



Arizona Department of Transportation

Environmental Planning

**Project - Level Particulate Matter
(PM₁₀) and Carbon Monoxide (CO)
Consultation Document**

Pima Road; Happy Valley Road to Jomax Road, Scottsdale

**SCT-0(243)D
0000 MA SCT T0499 01C**

April 29, 2024

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by ADOT pursuant to 23 U.S.C. 326 and a Memorandum of Understanding dated December 20, 2023, and executed by FHWA and ADOT.

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Project-Level PM₁₀ and CO Interagency Consultation

Project Setting and Description

The Arizona Department of Transportation (ADOT), in coordination with the City of Scottsdale, Arizona is proposing street improvements on Pima Road from Hackamore Drive to about 700 feet north of Jomax Road. The project is located on City of Scottsdale right-of-way (ROW), easements on Arizona State Land Department (ASLD) lands, drainage easements on private lands, utility easements on ASLD lands, ASLD lands, and private lands.

Pima Road is currently an arterial road with two lanes in each direction separated by a two-way left turn lane. The purpose of the project is to reconstruct the roadway with a profile that removes low flow crossings and provides curb, gutter, and storm drains, median islands, and right- and left-turn lane storage at intersections as needed in the 2045 design year.

Project elements relevant to air quality considerations include:

- Reconstruction of Pima Road to continue to accommodate two through traffic lanes in the northbound and southbound directions, but remove the low flow drainage crossings, add bike lanes, right turn lanes, a raised median island, curb and gutter, sidewalks, and a concrete shared use path;
- Reconstruct radius returns, pedestrian facilities, and pavement required to tie into existing cross streets;
- Construct new traffic signals and install cabinets, pedestals, pull boxes, and conduit, as needed.

The proposed project is in Maricopa County, portions of which are currently designated as nonattainment or maintenance areas for the National Ambient Air Quality Standards (NAAQS) for carbon monoxide (CO), eight-hour ozone, and particulate matter less than or equal to ten microns (PM₁₀).

The CO Maintenance Plan currently in effect is the “MAG 2013 Carbon Monoxide Maintenance Plan for the Maricopa County Area” (MAG, March 2013). As discussed in that plan, there have been no violations of the 1-hour NAAQS for CO (35 parts per million [ppm]) since 1984 and no violations of the 8-hour NAAQS (9 ppm) since 1996. There has also been a continuous downward trend in monitored CO concentrations over time and the maintenance demonstration summary described in the 2013 Maintenance Plan details continuing compliance with the CO standard through 2025.

The PM₁₀ Nonattainment Plan currently in effect is the “The 2012 Five Percent Plan for PM-10 for the Maricopa County Nonattainment Area,” the effective date of this plan as approved by the Environmental Protection Agency (EPA) is July 10, 2014. 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.

Name: Pima Rd; Happy Valley Rd to Jomax Rd , Scottsdale
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State ID: 0000 MA SCT T0499 01C



The project is included in the in the MAG Regional Transportation Plan: Momentum 2050 (MAG, 2021) and the Fiscal Year 2022-2025 Transportation Improvement Program (January 31, 2024 [SCT21-131 DRB - Pima Road: Happy Valley Road to Jomax Road]).

The current conformity determination for the FY 2022 - 2025 TIP and MOMENTUM 2050 MAG Regional Transportation Plan for the Maricopa nonattainment and maintenance areas was made by the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) on September 25, 2023.

The project location is shown in Figure 1 and the project study area is shown in Figure 2.

Figure 1. Project Location Map

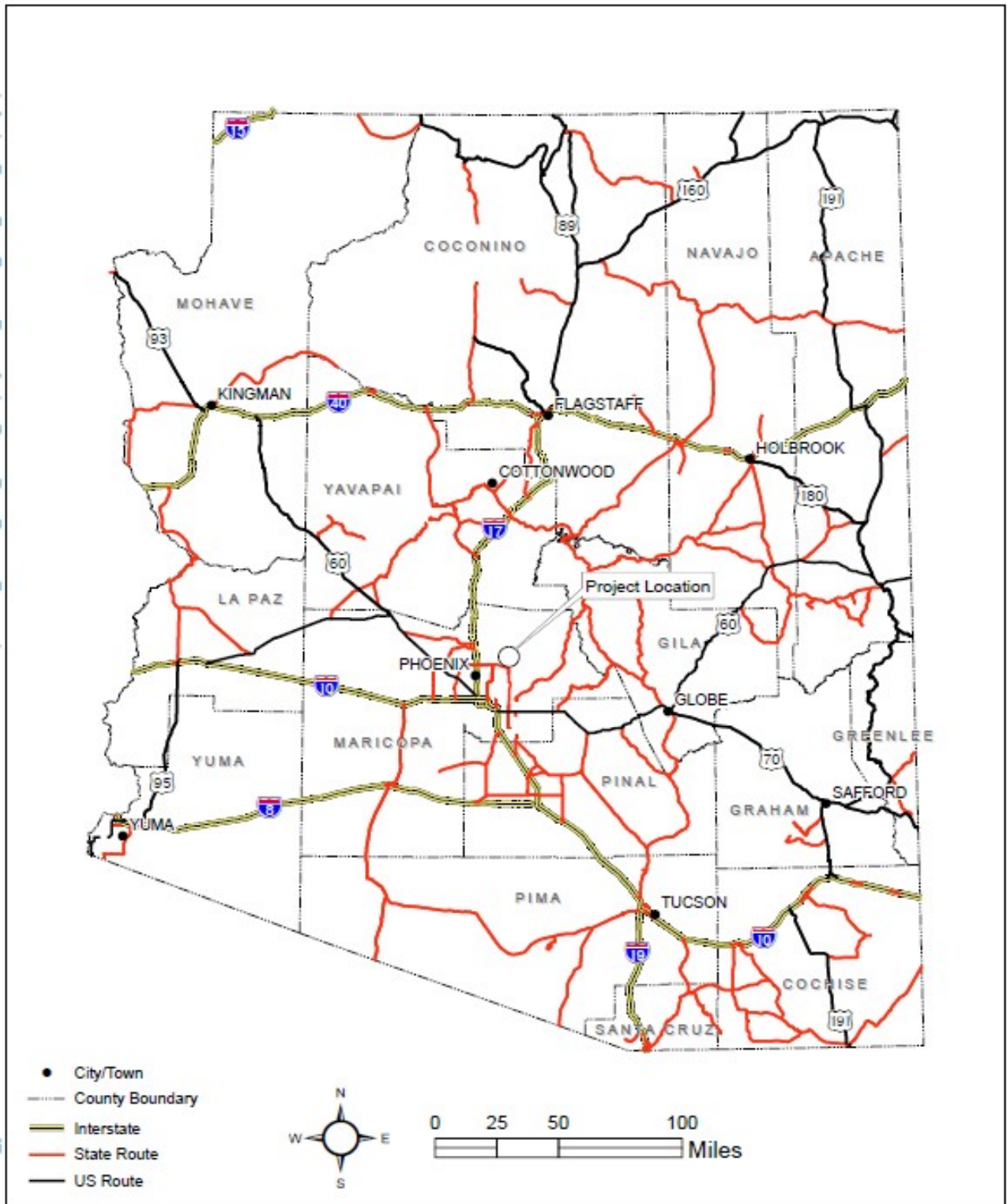


Figure 2. Project Study Area

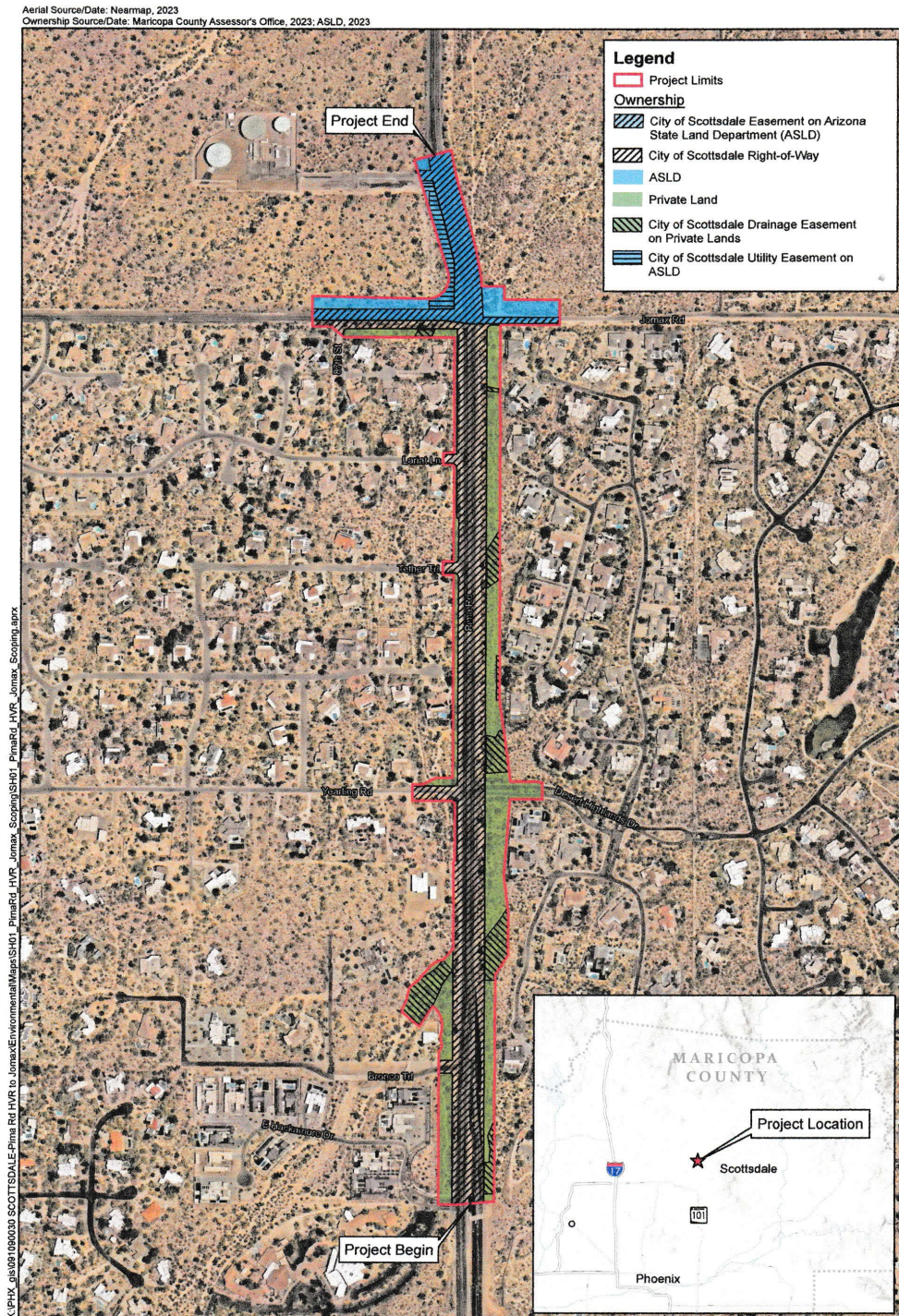
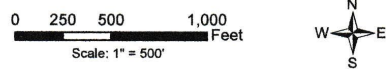


Figure 2. Vicinity Map
 0000 MA SCT T0499 01C
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 City Project No. SH01
 Pima Rd; Happy Valley Rd - Jomax Rd, Scottsdale



Project-Level PM₁₀ Consultation Project of Air Quality Concern

PM₁₀ 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 PM₁₀ 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 with 40 CFR 93.116(a) and the consultation requirements of 40 CFR 93.105(c)(1)(i). If the project does not require a PM hot-spot analysis, a qualitative assessment will be developed that demonstrates that the project will not contribute to any new localized violations, increase the frequency or 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 *PM_{2.5} and PM₁₀ Hot-Spot Analyses in Project-Level Transportation Conformity Determinations for the New PM_{2.5} 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;” While these examples were provided in the rulemaking, interagency consultation will be used to determine if a 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?

NO - The proposed project is not a new highway.

Expanded Highway Capacity

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

NO - The proposed project is not an expanded highway project.

Under 2022 Existing Conditions, Pima Road has two lanes in the northbound and southbound directions with a two-way center turn lane. The purpose of the project is to reconstruct the roadway with a profile that removes low flow crossings and provides curb, gutter, and storm drains, median islands, and right- and left-turn lane storage at intersections as needed in the 2045 design year.

Following construction, Pima Road will continue to accommodate two through lanes in the northbound and southbound directions, but remove the low flow drainage crossings, add bike lanes, right turn lanes, a raised median island, curb and gutter, sidewalks, and a concrete shared use path. In addition, intersections that are currently stop-controlled could be signalized under the 2045 Build Alternative.

As shown in Table 1, average daily traffic (ADT) volumes on Pima Road from Happy Valley Road to Jomax Road range from about 22,100 vehicles per day (vpd) under 2022 Existing Conditions to about 43,600 vpd under the 2045 Build Alternative. Compared to 2022 Existing Conditions, the total truck ADT increases by about 832 trucks per day as a result of the project without increasing the capacity of Pima Road (that is, not adding additional travel lanes). Total truck volumes (medium trucks and heavy trucks) are about 3.9% of the ADT.

The total truck volumes shown in Table 1 include both medium- and heavy-duty trucks, not all of which would be diesel-fueled. The combined medium- and heavy-duty truck ADT represent a worst-case assumption when considering if the increase in truck volumes represents a significant increase in the number of diesel-fueled vehicles resulting from the project.

Table 1. Pima Road Average Daily Traffic and Truck Volumes

Roadway Segment	2022 Existing				2025 Interim Build				2045 Build				Total Truck ADT Difference (2045 Build - 2022 Existing)
	ADT	Total Truck ADT	MT Volume	HT Volume	ADT	Total Truck ADT	MT Volume	HT Volume	ADT	Total Truck ADT	MT Volume	HT Volume	
Pima Road from Happy Valley Road to Jomax Road	22,100	862	530	332	24,200	944	581	363	43,600	1,700	1,046	654	838

Notes: ADT - Average daily traffic
 MT - Medium Trucks (vehicles with 2 axles & 6 wheels; gross vehicle weight - 10,000 to 26,400 pounds).
 HT - Heavy Trucks (vehicles with 3 or more axles; gross vehicle weight greater than 26,400 pounds).
 Source: Kimley-Horn & Associates, January 2023. *Pima Road Improvements: Happy Valley Road to Jomax Road Final Traffic Report.*

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 at LOS D or that will change to LOS D (or greater) because of a significant increase in the number of diesel-fueled trucks resulting from the project (see discussion above and Table 1).

As shown in Table 2 below, total truck volumes at both the Pima Road/Jomax Road intersection and the Pima Road/Yearling Road intersection increase by less than 100 trucks per hour compared to 2022 Existing Conditions in both the AM and PM peak-hours under the 2045 Build Alternative.

The total truck volumes at both intersections are not deemed to be a significant number of diesel-fueled vehicles or represent a significant increase in the volume of diesel-fueled vehicles related to the project.

Table 2. Intersection Level of Service and Peak Hour Volumes

Intersection	2022 Existing Conditions				2045 Build				Total Truck Volume Difference (2045 Build - 2022 Existing, vph) ³
	LOS ¹	Volumes (vph)	Medium Truck Volumes (vph)	Heavy Truck Volumes (vph)	LOS ² (delay, sec.)	Volumes (vph)	Medium Truck Volumes (vph)	Heavy Truck Volumes (vph)	
Pima Road/Jomax Road	--	AM: 1,569 PM: 1,649	AM: 38 PM: 40	AM: 24 PM: 25	AM: A (9.4) PM: A (16.2)	AM: 3,095 PM: 3,258	AM: 74 PM: 78	AM: 46 PM: 49	AM: 58 PM: 62
Pima Road/Yearling Road	--	AM: 1,627 PM: 1,708	AM: 39 PM: 41	AM: 24 PM: 26	AM: C PM: C	AM: 3,185 PM: 3,326	AM: 76 PM: 80	AM: 48 PM: 50	AM: 61 PM: 63

¹ Under 2022 Existing Conditions both intersections are unsignalized with LOS D, E, and F for several stop-controlled turning movements.
² Pima Road/Jomax Road signalized; Pima Road/Yearling Road operates at LOS C as signalized intersection or as LOS C as unsignalized intersection with added acceleration lanes.
³ Truck Volume Difference includes both MT and HT
 Source: Kimley-Horn & Associates, January 2023. *Pima Road Improvements: Happy Valley Road to Jomax Road Final Traffic Report.*
 MT - Medium Trucks (vehicles with 2 axles & 6 wheels; gross vehicle weight - 10,000 to 26,400 pounds)
 HT - Heavy Trucks (vehicles with 3 or more axles; gross vehicle weight greater than 26,400 pounds).

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 – The proposed project does not involve construction of 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 – The proposed project does not involve an existing bus or intermodal terminal.

Projects Affecting PM Sites of Violation or Possible Violation

Does the project affect locations, areas or categories of sites that are identified in the PM₁₀ or PM_{2.5} applicable plan or implementation plan submissions, as appropriate, as sites of violation or potential violation?

NO – The PM₁₀ State Implementation Plan does not identify any specific sites or potential sites of violation.

Project of Air Quality Concern Determination

Under the 2045 Build Alternative traffic volumes on Pima Road are less than 44,000 vehicles per day. The increase in diesel-fueled truck volumes due to the project are low; less than 850 total trucks per day compared to 2022 Existing Conditions and include both medium and heavy-duty trucks, not all of which are diesel-fueled (that is the truck volumes represent a worst-case condition and likely overstate the number of diesel-fueled trucks in the project area). While overall traffic volumes are expected to increase, the project does not significantly increase diesel-fueled total truck volumes.

In addition, total truck volumes increase by less than 100 trucks per hour under the 2045 Build Alternative compared to 2022 Existing Conditions in both the AM and PM peak hours.

As noted above, the primary purpose of the project is to reconstruct the roadway with a profile that removes low flow crossings and upgrading stop-controlled intersections to signalized intersections, thereby improving traffic flow on Pima Road.

The March 2006, Federal Register rulemaking, “PM_{2.5} and PM₁₀ Hot-Spot Analyses in Project-Level Transportation Conformity Determinations for the New PM_{2.5} and Existing PM₁₀ National Ambient Air Quality Standards” (71 Federal Register 12486-12511) provided examples of projects that would not be covered by 40 CFR 93.123(b)(1) and would not require a PM_{2.5} or PM₁₀ hot-spot analysis.

The proposed project fits as “any new or expanded highway project that primarily services gasoline vehicle traffic (i.e., does not involve a significant number or ncrease in the number of diesel vehicles), including such projects involving congested intersections operating at Level-of-Service D, E, or F.”

Therefore, the proposed improvements on Pima Road from Happy Valley Road to Jomax Road are NOT of Air Quality Concern and will not require a PM hot-spot analysis.

Carbon Monoxide Project Assessment

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, area, 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 area 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 with 40 CFR 93.116(a) and the consultation requirements of 40 CFR 93.105(c)(1)(i).

Projects Affecting CO Sites of Violation or Possible Violation

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

NO - The MAG 2013 Carbon Monoxide Maintenance Plan for the Maricopa County Area does not identify sites or categories of potential violation for CO (MAG, 2013).

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 - Under 2022 Existing Conditions, the 2025 Interim No-Build Alternative, and the 2045 Horizon Year No-Build Alternative, the Pima Road/Jomax Road and

Pima Road/Yearling Road intersections are unsignalized. As shown in Tables 3, 4, and 5, there are several stop-controlled intersection turning movements that operate at LOS D or worse under each No-Build alternative (highlighted in **bold**). As traffic volumes increase over time it is not unusual for minor approaches at stop-controlled intersections to experience longer delays as the number of acceptable gaps to enter traffic decreases on major approaches such as Pima Road (Kimley-Horn, 2023).

As shown above in Table 2, under the 2045 Build Alternative the intersection of Pima Road/Jomax Road would be signalized and would operate at LOS A. The Pima Road/Yearling Road intersection would operate at LOS C as either a signalized intersection or as an unsignalized intersection with added acceleration lanes.

Table 3. 2022 Existing Level of Service

Intersection	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
<i>Pima Road/Jomax Road (unsignalized)</i>												
AM Peak	E			F			B	-	-	A	-	
PM Peak	C			F			A	-	-	B	-	
<i>Pima Road/Yearling Road/Desert Highlands Drive (unsignalized)</i>												
AM Peak	C			C	A	B	-	-	A	-		
PM Peak	C			D	B	A	-	-	A	-		

Table 4. 2025 Interim No-Build Level of Service

Intersection	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
<i>Pima Road/Jomax Road (unsignalized)</i>												
AM Peak	F			F			B	-	-	A	-	
PM Peak	D			F			A	-	-	B	-	
<i>Pima Road/Yearling Road (unsignalized)</i>												
AM Peak	D			F	B	B	-	-	A	-		
PM Peak	C			F	B	A	-	-	B	-		

Table 5. 2045 No-Build Level of Service

Intersection	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
<i>Pima Road/Jomax Road (unsignalized)</i>												
AM Peak	F			F			C	-	-	B	-	
PM Peak	F			F			B	-	-	C	-	
<i>Pima Road/Yearling Road (unsignalized)</i>												
AM Peak	F			F	C	C	-	-	B	-		
PM Peak	F			F	C	B	-	-	C	-		

As noted above, there have been no violations of the 1-hour or 8-hour CO standard since 1984 and 1996, respectively, even as the region has grown substantially, adding more traffic to local roads. In addition, there has been

a continuous downward trend in measured CO concentrations over time and the region continues to meet CO emission standards.

Projects Affecting Intersections with the Highest Traffic Volumes

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

NO - There are two unsignalized intersections within the project limits as shown in Table 2. The three intersections with the highest traffic volumes in the *MAG 2013 Carbon Monoxide Maintenance Plan for the Maricopa County Area, March 2013* are located outside the project limits:

- Priest Drive & Southern Avenue
- 16th Street & Camelback Road
- 107th Avenue & Grand Avenue

Projects Affecting Intersections with the Worst Level of Service

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 maintenance plan?

NO - The three intersections with the worst level of service in the *MAG 2013 Carbon Monoxide Maintenance Plan for the Maricopa County Area, March 2013* are located outside the project limits:

- 7th Avenue & Van Buren Street
- Germann Road & Gilbert Road
- Thomas Road & 27th Avenue

The modeling conducted for the *MAG 2013 Carbon Monoxide Maintenance Plan for the Maricopa County Area*, approved by EPA (effective April 4, 2016), demonstrates continuing maintenance of the CO standard through 2025.

The modeling in that plan used 2025 in the future-year evaluation (*MAG 2013 Carbon Monoxide Maintenance Plan for the Maricopa County Area – Appendices*, page 180ff, March 2013). Based on the Motor Vehicle Emissions Simulator (MOVES) model used at that time (MOVES2010b), the highest 1-hour modeled CO concentration at the six highest intersections identified in the maintenance plan was 0.5 ppm. The highest 8-hour modeled CO concentration at the six intersections was 1.7 ppm which included a background CO concentration of 1.3 ppm.

Based on improved fuel standards and other technological improvements in vehicle operating efficiencies since 2013, including revisions to the MOVES model, it is reasonable to assume that the intersections associated with the proposed project would not exceed the CO NAAQS of 35 ppm (1-hour) or 9 ppm (8-hour) under the 2045 Build alternative.

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**

If the project fits the condition of the “CO Categorical Hot-Spot Finding.”

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

Projects Fitting the Condition of the CO Categorical Hot-Spot Finding (Updated 2/1/23)

If the project’s parameters fall within the acceptable range of modeled parameters, use FHWA 2023 CO Categorical Hot-Spot Finding Spreadsheet Tool:

https://www.fhwa.dot.gov/environment/air_quality/conformity/policy_and_guidance/c_mcf_2023/index.cfm

Under the 2045 Build Alternative the Pima Road/Jomax Road intersection and the Pima Road/Yearling Road intersection fit the conditions of the CO Categorical Hot-Spot Finding. The Categorical Hot-Spot Finding Tool results are included below. Excerpts from the *Pima Road Improvements: Happy Valley Road to Jomax Road Final Traffic Report* (Kimley Horn, January 2023) and other data sources supporting the Categorical Hot-Spot Finding are included as Attachment A.

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)

See discussions above demonstrating compliance with the CO NAAQS and supporting documentation in Attachment A.

Project of Air Quality Concern Determination

Under the 2045 Build Alternative the Pima Road/Jomax Road intersection and the Pima Road/Yearling Road intersection operate at LOS C or better in the AM and PM peak hours. Carbon monoxide monitor values from the JLG Supersite monitor demonstrate low CO concentrations in the area.

Based on this evaluation and supporting documentation included in Attachment A the proposed project is NOT a project of air quality concern and does not require CO hot-spot modeling.

References

Kimley Horn. January 2023. *Pimas Road Improvements: Happy Valley Road to Jomax Road Final Traffic Report*.

Maricopa Association of Governments. 2012. *2012 Five Percent Plan for PM-10 for the Maricopa County Nonattainment Area*.

Maricopa Association of Governments. December 2021. *Regional Transportation Plan: Momentum 2050*.

Maricopa Association of Governments. 2023. *Transportation Improvement Program FY 2022-2025*. <https://azmag.gov/Programs/Transportation/Transportation-Improvement-Program-TIP>.

Categorical Hot-Spot Finding Results: Pima Road/Jomax Road Intersection (2045 Build)

Federal Highway Administration (FHWA) 2023 Carbon Monoxide (CO) Categorical Hot-Spot Finding: Spreadsheet Tool Results							Reset
Parameter	Description	Acceptable Range	Input	Parameters that Vary by Scenario	Description	Acceptable Range (varies based on previous inputs)	Input
Analysis Year	The year when peak emissions are expected from the project when considered with background.	≥ 2022	2025	1-Hour Avg. CO Background Concentration (ppm)	1-hour average concentration in the project area due to other local sources, determined in most cases from local monitoring data as described in Section 4.7.3 of EPA's 1992 CO	≤ 29.8	2.1
Area Type - use drop down to select	An urban area has a population of 5,000 or greater within the FHWA adjusted urban area boundary. All other areas are rural.	Urban or Rural	Urban				
Road Grade (%)	The maximum grade along the approach, as measured from the stop line to a point 100 feet before the stop line along a line parallel to the direction of travel. Enter the maximum grade among the four	≤ 6	2	8-Hour Avg. CO Background Concentration (ppm)	8-hour average concentration in the project area due to other local sources, determined in most cases from local monitoring data as described in Section 4.7.3 of EPA's 1992 CO Guideline.	≤ 4.528	1.3
Truck Percent (%)	The percentage of the total traffic volume that is made up of single unit and combination trucks. Enter the highest truck percentage from all links at the project intersection.	≤ 20	3.9				
Temperature (°F)	Section 4.7.1 of EPA's 1992 CO Guideline allows two methods: 1) temperature corresponding to each of the ten highest non-overlapping 8-hour CO monitoring values for the last 3 years, or 2) average January temperature.	≤ 70	54.9	Output			
Speed (mph)	The average speed approaching the intersection during the peak hour. All intersection approaches must be within the acceptable range.	15-45	35				
Peak Hour Approach Volume (veh/hr)	The volume approaching the intersection during the peak hour. Enter the maximum among the four approaches.	≤ 2640	1877	Scenario	Area Type	Roadway Contribution: 1-Hour CO Concentration (PPM)	Roadway Contribution: 8-Hour CO Concentration (PPM)
Peak Hour Level-of-Service (LOS) - use drop down to select	During the peak hour, the letter representing the quality of service for the entire intersection measured on an A-F scale, with LOS A representing the best operating conditions from the traveler's perspective and LOS F the worst.	A-E	A				
Intersection Angle (degrees)	Enter the smallest angle between the two cross-streets of the intersection (90 degrees is perpendicular).	≥ 75	90	High Grade High Truck	Urban	5.2	4.472
Number of through lanes (one direction) - use drop down to select	The number of lanes approaching the intersection available for vehicles traveling through the intersection without turning. Enter the maximum among the four approaches.	≤ 4	2	Prepared By: Curt Overcast, Newton Environmental Consulting (12/18/23)			
Number of left turn lanes (one direction) - use drop down to select	The number of lanes approaching the intersection that are designated for use only by vehicles making left turns. Enter the maximum among the four approaches.	≤ 2	1				
Lane Width (feet)	The lateral distance between stripes for a single lane. Enter the minimum among all lanes at the intersection.	≥ 10	12	Project Name: Pima Road Improvements: Happy Valley Road to Jomax Road			
Median Width (feet)	The width of the area in the middle of a roadway separating opposing traffic flows.	Any (≥ 0)	0				
Persistence Factor	The factor used to calculate 8-hour concentration estimates from 1-hour concentration estimates, as determined by following Section 4.7.2 of EPA's 1992 CO Guideline.	0-1.0	0.86	Intersection Name: Pima Road/Jomax Road (2045 Build Alternative)			

Categorical Hot-Spot Finding Results: Pima Road/Yearling Road Intersection (2045 Build)

Federal Highway Administration (FHWA) 2023 Carbon Monoxide (CO) Categorical Hot-Spot Finding: Spreadsheet Tool Results

[Reset](#)

Parameter	Description	Acceptable Range	Input	Parameters that Vary by Scenario	Description	Acceptable Range (varies based on previous inputs)	Input												
Analysis Year	The year when peak emissions are expected from the project when considered with background.	≥ 2022	2025	1-Hour Avg. CO Background Concentration (ppm)	1-hour average concentration in the project area due to other local sources, determined in most cases from local monitoring data as described in Section 4.7.3 of EPA's 1992 CO	≤ 29.8	2.1												
Area Type - use drop down to select	An urban area has a population of 5,000 or greater within the FHWA adjusted urban area boundary. All other areas are rural.	Urban or Rural	Urban																
Road Grade (%)	The maximum grade along the approach, as measured from the stop line to a point 100 feet before the stop line along a line parallel to the direction of travel. Enter the maximum grade among the four	≤6	2	8-Hour Avg. CO Background Concentration (ppm)	8-hour average concentration in the project area due to other local sources, determined in most cases from local monitoring data as described in Section 4.7.3 of EPA's 1992 CO Guideline.	≤ 4.528	1.9												
Truck Percent (%)	The percentage of the total traffic volume that is made up of single unit and combination trucks. Enter the highest truck percentage from all links at the project intersection.	≤20	3.9																
Temperature (°F)	Section 4.7.1 of EPA's 1992 CO Guideline allows two methods: 1) temperature corresponding to each of the ten highest non-overlapping 8-hour CO monitoring values for the last 3 years, or 2) average January temperature.	≤ 70	54.9	<table border="1"> <thead> <tr> <th colspan="4">Output</th> </tr> <tr> <th>Scenario</th> <th>Area Type</th> <th>Roadway Contribution: 1-Hour CO Concentration (PPM)</th> <th>Roadway Contribution: 8-Hour CO Concentration (PPM)</th> </tr> </thead> <tbody> <tr> <td>High Grade High Truck</td> <td>Urban</td> <td>5.2</td> <td>4.472</td> </tr> </tbody> </table>				Output				Scenario	Area Type	Roadway Contribution: 1-Hour CO Concentration (PPM)	Roadway Contribution: 8-Hour CO Concentration (PPM)	High Grade High Truck	Urban	5.2	4.472
Output																			
Scenario	Area Type	Roadway Contribution: 1-Hour CO Concentration (PPM)	Roadway Contribution: 8-Hour CO Concentration (PPM)																
High Grade High Truck	Urban	5.2	4.472																
Speed (mph)	The average speed approaching the intersection during the peak hour. All intersection approaches must be within the acceptable range.	15-45	35																
Peak Hour Approach Volume (veh/hr)	The volume approaching the intersection during the peak hour. Enter the maximum among the four approaches.	≤ 2640	1917																
Peak Hour Level-of-Service (LOS) - use drop down to select	During the peak hour, the letter representing the quality of service for the entire intersection measured on an A-F scale, with LOS A representing the best operating conditions from the traveler's perspective and LOS F the worst.	A-E	C																
Intersection Angle (degrees)	Enter the smallest angle between the two cross-streets of the intersection (90 degrees is perpendicular).	≥ 75	90																
Number of through lanes (one direction) - use drop down to select	The number of lanes approaching the intersection available for vehicles traveling through the intersection without turning. Enter the maximum among the four approaches.	≤ 4	2																
Number of left turn lanes (one direction) - use drop down to select	The number of lanes approaching the intersection that are designated for use only by vehicles making left turns. Enter the maximum among the four approaches.	≤ 2	1																
Lane Width (feet)	The lateral distance between stripes for a single lane. Enter the minimum among all lanes at the intersection.	≥ 10	12																
Median Width (feet)	The width of the area in the middle of a roadway separating opposing traffic flows.	Any (≥ 0)	0																
Persistence Factor	The factor used to calculate 8-hour concentration estimates from 1-hour concentration estimates, as determined by following Section 4.7.2 of EPA's 1992 CO Guideline.	0-1.0	0.86	Prepared By:	Curt Overcast, Newton Environmental Consulting (12/18/23)														
				Project Name:	Pima Road Improvements: Happy Valley Road to Jomax Road														
				Intersection Name:	Pima Road/Yearling Road (2045 Build Alternative)														

Attachment A

Supporting Data for FHWA 2023 Carbon Monoxide (CO) Categorical Hot-Spot Finding

- **Analysis Year [The year when peak emissions are expected from the project when considered with background]**

2025 (Interim No-Build Alternative) was used as the year of peak emissions as it is likely that emission rates will continue to improve in future years (that is, 2025 emission rates are likely to be greater than emission rates in 2045 or later).

- **Area Type [An urban area has a population of 5,000 or greater within the FHWA adjusted urban area boundary. All other areas are rural]**

The proposed project is located within the city limits of Scottsdale, Arizona. According to the U.S. Census Bureau the 2022 population of Scottsdale was about 243,000

(<https://www.census.gov/quickfacts/fact/table/scottsdalecityarizona#>, accessed December 18, 2023); therefore, the urban area type was used in the hot-spot tool.

- **Road Grade (%) [The maximum grade along the approach, as measured from the stop line to a point 100 feet before the stop line along a line parallel to the direction of travel. Enter the maximum grade among the four approaches]**

Images of the Pima Road/Yearling Road and Pima Road/Jomax Road intersections are shown below. The topography surrounding each intersection is flat. To be conservative a 2% grade was used in the hot-spot tool.

Pima Road/Yearling Road



Pima Road/Jomax Road



- **Truck Percent (%) [The percentage of the total traffic volume that is made up of single unit and combination trucks. Enter the highest truck percentage from all links at the project intersection]**

The truck percentage used in the hot-spot tool of 3.9% and was derived from Appendix B (Intersection Turning Movement Counts & Average Daily Traffic Counts) of the *Pima Road Improvements: Happy Valley Road to Jomax Road Final Traffic Report* (Kimley Horn, January 2023) shown below.

Pima Road Daily Traffic Volumes & Truck Percentages			
	2022 Existing	2025 Interim Build	2045 Build
Total ADT	22,100	24,200	43,600
Truck ADT (Heavy Trucks & Medium Trucks)	862	944	1,700
Truck %	3.9	3.9	3.9

- **Temperature (°F) [Section 4.7.1 of EPA's 1992 CO Guideline allows two methods: 1) temperature corresponding to each of the ten highest non-overlapping 8-hour CO monitoring values for the last 3 years, or 2) average January temperature]**

Average January temperatures were derived from National Weather Service data as shown below for Scottsdale, Arizona (www.weather.gov). An average January temperature of 54.9 °F was used in the hot-spot tool.

Climate Data for Scottsdale, Arizona (2000-2023)				
Month	Temperature (°F)			Precipitation (inches) Average
	Average Daily	Average Daily Maximum	Average Daily Minimum	
January	54.9	66.5	43.4	1.05

Source: National Weather Service, 2023

- **Speed (mph) [The average speed approaching the intersection during the peak hour. All intersection approaches must be within the acceptable range]**

The posted speed limit on Pima Road is 50 mph. The average speed during the peak hour would likely be lower due to higher traffic volumes approaching the intersections during the peak hour. To be conservative, a speed limit of 35 mph was used in the hot-spot tool evaluation.

- **Peak Hour Approach Volume (veh/hr) [The volume approaching the intersection during the peak hour. Enter the maximum among the four approaches]**

The maximum peak hour approach volumes at the Pima Road/Jomax Road and the Pima Road/Yearling Road intersections were derived from Figure 7 (2045 Weekday AM Peak Hour Volumes) and Figure 8 (2045 Weekday PM Peak Hour Volumes) of the *Pima Road Improvements: Happy Valley Road to Jomax Road Final Traffic Report* (Kimley Horn, January 2023) as shown in the images below. The maximum approach volume at the Pima Road/Jomax Road intersection of 1,877 vehicles per hour (northbound approaches, PM peak hour) was used in the hot-spot tool. The maximum approach volume at the Pima Road/Yearling Road intersection of 1,917 vehicles per hour (southbound approaches, AM peak hour) was used in the hot-spot tool.

Figure 7. 2045 Weekday AM Peak Hour Volumes

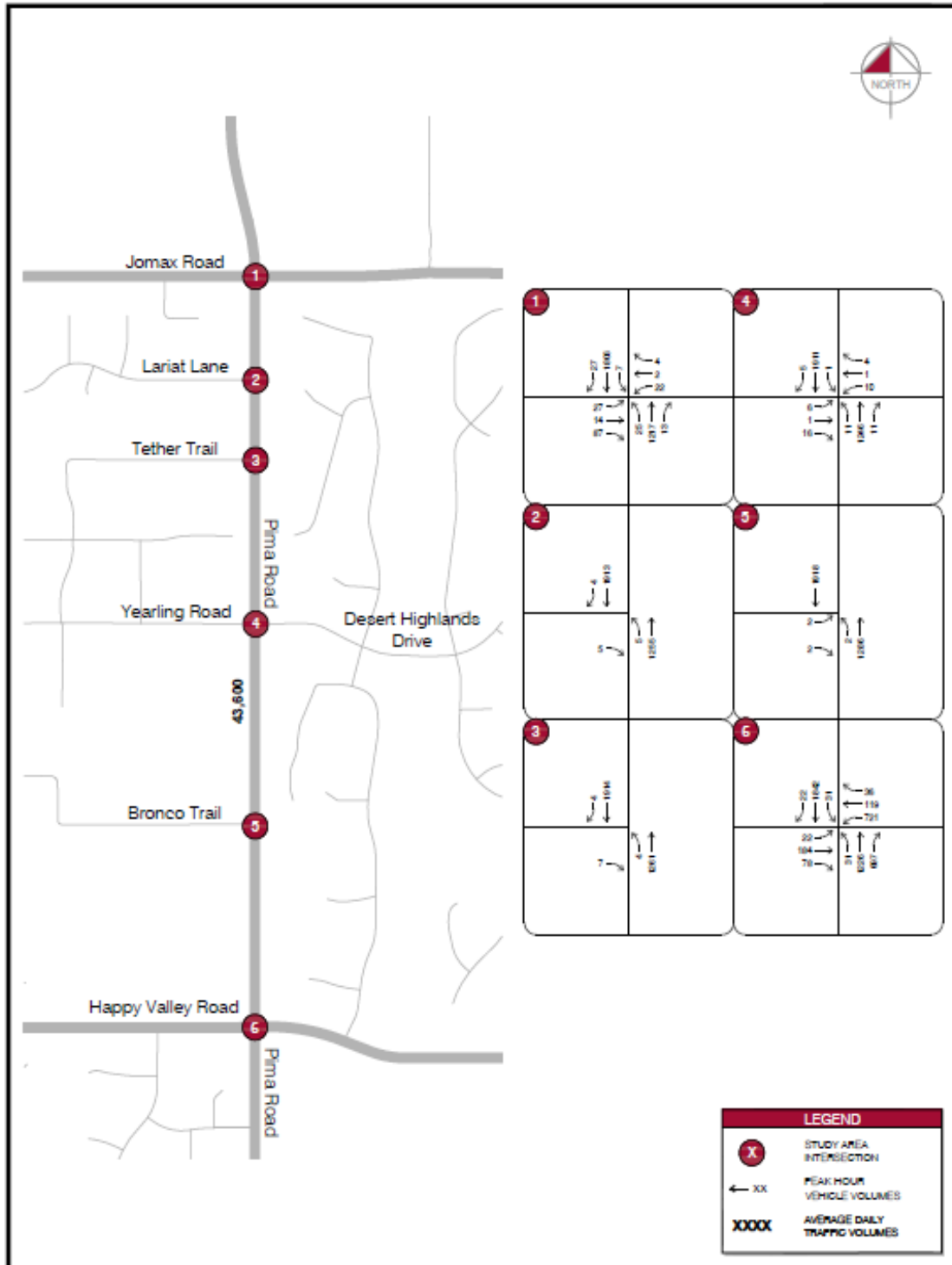
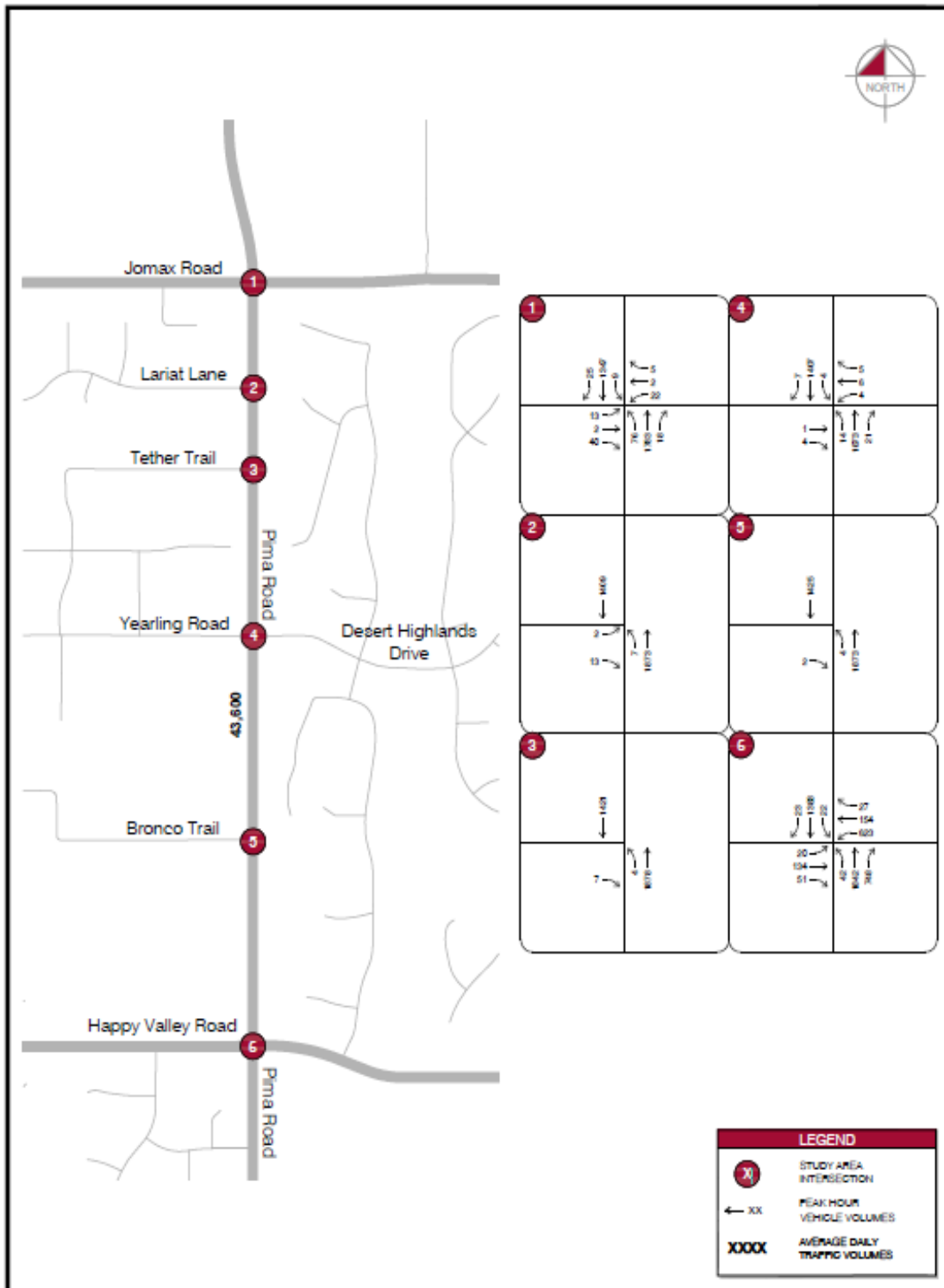


Figure 8. 2045 Weekday PM Peak Hour Volumes



- **Peak Hour Level-of-Service (LOS) [During the peak hour, the letter representing the quality of service for the entire intersection measured on an A-F scale, with LOS A representing the best operating conditions from the traveler's perspective and LOS F the worst]**
As shown in Table 2 of the Consultation Document (Intersection Level of Service and Peak Hour Volumes), the Pima Road/Jomax Road intersection operates at LOS A under the 2045 Build Alternative in both the AM and PM peak hours. The Pima Road/Yearling Road intersection operates at LOS C under the 2045 Build Alternative in the AM and PM peak hours.
- **Intersection Angle (degrees) (Enter the smallest angle between the two cross-streets of the intersection (90 degrees is perpendicular))**
As shown in the images above under Road Grade (%), both Jomax Road and Yearling Road intersect Pima Road at 90 degrees. 90 degrees was used as the intersection angle in the hot-spot tool evaluation.
- **Number of through lanes (one direction) [The number of lanes approaching the intersection available for vehicles traveling through the intersection without turning. Enter the maximum among the four approaches]**
As discussed in the Project Setting and Description section of the Consultation Document, following construction of the project Pima Road will continue to accommodate two through traffic lanes at the Pima Road/Jomax Road and Pima Road/Yearling Road intersections.
- **Number of left turn lanes (one direction) [The number of lanes approaching the intersection that are designated for use only by vehicles making left turns. Enter the maximum among the four approaches]**
A maximum of one left- turn lane will be included at the Pima Road/Jomax Road and Pima Road/Yearling Road intersections.
- **Lane Width (feet) [The lateral distance between stripes for a single lane. Enter the minimum among all lanes at the intersection]**
A standard lane width of 12 feet was used in the hot-spot evaluation tool.
- **Median Width (feet) (The width of the area in the middle of a roadway separating opposing traffic flows.)**
There would be no median separating travel lanes under the 2045 Build Alternative. A median width of 0 feet was used in the hot-spot evaluation tool.
- **Persistence Factor [The factor used to calculate 8-hour concentration estimates from 1-hour concentration estimates, as determined by following Section 4.7.2 of EPA's 1992 CO Guideline]**
For a separate project in Maricopa County in a more urbanized location, the Maricopa County Air Quality Department calculated a persistence factor of 0.86. To be conservative, the higher calculated persistence factor of 0.86 was used in the hot-spot tool evaluation.

- **1-Hour Avg. CO Background Concentration (ppm) [1-hour average concentration in the project area due to other local sources, determined in most cases from local monitoring data as described in Section 4.7.3 of EPA's 1992 CO Guideline]**

8-Hour Avg. CO Background Concentration (ppm) [8-hour average concentration in the project area due to other local sources, determined in most cases from local monitoring data as described in Section 4.7.3 of EPA's 1992 CO Guideline]

There are no CO monitors near the project corridor (CO monitors range from about 19 miles to more than 25 miles from the corridor). The nearest CO monitor is the JLG Supersite (4530 N. 17th Avenue) about 19 miles southwest of project corridor. The highest monitored 1-hour and 8-hour concentrations from the JLG Supersite were used in the hot-spot evaluation.

Carbon Monoxide Monitors Near Pima Road Project Location				
Monitor	Approximate Distance to Pima Road Project Location (miles)	2020 Maximum CO Concentration (1-hour/8-hour)	2021 Maximum CO Concentration (1-hour/8-hour)	2022 Maximum CO Concentration (1-hour/8-hour)
JLG Supersite (4530 N. 17 th Avenue)	19.0 miles SW	2.1/1.7	1.9/1.9	2.0/1.6
Source: US EPA AirData (https://www.epa.gov/outdoor-air-quality-data/monitor-values-report , accessed December 19, 2023) Values in Red - highest 1-hour and 8-hour CO concentrations over the 2020 to 2022 timeframe Concentrations shown in parts per million (ppm)				

Output

Based on the inputs to the CO Categorical Hot-Spot Finding Tool described above, CO concentrations at each intersection were as follows:

CO Categorical Hot-Spot Tool Results		
Intersection	1-hour CO Concentration	8-hour CO Concentration
Pima Road/Jomax Road	5.2	4.472
Pima Road/Yearling Road	5.2	4.472

The 1-hour and 8-hour CO concentrations were less than the applicable NAAQS.