatest vehicle exhaust emissions would not occur in 2050, the greatest total emissions occur in 2050 due to re-entrained road dust. No nearby emission sources other than the roadway links included in the model run would be affected by the project. Vehicle fleets would not change as a result of the project.

2. Table 1, Step 5, MODELOPT: Please explain the choice of the flat terrain option as an AERMOD input.

Response: EPA's PM Hot Spot Guidance recommends that the FLAT terrain option should be selected in most cases. The elevation in the project vicinity is not considered complex terrain; therefore, AERMOD was run with the FLAT terrain option.

3. EPA has the following comments for Table 2. Proposed Inputs, Parameters, and Data sources
   a. In the row, "Time Spans," we recommend choosing just one hour to model that is representative of the worst-case scenario for each intersection. It looks like this

would be the PM peak for both intersections. Please indicate which hour modeled will be used for the hot spot analysis

Response: For each intersection, MOVES was run for 4 time periods. The emission factor for each time period was run using an hour generally in the middle of the time period, as shown in the table below. Emission factors from all time periods were used in the AERMOD modeling. Note that MOVES and AERMOD hour IDs represent the end of an hour (i.e. the period 5:00 am to 6:00 am is represented by hour ID 6).

Time Period	Hours	MOVES Hour ID	AERMOD Hour ID
AM	5:00 am - 8:00 am	7	6-8
Midday	8:00 am – 1 pm	10	9-13
PM	1:00 pm – 5:00 pm	15	14-17
Overnight	5:00 pm – 5 am	19	18-24, 1-5

b. In the row, "General Output and Output Emissions Detail" please also make sure that population is selected.

Response: Selecting population is not required for MOVES to generate project-level PM10 emission rates.

c. In the row, "Link Drive Schedules, Operating Mode Distribution," please explain the choice of using average speed and road type from the Links Importer. From Section 4.5.8 of the Guidance:
   - "The MOVES model is capable of using complex activity datasets with high levels of resolution to calculate link-level emissions. EPA encourages the development of validated methods for collecting verifiable vehicle Op-Mode distribution data at locations and in traffic conditions representative of different projects covered by this guidance. However, the user should determine the most robust activity dataset that can be reasonably collected while still achieving the goal of determining an accurate assessment of the PM air quality impacts from a given project. The choice of whether to rely on average speed information in the Links Importer, or add more detailed information through the Link Drive Schedules or Op-Mode Distribution Importers should be based on the data available to the user."

Response: Average speed was used in the links importer because precise drive schedule and operating mode distribution was not available for the project links. MOVES input files specified a unique average speed and the appropriate road type ID for each roadway link included in the model.

d. In the row, "Off-Network, Hotelling," Please consider including off-network activity. There are numerous parking lots near the project area which could be substantially affected by the project area, including:
    - Southwest corner of Princess Drive and Pima Road
    - Between Frank Lloyd Wright Boulevard and Raintree Drive on both sides of SR 101
    - Northwest, northeast, and southeast corners of SR 101 and Shea Boulevard

    From Section 4.5.9 of the PM Hot-spot Guidance: "For example, an off-network link would be used if the area substantially affected by the project includes a parking area, a bus terminal, or a freight terminal."

Response: It is not expected that any off-network activity will be substantially affected by the project. Project volumes on SR101 would increase, but the project is not expected to generate additional idling or hoteling in parking lots, bus terminals or freight terminals.

e. Table 2, Step 5: Please explain the reasoning behind why variables are chosen to be the values listed in this table. For example, it is unclear what "Emission rate=1" means, and EMISFACT: "Use SEASHR or HROFDY" should include a brief explanation. The descriptions provided in the Reference column do not clearly explain the choice of these variables and values.

Response: As directed by the PM Hot Spot Guidance, emissions were input in a manner to reflect changes in emission factors and vehicle volumes throughout the day. This was represented in AERMOD by specifying an emission rate of 1 g/s/m² with the HROFDAY variable emission rate option to specify the emission rate applicable to each of 24 hours. Excel files that outline this process are included with MOVES and AERMOD modeling files for agency review.

f. Table 2, Step 5, SURFDATA & UAIRDATA: Please provide a justification for the surface and upper air meteorological stations used in AERMOD focusing on the representativeness of the data for this project location. Also include data completeness information and ensure that it is consistent with the Guidance (Sections 8.3 and 9). See Section 7.5.1 of the PM Hot-spot Guidance for additional information. Furthermore, it would be helpful to confirm the use of five years of data in the document itself beyond implying this in the names of the *.sfc and *.pfl AERMOD files.

Response: SURFDATA and UAIRDATA files were provided by ADEQ for the years 2017-2021. These files are used by ADEQ for dispersion modeling in support of air permitting in the metropolitan Phoenix area, and it was assumed that the files were produced according to all requirements outlined in Appendix W. Meteorological data from Phoenix Sky Harbor

International Airport is considered representative of the project area based on its similar land use, terrain, and proximity to the project area.

g. Table 2, Step 5, Urban or Rural Sources: Please include information to support urban option per Appendix W, Section 7.2.1.1(b) and PM Hot-spot Guidance Section 7.5.5.

Response: All emission sources used URBANOPT to specify urban dispersion coefficients. The PM Hot-spot Guidance recommends "in urban areas, sources should generally be treated as urban." Appendix W recommends multiple procedures to identify an area as urban. Using the Auer land use procedure described in Section 7.2.1.1(b)(i), based on aerial maps, greater than 50% of the land use within a 3-kilometer radius circle around the project area includes industrial, commercial, dense single/multi-family, and multi-family two-story land use types. Therefore, the use of urban dispersion coefficients is appropriate for the project area.

h. Table 2, Step 6, Other Sources (Ambient Monitoring Data): Please verbally describe how the wind rose in Figure B-2 supports the choice of the South Scottsdale monitor over the other monitors.

Response: The Scottsdale monitor was selected based on similar land use to the project area. The wind rose was provided for informational purposes in response to a previous agency request.

i. Table 2, Step 6, Nearby Sources: Please include a discussion of nearby sources and whether they should be explicitly modeled. Under the Description column, "not needed for the project" is written, but it is unclear why that is.

Response: There are no nearby emission sources that are expected to change as a result of the project. It is assumed that emissions from other nearby sources are already included in the ambient monitoring data.

4. What is the "total entering volume" described in Table A-3 and how are these values calculated?

Response: Total entering volume was calculated by adding the peak period volume from each approach (northbound, southbound, eastbound, and westbound) at a signalized intersection.

5. Figure A-1, A-3: There should be more receptors placed along the ends of the project. From Section 7.6.1 of the Guidance, "Given the closest set of receptors would usually be five meters from the source, five rows of receptors around the project, covering a distance from five meters away from the project to 105 meters away from the project at 25-meter intervals, would be sufficient for most projects. **These rows would not be straight lines, but instead would follow the boundaries of the project area.**" Thus, it is appropriate to have some rows on both ends of the project to extend beyond the grid currently shown in these figures (the south ends in both of these figures in particular).

Response: The current receptor grid extends to 500 meters from the midpoint of the interchanges, which is beyond the distance of 105 meters recommended in the guidance. The emissions sources were extended to this same distance so as not to give the appearance that emission sources were excluded. The sources and receptor grid were designed to capture the maximum emissions concentrations, and this is supported by the modeling results.

AERMOD files:

1. Please include the receptor files referenced in the *.adi files (i.e., the *.rou files). Including these files will help us determine whether the receptor grid is consistent with the Guidance.

Response: All receptors were included as discrete receptors with coordinates listed within the AERMOD input file (*.ADI). *.ROU files were not used for this project.

2. The air quality report should include a description of the AERMOD files, model setup, major results, and analysis of results. Consequently, we may have more comments on the AERMOD files after receiving this accompanying text.

Response: These items have been included in the Air Quality Technical Report.

Excel files:

1. AERMOD Input Var Emission Rates: Does Hour 1 correspond to 12 AM, Hour 2 to 1 AM, etc.? If so, it appears that the time periods here are inconsistent with those listed in the consultation document under "Time Spans." The Excel file has 5 PM – 6 AM instead of 5 PM – 5 AM, 6 AM – 9 AM instead of 5 AM – 8 AM, and 9 AM – 1 PM instead of 8 AM – 1 PM.

Response: Hour 1 in MOVES and AERMOD corresponds to the time period 0:00 – 01:00. Hour 2 corresponds to 01:00-02:00, etc.

2. Fugitive Dust Build: Please briefly describe the differences between road types 4 and 5.

Road type 4 refers to MOVES Road Type ID 4, which is defined as urban restricted. This road type represents controlled-access highways, ramps, interstates, and freeways. Road type 5 refers to MOVES Road Type ID 4, which is defined as urban unrestricted. This road type represents all other roads (arterials, local, collector, etc.).

3. Similar to the above comment regarding AERMOD files, some description of these calculations and underlying assumptions would be helpful. We may have further comments after receiving more details.

Response: The project team is available to answer any specific questions about the development of the AERMOD input files. All supporting calculations have been provided in the Excel files and were calculated in a manner consistent with the PM Hot-spot guidance.

Agency Comments from Consultation on October 31, 2022

RE: Project Level Interagency Consultation: 101-B(210)T | F0123 01C Pima Freeway (SR 101) Princess Drive to Shea Blvd

1 message

Yedlin, Rebecca (FHWA) <Rebecca.Yedlin@dot.gov> Tue, Nov 8, 2022 at 6:22 AM
To: "bchenausky azdot.gov" <bchenausky@azdot.gov>
Cc: Dena Whitaker <dwhitaker@azdot.gov>, Derek Boland <dboland@azdot.gov>, Joonwon Joo <jjoo@azdot.gov>, ADOTAirNoise - ADOT <adotairnoise@azdot.gov>, Dean Giles <dgiles@azmag.gov>, "Halle, Greta (FHWA)" <greta.halle@dot.gov>, Clifton Meek <meek.clifton@epa.gov>, Karina O'Conner <oconnor.karina@epa.gov>, Tim Franquist <tfranquist@azmag.gov>, "Wickersham, Lindsay (she/her)" <wickersham.lindsay@epa.gov>, Transportationconformity <transportationconformity@azdeq.gov>, "Johanna Kuspert (AQD)" <Johanna.Kuspert@maricopa.gov>

FHWA reviewed the documents and we have the following comments:

- For PM, based on the overall high truck volumes and on the increase in truck volumes between the no-build and build alternatives, this may be viewed as a significant increase in diesel traffic. ADOT should anticipate the need to do a PM hot-spot analysis for this project.
- For CO, we agree that a quantitative hot-spot analysis will be necessary. ADOT noted they would only include SB SR 101 & Frank Lloyd Wright and SR 101 & Raintree in the analysis. However, EPA's Guidelines for Modeling Carbon Monoxide from Roadway Intersections states to model the top 3 intersections based on the worst level of service (LOS) and to model the top 3 intersections with the highest traffic volumes. Based on the traffic and LOS information provided, the following intersections should all be included in the analysis:

1. NB SR 101 & Pima (PM Peak)

2. SB SR 101 & Frank Lloyd Wright (PM Peak)

3. SR 101 & Raintree (AM Peak)

4. SR 101 & Shea (PM Peak)

(Note: It's possible that one or more of these intersections may meet the criteria for FHWA's carbon monoxide's categorical hot-spot finding.)

Thanks, Rebecca

From: Beverly Chenausky <bchenausky@azdot.gov>
Sent: Monday, October 31, 2022 12:50 PM
To: Tim Franquist <tfranquist@azmag.gov>; Wickersham, Lindsay (she/her) <wickersham.lindsay@epa.gov>; Johanna Kuspert (AQD) <Johanna.Kuspert@maricopa.gov>; Yedlin, Rebecca (FHWA) <Rebecca.Yedlin@dot.gov>; Transportationconformity <transportationconformity@azdeq.gov>
Cc: Dena Whitaker <dwhitaker@azdot.gov>; Derek Boland <dboland@azdot.gov>; Joonwon Joo <jjoo@azdot.gov>; ADOTAirNoise - ADOT <adotairnoise@azdot.gov>; Dean Giles <dgiles@azmag.gov>; Halle, Greta (FHWA) <greta.halle@dot.gov>; Clifton Meek <meek.clifton@epa.gov>; Karina O'Conner <oconnor.karina@epa.gov>
Subject: Project Level Interagency Consultation: 101-B(210)T | F0123 01C Pima Freeway (SR 101) Princess Drive to Shea Blvd

ADOT, is presenting the following project, **Pima Freeway (SR 101) Princess Drive to Shea Blvd**, for interagency consultation, per 40 CFR 93.105 as a potential project that is **not** a project of Air Quality Concern for PM10, and thereby **will not** require a quantitative PM10 hot-spot analysis. ADOT is requesting responses to the attached *F0123_PM Consultation_Oct2022.pdf,* a non-response will be interpreted as concurrence that the project is not a project of air quality concern and does not require a quantitative hot-spot analysis. If any consulted party believes this project should be treated as a project of air quality concern that requires a Quantitative PM10 hot-spot analysis, please document the appropriate section under 40 CFR 93.123 (b) that applies to the project and describe why the project should be treated as a project of air quality concern, **within 10 business days**.

Additionally, ADOT has determined that the project may require a quantitative hot-spot analysis only for CO, the modeling assumptions are attached in the document *F0123_CO Consultation_Oct2022.pdf*. This document contains the combined Project Level CO Hot-Spot Analysis Questionnaire demonstrating the need for analysis for congested intersections identified. The Purpose of this document is to describe the methods, models and assumptions used for a quantitative hot-spot analysis as required in 40 CFR 93.105(c)(1)(i), 93.123, 93.116. It is requested that the consulted parties provide comments or questions on the methods, models and assumptions **within 30 days**, a non-response will be interpreted as concurrence with the planning assumptions as described in the attached CO document.

There is a Virtual Meeting Scheduled for November 2nd, details on this meeting and additional information on the project and how to subscribe to project updates can also be found on the project website (links for both are provided):

Nov. 2 virtual meeting set for Loop 101 project north of Shea Blvd | ADOT (azdot.gov)

Loop 101 (Pima Freeway), Princess Drive to Shea Boulevard Improvements | ADOT (azdot.gov)

If you have any additional questions or need additional information let me know, thank you.

Beverly T. Chenausky

Assistant Environmental Administrator

Air & Noise, Hazmat and Standards & Training

205 South 17th Avenue, MD EM02
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C: 480.390.3417

azdot.gov

RE: Project Level Interagency Consultation: 101-B(210)T | F0123 01C Pima Freeway (SR 101) Princess Drive to Shea Blvd

1 message

Wickersham, Lindsay (she/her/hers) <wickersham.lindsay@epa.gov> Wed, Nov 9, 2022 at 7:11 PM
To: Beverly Chenausky <bchenausky@azdot.gov>, Tim Franquist <tfranquist@azmag.gov>, "Johanna.Kuspert@maricopa.gov" <Johanna.Kuspert@maricopa.gov>, "rebecca.yedlin@dot.gov" <rebecca.yedlin@dot.gov>, Transportationconformity <transportationconformity@azdeq.gov>
Cc: Dena Whitaker <dwhitaker@azdot.gov>, Derek Boland <dboland@azdot.gov>, Joonwon Joo <jjoo@azdot.gov>, ADOTAirNoise - ADOT <adotairnoise@azdot.gov>, Dean Giles <dgiles@azmag.gov>, "Halle, Greta (FHWA)" <greta.halle@dot.gov>, "Meek, Clifton" <meek.clifton@epa.gov>, "Oconnor, Karina (she/her/hers)" <OConnor.Karina@epa.gov>, "Berry, Laura" <berry.laura@epa.gov>

Hi Beverly,

I hope you doing well!

Thank you for the opportunity to review the Pima Freeway (SR 101) Princess Drive to Shea Blvd for interagency consultation and all of the hard work that went into preparing these materials. At this time we have reviewed the PM-10 consultation and the CO Consultation and have a few comments and questions to share with you.

PM Consultation

Upon reviewing the *F0123_PM Consultation_Oct2022.pdf* we have determined that this project **should be** considered a project of Air Quality Concern for PM10, and therefore **will require** a quantitative PM10 hot-spot analysis. This interpretation is based on **40 CFR 93.123(b)(ii),** which states that a hot-spot demonstration is required for, "**Projects affecting intersections that are at Level-of-Service D, E, or F with a significant number of diesel vehicles**, or those that will change to Level-of-Service D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;"

We made this determination based the information contained in Table 2. Intersection LOS Summary, which shows that 7 out of the 9 intersections in the study area are projected to have a LOS of D or lower, and on the information contained in Table 1. AADT and Truck Percentage. While the truck percentage does not largely increase from the build and no build scenario, we believe that the truck AADT from the build scenario should be considered a significant number of diesel vehicles (>30,000). We are happy to discuss further if you have any questions 😊

CO Consultation

Upon reviewing the *F0123_CO Consultation_Oct2022.pdf* the EPA has the following comments and suggested edits. We appreciate the hard work and effort that went into this analysis! As a general note we would like to suggest that more specific values be included in the tables provided so that we can double check the project specific values that will be used to run MOVES3 and ensure that they are appropriate.

- On Page 1, in the second to last paragraph, it is stated that the improvements would be constructed in phases. We are curious to know how many phases are considered for this project and the duration of each phase.
- Thank you for including the most recent data from 2050 in your analysis! On page 8, it is stated that "As shown in Table 2, all intersections are projected in improve delay in the 2050 No Build condition except for SR 101 & Raintree in the AM peak."
    - Upon review of the table, there are many other intersections that also experience an increase in delay in the 2050 build scenario including but not limited to: SR 101 & Shea Blvd, Raintree & 87th Street, SR 101 & Cactus in the AM, NB SR 101 & Pima, and others. we recommend amending this text or addressing the other intersections with increased delays.
    - On page 15 a similar statement is made, "The intersection at SR 101 and Raintree is the only intersection in the study area that is projected to degrade due to the project; therefore, it will be modeled to determine the air quality impacts." As discussed above there are other intersections that degrade due to the project. Please include rationale for why these projects were omitted from the modeling work or include them in the analysis of air quality impacts as appropriate.
- Thank you for including photos of the roads and design concepts! This was very helpful for visualizing the project.
- On page 18, in Table 1, row, "Time Spans" we would like more detail to be included on which values will be used as the "typical peak-hour traffic activity." Specifically whether this will be a weekday or weekend, what hour(s) will be modeled, etc. Please include the values that will be entered into the MOVES3 run.

- On page 18, in Table 1, row “Project Data Management” a traffic study is referenced. Which traffic study is being referred to in this case? Is a particular one that ADOT is going to be pulling the missing information from or multiple studies?
- On page 19, in Table 1, row “Emission Sources” there appears to be a duplication of this section directly below it. Additionally, there appears to be a missing reference to a MOVES3 section, “as described in MOVES3 section.”
- On page 19, in Table 1, rows “Traffic and Geometric Design” and “meteorology” we would like to see the values that ADOT intends to use for the modeling portion of this section and not just the descriptions. Please include the values that will be used for these parameters.
- On page 19, in Table 1, row “Persistence Factor”, please indicate whether the local persistence factor or if the default will be used in its place.
- On page 19, in Table 1, row “Meteorology” there appears to be a typo, “temperature values for January 2019, 2019, and 2021.”
- On page 20, in Table 2, row “Age Distribution”, which regional conformity analysis will be used: The one from December 2021 or from the June 2022 modeling?
- On page 20, in Table 2, row “Fuels”, EPA guidance **strongly recommends** that the default fuel information provided by MOVES be used for project-level CO analyses. If local data provided by MAG would like to be used instead, please contact us for consultation before doing so. We are happy to have a call!
- On page 20, in Table 2, row “Link Source Types”, please indicate which of the two options provided in the guidance will be used for the modeling in this scenario. Will project specific data be collected or used from an existing project, or can the source type distribution for the project be represented by the distribution of the regional fleet for the given road type?
- On page 20, in Table 2, row “ Off-Network, Hoteling” it is stated that this is not applicable for this project. Can you please elaborate on the analysis that was used to determine that there weren’t any spots used by trucks for hoteling in the project area?

Thank you for your time and this opportunity for consultation. We are happy to discuss any of our comments in more detail if there is interest.

Have a great rest of the night,

Lindsay

Lindsay Wickersham (she/hers) | 415-947-4192

Physical Scientist | Planning Office (ARD-2) | Air and Radiation Division | US EPA - Region 9

From: Beverly Chenausky <bchenausky@azdot.gov>
Sent: Monday, October 31, 2022 12:50 PM
To: Tim Franquist <tfranquist@azmag.gov>; Wickersham, Lindsay (she/her) <wickersham.lindsay@epa.gov>; Johanna.Kuspert@maricopa.gov; rebecca.yedlin@dot.gov; Transportationconformity <transportationconformity@azdeq.gov>
Cc: Dena Whitaker <dwhitaker@azdot.gov>; Derek Boland <dboland@azdot.gov>; Joonwon Joo <jjoo@azdot.gov>; ADOTAirNoise - ADOT <adotairnoise@azdot.gov>; Dean Giles <dgiles@azmag.gov>; Halle, Greta (FHWA) <greta.halle@dot.gov>; Meek, Clifton <meek.clifton@epa.gov>; OConnor, Karina (she/her) <OConnor.Karina@epa.gov>
Subject: Project Level Interagency Consultation: 101-B(210)T | F0123 01C Pima Freeway (SR 101) Princess Drive to Shea Blvd

ADOT, is presenting the following project, **Pima Freeway (SR 101) Princess Drive to Shea Blvd**, for interagency consultation, per 40 CFR 93.105 as a potential project that is **not** a project of Air Quality Concern for PM10, and thereby **will not** require a quantitative PM10 hot-spot analysis. ADOT is requesting responses to the attached *F0123_PM Consultation_Oct2022.pdf,* a non-response will be interpreted as concurrence that the project is not a project of air quality concern and does not require a quantitative hot-spot analysis. If any consulted party believes this project should be treated as a project of air quality concern that requires a Quantitative PM10 hot-spot analysis, please document the appropriate section under 40 CFR 93.123 (b) that applies to the project and describe why the project should be treated as a project of air quality concern, **within 10 business days**.

Additionally, ADOT has determined that the project may require a quantitative hot-spot analysis only for CO, the modeling assumptions are attached in the document *F0123_CO Consultation_Oct2022.pdf.* This document contains the combined Project Level CO Hot-Spot Analysis Questionnaire demonstrating the need for analysis for congested intersections identified. The Purpose of this document is to describe the methods, models and assumptions used for a quantitative hot-spot analysis as required in 40 CFR 93.105(c)(1)(i), 93.123, 93.116. It is requested that the consulted parties provide comments or questions on the methods, models and assumptions **within 30 days**, a non-response will be interpreted as concurrence with the planning assumptions as described in the attached CO document.

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Loop 101 (Pima Freeway), Princess Drive to Shea Boulevard Improvements | ADOT (azdot.gov)

If you have any additional questions or need additional information let me know, thank you.

Beverly T. Chenausky

Assistant Environmental Administrator

Air & Noise, Hazmat and Standards & Training

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azdot.gov

ADOT Environmental Planning

Agency Comments from Consultation On the Draft Air Quality Report in June 2023

---------- Forwarded message ---------
From: Yedlin, Rebecca (FHWA) <Rebecca.Yedlin@dot.gov>
Date: Tue, Jun 6, 2023 at 9:45 AM
Subject: RE: Project Level Conformity Determination Request for 101-B(210)T | F0123 01C Pima Freeway (SR 101) Princess Drive to Shea
To: bchenausky azdot.gov <bchenausky@azdot.gov>, Ivan Racic <iracic@azdot.gov>
Cc: Halle, Greta (FHWA) <greta.halle@dot.gov>, Joonwon Joo <jjoo@azdot.gov>, Paul O'brien <POBrien@azdot.gov>, Hansen, Alan (FHWA) <Alan.Hansen@dot.gov>

One additional comment for 1) below - It appears the figures in the updated April report shows figures of the project arterial cross street links that do not extend nearly far enough. Thanks, Rebecca

Response: Project team has confirmed that the latest modeling files and report include the requested links extending to an appropriate distance. A new set of files has been provided to demonstrate that this has request has been addressed.

From: Yedlin, Rebecca (FHWA)
Sent: Tuesday, June 6, 2023 9:37 AM
To: Beverly Chenausky <bchenausky@azdot.gov>; Ivan Racic <iracic@azdot.gov>
Cc: Halle, Greta (FHWA) <greta.halle@dot.gov>; Joonwon Joo <jjoo@azdot.gov>; Paul O'brien <POBrien@azdot.gov>; Hansen, Alan (FHWA) <Alan.Hansen@dot.gov>
Subject: RE: Project Level Conformity Determination Request for 101-B(210)T | F0123 01C Pima Freeway (SR 101) Princess Drive to Shea

FHWA reviewed the documentation provided on May 25 and most of our comments were addressed through fixes to the text explanations in the report. However, it does not appear that our concerns on the modeling files were addressed. Those include the following:

1) For the interchanges modeled, the links and corresponding AERMOD sources should extend well beyond the edges of the receptor grid. The update AERMOD input file for SR101 and FLW still seems to cut off the cross arterial too early. This will not adequately include the influences of that roadway.

Response: Project team has confirmed that the latest modeling files and report include the requested links extending to an appropriate distance. A new set of files has been provided to demonstrate that this has request has been addressed.

2) The correction was to be made to the Links grade file (grade entered as fraction rather than whole percentage). This does not appear to have been corrected in the files provided.

Response: Project team has confirmed that the latest modeling files include the correction to the links grade file. A new set of files has been provided to demonstrate that this has request has been addressed.

3) There was no bus activity modeled on any of the links in the previous modeling. It's our understanding that the traffic data was only provided by four vehicle categories – and that buses "likely" fall under the medium and heavy duty truck category. It is common that traffic data may not be available for all MOVES source types for a project, however the project sponsor should still attempt a logical mapping to all source types present on the project. It is inaccurate to group buses within medium and heavy duty vehicle classes as MOVES emission rates are considerably different between trucks and buses in MOVES. One approach could be to allocate activity from those medium and heavy duty vehicles to the bus categories using the default mix of source types in MOVES. Some attempt should be made to populate all categories of vehicles present on the project.

Response: In response to this comment, the project team reviewed the traffic data provided by MAG. Traffic volumes for each roadway link were provided with the following categories: total volume, light Truck, medium Truck, heavy Truck. When truck volumes are subtracted from total volume, we are left with passenger vehicle volume + bus volume. Previously, the modeling team assumed this was all passenger vehicle volume and did not allocate any volumes to the bus vehicle type.

To correct this, we propose to use the vehicle ratios from MAG's regional conformity modeling to allocate a percentage of volume from each link to buses. See the table below. This method retains all truck volumes, adds bus volumes, and subtracts a small fraction of passenger volumes. Note this is a change from the assumption that buses were included in the truck categories. It was determined that was not true.

A new set of data processing files has been provided to demonstrate that this comment has been addressed.

yearID	sourceTypeID	sourceTypePopulation	Previous Modeling Bin Fractions	Proposed Updated Bin Fractions	
2050	11	132594	0.0323	0.0322	Passenger
2050	21	3322779	0.8093	0.8065	Passenger
2050	31	650617	0.1585	0.1579	Passenger
2050	32	81829	1	1	Light Truck
2050	41	5338	0	0.0013	Bus
2050	42	1288	0	0.0003	Bus
2050	43	7132	0	0.0017	Bus
2050	51	524	0.0063	0.0063	Medium Truck
2050	52	72915	0.8706	0.8706	Medium Truck
2050	53	3262	0.0389	0.0389	Medium Truck
2050	54	7056	0.0842	0.0842	Medium Truck
2050	61	4962	0.4002	0.4002	Heavy Truck
2050	62	7436	0.5998	0.5998	Heavy Truck

sourceTypePopulation Data from 2050 Maricopa County MOVES Inputs provided by MAG.

Notes from June 8, 2023 interagency meeting to discuss comments received from FHWA the morning of June 8 via email to ADOT

FHWA comment in black. Project team notes in blue.

- Add discussion about selection of met data. In particular, why was Tucson upper air used? Does Phoenix airport not have vertical soundings?
- Preprocessed met data was provided by ADEQ, consistent with modeling files used for air permit modeling. ADEQ uses upper air data from Tucson with Phoenix surface data. It does not appear that upper air soundings are available from Phoenix. This information will be updated in the consultation form, and report text will include references to where greater detail can be found.
- Use AERMOD22112 (not 21112) for final runs
- Version 22112 will be used for final runs
- To be clear, you used "AREA" sources, not "AREA-LINE". AREA-LINE refers to a specific source type in AERMOD that allows the user to specify endpoints and roadway width. This was not used. Rather, you used traditional area sources where rectangles are defined to represent roadways – which is completely fine. Your AERMOD view software might have a function called AREA-LINE, but it is different than the AERMOD source type "AREA-LINE".
- Consultation forms and report text will be updated so that all references to the AREA-LINE source type will be changed to AREA.
- Pg 39 – met data was from both Phoenix and Tucson
- Report text will be updated to clarify that surface data from Phoenix and upper air data from Tucson was used. Report text will include references to where greater detail can be found.
- Table 1 (pg 57) would be much clearer if there was three columns – the input, the guidance reference, the guidance on that input, and then what was used by ADOT including where the data came from
- This comment is in regards to the format of ADOT's consultation form. This feedback will be useful as the agencies discuss updates to the consultation processes.
- Table 1 is still in past-tense. "modeling will be done…"
- This comment is in regards to the format of ADOT's consultation form. This feedback will be useful as the agencies discuss updates to the consultation processes. Table 1 was intended to be used to present information to the reviewing agencies prior to the modeling process.
- Can you combine the information in table 2 with table 1? Seems redundant.
- This comment is in regards to the format of ADOT's consultation form. This feedback will be useful as the agencies discuss updates to the consultation processes.
- Elaborate on Link Source Type input – how was the project data for the four vehicle types mapped to the 13 MOVES source types? I already sent my comment about lack of bus VMT, but how was the passenger vehicle split between passenger cars and passenger trucks in MOVES? Etc…
- Link volumes were provided by Total volume, light trucks, medium trucks, and heavy trucks. To allocate the volumes within each of these bins to the MOVES source types, the ratio of sourceTypePopulation from MAG regional conformity modeling. There is no specific guidance for this process, and FHWA agreed the approach presented in "Response to FHWA Comments from Email Received June 6.doc". The report will be updated to acknowledge that the provided vehicle volumes were mapped to the MOVES source types, and a reference to where greater detail can be found.

APPENDIX B – CO AND PM_{10} MODELiNG RESULTS BY RECEPTOR

Due to the large volume of input and output files created for this CO analysis, they are available electronically upon request.

Table B-1
Predicted Worst-Case One-Hour CO Concentrations (ppm)
SR101 and Raintree Drive

Receptor ID	Maximum Modeled 1-hour Concentration (ppm)
R1	0.5
R2	0.5
R3	0.4
R4	0.3
R5	0.6
R6	0.4
R7	0.5
R8	0.6
R9	0.6
R10	0.6
R11	0.6
R12	0.6
R13	0.9
R14	1.6
R15	1.1
R16	0.6
R17	0.6
R18	0.5
R19	0.4
R20	0.7
R21	1.0
R22	1.3
R23	0.8
R24	0.5
R25	0.4
R26	0.5
R27	0.7
R28	0.2
R29	0.2
R30	0.3
R31	0.4
1-hour CO Standard	35

Maximum modeled concentration results without added background concentration
Abbreviations: CO = carbon monoxide; ppm = parts per million

Table B-2
Predicted Worst-Case One-Hour CO Concentrations (ppm)
SR101 and Frank Lloyd Wright Boulevard

Receptor ID	Maximum Modeled 1-hour Concentration (ppm)	Receptor ID	Maximum Modeled 1-hour Concentration (ppm)
R1	1.2	R31	1.9
R2	1.3	R32	0.7
R3	1.2	R33	0.8
R4	1.0	R34	0.8
R5	0.8	R35	0.8
R6	1.1	R36	0.8
R7	1.0	R37	0.8
R8	1.0	R38	1.1
R9	0.6	R39	1.1
R10	0.6	R40	1.1
R11	0.7		
R12	0.6		
R13	0.6		
R14	0.8		
R15	0.9		
R16	0.9		
R17	1.0		
R18	1.3		
R19	2.0		
R20	1.9		
R21	0.7		
R22	0.6		
R23	0.7		
R24	0.6		
R25	0.6		
R26	1.2		
R27	1.1		
R28	0.8		
R29	0.8		
R30	2.2		
1-hour CO Standard	35	1-hour CO Standard	35

Maximum modeled concentration results without added background concentration
Abbreviations: CO = carbon monoxide; ppm = parts per million

Table B-3
Predicted Worst-Case One-Hour CO Concentrations (ppm)
SR101 and Pima Road

Receptor ID	Maximum Modeled 1-hour Concentration (ppm)	Receptor ID	Maximum Modeled 1-hour Concentration (ppm)	Receptor ID	Maximum Modeled 1-hour Concentration (ppm)
R1	0.7	R31	0.9	R61	1.1
R2	0.8	R32	0.9	R62	1.1
R3	0.6	R33	0.9	R63	1.0
R4	0.7	R34	0.8	R64	1.1
R5	0.7	R35	0.7	R65	1.2
R6	0.7	R36	0.7	R66	1.3
R7	0.6	R37	0.7	R67	1.3
R8	0.7	R38	0.7	R68	1.1
R9	0.7	R39	1.1	R69	1.1
R10	0.7	R40	1.2	R70	2.6
R11	0.6	R41	0.9		
R12	1.0	R42	0.9		
R13	0.8	R43	0.9		
R14	1.5	R44	1.8		
R15	1.8	R45	2.1		
R16	1.2	R46	1.3		
R17	0.7	R47	0.4		
R18	0.7	R48	0.5		
R19	0.7	R49	0.5		
R20	0.8	R50	0.5		
R21	0.8	R51	0.5		
R22	0.8	R52	0.5		
R23	0.8	R53	0.5		
R24	0.8	R54	0.5		
R25	0.9	R55	0.5		
R26	0.9	R56	0.6		
R27	0.9	R57	0.7		
R28	1.0	R58	0.8		
R29	1.0	R59	0.9		
R30	1.2	R60	1.2		
1-hour CO Standard	35	1-hour CO Standard	35	1-hour CO Standard	35

Maximum modeled concentration results without added background concentration
Abbreviations: CO = carbon monoxide; ppm = parts per million

Table B-4
Predicted Worst-Case One-Hour CO Concentrations (ppm)
SR101 and Shea Boulevard

Receptor ID	Maximum Modeled 1-hour Concentration (ppm)	Receptor ID	Maximum Modeled 1-hour Concentration (ppm)
R1	0.9	R31	0.7
R2	0.8	R32	0.7
R3	0.8	R33	0.9
R4	0.8	R34	0.9
R5	0.8	R35	0.8
R6	0.8	R36	1.6
R7	0.8	R37	1.1
R8	0.6	R38	1.0
R9	1.4	R39	0.5
R10	1.1	R40	0.7
R11	0.9	R41	0.7
R12	0.8	R42	0.7
R13	2.7	R43	0.7
R14	0.7	R44	0.6
R15	0.7	R45	0.7
R16	0.7	R46	0.9
R17	0.7	R47	0.9
R18	0.8	R48	1.0
R19	0.8	R49	1.1
R20	0.8	R50	1.7
R21	0.8	R51	2.9
R22	0.8	R52	2.7
R23	0.9	R53	1.9
R24	1.0	R54	1.3
R25	1.1	R55	2.1
R26	0.8	R56	2.8
R27	0.8	R57	1.8
R28	0.8		
R29	0.8		
R30	0.7		
1-hour CO Standard	35	1-hour CO Standard	35

Maximum modeled concentration results without added background concentration
Abbreviations: CO = carbon monoxide; ppm = parts per million

Table B-5

PM_{10} Hot Spot Modeling Results by Receptor for SR101 and Frank Lloyd Wright Boulevard (only top 50 out of 789 receptors are shown)

Receptor Location		6th-Highest PM_{10} Value ($\mu g/m^3$)	Receptor Location		6th-Highest PM_{10} Value ($\mu g/m^3$)
X coordinate	Y coordinate		X coordinate	Y coordinate	
417345.5	3721489.9	37.46	417309.4	3721442.6	28.38
417325.5	3721483.5	37.14	417168.9	3721485.5	28.21
417525.3	3721442.4	33.51	417230.0	3721505.7	28.06
417351.1	3721524.3	33.50	417351.8	3721910.0	27.62
417300.5	3721487.5	33.41	417343.5	3721428.7	27.42
417356.2	3721624.2	32.71	417217.4	3721510.3	27.30
417207.4	3721473.0	32.54	417282.4	3721448.0	27.29
417277.2	3721490.3	32.47	417484.0	3721429.6	27.09
417351.1	3721549.3	32.15	417236.2	3721460.7	27.03
417489.5	3721492.1	31.08	417530.6	3721479.0	26.89
417351.1	3721574.3	31.08	417586.0	3721473.7	26.88
417505.1	3721480.3	30.78	417326.9	3721505.3	26.81
417351.1	3721599.3	30.25	417351.8	3721935.0	26.50
417351.8	3721785.0	29.96	417611.0	3721473.5	26.44
417351.8	3721760.0	29.81	417494.5	3721433.9	26.19
417484.5	3721517.6	29.79	417345.8	3721423.5	25.95
417351.1	3721624.3	29.58	417636.0	3721473.3	25.87
417351.8	3721810.0	29.54	417354.8	3721398.5	25.82
417351.8	3721835.0	29.17	417202.7	3721516.5	25.67
417330.0	3721437.6	29.15	417504.1	3721495.6	25.53
417351.8	3721685.0	28.86	417189.3	3721520.8	25.47
417351.8	3721860.0	28.84	417554.9	3721478.1	25.11
417351.8	3721710.0	28.52	417661.0	3721473.1	24.95
417351.8	3721735.0	28.48	417352.7	3721378.5	24.75
417351.8	3721885.0	28.44	417480.4	3721422.1	24.70

Table B-6

PM_{10} Hot Spot Modeling Results by Receptor for SR101 and Shea Boulevard (only top 50 out of 763 receptors are shown)

Receptor Location		6th-Highest PM_{10} Value ($\mu g/m^3$)	Receptor Location		6th-Highest PM_{10} Value ($\mu g/m^3$)
X coordinate	Y coordinate		X coordinate	Y coordinate	
417265.2	3716215.0	42.05	417225.9	3716210.5	28.88
417336.2	3716225.1	36.27	417390.2	3716236.1	28.86
417337.5	3716187.2	34.22	417241.4	3716288.1	28.82
417272.4	3716178.0	32.95	417237.7	3716313.2	28.50
417464.9	3716237.2	32.22	417294.2	3716624.9	28.45
417469.9	3716237.7	32.09	417234.2	3716338.1	28.41
417494.9	3716238.6	31.83	417298.7	3716575.1	28.23
417416.0	3716232.4	31.66	417239.4	3716224.0	28.20
417247.8	3716225.5	31.33	417220.9	3716642.2	27.94
417433.3	3716233.8	31.23	417301.4	3716550.3	27.47
417221.7	3716542.4	31.21	417569.8	3716242.1	27.26
417519.9	3716239.6	31.14	417227.1	3716388.7	26.96
417221.3	3716567.4	31.05	417304.1	3716525.4	26.93
417240.7	3716215.0	30.98	417269.6	3716148.8	26.30
417221.1	3716592.4	30.81	417211.7	3716208.5	26.27
417222.1	3716517.4	30.51	417223.6	3716406.2	25.90
417349.0	3716236.8	30.50	417224.7	3716217.6	25.78
417544.9	3716240.6	30.23	417227.1	3716363.7	25.71
417365.6	3716233.4	30.12	417340.0	3716277.2	25.65
417246.9	3716238.6	29.90	417292.8	3716649.9	25.62
417222.6	3716492.4	29.85	417594.8	3716242.0	25.44
417246.0	3716263.9	29.76	417222.0	3716430.5	25.34
417220.5	3716617.6	29.61	417219.3	3716475.5	24.94
417341.5	3716250.8	29.49	417276.6	3716094.7	24.90
417296.0	3716600.0	29.03	417220.2	3716454.5	24.86

F0123: Pima Freeway (SR101), Princess Drive to Shea Boulevard
ADOT Air Quality Project Team Responses to EPA Comments received 7/12/23 and 7/14/23

Page of Public Draft posted on 5/22/23	Section	EPA Comment	ADOT Response	Action
6	1	Where is this located in the reference section?	Added this document to reference section 4.0	Report revised
12	Figure 5	Are there receptors modeled for the new pedestrian facilities?	Receptors are located on new pedestrian facilities except for locations that are less than 5 meters from the edge of the roadway, as described in the PM Hot Spot Guidance. Text was added to section 3.2.1 to clarify locations where receptors were and were not placed. See response to EPA modeling comment 4b for more discussion on this item.	Report revised, no changes to made to modeling analysis
21	2.4	2008 standard mentioned here for the first time. Please include section on 2008 O3 standard	Added language to page 21 to address the initial designation of the 2008 standard.	Report revised
22	2.4	Please add in a discussion on the reclassifcation of the Phoenix nonattainment area (NAA) to a Moderate NAA (87 FR 60897)	Added language to and of page 21 and beginning of 22 to disclose when EPA reclassified the area from marginal to moderate.	Report revised
24		Blank page	Blank page has been removed	This was corrected in June 2023 updated report
26		Blank page	Blank page has been removed	This was corrected in June 2023 updated report
27	2.5	Please correct with working link	Table reference has been updated	This was corrected in June 2023 updated report

29	3.1.1.1	For Fuel specifications, the Hot Spot Guidance recommends using the dfault fuel data avilable in the MOVES model. Regional fuel specification data is not appropriate to use without a published volumetric study and consultation with EPA.	Confirmed MOVES defaults for Maricopa County were used. Updated text to clarify that MAG data was not used for fuel specifications.	Report revised
29	3.1.1.2	Thank you for adding in this section explaining the parameters used and the rationale behind them!	No response required	No change required
36	3.2.1	Please add a summary of why this was considered a project of air quality concern using the traffic data.	Added text to explain this decision was based on high volumes of diesel truck traffic in 2050.	Report revised
37	3.2.1	Please elaborate on which intersections and provide a summary here on why they were chosen.	Added text to specify the two intersections selected and why each represents a location most likely to experience elevated PM concentrations.	Report revised
37	3.2.1	Please elaborate further on the details of the appropriateness of the climate data	This specific sentence refers to the temperature and relative humidity values used in MOVES. Added more information about AERMET data and represetnativeness to previous section called "Determine Approach, Models, and Data". Specific information from ADEQ was added to Appendix A as part of the consultation form that summarizes all modeling inputs and assumptions as Attachment C.	Report revised, Appendix A revised by adding Attachment C
38	3.2.1	We suggest adding a table with the values used for this project	These values are included in Table 5.	No change required
39	3.2.1	Please elaborate on this section further (i.e. what nearby sources are in the project area)	Added text to clarify guidance on inclusion of nearby sources (Section 8 of PM Hot Spot Guidance)	Report revised
39	3.2.1	This information can be found in Table X on Page Y of this document.	These values are too large to included in the written documentation, but they were provided in electronic files for FHWA and EPA review.	No change implemented

39	3.2.1	Add in sentence or two about data completeness and why this data was appropriate outside of being provided by ADEQ.	Added text to explain this data meets completeness requirements and is representative of the project area. Directs	Report revised
39	3.2.1	Add in a sentence about how receptors were not placed where the pbulic did not ave access (i.e. fenced off area on the nofrthern end of the project)	Added information to clarify locations where receptors were not placed.	Report revised
40	3.2.1	Add in a table comparing the background monitor land use characteristics to the project area.	Added text to describe land uses of nearby monitors. Added table to summarize land use and other monitor characteristics.	Report revised
40	3.2.1	The results can be found in Appendix X.	AERMOD output files are too large to include in the written document, but they were provided for FHWA and EPA review. This value is included in Table 7.	No change implemented
40	3.2.1	This receptor was located…. Please see figure X for heat map of receptors	Information about location of receptors with maximum modeled concentrations have been added to Section 3.2.2.	Report revised
40	3.2.1	Results are shown in Table X below	Added a sentence to step 5 to direct the reader to the values in Table 5.	Report revised
41	3.2.2	Delete	Deleted	This was corrected in June 2023 updated report
41	3.2.2	Typo	Corrected	This was corrected in June 2023 updated report
69	Appendix A - Attachment B	Thank you for including this table. Please also include a table describing the land characteriscts of this monitor and other details that made it appropriate for use in this hot spot analysis	Added text to describe the land use in the vicinity of this monitor. Included a table to summarize additional characteristcs of each monitor.	Report and Appendix A revised

76	Appendix A - Response to comments	In the future it would be great to have a meeting to discuss our comments and your responses before they are published in the Air Quality Report. I think it's important to include this documentation, but our comments were requesting changes to the modeling parameter documentation. This information should be added to the air quality report and not just addressed here as an appendix. If it is just addressed at the appendix please at a minimum reference the specific section of this document where it was addressed.	Comment noted. The project team will consider these concerns for future projects.	No change implemented
76	Appendix A - Response to comments	Please reference this table above and clearly indicate it's location in this document	These values are included within the text in Section 3.1.1.2. Surface Roughness was not previously included and has been added.	Report revised
79	Appendix A - Response to comments	Please include this explanation in the Air quality report and not just in the response to comment	Added MOVES hour IDs to text in Section 3.2.1	Report revised
81	Appendix A - Response to comments	It would be helpful to see these values for comparison to back up this claim	Text was added to 3.2.1 to address the representativeness of this met data. For the Phoenix area, only Phx Sky Harbor data is availave for Surface Air and Tucson Airport data is available for Upper Air.	Report revised
141	Appendix A - Response to comments	Please include a similar table for PM receptors; I know that there are more receptors so maybe just the top 50 values? Some data backing up the PM hot spot analysis should be shown.	Table of top 50 receptor concentrations added to Appendix B for each intersection	Report and Appendix B revised

Itemized Comments from 7/12/23 Email

Item		EPA Comment	ADOT Response	Action
1		Generally, the Air Quality Report should be a stand-alone document which clearly outlines/walks through emissions, meteorology/background concentrations, modeling results, etc. and incorporates previous comments into a single document, which allows the public to easily follow the final information clearly and accurately. If through interagency consultation you have developed a final modeling methodology or other such documents, those final documents can be referenced. Currently, the AQIA refers to numerous past document, which is difficult to follow. Please make sure all documents referenced have an associated reference indicating where in the document the information can be found.	References to appendix sections have been added as needed. The project team will incorporate these suggestions to include data tables within the report text into future projects.	Report revised
2		The AQIA notes ""AERMOD was run using five years meteorological data provided by ADEQ based on observed surface data from Phoenix Sky Harbor International Airport and upper air data from Tucson International Airport for the 5-year period from 2017 through 2021." While these data were prepared by ADEQ, they have not been reviewed by EPA. The document should include a discussion of the met variables were used, completeness information, other data handling, and a representativeness discussion compared to other met sites considered.	Additional details about AERMET data and representativeness have beed added to report section called "Determine Approach, Models, and Data". Specific information from ADEQ was added to Appendix A - Attachment C as part of the consultation form that summarizes all modeling inputs and assumptions.	Report revised and Attachment C added to Appendix A

3		3.The discussion of background concentration in the AQIA is minimal. The AQIA should describe in detail how design concentrations were calculated and are appropriate based on monitoring frequency and provide a representativeness discussion. In particular, within the Air Quality report or other final consultation memo/document: a.monitor location, AQS ID and distance to the project, sampling frequency, completeness and design concentration (calculated based on the frequency and data available). b.density and mix of sources compared to the project site, land use/terrain (anything that would affect representativeness) c.Wind patterns (is it upwind during exceedance conditions?) d.Include description of why this site is preferrable to other available in the area (including a discussion of design concentrations at those sites). e.The discussion should include a discussion of nearby sources: what emission sources are nearby in the vicinity of the project? Do they emit at significant levels to affect the concentrations at the project site? Is the influence of these sources adequately captured by the monitor?	Text added to Section 3.2.1 discussion for Background Concentrations. Text also added to Appendix A - Attachment B to provide additional details about the monitor chosen. The monitor values used to determine the background concentration are included in the Consultation Document in Appendix A.	Report and Appendix A revised

4a		"Receptors should be placed with finer spacing (e.g., 25 meters) closer to a near ground source to cover a distance of at least 100 meters from the project. Given the closest set of receptors would usually be five meters from the source, five rows of receptors around the project, covering a distance from five meters away from the project to 105 meters away from the project at 25-meter intervals, would be sufficient for most projects. These rows would not be straight lines, but instead would follow the boundaries of the project area. In these rows, receptors should be placed 25 meters apart." Therefore, please assure that there are receptors five meters away from the R/W line and 25 meters apart from one another. Furthermore, please ensure that receptors cover distances of up to 100 meters from the project. Figure 18 suggest there are some sections which do not have five rows of receptors and some initial receptors seem further than 5 m.	After discussions with EPA, it was clarified that this comment was specifically in regard to receptors next to the northbound SR101 frontage road, north of Frank Lloyd Wright Boulevard. The modeling team reviewed the aerial photos to confirm that there are no sidewalks along the frontage road, and the area between the northbound SR101 frontage road and the Westworld soccer fields do not pedestrian access, and the area between the northbound SR101 frontage road and the office parks and commercial areas to the north of Westworld have fences that restrict pedestrian access. Screenshots from Google Earth are provided below this comment resolution table. Text has been added to Section 3.2.1 to clarify where receptors were not placed.	Report revised
4b		Additionally, we like to discuss the placement of receptors where the new pedestrian facilities will be added. All sidewalks within the project area with public access should be modeled regardless of distance from the R/W. On July 24, EPA provided additional information that after consultation with OTAQ, they confirmed that placing receptors within 5 meters of an area source would not produce skewed modeling results the way it would if volume sources were used. EPA requested additional receptors to be placed on pedestrian facilities.	Receptors were placed on all pedestrian facilities that were not within 5 meters of the edge of the roadway. Receptors were placed in a manner consistent with EPA's PM Hot Spot Guidance. Additional receptors were not added to the modeling analysis in response to this specific comment. Graphics with receptor placement were provided as part of the April 2023 consultation process, and consultation concluded in May 25th.	No change made
5		Please include maps of 6th high concentrations in your Air Quality Impact report so the public can visually see the areas of maximum impact and/or include .plt files.	Figures have been added to Section 3.2.2 to show the areas of maximum impact. Electronic *.PLT files were provided for FHWA and EPA review.	Report revised


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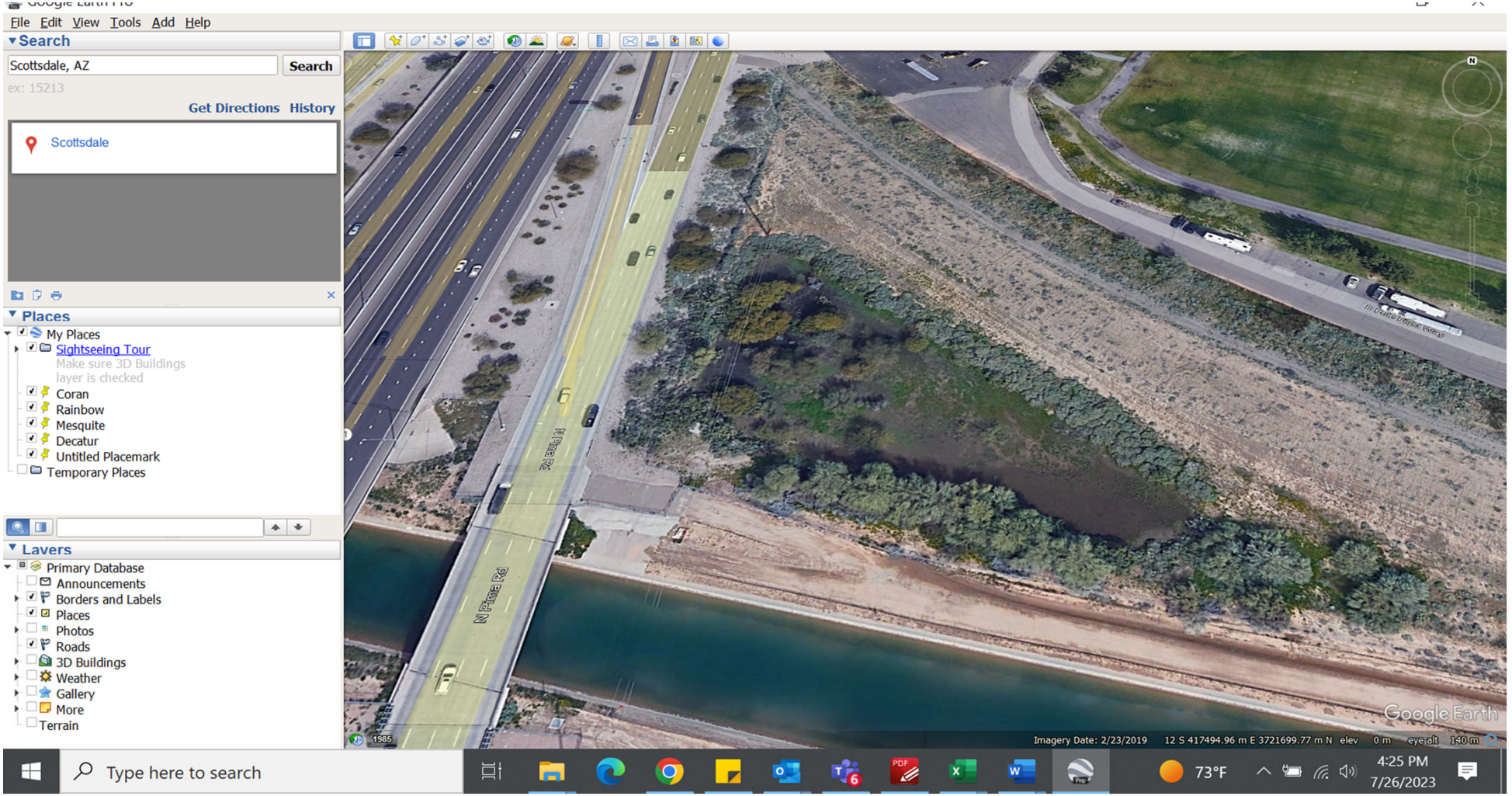
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APPENDIX C – PM_{10} MOVES AND AERMOD INPUT FILES

Due to the large volume of input and output files created for this PM_{10} analysis, they are available electronically upon request.

Supporting traffic volume and speed data is available as a shapefile dated May 2023.

CO Hot Spot files available dated May 2023. These files include MOVES input and output files and CAL3QHC input and output files.

PM Hot Spot files are available dated June 2023. These files include MOVES input and output files, AERMOD input and output files, AERMET surface and upper air files, as well as a series of Excel-based files that processed traffic data and MOVES output for the format needed by AERMOD.