Arizona Department of Transportation

Environmental Planning

Final Air Quality Report

HAPPY VALLEY ROAD
67TH AVENUE TO 35TH AVENUE

Federal Project No. PHX-0(363)D
ADOT Project No. 0000 MA PHX T0239 01C

ADOT Approval September 22, 2022

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

Final Air Quality Report

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Federal Project No. PHX-0(363)D
ADOT Project No. 0000 MA PHX T0239 01C01C

Prepared for:

City of Phoenix
Street Transportation Department
200 W Washington St, 5th floor
Phoenix, Arizona 85003

Prepared by:
AZTEC Engineering
501 N 44th St, Suite 300
Phoenix, AZ 85008

ADOT APPROVAL

This air quality technical report has been developed by the City of Phoenix in support of the proposed roadway improvement project along Happy Valley Road (HVR) between 67th Avenue and 35th Avenue in the City of Phoenix, Maricopa County, Arizona.

Section 176c of the Clean Air Act (CAA) requires that transportation projects conform to the approved air quality State Implementation Plan (SIP) for meeting federal national ambient air quality standards (NAAQS). Conformity requirements were made substantially more rigorous in the CAA Amendments. The conformity determinations for federal actions related to transportation projects must meet the requirements of 40 CFR Parts 51 and 93. This project is not likely to cause or contribute to the severity or number of violations of the NAAQS. This project is included in the Maricopa Association of Governments (MAG) MOMETUM 2050 Regional Transportation Plan (dated December 1, 2021). A transportation conformity determination for the regional conformity analysis of the MAG MOMETUM 2050 Regional Transportation Plan (RTP) and FY 2022-2025 Transportation Improvement Program (TIP) was most recently issued by FHWA and FTA on July 18, 2022.

ADOT provided a copy of the draft air quality report to interagency consultation partners and posted it online for agency and public comments from July 22 through September 13, 2022. The City of Phoenix hosted a public meeting on August 24, 2022, no air quality related public comments were received and all interagency comments received were included as highlighted in this final report, refer to Appendix D. ADOT submitted a request to Federal Highway Administration (FHWA) for a project-level conformity determination on September 19, 2022 and the FHWA issued a conformity determination on September 22, 2022.

The environmental review, consultation, and other actions required by applicable Federal environmental laws for project are being, or have been, carried out by ADOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated April 16, 2019 and executed by FHWA and ADOT. With the air quality conformity determination provided, this project is deemed approved.

U.S. Department of Transportation
Federal Highway Administration

ARIZONA DIVISION

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September 22, 2022

In Reply Refer To:
PHX-0(363)
000MA PHX T0239 01C
Happy Valley Road: 67th Avenue to 35th Avenue
Air Quality Conformity Determination

Paul O'Brien, P.E.
Environmental Planning Administrator
Environmental Planning Group
Arizona Department of Transportation
205 South 17th Avenue, MD 612E
Phoenix, Arizona 85007-3212

Dear Mr. O'Brien:

The Federal Highway Administration (FHWA) received the request from the Arizona Department of Transportation (ADOT) dated September 19, 2022, for a project-level air quality conformity determination for the Happy Valley Road: 67th Avenue to 35th Avenue project [PHX-0(363)D, 000 MA PHX T0239 01C]. The purpose of the project is to improve Happy Valley Road and accommodate increasing traffic volumes by providing greater roadway capacity and other improvements. The project scope includes roadway widening to accommodate a third travel lane between 62nd and 56th avenues, raised center medians, painted buffered bike lanes, new curb, gutter, sidewalk, multiuse trail, and ramps where missing, remove and replace curb, gutter, sidewalk, and ramps where necessary to meet current standards, pavement preservation treatment, including mill and overlay, and pavement markings, upgraded and new bus bays, pads and stops, removal or replacement of valley gutters as needed, street lighting, fiber cable, and traffic signal upgrades, and other improvements, as needed.

The project is located in the Maricopa Association of Governments (MAG) planning boundary, which is designated nonattainment for Particulate Matter (PM10), Ozone and designated maintenance for Carbon Monoxide (CO) under the National Ambient Air Quality Standards (NAAQS) which are subject to project-level conformity requirements. A regional conformity determination analysis was completed as part of the MAG MOMENTUM 2050 Regional Transportation Plan (RTP) and FY 2022-2025 Transportation Improvement Program (TIP) was most recently issued by FHWA and the Federal Transit Administration on July 18, 2022.

Based on our review of the air quality analysis and interagency consultation information provided by the ADOT, regarding this project and scope of work, FHWA is making the determination that this project is not a project of air quality concern and meets the air quality conformity requirements. If there are any questions on this determination, please contact Rebecca Yedlin at 602-382-8979 or Rebecca.Yedlin@dot.gov.

Sincerely,

Karla S. Petty
Division Administrator

By: Rebecca Yedlin

ecc:
AHansen, FHWA
ALirange, FHWA
GHalle, FHWA
Beverly Chenausky, ADOT

FINAL AIR QUALITY REPORT

HAPPY VALLEY ROAD

67TH AVENUE TO 35TH AVENUE

Federal Project No. PHX-0(363)D
ADOT Project No. 0000 MA PHX T0239 01C
City of Phoenix Project No. ST85100437

September 2022

Prepared For:

City of Phoenix
Street Transportation Department

Prepared By:

AZTEC TYPSA

Final Air Quality Report

HAPPY VALLEY ROAD
67TH AVENUE TO 35TH AVENUE

Federal Project No. PHX-0(363)D
ADOT Project No. 0000 MA PHX T0239 01C
City of Phoenix Project No. ST85100437

Prepared for:
City of Phoenix
Street Transportation Department
200 W Washington St, 5th floor
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Prepared by:
AZTEC Engineering
501 N 44th Street, Suite 300
Phoenix, AZ 85008

September 8, 2022

EXECUTIVE SUMMARY

The City of Phoenix (COP), in association with the Arizona Department of Transportation (ADOT), is planning a roadway improvement project along Happy Valley Road (HVR) between 67th Avenue and 35th Avenue in the City of Phoenix, Maricopa County, Arizona. This air quality technical report has been developed in support of the proposed HVR roadway improvement project.

The National Environmental Policy Act (NEPA) of 1969 and the Clean Air Act (CAA) Amendments of 1990 require air quality impacts to be addressed in the preparation of environmental documents for federal projects. The level of effort utilized to evaluate these impacts may vary from a qualitative description analysis to a quantitative modeling analysis. The project area is located in the Phoenix maintenance area for carbon monoxide (CO) and nonattainment area for particulate matter (PM_{10}). CO is one of the six criteria pollutants that were established in the National Ambient Air Quality Standards (NAAQS) in 1970 under the CAA. Through the consultation process, it was determined that CO hot-spot analysis was warranted. It was also determined that this project does not require a PM_{10} quantitative analysis.

Section 176c of the CAA requires that transportation projects conform to the approved air quality State Implementation Plan (SIP) for meeting federal air quality standards. Conformity requirements were made substantially more rigorous in the CAA Amendments. The conformity determinations for federal actions related to transportation projects must meet the requirements of 40 CFR Parts 51 and 93. This project is not likely to cause or contribute to the severity or number of violations of the NAAQS. This project is included in the *Maricopa Association of Governments (MAG) MOMENTUM 2050* Regional Transportation Plan (dated December 1, 2021) as approved by MAG Regional Council on December 1, 2021. In addition, the project is included in the *FY 2022-2025 Transportation Improvement Program* (dated December 1, 2021), as amended.

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LIST OF ACRONYMS

ADEQ	- Arizona Department of Environmental Quality
ADOT	- Arizona Department of Transportation
CAA	- Clean Air Act
CEQ	- Council of Environmental Quality
CFR	- Code of Federal Regulations
CO	- carbon monoxide
COP	- City of Phoenix
EPA	- Environmental Protection Agency
FHWA	- Federal Highway Administration
HVR	- Happy Valley Road
I-17	- Interstate 17
LOS	- Level of Service
MAG	- Maricopa Association of Governments
MCAQD	- Maricopa County Air Quality Department
MOVES	- Motor Vehicle Emissions Simulator
MP	- milepost
mph	- miles per hour
MSATs	- Mobile Source Air Toxics
NAAQS	- National Ambient Air Quality Standards
NEPA	- National Environmental Policy Act
NO_2	- nitrogen dioxide
O_3	- ozone
PAH	- polycyclic aromatic hydrocarbon
PM_{10}	- particulate matter
$PM_{2.5}$	- fine particulate matter
POM	- polycyclic organic matter
ppm	- parts per million
ROW	- right-of-way
RTP	- Regional Transportation Plan
SIP	- State Implementation Plan
SO_2	- sulfur dioxide
SR	- State Route
STIP	- State Transportation Improvement Program
TCEs	- temporary construction easements
TI	- traffic interchange
VMT	- vehicle mile traveled

1.0 INTRODUCTION

The City of Phoenix (COP), in association with the Arizona Department of Transportation (ADOT), is planning a roadway improvement project along Happy Valley Road (HVR) between 67th Avenue and 35th Avenue in the City of Phoenix, Maricopa County, Arizona. Figures 1 and 2 on pages 2 and 3 depict the project location and vicinity.

HVR from 67th Avenue to 35th Avenue is a major arterial roadway that supports commuting traffic to and from Interstate 17 (I-17) and supports local traffic for the residential and commercial development along the corridor. Currently, the existing roadway continuously shifts between two and three travel lanes. Curb, gutter, sidewalk, and medians are intermittent. Bike lane widths are varied and, in some places, non-existent. A Preliminary Engineering Scoping Report was completed in 2020 which identified improvements needed to HVR to meet current design standards, improve ridership, and extend the life of the roadway. The purpose of this project is to improve this section of HVR. The scope of work includes:

- Roadway widening to accommodate a third travel lane between 62nd and 56th Avenues
- Raised center medians
- Painted buffered bike lanes
- New curb, gutter, sidewalk, multiuse trail, and ramps where missing
- Remove and replace curb, gutter, sidewalk, and ramps where necessary to meet current standards
- Pavement preservation treatment, including mill and overlay, and pavement markings
- Upgraded and new bus bays, pads and stops
- Removal or replacement of valley gutters as needed
- Street lighting, fiber cable, and traffic signal upgrades
- Drainage improvements, as needed

The project would occur within existing City of Phoenix right-of-way (ROW), adjacent to Arizona State Trust land (commercially leased and partially developed) and privately-owned parcels. New ROW and temporary construction easements (TCEs) are anticipated for this project, which would be determined during final design. Construction is anticipated to begin in Fall of 2023 and is estimated to be completed in Spring of 2025. Access to residences and businesses will remain open during construction. Temporary lane closures will be required during work; however, at least one lane of traffic will remain open in each direction. Traffic delays should be expected. Night and/or weekend work may also be required.

Figure 1. Project Location Map

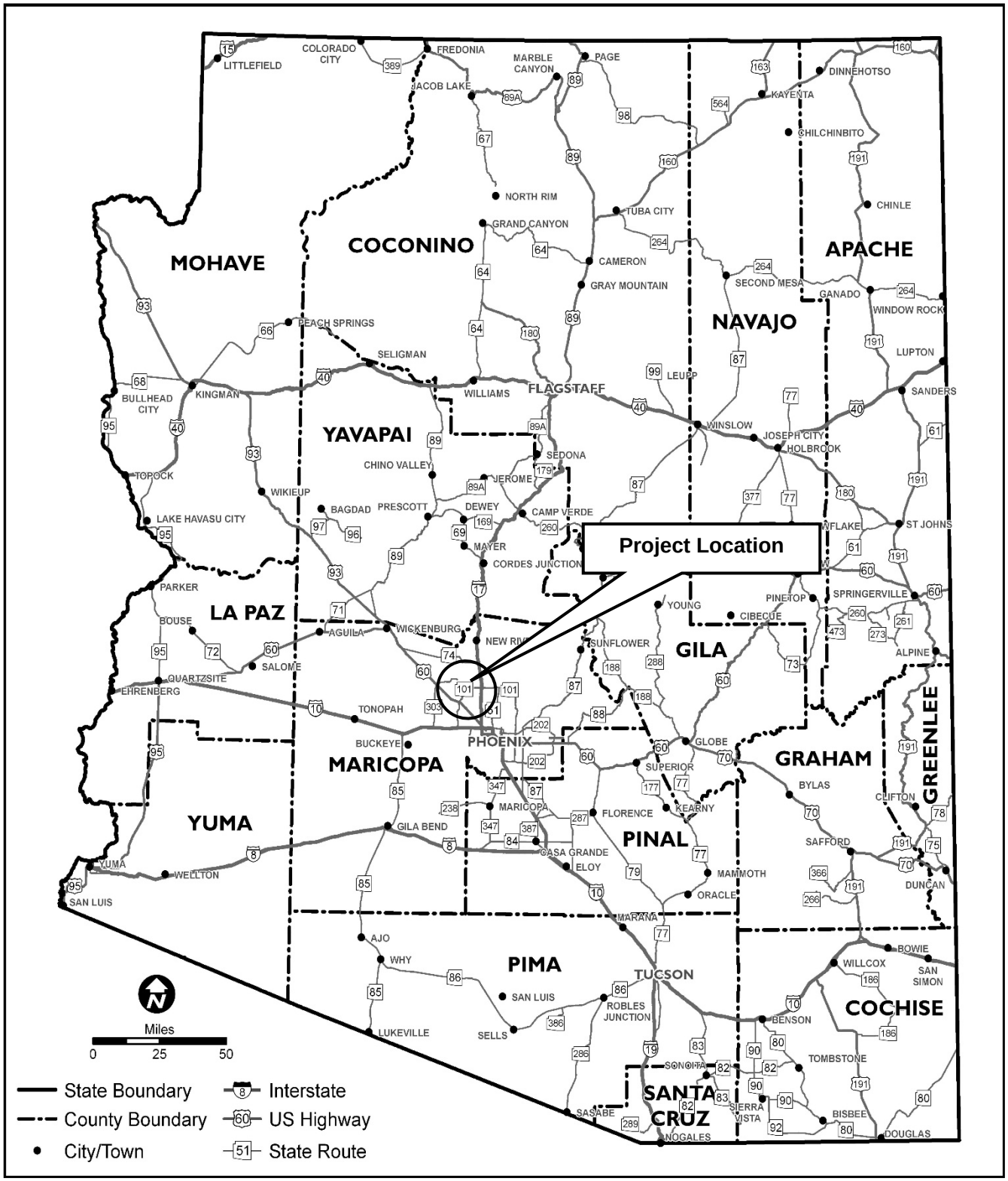
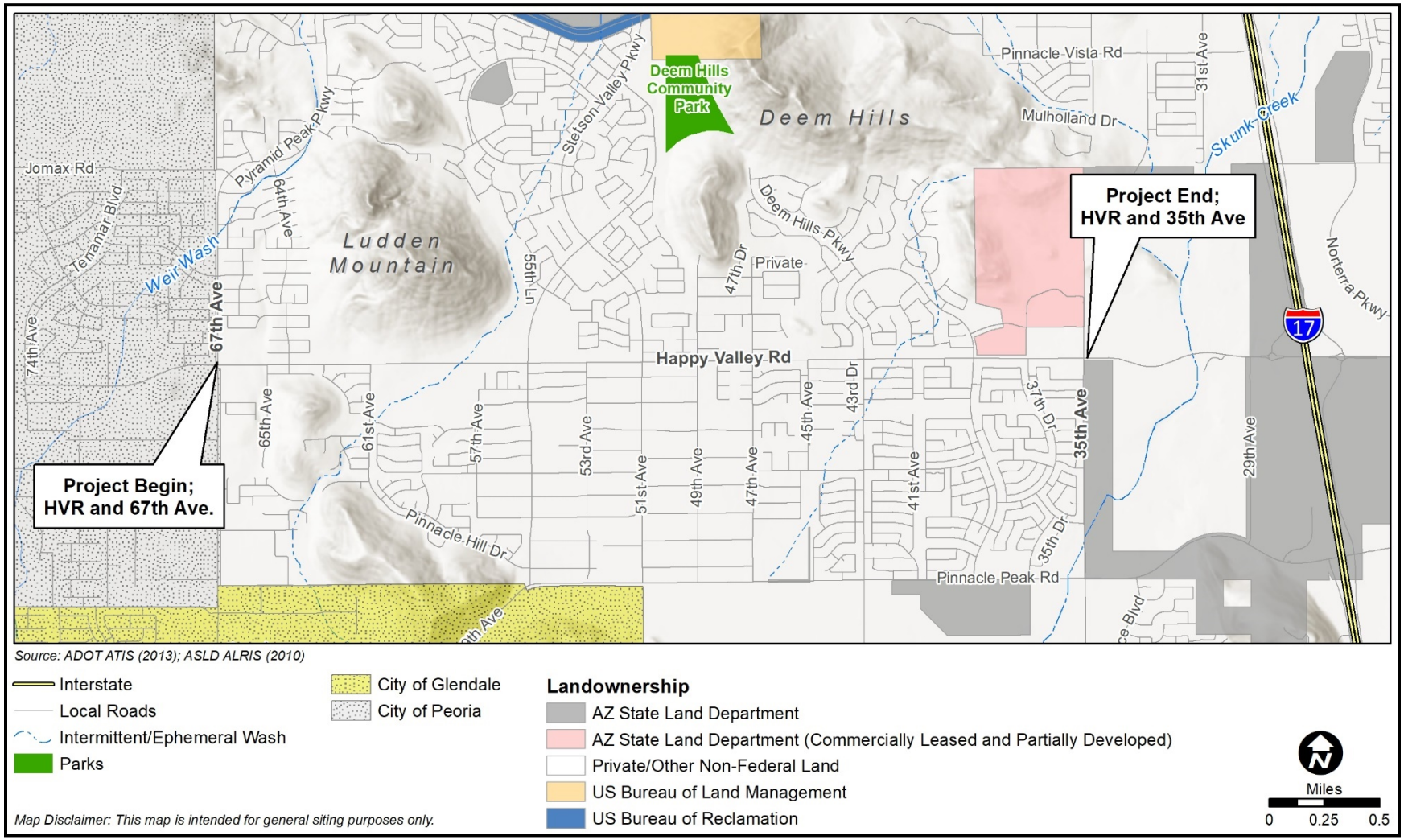


Figure 2. Project Vicinity Map



2.0 AFFECTED ENVIRONMENT

2.1 Regional Climatology

The study area elevation is approximately 1,380 – 1,430 feet above sea level. It lies in the Sonoran Desert, with a climate characterized by extremely hot summers, mild winters, and low precipitation. Average daily maximum temperatures during the summer months range between 104 and 106 degrees Fahrenheit (°F). Average minimum daily temperatures in the winter months range between 45°F and 46°F. Annual precipitation averages just less than 9 inches and occurs in the form of rain associated with afternoon showers or thunderstorms during the late summer months and with eastward-moving Pacific storms during the winter months. Snowfall is rare. A summary of average temperature and precipitation as recorded at the weather station at Phoenix Sky Harbor International Airport, is presented in Table 1.

Table 1
Climate Data for Phoenix Sky Harbor International Airport, Arizona (1981–2010)

Month	Temperature (ºF)			Precipitation (inches)
	Average	Avg. Maximum	Avg. Minimum	Average
January	56.4	67.2	45.6	0.91
February	59.7	70.7	48.7	0.92
March	65.2	76.9	53.5	0.99
April	72.7	85.2	60.2	0.28
May	82.1	94.8	69.4	0.11
June	90.8	103.9	77.7	0.02
July	94.8	106.1	83.5	1.05
August	93.6	104.4	82.7	1.00
September	88.4	99.8	76.9	0.64
October	76.7	88.5	64.8	0.58
November	64.1	75.5	52.7	0.65
December	55.4	66.0	44.8	0.88
Annual	75.1	86.7	63.5	8.03

Source: Western Regional Climate Center, accessed in 2022

2.2 Air Quality Standards

The federal Clean Air Act (CAA) of 1970 was the first comprehensive legislation aimed at reducing levels of air pollution throughout the country. The 1970 law required the U.S. Environmental Protection Agency (EPA) to establish the National Ambient Air Quality Standards (NAAQS), which set maximum allowable concentrations for six criteria pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10})/fine particulate matter ($PM_{2.5}$), sulfur dioxide (SO_2), and lead, as shown in Table 2 and briefly described below.

Table 2 National Ambient Air Quality Standards			
Pollutant	Average Time	Primary Standard	Secondary Standard
Carbon monoxide (CO)	1-hour	35 ppm	No standard
	8-hour	9 ppm	No standard
Nitrogen dioxide (NO_2)	1-hour	0.100 ppm	No standard
	Annual	0.053 ppm	0.053 ppm
Ozone (O_3)[a]	8-hour	0.070 ppm[b]	0.070 ppm
Particulate matter (PM_{10})	24-hour	150 µg/m^3	150 µg/m^3
Fine particulate matter ($PM_{2.5}$)	24-hour	35 µg/m^3	35 µg/m^3
	Annual	12 µg/m^3	15 µg/m^3
Sulfur dioxide (SO_2)	1-hour	0.075 ppm	No standard
	3-hour	No standard	0.5 ppm
Lead	Rolling 3-month average	0.15 µg/m^3	0.15 µg/m^3

µg/m^3 – micrograms per cubic meter
ppm – parts per million
Notes:
[a] 1-hour standard revoked June 15, 2005 in Arizona
[b] based on a 3-year average of the 4th highest concentration
Source: EPA, accessed in 2022

- CO is a colorless, odorless gas resulting from the incomplete combustion of carbon-based fuels, including petroleum products. In most areas, vehicle emissions are the primary source of CO. Mobile sources (on-road motor vehicle exhaust) are the primary source of CO in both Maricopa County and in the U.S. In cities, 85 to 95 percent of all CO emissions may come from motor vehicle exhaust. Prolonged exposure to high levels of CO can cause headaches, drowsiness, loss of equilibrium, or heart disease. CO levels are generally highest in the colder months of the year when inversion conditions (where warmer air traps colder air near the ground) are more frequent.

- Ozone (O_3) is a colorless toxic gas and is found in both the Earth's upper and lower atmospheric levels. In the upper atmosphere, O_3 is a naturally occurring gas that helps to prevent the sun's harmful ultraviolet rays from reaching the Earth. In the lower layer of the atmosphere, O_3 is human made. O_3 is produced through a complex chemical reaction in which precursor compounds, such as hydrocarbons and nitrogen oxides, are transformed by sunlight into ozone molecules, which consist of three oxygen atoms. The primary sources for O_3 precursors are vehicular and industrial emissions.

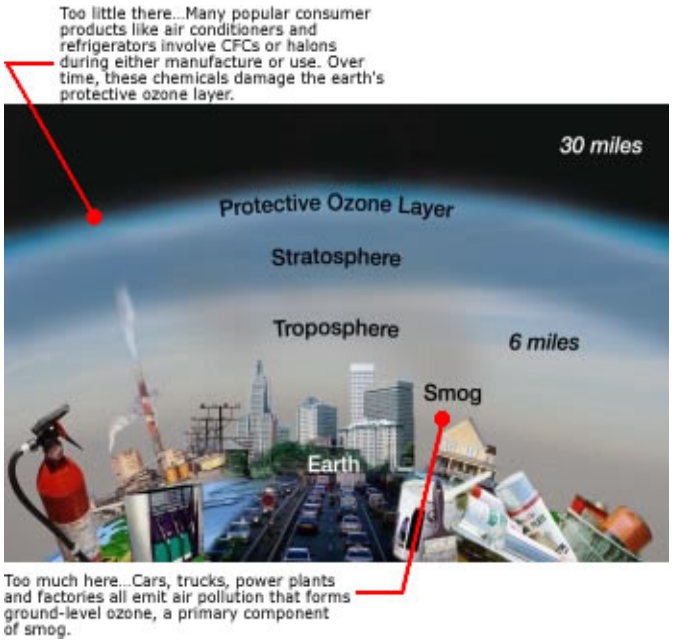
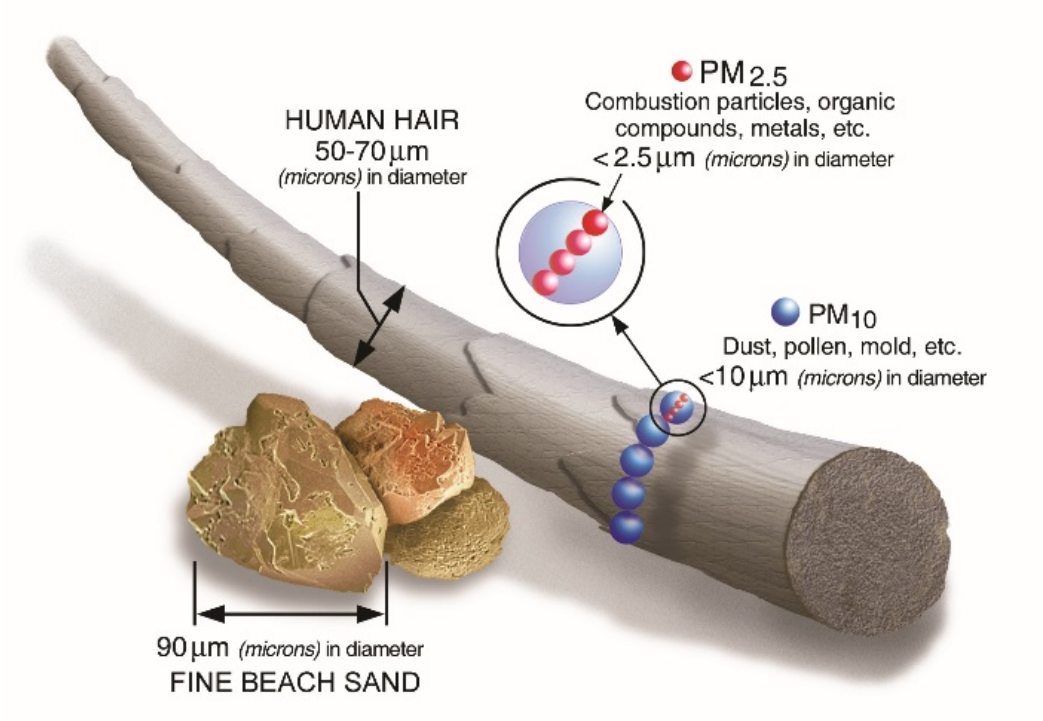


Figure 3. Ozone in the Atmosphere

- NO_2 is a yellowish-orange to reddish-brown gas resulting from high-temperature combustion. Diesel vehicles and power plants are major sources of NO_2.

- PM_{10} and $PM_{2.5}$ consist of suspended dust, fibers, combustion ash, and other fine particles. The major source is industrial emissions, but these pollutants also result from diesel vehicle emissions, unpaved roadways, agricultural activity, and dirt on paved roads kicked up by passing vehicles. PM_{10} is inhalable particles, with diameters that are generally 10 micrometers and smaller; and $PM_{2.5}$ is fine inhalable particles, with diameters that are generally 2.5 micrometers and smaller. Figure 4 shows the sizes of PM10 and PM2.5 relative to fine beach sand and human hair.

Figure 4. Size Comparisons for PM Particles



Source: EPA

- SO_2 is a colorless gas with a rotten egg odor that results from the combustion of fuels containing sulfur. Primary sources are coal-fired power plants, industrial plants, and metal smelters, with some emissions from diesel vehicles burning low-grade fuels.

- Lead in the atmosphere results primarily from the burning of leaded fuels. Lead pollution has been drastically reduced in the United States in recent years with the banning of leaded automobile fuels.

Amendments to the CAA were passed in 1977 and 1990. Among many other revisions included in the amendments are requirements for nonattainment areas and State Implementation Plans (SIPs) for areas that do not meet the standards.

For most of the six criteria pollutants, two standards have been established: a primary standard and a secondary standard. Although there is little difference between the two, the primary standard was established with the goal of protecting the public health, while the secondary standard is intended for the protection of the public welfare.

2.3 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), and stationary sources (e.g., factories or refineries).

MSATs are a subset of 21 of the 188 air toxics defined by the CAA. The MSATs are compounds that are emitted not only from stationary sources such as power plants, factories, oil refineries, dry cleaners and gas stations, but also from highway vehicles and nonroad equipment. A subset of the 21 MSATs have been labeled by the Federal Highway Administration (FHWA) as the seven priority MSATs. These are acrolein, benzene, 1,3 butadiene, diesel particulate matter plus diesel exhaust organic gases, formaldehyde, naphthalene, and polycyclic organic matter. These seven are currently considered the priority transportation toxics, but the list may be modified in the future.

Acrolein is a nearly clear to yellow liquid that burns easily, is easily volatized, and has a disagreeable odor. Acrolein can be formed from the breakdown of certain pollutants found in outdoor air, from tobacco burning, or from burning gasoline. Exposure to acrolein causes upper respiratory tract irritation and congestion in low concentrations and may cause death in high concentrations. Not enough information is available on acrolein to evaluate its carcinogenicity.

Benzene is a volatile, colorless, highly flammable liquid that dissolves easily in water and has sweet odor. Benzene is found in emissions from burning coal and oil, motor vehicle exhaust, evaporation from gasoline service stations, and in industrial solvents. Tobacco smoke contains benzene and accounts for nearly half the national exposure to benzene. Benzene exposure causes drowsiness, dizziness, headaches, unconsciousness, vomiting, convulsions, and irritation to the eyes, skin, and upper respiratory tract. Benzene is a known human carcinogen. Chronic exposure to benzene causes blood disorders and chromosomal aberrations.

1,3-butadiene is a colorless gas with a mild, gasoline-like odor. Sources of 1,3-butadiene in the air include motor vehicle exhaust, manufacturing and processing facilities, forest fires or other combustion, and cigarette smoke. Exposure to 1,3-butadiene causes irritation of the eyes, nasal passages, throat, and lungs in low concentrations and blurred vision, fatigue, headache, and vertigo in higher concentrations. 1,3-butadiene has recently been reclassified from a probable human carcinogen to a known human carcinogen.

Diesel particulate matter is a collection of various-sized particles emitted from diesel powered vehicles, including primarily elemental carbon, organic carbon, and sulfate particles, with trace amounts of nitrate, metals, and other particles. Diesel particulate matter of concern for MSAT analyses are those particles sized 10 microns or smaller. Although particulate matter may be

derived from a number of sources, diesel particulate matter by definition is derived exclusively from diesel vehicle exhaust. Exposure to diesel particulate matter results in irritation to the eyes, nose, throat, and lungs, and may exacerbate asthma. Diesel particulate matter is considered a probable human carcinogen.

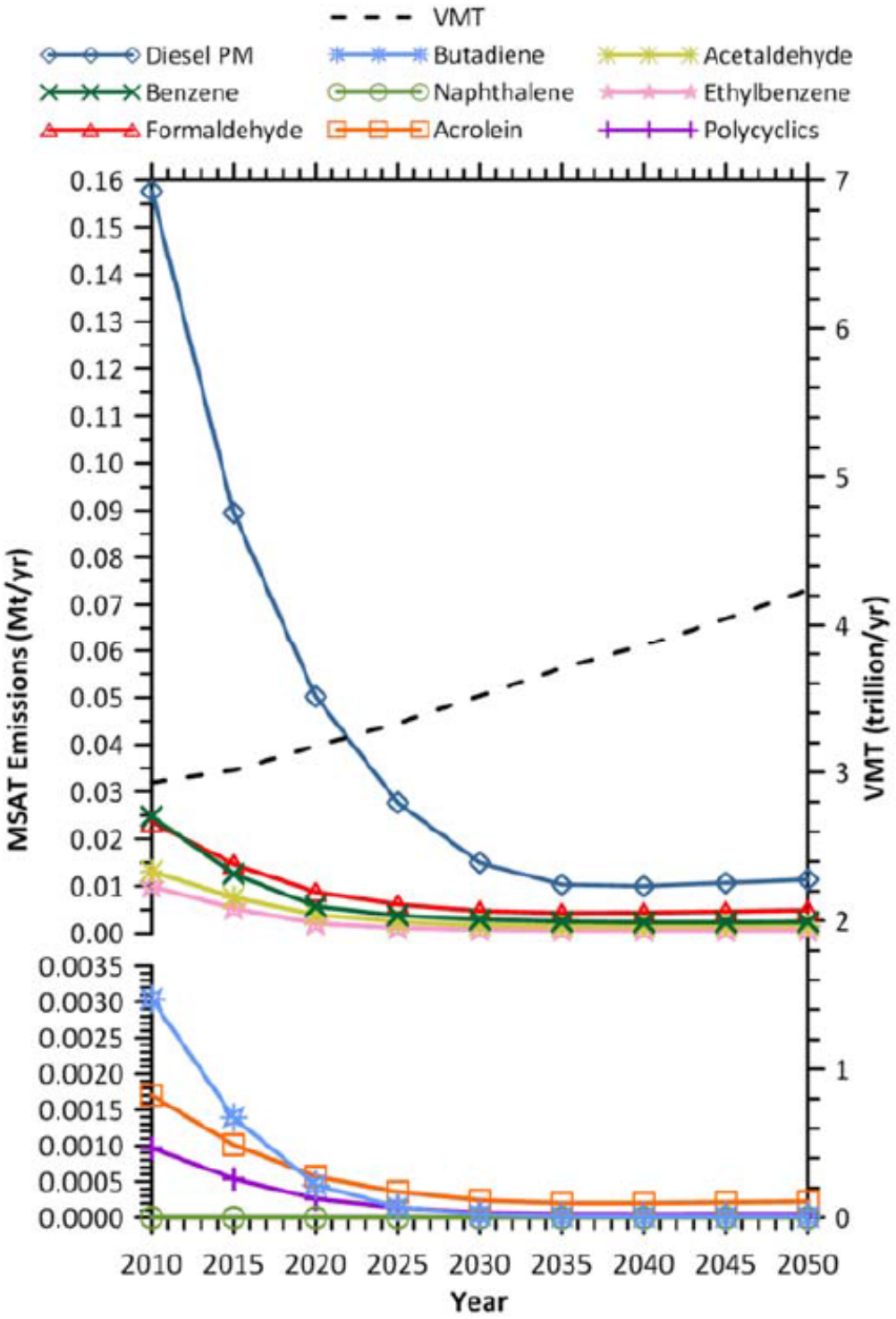
Formaldehyde is a colorless gas with a pungent, suffocating odor that is readily soluble in water. High levels of formaldehyde have been detected in indoor air, where it is released from various consumer products such as building materials and home furnishings. Major sources of outdoor concentrations of formaldehyde include power plants, manufacturing facilities, incinerators, and automobile exhaust emissions. Exposure to formaldehyde results in irritation to the eyes, nose, and throat; coughing; chest pains; and bronchitis. Formaldehyde is classified as a probable human carcinogen.

Polycyclic organic matter (POM) is a class of compounds that includes all organic structures having two or more fused aromatic rings, that have a boiling point greater than that of water, and that are extremely insoluble in water. There are eight major categories of POM, the most common being polycyclic aromatic hydrocarbon compounds (PAHs). POM compounds are formed primarily from combustion and are present in the atmosphere in particulate form. Major sources of POM include cigarette smoke, vehicle exhaust, and wood burning, among others. No information is available on the effects of short-term exposure to POM and PAHs. However, the EPA has classified several PAHs as probable human carcinogens, and evidence suggests possible reproductive toxicity, chronic blood and liver effects, and chronic respiratory effects from POM.

Naphthalene is a white solid or powder that is insoluble in water and has a strong, mothball odor. Primary sources of naphthalene in the air include the burning of coal and oil, the use of mothballs, and from cigarette smoke. Exposure to naphthalene results in headache, nausea, vomiting, liver damage, cataracts, neurological damage in infants, and chronic inflammation of the lungs and nasal passages. Naphthalene is classified as a possible human carcinogen.

While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules. According to EPA's latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007), controls are required to dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. Based on an FHWA analysis using MOVES2014a, as shown in Figure 5, even if vehicle miles traveled (VMT) increases by 45 percent as assumed from 2010 to 2050, a combined reduction of 91 percent in the total annual emissions for the priority MSAT is projected for the same time period (FHWA, 2016).

Figure 5. FHWA Predicted National MSAT trends, 2010–2050, for Vehicles Operating on Roadways



Source: EPA MOVES2014a model runs conducted by FHWA, September2016

2.4 Nonattainment Areas

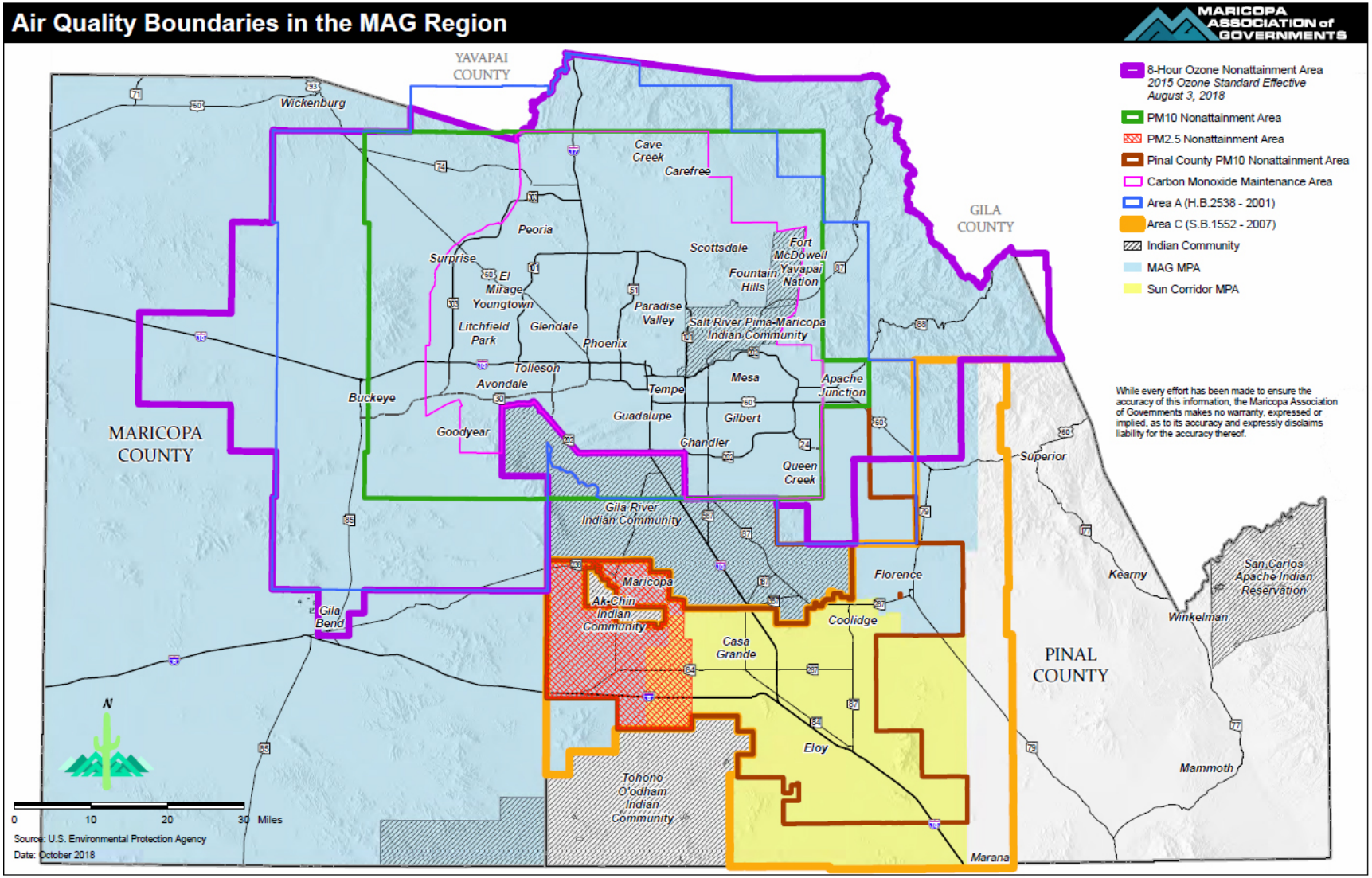
The CAA amendments of 1977 and 1990 authorized EPA to designate areas that have not met the NAAQS as nonattainment areas and to classify the severity of the nonattainment. Each nonattainment area requires a SIP that outlines actions to reduce air pollution to levels that comply with the NAAQS.

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

The Phoenix Ozone nonattainment area was originally designated a “moderate” nonattainment area in 1991 for not meeting the 1-hour O_3 NAAQS and was required to reach attainment by November 15, 1996. EPA reclassified the Phoenix area to “serious” nonattainment on February 13, 1998, for failing to attain the 1-hour O_3 standard. The State of Arizona requested attainment redesignation in December 2000, after 3 years had passed with no O_3 violation. On May 15, 2001, EPA determined that the Phoenix area had attained the 1-hour O_3 standard. A maintenance plan and a redesignation request were submitted on April 21, 2004, and the area was redesignated to attainment on June 14, 2005.

However, the 1-hour standard was revoked on June 15, 2005, and replaced with the 8-hour standard (called the 1997 standard because it was proposed in 1997, but implementation was delayed by litigation). Many of the control measures included in the 1-hour ozone maintenance plan are required to remain in place to ensure progress toward the 8-hour standard. In 2015, based on EPA’s review of the air quality criteria for O_3 and related photochemical oxidants and for O_3, EPA revised the levels of both standards. EPA revised the primary and secondary O_3 standard levels to 0.070 parts per million (ppm), and retained their indicator (O_3), forms (fourth-highest daily maximum, average across three consecutive years) and averaging times (eight hours). MAG submitted a 2017 Eight-Hour Ozone Moderate Area Plan for the 2008 ozone standards on January 1, 2017. On June 2, 2020, EPA published a final rule to approve the portions of the MAG 2017 Eight-Hour Ozone Plan that address the requirements for emissions inventories, a demonstration of attainment by the applicable attainment date, reasonably available control measures, reasonable further progress, motor vehicle emission budgets for transportation conformity, vehicle inspection and maintenance programs, new source review rules, and offsets, effective July 2, 2020. The MAG 2020 Eight-Hour Ozone Plan – Submittal of Marginal Area Requirements for the Maricopa Nonattainment Area was submitted to EPA on June 29, 2020. The MAG 2020 Eight-Hour Ozone Plan – Submittal of Marginal Area Requirements addresses the 2015 eight-hour ozone standard of 0.070 parts per million.

Figure 6. Nonattainment and Maintenance Areas in Maricopa and Pinal Counties



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

The Phoenix PM_{10} nonattainment area was originally classified in November 1990 as “moderate.” The area was reclassified in June 1996 to “serious,” requiring attainment by 2001. The State of Arizona submitted a revised plan to achieve attainment and requested a 5-year extension of the attainment deadline for the 24-hour and annual PM_{10} standards for the Phoenix area. On January 10, 2002, EPA announced approval of the plan and granted the extension to December 2006. Despite the Most Stringent Measures and Best Available Control Measures adopted and implemented earlier, the Phoenix area failed to attain the PM_{10} standard by the December 2006 deadline. The failure triggered a special requirement under Section 189(d) of the CAA that SIP revisions provide for annual reductions of PM_{10} and PM_{10} precursors of not less than 5 percent of the most recent emissions inventory until the NAAQS is attained. The SIP revision was submitted to EPA in December 2007, demonstrating the necessary 5 percent annual reductions through revisions to county dust control regulations, new agriculture best management practices, and paving unpaved roads and shoulders, among other control measures. On September 9, 2010, EPA proposed to approve in part and disapprove in part the SIP revisions. However, on January 25, 2011, prior to EPA’s final action on the SIP revisions, the State of Arizona withdrew the submitted plan from EPA’s consideration to be able to make improvements on the plan. This withdrawal triggered EPA to find, on February 14, 2011, that Arizona failed to make the required submittal under Section 189(d) of the CAA. The failure triggered an 18-month clock for mandatory application of sanctions (including loss of federal highway funds in 24 months) and a 2-year clock for a federal implementation plan. These sanctions clocks would stop when a new plan is submitted and EPA determines that the new plan is complete. The State of Arizona adopted and submitted the 2012 5% Plans on May 25, 2012, and submitted supplemental information June 22 and July 2, 2012. The EPA found the plans complete on July 20, 2012, stopping sanctions clocks. EPA concurred with Exceptional Events flags in letters dated September 6, 2012 and July 1, 2013. The EPA approved fugitive dust statutes for the plans on December 3, 2013. EPA published a Notice of Adequacy of the Motor Vehicle Emissions Budget on December 5, 2013.On June 10, 2014, EPA published the final rule approving the MAG 2012 5% Plan for PM_{10}.

2.5 Ambient Pollutant Levels

The Arizona Department of Environmental Quality (ADEQ) and the Maricopa County Air Quality Department (MCAQD) maintain a network of air monitoring sites throughout the county.

Monitoring sites vary in terms of the number of pollutants monitored, with some sites monitoring one pollutant and others monitoring up to five pollutants. Some monitoring sites operate for the entire year, while others operate for the peak pollutant season only. Most of the monitoring sites are located in the Phoenix metropolitan area. There are no monitoring sites within the HVR study area. The adjacent monitoring sites are the Zuni Hills site (located at 109th Avenue and Deer Valley Road) and the Glendale site (located at 59th Avenue and Olive Avenue). These two monitoring sites collect data on concentrations of O_3, $PM_{2.5}$, and PM_{10}. The Zuni Hills site recorded an exceedance of the PM_{10} standard in 2021. The Glendale site recorded exceedances of the O_3, $PM_{2.5}$, and PM_{10} standards in 2021. The PM10 exceedances were attributed to an Exceptional Event (EE). Per the EPA's Exceptional Event Rule, an EE is an uncontrollable event that was caused by natural sources of pollution or an event that is not expected to recur at a given location. Table 3 summarizes concentrations monitored in 2021 at this location.

Table 3
Zuni Hills Site and Glendale Site Air Quality Data

Monitoring Site	Pollutant	Averaging Time	Concentration	No. of Exceedances
Zuni Hills (ZH)	PM_{10}	24-hour	248*	1
		Annual	25.5	---
Glendale (GL)	O_3	8-hour	0.097 ppm	18
	$PM_{2.5}$	24-hour	51.2 µg/m^3	1
		Annual	6.99 µg/m^3	---
	PM_{10}	24-hour	173* µg/m^3	1
		Annual	21.9 µg/m^3	---

µg/m^3 – micrograms per cubic meter
ppm – parts per million
* - MCAQD flagged tis exceedance as an EE in AQS
Source: MCAQD, 2022 Air Monitoring Network Plan Draft

3.0 ENVIRONMENTAL CONSEQUENCES

Project-level air quality analyses for proposed roadways typically focus on vehicle emissions of CO, PM_{10}, and MSATs. Although vehicle emissions include other pollutants, the concentrations of CO, PM_{10}, and MSATs are the most easily assessed and provide a convenient measure of the local air quality impacts from a proposed roadway. Other pollutants, such as O_3, nitrogen oxides, and hydrocarbons, are regional in nature, making a project-level evaluation meaningless. Project-level analyses can be completed using qualitative or quantitative methods, depending on the scale of the project, the level of design information available for the analysis, and the overall purpose of the analysis.

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

3.1 CO Hotspot Analysis

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

3.1.1 Methodology

To determine the project's impact on local CO levels, a detailed hotspot analysis was conducted at one intersection between 67th Avenue and Happy Valley Road. This intersection was chosen from a screening evaluation based upon overall Level of Service (LOS) and traffic volumes. This location chosen underwent detailed microscale modeling using emission factors developed through the use of EPA's MOVES3.0 emission factor program and dispersion modeling using EPA's CAL3QHC program.

MOVES3.0 Emissions Model

EPA's Motor Vehicle Emissions Simulator (MOVES) model version MOVES3.0 was used to estimate CO emissions from the roadway segments included in the CO modeling analysis. MOVES3.0 is the EPA's state-of-the-art tool for estimating emissions from highway vehicles. The model is based on analyses of millions of emission test results and considerable advances in the Agency's understanding of vehicle emissions. Compared to previous tools, MOVES3.0 incorporates the latest emissions data, more sophisticated calculation algorithms, increased user flexibility, new software design, and substantial new capabilities.

MOVES3.0 was used to estimate CO emissions from the roadway segments included in the CO modeling analysis. MOVES input files were provided by MAG consistent with their regional

emissions analysis. MAG data was used to represent regional fuel specifications, fleet age distribution, and meteorology. Link-by-link traffic data was used to develop project-specific input files for each modeled link with that link's average speed and vehicle mix for both scenarios analyzed, the existing condition and worst case build condition.

CAL3QHC Dispersion Model

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

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

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

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

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

The transport and concentration of pollutants emitted from motor vehicles are influenced by three principal meteorological factors: wind direction, wind speed, and the atmosphere's profile. The values for these parameters were chosen to maximize pollutant concentrations at each prediction site to establish a conservative, reasonable worst-case scenario. The values used for these parameters are:

- Wind Direction. Maximum CO concentrations normally are found when the wind is assumed to blow parallel to a roadway adjacent to the receptor location. At complex intersections, it is difficult to predict which wind angle will result in maximum concentrations. Therefore, the approximate wind angle that would result in maximum pollutant concentrations at each receptor location was used in the analysis. All wind angles from 0 to 360 degrees (in 5-degree increments) were considered.

- Wind Speed. The CO concentrations are greatest at low wind speeds. A conservative wind speed of one meter per second (2.2 miles per hour) was used to predict CO concentrations during peak traffic periods.
- Profile of the Atmosphere. A "mixing" height (the height in the atmosphere to which pollutants rise) of 1,000 meters, and neutral atmospheric stability (stability class D) conditions were used in estimating microscale CO concentrations.

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

Predicted Levels

Carbon monoxide concentrations for existing year 2018 to be consistent with the traffic memo and the worst case build condition were predicted. The worst-case build condition uses the 2025 MOVES emission rates (highest CO emission rates) with the 2050 traffic data (maximum traffic). At each receptor site, maximum one-hour carbon monoxide concentrations were calculated. The one-hour CO levels were predicted for the peak hour of the day period. The 8-hour CO levels were predicted by applying a persistence factor of 0.7 to the 1-hour concentrations, as recommended in the EPA guidance (EPA 1992b).

Background Levels

Background levels for the study area were obtained from EPA-monitored data. The background level is the component of the total concentration that is not accounted for through the microscale modeling analysis. Background concentrations must be added to modeling results to obtain total pollutant concentrations at receptor locations. The data from the CO monitor located at West Phoenix (WP) between 39th Avenue and Earll Drive in Phoenix was approved during the interagency consultation process. Based on the last three years of monitoring data (2018-2020), the one-hour background of 4.7 ppm and the eight-hour background of 3.3 ppm were used for the existing 2018 and the worst case build condition analyses.

Comparison to NAAQS

The results from the analysis for the existing year 2018 and the worst case build condition were compared to the NAAQS, and to one another, to determine the impacts of the proposed project and if the project is in conformance with the guidelines set forth in the New Clean Air Act Amendments of 1990.

3.1.2 Screening Evaluation

An intersection screening analysis based on changes in LOS and overall intersection volumes between the No-Build and Build alternatives was performed, as described in EPA guidance (EPA 1992). The intersections evaluated are summarized in the *Project Level CO Hot-Spot Analysis Questionnaire*.

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

The intersections modeled were determined using the EPA guidance. Only the 67th Avenue and Happy Valley Road intersection was selected for hot-spot analysis because of congestion in the 2050 build scenario. Other intersections would not result in congestion in the 2050 build scenario.

Modeling was performed for the peak hour of the day for the worst case build condition using the 2025 MOVES emission rates (highest CO emission rates) with 2050 traffic data (maximum traffic). It is assumed that if the selected worst-case intersections do not show an exceedance of the NAAQS, none of the intersections will.

The *CO Hot-Spot Analysis Questionnaire* and *Consultation form* included in Appendix A has additional details about the model setup and options that were used in this analysis.

3.1.3 Analysis

Maximum one-hour CO levels were predicted for the existing year (2018) and worst case build condition at the intersection selected for analysis, 67th Avenue and Happy Valley Road. Figure 7 on next page shows CO receptor locations at the intersection. Maximum one-hour CO concentrations are shown in Table 4 and maximum eight-hour CO concentrations are shown in Table 5. The CO levels estimated by the model are the maximum concentrations that could be expected to occur at each air quality receptor site analyzed. This assumes simultaneous occurrence of a number of worst-case conditions: peak hour traffic conditions, conservative vehicular operating conditions, low wind speed, low atmospheric temperature, neutral atmospheric conditions, and maximized wind direction. Detailed receptor locations and analysis results are included in Appendix B. As shown in Figure 7 and Tables 4 and 5, the maximum CO concentrations would occur at receptors R8, R17, R28, and R40, adjacent to the approach queue area at each intersection corner. This is expected because vehicles waiting in queue would generate highest emissions to the nearby receptors. Predicted one-hour and eight-hour CO levels at all receptors are below NAAQS CO thresholds.

There are no nearby CO monitor locations. The CO monitor located at West Phoenix between 39th Avenue & Earll Drive in Phoenix has a similar environmental setting as the project corridor and was therefore selected for background monitor. The West Phoenix CO monitor is not upwind from the project area and winds are strongest from west and west-southwest, as shown in the wind rose figure in Appendix B.

Figure 7. 67th Avenue and Happy Road Intersection Receptors

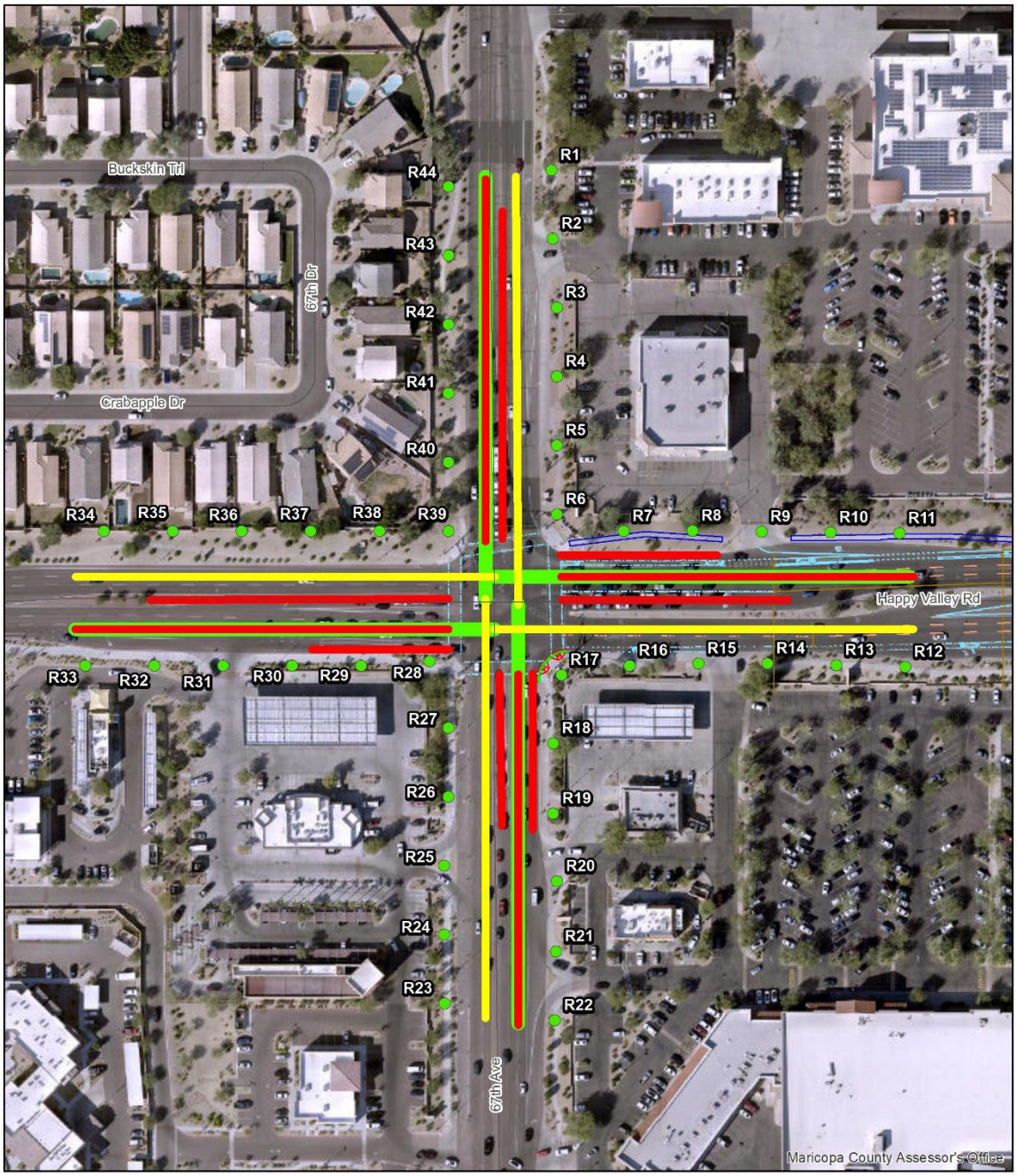


Table 4
Predicted Worst-Case One-Hour CO Concentrations (ppm)
67th Avenue & Happy Valley Road

Receptor ID	Existing Year (2018)	Worst Case Build Condition	Receptor ID	Existing Year (2018)	Worst Case Build Condition
R1	5.0	4.7	R2	4.9	4.7
R3	4.9	4.7	R4	4.9	4.7
R5	4.9	4.7	R6	5.0	4.8
R7	5.0	4.9	R8	5.1	4.9
R9	4.9	4.9	R10	4.9	4.9
R11	4.9	4.9	R12	4.9	4.9
R13	4.9	4.9	R14	4.9	4.9
R15	5.0	4.9	R16	5.0	4.9
R17	5.1	4.9	R18	5.0	4.8
R19	5.0	4.7	R20	4.9	4.7
R21	4.9	4.7	R22	4.9	4.7
R23	4.8	4.7	R24	4.8	4.7
R25	4.8	4.7	R26	4.9	4.8
R27	4.9	4.8	R28	5.1	5.0
R29	5.0	5.0	R30	5.0	4.9
R31	4.9	5.0	R32	4.9	5.0
R33	4.8	5.0	R34	4.9	4.9
R35	5.0	4.9	R36	5.0	4.9
R37	4.9	4.8	R38	5.0	4.9
R39	5.0	4.9	R40	5.1	4.8
R41	5.0	4.7	R42	5.0	4.7
R43	4.9	4.7	R44	4.9	4.7
1-hour CO standard	35	35	1-hour CO standard	35	35

Concentrations = modeled results + 1-hour CO background
1-hour CO background = 4.7 ppm
Abbreviations: CO = carbon monoxide; ppm = parts per million
Highlighted numbers denote the maximum one-hour CO concentrations

Table 5
Predicted Worst-Case Eight-Hour CO Concentrations (ppm)
67th Avenue & Happy Valley Road

Receptor ID	Existing Year (2018)	Worst Case Build Condition	Receptor ID	Existing Year (2018)	Worst Case Build Condition
R1	3.5	3.3	R2	3.4	3.3
R3	3.4	3.3	R4	3.4	3.3
R5	3.4	3.3	R6	3.5	3.4
R7	3.5	3.4	R8	3.6	3.4
R9	3.4	3.4	R10	3.4	3.4
R11	3.4	3.4	R12	3.4	3.4
R13	3.4	3.4	R14	3.4	3.4
R15	3.5	3.4	R16	3.5	3.4
R17	3.6	3.4	R18	3.5	3.4
R19	3.5	3.3	R20	3.4	3.3
R21	3.4	3.3	R22	3.4	3.3
R23	3.4	3.3	R24	3.4	3.3
R25	3.4	3.3	R26	3.4	3.4
R27	3.4	3.4	R28	3.6	3.5
R29	3.5	3.5	R30	3.5	3.4
R31	3.4	3.5	R32	3.4	3.5
R33	3.4	3.5	R34	3.4	3.4
R35	3.5	3.4	R36	3.5	3.4
R37	3.4	3.4	R38	3.5	3.4
R39	3.5	3.4	R40	3.6	3.4
R41	3.5	3.3	R42	3.5	3.3
R43	3.4	3.3	R44	3.4	3.3
8-hour CO standard	9	9	8-hour CO standard	9	9

Concentrations = (modeled results x persistence factor [0.7]) + 8-hour CO background
8-hour CO background = 3.3 ppm
Abbreviations: CO = carbon monoxide; ppm = parts per million
Highlighted numbers denote the maximum eight-hour CO concentrations

3.1.4 Project-Level Conformity

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

4.0 CONFORMITY

Section 176c of the CAA requires that transportation projects conform to the approved air quality State Implementation Plan for meeting federal air quality standards. Conformity requirements were made substantially more rigorous in the CAA Amendments. The conformity determinations for federal actions related to transportation projects must meet the requirements of 40 CFR Parts 51 and 93. This project is not likely to cause or contribute to the severity or number of violations of the NAAQS. The project is within the Phoenix PM_{10}, Ozone, and CO maintenance area. The proposed project is included in the *Maricopa Association of Governments (MAG) MOMENTUM 2050* Regional Transportation Plan (dated December 1, 2021) as approved by MAG Regional Council on December 1, 2021. In addition, the project is included in the *FY 2022-2025 Transportation Improvement Program* (dated December 1, 2021), as amended.

REFERENCES

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9. United States Environmental Protection Agency, Accessed in 2022. National Ambient Air Quality Standards (NAAQS). https://www.epa.gov/criteria-air-pollutants/naaqs-table

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Appendix A

INTERAGENCY CONSULTATION DOCUMENTATION

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

Project Setting and Description

The City of Phoenix (COP), in association with Arizona Department of Transportation, is planning a roadway improvement project along Happy Valley Road (HVR) between 67th Avenue and 35th Avenue in the city of Phoenix, Maricopa County, Arizona (see enclosed Figures 1).

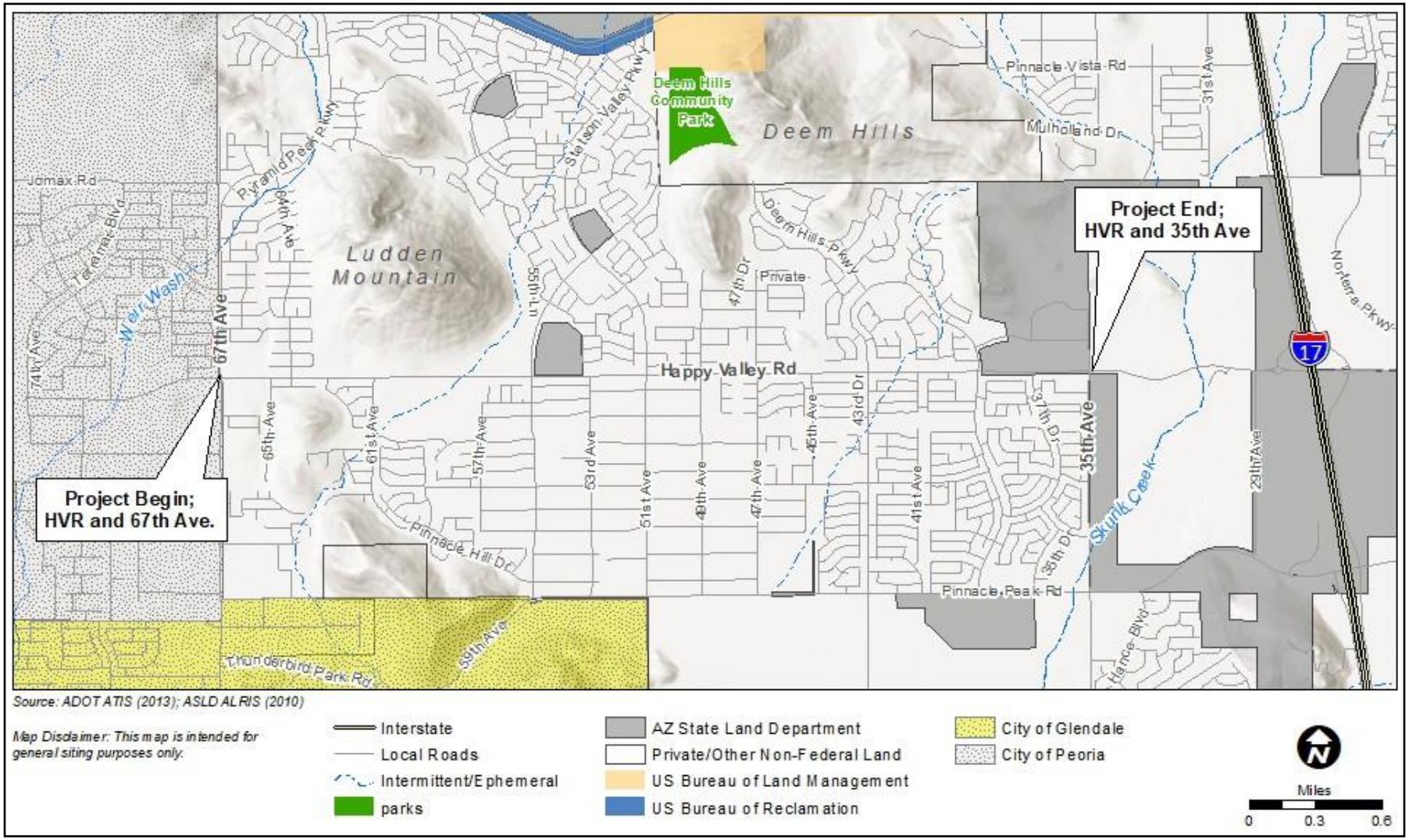
HVR from 67th Avenue to 35th Avenue is a major arterial roadway that supports commuting traffic to and from Interstate 17 (I-17) and supports local traffic for the residential and commercial development along the corridor. Currently, the existing roadway continuously shifts between two and three travel lanes. Curb, gutter, sidewalk, and medians are intermittent. Bike lane widths are varied and, in some places, non-existent. A Preliminary Engineering Scoping Report was completed in 2020 which identified improvements needed to HVR to meet current design standards, improve ridership, and extend the life of the roadway. The purpose of this project is to improve this section of HVR:

- Roadway widening to accommodate a third travel lane between 62nd and 56th avenues
- Raised center medians
- Painted buffered bike lanes
- New curb, gutter, sidewalk, multiuse trail, and ramps where missing
- Remove and replace curb, gutter, sidewalk, and ramps where necessary to meet current standards
- Pavement preservation treatment, including mill and overlay, and pavement markings
- Upgraded and new bus bays, pads and stops
- Removal or replacement of valley gutters as needed
- Street lighting, fiber cable, and traffic signal upgrades
- Drainage improvements, as needed

The project would occur within existing City of Phoenix right-of-way (ROW), adjacent to Arizona State Trust land and privately-owned parcels. New ROW and temporary construction easements (TCEs) are anticipated for this project, which would be determined during final design. Construction is anticipated to begin in Fall of 2023 and is estimated to be completed in Spring of 2025. Access to residences and businesses will remain open during construction. Temporary lane closures will be required during work; however, at least one lane of traffic will remain open in each direction. Traffic delays should be expected. Night and/or weekend work may also be required.

The project is within the Phoenix PM10, Ozone and CO nonattainment and maintenance area(s). The proposed project is included in the Maricopa Association of Governments (MAG) MOMENTUM 2050 Regional Transportation Plan as approved by MAG Regional Council on December 1, 2021. In addition, the project is included in the FY 2022-2025 Transportation Improvement Program, as amended.

Figure 1. Project Vicinity Map



Project Assessment

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

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

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

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

New Highway Capacity

Is this a new highway project that has a significant number of diesel vehicles?
Example: total traffic volumes ≥125,000 annual average daily traffic (AADT) and truck volumes ≥10,000 diesel trucks per day (8% of total traffic).

NO – This project is not a new highway project.

Expanded Highway Capacity

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

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

NO – This is an expanded highway project, but there is not a significant increase in the number of diesel vehicles. The Maricopa Association of Governments (MAG) travel demand model estimates that the percentage of truck traffic along the corridor will not increase significantly as a result of the project. The AADT and truck percentage for the Build alternative were compared to the No Build alternative on four mainline sections and five intersections along the project corridor, as summarized in Table 1. The percentage increase in the medium and heavy trucks ranges from a 0.30% to 0.44% on mainline and from ~~0.11%~~0.09% to ~~0.87%~~0.31% at the intersections, and the total increase in medium and heavy truck ranging from 238 to 365 vehicles on mainline and from ~~163~~141 to ~~588~~384 vehicles at the intersections.

Table 1 – HVR AADT and Truck AADT in Existing, No Build and Build Conditions

AADT and Truck Volumes		2018 Existing			2050 No-Build			2050 Build			Difference (Build - No-Build)		
		AADT	Truck AADT	Truck (%)	AADT	Truck AADT	Truck (%)	AADT	Truck AADT	Truck (%)	AADT	Truck AADT	Truck (%)
Roadway	67th Ave to 55th Ave	28,969	1,211	4.18%	38,648	1,592	4.12%	41,406	1,830	4.42%	2,758	238	0.30%
	55th Ave to 51st Ave	16,926	823	4.86%	20,749	1,004	4.84%	24,061	1,268	5.27%	3,312	264	0.43%
	51st Ave to 43rd Ave	24,079	1,303	5.41%	27,405	1,368	4.99%	31,822	1,683	5.29%	4,417	316	0.30%
	43rd Ave to 35th Ave	24,674	1,364	5.53%	25,865	1,348	5.21%	30,319	1,713	5.65%	4,454	365	0.44%
Intersection	67th Ave & HVR	53,140~~5~~ ~~1,288~~	2,200~~2,~~ ~~029~~	4.14% ~~3.96%~~	87,322~~8~~ ~~6,084~~	3,256 ~~2,785~~	3.73% ~~3.24%~~	89,057 ~~88,095~~	3,397 ~~2,948~~	3.81% ~~3.35%~~	1,735~~2,~~ ~~011~~	141 ~~163~~	0.09% ~~0.11%~~
	55th Ave & HVR	32,708~~3~~ ~~6,434~~	1,375~~1,~~ ~~816~~	4.20% ~~4.98%~~	46,243~~4~~ ~~8,512~~	2,085 ~~2,357~~	4.51% ~~4.86%~~	49,391 ~~50,880~~	2,343 ~~2,647~~	4.74% ~~5.20%~~	3,148~~2,~~ ~~368~~	258 ~~290~~	0.23% ~~0.34%~~
	51st Ave & HVR	30,202~~2~~ ~~4,459~~	1,421~~1,~~ ~~035~~	4.70% ~~4.23%~~	34,006~~3~~ ~~2,576~~	1,580 ~~1,376~~	4.65% ~~4.22%~~	37,909 ~~36,723~~	1,876 ~~1,606~~	4.95% ~~4.37%~~	3,903~~4,~~ ~~147~~	296 ~~230~~	0.30% ~~0.15%~~
	43rd Ave & HVR	29,879~~2~~ ~~9,879~~	1,491~~1,~~ ~~064~~	4.99% ~~3.56%~~	32,924~~3~~ ~~1,591~~	1,560 ~~1,356~~	4.74% ~~4.29%~~	38,580 ~~37,648~~	1,944 ~~1,944~~	5.04% ~~5.16%~~	5,656~~6,~~ ~~057~~	384 ~~588~~	0.30% ~~0.87%~~
	35th Ave & HVR	36,686~~3~~ ~~5,329~~	1,802~~1,~~ ~~801~~	4.91% ~~5.10%~~	48,960~~4~~ ~~9,375~~	2,202 ~~2,231~~	4.50% ~~4.52%~~	51,573 ~~51,786~~	2,481 ~~2,513~~	4.81% ~~4.85%~~	2,613~~2,~~ ~~411~~	279 ~~282~~	0.31% ~~0.33%~~

Note: Truck% include heavy truck and medium truck. AADT at intersections include volumes on approach lanes.
Source: MAG traffic demand model received from MAG on December 9, 2021

Projects with Congested Intersections

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

NO. This is not a project that affects a congested intersection of LOS D or will change LOS to D or greater which has a significant number of diesel trucks, see Table 2. The intersection operation analysis shows five intersections have a LOS of D, E, or F, and none of these intersections has a significant increase of diesel truck percentage, as shown in previous Table 1.

Table 3 provides refined traffic data generated by the Synchro model. The inconsistencies between the MAG data and Synchro data are attributable to the level of analysis. The MAG traffic demand model (TDM) was used to initially screen the project and help determine if modeling might be necessary. For the traffic memo, a LOS/synchro analysis at the local intersection level was conducted using geometric configurations, signal timings, and turning movement counts. The MAG model is routinely used to understand travel patterns and is capable of providing information related to volume and capacity; however, the intersection LOS produced by the MAG TDM does not reach the level of detail provided by the synchro analysis.

Table 2 – Intersections LOS in the project area

Level of Service (LOS)		2018 Existing		2050 No-Build		2050 Build	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
		LOS	LOS	LOS	LOS	LOS	LOS
Intersection LOS	67th Ave & Happy Valley Rd	F	D	F	F	F	F
	55th Ave & Happy Valley Rd	C	C	D	C	D	D
	51st Ave & Happy Valley Rd	D	C	D	D	C	C
	43rd Ave & Happy Valley Rd	D	C	D	C	C	C
	35th Ave & Happy Valley Rd	C	C	C	D	D	E

Source: LOS data provided by MAG. MAG traffic demand model received from MAG on December 9, 2021

Table 3 –Three Congested Intersections LOS in the project area[1]

Level of Service (LOS)		2018 Existing		2050 No-Build		2050 Build	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
		LOS	LOS	LOS	LOS	LOS	LOS
Intersection	67th Ave & Happy Valley Rd	D	D	D	D	E	D
	55th Ave & Happy Valley Rd	B	C	C	D	C	C
	35th Ave & Happy Valley Rd	C	B	C	C	C	C

Note:
[1]. Synchro model data are used for hot-spot modeling, see the Traffic Analysis Memorandum for detail.
Source: Happy Valley Road; 67th Avenue to 35th Avenue, Traffic Analysis Memorandum, April 2022, prepared by Wilson & Company

New Bus and Rail Terminals

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

NO – This project does not construct any new bus or rail terminals.

Expanded Bus and Rail Terminals

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

NO – This project does not expand any bus or rail terminals.

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

NO – The project location is not listed in MAG's 2012 SIP as a site of violation or potential violation.

POAQC Determination

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

Interagency Consultation Results

On May 2nd, 2022 ADOT provided a copy of this questionnaire, to the following consultation parties, City of Phoenix, EPA, FHWA, MAG, Arizona Department of Environmental Quality (ADEQ), Maricopa County Air Quality Department as the local air agencies in Maricopa County. There were suggestions for corrections and comments from FHWA, corrections were made and provided to Interagency consultation on June 3rd, no objections to the project determination and on June 21, 2022 ADOT concluded Interagency Consultation by notifying interested parties that this project will proceed as a project that does not require a quantitative PM10 hot-spot analysis under 40CFR 93.123(b).

Project Level CO Hot-Spot Analysis Questionnaire

Project Setting and Description

The City of Phoenix (COP), in association with Arizona Department of Transportation, is planning a roadway improvement project along Happy Valley Road (HVR) between 67th Avenue and 35th Avenue in the city of Phoenix, Maricopa County, Arizona (see enclosed Figures 1).

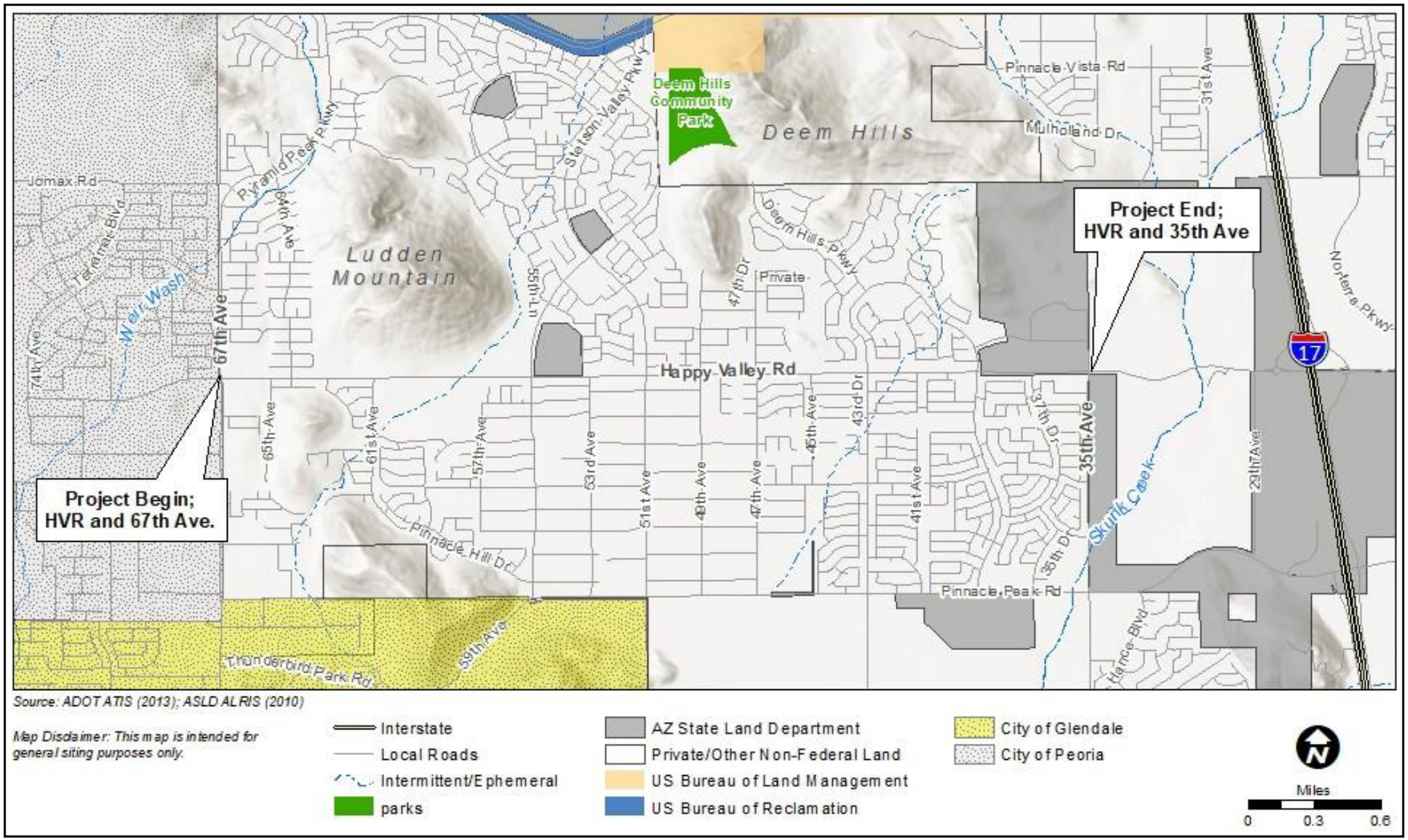
HVR from 67th Avenue to 35th Avenue is a major arterial roadway that supports commuting traffic to and from Interstate 17 (I-17) and supports local traffic for the residential and commercial development along the corridor. Currently, the existing roadway continuously shifts between two and three travel lanes. Curb, gutter, sidewalk, and medians are intermittent. Bike lane widths are varied and, in some places, non-existent. A Preliminary Engineering Scoping Report was completed in 2020 which identified improvements needed to HVR to meet current design standards, improve ridership, and extend the life of the roadway. The purpose of this project is to improve this section of HVR:

- Roadway widening to accommodate a third travel lane between 62nd and 56th avenues
- Raised center medians
- Painted buffered bike lanes
- New curb, gutter, sidewalk, multiuse trail, and ramps where missing
- Remove and replace curb, gutter, sidewalk, and ramps where necessary to meet current standards
- Pavement preservation treatment, including mill and overlay, and pavement markings
- Upgraded and new bus bays, pads and stops
- Removal or replacement of valley gutters as needed
- Street lighting, fiber cable, and traffic signal upgrades
- Drainage improvements, as needed

The project would occur within existing City of Phoenix right-of-way (ROW), adjacent to Arizona State Trust land and privately-owned parcels. New ROW and temporary construction easements (TCEs) are anticipated for this project, which would be determined during final design. Construction is anticipated to begin in Fall of 2023 and is estimated to be completed in Spring of 2025. Access to residences and businesses will remain open during construction. Temporary lane closures will be required during work; however, at least one lane of traffic will remain open in each direction. Traffic delays should be expected. Night and/or weekend work may also be required.

The project is within the Phoenix PM10, Ozone, and CO maintenance area. The proposed project is included in the *Maricopa Association of Governments (MAG) MOMENTUM 2050* Regional Transportation Plan as approved by MAG Regional Council on December 1, 2021. In addition, the project is included in the *FY 2022-2025 Transportation Improvement Program*, as amended.

Figure 1. Project Vicinity Map



Project Assessment – Part A

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

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

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

Project type ii) is relevant to this project because this project affects a congested intersection (LOS D or greater) that will change LOS to D or greater because of increased traffic volumes.

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? *Currently, no plan includes such areas

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

Projects with Congested Intersections

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

YES – MAG provided the intersection volumes and LOS for intersections in the project area (See Table 1 & 2). Among the 5 intersections, there are 4 intersections in AM peak hour and 3 intersections in PM peak hour would result in LOS D or worse in the 2050 no build scenario. In the 2050 build scenario, there are 3 intersections in AM peak hour and 3 intersections in PM peak hour that would result in LOS D or worse. LOS at two intersections would become worse from 2050 no build scenario to 2050 build scenario.

Table 3 provides refined traffic data generated by the Synchro model. The inconsistencies between the MAG data and Synchro data are attributable to the level of analysis. The MAG traffic demand model (TDM) was used to initially screen the project and help determine if modeling might be necessary. For the traffic memo, a LOS/synchro analysis at the local intersection level was conducted using geometric configurations, signal timings, and turning movement counts. The MAG model is routinely used to understand travel patterns and is capable of providing information related to volume and capacity; however, the intersection LOS produced by the MAG TDM does not reach the level of detail provided by the synchro analysis.

As indicated in Table 3, only the intersection at 67th Avenue and Happy Valley Road would result in congestion (LOS D or greater) in the 2050 build scenario.

Table 1 – HVR AADT and Truck AADT in Existing, No Build and Build Conditions

AADT and Truck Volumes		2018 Existing		2050 No-Build		2050 Build		Difference (Build - No-Build)	
		AADT	Truck (%)	AADT	Truck (%)	AADT	Truck (%)	AADT	Truck (%)
Roadway	67th Ave to 55th Ave	28,969	4.18%	38,648	4.12%	41,406	4.42%	2,758	0.30%
	55th Ave to 51st Ave	16,926	4.86%	20,749	4.84%	24,061	5.27%	3,312	0.43%
	51st Ave to 43rd Ave	24,079	5.41%	27,405	4.99%	31,822	5.29%	4,417	0.30%
	43rd Ave to 35th Ave	24,674	5.53%	25,865	5.21%	30,319	5.65%	4,454	0.44%
Intersection	67th Ave & HVR	53,1405 1,288	4.14%3. 96%	87,3228 6,084	3.73%3 .24%	89,0578 8,095	3.81% 3.35%	1,7352,0 11	0.09%0.11 %
	55th Ave & HVR	32,7083 6,434	4.20%4. 98%	46,2434 8,512	4.51%4 .86%	49,3915 0,880	4.74% 5.20%	3,1482,3 68	0.23%0.34 %
	51st Ave & HVR	30,2022 4,459	4.70%4. 23%	34,0063 2,576	4.65%4 .22%	37,9093 6,723	4.95% 4.37%	3,9034,1 47	0.30%0.15 %
	43rd Ave & HVR	29,8792 9,879	4.99%3. 56%	32,9243 1,591	4.74%4 .29%	38,5803 7,648	5.04% 5.16%	5,6566,0 57	0.30%0.87 %
	35th Ave & HVR	36,6863 5,329	4.91%5. 10%	48,9604 9,375	4.50%4 .52%	51,5735 1,786	4.81% 4.85%	2,6132,4 11	0.31%0.33 %

Note: Truck% include heavy truck and medium truck. AADT at intersections include volumes on approach lanes.
Source: MAG traffic demand model received from MAG on December 9, 2021

Table 2 – Intersections LOS in the project area

Level of Service (LOS)		2018 Existing		2050 No-Build		2050 Build	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
		LOS	LOS	LOS	LOS	LOS	LOS
Intersection LOS	67th Ave & Happy Valley Rd	F	D	F	F	F	F
	55th Ave & Happy Valley Rd	C	C	D	C	D	D
	51st Ave & Happy Valley Rd	D	C	D	D	C	C
	43rd Ave & Happy Valley Rd	D	C	D	C	C	C
	35th Ave & Happy Valley Rd	C	C	C	D	D	E

Source: LOS data provided by MAG. MAG traffic demand model received from MAG on December 9, 2021

Table 3 –Top Three Intersections LOS in the project area[1]

Level of Service (LOS)		2018 Existing		2050 No-Build		2050 Build	
		AM Peak LOS	PM Peak LOS	AM Peak LOS	PM Peak LOS	AM Peak LOS	PM Peak LOS
Intersection LOS	67th Ave & Happy Valley Rd	D	D	D	D	E	D
	55th Ave & Happy Valley Rd	B	C	C	D	C	C
	35th Ave & Happy Valley Rd	C	B	C	C	C	C

Note:
[1]. Synchro model data are used for hot-spot CO modeling, see attached Traffic Analysis Memorandum for detail.
Source: Happy Valley Road; 67th Avenue to 35th Avenue, Traffic Analysis Memorandum, April 2022, prepared by Wilson & Company

Projects Affecting Intersections with Highest Traffic Volumes

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

*Three Highest Intersections in Current Plans

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

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

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

Projects Affecting Intersections with the Worst Level of Services

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

*Three Worst LOS Intersections in Current Plans

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

[1]Same as above

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

Project Assessment – Part B

Hot-Spot Determination

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

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

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

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

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

- **Or**

☐ Check **If** the project fits the condition of the "**CO Categorical Hot-Spot Finding"**. In the January 24, 2008, Transportation Conformity Rule Amendments, EPA included a provision at 40 CFR 93.123(a)(3) to allow the U.S. DOT, in consultation with EPA, to make categorical hot-spot findings in CO nonattainment and maintenance areas if appropriate modeling showed that a type of highway or transit project would not cause or contribute to a new or worsened air quality violation of the CO NAAQS or delay timely attainment of the NAAQS or required interim milestone(s), as required under 40 CFR 93.116(a). (Note: Any new CO hot-spot analyses for conformity purposes begun on or after January 9, 2023 may no longer rely on the July 2017 CO categorical hotspot finding.)

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 "Table 1: Project Parameters and Acceptable Ranges for CO Categorical Hot-Spot Finding" or enter the project information into FHWA's web based tool: https://www.fhwa.dot.gov/environment/air_quality/conformity/policy_and_guidance/cmcf_2017/tool.cfm)?

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

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

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

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

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

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

- **Or**

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

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

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

This project requires a quantitative hot-spot analysis for carbon monoxide. The intersections to be modeled were determined using EPA's Guideline for Modeling Carbon Monoxide from Roadway Intersections (EPA, 1992). ~~The intersections with the highest volumes and longest delays were identified for the 2050 build alternative. The top three intersections ranked by volume are as follows:~~

~~67th Ave & Happy Valley Road~~

~~55th Ave & Happy Valley Road~~

~~35th Ave & Happy Valley Road~~

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

~~67th Ave & Happy Valley Road~~

~~55th Ave & Happy Valley Road~~

~~35th Ave & Happy Valley Road~~

~~All three intersections are found on both groups, thus the intersection modeling analysis will be performed for the following three intersections:~~

~~67th Ave & Happy Valley Road~~

~~55th Ave & Happy Valley Road~~

~~35th Ave & Happy Valley Road~~

Only the 67th Ave & Happy Valley Road intersection is selected for hot-spot analysis because of congestion in the 2050 build scenario. Other intersections would not result in congestion in the 2050 build scenario.

~~Modeling will be performed for the AM and PM peak hour of no build 2050 and build 2050.~~ Modeling will be performed for the peak hour of the day under the project opening year (2025) condition with the worst case scenario using the 2025 MOVES emission rates (highest CO emission rates) with 2050 traffic data (maximum traffic). It is assumed that if the selected worst-case intersections do not show an exceedance of the NAAQS, none of the intersections will. Refer to the enclosed supplemental traffic study.

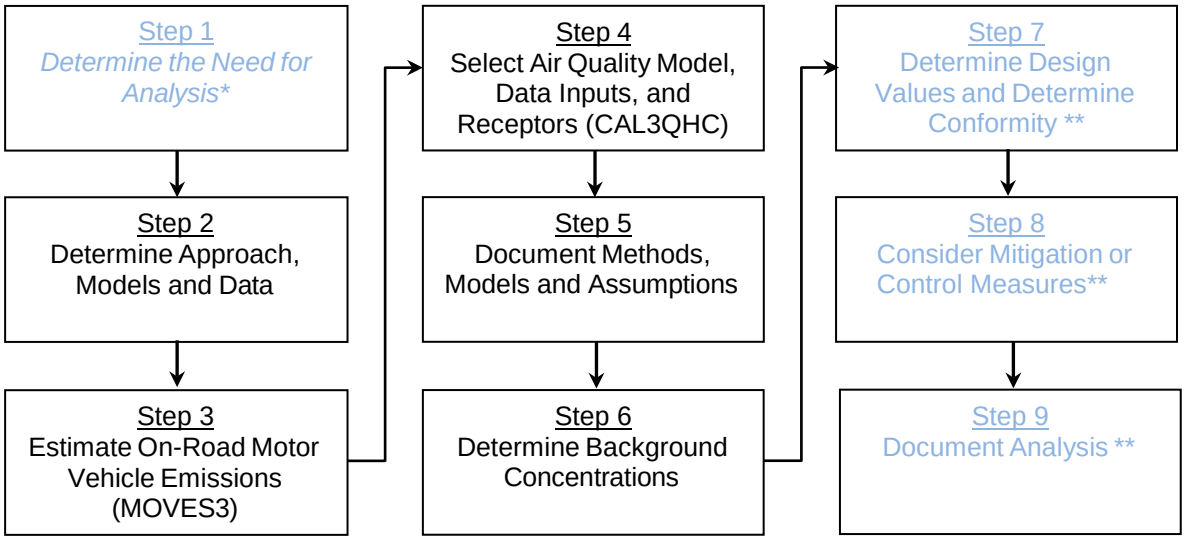
Interagency Consultation Results

On May 2nd, 2022 ADOT provided a copy of this questionnaire, to the following consultation parties, City of Phoenix, EPA, FHWA, MAG, Arizona Department of Environmental Quality (ADEQ), Maricopa County Air Quality Department as the local air agencies in Maricopa County. There were suggestions for corrections and comments from FHWA, corrections were made and provided to Interagency consultation on June 3rd, responses to additional comments received on the CO modeling assumptions are included. There were no objections to the revised planning assumptions described for the quantitative analysis methods in accordance to 40 CFR 93.116(a) and the consultation requirements of 40 CFR 93.105(c)(1)(i). On June 21, 2022 ADOT concluded Interagency Consultation by notifying interested parties that this project will commence CO hot-spot conformity modeling required for transportation conformity in accordance to the latest planning assumptions and emissions model in place.

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

Completing a Carbon Monoxide (CO) Hot-Spot Analysis

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



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

Step 2: Determine the Approach, Models, and Data

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

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

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

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

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

Step 5: Document Methods, Models and Assumptions

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

Step 6: Determine Background Concentrations

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

Step 7: Calculate Design Values and Determine Conformity

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

Step 8: Consider Mitigation or Control Measures

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

Step 9: Document Analysis

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

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

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

Table 1. Methods, Models and Assumptions for CO

MOVES3 and CAL3QHC Requirements		
Estimate On-Road Motor Vehicle Emissions (Step 3)		
MOVES3	**Description**	**Data Source**
Scale	On road, Project, Inventory	EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.3.2
Time Spans	EPA 1992 Guideline conservatively uses a typical peak-hour traffic activity in one MOVES run to generate emission rates.	EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.3.3.
Geographic Bounds	Maricopa County	EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.3.4
Onroad Vehicles	All Fuels and Source Use Types will be selected	EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.3.5
Road Type	Urban Unrestricted access	EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.3.6
Pollutants and Processes	CO Running Exhaust, CO Crankcase Running Exhaust	EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.3.7
Output	Database will be created, Grams, Miles, Distance Traveled, Population will be selected. Emissions process will be selected in the Output Emissions Detail. Emission rates for each process can be appropriately summed to calculate aggregate CO emission rates for each link.	EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.3.8 & 2.3.9
Project Data Manager	Database will be created and MOVES3 templates will be created to include local project data and information provided by project team/MPO, e.g., I/M programs, Fuel, Age Distribution, to be consistent with the regional model. The average temperature and humidity in January may be used. Links and Link Source Type will be specific to project as provided by the traffic study, any missing information will use default MOVES3 data. After running MOVES, the MOVES CO_CAL3QHC_EF post-processing script is run.	EPA 1992 Guideline, Section 4.7.1., Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4, 2.1 for Links; the required data necessary to be consistent with regional emissions analysis (40 CFR 93.123(c)(3)).
Select Air Quality Model, Data Inputs, and Receptors (Step 4)		
CAL3QHC	**Description**	**Data Source**

Emissions Sources	Emissions Rates in grams/mile, as described in MOVES3 section. The free flow and queue links defined for modeling with MOVES3 will be used as input into CAL3QHC.	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, EPA-454/R-92-005, November 1992. Section 5.2.3 of Appendix W to 40 CFR Part 51, CO screening analyses of intersection projects should use the CAL3QHC dispersion model.
Emissions Sources	Emissions Rates in grams/mile, as described in MOVES3 section. The free flow and queue links defined for modeling with MOVES3 will be used as input into CAL3QHC.	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, EPA-454/R-92-005, November 1992. Section 5.2.3 of Appendix W to 40 CFR Part 51, CO screening analyses of intersection projects should use the CAL3QHC dispersion model.
Traffic and Geometric Design	Lane Configuration, Lane Width, Signalization, Turning Movements, Median Width, Traffic Volume, Level of Service, Grade, % of Heavy-Duty Trucks, and Peak Hour Average Approach Speed.	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, Section 4.7.4
Meteorology	Temperature, Wind Speed, Wind Direction, Atmospheric Stability Class, Mixing Heights and Surface Roughness.	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, Section 4.7.1
Persistence Factor	Local persistence factor based on monitoring data. If it is not available, use a default persistence factor of 0.7.	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, Section 4.7.2
Determine Background Concentrations (Step 6)		
Background Monitor	*The CO monitor located at West Phoenix (WP) between 39th Avenue & Earll Drive in Phoenix has similar environment settings as the project corridor. Three years of monitoring data (2018--2020) show a maximum 8-hour value of 3.3 ppm. 4.7 ppm (which is the 8-hour concentration divided by a persistence factor of 0.7) will be added to the maximum modeled hourly concentration for comparison to the NAAQS. 3.3 ppm will be added to the maximum 8-hour modeled concentration. The same background values will be used for all analysis years.*	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, Section 4.7.3

Table 2. Project Data Manager Inputs

Input	Level of Detail/notes	Possible Data Source
Meteorology	*Same for build and no-build scenarios. The average temperature and humidity were determined by averaging all hourly temperature values for January 2018,2019, and 2020. The average temperature of 57.55 degrees F and the average relative humidity of 45.64% were uses in all MOVES runs, regardless of analysis year or time of day.*	ADEQ, NOAA EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.1, 1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, Screening Analyses of Roadway Intersections

Age Distribution	*Same for build and no-build scenarios. Data from latest regional CO conformity analysis provided by MAG.*	ADOT, MPO EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.2
Fuel	*Same for build and no-build scenarios. Data from latest regional CO conformity analysis provided by MAG.*	MPO, MOVES defaults EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.3
I/M Programs	*Same for build and no-build scenarios. Data from latest regional CO conformity analysis provided by MAG.*	MPO, MOVES defaults EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.4
Retrofit Data	*Not applicable for this project.*	Project specific modeling EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.7
Links	~~*Four selected intersections (67th Ave & Happy Valley Road, 55th Ave & Happy Valley Road, 35th Ave & Happy Valley Road)*~~ *One intersection at 67th Avenue & Happy Valley Road will be divided into links and each link's length (in miles), traffic volume (vehicle per hour), average speed (miles per hour) and road grade (percent) will be specified. Other roadway segments within 500 feet of the intersection will be included. (See attachment for graphical representation of model setup)*	Project specific modeling, ADOT, MPO EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.6
Link Source Types	*Source type distribution will be determined using a combination of project data and regional fleet information from the latest regional CO conformity analysis provided by MAG.*	Project specific modeling, ADOT, MPO EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.5
Link Drive Schedules, Operating Mode Distribution	*Average speed and road type will be used in the Links Importer based on project-specific modeling.*	Project specific modeling, ADOT, MPO EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.8, 2.4.9
Off-Network, Hoteling	*Not applicable for this project.*	EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.9

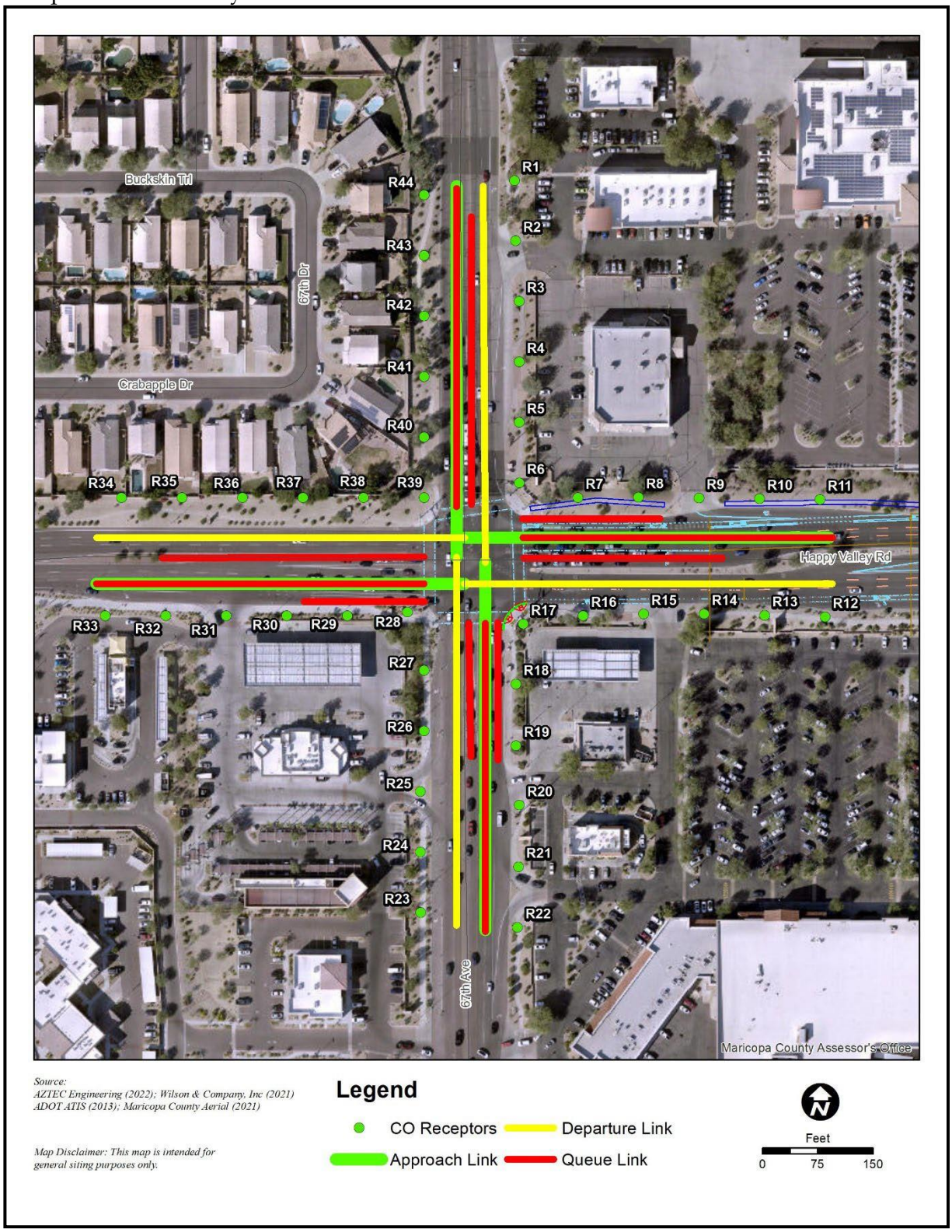
Table 3. Construction Emissions *(Only if Applicable)*		
Construction Emissions	*Construction Emissions will be addressed qualitatively because construction is not expected to last longer than 5 years at any individual site. In the context of CO, this is usually excess CO emissions due to traffic delay and/or detours.*	40CFR93.123(c)(5)"Each site which is affected by construction-related activities shall be considered separately, using established "Guideline" methods." If applicable, include analysis as an Appendix to the Air Quality Report.

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

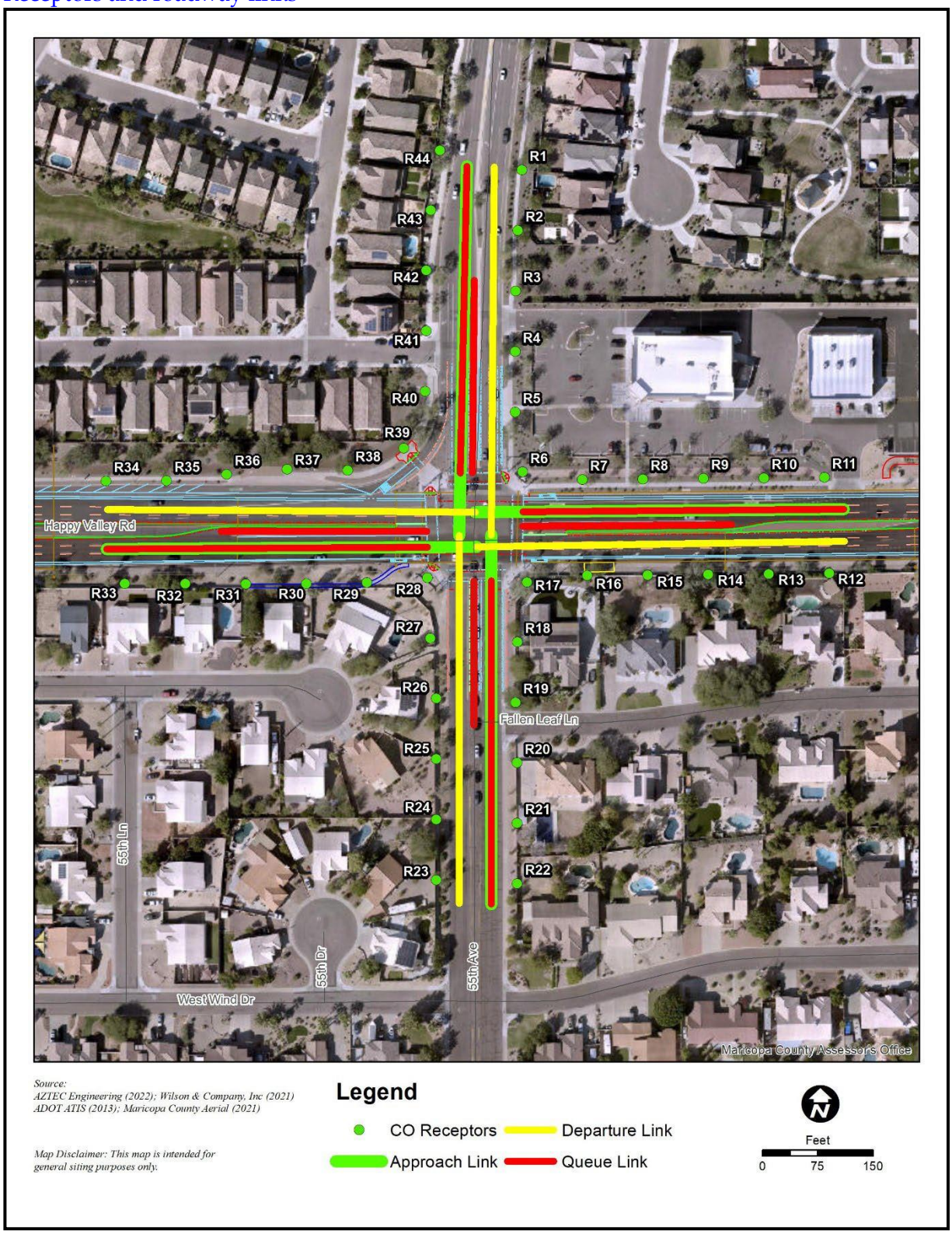
The following graphics present the preliminary link configurations and receptor placements for the three intersections that will be modeled as part of the CO hot-spot analysis in CAL3QHC. The following applies to all figures:

- Free flow links extend 500 feet away from center of signalized intersection
- Graphic representation of free flow links includes 10-foot mixing zone
- Traffic activity within 500 feet from intersections are included
- Yellow circles are receptors located on or adjacent to the existing R/W (more than 10 feet from the edge of roadway).
- Receptors are spaced at 82 feet (25 meter) intervals outside of the mixing zone.
- Receptor location coordinates will be provided by a separate file

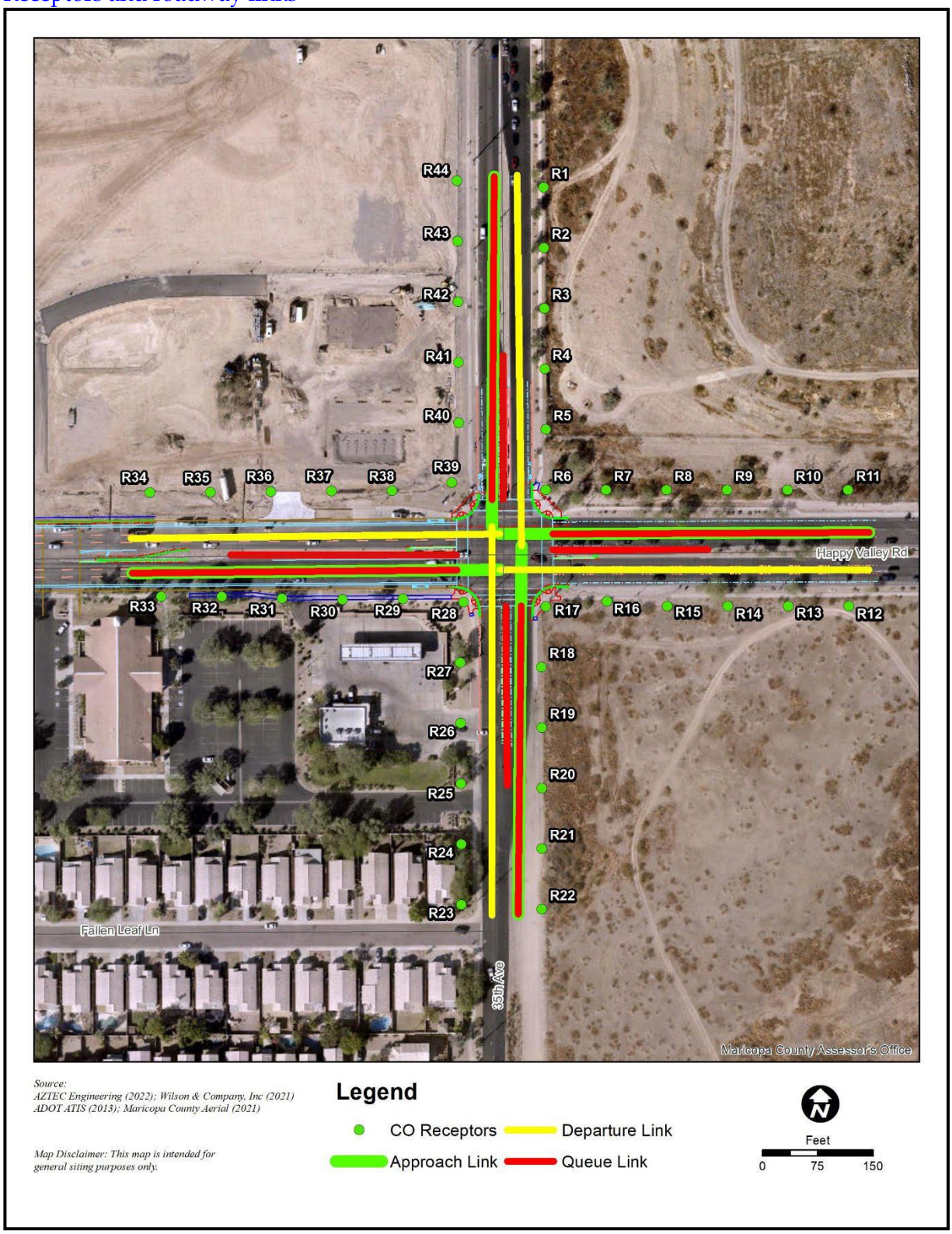
67th Avenue and Happy Valley Road Intersection
Receptors and roadway links



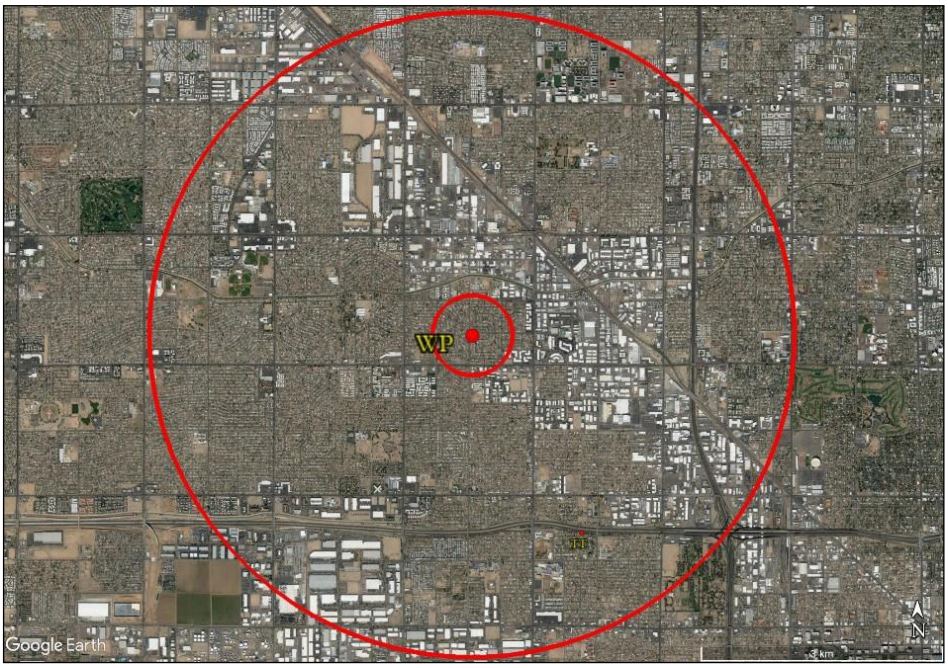
~~55th Avenue and Happy Valley Road Intersection Receptors and roadway links~~



~~35th Avenue and Happy Valley Road Intersection Receptors and roadway links~~



West Phoenix (WP) (04-013-0019)



Site Location: 39th Ave. & Earll Dr., Phoenix

Spatial Scale: Neighborhood

Site Type: Population Exposure for CO, NO_2, O_3, PM_{10}, and Highest Concentration for $PM_{2.5}$

Site Description: This site began operating in January 1984. This SLAMS location monitors for CO, NO_2, O_3, PM_{10}, and $PM_{2.5}$. Meteorological monitoring includes ambient temperature, barometric pressure, and wind speed/direction. The site is located in an area of stable, high-density, residential properties. This is the QA collocation site for $PM_{2.5}$ where one filter-based $PM_{2.5}$ FRM sampler operates alongside a continuous $PM_{2.5}$ FEM analyzer as per *40 CFR Part 58 Appendix A*.

Pollutant	Metric	2018	2019	2020
CO	Maximum 8-hr CO Average (ppm)	4.4	2.4	3.0
	Number of 8-hr CO Exceedance Days	0	0	0
NO_2	Annual NO_2 Average (ppb)	16.12	14.07	13.36
	NO_2 1-hr Average 98th Percentile (ppb)	52.0	47.0	48.0
O_3	Maximum 8-hr O_3 Average (ppm)	0.086†	0.078†	0.091†‡
	Number of O_3 Exceedance Days	6	3	10
	3-yr 8-hr 4th Highest O_3 Average (ppm)	0.074#	0.073#	0.074#
PM_{10}	Maximum 24-hr PM_{10} Average (µg/m³)	259†‡	58	159†
	Number of 24-hr PM_{10} Exceedance Days	4	0	1
	Annual PM_{10} Average (µg/m³)	33.3	23.0	30.8
$PM_{2.5}$	Maximum 24-hr $PM_{2.5}$ Average (µg/m³)	199.3†‡	40.4†	149.1†
	Number of 24-hr $PM_{2.5}$ Exceedance Days	3	1	7
	Annual $PM_{2.5}$ Average (µg/m³)	9.92	8.17	10.47
	$PM_{2.5}$ 98th Percentile Value	30.6	23.4	33.9

† - Indicates an exceedance of the standard
‡ - Indicates EE submission – listed value is currently the official maximum concentration in AQS
# - Indicates a violation of the standard

Source: EPA AQS database - *2018 – 2020 Quicklook Criteria Report (AMP450)*
MCAQD 2018 - 2020 O_3, $PM_{2.5}$, and PM_{10} Exceedance Day Reports for Numbers

Project Name: Happy Valley Road, 67th Avenue to 35th Avenue
Federal Project No.: PHX-0(363)D
ADOT Project No.: 0000 MA PHX T0239 01C
City of Phoenix Project No.: ST85100437

ADOT
Environmental Planning

Refer to the Supplemental Traffic Study for CO modeling - Provided May 2,2022.

Project Name: Happy Valley Road, 67th Avenue to 35th Avenue
Federal Project No.: PHX-0(363)D
ADOT Project No.: 0000 MA PHX T0239 01C
City of Phoenix Project No.: ST85100437

ADOT
Environmental Planning

Interagency Consultation Summary

Re: Interagency Consultation: PHX-0(363)D | 000 MA PHX T0239 01C; Happy Valley Road: 67th Avenue to 35th Avenue

1 message

Beverly Chenausky <bchenausky@azdot.gov> Tue, Jun 21, 2022 at 9:28 AM
To: "Wickersham, Lindsay (she/her)" <wickersham.lindsay@epa.gov>
Cc: "rebecca.yedlin@dot.gov" <rebecca.yedlin@dot.gov>, Transportationconformity <transportationconformity@azdeq.gov>, Tim Franquist <TFranquist@azmag.gov>, "Johanna Kuspert (AQD)" <Johanna.Kuspert@maricopa.gov>, Greta Halle <greta.halle@phoenix.gov>, Morgan Ghods <mghods@azdot.gov>, Dean Giles <dgiles@azmag.gov>, "Hansen, Alan (FHWA)" <Alan.Hansen@dot.gov>, Paul O'brien <POBrien@azdot.gov>, Joonwon Joo <jjoo@azdot.gov>, "Meek, Clifton" <meek.clifton@epa.gov>, "OConnor, Karina (she/her)" <OConnor.Karina@epa.gov>, Madhav Mundle <MMundle@azdot.gov>
Bcc: adotairnoise@azdot.gov

Lindsay -
For project level hot-spot CO modeling FHWA has recommended to use the screening approach identified in both the *Guideline for Modeling Carbon Monoxide from Roadway Intersections, EPA-454/R-92-005, November 1992* (Section 4.7.1) and *Using MOVES3 in Project-Level Carbon Monoxide Analyses, December 2021* (Section 2.4.1) referencing the use of an average January temperature and humidity value. I am sure we can work with the Maricopa County Air Quality Department monitoring staff to obtain the windrose information for the selected background monitor, we can add that content into the air quality report.

All - Given no additional comments or suggested changes where received, the project team will commence the CO project level hot-spot analysis, when complete the draft report and modeling files will be provided for additional review and comment. Thank you. Beverly

On Fri, Jun 17, 2022 at 1:53 PM Wickersham, Lindsay (she/her) <wickersham.lindsay@epa.gov> wrote:

> Hi Beverly,
>
> Thank you for the opportunity to review the Happy Valley Road Project and PM10 and CO consultation documents. At this time I have no formal comments but do have one question for my own understanding and have a suggestion for an addition to the modeling documents when they are available.
>
> My question was regarding the choice to use average temperature and humidity in January for the CO hotspot analysis (Table 2, P.4, Meterology) . I see that in the MAG 2013 CO Maintenance Plan, the CO winter season was described from November- January. Is there a reason why January and not another month was chosen? Does this represent the “worst case” scenario for CO production?
>
> I noticed in the CO hot spot consultation document that there was a picture of the location of the CO receptors on P.7. I appreciate having this visualization and I would like to suggest that a wind rose be added in future versions and in modeling documents so that we can deduce the primary wind direction.
>
> Thank you again for sharing this with me and I hope you have a great weekend.
>
> Best,
>
> Lindsay
>
> **Lindsay Wickersham** (she/her/hers)

BSPH, MSEE | Physical Scientist

U.S. Environmental Protection Agency

Air & Radiation Division | Planning Office

Region 9 | 415-947-4192

From: Beverly Chenausky <bchenausky@azdot.gov>
Sent: Friday, June 3, 2022 9:55 AM
To: rebecca.yedlin@dot.gov; Transportationconformity <transportationconformity@azdeq.gov>; Tim Franquist <TFranquist@azmag.gov>; Johanna Kuspert (AQD) <Johanna.Kuspert@maricopa.gov>; Wickersham, Lindsay (she/her) <wickersham.lindsay@epa.gov>
Cc: Greta Halle <greta.halle@phoenix.gov>; Morgan Ghods <mghods@azdot.gov>; Dean Giles <dgiles@azmag.gov>; Hansen, Alan (FHWA) <Alan.Hansen@dot.gov>; Paul O'brien <POBrien@azdot.gov>; Joonwon Joo <jjoo@azdot.gov>; Meek, Clifton <meek.clifton@epa.gov>; OConnor, Karina (she/her) <OConnor.Karina@epa.gov>; Madhav Mundle <MMundle@azdot.gov>
Subject: Re: Interagency Consultation: PHX-0(363)D | 000 MA PHX T0239 01C; Happy Valley Road: 67th Avenue to 35th Avenue

ADOT has not received any additional comments or requests for changes to either the PM10 and/or CO documents. The project team has incorporated the FHWA suggested revisions and are noted in **blue** in the attached pdf documents. These changes include; modifying Table 1 in both documents, adding a Table 3 to show data pulled from the traffic study, including the same data tables for both documents, removing the two receptors maps, and noting these corrections throughout the document, as applicable.

Additionally, to better represent a scenario where emissions are expected to be the worst, a 2025 emission rate will be used in the 2050 model year run. Please review the changes to the planning assumptions included in the document, given the project schedule demands, we are requesting responses on these changes within 10 business days. If there are no objections to this approach, modeling will commence and an air quality report, with the associated modeling data, will be provided when available for further review and comments. There were no changes to the traffic data provided May 2, 2022, as such those traffic assumptions will be used in the hot-spot modeling.

Please let me know if you have additional questions. Thanks, Beverly

On Wed, May 18, 2022 at 6:37 AM Yedlin, Rebecca (FHWA) <Rebecca.Yedlin@dot.gov> wrote:

> I provided your responses to the FHWA Resource Center AQ Specialists and have placed their responses below in green.
>
> If you have any questions, please let me know. Thanks, Rebecca

From: Greta Halle <greta.halle@phoenix.gov>
Sent: Friday, May 13, 2022 3:34 PM
To: Yedlin, Rebecca (FHWA) <Rebecca.Yedlin@dot.gov>; bchenausky azdot.gov <bchenausky@azdot.gov>
Cc: Morgan Ghods <mghods@azdot.gov>; Dean Giles <dgiles@azmag.gov>; Hansen, Alan (FHWA) <Alan.Hansen@dot.gov>; Paul O'brien <POBrien@azdot.gov>; Stauffer, Panah <Stauffer.Panah@epa.gov>; Transportationconformity <transportationconformity@azdeq.gov>; Joonwon Joo <jjoo@azdot.gov>; Clifton Meek <meek.clifton@epa.gov>; Johanna Kuspert (AQD) <Johanna.Kuspert@maricopa.gov>; Karina O'Conner <oconnor.karina@epa.gov>; Madhav Mundle <MMundle@azdot.gov>; Tim Franquist <TFranquist@azmag.gov>
Subject: RE: Interagency Consultation: PHX-0(363)D | 000 MA PHX T0239 01C; Happy Valley Road: 67th Avenue to 35th Avenue

Good afternoon, on behalf of the City of Phoenix Street Transportation Department, our responses to FHWA's comments are below in red. Thank you.

Greta Halle

Planner III

Office of the City Engineer

Street Transportation Department | City of Phoenix

200 W. Washington St., 5th floor | Phoenix, AZ 85003

(P) 602.534.6030 | greta.halle@phoenix.gov

Follow us on Twitter @StreetsPHX [twitter.com]

From: Yedlin, Rebecca (FHWA) <Rebecca.Yedlin@dot.gov>
Sent: Monday, May 9, 2022 6:00 AM
To: bchenausky azdot.gov <bchenausky@azdot.gov>
Cc: Greta Halle <greta.halle@phoenix.gov>; Morgan Ghods <mghods@azdot.gov>; Dean Giles <dgiles@azmag.gov>; Hansen, Alan (FHWA) <Alan.Hansen@dot.gov>; Paul O'brien <POBrien@azdot.gov>; Stauffer, Panah <Stauffer.Panah@epa.gov>; Transportationconformity <transportationconformity@azdeq.gov>; Joonwon Joo <jjoo@azdot.gov>; Clifton Meek <meek.clifton@epa.gov>; Johanna Kuspert (AQD) <Johanna.Kuspert@maricopa.gov>; Karina O'Conner <oconnor.karina@epa.gov>; Madhav Mundle <MMundle@azdot.gov>; Tim Franquist <TFranquist@azmag.gov>
Subject: RE: Interagency Consultation: PHX-0(363)D | 000 MA PHX T0239 01C; Happy Valley Road: 67th Avenue to 35th Avenue

FHWA has the following comments:

- The traffic shown in the PM and CO consultation documents are inconsistent with the traffic report included with the CO document. This should be corrected so that the traffic used for interagency consultation and determining whether hot-spot analyses are required is consistent with the traffic data used for other analyses in NEPA. // COP STR response: The inconsistencies are attributable to the level of analysis conducted for the respective document. For the questionnaires, the MAG TDM model was used to initially screen the project and help determine if modeling might be necessary. For the traffic memo, a LOS/synchro analysis at the local intersection level was conducted using geometric configurations, signal timings, and turning movement counts. The MAG model is routinely used to inform travel patterns and capable of providing information related to volume and capacity; however, the intersection LOS produced by the MAG TDM does not reach the level of detail provided by the synchro

analysis. - The tables for the interagency consultation memos/questionnaires should be updated to reflect the more refined traffic forecasts.

- There should be supporting information included on why 2050 was chosen for the year of peak year emissions. Traffic volumes are expected to be highest in 2050, but emission rates are likely highest in the opening year of the project. There should be an analysis that looks at these offsetting factors to determine the year of peak emissions. // COP STR response: 2050 was chosen for the year of peak year emissions based on the following reasons: (a) 2050 is the horizon year as described in the latest Regional Transport Plan (RTP), dated December 1, 2021. (b) 2050 is the year that traffic volumes along the project corridor are expected to be highest and corresponding intersections are expected to be most congested with longest intersection wait time, which would result in highest CO emissions. As specified in 40 CFR part 51, Appendix W (Guideline on Air Quality Models), the main assumption is that intersections with less traffic volumes and congestions will have lower ambient air impacts. - An analysis to make the determination which year will have the highest emissions (not traffic or congestion) should be completed. For conformity, the year of peak emissions should be evaluated in CAL3QHC. The only way to determine this year is doing a MOVES analysis that accounts for emissions rates being highest in the opening year (with lower volumes), and lowest in the horizon year (with higher volumes). The emission rates will be higher during the opening year, but the question is whether the growth in VMT and reduction in speeds in the design year (2050) is enough to offset the decrease in emissions due to fleet turnover.

- The project sponsor is proposing to do more modeling than what is required for conformity. (Not necessarily a problem, but wanted to point out it is not required for conformity purposes).
    - For a CO hot-spot analysis for determining conformity, there is no need to model the no-build condition.
    - Only the peak hour is required to be modeled (not both the AM and PM peak hours, but just the one that is THE peak of the day).
    - Based on the traffic report in the appendix, only the Happy Valley Road and 67th intersection requires a hot-spot analysis.

    // COP STR response: Duly noted. We will only conduct hotspot analysis during *THE* peak hour of the day for the 2050 Build condition at the Happy Valley Road/67th Avenue intersection. - ok

Please let me know if you have any questions or would like to discuss the comments above. Thanks, Rebecca

---

From: Beverly Chenausky <bchenausky@azdot.gov>
Sent: Monday, May 2, 2022 9:12 AM
To: Tim Franquist <TFranquist@azmag.gov>; Transportationconformity <transportationconformity@azdeq.gov>; Stauffer, Panah <Stauffer.Panah@epa.gov>; Johanna Kuspert (AQD) <Johanna.Kuspert@maricopa.gov>; Yedlin, Rebecca (FHWA) <Rebecca.Yedlin@dot.gov>
Cc: Greta Halle <greta.halle@phoenix.gov>; Morgan Ghods <mghods@azdot.gov>; Dean Giles <dgiles@azmag.gov>; Hansen, Alan (FHWA) <Alan.Hansen@dot.gov>; Paul O'brien <POBrien@azdot.gov>; Joonwon Joo <jjoo@azdot.gov>; Clifton Meek <meek.clifton@epa.gov>; Karina O'Conner <oconnor.karina@epa.gov>; Madhav Mundle <MMundle@azdot.gov>
Subject: Interagency Consultation: PHX-0(363)D | 000 MA PHX T0239 01C; Happy Valley Road: 67th Avenue to 35th Avenue

ADOT, in coordination with City of Phoenix, is presenting the following project, **Happy Valley Road: 67th Avenue to 35th Avenue**, for interagency consultation, per 40 CFR 93.105 as a potential project that is not a project of Air Quality Concern and thereby will not require a PM10 hot-spot analysis. ADOT is requesting responses to the attached *PHX T0239_Project Level PM10Consultation_050222.pdf,*

a non-response will be interpreted as concurrence that the project is not a project of air quality concern and does not require a hot-spot analysis. If any consulted party believes this project should be treated as a project of air quality concern that requires a Quantitative PM10 hot-spot analysis, please document the appropriate section under 40 CFR 93.123 (b) that applies to the project and describe why the project should be treated as a project of air quality concern, **within 10 business days**.

Additionally, ADOT has determined that the project may require a quantitative hot-spot analysis only for CO, the modeling assumptions are attached in the document *PHX T0239_Project Level CO Consultation Document_05022022.pdf.* This document contains the combined Project Level CO Hot-Spot Analysis Questionnaire demonstrating the need for analysis and the City provided supplemental traffic report for those congested intersections identified. The Purpose of this document is to describe the methods, models and assumptions used for a quantitative hot-spot analysis as required in 40 CFR 93.105(c)(1)(i), 93.123, 93.116. It is requested that the consulted parties provide comments or questions on the methods, models and assumptions **within 30 days**, a non-response will be interpreted as concurrence with the planning assumptions as described in the attached CO document.

Please let me know if you have any additional questions or need additional time to review, Project-Level hot-spot conformity will begin at the conclusion of interagency consultation. All other project details, upcoming events, and additional information on how to subscribe to project updates can be found on the project website at:

https://www.phoenix.gov/streets/projects/happyvalley [gcc02.safelinks.protection.outlook.com]

Beverly T. Chenausky

Air & Noise Program Manager
MD EM02
205 South 17th Avenue
Phoenix, AZ 85007

C: 480.390.3417

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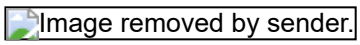
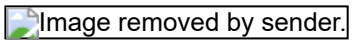




Project Name:	Happy Valley Road: 67th Ave to 35th Ave	**Document Author(s):**	David Shu
Project Number(s):	ST85100437	**Reviewer(s):**	Rebecca Yedlin (FHWA), Lindsay Wickersham (EPA)
Document Name:	Draft Air Quality Report	**Date of Comments:**	Received 8/4/2022 & 8/23/2022
Document Date:	7/6/2022	**Revised Document Date:**	N/A

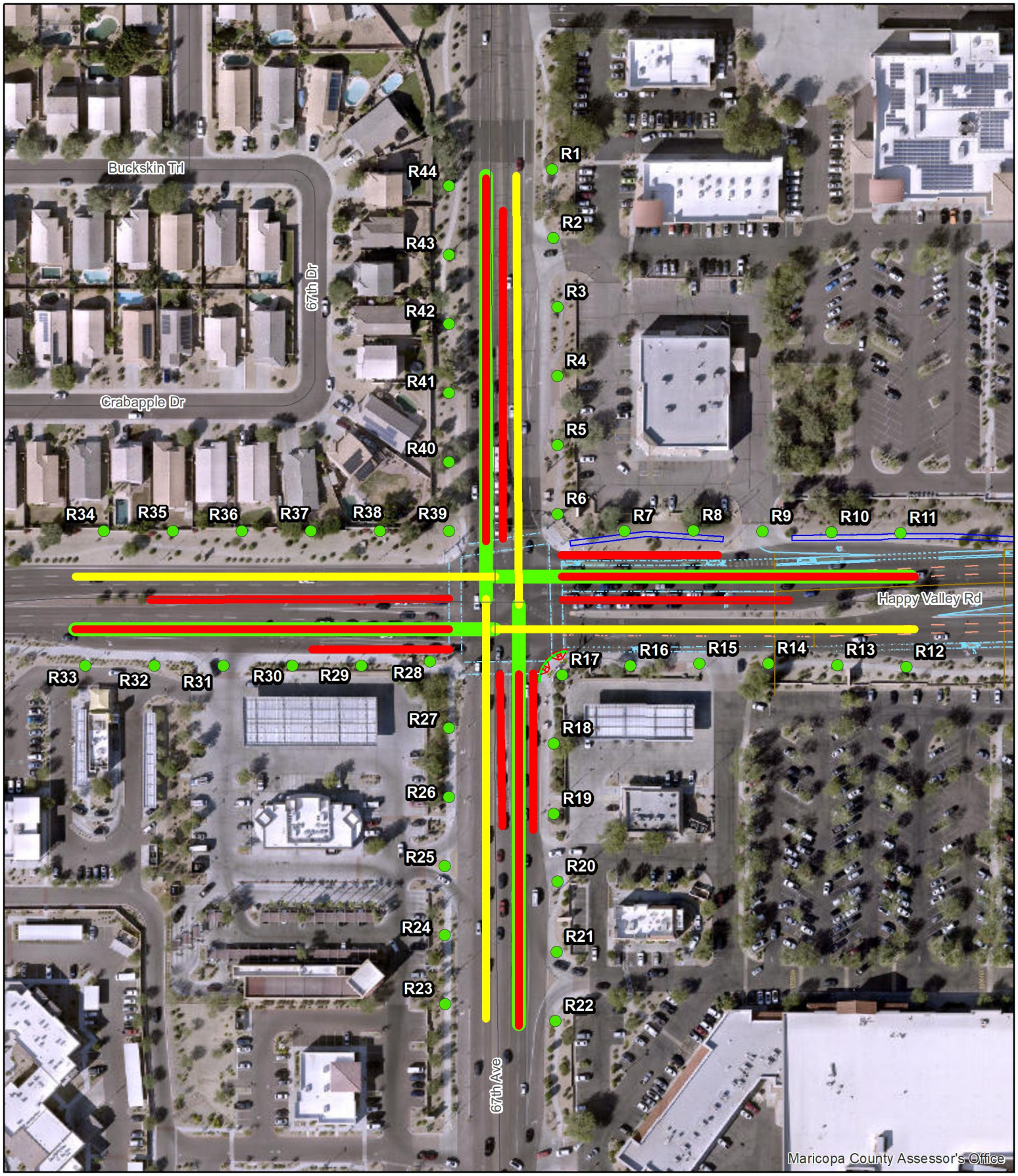
Diposition Codes: A = Consultant Complied; B = Consultant Evaluated; C = Client to Evaluate; D = No Action Required

Comment #	Reviewer	Page	Paragraph	Comment	Disposition	Response Notes	Back-Checked By
1	RY	N/A	N/A	Overall the modeling files appear consistent with the documentation provided and the applicable guidance.	A	Thank you for your comment	MM
2	RY	N/A	N/A	Please confirm that the traffic data used in the CAL3QHC files are correct. It appears that the traffic volumes for the "existing" 2018 scenario are higher than the "worst-case" 2025 scenario in the CAL3QHC input files. This seems to conflict with traffic data in Table 1 of the report showing a significant increase in volumes for the 67th avenue intersection between existing and build.	A	The traffic volumes in the modeling files are correct. The 2018 N/S bound traffic volumes on 67th Ave are higher than 2025 for some reason but the large increase of the E/W bound traffic volumes on Happy Valley Road may worsen the traffic at the intersection.	MM
3	RY	N/A	N/A	Please confirm that the traffic volumes for the approach links are consistent with those used for the queue links. Queue approach volumes should equal the total approach link traffic volume. For some links/directions, they do not appear to be the same (e.g., EB approach links in worst-case scenario).	A	Traffic volumes for the approach links are consistent with those used for the queue links. There was a typo for EB approach link volume, the correct EB approach volumes should be 2,546 instead of 2,346 in the CAL3QHC 2025 input file. Input volumes of other links in 2018 are 2050 input files are correct. This number was corrected in the model and the model was re-ran. Results are updated in Table 4 and 5, also in Appendix C.	MM
4	RY	14	Section 3.0, 2nd paragraph	edit the sentences that begin, "The Project Level CO [PM] Hot-Spot Analysis Questionnaire. . ." as shown below. The Project Level CO Hot-Spot Analysis Questionnaire and interagency consultation determined that ~~conformity~~ a hot-spot analysis was warranted for CO ~~analysis~~. The Project Level PM Quantitative Hot-Spot Analysis – Project of Air Quality Concern Questionnaire and interagency consultation determined that this project is not a project of air quality concern and does not require a PM10 quantitative analysis.	A	The change was incorporated.	MM
5	RY	16	Predicted Levels section	It is somewhat confusing to describe the modeled build alternative as the "opening year 2025 with worst case scenario." It may better to describe it as the "worst case build condition," and then explain what "worst-case" means. Proposed edits: "Predicted Levels Carbon monoxide concentrations for existing year 2018 to be consistent with the traffic memo and the worst case build condition ~~opening year 2025 with worst case scenario~~ were predicted. The worst-case scenario uses the 2025 MOVES emission rates (highest CO emission rates) with the 2050 traffic data (maximum traffic)."	A	The change was incorporated.	MM
6	RY	17	3rd paragraph	the "worst-case" scenario is explained here. I suggest the following edits to the first sentence: "Modeling was performed for the peak hour of the day ~~under the project opening year (2025)~~ for the worst case build condition ~~with the worst-case scenario~~ using the 2025 MOVES emission rates (highest CO emission rates) with 2050 traffic data (maximum traffic).	A	The change was incorporated.	MM
7	RY	16		Recommend changing "opening year 2025 with worst case scenario" to "worst case build condition" throughout the report.	A	The change was incorporated.	MM

Comment #	Reviewer	Page	Paragraph	Comment	Disposition	Response Notes	Back-Checked By
8	RY	17	Section 3.1.3	Analysis: consider adding some narrative regarding the receptor with the highest design concentration (and how that is well below the NAAQS), and discuss that many receptor locations are not at all impacted by the project (i.e. per the results shown in Tables 4 & 5 most receptor locations' design concentrations are equal to the background concentration.)	A	added narrative regarding the receptor with the highest design concentration (and how that is well below the NAAQS), and discuss that many receptor locations are not at all impacted by the project.	MM
9	RY	Page 18 & 19	Table 4 & 5	Highlight the receptor with the highest CO design concentration.	A	The change was incorporated.	MM
10	RY			Add the receptor map from Appendix A to the main body of the report, either just before or just after Tables 4 & 5, to provide context to the design concentrations by receptor location shown in Tables 4 & 5.	A	The change was incorporated.	MM
11	RY	20	Section 4.0	Add the date of the most recent US DOT conformity determination for the MTP and TIP. Also, add the same to the executive summary.	A	Added the date of the most recent US DOT conformity determination for the MTP and TIP, and the same to the executive summary.	MM
12	LW	10	Section 2.4	On Page 10, Section 2.4 Nonattainment areas, Paragraph 4, the final sentence reads, "MAG submitted a 2017 Eight-Hour Ozone Moderate Area Plan for the 2008 ozone standards on January 1, 2017, which is pending approval." I would amend the text as follows (copied and pasted from MAG's December 2021 Conformity Analysis p. 12) "MAG submitted a 2017 Eight-Hour Ozone Moderate Area Plan for the 2008 ozone standards on January 1, 2017. On June 2, 2020, EPA published a final rule to approve the portions of the MAG 2017 Eight-Hour Ozone Plan that address the requirements for emissions inventories, a demonstration of attainment by the applicable attainment date, reasonably available control measures, reasonable further progress, motor vehicle emission budgets for transportation conformity, vehicle inspection and maintenance programs, new source review rules, and offsets, effective July 2, 2020. " I would also recommend that text be added addressing the 2015 Ozone standard, for which this area is also nonattainment: "The MAG 2020 Eight-Hour Ozone Plan – Submittal of Marginal Area Requirements for the Maricopa Nonattainment Area was submitted to EPA on June 29, 2020. The MAG 2020 Eight-Hour Ozone Plan – Submittal of Marginal Area Requirements addresses the 2015 eight-hour ozone standard of 0.070 parts per million;"	A	The change was incorporated.	MM
13	ADOT informal comment	10	Section 2.4	"the Ozone plan effective July 2nd 2020"	A	The change was incorporated as part of addressing Comment 12.	MM
14	ADOT informal comment	12	first paragraph	"discussed CO include details on the 2013 CO second maintenance plan takes it out full maintenance period. add content on the CO maintenance plan."	A	The change was incorporated.	MM

Appendix B

CO HOTSPOT ANALYSIS RESULTS



Source:
AZTEC Engineering (2022); Wilson & Company, Inc (2021)
ADOT ATIS (2013); Maricopa County Aerial (2021)

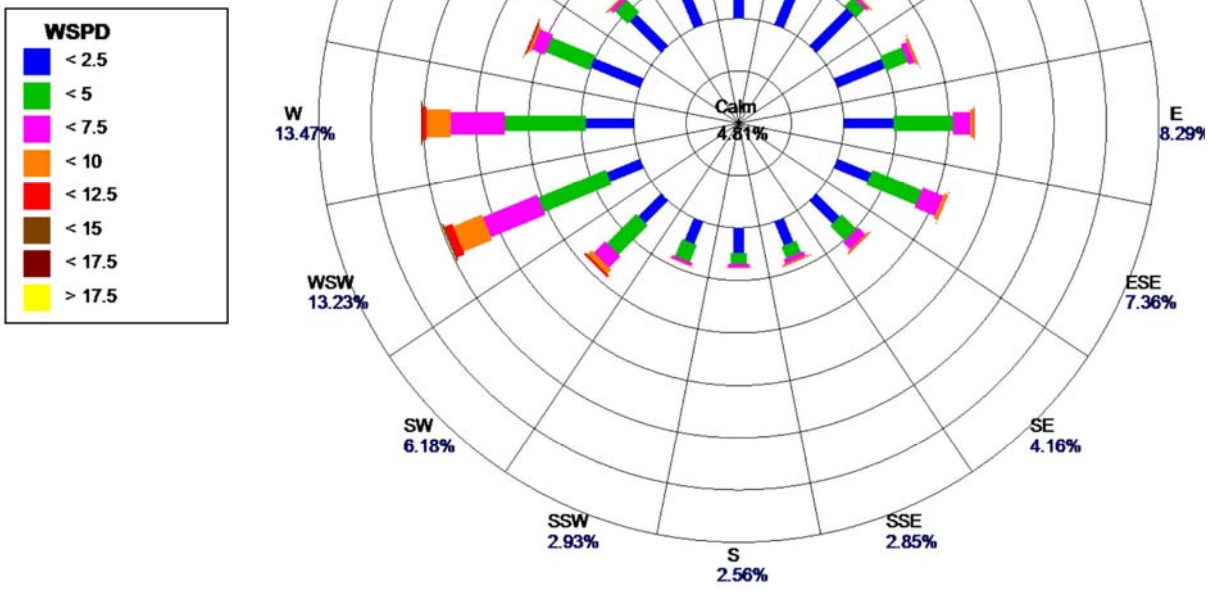
Map Disclaimer: This map is intended for general siting purposes only.

Legend

CO Receptors
Departure Link
Approach Link
Queue Link

Feet
0 75 150

Site: West Phoenix
Parameter: WSPD
Units: MPH



Period: 01/01/2018-12/31/2020

Predicted Worst-Case One-Hour CO Concentrations (ppm) 67th Avenue & Happy Valley Road					
Receptor ID	Existing Year (2018)	Opening Year (2025) Worst-Case Scenario	Receptor ID	Existing Year (2018)	Opening Year (2025) Worst-Case Scenario
R1	5.0	4.7	R2	4.9	4.7
R3	4.9	4.7	R4	4.9	4.7
R5	4.9	4.7	R6	5.0	4.8
R7	5.0	4.9	R8	5.1	4.9
R9	4.9	4.9	R10	4.9	4.9
R11	4.9	4.9	R12	4.9	4.9
R13	4.9	4.9	R14	4.9	4.9
R15	5.0	4.9	R16	5.0	4.9
R17	5.1	4.9	R18	5.0	4.8
R19	5.0	4.7	R20	4.9	4.7
R21	4.9	4.7	R22	4.9	4.7
R23	4.8	4.7	R24	4.8	4.7
R25	4.8	4.7	R26	4.9	4.8
R27	4.9	4.8	R28	5.1	5.0
R29	5.0	5.0	R30	5.0	4.9
R31	4.9	5.0	R32	4.9	5.0
R33	4.8	5.0	R34	4.9	4.9
R35	5.0	4.9	R36	5.0	4.9
R37	4.9	4.8	R38	5.0	4.9
R39	5.0	4.9	R40	5.1	4.8
R41	5.0	4.7	R42	5.0	4.7
R43	4.9	4.7	R44	4.9	4.7
1-hour CO standard	35	35	1-hour CO standard	35	35

Concentrations = modeled results + 1-hour CO background

1-hour CO background = 4.7 ppm

Abbreviations: CO = carbon monoxide; ppm = parts per million

Predicted Worst-Case Eight-Hour CO Concentrations (ppm) 67th Avenue & Happy Valley Road					
Receptor ID	Existing Year (2018)	Opening Year (2025) Worst-Case Scenario	Receptor ID	Existing Year (2018)	Opening Year (2025) Worst-Case Scenario
R1	3.5	3.3	R2	3.4	3.3
R3	3.4	3.3	R4	3.4	3.3
R5	3.4	3.3	R6	3.5	3.4
R7	3.5	3.4	R8	3.6	3.4
R9	3.4	3.4	R10	3.4	3.4
R11	3.4	3.4	R12	3.4	3.4
R13	3.4	3.4	R14	3.4	3.4
R15	3.5	3.4	R16	3.5	3.4
R17	3.6	3.4	R18	3.5	3.4
R19	3.5	3.3	R20	3.4	3.3
R21	3.4	3.3	R22	3.4	3.3
R23	3.4	3.3	R24	3.4	3.3
R25	3.4	3.3	R26	3.4	3.4
R27	3.4	3.4	R28	3.6	3.5
R29	3.5	3.5	R30	3.5	3.4
R31	3.4	3.5	R32	3.4	3.5
R33	3.4	3.5	R34	3.4	3.4
R35	3.5	3.4	R36	3.5	3.4
R37	3.4	3.4	R38	3.5	3.4
R39	3.5	3.4	R40	3.6	3.4
R41	3.5	3.3	R42	3.5	3.3
R43	3.4	3.3	R44	3.4	3.3
8-hour CO standard	9	9	8-hour CO standard	9	9

Concentrations = (modeled results x persistence factor [0.7]) + 8-hour CO background

8-hour CO background = 3.3 ppm

Abbreviations: CO = carbon monoxide; ppm = parts per million

Appendix C

CO CAL3QHC AND MOVES MODELING FILES

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```

JOB: HappyValleyRd&67th_Exist2018 RUN: Exist2018_67thAve_AM

DATE : 6/16/22
TIME : 8:51:32

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (FT)				*	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
	*	X1	Y1	X2	Y2	*									
1. 1- NB Approach	*	613013.8	986440.4	613013.8	986940.7	*	500.	360.	AG	925.	2.6	0.0	44.0		
2. 5 - NB Departure	*	613013.8	986940.7	613010.4	987450.2	*	509.	360.	AG	617.	2.6	0.0	44.0		
3. 6 - SB Approach	*	612974.7	987449.9	612974.7	986947.5	*	502.	180.	AG	1486.	2.6	0.0	44.0		
4. 9 - SB Departure	*	612974.7	986947.5	612974.7	986449.0	*	498.	180.	AG	1386.	2.6	0.0	44.0		
5. 10 - WB Approach	*	613484.2	986974.0	612985.7	986974.0	*	498.	270.	AG	906.	2.4	0.0	56.0		
6. 14 - WB Departure	*	612985.7	986974.0	612487.2	986974.0	*	499.	270.	AG	957.	2.4	0.0	56.0		
7. 15 - EB Approach	*	612486.5	986911.4	612985.0	986911.4	*	498.	90.	AG	1429.	2.4	0.0	56.0		
8. 19 - EB Departure	*	612985.0	986911.4	613483.5	986911.4	*	498.	90.	AG	2086.	2.4	0.0	56.0		
9. 2- NB Approach Queue	*	613013.8	986858.2	613013.8	986745.8	*	112.	180.	AG	34.	100.0	0.0	24.0	0.46	5.7
10. 3 - NB LT Queue	*	612991.2	986858.2	612994.6	986650.3	*	208.	179.	AG	19.	100.0	0.0	12.0	0.93	10.6
11. 4 - NB RT Queue	*	613030.8	986858.8	613030.8	986710.2	*	149.	180.	AG	17.	100.0	0.0	12.0	0.67	7.5
12. 7 - SB Approach Queu	*	612974.7	987016.0	612974.7	988855.8	*	1840.	360.	AG	34.	100.0	0.0	24.0	1.47	93.5
13. 8- SB LT Queue	*	612994.6	987019.2	612994.6	987210.7	*	192.	360.	AG	38.	100.0	0.0	24.0	0.91	9.7
14. 11 - WB Approach Que	*	613064.7	986974.0	613158.5	986974.0	*	94.	89.	AG	53.	100.0	0.0	36.0	0.43	4.8
15. 12 - WB LT Queue	*	613065.4	986945.8	613201.5	986945.8	*	136.	89.	AG	41.	100.0	0.0	24.0	0.93	6.9
16. 13 - WB RT Queue	*	613064.0	986999.7	613134.4	986999.7	*	70.	90.	AG	18.	100.0	0.0	12.0	0.34	3.6
17. 16 - EB Approach Que	*	612930.6	986911.4	612715.4	986911.4	*	215.	270.	AG	53.	100.0	0.0	36.0	0.91	10.9
18. 17 - EB LT Queue	*	612930.8	986947.4	612850.3	986947.2	*	80.	269.	AG	21.	100.0	0.0	12.0	0.65	4.1
19. 18 - EB RT Queue	*	612931.1	986887.7	612708.4	986887.7	*	223.	269.	AG	18.	100.0	0.0	12.0	0.93	11.3

JOB: HappyValleyRd&67th_Exist2018 RUN: Exist2018_67thAve_AM

DATE : 6/16/22
TIME : 8:51:32

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
9. 2- NB Approach Queue	*	150	107	6.0	385	1777	9.01	2	3
10. 3 - NB LT Queue	*	150	117	5.0	286	1781	9.01	2	3
11. 4 - NB RT Queue	*	150	107	5.0	254	1585	9.01	2	3
12. 7 - SB Approach Queu	*	150	107	6.0	943	1379	9.01	2	3
13. 8- SB LT Queue	*	150	117	5.0	543	1728	9.01	2	3
14. 11 - WB Approach Que	*	150	110	6.0	469	1702	9.01	2	3
15. 12 - WB LT Queue	*	150	128	5.0	320	1728	9.01	2	3
16. 13 - WB RT Queue	*	150	110	5.0	117	1585	9.01	2	3
17. 16 - EB Approach Que	*	150	110	6.0	989	1702	9.01	2	3
18. 17 - EB LT Queue	*	150	128	5.0	115	1781	9.01	2	3
19. 18 - EB RT Queue	*	150	110	5.0	325	1585	9.01	2	3

RECEPTOR LOCATIONS

RECEPTOR	X	Y	Z
1. R1	613053.2	987457.7	5.9
2. R2	613054.6	987376.0	5.9
3. R3	613059.6	987293.9	5.9
4. R4	613059.6	987211.9	5.9
5. R5	613059.6	987129.9	5.9
6. R6	613059.6	987047.9	5.9
7. R7	613139.2	987028.2	5.9
8. R8	613221.1	987028.5	5.9
9. R9	613303.1	987027.7	5.9
10. R10	613385.1	987026.5	5.9
11. R11	613467.1	987025.5	5.9
12. R12	613474.2	986866.5	5.9
13. R13	613392.1	986868.5	5.9
14. R14	613310.2	986870.7	5.9
15. R15	613228.2	986870.5	5.9
16. R16	613146.2	986868.2	5.9
17. R17	613065.0	986856.9	5.9
18. R18	613055.1	986775.5	5.9
19. R19	613055.2	986692.0	5.9
20. R20	613059.9	986611.4	5.9
21. R21	613058.6	986528.1	5.9
22. R22	613057.4	986446.0	5.9
23. R23	612925.9	986466.2	5.9
24. R24	612925.7	986548.3	5.9
25. R25	612925.6	986630.2	5.9
26. R26	612930.5	986712.2	5.9
27. R27	612930.5	986794.2	5.9
28. R28	612908.4	986873.2	5.9
29. R29	612826.5	986867.9	5.9
30. R30	612744.5	986867.9	5.9
31. R31	612662.5	986867.9	5.9
32. R32	612580.5	986867.9	5.9
33. R33	612498.5	986867.9	5.9
34. R34	612520.8	987028.0	5.9

RECEPTOR LOCATIONS

RECEPTOR	X	Y	Z
35. R35	612602.8	987028.0	5.9
36. R36	612684.8	987028.0	5.9
37. R37	612766.8	987028.0	5.9
38. R38	612848.7	987028.0	5.9
39. R39	612930.8	987028.0	5.9
40. R40	612930.8	987110.0	5.9
41. R41	612930.8	987191.9	5.9
42. R42	612930.8	987273.9	5.9
43. R43	612930.8	987356.0	5.9
44. R44	612930.8	987438.0	5.9

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19

REC20

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------*-------------------------------------------------------------------------------------------------------------
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   0.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.2   0.1   0.1   0.0
 0.0
  10.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.2   0.1   0.1   0.0
 0.0
  20.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.2   0.1   0.0
 0.0
  30.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.2   0.1   0.0
 0.0
  40.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.2   0.1   0.0
 0.0
  50.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.2   0.2   0.2   0.1   0.1   0.0
 0.0
  60.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.2   0.2   0.2   0.1   0.1   0.0
 0.0
  70.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.2   0.2   0.2   0.1   0.0   0.0
 0.0
  80.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.0   0.0
 0.0
  90.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.0   0.0
 0.0
 100.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 110.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.2   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 120.  *   0.0   0.0   0.0   0.0   0.0   0.1   0.2   0.2   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 130.  *   0.0   0.0   0.0   0.0   0.0   0.2   0.2   0.2   0.2   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 140.  *   0.0   0.0   0.0   0.0   0.0   0.2   0.2   0.2   0.2   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 150.  *   0.0   0.0   0.0   0.0   0.0   0.2   0.2   0.2   0.2   0.2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 160.  *   0.0   0.0   0.0   0.0   0.0   0.2   0.2   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 170.  *   0.0   0.0   0.0   0.0   0.0   0.2   0.3   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 180.  *   0.0   0.0   0.0   0.0   0.0   0.1   0.3   0.1   0.2   0.2   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 190.  *   0.1   0.0   0.0   0.0   0.0   0.3   0.3   0.1   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1
 0.0
 200.  *   0.3   0.2   0.1   0.0   0.0   0.1   0.3   0.1   0.2   0.2   0.2   0.0   0.0   0.0   0.0   0.0   0.2   0.2   0.1
 0.1
 210.  *   0.2   0.2   0.1   0.2   0.1   0.1   0.3   0.2   0.2   0.2   0.2   0.0   0.0   0.0   0.0   0.0   0.3   0.2   0.2
 0.1
 220.  *   0.2   0.2   0.1   0.2   0.2   0.0   0.3   0.3   0.2   0.2   0.2   0.0   0.0   0.0   0.0   0.0   0.3   0.2   0.2
 0.2
 230.  *   0.2   0.1   0.1   0.2   0.2   0.1   0.2   0.4   0.2   0.2   0.2   0.0   0.0   0.0   0.0   0.0   0.3   0.2   0.2
 0.2
 240.  *   0.1   0.1   0.1   0.2   0.2   0.1   0.1   0.3   0.2   0.2   0.2   0.0   0.0   0.0   0.0   0.0   0.3   0.2   0.2
 0.2
 250.  *   0.1   0.1   0.1   0.1   0.2   0.1   0.0   0.2   0.1   0.2   0.2   0.0   0.0   0.0   0.0   0.0   0.3   0.3   0.2
 0.2
 260.  *   0.0   0.1   0.1   0.1   0.2   0.1   0.0   0.0   0.0   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.2   0.3   0.2
 0.2
 270.  *   0.0   0.1   0.1   0.1   0.2   0.2   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.0   0.3   0.3   0.2
 0.2
 280.  *   0.0   0.1   0.1   0.1   0.2   0.2   0.0   0.0   0.0   0.0   0.0   0.2   0.2   0.2   0.1   0.2   0.4   0.3   0.2
 0.2
 290.  *   0.0   0.1   0.1   0.1   0.2   0.2   0.0   0.0   0.0   0.0   0.0   0.2   0.2   0.2   0.2   0.1   0.4   0.3   0.2
 0.2
 300.  *   0.0   0.1   0.1   0.1   0.2   0.2   0.0   0.0   0.0   0.0   0.0   0.2   0.2   0.2   0.2   0.2   0.3   0.3   0.2
 0.2
 310.  *   0.1   0.0   0.1   0.1   0.2   0.2   0.0   0.0   0.0   0.0   0.0   0.2   0.2   0.2   0.3   0.2   0.2   0.3   0.2
 0.2
 320.  *   0.1   0.1   0.2   0.2   0.2   0.3   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.2   0.1   0.1   0.3   0.2
 0.2
 330.  *   0.1   0.1   0.1   0.2   0.2   0.3   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.3   0.2   0.2   0.3
 0.2
 340.  *   0.1   0.1   0.1   0.1   0.2   0.2   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.3   0.2   0.1   0.2
 0.2
 350.  *   0.1   0.1   0.1   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.3   0.3   0.2   0.1
 0.1
 360.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.2   0.1   0.1   0.0
```

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
0.	*	0.0	0.0	0.1	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.2
10.	*	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.4	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.2
20.	*	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.2
30.	*	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.3	0.2
40.	*	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.3	0.2
50.	*	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.3	0.3
60.	*	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.3	0.3
70.	*	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.3	0.3
80.	*	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.3	0.3
90.	*	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.3
100.	*	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.2	0.3
110.	*	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.3	0.3
120.	*	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.2	0.1	0.2	0.2	0.3
130.	*	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.3	0.1	0.1	0.2	0.4
140.	*	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.1	0.2	0.2
150.	*	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.1	0.2
160.	*	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.1	0.1
170.	*	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.2
180.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.0
190.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.1	0.0
200.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.0
210.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.0
220.	*	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.3	0.3	0.0
230.	*	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.3	0.0

240.	*	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2
0.0																				
250.	*	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
0.0																				
260.	*	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
0.0																				
270.	*	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0																				
280.	*	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0																				
290.	*	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0																				
300.	*	0.2	0.2	0.0	0.0	0.0	0.0	0.1	0.4	0.3	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0																				
310.	*	0.2	0.2	0.0	0.0	0.0	0.0	0.2	0.4	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0																				
320.	*	0.2	0.2	0.0	0.0	0.0	0.0	0.1	0.3	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0																				
330.	*	0.2	0.2	0.0	0.0	0.0	0.0	0.1	0.3	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0																				
340.	*	0.2	0.2	0.0	0.0	0.0	0.0	0.1	0.3	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0																				
350.	*	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
0.0																				
360.	*	0.0	0.0	0.1	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2
0.2																				
------	*	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------
----																				
MAX	*	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.4	0.3	0.3	0.2	0.2	0.1	0.2	0.3	0.3	0.2	0.3	0.3
0.4																				
DEGR.	*	240	290	0	10	10	50	0	10	60	50	50	70	0	120	120	130	110	220	30
130																				

JOB: HappyValleyRd&67th_Exist2018 RUN: Exist2018_67thAve_AM

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC41	REC42	REC43	REC44
0.	*	0.1	0.1	0.1	0.1
10.	*	0.2	0.2	0.1	0.1
20.	*	0.2	0.2	0.2	0.1
30.	*	0.2	0.2	0.2	0.1
40.	*	0.2	0.2	0.2	0.1
50.	*	0.2	0.2	0.2	0.1
60.	*	0.2	0.2	0.2	0.1
70.	*	0.2	0.2	0.2	0.1
80.	*	0.2	0.2	0.2	0.2
90.	*	0.3	0.2	0.2	0.2
100.	*	0.3	0.2	0.2	0.2
110.	*	0.3	0.2	0.2	0.2
120.	*	0.3	0.2	0.2	0.2
130.	*	0.3	0.2	0.2	0.2
140.	*	0.3	0.2	0.2	0.2
150.	*	0.3	0.3	0.2	0.2
160.	*	0.2	0.3	0.2	0.2
170.	*	0.1	0.2	0.2	0.2
180.	*	0.0	0.1	0.1	0.1
190.	*	0.0	0.0	0.0	0.0
200.	*	0.0	0.0	0.0	0.0
210.	*	0.0	0.0	0.0	0.0
220.	*	0.0	0.0	0.0	0.0
230.	*	0.0	0.0	0.0	0.0
240.	*	0.0	0.0	0.0	0.0
250.	*	0.0	0.0	0.0	0.0

260.	*	0.0	0.0	0.0	0.0
270.	*	0.0	0.0	0.0	0.0
280.	*	0.0	0.0	0.0	0.0
290.	*	0.0	0.0	0.0	0.0
300.	*	0.0	0.0	0.0	0.0
310.	*	0.0	0.0	0.0	0.0
320.	*	0.0	0.0	0.0	0.0
330.	*	0.0	0.0	0.0	0.0
340.	*	0.0	0.0	0.0	0.0
350.	*	0.0	0.0	0.0	0.0
360.	*	0.1	0.1	0.1	0.1
MAX	*	0.3	0.3	0.2	0.2
DEGR.	*	90	150	20	80

THE HIGHEST CONCENTRATION OF 0.40 PPM OCCURRED AT RECEPTOR REC28.

JOB: HappyValleyRd&67th_Exist2018 RUN: Exist2018_67thAve_AM

DATE : 6/16/22
TIME : 8:51:32

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

		CO/LINK (PPM)																	
		ANGLE (DEGREES)																	
	*	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
LINK #	*	200	200	320	210	220	190	170	230	130	150	200	280	280	50	310	330	280	250	330	220
1	*	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
2	*	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	*	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	*	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
5	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
8	*	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.0
9	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0
10	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	*	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	*	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	*	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
15	*	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
16	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
18	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

JOB: HappyValleyRd&67th_Exist2018 RUN: Exist2018_67thAve_AM

DATE : 6/16/22

TIME : 8:51:32

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

LINK #	*	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
	*	240	290	0	10	10	50	0	10	60	50	50	70	0	120	120	130	110	220	30	130
1	*	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	*	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
4	*	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0
7	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0
8	*	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
9	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	*	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
13	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
14	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0
18	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DATE : 6/16/22
TIME : 8:51:32

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

LINK #	*	REC41	REC42	REC43	REC44
	*	90	150	20	80
1	*	0.0	0.0	0.0	0.0
2	*	0.0	0.0	0.0	0.0
3	*	0.1	0.1	0.1	0.1
4	*	0.0	0.0	0.0	0.0
5	*	0.0	0.0	0.0	0.0
6	*	0.0	0.0	0.0	0.0
7	*	0.0	0.0	0.0	0.0
8	*	0.0	0.0	0.0	0.0
9	*	0.0	0.0	0.0	0.0

```
10  *   0.0   0.0   0.0   0.0
11  *   0.0   0.0   0.0   0.0
12  *   0.1   0.1   0.1   0.1
13  *   0.1   0.1   0.0   0.0
14  *   0.0   0.0   0.0   0.0
15  *   0.0   0.0   0.0   0.0
16  *   0.0   0.0   0.0   0.0
17  *   0.0   0.0   0.0   0.0
18  *   0.0   0.0   0.0   0.0
19  *   0.0   0.0   0.0   0.0
```

JOB: HappyValleyRd&67th_WorstCase RUN: WorstCase_67thAve_AM

DATE : 8/17/22
TIME : 13:46:27

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (FT)				*	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
	*	X1	Y1	X2	Y2	*									
1. 1- NB Approach	*	613013.8	986440.4	613013.8	986940.7	*	500.	360.	AG	382.	1.9	0.0	44.0		
2. 5 - NB Departure	*	613013.8	986940.7	613010.4	987450.2	*	509.	360.	AG	780.	1.9	0.0	44.0		
3. 6 - SB Approach	*	612974.7	987449.9	612974.7	986947.5	*	502.	180.	AG	711.	1.9	0.0	56.0		
4. 9 - SB Departure	*	612974.7	986947.5	612974.7	986449.0	*	498.	180.	AG	149.	1.9	0.0	56.0		
5. 10 - WB Approach	*	613484.2	986974.0	612985.7	986974.0	*	498.	270.	AG	1140.	1.7	0.0	56.0		
6. 14 - WB Departure	*	612985.7	986974.0	612487.2	986974.0	*	499.	270.	AG	1036.	1.7	0.0	56.0		
7. 15 - EB Approach	*	612486.5	986911.4	612985.0	986911.4	*	498.	90.	AG	2546.	1.7	0.0	56.0		
8. 19 - EB Departure	*	612985.0	986911.4	613483.5	986911.4	*	498.	90.	AG	2814.	1.7	0.0	56.0		
9. 2- NB Approach Queue	*	613013.8	986858.2	613013.8	986814.3	*	44.	180.	AG	13.	100.0	0.0	24.0	0.18	2.2
10. 3 - NB LT Queue	*	612991.2	986858.2	612991.3	986848.7	*	9.	179.	AG	15.	100.0	0.0	24.0	0.06	0.5
11. 4 - NB RT Queue	*	613030.8	986858.8	613030.8	986763.8	*	95.	180.	AG	5.	100.0	0.0	12.0	0.34	4.8
12. 7 - SB Approach Queu	*	612974.7	987016.0	612974.7	987082.7	*	67.	360.	AG	19.	100.0	0.0	36.0	0.26	3.4
13. 8- SB LT Queue	*	612994.6	987019.2	612994.6	987129.2	*	110.	360.	AG	15.	100.0	0.0	24.0	0.58	5.6
14. 11 - WB Approach Que	*	613064.7	986974.0	613179.5	986974.0	*	115.	90.	AG	16.	100.0	0.0	36.0	0.38	5.8
15. 12 - WB LT Queue	*	613065.4	986945.8	613075.9	986945.8	*	11.	86.	AG	16.	100.0	0.0	24.0	0.09	0.5
16. 13 - WB RT Queue	*	613064.0	986999.7	613164.4	986999.7	*	100.	89.	AG	3.	100.0	0.0	12.0	0.37	5.1
17. 16 - EB Approach Que	*	612930.6	986911.4	608707.3	986911.4	*	4223.	270.	AG	20.	100.0	0.0	36.0	1.96	214.5
18. 17 - EB LT Queue	*	612930.8	986947.4	611490.1	986944.1	*	1441.	270.	AG	17.	100.0	0.0	24.0	****	73.2
19. 18 - EB RT Queue	*	612931.1	986887.7	612927.1	986887.7	*	4.	270.	AG	5.	100.0	0.0	12.0	0.01	0.2

JOB: HappyValleyRd&67th_WorstCase RUN: WorstCase_67thAve_AM

DATE : 8/17/22
TIME : 13:46:27

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
9. 2- NB Approach Queue	*	150	107	6.0	151	1777	3.48	2	3
10. 3 - NB LT Queue	*	150	124	5.0	29	1728	3.48	2	3
11. 4 - NB RT Queue	*	150	86	5.0	202	1585	3.48	2	3
12. 7 - SB Approach Queu	*	150	100	6.0	367	1702	3.48	2	3
13. 8- SB LT Queue	*	150	117	5.0	344	1728	3.48	2	3
14. 11 - WB Approach Que	*	150	84	6.0	750	1702	3.48	2	3
15. 12 - WB LT Queue	*	150	129	5.0	30	1728	3.48	2	3
16. 13 - WB RT Queue	*	150	51	5.0	360	1585	3.48	2	3
17. 16 - EB Approach Que	*	150	108	6.0	2268	1702	3.48	2	3
18. 17 - EB LT Queue	*	150	140	5.0	269	681	3.48	2	3
19. 18 - EB RT Queue	*	150	82	5.0	9	1585	3.48	2	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. R1	613053.2	987457.7	5.9
2. R2	613054.6	987376.0	5.9
3. R3	613059.6	987293.9	5.9
4. R4	613059.6	987211.9	5.9
5. R5	613059.6	987129.9	5.9
6. R6	613059.6	987047.9	5.9
7. R7	613139.2	987028.2	5.9
8. R8	613221.1	987028.5	5.9
9. R9	613303.1	987027.7	5.9
10. R10	613385.1	987026.5	5.9
11. R11	613467.1	987025.5	5.9
12. R12	613474.2	986866.5	5.9
13. R13	613392.1	986868.5	5.9
14. R14	613310.2	986870.7	5.9
15. R15	613228.2	986870.5	5.9
16. R16	613146.2	986868.2	5.9
17. R17	613065.0	986856.9	5.9
18. R18	613055.1	986775.5	5.9
19. R19	613055.2	986692.0	5.9
20. R20	613059.9	986611.4	5.9
21. R21	613058.6	986528.1	5.9
22. R22	613057.4	986446.0	5.9
23. R23	612925.9	986466.2	5.9
24. R24	612925.7	986548.3	5.9
25. R25	612925.6	986630.2	5.9
26. R26	612930.5	986712.2	5.9
27. R27	612930.5	986794.2	5.9
28. R28	612908.4	986873.2	5.9
29. R29	612826.5	986867.9	5.9
30. R30	612744.5	986867.9	5.9
31. R31	612662.5	986867.9	5.9
32. R32	612580.5	986867.9	5.9
33. R33	612498.5	986867.9	5.9
34. R34	612520.8	987028.0	5.9

DATE : 8/17/22
TIME : 13:46:27

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
35. R35	612602.8	987028.0	5.9
36. R36	612684.8	987028.0	5.9
37. R37	612766.8	987028.0	5.9
38. R38	612848.7	987028.0	5.9
39. R39	612930.8	987028.0	5.9
40. R40	612930.8	987110.0	5.9
41. R41	612930.8	987191.9	5.9
42. R42	612930.8	987273.9	5.9
43. R43	612930.8	987356.0	5.9
44. R44	612930.8	987438.0	5.9

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19

REC20

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------*-------------------------------------------------------------------------------------------------------------
----
   0.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.0
 0.0
  10.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.0
 0.0
  20.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.1   0.0
 0.0
  30.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.1   0.0
 0.0
  40.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.1   0.0
 0.0
  50.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.2   0.2   0.2   0.1   0.1   0.0
 0.0
  60.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.2   0.2   0.2   0.1   0.1   0.0
 0.0
  70.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.2   0.2   0.2   0.1   0.0   0.0
 0.0
  80.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.0   0.0
 0.0
  90.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.0   0.0
 0.0
 100.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 110.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 120.  *   0.0   0.0   0.0   0.0   0.0   0.1   0.2   0.2   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 130.  *   0.0   0.0   0.0   0.0   0.0   0.1   0.2   0.2   0.2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 140.  *   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 150.  *   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 160.  *   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 170.  *   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 180.  *   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 190.  *   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 200.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 210.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 220.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 230.  *   0.0   0.0   0.0   0.0   0.0   0.1   0.0   0.2   0.2   0.2   0.2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 240.  *   0.0   0.0   0.0   0.0   0.0   0.1   0.0   0.2   0.2   0.2   0.2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 250.  *   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.0   0.1   0.2   0.2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 260.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 270.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.1   0.0   0.0
 0.0
 280.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.2   0.2   0.2   0.2   0.2   0.1   0.0   0.0
 0.0
 290.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.2   0.2   0.2   0.2   0.1   0.1   0.1   0.0
 0.0
 300.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.2   0.2   0.2   0.2   0.1   0.2   0.1   0.0
 0.0
 310.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.2   0.2   0.2   0.1   0.1   0.1   0.0
 0.0
 320.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.1   0.0   0.0
 0.0
 330.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.1   0.0   0.0
 0.0
 340.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.1   0.0   0.0
 0.0
 350.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.0
 0.0
 360.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.0
```

0.0

------*--

MAX * 0.0 0.0 0.0 0.0 0.0 0.1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.1 0.0
0.0
DEGR. * 0 0 0 0 0 120 110 120 130 230 220 280 280 50 50 50 300 0 0
0

JOB: HappyValleyRd&67th_WorstCase RUN: WorstCase_67thAve_AM

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND * CONCENTRATION
ANGLE * (PPM)
(DEGR)* REC21 REC22 REC23 REC24 REC25 REC26 REC27 REC28 REC29 REC30 REC31 REC32 REC33 REC34 REC35 REC36 REC37 REC38 REC39
REC40

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----
0. * 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.0 0.0 0.0 0.0 0.0 0.0
0.0
10. * 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.0 0.0 0.0 0.0 0.0 0.0
0.0
20. * 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.1 0.1 0.1 0.1 0.1 0.0 0.0 0.0 0.0 0.0 0.0
0.0
30. * 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.1 0.1 0.1 0.1 0.1 0.0 0.0 0.0 0.0 0.0 0.0
0.0
40. * 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.1 0.1 0.1 0.2 0.2 0.2 0.0 0.0 0.0 0.0 0.0 0.0
0.0
50. * 0.0 0.0 0.0 0.0 0.0 0.1 0.1 0.1 0.1 0.2 0.2 0.2 0.2 0.0 0.0 0.0 0.0 0.0 0.0
0.0
60. * 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.2 0.1 0.2 0.2 0.2 0.3 0.0 0.0 0.0 0.0 0.0 0.0
0.0
70. * 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.2 0.2 0.1 0.3 0.3 0.3 0.0 0.0 0.0 0.0 0.0 0.0
0.0
80. * 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.2 0.2 0.2 0.1 0.1 0.2 0.0 0.0 0.0 0.0 0.0 0.0
0.0
90. * 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.1 0.2 0.1 0.1 0.1 0.0 0.0 0.0 0.0 0.0 0.0
0.0
100. * 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
0.0
110. * 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.2 0.2 0.0 0.1 0.1 0.2
0.0
120. * 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.2 0.2 0.2 0.0 0.1 0.1
0.0
130. * 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.1 0.1 0.1 0.0 0.1
0.1
140. * 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.1 0.1 0.1 0.1 0.1
0.0
150. * 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.1 0.1 0.1 0.1 0.0
0.0
160. * 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.1 0.1 0.1 0.1 0.0
0.0
170. * 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.1 0.1 0.1 0.1 0.1
0.0
180. * 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.1 0.1 0.1 0.1 0.1
0.0
190. * 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.1 0.1 0.1 0.1
0.0
200. * 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.1 0.1 0.1 0.1
0.0
210. * 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.1 0.1 0.1 0.1
0.0
220. * 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.1 0.1 0.1
0.0
230. * 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.1 0.1 0.1
0.0

```
 240.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.2   0.2
 0.0
 250.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.2
 0.0
 260.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 270.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.2   0.2   0.2   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 280.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.3   0.2   0.2   0.2   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 290.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.3   0.3   0.2   0.2   0.2   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 300.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.3   0.2   0.2   0.2   0.2   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 310.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.2   0.2   0.2   0.2   0.2   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 320.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.2   0.1   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 330.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.2   0.1   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 340.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.2   0.1   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 350.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0
 360.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 0.0

------*-------------------------------------------------------------------------------------------------------------------------
----
 MAX   *   0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.3   0.3   0.2   0.3   0.3   0.3   0.2   0.2   0.2   0.1   0.2   0.2   0.2
 0.1
 DEGR. *    0     0     0     0     0    50     0   280   290    50    70    70    60   110   110   120   110   240   110
130
```


JOB: HappyValleyRd&67th_WorstCase RUN: WorstCase_67thAve_AM

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC41	REC42	REC43	REC44
0.	0.0	0.0	0.0	0.0
10.	0.0	0.0	0.0	0.0
20.	0.0	0.0	0.0	0.0
30.	0.0	0.0	0.0	0.0
40.	0.0	0.0	0.0	0.0
50.	0.0	0.0	0.0	0.0
60.	0.0	0.0	0.0	0.0
70.	0.0	0.0	0.0	0.0
80.	0.0	0.0	0.0	0.0
90.	0.0	0.0	0.0	0.0
100.	0.0	0.0	0.0	0.0
110.	0.0	0.0	0.0	0.0
120.	0.0	0.0	0.0	0.0
130.	0.0	0.0	0.0	0.0
140.	0.0	0.0	0.0	0.0
150.	0.0	0.0	0.0	0.0
160.	0.0	0.0	0.0	0.0
170.	0.0	0.0	0.0	0.0
180.	0.0	0.0	0.0	0.0
190.	0.0	0.0	0.0	0.0
200.	0.0	0.0	0.0	0.0
210.	0.0	0.0	0.0	0.0
220.	0.0	0.0	0.0	0.0
230.	0.0	0.0	0.0	0.0
240.	0.0	0.0	0.0	0.0
250.	0.0	0.0	0.0	0.0

```
 260.  *   0.0   0.0   0.0   0.0
 270.  *   0.0   0.0   0.0   0.0
 280.  *   0.0   0.0   0.0   0.0
 290.  *   0.0   0.0   0.0   0.0
 300.  *   0.0   0.0   0.0   0.0
 310.  *   0.0   0.0   0.0   0.0
 320.  *   0.0   0.0   0.0   0.0
 330.  *   0.0   0.0   0.0   0.0
 340.  *   0.0   0.0   0.0   0.0
 350.  *   0.0   0.0   0.0   0.0
 360.  *   0.0   0.0   0.0   0.0
 ------*-----------------------
 MAX   *   0.0   0.0   0.0   0.0
 DEGR. *    0     0     0     0

 THE HIGHEST CONCENTRATION OF    0.30 PPM OCCURRED AT RECEPTOR REC33.
```


JOB: HappyValleyRd&67th_WorstCase RUN: WorstCase_67thAve_AM

DATE : 8/17/22
TIME : 13:46:27

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

	* CO/LINK (PPM) / ANGLE (DEGREES)	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
LINK #	*	0	0	0	0	0	120	110	120	130	230	220	280	280	50	50	50	300	0	0	0
1	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	*	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
8	*	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.0	0.0
9	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

JOB: HappyValleyRd&67th_WorstCase RUN: WorstCase_67thAve_AM

DATE : 8/17/22

TIME : 13:46:27

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

LINK #	*	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
	*	0	0	0	0	0	50	0	280	290	50	70	70	60	110	110	120	110	240	110	130
1	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
6	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.0
7	*	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.1	0.0	0.0
8	*	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
9	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DATE : 8/17/22
TIME : 13:46:27

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

LINK #	*	REC41	REC42	REC43	REC44
	*	0	0	0	0
1	*	0.0	0.0	0.0	0.0
2	*	0.0	0.0	0.0	0.0
3	*	0.0	0.0	0.0	0.0
4	*	0.0	0.0	0.0	0.0
5	*	0.0	0.0	0.0	0.0
6	*	0.0	0.0	0.0	0.0
7	*	0.0	0.0	0.0	0.0
8	*	0.0	0.0	0.0	0.0
9	*	0.0	0.0	0.0	0.0

```
10  *   0.0   0.0   0.0   0.0
11  *   0.0   0.0   0.0   0.0
12  *   0.0   0.0   0.0   0.0
13  *   0.0   0.0   0.0   0.0
14  *   0.0   0.0   0.0   0.0
15  *   0.0   0.0   0.0   0.0
16  *   0.0   0.0   0.0   0.0
17  *   0.0   0.0   0.0   0.0
18  *   0.0   0.0   0.0   0.0
19  *   0.0   0.0   0.0   0.0
```

Appendix D – Public Involvement Documentation

Streets PHX
STREET TRANSPORTATION DEPARTMENT

HAPPY VALLEY ROAD
FROM 67TH AVENUE TO 35TH AVENUE
IMPROVEMENT PROJECT

Public Meeting #2

90% Design

Spanish Language Line

To listen in Spanish

Dial: 602-534-1000

Enter: 57271 and press #

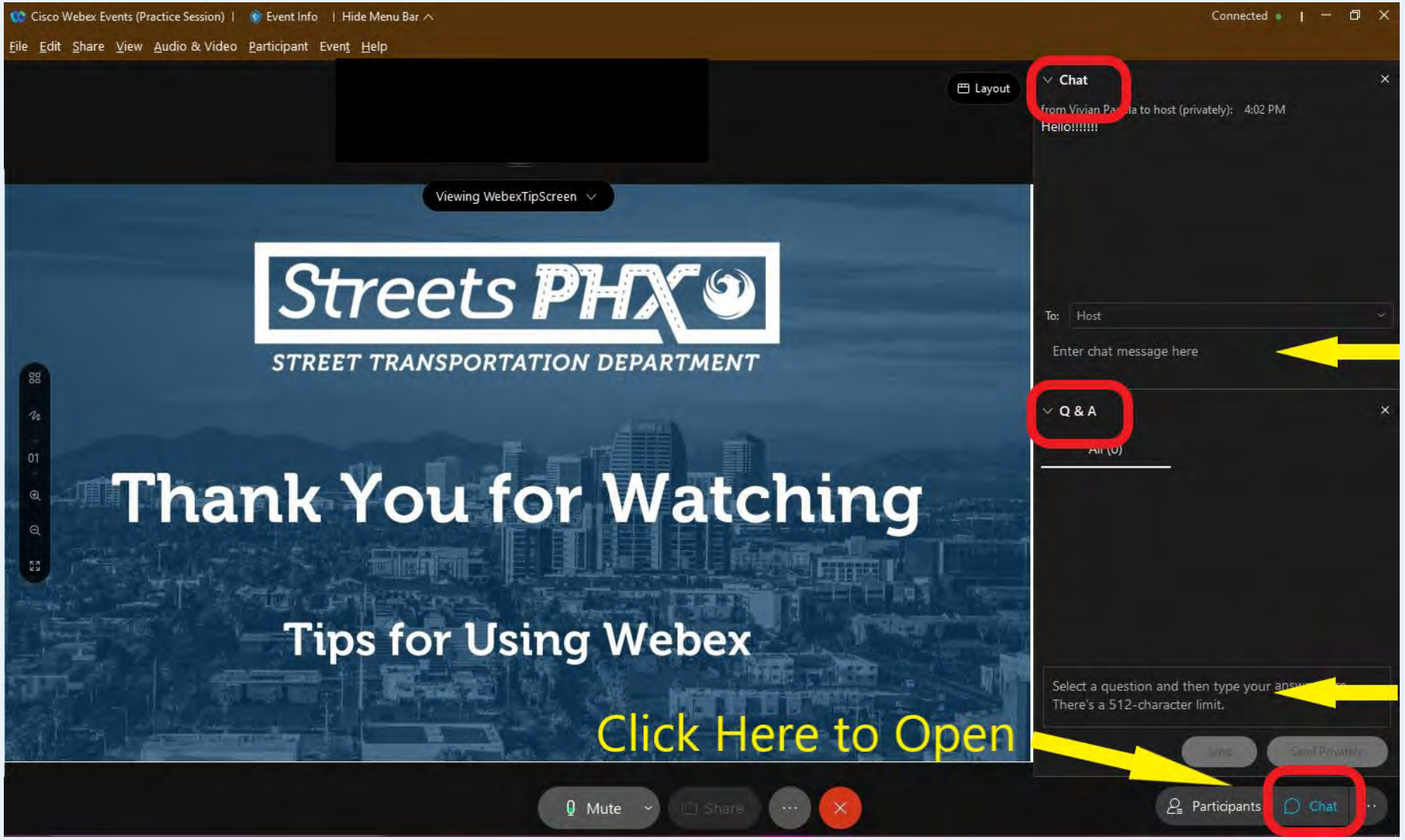
Escuchar en Español

Marque: 602-534-1000,

Luego el Número de Reunión

57271, y luego apriete el #.

Webex Tips


Cisco Webex Events (Practice Session)
Event Info
Hide Menu Bar
Connected
File Edit Share View Audio & Video Participant Event Help
Layout
Chat
Hello!!!!!!!
4:02 PM
Viewing WebexTipScreen
Streets PHX
STREET TRANSPORTATION DEPARTMENT
To: Host
Enter chat message here
Q & A
Thank You for Watching
Tips for Using Webex
There's a 512-character limit.
Click Here to Open
Mute
Share
Participants
Chat

Panel Members

- Kini Knudson, P.E. – *Street Transportation Department Director*
- Briiana Velez, P.E. – *Assistant Street Transportation Director*
- Mark Glock, P.E. – *Deputy Street Transportation Director*
- Mario Brown, P.E. – *Special Projects Administrator*
- Carl Langford, PE – *Engineering Supervisor*
- Tariq Momika, P.E. – *Project Manager*
- Todd Cencimino, P.E. – *Design Project Manager at Wilson & Company, Inc., Engineers & Architects*

Welcome

Kini Knudson, P.E.

Director, City of Phoenix

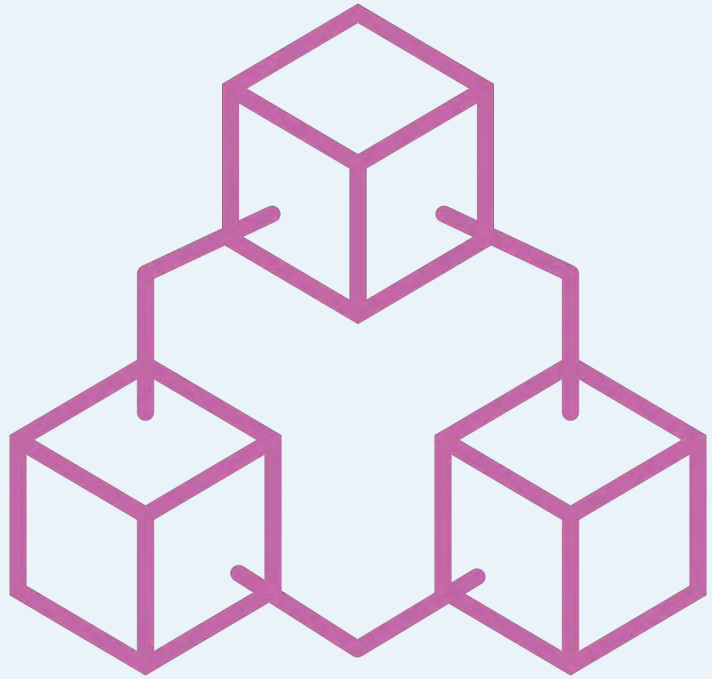
Street Transportation Department

Meeting Agenda

- Project Overview
- Project Purpose
- Project Limits
- Existing Street Conditions
- Project Studies
- Project Improvements
- Project Timeline

Project Overview

- Roadway cross section improvements
- Bike and pedestrian improvements
- Funding: Federal funds + local matching funds
- Project Assessment Report was completed in 2020
- Currently at 90% design phase



Project Purpose

- Improve traffic flow and safety
- Provide pedestrian connectivity
- Improve bicycle safety and connectivity
- Roadway cross section enhancements

Project Limits

HAPPY VALLEY ROAD : 67TH AVENUE TO 35TH AVENUE

CORRIDOR LENGTH : 4 MILES

N

Existing Street Conditions

- Inconsistent number of travel lanes (2 or 3)
- No medians to guide turning movements and protect cars making left turns
- Inconsistence and lack of dedicated bicycle lanes and buffers
- Missing sections of curb, gutters, sidewalk and trail
- Outdated curb ramps (ADA)

At 53rd Ave looking West

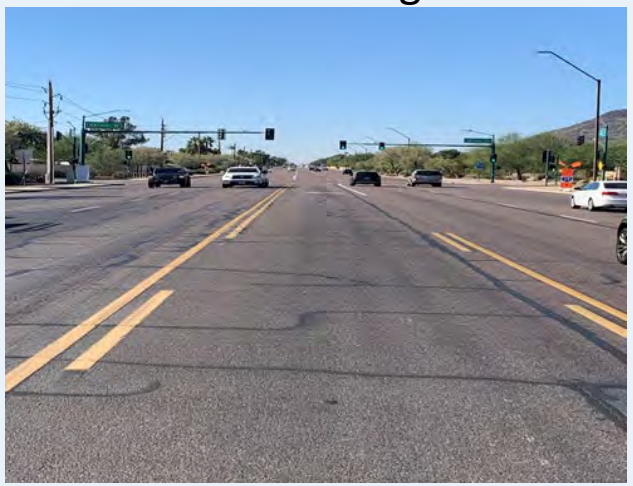
E of 51st Ave. looking East

W of 47th Ave looking west

Existing Street Conditions

- Inconsistent streetlighting throughout corridor
- Drainage issues with Ludden Mountain runoff
- Inconsistent landscaping
- Aging pavement

E of 53rd Ave. looking West



E of 49th Ave. looking West

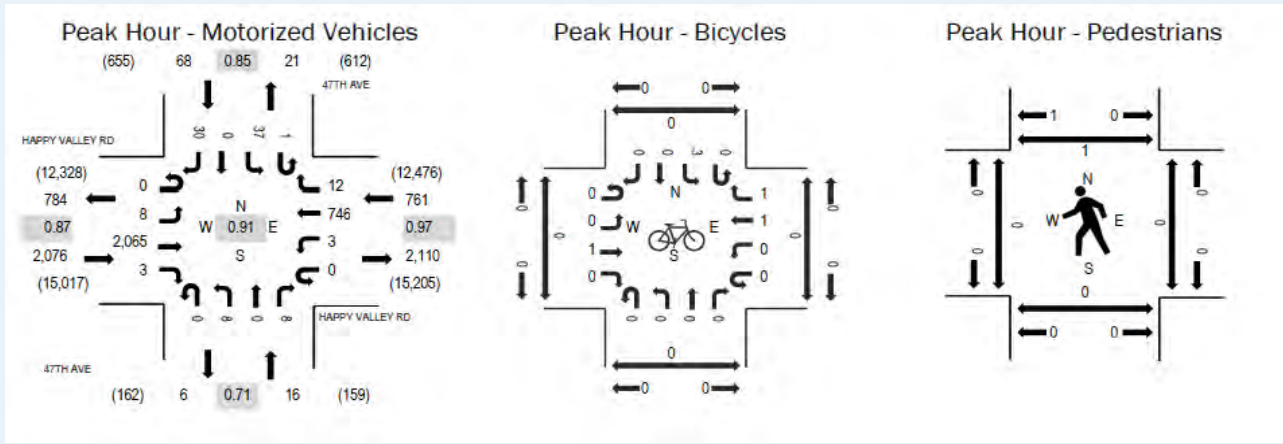
E of 59th Ave. Ludden Mountain runoff

Project Studies

- Geotechnical investigations
- Traffic memo associated with:
  - o Noise Study and Analysis
  - o Air Quality Study and Analysis
- Traffic Signal Warrant Study at:
  - o 61st Avenue/HVR
  - o 47th Avenue/HVR

Geotechnical investigation locations

Traffic Signal Study

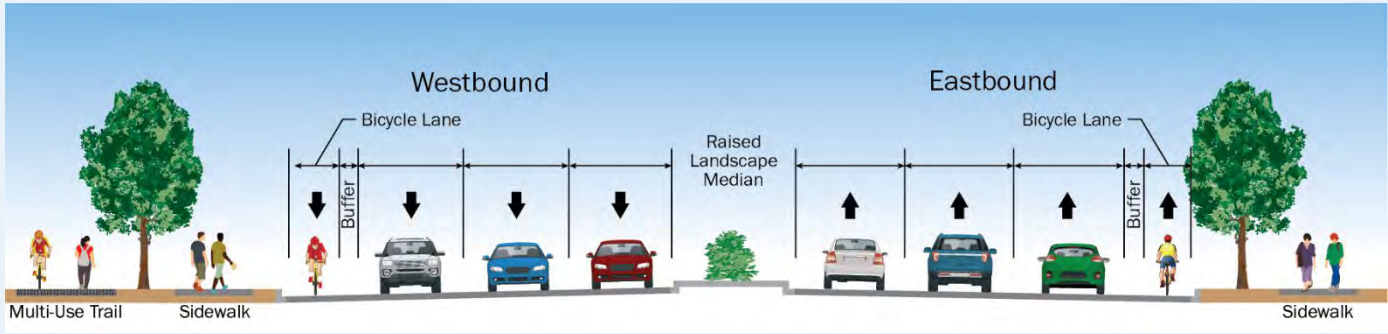


Project Improvements

Street Improvements

- Roadway consistent 3 lanes in each direction
- Adjusting lane configuration
- Widening the cross section

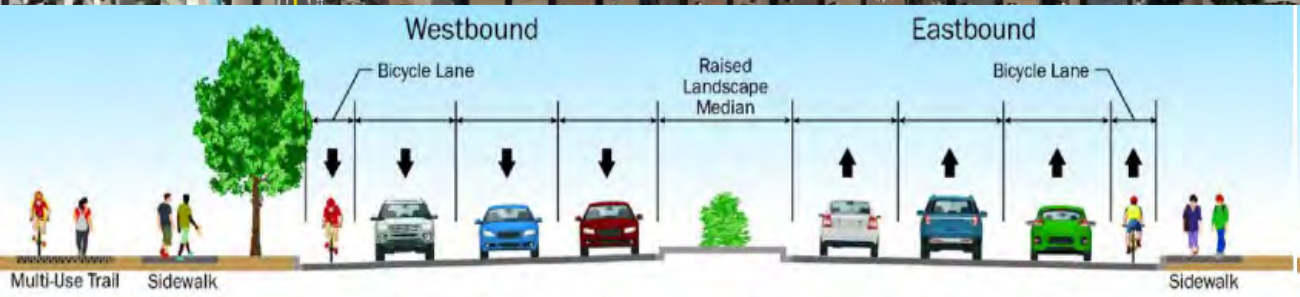
62nd Ave. to west of 55th Ave



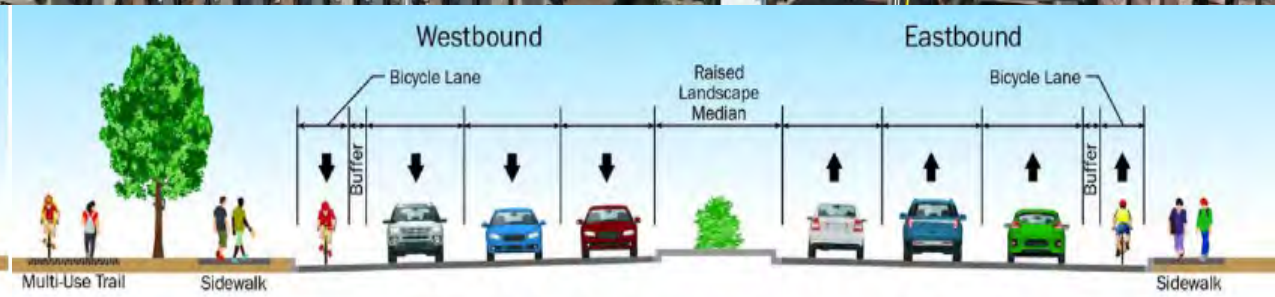
Project Improvements

Street Improvements

- Raised median islands with channelized left-turn lanes



Section: 45th Ave. to 41st Ave.



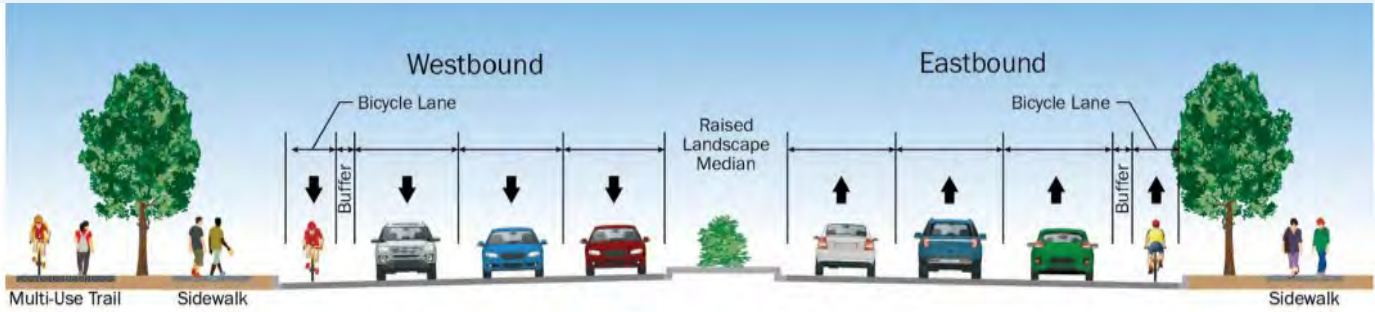
Section: 41st Ave. to 39th Dr.

Project Improvements

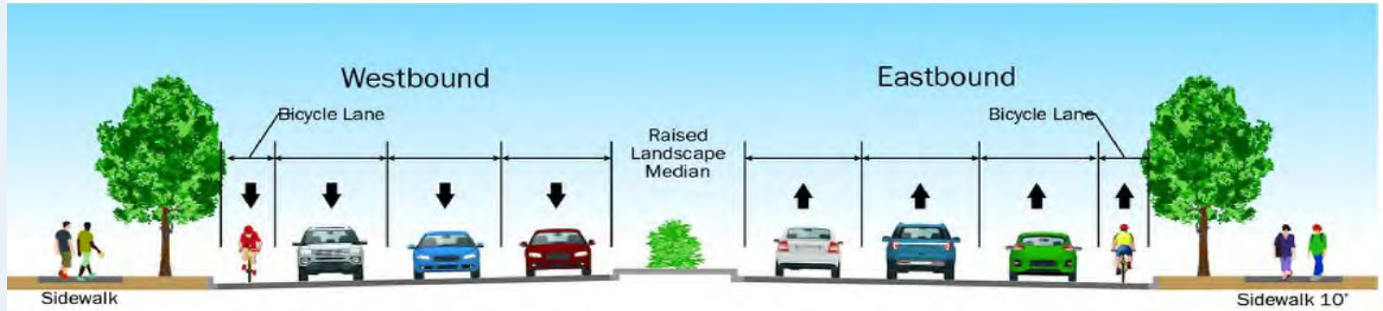
Streets PHX
STREET TRANSPORTATION DEPARTMENT

Street Improvements

- Continuous curb, gutter and sidewalk
- Adding buffered bicycle lanes



Section: West of 55th Ave. to 51st Ave.

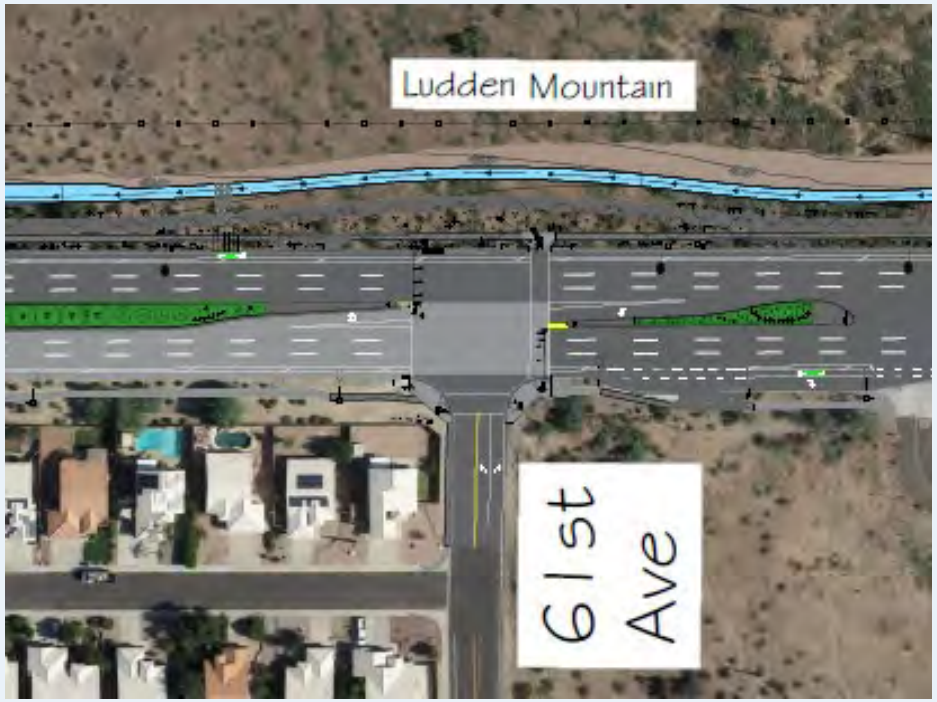


Section: 51st Ave. to 48th Ave.

Project Improvements

New Traffic Signals at:

- 61st Ave and Happy Valley Rd

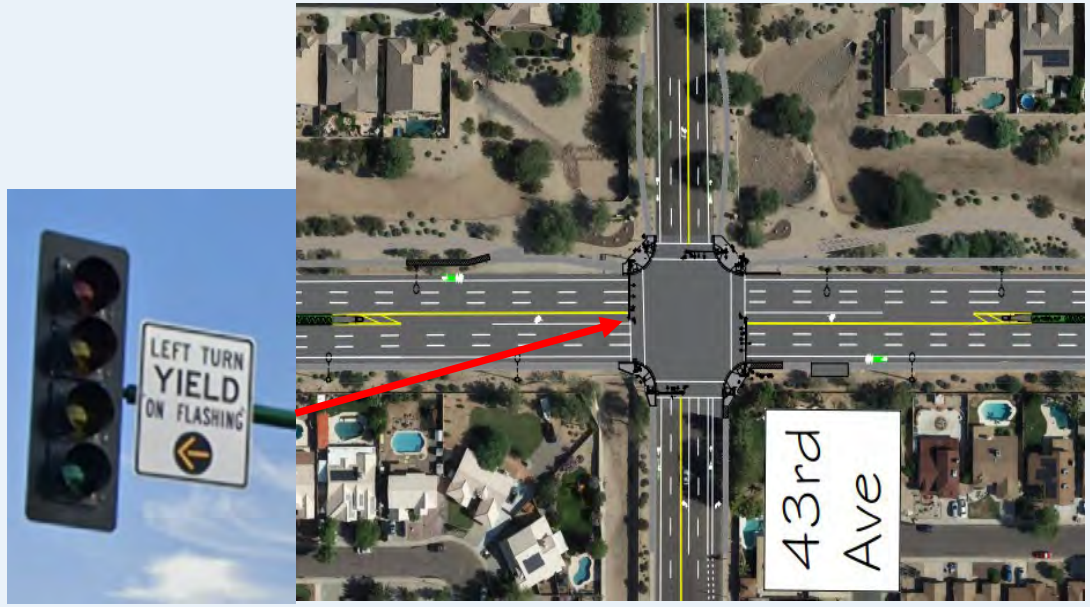


- 47th Ave and Happy Valley Rd

Project Improvements

Traffic signal upgrades at:

- 64th Avenue
- Glendale Community College
- 51st Avenue
- 43rd Avenue
- 35th Avenue



64th Ave and HVR intersection

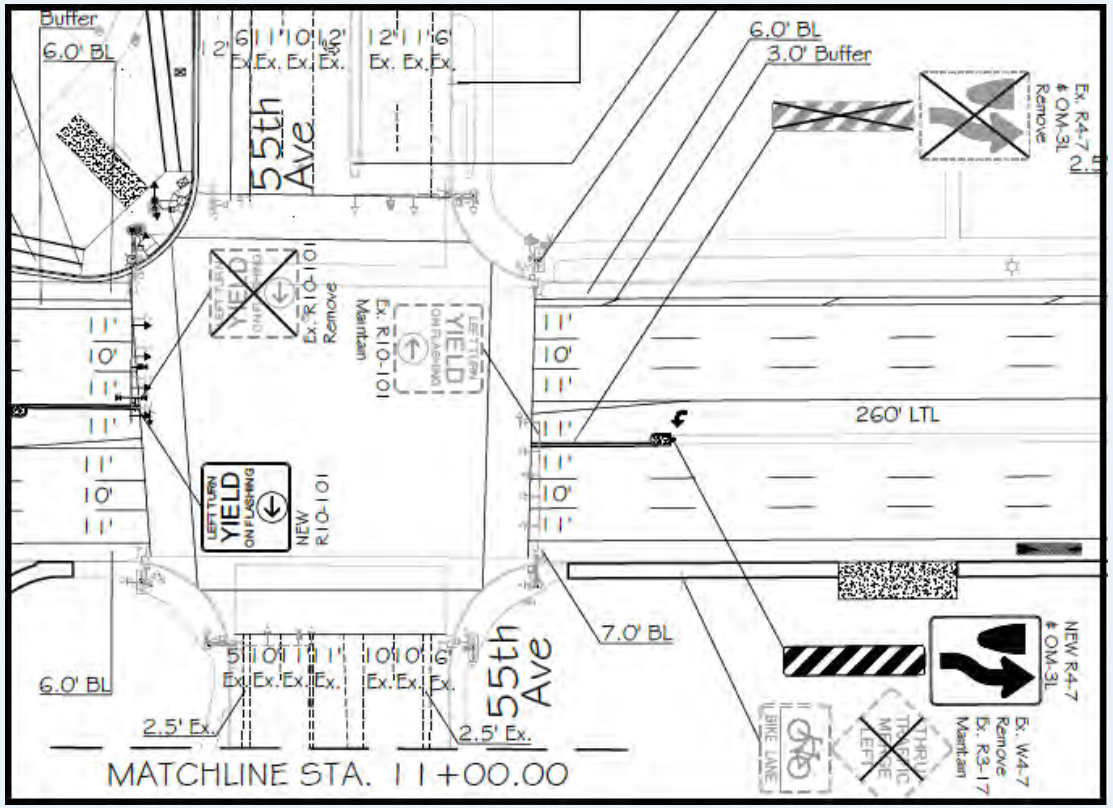
43rd Ave and HVR intersection

Project Improvements

Streets PHX
STREET TRANSPORTATION DEPARTMENT

Traffic safety improvement at:

- 55th Avenue and Happy Valley Rd

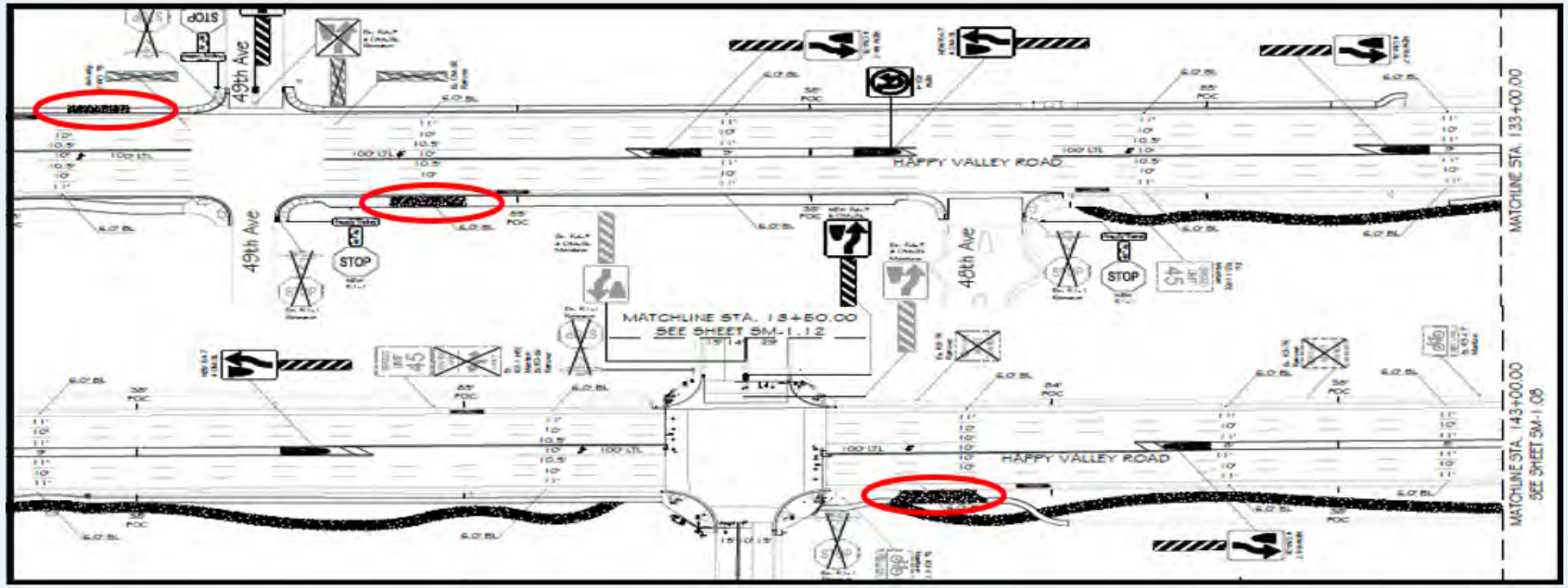


Project Improvements

Streets PHX
STREET TRANSPORTATION DEPARTMENT

Traffic Safety and Streetlight Improvements

- Fiber optic communications infrastructure for traffic signal connectivity and automation
- Streetlight improvement



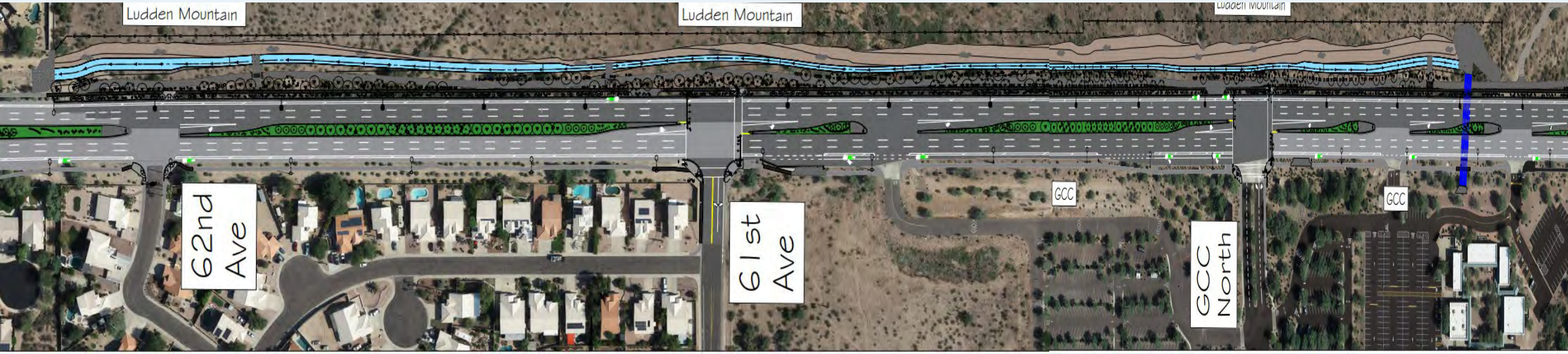
Public Transit Service

- Bus Pads

Project Improvements

Drainage Improvements

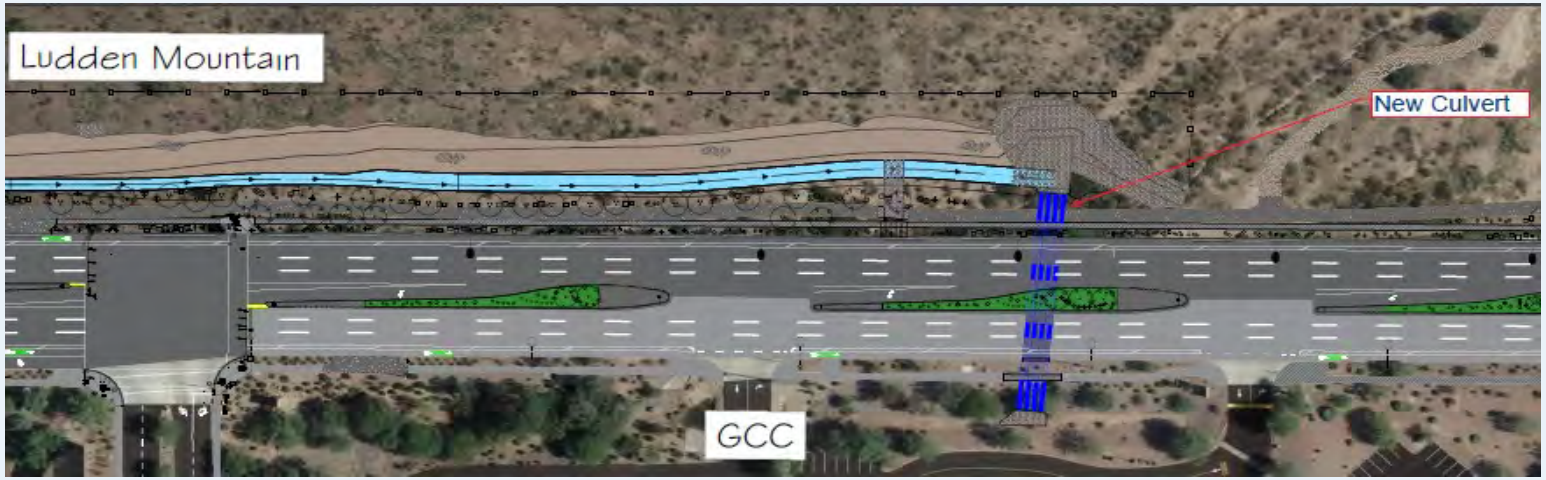
- New drainage ditch to capture runoff along base of Ludden Mountain



Project Improvements

Drainage Improvements

- New drainage cross culvert at Glendale Community College
- Add drainage facilities to the corridor

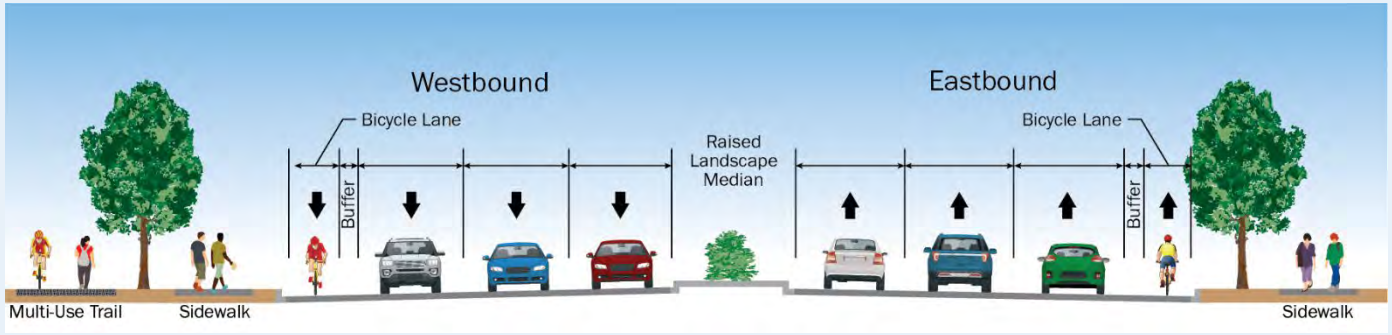


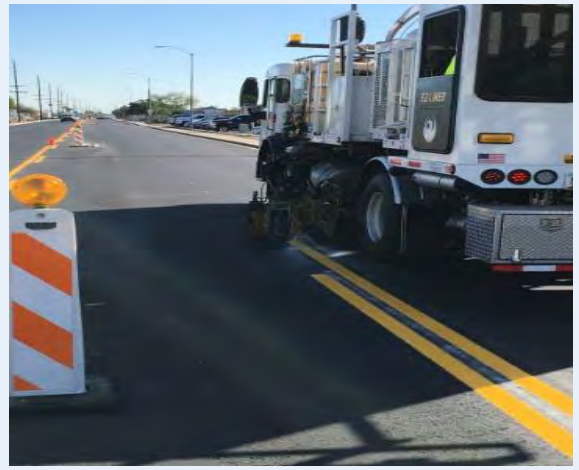
Project Improvements

Aesthetics Improvements

- Extending continuous multi-use recreational trail
- Landscape roadside and median islands
- Pavement improvement
- Pavement markings and signs

62nd Ave. to west of 55th Ave





Project Timeline

Streets PHX
STREET TRANSPORTATION DEPARTMENT

- Complete Design: Fall 2022
- Environmental Studies & ROW Acquisition: Summer 2023
- Procurement and Awarding: Late Summer 2023
- Begin Construction: Fall 2023
- Construction Completion: Summer 2025

Streets PHX
STREET TRANSPORTATION DEPARTMENT

Questions & Comments

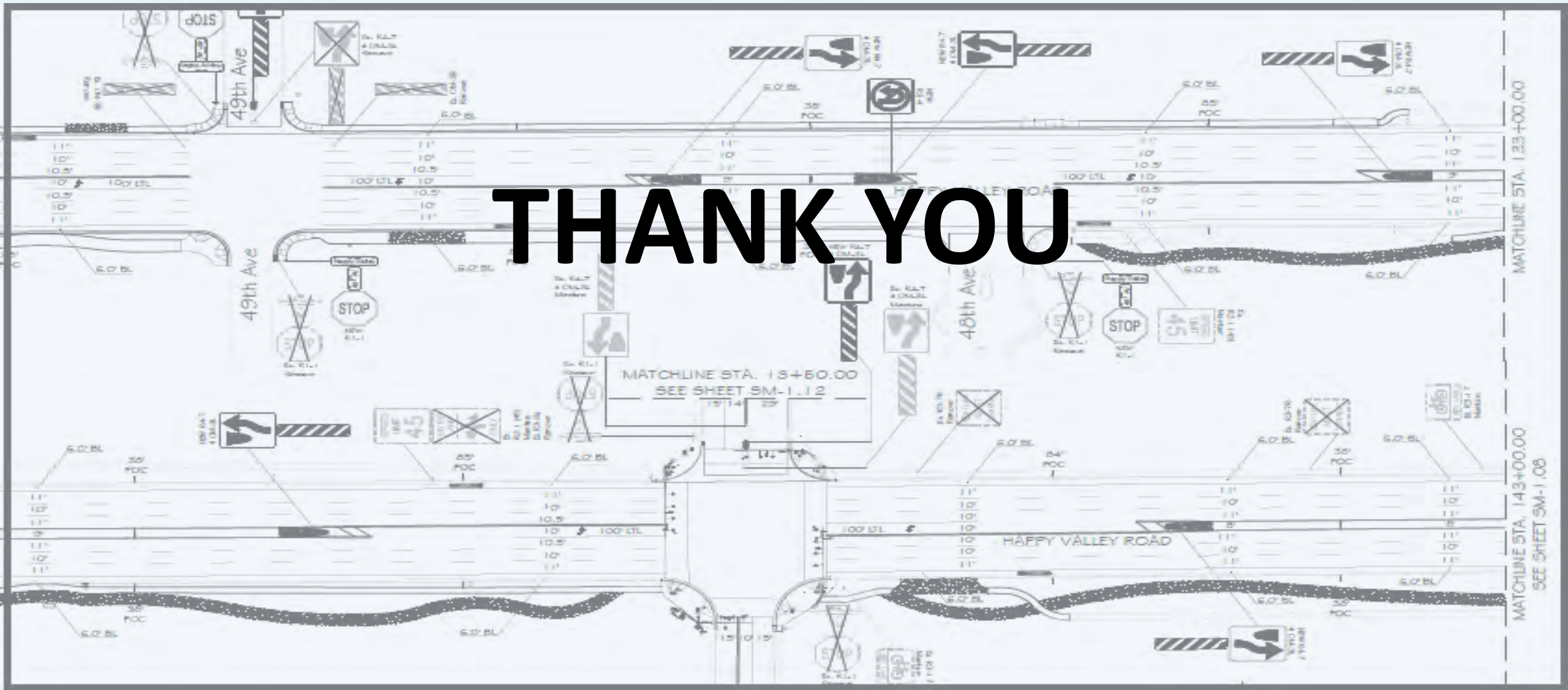
Project Hotline: 623-825-3444

Project Website with Detailed Roll Plots

phoenix.gov/streets/happyvalley

HAPPY VALLEY RD: 67th Avenue to 35th Avenue

Streets PHX
STREET TRANSPORTATION DEPARTMENT



Re: Interagency Consultation: PHX-0(363)D | 000 MA PHX T0239 01C; Happy Valley Road: 67th Avenue to 35th Avenue

1 message

Beverly Chenausky <bchenausky@azdot.gov> Tue, Sep 13, 2022 at 3:19 PM
To: "Wickersham, Lindsay (she/her)" <wickersham.lindsay@epa.gov>, "rebecca.yedlin@dot.gov" <rebecca.yedlin@dot.gov>, Transportationconformity <transportationconformity@azdeq.gov>, Tim Franquist <TFranquist@azmag.gov>, "Johanna Kuspert (AQD)" <Johanna.Kuspert@maricopa.gov>
Cc: Morgan Ghods <mghods@azdot.gov>, Dean Giles <dgiles@azmag.gov>, "Hansen, Alan (FHWA)" <Alan.Hansen@dot.gov>, Paul O'brien <POBrien@azdot.gov>, Joonwon Joo <jjoo@azdot.gov>, "Meek, Clifton" <meek.clifton@epa.gov>, "OConnor, Karina (she/her)" <OConnor.Karina@epa.gov>, Madhav Mundle <MMundle@azdot.gov>, Tariq Momika <tariq.momika@phoenix.gov>

The attached comments and responses, as appropriate, were incorporated into the revised air quality report, the report and associated updated modeling files will be provided through a separate ShareFile notification. Thank you for taking your time in reviewing this project, this concludes interagency consultation for this project. Any additional updates on this project will be available on the City's website as provided. Beverly

On Wed, Jul 27, 2022 at 12:52 PM Beverly Chenausky <bchenausky@azdot.gov> wrote:

> The aforementioned air quality report is now available for review on the ADOT Air Quality website linked below. The associated modeling files will be provided through a seperate ShareFile notification, we ask that you provide any comments on the draft report within 30 days.
>
> DRAFT Air Quality Report - Happy Valley Road 67th Avenue to 35the Avenue (azdot.gov)
>
> Additionally, the City of Phoenix will be hosting a virtual public meeting on 8/24/22 where project-specific updates will be provided with an opportunity to ask questions about the overall project. Information and details on how to register for the public meeting and/or provide comments can be found on the City of Phoenix project website linked below.
>
> Street Transportation Happy Valley Road (35th Avenue to 67th Avenue) (phoenix.gov)
>
> Thank you, please let me know if you have any questions.
>
> Beverly
>
> On Tue, Jun 21, 2022 at 9:28 AM Beverly Chenausky <bchenausky@azdot.gov> wrote:
>
> > Lindsay -
> > For project level hot-spot CO modeling FHWA has recommended to use the screening approach identified in both the *Guideline for Modeling Carbon Monoxide from Roadway Intersections, EPA-454/R-92-005, November 1992* (Section 4.7.1) and *Using MOVES3 in Project-Level Carbon Monoxide Analyses, December 2021* (Section 2.4.1) referencing the use of an average January temperature and humidity value. I am sure we can work with the Maricopa County Air Quality Department monitoring staff to obtain the windrose information for the selected background monitor, we can add that content into the air quality report.
> >
> > All - Given no additional comments or suggested changes where received, the project team will commence the CO project level hot-spot analysis, when complete the draft report and modeling files will be provided for additional review and comment. Thank you. Beverly
> >
> > On Fri, Jun 17, 2022 at 1:53 PM Wickersham, Lindsay (she/her) <wickersham.lindsay@epa.gov> wrote:
> >
> > > Hi Beverly,
> > >
> > > Thank you for the opportunity to review the Happy Valley Road Project and PM10 and CO consultation documents. At this time I have no formal comments but do have one question for my own understanding and have a suggestion for an addition to the modeling documents when they are available.
> > >
> > > My question was regarding the choice to use average temperature and humidity in January for the CO hotspot analysis (Table 2, P.4, Meterology) . I see that in the MAG 2013 CO Maintenance Plan, the CO winter season was described from November- January. Is there a reason why January and not another month was chosen? Does this represent the “worst case” scenario for CO production?
> > >
> > > I noticed in the CO hot spot consultation document that there was a picture of the location of the CO receptors on P.7. I appreciate having this visualization and I would like to suggest that a wind rose be added in future versions and in modeling documents so that we can deduce the primary wind direction

be added in future versions and in modeling documents so that we can deduce the primary wind direction.

Thank you again for sharing this with me and I hope you have a great weekend.

Best,

Lindsay

Lindsay Wickersham (she/her/hers)

BSPH, MSEE | Physical Scientist

U.S. Environmental Protection Agency

Air & Radiation Division | Planning Office

Region 9 | 415-947-4192

From: Beverly Chenausky <bchenausky@azdot.gov>
Sent: Friday, June 3, 2022 9:55 AM
To: rebecca.yedlin@dot.gov; Transportationconformity <transportationconformity@azdeq.gov>; Tim Franquist <TFranquist@azmag.gov>; Johanna Kuspert (AQD) <Johanna.Kuspert@maricopa.gov>; Wickersham, Lindsay (she/her) <wickersham.lindsay@epa.gov>
Cc: Greta Halle <greta.halle@phoenix.gov>; Morgan Ghods <mghods@azdot.gov>; Dean Giles <dgiles@azmag.gov>; Hansen, Alan (FHWA) <Alan.Hansen@dot.gov>; Paul O'brien <POBrien@azdot.gov>; Joonwon Joo <jjoo@azdot.gov>; Meek, Clifton <meek.clifton@epa.gov>; OConnor, Karina (she/her) <OConnor.Karina@epa.gov>; Madhav Mundle <MMundle@azdot.gov>
Subject: Re: Interagency Consultation: PHX-0(363)D | 000 MA PHX T0239 01C; Happy Valley Road: 67th Avenue to 35th Avenue

ADOT has not received any additional comments or requests for changes to either the PM10 and/or CO documents. The project team has incorporated the FHWA suggested revisions and are noted in **blue** in the attached pdf documents. These changes include; modifying Table 1 in both documents, adding a Table 3 to show data pulled from the traffic study, including the same data tables for both documents, removing the two receptors maps, and noting these corrections throughout the document, as applicable.

Additionally, to better represent a scenario where emissions are expected to be the worst, a 2025 emission rate will be used in the 2050 model year run. Please review the changes to the planning

assumptions included in the document, given the project schedule demands, we are requesting responses on these changes within 10 business days. If there are no objections to this approach, modeling will commence and an air quality report, with the associated modeling data, will be provided when available for further review and comments. There were no changes to the traffic data provided May 2, 2022, as such those traffic assumptions will be used in the hot-spot modeling.

Please let me know if you have additional questions. Thanks, Beverly

On Wed, May 18, 2022 at 6:37 AM Yedlin, Rebecca (FHWA) <Rebecca.Yedlin@dot.gov> wrote:

> I provided your responses to the FHWA Resource Center AQ Specialists and have placed their responses below in green.
>
> If you have any questions, please let me know. Thanks, Rebecca
>
> ---
>
> **From:** Greta Halle <greta.halle@phoenix.gov>
> **Sent:** Friday, May 13, 2022 3:34 PM
> **To:** Yedlin, Rebecca (FHWA) <Rebecca.Yedlin@dot.gov>; bchenausky azdot.gov <bchenausky@azdot.gov>
> **Cc:** Morgan Ghods <mghods@azdot.gov>; Dean Giles <dgiles@azmag.gov>; Hansen, Alan (FHWA) <Alan.Hansen@dot.gov>; Paul O'brien <POBrien@azdot.gov>; Stauffer, Panah <Stauffer.Panah@epa.gov>; Transportationconformity <transportationconformity@azdeq.gov>; Joonwon Joo <jjoo@azdot.gov>; Clifton Meek <meek.clifton@epa.gov>; Johanna Kuspert (AQD) <Johanna.Kuspert@maricopa.gov>; Karina O'Conner <oconnor.karina@epa.gov>; Madhav Mundle <MMundle@azdot.gov>; Tim Franquist <TFranquist@azmag.gov>
> **Subject:** RE: Interagency Consultation: PHX-0(363)D | 000 MA PHX T0239 01C; Happy Valley Road: 67th Avenue to 35th Avenue
>
>
>
> Good afternoon, on behalf of the City of Phoenix Street Transportation Department, our responses to FHWA's comments are below in red. Thank you.
>
> **Greta Halle**
>
> Planner III
>
> Office of the City Engineer
>
> Street Transportation Department | City of Phoenix
>
> 200 W. Washington St., 5th floor | Phoenix, AZ 85003
>
> (P) 602.534.6030 | greta.halle@phoenix.gov
>
> Follow us on Twitter @StreetsPHX [twitter.com]
>
> ---
>
> **From:** Yedlin, Rebecca (FHWA) <Rebecca.Yedlin@dot.gov>
> **Sent:** Monday, May 9, 2022 6:00 AM
> **To:** bchenausky azdot.gov <bchenausky@azdot.gov>
> **Cc:** Greta Halle <greta.halle@phoenix.gov>; Morgan Ghods <mghods@azdot.gov>; Dean Giles <dgiles@azmag.gov>; Hansen, Alan (FHWA) <Alan.Hansen@dot.gov>; Paul O'brien <POBrien@azdot.gov>; Stauffer, Panah <Stauffer.Panah@epa.gov>; Transportationconformity <transportationconformity@azdeq.gov>; Joonwon Joo <jjoo@azdot.gov>; Clifton Meek <meek.clifton@epa.gov>; Johanna Kuspert (AQD) <Johanna.Kuspert@maricopa.gov>; Karina O'Conner <oconnor.karina@epa.gov>; Madhav Mundle <MMundle@azdot.gov>; Tim Franquist <TFranquist@azmag.gov>
> **Subject:** RE: Interagency Consultation: PHX-0(363)D | 000 MA PHX T0239 01C; Happy Valley Road: 67th Avenue to 35th Avenue

FHWA has the following comments:

- The traffic shown in the PM and CO consultation documents are inconsistent with the traffic report included with the CO document. This should be corrected so that the traffic used for interagency consultation and determining whether hot-spot analyses are required is consistent with the traffic data used for other analyses in NEPA. // COP STR response: The inconsistencies are attributable to the level of analysis conducted for the respective document. For the questionnaires, the MAG TDM model was used to initially screen the project and help determine if modeling might be necessary. For the traffic memo, a LOS/synchro analysis at the local intersection level was conducted using geometric configurations, signal timings, and turning movement counts. The MAG model is routinely used to inform travel patterns and capable of providing information related to volume and capacity; however, the intersection LOS produced by the MAG TDM does not reach the level of detail provided by the synchro analysis. - The tables for the interagency consultation memos/questionnaires should be updated to reflect the more refined traffic forecasts.

- There should be supporting information included on why 2050 was chosen for the year of peak year emissions. Traffic volumes are expected to be highest in 2050, but emission rates are likely highest in the opening year of the project. There should be an analysis that looks at these offsetting factors to determine the year of peak emissions. // COP STR response: 2050 was chosen for the year of peak year emissions based on the following reasons: (a) 2050 is the horizon year as described in the latest Regional Transport Plan (RTP), dated December 1, 2021. (b) 2050 is the year that traffic volumes along the project corridor are expected to be highest and corresponding intersections are expected to be most congested with longest intersection wait time, which would result in highest CO emissions. As specified in 40 CFR part 51, Appendix W (Guideline on Air Quality Models), the main assumption is that intersections with less traffic volumes and congestions will have lower ambient air impacts. - An analysis to make the determination which year will have the highest emissions (not traffic or congestion) should be completed. For conformity, the year of peak emissions should be evaluated in CAL3QHC. The only way to determine this year is doing a MOVES analysis that accounts for emissions rates being highest in the opening year (with lower volumes), and lowest in the horizon year (with higher volumes). The emission rates will be higher during the opening year, but the question is whether the growth in VMT and reduction in speeds in the design year (2050) is enough to offset the decrease in emissions due to fleet turnover.

- The project sponsor is proposing to do more modeling than what is required for conformity. (Not necessarily a problem, but wanted to point out it is not required for conformity purposes).
    - For a CO hot-spot analysis for determining conformity, there is no need to model the no-build condition.
    - Only the peak hour is required to be modeled (not both the AM and PM peak hours, but just the one that is THE peak of the day).
    - Based on the traffic report in the appendix, only the Happy Valley Road and 67th intersection requires a hot-spot analysis.

    // COP STR response: Duly noted. We will only conduct hotspot analysis during *THE* peak hour of the day for the 2050 Build condition at the Happy Valley Road/67th Avenue intersection. - ok

Please let me know if you have any questions or would like to discuss the comments above. Thanks, Rebecca

---

From: Beverly Chenausky <bchenausky@azdot.gov>
Sent: Monday, May 2, 2022 9:12 AM
To: Tim Franquist <TFranquist@azmag.gov>; Transportationconformity <transportationconformity@azdeq.gov>; Stauffer, Panah <Stauffer.Panah@epa.gov>; Johanna Kuspert (AQD) <Johanna.Kuspert@maricopa.gov>; Yedlin, Rebecca (FHWA) <Rebecca.Yedlin@dot.gov>
Cc: Greta Halle <greta.halle@phoenix.gov>; Morgan Ghods <mghods@azdot.gov>; Dean Giles <dgiles@azmag.gov>; Hansen, Alan (FHWA) <Alan.Hansen@dot.gov>; Paul O'brien <POBrien@azdot.gov>; Joonwon Joo <jjoo@azdot.gov>; Clifton Meek <meek.clifton@epa.gov>; Karina O'Conner <oconnor.karina@epa.gov>; Madhav Mundle <MMundle@azdot.gov>
Subject: Interagency Consultation: PHX-0(363)D | 000 MA PHX T0239 01C; Happy Valley Road: 67th Avenue to 35th Avenue

ADOT, in coordination with City of Phoenix, is presenting the following project, **Happy Valley Road: 67th Avenue to 35th Avenue**, for interagency consultation, per 40 CFR 93.105 as a potential project that is not a project of Air Quality Concern and thereby will not require a PM10 hot-spot analysis. ADOT is requesting responses to the attached *PHX T0239_Project Level PM10Consultation_050222.pdf,*

a non-response will be interpreted as concurrence that the project is not a project of air quality concern and does not require a hot-spot analysis. If any consulted party believes this project should be treated as a project of air quality concern that requires a Quantitative PM10 hot-spot analysis, please document the appropriate section under 40 CFR 93.123 (b) that applies to the project and describe why the project should be treated as a project of air quality concern **within 10 business days**

describe why the project should be treated as a project of air quality concern, **within 10 business days**.

Additionally, ADOT has determined that the project may require a quantitative hot-spot analysis only for CO, the modeling assumptions are attached in the document *PHX T0239_Project Level CO Consultation Document_05022022.pdf*. This document contains the combined Project Level CO Hot-Spot Analysis Questionnaire demonstrating the need for analysis and the City provided supplemental traffic report for those congested intersections identified. The Purpose of this document is to describe the methods, models and assumptions used for a quantitative hot-spot analysis as required in 40 CFR 93.105(c)(1)(i), 93.123, 93.116. It is requested that the consulted parties provide comments or questions on the methods, models and assumptions **within 30 days**, a non-response will be interpreted as concurrence with the planning assumptions as described in the attached CO document.

Please let me know if you have any additional questions or need additional time to review, Project-Level hot-spot conformity will begin at the conclusion of interagency consultation. All other project details, upcoming events, and additional information on how to subscribe to project updates can be found on the project website at:

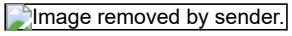
https://www.phoenix.gov/streets/projects/happyvalley [gcc02.safelinks.protection.outlook.com]

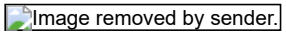
Beverly T. Chenausky

Air & Noise Program Manager
MD EM02
205 South 17th Avenue
Phoenix, AZ 85007

C: 480.390.3417

azdot.gov [gcc02.safelinks.protection.outlook.com]





ST85100437_AQReport_S1_CommentRes_v3.xlsx
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PHX T0239 Happy Valley Road 67th Avenue to 35th Avenue

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