Arizona Department of Transportation

Environmental Planning

Final Noise Report

State Route 202L (Santan Freeway)
from Val Vista to Interstate 10

Project No. 202L MA 44 F0124 01C
Federal No. 202-C(208)T

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March 19, 2019

Submittal Number 1

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March 19, 2019

EXECUTIVE SUMMARY

This noise technical report has been developed in support of the Design Concept Report (DCR) for the proposed general purpose (GP) lane widening of the segment of the Santan Freeway, State Route Loop 202 (SR 202L) from Val Vista Drive (Milepost 42.00) to Interstate 10 (I-10), Maricopa Freeway (Milepost 57.00). This project is located in the Arizona Department of Transportation's (ADOT's) Phoenix Construction District within Maricopa County in south-central Arizona, within the cities of Phoenix, Chandler, and the town of Gilbert. The purpose of this project is to increase freeway capacity to ameliorate existing and future traffic congestion, and improve conditions to allow motorists to weave into or out of traffic as they enter and exit the freeway.

The noise impact determination used in this analysis is based on the ADOT's Noise Abatement Requirements (NAR), dated May 4, 2017. The ADOT NAR complies with the Federal Highway Administration (FHWA) Noise Abatement Criteria (NAC). The FHWA NAC specify noise level impact thresholds for different categories of land use and activities. Homes, churches, schools, and parks are classified in Categories B and C, and the allowable hourly equivalent sound level (L_{eq}) for these categories is 67 "A"-weighted decibels (dBA). The ADOT NAR determines impacts as traffic noise levels approach the limits specified in the FHWA NAC. ADOT defines "approach" as one (1) dBA below the NAC for Categories A, B, C, D, and E; no noise impact threshold occurs for F and G Categories. Therefore, for Categories B and C, ADOT will consider mitigation for receivers when predicted traffic noise levels are 66 dBA or higher. Additionally, ADOT will consider mitigation if noise levels from the transportation project are predicted to increase substantially. A substantial noise level increase is equal to or greater than 15 dBA.

This noise analysis evaluated the existing condition, as well as future No Build and Build conditions. The existing condition was analyzed by conducting ambient noise levels within the project areas. The monitoring noise levels ranged from 54 to 68 dBA. The No Build condition was evaluated based on predicted noise levels from the existing configuration of Santan Freeway in the design year of 2040. The Build condition was evaluated based on predicted noise levels with proposed configuration with additional general-purpose lanes in the design year of 2040. A total of 375 receivers were modeled to generate noise levels for different categories of land use and activities.

The following table summarizes the results of the potentially recommended noise mitigation/barriers determined in accordance with the ADOT NAR guidelines for the Project. The noise barrier location/limits are shown in Appendix A. A total of four (4) new noise barriers are potentially recommended. Barrier 1 is recommended for the Tempe Korean Presbyterian Church on the northwest quadrant between SR202 and Dobson Road interchange. Barrier 2 is recommended along WB SR202 mainline east of McQueen Road for Willis Gated Community under construction and approved Canal View Homes subdivision. Barrier 3 is recommended on EB SR202 mainline east of McQueen Road for San Valencia subdivision under construction. Barrier 4 is recommended for Quartz Hill Elementary School on the southwest quadrant between SR202 and Val Vista Drive interchange.

The predicted noise levels at two receivers within the Pillar at Pecos Springs Apartments are greater than 66 dBA. The existing community wall (existing barrier 9) ranges from 8 to 9 feet high serving the purpose of noise reduction and meets the ADOT NAR. Therefore, no modification to the existing noise barrier 9 is required. The predicted noise level at one receiver within the Haven subdivision currently under construction, is greater than 66 dBA. The existing community wall (existing barrier 12) is approximately 9 feet high serving the purpose of noise reduction and meets the ADOT NAR. Therefore, no modification to the existing noise barrier 12 is required.

The noise barrier locations and termini described in this report are subject to adjustments by final designers to accommodate final design features not contemplated with the detail of the noise analysis and this report.

NOISE BARRIER SUMMARY
State Route 202L (Santan Freeway) from Val Vista to Interstate 10

Noise Barrier	Barrier Height Range (ft)	Barrier Length (ft)	Area of Barrier (ft^2)	Total Barrier Cost	Number of Benefited Receptors	Cost-Per-Benefited-Receptor
New Barrier 1 (Sta 2284+87 to Sta 2298+23)	12 - 18	1,439	21,717	$760,100	22	$34,600
New Barrier 2 (Sta 2463+14 to Sta 2486+59)	12	2,347	28,162	$1,066,700	29	$36,800
New Barrier 3 (Sta 2469+76 to Sta 2489+60)	14	1,985	27,792	$1,067,300	35	$30,500
New Barrier 4 (Sta 2641+14 to Sta 2660+74)	12	2,000	24,001	$840,100	47	$17,900
Total for Recommended Barriers	12 to 18	7,771	101,672	$3,734,200	133	$28,100

Notes:
[1] Total cost of the noise barrier is based on the unit cost of $35 per square foot off-structure and $85 per square foot on-structure.
[2] Barrier 2 and Barrier 3 include a length of 135’ bridge section.

The public meetings will be held during earlier phase of final design prior to 60% design plans. The potentially recommended noise barriers are required to be presented to public/owners to determine their preferences during the public meetings.

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LIST OF ACRONYMS

AADT	- annual average daily traffic
ADOT	- Arizona Department of Transportation
ANSI	- American National Standards Institute
CFR	- Code of Federal Regulations
dB	- decibel
dBA	- “A”-weighted decibel
DTM	- digital terrain model
FHWA	- Federal Highway Administration
ft	- feet
GP	- general purpose
Hz	- hertz
kHz	- kilohertz
$L_{Aeq(h)}$	- hourly “A”- weighted steady state sound level
Leq	- steady state (equivalent) sound level
L_{max}	- maximum sound level
L_{min}	- minimum sound level
LOS	- level of service
MAG	- Maricopa Association of Governments
MP	- milepost
mph	- miles per hour
MON	- monitoring location
NAC	- Noise Abatement Criteria
NAR	- Noise Abatement Requirements
R/W	- right-of-way
SFH	- single family home
SPL	- sound pressure level
TI	- traffic interchange
TNM 2.5	- Traffic Noise Model version 2.5
µPa	- micro-Pascals

1.0 INTRODUCTION

This noise technical report has been prepared for the Arizona Department of Transportation (ADOT) to evaluate potential noise impacts from the proposed general purpose (GP) lane widening of State Route Loop 202 (SR 202L) from Val Vista Drive (Milepost 42.00) to Interstate 10 (I-10), Maricopa Freeway (Milepost 57.00). This project is located in ADOT's Phoenix Construction District within Maricopa County in south-central Arizona, within the cities of Phoenix, Chandler, and the town of Gilbert. The location of the project site is provided on page 2, Figure 1. The project vicinity map is provided on page 3, Figure 2.

The project is currently in the design concept phase. The scope of work identified at this stage includes:

- Conducting subsurface utility and geotechnical investigations, as necessary
- Constructing one GPL to the outside in each direction of SR 202L between I-10 and SR 101 and Arizona Ave to Val Vista
- Constructing two GPL to the outside in each direction of SR 202L between SR 101 and Arizona Ave
- Widening entrance and exit ramps to accommodate new GPLs
- Milling and replacing AR-ACFC for the full width of the roadway
- Widening of bridge structures over 56th St, Arizona Ave, the Union Pacific Railroad, the Consolidated Canal, and Lindsay Road
- Reconstructing and/or relocating the Arizona Ave Ramp D RR OP
- Constructing retaining walls that will have the same design patterns as the corridor, as necessary
- Relocating catch basins and storm drainages, as necessary
- Completing drainage pipe improvements and/or relocations, as necessary
- Potentially installing new sound wall north of SR 101 just east of McQueen Rd and raising existing noise walls
- Restriping the roadway
- Removing, replacing, and/or upgrading traffic signs
- Removing and replacing embedded traffic counters
- Re-landscaping disturbed area to match existing conditions, including replacing irrigation lines
- Repainting base and accent colors on bridges, walls, and other painted features

The project's construction limits funded by Regional Area Road Fund (RARF) is between I-10 and Gilbert. However upon request from the Maricopa Association of Governments (MAG), Chandler & Gilbert, ADOT has extended the "study and environmental clearance" limits only up to Val Vista Dr. The construction phase is still not funded for the extended portion.

This study was performed in accordance with the *Code of Federal Regulations* (Title 23, Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise) that provide procedures for conducting noise analyses to protect the public health and welfare. Furthermore, this analysis is performed in accordance with the ADOT Noise Abatement Requirements (NAR) dated May 4, 2017.

FIGURE 1. Project Location Map

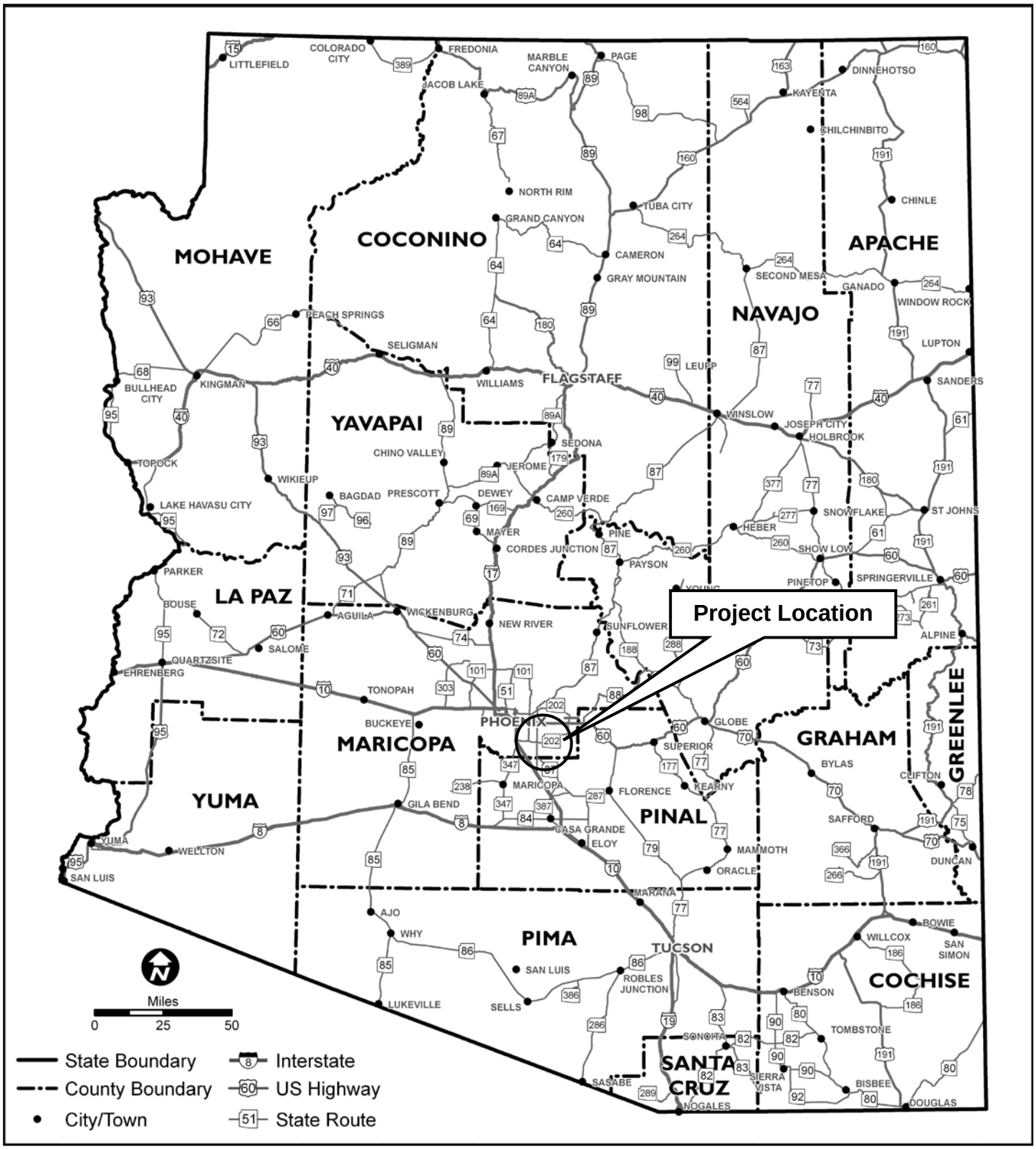
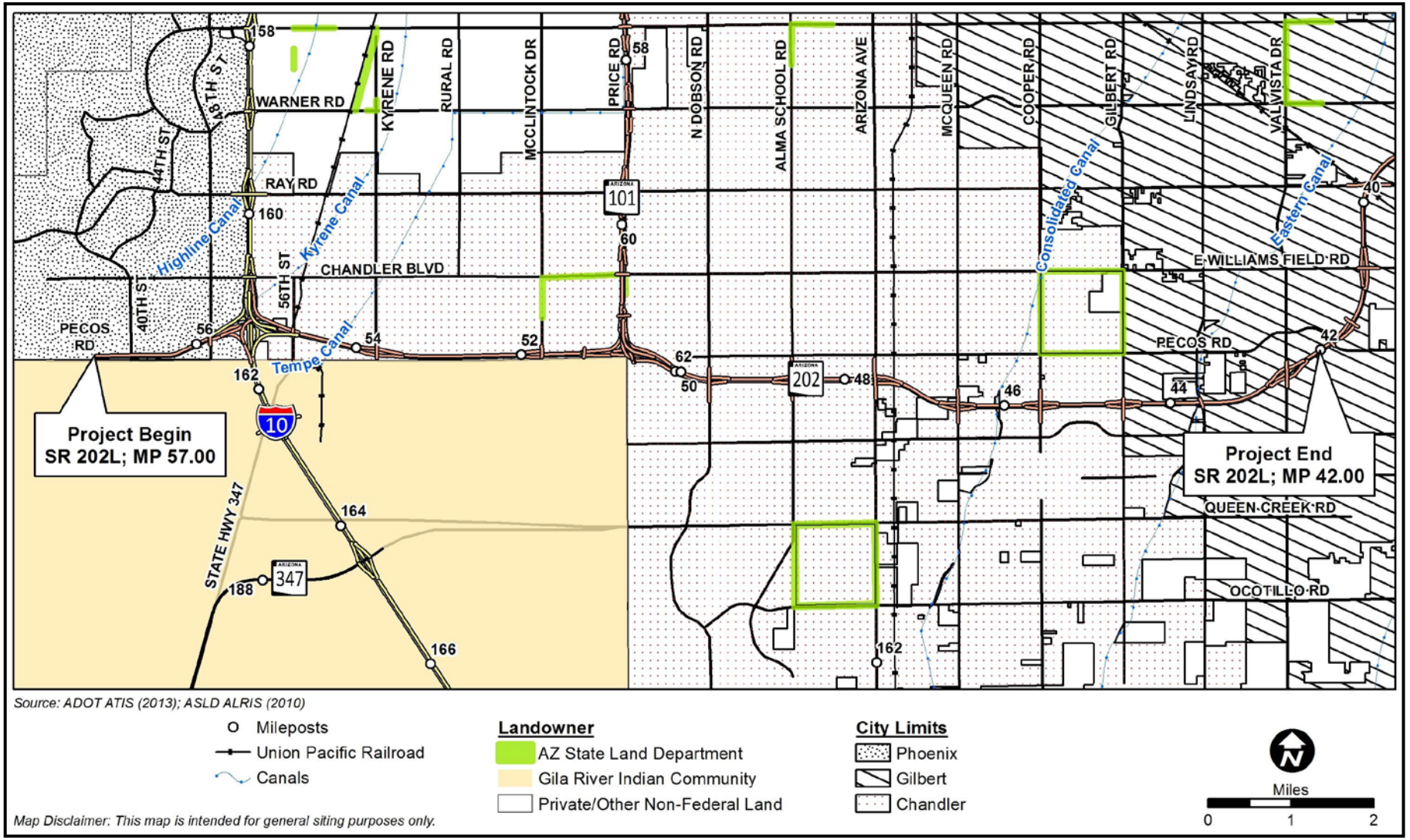


FIGURE 2. Project Vicinity Map



2.0 FUNDAMENTALS OF TRAFFIC NOISE

2.1 Sound, Noise, and Acoustics

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a hearing organ, such as a human ear. Noise is often defined as unwanted sound which is loud, unexpected, or annoying.

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receiver, and the propagation path between them. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receiver determine the sound level and characteristics of the noise perceived by the receiver. The field of acoustics deals primarily with the propagation and control of sound.

2.2 Frequency

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low-frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or Hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz (kHz), or thousands of Hertz. The audible frequency range for humans is generally between 20 Hz and 20,000 Hz.

2.3 Sound Pressure Levels and Decibels

The amplitude of pressure waves generated by a sound source determines the loudness of that source. Sound pressure amplitude is measured in micro-Pascals (µPa). One µPa is approximately one hundred billionth (0.00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 to 100,000,000 µPa. Because of this huge range of values, sound is rarely expressed in terms of µPa. Instead, a logarithmic scale is used to describe sound pressure level (SPL) in terms of decibels (dB). The threshold of hearing for young people is about 0 dB, which corresponds to 20 µPa.

2.4 Addition of Decibels

Because decibels are logarithmic units, SPL cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions. For example, if one automobile produces an SPL of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB—rather, they would combine to produce 73 dB. Under the decibel scale, three sources of equal loudness together produce a sound level 5 dB louder than one source.

2.5 A-Weighted Decibels

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear.

Human hearing is limited in the range of audible frequencies as well as in the way it perceives the SPL in that range. In general, people are most sensitive to the frequency range of 1,000–8,000 Hz, and perceive sounds within that range better than sounds of the same amplitude in higher or lower frequencies. To approximate the response of the human ear, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies. Then, an "A-weighted" sound level (expressed in units of dBA) can be computed based on this information.

The A-weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments of the relative loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Other weighting networks have been devised to address high noise levels or other special problems (e.g., B-, C-, and D-scales), but these scales are rarely used in conjunction with highway-traffic noise. Noise levels for traffic noise reports are typically reported in terms of A-weighted decibels or dBA. Table 1 describes typical A-weighted noise levels for various noise sources.

TABLE 1
Typical A-Weighted Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	— 110 —	Rock band
Jet fly-over at 1000 feet		
	— 100 —	
Gas lawn mower at 3 feet		
	— 90 —	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	— 80 —	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	**— 70 —**	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	**— 60 —**	
		Large business office
Quiet urban daytime	**— 50 —**	Dishwasher next room
Quiet urban nighttime	**— 40 —**	Theater, large conference room (background)
Quiet suburban nighttime		
	— 30 —	Library
Quiet rural nighttime		Bedroom at night
	— 20 —	
		Broadcast/recording studio
	— 10 —	
Lowest threshold of human hearing	**— 0 —**	Lowest threshold of human hearing

Source: ADOT 2008.

2.6 Human Response to Changes in Noise Levels

As discussed above, doubling sound energy results in a 3 dB increase in sound. However, given a sound level change measured with precise instrumentation, the subjective human perception of a doubling of loudness will usually be different than what is measured.

Under controlled conditions in an acoustical laboratory, the trained, healthy human ear is able to discern 1 dB changes in sound levels, when exposed to steady, single-frequency ("pure-tone") signals in the mid-frequency (1,000 Hz–8,000 Hz) range. In typical noisy environments, changes in noise of 1 to 2 dB are generally not perceptible. However, it is widely accepted that people are able to begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5 dB increase is generally perceived as a distinctly noticeable increase, and a 10 dB increase is generally perceived as a doubling of loudness. Therefore, a doubling of sound energy (e.g., doubling the volume of traffic on a highway) that would result in a 3 dB increase in sound, would generally be perceived as barely detectable.

2.7 Noise Descriptors

Noise in our daily environment fluctuates over time. Some fluctuations are minor, but some are substantial. Some noise levels occur in regular patterns, but others are random. Some noise levels fluctuate rapidly, but others slowly. Some noise levels vary widely, but others are relatively constant. Various noise descriptors have been developed to describe time-varying noise levels. The most commonly used noise descriptors in traffic noise analysis are:

- **Equivalent Sound Level (L_{eq}):** L_{eq} represents an average of the sound energy occurring over a specified period. In effect, L_{eq} is the steady-state sound level containing the same acoustical energy as the time-varying sound that actually occurs during the same period. The 1-hour A-weighted equivalent sound level [$L_{Aeq(h)}$] is the energy average of A-weighted sound levels occurring during a one-hour period, and is the basis for noise abatement criteria used by the ADOT and the FHWA.

- **Maximum Sound Level (L_{max}):** L_{max} is the highest instantaneous sound level measured during a specified period.

- **Minimum Sound Level (L_{min}):** L_{min} is the lowest instantaneous sound level measured during a specified period.

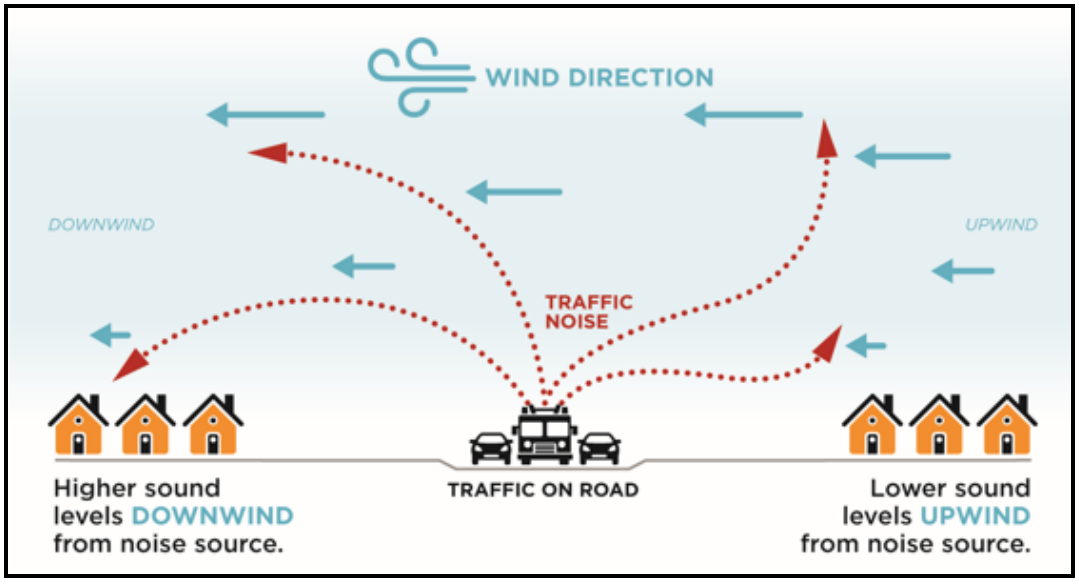
2.8 Weather Conditions

Changes in weather conditions also affect how well a noise barrier performs. Temperature inversions and downwind conditions can increase sound levels in neighborhoods protected by a noise barrier. Temperature lapses and upwind conditions can further reduce sound levels in neighborhoods protected by a noise barrier. The changes in sound levels will depend on the specific wind and temperature conditions.

Changing wind speeds above the ground cause sound waves to bend toward or away from the earth — a process called refraction. The change in the sound level depends on the differences

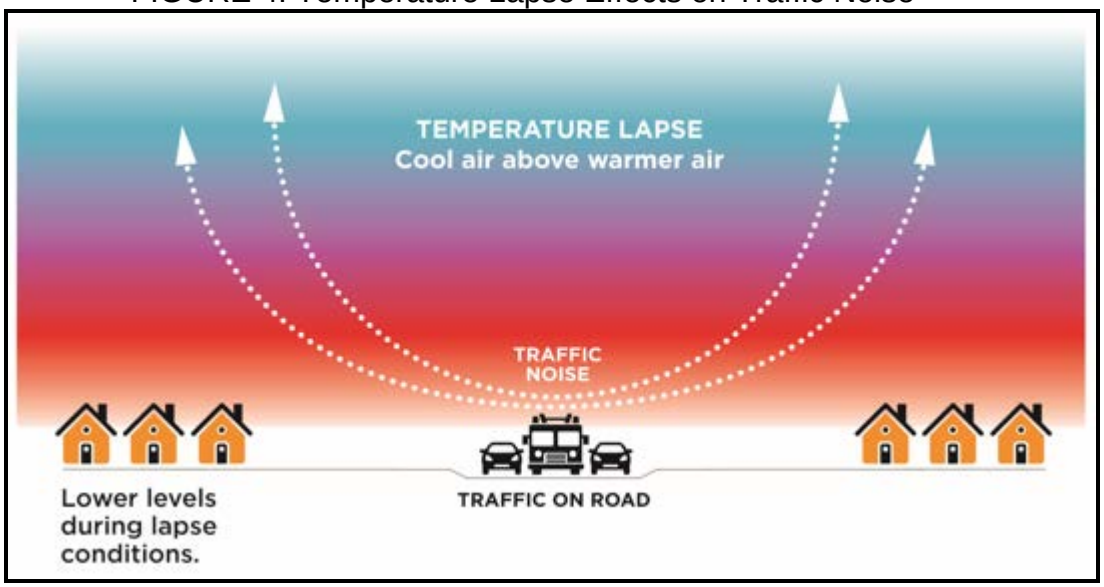
in wind speeds above the ground and the wind direction. You might notice that sound levels are higher when the wind is blowing from the highway toward you (downwind) as illustrated below. Conversely, you might notice that sound levels are lower when the wind is blowing away from you and toward the highway (upwind).

FIGURE 3. Wind Direction Effects on Traffic Noise



The temperature of the air above the ground changes with height. A temperature lapse occurs when the air above the ground is cooler than the air near the ground. Temperature lapses are common during the day. Lapses cause sound waves to bend away from the earth and reduce sound levels in nearby communities as illustrated below. You might notice that sound levels are lower during the day than at night even though there may be more traffic on the road.

FIGURE 4. Temperature Lapse Effects on Traffic Noise



3.0 TRAFFIC NOISE ANALYSIS

3.1 FHWA and ADOT Noise Criteria

ADOT considers mitigation for receivers predicted to be impacted by increased noise levels associated with a proposed transportation improvement project. This analysis determines the traffic noise impacts based upon FHWA Noise Abatement Criteria (NAC), which is referred to in the ADOT NAR dated May 4, 2017. The FHWA NAC specify an allowable traffic noise level for different categories of land uses and activities.

The ADOT NAR describes impacts if the noise level "approaches" the allowable limits of the FHWA NAC. ADOT defines "approach" as one (1) dBA below the NAC for Categories A, B, C, D, and E and there is no noise impact threshold for Categories F and G. Table 2 shows the FHWA NAC noise level for each land use category. Homes, churches, schools, and parks are classified in Categories B and C, and the allowable hourly L_{eq} for these categories is 67 dBA.

TABLE 2
Noise Abatement Criteria
Hourly A-Weighted Sound Level – Decibels (dBA)

Activity Category	$L_{Aeq(h)}$[1], dBA	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[2]	67 (Exterior)	Residential
C[2]	67 (Exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	52 (Interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E[2]	72 (Exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	---	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	---	Undeveloped lands that are not permitted

Notes:
[1]. The hourly equivalent sound level, $L_{Aeq(h)}$, represents the A-weighted sound level that contains the same amount of acoustic energy as the actual time-varying A-weighted sound level over one hour.
[2]. Includes undeveloped lands permitted for this activity category.

Source: ADOT NAR Rev 2017-05-04

For Categories B and C, ADOT will consider mitigation for receivers with exterior traffic noise levels that are equal to or exceed 66 dBA. For Category E, ADOT will consider mitigation for receivers with exterior traffic noise levels that are equal to or exceed 71 dBA. Additionally,

ADOT will consider mitigation if the transportation improvement project is predicted to result in a substantial increase in noise level compared to the existing measured noise levels. A substantial noise level increase is equal to or greater than 15 dBA. In determining and reducing traffic noise impacts, exterior areas are given primary consideration and ADOT generally will consider mitigation only where frequent human use occurs.

3.2 Sensitive Land Uses in the Study Area

Land within the study area mainly belongs to private owners and the Gila River Indian Community. Existing land uses within the project area consist of residential, commercial, office, industrial, and vacant. Residential land use of Activity Category B within the study area includes existing single family homes, apartments, and communities under construction with active building permits. The Activity Category C includes the Tempe Korean Presbyterian Church, the Zanjero Park, and Quartz Hill Elementary school. The Activity Category E includes office buildings, hotels, and restaurants. The existing land use within the project area was examined based on MAG land use map and GIS map from the City of Chandler Planning Department.

3.3 Existing Noise Levels

Existing noise-sensitive land uses within the project area were identified using land-use maps, aerial photographs, and site reconnaissance. The noise analysis of this project used six (6) geographical sections that correspond to noise receiver locations.

In total, 375 noise receivers were evaluated in the noise model for different land use categories and activities. The modeled noise receivers represent different activity categories such as residential (Category B), church/park (Category C), hotels and offices (Category E), and undeveloped lands (Category G). Each modeled noise receiver was assigned a two part identifier, such as EX or WX. E stands for eastbound and W stands for westbound, and followed by an arbitrary sequential number X.

Table 3 shows the description of the sections and the number of modeled receivers in each section. No construction would occur west of I-10, as a result, no noise modeling was conducted for segment west of I-10.

TABLE 3
Location of Modeled Receivers

Section	Number of Modeled Receivers	Description of Section
1	12	I-10 to Kyrene Road
2	55	Kyrene Road to McClintock Drive
3	55	McClintock Drive to Dobson Road
4	82	Dobson Road to Arizona Avenue
5	73	Arizona Avenue to Cooper Road
6	98	Cooper Road to Val Vista Drive
Total Number of Modeled Receivers	375	

Twenty-five (25) different sites were selected for noise monitoring within the project area (monitoring locations are labeled "MON") to document existing traffic noise levels. Noise monitoring was conducted on September 19 & 20, 2018, September 26 & 27, 2018, October 4, 2018, and October 11, 2018. During the monitoring, weather conditions (temperature, relative humidity, wind speed and direction, and sky condition) were documented (see Appendix B). A Larson Davis System 824 with sound level meter and real-time analyzer, which complies with ANSI S1.4 and Type I Standards, was used during the noise monitoring. The noise monitoring followed the procedures specified in the report FHWA-PD-96-046/DOT-VNTC-FHWA-96-5, *Measurement of Highway-Related Noise*. The monitoring results are summarized in Table 4.

TABLE 4
Noise Level Measurements Summary

Section	Monitor Number	Address/Description	Monitoring Result Leq, dBA
1	MON-01	Empty parcel west of Kyrene Rd	62
2	MON-02	Drainage basin area in Monte Vista Subdivision	59
	MON-03	Outside residence backyard on Geronimo Street	65
3	MON-04	Cul-de-sac on Geronimo Street	54
	MON-05	Pool area at Fairfield Inn & Suites by Marriott Phoenix Chandler/Fashion Center	58
	MON-06	Close to parking area in Canterra Apartments	62
	MON-07	Corner between Los Altos Drive and Hawken Way	57
	MON-08	Driveway at the Tempe Korean Presbyterian Church	68
4	MON-09	Cul-de-sac on Villas Court	58
	MON-10	Cul-de-sac on Pennington Drive	58
	MON-11	Cul-de-sac on Longhorn Court	57
	MON-12	Gravel parcel at the end of Arrowhead Drive in the Messina Subdivision	56
	MON-13	Sidewalk on Hawken Way in front of residence in the Carizal Subdivision	58
	MON-14	Close to parking area in Pecos Springs Apartments	61
	MON-15	Southern end of a 38-acre graded lot; planned future residential development	58
	MON-16	Cul-de-sac on Holguin Court	58
5	MON-17	Front yard of first-row home on Bogle Court	55
	MON-18	Basin in the planned Willis Gated Community	58
	MON-19	Northern end of the San Valencia Apartment complex, currently under construction for private development	63
	MON-20	Behind the backyard in Canon Oaks Subdivision	58
6	MON-21	Within open space/basin area of neighborhood near the sidewalk	57
	MON-22	Dirt road, adjacent to residential and land used for agriculture/cattle	57
	MON-23	North end of Zanjero Park, south of a concrete lined ditch	63
	MON-24	Dirt road, in between large vacant lot and horse farm	61
	MON-25	Playground behind Gilbert Elementary School	63

The monitored noise levels represent the existing noise conditions within the project area. The average ambient noise levels from the measurements ranged from 54 dBA to 68 dBA. The lowest monitoring noise level was recorded from site MON-04 at the cul-de-sac on Geronimo Street. The highest monitoring noise level was recorded from site MON-08 on the driveway at the Tempe Korean Presbyterian Church. Detailed noise level monitoring information is located in Appendix B of this report.

3.4 TNM 2.5 Modeling Approach and Assumptions

The FHWA-approved highway noise computer model Traffic Noise Model (TNM) 2.5 was used for the noise-level computations and mitigation analysis. Standard English units of measurement were used throughout this analysis.

Traffic noise levels are affected mainly by roadway geometry, traffic volumes, traffic speeds, traffic mix (percentage of cars, medium trucks and heavy trucks), and shielding effects between noise sources and receivers. These variables were input into the TNM 2.5 model to predict future noise levels at the sensitive receiver locations. If the predicted unmitigated noise levels are less than the NAR threshold of 66 dBA, no noise impacts would occur and no noise mitigation is warranted. Otherwise, mitigation consisting of noise barriers within the right-of-way (R/W) would be evaluated. The barrier heights are then adjusted to achieve predicted mitigated noise levels of less than 66 dBA as applicable. Noise barriers are recommended if they meet the ADOT NAR "feasible" and "reasonable" criteria. Noise barriers are considered the most cost effective and accepted technique to mitigate traffic noise. Noise barriers may consist of earth berms or concrete/masonry walls, or a combination of the two.

Roadway Geometry

The horizontal and vertical geometry of the proposed design of the SR202 mainline and ramps utilized in this analysis were obtained from the preliminary design files by AZTEC Engineering. The digital terrain model (DTM) were requested from the Maricopa County. Speed was modeled 5 miles per hour (mph) higher than posted speed limit.

Traffic Volumes

The FHWA criteria specify that the noisiest condition be modeled for the project design year. In general this should reflect level of service (LOS) C traffic conditions during the peak noise hour, with traffic moving at 5 miles per hour above the posted speed limits. If future peak hour traffic volumes are less than maximum LOS C volumes, future peak hour traffic volumes will be utilized. For this project, PM peak hour volumes were used for ramps and cross streets. For SR202 mainline, LOS C volumes were used because peak hour volumes on SR202 mainline would result in congestion. The traffic volumes used in this analysis are provided from the traffic engineer by AZTEC Engineering and are included in Appendix C.

Traffic Mix

Traffic mix is the percentage of vehicles by type, typically including cars, medium trucks, and heavy trucks. Traffic mix is an important factor on the magnitude of noise levels. Generally, heavy trucks generate more noise than cars and medium trucks. Therefore, the higher percentage of heavy truck, the louder the noise levels would be.

Vehicle types are defined as follows:

- Cars: All vehicles with two axles and four wheels designed primarily for passenger transportation or cargo (light trucks). Generally, the gross vehicle weight is less than 10,000 pounds.

- Medium Trucks: All vehicles having two axles and six wheels designed for the transportation of cargo. Generally, the gross vehicle weight is greater than 10,000 pounds but less than 26,400 pounds.
- Heavy Trucks: All vehicles having three or more axles and designed for the transportation of cargo. Generally, the gross weight is greater than 26,400 pounds.

The traffic mix percentage used in this analysis is 93% of cars, 4.5% of medium trucks, and 2.5% of heavy trucks. The data was provided from the traffic engineer by AZTEC Engineering, and is included in Appendix C.

Traffic Speed

For the Build condition, SR 202L mainline was modeled at operating speed of 70 mph (5 mph above the posted speed limit). The service TI on-ramp and off-ramp speeds were modeled at 50 mph and the system TI ramp speeds were modeled at 60 mph. The cross street speeds were modeled at 50 mph.

Shielding Effects

TNM 2.5 can account for the noise shielding effects created by existing noise barriers, privacy walls, buildings, and terrain changes that are an obstruction between noise sources and receivers. Neighborhood privacy walls and large commercial or apartment buildings were modeled as barriers. Cut-and-fill slopes and corresponding elevation changes were modeled as terrain lines. Rows of homes in neighborhoods were modeled as building rows. The loose soil ground type was used in the model. The existing privacy walls measuring approximately 6 to 9 feet high that typically shield residential subdivisions were also modeled.

Other assumptions included average pavement type and default weather. These default assumptions are the FHWA-recommended values.

3.5 Construction Noise Impacts

Depending on the nature of construction operations, the duration of the noise could last from seconds (e.g. a truck passing a customer) to months (e.g. constructing a bridge). Construction noise is also intermittent and depends on the type of operation, location, and function of the equipment and the equipment usage cycle. Construction equipment is typically considered as a point source, as opposed to traffic which is considered as a line source; therefore the noise level decreases, theoretically, by 6 dB(A) per doubling the distance from it, as opposed to 3 dB(A) for line source. Noise levels, at various distances, using listed equipment, are shown in Table 5. ADOT has set forth guidelines for construction noise in the *Standard Specifications for Road and Bridge Construction*, 2008. Per ADOT specifications 104.08 Prevention of Air and Noise Pollution:

“The contractor shall comply with all local sound control and noise rules, regulations and ordinances which apply to any work pursuant to the contract. Each internal combustion engine used for any purpose on the work or related to the work shall be equipped with a muffler or a

type recommended by the manufacturer. No internal combustion engine shall be operated on the work without its muffler being in good working condition."

TABLE 5
Construction Noise Levels at Various Distances from the Equipment

Equipment	Land Use	Residential	Descriptor		L10
	R_300 ft	R_600 ft	R_900 ft	R_1200 ft	R_1500 ft
Auger Drill Rig	64.8	58.8	55.3	52.8	50.8
Boring Jack Power Unit	67.4	61.4	57.9	55.4	53.4
Compactor (ground)	63.7	57.7	54.1	51.6	49.7
Concrete Mixer Truck	62.3	56.2	52.7	50.2	48.3
Dump Truck	59.9	53.9	50.4	47.9	45.9
Excavator	64.2	58.1	54.6	52.1	50.2
Generator	65.1	59.0	55.5	53.0	51.1
Compressor (air)	61.1	55.1	51.6	49.1	47.1
Grader	68.5	62.4	58.9	56.4	54.5
Warning Horn	57.6	51.6	48.1	45.6	43.6
All Other Equipment > 5 HP	69.4	63.4	59.9	57.4	55.4
Bar Bender	60.4	54.4	50.9	48.4	46.5
Concrete Pump Truck	61.8	55.8	52.3	49.8	47.9
Soil Mix Drill Rig	64.4	58.4	54.9	52.4	50.4
Concrete Saw	70.0	64.0	60.5	58.0	56.0
Auger Drill Rig	64.8	58.8	55.3	52.8	50.8
Roller	60.4	54.4	50.9	48.4	46.5

Ground vibration and ground-born noise can also be a source of annoyance to individuals who live or work close to vibration-generating activities. Pile driving, demolition activity, blasting, and crack-and-seat operations are the primary sources of vibration, while the impact pile driving can be the most significant source of vibration at construction sites. It is recommended to apply methods that may be practical and appropriate in specific situations, to reduce vibration to an acceptable level. Such measures may be:

- Jetting,
- Predrilling
- Cast-in-place or auger cast piles
- Non-displacement piles
- Pile cushioning
- Using alternative non-impact drivers
- Scheduling activities to minimize disturbance at near-construction sites

To minimize noise impacts on the neighborhoods during construction, the following mitigation measures will be taken:

- Exhaust systems on equipment will be kept in good working order, in accordance with Section 104.08, *Prevention of Air and Noise Pollution* of the ADOT Standard Specifications for Road and Bridge Construction;
- Engine enclosures and intake silencers will be used where appropriate;
- Equipment will be maintained on a regular basis;
- New equipment will meet new noise emission standards;
- Stationary equipment will be located as far away from neighborhoods as possible; and
- The public shall be notified of construction operations and schedules by the ADOT's Communications office during construction.

4.0 NOISE MITIGATION EVALUATION

4.1 Noise Mitigation Guidelines

The ADOT NAR adopted in 2017 provides guidelines for noise abatement based on both the "feasible" and "reasonable" criteria. The ADOT NAR defines "feasibility" based on engineering and acoustical considerations (e.g., if a barrier can be built given the topography of the location; consider access, drainage, safety, or maintenance requirements, can a substantial noise reduction be achieved? are other noise sources present in the area? etc.). According to the ADOT NAR, engineering feasibility factors of abatement shall include, but not limited to:

- Safety – noise barriers will not be constructed in such a way as to create a potential safety hazard or to inhibit response to a safety emergency.
- Barrier height – due to safety, structural and wind load considerations, ADOT will not normally construct barriers higher than 20 feet, as a stand-along structure. However, a wall segment height may be up to 24 feet.
- Topography – the topography of the local area may potentially preclude the use or reduce the effectiveness of noise abatement measures such as barriers and berms.
- Drainage – any noise abatement measure constructed must provide for adequate drainage, both as a safety concern and to prolong the lifespan of the roadway.
- Utilities – in the event of a conflict between existing or planned utilities and potential noise abatement measures, any extra cost involved with utility relocation or modification may be included in the wall cost when comparing against the cost-per-benefited-receptor.
- Maintenance requirements – abatement measures must be designed and constructed in such a way as to allow access to perform maintenance activities both for the barrier and for adjacent properties.
- Access to adjacent properties – abatement measures must not be designed or constructed in a manner that denies access to any property adjacent to the barrier.
- Overall project purposes – the use of abatement measures must be consistent with the overall purpose of the project.

For a noise abatement measure to be acoustically feasible ADOT requires achievement of at least a five (5) dBA highway traffic noise reduction at 50% of impacted receptors.

The "reasonable" criterion implies that common sense and good judgment were applied in arriving at a decision. According to the ADOT NAR, reasonability of abatement shall include, but not be limited to:

- Viewpoints or preferences of property owners and residents – The preferences of the property owners and residents of the benefited receptors of a noise barrier will be taken into account when determining whether the barrier is considered reasonable.
- Noise reduction design goal – Noise barriers should be designed to reduce projected unmitigated noise levels by at least seven (7) dBA for benefited receptors closest to the transportation facility. To be considered reasonable, at least half of the benefited receptors in the first row shall achieve this level of noise reduction.

- Cost effectiveness – The maximum reasonable cost of abatement is $49,000 per benefited receptor (cost-per-benefited-receptor) with barrier costs calculated at $35 per square foot, $85 per square foot if constructed on a structure.

4.2 Substantial Noise Level Increase

The projected increases in noise levels for receivers that were monitored are shown in Table 6. The monitoring results represent the existing noise levels. The TNM 2.5 2040 unmitigated column represents the future predicted noise level in the Build Condition. The difference between these two values, the arithmetic increase, is the projected increase in noise levels.

TABLE 6
Substantial Noise Level Increases

Section	Monitor Number	Noise Receiver	Noise Level Leq, dBA		
			Monitoring Result	TNM 2.5 2040 unmitigated	Arithmetic Increase
1	MON-01	W5	62	69	7
2	MON-02	W18	59	61	2
	MON-03	W49	65	63	-2
3	MON-04	W61	54	60	6
	MON-05	E19	58	61	3
	MON-06	W73	62	64	2
	MON-07	E30	57	61	4
	MON-08	W77	68	70	2
4	MON-09	E42	58	63	5
	MON-10	W83a	58	62	4
	MON-11	E46	57	62	5
	MON-12	W92	56	62	6
	MON-13	E53	58	61	3
	MON-14	W107	61	65	4
	MON-15	W112	58	61	3
	MON-16	E65	58	65	7
5	MON-17	W126	55	63	8
	MON-18	W143a	58	69	11
	MON-19	E83a	63	73	10
	MON-20	W157	58	63	5
6	MON-21	W175	57	62	5
	MON-22	W200a	57	64	7
	MON-23	E112a	63	65	2
	MON-24	W206a	61	59	-2
	MON-25	E127a	63	71	8

The arithmetic increases between the monitoring levels and future predicted noise levels range from -2 to 11 dBA; no monitoring sites show a significant increase of equal to or greater than 15 dBA. As a result, no noise mitigation was evaluated due to the substantial noise level increases predicted for monitoring sites.

4.3 Noise Modeling Results

Appendix A shows noise receiver and potentially recommended barrier locations and Appendix D shows the predicted noise levels for the No Build and Build conditions based on the results of the TNM 2.5 modeling. Modeling results are rounded to the nearest decibel before comparisons are made. In some cases, this can result in relative changes that may not appear intuitive. For example, the difference between sound levels of 64.4 and 64.5 dBA is 0.1 dBA. However, after rounding to the nearest whole number, the difference is reported as 1 dBA. Noise modeling and results for Section 1 through Section 6 are discussed below.

Section 1: I-10 to Kyrene Road

Section 1 has 12 modeled receivers representing receptors at offices, open space, industrial, and undeveloped land. The predicted noise levels and number of dwelling units represented by each receiver is shown in Appendix D. The vacant parcel represented by receivers W5 and W6 is owned by Temple Union High School District #213 per Maricopa County Assessor map. It was further revealed that the school district hired Nathan & Associates, Inc. to sell or lease the parcel to a commercial developer. As a result, no school is planned for the parcel. The noise levels of the receivers are less than the ADOT NAR threshold for the corresponding NAC categories in the 2040 Build Condition. As a result, no consideration of noise mitigation is warranted.

Section 2: Kyrene Road to McClintock Drive

Section 2 has 55 modeled receivers representing receptors in residential, a few industrial buildings, and undeveloped land. An existing noise barrier is located along the WB SR202 between Kyrene Road and McClintock Drive, protecting all the single family homes behind the barrier. The noise levels of the receivers are less than the ADOT NAR threshold for the corresponding NAC categories in the 2040 Build Condition. As a result, no consideration of noise mitigation is warranted.

The Stellar Airpark lies west of McClintock Drive with runways perpendicular to the SR202 mainline. There are about 110 aircraft operations per day in this airpark and the 24-hour day-night level (DNL) is approximately 65 dBA on the nearby subdivision represented by receiver W49. If we evenly distribute the aircraft noise energy, the hour L_{eq} noise level from the airpark would be approximately 64 – 65 dBA. This explains the reason that the current noise measurement at site MON-03 is higher than predicted noise level in the Build condition because of aircraft noise in the vicinity. The detailed airpark data and noise contour maps are included in Appendix E.

Section 3: McClintock Drive to Dobson Road

Section 3 has 55 modeled receivers representing receptors in residential, a church (Tempe Korean Presbyterian Church), retail, offices, industrial, and undeveloped land. The noise levels of the receivers representing the church are greater than the ADOT NAR threshold for 66 dBA in NAC C in the 2040 Build Condition. As a result, consideration of noise mitigation is warranted for the church.

Noise barrier 1 on the westbound side of SR202 was evaluated to shield receivers representing the common outdoor use areas of the Tempe Korean Presbyterian Church. Barrier 1 was evaluated along the R/W line from Station 2284+87 to 2298+23. The height for the barrier segments would be 12 to 18 feet relative to the existing ground elevation. Noise barrier 1 would provide noise reduction of 5 dBA or more for 22 equivalent receptors. The cost-per-benefited receptor is below the ADOT NAR criteria of $49,000. In addition, Noise barrier 1 meets the ADOT NAR guidelines by achieving at least a 5 dBA reduction at 50% of impacted receptors and a 7 dBA reduction design goal for at least half of the first row receptors. As a result, noise barrier 1 is potentially recommended for mitigation. Because noise barrier 1 would wrap around Dobson Road, an acoustic gate may need to be installed along with the noise barrier on Dobson Road for maintenance access. See Figure 5 below for the location of the existing gate access. In final design, a public meeting may be held to obtain viewpoints from the property owner regarding this recommended noise barrier. Recommended noise barrier dimension and coordinates are provided in Appendix F.

FIGURE 5. Existing Gate Location along Dobson Road

Barrier Summary for Section 3 is shown in Table 7.

TABLE 7
Barrier Summary Section 3 – McClintock Drive to Dobson Road

Noise Barrier	Barrier Height Range (ft)	Barrier Length (ft)	Area of Barrier (ft^2)	Total Barrier Cost[1]	Number of Benefited Receptors	Cost-Per-Benefited-Receptor
New Barrier 1 (Sta 2284+87 to Sta 2298+23)	12 - 18	1,439	21,717	$760,100	22	$34,600
Total for Recommended Barriers	12 – 18	1,439	21,717	$760,100	22	$34,600

Note:
[1] Total cost of the noise barrier is based on the unit cost of $35 per square foot off-structure and $85 per square foot on-structure.

Section 4: Dobson Road to Arizona Avenue

Section 4 has 82 modeled receivers representing receptors in residential, community park, retail and offices, and undeveloped land. The noise levels of four receivers are greater than the ADOT NAR threshold of 66 dBA in NAC B and C; As a result, consideration of noise mitigation is warranted.

The predicted noise level at receiver W78, which is a retention basin that also serves as a neighborhood park, is greater than 66 dBA. The drainage basin/park is located at the northeast quadrant of the Santan Freeway and Dobson Road. Because its primary function is for drainage, it does not qualify for mitigation.

The predicted noise levels at receivers W109 and W110, representing first row receptors within the Pillar at Pecos Springs Apartments, are greater than 66 dBA. The existing community wall (existing barrier 9) ranges from 8 to 9 feet high serving the purpose of noise reduction. Per the ADOT NAR [FHWA-HEP-12-051], noise barrier 9 achieves of at least 5 dBA traffic noise reduction at 50% of impacted receptors, and achieves noise reduction design goal. Therefore, no modification to the existing noise barrier 9 is required.

The predicted noise level at receiver W112b, representing first row receptors within the Haven subdivision currently under construction, is greater than 66 dBA. The existing community wall (existing barrier 12) is approximately 9 feet high serving the purpose of noise reduction. Per the ADOT NAR [FHWA-HEP-12-051], noise barrier 12 achieves of at least 5 dBA traffic noise reduction at 50% of impacted receptors, and achieves noise reduction design goal. Therefore, no modification to the existing noise barrier 12 is required.

Section 5: Arizona Avenue to Cooper Road

Section 5 has 73 modeled receivers representing receptors in residential, retail and offices, and undeveloped land. The noise levels of twelve receivers are greater than the ADOT NAR threshold for the corresponding NAC categories; As a result, consideration of noise mitigation is warranted.

The predicted noise levels at receivers W143 through W150b, representing receptors within the Willis Gated Community subdivision currently under construction and Canal View Homes subdivision with active building permits, are greater than 66 dBA. Noise barrier 2 on the westbound side of SR202 was evaluated to shield receivers representing these two subdivisions. Barrier 2 was evaluated along the proposed roadway edge from Station 2463+14 to 2486+59. The height for the barrier segments would be 12 feet relative to the freeway pavement. Noise barrier 2 would provide noise reduction of 5 dBA and plus for 29 receptors. The cost-per-benefited receptor is below the ADOT NAR criteria of $49,000. In addition, Noise barrier 2 meets the ADOT NAR guidelines by achieving at least a 5 dBA reduction at 50% of impacted receptors and a 7 dBA reduction design goal for at least half of the first row receptors. As a result, noise barrier 2 is potentially recommended for mitigation.

The predicted noise levels at receivers E83a, E87a, E87b and E87c, representing receptors within the San Valencia subdivision currently under construction, are greater than 66 dBA.

Hard soil ground type was used in noise model in this area to account for the high monitoring noise levels and local terrain effect. Noise barrier 3 on eastbound side of SR202 was evaluated to shield receivers representing this subdivision. Barrier 3 was evaluated along the proposed roadway edge from Station 2469+76 to 2489+60. The height for the barrier segments would be 14 feet relative to the freeway pavement. Noise barrier 3 would provide noise reduction of 5 dBA and plus for 35 receptors. The cost-per-benefited receptor is below the ADOT NAR criteria of $49,000. In addition, Noise barrier 3 meets the ADOT NAR guidelines by achieving at least a 5 dBA reduction at 50% of impacted receptors and a 7 dBA reduction design goal for at least half of the first row receptors. As a result, noise barrier 3 is potentially recommended for mitigation.

The predicted noise level at receiver E90 representing an office building, is equal to 71 dBA of the threshold in NAC E category. The exterior use of this building is mainly parking lot and is not considered as exterior area of frequent human use. As a result, it does not qualify for mitigation.

Barrier Summary for Section 5 is shown in Table 8.

TABLE 8
Barrier Summary Section 5 – Arizona Avenue to Cooper Road

Noise Barrier	Barrier Height Range (ft)	Barrier Length (ft)	Area of Barrier (ft^2)	Total Barrier Cost[1]	Number of Benefited Receptors	Cost-Per-Benefited-Receptor
New Barrier 2 (Sta 2463+14 to Sta 2486+59)	12	2,347	28,162	$1,066,700	29	$36,800
New Barrier 3 (Sta 2469+76 to Sta 2489+60)	14	1,985	27,792	$1,067,300	35	$30,500
Total for Recommended Barriers	12 – 14	4,332	55,954	$2,134,000	64	$33,400

Note:
[1] Total cost of the noise barrier is based on the unit cost of $35 per square foot off-structure and $85 per square foot on-structure.

Section 6: Cooper Road to Val Vista Drive

Section 6 has 98 modeled receivers representing receptors in residential, school, retail and offices, industrial, and undeveloped land. The noise levels of thirteen receivers are greater than the ADOT NAR threshold for the corresponding NAC categories; As a result, consideration of noise mitigation is warranted.

The predicted noise level at receiver E104, representing a restaurant, is equal to 71 dBA of the threshold in NAC E category. Noise barrier 3B along the EB Gilbert Road on-ramp was evaluated shielding this receiver. The cost-per-benefited receptor is above the ADOT NAR criteria of $49,000. As a result, noise barrier 3B is not recommended for mitigation.

Per ADOT's direction, the roadway improvements at the Lindsay Road TI and associated noise analysis would be evaluated in the separate Lindsay Road TI project.

The predicted noise levels at receivers E116 through E129, representing receptors within the Quartz Hill Elementary School, are greater than 66 dBA of the threshold in NAC C category.

Noise barrier 4 on eastbound side of SR202 was evaluated to shield receivers representing this school. Barrier 4 was evaluated on top of the berm from Station 2641+14 to 2660+74. The height for the barrier segments would be 12 feet relative to the ground. Noise barrier 4 would provide noise reduction of 5 dBA and plus for 47 receptors. The cost-per-benefited receptor is below the ADOT NAR criteria of $49,000. In addition, Noise barrier 4 meets the ADOT NAR guidelines by achieving at least a 5 dBA reduction at 50% of impacted receptors and a 7 dBA reduction design goal for at least half of the first row receptors. As a result, noise barrier 4 is potentially recommended for mitigation. The accuracy of the DTM requested from the Maricopa County in this area is within 10 foot for noise modeling, the barrier dimension/limits need to be refined during final design.

Barrier Summary for Section 6 is shown in Table 9.

TABLE 9
Barrier Summary Section 6 – Cooper Road to Val Vista Drive

Noise Barrier	Barrier Height Range (ft)	Barrier Length (ft)	Area of Barrier (ft^2)	Total Barrier Cost[1]	Number of Benefited Receptors	Cost-Per-Benefited-Receptor
New Barrier 4 (Sta 2641+14 to Sta 2660+74)	12	2,000	24,001	$840,100	47	$17,900
Total for Recommended Barriers	12	2,000	24,001	$840,100	47	$17,900

Note:
[1] Total cost of the noise barrier is based on the unit cost of $35 per square foot off-structure and $85 per square foot on-structure.

5.0 CONCLUSION AND RECOMMENDATION

This noise report provides the existing monitored and future predicted noise levels and recommendations for mitigation measures in accordance with the ADOT NAR for the Santan project. This study evaluates impacts predicted to result from traffic noise levels during the noisiest conditions that would result from the planned improvements to SR202 freeway.

Table 10 below summarizes the results of the potentially recommended noise mitigation/barriers determined in accordance with the ADOT NAR guidelines for the Project. A total of four (4) new noise barriers are potentially recommended. Barrier 1 is recommended for the Tempe Korean Presbyterian Church on the northwest quadrant between SR202 and Dobson Road interchange. Barrier 2 is recommended along WB SR202 mainline east of McQueen Road for Willis Gated Community under construction and approved Canal View Homes subdivision. Barrier 3 is recommended on EB SR202 mainline east of McQueen Road for San Valencia subdivision under construction. Barrier 4 is recommended for Quartz Hill Elementary School on the southwest quadrant between SR202 and Val Vista Drive interchange. The noise barrier locations and termini described in this report are subject to adjustments by final designers to accommodate final design features not contemplated with the detail of the noise analysis and this report.

TABLE 10
Recommended Barrier Summary

Noise Barrier	Barrier Height Range (ft)	Barrier Length (ft)	Area of Barrier (ft^2)	Total Barrier Cost	Number of Benefited Receptors	Cost-Per-Benefited-Receptor
New Barrier 1 (Sta 2284+87 to Sta 2298+23)	12 - 18	1,439	21,717	$760,100	22	$34,600
New Barrier 2 (Sta 2463+14 to Sta 2486+59)	12	2,347	28,162	$1,066,700	29	$36,800
New Barrier 3 (Sta 2469+76 to Sta 2489+60)	14	1,985	27,792	$1,067,300	35	$30,500
New Barrier 4 (Sta 2641+14 to Sta 2660+74)	12	2,000	24,001	$840,100	47	$17,900
Total for Recommended Barriers	12 to 18	7,771	101,672	$3,734,200	133	$28,100

Notes:
[1] Total cost of the noise barrier is based on the unit cost of $35 per square foot off-structure and $85 per square foot on-structure.
[2] Barrier 2 and Barrier 3 include a length of 135' bridge section.

The Date of Public Knowledge is the date of approval of the Categorical Exclusion (CE), the Finding of No Significant Impact (FONSI) or the Record of Decision (ROD), as defined in 23 CFR 771. This project is funded by RARF. For state-funded projects, the Date of Public Knowledge is the date of approval of the appropriate environmental document.

This information will be made available to the local officials with the responsibility for making zoning/permitting decisions for that location. This information will be accompanied by the statement: "This information is presented purely to assist with noise-compatible land use planning decision making. Abatement for lands permitted after the Date of Public Knowledge for this project is not eligible for federal aid."

6.0 STATEMENT OF LIKELIHOOD

This statement of likelihood is to be included in the environmental document since feasibility and reasonableness determinations may change due to changes in project design after approval of the environmental document. This report contains a preliminary location and physical description of noise abatement measures determined feasible and reasonable in the preliminary analysis. The final recommendations on the construction of an abatement measures described within the report are to be determined during the completion of the project's final design and the public involvement processes, in line with ADOT’s Instruction on Solicitation of Viewpoints in Project Type I Noise Analysis.

References

Arizona Department of Transportation, *Noise Abatement Requirements*, May 2017.

Arizona Department of Transportation, *Standard Specifications for Road and Bridge Construction*, 2008.

U.S. Code of Federal Regulations, Title 23, Part 772. *Procedures for Abatement of Highway Traffic Noise and Construction Noise*.

U.S. Department of Transportation, Federal Highway Administration, *FHWA Roadway Construction Noise Model User's Guide*, January 2006.

U.S. Department of Transportation, Federal Highway Administration, Highway Traffic *Noise Analysis and Abatement Policy and Guidance*, June 1995.

U.S. Department of Transportation, Federal Highway Administration, *Highway Traffic Noise Prediction Model*, FHWA-RD-77-108, December 1978.

U.S. Department of Transportation, Federal Highway Administration, *Measurement of Highway-Related Noise*, FHWA-PD-96-046, May 1996.

Glossary of Terms

Design Year – The future year used to estimate the probable traffic volume for which a highway is designed. Normally, traffic estimates are projected 20 years into the future from the estimated start date of construction.

Existing Sound Level – The current noise level, made up of all natural and manmade noises normally present within a particular area. The existing sound level provides a reference point for determining noise impacts when transportation improvements or new highways are being considered.

Insertion Loss – A term used in noise analysis describing the projected noise reduction that results when a noise barrier is placed between a noise source and a receiver.

L_{eq} – The equivalent steady-state, A-weighted sound level which, in a stated period of time, would contain the same acoustical energy as the time-varying sound levels during the same period.

Noise Receiver – The technical term used in noise modeling to describe the location of a potential noise impact.

Shielding – Any construction or natural barrier which, when interposed between the noise source and the receiver, will provide an excess reduction in roadway noise.

TNM Model Runs Description

TNM File Name	Description
Sec1_I-10_to_Kyrene_Build	Build condition, Section 1 between I-10 and Kyrene Road, No barriers recommended
Sec1_I-10_to_Kyrene_NoBuild	No Build condition, Section 1 between I-10 and Kyrene Road
Sec2_Kyrene_to_McClintock_Build	Build condition, Section 2 between Kyrene Road to McClintock Drive, No barriers recommended
Sec2_Kyrene_to_McClintock_NoBuild	No Build condition, Section 2 between Kyrene Road to McClintock Drive
Sec3_Church_Dobson_Build	Build condition, Section 3 Tempe Korean Church at the northwest quadrant between SR202 and Dobson Road, Barrier 1 is recommended
Sec3_Church_Dobson_NoBuild	No Build condition, Section 3 Tempe Korean Church at the northwest quadrant between SR202 and Dobson Road
Sec3_McClintock_to_Dobson_Build	Build condition, Section 3 between McClintock Drive and Dobson Road except for Tempe Korean Church, No barriers recommended
Sec3_McClintock_to_Dobson_NoBuild	No Build condition, Section 3 between McClintock Drive and Dobson Road
Sec4_Dobson_to_Arizona_Build	Build condition, Section 4 between Dobson Road and Arizona Avenue, No barriers recommended
Sec4_Dobson_to_Arizona_NoBuild	No Build condition, Section 4 between Dobson Road and Arizona Avenue
Sec4_ExistBarrier_Build_Mitigated	Build condition, Section 4 detailed analysis for existing barrier 9 & 12 due to topographic variation before/after considering existing barrier 9 & 12, terrain line of the berm was modeled in mitigated scenario
Sec4_ExistBarrier_Build_Unmitigated	Build condition, Section 4 detailed analysis for existing barrier 9 & 12 due to topographic variation before/after considering existing barrier 9 & 12, terrain line of the berm was not modeled in the unmitigated scenario
Sec5_Arizona_to_Cooper_Build	Build condition, Section 5 between Arizona Avenue and Cooper Road, Barrier 2 is recommended
Sec5_Arizona_to_Cooper_NoBuild	No Build condition, Section 5 between Arizona Avenue and Cooper Road
Sec5_Barrier3_Build	Build condition, Section 5 for San Valencia Luxury Apartments (proposed Barrier 3) using hard soil ground type
Sec5_barrier3_NoBuild	No Build condition, Section 5 for San Valencia Luxury Apartments using hard soil ground type
Sec6_Cooper_to_ValVista_Build_Mitigated	Build condition, Section 6 between Cooper Road and Val Vista Drive, mitigated scenario, Barrier 4 is recommended
Sec6_Cooper_to_ValVista_Build_Unmitigated	Build condition, Section 6 between Cooper Road and Val Vista Drive, Unmitigated scenario
Sec6_Cooper_to_ValVista_NoBuild	No Build condition, Section 6 between Cooper Road and Val Vista Drive

APPENDIX A

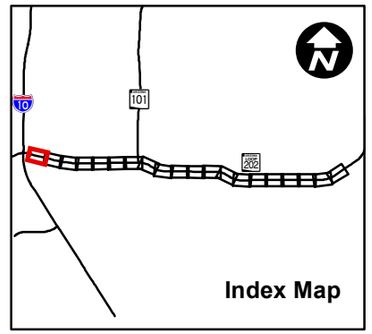
Noise Receiver and Potentially Recommended Barrier Locations

State Route 202L (Santan Freeway) Val Vista to Interstate 10

ADOT

Legend

- Noise Receivers
- Monitoring Sites
- Exist Noise Barriers
- Potential Noise Barriers
- Mileposts



Feet

0 150 300

Sources: AZTEC (2019)
World Imagery (accessed in 2019)

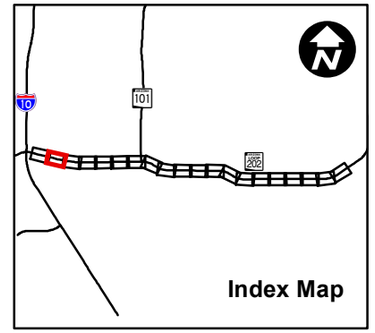
Map Disclaimer: This map is intended for general siting purposes only.

State Route 202L (Santan Freeway) Val Vista to Interstate 10

ADOT

Legend

- Noise Receivers
- Monitoring Sites
- Exist Noise Barriers
- Potential Noise Barriers
- Mileposts



Feet
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Sources: AZTEC (2019)
World Imagery (accessed in 2019)

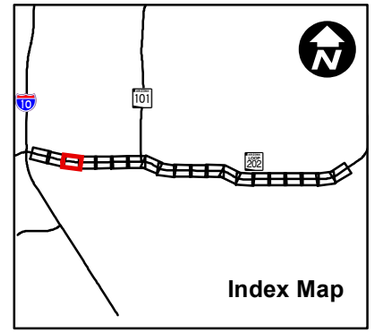
Map Disclaimer: This map is intended for general siting purposes only.

State Route 202L (Santan Freeway) Val Vista to Interstate 10

ADOT

Legend

- Noise Receivers
- Monitoring Sites
- Exist Noise Barriers
- Potential Noise Barriers
- Mileposts



Feet
0 150 300

Sources: AZTEC (2019)
World Imagery (accessed in 2019)

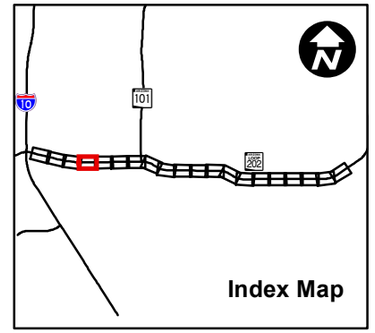
Map Disclaimer: This map is intended for general siting purposes only.

State Route 202L (Santan Freeway) Val Vista to Interstate 10

ADOT

Legend

- Noise Receivers
- Monitoring Sites
- Exist Noise Barriers
- Potential Noise Barriers
- Mileposts



Feet
0 150 300

Sources: AZTEC (2019)
World Imagery (accessed in 2019)

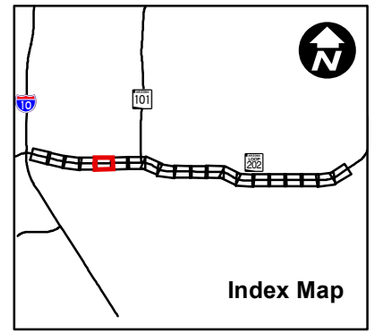
Map Disclaimer: This map is intended for general siting purposes only.

State Route 202L (Santan Freeway) Val Vista to Interstate 10

ADOT

Legend

- Noise Receivers
- Monitoring Sites
- Exist Noise Barriers
- Potential Noise Barriers
- Mileposts



Feet
0 150 300

Sources: AZTEC (2019)
World Imagery (accessed in 2019)

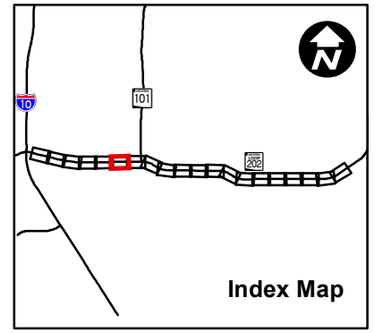
Map Disclaimer: This map is intended for general siting purposes only.

State Route 202L (Santan Freeway) Val Vista to Interstate 10

ADOT

Legend

- Noise Receivers
- Monitoring Sites
- Exist Noise Barriers
- Potential Noise Barriers
- Mileposts



Feet
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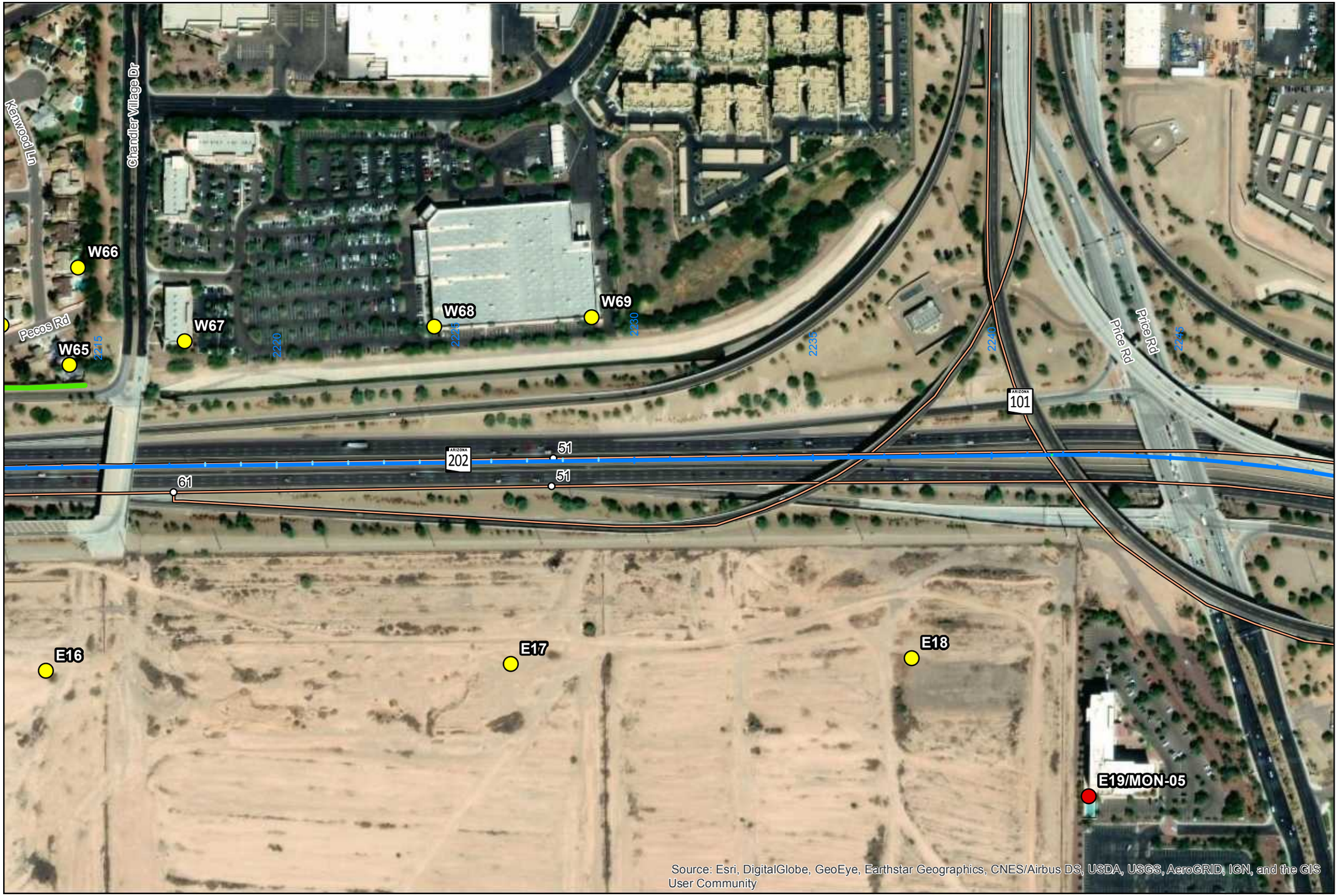
Sources: AZTEC (2019)
World Imagery (accessed in 2019)

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

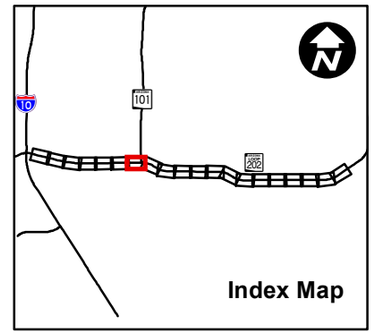


State Route 202L (Santan Freeway) Val Vista to Interstate 10

ADOT

Legend

- Noise Receivers
- Monitoring Sites
- Exist Noise Barriers
- Potential Noise Barriers
- Mileposts



Feet
0 150 300

Sources: AZTEC (2019)
World Imagery (accessed in 2019)

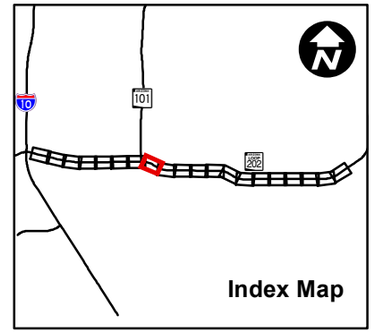
Map Disclaimer: This map is intended for general siting purposes only.

State Route 202L (Santan Freeway) Val Vista to Interstate 10

ADOT

Legend

- Noise Receivers
- Monitoring Sites
- Exist Noise Barriers
- Potential Noise Barriers
- Mileposts



Feet
0 150 300

Sources: AZTEC (2019)
World Imagery (accessed in 2019)

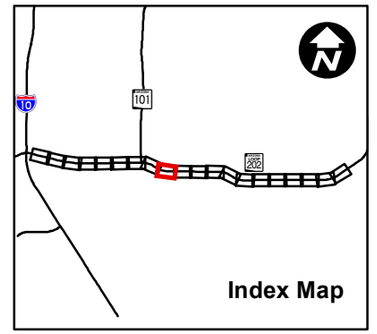
Map Disclaimer: This map is intended for general siting purposes only.

State Route 202L (Santan Freeway) Val Vista to Interstate 10

ADOT

Legend

- Noise Receivers
- Monitoring Sites
- Exist Noise Barriers
- Potential Noise Barriers
- Mileposts



Feet
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Sources: AZTEC (2019)
World Imagery (accessed in 2019)

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

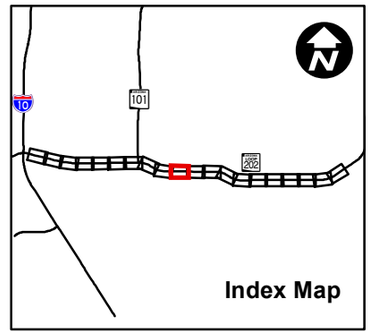
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and User Community

State Route 202L (Santan Freeway) Val Vista to Interstate 10

ADOT

Legend

- Noise Receivers
- Monitoring Sites
- Exist Noise Barriers
- Potential Noise Barriers
- Mileposts



Feet
0 150 300

Sources: AZTEC (2019)
World Imagery (accessed in 2019)

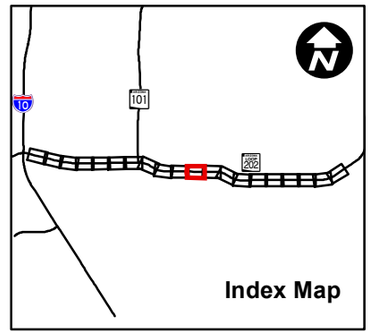
Map Disclaimer: This map is intended for general siting purposes only.

State Route 202L (Santan Freeway) Val Vista to Interstate 10

ADOT

Legend

- Noise Receivers
- Monitoring Sites
- Exist Noise Barriers
- Potential Noise Barriers
- Mileposts



Feet
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Sources: AZTEC (2019)
World Imagery (accessed in 2019)

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

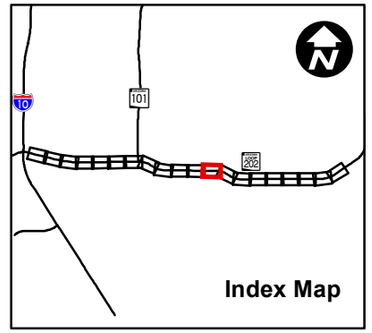
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

State Route 202L (Santan Freeway) Val Vista to Interstate 10

ADOT

Legend

- Noise Receivers
- Monitoring Sites
- Exist Noise Barriers
- Potential Noise Barriers
- Mileposts



Feet
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Sources: AZTEC (2019)
World Imagery (accessed in 2019)

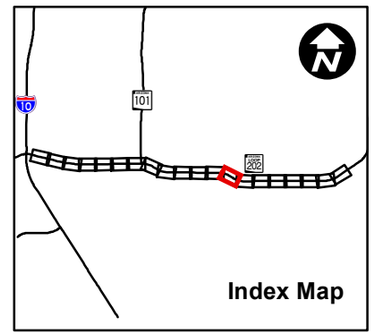
Map Disclaimer: This map is intended for general siting purposes only.

State Route 202L (Santan Freeway) Val Vista to Interstate 10

ADOT

Legend

- Noise Receivers
- Monitoring Sites
- Exist Noise Barriers
- Potential Noise Barriers
- Mileposts



Feet
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Sources: AZTEC (2019)
World Imagery (accessed in 2019)

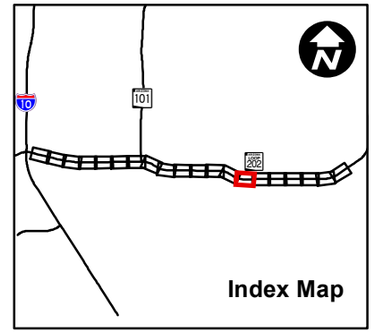
Map Disclaimer: This map is intended for general siting purposes only.

State Route 202L (Santan Freeway) Val Vista to Interstate 10

ADOT

Legend

- Noise Receivers
- Monitoring Sites
- Exist Noise Barriers
- Potential Noise Barriers
- Mileposts



Feet
0 150 300

Sources: AZTEC (2019)
World Imagery (accessed in 2019)

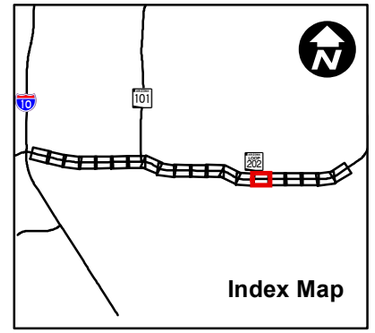
Map Disclaimer: This map is intended for general siting purposes only.

State Route 202L (Santan Freeway) Val Vista to Interstate 10

ADOT

Legend

- Noise Receivers
- Monitoring Sites
- Exist Noise Barriers
- Potential Noise Barriers
- Mileposts



Feet
0 150 300

Sources: AZTEC (2019)
World Imagery (accessed in 2019)

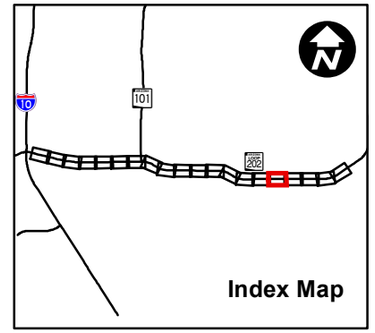
Map Disclaimer: This map is intended for general siting purposes only.

State Route 202L (Santan Freeway) Val Vista to Interstate 10

ADOT

Legend

- Noise Receivers
- Monitoring Sites
- Exist Noise Barriers
- Potential Noise Barriers
- Mileposts



Feet
0 150 300

Sources: AZTEC (2019)
World Imagery (accessed in 2019)

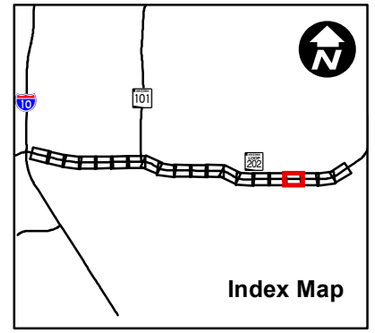
Map Disclaimer: This map is intended for general siting purposes only.

State Route 202L (Santan Freeway) Val Vista to Interstate 10

ADOT

Legend

- Noise Receivers
- Monitoring Sites
- Exist Noise Barriers
- Potential Noise Barriers
- Mileposts



Feet
0 150 300

Sources: AZTEC (2019)
World Imagery (accessed in 2019)

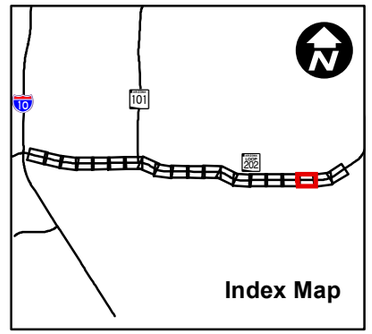
Map Disclaimer: This map is intended for general siting purposes only.

State Route 202L (Santan Freeway) Val Vista to Interstate 10

ADOT

Legend

- Noise Receivers
- Monitoring Sites
- Exist Noise Barriers
- Potential Noise Barriers
- Mileposts



Feet
0 150 300

Sources: AZTEC (2019)
World Imagery (accessed in 2019)

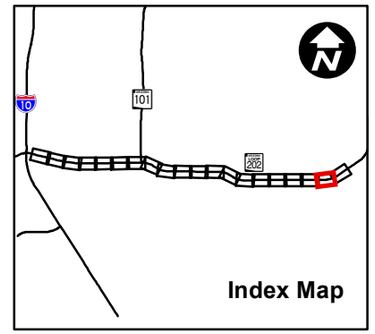
Map Disclaimer: This map is intended for general siting purposes only.

State Route 202L (Santan Freeway) Val Vista to Interstate 10

ADOT

Legend

- Noise Receivers
- Monitoring Sites
- Exist Noise Barriers
- Potential Noise Barriers
- Mileposts



Feet
0 150 300

Sources: AZTEC (2019)
World Imagery (accessed in 2019)

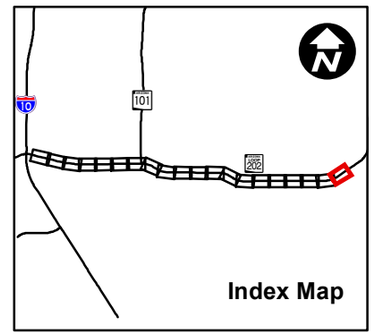
Map Disclaimer: This map is intended for general siting purposes only.

State Route 202L (Santan Freeway) Val Vista to Interstate 10

ADOT

Legend

- Noise Receivers
- Monitoring Sites
- Exist Noise Barriers
- Potential Noise Barriers
- Mileposts



Feet
0 150 300

Sources: AZTEC (2019)
World Imagery (accessed in 2019)

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

APPENDIX B

Noise Level Monitoring Results

4561 E McDowell Road
Phoenix, AZ 85008
Tel: (602) 454-0402
Fax: (602) 458-7465

ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista Rd to Interstate 10 **Date:** 10/04/2018

Site Number/Description: MON-01, (Lat/Long: 33.294443, -111.950428) at approximate milepost 54.03
Empty parcel west of Kyrene Rd
(approximately 430 feet north of the existing roadway edge of SR 202L)

(Prepared by)/Crew: Scott Solliday, Margaret Bowler, Homaira Parveen, David Shu

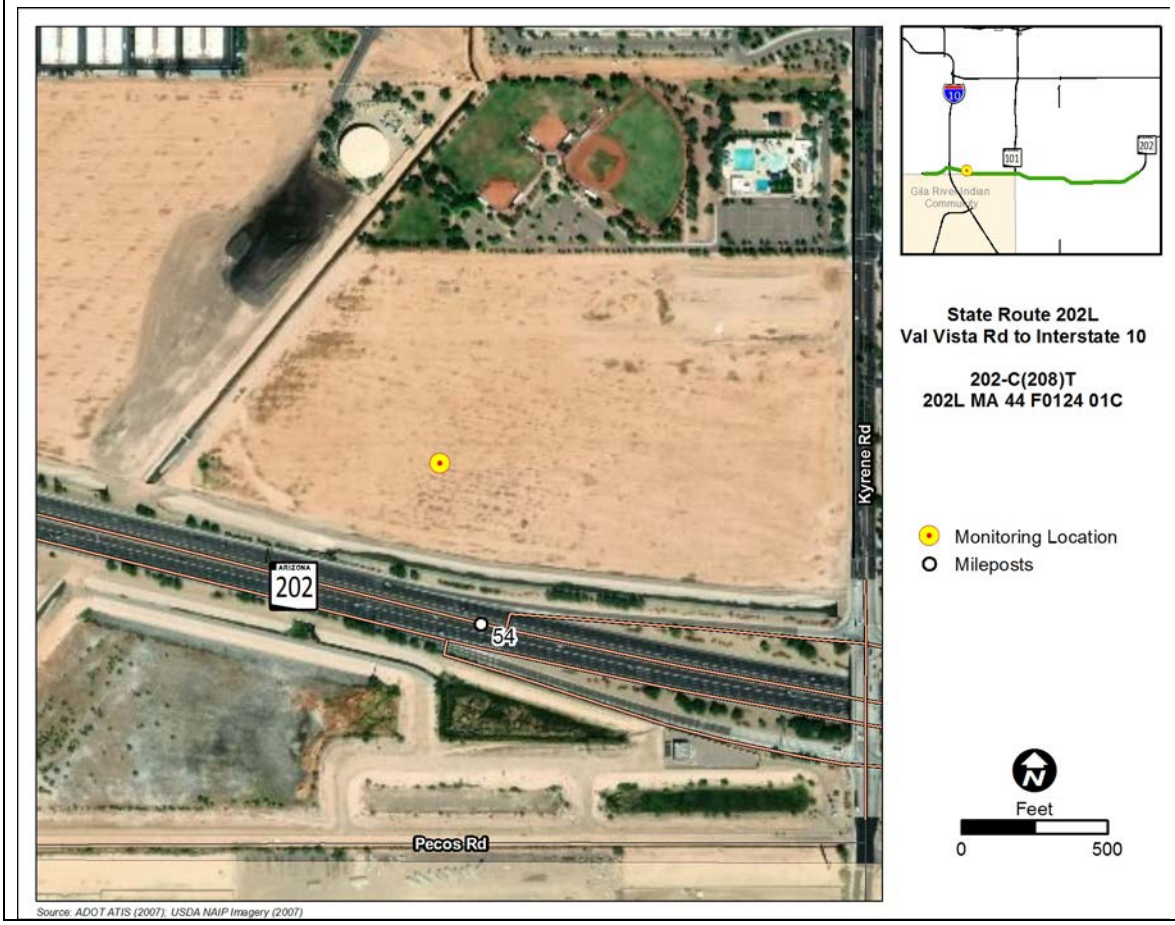
Temperature: 84 °F **Relative Humidity:** 40 % **Wind & Direction:** 3 mph/W **Sky:** Partly Cloudy

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65



Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	5:53 PM	10 mins	58.0	61.5	71.4	---	---	---
2	6:03 PM	10 mins	57.8	61.4	69.3	---	---	---
3	6:13 PM	10 mins	57.2	62.4	72.5	---	---	---

NOTES:

4561 E McDowell Road
Phoenix, AZ 85008
Tel: (602) 454-0402
Fax: (602) 458-7465

ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Figure 1. Looking east

Figure 2. Looking south

4561 E McDowell Road
Phoenix, AZ 85008
Tel: (602) 454-0402
Fax: (602) 458-7465

ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista Rd to Interstate 10 **Date:** 10/11/2018

Site Number/Description: MON-02, (Lat/Long: 33.292102, -111.935329) at approximate milepost 53.15
Drainage basin area in Monte Vista Subdivision
(approximately 186 feet north of the existing roadway edge of SR 202L)

(Prepared by)/Crew: Scott Solliday, Homaira Parveen, David Shu

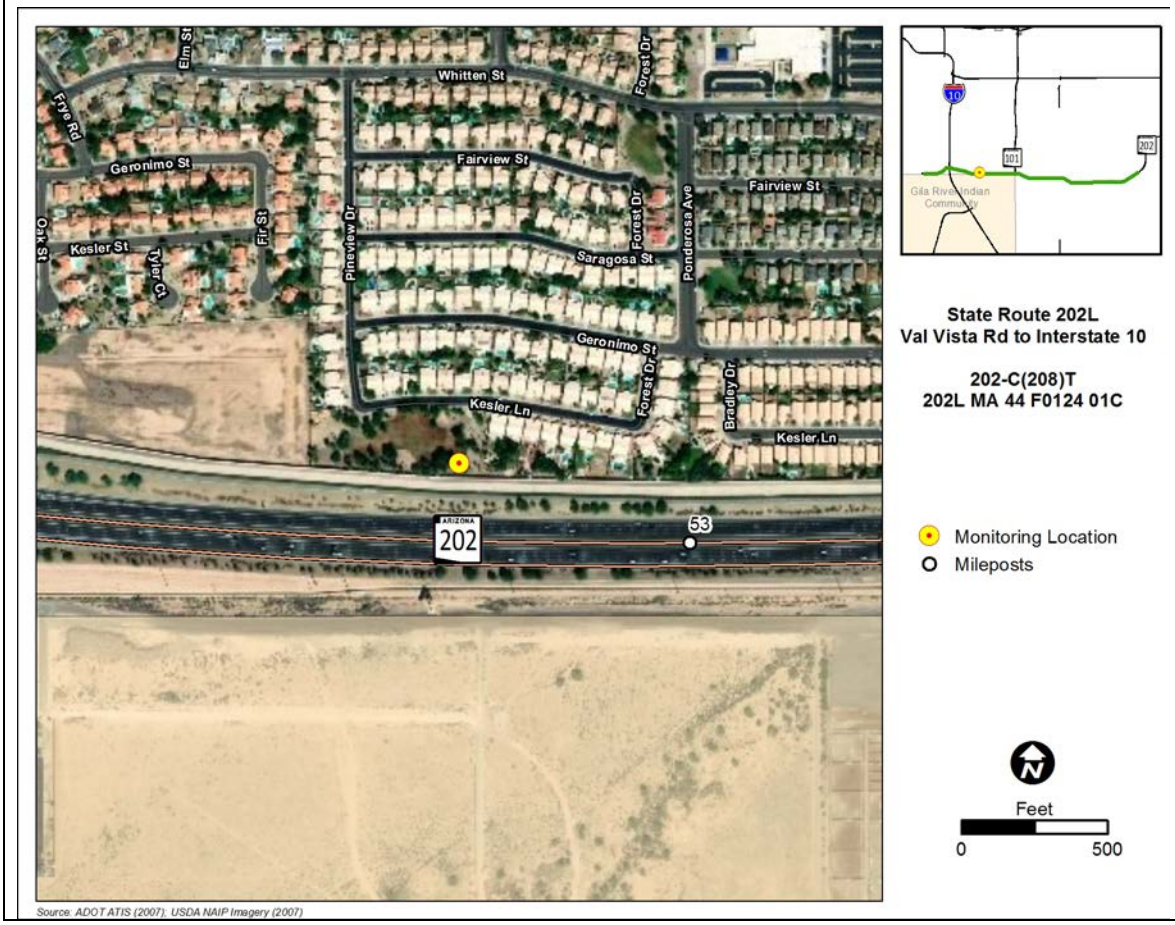
Temperature: 79 °F **Relative Humidity:** 42 % **Wind & Direction:** 7 mph/WSW **Sky:** Mostly Cloudy

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65



Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	5:58 PM	10 mins	56.2	58.6	65.5	---	---	---
2	6:09 PM	10 mins	56.9	59.3	63.8	---	---	---
3	6:20 PM	10 mins	55.7	59.5	59.8	---	---	---

NOTES:

4561 E McDowell Road
Phoenix, AZ 85008
Tel: (602) 454-0402
Fax: (602) 458-7465

ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Figure 1. Looking north

Figure 2. Looking south

4561 E McDowell Road
Phoenix, AZ 85008
Tel: (602) 454-0402
Fax: (602) 458-7465

ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista Rd to Interstate 10 **Date:** 10/04/2018

Site Number/Description: MON-03, (Lat/Long: 33.292588, -111.917695) at approximate milepost 52.13
Outside residence backyard on Geronimo Street
(approximately 256 feet north of the existing roadway edge of SR 202L)

(Prepared by)/Crew: Scott Solliday, Margaret Bowler, Homaira Parveen, David Shu

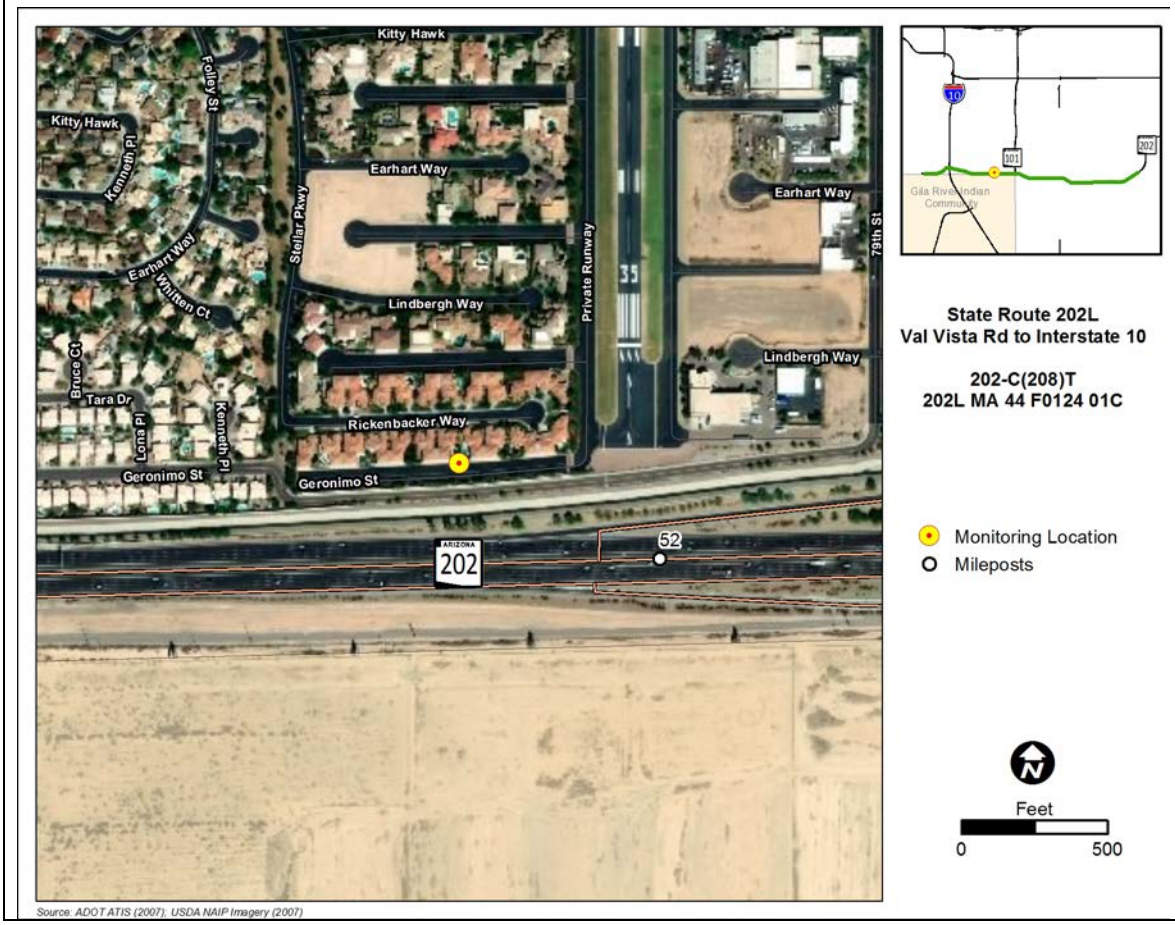
Temperature: 86 °F **Relative Humidity:** 35 % **Wind & Direction:** 7 mph/S **Sky:** Fair

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65



Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	3:55 PM	10 mins	58.8	63.1	74.0	---	---	---
2	4:09 PM	10 mins	61.5	65.4	73.7	---	---	---
3	4:22 PM	10 mins	61.6	64.9	74.3	---	---	---

NOTES:

4561 E McDowell Road
Phoenix, AZ 85008
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Fax: (602) 458-7465

Figure 1. Looking west

Figure 2. Looking north

4561 E McDowell Road
Phoenix, AZ 85008
Tel: (602) 454-0402
Fax: (602) 458-7465

ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista Rd to Interstate 10 **Date:** 09/27/2018

Site Number/Description: MON-04, (Lat/Long: 33.292675, -111.905878) at approximate milepost 51.43
Cul-de-sac on Geronimo Street
(approximately 212 feet north of the existing roadway edge of SR 202L)

(Prepared by)/Crew: Scott Solliday, Homaira Parveen, David Shu

Temperature: 90 °F **Relative Humidity:** 26 % **Wind & Direction:** 0 mph **Sky:** Fair

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65

Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	9:41 AM	10 mins	50.3	54.6	61.7	---	---	---
2	9:53 AM	10 mins	50.1	54.6	64.4	---	---	---
3	10:04 AM	10 mins	49.8	53.9	60.9	---	---	---

NOTES:

4561 E McDowell Road
Phoenix, AZ 85008
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Fax: (602) 458-7465

Figure 1. Looking west

Figure 2. Looking south

AZTEC
www.aztec.us
4561 E McDowell Road
Phoenix, AZ 85008
Tel: (602) 454-0402
Fax: (602) 458-7465

ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista Rd to Interstate 10 **Date:** 09/27/2018

Site Number/Description: MON-05, (Lat/Long: 33.289502, -111.893432) at approximate milepost 51.71
Pool area at Fairfield Inn & Suites by Marriott Phoenix Chandler/Fashion Center
(approximately 842 feet south of the existing roadway edge of SR202L)

(Prepared by)/Crew: Scott Solliday, Homaira Parveen, David Shu

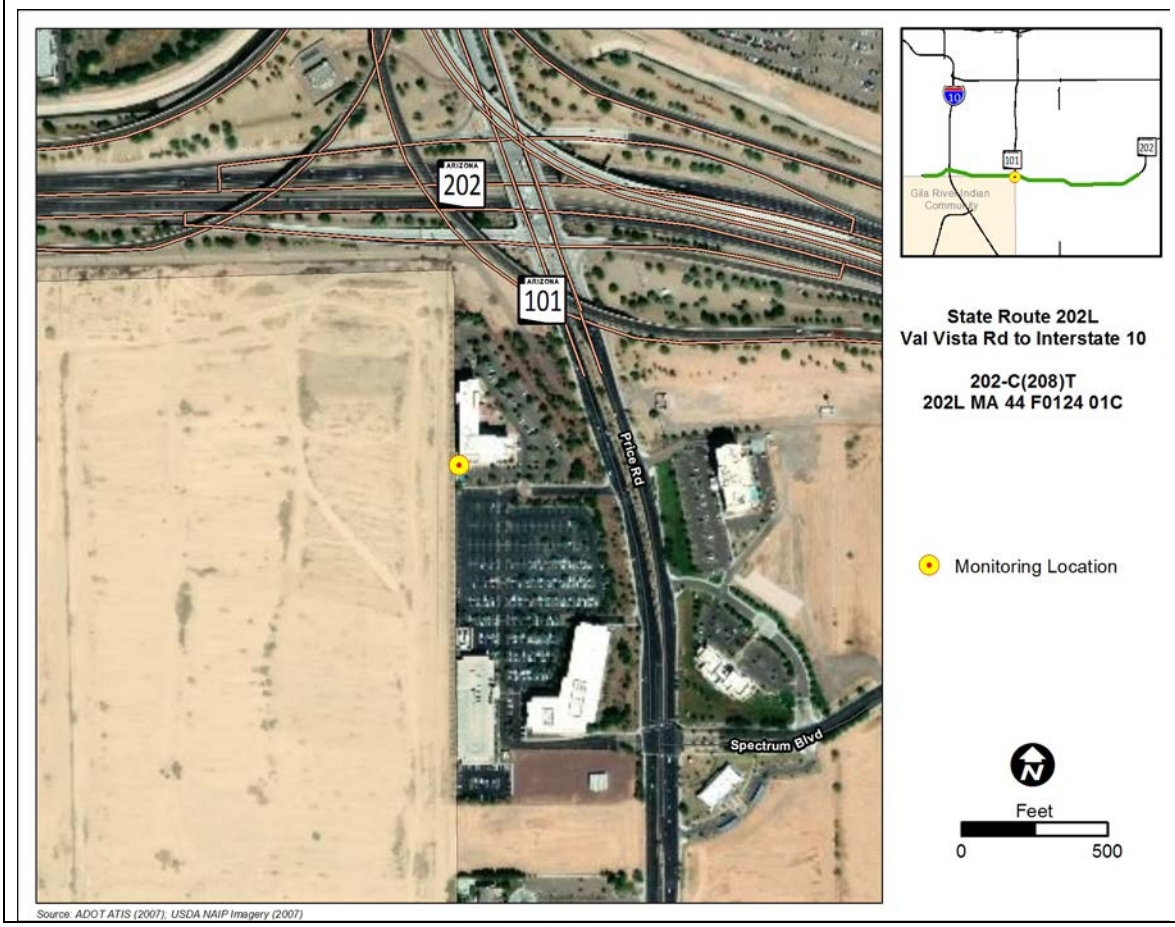
Temperature: 81 °F **Relative Humidity:** 31 % **Wind & Direction:** 4 mph/NE **Sky:** Fair

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65



Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	8:48 AM	10 mins	52.5	57.8	62.6	---	---	---
2	8:59 AM	10 mins	51.5	57.3	61.9	---	---	---
3	9:10 AM	10 mins	52.1	57.5	66.2	---	---	---

NOTES: Intermittent noise from a landscape crew working about a quarter mile away for the duration of all three samples

4561 E McDowell Road
Phoenix, AZ 85008
Tel: (602) 454-0402
Fax: (602) 458-7465

Figure 1. Looking west

Figure 2. Looking south

4561 E McDowell Road
Phoenix, AZ 85008
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Fax: (602) 458-7465

ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista Rd to Interstate 10 **Date:** 09/26/2018

Site Number/Description: MON-06, (Lat/Long: 33.289404, -111.881997) at approximate milepost 50.00
Close to parking area in Canterra Apartments
(approximately 195 feet north of the existing roadway edge of SR202L)

(Prepared by)/Crew: Scott Solliday, Margaret Bowler, Homaira Parveen, David Shu

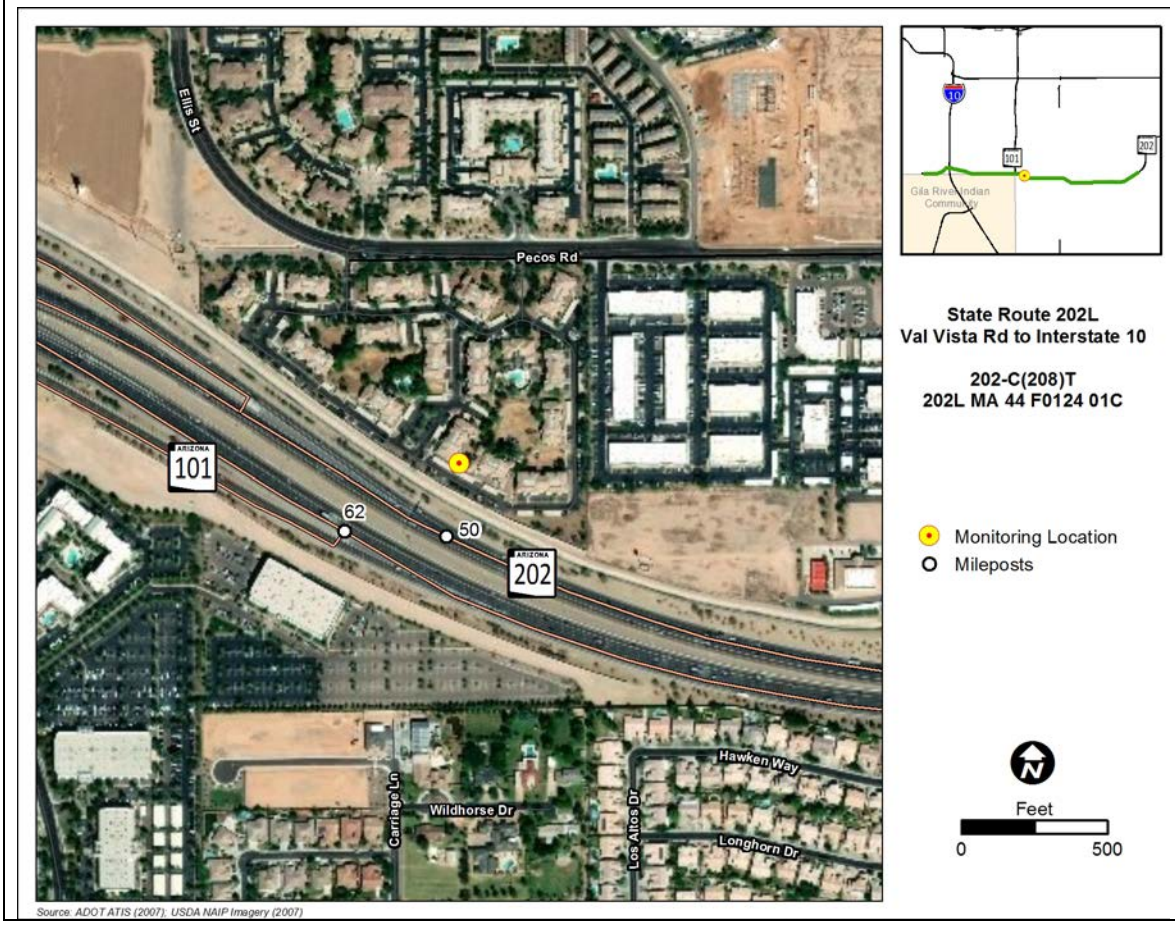
Temperature: 99 °F **Relative Humidity:** 16 % **Wind & Direction:** 9 mph/SW **Sky:** Partly Cloudy

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65



Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	5:28 PM	10 mins	56.7	61.0	65.9	---	---	---
2	5:38 PM	10 mins	58.0	61.5	68.8	---	---	---
3	5:49 PM	10 mins	58.6	62.5	65.6	---	---	---

NOTES:

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Phoenix, AZ 85008
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Figure 1. Looking north

Figure 2. Looking south

4561 E McDowell Road
Phoenix, AZ 85008
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ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista to Interstate 10 **Date:** 09/27/2018

Site Number/Description: MON-07, (Lat/Long: 33.286564, -111.88) at approximate milepost 49.86.
Corner between Los Altos Drive and Hawken Way
(approximately 345 feet south of the existing roadway edge of SR202L)

(Prepared by)/Crew: Scott Solliday, Homaira Parveen, David Shu

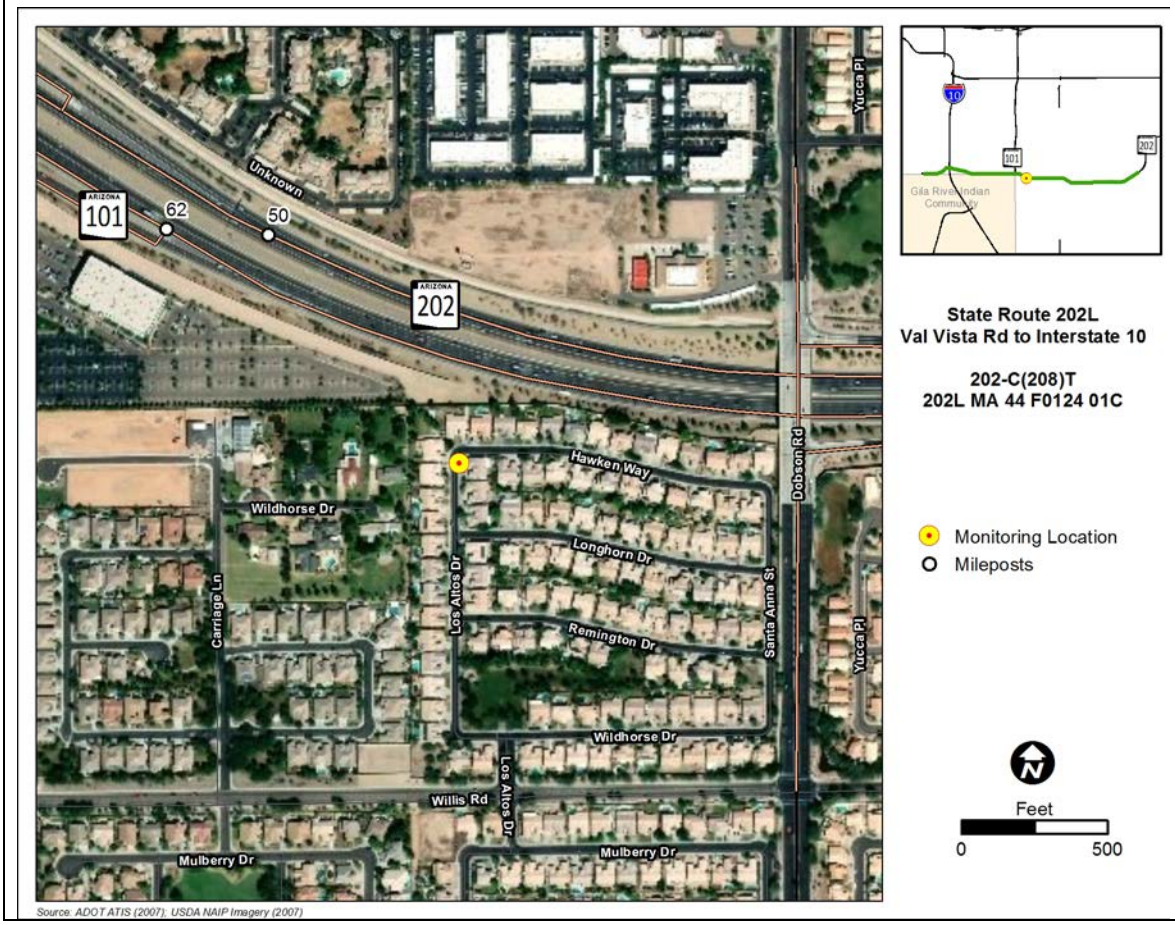
Temperature: 79 °F **Relative Humidity:** 42 % **Wind & Direction:** 0 mph **Sky:** Fair

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65



Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	7:54 AM	10 mins	52.1	56.2	65.6	---	---	---
2	8:05 AM	10 mins	50.2	55.5	65.1	---	---	---
3	8:16 AM	10 mins	50.7	58.3	73.0	---	---	---

NOTES:

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ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Figure 1. Looking east

Figure 2. Looking north

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ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista Rd to Interstate 10 **Date:** 09/20/2018

Site Number/Description: MON-08, (Lat/Long: 33.28817, -111.87778) at approximate milepost 49.73
Driveway at the Tempe Korean Presbyterian Church
(approximately 203 feet north of the existing roadway edge of SR202L)

(Prepared by)/Crew: Scott Solliday, Homaira Parveen, David Shu

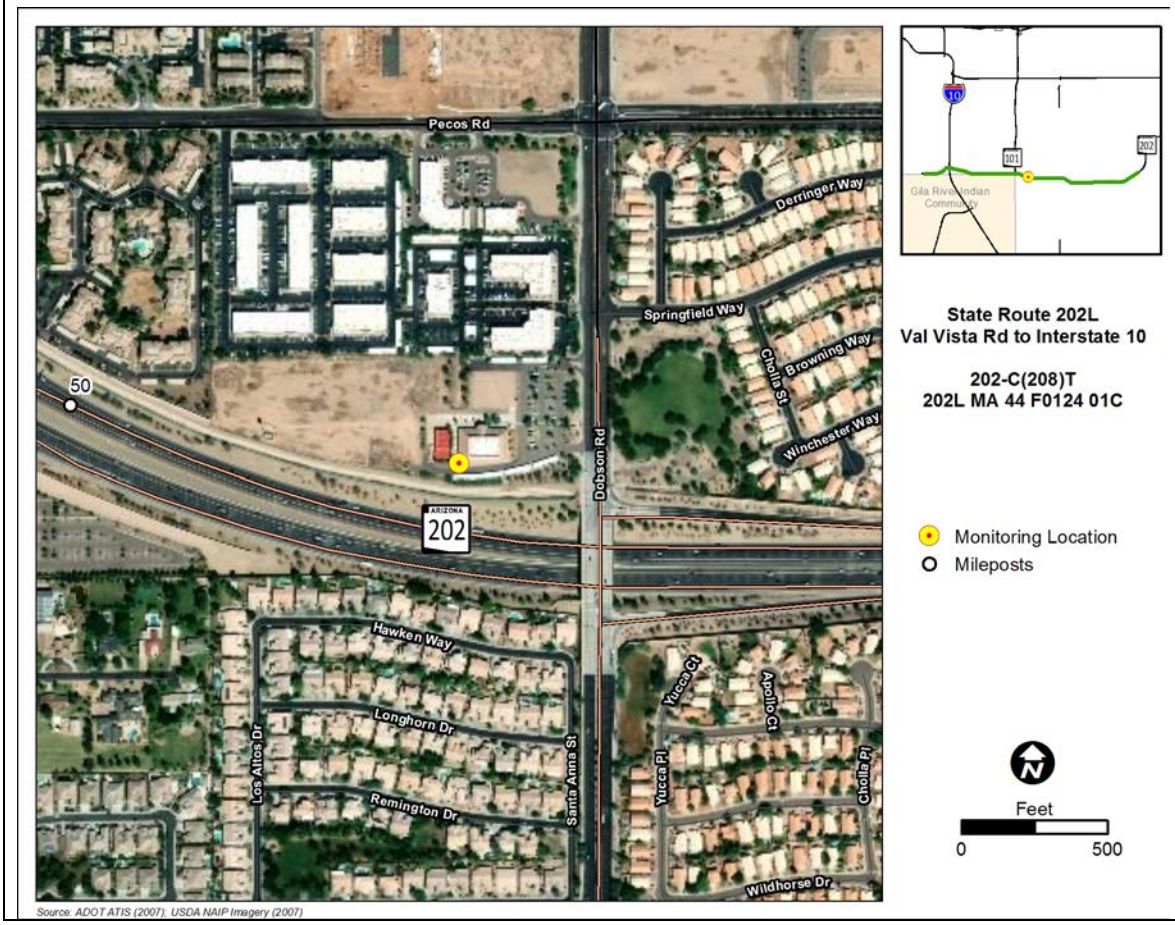
Temperature: 79 °F **Relative Humidity:** 78 % **Wind & Direction:** 7 mph/SSW **Sky:** Mostly Cloudy

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65



Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	10:02 AM	10 mins	64.5	68.2	71.9	---	---	---
2	10:13 AM	10 mins	60.9	67.5	72.6	---	---	---
3	10:23 AM	10 mins	63.3	67.5	71.1	---	---	---

NOTES:

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Figure 1. Looking west

Figure 2. Looking south

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ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista Rd to Interstate 10 **Date:** 09/20/2018

Site Number/Description: MON-09, (Lat/Long: 33.286333, -111.872254) at approximate milepost 49.42
Cul-de-sac on Villas Court
(approximately 200 feet south of the existing roadway edge of SR202L)

(Prepared by)/Crew: Scott Solliday, Homaira Parveen, David Shu

Temperature: 72 °F **Relative Humidity:** 100 % **Wind & Direction:** 0 mph **Sky:** Fair

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65

Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	6:58 AM	10 mins	54.0	56.7	66.0	---	---	---
2	7:09 AM	10 mins	53.5	58.7	70.6	---	---	---
3	7:19 AM	10 mins	54.8	58.7	65.2	---	---	---

NOTES: Original photos were lost due to camera malfunction. Returned to the site later that same day to recreate the photos.

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Figure 1. Looking north

Figure 2. Looking south

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ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista Rd to Interstate 10 **Date:** 09/20/2018

Site Number/Description: MON-10, (Lat/Long: 33.288036, -111.87226) at approximate milepost 49.42
Cul-de-sac on Pennington Drive
(approximately 161 feet north of the existing off-ramp roadway edge of SR202L)

(Prepared by)/Crew: Scott Solliday, Homaira Parveen, David Shu

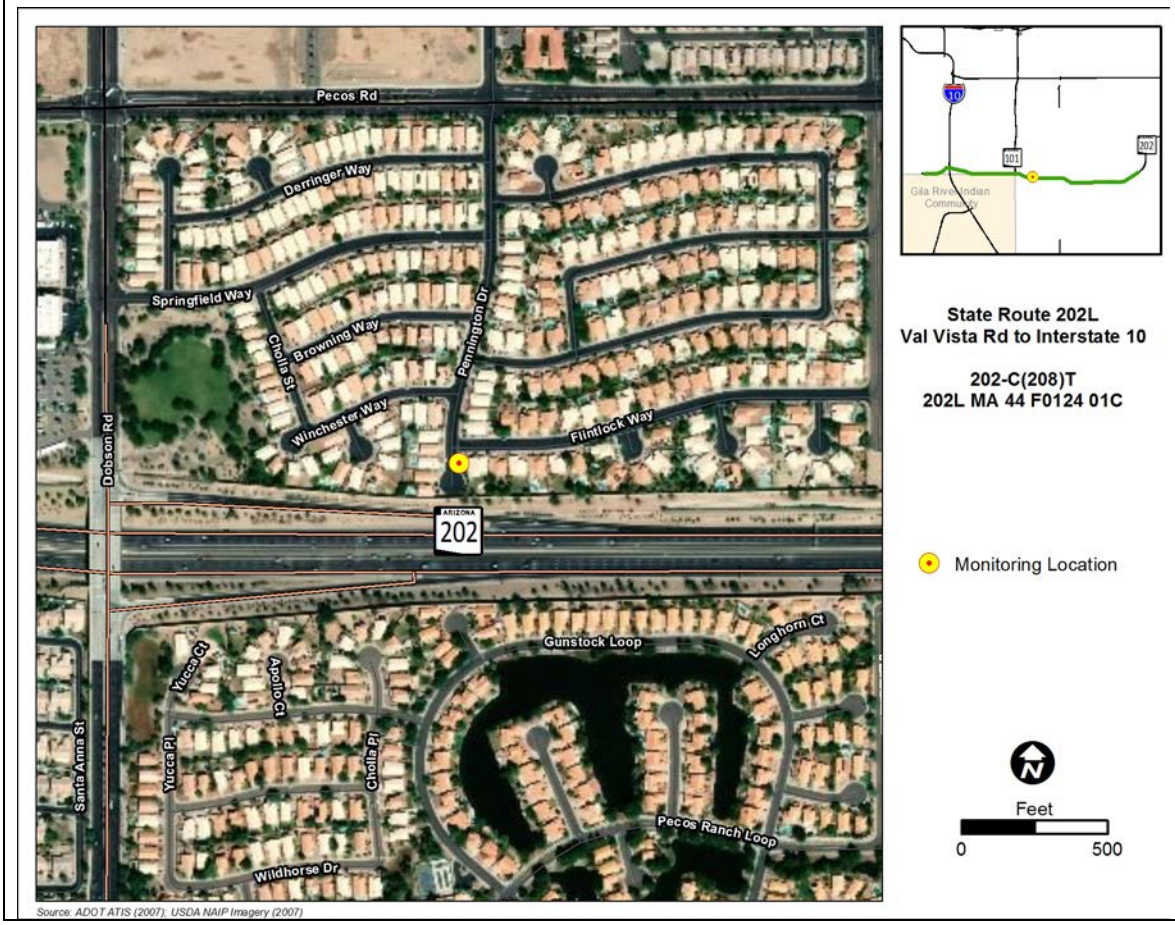
Temperature: 75 °F **Relative Humidity:** 94 % **Wind & Direction:** 0 mph **Sky:** Fair

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65



Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	7:40 AM	10 mins	54.6	58.9	73.5	---	---	---
2	7:51 AM	10 mins	55.1	58.2	69.0	---	---	---
3	8:01 AM	10 mins	51.5	55.7	65.7	---	---	---

NOTES:

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Figure 1. Looking north

Figure 2. Looking south

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ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista to Interstate 10 **Date:** 09/19/2018

Site Number/Description: MON-11, (Lat/Long: 33.286378, -111.86883) at approximate milepost 49.18
Cul-de-sac on Longhorn Court
(approximately 215 feet south of the existing roadway edge of SR202L)

(Prepared by)/Crew: Scott Solliday, Margaret Bowler, Homaira Parveen, David Shu

Temperature: 73 °F **Relative Humidity:** 94 % **Wind & Direction:** 5 mph/SSW **Sky:** Cloudy

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65

Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	5:55 PM	10 mins	52.7	57.4	68.0	---	---	---
2	6:06 PM	10 mins	53.9	58.6	75.2	---	---	---
3	6:16 PM	10 mins	51.5	55.5	65.6	---	---	---

NOTES:

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Figure 1. Looking north

Figure 2. Looking west

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ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista Rd to Interstate 10 **Date:** 09/20/2018

Site Number/Description: MON-12, (Lat/Long: 33.287861, -111.86758) at approximate milepost 49.14
Gravel parcel at the end of Arrowhead Drive in the Messina Subdivision
(approximately 149 feet north of the existing roadway edge of SR202L)

(Prepared by)/Crew: Scott Solliday, Homaira Parveen, David Shu

Temperature: 77 °F **Relative Humidity:** 89 % **Wind & Direction:** 0 mph **Sky:** Partly Cloudy

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65

Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	8:22 AM	10 mins	50.5	54.9	66.2	---	---	---
2	8:33 AM	10 mins	50.5	54.7	60.5	---	---	---
3	8:44 AM	10 mins	53.8	56.7	65.6	---	---	---

NOTES: Original camera malfunctioned forcing crew to switch to a different camera

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Figure 1. Looking north

Figure 2. Looking west

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ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista Rd to Interstate 10 **Date:** 09/19/2018

Site Number/Description: MON-13, (Lat/Long: 33.286432, -111.862311) at approximate milepost 48.85
Sidewalk on Hawken Way in front of residence in the Carizal Subdivision
(approximately 148 feet south of the existing roadway edge of the SR202L off-ramp)

(Prepared by)/Crew: Scott Solliday, Margaret Bowler, Homaira Parveen, David Shu

Temperature: 75 °F **Relative Humidity:** 78 % **Wind & Direction:** 6 mph/S **Sky:** Light Rain

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65

Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	3:45 PM	10 mins	54.3	60.1	74.8	---	---	---
2	3:56 PM	10 mins	53.9	57.6	67.1	---	---	---
3	4:07 PM	10 mins	52.7	56.0	67.0	---	---	---

NOTES:

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ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Figure 1. Looking east

Figure 2. Looking west

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ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista Rd to Interstate 10 **Date:** 09/20/2018

Site Number/Description: MON-14, (Lat/Long: 33.2882, -111.856148) at approximate milepost 48.78
Close to parking area in Pecos Springs Apartments
(approximately 205 feet north of the existing roadway edge of the SR202L off-ramp)

(Prepared by)/Crew: Scott Solliday, Homaira Parveen, David Shu

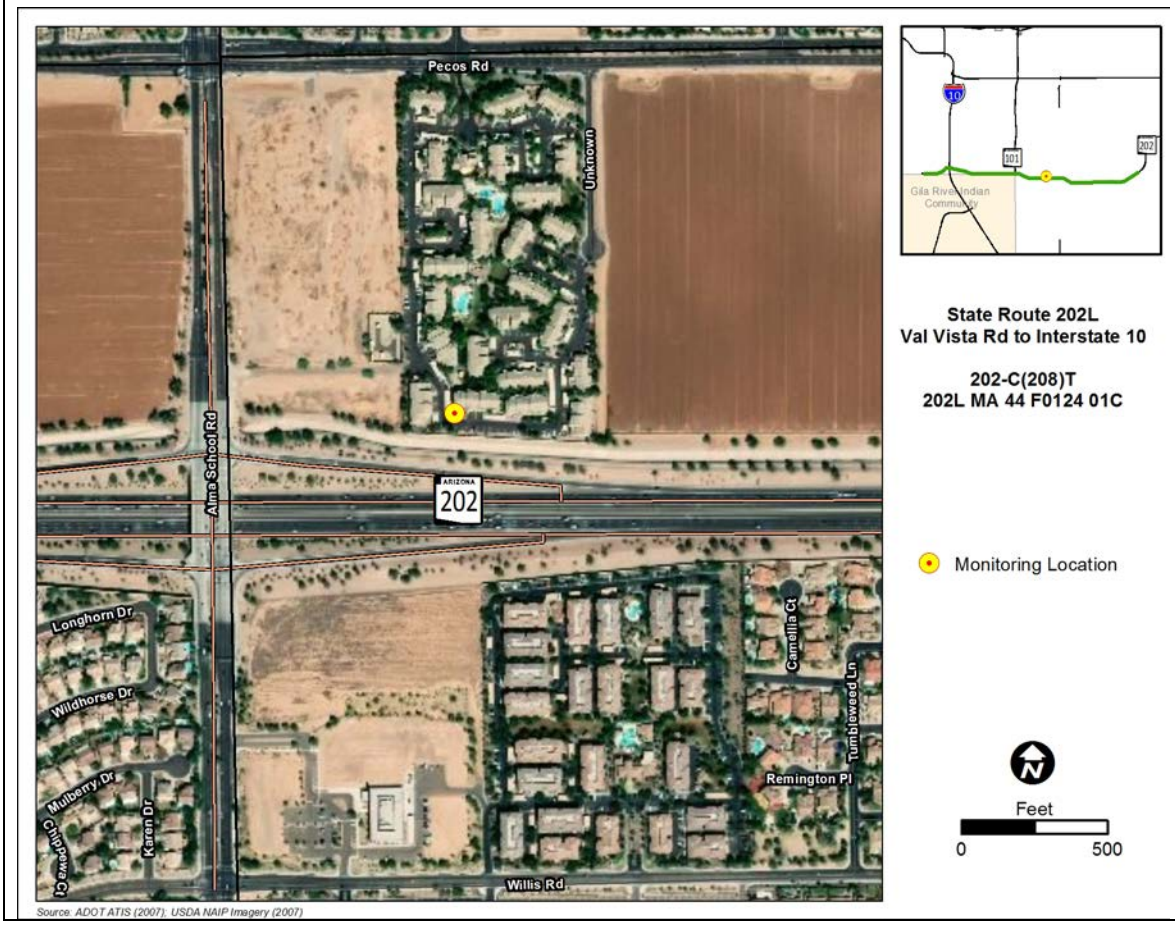
Temperature: 78 °F **Relative Humidity:** 92 % **Wind & Direction:** 5 mph/SSW **Sky:** Mostly Cloudy

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65



Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	9:12 AM	10 mins	57.1	61.4	67.8	---	---	---
2	9:23 AM	10 mins	57.8	61.4	72.1	---	---	---
3	9:34 AM	10 mins	57.7	60.9	58.7	---	---	---

NOTES:

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Figure 1. Looking west

Figure 2. Looking south

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ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista to Interstate 10 **Date:** 10/04/2018

Site Number/Description: MON-15, (Lat/Long: 33.288379, -111.853331) at approximate milepost 48.32
Southern end of a 38-acre graded lot; planned future residential development
(approximately 321 feet north of the existing roadway edge of the SR202L)

(Prepared by)/Crew: Scott Solliday, Margaret Bowler, Homaira Parveen, David Shu

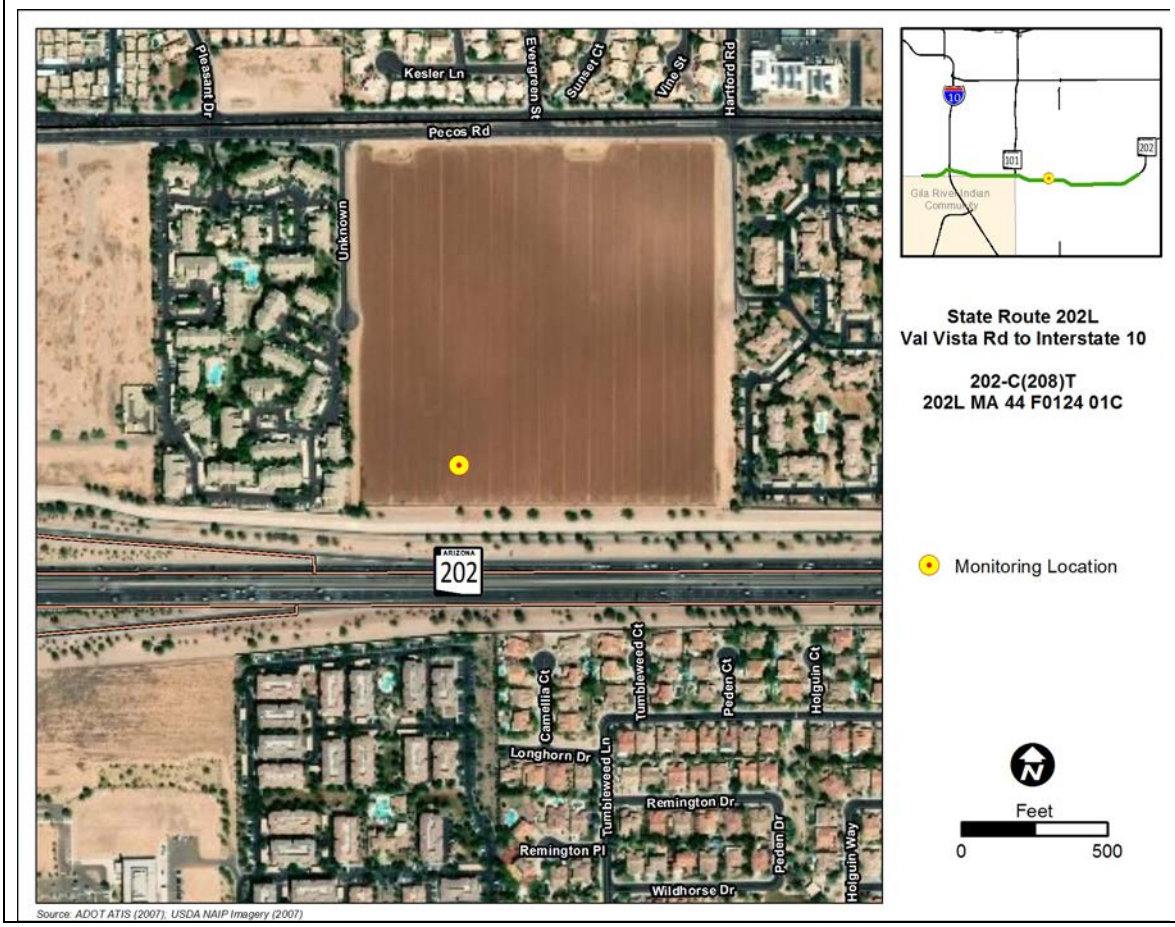
Temperature: 84 °F **Relative Humidity:** 40 % **Wind & Direction:** 5 mph/SW **Sky:** Mostly Cloudy

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65



Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	4:59 PM	10 mins	53.7	57.8	69.2	---	---	---
2	5:10 PM	10 mins	54.5	57.9	65.1	---	---	---
3	5:20 PM	10 mins	55.4	58.4	65.0	---	---	---

NOTES:

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Figure 1. Looking west

Figure 2. Looking south

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ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista Rd to Interstate 10 **Date:** 09/26/2018

Site Number/Description: MON-16, (Lat/Long: 33.28653, -111.849505) at approximate milepost 48.10
Cul-de-sac on Holguin Court
(approximately 195 feet south of the existing roadway edge of the SR202L)

(Prepared by)/Crew: Scott Solliday, Margaret Bowler, Homaira Parveen, David Shu

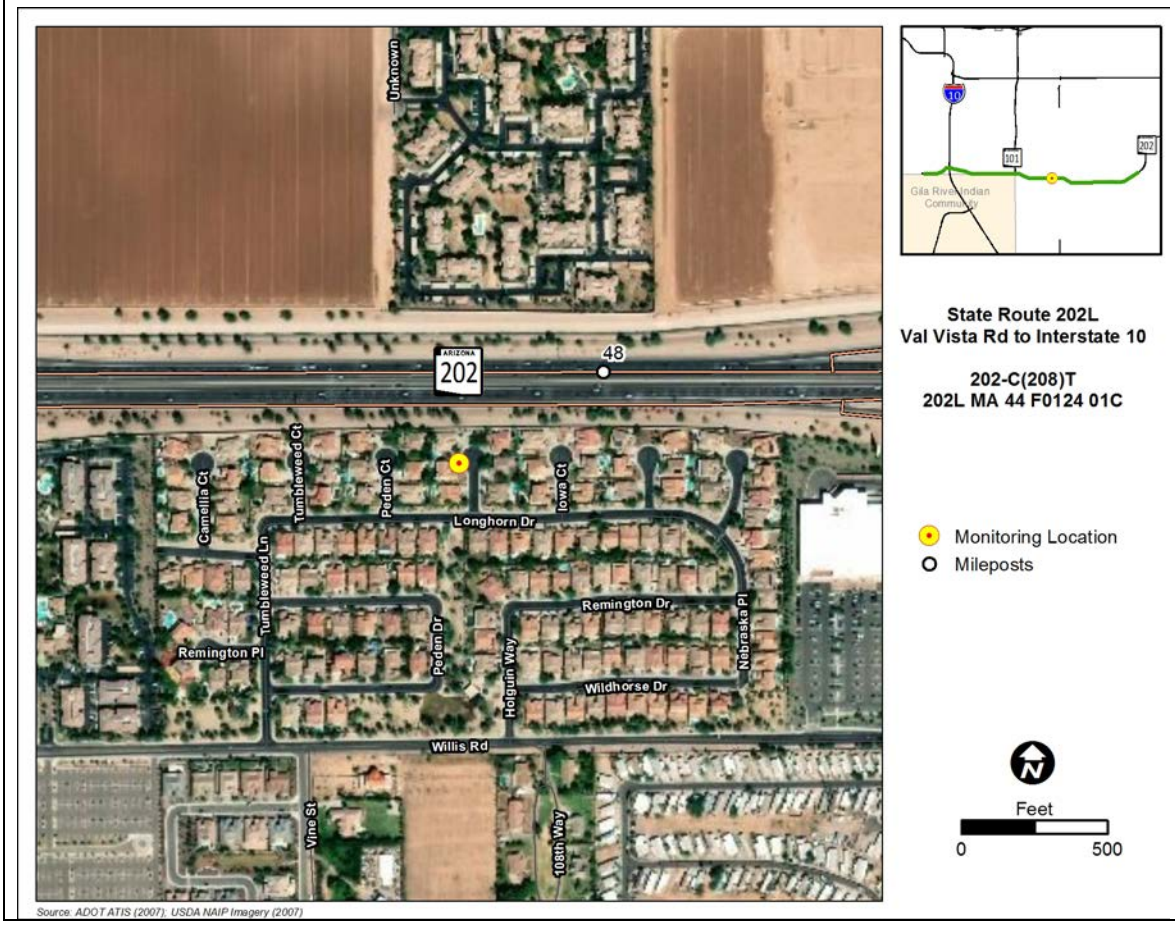
Temperature: 100 °F **Relative Humidity:** 16% **Wind & Direction:** 8 mph/WSW **Sky:** Fair

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65



Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	4:04 PM	10 mins	53.0	56.7	59.0	---	---	---
2	4:14 PM	10 mins	53.1	57.5	67.5	---	---	---
3	4:25 PM	10 mins	53.6	59.6	69.2	---	---	---

NOTES:

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Figure 1. Looking west

Figure 2. Looking north

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ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista Rd to Interstate 10 **Date:** 09/26/2018

Site Number/Description: MON-17, (Lat/Long: 33.286188, -111.832898) at approximate milepost 47.13
Front yard of first-row home on Bogle Court
(approximately 260 feet north of the existing roadway edge of the SR202L)

(Prepared by)/Crew: Scott Solliday, Margaret Bowler, Homaira Parveen, David Shu

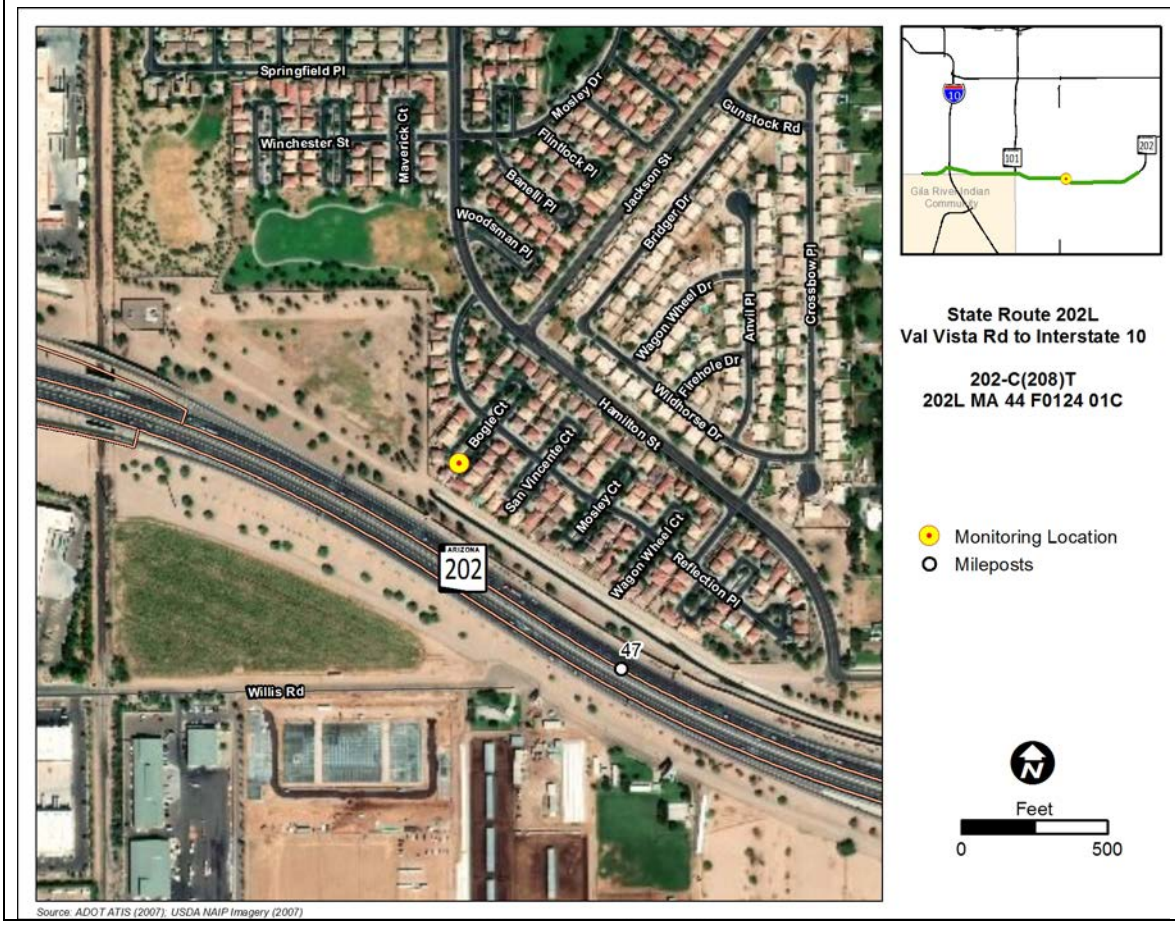
Temperature: 84 °F **Relative Humidity:** 35% **Wind & Direction:** 0 mph **Sky:** Fair

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65



Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	9:27 AM	10 mins	48.5	56.1	69.1	---	---	---
2	9:37 AM	10 mins	51.1	55.6	63.9	---	---	---
3	9:48 AM	10 mins	51.0	54.0	58.4	---	---	---

NOTES:

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Figure 1. Looking east

Figure 2. Looking west

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ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista Rd to Interstate 10 **Date:** 10/11/2018

Site Number/Description: MON-18, (Lat/Long: 33.283551, -111.822735) at approximate milepost 46.48
Basin in the planned Willis Gated Community
(approximately 183 feet north of the existing roadway edge of the SR202L off-ramp)

(Prepared by)/Crew: Scott Solliday, Homaira Parveen, David Shu

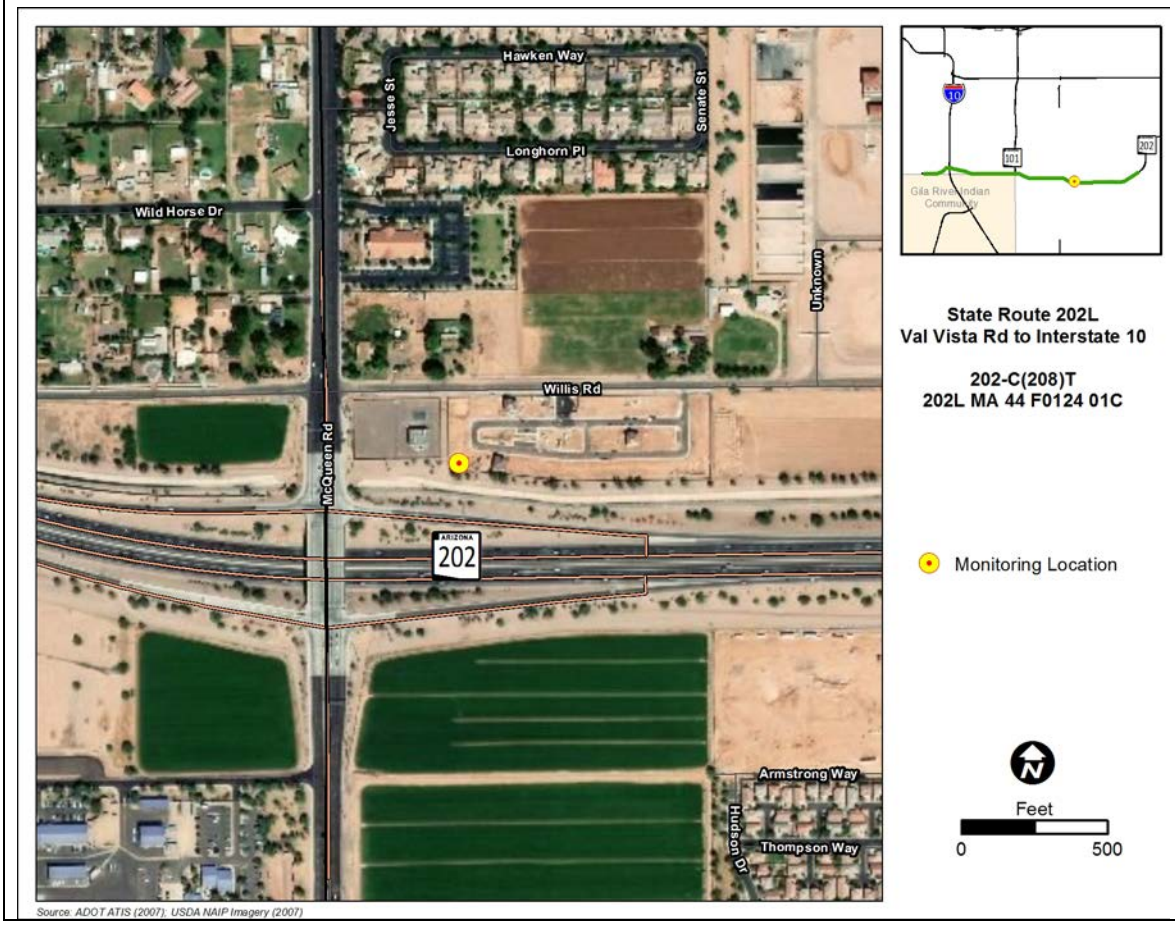
Temperature: 81 °F **Relative Humidity:** 39% **Wind & Direction:** 8 mph/SSW **Sky:** Mostly Cloudy

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65



Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	5:07 PM	10 mins	53.9	57.3	69.2	---	---	---
2	5:17 PM	10 mins	53.2	58.5	68.1	---	---	---
3	5:28 PM	10 mins	53.0	57.4	68.3	---	---	---

NOTES:

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Figure 1. Looking east

Figure 2. Looking north

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ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista Rd to Interstate 10 **Date:** 09/19/2018

Site Number/Description: MON-19, (Lat/Long: 33.281724, -111.819818) at approximate milepost 46.30
Northern end of the San Valencia Apartment complex, currently under construction for private development (approximately 230 feet south of the existing roadway edge of the SR202L)

(Prepared by)/Crew: Scott Solliday, Margaret Bowler, Homaira Parveen, David Shu

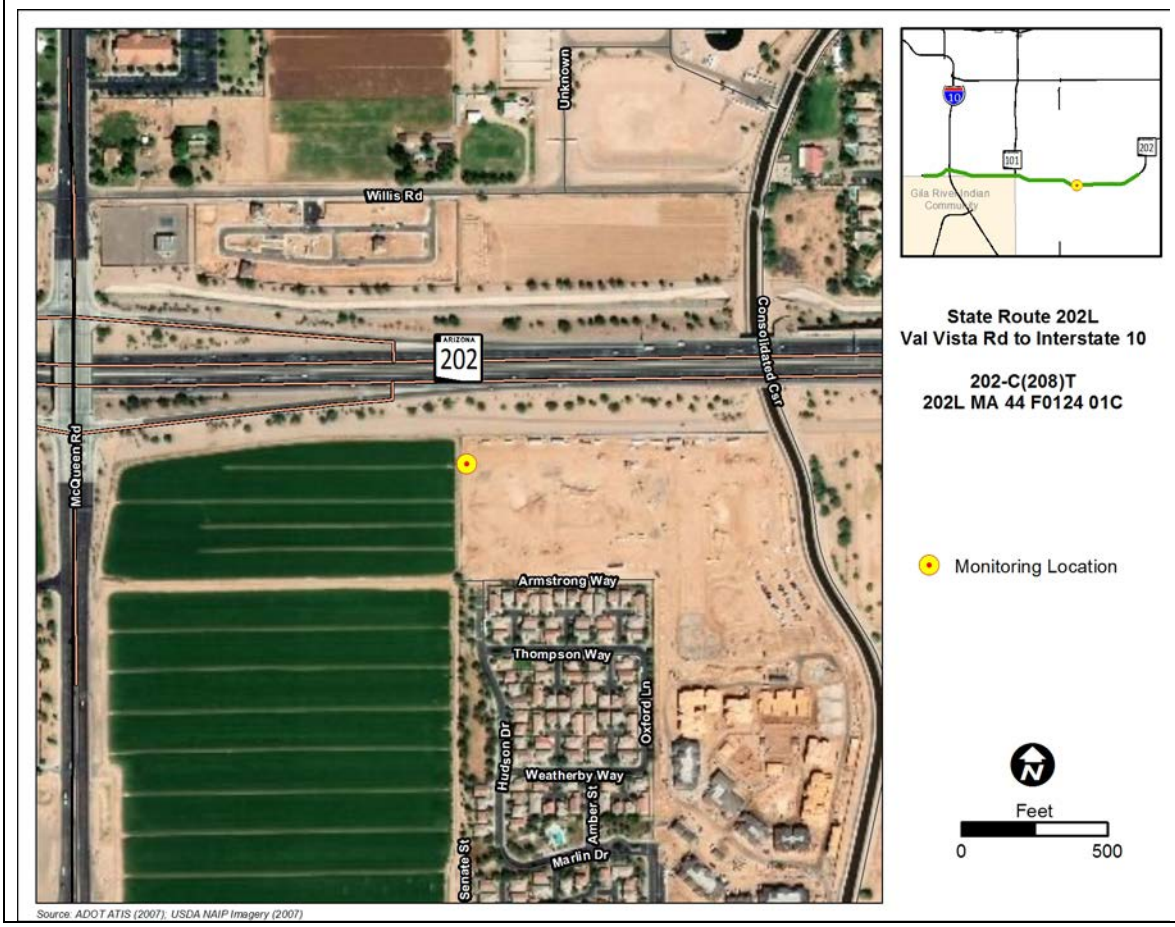
Temperature: 82 °F **Relative Humidity:** 66% **Wind & Direction:** 0 mph **Sky:** Cloudy

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65



Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	10:20 AM	10 mins	54.4	61.3	71.3	---	---	---
2	10:31 AM	10 mins	55.7	62.6	75.7	---	---	---
3	10:41 AM	10 mins	58.0	64.9	77.5	---	---	---

NOTES: Monitoring was conducted on an active construction site and in close proximity to Chandler Airport; however, no airplanes were flying overhead or heavy equipment were being operated. Very little construction noise was present until the last half of the third measurement.

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Figure 1. Looking west

Figure 2. Looking north

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ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista Rd to Interstate 10 **Date:** 09/26/2018

Site Number/Description: MON-20, (Lat/Long: 33.28332, -111.812665) at approximate milepost 45.90
Behind the backyard in Canon Oaks Subdivision
(approximately 155 feet north of the existing roadway edge of the SR202L)

(Prepared by)/Crew: Scott Solliday, Margaret Bowler, Homaira Parveen, David Shu

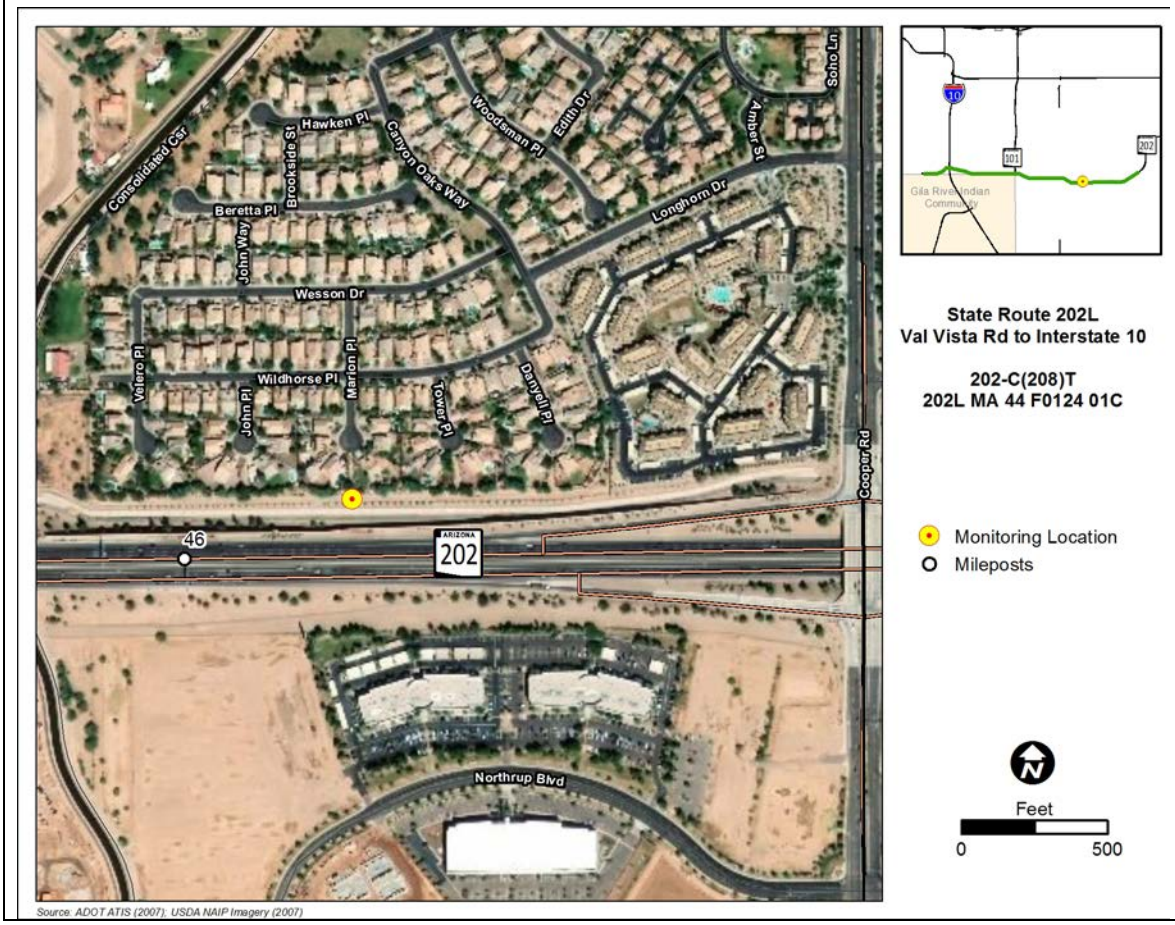
Temperature: 84 °F **Relative Humidity:** 35% **Wind & Direction:** 0 mph **Sky:** Fair

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65



Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	8:30 AM	10 mins	53.3	57.4	64.3	---	---	---
2	8:41 AM	10 mins	52.1	56.3	64.7	---	---	---
3	8:52 AM	10 mins	55.5	58.6	67.0	---	---	---

NOTES:

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Figure 1. Looking east

Figure 2. Looking north

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ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista Rd to Interstate 10 **Date:** 09/26/2018

Site Number/Description: MON-21, (Lat/Long: 33.283556, -111.802725) at approximate milepost 45.31
Within open space/basin area of neighborhood near the sidewalk
(approximately 175 feet north of the existing roadway edge of the SR202L off-ramp)

(Prepared by)/Crew: Scott Solliday, Margaret Bowler, Homaira Parveen, David Shu

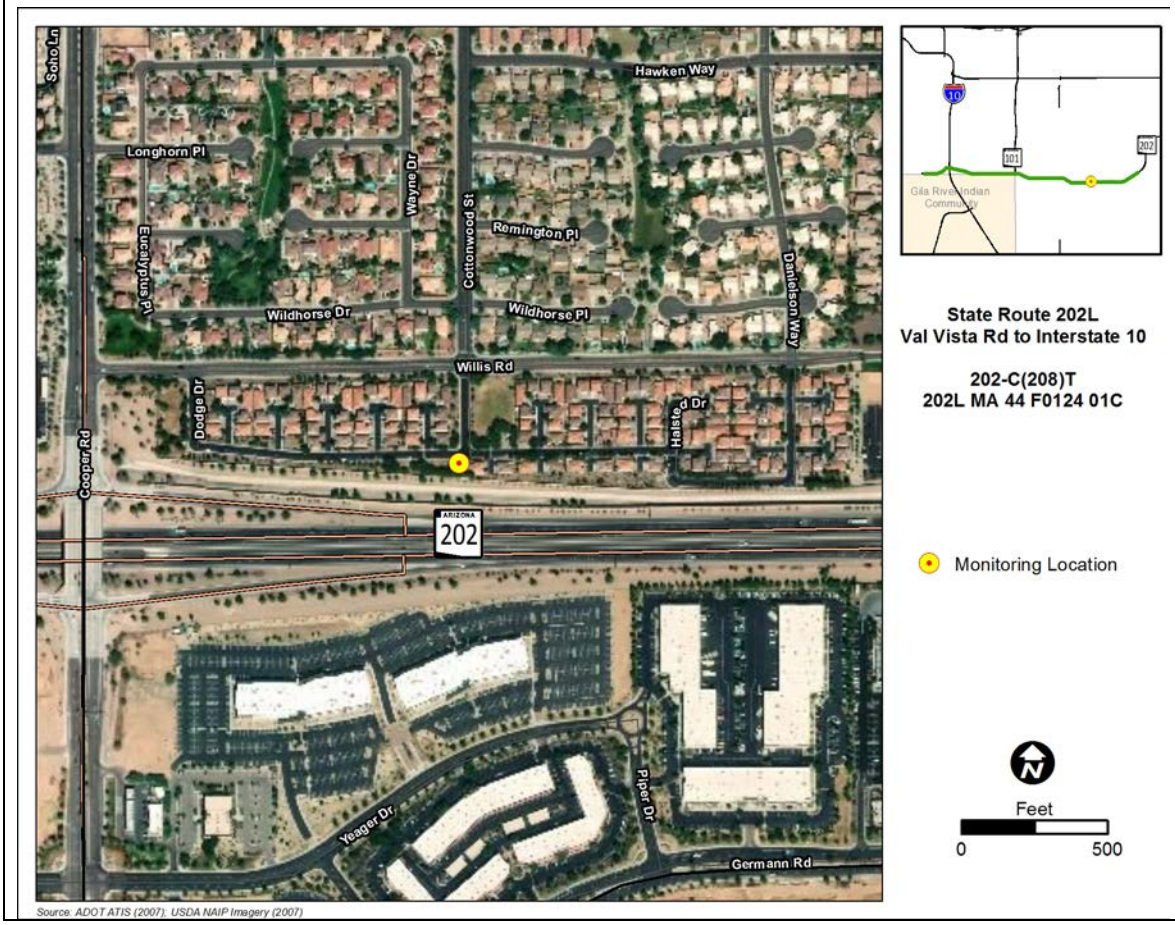
Temperature: 79 °F **Relative Humidity:** 42% **Wind & Direction:** 0 mph **Sky:** Fair

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65



Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	7:25 AM	10 mins	50.7	57.3	67.6	---	---	---
2	7:40 AM	10 mins	49.6	58.0	71.3	---	---	---
3	7:57 AM	10 mins	48.6	55.4	66.7	---	---	---

NOTES: Many small airplanes flying over due to proximity of Chandler Airport. Meter was paused frequently.

4561 E McDowell Road
Phoenix, AZ 85008
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Fax: (602) 458-7465

Figure 1. Looking east

Figure 2. Looking south

AZTEC
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Phoenix, AZ 85008
Tel: (602) 454-0402
Fax: (602) 458-7465

ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista Rd to Interstate 10 **Date:** 09/20/2018

Site Number/Description: MON-22, (Lat/Long: 33.284881, -111.776958) at approximate milepost 43.84
Dirt road, adjacent to residential and land used for agriculture/cattle
(approximately 580 feet north of the existing roadway edge of the SR202L)

(Prepared by)/Crew: Scott Solliday, Homaira Parveen, David Shu

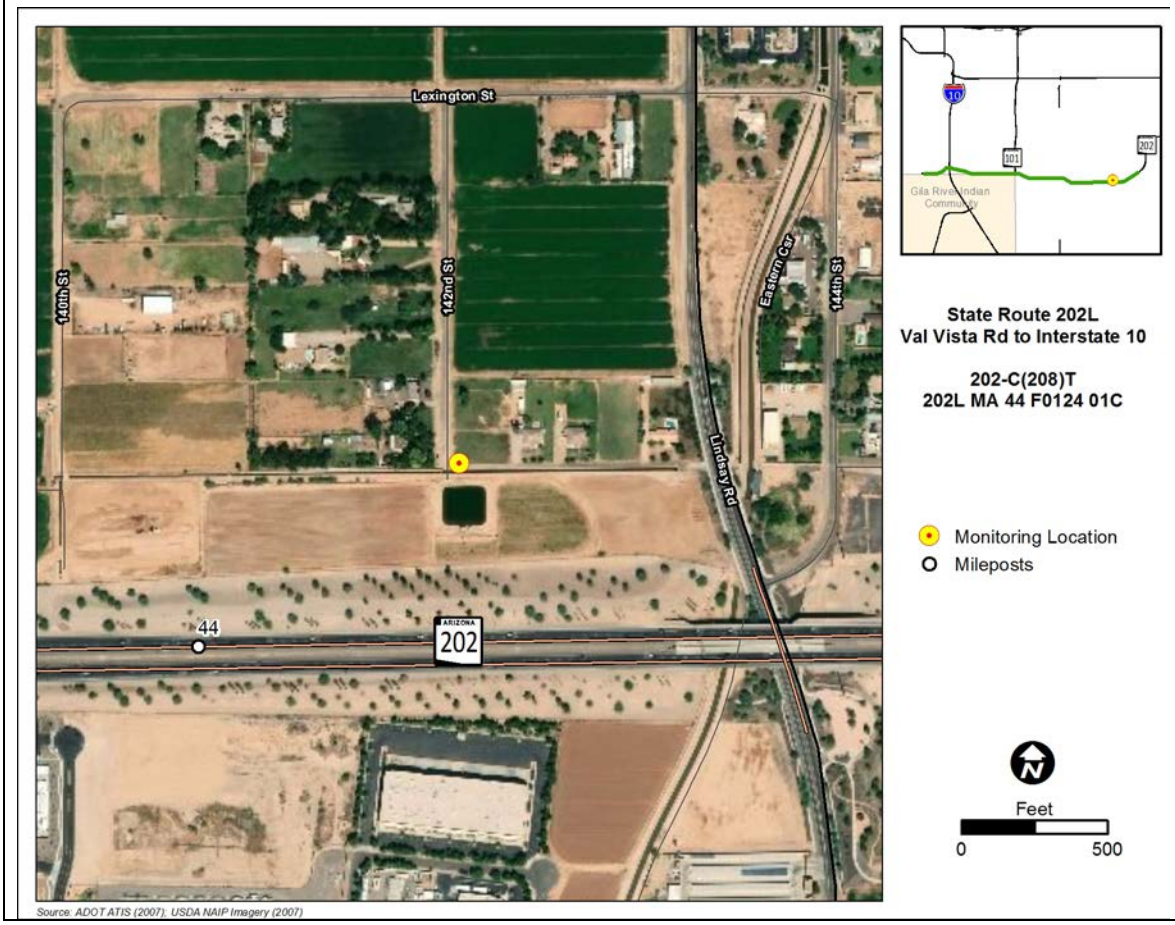
Temperature: 95 °F **Relative Humidity:** 28% **Wind & Direction:** 9 mph/SSW **Sky:** Fair

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65



Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	4:48 PM	10 mins	54.2	57.8	59.4	---	---	---
2	4:58 PM	10 mins	53.6	57.2	69.7	---	---	---
3	5:09 PM	10 mins	54.1	57.2	67.9	---	---	---

NOTES:

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ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Figure 1. Looking east

Figure 2. Looking south

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ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista Rd to Interstate 10 **Date:** 10/11/2018

Site Number/Description: MON-23, (Lat/Long: 33.282345, -111.771638) at approximate milepost 43.52
North end of Zanjero Park, south of a concrete lined ditch
(approximately 222 feet south of the existing roadway edge of the SR 202L)

(Prepared by)/Crew: Scott Solliday, Homaira Parveen, David Shu

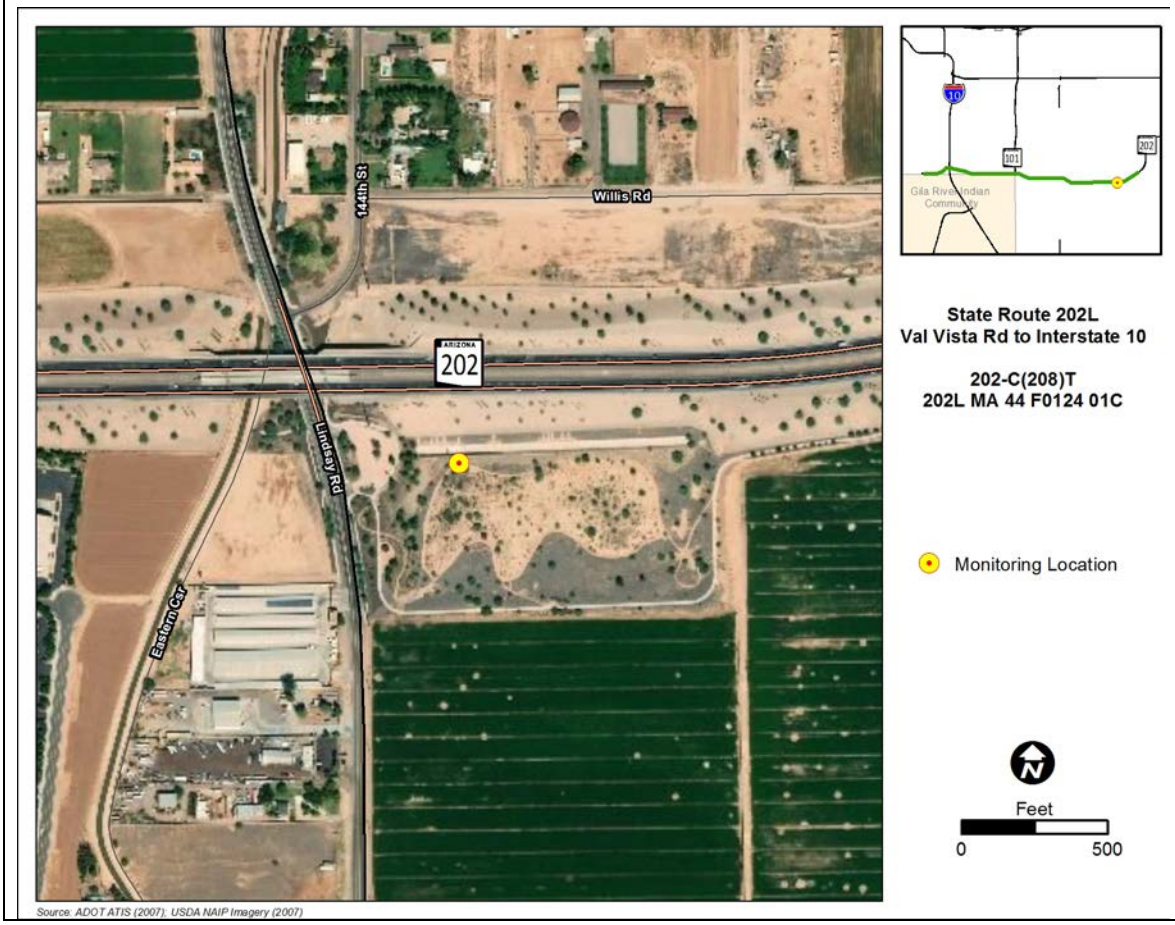
Temperature: 82 °F **Relative Humidity:** 37% **Wind & Direction:** 12 mph/SSW **Sky:** Mostly Cloudy

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65



Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	4:16 PM	10 mins	58.4	62.6	72.2	---	---	---
2	4:26 PM	10 mins	58.8	62.8	70.7	---	---	---
3	4:37 PM	10 mins	58.3	63.1	71.7	---	---	---

NOTES:

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Figure 1. Looking west

Figure 2. Looking north

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ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista Rd to Interstate 10 **Date:** 09/20/2018

Site Number/Description: MON-24, (Lat/Long: 33.284971, -111.770169) at approximate milepost 43.43
Dirt road, in between large vacant lot and horse farm
(approximately 593 feet north of the existing roadway edge of SR202L)
Dirt road,

(Prepared by)/Crew: Scott Solliday, Homaira Parveen, David Shu

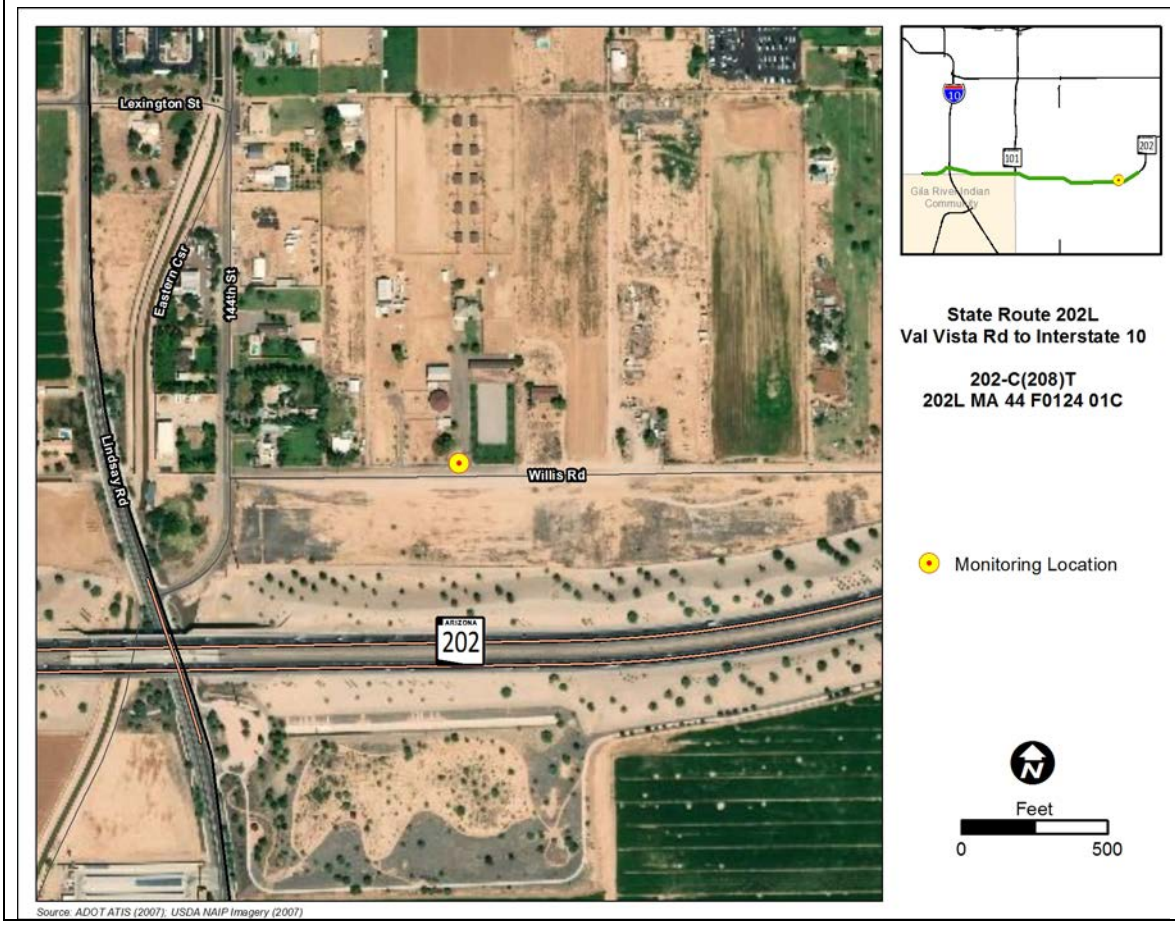
Temperature: 91 ºF **Relative Humidity:** 41% **Wind & Direction:** 12 mph/WSW **Sky:** Fair

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65



Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	3:52 PM	10 mins	55.9	62.7	79.0	---	---	---
2	4:02 PM	10 mins	56..1	60.6	76.2	---	---	---
3	4:13 PM	10 mins	56.2	58.6	66.8	---	---	---

NOTES:

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Figure 1. Looking west

Figure 2. Looking east

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ROADWAY TRAFFIC
NOISE LEVEL MEASUREMENT DATA SHEET

Project Number/Name: 202L MA 44 F0124 01C; 202-C(208)T
SR 202L, Val Vista to Interstate 10 **Date:** 10/11/2018

Site Number/Description: MON-25, (Lat/Long: 33.284177, -111.760916) at approximate milepost 42.88
Playground behind Gilbert Elementary School
(approximately 265 feet south of the existing roadway edge of the SR202L)

(Prepared by)/Crew: Scott Solliday, Homaira Parveen, David Shu

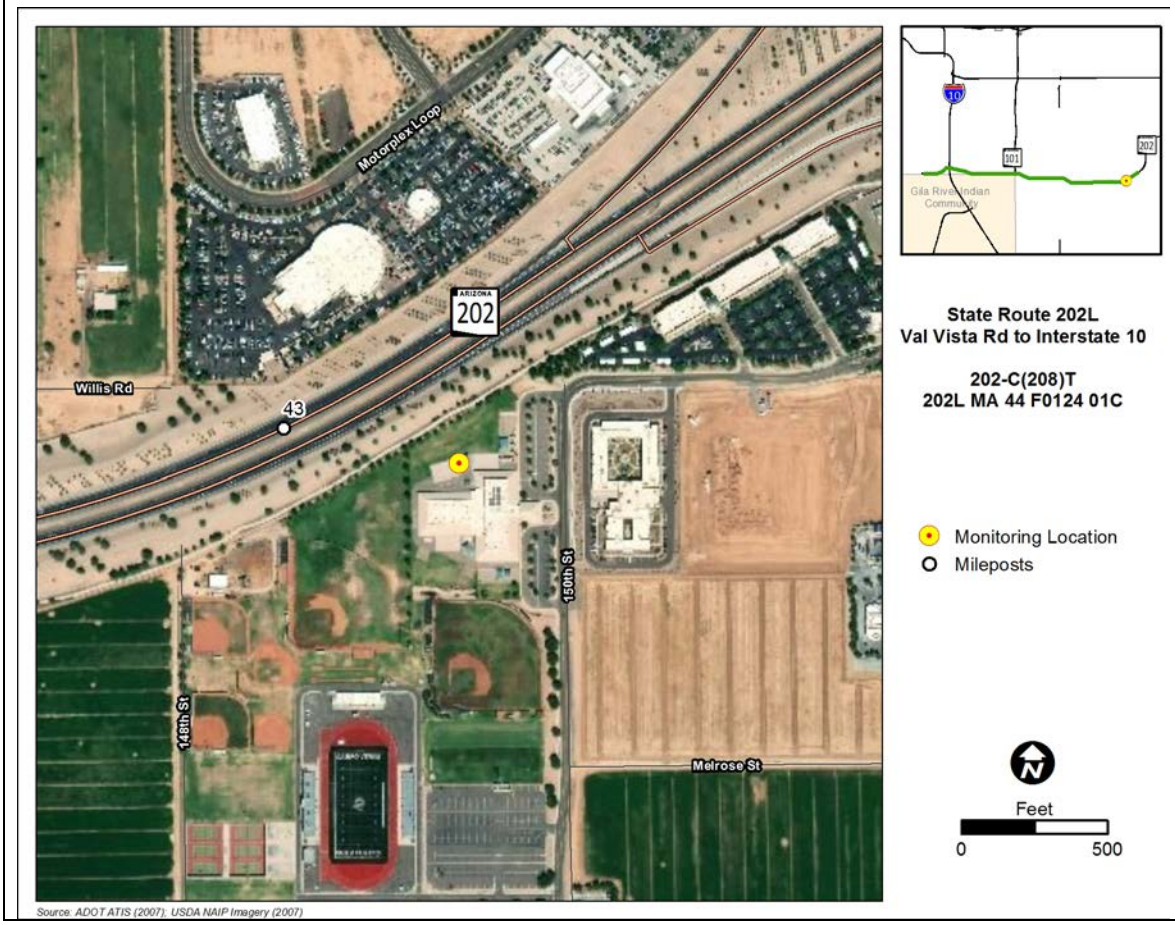
Temperature: 93 □F **Relative Humidity:** 34% **Wind & Direction:** 9 mph/W **Sky:** Fair

SLM Make/Model: LDL 824 **Calibration Make/Model:** LDL CA 200 @ 114.26 dB

Calibration: ☒

Posted Speed Limit (mph): 65

Observed Speed (mph): 50-65



Sample	Time		Sound Level, dBA			Traffic Count		
	Start	Duration	L_{MIN}	L_{EQ}	L_{MAX}	Auto	Med. Trk.	Hvy. Trk.
1	3:30 PM	10 mins	59.1	63.4	73.2	---	---	---
2	3:41 PM	10 mins	60.1	63.7	68.8	---	---	---
3	3:51 PM	10 mins	59.3	63.2	71.8	---	---	---

NOTES:

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Figure 1. Looking north

Figure 2. Looking west

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Certificate of Calibration and Conformance

Certificate Number 2018-206841

Instrument Model 824, Serial Number A3505, was calibrated on 6 Jun 2018. The instrument meets factory specifications per Procedure D0001.8046, IEC 61672-1:2002 Class 1; IEC 60651-2001, 60804-2000 and ANSI S1.4-1983 Type 1 1/3, 1/1 Oct. Filters; S1.11-1986 Type 1C; IEC61260-am1-2001 Class 1 .

Instrument found to be in calibration as received: YES
Date Calibrated: 6 Jun 2018
Calibration due: 6 Jun 2020

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0617 / 0104	12 Months	19 Dec 2018	2017-206126

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 31 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As received" data is the same as shipped data.
Tested with PRM902 S/N 5661

Signed: 
Technician: Sean Childs

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

LARSON DAVIS
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Certificate of Calibration and Conformance

Certificate Number 2018-206840

Instrument Model PRM902, Serial Number 5661, was calibrated on 6 Jun 2018. The instrument meets factory specifications per Procedure D0001.8126.

Instrument found to be in calibration as received: YES
Date Calibrated: 6 Jun 2018
Calibration due: 6 Jun 2020

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Agilent Technologies	34401A	MY41038589	12 Months	6 Sep 2018	2017009650
Larson Davis	LDSigGn/2209	0617 / 0104	12 Months	19 Dec 2018	2017-206126

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 31 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As received" data is the same as shipped data.

Signed: 

Technician: Sean Childs

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

~ Certificate of Calibration and Compliance ~

Microphone Model: 377B02 Serial Number: 305112 Manufacturer: PCB

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Reference Equipment

Manufacturer	Model #	Serial #	PCB Control #	Cal Date	Due Date
National Instruments	PCIe-6351	1896F08	CA1918	10/20/17	10/19/18
Larson Davis	PRM915	134	CA2114	11/30/17	11/30/18
Larson Davis	PRM902	5352	CA1247	4/12/18	4/12/19
Larson Davis	PRM916	130	CA1161	9/13/17	9/13/18
Larson Davis	CAL250	5109	CA1496	10/19/17	10/19/18
Larson Davis	2201	115	TA472	4/12/18	4/12/19
Bruel & Kjaer	4192	2954556	CA2323	9/15/17	9/14/18
Larson Davis	GPRM902	3999	CA1090	9/20/17	9/20/18
Newport	iTHX-SD/N	1080002	CA1511	2/9/18	2/8/19
Larson Davis	PRA951-4	222	LD026	12/19/17	12/19/18
Larson Davis	PRM915	147	CA2179	6/6/17	6/6/18
PCB	68510-02	N/A	CA2672	12/27/17	12/27/18
0	0	0	0	not required	not required
0	0	0	0	not required	not required
0	0	0	0	not required	not required

Frequency sweep performed with B&K UA0033 electrostatic actuator.

Condition of Unit

As Found: n/a

As Left: New Unit, In Tolerance

Notes

1. Calibration of reference equipment is traceable to one or more of the following National Labs; NIST, PTB or DFM.
2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc.
3. Calibration is performed in compliance with ISO 10012-1, ANSI/NCSL Z540.3 and ISO 17025.
4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications.
5. Open Circuit Sensitivity is measured using the insertion voltage method following procedure AT603-5.
6. Measurement uncertainty (95% confidence level with coverage factor of 2) for sensitivity is +/-0.20 dB.
7. Unit calibrated per ACS-20.

Technician: Leonard Lukasik Date: May 22, 2018

ilac-MRA A2LA ACCREDITED

CALIBRATION CERT #1862.01

PCB PIEZOTRONICS VIBRATION DIVISION

3425 Walden Avenue, Depew, New York, 14043

TEL: 888-684-0013 FAX: 716-685-3886 www.pcb.com

Calibration Certificate

Certificate Number 2018005660

Customer:
Aztec Engineering
4561 East McDowell Road
Phoenix, AZ 85008, United States

Model Number	CAL200	***Procedure Number***	D0001.8386
Serial Number	5482	***Technician***	Scott Montgomery
Test Results	**Pass**	***Calibration Date***	6 Jun 2018
Initial Condition	Adjusted	***Calibration Due***	6 Jun 2020
Description	Larson Davis CAL200 Acoustic Calibrator	***Temperature***	23 °C ± 0.3 °C
		Humidity	35 %RH ± 3 %RH
		Static Pressure	101.2 kPa ± 1 kPa

Evaluation Method The data is aquired by the insert voltage calibration method using the reference microphone's open circuit sensitivity. Data reported in dB re 20 µPa.

Compliance Standards Compliant to Manufacturer Specifications per D0001.8190 and the following standards:
IEC 60942:2017 ANSI S1.40-2006

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005.
Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2008.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

Standards Used

Description	Cal Date	Cal Due	Cal Standard
Agilent 34401A DMM	09/06/2017	09/06/2018	001021
Larson Davis Model 2900 Real Time Analyzer	04/10/2018	04/10/2019	001051
Microphone Calibration System	03/07/2018	03/07/2019	005446
1/2" Preamplifier	10/05/2017	10/05/2018	006506
Larson Davis 1/2" Preamplifier 7-pin LEMO	08/08/2017	08/08/2018	006507
1/2 inch Microphone - RI - 200V	10/23/2017	10/23/2018	006511
Pressure Transducer	10/20/2017	10/20/2018	007204

Output Level

Nominal Level [dB]	Pressure [kPa]	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
114	101.2	114.01	113.80	114.20	0.14	Pass
94	101.2	93.99	93.80	94.20	0.14	Pass

-- End of measurement results--

Frequency

Nominal Level [dB]	Pressure [kPa]	Test Result [Hz]	Lower limit [Hz]	Upper limit [Hz]	Expanded Uncertainty [Hz]	Result
114	101.2	1,000.04	990.00	1,010.00	0.20	Pass
94	101.2	1,000.04	990.00	1,010.00	0.20	Pass

-- End of measurement results--

Total Harmonic Distortion + Noise (THD+N)

Nominal Level [dB]	Pressure [kPa]	Test Result [%]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
114	101.2	0.54	0.00	2.00	0.25	Pass
94	101.2	0.55	0.00	2.00	0.25	Pass

-- End of measurement results--

Level Change Over Pressure

Tested at: 114 dB, 24 °C, 31 %RH

Nominal Pressure [kPa]	Pressure [kPa]	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
108.0	107.9	-0.02	-0.30	0.30	0.04 ‡	Pass
101.3	101.3	0.00	-0.30	0.30	0.04 ‡	Pass
92.0	92.0	0.03	-0.30	0.30	0.04 ‡	Pass
83.0	83.1	0.06	-0.30	0.30	0.04 ‡	Pass
74.0	74.0	0.10	-0.30	0.30	0.04 ‡	Pass
65.0	65.1	0.15	-0.30	0.30	0.04 ‡	Pass

-- End of measurement results--

Frequency Change Over Pressure

Tested at: 114 dB, 24 °C, 31 %RH

Nominal Pressure [kPa]	Pressure [kPa]	Test Result [Hz]	Lower limit [Hz]	Upper limit [Hz]	Expanded Uncertainty [Hz]	Result
108.0	107.9	0.00	-10.00	10.00	0.20 ‡	Pass
101.3	101.3	0.00	-10.00	10.00	0.20 ‡	Pass
92.0	92.0	0.00	-10.00	10.00	0.20 ‡	Pass
83.0	83.1	0.00	-10.00	10.00	0.20 ‡	Pass
74.0	74.0	0.00	-10.00	10.00	0.20 ‡	Pass
65.0	65.1	0.00	-10.00	10.00	0.20 ‡	Pass

-- End of measurement results--

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1681 West 820 North
Provo, UT 84601, United States
716-684-0001

ACCREDITED Cert. #3622.01

LARSON DAVIS
A PCB PIEZOTRONICS DIV.

Total Harmonic Distortion + Noise (THD+N) Over Pressure

Tested at: 114 dB, 24 °C, 31 %RH

Nominal Pressure [kPa]	Pressure [kPa]	Test Result [%]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
108.0	107.9	0.58	0.00	2.00	0.25 ‡	Pass
101.3	101.3	0.55	0.00	2.00	0.25 ‡	Pass
92.0	92.0	0.52	0.00	2.00	0.25 ‡	Pass
83.0	83.1	0.49	0.00	2.00	0.25 ‡	Pass
74.0	74.0	0.46	0.00	2.00	0.25 ‡	Pass
65.0	65.1	0.44	0.00	2.00	0.25 ‡	Pass

-- End of measurement results--

Signatory: Scott Montgomery

Larson Davis, a division of PCB Piezotronics, Inc
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Provo, UT 84601, United States
716-684-0001

ilac-MRA A2LA ACCREDITED Cert. #3622.01

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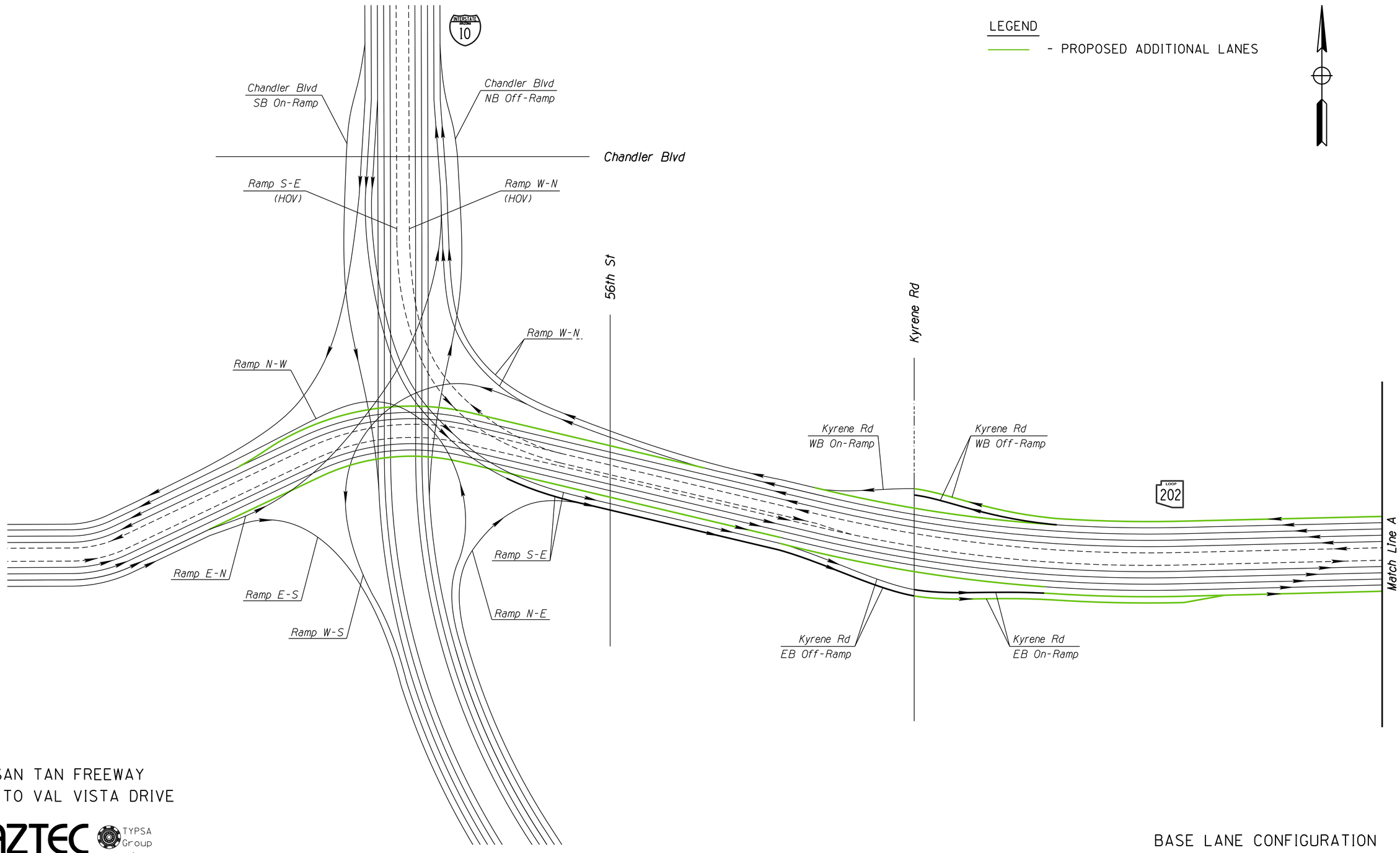
APPENDIX C

Future Traffic Volumes

LEGEND

——— - PROPOSED ADDITIONAL LANES



SAN TAN FREEWAY
I-10 TO VAL VISTA DRIVE

AZTEC TYPSA Group
www.aztec.us
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Phoenix, AZ 85008-4505 Fax (602) 454-0403

BASE LANE CONFIGURATION
SHEET 1 OF 4

LEGEND

- PROPOSED ADDITIONAL LANES

LOOP 101

McClintock Dr

Chandler Village Dr

Ramp S-E (HOV)

Ramp W-N (HOV)

Frye Rd

Price Rd WB Off-Ramp

Ramp W-N

Dobson Rd

Alma School Rd

McClintock Dr WB On-Ramp

Ramp S-W

Price Rd WB On-Ramp

LOOP 202

Match Line A

Dobson Rd WB Off-Ramp

Alma School Rd WB On-Ramp

Alma School Rd WB Off-Ramp

LOOP 202

Match Line B

McClintock Dr EB Off-Ramp

Ramp E-N

Price Rd EB Off-Ramp

Ramp S-E

Price Rd EB On-Ramp

Price Rd

Dobson Rd EB On-Ramp

Alma School Rd EB Off-Ramp

Alma School Rd EB On-Ramp

SAN TAN FREEWAY
I-10 TO VAL VISTA DRIVE

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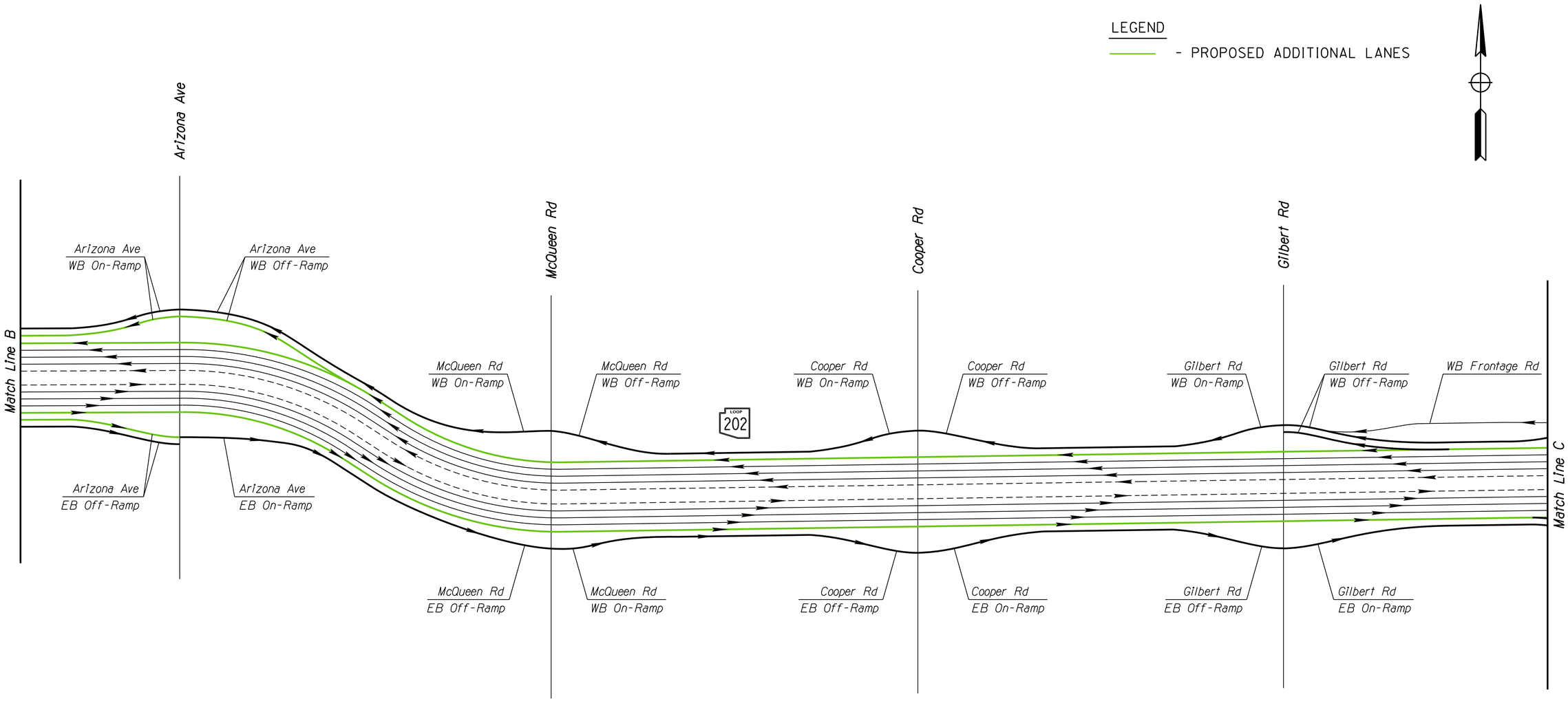
BASE LANE CONFIGURATION
SHEET 2 OF 4

LEGEND

- PROPOSED ADDITIONAL LANES



SAN TAN FREEWAY
I-10 TO VAL VISTA DRIVE

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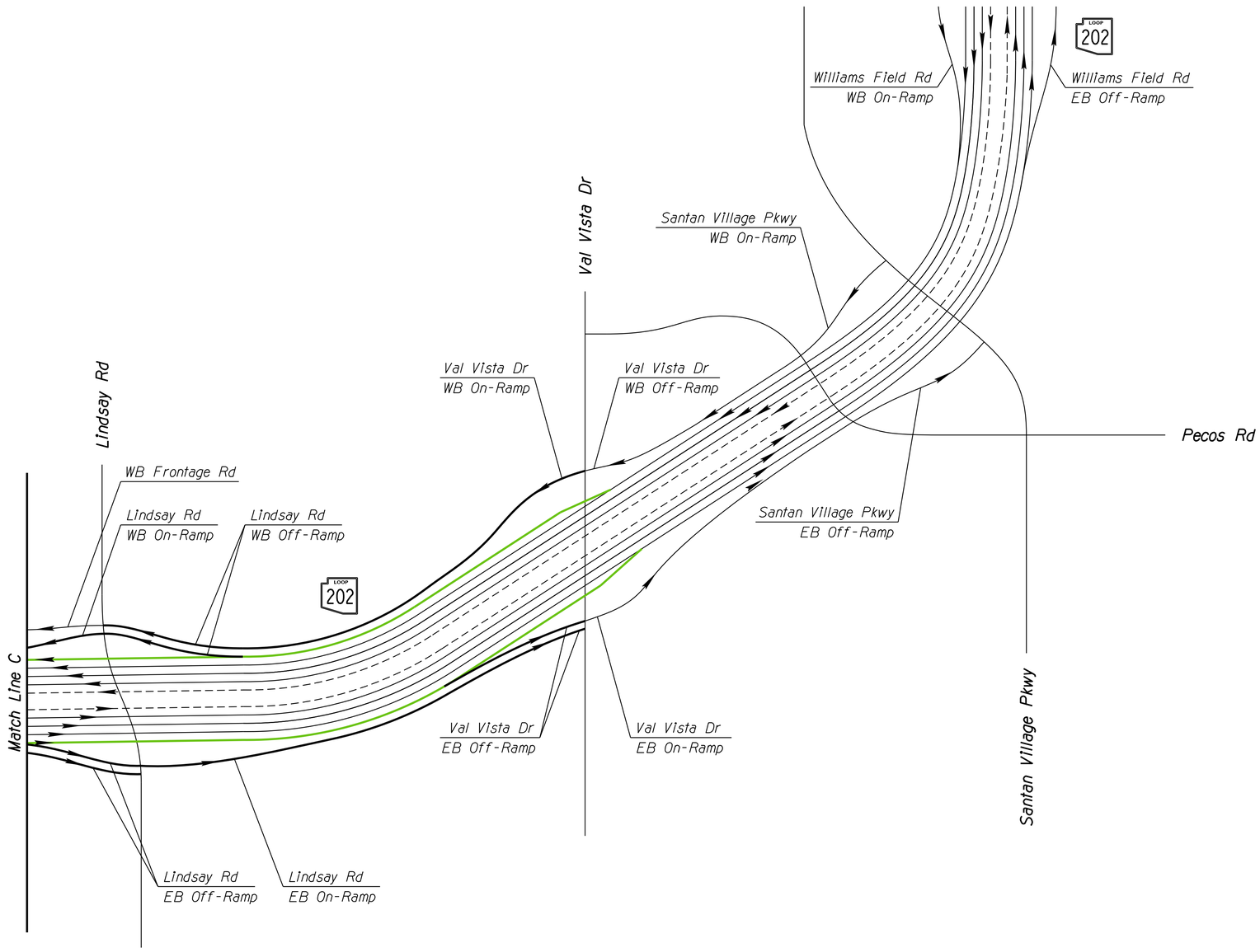
Phoenix, AZ 85008-4505 Fax (602) 454-0403

BASE LANE CONFIGURATION
SHEET 3 OF 4



LEGEND

——— - PROPOSED ADDITIONAL LANES

SAN TAN FREEWAY
I-10 TO VAL VISTA DRIVE

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BASE LANE CONFIGURATION
SHEET 4 OF 4

SR 202L, I-10 to Val Vista Rd, Build Condition
202L MA 44 F0124 01C

Segments	Number of GP Lanes (Each Direction)	LOS C Volumes (GL Lanes)	HOV Lane Volumes (10% of GPL Volumes)	Total Directional Modeled Volumes	Auto Volumes	MT Volumes	HT Volumes	Lateral Traffic Distribution in TNM					
								Outside Modeled Lane			Inside Modeled Lane		
								Auto	MT	HT	Auto	MT	HT
Segment 1 (I-10)													
40th St On Ramp to I-10 Off Ramp	4	6100	610	6710	6240	302	168	3682	178	138	2559	124	30
I-10 Off Ramp to I-10 On Ramp	3	4500	450	4950	4604	223	124	2716	131	101	1887	91	22
I-10 On Ramp to Kyrene Rd Off Ramp	4	6100	610	6710	6240	302	168	3682	178	138	2559	124	30
Segment 2 (Kyrene Rd to McClintock Dr)													
Kyrene Rd Off Ramp to Kyrene Rd On Ramp	4	6100	610	6710	6240	302	168	3682	178	138	2559	124	30
Kyrene Rd On Ramp to McClintock Dr Off Ramp	5	7300	730	8030	7468	361	201	4406	213	165	3062	148	36
Segment 3 (SR 101L)													
McClintock Dr Off Ramp to SR 101L Off Ramp	4	6100	610	6710	6240	302	168	3682	178	138	2559	124	30
SR 101L Off Ramp to Price Rd Off Ramp	4	6100	610	6710	6240	302	168	3682	178	138	2559	124	30
Price Rd Off Ramp to Price Rd On Ramp	4	6100	610	6710	6240	302	168	3682	178	138	2559	124	30
Price Rd On Ramp to SR 101L On Ramp	4	6100	610	6710	6240	302	168	3682	178	138	2559	124	30
SR 101L On Ramp to Dobson Rd On Ramp	5	7300	730	8030	7468	361	201	4406	213	165	3062	148	36
Segment 4 (Dobson Rd to Arizona Ave)													
Dobson Rd On Ramp to Alma School Off Ramp	5	7300	730	8030	7468	361	201	4406	213	165	3062	148	36
Alma School Rd Off Ramp to Alma School Rd On Ramp	5	7300	730	8030	7468	361	201	4406	213	165	3062	148	36
Alma School Rd On Ramp to Arizona Ave Off Ramp	5	7300	730	8030	7468	361	201	4406	213	165	3062	148	36
Arizona Ave Off Ramp to Arizona Ave On Ramp	4	6100	610	6710	6240	302	168	3682	178	138	2559	124	30
Segment 5 (East of Arizona Ave)													
Arizona Ave On Ramp to McQueen Rd Off Ramp	4	6100	610	6710	6240	302	168	3682	178	138	2559	124	30
McQueen Rd Off Ramp to McQueen Rd On Ramp	4	6100	610	6710	6240	302	168	3682	178	138	2559	124	30
McQueen Rd On Ramp to Cooper Rd Off Ramp	4	6100	610	6710	6240	302	168	3682	178	138	2559	124	30
Cooper Rd Off Ramp to Cooper Rd On Ramp	4	6100	610	6710	6240	302	168	3682	178	138	2559	124	30
Cooper Rd On Ramp to Gilbert Rd Off Ramp	4	6100	610	6710	6240	302	168	3682	178	138	2559	124	30
Gilbert Rd Off Ramp to Gilbert Rd On Ramp	4	6100	610	6710	6240	302	168	3682	178	138	2559	124	30
East of Gilbert Rd On Ramp	4	6100	610	6710	6240	302	168	3682	178	138	2559	124	30

Modeled Vehicle Mix Percentage:
Auto: 93%
MT: 4.5%
HT: 2.5%

LOS C volumes were used for SR202 mainline because peak hour volumes on SR 202 mainline are mainly greater than LOS C volumes.
Use PM peak volumes for ramps and cross streets
Due to Lindsay Rd TI is a separate project that included noise analysis, it would not be analyzed in this SR202 project.

SR 202L, I-10 to Val Vista Rd, No Build Condition
202L MA 44 F0124 01C

Segments	Number of GP Lanes (Each Direction)	LOS C Volumes (GL Lanes)	HOV Lane Volumes (10% of GPL Volumes)	Total Directional Modeled Volumes	Auto Volumes	MT Volumes	HT Volumes	Lateral Traffic Distribution in TNM					
								Outside Modeled Lane			Inside Modeled Lane		
								Auto	MT	HT	Auto	MT	HT
Segment 1 (I-10)													
40th St On Ramp to I-10 Off Ramp	3	4500	450	4950	4604	223	124	2716	131	101	1887	91	22
I-10 Off Ramp to I-10 On Ramp	2	3200	320	3520	3274	158	88	1931	93	72	1342	65	16
I-10 On Ramp to Kyrene Rd Off Ramp	3	4500	450	4950	4604	223	124	2716	131	101	1887	91	22
Segment 2 (Kyrene Rd to McClintock Dr)													
Kyrene Rd Off Ramp to Kyrene Rd On Ramp	3	4500	450	4950	4604	223	124	2716	131	101	1887	91	22
Kyrene Rd On Ramp to McClintock Dr Off Ramp	4	6100	610	6710	6240	302	168	3682	178	138	2559	124	30
Segment 3 (SR 101L)													
McClintock Dr Off Ramp to SR 101L Off Ramp	3	4500	450	4950	4604	223	124	2716	131	101	1887	91	22
SR 101L Off Ramp to Price Rd Off Ramp	3	4500	450	4950	4604	223	124	2716	131	101	1887	91	22
Price Rd Off Ramp to Price Rd On Ramp	3	4500	450	4950	4604	223	124	2716	131	101	1887	91	22
Price Rd On Ramp to SR 101L On Ramp	3	4500	450	4950	4604	223	124	2716	131	101	1887	91	22
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Segment 4 (Dobson Rd to Arizona Ave)													
Dobson Rd On Ramp to Alma School Off Ramp	4	6100	610	6710	6240	302	168	3682	178	138	2559	124	30
Alma School Rd Off Ramp to Alma School Rd On Ramp	3	4500	450	4950	4604	223	124	2716	131	101	1887	91	22
Alma School Rd On Ramp to Arizona Ave Off Ramp	3	4500	450	4950	4604	223	124	2716	131	101	1887	91	22
Arizona Ave Off Ramp to Arizona Ave On Ramp	3	4500	450	4950	4604	223	124	2716	131	101	1887	91	22
Segment 5 (East of Arizona Ave)													
Arizona Ave On Ramp to McQueen Rd Off Ramp	3	4500	450	4950	4604	223	124	2716	131	101	1887	91	22
McQueen Rd Off Ramp to McQueen Rd On Ramp	3	4500	450	4950	4604	223	124	2716	131	101	1887	91	22
McQueen Rd On Ramp to Cooper Rd Off Ramp	3	4500	450	4950	4604	223	124	2716	131	101	1887	91	22
Cooper Rd Off Ramp to Cooper Rd On Ramp	3	4500	450	4950	4604	223	124	2716	131	101	1887	91	22
Cooper Rd On Ramp to Gilbert Rd Off Ramp	3	4500	450	4950	4604	223	124	2716	131	101	1887	91	22
Gilbert Rd Off Ramp to Gilbert Rd On Ramp	3	4500	450	4950	4604	223	124	2716	131	101	1887	91	22
East of Gilbert Rd On Ramp	3	4500	450	4950	4604	223	124	2716	131	101	1887	91	22

Modeled Vehicle Mix Percentage:
Auto: 93%
MT: 4.5%
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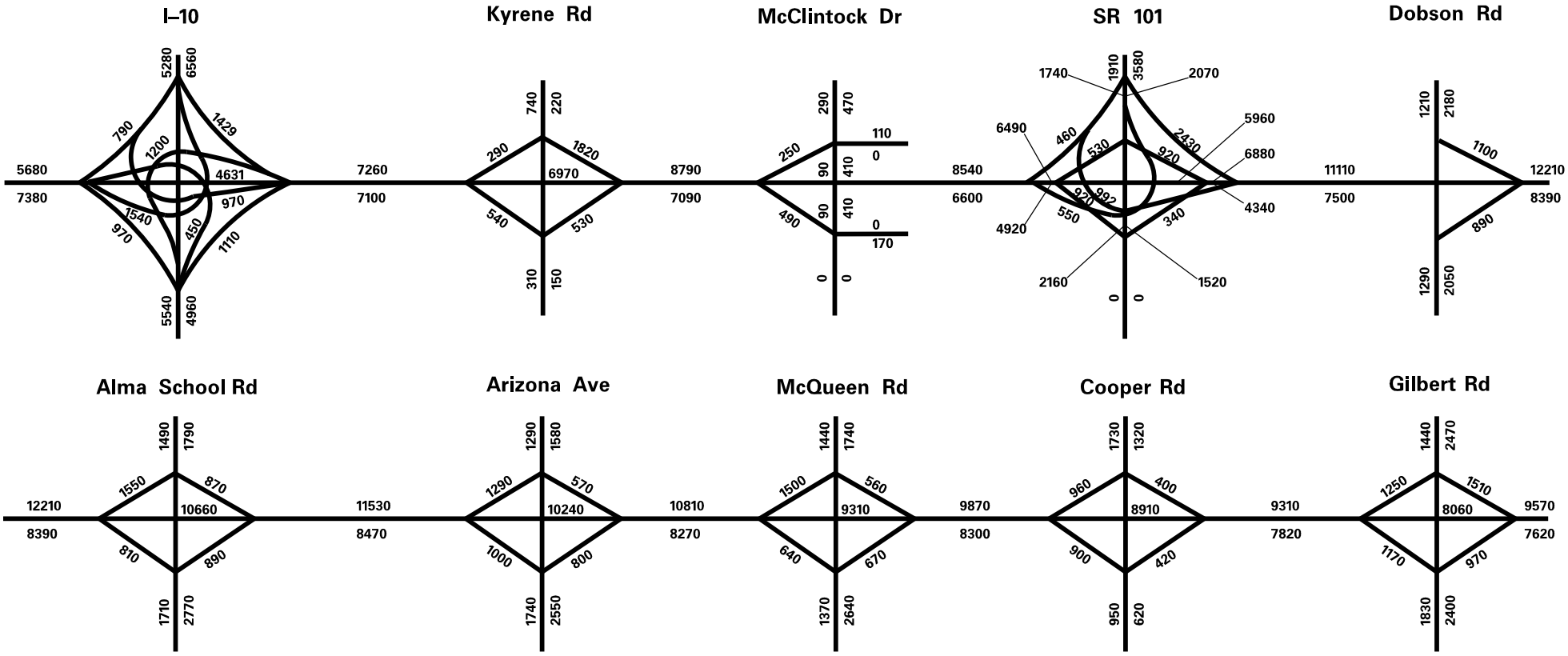
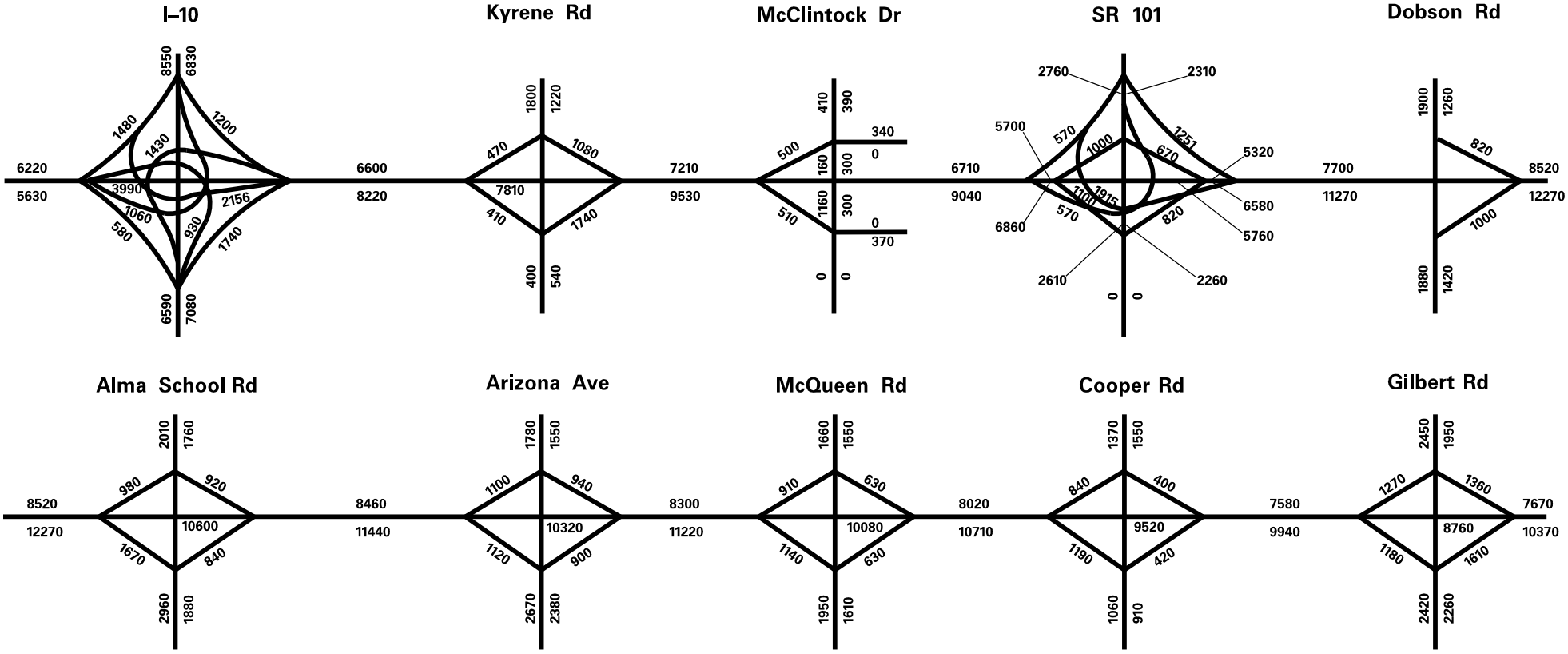
LOS C volumes were used for SR202 mainline because peak hour volumes on SR 202 mainline are mainly greater than LOS C volumes.
Use PM peak volumes for ramps and cross streets
Due to Lindsay Rd TI is a separate project that included noise analysis, it would not be analyzed in this SR202 project.

2040 AM PEAK DESIGN HOUR VOLUME



Source: Burgess & Niple, 4/30/2018

2040 PM PEAK DESIGN HOUR VOLUME



Source: Burgess & Niple, 4/30/2018

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Envelope Summary Events	Status	Timestamps
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Certified Delivered	Security Checked	3/20/2019 9:01:03 AM
Signing Complete	Security Checked	3/20/2019 9:01:32 AM
Completed	Security Checked	3/20/2019 9:01:32 AM

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