ADOT Environmental Planning

Project Level CO Hot-Spot Analysis Questionnaire

Project Setting and Description

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

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

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

The scope of work for the project consists of:

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

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

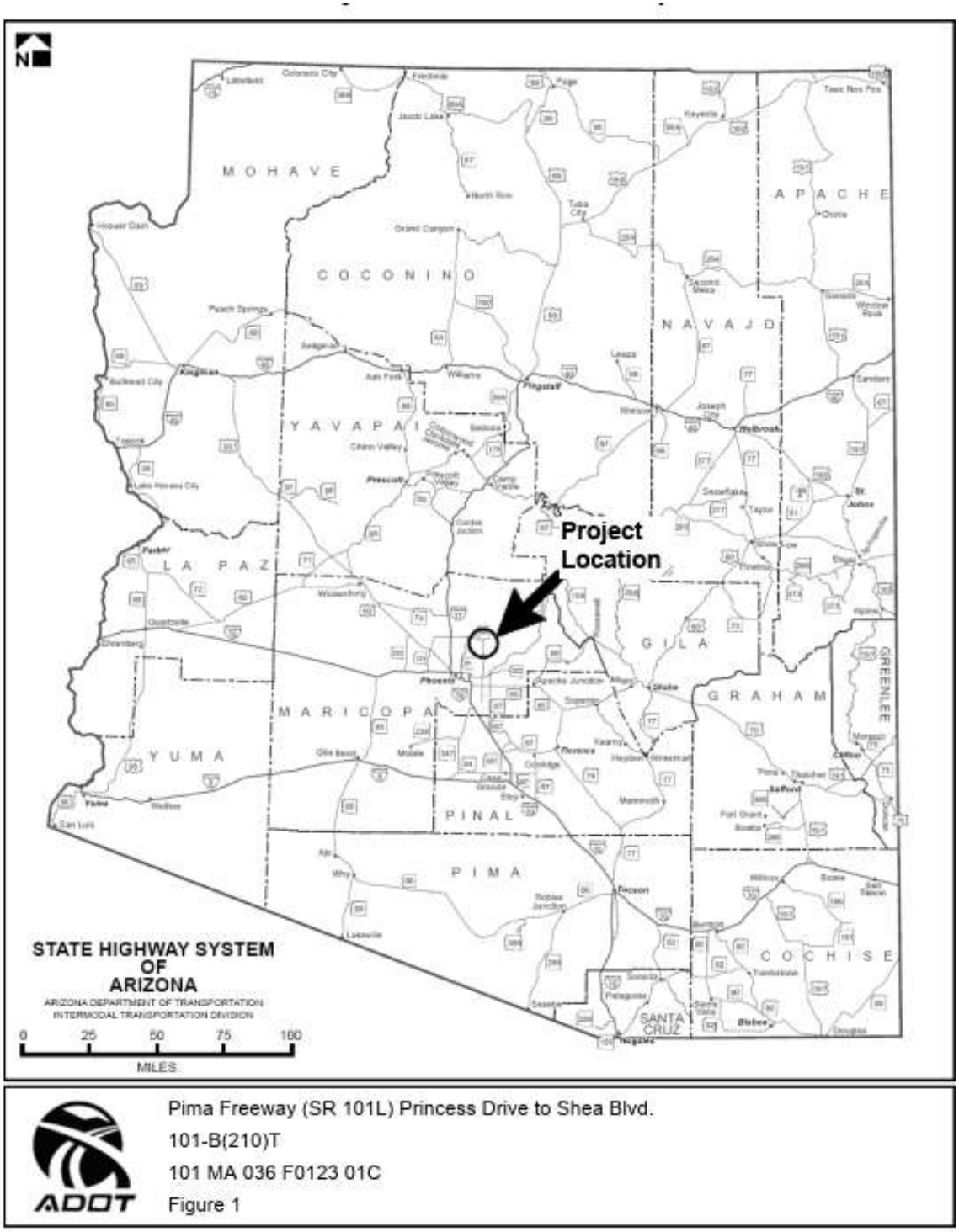
The project would occur within the existing ADOT right-of-way (R/W) through private lands, and ADOT easement through land held in trust by the Arizona State Land Department, and public lands under the management of the US Bureau of Reclamation. Approximately one acre of new R/W and temporary construction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

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

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

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

Figure 1. Project Location Map



ADOT Environmental Planning

Figure 2a. Project Details

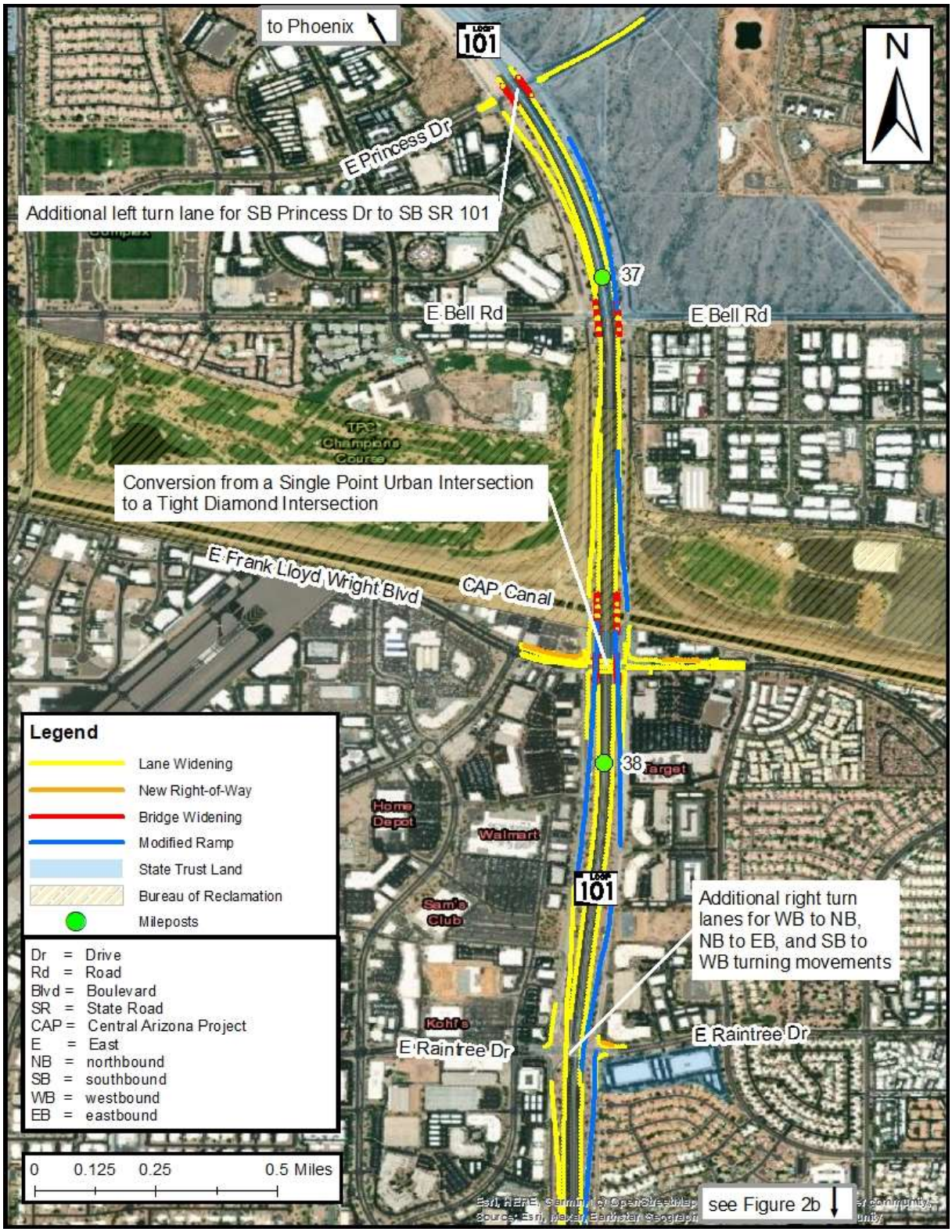
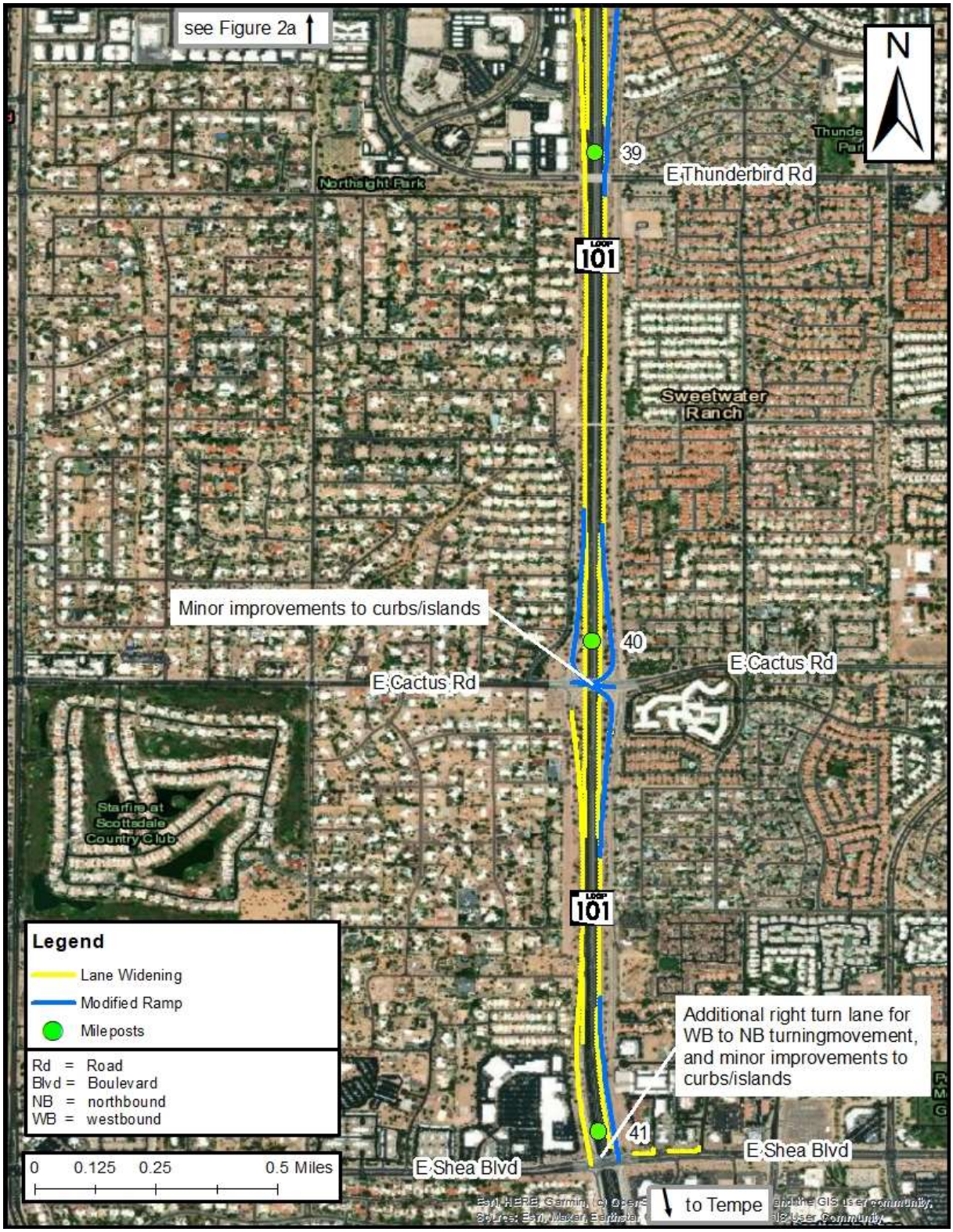


Figure 2b. Project Details



Project Assessment – Part A

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

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

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

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

Projects Affecting CO Sites of Violation or Possible Violation

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

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

Projects with Congested Intersections

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

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

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

Design Concept Report Summary

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

Table 1. 2040 LOS and Traffic Volumes

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

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

Updated 2050 Evaluation

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

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

Table 2. 2050 LOS and Traffic Volumes

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

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

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

Projects Affecting Intersections with Highest Traffic Volumes

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

*Three Highest Intersections in Current Plans

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

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

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

Projects Affecting Intersections with the Worst Level of Services

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

*Three Worst LOS Intersections in Current Plans

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

[1]Same as above

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

Project Assessment – Part B

Hot-Spot Determination

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

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

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

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

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

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

- **Or**

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

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

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

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

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

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

- **Or**

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

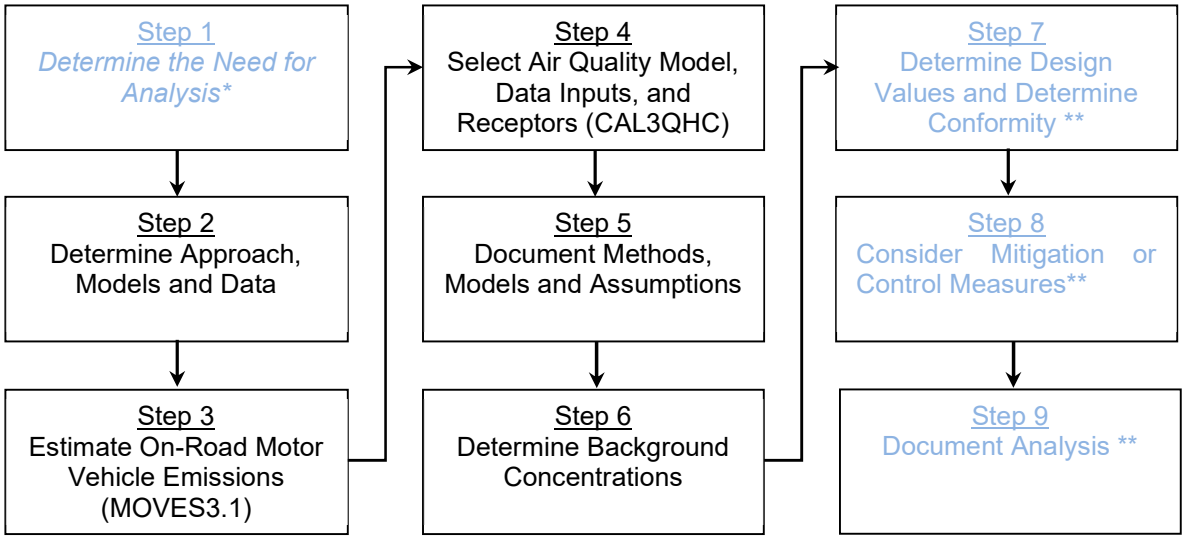
  ☐ Check **If** there is an Air Quality Report that does not include CO modeling for NEPA EA/EIS use this report to satisfy (ii)

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

Project Level CO Quantitative Hot-Spot Analysis – Consultation Document

Completing a Carbon Monoxide (CO) Hot-Spot Analysis

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



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

Step 2: Determine the Approach, Models, and Data

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

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

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

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

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

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

Step 5: Document Methods, Models and Assumptions

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

Step 6: Determine Background Concentrations

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

Step 7: Calculate Design Values and Determine Conformity

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

Step 8: Consider Mitigation or Control Measures

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

Step 9: Document Analysis

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

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

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

Approach, Models, and Data (Step 2)

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

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

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

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

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

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

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

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

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

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

Methods, Models and Assumptions for CO

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

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

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

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

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

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

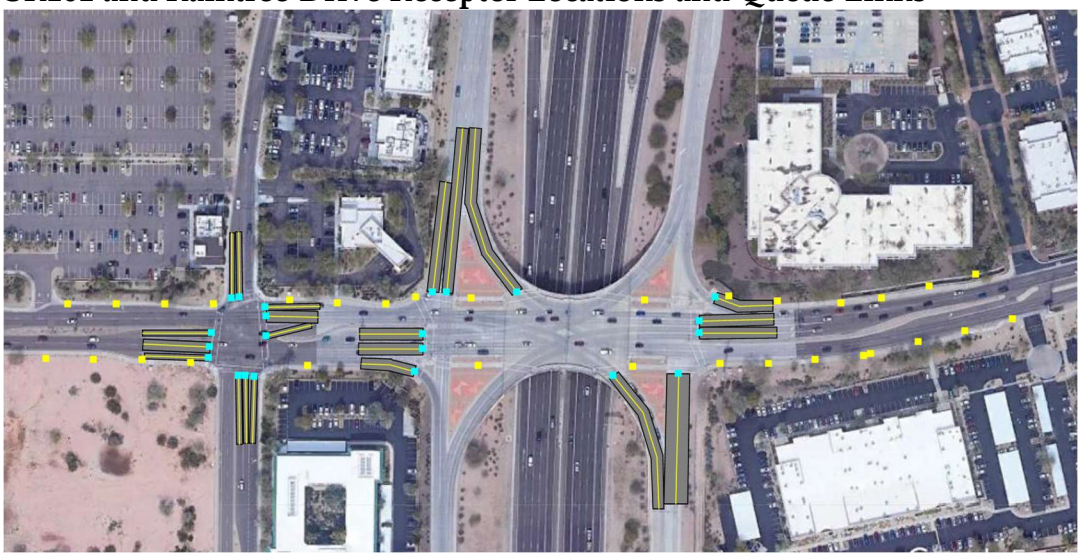
Table 3. Construction Emissions *(Only if Applicable)*		
Construction Emissions	Construction Emissions need to be addressed if construction lasts longer than 5 years at any individual site. In the context of CO, this is usually excess CO emissions due to traffic delay and/or detours.	40CFR93.123(c)(5)"Each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

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

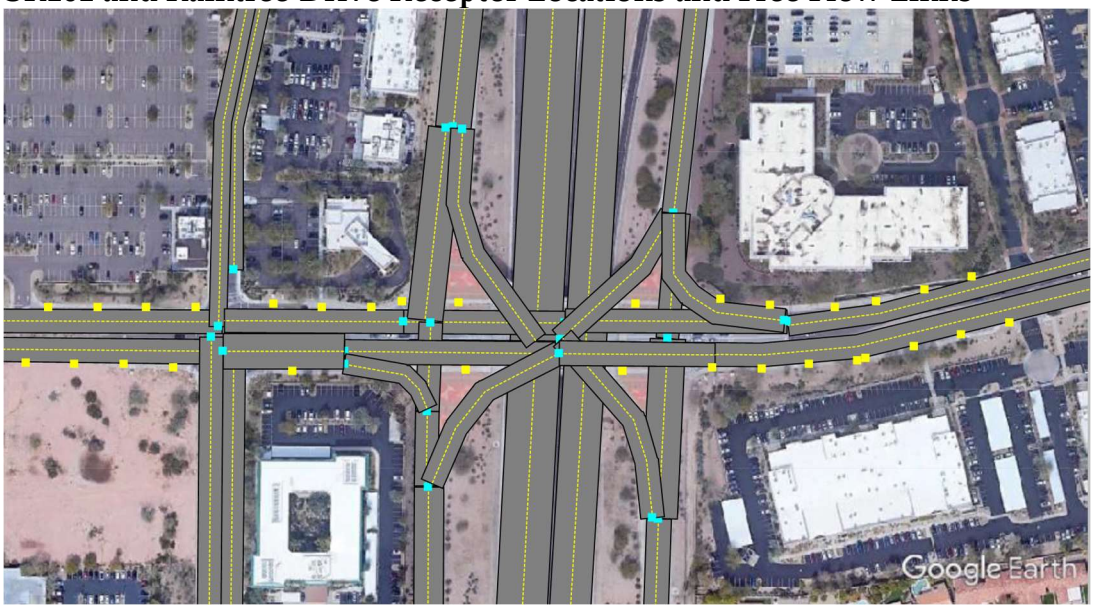
The following graphics present the preliminary link configurations and receptor placements for the
three intersections that will be modeled as part of the CO hot-spot analysis in CAL3QHC. The following applies to all figures:

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

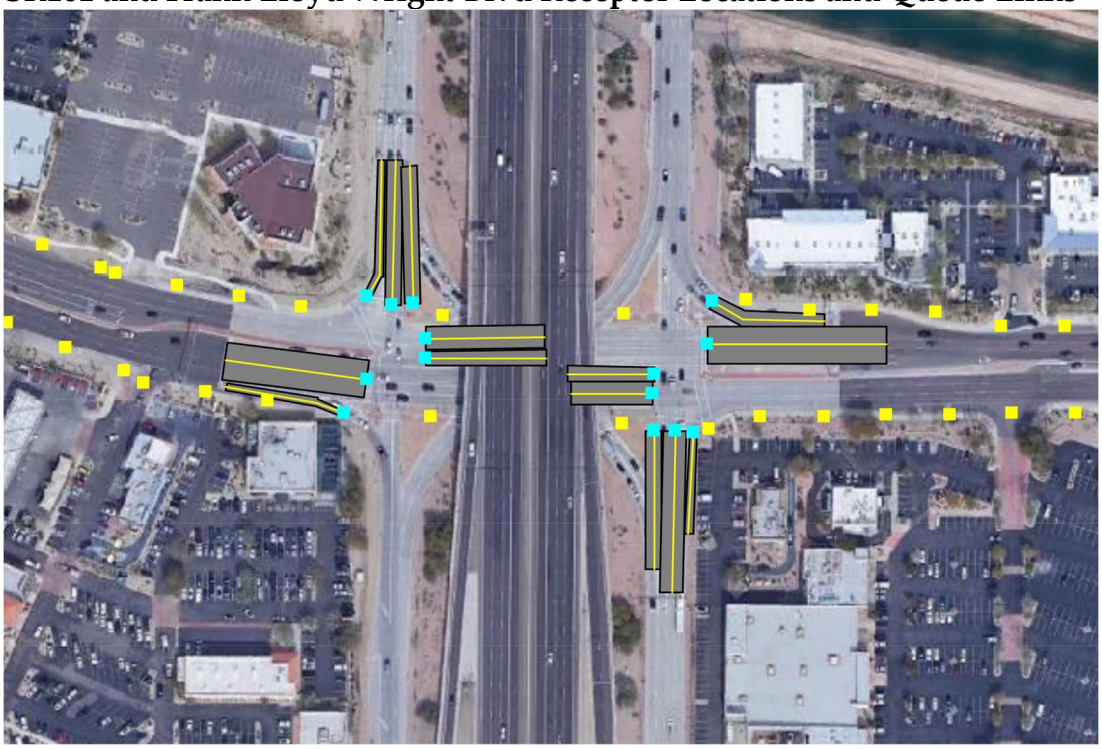
SR101 and Raintree Drive Receptor Locations and Queue Links



SR101 and Raintree Drive Receptor Locations and Free Flow Links



SR101 and Frank Lloyd Wright Blvd Receptor Locations and Queue Links

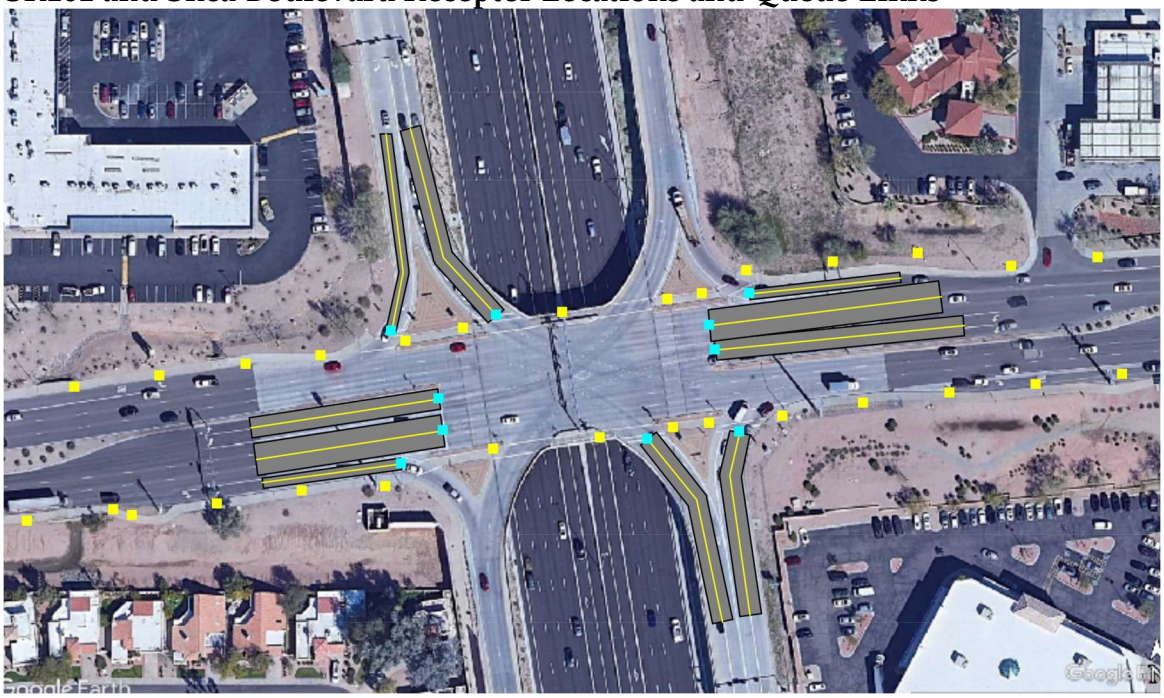


SR101 and Frank Lloyd Wright Blvd Receptor Locations and Free Flow Links

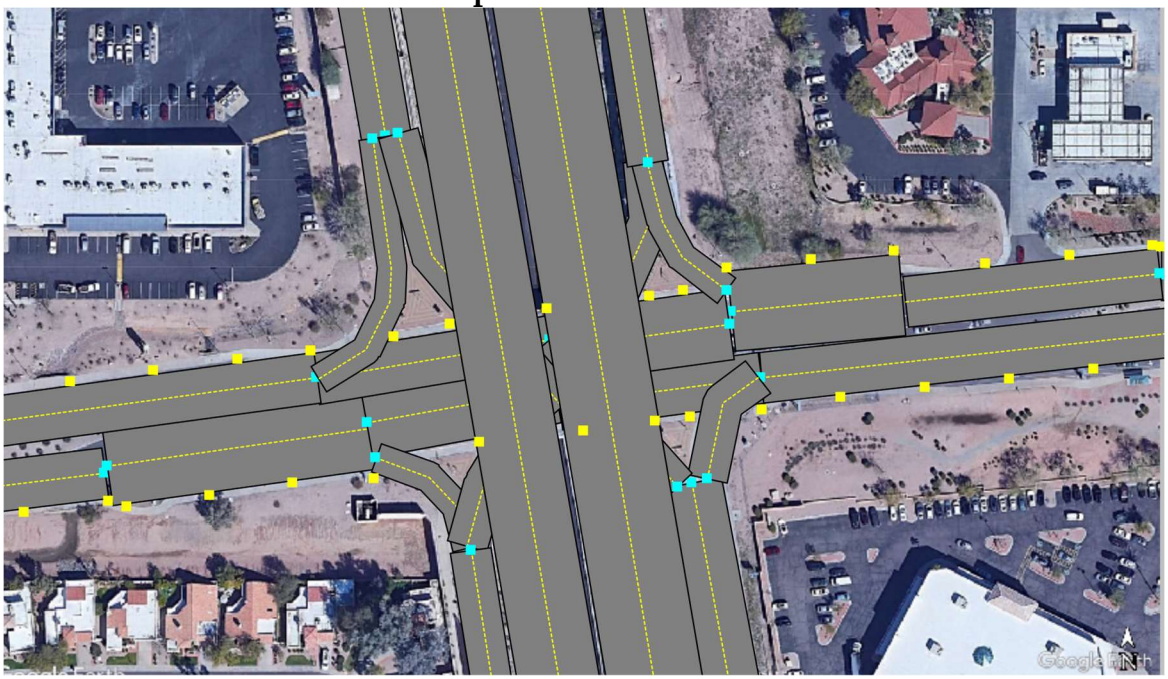
SR101 and Pima Road Receptor Locations and Queue Links

SR101 and Pima Road Receptor Locations and Free Flow Links

SR101 and Shea Boulevard Receptor Locations and Queue Links



SR101 and Shea Boulevard Receptor Locations and Free Flow Links



Proposed Background Monitor Located in Central Phoenix

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

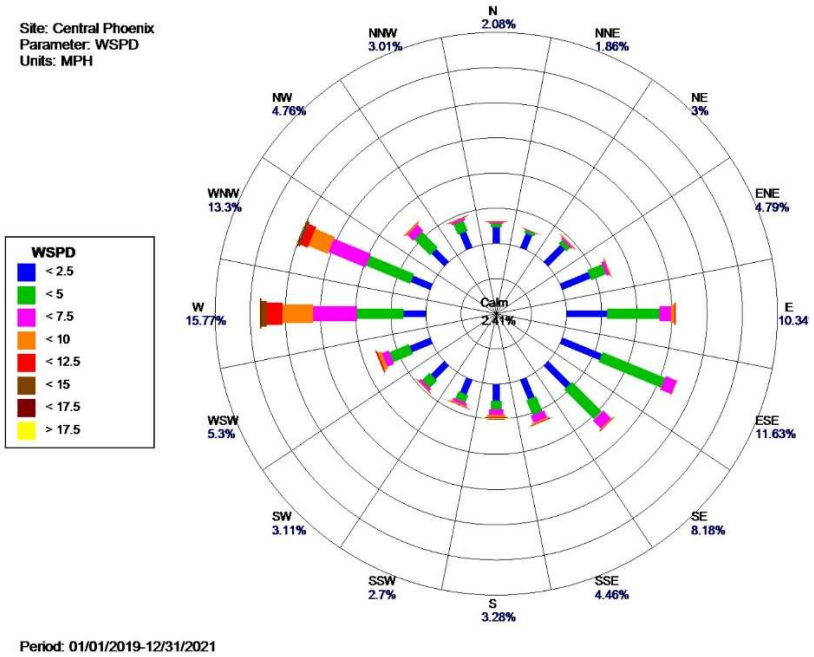
Central Phoenix (CP) (04-013-3002)

Site Location 19th St. & Roosevelt St., Phoenix

Spatial Scale Neighborhood

Site Type Population Exposure for CO, O_3, and PM_{10} Highest Concentration for NO_2 and SO_2

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



Agency Comments from Consultation on October 31, 2022

Gmail

Beverly Chenausky <bchenausky@azdot.gov>

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

1 message

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

FHWA reviewed the documents and we have the following comments:

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

1. NB SR 101 & Pima (PM Peak)

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

3. SR 101 & Raintree (AM Peak)

4. SR 101 & Shea (PM Peak)

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

Thanks, Rebecca

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

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

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

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

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

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

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

Beverly T. Chenausky

Assistant Environmental Administrator

Air & Noise, Hazmat and Standards & Training

205 South 17th Avenue, MD EM02
Phoenix, AZ 85007
C: 480.390.3417

azdot.gov

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

1 message

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

Hi Beverly,

I hope you doing well!

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

PM Consultation

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

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

CO Consultation

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

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

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

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

Have a great rest of the night,

Lindsay

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

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

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

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

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

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

Beverly T. Chenausky

Assistant Environmental Administrator

Air & Noise, Hazmat and Standards & Training

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

Project Setting and Description

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

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

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

The scope of work for the project consists of:

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

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

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

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

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

Figure 1. Project Location Map

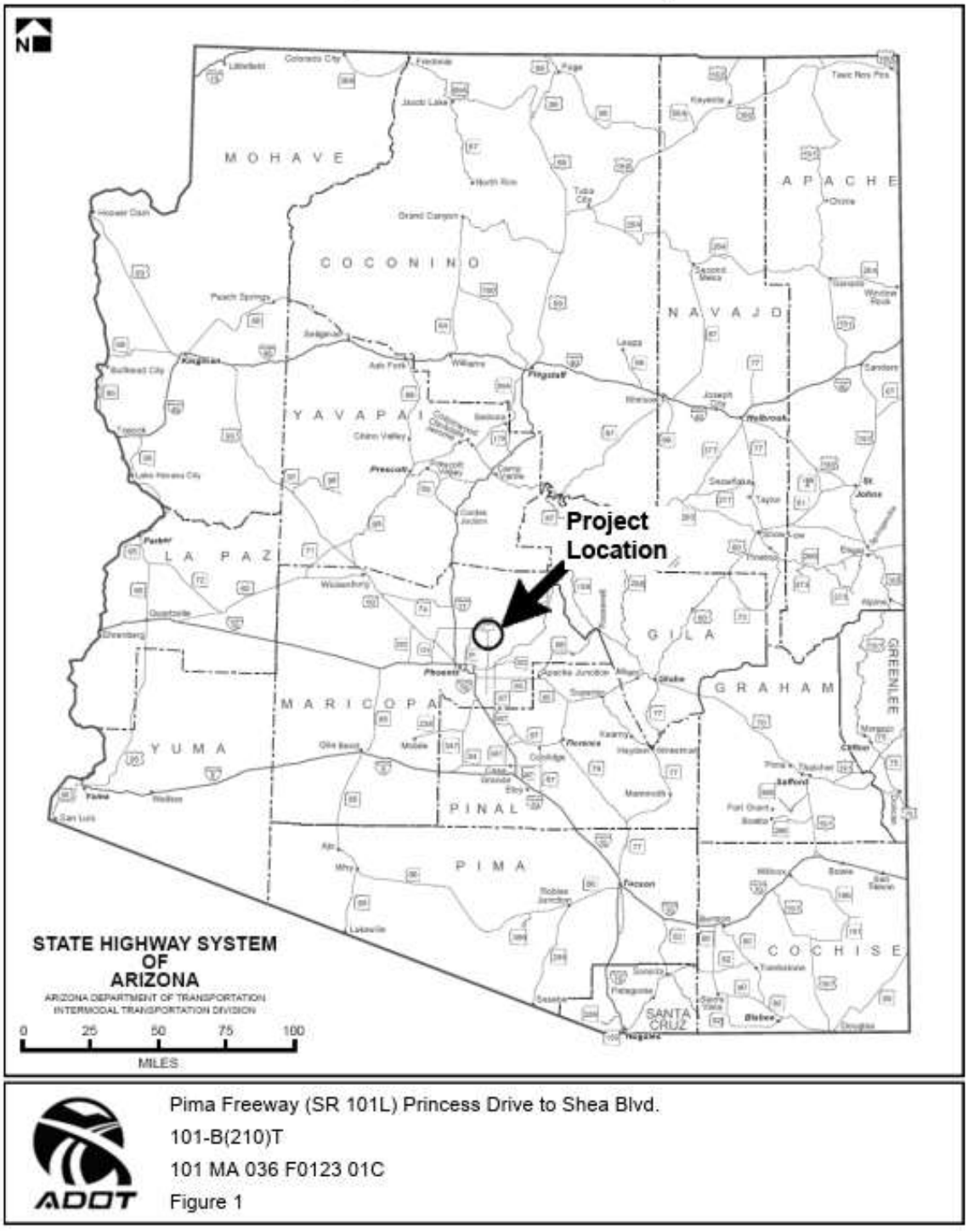


Figure 2a. Project Details

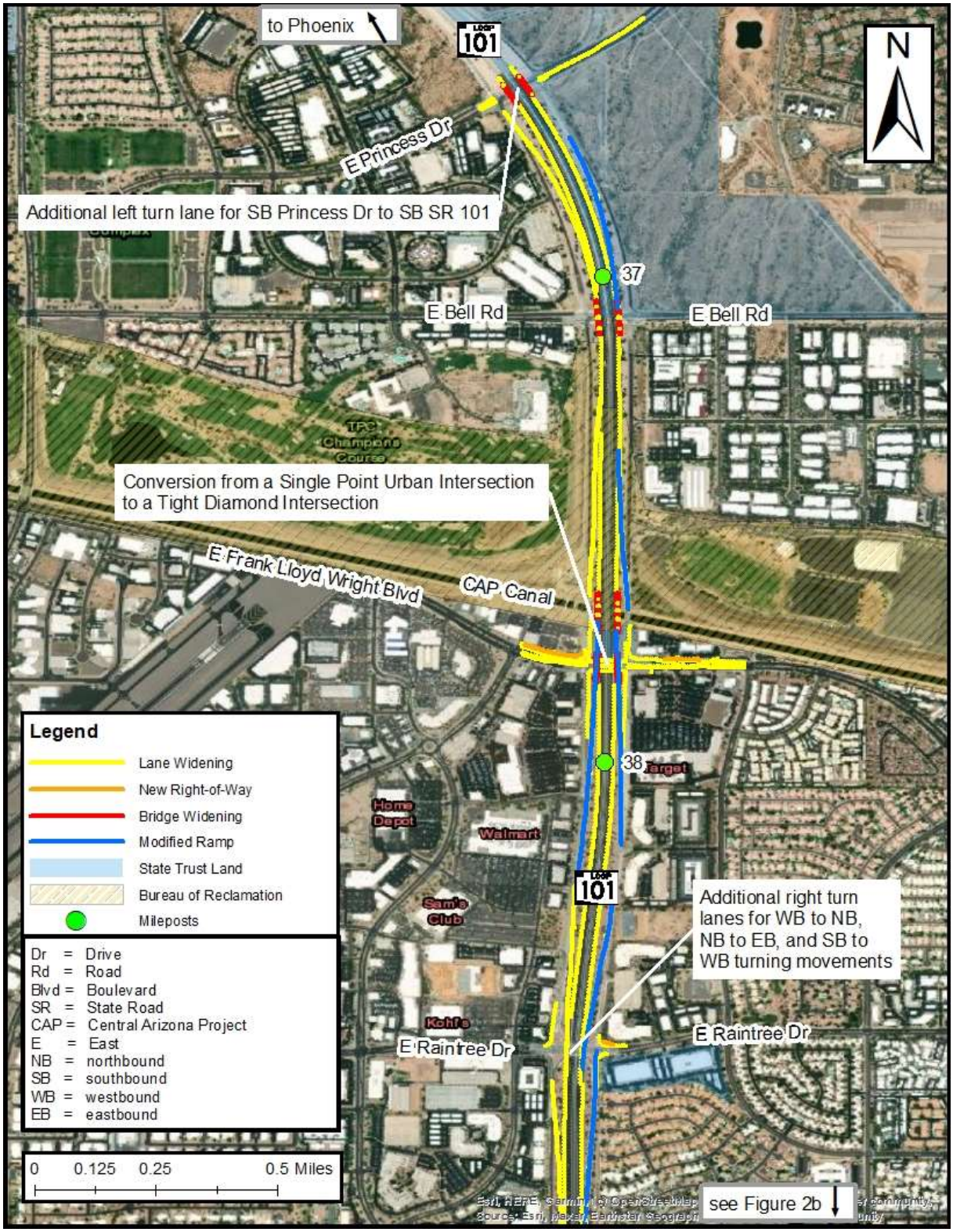
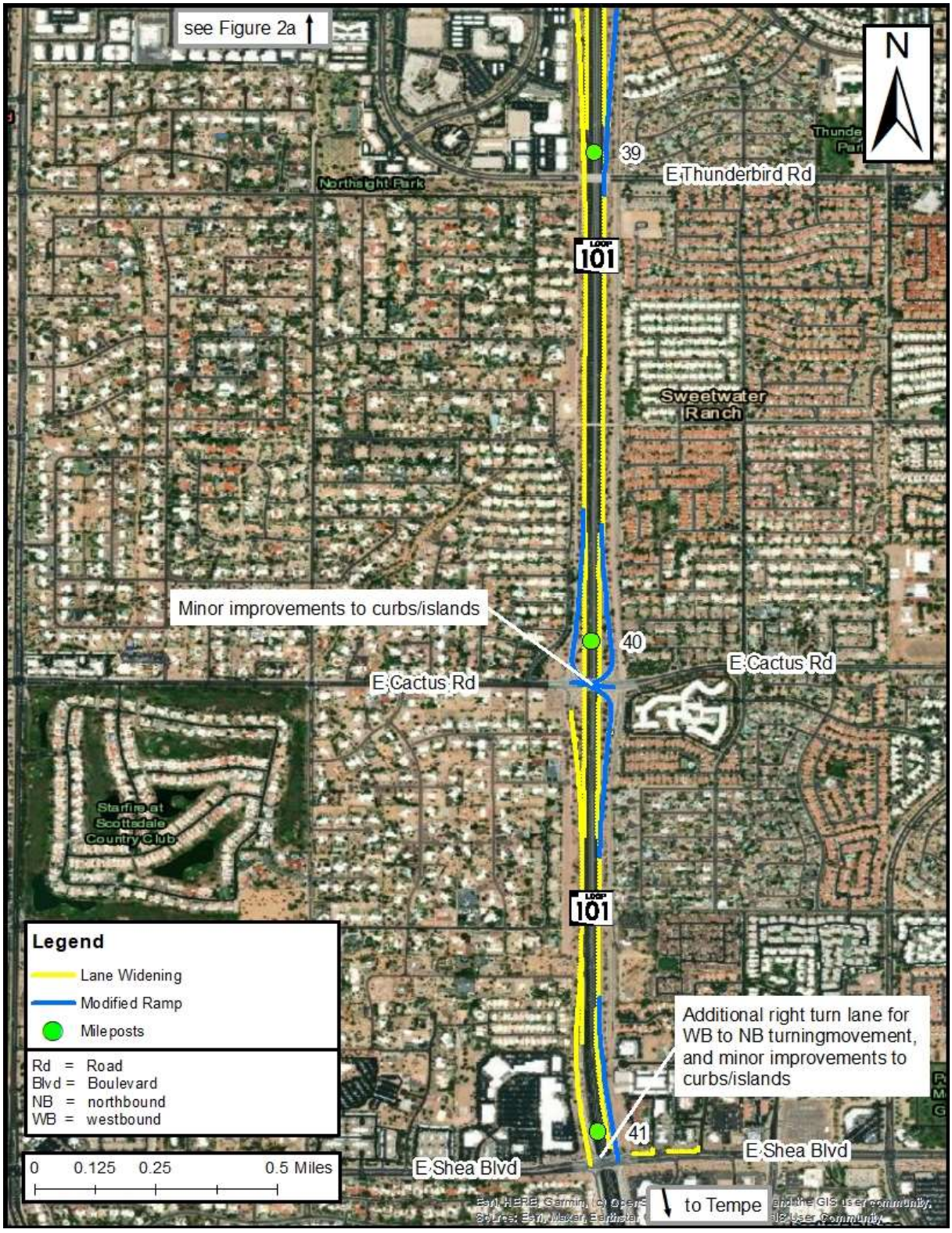


Figure 2b. Project Details



Project Assessment

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

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

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

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

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

New Highway Capacity

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

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

NO – This project is not a new highway project.

Expanded Highway Capacity

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

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

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

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

Table 1. AADT and Truck Percentage

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

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

Projects with Congested Intersections

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

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

Table 2. Intersection LOS Summary

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

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

New Bus and Rail Terminals

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

NO – These facilities are not included in the project.

Expanded Bus and Rail Terminals

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

NO – These facilities are not included in the project.

Projects Affecting PM Sites of Violation or Possible Violation

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

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

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

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

POAQC Determination

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

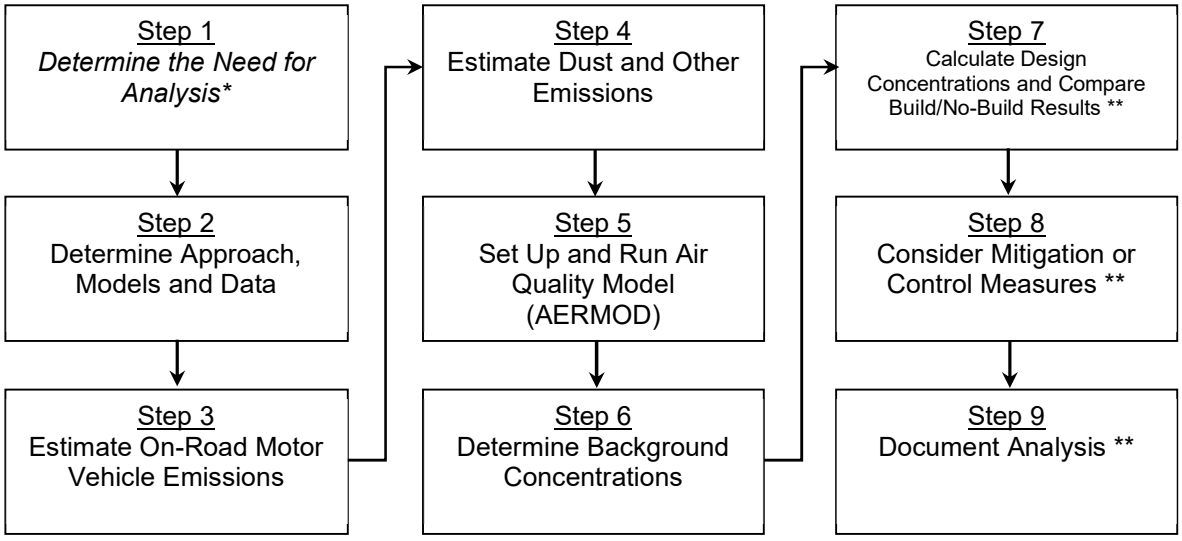
i. This an expanded highway projects that has a significant increase in the number of diesel vehicles
ii. This a project that affects a congested intersection (LOS D or greater) that has a significant number of diesel trucks

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

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

Completing a Particulate Matter (PM) Hot-Spot Analysis

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



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

Step 2: Determine the Approach, Models, and Data

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

Step 3: Estimate On-Road Motor Vehicle Emissions

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

Step 4: Estimate Dust and Other Emissions

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

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

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

Step 6: Determine Background Concentrations

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

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

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

Step 8: Consider Mitigation or Control Measures

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

Step 9: Document Analysis

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

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

Interagency Consultation

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

Table 1. Methods, Models and Assumptions

Estimate On-Road Motor Vehicle Emissions (Step 3) – Modeling highways and/or intersections for PM10 (Contact ADOT if modeling off-network data such as terminals and parking lots or performing a PM2.5 analysis)		
MOVES3.1	**Description**	**Reference**

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

Age Distribution	*Provided by MAG; same for build and no-build scenarios.*	EPA Hot Spot Guidance Section 4.5.2
Fuel	*Same for build and no-build scenarios. Fuel files provided by MAG and used in the latest regional conformity analysis will be used.*	EPA Hot Spot Guidance Section 4.5.3, PM hot-spot training slides Module 2
I/M Programs	*No impact on PM emissions.*	EPA Hot Spot Guidance Section 4.5.4
Retrofit Data	*If necessary; not needed for the project.*	Project specific modeling EPA Hot Spot Guidance Section 4.5.5
Links	*Unique inputs needed for each run. Requires information on each link's length (in miles), traffic volume (vehicle per hour), average speed (miles per hour) and road grade (percent).*	EPA Hot Spot Guidance Section 4.5.6 & Appendix D
Link Source Types	*Unique inputs needed for each run. Information provided by MAG and used in the latest regional conformity analysis will be used.*	EPA Hot Spot Guidance Section 4.5.7
Link Drive Schedules, Operating Mode Distribution	*Not used; average speed and road type will be provided through the Links Importer.*	EPA Hot Spot Guidance Section 4.5.8
Off-Network, Hoteling, Generic	*If necessary; not needed for the project.*	EPA Hot Spot Guidance Section 4.5.9
Estimate Dust and Other Emissions (Step 4) (AP-42 emission factors below should be based on SIP or Regional Conformity Analysis provided by ADEQ, MAG, PAG or YMPO depending on the project's location)		
AP-42, Fifth Edition, 2011	**Description**	**Reference**
Average Weight Vehicles	*Freeways 3.83 tons in 2025, 3.87 tons in 2030, 3.97 tons in 2040, and 4.08 tons in 2050. Arterials 2.48 tons in 2025, 2.49 tons in 2030, 2.48 tons in 2040, and 2.48 tons in 2050*	Conformity Analysis for the FY 2022-2025 MAG TIP and the Momentum 2050 RTP
Silt Loading	*Section 13.2.1 Paved Roads from AP 42 will be used, consistent with the regional analysis from MAG. Emission factors for road and construction dust should be added to the emission factors generated for each link by MOVES3.1. Ex. Silt loading – Freeways .02 g/m^2, Arterials >10,000 ADT .067g/m^2, Low traffic roads <10,000 ADT .23g/m^2.*	EPA Hot Spot Guidance Section 6, When estimating emissions of re-entrained road dust from paved roads, site-specific silt loading data must be consistent with the data used for the project's county in the regional emissions analysis (40 CFR 93.123(c)(3)).
Construction Dust	*Construction Dust is temporary and will not be included. There are no other sources (e.g., locomotives) that need to be considered.*	EPA Hot Spot Guidance Section 6.5
Precipitation	*An average of 32 days with at least .01 inch of precipitation (based on 2008-2012 precipitation data from Phoenix Sky Harbor Airport) will be used consistent with the regional conformity analysis.*	Conformity Analysis for the FY 2022-2025 MAG TIP and the Momentum 2050 RTP

Set Up and Run Air Quality Model (AERMOD) (Step 5)		
AERMOD v.22112	**Description**	**Reference**
Model Setup (CO Pathway)	*Control Pathway defines the primary model settings.*	EPA Hot Spot Guidance Section 7.1, 7.2 & Appendix J, AERMOD User's Guide Section 2.3.2 & 3.2
TITLEONE	*Model title*	
MODELOPT	*CONC FLAT*	Modeling Concentrations and Flat Terrain
AVERTIME	*24*	Average across each 24-hour period from the available met data
URBANOPT	*Population for Urban Area*	
FLAGPOLE	*1.8*	
POLLUTID	*PM10*	
Source Types and Characters (SO Pathway)	*A highway "line source" can be modeled using a series of adjacent line/area sources. A series of adjacent line/area sources will be used to represent the project.*	EPA Hot Spot Guidance Section 7.3, 7.4 & Appendix J.2, J.3, AERMOD User's Guide Section 2.3.3 & 3.3
LOCATION	*Srcid Srctyp Xs Ys (Zs)*	LINE AREA Source parameters
SRCPARAM	*Srcid Aremis Relhgt Xinit (Yinit) (Angle) (Szinit)*	LINE AREA Source parameters
URBANSRC	*Srcid*	Urban source IDs
EMISFACT	*Emission rate=1, Use SEASHR or HROFDY*	Total 16 MOVES run=4 seasons x 4 time periods to 96 factors (4 seasons/24 hours) See PM hot-spot training slides (FHWA, 2022). This was updated in EPA Hot Spot Guidance Section 4.3.1. Project without gasoline start activity shall use 4 total MOVES runs=1 season x 4 time periods)
SRCGROUP	*GroupID or All*	
Meteorological Data (ME Pathway)	*The meteorological data will be based on pre-processed met files from ADEQ.*	EPA Hot Spot Guidance Section 7.5, Appendix J.4, AERMOD User's Guide Section 2.3.5 & 3.5
SURFFILE	*Surface file name*	*.sfc
PROFFILE	*Profile (upper air) file name*	*.pfl
SURFDATA	*Surface data station*	
UAIRDATA	*Upper air data station*	
PROFBASE	*Met data station elevation*	
Run Met Pre-Processor	*Not needed; pre-processed met files available from ADEQ.*	AERMET User's Guide (for AERMOD)
Urban or Rural Sources	*Specifications for URBANOPT (CO Pathway) and URBANSRC (SO Pathway)*	EPA Hot Spot Guidance Section 7.5.5 & Appendix J.4, AERMOD Implementation Guide, Section 7.2.3 of Appendix W to 40 CFR Part 51
Receptors (RE Pathway)	*Receptors should begin 5 m from roadway edge, extending up to 105 m (or further if*	EPA Hot Spot Guidance Section 7.6,

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

Table 2. Proposed Inputs, Parameters and Data Sources

Estimate On-Road Motor Vehicle Emissions (Step 3)		
MOVES3.1	**Input**	**Data Source/Detail**
Scale	Onroad, Project Scale and Inventory	MAG June 2022 Regional Conformity Data (Published July, 2022)

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

Estimate Dust and Other Emissions (Step 4)		
AP-42, Fifth Edition, 2011	**Parameter**	**Data Source/Detail**
Average Weight Vehicles	Freeways 3.83 tons in 2025, 3.87 tons in 2030, 3.97 tons in 2040, and 4.08 tons in 2050. Arterials 2.48 tons in 2025, 2.49 tons in 2030, 2.48 tons in 2040, and 2.48 tons in 2050	Conformity Analysis for the FY 2022-2025 MAG TIP and the Momentum 2050 RTP
Silt Loading	Freeways .02 g/m^2, Arterials >10,000 ADT .067g/m^2, Low traffic roads <10,000 ADT .23g/m^2	Conformity Analysis for the FY 2022-2025 MAG TIP and the Momentum 2050 RTP
Construction Dust	Construction Dust is temporary and will not be included. There are no other sources (e.g., locomotives) that need to be considered.	EPA Hot Spot Guidance Section 6.5
Precipitation	In 2008-2012 SIP/Regional Conformity used average of 32 days with at least .01 inch of precipitation County	2008-2012 SIP/Regional Conformity Analysis
Set Up and Run Air Quality Model (AERMOD) (Step 5)		
AERMOD v.22112	**Parameter**	**Data Source/Detail**
Model Setup (CO Pathway)		
TITLEONE	SR101 and Shea Blvd SR101 and Frank Lloyd Blvd	Specific to each intersection modeled
MODELOPT	CONC FLAT	Modeling Concentrations and Flat Terrain
AVERTIME	1 24 PERIOD	Average across each 1-hour period, 24-hour period, and the full 5 year period from the available met data
URBANOPT	242753	Population of Scottsdale, AZ
FLAGPOLE	1.8	
POLLUTID	PM-10	
Source Types and Characters (SO Pathway)		
LOCATION	Srcid Srctyp Xs Ys (Zs)	LINE AREA: Line Source Represented by Area Sources
SRCPARAM	Srcid Aremis Relhgt Xinit (Yinit) (Angle) (Szinit)	LINE AREA: Line Source Represented by Area Sources
URBANSRC	ALL	All urban source
EMISFACT	Emission rate=1, Use Variable Emissions by Hour-of-Day (HROFDY)	Total 4 MOVES runs = worst case season x 4 time periods to 24 factors (24 hours)
SRCGROUP	ALL	
Meteorological Data (ME Pathway)		
SURFFILE	Phoenix2017-2021.sfc	*ADEQ Phoenix AERMET files*
PROFFILE	Phoenix2017-2021.pfl	*ADEQ Phoenix AERMET files*
SURFDATA	23183 2017 PHOENIX/SKY_HARBOR_INT'L_ARPT	*ADEQ Phoenix AERMET files*
UAIRDATA	23160 2017 TUCSON/INT'L_ARPT	*ADEQ Phoenix AERMET files*
PROFBASE	346.0 Meters	*ADEQ Phoenix AERMET files*
Run Met Pre-Processor	Not used	

Urban or Rural Sources	Specifications for URBANSRC (SO Pathway)	
Receptors (RE Pathway)	See Attachment A for receptor maps.	
DISCCART	*X Y (Z)*	
GRIDCART	Receptors begin on sidewalk adjacent to roadway or no greater than 5 m from roadway edge, extending up to 105 m at 25 m spacing and 350 m at 50 m spacing. Grid converted to discrete receptors.	
Output (OU Pathway)		
RECTABLE	ALLAVE 1ST; 1 1ST; 24 1ST 6TH	Since PM should be one or less exceedance per year, with 5 years of met data, the 6th highest concentration at each receptor is used.
PLOTFILE	Auto-generated	
POSTFILE	Not used	
Model Runs		
Determine Background Concentrations (Step 6)		
Source Type	**Description**	**Data Source/Detail**
Nearby Sources	None	
Other Sources (Ambient Monitoring Data)	See Attachment B for details about South Scottsdale air monitor used as background for this analysis.	

References

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

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

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

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

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

Attachment A – Description of Modeling Domain

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

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

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

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

Table A-1. Project AADT and Truck Percentage

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

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

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

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

Table A-2. Intersection LOS Summary

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

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

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

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

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

If conformity is met at these two modeled locations, it can be assumed that conformity is met throughout the project area, which has similar traffic activity with lower AADT and delay. These two locations will be modeled with the following conservative assumptions that should predict pollutant concentrations that are greater than what would be experienced in reality:

1. All sources and receptors with a base elevation of zero, ignoring the vertical distance between the overpasses and underpasses.

2. Road dust emissions do not take credit for street sweeping measures on freeways and arterials that are identified in the MAG 2012 Five Percent Plan.

3. Exhaust emissions for the year 2050 are based on current vehicle registration data and do not assume that any new electric or alternative fuel vehicles enter the fleet in the year 2050.

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

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

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

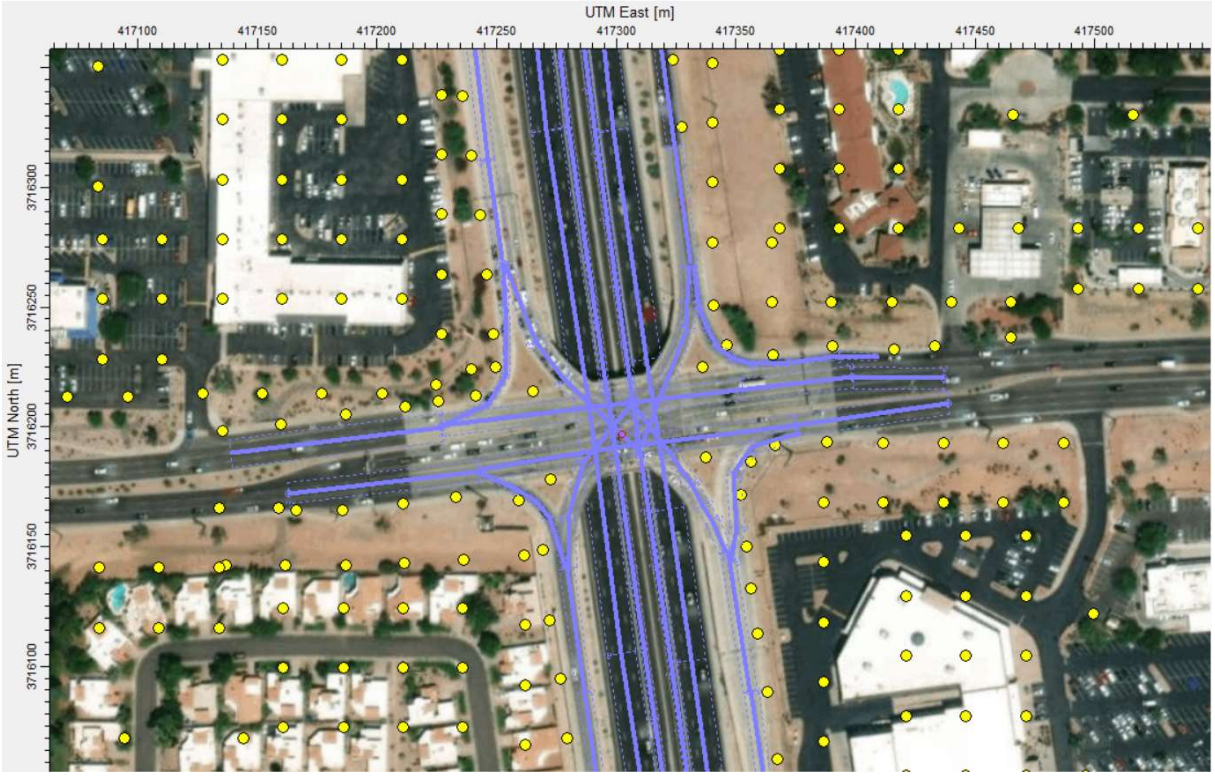


Figure A-3. Links and Receptors Placement for Air Quality Modeling (SR101 & Frank Lloyd Wright Boulevard)

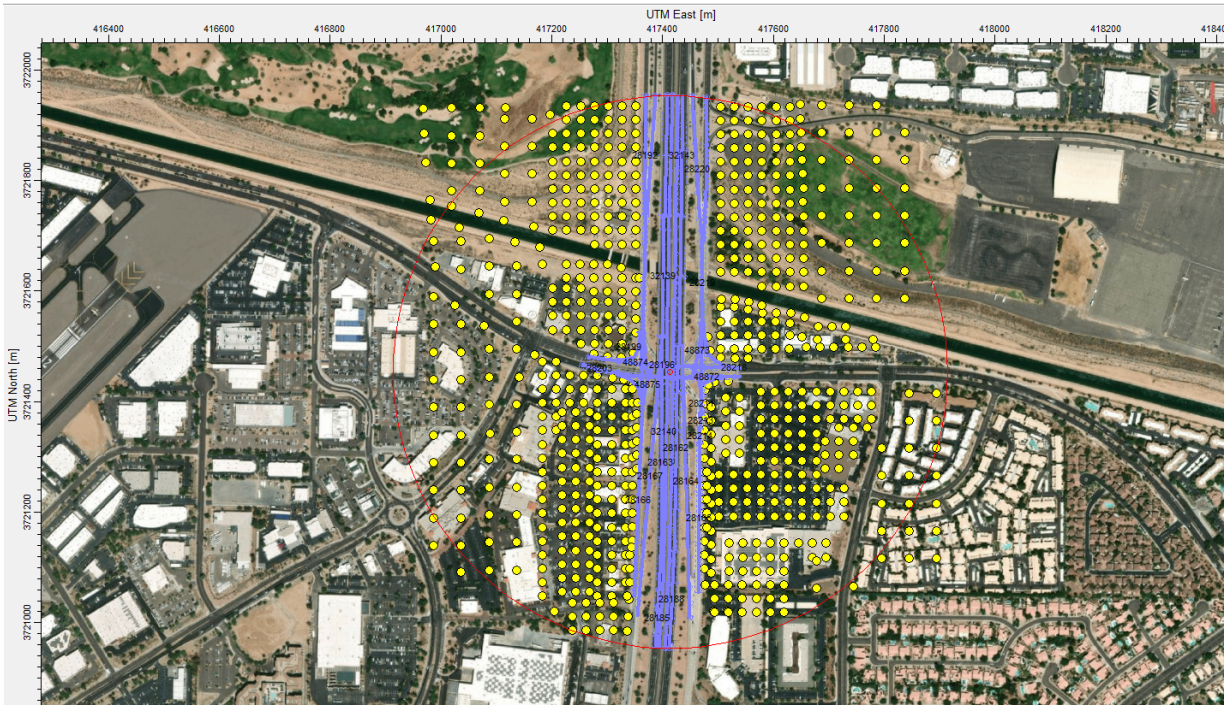
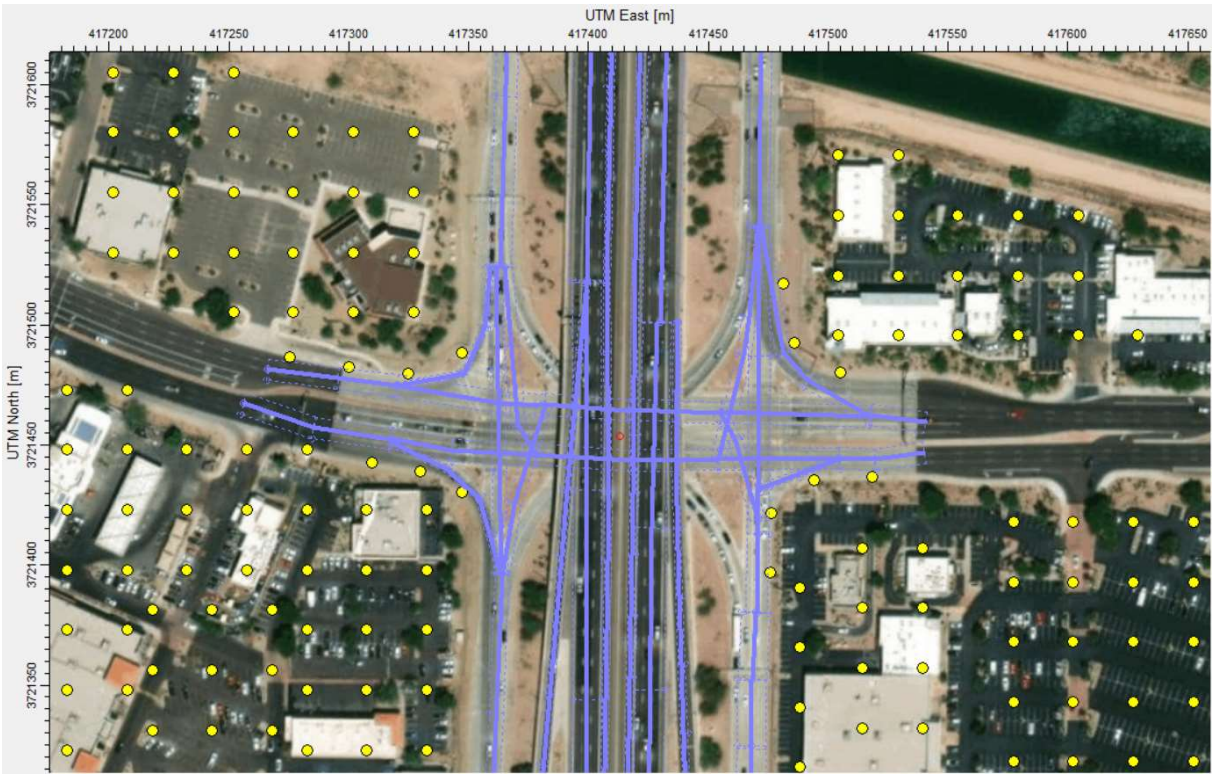


Figure A-4. Zoomed In View of Links and Receptors Placement for Air Quality Modeling (SR101 & Frank Lloyd Wright Boulevard)



Attachment B – Background Monitor Details

A series of PM_{10} monitors are operated by Maricopa County in the project vicinity. As shown in Figure B-1, the South Scottsdale monitor located at 2857 N Miller Rd is the closest monitor to the project limits with similar land use characteristics.

Three years of daily data from this monitor was retrieved from EPA's Outdoor Air Quality Data system. The fourth highest monitor value over the 3-year period will be used for design concentration calculations, as described in the PM Hot-Spot Guidance section 9.3.4. Note that Exceptional Events flagged in AQS were included in the data used to determine the background concentration. Table B-1 summarizes the maximum monitor values between 2019-2021. A wind rose and station information are provided as Figure B-2.

Table B-1. South Scottsdale PM10 Monitor Data

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

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

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

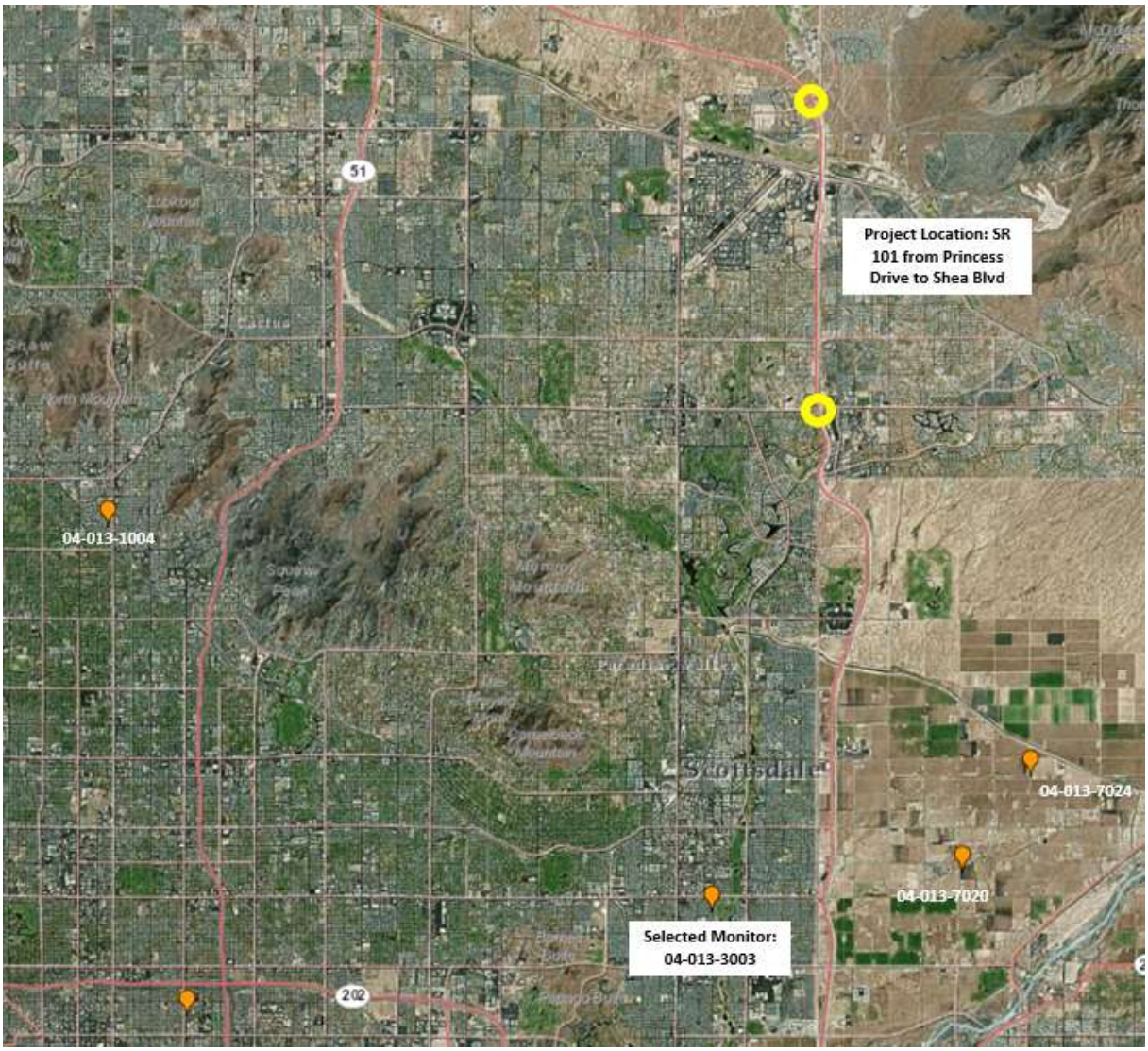


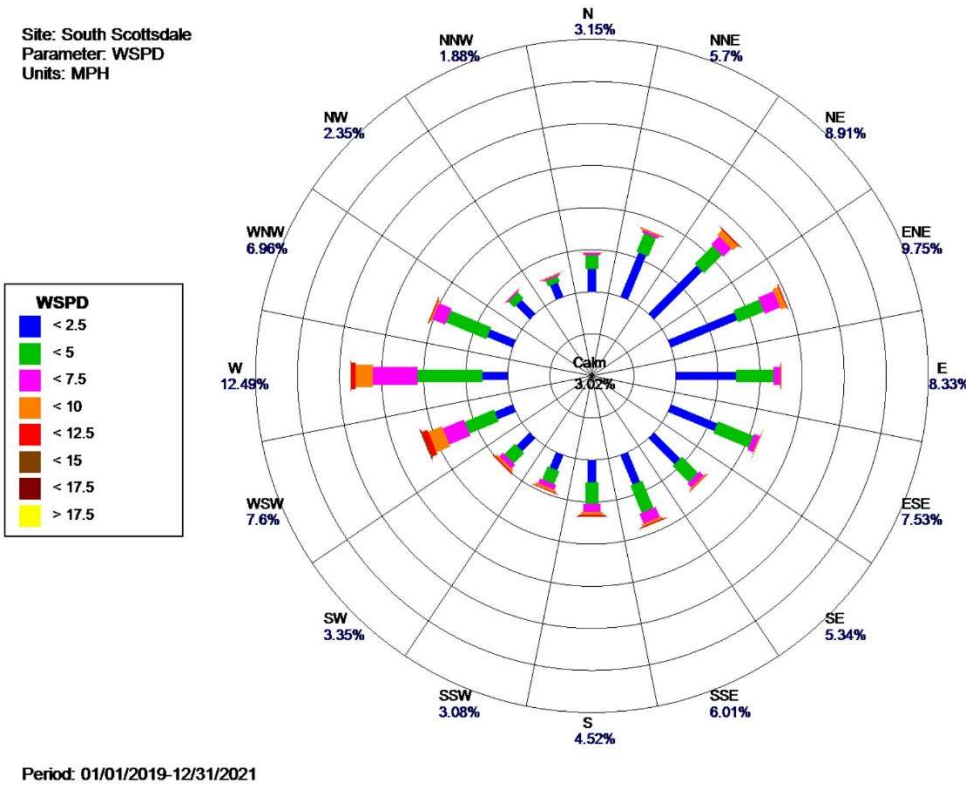
Figure B-2. South Scottsdale Station Information

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

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

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

The station is in a residential area.



Agency Comments from Consultation on October 31, 2022

Gmail

Beverly Chenausky <bchenausky@azdot.gov>

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

1 message

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

FHWA reviewed the documents and we have the following comments:

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

1. NB SR 101 & Pima (PM Peak)

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

3. SR 101 & Raintree (AM Peak)

4. SR 101 & Shea (PM Peak)

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

Thanks, Rebecca

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

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

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

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

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

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

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

Beverly T. Chenausky

Assistant Environmental Administrator

Air & Noise, Hazmat and Standards & Training

205 South 17th Avenue, MD EM02
Phoenix, AZ 85007
C: 480.390.3417

azdot.gov

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

1 message

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

Hi Beverly,

I hope you doing well!

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

PM Consultation

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

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

CO Consultation

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

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

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

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

Have a great rest of the night,

Lindsay

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

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

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

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

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

Beverly T. Chenausky

Assistant Environmental Administrator

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