Arizona Department of Transportation

Environmental Planning

DRAFT REPORT
Air Quality Technical Report

I-10, Jct I-19 to Kolb Road and SR210, Golf Links Road to I-10

Federal Project No. 010-E(210)S
ADOT Project No. 010 PM 260 H7825 01L

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Draft Air Quality Technical Report
FOR
I-10, Jct I-19 to Kolb Road and SR210, Golf Links Road to I-10

Federal Project No. 101-E(210)S
ADOT Project No. 010 PM 260 H7825 01L

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Executive Summary

The Interstate 10 (I-10) from the junction of I-19 to Kolb Road and the extension of the Barraza-Aviation Parkway (State Route 210 [SR 210]) from Golf Links Road to I-10 Project is located in the city of South Tucson, the city of Tucson, and unincorporated Pima County. Two alternatives, System I and System IV, were screened from a total of eight alternatives evaluated in the feasibility study that also included System II, III, IIIa, IIIb, and IIIc alternatives as well as a no-build alternative.

The System I alternative would extend SR 210 to the south, generally along Alvernon Way, to intersect with I-10 east of the existing Alvernon Way traffic interchange (TI). Under this alternative, I-10 would be widened to include the following:

- Four lanes in each direction from I-19 to Kino Parkway
- Three lanes in each direction from Kino Parkway to Alvernon Way
- Five lanes in each direction west of Alvernon Way

Modifications to TIs at Park Avenue, Kino Parkway, Craycroft Road, Valencia Road, and Alvernon Way to maximize weaving distances, the removal of the Palo Verde Road TI and the addition of a TI at Country Club Road are also proposed.

The System IV alternative would also extend SR 210 to the south, generally along Alvernon Way, and proposes the same modifications to TIs and the addition of a TI at Country Club Road proposed for Alternative I. Alternative IV would widen I-10 from the I-19 junction to Kolb Road with the addition of two-lane collector-distributor roadways running parallel to the existing three-lane freeway mainline.
Figure ES-1 shows the project area.

Requirements of the air quality analysis are separated into the following four criteria areas:

- The impacts on air quality during construction were assessed qualitatively based on the expected construction activities and potential mitigation.
- The impacts of project operation were assessed by comparing the system alternatives-affected intersections to the no-build alternative level of service (LOS) and qualitatively describe the improvement in LOS that would result in equal or lesser impacts compared to the no-build alternative.
- The impacts from mobile source air toxics (MSATs) were addressed quantitatively based on projected traffic volumes and resultant MSAT emissions and potential mitigation.
- The impacts of project operation on climate change were assessed qualitatively based on the projected traffic volumes and resultant greenhouse gas (GHG) emissions.

The results of the quantitative MSAT and GHG analyses for the modeled scenarios of existing conditions (2017) and analysis year (2045) are presented in Tables ES-1 and ES-2, respectively.

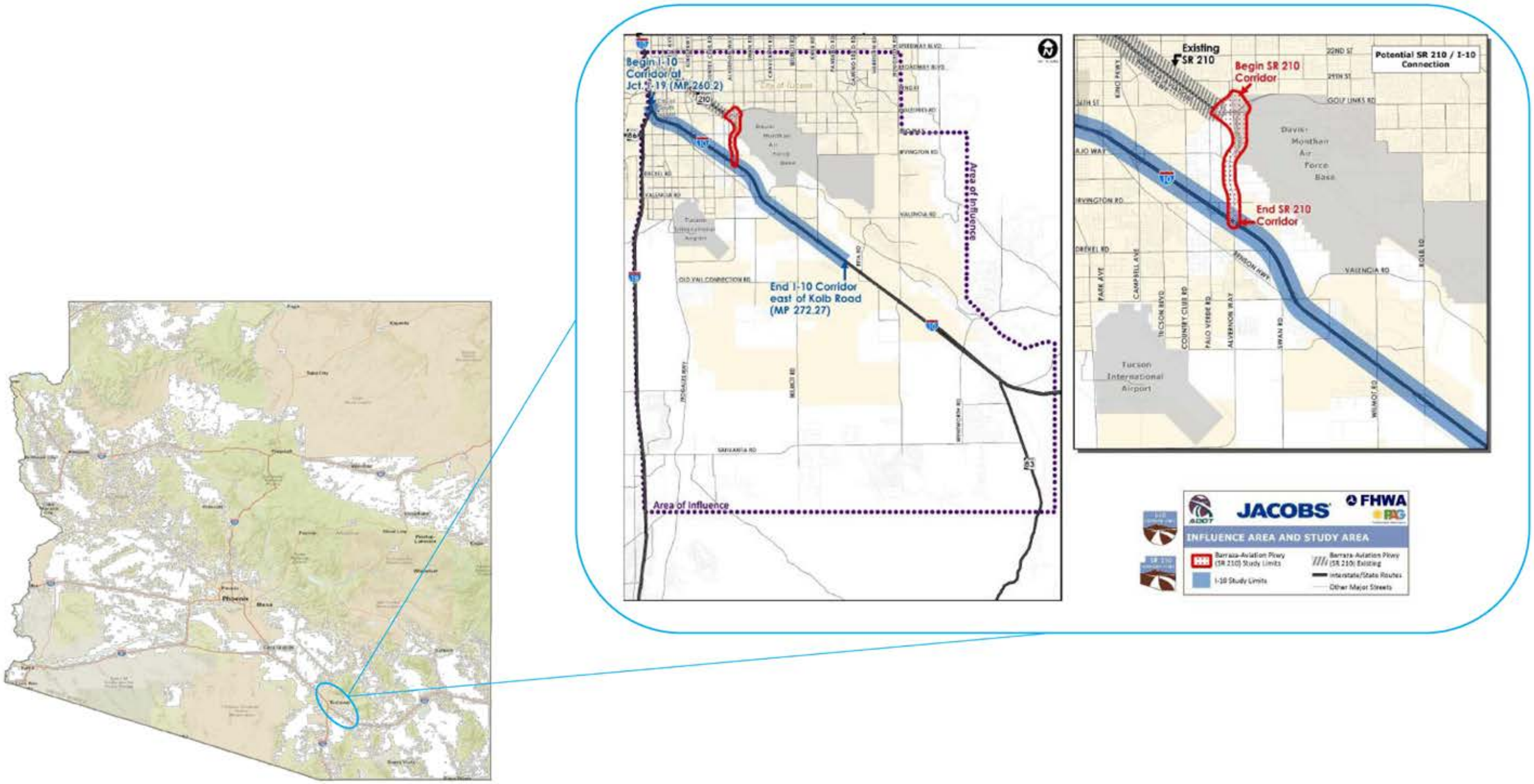

Figure ES-1. Project Area

Table ES-1. Predicted MSAT Emissions

Pollutant	Predicted MSAT Emissions (tons/year)				% Change from No-Build		% Change from Existing	
	2017 Existing	2045 No-Build	2045 System I	2045 System IV	2045 System I	2045 System IV	2045 System I	2045 System IV
1,3-Butadiene	2.8	0.0	0.0	0.0	-12.9%	-12.9%	-99.6%	-99.6%
Acetaldehyde	6.7	2.3	2.1	2.1	-9.1%	-9.1%	-69.2%	-69.2%
Acrolein	0.9	0.3	0.3	0.3	-9.5%	-9.5%	-68.0%	-68.0%
Benzene	40.1	12.8	12.1	12.2	-5.0%	-4.8%	-69.8%	-69.7%
Diesel PM	24.9	6.4	5.7	5.7	-9.9%	-9.9%	-77.0%	-77.0%
Ethyl Benzene	26.8	12.9	12.4	12.5	-3.8%	-3.1%	-53.6%	-53.3%
Formaldehyde	15.1	6.2	5.6	5.6	-9.8%	-9.8%	-63.0%	-63.0%
Naphthalene	2.0	0.6	0.6	0.6	-8.6%	-8.6%	-70.9%	-70.9%
Polycyclic Organic Matter	0.8	0.2	0.2	0.2	-3.8%	-3.8%	-74.5%	-74.5%
Total MSATs	**120.2**	**41.7**	**39.0**	**39.2**	**-6.4%**	**-6.1%**	**-67.5%**	**-67.4%**

Table ES-2. Predicted GHG Emissions

Precited CO_2e Emissions				% Change from No-Build		% Change from Existing	
2017 Existing	2045 No-Build	2045 System I	2045 System IV	2045 System I	2045 System IV	2045 System I	2045 System IV
2,244,662	2,075,355	1,974,387	1,974,386	-4.9%	-4.9%	-12.0%	-12.0%

CO_2e = carbon dioxide equivalent

As shown in Table ES-1, there is a substantial decrease in MSAT emissions in 2045 from existing year to analysis year for all alternatives because of engine technology advancements and cleaner vehicle power alternatives included in the Motor Vehicle Emission Simulator (MOVES) emissions development. The 2045 build scenarios are predicted to have a slight decrease in emissions from the 2045 no-build condition of approximately 5 percent. The two build conditions are predicted to have very similar emission profiles because of their similar traffic volumes and the low emission factors developed by MOVES for year 2045 requiring a greater difference in traffic data to yield a noticeable change.

Similarly, in Table ES-2, the build year scenarios are predicted to have a 7 percent decrease of CO_2e emissions from the no-build year scenario and an even greater decrease when compared to the existing year.

Overall, the project would have minimal impacts from construction activities, MSAT emissions, and GHG. Proposed project-related emissions would not have an adverse effect on neighboring Class I areas or ambient air quality or cause a violation of the carbon dioxide National Ambient Air Quality Standards.

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Acronyms and Abbreviations

°F	degrees Fahrenheit
$\mu g/m^3$	microgram(s) per cubic meter
ADOT	Arizona Department of Transportation
CAA	Federal Clean Air Act
CAAA	Clean Air Act Amendments of 1990
CD	collector-distributor
CFR	*Code of Federal Regulation*
CNG	clean natural gas
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
DMAFB	Davis–Monthan Air Force Base
E85	blended ethanol 85% fuel
EPA	U.S. Environmental Protection Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GHG	greenhouse gas
I-	Interstate
IRIS	Integrated Risk Information System
LOS	level of service
MOVES	Motor Vehicle Emission Simulator
MP	milepost
MPO	metropolitan planning organization
MSAT	mobile source air toxic
NAAQS	National Ambient Air Quality Standard(s)
NATA	National Air Toxics Assessment
NEPA	National Environmental Policy Act
NO_2	nitrogen oxide
NO_X	oxides of nitrogen
O_3	ozone
PAG	Pima County Association of Governments
Pb	lead
PM	particulate matter
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to 10 micrometers
ppb	part(s) per billion
ppm	part(s) per million

ROW	right-of-way
RTP	regional transportation plan
SIP	state implementation plan
SO_2	sulfur dioxide
SO_x	sulfur oxides
SR	State Route
TI	traffic interchange
TIP	Transportation Improvement Program
UPRR	Union Pacific Railroad
VMT	vehicle miles traveled
VOC	volatile organic compound

1. Project Descriptions

The proposed action involves Interstate 10 (I-10) and State Route (SR) 210, within the city of South Tucson, the city of Tucson, and unincorporated Pima County, Arizona (Figure ES-1). The project limits along I-10 begin at its junction with I-19 at milepost (MP) 260.2 and continue east to Kolb Road at MP 271.8. The SR 210 project limits begin at Golf Links Road and extend south along Alvernon Way to I-10 (MP 265.0). SR 210 is also known as Aviation Parkway or East Aviation Parkway. Throughout this document, the term SR 210 will be used.

The project vicinity includes a substantial portion of the southeast Tucson metro area. Major employers, military installations, transportation facilities, public services, commercial centers, and residential communities are within 3 miles of the project limits. These include Davis–Monthan Air Force Base (DMAFB), Tucson International Airport, Aerospace Research Park, Union Pacific Railroad (UPRR), Tucson Electric Power Plant, HEP Refining (bulk fuel oil storage facility), Southern Arizona Veterans Administration Health Care System (VA Hospital), University of Arizona Medical Center (formerly Kino Hospital), Kino Regional Sports Complex, Tucson Marketplace (retail/commercial), University of Arizona Science and Technology Park, and Tucson Rodeo Grounds.

The project area along I-10 can be characterized as urban from I-19 to Kolb Road. Most of the lands adjacent to I-10 are developed; however, tracts of vacant land occur on both sides of the interstate. The SR 210 project area is dominated by commercial and industrial development, including DMAFB.

Residential development abuts I-10 at several locations—in the 10th Avenue vicinity (northern and southern sides of I-10), Alvernon Way to Drexel Road (southern side), Valencia Road (northern and southern sides), Craycroft Road to Wilmot Road (northern side), Wilmot Road to Kolb Road (southern side), and east of Kolb Road on the southern side (though separated by a commercial strip between I-10 and the homes. The planning area is referred to as Rincon/Southeast Subregional Plan (City of Tucson 2005).

Manufacturing, business parks, and light industry dominate the Alvernon Way corridor, with UPRR generally paralleling Alvernon Way between I-10 and SR 210. The UPRR main switching and maintenance yard is just northwest of the project area. A bulk fuel oil storage facility occupies about 40 acres west of Alvernon Way, and the Tucson Electric Power Company–Irvington Station is east of Alvernon Way at I-10. The area bounded by DMAFB, Alvernon Way/Contractors Way, and I-10 includes several auto and metal salvage operations, construction firms, materials supply buildings, and moving/storage facilities. The western portion of the study area is a major employment center, including critical facilities that support the region (e.g., Tucson Electric Power Company–Irvington Station, Fuel storage facility, UPRR).

The project area from the Valencia Road vicinity east is less developed. Land uses are more residential in nature, with subdivisions between Valencia Road and Kolb Road. Other uses include the Pima Air and Space Museum, the Army National Guard facility, the University of Arizona Science and Technology Park, two public schools, and Thomas Jay Regional Park. Undeveloped lands are generally near the Julian Wash floodplain.

1.1 Alternatives Considered for Further Study

1.1.1 System I Alternative

Under the System I alternative, SR 210 would be extended south, generally along Alvernon Way, to intersect I-10 at the existing Alvernon Way traffic interchange (TI). The TI would be reconfigured to accommodate this connection. With this alternative, the new SR 210 would cross Ajo Way on a new grade-separated TI. The length of this new roadway would be about 2.5 miles. The new roadway would replace existing Alvernon Way. New connections at Alvernon Way, Golf Links Road, and Palo Verde Road would be constructed. A new grade-separated diamond interchange with Ajo Way would be added, and SR 210 would be elevated over the UPRR and Irvington Road. Local access would change because of this system alternative because no direct access would occur off the SR 210 extension.

New rights-of-way (ROWs) would be required to accommodate the SR 210 extension from a triangular area of commercial/industrial property bounded by the UPRR, Golf Links Road, and 34th Street; commercial property in the southwest quadrant of Irvington Road and Alvernon Way; and along Alvernon Way. Minor ROW would be needed for I-10 TI improvements, drainage, and frontage road adjustments.

1.1.2 System IV Alternative

The System IV alternative is an improvement of I-10 from the I-10/I-19 TI easterly through the Kolb Road TI and the extension of SR 210 south along the Alvernon Way alignment to I-10. This alternative features collector-distributor (CD) roadways adjacent to both the eastbound and westbound I-10 mainline roadway from Alvernon Way easterly through the Kolb Road TI. The adjacent CD roadways provide an expanded frontage road system to handle local destination traffic and the mainline freeway with limited access points for through traffic.

An I-10/SR 210 system interchange would provide access between SR 210 and the eastbound and westbound I-10 CD roadways and would be integrated with the diamond interchange at the junction of Alvernon Way/I-10. The connection at SR 210 shares the same configuration as Alternative I from Golf Links Road to I-10. This alternative allows direct free-flow connections from I-10 to SR 210 at the Alvernon Way TI. Access points to CD roadways would occur at Valencia Road, Craycroft Road, Wilmot Road, and Kolb Road.

Additional ROWs would be required for SR 210, the SR 210/Golf Links TI, the Ajo Way TI, and the I-10/SR 210 system interchange. Because of the additional width of the CD roadways along I-10, some additional ROWs may be required along I-10 mainline as well as TIs, drainage, and frontage roads.

1.1.3 General Modifications—Common to System I and System IV Alternatives

I-10 Mainline Improvements

From I-19 to Alvernon Way, additional I-10 mainline travel lanes and auxiliary lanes between successive entrance and exit ramps would be needed to achieve an adequate level of service (LOS) for the design year 2040. For both alternatives, the following are the required lanes in each direction:

- I-19 to Kino Parkway – four lanes
- Kino Parkway to Alvernon Way – three lanes

The existing I-10 horizontal centerline would be retained. From west of Park Avenue to Alvernon Way, the existing open median would be enclosed with a concrete median barrier located at the existing centerline, a wide inside paved shoulder, and as needed, a new traffic lane.

From I-19 to west of Kino Parkway, the intent of the design is to retain this pavement, widen as additional lanes are needed, and retain the existing I-10 vertical profile. East of Kino Parkway, I-10 would have a new vertical profile, which would be designed to accommodate overpass structure replacements at traffic interchanges and a new structure over Country Club Road.

East of Kino Parkway, Pima County is expanding the Pima Sports Complex to the southern side of I-10. A grade-separated crossing under I-10 and a light-well grate in the median to provide natural light for the undercrossing is planned. The crossing is being developed as a separate project from the I-10 improvements, in coordination between Arizona Department of Transportation (ADOT) and Pima County.

For all alternatives, the existing storm drain system between I-19 and Park Avenue would be retained with minor modifications to accommodate the extra pavement width. East of Park Avenue, the rural-type drainage design would be converted to an urban-type design with catch basins and an enclosed storm drain system. In areas where existing water ponds at slope toes, the storm drains would outlet into new retention basins. Typically, the basins would be in the infields of traffic interchanges, but some may be needed between interchanges, requiring new ROW. In areas where water outlets into existing cross drainage structures, the storm drains will outlet into these structures. As needed to retain capacity in the cross drainages, the storm drains would outlet initially into detention basins.

Craycroft Road TI

Access issues at Craycroft Road TI are common to both System I and IV alternatives. Access issues involving the commercial and residential properties north of the Craycroft Road TI were identified as part of the I-10, Junction I-19 to Kolb Road, and SR 210, Golf Links to I-10 project Phase II studies. The Craycroft Road/Travel Plaza Way intersection is too close to the westbound ramps of I-10, and traffic operations along Craycroft Road north of I-10 are degrading and are expected to continue to degrade in the future. A drainage concern was also identified, associated with storm flows from the east that currently flow across Craycroft Road at Dream Street and just north of Travel Plaza Way.

To address these concerns, the project team identified and evaluated multiple access control concepts to manage commercial truck and other vehicle turning movements on Craycroft Road north of I-10 and keep traffic moving. The concepts involved changes in roadway alignments, access, and traffic circulation, and the implementation of drainage improvements. The implementation of these concepts would require varying amounts of new ROW, and some concepts could require residential or commercial relocations. The project team prepared a summary of these alternatives with conclusions on the advantages and disadvantages of each. From these concepts, a proposed concept was identified. Because of the potential presence of populations protected under Title VI, environmental justice, or related statutes in this vicinity, a Title VI/ Environmental Justice Evaluation was completed for this concept. The proposed concept would improve Craycroft Road between I-10 and Dream Street. The improvements proposed along Craycroft Road include the following:

- Installing a signalized intersection on Craycroft Road just south of the Circle K convenience market
- Constructing a two-way connector road from the new intersection on Craycroft Road west and south to I-10 through the Triple T Truck Stop property to provide access to the I-10 frontage road in the westbound direction
- Constructing a new bus bay on the northern side of the new two-way connector road, just west of Craycroft Road
- Constructing a raised median on Craycroft Road from I-10 north to the new signalized intersection
- Constructing a one-way frontage road on the eastern side of Craycroft Road north and south of the new intersection to provide access, separated from truck traffic, for 10 residential properties that front Craycroft Road in this area
- Constructing a raised median to separate the new one-way frontage road from the northbound Craycroft Road travel lane
- Retaining the existing sidewalk on the eastern side of Craycroft Road
- Constructing curb, gutter, and sidewalk on the western side of Craycroft Road from the I-10 TI to the new bus bay and the Circle K convenience market
- Constructing drainage inlets, culverts, a drainage channel, and retention/detention basins (one north and one south of I-10)

Implementation of this proposed concept would require the acquisition of new ROWs.

1.1.4 No-Build Alternative

The no-build alternative assumes that no major improvements would be made to I-10 or SR 210 in the study area. Maintenance of the existing I-10 and SR 210 would continue. This alternative serves as a baseline for comparing and evaluating the I-10/SR 210 alternatives and provides a means to compare the impacts of the alternative actions with the impacts of not undertaking either of the alternative actions.

2. Affected Environment

2.1 Area of Potential Impact

Air quality impacts are closely tied to traffic impacts. This report analyzes local and regional air quality using traffic data developed by Jacobs and presented in the Traffic and Transportation Final Technical Report Addendum (Jacobs 2019b). The area of potential impact, hereafter referred to as the study area, includes existing roadways, planned new roadways, and local, poorly performing intersections where changes in traffic volumes would occur as a result of the project. Figure ES-1 shows the project area, including specific routes of concern that are described in more detail in Sections 4.3 and 4.4.

Located near the project are two federally registered Class I areas: Saguaro National Park, approximately 12 kilometers (7.5 miles) northwest of the project area, and the Saguaro Wilderness Area, approximately 30 kilometers (18.7 miles) east of the project area.

2.2 National Ambient Air Quality Standards

The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for several criteria pollutants to protect public health and welfare (Section 3.1.1). Criteria pollutants are carbon monoxide (CO), particulate matter (PM), ozone (O_3), lead (Pb), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2). Descriptions of each criteria air pollutant are in Sections 2.2.1 through 2.2.7. State and local agencies measure air concentrations to determine whether specific areas follow these standards. The following EPA designations indicate the level of compliance with the NAAQS for specific areas and specific pollutants:

- Attainment areas are those that meet the primary and secondary air quality standards.
- Nonattainment areas are any geographic regions of the United States that EPA has designated as not meeting the standards. These areas must take action within a specific timeframe to reduce emissions and attain the NAAQS.
- Maintenance areas are those that were previously nonattainment for a specific pollutant but have consistently shown improvement with several years of concentrations below the standards. These areas are considered attainment but are subject to maintenance plans to ensure that measures are in place for continued compliance.
- Unclassified areas are those that cannot be classified based on available information as meeting or not meeting the primary or secondary air quality standards. Unclassified areas are treated the same as an attainment area until additional data are available to make a final determination.

Specific areas can be designated as attainment for one pollutant and nonattainment or maintenance for another pollutant. Figure 2-1 shows the maintenance and nonattainment areas within Arizona.

2.2.1 Air Quality Standards

As required by the Clean Air Act (CAA), NAAQS have been established for six major air pollutants. These pollutants are CO, NO_2, O_3, PM_{10} and $PM_{2.5}$ (inhalable particles with diameters that are 10 or 2.5 micrometers or smaller), SO_2, and Pb. These standards are summarized in Table 2-1. 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 general welfare. Brief descriptions of those criteria pollutants relevant to transportation projects (O_3, CO, and PM) are provided in Sections 2.2.2 through 2.2.7.

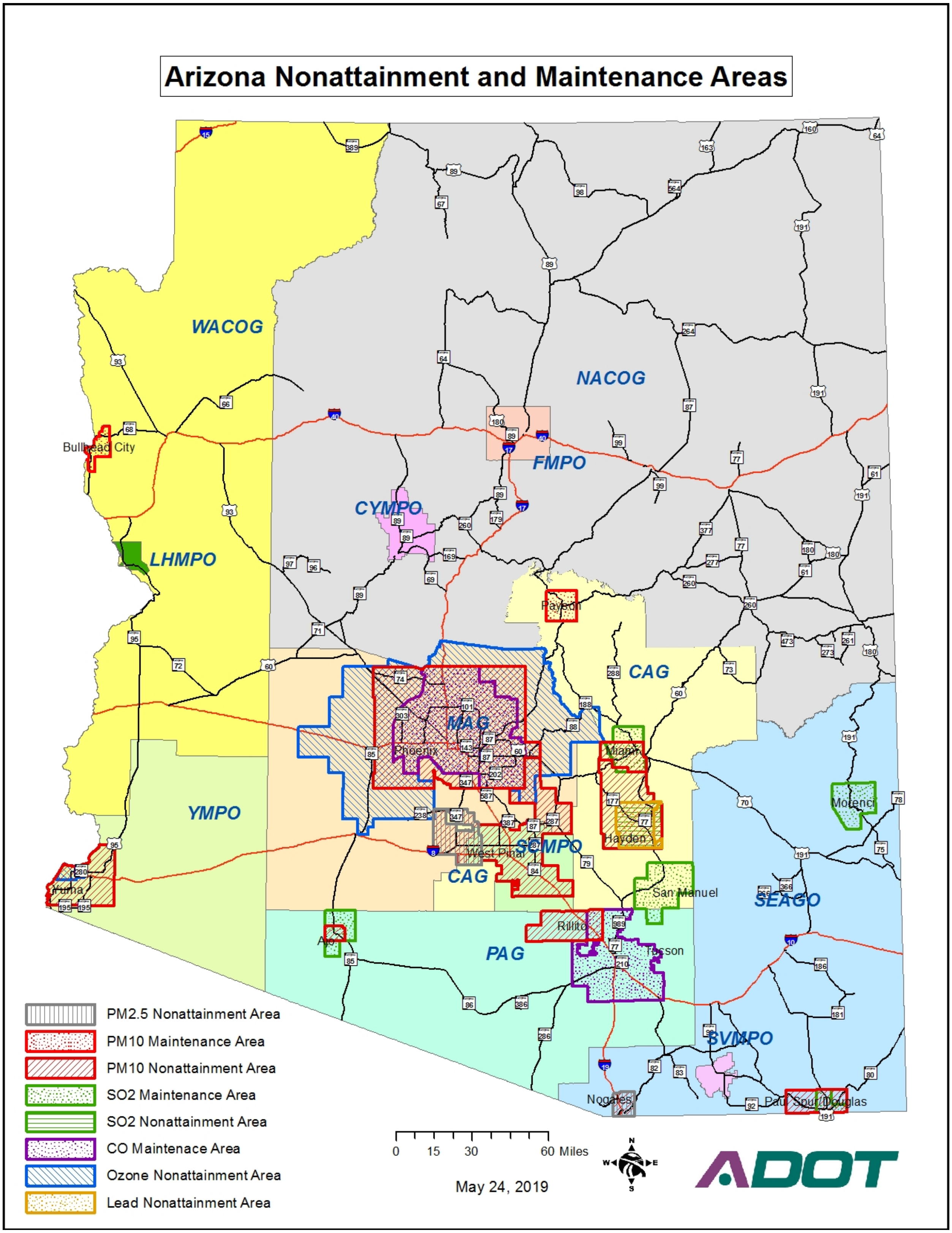

Figure 2-1. Nonattainment and Maintenance Areas in Arizona

Table 2-1. National Ambient Air Quality Standards

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
CO		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Pb		primary and secondary	Rolling 3-month average	0.15 μg/m^3 [a]	Not to be exceeded
NO_2		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb [b]	Annual mean
O_3		primary and secondary	8 hours	0.070 ppm [c]	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
PM	$PM_{2.5}$	primary	1 year	12.0 μg/m^3	Annual mean, averaged over 3 years
		secondary	1 year	15.0 μg/m^3	Annual mean, averaged over 3 years
		primary and secondary	24 hours	35 μg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hours	150 μg/m^3	Not to be exceeded more than once per year on average over 3 years
SO_2		primary	1 hour	75 ppb [d]	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

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

[b] 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.

[c] 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 transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

[d] 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 an SIP call under the previous SO_2 standards (40 CFR 50.4(3)). An SIP call is an EPA action requiring a state to resubmit all or part of its SIP to demonstrate attainment of the required NAAQS.

μg/m^3 = microgram(s) per cubic meter
CFR = *Code of Federal Regulation*
ppb = part(s) per billion
ppm = part(s) per million
SIP = state implementation plan

2.2.2 Carbon Monoxide

CO is a colorless, odorless gas that can be harmful when inhaled in large amounts. CO is released when something is burned. The greatest sources of CO to outdoor air are vehicles or machinery that burn fossil fuels.

Breathing air with a high concentration of CO reduces the amount of oxygen that can be transported in the blood stream to critical organs like the heart and brain.

At very high levels indoors or in other enclosed environments, CO can cause dizziness, confusion, unconsciousness, and death.

2.2.3 Particulate Matter

PM, also called particle pollution, is the term for a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. Others are so small they can only be detected using an electron microscope.

Particle pollution includes the following:

- PM_{10}: inhalable particles, with diameters that are generally 10 micrometers and smaller
- $PM_{2.5}$: fine inhalable particles, with diameters that are generally 2.5 micrometers and smaller

2.5 micrometers is much smaller than the width a single hair from your head. The average human hair is about 70 micrometers in diameter, making it 30 times larger than the largest fine particle.

These particles come in many sizes and shapes and can be made up of hundreds of different chemicals. Some are emitted directly from a source, such as construction sites, unpaved roads, fields, smoke-stacks, or fires. Most particles form in the atmosphere because of complex reactions of chemicals such as SO_2 and nitrogen oxides (NO_x), which are pollutants emitted from power plants, industries, and automobiles.

PM contains microscopic solids or liquid droplets that are so small that they can be inhaled and cause serious health problems. Some particles less than 10 micrometers in diameter can get deep into your lungs and some may even get into your bloodstream. Of these, $PM_{2.5}$ pose the greatest risk to health.

Fine particles are also the main cause of reduced visibility (haze) in parts of the United States, including many of our treasured national parks and wilderness areas.

2.2.4 Ozone

O_3 is a gas composed of three atoms of oxygen. O_3 occurs both in the Earth's upper atmosphere and at ground level. O_3 can be good or bad, depending on where it is found.

Good O_3 occurs naturally in the upper atmosphere, where it forms a protective layer that shields us from the sun's harmful ultraviolet rays. O_3 at ground level is a harmful air pollutant, because of its effects on people and the environment. It is the main ingredient in smog.

O_3 in the air can harm our health. People most at risk from breathing O_3 include people with asthma, children, older adults, and people who are active outdoors, especially outdoor workers. In addition, people with certain genetic characteristics and people with reduced intake of certain nutrients, such as vitamins C and E, are at greater risk from O_3 exposure.

Breathing O_3 can trigger a variety of health problems including chest pain, coughing, throat irritation, and airway inflammation. It also can reduce lung function and harm lung tissue. O_3 can worsen bronchitis, emphysema, and asthma, leading to increased medical care.

2.2.5 Lead

Sources of Pb emissions vary from one area to another. At the national level, major sources of Pb in the air are ore and metals processing and piston-engine aircraft operating on leaded aviation fuel. Other sources are waste incinerators, utilities, and Pb-acid battery manufacturers. The highest air concentrations of Pb are usually found near Pb smelters.

Because of EPA's regulatory efforts, including the removal of Pb from motor vehicle gasoline, levels of Pb in the air decreased by 98 percent between 1980 and 2014.

Once taken into the body, Pb distributes throughout the body in the blood and is accumulated in the bones. Depending on the level of exposure, Pb can adversely affect the nervous system, kidney function, immune system, reproductive and developmental systems and the cardiovascular system. Pb exposure also affects the oxygen-carrying capacity of the blood. The Pb effects most commonly encountered in current populations are neurological effects in children and cardiovascular effects (e.g., high blood pressure and heart disease) in adults.

2.2.6 Nitrogen Dioxide

NO_2 is one of a group of highly reactive gases known as oxides of nitrogen or NO_x. Other NO_x include nitrous acid and nitric acid. NO_2 is used as the indicator for the larger group of NO_x.

NO_2 primarily gets in the air from the burning of fuel. NO_2 forms from emissions from vehicles, power plants, and off-road equipment.

2.2.7 Sulfur Dioxide

The largest source of SO_2 in the atmosphere is the burning of fossil fuels by power plants and other industrial facilities. Smaller sources of SO_2 emissions include industrial processes such as extracting metal from ore; natural sources such as volcanoes; and locomotives, ships, and other vehicles and heavy equipment that burn fuel with a high sulfur content.

Short-term exposure to SO_2 can harm the human respiratory system and make breathing difficult. Children, the elderly, and asthma sufferers are particularly sensitive to SO_2 effects.

SO_2 emissions that lead to high concentrations of SO_2 in the air generally also lead to the formation of other sulfur oxides (SO_x). SO_x can react with other compounds in the atmosphere to form small particles. These particles contribute to PM pollution, and particles may penetrate deeply into sensitive parts of the lungs and cause additional health problems.

2.3 Local Climate

Tucson, Arizona, has a desert climate with summer temperatures exceeding 100 degrees Fahrenheit (°F) during the day and overnight temperatures mostly staying above 50°F. Monsoon season is from July to August, during which the humidity is much higher than the rest of the year.

Winters are relatively mild compared to other parts of the United States. Daytime high temperatures are approximately 70°F with lows dropping between 30° and 40°F and normally one or two hard freezes each year. Snow does occur in the Tucson region, but any light dusting normally melts within the day.

The Tucson International Airport National Weather Service observation station (WBAN no. 23160) has been collecting meteorological data since June 1946 (NCDC 2018). Figure 2-2 shows the wind patterns in the region observed over 2015, 2016, and 2017 as a wind rose. Each petal of the wind rose represents a direction the wind is blowing from, with the colors of each petal corresponding to a wind speed. The winds generally blow from the southeast with an annual average windspeed of 3.13 meters per second, or approximately 7 miles per hour.

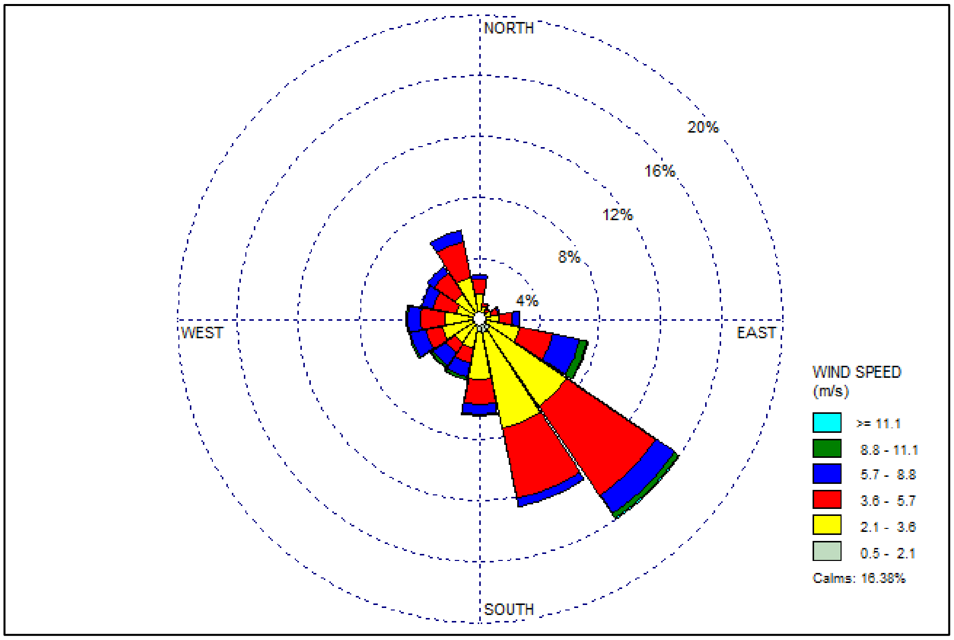

Figure 2-2. Tucson 3-Year Wind Rose

2.4 Attainment Status of Project Area

The project is in an area designated as maintenance for CO and attainment or unclassified for all other criteria pollutants. The Tucson region was previously a CO nonattainment area. It is currently subject to a maintenance plan (effective July 10, 2000). Table 2-2 outlines the project area attainment status for each of the criteria pollutant standards.

Table 2-2. Project Attainment Area Status

Criteria Pollutant	Standard Averaging Period	Attainment Status
CO	8-hour	Attainment - Maintenance[a]
	1-hour	Attainment - Maintenance[a]
Pb	Rolling 3-month average	Attainment/Unclassified
NO_2	1-hour	Attainment/Unclassified
	annual	Attainment/Unclassified
O_3	8-hour	Attainment/Unclassified
PM_{10}	24-hour	Attainment/Unclassified
$PM_{2.5}$	14-hour	Attainment/Unclassified
	annual	Attainment/Unclassified
SO_2	1-hour	Attainment/Unclassified
	3-hour	Attainment/Unclassified

[a] Maintenance Plan effective July 10, 2000

2.5 Existing Air Quality and Monitoring Data

The Arizona Department of Environmental Quality conducts ambient air monitoring throughout Arizona with stations located in Pima county and more specifically the Tucson region. Data collected at these monitors help determine the current air quality status regarding the NAAQS, determine air quality trends, and assist in forecasting air quality trends. Table 2-3 summarizes the monitored design value for the most recent 3 years (2015, 2016, and 2017) of data. The nearest station to the project study area was selected. Data were obtained from the EPA Air Quality System (EPA 2018).

Table 2-3. Tucson Ambient Air Monitoring Data

Pollutant	Averaging Period	2015[a]	2016[a]	2017[a]	NAAQS	Station Name	Station Number
CO	1-Hour	1.9 ppm	1.8 ppm	1.7 ppm	9 ppm	22nd and Alvernon	04-019-1014
CO	8-Hour	1.0 ppm	0.9 ppm	1.0 ppm	35 ppm	22nd and Alvernon	04-019-1014
PM_{10}	24-Hour	53 µg/m^3	67 µg/m^3	92 µg/m^3	150 µg/m^3	Geronimo	04-019-1113
$PM_{2.5}$	24-Hour	11 µg/m^3	10 µg/m^3	16 µg/m^3	35 µg/m^3	400 W. River Road	04-019-1028
$PM_{2.5}$	Annual	5.1 µg/m^3	4.5 µg/m^3	6.7 µg/m^3	12 µg/m^3	400 W. River Road	04-019-1028
O_3	8-Hour	0.065 ppm	0.066 ppm	0.066 ppm	0.070 ppm	710 W Michigan St.	04-019-1032
Pb	Quarterly	<0.01 µg/m^3	<0.01 µg/m^3	N/A[c]	0.15 µg/m^3	400 W. River Road	04-019-1028
NO_2	1-Hour	40 ppb	34 ppb	37 ppb	100 ppb	1237 S. Beverly	04-019-1011
NO_2	Annual	8.6 ppb	8.2 ppb	8.4 ppb	53 ppb	1237 S. Beverly	04-019-1011
SO_2	1-Hour	5 ppb	3.2 ppb	2 ppb	75 ppb	400 W. River Road	04-019-1028
SO_2	3-Hour[b]	5 ppb	3.2 ppb	2 ppb	500 ppb	400 W. River Road	04-019-1028

Notes:

[a] Value reported is the design value for the criteria pollutant unless noted.

[b] The 1-hour value was used as a surrogate because EPA does not report the 3-hour secondary NAAQS in the Air Quality System database.

[c] The Pb monitor ceased operation midway through 2016.

<: less than
N/A: not available

Source: www.epa.gov/air-data. Last accessed December 12, 2018

2.6 Air Quality Trends

Historical air monitoring data in the area are an indicator to determine if air quality is improving, staying relatively stagnant, or degrading. Sections 2.6.1 through 2.6.5 summarize the air quality trends for criteria air pollutants in the project area using data from the monitors summarized in Table 2-3. The trends are summarized for CO, PM_{10}, $PM_{2.5}$, O_3, and NO_2. Historical data for SO_2 and Pb have shown monitored concentrations significantly below the NAAQS and are not summarized further.

2.6.1 Carbon Monoxide Trends

Figure 2-3 shows that the daily maximum 8-hour CO air quality concentration since 2007 has been well below the 1-hour and 8-hour NAAQS limits of 35 ppm and 9 ppm, respectively. Concentrations fluctuate by season, with the highest concentrations during the winter. In general, CO concentrations have not drastically changed from 2007 to 2017.

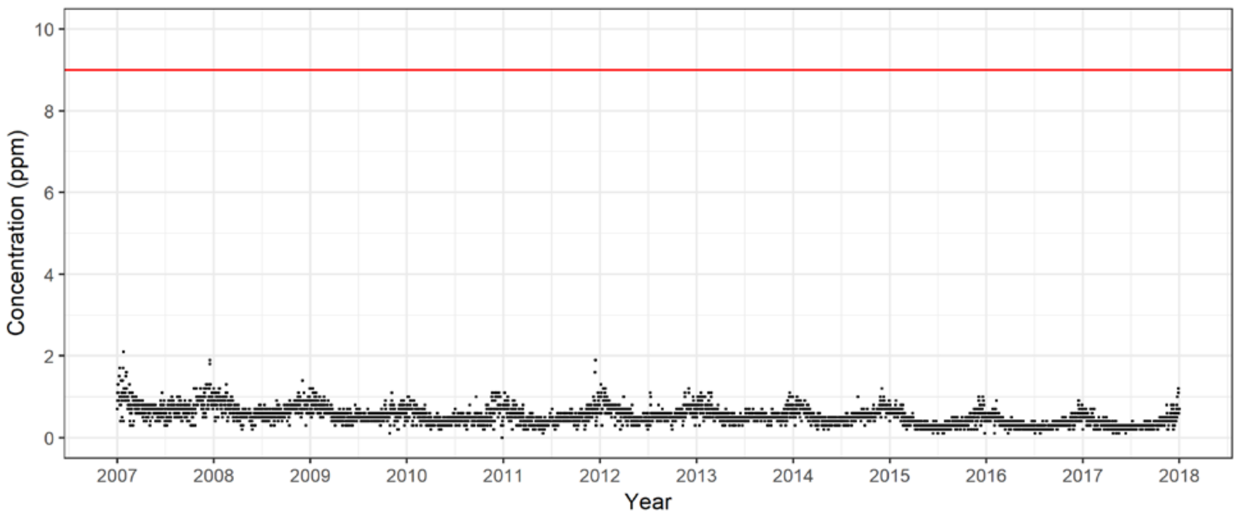

Figure 2-3. Daily Maximum 8-hour CO Air Quality Concentration Data from 2007 to 2018
The red line shows the 8-hour CO NAAQS limit (9 ppm, primary, not to be exceeded more than once per year).

2.6.2 PM_{10} Trends

Figure 2-4 shows that the daily mean PM_{10} air quality concentration since 2007 has rarely exceeded the 24-hour NAAQS limit of 150 µg/m^3. The monitored concentrations above the 150 µg/m^3 limit do not constitute a violation of the standard. Concentrations fluctuate throughout the seasons. In general, PM_{10} concentrations have not drastically changed from 2007 to 2017.

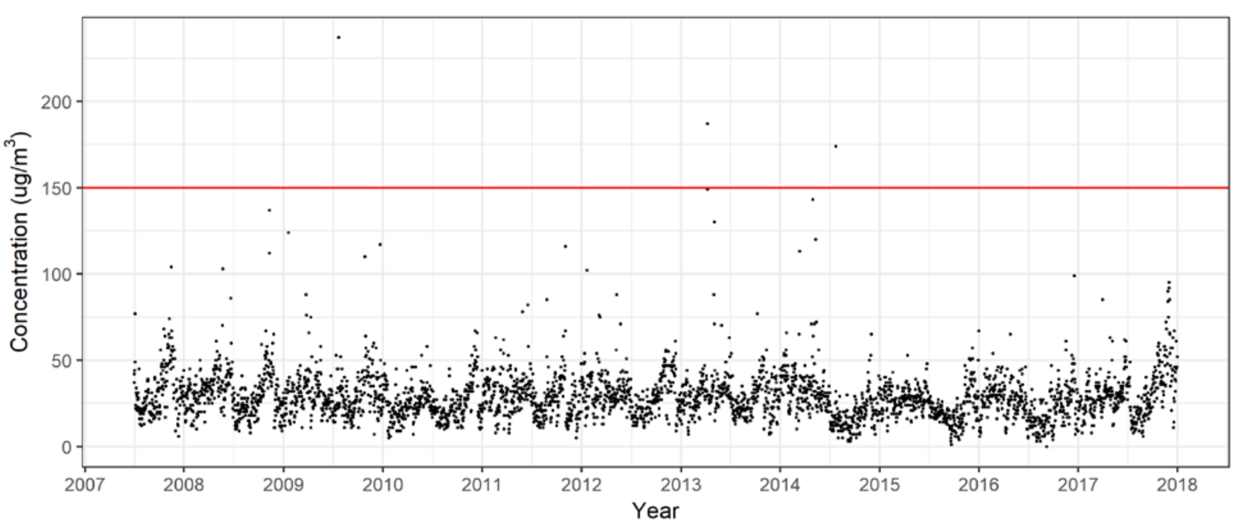

Figure 2-4. 24-hour PM_{10} Air Quality Concentration Data from 2007 to 2018
The red line shows the 24-hour PM_{10} NAAQS limit (150 µg/m^3, primary/secondary, not to be exceeded more than once per year on average over 3 years).

2.6.3 $PM_{2.5}$ Trends

Figure 2-5 shows that the daily mean $PM_{2.5}$ air quality concentration since 2007 has been well below the 24-hour NAAQS limit of 35 µg/m^3. The data has not exceeded the 24-hour standard. Concentrations fluctuate throughout the seasons. In general, $PM_{2.5}$ concentrations have not drastically changed from 2007 to 2017.

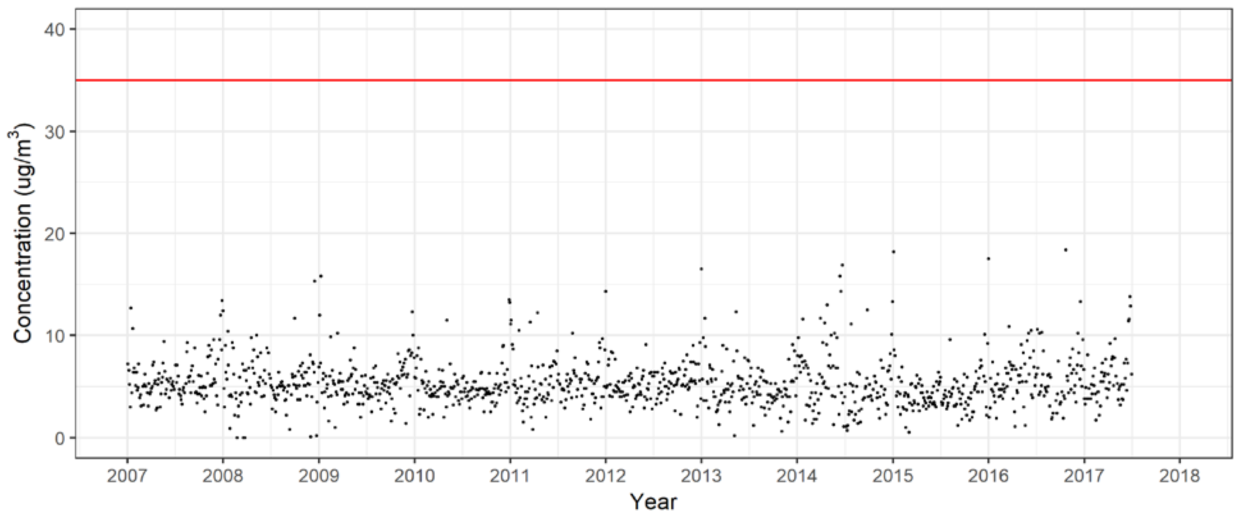

Figure 2-5. 24-hour $PM_{2.5}$ Air Quality Concentration Data from 2007 to 2017
The red line shows the 24-hour $PM_{2.5}$ NAAQS limit (35 µg/m^3, primary/secondary, 98th percentile, averaged over 3 years).

2.6.4 Ozone Trends

Figure 2-6 shows that the daily maximum 8-hour O_3 air quality concentration since 2007 has rarely exceeded the 8-hour NAAQS limit of 0.070 ppm. The measured concentrations above the 8-hour limit is not a violation of the standard. Concentrations fluctuate by season, with the highest concentrations during the summer. In general, O_3 concentrations have not drastically changed from 2007 to 2017.

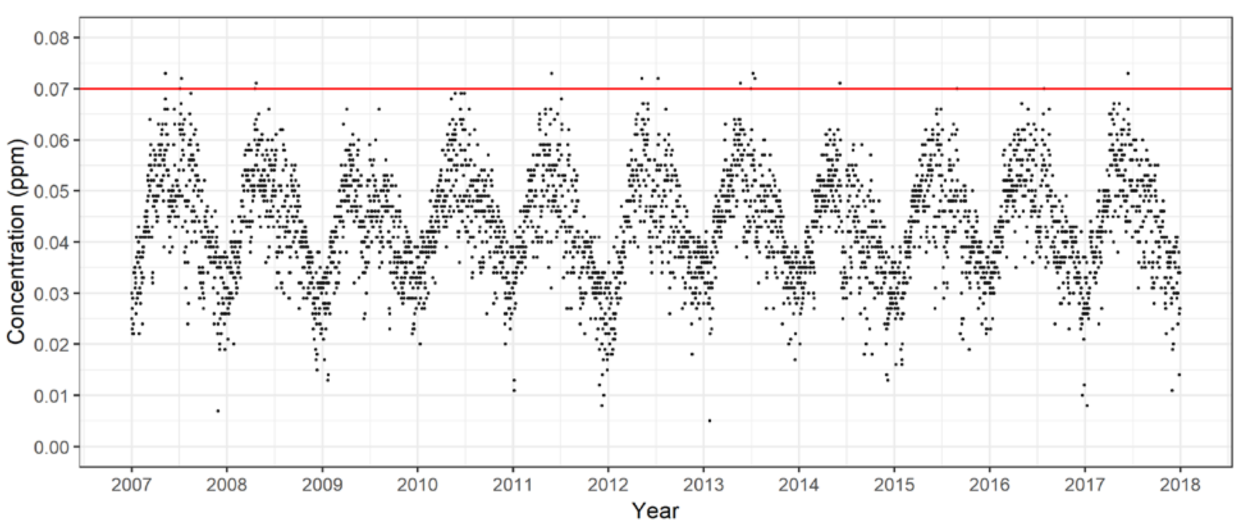

Figure 2-6. Daily Maximum 8-hour O_3 Air Quality Concentration Data from 2007 to 2017
The red line shows the 8-hour O_3 NAAQS limit (0.070 ppm, primary/secondary, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years).

2.6.5 Nitrogen Dioxide Trends

Figure 2-7 shows that the daily maximum 1-hour NO_2 air quality concentration since 2007 has been well below the 1-hour NAAQS limit of 100 ppb. Concentrations fluctuate by season, with the highest concentrations during the winter. In general, NO_2 concentrations have not drastically changed from 2007 to 2017.

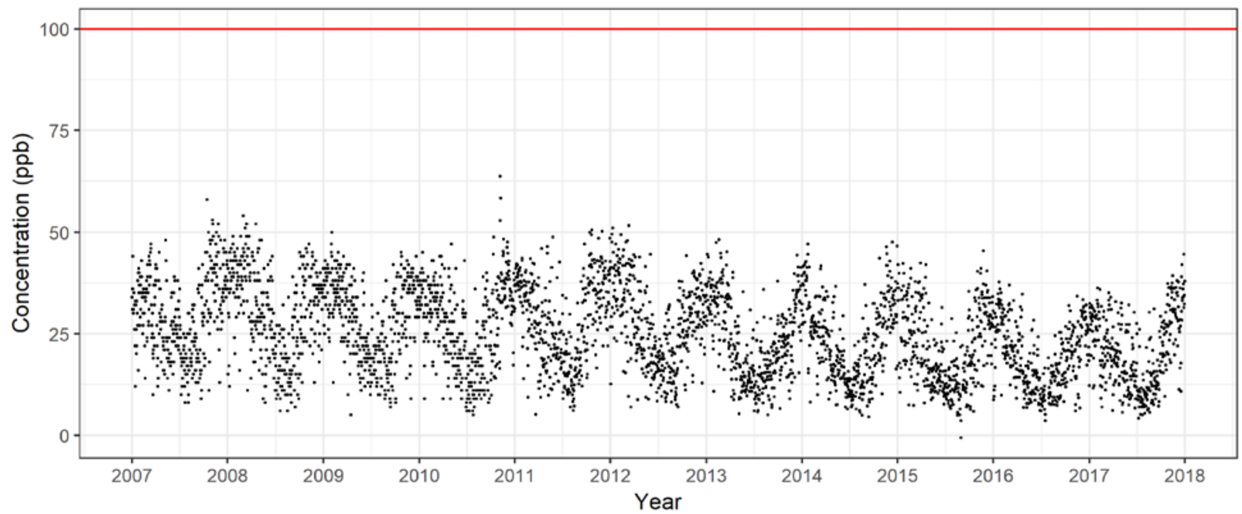

Figure 2-7. Daily Maximum 1 hour NO_2 Air Quality Concentration Data from 2007 to 2018
The red line shows the 1-hour NO_2 NAAQS limit (100 ppb, primary 98th percentile of 1 hour daily maximum concentrations, averaged over 3 years).

2.7 Mobile Source Air Toxics and Greenhouse Gases

2.7.1 Mobile Source Air Toxics

In addition to the criteria air pollutants for which there are NAAQS, EPA also regulates air toxics. 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).

Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the CAA. The MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

EPA is the lead federal agency for administering the CAA. It has certain responsibilities regarding the health effects of MSATs. Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments of 1990 (CAAA), 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; Final Rule* (EPA 2007, p.8430) and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS). In addition, EPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their *National Air Toxics Assessment* (NATA) (EPA 1999). The following are these compounds:

- Acrolein
- Benzene
- 1,3-butadiene
- Diesel PM plus diesel exhaust organic gases (diesel PM)
- Formaldehyde
- Naphthalene

- Polycyclic organic matter

While Federal Highway Administration (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 *Control of Hazardous Air Pollutants from Mobile Sources; Final Rule* (EPA 2007) requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. According to an FHWA analysis using EPA's Motor Vehicle Emission Simulator (MOVES) model version 2014a (FHWA 2018), even if vehicle activity (vehicle-miles traveled [VMT]) increases by 45 percent as assumed, a combined reduction of 91 percent in the total annual emission rate for the priority MSAT is projected from 2010 to 2050. Figure 2-8 shows the trend as described by EPA.

EPA is responsible for establishing NAAQS, national guidance, and guidelines for the uniform and scientifically reliable study of air pollutants. To date, there are no NAAQS for MSATs, and there are no established criteria for determining when MSAT emissions should be considered a significant issue.

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).

The 2007 EPA rule requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. Using EPA’s MOVES model version MOVES2014a, as shown in Figure 3-5, 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 period.

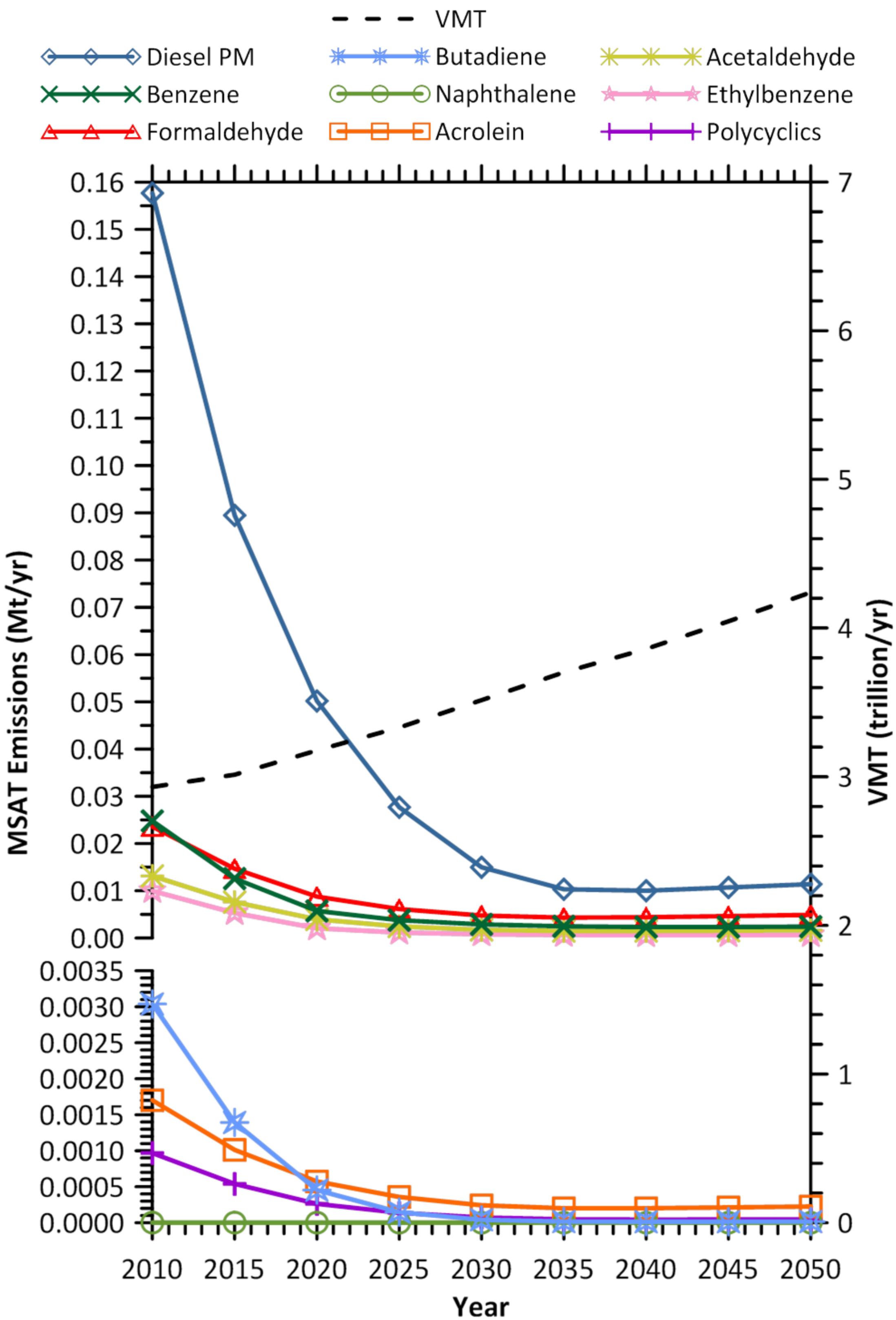

Figure 2-8. FHWA PROJECTED NATIONAL MSAT EMISSION TRENDS 2010 – 2050 FOR VEHICLES OPERATING ON ROADWAYS USING EPA's MOVES2014a MODEL

2.7.2 Greenhouse Gasses

Climate change refers to long-term changes in temperature, precipitation, wind patterns, and other elements of the earth's climate system. An ever-increasing body of scientific research attributes these climatological changes to greenhouse gas (GHG) emissions, particularly those generated from the production and use of fossil fuels.

While climate change has been a concern for several decades, the establishment of the Intergovernmental Panel on Climate Change by the United Nations and the World Meteorological Organization in 1988 has led to increased efforts devoted to GHG emissions reduction and climate change research and policy. These efforts are primarily concerned with the emissions of GHGs generated by human activity including carbon dioxide (CO_2), methane, nitrous oxide, tetrafluoromethane, hexafluoroethane, sulfur hexafluoride, fluoroform, s,s,s,2-tetrafluoroethane, and difluoroethane.

In the United States, the main source of GHG emissions is electricity generation, followed by transportation. The dominant GHG emitted is CO_2, which is mostly from fossil fuel combustion.

Two terms are used when discussing the impacts of climate change: Greenhouse Gas Mitigation and Adaptation. Greenhouse gas mitigation is a term for reducing GHG emissions to reduce or mitigate the impacts of climate change. Adaptation refers to the effort of planning for and adapting to impacts resulting from climate change (e.g., adjusting transportation design standards to withstand more intense storms and higher sea levels).

Neither the EPA nor the FHWA has issued explicit guidance or methods to conduct project-level GHG analysis. FHWA emphasizes concepts of resilience and sustainability in highway planning, project development, design, operations, and maintenance.

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 U.S. National Academy of Sciences, EPA, and other federal agencies. GHGs differ from other air pollutants evaluated in federal environmental reviews because their impacts are not localized or regional because of the rapid dispersion into the global atmosphere that is characteristic of these gases. 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.

3. Transportation Conformity Requirements

Air quality in the United States is regulated by the CAA and is administered by EPA. Federal air quality standards and regulations provide the basic scheme for project-level air quality analysis under the National Environmental Policy Act (NEPA). In addition to this environmental analysis, a parallel transportation conformity requirement under the CAA also applies for areas that are nonattainment or maintenance for any NAAQS. The CAAA directed EPA to implement environmental policies and regulations that will ensure acceptable levels of air quality. Under the Transportation Conformity section of the CAAA, a project cannot do the following:

- Cause or contribute to any new violation of any NAAQS in any area
- Increase the frequency or severity of any existing violation of any NAAQS in any area
- Delay timely attainment of any NAAQS or any required interim emission reductions or other milestones in any area

3.1.1 State and Federal Transportation Conformity Rule

The conformity requirement is based on CAA Section 176(c), which prohibits the U.S. Department of Transportation and other federal agencies from funding, authorizing, or approving plans, programs, or projects that do not conform to the SIP for attaining the NAAQS. Transportation conformity applies to highway and transit projects and takes place on two levels: the regional—or planning and programming—level and the project level. The proposed project must conform at both levels to be approved.

Conformity requirements apply only in nonattainment and maintenance (former nonattainment) areas for the NAAQS, and only for the specific NAAQS that are or were violated. EPA regulations noted in 40 CFR 93 govern the conformity process. Conformity requirements do not apply in unclassifiable/ attainment areas for NAAQS and do not apply at all for state standards regardless of the status of the area.

Under the CAAA, the Intermodal Surface Transportation Efficiency Act of 1991, the Transportation Equity Act for the 21st Century, and Moving Ahead for Progress in the 21st Century Act proposed transportation projects must be derived from a long-range transportation plan or regional transportation plan (RTP) that conforms with the state air quality plans as outlined in the 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, 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 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 metropolitan transportation plans. 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.

Federal transportation projects are required to use interagency consultation 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 conformity. The CO document is included in the Appendix A.

3.1.1.1 Regional Conformity

Regional conformity is concerned with how well the regional transportation system supports plans for attaining the NAAQS for CO, NO_2, O_3, PM_{10}, and $PM_{2.5}$. Regional conformity is based on emission analysis of RTPs and TIPs that include all transportation projects planned for a region over at least 20 years for the RTP and 4 years for the TIP. RTP and TIP conformity uses travel demand and emission models to determine whether the implementation of those projects would conform to emission budgets or other tests at various analysis years showing that requirements of the CAA and the SIP are met. If the conformity analysis is successful, the MPO, FHWA, and FTA make determinations that the RTP and TIP conform to the SIP for achieving the goals of the CAA. Otherwise, the projects in the RTP and/or TIP must be modified until they demonstrate conformity. If the design concept, scope, and open-to-traffic schedule of a proposed transportation project is the same as described in the RTP and TIP, then the proposed project meets regional conformity requirements for purposes of project-level analysis.

3.1.1.2 Project Level Conformity

Project-level conformity is achieved by demonstrating that the project comes from a conforming RTP and TIP; the project has a design concept and scope that has not changed significantly from those in the RTP and TIP; project analyses have used the latest planning assumptions and EPA-approved emissions models; and in CO nonattainment or maintenance areas, the project complies with any control measures in the SIP. Furthermore, additional analyses (known as hot-spot analyses) may be required for projects located in CO nonattainment or maintenance areas to examine localized air quality impacts. The project is listed in the TIP and included in the *2045 Regional Mobility and Accessibility Plan* (PAG 2016). The conformity determination for the Mobility and Accessibility Plan and the FY 2017-2021 TIP were approved by the FHWA and FTA in July 2016 (PAG 2017). Therefore, the project meets the requirement to meet regional transportation conformity by complying with the SIP.

4. NEPA Air Quality Impact Analysis

The air quality analysis consists of evaluating impacts because of construction, transportation conformity for CO, a quantitative MSAT analysis with a GHG analysis. Sections 4.1 through 4.4 summarize the methods and results of the impact analyses.

4.1 CO Analysis Results

CO is typically the criteria pollutant of greatest local concern for transportation projects in maintenance areas.

Violations of the CO NAAQS have not been observed in the region in the last 10 years, and the concentrations summarized in Section 2.6.1 demonstrate that the concentrations are significantly below the NAAQS. The improvement in LOS for affected intersections from the System I and System IV build alternatives compared to the no-build alternative, in addition to the improvements in vehicle tailpipe emissions over time, would result in a less than significant impact. Therefore, CO concentrations near poorly performing intersections in the project area are expected to remain well below the CO NAAQS.

Additional information and a summary of the CO interagency consultation is in Appendix A.

4.2 MSATS

The purpose of MSAT analyses are to capture and quantify the relative net change in potential MSAT emissions within the selected study area. The study area for this MSAT analysis may be different than that included in other sections in the NEPA document such as noise. This is primarily because the prediction of MSATs only within a small geographic area may not accurately capture the emissions effects from the difference in traffic and roadway flows because of the project alternatives in the region. An example of this is a change in an emissions profile over a larger area because of project-related traffic diversion from the no-build scenario because of new roadways. At the other extreme, selecting an entire metropolitan area as an affected area can tend to dilute results and less accurately capture the project-specific impacts.

Sections 4.2.1 through 4.2.4 summarize the methodology and results of the MSAT analysis for the project System I and System IV alternatives.

4.2.1 Methodology

FHWA's most recent MSAT guidance, *Updated Interim Guidance on Mobile Source Air Toxic Analysis* (FHWA 2016), is to be included in NEPA documents. The purpose of this guidance is to advise on when and how to analyze MSATs in NEPA review for highways. This guidance is considered interim guidance because MSAT science and analysis is a constantly evolving field.

A quantitative analysis provides a basis for identification and comparison of the potential differences of MSAT emissions, if any exist, from the various alternatives. FHWA's interim guidance (FHWA 2016) categorizes projects into the following tiers:

- No analysis necessary for projects without potential meaningful MSAT effects
- Qualitative analysis for projects with low potential MSAT effects
- Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects

Based on FHWA's recommended tiering approach and consultation with ADOT (Appendix B.1), the project falls within the Tier 3 approach for projects with a higher potential for MSAT effects. In accordance with the guidance (FHWA 2016), a quantitative analysis of MSATs was performed using EPA's MOVES model version MOVES2014b.

4.2.2 Study Area

The MSAT study area was developed in consultation with ADOT and extends beyond the Traffic Report Area of Influence (Jacobs 2019a), particularly to the north and east to capture a greater area of potential MSAT effects in the greater Tucson area. Within this agreed-upon region, all links associated with the project build alternatives and those expecting meaningful changes in potential emissions because of the project were included in this analysis. Links associated with the affected network being categorized as having meaningful potential changes in emissions because of the project were screened based on meeting each of the following criteria:

- +/- 5 percent or more in daily volume
- Links with 50 or more daily volume
- Project-specific knowledge and consideration of local circumstances

Using the above screening criteria, the links within the MSAT study area for this analysis were developed and illustrated in Figures 4-1 and 4-2 for the project System I and System IV build alternatives, respectively.

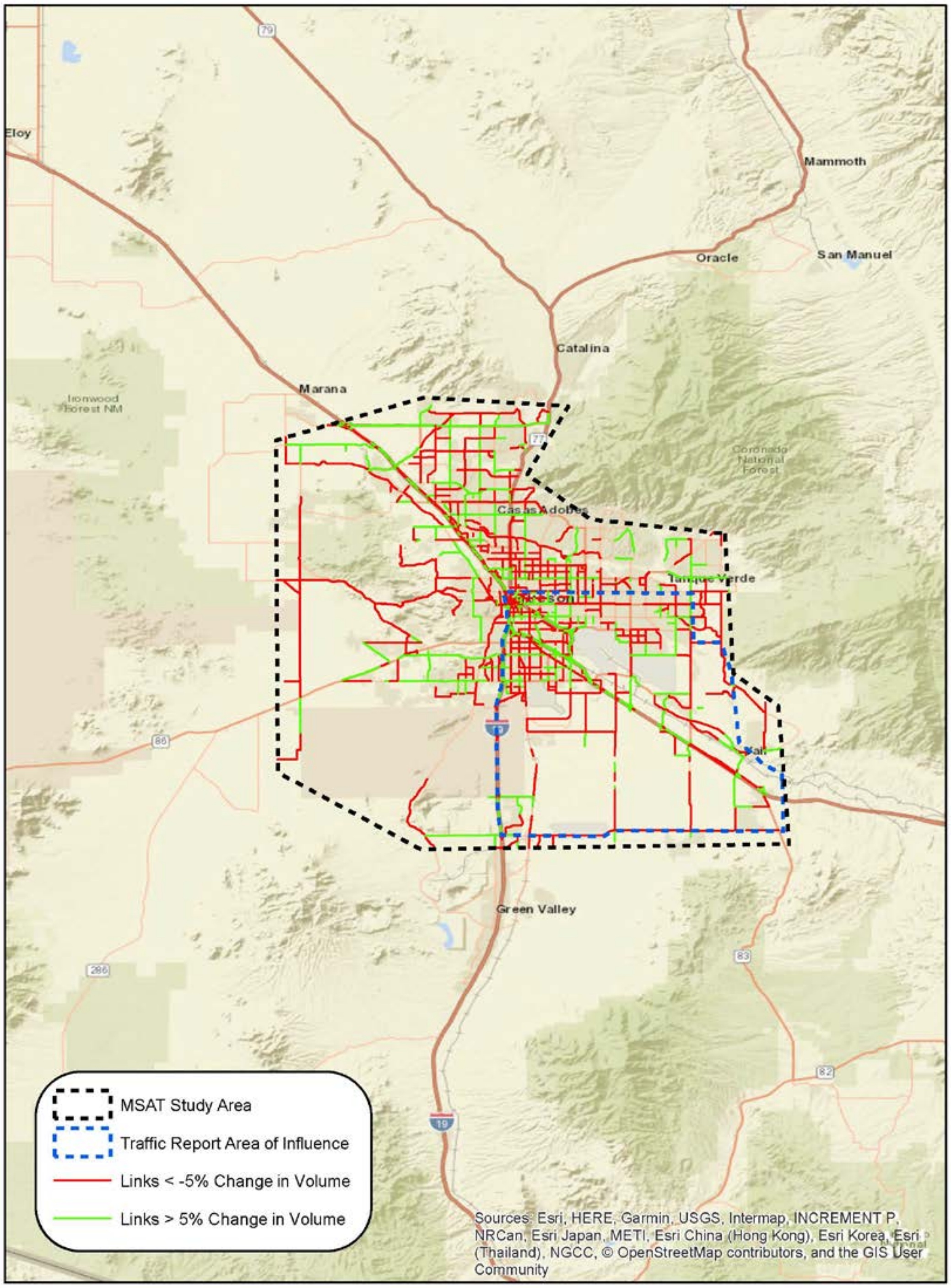

Figure 4-1. MSAT Study Area System I Alternative

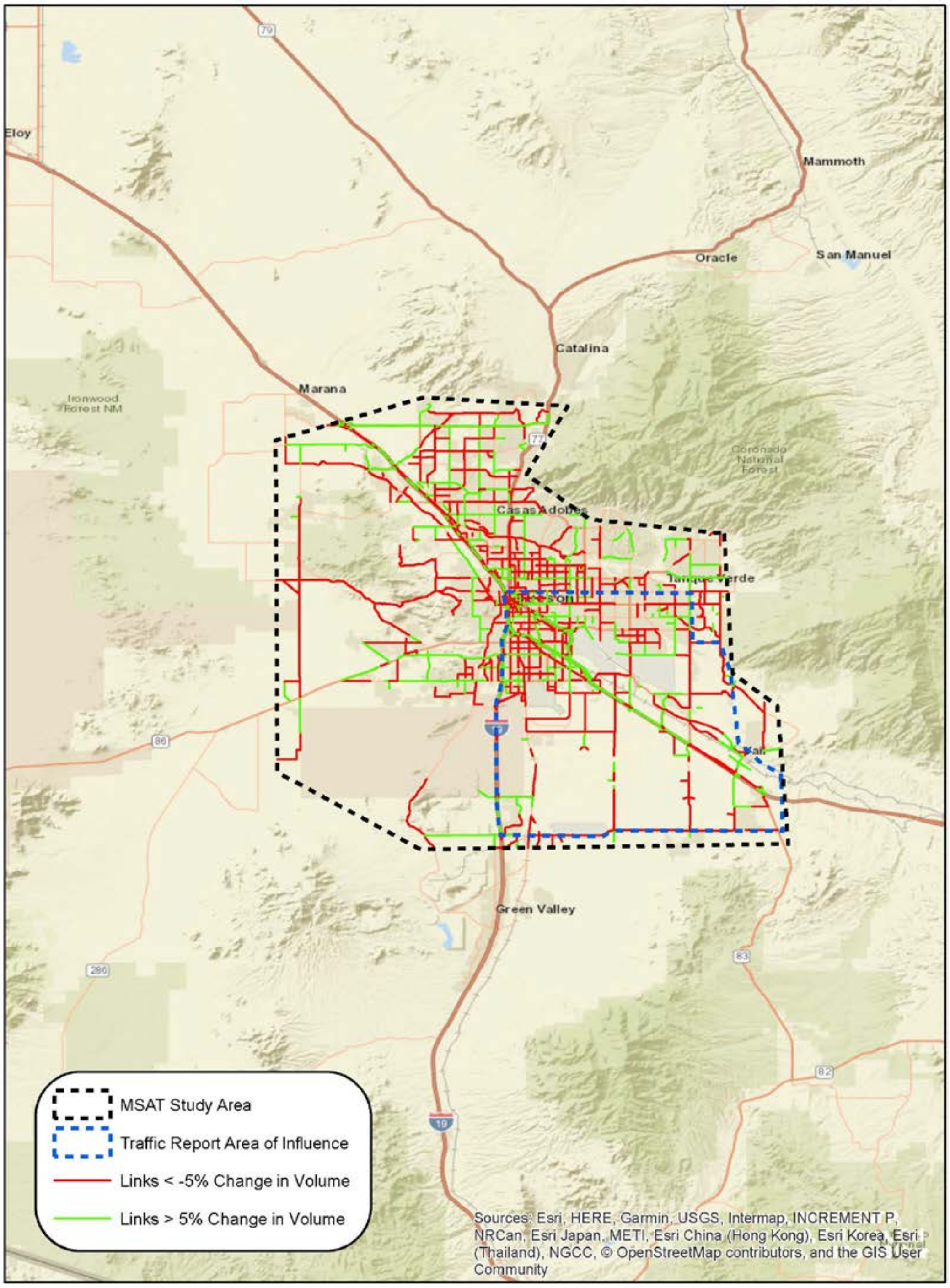

Figure 4-2. MSAT Study Area System IV Alternative

4.2.3 Model Selection

MSAT emissions from the affected network were developed using EPA's MOVES model version MOVES2014b. MOVES inputs were provided by the Pima County Association of Governments (PAG) for the analysis years, consistent with their regional emissions analyses used for the most recent TIP (PAG 2017). Where available, project-specific data on a link-by-link basis was used to develop MOVES inputs while using PAG regional-specific data (Cotty, pers. comm. 2017) for all remaining inputs for each scenario analyzed: Existing 2017, No-Build 2045, System I Build Alternative 2045, and System IV Build Alternative 2045. Lists of the MOVES inputs are included in Tables 4-1, 4-2, 4-3, and 4-4. These inputs were developed following ADOT MSAT guidance (Appendix B).

Table 4-1. MOVES RunSpec Options

MOVES Tab	Model Selections
Scale	County scale; inventory calculation type
Time Span	Hourly time aggregation including weekdays only, all hours for Jan/Apr/July/Oct
Geographic Bounds	Pima county
Vehicles/Equipment	All gas and diesel vehicle types; CNG transit bus, E85 fuel type
Road Type	All road types
Pollutants and Processes	See Tables 4-2 and 4-3
Output	Output included speciation of emissions by fuel type to differentiate diesel PM from other fuel type PM.

CNG = clean natural gas
E85 = blended ethanol 85% fuel

Table 4-2. MOVES RunSpec Pollutants

Polycyclic Organic Matter			
68	Dibenzo(a,h)anthracene particle	168	Dibenzo(a,h)anthracene gas
69	Fluoranthene particle	169	Fluoranthene gas
70	Acenaphthene particle	170	Acenaphthene gas
71	Acenaphthylene particle	171	Acenaphthylene gas
72	Anthracene particle	172	Anthracene gas
73	Benz(a)anthracene particle	173	Benz(a)anthracene gas
74	Benzo(a)pyrene particle	174	Benzo(a)pyrene gas
75	Benzo(b)fluoranthene particle	175	Benzo(b)fluoranthene gas
76	Benzo(g,h,i)perylene particle	176	Benzo(g,h,i)perylene gas
77	Benzo(k)fluoranthene particle	177	Benzo(k)fluoranthene gas
78	Chrysene particle	178	Chrysene gas
81	Fluorene particle	181	Fluorene gas
82	Indeno(1,2,3,c,d)pyrene particle	182	Indeno(1,2,3,c,d)pyrene gas
83	Phenanthrene particle	183	Phenanthrene gas
84	Pyrene particle	184	Pyrene gas
Primary Exhaust PM_{10} - Total			
100	Primary Exhaust PM_{10} - Total	115	Sulfate Particulate
110	Primary Exhaust $PM_{2.5}$ - Total	118	Composite - NonECPM
112	Elemental Carbon	119	H2O (aerosol)
Naphthalene			
185	Naphthalene gas	23	Naphthalene particle
All Other MSATs			
24	1,3-Butadiene	20	Benzene
26	Acetaldehyde	41	Ethyl Benzene
27	Acrolein	25	Formaldehyde

Table 4-3. MOVES RunSpec Processes

ID	Process
1	Running Exhaust
15	Crankcase Running Exhaust
11	Evap Permeation[a]
13	Evap Fuel Leaks[a]

[a] These evaporative processes were conservatively included in the analysis.

Table 4-4. MOVES County Data Manager Inputs

County Data Manager Tab	Data Source
Ramp Fraction	MOVES Default
Source Type Population	PAG Data
Age Distribution	PAG Data
Fuel	PAG Data
Meteorology Data	PAG Data
Vehicle Type VMT	Project-specific Data
Average Speed Distribution	Project-specific Data
Road Type Distribution	Project-specific Data

MOVES was used to determine the emissions burden of each scenario for the FHWA-required MSATs, including the following:

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

4.2.4 Analysis

The results of this analysis for the modeled scenarios of existing conditions (2017) and future year (2045) are presented in Table 4-5.

Table 4-5. Predicted MSAT Emissions

Pollutant	Predicted MSAT Emissions (tons/yr)				% Change from No-Build		% Change from Existing	
	2017 Existing	2045 No-Build	2045 System I	2045 System IV	2045 System I	2045 System IV	2045 System I	2045 System IV
1,3-Butadiene	2.8	0.0	0.0	0.0	-12.9%	-12.9%	-99.6%	-99.6%
Acetaldehyde	6.7	2.3	2.1	2.1	-9.1%	-9.1%	-69.2%	-69.2%
Acrolein	0.9	0.3	0.3	0.3	-9.5%	-9.5%	-68.0%	-68.0%
Benzene	40.1	12.8	12.1	12.2	-5.0%	-4.8%	-69.8%	-69.7%
Diesel PM	24.9	6.4	5.7	5.7	-9.9%	-9.9%	-77.0%	-77.0%
Ethyl Benzene	26.8	12.9	12.4	12.5	-3.8%	-3.1%	-53.6%	-53.3%

Table 4-5. Predicted MSAT Emissions

Pollutant	Predicted MSAT Emissions (tons/yr)				% Change from No-Build		% Change from Existing	
	2017 Existing	2045 No-Build	2045 System I	2045 System IV	2045 System I	2045 System IV	2045 System I	2045 System IV
Formaldehyde	15.1	6.2	5.6	5.6	-9.8%	-9.8%	-63.0%	-63.0%
Naphthalene	2.0	0.6	0.6	0.6	-8.6%	-8.6%	-70.9%	-70.9%
Polycyclic Organic Matter	0.8	0.2	0.2	0.2	-3.8%	-3.8%	-74.5%	-74.5%
Total MSATs	**120.2**	**41.7**	**39.0**	**39.2**	**-6.4%**	**-6.1%**	**-67.5%**	**-67.4%**

Table 4-5 shows a substantial decrease in emissions in 2045 from existing year to future years for all alternatives because of advancements in engine technology and cleaner alternative of vehicle power that are included in the MOVES emissions development. The 2045 build scenarios are predicted to have a slight decrease in emissions from the 2045 no-build condition of approximately 5 percent. The two build conditions are predicted to have similar emission profiles, which is expected because of their similar traffic volumes and the low emission factors developed by MOVES for 2045 requiring a greater difference in traffic data to yield a noticeable change.

Projected emissions from each build alternative in the MSAT study area are similar and less than the no-build MSAT emissions. MSAT levels could be higher in some locations than others, such as along mainlines or interstates, but the current models and tools are not adequate to quantify them. A discussion of unavailable or incomplete information is included in Appendix B.2.

4.3 Greenhouse Gases

GHG emissions were quantified similar to the MSAT emissions. However, since GHG emissions from individual transportation projects are difficult to characterize as significant or not, a comparison to the project System I and System IV build alternatives GHG emissions to the no-build alternative is conducted for informational purposes.

4.3.1 Methodology

The GHG analysis was performed using EPA's MOVES model version MOVES2014b to develop annual GHG emissions for the existing, no-build, System I and System IV build alternative scenarios. This GHG analysis was performed using the same affected area and modeling methodology as the MSAT section.

The GHG emissions calculated from MOVES is the CO_2 Equivalent pollutant (ID=98) and is a mixture of GHG species weighted and summed based upon their global warming potential.

4.3.2 Analysis

The results of this analysis are shown in Table 4-6 for the existing, no-build year, and build year scenarios. The build year scenarios are predicted to have a 7 percent decrease of CO_2 equivalent (CO_2e) emissions from the no-build year scenario and an even greater decrease when compared to the existing year.

Table 4-6. Predicted GHG Emissions

Precited CO_2e Emissions				% Change from No-Build		% Change from Existing	
2017 Existing	2045 No-Build	2045 System 1	2045 System 4	2045 System 1	2045 System 4	2045 System I	2045 System IV
2,244,662	2,075,355	1,974,387	1,974,386	-4.9%	-4.9%	-12.0%	-12.0%

4.4 Cumulative and Construction Assessments

4.4.1 Cumulative Impact Assessment

Reasonably foreseeable future actions include projects listed in the TIP (PAG 2017). These projects were assumed to be in place under the no-build alternative. Air quality analysis is inherently cumulative in that the analysis compares the overall effects of air pollution in an airshed to ambient air quality standards, or benchmarks, that apply overall to the ambient air. The project System I and System IV build alternatives would result in temporary emissions increases during construction and little effect on emissions for operations. The System I and System IV build alternatives are not expected to cause long-term air quality impacts or contribute to cumulative effects on air quality.

4.4.2 Construction Impact Assessment

Construction of the project System I and System IV build alternatives is not anticipated to occur at a single location for a duration longer than 5 years; therefore, the construction impacts to air quality are addressed qualitatively.

During construction of roadway projects, soil-disturbing activities, operations of heavy-duty equipment, commuting workers, and the laying of asphalt may generate emissions that would temporarily affect air quality. The total emissions and the timing of the emissions from these sources would vary depending on the phasing of the project and options chosen for the project.

Typical sources of emissions during construction of transportation projects include the following:

- Fugitive dust generated during excavation, grading, and loading and unloading activities
- Dust generated during demolition of structures and pavement
- Engine exhaust emissions from construction vehicles, worker vehicles, and diesel fuel-fired construction equipment
- Increased motor vehicle emissions associated with increased traffic congestion during construction
- Volatile organic compound (VOC) and odorous compounds emitted during asphalt paving

The regulated pollutants of concern for the first two source types (dust) are $PM_{2.5}$ and PM_{10}. Engine and motor vehicle exhaust would result in emissions of CO, VOCs, NO_x, $PM_{2.5}$, PM_{10}, air toxics, and GHGs.

4.4.2.1 Suggested Mitigation

For temporary impacts during construction, fugitive dust may become airborne during demolition, material transport, grading, driving of vehicles and machinery on and off the site, and wind events. Controlling fugitive dust emissions may require some of the following actions:

- Spray exposed soil with water or other suppressant to reduce PM_{10} emissions and PM deposits.
- Use phased development to keep disturbed areas to a minimum.
- Use wind fencing to reduce soil disturbance.
- Minimize dust emissions during transport of fill material or soil by wetting down or ensuring adequate freeboard (space from the top of the material to the top of the truck bed) on trucks.
- Promptly clean up spills of transported material on public roads.
- Schedule work tasks to minimize disruption of the existing vehicle traffic on streets.
- Restrict traffic onsite to reduce soil upheaval and the transport of material to roadways.
- Locate construction equipment and truck staging areas away from sensitive receptors, as practical and considering potential impacts on other resources.
- Provide wheel washers to remove PM that would otherwise be carried offsite by vehicles to decrease PM deposition on area roadways.
- Cover dirt, gravel, and debris piles as needed to reduce dust and wind-blown debris.

- Minimize odors onsite by covering loads of hot asphalt.

Emissions of $PM_{2.5}$, $PM_{10,}$ VOCs, NO_x, SO_x, and CO would be minimized whenever reasonable and possible. Since these emissions primarily result from construction equipment, machinery engines would be kept in good mechanical condition to minimize exhaust emissions. Additionally, contractors would be encouraged to reduce idling time of equipment and vehicles and to use newer construction equipment or equipment with add-on emission controls.

5. References

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Appendix A
CO Transportation Conformity Documentation

Arizona Department of Transportation

Environmental Planning

Air Quality Conformity Report

I-10, Jct I-19 to Kolb Road and SR210, Golf Links Road to I-10 Federal

Project No. 010-E(210)S
ADOT Project No. 010 PM 260 H7825 01L

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:

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

[FHWA Conformity Finding Letter to be added]

Project Level CO Hot-Spot Analysis Questionnaire

Project Setting and Description

The Arizona Department of Transportation (ADOT) in cooperation with the Federal Highway Administration (FHWA) prepared a Phase I feasibility study to identify and evaluate alternatives for increasing capacity and improving the functionality of I-10 from the Junction of I-19 (Jct. I-19) to SR 83 and the extension of the Barraza-Aviation Parkway (SR 210) from Golf Links Road to I-10. Traffic demands on I-10 are currently constrained by limitations on north-south arterial corridors.

A Phase II design concept report (DCR) and Environmental Assessment (EA) is being completed to evaluate the first phase of I-10 design implementation from Jct. I-19 to Kolb Road and SR 210, Golf Links Road to I-10. The study area falls within the city of South Tucson, the city of Tucson, and unincorporated Pima County (Figure 1). The study corridor begins at the junction of I-19/I-10 at milepost (MP) 260.2 and continues east to Kolb Road at MP 270.6. The existing SR 210 is about 4 miles long and is oriented northwest–southeast from Broadway Road in downtown Tucson to Alvernon Way/Golf Links Road near Davis-Monthan Air Force Base (DMAFB). The SR 210 study corridor begins at MP 4.0 (Golf Links Road) and extends south and east along I-10 to an interchange connection with I-10 located between Alvernon Way and Valencia Road.

Two alternatives, System Alternative I and System Alternative IV, were screened from a total of eight alternatives evaluated in the feasibility study including System II, III, IIIa, IIIb and IIIc as well as a No Build Alternative. System Alternative I [1]would extend SR 210 to the south, generally along Alvernon Way, to intersect with I-10 east of the existing Alvernon Way traffic interchange (TI). Under this alternative, I-10 would be widened from the I-19 Junction to Kolb Road to five lanes in each direction. Modifications to traffic interchanges (TIs) at Park Avenue, Kino Parkway, Craycroft Road, Valencia Road, and Alvernon Way to maximize weaving distances, the removal of the Palo Verde Road TI and the addition of a TI at Country Club Road are also proposed.

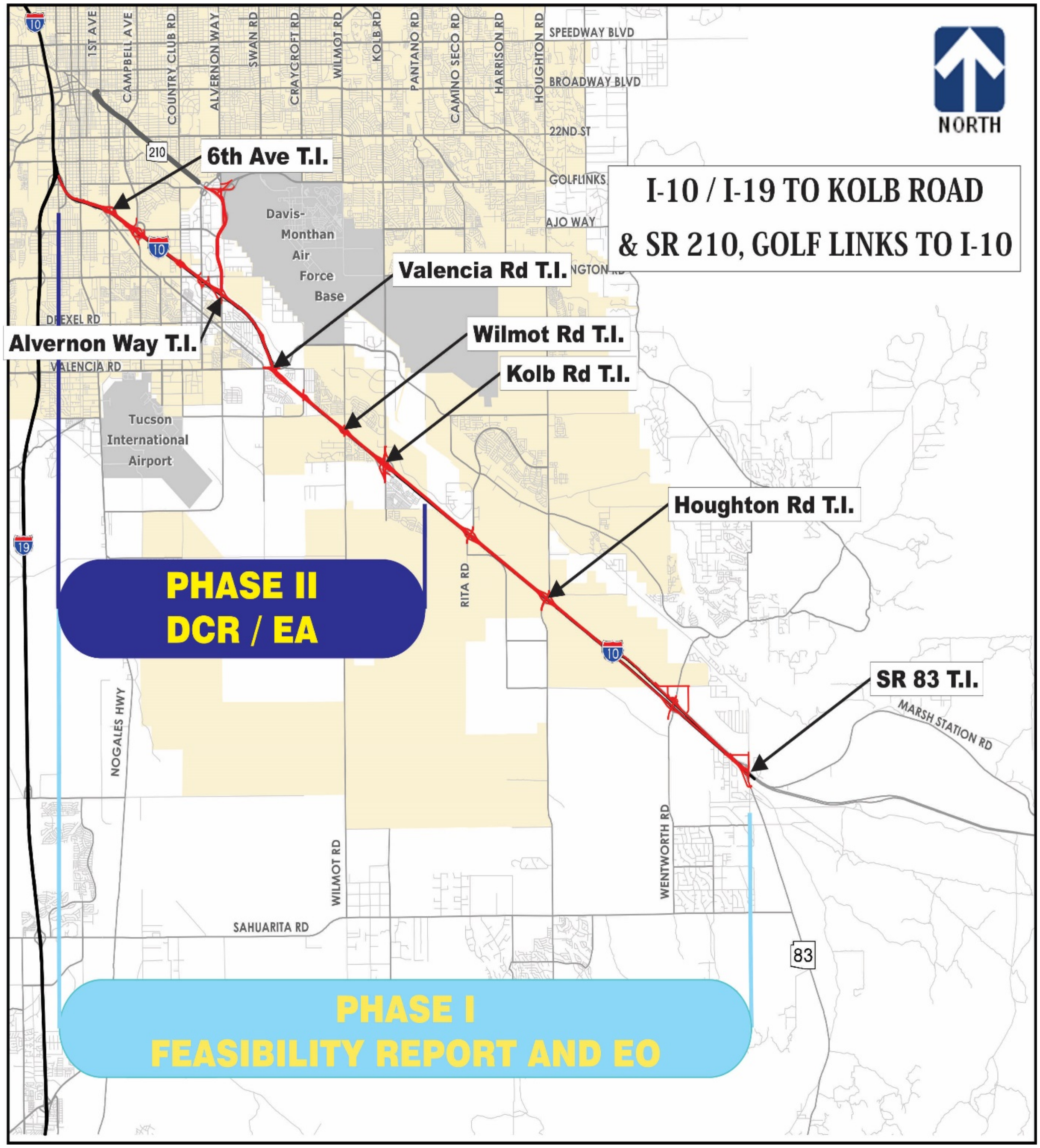
System Alternative IV would also extend SR 210 to the south, generally along Alvernon Way and proposes the same modifications to TIs and the addition of a TI at Country Club Road proposed for Alternative I. Alternative IV would widen I-10 from the I-19 Junction to Kolb Road with the addition of two-lane collector-distributor roadways running parallel to the existing three freeway mainline.

The study alternatives are included in the list of “2045 RMAP Sample Roadway Projects” in the Pima Association of Governments *2045 Regional Mobility and Accessibility Plan* (PAG, 2016), the PAG *2017 – 2021 TIP, 5-Year Regional Transportation Improvement Plan* (PAG, 2016) and the ADOT *2019 – 2023 Five-Year Transportation Facilities Construction Program* via reference (ADOT, 2018).

The study area is located in the Tucson Carbon Monoxide Maintenance Area. PAG adopted a State Implementation Plan (SIP) revision under the limited maintenance plan (LMP) option. The Tucson Air Planning Area (TAPA) was designated CO attainment status with an effective date of July 10, 2000.

[1] Alternative I is preferred by Pima County, the City of Tucson and the University of Arizona.

Figure 1. Project Area



This plan met the requirements of the "Limited Maintenance Plan Option for Nonclassifiable [not classified] CO Nonattainment areas" announced by the U.S. Environmental Protection Agency (EPA) on Oct. 6, 1995. In 2008, PAG submitted a SIP revision to the EPA to revise the CO LMP in accordance with §107 (d) of the Clean Air Act (CAA) to ensure maintenance of the National Ambient Air Quality Standards (NAAQS) in the TAPA for a second 10-year period through year 2020 (EPA, 2009). This 10-year plan essentially maintains existing controls and contingency provisions, and succeeds the previous plan approved by EPA in 2000. CO levels are expected to remain well below the NAAQS for the 10-year period ending in 2020.

The Initial Traffic Study (ITS) completed in 2011 for the feasibility study was updated for the design year 2040 using the improved PAG Travel Demand Model (TDM), which was obtained from PAG at the end of February 2014 (PAG, 2014). The 2011 model data utilized an external travel survey conducted by PAG to calibrate the external travel component of the model. The updated PAG TDM incorporates 2010 census and American Community Survey data and provides more accurate information about population distribution and current travel characteristics in the PAG region.

New 2045 PAG model socioeconomic data and traffic analysis zones were not revised for the 2014 ITS update; however, it was assumed that the 2045 population would be in place by 2040 as a conservative assessment. Under 40 CFR 93.116 *Criteria and Procedures: Localized CO, PM_{10}, and $PM_{2.5}$ violations (hot-spots),* there is flexibility for selecting a design year within the long-range transportation plan (PAG 2045 RMAP) for capturing the year of highest emission for project-conformity purposes. Because the updated ITS 2040 captures the PAG RMAP population projections and travel demand, it was determined that the 2040 design year represents the year of highest emissions for determining project-level conformity.

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 (LOS) D, E, or F, or those that will change to LOS 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 - The closest intersection identified in the PAG *CO LMP* as an area "most susceptible to CO violations" is the Valencia Road/Kolb Road intersection based on LOS. This intersection is approximately 2.5 miles from the study area; therefore, the ADOT I-10, Jct. I-19 to Kolb Road and SR 210, Golf Links Road to I-10 project will not impact a site of violation or potential violation.

Projects with Congested Intersections

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

NO - The ADOT I-10, Jct. I-19 to Kolb Road and SR 210, Golf Links Road to I-10 project does not currently impact a congested intersection as noted in Table B under existing conditions. This project will substantially improve the LOS in the 2040 scenario compared to the NoBuild 2040 condition. Table B shows the LOS and annual average daily traffic volumes at I-10 TIs and SR 210 intersections in the study area.

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 - The ADOT I-10, Jct. I-19 to Kolb Road and SR 210, Golf Links Road to I-10 project will not impact any of the three intersection locations identified in the PAG *CO LMP* with the highest ADT (see Table A), which include:

*Table A - Three Highest Intersections in Current Plan

PAG[1]
Ina Rd & Oracle Rd
Broadway Blvd & Kolb Rd
Speedway Blvd & Campbell Ave

[1]2008 Revision to the Carbon Monoxide Limited Maintenance Plan for the Tucson Air Planning Area (for 2010)

Intersection Name	**TABLE B.** Operational Analysis Scenarios							
	2010 – Existing LOS		2040 – No Build LOS		2040– System I* LOS		2040 – System IV LOS	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
I-10 **WB Ramps** and 6th Avenue	B	B	F	F	B	D	B	D
Peak Hour Traffic (Total)		-	2684	3345	-	2460	-	2433
Park Avenue and I-10 **WB Ramps**	B	A	F	F	B	C	B	C
Peak Hour Traffic (Total)	-	-	2663	3194	-	-	-	-
I-10 **EB Ramps** and 6th Avenue	A	B	F	F	B	B	B	B
Peak Hour Traffic (Total)	-	-	3253	3749	-	-	-	-
Park Avenue and I-10 **EB Ramps**	A	A	E	F	B	C	B	B
Peak Hour Traffic (Total)	-	-	2574	3283	-	-	-	-
Kino Parkway and Ajo Way	C	B	F	F	C	C	C	C
Peak Hour Traffic (Total)	-	-	3705	4107	-	-	-	-
Ajo Connector and Ajo Way	D	C	F	F	B	B	B	B
Peak Hour Traffic (Total)	2965	-	4485	4946	-	-	-	-
Country Club N of I-10	-	-	-	-	C	C	B	C
Peak Hour Traffic (Total)	-	-	-	-	-	-	-	-
Country Club S of I-10	-	-	-	-	B	B	B	B
Peak Hour Traffic (Total)	-	-	-	-	-	-	-	-
Irvington Road and Palo Verde Road	C	C	D	D	C	C	C	C
Peak Hour Traffic (Total)	-	-	4003	4026	-	-	-	-
Palo Verde S of I-10	-	-	-	-	A	A	A	A
Peak Hour Traffic (Total)	-	-	-	-	-	-	-	-
Kino Parkway N of I-10	-	-	-	-	C	C	B	C
Peak Hour Traffic (Total)	-	-	-	-	-	-	-	-
Kino Parkway S of I-10	-	-	-	-	B	B	B	B
Peak Hour Traffic (Total)	-	-	-	-	-	-	-	-

Alvernon Way and Irvington Road	C	D	D	E	-	-	-	-
Peak Hour Traffic (Total)	-	4100	4813	5638	-	-	-	-
I-10 EB (SB) Ramps and Valencia Road	B	C	F	F	B	C	B	C
Peak Hour Traffic (Total)	-	-	4567	4718	-	-	-	-
I-10 WB (SB) Ramps and Valencia Road	E	B	F	F	B	C	B	C
Peak Hour Traffic (Total)	3005	-	5160	5172	-	-	-	-
I-10 WB Ramps and Caycroft Road	-	-	-	-	-	-	-	-
Peak Hour Traffic (Total)	-	-	-	-	-	-	-	-
I-10 EB Ramps and Caycroft Road	-	-	-	-	-	-	-	-
Peak Hour Traffic (Total)	-	-	-	-	-	-	-	-
Alvernon Way and I-10 **EB Ramps**	B	B	B	E	B	B	B	B
Peak Hour Traffic (Total)	-	-	-	3939	-	-	-	-
Alvernon Way and I-10 **WB Ramps**	-	-	-	-	B	B	B	B
Peak Hour Traffic (Total)	-	-	-	-	-	-	-	-
Irvington Road and I-10 **WB Ramps**/Hotel Drive	B	C	D	D	-	-	-	-
Peak Hour Traffic (Total)	-	-	2045	2252	-	-	-	-

Source: Initial Traffic Report , Interstate 10: Junction Interstate 19 to Kolb Road; State Route 210: Golf Links Road to I-10 (Jacobs, 2019).
ADOT guidance recommends comparing average annual daily traffic volumes; however, only peak hour data is reported in the traffic study for service interchanges.
*Alternative I is preferred by Pima County, the City of Tucson and the University of Arizona.

Highest ADT
1. Ina Road/Oracle Road
2. Broadway Road/Kolb Road
3. Speedway Road/Campbell Avenue

The closest intersection to the study limits is Broadway Boulevard/Kolb Road at 1.4 miles.

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?

*Table C - Three Worst LOS Intersections in Current Plan

PAG[1]
Ina Rd & Oracle Rd
Tanque Verde Rd & Grant Rd/Kolb Rd
Valencia Rd & Kolb Rd

[1]Same as Table A

NO - The ADOT I-10, Jct. I-19 to Kolb Road and SR 210, Golf Links Road to I-10 project will not impact any of the three intersection locations identified in the PAG *CO LMP* with the worst LOS (see Table C above), which include:

Worst LOS
1. Ina Road/Oracle Road
2. Tanque Verde/Grant Road/Kolb Road
3. Valencia Boulevard/Kolb Road

The closest intersection to the study limits is Valencia Boulevard/Kolb Road at 2.5 miles.

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 - The project is not one of the listed exempt projects; therefore, quantitative or qualitative analysis as discussed below will be necessary for this project.

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.

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/tool.cfm)?

NO - Several of the project parameters are outside acceptable ranges for design geometry, traffic volumes and vehicle mix presented in Table 1 below.

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Gmail by Google

Beverly Chenausky <bchenausky@azdot.gov>

RE: 010-E(210)A | H7825 I-10, Jct. I-19 to Kolb Road and SR 210, Golf Links Road to I-10_ FHWA Review of Level of Analysis for Air Quality

1 message

Wilson, Tremaine (FHWA) <tremaine.wilson@dot.gov> Tue, Mar 19, 2019 at 7:14 AM
To: "bchenausky azdot.gov" <bchenausky@azdot.gov>
Cc: Sarah Karasz <SKarasz@azdot.gov>, ADOTAirNoise <AdotAirNoise@azdot.gov>, "Tazeen A. Dewan" <TDewan@azdot.gov>, "Heier, Ammon (FHWA)" <ammon.heier@dot.gov>

Good morning Beverly,

Thank you for your patience. Our Resource Center has reviewed your requests below and the documentation that was provided, and below are FHWA's responses:

1. Based on the information provided, we concur with ADOT's assessment that a CO quantitative hot-spot analysis is not necessary for the subject project. As noted in the documentation, a qualitative analysis is required.

2. Based on the information provided, we concur with ADOT's assessment that a Level 3 quantitative MSAT analysis should be completed.
    a. Note: please refer to the most recent FHWA MSAT Guidance and Frequently Asked Questions document. We note that Figures A-1 and A-2 in the provided *"I10_MSAT Project-level Analysis Questionnaire_022519"* document defines an "area of influence" that is not consistent with the guidance; specifically see FAQ #2, "How do I define the affected environment" https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/moves_msat_faq.cfm

Please let me know if you need anything else.

Thank you,

Tremaine L. Wilson

Tremaine L. Wilson

Tremaine L. Wilson

Environmental Coordinator

FHWA Arizona Division

602-382-8970

From: bchenausky azdot.gov
Sent: Tuesday, February 26, 2019 12:00 PM
To: Wilson, Tremaine (FHWA) <tremaine.wilson@dot.gov>
Cc: Sarah Karasz <SKarasz@azdot.gov>; ADOTAirNoise <AdotAirNoise@azdot.gov>; Tazeen A. Dewan <TDewan@azdot.gov>; Heier, Ammon (FHWA) <ammon.heier@dot.gov>
Subject: RE: 010-E(210)A | H7825 I-10, Jct. I-19 to Kolb Road and SR 210, Golf Links Road to I-10_ FHWA Review of Level of Analysis for Air Quality
Importance: High

Tremaine – I am seeking concurrence from FHWA on the air quality modeling approach for the following project **I-10, Jct. I-19 to Kolb Road and SR 210, Golf Links Road to I-10.** Attached you will find documentation on CO, for the purposes of transportation conformity we are recommending that hot-spot analysis is not needed for this project, as the preferred alternative does not include any intersections with LOS and all alternatives provide LOS improvement from the NoBuild. An Air Quality Report will be developed for NEPA purposes only to include analysis for CO and MSATs as part of the EA for this project. For MSATs we are seeking FHWA guidance on if the suggested Level 3 analysis is warranted for this project, further information in regards to the modeling approach will follow utilizing ADOT's ShareFile site. I am aware that the Resources Center has replaced Jeff Houk's position but I am not sure who you facilitate Air Quality modeling reviews with at the Resource Center (in particular the required discussion on the project area needed for MSAT)? Please provide me information on the point of contact from the resource center needs to be added to the ShareFile folder to review the GIS Shapefiles and additional supporting materials for this project.

ADOT would like to obtain a recommendation on the modeling level of effort for this project in advance so the consultant can modify the scope accordingly. The description of the project is included in the CO document the MSAT document includes excerpts of the traffic study that was used to make the determination that MSAT's modeling is needed. All other supporting materials will be sent through the ShareFile notification system. Let me know if you have any follow up questions, thanks.

Beverly T. Chenausky

Air & Noise Program Manager

MD EM02, Room 41

1611 W. Jackson St.

Phoenix, AZ 85007

602.712.6269

Appendix B.1
MSAT Modeling Assumptions

Modeling files available upon request

MSAT Project-level Analysis Requirements

SEE – CO Document for Project Scope and Description

Consideration of MSAT emission in NEPA Documents

The NEPA requires, to the fullest extent possible, that the policies, regulations, and laws of the Federal Government be interpreted and administered in accordance with its environmental protection goals. The NEPA also requires Federal agencies to use an interdisciplinary approach in planning and decision-making for any action that adversely impacts the environment. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. Even as the science emerges, we are duly expected by the public and other agencies to address MSAT impacts in our environmental documents. Nonetheless, air toxics concerns continue to be raised on highway projects during the NEPA process. FHWA issued ***Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*** (further referred to as the ***Interim Guidance***) that advised Federal Highway (FHWA) Division Offices on when and how to analyze Mobile Source Air Toxics (MSAT) within the National Environmental Policy Act (NEPA) review process for proposed highway projects. This interim guidance replaces the previous Interim Guidance version issued on December 6, 2012. The October 2016 update was prompted by recent changes in emissions model required for conducting emissions analysis.

The FHWA has outlined a tiered approach for analyzing MSATs in NEPA documents, with three tiers representing the levels of potential impacts from projects.

Depending on specific project circumstances, the FHWA has identified three levels of analysis:

a) No analysis for projects with no potential for meaningful MSAT effects;
b) Qualitative analysis for projects with low potential MSAT effects; or
c) Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

1. Does the project meet criteria for Projects with No Meaningful Potential MSATs Effects?

1.1 Projects qualifying as a categorical exclusion under 23 CFR 771.117(c);
1.2 Projects exempt under the Clean Air Act conformity rule under 40 CFR 93.126; or
1.3 Other projects with no meaningful impacts on traffic volumes or vehicle mix.

<u>NO</u> – The Project does not meet the requirements to have no meaning potential for MSAT effects. As described above, the Project would substantially increase traffic volumes along the I-10 corridor through Tucson, AZ

2. Does the project meet criteria for Projects with Low Potential MSATs Effects?

The types of projects included in this category are those that serve to improve operations of highway, transit or freight without adding substantial new capacity or without creating a facility that is likely to meaningfully increase MSAT emissions. This category covers a broad range of projects, including most highway projects. Examples of projects covered in this section are minor widening projects; new interchanges, such as those that replace a signalized intersection on a surface street; or projects where design year traffic is projected to be less than 140,000 to 150,000 annual average daily traffic (AADT).

NO – As described above, the Project design year has projected annual average daily traffic to exceed 140,000. Additionally, the Project build alternatives would add capacity to the I-10 urbanized area through the Tucson, AZ region.

3. Does the project meet criteria for Projects with Higher Potential MSATs Effects?

This category includes projects that have the potential for meaningful differences in MSATs emissions among project alternatives. To fall into this category, a project must:

3.1 Does this project Create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of diesel particulate matter in a single location, involving a significant number of diesel vehicles for new projects or accommodating with a significant increase in the number of diesel vehicles for expansion projects?

3.2 Create new capacity or add significant capacity to urban highways such as Interstates, urban arterials, or urban collector-distributor routes with traffic volumes where the AADT is projected to be in the range of 140,000 to 150,000 or greater by the design year.

AND

3.3 Be located in proximity to populated areas.

YES – The Project would increase capacity along a major freeway through a populated urban area within Tucson, AZ. The AADT of the proposed Project would affect an area of I-10 and SR-210 and exceed the 140,000 threshold. For example, the 2040 System I Build Alternative for I10 east of Craycroft Rd. has an estimated AADT 193,789. Similarly, the System IV Build alternative for I10 west of Country Club Rd. has an estimated AADT of 159,041. Table 1 below summarizes the maximum segments of I10 for the 2040 No Build, System I, and System IV alternatives. The table also highlights the figure in the Traffic Report (Jacobs 2019[2]) the data is located. Additionally, the Traffic Report (Jacobs 2019) Section 4.5.4 demonstrates the estimated percentage of diesel trucks along I-10 for the System I and System IV build alternatives range between 9% to 16% depending on the time of day.

[2] Jacobs, 2019. *Initial Traffic Report. Interstate 10: Junction Interstate 19 to Kolb Road. State Route 2010: Golf Links Road to I-10.* Phoenix, AZ. February

Table 1: 2040 AADT for I10 Segments Greater than 150,000

Alternative	AADT[1]	Location	Traffic Report Figure[3]
No Build	137,206[2]	I10 between Craycroft Road and Wilmot Road.	Figure 4.4
System I Alternative	155,316	I10 between Ajo Connector and Country Club Road.	Figure 4.6
System I Alternative	182,878	I10 between Alvernon Way and Valencia Road	Figure 4.6
System I Alternative	178,159	I10 between Valencia Road and Craycroft Road	Figure 4.6
System I Alternative	193,789	I10 between Craycroft Road and Wilmot Road.	Figure 4.6
System I Alternative	165,822	I10 between Wilmot Road and Kolb Road.	Figure 4.6
System IV Alternative	150,800	Between I10/I19 Interchange and 6th Ave.	Figure 4.8
System IV Alternative	159,041	I10 between Ajo Way Connector and Kino Pkwy.	Figure 4.8

1. Sum of AADT for eastbound and westbound lanes.
2. Maximum for the No Build Alternative
3. Excerpts of the Figures from the Traffic Report (Jacobs 2019) are attached to this document.

If the Project is determined to trigger FHWA thresholds for a Level 3 MSAT analysis, the project will be assessed for MSAT impacts quantitatively. This will require an analysis to forecast local-specific emission trends of the priority MSATs for the No-Build, Scenario I and Scenario IV alternatives, to use as a basis of comparison. The priority MSATs to be assessed are:

- 1,3-butadiene,
- acetaldehyde,
- acrolein,
- benzene,
- diesel particulate matter (diesel PM),
- ethylbenzene,
- formaldehyde,
- naphthalene, and
- polycyclic organic matter

Attached is Figure A-1 and Figure A-2, showing the percent change in volume for links on the affected network within the Traffic Study Area of the proposed project for year 2040 from the No-Build alternative to the System I and System IV alternatives, respectively. All links within the proposed study area greater than 50 VMT for the No-Build alternative would be assessed. The MOVES2014b model will be used with project specific data supplemented with input data supplied from PAG for the region. For specific inputs not available from the traffic analysis, the PAG values will first be used (ie, fleet mix), then MOVES default values if PAG did not supply a value.

As noted above, the Traffic Study Area used a projected design year of 2040 to model each alternative. The Traffic Study Area design year 2040 volumes exceed the current PAG RMAP 2045 model volumes (PAG, 2016[3]). Therefore, the Traffic Study Area 2040 design year volumes will be used with MOVES 2014b 2045 emission factors.

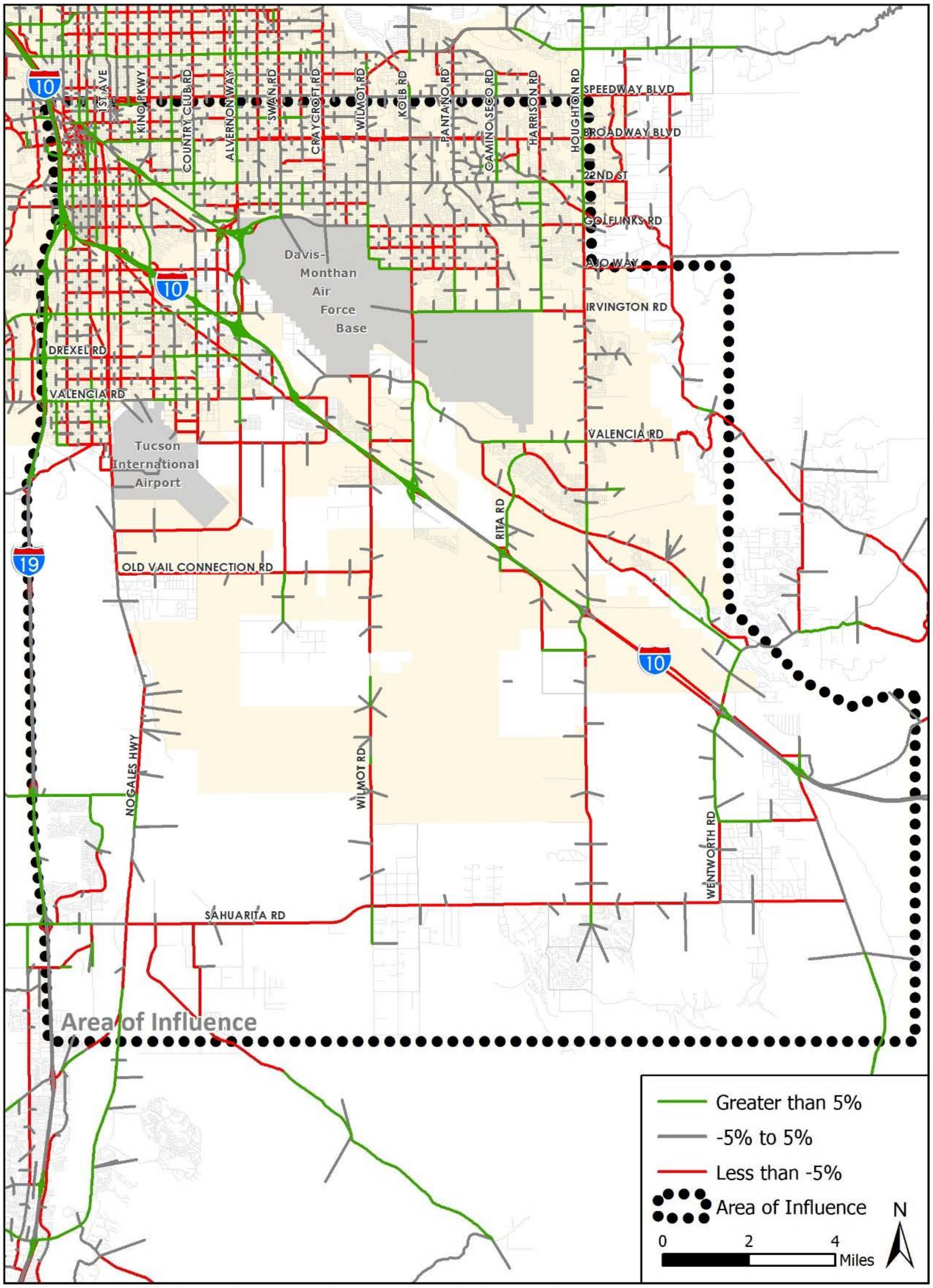
The analysis will be conducted for the project scenarios (No-Build, Build Alternatives I and IV) for existing (2017), open to traffic (2022), and the project design year (2040) in lieu of the PAG RTP horizon year (2045). The full traffic network analysis did not conduct a regional model for the opening year. Therefore, a reverse growth factor will be applied traffic volumes for the Traffic Study Area design year (2040) to obtain opening Build year (2022) and existing year volumes for input into MOVES. All other project specific MOVES requirements (average speed, fleet mix, etc) utilized for the Design year analysis will be consistent with the PAG 2045 runs.

[3] Pima Association of Governments. 2016. *2045 Regional Mobility and Accessibility Plan*. https://www.pagregion.com/documents/rmap/rmap2045/2045RMAP.pdf. Accessed 7/28/17.

Attachments (2)

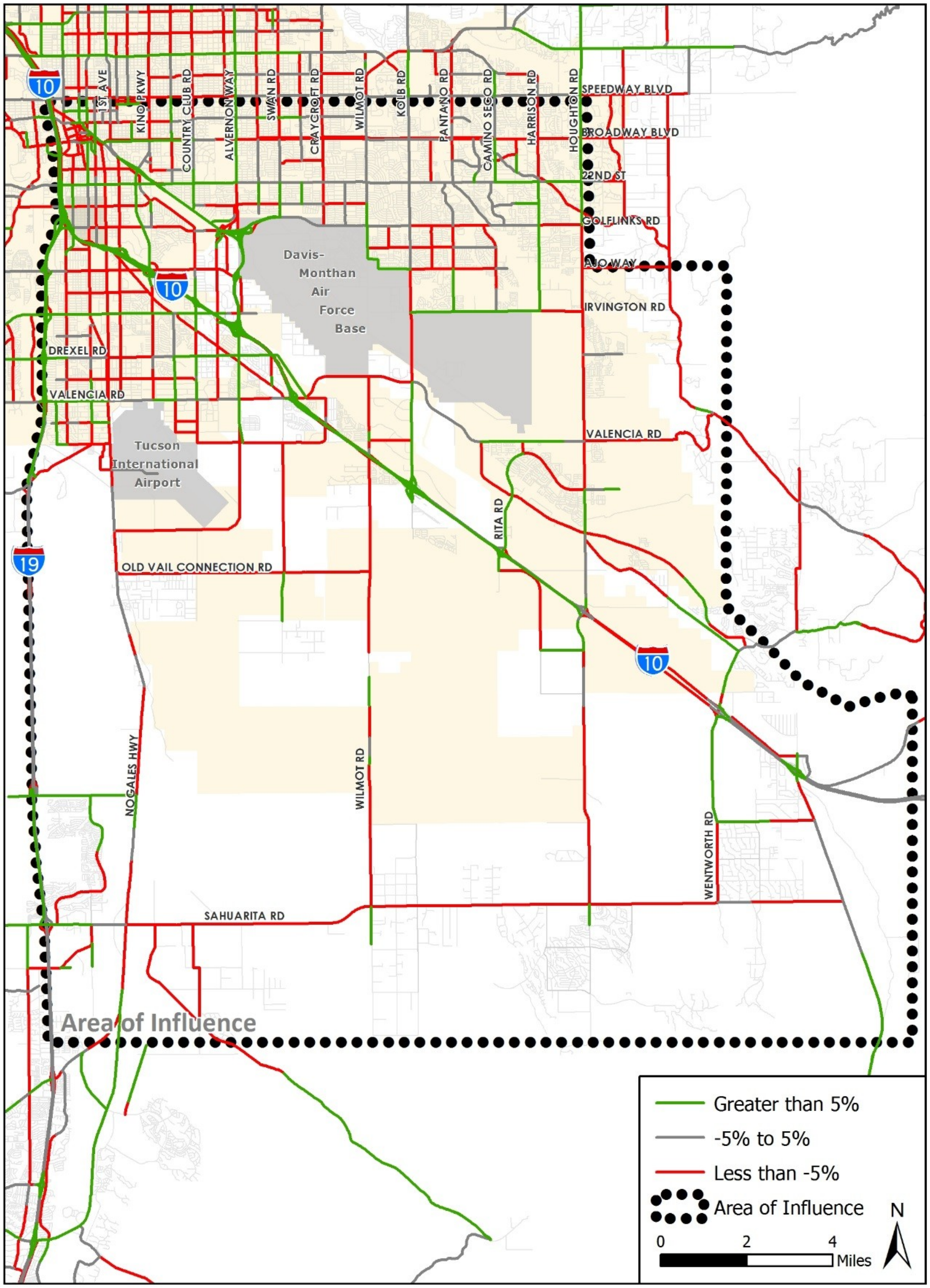
Attachment A
MSAT Figures

Figure A-1 - No Build vs System I Traffic Volume Difference



I-10, Jct. I-19 to Kolb Road and SR 210, Golf Links Road to I-10
Federal Project No.: 010-E(210)A
ADOT Project No.: 010 PM 260 H7825 01L

Figure A-2 - No Build vs System IV Traffic Volume Difference

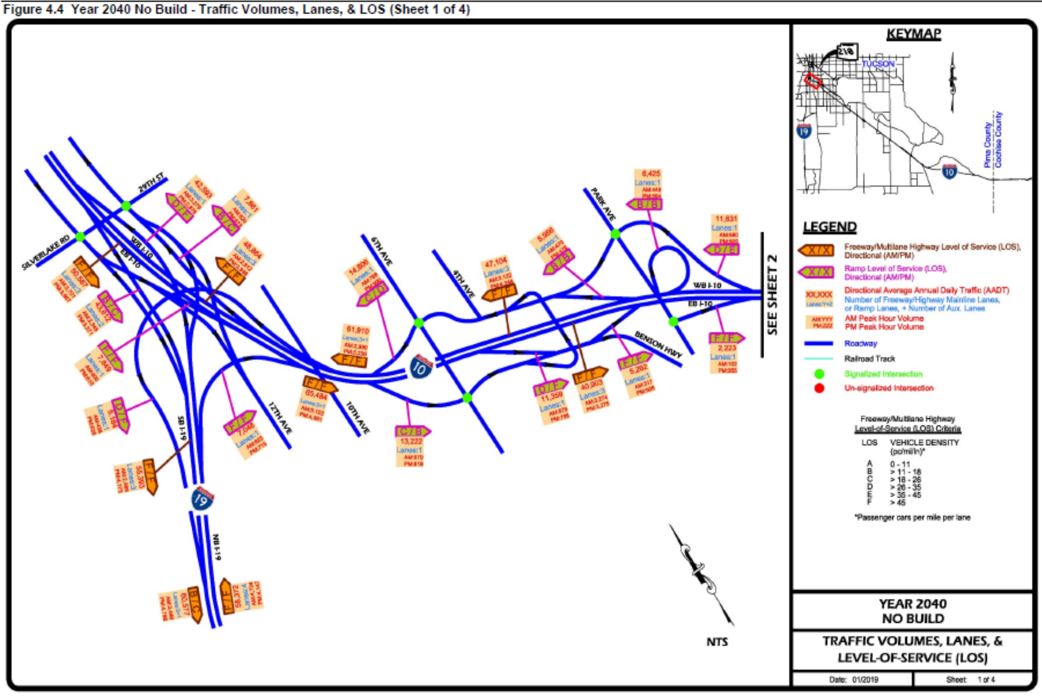


I-10, Jct. I-19 to Kolb Road and SR 210, Golf Links Road to I-10
Federal Project No.: 010-E(210)A
ADOT Project No.: 010 PM 260 H7825 01L

Attachment B
Traffic Report AADT Figures

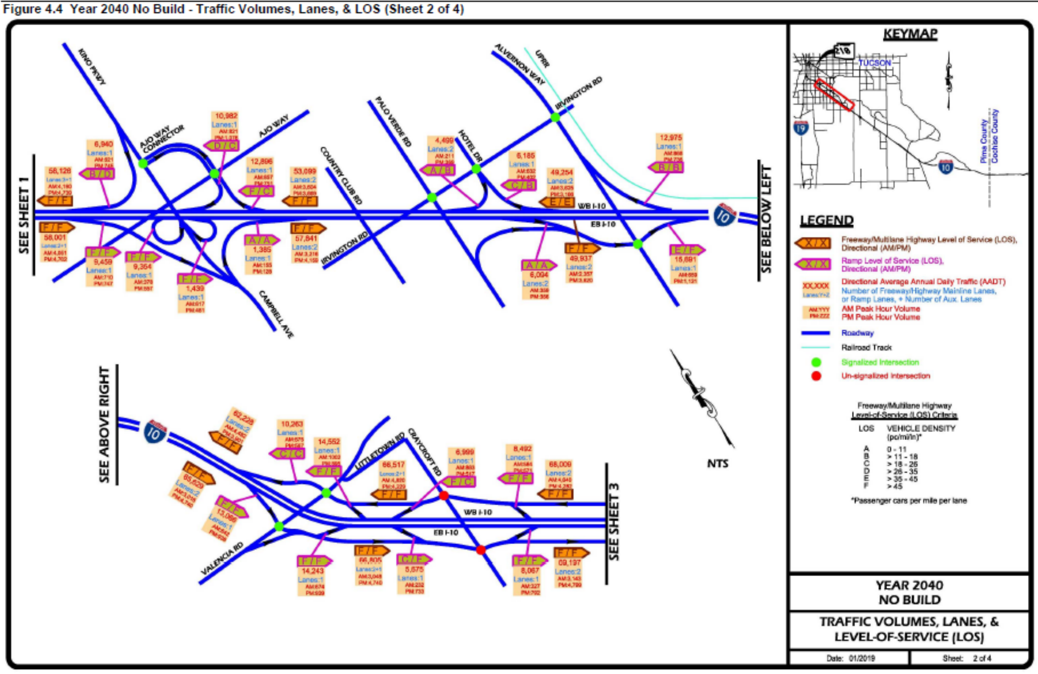
I-10; Jct. I-19 to Kolb Road & SR 210; Golf Links Road to I-10 — *Initial Traffic Report*

Figure 4.4 Year 2040 No Build - Traffic Volumes, Lanes, & LOS (Sheet 1 of 4)



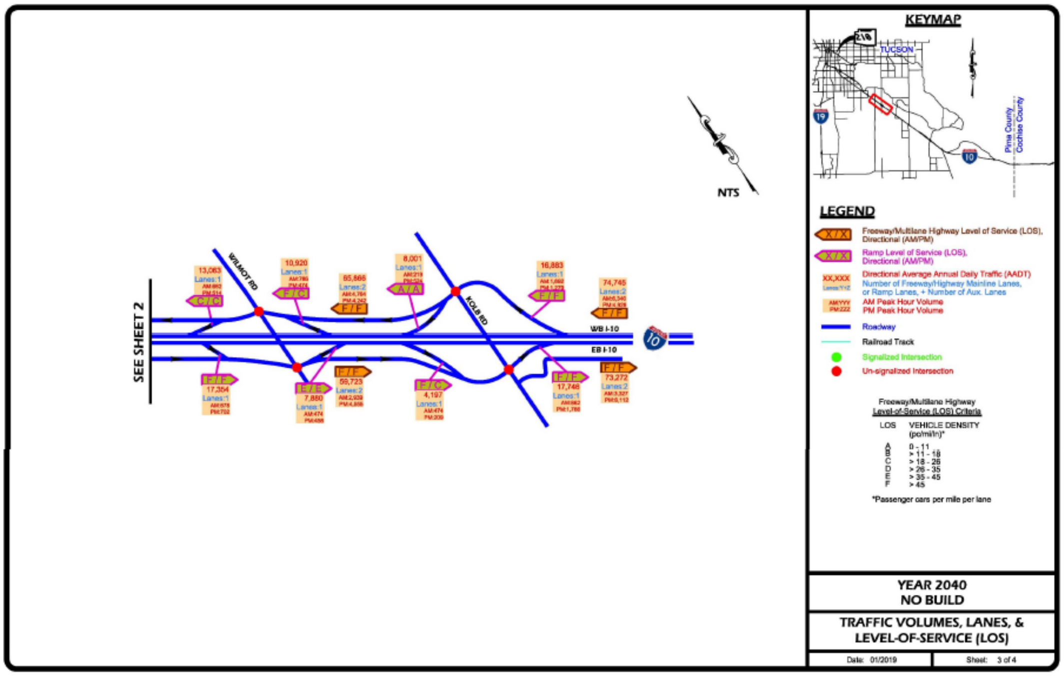
I-10; Jct. I-19 to Kolb Road & SR 210; Golf Links Road to I-10 — *Initial Traffic Report*

Figure 4.4 Year 2040 No Build - Traffic Volumes, Lanes, & LOS (Sheet 2 of 4)



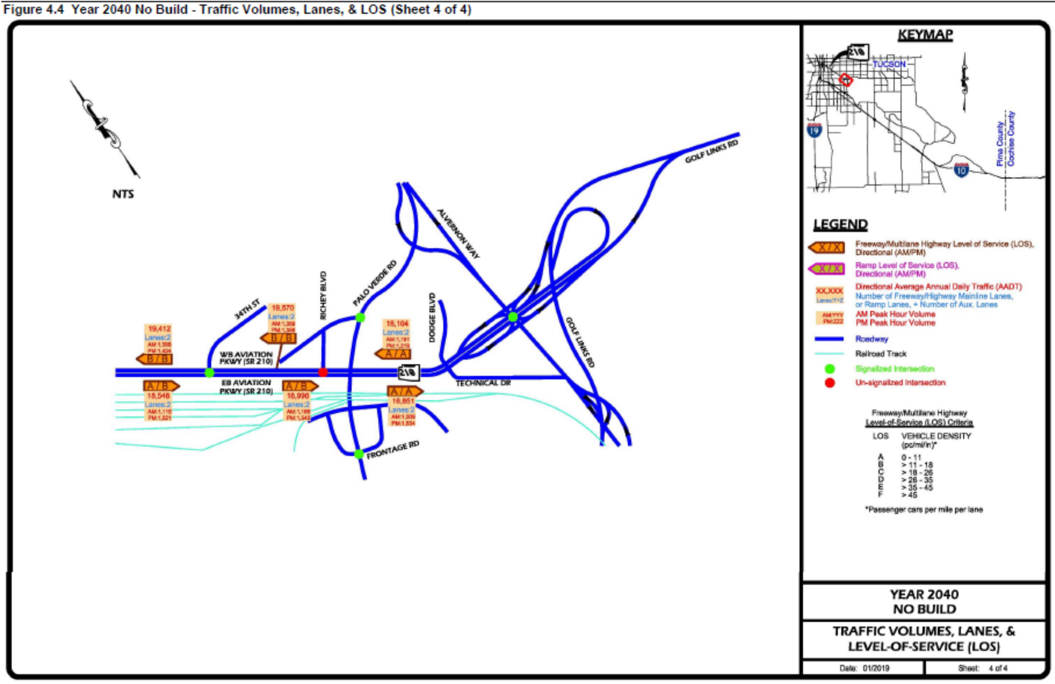
I-10; Jct. I-19 to Kolb Road & SR 210; Golf Links Road to I-10 *Initial Traffic Report*

Figure 4.4 Year 2040 No Build - Traffic Volumes, Lanes, & LOS (Sheet 3 of 4)



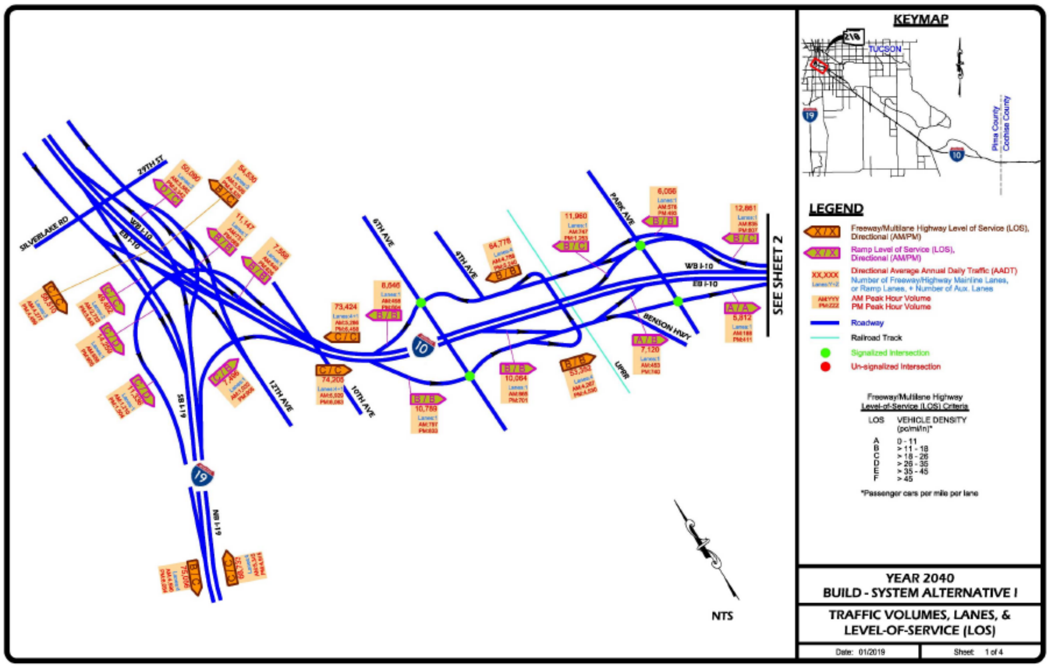
I-10; Jct. I-19 to Kolb Road & SR 210; Golf Links Road to I-10 *Initial Traffic Report*

Figure 4.4 Year 2040 No Build - Traffic Volumes, Lanes, & LOS (Sheet 4 of 4)



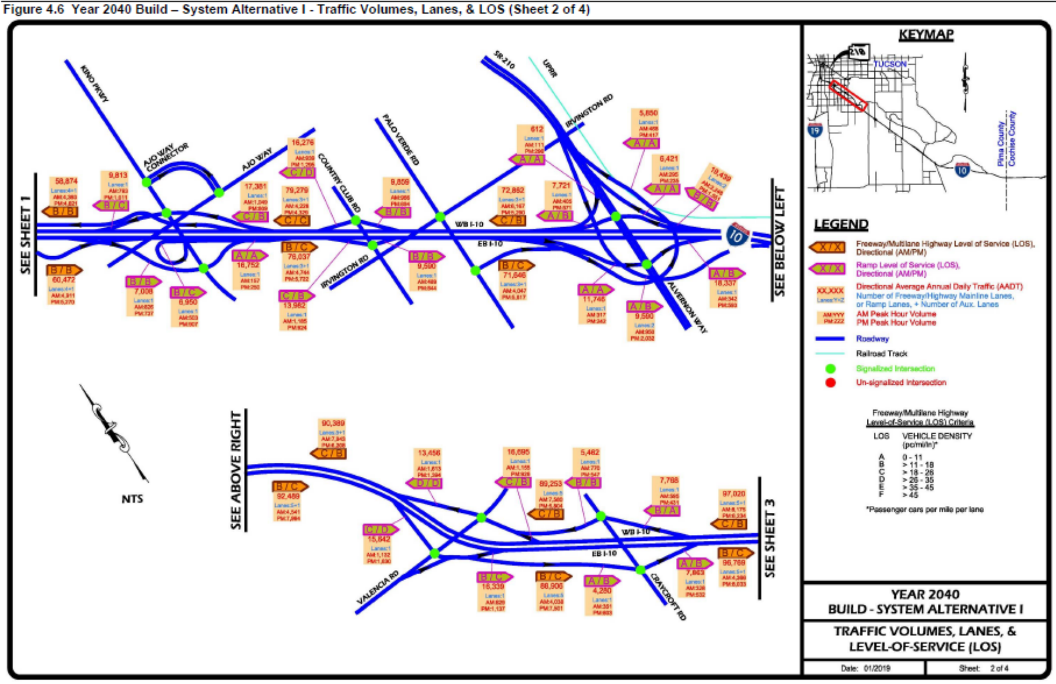
I-10; Jct. I-19 to Kolb Road & SR 210; Golf Links Road to I-10 — *Initial Traffic Report*

Figure 4.6 Year 2040 Build – System Alternative I - Traffic Volumes, Lanes, & LOS (Sheet 1 of 4)



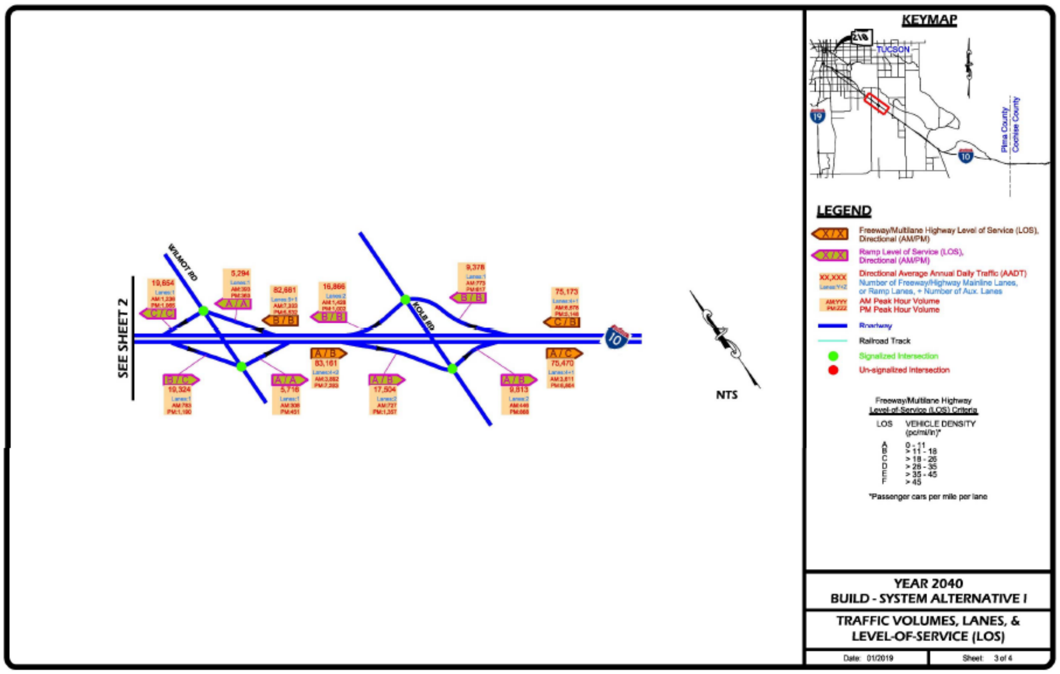
I-10; Jct. I-19 to Kolb Road & SR 210; Golf Links Road to I-10 — *Initial Traffic Report*

Figure 4.6 Year 2040 Build – System Alternative I - Traffic Volumes, Lanes, & LOS (Sheet 2 of 4)



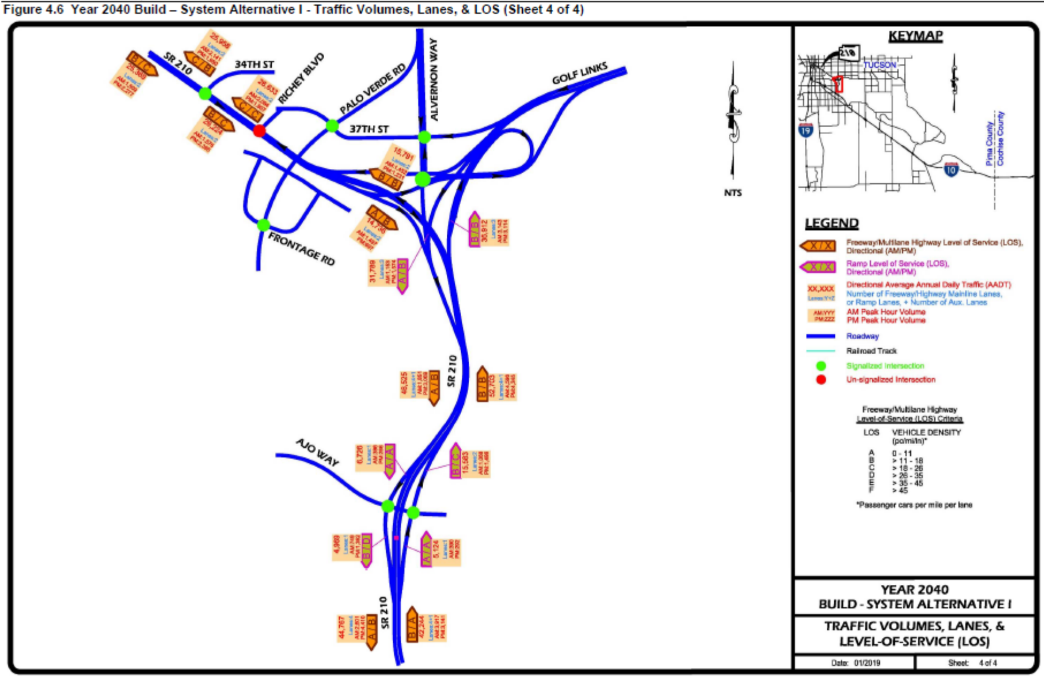
I-10; Jct. I-19 to Kolb Road & SR 210; Golf Links Road to I-10 *Initial Traffic Report*

Figure 4.6 Year 2040 Build – System Alternative I - Traffic Volumes, Lanes, & LOS (Sheet 3 of 4)



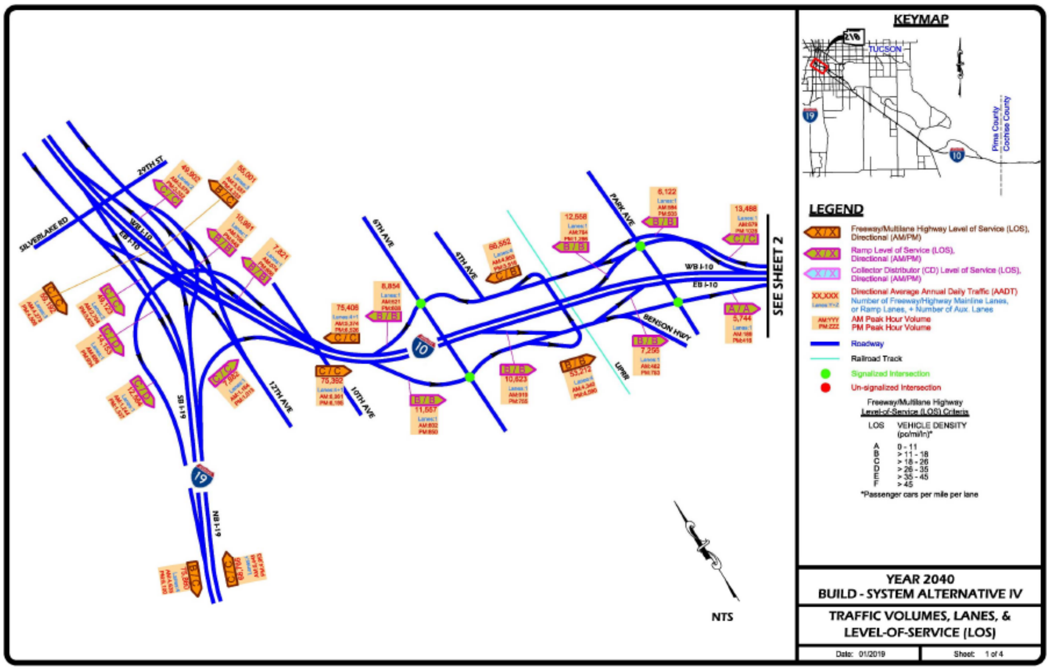
I-10; Jct. I-19 to Kolb Road & SR 210; Golf Links Road to I-10 *Initial Traffic Report*

Figure 4.6 Year 2040 Build – System Alternative I - Traffic Volumes, Lanes, & LOS (Sheet 4 of 4)



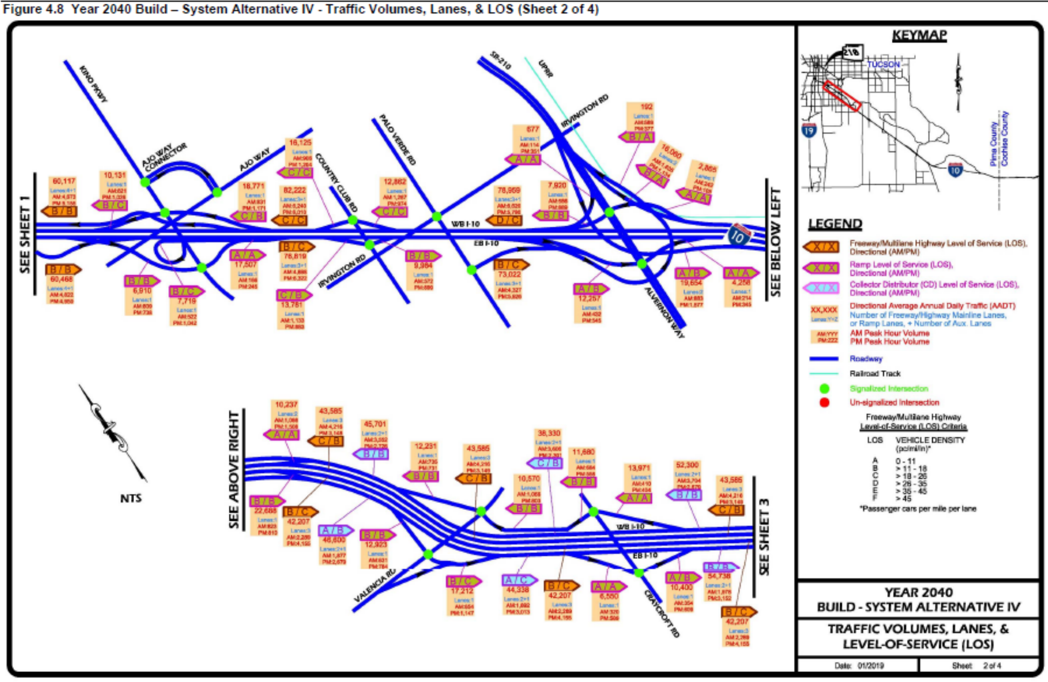
I-10; Jct. I-19 to Kolb Road & SR 210; Golf Links Road to I-10 — *Initial Traffic Report*

Figure 4.8 Year 2040 Build – System Alternative IV - Traffic Volumes, Lanes, & LOS (Sheet 1 of 4)



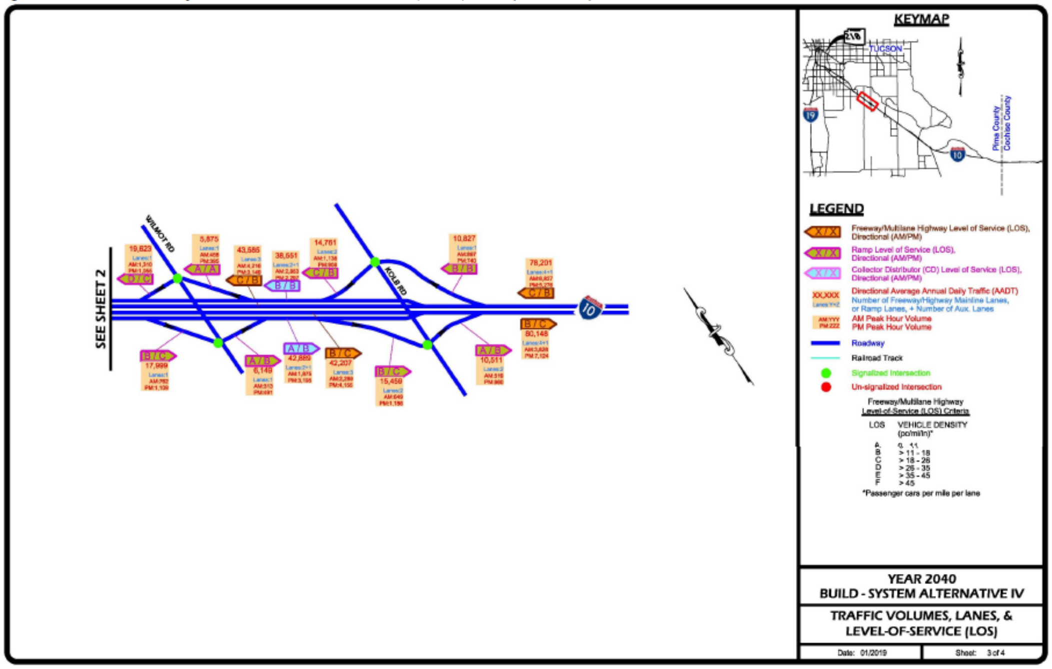
I-10; Jct. I-19 to Kolb Road & SR 210; Golf Links Road to I-10 — *Initial Traffic Report*

Figure 4.8 Year 2040 Build – System Alternative IV - Traffic Volumes, Lanes, & LOS (Sheet 2 of 4)



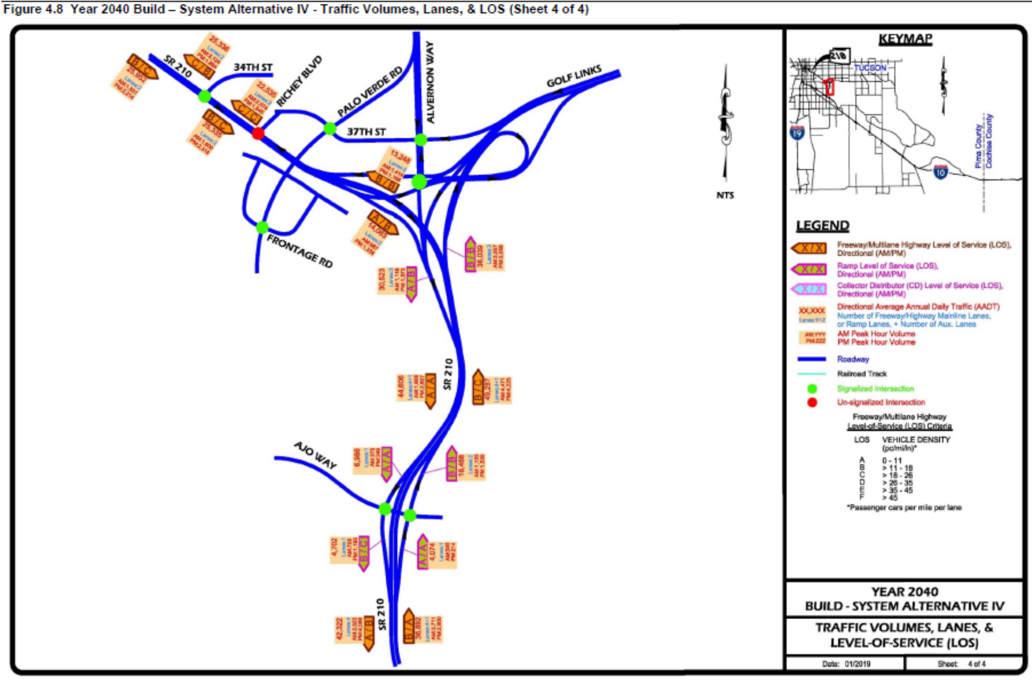
I-10; Jct. I-19 to Kolb Road & SR 210; Golf Links Road to I-10 — *Initial Traffic Report*

Figure 4.8 Year 2040 Build – System Alternative IV - Traffic Volumes, Lanes, & LOS (Sheet 3 of 4)



I-10; Jct. I-19 to Kolb Road & SR 210; Golf Links Road to I-10 — *Initial Traffic Report*

Figure 4.8 Year 2040 Build – System Alternative IV - Traffic Volumes, Lanes, & LOS (Sheet 4 of 4)



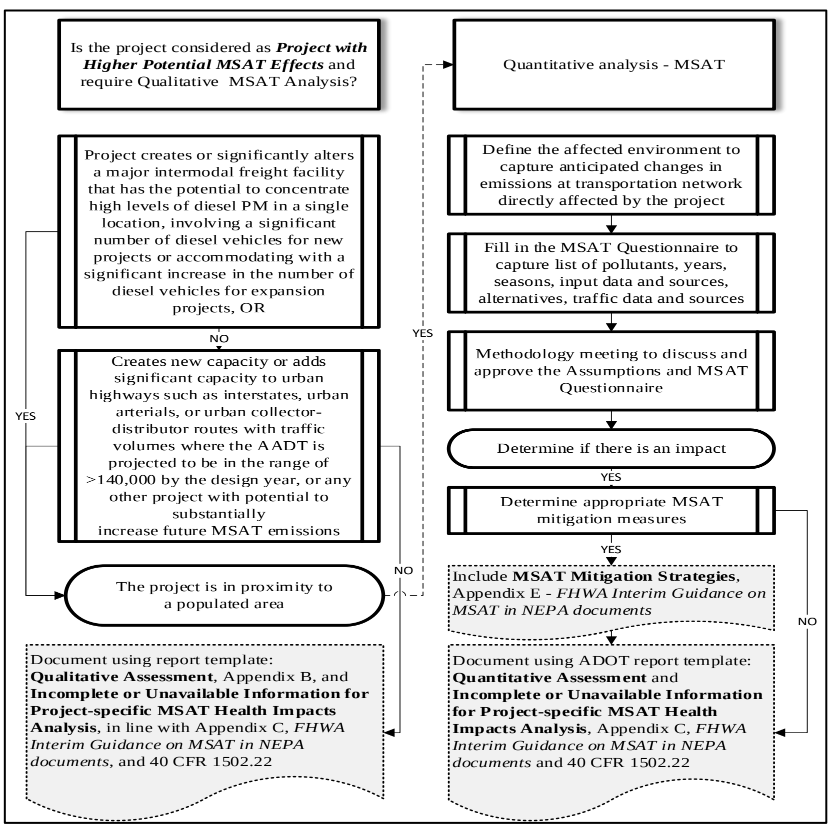
MSAT Quantitative Analysis Modeling Assumptions Document

General Instructions: The Arizona Department of Transportation (ADOT) developed the following 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 MSAT quantitative analysis, as suggested in Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents.

Completing MSAT Quantitative Analysis – General Process

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the U.S. Environmental Protection Agency (EPA) regulate 188 air toxics. 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). These are *1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter*. The list is subject to change and may be adjusted in consideration of future EPA rules. The general process on MSAT analysis is shown in Figure 1. Please consult when appropriate the Resources, page 11.

Figure 1 - Quantitative MSAT Analysis Process



1. Determine Base, Interim, and Design (horizon) Year, and Alternatives if applicable

Define the appropriate Base and Design year to analyze in the MSAT analysis, and consider if there is a compelling reason for consideration of an Interim Year, such as the first year of operation, for this project.

2. Describe the project area, determine the County, and MPO covering the area the project is located in, and determine the source of Traffic Demand Model to be used in the project.

- If the project was subject to PM conformity determination, due to the attainment status of the area, use thereupon provided traffic data
- If the project is within MPO, use the traffic information provided by the respective MPO
- If project is outside MPO areas, ADOT HPMS and AZTDM data would be used.

For example, if the project is located within Maricopa Association of Governments (MAG), they would have a significant amount of traffic available data. However, not all areas would have that level of information, and it has to be taken into consideration when determining methodology, ensuring that all information consequential to the MSAT emission is determined and acquired.

3. Identify Affected Environment and Transportation Network

MSAT analyses are intended to capture the anticipated changes in emissions within an affected environment, defined as the transportation network directly affected by the project. In line with FHWA recommendation, ADOT requires analyzing ***all segments*** associated with the project, ***plus those segments expecting meaningful changes in emissions as a result of the project***. It is appropriate to present the affected network in an aerial image, resembling ArcGIS generated network and images, for example using red color for affected and green for not affected links.

3.1 Define the affected network based on available project-specific information such as the environmental document traffic analysis considering changes in such metrics as:

- ± 5% or more in annual average daily traffic (AADT) on congested highway links of level of service (LOS) D or worse;
- ± 10% or more in AADT on uncongested highway links of LOS C or better;
- ± 10% or more in travel time; and
- ± 10% or more in intersection delay.
- Determine if the project affects a major intermodal facility or port located in proximity to a populated area, to aid eventual determination if it is meaningful to include the processes Hoteling, Retrofit, and Starts in modeling.
- Identify eventual construction activities and public concerns regarding MSAT emissions associated with the project

- You should also consult with HEPN and HEPE if you have a concern; for example, a project that does not fall within any of the types of projects listed above, but you think has the potential to substantially increase future MSAT emissions.

Any deviation from these recommendations should include documentation in the project file explaining what segments were included or excluded from the affected area and why.

4. Developing a County scale MOVES RunSpec for MSAT analysis

- The *FHWA Frequently Asked Questions (FAQ) Conducting Quantitative MSAT Analysis for FHWA NEPA Documents*, recommends using MOVES at the County scale for quantitative MSAT analysis. FHWA recommends selecting the Inventory Calculation Type because MOVES runs faster and MOVES output can be used directly to produce reports for most MSAT pollutants to include in NEPA documentation. The MOVES Rates Calculation Type requires more post-processing in spreadsheets, takes longer to run, and is more cumbersome to troubleshoot.

- Model one RunSpec for baseline, interim, and design year, NoBuild and Build selected alternative(s).For Diesel PM, if it is modeled separately from the other MSATs, then two RunSpecs for each year and alternative; one RunSpec should include all vehicle types, and the non-DPM MSAT pollutant/process selections, while the other RunSpec should include only the diesel vehicle types, and DPM pollutant/process selections.

- All tabs/fields in the County Data Manager should be completed to ensure the output generated is correct, Figure 2. CDM inputs are the same, with total VMT), with the same input databases for DPM and non-DPM runs.

Figure 2 – County Data Manager import files

MOVES Data	Data Importer	CMD
RampFraction	✔	✔
RoadTypeDistribution	✔	✔
SourceTypePopulation	✔	✔
HPMSVtypeYear, SourceTypeYearVMT, HPMSVtypeDay, SourceTypeDayVMT	✔	✔
MonthVMTFraction, DayVMTFraction, HourVMTFraction	✔	✔
AgeDistribution	✔	✔
AverageSpeedDistribution	✔	✔
FuelSupply, FuelFormulation	✔	✔
FuelUsageFraction, AVFT	✔	✔
IMCoverage	✔	✔
HotellingHours	✔	✔
HotellingActivityDistribution	✔	✔
Starts, StartsPerDay, StartsHourFraction, StartsSourceTypeFraction, StartsMonthAdjustData, ImportStartsOpModeDistribution	✔	✔

- Develop a set of spreadsheet inputs for a MOVES run. Figure 3, is an example of the master checklist/spreadsheets needed for analysis, design year, NoBuild scenario, it is to be submitted alongside every run.

Figure 3 – Example master checklist for QA (input or output database)

Input:	Spreadsheet data file:
Age distribution	Age_allruns.xls
Meteorology	Met_allruns.xls
Sourcetype population	Population_2040.xls
I/M	IM_2040.xls
Fuels	Fuels_2040_winter.xls
Vehicle-miles traveled (VMT)	VMT_2040_NoBuild.xls
Speed distribution	Speed_2040_NoBuild.xls
Road type distribution	Roadtype_2040_NoBuild.xls
Ramp fraction	Ramps_allruns.xls
Month, Day VMT fractions	MonthDayfractions_allruns.xls
Hour VMT fractions	Hourfractions_2040.xls

- Create the necessary RunSpec, and import the inputs using the County Data Manager for emissions analysis
  - Label run as a Test run, include information that it is used for test in Description, to avoid eventual confusion in review process
  - Find and resolve any error messages reported by the CDM
- Execute the RunSpec and QA the output and check
  - Are all pollutants, emission processes, road types, etc. that you requested in the RunSpec included in the output?
  - Did you get "0" for any emissions?
  - Do the distance outputs agree with your VMT inputs?
  - Other anomalies?
- Name each run using following format: YEAR_Scenario_MSAT (example: 2040_Build_MSAT). Use the Description panel in the RunSpec to explain what each run does.
- Define Source and Scale to be used in model. Use On-road, County scale, and Inventory mode
- Define Time Span
  - Set Time Aggregation to Hour. For example if information is available, select 4 months (3x4 months to represent year later to be post-processed to get annual emissions), Weekdays, All 24 hours, as per FHWA recommendation. Model Single year (Baseline, Interim, Design Year).

  - Select the County where project is located
  - Select applicable vehicle/fuel for Onroad Vehicle Equipment. All gas and diesel vehicle types; CNG transit bus, E85 fuel type (select the CNG transit bus vehicle combination, and E85 passenger car and passenger truck, default values built-in)
  - Select All road types in the affected network. Don't select "off-network" road type, as it captures start, extended idle, and resting evaporative emissions; these emissions aren't normally included in NEPA MSAT analysis.
  - Select Pollutants and Processes. For Diesel Particulate Matter (DPM) emissions, include pollutants shown in Figure 4. Follow instructions in *Q 6 - Frequently Asked Questions (FAQ) Conducting Quantitative MSAT Analysis for FHWA NEPA Documents*, while preferred method is to model DPM in a separate run, with only diesel vehicles selected. However, terms *preferred* or *recommended* are not to be mistaken for *required*.

Figure 4 - Diesel particulate matter - Primary Exhaust PM10 with prerequisite pollutants

Pollutant ID	Pollutant Name
100	Primary Exhaust PM10 - Total
110	Primary Exhaust PM2.5 - Total
112	Elemental Carbon
115	Sulfate Particulate
118	Composite - NonECPM
119	H2O (aerosol)

As POM (polycyclic organic matter) cannot be modeled as an individual "pollutant" in MOVES the following individual pollutants need to be selected, modeled, and post-processed.

Figure 5 - List of modeled pollutants

Pollutant ID	Pollutant Name	Pollutant ID	Pollutant Name
68	Dibenzo(a,h)anthracene particle	**168**	Dibenzo(a,h)anthracene gas
69	Fluoranthene particle	**169**	Fluoranthene gas
70	Acenaphthene particle	**170**	Acenaphthene gas
71	Acenaphthylene particle	**171**	Acenaphthylene gas
72	Anthracene particle	**172**	Anthracene gas
73	Benz(a)anthracene particle	**173**	Benz(a)anthracene gas
74	Benzo(a)pyrene particle	**174**	Benzo(a)pyrene gas
75	Benzo(b)fluoranthene particle	**175**	Benzo(b)fluoranthene gas
76	Benzo(g,h,i)perylene particle	**176**	Benzo(g,h,i)perylene gas
77	Benzo(k)fluoranthene particle	**177**	Benzo(k)fluoranthene gas
78	Chrysene particle	**178**	Chrysene gas
81	Fluorene particle	**181**	Fluorene gas
82	Indeno(1,2,3,c,d)pyrene particle	**182**	Indeno(1,2,3,c,d)pyrene gas
83	Phenanthrene particle	**183**	Phenanthrene gas
84	Pyrene particle	**184**	Pyrene gas

Figure 6 - MSAT emissions process that may occur on the roadway

ProcessID	Process
1	Running Exhaust
15	Crankcase Running Exhaust
11	Evap Permeation
13	Evap Fuel Leaks

- Pollutants to be calculated and analyzed
  a) Primary Exhaust PM10-Total (as Diesel PM)
  b) Benzene

c) 1,3-Butadiene
d) Formaldehyde
e) Acrolein
f) POM — All PAHs minus naphthalene gas and naphthalene particle
g) Naphthalene — naphthalene gas plus naphthalene particle
h) Ethyl Benzene
i) Acetaldehyde
j) If appropriate, consider inclusion of
- *Total Gaseous Hydrocarbons*
- *Non-Methane Hydrocarbons*
- *Volatile Organic Compounds*
  - Processes, as applicable in respect of the pollutant(s) analyzed

a) Running Exhaust
b) Crankcase Running Exhaust
c) Evap permeation
d) Evap fuel leaks

Consider that for major intermodal freight facilities, off-network emission processes, such as start, extended idle, and evap components, may be appropriate. Start and evaporative emissions are not used in MSAT analysis, but may be needed for MOVES to run.

- General Output information. Select “Distance Traveled” for QA purposes. Select Units “Grams”, “Joules”, “Miles”
- Output Emissions Detail. Select “Fuel Type”, “Road Type”

As a QA, you may make a run with “Source Use Type” to confirm there are no zero values.

- County Data Manager (CMD) - input files

To streamline the review process and facilitate troubleshooting, when working on analysis and later while submitting runs for review in a folder, please follow the file structure and naming shown in Figure 7, as an example.

Figure 7 - File structure and naming, with expected sources

Input:	Spreadsheet data file:	Remarks:	Source
Age distribution	Age_allruns.xls	Same for all runs	MPO, ADOT
Meteorology	Met_allruns.xls	Same for all runs	ADEQ
Sourcetype population	Population_2040.xls	Unique for every run	MPO, ADOT
I/M	IM_2040.xls	Same for alternatives	MPO/ADEQ
Fuels	Fuels_2040_winter.xls	Vary by season	MPO/ADEQ
Vehicle-miles traveled (VMT)	VMT_2040_NoBuild.xls	Unique for every run	MPO, ADOT
Speed distribution	Speed_2040_NoBuild.xls	Unique for every run	MPO, ADOT
Road type distribution	Roadtype_2040_NoBuild.xls	Unique for every run	MPO, ADOT
Ramp fraction	Ramps_allruns.xls	Unique for every run	MPO, ADOT
Month, Day VMT fractions	MonthDayfractions_allruns.xls	Same for all runs	MPO, ADOT
Hour VMT fractions	Hourfractions_2040.xls	Same for all runs/may differ per year	MPO, ADOT

For output database, please use separate output database for each run and reference it, for the analysis and review.

5. Minimum data required

For NEPA clearance document, MSAT analysis, comparison is done for years and alternatives, without attempt to calculate an exact number to compare against a set target, like we are normally refereeing to NAAQS in other air quality analyses. Therefore, inputs that would be ***affected by the project alternatives***, as described in NEPA, like speed for example, are immensely important to accurately depict, while inputs that are not affected by alternatives, such is temperature, are not as important in MSAT analysis. Emissions are sensitive to age but age distributions may not be affected by the project, except perhaps transit projects that include purchase of new buses. If available, use local age distribution (age fractions of fleet by age and source type, varies by base year, first year of operation, and design year), or use default. It is *not allowed* to use a mix of defaults and local data for different years and compare emission, as consistency in approach is of utmost importance.

Some tabs have default data available:

- Average Speed Distribution (*it is recommended to use project-specific (TDM) speed distribution data are needed, by year and alternative, on projects with congestion relief, and if separate speed distributions are known for arterials, collectors, and local roads, calculate a weighted speed, distribution that applies to all urban or rural unrestricted roads*)
- Ramp Fraction
- Fuel
- Meteorology Data
- I/M Programs (*use local input data, otherwise use defaults*)

For every individual link in the Affected Transportation Network, the minimum Project Traffic Data needed to complete a quantitative MSAT analysis are:

1. Link ID

2. MOVES Road Type
3. Length
4. Annual Average Daily Traffic (AADT)
5. % Trucks
6. Peak/Off-peak Travel Fractions
7. Peak/Off-peak Travel Speeds
8. Vehicle-miles of travel (VMT);
9. Vehicle-hours of travel (VHT);
10. AADT or VMT by vehicle types;
11. AADT or VMT by time period; and/or Speed or VHT by vehicle types

An example of a project-specific data and with sources used in analysis is shown in Figure 8.

Figure 8 – Methodology - preview of information

Data	Run Detail Applicability			Source			Data used	
	Same for all Runs	Varies by Year	Varies by Alternative	MPO	ADEQ	ADOT	MOVES default	Project Specific
Age distribution	✔		✔	✔	✔	✔		
Average speed distribution		✔	✔					✔
Fuel Supply		✔		✔	✔		✔	
Fuel Formulation		✔		✔	✔		✔	
Fuel Usage Fraction		✔		✔	✔		✔	
AVFT	✔			✔	✔		✔	
Meteorology	✔							
Ramp fraction		✔	✔	✔		✔		✔
Road Type Distribution		✔	✔	✔		✔		✔
Source Type Population		✔		✔		✔		✔
Starts	Typically not used in MSAT analysis							
HPMS Vehicle Type Year		✔	✔					✔
Month VMT Fraction	✔			✔		✔	✔	
Day VMT Fraction	✔			✔		✔	✔	
Hour VMT Fraction	✔			✔		✔	✔	
Hoteling	Typically not used in MSAT analysis							
IM Programs		✔		✔	✔		✔	
Retrofit	Typically not used in MSAT analysis							
Generic	Typically not used in MSAT analysis							

- Estimate On-Road Motor Vehicle Emissions with MOVES2014a
- Since FHWA guidance is based on addressing the priority MSAT from EPA's 2011 National Air Toxic Assessment of chronic health exposure, the analysis should reflect *annual-average conditions*, and needs to account for the changes in emissions due to different traffic conditions, meteorology, and fuels during the year. For MSAT analysis with MOVES, FHWA recommends modeling four months to represent the different seasons, averaging the resulting emissions to obtain an estimate for a typical day, and multiplying by 365 to estimate annual emissions (*NEPA documents can report emissions either on a daily or annual basis*).

- When selecting Output Emission Detail, consider that checking all the boxes can result in extremely large output files that may require a lot of post-processing, and may likely be a cause of errors. It is prudent to carefully consider what details (pollutants and processes) are needed in output before making selection. The MOVES output database contains numerous output tables with results of the RunSpec, input data, and other information about the RunSpec.
- The two main tables are:
  - MOVESOutput table
    Contains the quantity of emissions by source type, pollutant/process, etc. It is based upon previous output detail selections made in the RunSpec.
  - MOVESActivityOutput table
    Contains the quantities (miles, number of vehicles, hours) of activity types selected in the General Output panel. These can be useful for QA to confirm that all activity was accounted for.

6. Mitigation measures

If the analysis for a project in this category indicates meaningful differences in levels of MSAT emissions among alternatives, mitigation options should be identified and considered. See "*Appendix E - Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents for information on mitigation strategies."*

7. Documentation

Please refer to the handbook developed by the American Association of State Highway and Transportation Officials (AASHTO) Practitioner's Handbook 18 to assist in documenting air quality issues in the NEPA process. Please use this as a guide for developing the necessary NEPA air quality reports for ADOT projects.

NEPA requires:

- Comparative analysis of reasonably foreseeable direct, indirect, and cumulative effects of the alternatives,
- Documentation of compliance with other legal requirements
- Public involvement and agency coordination

What the MSAT FHWA guidance requires:

- If "no potential for meaningful effects" – analysis not required
- If "low potential for meaningful effects" – qualitative analysis
- If "higher potential for meaningful effects" – quantitative analysis
- Discussion of unavailable/incomplete information regarding effects of MSATs on public health – per 40 CFR 1502.22

- If impact identified, mitigation information is required.

MSAT technical report content, but not restricted to:

- Description of proposed project, affected network, when it is expected to open, and projected travel activity data
- Analysis year(s) and alternatives examined
- Key Assumptions, Emissions modeling data, model used with inputs and results, and characterization of project links
- Any mitigation and control measures recommended, including public involvement or consultation if needed.
- Sources of data for modeling. Description of methodology, including model versions
- Summary of traffic data used in analyses
- Detail on air quality modeling analyses, including tables of results and comparisons, preferably with charts to visually aid depiction of differences between alternatives/years
- Documentation of agency coordination relating to air quality, including meeting notes and correspondence where applicable.
- All electronic copies of all supporting data, spreadsheets, and model runs are to be provided as an integral part of process review, and kept in project files.

Resources

1. FHWA NEPA Technical Advisory
   https://www.environment.fhwa.dot.gov/guidebook/vol2/doc15d.pdf

2. FHWA MSAT interim guidance
   https://www.fhwa.dot.gov/environment/air_quality/air_toxics/

3. MOVES – Frequent questions
   https://movesepa.zendesk.com/hc/en-us/categories/201500228-Guidance

4. MOVES2014a User Guide and Manuals
   https://www.epa.gov/moves/moves2014a-latest-version-motor-vehicle-emission-simulator-moves#manuals

5. Examples of MSAT reports, with tables, pollutants, processes, and analyses (from FHWA)
   https://www.fhwa.dot.gov/Environment/air_quality/air_toxics/research_and_analysis/ny_gateway/fhwahep16063.pdf

https://www.fhwa.dot.gov/Environment/air_quality/air_toxics/research_and_analysis/ny_gate

way/fhwahep16063.pdf

https://www.fhwa.dot.gov/Environment/air_quality/air_toxics/research_and_analysis/mn_194/fhwahep16064.pdf

6. AASHTO Practitioner's Handbook 18, Addressing Air Quality Issues in the NEPA Process for Highway Projects. http://environment.transportation.org/center/products_programs/practitioners_handbooks.aspx#17

Appendix B.2
MSAT Incomplete Information

Sec. 1502.22 INCOMPLETE OR UNAVAILABLE INFORMATION

When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking.

(a) If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement.

(b) If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement:

1. A statement that such information is incomplete or unavailable;
2. A statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;
3. A summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and
4. The agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes impacts that have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.

(c) The amended regulation will be applicable to all environmental impact statements for which a Notice to Intent (40 CFR 1508.22) is published in the Federal Register on or after May 27, 1986. For environmental impact statements in progress, agencies may choose to comply with the requirements of either the original or amended regulation.

INCOMPLETE OR UNAVAILABLE INFORMATION FOR PROJECT-SPECIFIC MSAT HEALTH IMPACTS ANALYSIS

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 rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The U.S. Environmental Protection Agency (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" (EPA https://www.epa.gov/iris/). Each report contains assessments of noncancerous 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). Two HEI studies are summarized in Appendix D of FHWA's Interim Guidance Update 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 (HEI, http://pubs.healtheffects.org/view.php?id=282) or in the future as vehicle emissions substantially decrease (HEI, http://pubs.healtheffects.org/view.php?id=306).

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.

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 HEI (http://pubs.healtheffects.org/view.php?id=282). 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 DPM. The EPA (http://www.epa.gov/risk/basicinformation.htm#g) and the HEI (http://pubs.healtheffects.org/getfile.php?u=395) have not established a basis for quantitative risk assessment of DPM in ambient settings.

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.

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.

Because of the limitations cited, a discussion such as the example provided in this appendix (reflecting any local and project-specific circumstances) should be included regarding incomplete or unavailable information in accordance with Council on Environmental Quality (CEQ) regulations [40 CFR 1502.22(b)]. The FHWA Headquarters and Resource Center staff Victoria Martinez (787) 766-5600 X231, Bruce Bender (202) 366-2851, and Michael Claggett (505) 820-2047 are available to provide guidance and technical assistance and support. (http://www.epa.gov/risk/basicinformation.htm#g) and the HEI (http://pubs.healtheffects.org/getfile.php?u=395) have not established a basis for quantitative risk assessment of DPM in ambient settings.