Arizona Department of Transportation

Environmental Planning

Air Quality Technical Report

I-10, I-17 to S.R. 202L (I-10 Broadway Curve) Improvement Project

Federal Project No. NH-010-C(220)T
ADOT Project No. 010 MA 150 F0072 01D

September 2019

Submittal Number 2

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 I-10, I-17 (Split) to SR 202L (Santan) improvement (I-10 Broadway Curve) 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. According to this analysis, the project is not predicted to cause or exacerbate a violation of any National Ambient Air Quality Standards (NAAQS). A qualitative PM_{10} assessment and a quantitative CO modeling analysis is required for this project. The modeled CO build alternative concentrations were demonstrated to be below the CO NAAQS. The project does not interfere with any transportation control measures in Phoenix-Mesa region's State Implementation Plans (SIPs) for PM_{10}, CO, or Ozone NAAQS. A quantitative analysis also predicted to have no measurable effect on mobile source air toxic (MSAT) or greenhouse gas (GHG) emissions.

1.0 *INTRODUCTION*

This Air Quality Technical Report has been prepared in support of the (I-10 Broadway Curve) project in Maricopa County, Arizona. The air quality analysis was performed based on traffic data presented in the Traffic Operations Analysis (WSP, 2019). The air quality analysis and the Traffic Report are consistent with the most recent Maricopa Association of Governments (MAG) January 2019 Conformity modeling performed for the Air Quality Conformity Analysis.

2.0 *PROJECT DESCRIPTION*

The Arizona Department of Transportation (ADOT) is preparing an Environmental Assessment (EA) document for proposed improvements to a segment of Interstate 10 (I-10) from the I-10/I-17 (Split) Traffic Interchange (TI) (Milepost [MP] 149.5) to the Loop 202 (SR202L) Santan Freeway (MP 160.9) and the segment of State Route (SR) 143 from Broadway Road (MP 000.25-) north to just south of the south bank of the Salt River (MP 001.3), and US60 (Superstition Freeway) from I-10 (MP 172.0) east to Hardy Drive (MP 173.0) within the cities of Phoenix, Tempe, and Chandler, and the Town of Guadalupe, Maricopa County, Arizona. The EA will be completed in accordance with the National Environmental Policy Act (NEPA) and other regulatory requirements.

The study area of the proposed I-10 improvements serves the growing communities in the South and East Valley, downtown Phoenix metropolitan area, and other major employment centers. Traffic demand is causing the I-10 corridor and adjacent local arterial street system to become increasingly congested during the morning and evening peak travel periods. Future traffic volume projections indicate the congestion will continue to worsen, causing further travel delays and increased travel times for those using the I-10 corridor. The purpose of this proposed project is to improve travel time reliability and regional mobility, and address congestion on I-10 while maintaining local and multimodal access.

Improvements to this segment of I-10 have been considered over the past 30 years in the following transportation studies:

- *Interstate 10 Corridor Refinement Study (1988)*
- *I-10 Corridor Improvement Study (2007)*
- *Spine Corridor Study (2014)*
- *Interstate 10 Near Term Improvements Study (2014)*

Each of these previous studies systematically approached the development of viable improvement concepts and alternative options, through interdisciplinary team dialogues that included ADOT, FHWA, MAG, and agency stakeholders, as well as input obtained through public outreach.

The project will evaluate a build and no-build alternative for the improvements in this study area. The no-build alternative will be evaluated to provide a baseline comparison for the build alternative. If selected, the build alternative improvements would consist of widening and restriping I-10 within the project limits to add general-purpose (GP) lanes, high-occupancy vehicle (HOV) lanes, and auxiliary (AUX) lanes; constructing collector-distributor (C-D) roads, reconstructing and improving I-10 interchanges along this segment of I-10; construction of and modifications to bridges; various drainage improvements; installing and upgrading Freeway Management System (FMS) facilities and dynamic message signs (DMS) within the project limits; and other components such as fencing, utilities, traffic markers, and lighting systems.

The proposed build alternative would require additional right-of-way (ROW) and temporary construction easements (TCE) from private land owners within the study area. Any new ROW and/or TCEs would be evaluated prior to construction.

The proposed project location is shown in Figure 1 and Figure 2.

Figure 1. Project Location

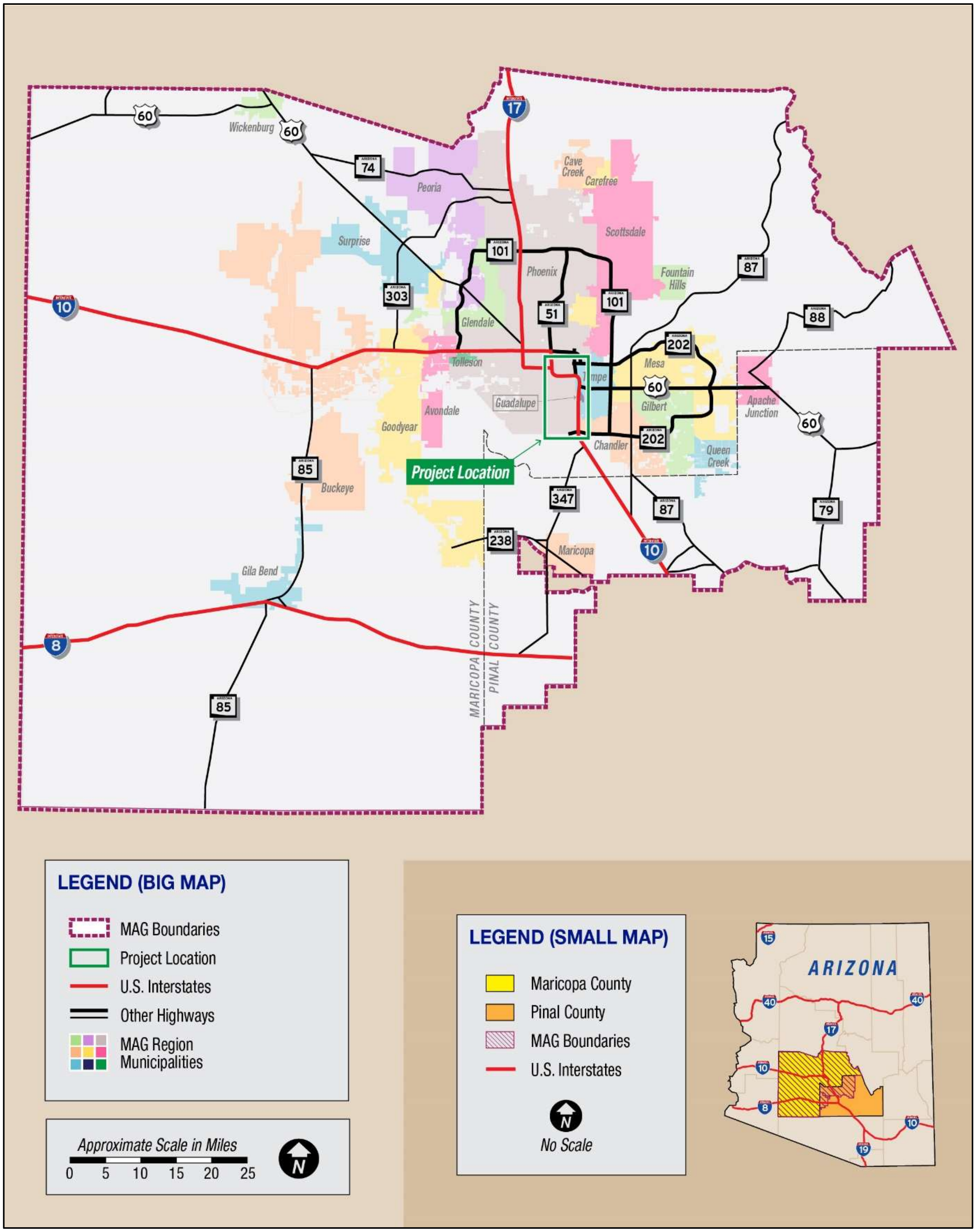
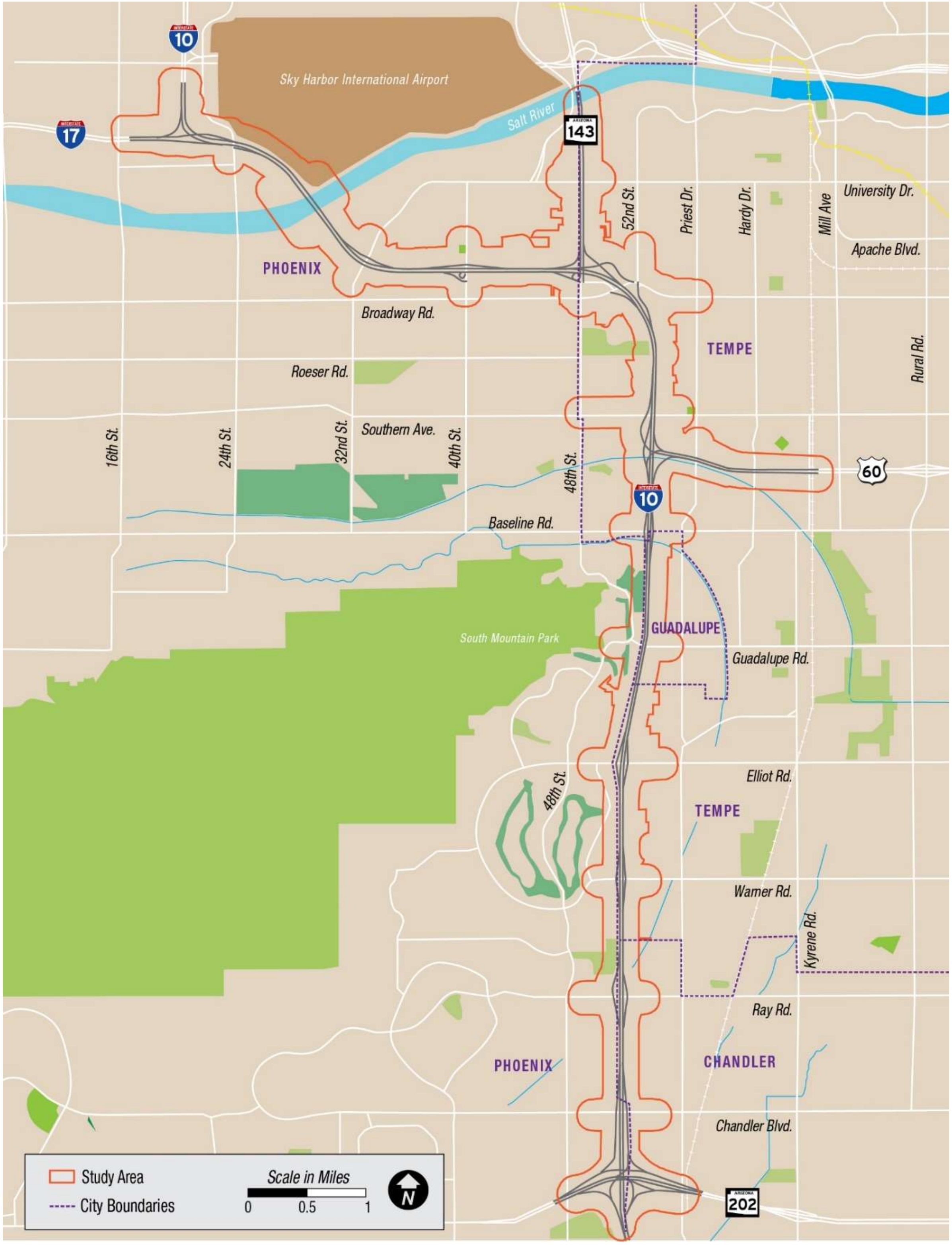


Figure 2. Study Area Limits



3.0 *REGULATIONS*

Air quality is a term used to describe the amount of air pollution the public is exposed to. “Air Pollution” is a general term that refers to one or more chemical substances that degrade the quality of the atmosphere. Individual air pollutants degrade the atmosphere by reducing visibility; they also are responsible for damaging property, reducing the productivity or vigor of crops and natural vegetation, and/or negatively affecting human and animal health. Air quality in the United States is regulated by the Federal Clean Air Act (CAA) and is administered by the United States Environmental Protection Agency (EPA).

3.1 CLEAN AIR ACT AMENDMENTS OF 1990 (CAAA)

Under the CAA, the Environmental Protection Agency (EPA) has established the NAAQS, which specify maximum concentrations for carbon monoxide (CO), particulate matter less than 10 micrometers in size (PM_{10}), $PM_{2.5}$, O_3, sulfur dioxide (SO_2), lead, and nitrogen dioxide. These pollutants are referred to as criteria pollutants.

Under the CAAA, the US Department of Transportation cannot fund, authorize, or approve federal actions to support programs or projects that are not first found to conform to the State Implementation Plan (SIP). A project that uses federal funds cannot:

- Cause or contribute to any new violation of any National Ambient Air Quality Standards (NAAQS) in any area;
- Increase the frequency or severity of any existing violation of any NAAQS in any area; or
- Delay timely attainment of any NAAQS or any required interim emission reductions or other milestones in any area.

3.1.1 National Ambient Air Quality Standards

As required by the 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	9ppm	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/m³ (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 concen-tration, averaged over 3 years
Particle Pollution – $PM_{2.5}$	primary	Annual	12 μg/m³	Annual mean, averaged over 3 years
	secondary	Annual	15 μg/m³	Annual mean, averaged over 3 years
	primary and secondary	24-hour	35 μg/m³	98th percentile, averaged over 3 years
Particle Pollution – PM_{10}	primary and secondary	24-hour	150 μg/m³	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/m³ 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 additionally remain in effect in some areas. Revocation of the previous (2008) O_3 standards and transition to the current (2015) standards will be addressed in the implementation rule for the current standards.

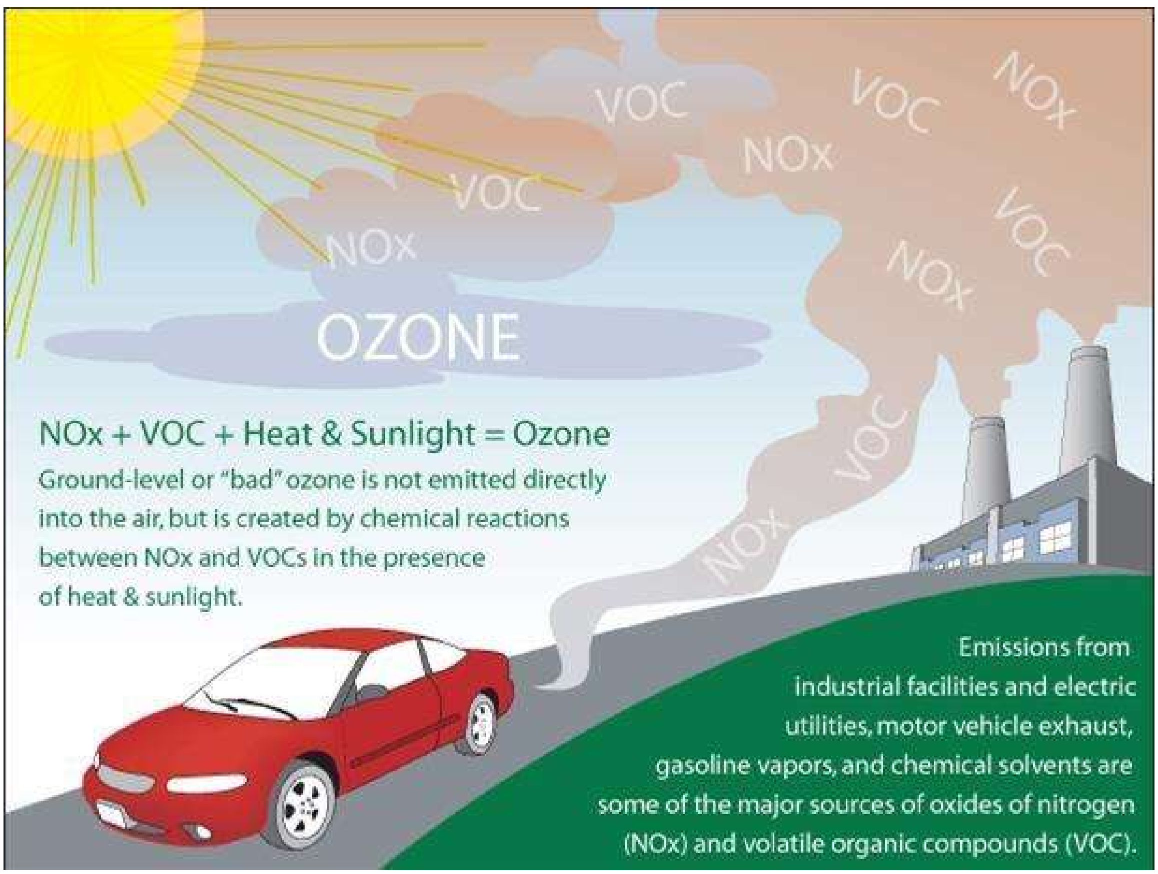
(4) The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: 1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and 2) any area for which an implementation plan providing 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.

3.1.1.1 Ozone

Ozone (O_3) is a colorless toxic gas. As shown in Figure 3, 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 3. Ozone in the Atmosphere

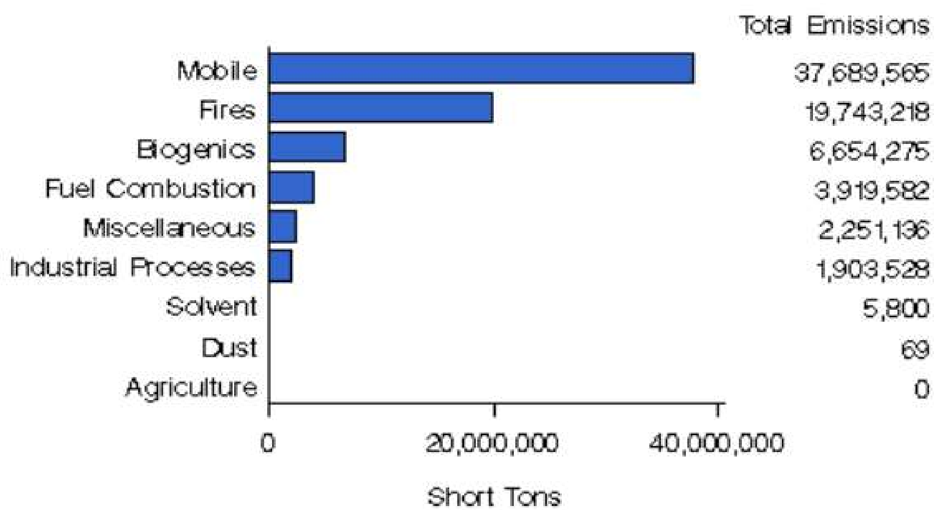


Source: EPA: https://www.epa.gov/ground-level-ozone-pollution/ground-level-ozone-basics#wwh

3.1.1.2 Carbon Monoxide

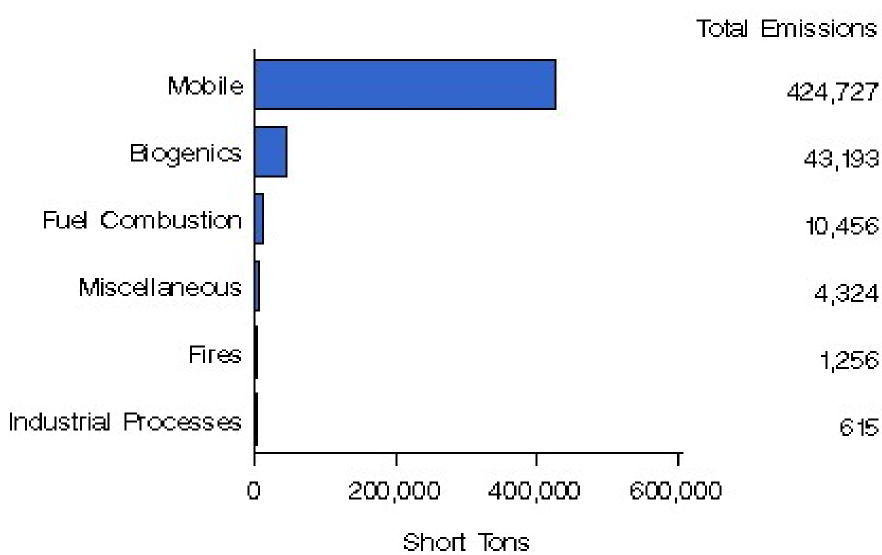
Carbon monoxide (CO) is a colorless gas that interferes with the transfer of oxygen to the brain. CO is emitted almost exclusively from the incomplete combustion of fossil fuels. As shown in Figure 4. and Figure 5, mobile sources (on-road motor vehicle exhaust) are the primary source of CO in both Maricopa 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.

Figure 4. Sources of CO in the United States (2014)



Source: EPA, https://www.epa.gov/air-emissions-inventories/air-emissions-sources

Figure 5. Sources of CO in Maricopa County (2014)



Source: EPA, https://www.epa.gov/air-emissions-inventories/air-emissions-sources

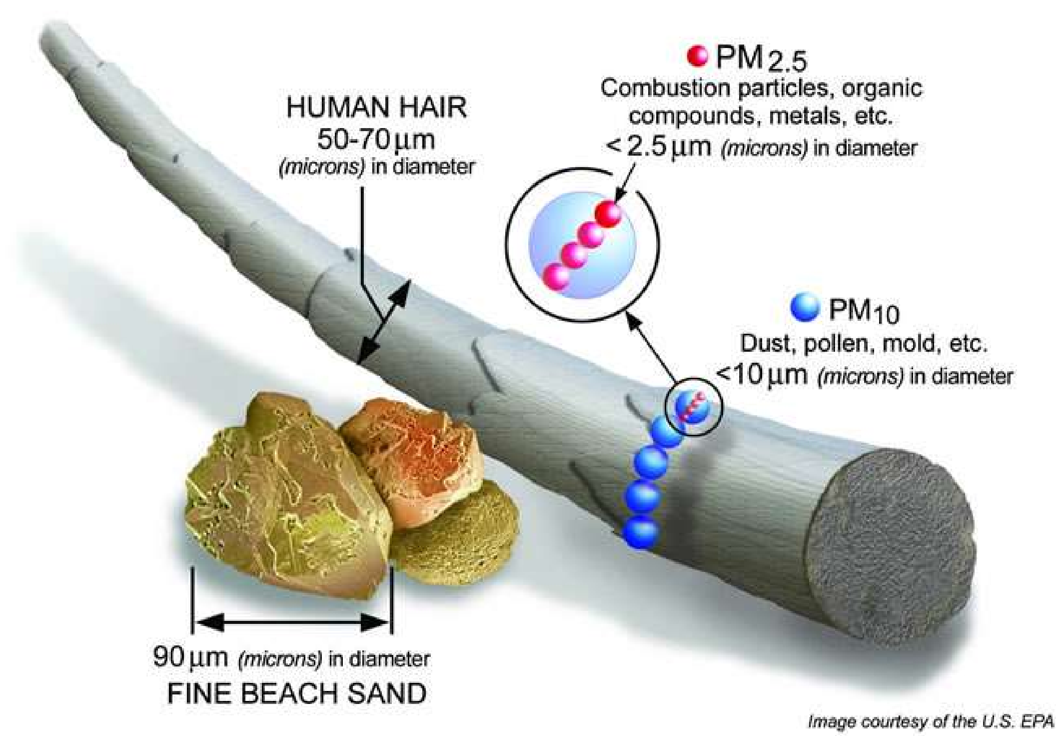
CO concentrations can vary greatly over relatively short distances. Relatively high concentrations of CO are typically found near congested intersections, along heavily used roadways carrying slow-moving traffic, and in areas where atmospheric dispersion is inhibited by urban “street canyon” conditions.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

3.1.1.3 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 6). 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 6. Relative Particulate Matter Size



Source: EPA: 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, a regional basis, and a statewide basis.

3.1.2 Transportation Conformity Rule

Under the Clean Air Act Amendments of 1990, the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), the Transportation Equity Act for the 21st Century (TEA-21), and Moving Ahead for Progress in the 21^{st} Century Act (MAP-21), proposed transportation projects must be derived from a long-range transportation plan (LRP) or regional transportation plan (RTP) that conforms with the state air quality plans as outlined in the state implementation plan (SIP). The SIP sets forth the state's strategies for achieving air quality standards. EPA's Transportation Conformity Rule requires conformity determinations from proposed transportation plans, programs, and projects before they are approved, accepted, funded, or adopted. Federal activities may not cause or contribute to new violations of air quality standards, exacerbate existing violations, or interfere with timely attainment or required interim emissions reductions towards attainment.

The conformity rule also establishes the process by which FHWA, the Federal Transit Administration (FTA), and local metropolitan planning organizations (MPOs) determine conformance of transportation plans and transportation improvement programs (TIPs) and federally funded highway and transit projects. As part of this process, local MPOs are required under regulations promulgated in the CAA of 1990 to undertake conformity determinations on metropolitan transportation plans (MTPs) and TIPs before they are adopted, approved, or accepted. TIPs are a subset of staged, multi-year, inter-modal programs of transportation projects covering metropolitan planning areas that are consistent with MTPs. The TIPs include a list of roadway and transit projects selected as priorities for funding by cities, county road commissions, and transit agencies. Federal projects to be completed in the near term must be included in the regional conformity analysis completed by the MPO; such projects are also usually included in the region's TIP, and therefore conform with the SIP.

3.1.3 Interagency Consultation

Federal transportation projects are required to use interagency consultation in order to determine the need for project-level air quality analyses and, if applicable, to consult on models and methodologies.

ADOT has developed standard questionnaires for project level PM quantitative hot-spot analyses and project-level CO hot-spot analyses. These questionnaires outline the assumptions and sources of data to be used when quantitative analyses are required.

On June 6, 2019, ADOT provided a copy of the PM hot-spot questionnaire for a 10-day consultation period, to the following consulting parties: EPA, FHWA, MAG, Arizona Department of Environmental Quality (ADEQ), and the Maricopa County Air Quality Department, as the local air agency in Maricopa County. The consultation period concluded on June 18, 2019, resulting in concurrence that the proposed project does not meet the criteria to be considered a Project of Air Quality Concern (POAQC).

On June 6, 2019, ADOT provided a copy of the CO hot-spot questionnaire and associated planning assumptions to the following consultation parties, for a 30-day consultation period: EPA, FHWA, MAG, ADEQ, and the Maricopa County Air Quality Department, as the local air agency in Maricopa County. There were no comments on the methodology and assumptions, including the four intersections recommended for quantitative analysis, and on July 9, 2019, ADOT concluded interagency consultation.

Documentation of interagency correspondence, including the completed questionnaires that provide methodologies for the PM_{10} and CO, can be found in Appendix A.

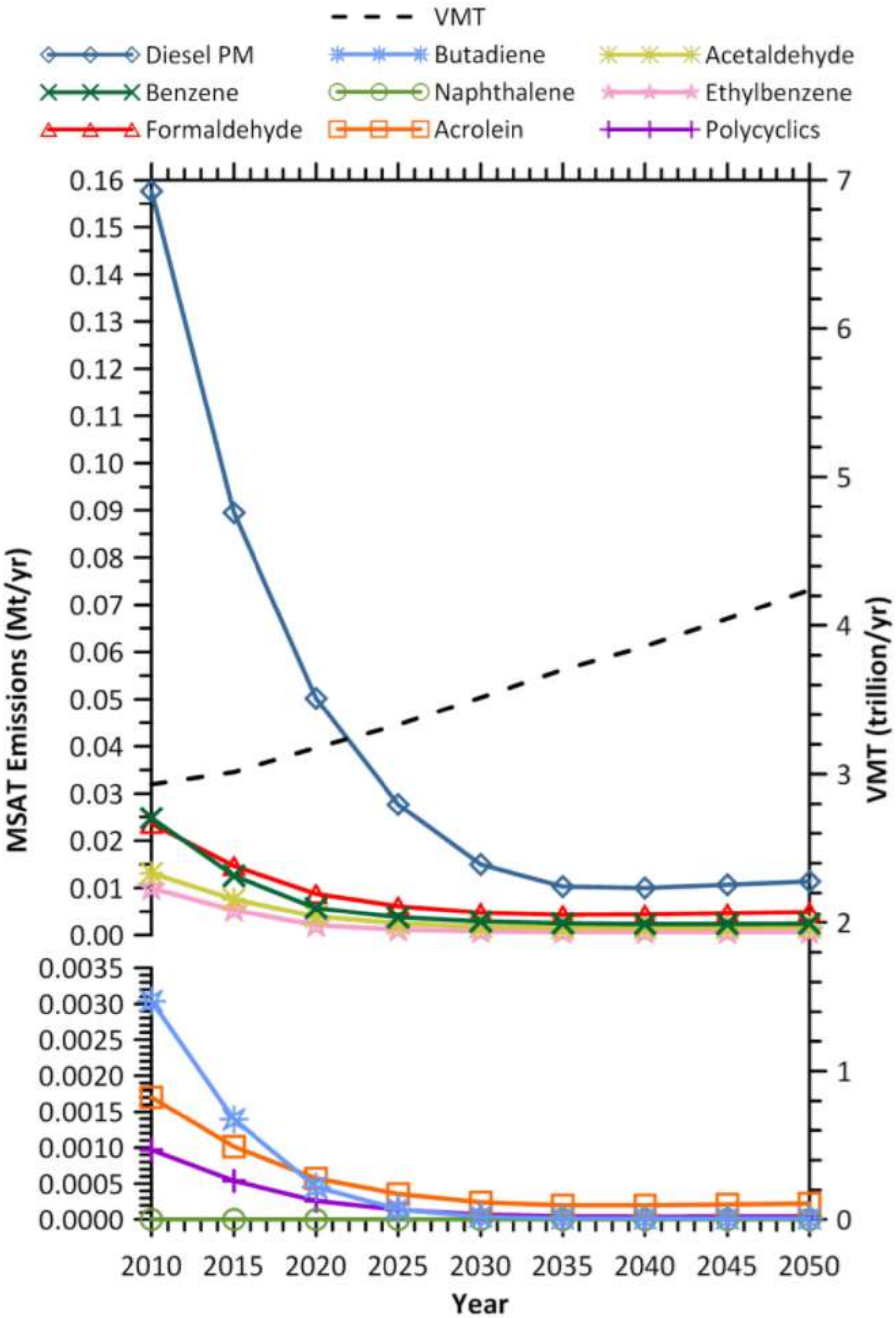
3.2 MOBILE SOURCE AIR TOXICS

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 CAAA 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 MOVES2014a model, as shown in Figure 7, FHWA estimates that even if VMT increases by 45 percent from 2010 to 2050 as forecast, a combined reduction of 91 percent in the total annual emissions for the priority MSAT is projected for the same time period.

Figure 7. National MSAT Emission Trends 2010 – 2050 For Vehicles Operating on Roadways Using EPA's MOVES2014a 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 MOVES2014a model runs conducted by FHWA in September 2016: https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/msat/

3.3 GREENHOUSE GASES

Anthropogenic (human-caused) greenhouse gas (GHG) emissions contribute to climate change. CO_2 makes up the largest component of these GHG emissions. Other prominent transportation greenhouse gases include methane (CH_4) and nitrous oxide (N_2O). GHGs differ from other air pollutants evaluated in federal environmental reviews because their impacts are not localized or regional due to the rapid dispersion into the global atmosphere that is characteristic of these gases.

Many GHGs occur naturally. Water vapor is the most abundant GHG and makes up approximately two thirds of the natural greenhouse effect. However, the burning of fossil fuels and other human activities are adding to the concentration of GHGs in the atmosphere. Many GHGs remain in the atmosphere for time periods ranging from decades to centuries. GHGs trap heat in the earth's atmosphere.

To date, no national standards have been established regarding GHGs, nor has EPA established criteria or thresholds for ambient GHG emissions pursuant to its authority to establish motor vehicle emission standards for CO_2 under the CAA. However, a considerable body of scientific literature exists addressing the sources of GHG emissions and their adverse effects on climate, including reports from the Intergovernmental Panel on Climate Change, the US National Academy of Sciences, and EPA and other federal agencies. The affected environment for CO_2 and other GHG emissions is the entire planet. In addition, from a quantitative perspective, global climate change is the cumulative result of numerous and varied emissions sources (in terms of both absolute numbers and types), each of which makes a relatively small addition to global atmospheric GHG concentrations. In contrast to broad-scale actions such as those involving an entire industry sector or very large geographic areas, it is difficult to isolate and understand the GHG emissions impacts of a particular transportation project. Furthermore, no scientific methodology for attributing specific climatological changes to a particular transportation project's emissions currently exists.

4.0 *EXISTING CONDITIONS*

4.1 AMBIENT AIR QUALITY DATA

4.1.1 Local Meteorology

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).

4.1.2 Local Monitored Air Quality

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 closest monitoring stations to the project area.

Table 2. Ambient Air Quality Monitor Data

Pollutant		Monitor Location	Monitor Value	2015	2016	2017
Carbon Monoxide (CO) [ppm]	1-Hour	1919 W Fairmont Dr Tempe, AZ	Maximum	1.9	2.0	2.0
			2nd Maximum	1.9	2.0	2.0
			# of Exceedances	0	0	0
	8-Hour	1919 W Fairmont Dr Tempe, AZ	Maximum	1.6	1.7	1.7
			2nd Maximum	1.4	1.6	1.6
			# of Exceedances	0	0	0
Particulate Matter [ug/m³]	PM_{10}	1645 E Roosevelt St Phoenix, AZ	Maximum 24-Hour	114	106	126
			Second Maximum	85	102	106
			# of Exceedances	0	0	0
	$PM_{2.5}$	1919 W Fairmont Dr Tempe, AZ	24-Hour 98th Percentile	17.0	17.0	21.0
			Mean Annual	7.9	7.9	8.1
Ozone (O_3) [ppm]	8-Hour	1645 E Roosevelt St Phoenix, AZ	First Highest	0.075	0.072	0.077
			Second Highest	0.075	0.071	0.076
			Third Highest	0.074	0.071	0.075
			Fourth Highest	0.071	0.070	0.071
			# of Days Standard Exceeded	5	3	8
Nitrogen Dioxide (NO_2) [ppb]		1645 E Roosevelt St Phoenix, AZ	1-Hour Maximum	63	62	66
			1-Hour Second Maximum	62	62	65
			98th Percentile	59	59	62
			Annual Mean	17.85	17.34	18.24
Sulfur Dioxide (SO_2) [ppb]		1645 E Roosevelt St Phoenix, AZ	1-Hour Maximum	9.0	8.0	9.0
			24-Hour Maximum	3.4	3.0	4.3
			# of Days Standard Exceeded	0	0	0

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

4.2 ATTAINMENT STATUS

Section 107 of the 1977 CAAA requires that EPA publish a list of all geographic areas in compliance with the NAAQS, plus those not attaining the NAAQS. Areas not in NAAQS compliance are deemed nonattainment areas. Areas that have insufficient data to make a determination are deemed unclassified and are treated as attainment areas until proven otherwise. Maintenance areas are areas that were previously designated as nonattainment for a particular pollutant but have since demonstrated compliance with the NAAQS for that pollutant. An area's designation is based on data collected by the state monitoring network on a pollutant-by-pollutant basis.

The project is located in Maricopa County, Arizona. Table 3 shows the attainment status for Maricopa County. As shown in the table, EPA has classified portions of Maricopa County as a nonattainment area for PM_{10} and ozone, and a maintenance area for CO. Therefore, a project-level transportation conformity analysis is required for CO and PM_{10}. The regional transportation conformity determination is addressed in the TIP and RTP.

Table 3. Project Area Attainment Status

Pollutant	Designation	Current Standard (Year Established)	Area
Ozone (O_3)	Nonattainment	8-Hr: 70 ppb (2015)	Portions of Maricopa County and Pinal County
Fine Particulate Matter ($PM_{2.5}$) 24-Hr	Attainment	35 µg/m^3 (2012)	Maricopa County
Fine Particulate Matter ($PM_{2.5}$) Annual	Attainment	12 µg/m^3 (2012)	Maricopa County
Coarse Particulate Matter (PM_{10}) 24-Hr	Nonattainment	150 µg/m^3 (2012)	Portions of Maricopa County and Pinal County
Carbon Monoxide (CO)	Attainment/ Maintenance	1-Hr: 35 ppm 8-Hr: 9 ppm (1971)	Portions of Maricopa County
Sulfur Dioxide (SO_2)	Attainment	1-Hr: 75 ppb (2010)	Maricopa County

Source: EPA, 2018 https://www.epa.gov/green-book

The MPO for the study area, MAG, adopted the latest RTP in September 2017, and the latest amendment to the 2018-2022 FY TIP was approved in August 2019. The project is included in the RTP as project ID 40575, and in the TIP as project ID DOT21-820. The I-10 widening project is included in the regional conformity analysis; therefore, the project's associated emissions would not have an adverse effect on the ability of the MAG region to attain their applicable air quality goals. As such, no additional regional conformity analyses are required.

5.0 *ENVIRONMENTAL CONSEQUENCES*

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.

5.1 CO HOT-SPOT ANALYSIS

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

5.1.1 Methodology

To determine the project's impact on local CO levels, a detailed hotspot analysis was conducted at three locations within the study area: Baseline Road and I-10 Traffic Interchange (TI), Elliot Road and I-10 TI, and Broadway Road and I-10 Westbound / 52nd Street. These locations were chosen from a screening evaluation based upon overall level of service and volumes. The locations chosen underwent detailed microscale modeling using emission factors developed through the use of EPA's MOVES2014b emission factor program and dispersion modeling using EPA's CAL3QHC program.

5.1.1.1 MOVES 2014b Emissions Model

EPA's Motor Vehicle Emissions Simulator (MOVES) model version MOVES2014b was used to estimate CO emissions from the roadway segments included in the CO modeling analysis. MOVES2014b 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, MOVES2014b incorporates the latest emissions data, more sophisticated calculation algorithms, increased user flexibility, new software design, and substantial new capabilities.

MOVES2014b 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 regional fuel specifications, fleet age distribution, and meteorology. Link-by-link traffic data was used to develop project-specific input files for each modeled link with that link's average speed and vehicle mix for each scenario analyzed: 2018, 2040 No-Build, and 2040 Build.

5.1.1.2 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. 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 360 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.

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 6 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.

5.1.1.3 Predicted Levels

Carbon monoxide concentrations for Existing Conditions, the future No-Build Alternative, and the future Build Alternative were predicted. Future carbon monoxide concentrations were predicted for the project's design year, which is 2040. At each receptor site, maximum one-hour carbon monoxide concentrations were calculated. The one-hour CO levels were predicted for the AM and PM peak periods. 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).

5.1.1.4 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 CO monitor located at 1919 Fairmont Drive in Tempe was approved during the interagency consultation process. Based on the last three years of monitoring data (2015-2017), the one-hour background of 2.0 ppm and the eight-hour background of 1.7 ppm were used for the existing and future year analyses.

5.1.1.5 Comparison to NAAQS

The results from the analysis for the existing, future No-Build, and Build Alternative were compared to the NAAQS, and to one another, to determine the impacts of the proposed project and if the project is in conformance with the guidelines set forth in the New Clean Air Act Amendments of 1990.

5.1.2 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). The intersections evaluated in the Traffic Operations Analysis (WSP, 2019) are summarized in Table 4.

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.

Table 4. I-10 Broadway Curve Project Intersection Screening

Intersection	Existing						2040 No Build						2040 Build					
	AM			PM			AM			PM			AM			PM		
	LOS	Delay	Volume	LOS	Delay	Volume	LOS	Delay	Volume	LOS	Delay	Volume	LOS	Delay	Volume	LOS	Delay	Volume
32nd Street & I-10 EB	D	40.1	4236	D	48.5	4410	E	61.6	4991	E	63.4	5014	F	82.8	5522	F	86.5	5554
32nd Street & I-10 WB	C	25.3	3098	E	56.1	4091	D	45	3768	E	69.2	4565	D	37.5	3923	F	110.9	4778
40th Street & I-10 EB	C	28.9	3245	C	22.5	3150	C	32.5	4171	C	32.6	3649	D	51.3	4429	E	64.5	4607
40th Street & I-10 WB	D	38.4	3250	E	58.5	3419	D	47.8	3545	E	57.6	3808	F	93.4	3873	F	110.7	4108
48th Street & I-10 EB	D	54.2	4186	D	36.4	4454	-	-	-	-	-	-	-	-	-	-	-	-
Broadway Rd & 48th St	D	54.5	5519	F	112.3	6295	D	48.8	5353	F	85.3	5604	D	54.1	5395	F	81.2	5059
Broadway Rd & I-10 EB	D	50.7	3631	F	175.2	4540	E	68.7	3962	F	166.8	4818	C	22.8	3406	D	43.7	3497
Broadway Road & I-10 WB / 52nd Street	E	56.2	5211	D	43.4	5213	F	81	5881	F	126.8	6213	E	60	5262	F	262.3	5764
University Dr & SR 143	C	25.3	6093	F	82.9	6698	D	41.6	6861	F	167.5	7691	C	25.1	6331	E	58.7	7090
Baseline Rd & I-10 EB	E	59.4	6279	F	126.4	7519	F	106.9	6495	F	182.2	7757	F	94.4	6850	F	155.6	7590
Baseline Rd & I-10 WB	D	53.9	5755	E	66.7	6313	E	71.1	5683	E	79.3	6406	F	81	6018	E	68.4	6481
Elliot Road & I-10 EB	E	73.5	4052	E	71.4	4397	F	62.1	4403	E	183.5	4779	F	148.7	6232	F	367.9	7226
Elliot Road & I-10 WB	F	172.6	3905	E	66.2	4387	F	106.6	4712	E	65	5180	F	285.3	7541	F	222.7	6901
Warner Rd & I-10 EB	C	32.3	2754	F	86.4	3490	C	30.2	2772	F	103.5	3450	C	30.7	2706	F	150.7	3504
Warner Rd & I-10 WB	E	55.4	3160	C	24.5	3132	F	121.4	3259	D	40	3492	F	88.6	3423	F	87.4	3711
Priest Dr & US 60 EB	D	48.2	2518	D	36.9	3776	D	47.4	2444	D	36.5	3542	D	39.4	2601	C	34.5	3473
Priest Dr & US 60 WB	C	27.1	3617	C	25.7	4191	C	28	3599	C	23.7	4119	C	23.9	3517	C	22.8	4002
Ray Road & I-10 EB	C	31.6	5148	D	49.7	5677	C	33.1	4576	C	32.5	5270	D	38.9	4874	D	38	5725
Ray Road & I-10 WB	D	44.5	4658	D	46.6	4713	D	44.7	4625	D	38.4	4626	E	59.8	4947	D	42.4	5031

Source: MAG Travel Demand Model (TR #1967) Shaded rows represent intersection selected for CO modeling

The intersections to be modeled were determined using the EPA guidance. The intersections with the highest volumes and longest delays were identified for the 2040 Build Alternative. The top three intersections ranked by volume are as follows:

- Baseline Road & I-10 EB
- Elliot Road & I-10 WB
- Elliot Road & I-10 EB

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

- Elliot Road & I-10 EB
- Elliot Road & I-10 WB
- Broadway Road & I-10 WB / 52nd Street

Two of the intersections are found on both groups, thus the intersection modeling analysis will be performed for the following four intersections:

- Baseline Road & I-10 EB
- Elliot Road & I-10 WB
- Elliot Road & I-10 EB
- Broadway Road & I-10 WB / 52nd Street

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 Questionnaire and Consultation form included in Appendix A has additional details about the model setup and options that were used in this analysis. Information on the modeling files are included in Appendix B.

5.1.3 Analysis

Maximum one-hour CO levels were predicted for the existing year (2018) and design year (2040) at the locations selected for analysis. Maximum one-hour CO concentrations are shown in Table 5 and maximum eight-hour CO concentrations are shown in Table 6. 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.

The four intersections were included in 3 modeling sites. Elliot Road & I-10 WB and Elliot Road & I-10 EB were close enough in proximity to be included in the same modeling setup, and the results are not presented separately.

Table 5. Predicted Worst-Case One-Hour CO Concentrations (ppm)

Intersection	2018		2040			
	Existing		No Build		Build	
	AM	PM	AM	PM	AM	PM
Baseline Road & I-10	3.2	3.2	2.3	2.4	2.4	2.3
Elliot Road & I-10	2.8	3.0	2.4	2.4	2.3	2.5
Broadway Road & I-10 WB / 52nd Street	2.8	3.2	2.2	2.4	2.3	2.2
1-hour CO standard	35	35	35	35	35	35

Concentrations = modeled results + 1-hour CO background.
1-hour CO background = 2.0 ppm
Abbreviations: AM = morning; PM = evening; CO = carbon monoxide; ppm = parts per million.

Table 6. Predicted Worst-Case Eight-Hour CO Concentrations (ppm)

Intersection	2018		2040			
	Existing		No Build		Build	
	AM	PM	AM	PM	AM	PM
Baseline Road & I-10	2.54	2.54	1.91	1.98	1.98	1.91
Elliot Road & I-10	2.26	2.40	1.98	1.98	1.91	2.05
Broadway Road & I-10 WB / 52nd Street	2.26	2.54	1.84	1.98	1.91	1.84
8-hour CO standard	9	9	9	9	9	9

Concentrations = (modeled results x persistence factor [0.7]) + 8-hour CO background.
8-hour CO background = 1.7 ppm
Abbreviations: AM = morning; PM = evening; CO = carbon monoxide; ppm = parts per million

Based on the values presented in Table 5 and Table 6, the Build Alternative is not predicted to cause a violation of the NAAQS for any of the analysis years.

5.1.4 Project-Level Conformity

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 in included in Appendix A, including specific modeling details and assumptions.

5.2 PM_{10} HOT-SPOT ANALYSIS

The study area is currently classified as a PM_{10} nonattainment area. As such, it was necessary to determine if the project is one of air quality concern, as detailed in EPA's Transportation Conformity Guidance for Quantitative Hot-Spot Analysis in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas (EPA 2015).

Project types in 40 CFR 93.123(b) requiring a quantitative analysis of local particulate emissions (hot-spots) in non-attainment or maintenance areas 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 LOS D, E, or F with a significant number of diesel vehicles, or those that will change to LOS 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 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 with 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 National Ambient Air Quality Standards or any required emission reductions or milestones in any nonattainment or maintenance area.

Although the proposed project is an expanded highway project, it would not result in a significant increase in the number of diesel vehicles. The MAG travel demand model estimates that the percentage of truck traffic along the corridor will not increase as a result of the project. The AADT and truck percentages for the Build alternative were compared to the No Build alternative at four locations along the project corridor, as summarized in Table 7.

This is not a project that affects a congested intersection of LOS D or will change LOS to D or greater due to a significant increase in the number of diesel trucks. The intersection operation analysis shows 17 intersections have a LOS of D, E, or F under Build conditions, and none of these intersections has a significant number of diesel trucks.

Based on the criteria, ADOT recommended that this project is not a project of air quality concern. This recommendation was agreed upon during interagency consultation, and the project does not require a PM_{10} quantitative analysis, as documented in Appendix A.

Table 7. AADT and Truck Percentage

Link Endpoints		Scenario	Total AADT	% Truck	Truck AADT	Increase Truck	% Increase
I-17 Split	32nd Street	2018 Existing	305,620	14%	43,612		
		2040 No-Build	330,389	13%	43,266	5,206	0.59%
		2040 Build	354,222	14%	48,472		
32nd Street	40th Street	2018 Existing	291,876	13%	38,581		
		2040 No-Build	308,441	12%	38,104	5,894	0.82%
		2040 Build	333,906	13%	43,998		
40th Street	48th Street / SR143	2018 Existing	293,240	13%	38,381		
		2040 No-Build	305,066	12%	36,783	6,972	0.24%
		2040 Build	355,762	12%	43,755		
48th Street / SR143	Broadway Road	2018 Existing	305,118	12%	36,286		
		2040 No-Build	302,763	10%	30,647	8,734	0.48%
		2040 Build	371,398	11%	39,381		
Broadway Road	US60	2018 Existing	337,193	11%	38,767		
		2040 No-Build	338,350	11%	36,120	3,260	-0.33%
		2040 Build	380,571	10%	39,380		
US60	Baseline Road	2018 Existing	152,396	15%	23,368		
		2040 No-Build	147,191	13%	19,394	3,593	-3.98%
		2040 Build	250,001	9%	22,987		
Baseline Road	Elliot Road	2018 Existing	250,686	11%	27,860		
		2040 No-Build	251,317	10%	24,112	5,729	1.02%
		2040 Build	281,067	11%	29,841		
Elliot Road	Warner Road	2018 Existing	225,472	10%	23,375		
		2040 No-Build	223,949	9%	19,366	5,375	1.35%
		2040 Build	247,464	10%	24,741		
Warner Road	Ray Road	2018 Existing	209,244	11%	22,562		
		2040 Build	211,282	9%	18,507	5,347	1.19%
		2040 No-Build	239,690	10%	23,854		
Average					*32,426*	*5,568*	*0.15%*

Source: I-10: I-17 (Split) to Loop 202 (Santan Freeway) Traffic Operations Analysis, WSP 2019

5.3 CONFORMITY DETERMINATION

The project has met conformity requirements because it is included in conforming regional plans, and it is not expected to cause or contribute to an exceedance of the NAAQS.

The project is included in the region's RTP and the 2018-2022 FY TIP, both of which have been found to meet the CO, PM_{10}, and ozone conformity tests as identified by federal conformity regulations. Therefore, the project has met the requirement of being included in the regional plans, which have been found to conform to the SIP.

A project-level conformity determination was performed by conducting a CO hotspot analysis on affected intersections in the project vicinity. Based on modeling, intersections in the project vicinity currently do not exceed the CO NAAQS and affected intersections would not create any new exceedances of the CO NAAQS. The interagency consultation process was used to determine the CO modeling methodology. Appendix A includes documentation of communications regarding the proposed modeling approach and assumptions.

A PM_{10} project-level hotspot analysis is not required for the project because it is not a project of air quality concern. The interagency consultation process was used to establish concurrence that the project is not a project of air quality concern, as documented in Appendix A.

5.4 MSAT AND GHG NEPA ANALYSIS

5.4.1 Methodology

On February 3, 2006, FHWA released Interim Guidance on Air Toxic Analysis in NEPA Documents (FHWA 2006a). This guidance was superseded on October 18, 2016 by FHWA's Updated Interim Guidance Update on Air Toxic Analysis in NEPA Documents (FHWA 2016). The purpose of FHWA's guidance is to advise on when and how to analyze MSATs in the National Environmental Policy Act (NEPA) environmental review process for highways. This guidance is considered interim, since MSAT science is still evolving. As the science progresses, FHWA will update the guidance.

A quantitative analysis provides a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various alternatives. FHWA's Interim Guidance groups projects into the following tier categories:

1. No analysis for projects without potential for meaningful MSAT effects.
2. Qualitative analysis for projects with low potential MSAT effects.
3. Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

Based on FHWA's recommended tiering approach, the project falls within the Tier 3 approach (i.e., for projects with a high potential for MSAT effects). In accordance with FHWA's guidance, EPA's MOVES2014b was used to calculate annual MSAT emissions for the No-Build Alternative and the Build Alternative.

Draft Guidance from the Council on Environmental Quality recommends that agencies quantify a proposed action's projected direct and reasonably foreseeable indirect GHG emissions when it is practicable to quantify them using available data and tools (CEQ 2019). Based upon consultation with FHWA, it was agreed upon that direct GHG emissions would be calculated using the MSAT study area and methodology. Indirect GHG emissions were not quantified.

5.4.1.1 MSAT Study Area

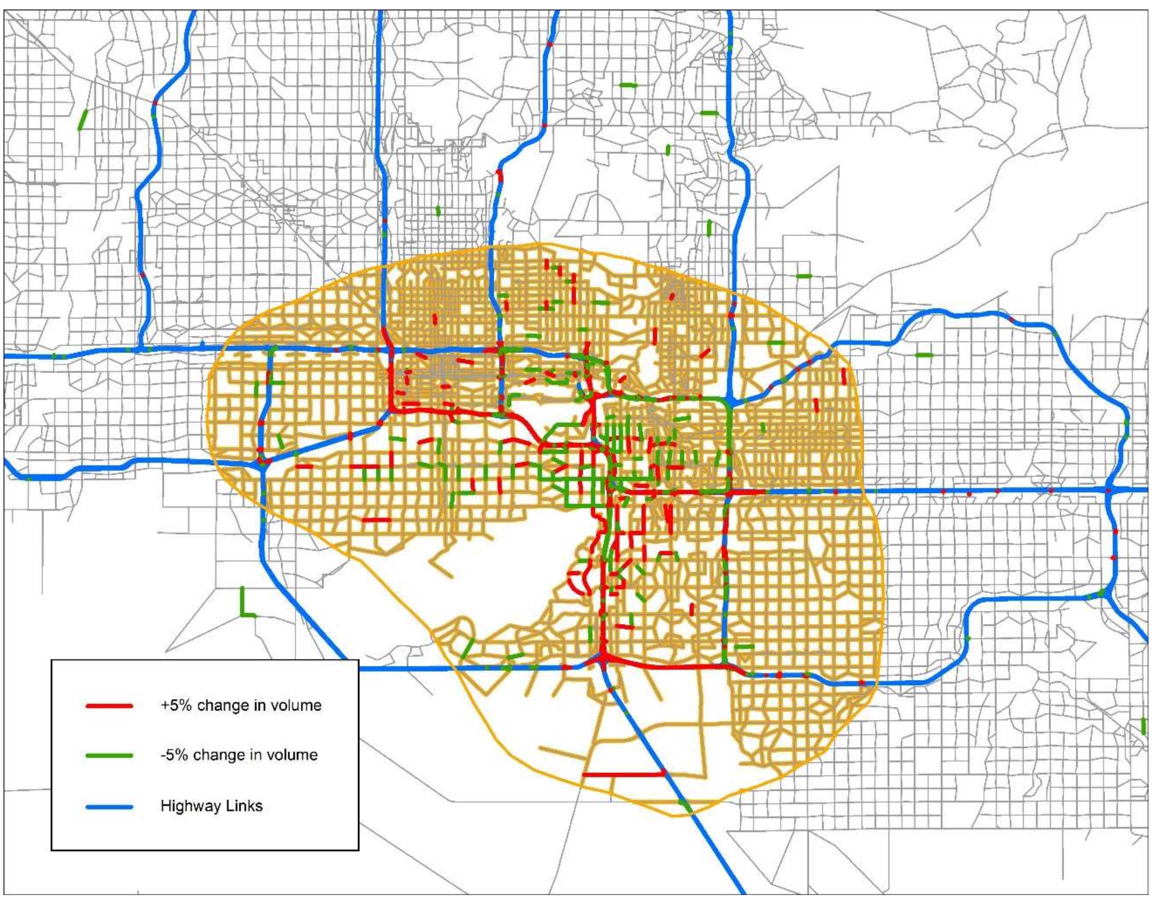
The MSAT study area was refined to focus on the portion of the study area substantially impacted by the project. FHWA recommends analyzing all segments associated with the project, plus those segments expecting meaningful changes in emissions because of the project (e.g., ± 5 percent or more).

The affected network was defined based on available project-specific information considering changes in such metrics as:

- ± 5 percent or more change in annual average daily traffic (AADT) on congested highway links
- Links with 50 or more vehicles AADT
- Project-specific knowledge and consideration of local circumstances

The study area was refined by conducting a comparison between the No-Build and Build traffic volumes for all links in the regional model. Using the recommendations described above, along with a level of judgment and local knowledge, a roadway network within a defined boundary, as shown in Figure 8, was developed. The analysis was performed using the links designated as red and green within the yellow area only.

Figure 8. Roadway Network Used to Calculate Total MSAT Emissions



Note: analysis included red and green links within the yellow boundary only

By conducting this study area screening analysis, the affected network was sized to include the project itself, nearby roadways that show meaningful changes in traffic, potential diversion routes, and the roadways in between that create a continuous network. The same affected network area was used to compute the emission burdens under all tested scenarios, including Existing Conditions and the No-Build Alternative. This allows for a “like-to-like” comparison of the total VMT and resulting pollutant emission burdens.

The project area includes major capacity-adding projects that are planned to be in operation by the analysis year 2040, under both No-Build and Build conditions. Most notably, various projects on I-10 and SR 30 will add many new links to the existing roadway network. As such, when directly comparing the pollutant burdens associated with the existing (2018) and analysis year (2040) networks, the additional VMT generated by these new projects and roadway links in 2040 should be considered.

5.4.1.2 MOVES2014b

EPA’s Motor Vehicle Emissions Simulator (MOVES) model version MOVES2014b was used to estimate emissions from the MSAT network. MOVES input files were provided by MAG, consistent with their regional emissions analysis. MAG data was used to represent regional conditions, and link-by-link traffic data was used to develop project-specific input files to demonstrate the effects of the project for each scenario analyzed: 2018, 2040 No-Build, and 2040 Build. Specific MOVES inputs are described in Table 8 and

Table 9.

Table 8. MOVES RunSpec Options

MOVES Tab	Model Selections
Scale	County scale Inventory calculation type
Time Span	Hourly time aggregation including all months, days, and hours
Geographic Bounds	Maricopa County
Vehicles/Equipment	All on-road vehicle and fuel type combinations
Road Type	All road types were selected, but not all were used for some scenarios
Pollutants and Processes	All MSAT pollutants and their precursors were selected Processes included running exhaust and crankcase running exhaust
Output	Output was produced by fuel type to differentiate diesel PM from PM produced by other fuel types

Table 9. MOVES County Data Manager Inputs

County Data Manager Tab	Data Source
Ramp Fraction	MAG
Source Type Population	MAG
Age Distribution	MAG
Fuel	MAG
Meteorology Data	MAG
Vehicle Type VMT	Created from project daily traffic data
Average Speed Distribution	Created from project daily traffic data
Road Type Distribution	Created from project daily traffic data

MOVES was used to estimate the total emissions from the MSAT network for each scenario. The VMT, emissions of each MSAT pollutant, and GHG emissions were presented in a table and compared with the existing and No-Build scenarios. MSAT emissions were calculated for the following MSATs, as required by FHWA:

- 1,3 Butadiene
- Acetaldehyde
- Acrolein
- Benzene
- Diesel PM
- Ethylbenzene
- Formaldehyde
- Naphthalene
- Polycyclic Organic Matter (POM)

GHG emissions are expressed in terms of carbon dioxide equivalent (CO_2e). MOVES derives CO_2e from the global warming potential of atmospheric carbon dioxide, methane, and nitrous oxide.

MSAT analyses are intended to capture the net change in emissions within an affected environment, defined as the transportation network affected by the project. The affected environment for MSATs may be different than the affected environment defined in the NEPA document for other environmental effects, such as noise or wetlands. Analyzing MSATs only within a geographically-defined "study area" will not capture the emissions effects of changes in traffic on roadways outside of that area, which is particularly important where the project creates an alternative route or diverts traffic from one roadway class to another. At the other extreme, analyzing a metropolitan area's entire roadway network will result in emissions estimates for many roadway links not affected by the project, diluting the results of the analysis.

5.4.2 Analysis

The results of this analysis for the existing conditions (2018) and design year (2040) are shown in Table 10. In the design year, regional MSAT and GHG emissions would be substantially lower under both No-Build and Build conditions, when compared to Existing

MSAT emissions. Build MSAT burdens would be 0 percent to 3 percent lower than No-Build emissions in the year 2040. Build GHG burdens would be approximately 3 percent lower than No-Build burdens in the year 2040.

Table 10. 2040 Predicted MSAT and GHG Emissions (tons/year)

Pollutant	Existing 2018	2040 No-Build Alternative		2040 Build Alternative		
		Value	% Change from Existing	Value	% Change from Existing	% Change from No-Build
MSAT Study Area Annual VMT	2,070,158,477	2,210,136,442	7%	2,188,673,958	6%	-1%
1,3-Butadiene	29.60	7.845	-73%	7.844	-73%	0%
Acetaldehyde	84.95	25.39	-70%	25.29	-70%	0%
Acrolein	5.05	1.52	-70%	1.50	-70%	-1%
Benzene	201.76	51.84	-74%	51.81	-74%	0%
Diesel Particulate Matter	52.96	6.21	-88%	6.01	-89%	-3%
Ethylbenzene	92.77	20.41	-78%	20.40	-78%	0%
Formaldehyde	68.34	17.41	-75%	17.09	-75%	-2%
Naphthalene	11.98	3.12	-74%	3.10	-74%	-1%
Polycyclic Organic Matter	4.21	0.97	-77%	0.97	-77%	0%
Total MSATs	551.61	134.72	-73%	134.00	-73%	-1%
CO_2e	1,876,505	1,434,673	-24%	1,395,626	-26%	-3%

In summary, it is projected that there would be changes in MSAT emissions in the immediate area of the project under the Build Alternative relative to the No-Build Alternative, as a result of the VMT changes associated with the project. MSAT levels could be higher in some locations than others, such as adjacent to the I-10 mainline, but current tools and science are not adequate to quantify them.

This document has provided a quantitative analysis of MSAT emissions relative to the proposed project and has acknowledged that the alternatives could increase exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain. However, available technical tools do not enable prediction of project-specific health impacts of the emission changes associated with the alternatives. Because of these limitations, the following discussion is included in accordance with the President's Council on Environmental Quality (CEQ) regulations (40 CFR 1502.22[b]) regarding incomplete or unavailable information.

5.4.3 Information That Is Unavailable or Incomplete

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation than by any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects"[1]. Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). A number of HEI studies are summarized in Appendix D of FHWA's Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents. Among the adverse health effects linked to MSAT compounds at high exposures are: cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations[2] or in the future as vehicle emissions substantially decrease.

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70-year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

[1] EPA, https://www.epa.gov/iris/

[2] HEI Special Report 16, https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI3. As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA states that with respect to diesel engine exhaust, "[t]he absence of adequate data to develop a sufficiently confident dose-response relationship from the epidemiologic studies has prevented the estimation of inhalation carcinogenic risk." [4]

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA, as provided by the Clean Air Act, to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable.[5]

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

[3] Special Report 16, https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects

[4] EPA IRIS database, Diesel Engine Exhaust, Section II.C. https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0642.htm#quainhal

[5] https://www.cadc.uscourts.gov/internet/opinions.nsf/284E23FFE079CD59852578000050C9DA/$file/07-1053-1120274.pdf

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APPENDIX A: INTERAGENCY CONSULTATION

Arizona Department of Transportation

Environmental Planning

Interagency Consultation

I-10, I-17 to S.R. 202L (I-10 Broadway Curve)
Improvement Project

Federal Project No. NH-010-C(220)T
ADOT Project No. 010 MA 150 F0072 01D

ADOT NEPA Air Quality Report Approval Date: TBD

FHWA Conformity Determination Submittal Date: TBD

ADOT has determined that all the conformity requirements have been met for this project and a conformity determination can be adopted and approved by FHWA pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated April 16, 2019 and executed by FHWA and ADOT.

Conformity Determination Requirements

ADOT 327 Air Quality Checklist
Check to document how conformity requirements are met:

	Currently conforming plan/TIP must be in place (40 CFR 93.114)
	Project comes from a conforming plan/TIP (40 CFR 93.115)
	Hot-spot analysis required in PM and CO areas (40 CFR 93.116 and 40 CFR 93.123)
	Compliance with SIP's PM control measures (40 CFR 93.117)
	Latest planning assumptions and emissions models (40 CFR 93.110 and 40 CFR 93.111)
	Interagency consultation (40 CFR 93.112)

For Isolated Rural Areas

N/A	**Emissions budget and/or Interim emissions (40 CFR 93.118/119)**
N/A	**Project does not interfere with the implementation of any TCM in the applicable SIP (93.113(d))**

Attachments *(As Applicable)*
FHWA Conformity Determination Letter [Required before ADOT can issue a NEPA Clearance under 23 U.S.C 327]
Appendix A – PM Conformity Documentation
Appendix B – CO Conformity Documentation

FHWA Conformity Finding Letter

Appendix A – PM Conformity Documentation

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

Project Setting and Description

The Arizona Department of Transportation (ADOT), pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated April 16, 2019 and executed by FHWA and ADOT (84 FR 26503), is preparing an Environmental Assessment (EA) of the proposed improvements to a segment of Interstate 10 (I-10) from the I-10/I-17 (Split) Traffic Interchange (TI) (Milepost [MP] 149.5) to the Loop 202 (SR202L) Santan Freeway (MP 160.9). The proposed project would widen existing I-10 to the outside between 24th Street and Ray Road.

The existing Salt River bridge would be widened to accommodate 7 general purpose (GP) lanes and 2 high-occupancy vehicle (HOV) lanes to 32nd Street. The west end of the bridge would flare to accommodate proposed future reconstruction of the I-10/I-17 system interchange. Between 32nd Street and the I-10 system interchange with US60, I-10 would have a basic 6 GP lane and 2 HOV lane typical section, with auxiliary (AUX) lanes added between interchanges and at collector-distributor (CD) roadway connections. South of Baseline Road, two GP lanes would be added in the eastbound direction to Elliot Road (6 GP lanes and 1 HOV lane) and one GP lane in the westbound (5 GP lanes and 1 HOV lane). Between Elliot Road and Ray Road, one GP lane would be added in each direction (4 GP lanes and 1 HOV lane). HOV buffers would be eliminated throughout the project length.

The SR143, Broadway Road, and 48th Street interchanges would be reconstructed and connected to new CD roads. The eastbound CD road would begin as the direct connection from southbound SR143 to eastbound I-10 with the addition of the Broadway Road eastbound on-ramp and extending to Baseline Road, providing access to US60, I-10, and Baseline Road. The westbound CD road would run between Baseline Road and 40th Street, providing access to Broadway Road, SR143, 48th Street north, University Drive, and 40th Street. A direct HOV connection between SR143 and I-10 to and from the east would also be added.

Access to I-10 eastbound from 24th, 32nd, and 40th Streets would be maintained. SR143 southbound and the Broadway Road on-ramp would access I-10 eastbound via the proposed eastbound CD road. Traffic from University Drive would no longer access I-10 eastbound via SR143, but would continue south on 48th Street to eastbound Broadway Road to access I-10 eastbound as described above. University Drive traffic could also access I-10 eastbound from the 40th Street and 32nd Street TIs.

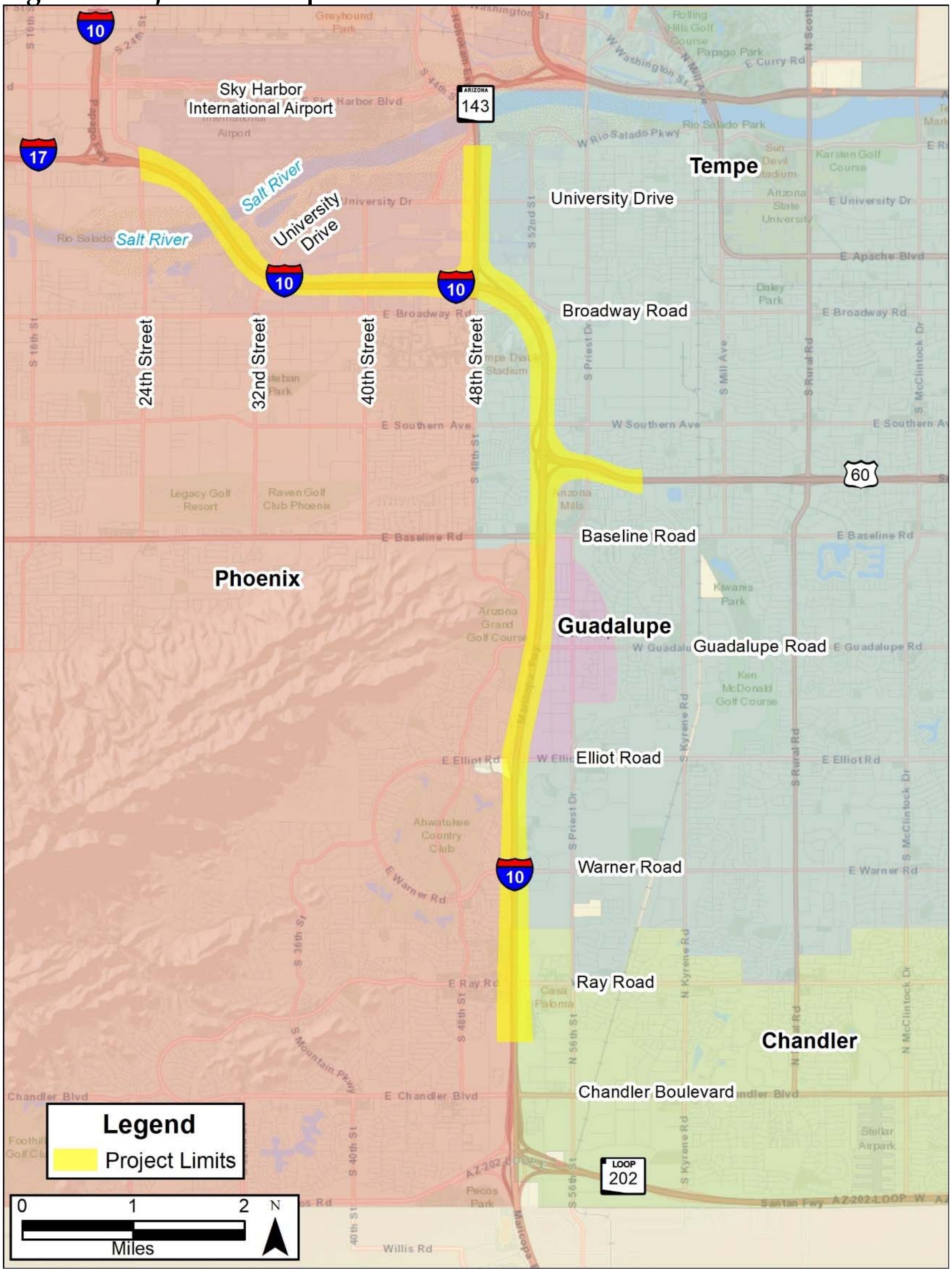
Baseline Road and SR143 southbound would access I-10 westbound via the proposed westbound CD road. A new ramp from US60 westbound would also connect directly to the westbound CD road. On ramps from 40th Street and Broadway Road westbound would provide direct access to I-10 westbound.

The interchanges at 40th Street and US60 would be modified. The existing loop on-ramp from 40th Street southbound to I-10 eastbound would be eliminated, and the I-10 eastbound off-ramp to 40th Street relocated. In addition, the I-10 westbound to US60 eastbound ramp would be widened.

The goal of this proposed project is to increase the capacity of the I-10 corridor in accordance with the approved regional and local transportation plans. This project would also seek to optimize the traffic operations within the corridor for the projected Design Year 2040 traffic demand, to retain local access at existing traffic interchanges, and to minimize or mitigate impacts the improvements could have on the surrounding community. The proposed project is included in the Maricopa Association of Governments (MAG) 2040 Regional Transportation Plan (RTP). Project construction is currently planned to begin the summer of 2021, with an expected duration of 36 months.

The project is within the Phoenix carbon monoxide (CO) maintenance area. The latest conformity determination for the FY 2018-2022 MAG Transportation Improvement Program and 2040 MAG Regional Transportation Plan for the area was made by the Federal Highway Administration and Federal Transit Administration on February 7, 2019.

Figure 1. Project Area Map



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 non-attainment 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.

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.*

NO - This is an expanded highway project, but there is not a significant increase in the number of diesel vehicles. The Maricopa Association of Governments (MAG) travel demand model estimates that the percentage of truck traffic along the corridor will not increase as a result of the project. The AADT and truck percent for the build alternative were compared to the no build alternative at four locations along the project corridor, as summarized in Table 1. The percent change in medium and heavy trucks ranges from a decrease of 3.98% to an increase of 1.35% with an average increase of 0.15%, and the total increase in medium and heavy trucks ranging from 3,260-8,734 with an average total of 5,568 medium and heavy trucks.

Table 1. AADT and Truck Percentage

		Scenario	Total AADT	% Truck	Truck AADT	Increase Truck	% Increase
I-17 Split	32nd Street	2018 Existing	305,620	14%	43,612		
		2040 No Build	330,389	13%	43,266	5,206	0.59%
		2040 Build	354,222	14%	48,472		
32nd Street	40th Street	2018 Existing	291,876	13%	38,581		
		2040 No Build	308,441	12%	38,104	5,894	0.82%
		2040 Build	333,906	13%	43,998		
40th Street	48th Street / SR143	2018 Existing	293,240	13%	38,381		
		2040 No Build	305,066	12%	36,783	6,972	0.24%
		2040 Build	355,762	12%	43,755		
48th Street / SR143	Broadway Road	2018 Existing	305,118	12%	36,286		
		2040 No Build	302,763	10%	30,647	8,734	0.48%
		2040 Build	371,398	11%	39,381		
Broadway Road	US60	2018 Existing	337,193	11%	38,767		
		2040 No Build	338,350	11%	36,120	3,260	-0.33%
		2040 Build	380,571	10%	39,380		
US60	Baseline Road	2018 Existing	152,396	15%	23,368		
		2040 No Build	147,191	13%	19,394	3,593	-3.98%
		2040 Build	250,001	9%	22,987		
Baseline Road	Elliot Road	2018 Existing	250,686	11%	27,860		
		2040 No Build	251,317	10%	24,112	5,729	1.02%
		2040 Build	281,067	11%	29,841		
Elliot Road	Warner Road	2018 Existing	225,472	10%	23,375		
		2040 No Build	223,949	9%	19,366	5,375	1.35%
		2040 Build	247,464	10%	24,741		
Warner Road	Ray Road	2018 Existing	209,244	11%	22,562		
		2040 Build	211,282	9%	18,507	5,347	1.19%
		2040 No Build	239,690	10%	23,854		
	Average				*32,426*	*5,568*	*0.15%*

Source: I-10: I-17 (Split) to Loop 202 (Santan Freeway) Traffic Operations Analysis, WSP 2019

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 increase traffic volumes for significant number of diesel trucks related to the project?

> **NO -** This is not a project that affects a congested intersection of LOS D or will change LOS to D or greater which has a significant number of diesel trucks. The intersection operation analysis shows 17 intersections have a LOS of D, E, or F, and none of these intersections has a significant number of diesel trucks (Table 2), there is a slight decrease in the number of trucks in the AM peak with two intersections showing improvement in LOS in both AM and PM peak, overall the LOS isn't impacted by this project.

Table 2. 2040 LOS and Traffic Volumes

	Existing						2040 No Build						2040 Build					
	AM			PM			AM			PM			AM			PM		
Intersection	LOS	Delay	Volume	LOS	Delay	Volume	LOS	Delay	Volume	LOS	Delay	Volume	LOS	Delay	Volume	LOS	Delay	Volume
32nd Street & I-10 EB	D	40.1	4236	D	48.5	4410	E	61.6	4991	E	63.4	5014	F	82.8	5522	F	86.5	5554
32nd Street & I-10 WB	C	25.3	3098	E	56.1	4091	D	45	3768	E	69.2	4565	D	37.5	3923	F	110.9	4778
40th Street & I-10 EB	C	28.9	3245	C	22.5	3150	C	32.5	4171	C	32.6	3649	D	51.3	4429	E	64.5	4607
40th Street & I-10 WB	D	38.4	3250	E	58.5	3419	D	47.8	3545	E	57.6	3808	F	93.4	3873	F	110.7	4108
48th Street & I-10 EB	D	54.2	4186	D	36.4	4454	-	-	-	-	-	-	-	-	-	-	-	-
Broadway Road & 48th Street	D	54.5	5519	F	112.3	6295	D	48.8	5353	F	85.3	5604	D	54.1	5395	F	81.2	5059
Broadway Road & I-10 EB	D	50.7	3631	F	175.2	4540	E	68.7	3962	F	166.8	4818	C	22.8	3406	D	43.7	3497
Broadway Road & I-10 WB / 52nd Street	E	56.2	5211	D	43.4	5213	F	81	5881	F	126.8	6213	E	60	5262	F	262.3	5764
University Drive & SR 143	C	25.3	6093	F	82.9	6698	D	41.6	6861	F	167.5	7691	C	25.1	6331	E	58.7	7090
Baseline Road & I-10 EB	E	59.4	6279	F	126.4	7519	F	106.9	6495	F	182.2	7757	F	94.4	6850	F	155.6	7590
Baseline Road & I-10 WB	D	53.9	5755	E	66.7	6313	E	71.1	5683	E	79.3	6406	F	81	6018	E	68.4	6481
Elliot Road & I-10 EB	E	73.5	4052	E	71.4	4397	F	62.1	4403	E	183.5	4779	F	148.7	6232	F	367.9	7226
Elliot Road & I-10 WB	F	172.6	3905	E	66.2	4387	F	106.6	4712	E	65	5180	F	285.3	7541	F	222.7	6901
Warner Road & I-10 EB	C	32.3	2754	F	86.4	3490	C	30.2	2772	F	103.5	3450	C	30.7	2706	F	150.7	3504
Warner Road & I-10 WB	E	55.4	3160	C	24.5	3132	F	121.4	3259	D	40	3492	F	88.6	3423	F	87.4	3711
Priest Drive & US 60 EB	D	48.2	2518	D	36.9	3776	D	47.4	2444	D	36.5	3542	D	39.4	2601	C	34.5	3473
Priest Drive & US 60 WB	C	27.1	3617	C	25.7	4191	C	28	3599	C	23.7	4119	C	23.9	3517	C	22.8	4002
Ray Road & I-10 EB	C	31.6	5148	D	49.7	5677	C	33.1	4576	C	32.5	5270	D	38.9	4874	D	38	5725
Ray Road & I-10 WB	D	44.5	4658	D	46.6	4713	D	44.7	4625	D	38.4	4626	E	59.8	4947	D	42.4	5031

Source: MAG Travel Demand Model (TR #1967)

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** –Twenty-one PM_{10} monitoring stations are located in Maricopa County, four of which are located within five miles of the project footprint. 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.

POAQC Determination

The Traffic Operations Analysis does not show a significant increase in diesel truck traffic volume due to the Project. Therefore, ADOT is recommending that this project is not a project of air quality concern and does not require a PM10 quantitative analysis.

Interagency Consultation Results

On June 6th, 2019 ADOT provided a copy of this questionnaire, to the following consultation parties, EPA, FHWA, MAG, Arizona Department of Environmental Quality (ADEQ), and Maricopa County Air Quality Department as the local air agencies in Maricopa County. There were no objections to the project determination and on June 20th, 2019 ADOT concluded Interagency Consultation by notifying interested parties that this project will proceed as a project that does not require a quantitative PM10 hot-spot analysis under 40CFR 93.123(b).

Appendix B – CO Conformity Documentation

Project Level CO Hot-Spot Analysis Questionnaire

Project Setting and Description

The Arizona Department of Transportation (ADOT), pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated April 16, 2019 and executed by FHWA and ADOT (84 FR 26503), is preparing an Environmental Assessment (EA) of the proposed improvements to a segment of Interstate 10 (I-10) from the I-10/I-17 (Split) Traffic Interchange (TI) (Milepost [MP] 149.5) to the Loop 202 (SR202L) Santan Freeway (MP 160.9). The proposed project would widen existing I-10 to the outside between 24th Street and Ray Road.

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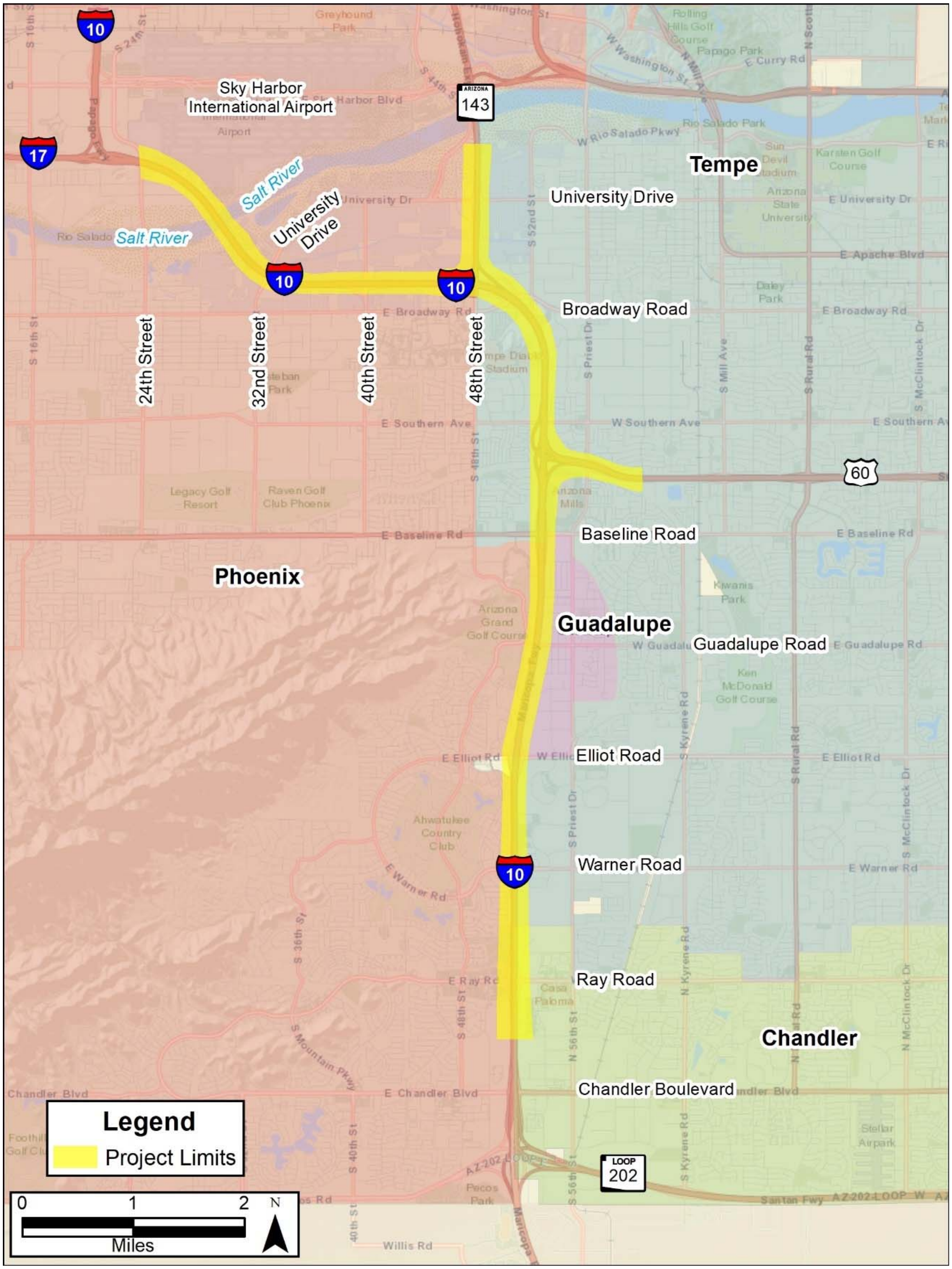
Baseline Road and SR143 southbound would access I-10 westbound via the proposed westbound CD road. A new ramp from US60 westbound would also connect directly to the westbound CD road. On ramps from 40th Street and Broadway Road westbound would provide direct access to I-10 westbound.

The interchanges at 40th Street and US60 would be modified. The existing loop on-ramp from 40th Street southbound to I-10 eastbound would be eliminated, and the I-10 eastbound off-ramp to 40th Street relocated. In addition, the I-10 westbound to US60 eastbound ramp would be widened.

The goal of this proposed project is to increase the capacity of the I-10 corridor in accordance with the approved regional and local transportation plans. This project would also seek to optimize the traffic operations within the corridor for the projected Design Year 2040 traffic demand, to retain local access at existing traffic interchanges, and to minimize or mitigate impacts the improvements could have on the surrounding community. The proposed project is included in the Maricopa Association of Governments (MAG) 2040 Regional Transportation Plan (RTP). Project construction is currently planned to begin the summer of 2021, with an expected duration of 36 months.

The project is within the Phoenix carbon monoxide (CO) maintenance area. The latest conformity determination for the FY 2018-2022 MAG Transportation Improvement Program and 2040 MAG Regional Transportation Plan for the area was made by the Federal Highway Administration and Federal Transit Administration on February 7, 2019.

Figure 1. Project Area Map



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 non-attainment 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).

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. In the project area, fifteen intersections are projected to operate at LOS D or worse in the 2040 no build scenario, and seventeen intersections are projected to operate at LOS D or worse in the 2040 build scenario (Table 1).

Table 1. 2040 LOS and Traffic Volumes

	Existing						2040 No Build						2040 Build					
	AM			PM			AM			PM			AM			PM		
Intersection	LOS	Delay	Volume	LOS	Delay	Volume	LOS	Delay	Volume	LOS	Delay	Volume	LOS	Delay	Volume	LOS	Delay	Volume
32nd Street & I-10 EB	D	40.1	4236	D	48.5	4410	E	61.6	4991	E	63.4	5014	F	82.8	5522	F	86.5	5554
32nd Street & I-10 WB	C	25.3	3098	E	56.1	4091	D	45	3768	E	69.2	4565	D	37.5	3923	F	110.9	4778
40th Street & I-10 EB	C	28.9	3245	C	22.5	3150	C	32.5	4171	C	32.6	3649	D	51.3	4429	E	64.5	4607
40th Street & I-10 WB	D	38.4	3250	E	58.5	3419	D	47.8	3545	E	57.6	3808	F	93.4	3873	F	110.7	4108
48th Street & I-10 EB	D	54.2	4186	D	36.4	4454	-	-	-	-	-	-	-	-	-	-	-	-
Broadway Road & 48th Street	D	54.5	5519	F	112.3	6295	D	48.8	5353	F	85.3	5604	D	54.1	5395	F	81.2	5059
Broadway Road & I-10 EB	D	50.7	3631	F	175.2	4540	E	68.7	3962	F	166.8	4818	C	22.8	3406	D	43.7	3497
Broadway Road & I-10 WB / 52nd Street	E	56.2	5211	D	43.4	5213	F	81	5881	F	126.8	6213	E	60	5262	F	262.3	5764
University Drive & SR 143	C	25.3	6093	F	82.9	6698	D	41.6	6861	F	167.5	7691	C	25.1	6331	E	58.7	7090
Baseline Road & I-10 EB	E	59.4	6279	F	126.4	7519	F	106.9	6495	F	182.2	7757	F	94.4	6850	F	155.6	7590
Baseline Road & I-10 WB	D	53.9	5755	E	66.7	6313	E	71.1	5683	E	79.3	6406	F	81	6018	E	68.4	6481
Elliot Road & I-10 EB	E	73.5	4052	E	71.4	4397	F	62.1	4403	E	183.5	4779	F	148.7	6232	F	367.9	7226
Elliot Road & I-10 WB	F	172.6	3905	E	66.2	4387	F	106.6	4712	E	65	5180	F	285.3	7541	F	222.7	6901
Warner Road & I-10 EB	C	32.3	2754	F	86.4	3490	C	30.2	2772	F	103.5	3450	C	30.7	2706	F	150.7	3504
Warner Road & I-10 WB	E	55.4	3160	C	24.5	3132	F	121.4	3259	D	40	3492	F	88.6	3423	F	87.4	3711
Priest Drive & US 60 EB	D	48.2	2518	D	36.9	3776	D	47.4	2444	D	36.5	3542	D	39.4	2601	C	34.5	3473
Priest Drive & US 60 WB	C	27.1	3617	C	25.7	4191	C	28	3599	C	23.7	4119	C	23.9	3517	C	22.8	4002
Ray Road & I-10 EB	C	31.6	5148	D	49.7	5677	C	33.1	4576	C	32.5	5270	D	38.9	4874	D	38	5725
Ray Road & I-10 WB	D	44.5	4658	D	46.6	4713	D	44.7	4625	D	38.4	4626	E	59.8	4947	D	42.4	5031

Source: MAG Travel Demand Model (TR #1967)

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?

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?

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

The following questionnaire is used to compare the proposed project to a list of the project types in 40 CFR 93.126 and 40 CFR 93.128 which are exempt from the requirement to determine conformity:

Exempt Projects in the CO maintenance Area
Is this one of the exempt projects listed – Safety, Mass Transit, Air Quality and Others in Table 2 of 40 CFR 93.126 or a traffic signal synchronization project described in 40 CFR 93.128?

NO. This project is not exempt under Table 2 of 40 CFR 93.126 and is not a traffic signal synchronization project as described in 40 CFR 93.128.

Hot-Spot Determination

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 and "No" to the question in the Project Assessment – Part B,

- A quantitative CO hot-spot analysis is required under 40 CFR 93.123(a)(1).
- 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 and circulated through interagency consultation for review and comments for 10 days prior to commencing any modeling activities.
- Check if the project fits the condition of the CO Categorical Hot-Spot Finding.

☐ If answered "No" to all of the questions in the Project Assessment – Part A and "No" to the question in the Project Assessment – Part B,

- A qualitative CO hot-spot 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; 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.

☐ **Regardless of the questions in the Project Assessment – Part A, if "Yes" to the question in the Project Assessment – Part B,**

- No CO hot-spot analysis is required.

This project requires a quantitative hot-spot analysis for carbon monoxide. The intersections to be modeled were determined using EPA's Guideline for Modeling Carbon Monoxide from Roadway Intersections (EPA, 1992). The intersections with the highest volumes and longest delays were identified for the 2040 build alternative. The top three intersections ranked by volume are as follows:

- Baseline Road & I-10 EB
- Elliot Road & I-10 WB
- Elliot Road & I-10 EB

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

- Elliot Road & I-10 EB
- Elliot Road & I-10 WB
- Broadway Road & I-10 WB / 52nd Street

Two of the intersections are found on both groups, thus the intersection modeling analysis will be performed for the following four intersections:

- Baseline Road & I-10 EB
- Elliot Road & I-10 WB
- Elliot Road & I-10 EB
- Broadway Road & I-10 WB / 52nd Street

Modeling will be performed for the AM and PM peak hour of existing 2018, no build 2040, and build 2040. It is assumed that if the selected worst-case intersections do not show an exceedance of the NAAQS, none of the intersections will. Since an interagency consultation is required for the analysis, the consultation document, including the methods, model, and assumptions, is attached.

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

Do the project's parameters fall within the acceptable range of modeled parameters (Use the table in the appendix, "Table 1: Project Parameters and Acceptable Ranges for CO Categorical Hot-Spot Finding" or enter the project information into FHWA's web based tool: https://www.fhwa.dot.gov/environment/air_quality/conformity/policy_and_guidance/cmcf_2017/tool.cfm)?

NO. This project's parameters do not fall within the acceptable range of modeling parameters for a CO Categorical Hot-spot Finding in Appendix Table 1 below.

Appendix

Table 1: Project Parameters and Acceptable Ranges for CO Categorical Hot-Spot Finding for Urban Intersection

Parameter	Acceptable Range
Analysis year	Greater than or equal to 2017
Angle of cross streets for intersection (degrees)	90
Maximum grade for the intersection (%)	Less than or equal to 2
Maximum grade on cross street for the intersection (%)	0
Number of through lanes	Less than or equal to 4
Number of left turn lanes	Less than or equal to 2
Lane width (ft)	12
Median width (ft)	0
Peak hour average approach speed (mph)	Greater than or equal to 25
Peak hour approach volume (vph)	Less than or equal to 2640
Peak hour Level of Service	A through E
Ambient temperature (ºF)	Greater than or equal to -10
Heavy-duty trucks (%)	Greater than or equal to 5
1-hour background CO concentrations (ppm)	Less than or equal to 32.6
8-hour background CO concentrations (ppm)	Less than or equal to 7.3
Persistence factor	Less than or equal to 0.7

Interagency Consultation Results

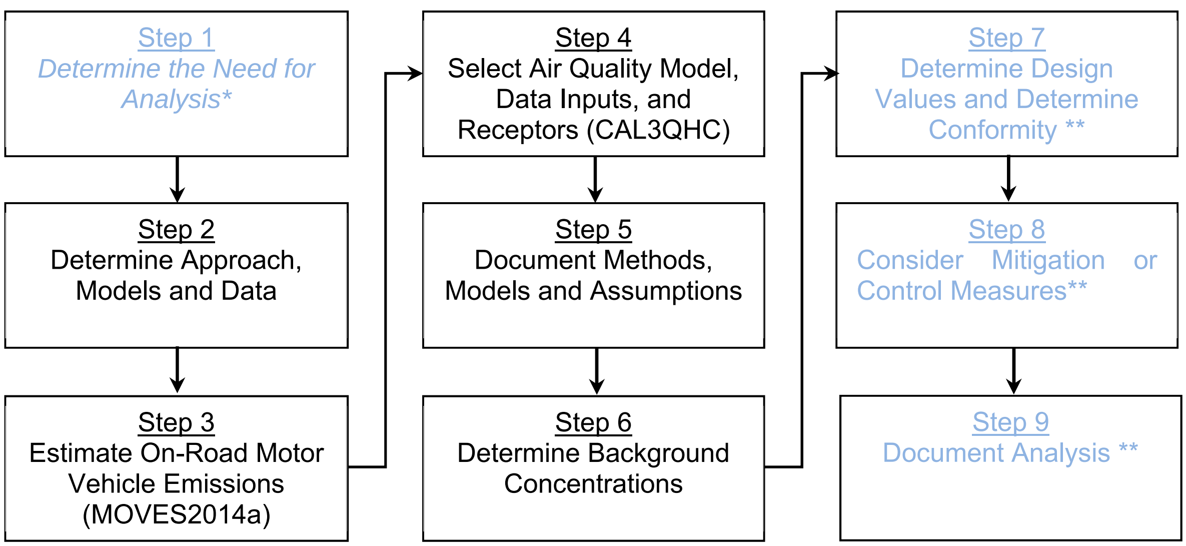
On June 6th, 2019 ADOT provided a copy of this questionnaire, to the following consultation parties, EPA, FHWA, MAG, Arizona Department of Environmental Quality(ADEQ), and Maricopa County Air Quality Department as the local air agencies in Maricopa County. There were no objections to the "Project Level CO Quantitative Hot-Spot Analysis - Consultation Document", provided below and on July 9th, 2019 ADOT concluded Interagency Consultation by notifying interested parties that this project will proceed as a project that does not require a quantitative PM10 hot-spot analysis under 40CFR 93.123(b).

Project Level CO Quantitative Hot-Spot Analysis – Consultation Document

The Arizona Department of Transportation (ADOT) developed the following consultation document for the projects of air quality concern that are funded by Federal Highway Administration (FHWA) and Federal Transit Administration (FTA). The Purpose of this document is to describe the methods, models and assumptions used for a CO quantitative Hot-spot analysis as required in 40 CFR 93.105(c)(1)(i), 93.123, 93.116.

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 MOVES2014 in Project-Level Carbon Monoxide Analyses" EPA-420-B-15-028, March 2015, 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 MOVES2014a

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.*

Methods, Models and Assumptions for CO Hot-Spot Analysis

Table 1. Methods, Models and Assumptions		
Estimate On-Road Motor Vehicle Emissions (Step 3)		
MOVES2014b	**Description**	**Data Source**
Scale	*On road, Project, Inventory*	EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.3.2
Time Span	*Four unique model runs: For existing conditions, 2018, January, weekday, AM peak hour, and PM peak hour. For future conditions, 2040, January, weekday, AM peak hour, and PM peak hour.*	EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.3.3
Geographic Bounds	*Maricopa County*	EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.3.4
Vehicles Equipment	*All Fuels and Source Use Types will be selected*	EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.3.5
Road Type	*Urban Restricted and Unrestricted access*	EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.3.6
Pollutants and Processes	*CO Running Exhaust, CO Crankcase Running Exhaust*	EPA Using MOVES2014 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 MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.3.10
Project Data Manager	*Database will be created and MOVES2014b templates will be created to include local project data and information provided by MAG's I/M programs, Fuel and Age Distribution data which are consistent with the regional models. Links will be based on travel speeds and roadway grades specific to project as provided by the traffic study. Link Source Type will be based on the regional fleet mix for each road type and year. Any missing information will use default MOVES2014b data. After running MOVES, the MOVES CO_CAL3QHC_EF post-processing script is run.*	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, as described in MOVES2014b section. The free flow and queue links defined for modeling with MOVES2014b will be used as input into CAL3QHC.*	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 (See attachment for graphical representation of model setup).*	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, Section 2.2
Traffic and Geometric Design	*Lane Configuration, Lane Width, Signalization, Turning Movements, Median Width, Traffic Volume, Level of Service, Grade, % of Heavy-Duty Trucks, and Peak Hour Average Approach Speed.*	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, Section 4.7.4
Meteorology	*The following meteorology options will be used as recommended in the CO Guidelines: a worst-case wind speed of 1 m/s, 5-degree wind direction intervals from 0 to 355 degrees, and a mixing height of 1000 m.* *Atmospheric stability class D will be used to represent an urban area.* *A surface roughness of 108 cm will be used, representing a suburban area.*	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, Section 4.7.1
Persistence Factor	*Default persistence factor of 0.7.*	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 1919 W Fairmont Drive in Tempe is directly adjacent to the project corridor. Three years of monitoring data (2015--2017) show a maximum 1-hour value of 2.0 ppm and a maximum 8-hour value of 1.7 ppm. 2.0 ppm will be added to the maximum modeled hourly concentration for comparison to the NAAQS. 1.7 ppm will be added to the maximum 8-hour modeled concentration (which is the 1-hour concentration multiplied by a persistence factor of 0.7 as described above.) The same background values will be used for all analysis years.*	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, Section 4.7.3 EPA Air Data Monitor Values Report

Table 2. Project Data Manager Inputs		
Input	**Level of Detail/notes**	**Data Source**
Meteorology	*Same for build and no-build scenarios. Emission factors will be developed for 8-9 am and 5-6 pm in*	MPO EPA Using MOVES2014 in Project-Level

	the month of January using the average temperature and humidity data obtained from the National Climatic Data Center (2018 existing condition-2018 averages, 2040 build/no-build - 2016-2018 averages).	Carbon Monoxide Analyses, Section 2.4.1
Age Distribution	*Same for build and no-build scenarios. Data from latest regional CO conformity analysis provided by MAG.*	MPO EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.4.2
Fuel	*Same for build and no-build scenarios. Data from latest regional CO conformity analysis provided by MAG.*	MPO EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.4.3
I/M Programs	*Same for build and no-build scenarios. Data from latest regional CO conformity analysis provided by MAG.*	MPO EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.4.4
Retrofit Data	*Not applicable for this project.*	Project specific modeling EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.4.7
Links	*Four selected intersections (Baseline Rd & I-10 EB, Elliot Rd & I-10 WB, Elliot Rd & I-10 EB, Broadway Rd & I-10 WB/52nd St) 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 EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.4.6
Link Source Types	*Source type distribution will be represented by the regional fleet for each road type and analysis year, based on data from latest regional CO conformity analysis provided by MAG.*	MPO EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.4.5
Link Drive Schedules, Operating Mode Distribution	*Average speed and road type will be used in the Links Importer based on project-specific modeling.*	Project specific modeling EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.4.8, 2.4.9
Off-Network, Hotelling	*Not applicable for this project.*	EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.4.9

Table 3. Construction Emissions *(Only if Applicable)*		
Construction Emissions	*Construction Emissions will be addressed qualitatively because construction is not expected to last 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 four intersections that will be modeled as part of the CO hot-spot analysis in CAL3QHC. The following applies to all figures:

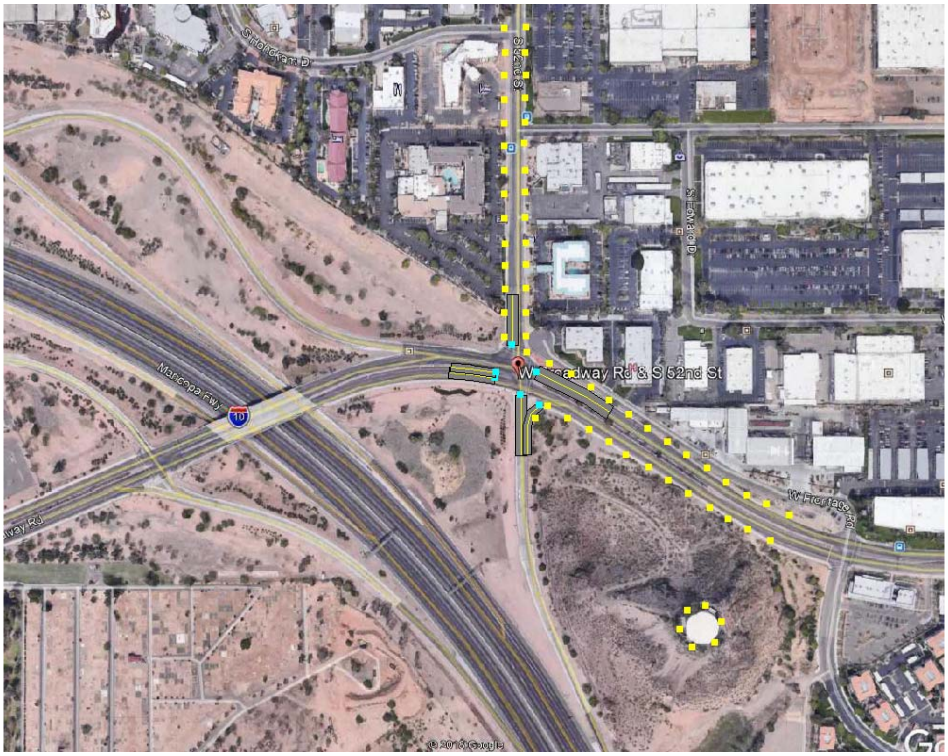
- Free flow links extend 1000 feet away from center of signalized intersection
- Graphic representation of free flow links includes 10 foot mixing zone
- Traffic activity within 1000 feet from intersections are included
- Yellow squares are receptors located 10 feet from the edge of roadway
- Receptors are spaced at 25-meter intervals outside of the mixing zone
- Receptor location coordinates will be provided by a separate file

52nd Street and West Broadway No Build/Existing

Free Flow Links:

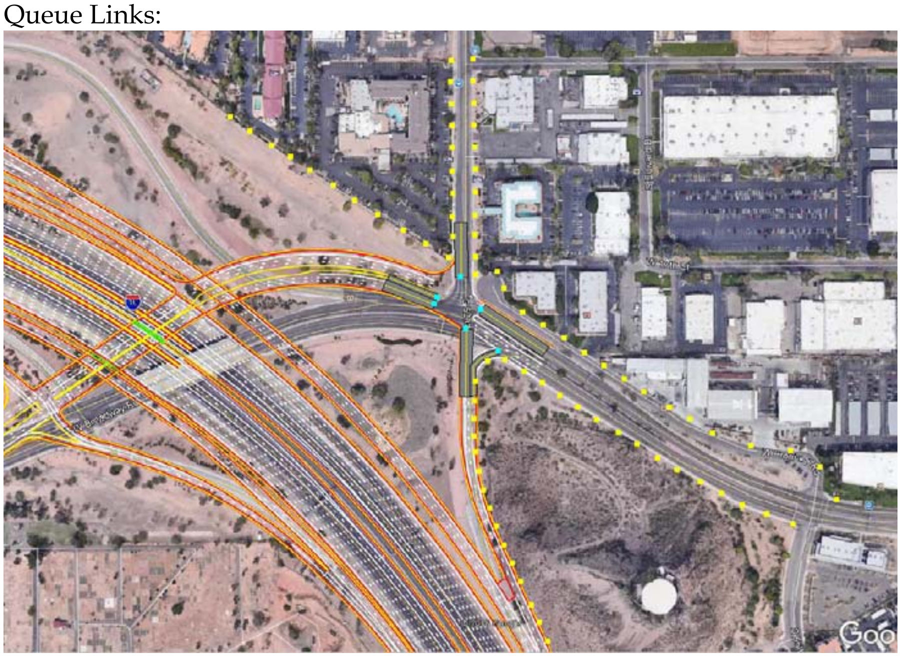
52nd Street and West Broadway

No Build/Existing Queue Links:



52nd Street and West Broadway Build Scenario
Free Flow Links:

52nd Street and West Broadway Build Scenario
Queue Links:

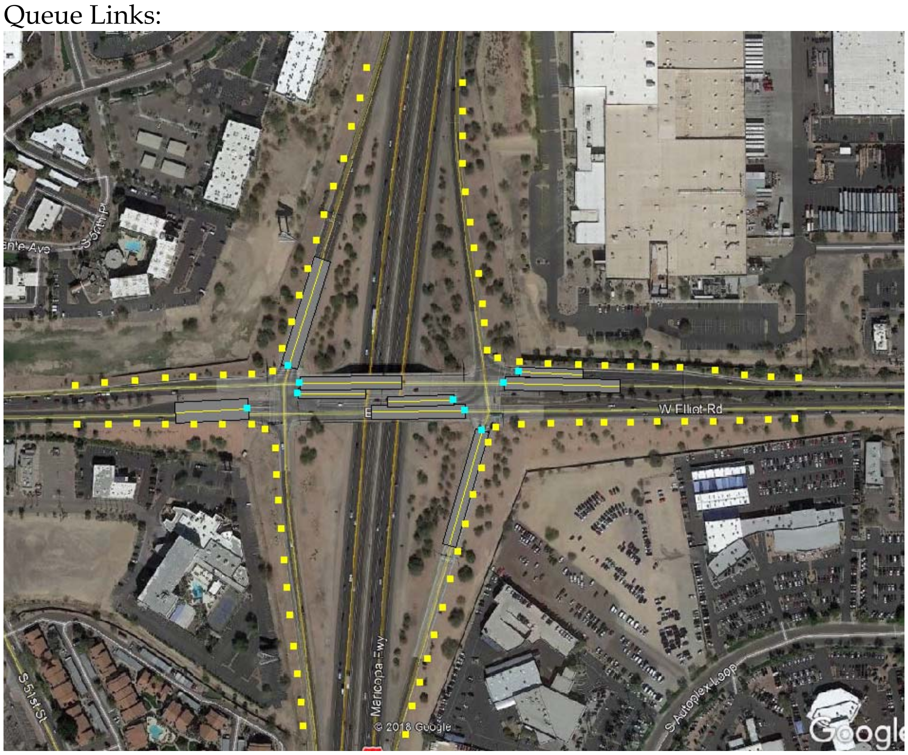


Elliot Rd at I-10 EB & WB Build and No Build Scenarios

Free Flow Links:

Elliot Rd at I-10 EB & WB Build and No Build Scenarios

Queue Links:



Baseline & I-10 Build and No Build Scenarios
Free Flow Links:

Baseline & I-10 Build and No Build Scenarios
Queue Links:

Interagency Consultation Emails

Re: Interagency Consultation: Determining Project of Air Quality Concern in MAG Region

1 message

Beverly Chenausky <bchenausky@azdot.gov> Tue, Jul 9, 2019 at 9:15 AM
To: Lindy Bauer <lbauer@azmag.gov>, "Wamsley.Jerry" <wamsley.jerry@epa.gov>, Johanna Kuspert - AQDX <JKuspert@mail.maricopa.gov>, Transportationconformity <transportationconformity@azdeq.gov>, "Hansen, Alan (FHWA)" <Alan.Hansen@dot.gov>, Paul O'brien <POBrien@azdot.gov>
Cc: Clifton Meek <meek.clifton@epa.gov>, Karina O'Conner <oconnor.karina@epa.gov>, ADOTAirNoise - ADOT <adotairnoise@azdot.gov>, Dean Giles <dgiles@azmag.gov>, Katie Rodriguez <krodriguez@azdot.gov>

As there are no objections or request for changes to the CO modeling assumptions provided June 6th, 2019, interagency consultation is complete. The project will commence with the CO modeling for conformity the results of this analysis will be included in the air quality report that will be developed for the Environmental Assessment scheduled to be released for public comment later this year. Additional notification will be provided when the draft analysis is available for review, any requested modeling files will be provided at that time, thank you.

Beverly T. Chenausky
Air & Noise Program Manager
MD EM02, Room 41
1611 W. Jackson St.
Phoenix, AZ 85007
602.712.6269
azdot.gov

ADOT Environmental Planning

On Thu, Jun 20, 2019 at 8:42 AM Beverly Chenausky <bchenausky@azdot.gov> wrote:

As there are no objections to the project determination presented for PM10, interagency consultation is complete with the project identified as a project that does not require a quantitative hot-spot analysis as listed under 40 CFR 93.123(b). Please provide any additional comments on the models, methods and assumptions used for the CO Quantitative Hot-spot modeling, by **July 8, 2019.**

Beverly T. Chenausky
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ADOT Environmental Planning

On Thu, Jun 6, 2019 at 11:59 AM Beverly Chenausky <bchenausky@azdot.gov> wrote:

ADOT is presenting the following project, **I-10, I-17 (Split) to SR202L (Santan)**, for interagency consultation per 40 CFR 93.105 as a potential project that is **not** a project of Air Quality Concern and thereby will not require a PM10 hot-spot analysis. If through interagency consultation it is determined that this project will not require a hot-spot analysis, other conformity provisions apply and will be addressed in the air quality section of the environmental clearance. ADOT is requesting responses to the attached PM questionnaire within **10 business days**; a non-response will be interpreted as concurrence that the project is not a project of air quality concern and does not require a hot-spot analysis. If any consulted party believes this project should be treated as a project of air quality concern that requires a Quantitative PM 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.

Additionally, ADOT has determined that the project requires a quantitative hot-spot analysis only for CO, the modeling assumptions for Attached is the combined *Project Level CO Hot-Spot Analysis Questionnaire* demonstrating the need for analysis and the *Project Level CO Quantitative Hot_Sot Analysis - Consultation Document.* 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,

additional information on the receptor locations is also included (as zip file). 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 describe in the attached CO document.

Beverly T. Chenausky
Air & Noise Program Manager
MD EM02, Room 41
1611 W. Jackson St.
Phoenix, AZ 85007
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ADOT
Environmental Planning

Gmail by Google

Beverly Chenausky <bchenausky@azdot.gov>

Re: Interagency Consultation: Determining Project of Air Quality Concern in MAG Region

1 message

Transportationconformity - AZDEQ <transportationconformity@azdeq.gov> Mon, Jul 8, 2019 at 3:27 PM
To: Beverly Chenausky <bchenausky@azdot.gov>, Ellen Kennedy <kennedy.ellen@azdeq.gov>

Hi Beverly, our comment letter is attached. We appreciate the opportunity to review.

Amanda Luecker

On Thu, Jun 6, 2019 at 11:59 AM Beverly Chenausky <bchenausky@azdot.gov> wrote:

> ADOT is presenting the following project, **I-10, I-17 (Split) to SR202L (Santan),** for interagency consultation per 40 CFR 93.105 as a potential project that is **not** a project of Air Quality Concern and thereby will not require a PM10 hot-spot analysis. If through interagency consultation it is determined that this project will not require a hot-spot analysis, other conformity provisions apply and will be addressed in the air quality section of the environmental clearance. ADOT is requesting responses to the attached PM questionnaire within **10 business days**; a non-response will be interpreted as concurrence that the project is not a project of air quality concern and does not require a hot-spot analysis. If any consulted party believes this project should be treated as a project of air quality concern that requires a Quantitative PM 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.
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> Additionally, ADOT has determined that the project requires a quantitative hot-spot analysis only for CO, the modeling assumptions for Attached is the combined *Project Level CO Hot-Spot Analysis Questionnaire* demonstrating the need for analysis and the *Project Level CO Quantitative Hot_Sot Analysis - Consultation Document.* 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, additional information on the receptor locations is also included (as zip file). 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 describe in the attached CO document.
>
> **Beverly T. Chenausky**
> **Air & Noise Program Manager**
> MD EM02, Room 41
> 1611 W. Jackson St.
> Phoenix, AZ 85007
> 602.712.6269
> azdot.gov
>
> ADOT Environmental Planning

ADEQ Comment Letter to ADOT on I10 I17 to SR202L.pdf
49K

Arizona Department of Environmental Quality

Douglas A. Ducey
Governor

Misael Cabrera
Director

July 8, 2019

Beverly T. Chenausky
Air & Noise Program Manager
MD EM02, Room 41
1611 W. Jackson St.
Phoenix, AZ 85007

Dear Ms. Chenausky:

We have reviewed the Arizona Department of Transportation's (ADOT) *Project Level CO Hot-Spot Analysis Questionnaire* and *Project Level CO Quantitative Hot Spot Analysis - Consultation Document* for the I-10, I-17 (Split) to SR202L (Santan) project (ADOT Project No.: 010 MA 150 F0072 01D), received by our office on June 6, 2019.

The Arizona Department of Environmental Quality (ADEQ) does not have comments on the project's air quality analysis at this time. We consider transportation planning an important part of our mission to protect and enhance public health and the environment in Arizona. As such, ADEQ looks forward to additional opportunities to consult with ADOT as this project advances.

Sincerely,

Daniel Czecholinski
Acting Air Quality Director

Gmail by Google

Beverly Chenausky <bchenausky@azdot.gov>

RE: 010-C(220); F0072 - AQ Review

1 message

Yedlin, Rebecca (FHWA) <Rebecca.Yedlin@dot.gov> Tue, May 28, 2019 at 7:33 AM
To: "bchenausky azdot.gov" <bchenausky@azdot.gov>
Cc: "Lirange, Aryan (FHWA)" <Aryan.lirange@dot.gov>

While the traffic data issue is being worked out, the following are comments in response to the info you provided below:

1. For the MSAT analysis – FHWA is available to review the additional/updated information, once it's available.
2. For the CO Hot-Spot:
   a. FHWA would like more clarity on their receptor locations and to see another map of them. A conference call on the receptor locations might be warranted after they provide an updated map of the receptor locations.
   b. ADOT must follow the 1992 CO Guideline and cannot use the average December temperature (the MPO most likely used the daily profile for December and not the December average.) In the 1992 CO Guideline Section 4.7.1 and reiterated in the 2015 'Using MOVES2014 in Project-Level Carbon Monoxide Analyses' section 2.4.1 (page 19) there are two options for meteorology regarding CO Hot-Spot modeling. Below are the 2 options that can be used:

1. The temperature and humidity corresponding to each of the ten highest nonoverlapping 8-hour CO monitoring values for the last three years should be obtained. The average 8-hour temperature and humidity for each event should be calculated and then all ten values should be averaged for use with MOVES.
2. Alternatively, the average temperature and humidity in January may be used. Meteorological data may be obtained either from the National Weather Service (NWS) or as part of a site-specific measurement program. Local universities, the Federal Aviation Administration (FAA), military stations, and state and local air agencies may also be sources of such data. The National Oceanic and Atmospheric Administration's National Climatic Data Center (NCDC; online at www.ncdc.noaa.gov) is the world's largest active archive of weather data through which years of archived data can be obtained. A data source should be selected that is representative of local meteorological conditions.

Let me know if you have any questions and/or would like to meet with the Division and the Resource Center to discuss further. Thanks,
Rebecca

From: bchenausky azdot.gov
Sent: Wednesday, May 22, 2019 2:45 PM
To: Yedlin, Rebecca (FHWA) <Rebecca.Yedlin@dot.gov>
Cc: Lirange, Aryan (FHWA) <Aryan.lirange@dot.gov>
Subject: Re: 010-C(220); F0072 - AQ Review

Rebecca - Do you have an estimated time of when FHWA will be providing comments for the PM10? We have a tight deadline and would like to start interagency consultation for this project. Also the answers to the earlier comments are provided below.

1. or CO, based on the traffic forecasts provided, FHWA concurs that the project requires a hot-spot analysis and does not meet the thresholds for the categorical hot-spot.

   a. Comments regarding the CO hot-spot modeling methodology:

      i. Are both the AM and PM peak rates going to be modeled with CAL3QHC? Yes, we are going to see both AM/PM peak emission factors to make sure which one is worse. Unlike other areas, sometimes PM could be worse than AM in Arizona.

      ii. (Additional comments included in the figures.) Additional receptors need to be added. To adhere to the 1992 guidance the receptors along the approach legs should be spaced 25 meters apart from each other. That should be stated here. We will add more receptors with 25 m spaces and review the locations.

      iii. Since the persistence factor is being used for the 8 hr CO concentration are both the AM peak and PM peak going to be modeled with CAL3QHC? Yes, answered above. but please let us know if you anticipate any problems for modeling both AM and PM.

      iv. The average January temperature and humidity is being used here, correct? The specific hour temperature and humidity should not be used for MOVES modeling but the average January temperature and humidity according to the guidance. Just to clarify the data from the regional CO conformity analysis should be used to obtain the average January temperature and humidity. The regional CO conformity analysis done by MPO (MAG) used December average temperature and humidity, so we are planning to use them (will correct month in the table).

v. There are a couple of locations where receptors need to be added where there is public access. A review on google maps, for example, saw some sidewalks that were not accounted for. Answered above "ii".

2. For MSAT, based on the information provided, FHWA concurs that the project will require a quantitative MSAT analysis.

   a. Please provide a pdf showing the proposed area of influence. Will provide.
   b. Based on the information on page 6 of the "F0072_I-10 Broadway MSAT Project-level Analysis_FHWAReview_04012019.docx" it does not appear that enough information has been provided to determine an "area of influence." The analysis only considers volume changes of +/- 5%. We will provide a boundary of the area of influence and add more explanation.
   c. Per the FHWA FAQs on conducting Quantitative MSAT Analysis (FAQs), the +/- 5% volume change should only apply to those areas of LOS D or worse. While this applies to much of I-10 in the study area, there are roads (namely SR 143 and US 60) that do not have LOS D (or worse) and therefore should be considered for volume changes of +/- 10%. Will review the options.
   d. Additionally, it may be useful to see where travel times vary by more than +/-10%, to help determine the area of influence (as suggested in the FAQs). Same as above.
   e. Based solely on the +/- 5% volume changes shown on page 6, it appears that some of the identified links could be considered "model noise" and would not necessarily need to be part of the area of influence (for example: the few identified links located east of Route 101, or north of Route 202). Need to verify with review of area of influence pdf. Answered above "b".

-- Let me know if you need more information, thanks.

Beverly T. Chenausky
Air & Noise Program Manager
MD EM02, Room 41
1611 W. Jackson St.
Phoenix, AZ 85007
602.712.6269
azdot.gov

ADOT
Environmental Planning

On Thu, May 2, 2019 at 6:49 AM Yedlin, Rebecca (FHWA) <Rebecca.Yedlin@dot.gov> wrote:

FHWA is working on the review of the POAQC and supporting documentation.

While we complete the review of the PM_{10} analysis, I wanted to send you the comments on the CO and MSAT. Our comments:

1. For CO, based on the traffic forecasts provided, FHWA concurs that the project requires a hot-spot analysis and does not meet the thresholds for the categorical hot-spot.

   a. Comments regarding the CO hot-spot modeling methodology:

i. Are both the AM and PM peak rates going to be modeled with CAL3QHC?

ii. (Additional comments included in the figures.) Additional receptors need to be added. To adhere to the 1992 guidance the receptors along the approach legs should be spaced 25 meters apart from each other. That should be stated here.

iii. Since the persistence factor is being used for the 8 hr CO concentration are both the AM peak and PM peak going to be modeled with CAL3QHC?

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Thanks, Rebecca

Rebecca Yedlin

Environmental Coordinator

Federal Highway Administration Arizona Division

4000 N Central Ave, Ste#1500

Phoenix, AZ 85012

602.382.8979

Re: Interagency Consultation: Determining Project of Air Quality Concern in MAG Region

1 message

Beverly Chenausky <bchenausky@azdot.gov> Thu, Jun 20, 2019 at 8:42 AM
To: Lindy Bauer <lbauer@azmag.gov>, "Wamsley.Jerry" <wamsley.jerry@epa.gov>, Johanna Kuspert - AQDX <JKuspert@mail.maricopa.gov>, Transportationconformity <transportationconformity@azdeq.gov>, "Hansen, Alan (FHWA)" <Alan.Hansen@dot.gov>, Paul O'brien <POBrien@azdot.gov>
Cc: Clifton Meek <meek.clifton@epa.gov>, Karina O'Conner <oconnor.karina@epa.gov>, ADOTAirNoise - ADOT <adotairnoise@azdot.gov>, Dean Giles <dgiles@azmag.gov>, Katie Rodriguez <krodriguez@azdot.gov>

As there are no objections to the project determination presented for PM10, interagency consultation is complete with the project identified as a project that does not require a quantitative hot-spot analysis as listed under 40 CFR 93.123(b). Please provide any additional comments on the models, methods and assumptions used for the CO Quantitative Hot-spot modeling, by **July 8, 2019.**

Beverly T. Chenausky
Air & Noise Program Manager
MD EM02, Room 41
1611 W. Jackson St.
Phoenix, AZ 85007
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azdot.gov

ADOT Environmental Planning

On Thu, Jun 6, 2019 at 11:59 AM Beverly Chenausky <bchenausky@azdot.gov> wrote:

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> azdot.gov
>
> ADOT Environmental Planning

Gmail by Google

Beverly Chenausky <bchenausky@azdot.gov>

Interagency Consultation: Determining Project of Air Quality Concern in MAG Region

1 message

Beverly Chenausky <bchenausky@azdot.gov> Thu, Jun 6, 2019 at 11:59 AM
To: Lindy Bauer <lbauer@azmag.gov>, "Wamsley.Jerry" <wamsley.jerry@epa.gov>, Johanna Kuspert - AQDX <JKuspert@mail.maricopa.gov>, Transportationconformity <transportationconformity@azdeq.gov>, "Hansen, Alan (FHWA)" <Alan.Hansen@dot.gov>, Paul O'brien <POBrien@azdot.gov>
Cc: Clifton Meek <meek.clifton@epa.gov>, Karina O'Conner <oconnor.karina@epa.gov>, ADOTAirNoise - ADOT <adotairnoise@azdot.gov>, Dean Giles <dgiles@azmag.gov>, Katie Rodriguez <krodriguez@azdot.gov>

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ADOT Environmental Planning

3 attachments

F0072_PM10 Consultation_0662019.pdf
386K

F0072_CO Hotspot_Consultation_0606209.pdf

1951K

Receptors.zip
4K

Beverly Chenausky <bchenausky@azdot.gov>

Re: FW: 010-C(220); F0072 - AQ Review

1 message

Amy Ritz <aritz@azdot.gov> Tue, May 28, 2019 at 9:11 AM
To: "Lirange, Aryan (FHWA)" <Aryan.lirange@dot.gov>
Cc: "Thoms, Sandra" <Sandra.Thoms@wsp.com>, "Steve Mishler (MMishler@azdot.gov)" <MMishler@azdot.gov>, "Grombacher, Sam M." <Sam.Grombacher@wsp.com>, "Fly, Becky" <BECKY.FLY@wsp.com>, "bchenausky azdot.gov" <bchenausky@azdot.gov>, "Yedlin, Rebecca (FHWA)" <Rebecca.Yedlin@dot.gov>, Katie Rodriguez <krodriguez@azdot.gov>

Aryan,
Our conversations with MAG do not change the number of lanes, just the width of the lanes. The 5+1 is just Baseline to Elliot but that remains unchanged.

Amy Ritz

Project Manager

Major Projects

(602) 708-0267

aritz@azdot.gov

ADOT

On Tue, May 28, 2019 at 6:36 AM Lirange, Aryan (FHWA) <Aryan.lirange@dot.gov> wrote:

> Good Morning… I understand that there are deliberations with MAG and the project team about modifying the southern section of the project from a 5+1 to a 4+1. The graphics at the back of the traffic memo show a 5+1 and I presume the mem data tables are based on 5+1.
>
> Beverly, can you provide feedback on if and how this change to 4+1 (reduction of lanes and change in operation) would impact the analysis you are performing?
>
> *Aryan*
>
> Arizona FHWA – Senior Urban Engineer
>
> (eMail) aryan.lirange@dot.gov
>
> (602) 382 8973 | cell (602) 999 2921
>
> **From:** bchenausky azdot.gov
> **Sent:** Friday, May 24, 2019 9:50 AM
> **To:** Yedlin, Rebecca (FHWA) <Rebecca.Yedlin@dot.gov>
> **Subject:** Re: 010-C(220); F0072 - AQ Review
>
> We have a final May 7, 2019 traffic memo based on Aryan's comments, as noted and attached and we already provided the Shapefiles.
>
> "Good morning everyone,

Some questions were raised about the consistency between some of the 2040 Build volumes in the MAG TDM (shapefile) and the Traffic Memo. We looked into it and found that the Traffic Memo was reporting 2040 Build volumes from a different version of the MAG TDM – the one used for the Spine Study. The numbers used for the Air Quality and Noise Analysis were the most recent ones that correlate to the provided shapefile. I have since updated the Traffic Memo to reflect the newest 2040 Build volumes which match the shapefile. An additional change you will note is in the Truck volumes. The MAG TDM shows trucks in the HOV lanes and those were not extracted and represented in the previous version of the memo. Now the number of trucks shown represents those in the GP and HOV lanes.

Additionally, Aryan Lirange from FHWA had asked about the intersection LOS table that was provided as part of the Air Quality document. I have added a sub-section of the memo to present that table (Tables 6, 7, & 8) and discuss how those results were obtained."

Beverly T. Chenausky
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ADOT
Environmental Planning

On Thu, May 23, 2019 at 8:56 AM Yedlin, Rebecca (FHWA) <Rebecca.Yedlin@dot.gov> wrote:

FHWA is reviewing the responses you provided below. I hope to get a response to you on those pieces by the end of next week.

As for the PM10, we are still waiting for the final traffic data from the PM. We can complete our review of that piece once we receive the information requested. Thanks, Rebecca

From: bchenausky azdot.gov
Sent: Wednesday, May 22, 2019 2:45 PM
To: Yedlin, Rebecca (FHWA) <Rebecca.Yedlin@dot.gov>
Cc: Lirange, Aryan (FHWA) <Aryan.lirange@dot.gov>
Subject: Re: 010-C(220); F0072 - AQ Review

Rebecca - Do you have an estimated time of when FHWA will be providing comments for the PM10? We have a tight deadline and would like to start interagency consultation for this project. Also the answers to the earlier comments are provided below.

1. or CO, based on the traffic forecasts provided, FHWA concurs that the project requires a hot-spot analysis and does not meet the thresholds for the categorical hot-spot.
    a. Comments regarding the CO hot-spot modeling methodology:
        i. Are both the AM and PM peak rates going to be modeled with CAL3QHC? Yes, we are going to see both AM/PM peak emission factors to make sure which one is worse. Unlike other areas, sometimes PM could be worse than AM in Arizona.
        ii. (Additional comments included in the figures.) Additional receptors need to be added. To adhere to the 1992 guidance the receptors along the approach legs should be spaced 25 meters apart from each other. That should be stated here. We will add more receptors with 25 m spaces and review the locations.
        iii. Since the persistence factor is being used for the 8 hr CO concentration are both the AM peak and PM peak going to be modeled with CAL3QHC? Yes, answered above. but please let us know if you anticipate any problems for modeling both AM and PM.

APPENDIX B: CO CAL3QHC AND MOVES MODELING FILES

CO CAL3QHC and MOVES modeling files are available upon request. One MOVES runspec file is shown below:


```
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CO Hotspot
2018 AM]]></description>
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sourcetypeid="21" sourcetypename="Passenger Car"/>
                <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline"
sourcetypeid="31" sourcetypename="Passenger Truck"/>
                <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline"
sourcetypeid="51" sourcetypename="Refuse Truck"/>
                <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline"
sourcetypeid="43" sourcetypename="School Bus"/>
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sourcetypeid="53" sourcetypename="Single Unit Long-haul Truck"/>
                <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline"
sourcetypeid="52" sourcetypename="Single Unit Short-haul Truck"/>
                <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline"
sourcetypeid="42" sourcetypename="Transit Bus"/>
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        <offroadvehicleselections>
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        </offroadvehiclesccs>
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modelCombination="M1"/>
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modelCombination="M1"/>
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Monoxide (CO)" processkey="15" processname="Crankcase Running Exhaust"/>
        </pollutantprocessassociations>
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        </databaseselections>
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classname="gov.epa.otaq.moves.master.implementation.ghg.internalcontrolstrategies.rateofp
rogress.RateOfProgressStrategy"><![CDATA[
useParameters  No

]]></internalcontrolstrategy>
        </internalcontrolstrategies>
        <inputdatabase servername="" databasename="" description=""/>
        <uncertaintyparameters uncertaintymodeenabled="false"
numberofrunspersimulation="0" numberofsimulations="0"/>
        <geographicoutputdetail description="LINK"/>
        <outputemissionsbreakdownselection>
                <modelyear selected="false"/>
                <fueltype selected="false"/>
                <fuelsubtype selected="false"/>
                <emissionprocess selected="false"/>
                <onroadoffroad selected="true"/>
                <roadtype selected="false"/>
                <sourceusetype selected="false"/>
                <movesvehicletype selected="false"/>
                <onroadscc selected="false"/>
                <estimateuncertainty selected="false" numberOfIterations="2"
keepSampledData="false" keepIterations="false"/>
                <sector selected="false"/>
                <engtechid selected="false"/>
                <hpclass selected="false"/>
                <regclassid selected="false"/>
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description=""/>
        <outputtimestep value="Hour"/>
```

```
        <outputvmtdata value="true"/>
        <outputsho value="false"/>
        <outputsh value="false"/>
        <outputshp value="false"/>
        <outputshidling value="false"/>
        <outputstarts value="false"/>
        <outputpopulation value="false"/>
        <scaleinputdatabase servername="localhost" databasename="co_hotspot_2018_in"
description=""/>
        <pmsize value="0"/>
        <outputfactors>
                <timefactors selected="true" units="Hours"/>
                <distancefactors selected="true" units="Miles"/>
                <massfactors selected="true" units="Grams" energyunits="Million BTU"/>
        </outputfactors>
        <savedata>

        </savedata>

        <donotexecute>

        </donotexecute>

        <generatordatabase shouldsave="false" servername="" databasename=""
description=""/>
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        <lookuptableflags scenarioid="" truncateoutput="true" truncateactivity="true"
truncatebaserates="true"/>
</runspec>
```

APPENDIX C: MSAT AND CO2E MOVES MODELING FILES AND CO2E MOVES MODELING FILES

MSAT and CO_2e MOVES modeling files are available upon request. One MOVES runspec file is shown below:


```
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	<description><![CDATA[Regional Emissions
2040 Build]]></description>
	<models>
		<model value="ONROAD"/>
	</models>
	<modelscale value="Inv"/>
	<modeldomain value="SINGLE"/>
	<geographicselections>
		<geographicselection type="COUNTY" key="4013" description="ARIZONA -
Maricopa County"/>
	</geographicselections>
	<timespan>
		<year key="2040"/>
		<month id="1"/>
		<month id="2"/>
		<month id="3"/>
		<month id="4"/>
		<month id="5"/>
		<month id="6"/>
		<month id="7"/>
		<month id="8"/>
		<month id="9"/>
		<month id="10"/>
		<month id="11"/>
		<month id="12"/>
		<day id="2"/>
		<day id="5"/>
		<beginhour id="1"/>
		<endhour id="24"/>
		<aggregateBy key="Hour"/>
	</timespan>
	<onroadvehicleselections>
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Gas (CNG)" sourcetypeid="62" sourcetypename="Combination Long-haul Truck"/>
		<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural
Gas (CNG)" sourcetypeid="61" sourcetypename="Combination Short-haul Truck"/>
		<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural
Gas (CNG)" sourcetypeid="41" sourcetypename="Intercity Bus"/>
		<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural
Gas (CNG)" sourcetypeid="32" sourcetypename="Light Commercial Truck"/>
		<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural
Gas (CNG)" sourcetypeid="54" sourcetypename="Motor Home"/>
		<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural
Gas (CNG)" sourcetypeid="11" sourcetypename="Motorcycle"/>
		<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural
Gas (CNG)" sourcetypeid="21" sourcetypename="Passenger Car"/>
		<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural
Gas (CNG)" sourcetypeid="31" sourcetypename="Passenger Truck"/>
		<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural
Gas (CNG)" sourcetypeid="51" sourcetypename="Refuse Truck"/>
		<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural
Gas (CNG)" sourcetypeid="43" sourcetypename="School Bus"/>
		<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural
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		<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural
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		<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural
Gas (CNG)" sourcetypeid="42" sourcetypename="Transit Bus"/>
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sourcetypeid="62" sourcetypename="Combination Long-haul Truck"/>
```

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<pollutantprocessassociation pollutantkey="72" pollutantname="Anthracene particle" processkey="16" processname="Crankcase Start Exhaust"/>
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