ARIZONA DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL PLANNING

NOISE ANALYSIS TECHNICAL REPORT

Pima Freeway (SR 101L)
Princess Drive to Shea Boulevard

Federal Project Number: 101-B(210)
ADOT Project Number: 101 MA 036 F0123 01C

Submittal Date: October 2022

DocuSigned by:
Ivan Racic
D00D4A7BCC34420...
10/27/2022

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

µPa	Micropascal
ADOT	Arizona Department of Transportation
ANSI	American National Standards Institute
AUX	Auxiliary
C-D	Collector-Distributor
CFR	Code of Federal Regulations
dB	Decibel
dB(A)	A-Weighted Decibel
DMS	Dynamic Message Sign
EA	Environmental Assessment
EB	Eastbound
F	Fahrenheit
FHWA	Federal Highway Administration
FMS	Freeway Management System
FTA	Federal Transit Administration
HD	High Definition
GPL	General Purpose Lane
HOV	High-Occupancy Vehicle
Hz	Hertz
$L_{Aeq(h)}$	1-Hour A-weighted Equivalent Sound Level
L_{eq}	Equivalent Sound Level

LOS	Level of Service
LPA	Local Public Agency
MAG	Maricopa Association of Governments
MP	Milepost
mph	Miles Per Hour
NAC	FHWA Noise Abatement Criteria
NAR	ADOT Noise Abatement Requirements (2017)
NB	Northbound
NEPA	National Environmental Policy Act
Pa	Pascal
SB	Southbound
SPL	Sound Pressure Level
SR	State Route
TCE	Temporary Construction Easement
TI	Traffic Interchange
TNM	Traffic Noise Model
vph	Vehicles per hour
WB	Westbound

1 EXECUTIVE SUMMARY

1.1 PROJECT OBJECTIVES

The Arizona Department of Transportation (ADOT) is planning to construct additional general-purpose lanes (GPL) along State Route (SR) 101L between milepost (MP) 36.6 (intersection of Pima Road and Princess Drive) and MP 41.1 (Shea Boulevard). This project is located within the City of Scottsdale, Maricopa County, Arizona.

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

The scope of work for the project consists of:

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

The Design Year for the project is 2040. The technical analysis for the study area provides thorough details and methodology used to determine impacts, appropriate noise abatement measures, and its feasibility and reasonableness.

Per 23 CFR 772 and ADOT Noise Abatement Requirements (NAR), traffic noise analysis is required for any projects that receive federal-aid funds or are otherwise subject to Federal Highway Administration (FHWA) approval. They include federal projects that are administered by Local Public Agencies as well as ADOT. In addition to federal projects, it is required for other ADOT-funded projects that involve:

- construction of a highway on new alignment or
- a significant change in the horizontal or vertical alignment of an existing highway, or
- adding new through lanes to an existing highway.

1.2 CURRENT NOISE ENVIRONMENT

To describe the current noise environment, the study area has been divided into four subsections:

- **SR 101L from Princess Drive to Raintree Drive (Modeling Area A) –** Land use in this area is mainly commercial, office and light industrial. A private golf course (Activity Category E) is

located along the west side of the SR 101L, and soccer fields (Activity Category E) are located on the east side along the SR 101L between East Bell Road and Central Arizona Project Canal. Sound levels in the area between the Princess Drive to Raintree Drive are mainly influenced by the noise from Scottsdale Airport and SR 101L. Field measurements were taken at one site in this portion the study area, M1 (see **Figure 7**).

- **SR 101L from Raintree Drive to Cactus Avenue (Modeling Area B & C) –** The land use along the east side (Area B) of the SR 101L in this area is surrounded mainly by residential single-family residential homes (Activity Category B) and a community park (Activity Category C), and a light industrial/commercial building. The land use along the west side (Area C) of the SR 101 in this area is surrounded mainly by single-family residential homes between Thunderbird Road and Cactus Avenue and a hotel (Holiday Inn-Activity Category C), office and light industrial (Activity Category E) between Raintree Drive and Thunderbird Road. Sound levels in the area between the Raintree Drive to Cactus Avenue are mainly influenced by the noise from SR 101L. Field measurements were taken at six sites in this area, M2, M3, M5 and M7 along the east side of the SR 101L (Area B) and M4 and M6 along the west side of the SR 101L (Area C) (see **Figure 7** and **Figure 8**).
- **SR 101L from Cactus Avenue to Shea Boulevard (Modeling Area D & E) –** The land use along the east side (Area D) of the SR 101L in this area is surrounded mainly by residential single-family residential homes, a senior assisted living community (Activity Category B), church and hotel (Activity Category C) and commercial buildings. The land use along the west side (Area E) of the SR 101L in this area is surrounded mainly by single-family residential homes (Activity Category B) and commercial shopping center (Activity Category E). Sound levels in the area between the Cactus Avenue and Shea Boulevard are mainly influenced by the noise from SR 101L. Field measurements were taken at four sites in this area, M8 and M11 along the east side of the SR 101 (Area D) and M9 and M10 along the west side of the SR 101L (Area E) (see **Figure 9** and **Figure 10**).
- **SR 101L at Shea Boulevard Interchange (Southern Project Terminus, Modeling Area F) –** The land use in this section is a shopping center northbound side (Activity Category E), and residential (Activity Category B) the southbound side. No measurements were taken in this area. This area does not have roadway improvement along the mainline of the SR 101L (see **Figure 10**).

1.3 NOISE IMPACTS INFORMATION

Table 1 depicts a summary of the modeled Existing, No-Build, and Build traffic noise levels, along with the Build impacted receptors indicating where consideration of abatement measures is warranted.

No barriers were proposed as part of this project. Existing sound walls throughout the project corridor meet the acoustic reduction feasibility and noise reductions design goals.

Table 1. Noise Modeling Summary

Study Area Subsection	Existing	No-Build	Build	Abatement Measure Consideration
SR 101L from Princess Drive (Northern Project Terminus) to Raintree Drive (Area A)	57.7 dB(A) to 69.6 dB(A)	57.7 dB(A) to 69.6 dB(A)	58.6 dB(A) to 69.8 dB(A)	The modeled noise levels at the 8 in this area does not approach or exceed FHWA Noise Abatement Criteria (NAC) for Activity Category C or E, soccer fields and golf course. Therefore, consideration of abatement measures is not warranted.
SR 101L from Raintree Drive to Cactus Avenue (Area B, East side of SR 101L)	42.6 dB(A) to 64.6 dB(A)	42.6 dB(A) to 64.6 dB(A)	43.3 dB(A) to 65.0 dB(A)	The modeled noise levels at 164 receivers do not approach or exceed FHWA NAC for Activity Category B/C for residences and community park. Therefore, consideration of abatement measures is not warranted.
SR 101L from Raintree Drive to Cactus Avenue (Area C, West side of SR 101L)	50.3 dB(A) to 67.2 dB(A)	50.4 dB(A) to 67.2 dB(A)	51.1 dB(A) to 67.8 dB(A)	The modeled noise levels at 4 out of 79 receivers approach or exceed FHWA NAC for Activity Category B, residences. However, the existing noise wall meets the acoustic feasibility and noise reduction design goals, therefore, consideration of abatement measures is not warranted.
SR 101L from Cactus Avenue to Shea Boulevard (Area D, East side of SR 101L)	53.1 dB(A) to 64.3 dB(A)	53.1 dB(A) to 64.3 dB(A)	54.0 dB(A) to 65.3 dB(A)	The modeled noise levels at 82 receivers do not approach or exceed FHWA NAC for Activity Category B/C for residences, church and hotel. Therefore, consideration of abatement measures is not warranted.
SR 101L from Cactus Avenue to Shea Boulevard (Area E, West side of SR 101)	51.4 dB(A) to 63.6 dB(A)	51.4 dB(A) to 63.6 dB(A)	52.3 dB(A) to 63.7 dB(A)	The modeled noise levels at 61 receivers do not approach or exceed FHWA NAC for Activity Category B/C for residences, church and hotel. Therefore, consideration of abatement measures is not warranted.
SR 101L Shea Boulevard (Southern Project Terminus - Area F, West side of SR 101L)	55.2 dB(A) to 60.5 dB(A)	55.2 dB(A) to 60.5 dB(A)	55.1 dB(A) to 60.5 dB(A)	The modeled noise levels at 28 receivers do not approach or exceed FHWA NAC for Activity Category B for residences. Therefore, consideration of abatement measures is not warranted.

2 INTRODUCTION

2.1 PROJECT DESCRIPTION

The Arizona Department of Transportation (ADOT) is planning to construct additional general-purpose lanes (GPL) along State Route (SR) 101L between milepost (MP) 36.6 (intersection of Pima Road and Princess Drive) and MP 41.1 (Shea Boulevard). This project is located within the City of Scottsdale, Maricopa County, Arizona (see **Figure 1, Figure 2,** and **Figure 3**).

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

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

The scope of work for the project consists of:

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

The project would occur within the existing ADOT right-of-way (R/W) through private lands, and ADOT easement through land held in trust by the Arizona State Land Department, and public lands under the management of the US Bureau of Reclamation. Approximately one acre of new R/W and temporary construction easements (TCEs) would be required to construct the improvements. Construction is anticipated to begin in summer 2023 and is expected to take approximately two years to complete. The improvements would be constructed in phases. This project would require temporary lane closures along SR 101L and the crossroads, night and/or weekend full freeway closures, and temporary ramp closures; however, access would be maintained to adjacent properties throughout construction.

During full closures, EB/SB travelers would be detoured along Scottsdale Road to Shea Boulevard, then to the on-ramp for SB SR 101L at Shea; NB travelers would similarly be detoured along Shea Boulevard to Scottsdale Road, then to the on-ramp for WB/NB SR 101L at Scottsdale Road. Detour signs would be mounted on spring stands. No new R/W, easements, or ground disturbance would result from the detours.

2.2 TYPE I TRIGGER FOR NOISE ANALYSIS

Per 23 CFR 772 and ADOT NAR, traffic noise analysis is required for any projects that receive federal-aid funds or are otherwise subject to FHWA approval. They include federal projects that are administered by Local Public Agencies (LPAs) as well as ADOT. In addition to federal projects, it is required for other ADOT-funded projects that involve:

- construction of a highway on new alignment or
- a significant change in the horizontal or vertical alignment of an existing highway or
- adding new through lanes to an existing highway.

The proposed build alternative would require additional right-of-way (ROW) and temporary construction easements (TCE) from private landowners within the study area. Any ROW and/or TCEs would be evaluated prior to construction.

The Design Year for the project is 2040. This project includes various land uses along the corridor with a number of residences, shopping centers, businesses, and hotels along the freeway. A search residential permitted developments within Maricopa County found a development called “True North 8 Sub” which was included in this study. The development is located east of SR 101L, just south of Thunderbird Road. The technical analysis provides thorough details and methodology used to determine impacts, appropriate noise abatement measures, and its feasibility and reasonableness.

The technical analysis for the study area provides thorough details and methodology used to determine impacts, appropriate noise abatement measures, and its feasibility and reasonableness. The technical analysis is presented for the four subsections of the Project study area (**Figure 4**).

- Princess Drive to Raintree Drive (TNM Modeling Area A)
- Raintree Drive to Cactus Avenue (TNM Modeling Area B – East side of SR 101L & Area C – West side of SR 101L)
- Cactus Avenue to Shea Boulevard (TNM Modeling Area D – East side of SR 101L & Area E – West side of SR 101L)
- Shea Boulevard – Southern Project Terminus (TNM Modeling Area F – West side of SR 101L)

Figure 1. Project Map

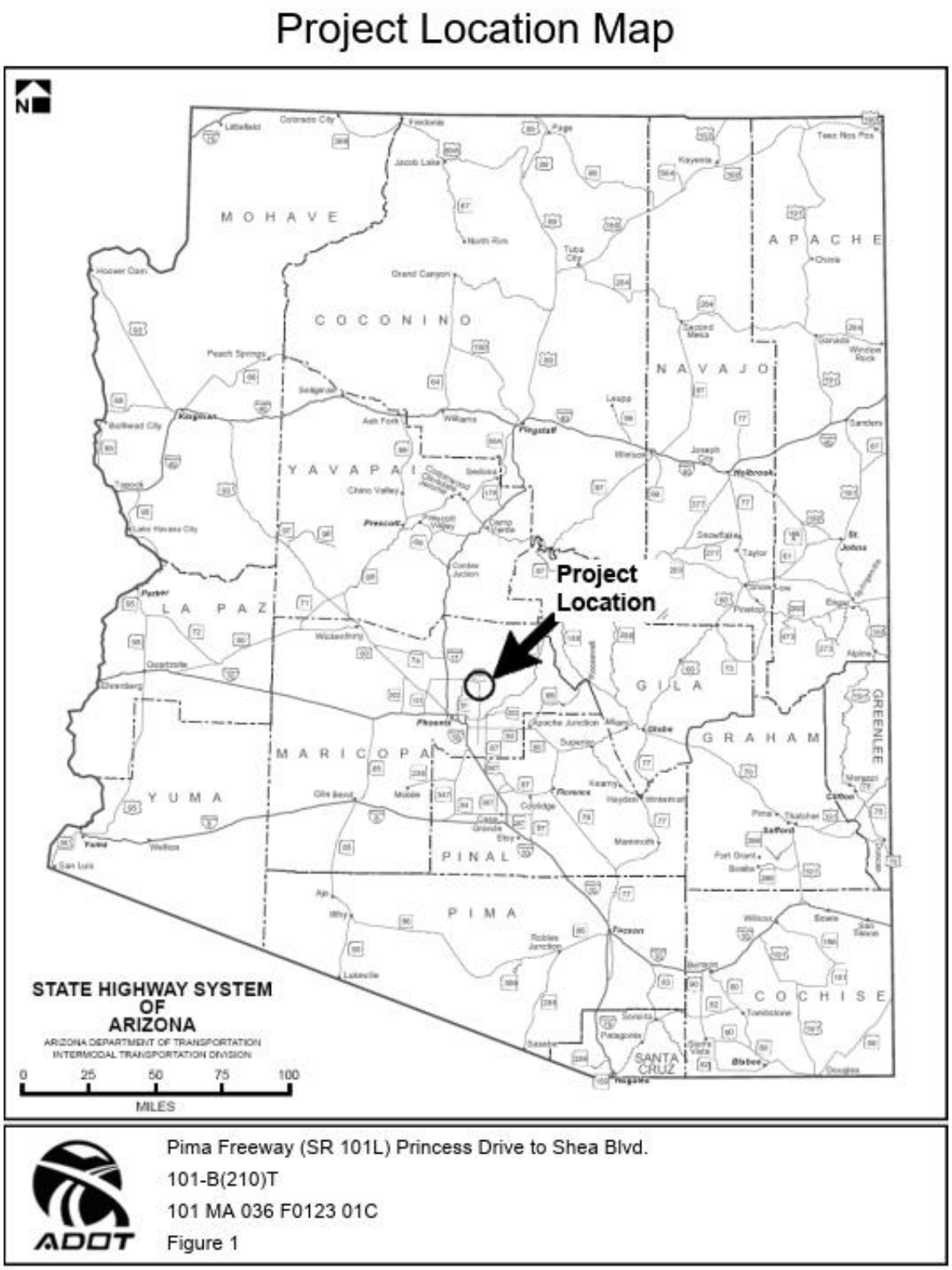


Figure 2. Project Vicinity North

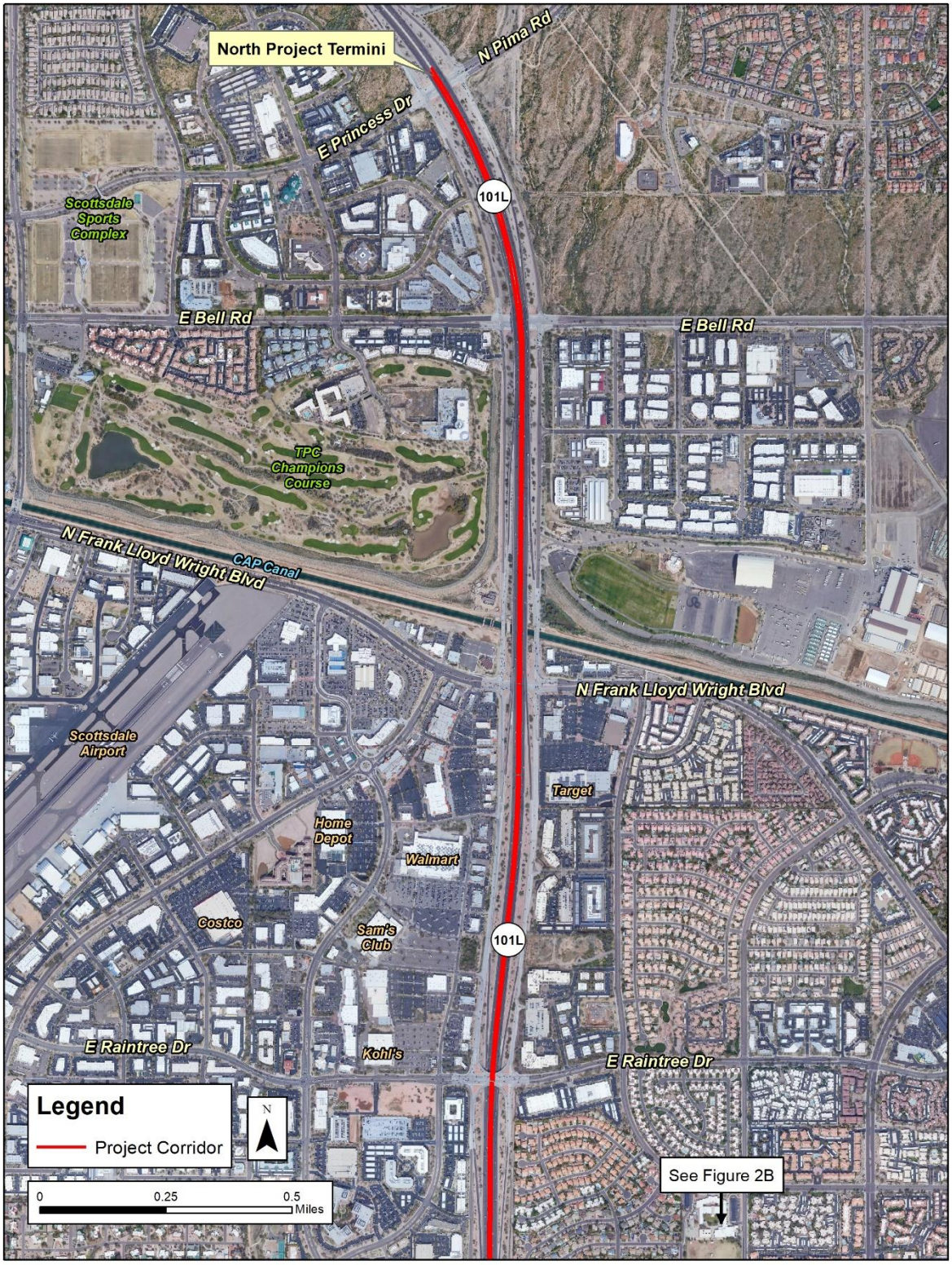


Figure 3. Project Vicinity South

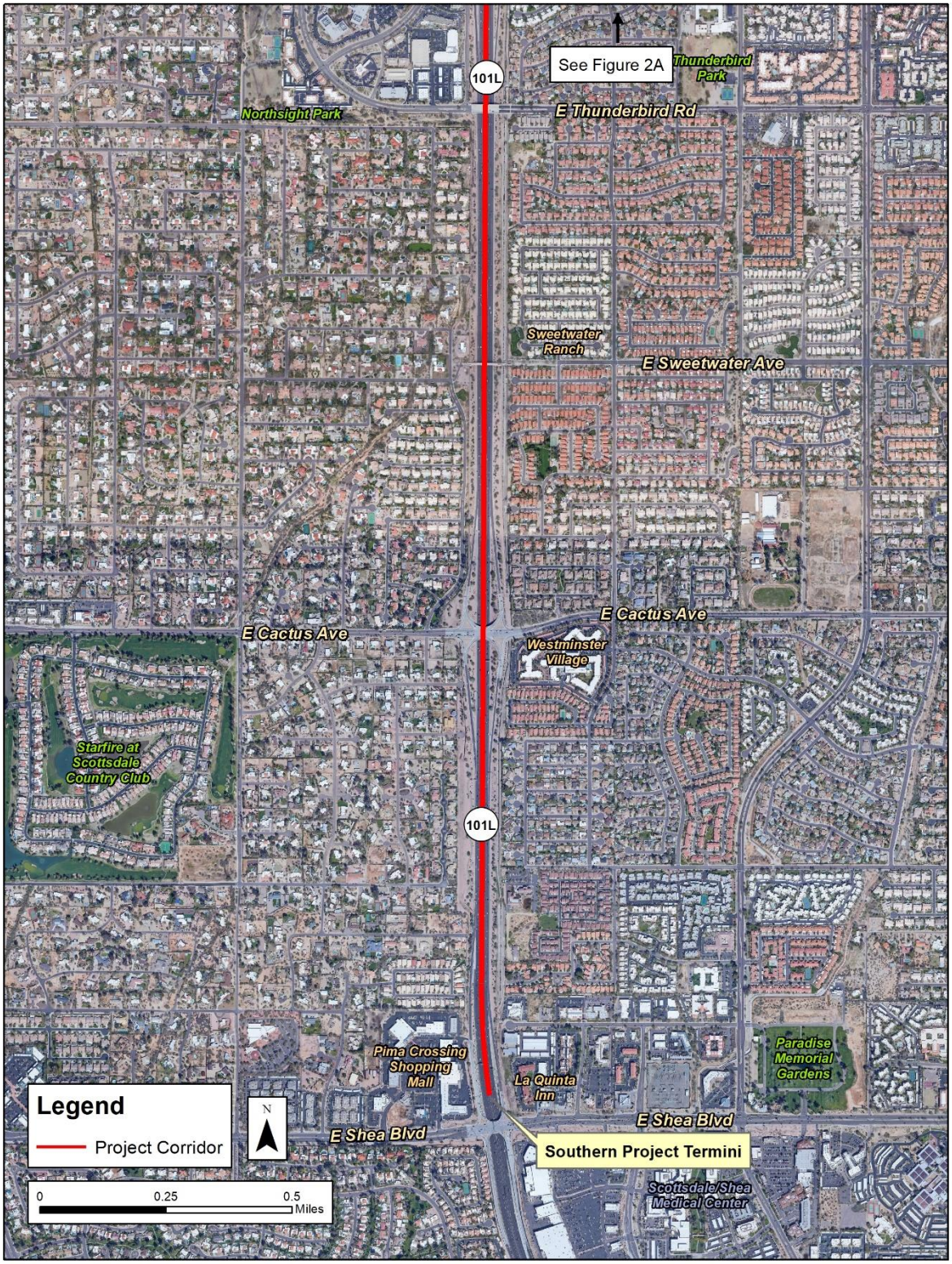
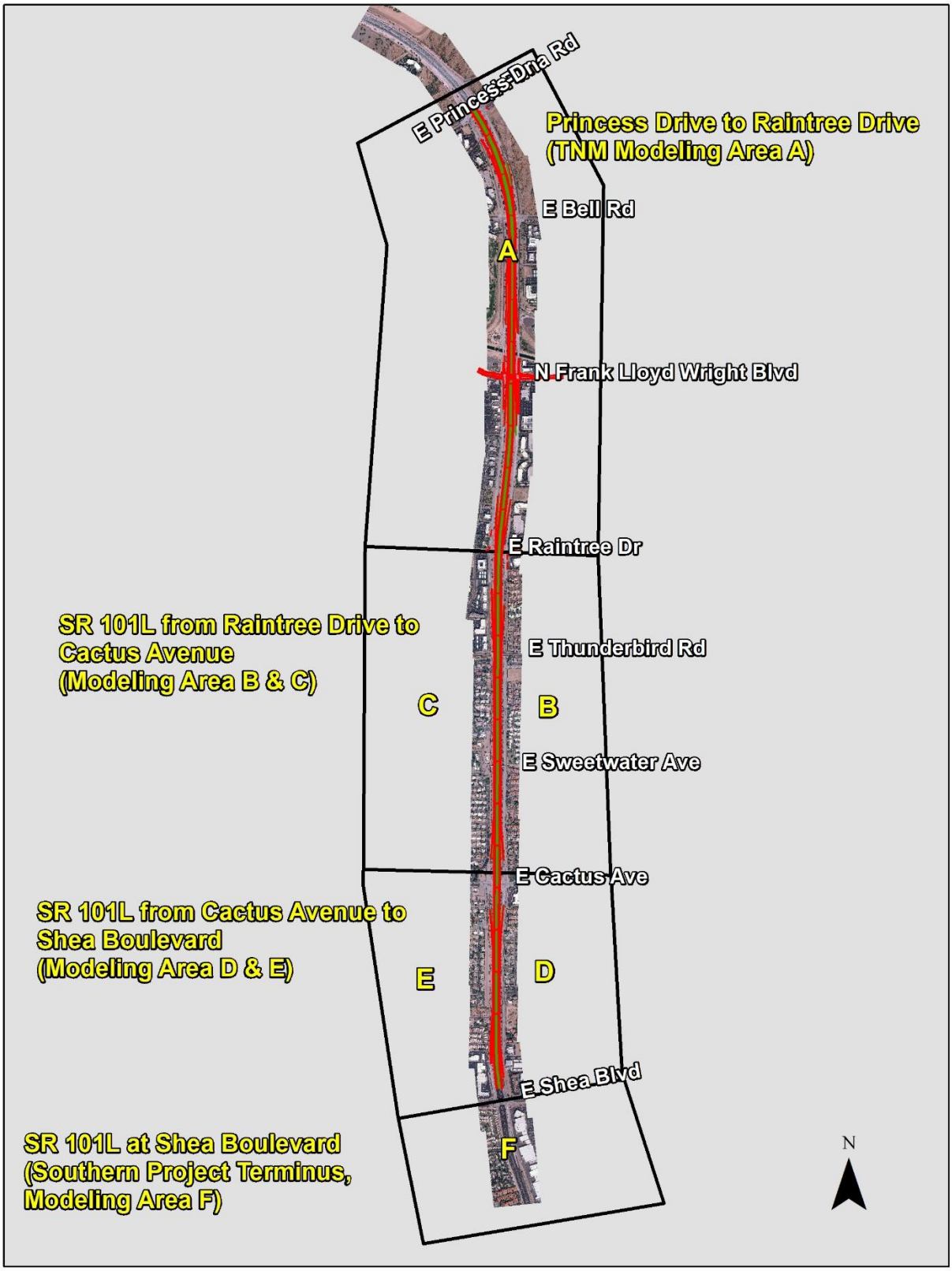
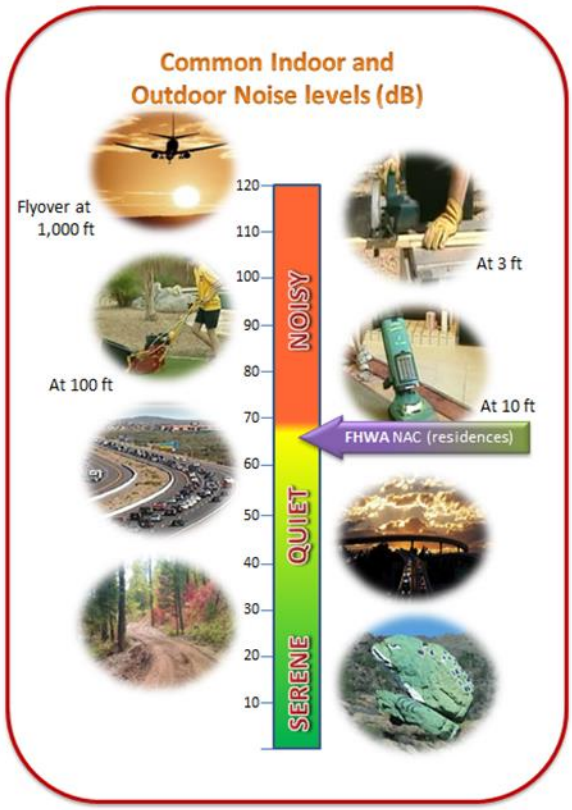


Figure 4. Project Study Area Subsections



3 FUNDAMENTALS OF TRAFFIC NOISE

Sound is the sensation produced by stimulation of the hearing organs produced by continuous and regular vibrations of a longitudinal pressure wave that travels through an elastic medium (e.g., air, water, metal, wood) and can be heard when they reach a person's or animal's ear. When sound travels through air, the atmospheric pressure wave variations occur periodically. It travels in air at a speed of approximately 1,087 feet per second at sea level and a temperature of 32° F. *Noise* is usually defined as "any unwanted sound," and consists of sounds that are perceived as interfering with communication, work, rest, and recreation. It is characterized as a non-harmonious or discordant group of sounds.



3.1 SOUND PRESSURE LEVELS, DECIBELS, FREQUENCIES, AND A-WEIGHTED DECIBELS-DB(A)

Noise can be measured in Pa (Pascals). A healthy human ear can detect a pressure variation of 20 µPa, which is referred to as the threshold of hearing. A logarithmic scale is useful for handling numbers on a wide scale, but for a smaller span, the decibel (dB) scale is used. Sound pressure level (SPL) is calculated using measured sound level and the hearing threshold of 20 µPa, or 20 x 10^{-6} Pa, as the reference level; this level can also be defined as 0 dB. The decibel alone is insufficient to describe how the human ear responds to sound pressures at all frequencies. The human ear has its peak response in the range of 2,500 to 3,000 vibrations per second, or Hertz (Hz), and has a somewhat low response at lower or higher frequencies. In response to the human ear sensitivity, the A-weighted noise level, referenced in units of dB(A), was developed to better represent people's perception of sound levels. The dB(A) unit of measurement is used in noise studies and reporting. Changes in sound level under 3 dB(A) are not noticed by the human ear, while the human ear perceives a 10 dB(A) increase in sound level to be a doubling of sound.

3.2 NOISE DESCRIPTORS

The most commonly used noise descriptor in traffic noise analysis is 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 occurs during the same period. The 1-hour A-weighted equivalent sound level

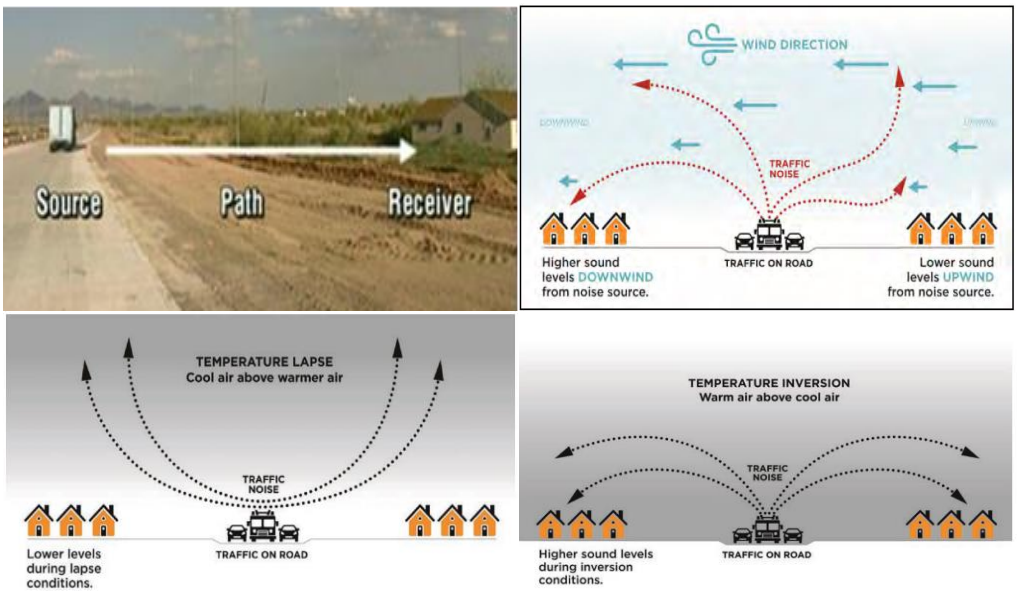
[$L_{Aeq(h)}$] is the energy average of A-weighted sound levels occurring during a one-hour period and is the basis for noise criteria used by ADOT.

3.3 WHAT ARE THE SOURCE, RECEIVER, RECEPTOR, AND PATH OF TRAFFIC NOISE?

Traffic noise is a combination of the noises produced by vehicle engines, exhaust, and tires. The source of highway traffic comes from vehicles traveling on highways. The noise level at the *Source* depends on pavement type, number of heavy trucks, traffic volumes, and traffic speeds. The predominant noise sources in vehicles at speeds less than 30 miles per hour (mph) are engine and exhaust. At speeds greater than 30 mph, tire noise becomes the dominant noise source.

As shown on **Figure 5**, the receptor is any location where people are affected by traffic noise. It can be residence, park, school, playground, or any other place where frequent human activity occurs. The area between the source and the receptor *(receiver* represents a receptor[s] when modeled in FHWA's Traffic Noise Model software) is considered a *path*. Depending on the path surface, propagation of sound may be reduced; such is the case with soft ground and fresh snow. Doubling the distance between the source and receptor reduces noise by three dB(A), depending on the ground.

Figure 5. Source, Propagation Path, Receptor



Source, Propagation Path, Receptor

Air changes its density due to variations in humidity and temperature, and wind influences refraction of sound waves. Wind, humidity, and temperature may have a significant impact on propagation of sound, but only influences receptors located a long distance from the source. As

residents are usually much closer to the noise source, atmospheric conditions are insignificant for consideration in modeling.

For more information on noise, please visit ADOT's Environmental Planning Noise webpage.

4 NOISE IMPACT CRITERIA

As required by the Code of Federal Regulations Title 23, Section 772.5 (23 CFR 772.5), ADOT defines a Substantial Increase in noise levels as an increase of 15 dB(A) in the predicted noise level over the existing noise level. As required by 23 CFR 772.11(e), the point at which the noise levels "approach" the FHWA Noise Abatement Criteria (NAC) (**Table 2**) is defined by ADOT as one dB(A), for Activity Categories A, B, C, D, and E. There is no noise impact threshold for Category F or Category G locations.

Table 2. FHWA Noise Abatement Criteria [1]

Activity Category	dB(A), L_{eq1h}[2]	Activity Description
A	57 (exterior)	Land 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	67 (exterior)	Residential
C	67 (exterior)	Active sports 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 structures, recording studios, schools, and television studios
E	72 (exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in categories 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

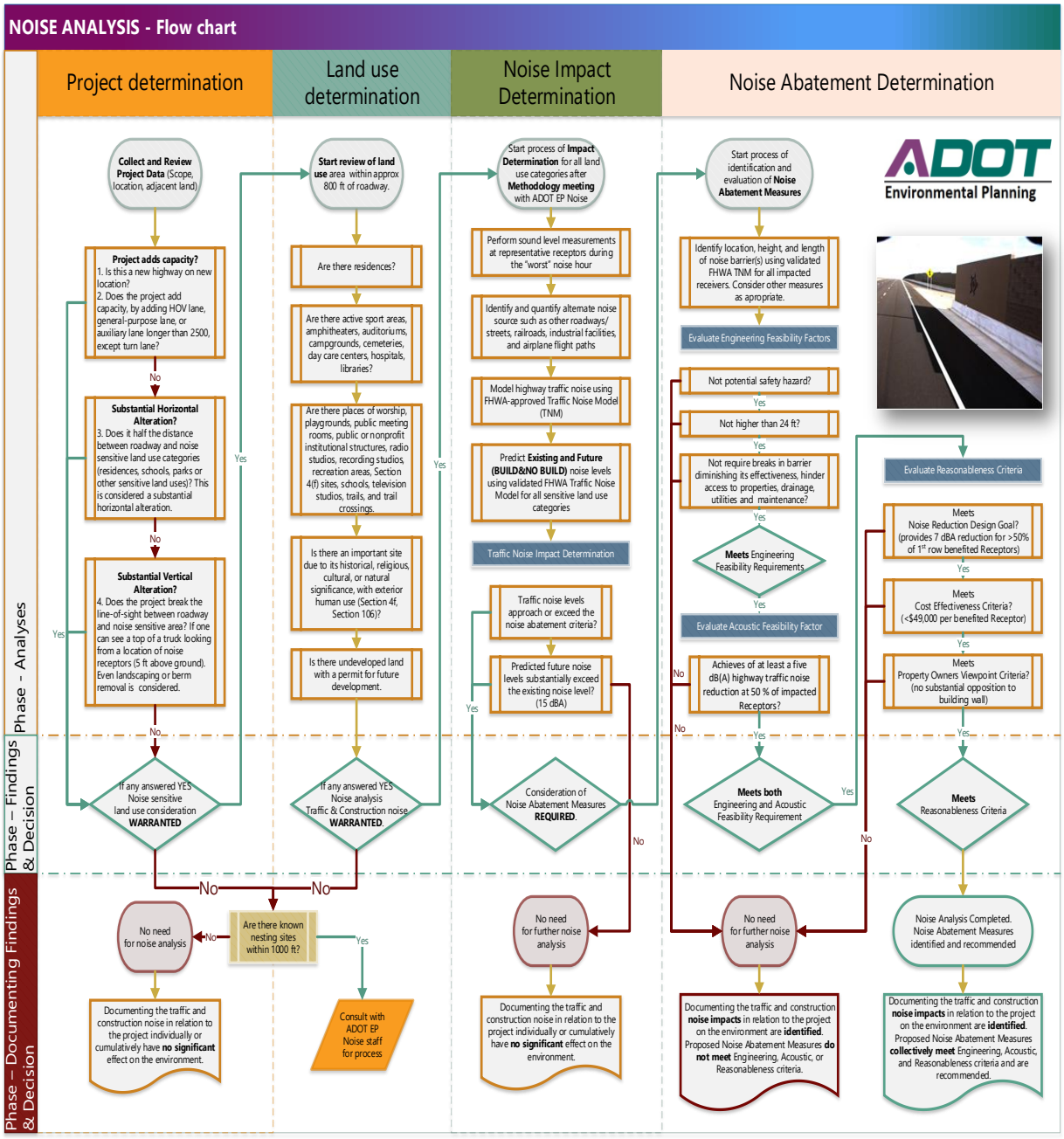
[1] Sources: Federal Highway Administration (2011); 23 Code of Federal Regulations § 772
[2] The 1-hour equivalent loudness in A-weighted decibels, which is the logarithmic average of noise over a 1-hour period

5 ANALYSIS METHODOLOGY

The noise analysis procedure of is exhibited on **Figure 6**. In principle, once the project is identified as Type I in line with 23 CFR 772.5, the next three major steps are:

1. Land use determination (refer to the Instructions on *Land Use Determination*) answering the question whether there are noise sensitive areas, per **Table 2**. If there are noise sensitive areas within approximately 500-800 feet from the highway, the analysis continues with noise impact determination.
2. Noise impact determination (refer to the *Instructions on Determining Existing Noise Levels* and *Instructions on Predicting Future Noise Levels*), answering whether there are any noise sensitive areas impacted by the project itself. If any of the noise sensitive areas are determined to be impacted, a consideration of noise abatement measures is required.
3. Noise abatement measures, answering whether there are measures that meet all feasibility and reasonableness criteria, as per ADOT NAR.

Figure 6. Noise Analysis Flow Chart



6 DETERMINATION OF EXISTING NOISE LEVELS

6.1 GENERAL INFORMATION

The methodology used for the highway noise level measurement complies with procedures specified in the FHWA document FHWA-PD-96-046/DOT-VNTC-FHWA-96-5, *Measurement of Highway-Related Noise* (FHWA, 1996) Section 4 - *Existing-Noise Measurements in the Vicinity of Highways*, or any other subsequent FHWA-approved methodology.

Measurements were taken under meteorologically acceptable conditions, with winds less than 12 mph and dry pavement. All measurement equipment had a valid calibration certificate at the time of measurements, in line with ADOT NAR and the *Instruction on Determination of Existing Noise levels and Noise Measurement* Data Form.

In general, for all Activity Categories, existing noise levels were established by:

- field measurements alone during *worst noise hour*, or
- field measurements in combination with the FHWA TNM model, and if necessary, other noise prediction models, depending on the presence of background noise sources.

Field measurements are required, as existing background noise is usually a composite from many sources, and noise prediction models are applicable only to noise originating from a specific source.

6.2 BACKGROUND NOISE CONSIDERATION

Any noise source contributing to the noise levels at a location, other than observed traffic noise, must be identified and captured in the TNM model for that modeled receiver. For multimodal projects, or when a background noise source is from an adjoining facility under the jurisdiction of the Federal Transit Administration (FTA) or Federal Railroad Administration (FRA), one may use the following resources:

- FHWA Traffic Noise Model (TNM2.5)
  - For ADOT-managed infrastructure, ample traffic information is available on the Transportation Data Management System. Following Steps 1 to 6, one may access continuous traffic monitoring data that may provide answers on traffic patterns to determine the “noisiest hour”
- Federal Transit Administration Noise Impact Assessment Spreadsheet, version 1/29/2019
  - Federal Railroad Administration General Freight Noise Assessment – CREATE Freight Noise and Vibration Model.

The noise measurement yields the worst hourly noise level generated from representative noise sources for that area. It is critical to understand that the FHWA NAC focuses on noise levels where highway traffic noise could potentially interfere with speech communication in exterior areas. Therefore, in properly determining existing noise conditions, the following factors are essential for consideration.

- The location is a representative area of frequent human use.
- The time of measurements at the location coincides with frequent human use common occurrence.
- The worst noise hours of both highway and alternative noise sources are captured, and
- The worst noise hours of both highway and alternative noise sources at the time when frequent human use commonly occurs is captured.

6.2.1 Noise Measurement Site Selection:

The purpose for conducting noise measurements of the existing freeway noise were to calibrate the TNM noise model to existing conditions, and thus provide a more accurate model for prediction of noise levels with the noise barrier. Field notes were written up for each measurement location. The field notes include time, temperature, average wind speed, humidity, geographic coordinates (or street address), and photos. The field notes also list all noise sources that contributed to the recorded noise levels.

A total of 11 receptor locations were selected for field noise measurement locations along the proposed project improvements. Measurements were conducted between the hours of 6:00 A.M. and 10:30 A.M. or between 3:30 P.M. and 6:00 P.M. It is recommended by the Arizona Nosie Abatement Requirements that for TNM model validation, two noise measurements should be taken along the same line perpendicular to the highway, one within 400 feet and the other half the distance from the roadway to the first measurement location. This was done when and where it is possible. If two measurements were not possible, measurement was conducted where practicable, 10 feet from the property line (nearest the freeway) and 10 feet away from any buildings. **Figure 7** to **Figure 10** show the measurement locations.

To describe the current noise environment, the study area has been divided into four subsections:

- **SR 101L from Princess Drive to Raintree Drive (Modeling Area A) –** Land use in this area is mainly commercial, office and light industrial. A private golf course (Activity Category E) is located along the west side of the SR 101L, and soccer fields (Activity Category E) are located on the east side along the SR 101L between East Bell Road and Central Arizona Project Canal. Sound levels in the area between the Princess Drive to Raintree Drive are mainly influenced by the noise from Scottsdale Airport and SR 101L. There are no existing sound walls located in this area. Field measurements were taken at one site in this portion the study area, M1 (see **Figure 7**).

- **SR 101L from Raintree Drive to Cactus Avenue (Modeling Area B & C) –** The land use along the east side (Area B) of the SR 101L in this area is surrounded mainly by residential single-family residential homes (Activity Category B), a community park (Activity Category C), and a light industrial/commercial building. The land use along the west side (Area C) of the SR 101 in this area is surrounded mainly by single-family residential homes between Thunderbird Road and Cactus Avenue and a hotel (Holiday Inn-Activity Category C), office and light industrial (Activity Category E) between Raintree Drive and Thunderbird Road. Sound levels in the area between the Raintree Drive to Cactus Avenue are mainly influenced by the noise from SR 101L.

  Six existing noise barriers are located in this study area, three barrier segments on each side of SR 101L. The barrier heights on the east side range from approximately 12.4 to 14.7 feet above ground from approximately Station 2190+70 to 2212+00 (Wall B1), approximately 10.2 to 14.7 feet above ground from approximately Station 2213+00 to 2239+00 (Wall B2), and approximately 11.8 to 13.7 feet above ground from approximately Station 2239+50 to 2266+50 (Wall B3). The barrier heights on the west side range from approximately 7.0 to 12.0 feet above ground from approximately Station 2214+00 to 227+90 (Wall C1), approximately 12.5 to 14.1 feet above ground from approximately Station 2226+90 to 2239+00 (Wall C2), and approximately 8.0 to 15.1 feet above ground from approximately Station 2239+50 to 2266+50.

  Field measurements were taken at six sites in this area, M2, M3, M5 and M7 along the east side of the SR 101L (Area B) and M4 and M6 along the west side of the SR 101L (Area C) (see **Figure 7** and **Figure 8**).

- **SR 101L from Cactus Avenue to Shea Boulevard (Modeling Area D & E) –** The land use along the east side (Area D) of the SR 101L in this area is surrounded mainly by residential single-family residential homes, a senior assisted living community (Activity Category B), church and hotel (Activity Category C) and commercial buildings. The land use along the west side (Area D) of the SR 101L in this area is surrounded mainly by single-family residential homes (Activity Category B) and commercial shopping center (Activity Category E). Sound levels in the area between the Cactus Avenue and Shea Boulevard are mainly influenced by the noise from SR 101L.

  Four existing noise barriers and a berm are located in this study area, two barrier segments on each side of SR 101L and a berm on the west side of SR 101L. The barrier heights on the east side range from approximately 9.9 to 13.3 feet above ground from approximately Station 2268+00 to 2293+30 (Wall D1) and approximately 10.8 to 14.8 feet above ground from approximately Station 2291+50 to 2305+50 (Wall D2). The barrier heights on the west side range from approximately 11.5 to 16.0 feet above ground from approximately Station 2268+20 to 2281+70 (Wall E1), and approximately 10.3 to 28.7 feet above ground from approximately Station 2294+50 to 2307+30 (Wall E2). The height of the berm on the west side tapers into the top of wall of Wall E1 and Wall E2.

  Field measurements were taken at four sites in this area, M8 and M11 along the east side of the SR 101 (Area D) and M9 and M10 along the west side of the SR 101L (Area E) (see **Figure 9** and **Figure 10**).

- **SR 101L at Shea Boulevard Interchange (Southern Project Terminus, Modeling Area F) –** The land use in this section is a shopping center northbound side (Activity Category E), and residential (Activity Category B) the southbound side (see **Figure 10**).

  An existing noise barrier is located along the west side of SR 101L. The barrier heights on the west side range from approximately 20.6 to 39.5 feet above ground from approximately Station 2321+00 to 22345+00 (Wall F1).

Figure 7. E Princess Drive/N Pima Road to N Frank Llyod Wright Boulevard - Existing Noise Measurement Locations

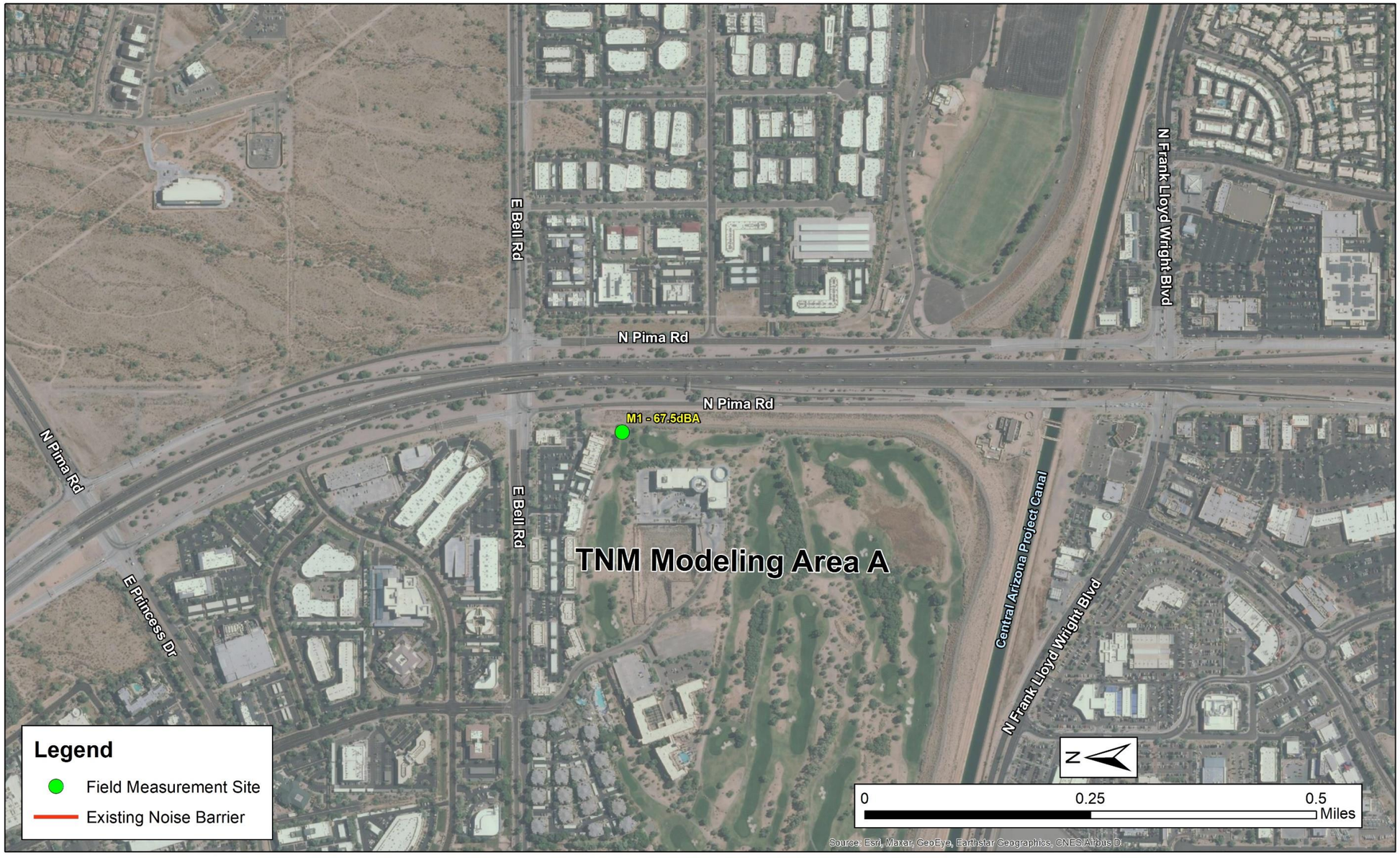


Figure 8. N Frank Lloyd Wright Boulevard to E Thunderbird Road - Existing Noise Measurement Locations

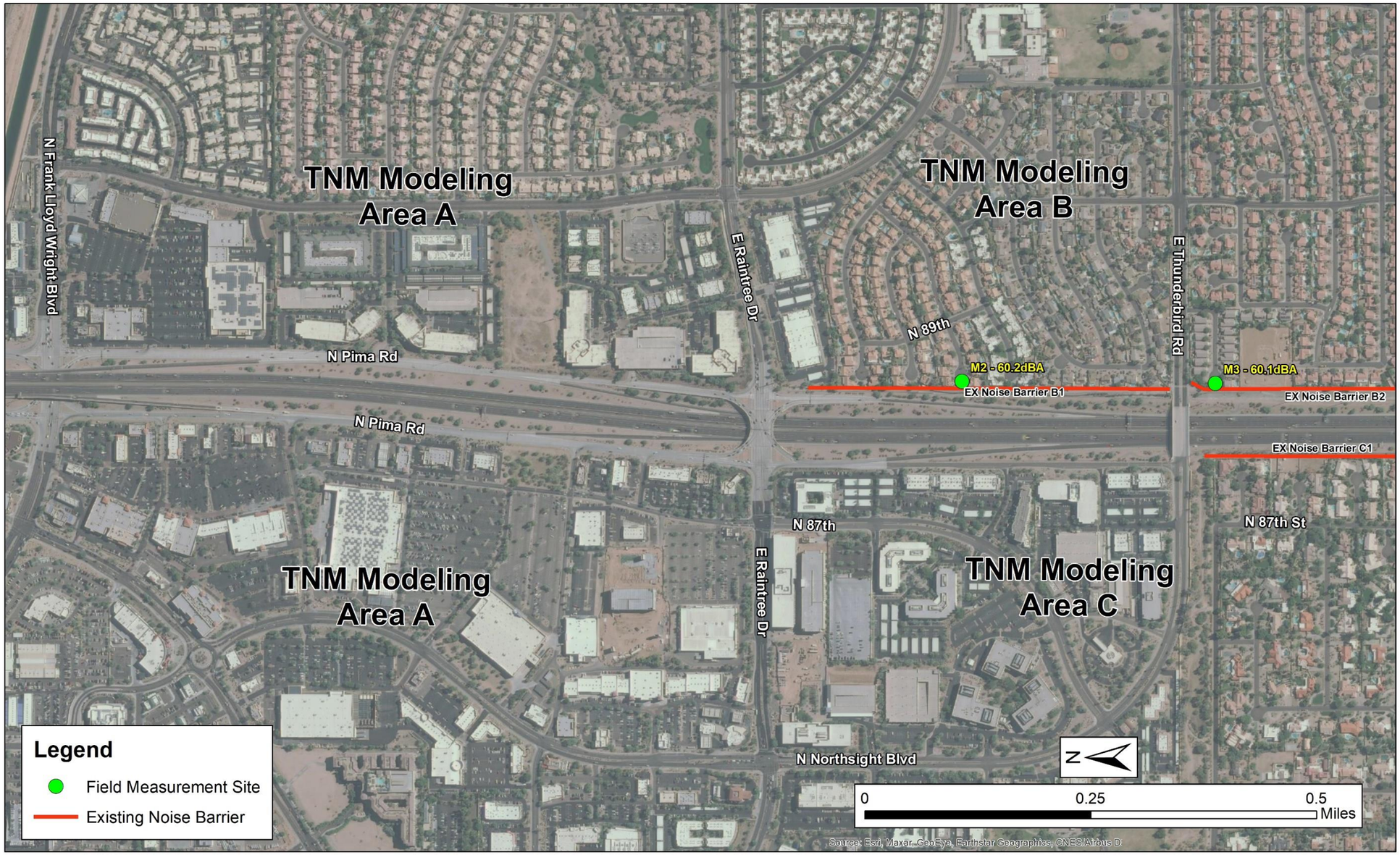


Figure 9. E Thunderbird Road to E Cactus Avenue - Existing Noise Measurement Locations

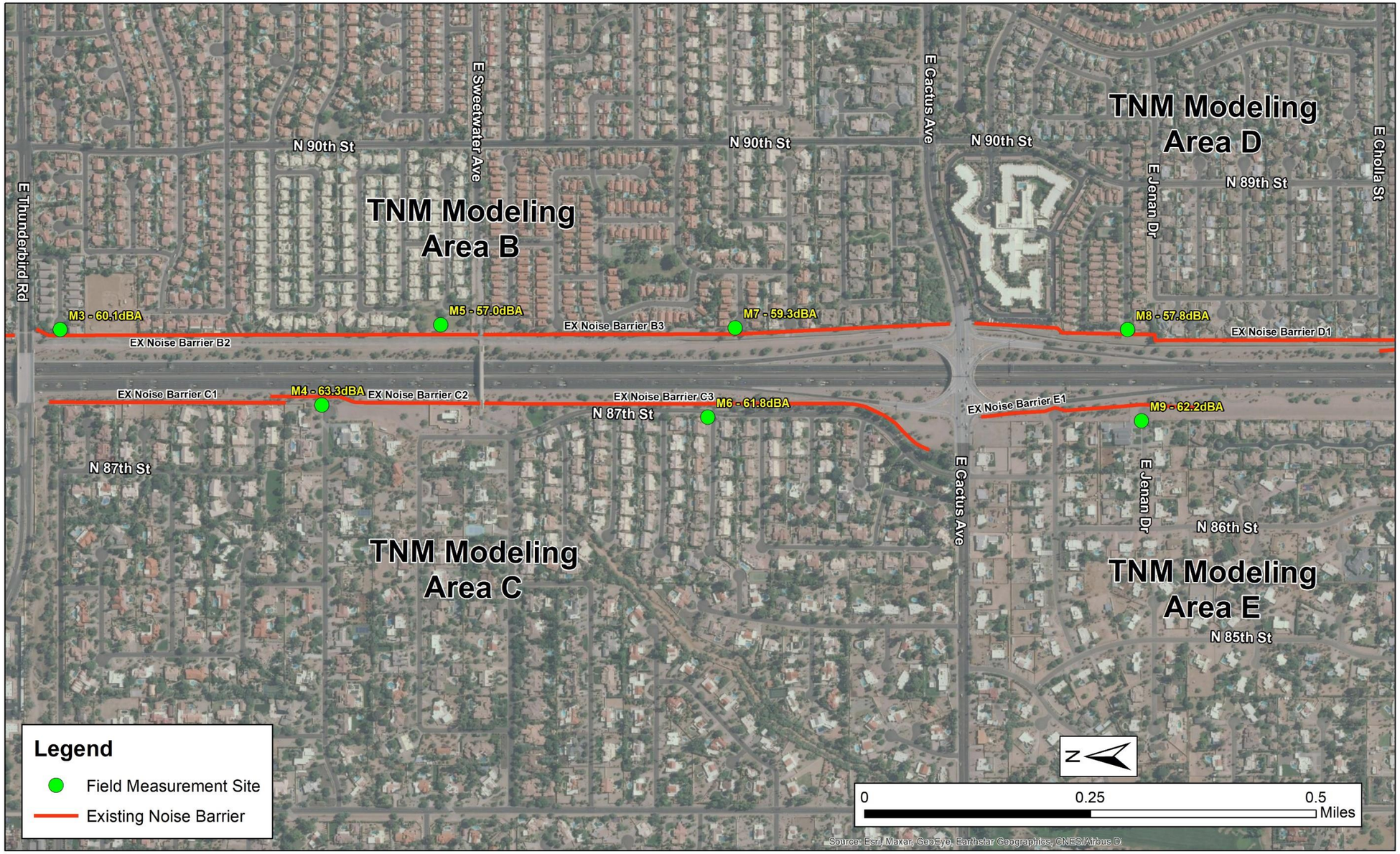
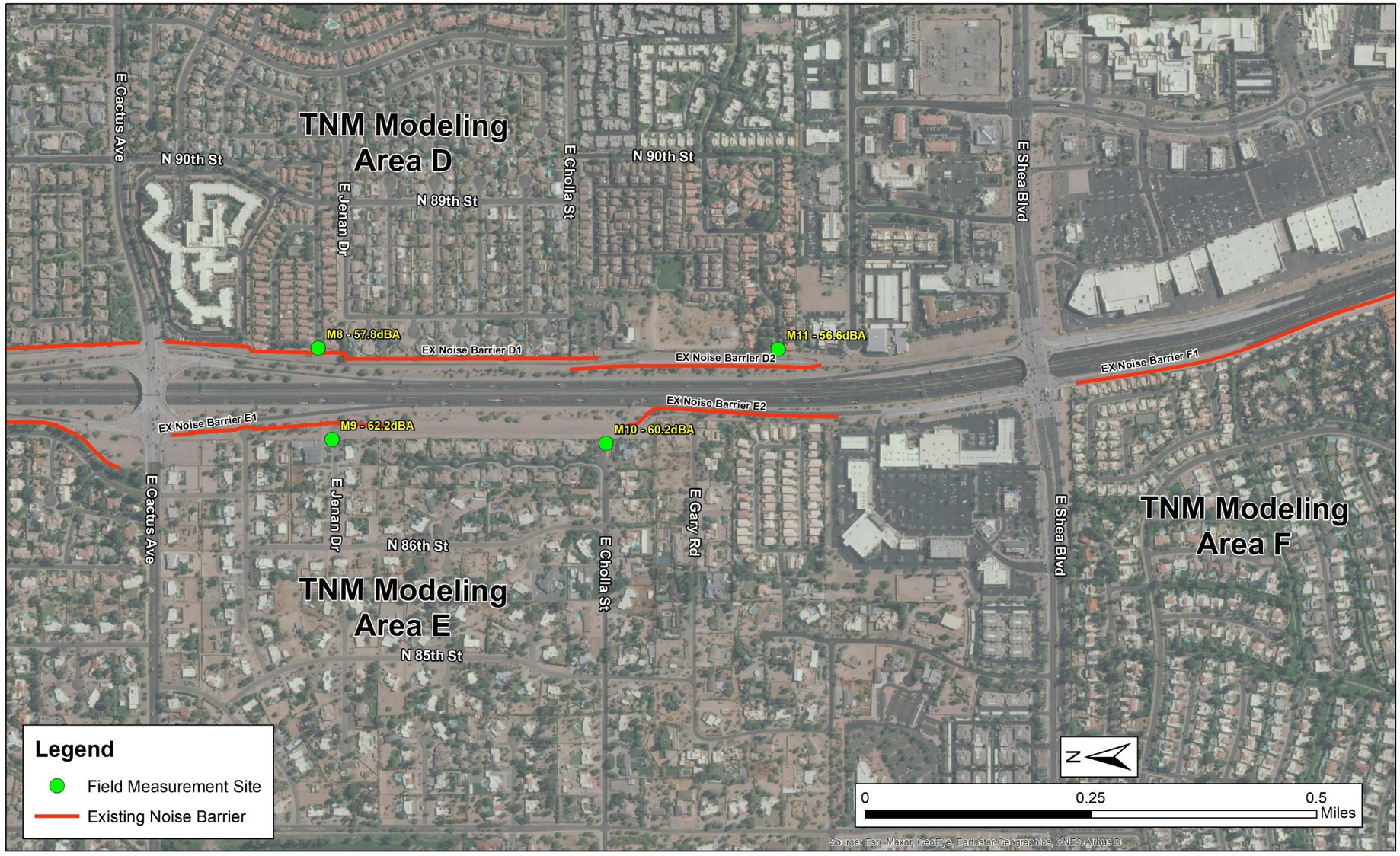


Figure 10. E Cactus Road to E Shea Boulevard - Existing Noise Measurement Locations



6.2.2 Measurement Instrumentation

The instruments used for the noise measurements include the following:

- **Short-Term:**

1. Integrating Sound Level Meter – One (1) SVANTEK model 971 Meter with American National Standards Institute (ANSI) Type 1 accuracy.

- **Other Instrumentation:**

1. Acoustic Field Calibrator – One (1) Bruel & Kjaer Type 4231
2. Wind Monitor, Temperature & Humidity Gauge – One (1) Kestrel 3000 Pocket weather meter.
3. Radar Speed Detector – One (1) Stalker Sport Digital Sports Radar model SS79355 sports radar gun.
4. Video Camera – One (1) Sony HDR-AS20 Action CAM for traffic count and vehicle identification recording.

Items 3 and 4 above were used to make accurate counts of the traffic volume and speeds for all traffic lanes in both directions of the highway. The data were used for model calibration.

All measurement systems were calibrated on site using the acoustic field calibrator. All the systems that were used were laboratory calibrated within a 12-month period prior to the measurements.

6.2.3 Measurement Procedure

The measurement instruments were field calibrated before and after each measurement series. The calibration check conducted after the completion of the measurements is to verify that the instruments are operating within the normal operating parameters. For each measurement, the A-weighted, slow detector response were used. The systems were configured to store noise level data on an interval basis (one-hour or 15-minute intervals for long-term sites, and 15-minute intervals for short-term sites). The data included the average, minimum, maximum, and selected exceedance levels for each interval period (L_{eq}, L_{MIN}, L_{MAX}, L_{10}, L_{50}, L_{90}).

The microphone positions were at least 10 feet from any wall or building to prevent reflections or unrepresentative shielding of traffic noise. Measurement sites were not used if there was a possibility of any unusual noises such as barking dogs, air conditioning compressors, pool pumps, or children that would affect the measured sound level. The microphone was located 5 feet above ground with the manufacturer's recommended windscreen. Site geometry, such as distances, elevations, and location of walls and buildings, were noted for each location.

Traffic volumes were recorded using a video camera during the short-term measurements on each side of the freeway. The video recordings of the freeway traffic were later reviewed and

tabulated according to three vehicle types: automobiles, medium trucks (2-axle with 6 wheels but not including dually pick-up trucks), and heavy trucks (3- or more axle vehicles). Traffic speeds were periodically checked using a handheld radar gun placed out of sight from passing traffic. Field observations and measurement data were used to calibrate the accuracy of the traffic noise model.

Meteorological conditions, including temperature, relative humidity, wind direction, and speed were recorded for all noise measurement sites using a pocket weather meter. These records were noted on the measurement forms while observers were present at the sites.

6.3 TRAFFIC NOISE MODEL - VALIDATION AND PREDICTION DATA

For validation of the FHWA TNM, the noise level measurements taken were representative of free-flow conditions, without traffic controls, away from sound reflective objects (warehouses, parked trucks, privacy walls etc.), without being influenced by other noise sources (aircrafts, lawn mowers, engines running, running water, loud insects, birds, animals), and with a clear view to the roadway.

To ensure that the noise model used to predict traffic noise impacts accurately reflected the sound levels in the noise study area, a model was constructed using the same traffic volumes, speed, and vehicle types that were present during the sound level measurements. Modeled values had to be within ±3.0 dB(A) of the measured levels for the model to be validated. Validation sites were used for model validation only and not for any further impact analysis. The validated noise levels are provided in **Table 3**.

Validated FHWA Traffic Noise Model (TNM) Version 2.5 was used to predict both Existing and Future $L_{Aeq(h)}$ traffic noise levels. To create the model, design files outlining major roadways, topographical features, and sensitive receptors were imported into the TNM model as background features and the corresponding values were entered manually.

Table 3. Validation Noise Levels

Receiver	Meas. Position	Facility type (MF, SF, etc.)	Number of represented receptors	NAC, L_{eq} dB(A)	Measured Noise Level, L_{eq} dB(A)	Modeled Noise Level, L_{eq} dB(A)	Difference (Measured minus Modeled)	Remarks
M1	1st Row	Golf Course	1	71	67.5	67.8	-0.3	Model Validation
M2*	1st Row	SFR	1	66	60.2	58.0	2.2	Model Validation
M3	1st Row	SFR	1	66	60.1	59.3	0.8	Model Validation
M4	1st Row	SFR	1	66	63.3	64.0	-0.7	Model Validation
M5	1st Row	Community Park	1	66	57.0	58.4	-1.4	Model Validation
M6	1st Row	SFR	1	66	61.8	62.0	-0.2	Model Validation
M7	1st Row	SFR	1	66	59.3	61.4	-2.1	Model Validation
M8	1st Row	SFR	1	66	57.8	59.1	-1.3	Model Validation
M9	1st Row	SFR	1	66	62.2	61.8	0.4	Model Validation
M10**	1st Row	SFR	1	66	60.2	58.6	1.6	Model Validation
M11	1st Row	SFR	1	66	56.6	57.2	-0.6	Model Validation

SFR = Single-Family Residential

**Difference between measurement and modeled noise level was due to multiple loud motorcycle pass-bys NB off ramp to Raintree Drive and car starting at adjacent property during measurement.*

***Difference between measurement and modeled noise level was due to multiple loud motorcycle pass-bys and heavy truck horn on SB SR101L during measurement.*

7 FUTURE PREDICTED NOISE LEVELS

The highway noise prediction computer model FHWA TNM Version 2.5 was used for the traffic noise computations. This model is based on the highway traffic noise prediction method specified in FHWA-RD-77-108. Project area topographical drawings generated as part of this task order were used to mark all roadway and barrier segments, as well as noise sensitive receptors. These locations were digitized using MicroStation. An ARCGIS application developed by WSP's Noise Group that provides an interface between MicroStation and TNM was used to capture the coordinates of the roadway and barrier segment points, as well as sensitive receptor coordinates. This unique program substantially increases the accuracy of the data input and reduces the time required to prepare the input data.

A sufficient number of receptor points were analyzed and presented so that future noise levels (with a noise barrier) may be determined and the number of residential units that achieve a minimum noise level reduction of 5 dB(A) can be counted. Noise barriers starting with 6-foot height and taller with 2-foot increments were used for modeling. If none of the receptors achieved a noise reduction of at least 7 dB(A), additional heights up to 24 feet were modeled. The number of modeled receptor points was higher than the number of receptor points selected for measurement of the existing noise levels. Additional receptor points were selected for modeling to fine-tune the ending locations of the proposed noise barrier(s). This was accomplished by extending or shortening the endings of the wall and modeling the residential unit that was most impacted by the change. This iterative process was continued if the critical receptor achieved at least a 5 dB(A) reduction. The critical receptor at each end of the wall is defined as the last residential unit that can achieve at least a 5 dB(A) reduction by extending the wall. So, if the last receptor examined achieved a reduction of more than 5 dB(A), such as 5.3 dB(A), it was likely that the next residential unit further up might achieve a 5 dB(A) reduction. The process was continued until the last receptor examined was shown to achieve a less than 5 dB(A) reduction. This is an exhaustive process to demonstrate all the receptors that might have a potential for achieving a 5 dB(A) reduction. The same exhaustive process was applied to receptors perpendicular or diagonal to the highway. However, if the future noise level at any receptor was less than 66 dB(A), the wall did not have to be extended any further.

All measured receptors and modeled receptors were clearly shown and identified in the survey topographic maps or aerial photographic maps. These maps are included in the noise report. Additionally, all the measured and modeled receptors, including the ones that achieve a reduction of less than 5 dB(A), were shown in tables with corresponding insertion losses. The purpose of a noise barrier is to provide maximum noise reduction for the impacted receptors. As such, if the receptors at each end of the wall achieve a reduction of 5 dB(A) or more, extension of the length of the wall was modeled and considered for providing the maximum noise reduction for those receptors.

The predicted noise levels are shown in the report within at least one decimal accuracy. For example, 68.6 dB(A) is shown as 68.6 dB(A) and not 69 dB(A). The insertion loss table was also prepared accordingly.

For existing sound walls, additional heights were modeled. Future predicted Traffic Noise Analysis relies on project-specific traffic data pertaining to all lanes, general purpose lanes, ramps, HOV lanes, TIs, and roundabouts at Level of Service (LOS) C, and on other highway-influenced infrastructure that may not be considered inconsequential to increasing noise levels within project area. These data include:

- Traffic volumes, with lateral distribution (per lane).
- Vehicle type, vehicle distribution between automobiles, medium trucks, heavy trucks, busses, and motorcycles, with attention to percentage of heavy trucks with lateral distribution (per lane).
- Speed of traffic (per lane).

When predicting noise levels for the design year, a 'worst-case' approach is used, wherein the traffic characteristics that produce the worst traffic noise impact are considered. In general, this should reflect LOS C traffic conditions during the peak noise hour with traffic moving at five miles per hour above the posted speed limit. For the Existing, No Build and Build, the SR 101L the operating speed of 70 mph was used (5 mph above the posted speed limit). If future traffic volumes are less than maximum LOS C volumes, future traffic volumes were utilized. If no other information is available, the peak hourly volume should be 10 percent of the predicted Annual average daily traffic (AADT), with factors K, D, and T included in the analysis and with lateral lane across the travel lanes of a multiple-lane highway.

An exception to worst-case approach is pavement type, as all TNM-noise level predictions must utilize "average" pavement type unless FHWA approval to use a different pavement type has been obtained.

7.1 ROADWAY GEOMETRY & TOPOGRAPHIC DATA AND GROUND TYPE

The roadway geometry data used for the noise modeling effort, such as roadway and lane width, horizontal and vertical coordinates, were based on the electronic roadway geometry data and plans provided. Terrain lines determined the elevation of sound propagation interfering features between the source and the noise receiver. Ground type for modeling purposes was determined as loose soil with ground zone in some areas depending on the land use.

7.2 TRAFFIC VOLUMES AND MIX

Different vehicle types have different noise emission levels, with trucks producing higher noise levels than passenger automobiles. Furthermore, trucks with higher cargo weight capacity

produce higher noise levels than trucks of lower cargo weight capacity. Vehicles are categorized as follows:

- Automobiles are categorized as vehicles with two axles and four wheels designed primarily for passenger or cargo transportation (includes light trucks). Generally, the gross weight of an automobile is less than 10,000 pounds.
- Medium trucks are categorized as vehicles having two axles. Generally, the gross weight of a medium truck is greater than 10,000 pounds but less than 26,400 pounds.
- Heavy trucks are categorized as vehicles having three or more axles and designed for the transportation of cargo. Generally, the gross weight of a heavy truck is greater than 26,400 pounds.

The worst-case noise impacts occur when traffic is operating under Level of Service "C" conditions, with traffic traveling 5 miles per hour above the posted speed limit. The following peak hour traffic volume assumptions were used for modeling:

- Main Lanes Volume: 1,600 vehicles per hour (vph) / lane
- Auxiliary Lane Volume: 1,000 vph/Lane
- Ramp Volume: 1,000 vph / lane, or predicted future volume (whichever is less)
- Truck Percentage: 7% (4% Medium, 3% Heavy)
- Ramps Truck Percentage: 4% (3% Medium, 1% Heavy)

7.3 VEHICLE SPEED

The modeled vehicle speeds are 5 mph above free-flow speed for all vehicle categories as listed below:

- Main Lane Speed: 70 mph
- Ramp Speed: 10 to 65 mph

7.4 ATMOSPHERIC VARIABLES

Noise level is affected by temperature and humidity. For noise modeling purposes, FHWA recommends the default values to be a temperature of 68 degrees Fahrenheit and the humidity level at 50 percent.

7.5 RECEPTOR AND RECEIVER LOCATIONS

The ADOT NAR defines a "receptor" as a discrete or representative location of a noise sensitive area(s) for any of the land uses listed in **Table 4** through **Table 9**. The "receiver" is defined as a

location used in noise modeling to represent the measured and predicted noise level at a point. The backyard or common outdoor areas of residential properties are noise-sensitive receptors.

7.6 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 receptors. Neighborhood privacy walls were modeled as barriers, while large buildings were modeled as building rows. Cut-and-fill slopes and corresponding elevation changes were modeled as terrain lines. Rows of homes in neighborhoods were modeled as building rows.

Based on the assumptions stated in this report, FHWA TNM 2.5 predicts noise levels along the project route in the design year after construction of the project has occurred. Actual noise levels in the future may differ somewhat due to a number of factors outside the scope of this modeling effort.

This analysis determines the traffic noise impacts based on the FHWA Noise Abatement Criteria (NAC), which are referred to in ADOT's Noise Abatement Requirement (NAR). The FHWA NAC specify an allowable traffic noise level for different categories of land use and activities. Homes, churches, schools, and parks are classified in Categories B and C, and the noise abatement criteria for these categories is 67 dB(A) hourly equivalent sound level ($L_{Aeq(h)}$). Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in categories B and C are classified in Category E and have a NAC of 72 dB(A). In the absence of traffic noise impacts, noise abatement measures considerations are not warranted. **Table 4** through **Table 9** show the list of receivers with predicted future noise levels. The location of the receivers is shown on **Figure 11** to **Figure 16**.

Table 4. Modeled Noise Levels (Existing, No-Build & Build Conditions): Princess Drive to Raintree Drive (Modeling Area A)

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Laeq1h, dB(A)			Impacted
				Existing	No-Build	Build	
R-A1-1	Private Golf Course	1	71	68.7	68.7	69.3	No
R-A1-2	Private Golf Course	1	71	69.6	69.6	69.8	No
R-A1-3	Private Golf Course	1	71	60.9	60.9	61.7	No
R-A1-4	Private Golf Course	1	71	59.7	59.7	60.7	No
R-A1-5	Private Golf Course	1	71	57.7	57.7	58.6	No
R-A1-6	Soccer Fields	1	66	60.5	60.5	61.1	No
R-A1-7	Soccer Fields	1	66	61.8	61.8	62.7	No
R-A1-8	Soccer Fields	1	66	61.5	61.5	62.4	No

Table 5. Modeled Noise Levels (Existing, No-Build & Build Conditions): SR 101L from Raintree Drive to Cactus Avenue (Modeling Area B)

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Laeq1h, dB(A)			Impacted
				Existing	No-Build	Build	
R-B1-1	SFR	1	66	59.7	59.7	60.3	No
R-B1-2	SFR	1	66	61.4	61.4	62.0	No
R-B1-3	SFR	1	66	60.5	60.5	61.1	No
R-B1-4	SFR	1	66	62.3	62.3	62.8	No
R-B1-5	SFR	1	66	61.2	61.2	61.7	No
R-B1-6	SFR	1	66	61.5	61.5	61.9	No
R-B1-7	SFR	1	66	61.4	61.4	61.8	No
R-B1-8	SFR	1	66	61.4	61.4	61.7	No
R-B1-9	SFR	1	66	62.0	62.0	62.3	No
R-B1-10	SFR	1	66	62.2	62.2	62.5	No
R-B1-11	SFR	1	66	62.2	62.2	62.6	No
R-B1-12	SFR	1	66	62.1	62.1	62.5	No
R-B1-13	SFR	1	66	62.1	62.1	62.4	No
R-B1-14	SFR	1	66	62.2	62.2	62.5	No
R-B1-15	SFR	1	66	62.3	62.3	62.6	No
R-B1-16	SFR	1	66	62.3	62.3	62.7	No
R-B1-17	SFR	1	66	64.6	64.6	65.0	No
R-B1-18	SFR	1	66	63.4	63.4	63.8	No
R-B1-19	SFR	1	66	62.5	62.5	62.9	No
R-B1-20	SFR	1	66	63.3	63.3	63.7	No
R-B1-21	SFR	1	66	62.3	62.3	62.7	No
R-B1-22	SFR	1	66	62.5	62.5	62.9	No
R-B1-23	SFR	1	66	62.5	62.5	62.9	No
R-B1-24	SFR	1	66	62.3	62.3	62.8	No
R-B1-25	SFR	1	66	62.4	62.4	62.9	No
R-B1-26	SFR	1	66	62.2	62.2	62.7	No
R-B1-27	SFR	1	66	62.1	62.1	62.6	No
R-B1-28	SFR	1	66	60.1	60.1	60.7	No
R-B1-29	SFR	1	66	60.5	60.5	61.1	No
R-B1-30	SFR	1	66	62.2	62.2	62.7	No
R-B1-31	SFR	1	66	62.5	62.5	63.0	No
R-B1-32	SFR	1	66	62.5	62.5	63.1	No
R-B1-33	SFR	1	66	62.5	62.5	63.1	No
R-B1-34	SFR	1	66	61.8	61.8	62.3	No
R-B1-35	SFR	1	66	62.0	62.0	62.6	No
R-B1-36	SFR	1	66	62.2	62.2	62.8	No
R-B1-37	SFR	1	66	62.2	62.2	62.7	No
R-B1-38	SFR	1	66	62.1	62.1	62.6	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Laeq1h, dB(A)			Impacted
				Existing	No-Build	Build	
R-B1-39	SFR	1	66	61.9	61.9	62.4	No
R-B1-40	Community Park	5	66	60.0	60.0	60.5	No
R-B1-41	SFR	1	66	62.0	62.0	62.6	No
R-B1-42	SFR	1	66	61.1	61.1	61.6	No
R-B1-43	SFR	1	66	57.2	57.2	57.9	No
R-B1-44	SFR	1	66	61.8	61.8	62.4	No
R-B1-45	SFR	1	66	60.7	60.7	61.3	No
R-B1-46	SFR	1	66	61.7	61.7	62.3	No
R-B1-47	SFR	1	66	61.4	61.4	62.0	No
R-B1-48	SFR	1	66	61.4	61.4	62.1	No
R-B1-49	SFR	1	66	61.7	61.7	62.4	No
R-B1-50	SFR	1	66	61.7	61.7	62.4	No
R-B1-51	SFR	1	66	61.8	61.8	62.6	No
R-B1-52	SFR	1	66	61.8	61.8	62.5	No
R-B1-53	SFR	1	66	61.8	61.8	62.6	No
R-B1-54	SFR	1	66	60.5	60.5	61.2	No
R-B1-55	SFR	1	66	57.2	57.2	58.3	No
R-B1-56	SFR	1	66	63.1	63.1	64.2	No
R-B1-57	SFR	1	66	61.0	61.0	62.3	No
R-B1-58	SFR	1	66	60.8	60.8	62.0	No
R-B1-59	SFR	1	66	60.9	60.9	62.2	No
R-B1-60	SFR	1	66	60.9	60.9	62.2	No
R-B1-61	SFR	1	66	60.8	60.9	62.1	No
R-B1-62	SFR	1	66	60.7	60.7	62.0	No
R-B1-63	SFR	1	66	60.0	60.0	61.2	No
R-B2-1	SFR	1	66	58.6	58.6	59.3	No
R-B2-2	SFR	1	66	59.0	59.0	59.6	No
R-B2-3	SFR	1	66	57.8	57.8	58.4	No
R-B2-4	SFR	1	66	59.1	59.1	59.6	No
R-B2-5	SFR	1	66	58.3	58.3	58.8	No
R-B2-6	SFR	1	66	59.3	59.3	59.7	No
R-B2-7	SFR	1	66	57.8	57.8	58.2	No
R-B2-8	SFR	1	66	60.3	60.3	60.6	No
R-B2-9	SFR	1	66	59.6	59.6	60.0	No
R-B2-10	SFR	1	66	55.0	55.0	55.7	No
R-B2-11	SFR	1	66	55.9	55.9	56.5	No
R-B2-12	SFR	1	66	56.2	56.2	56.8	No
R-B2-13	SFR	1	66	60.8	60.8	61.2	No
R-B2-14	SFR	1	66	60.3	60.3	60.9	No
R-B2-15	SFR	1	66	61.3	61.3	61.7	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Laeq1h, dB(A)			Impacted
				Existing	No-Build	Build	
R-B2-16	SFR	1	66	60.7	60.7	61.2	No
R-B2-17	SFR	1	66	58.7	58.7	59.2	No
R-B2-18	SFR	1	66	57.9	57.9	58.4	No
R-B2-19	SFR	1	66	56.3	56.3	57.1	No
R-B2-20	SFR	1	66	56.1	56.1	56.9	No
R-B2-21	SFR	1	66	55.9	55.9	56.7	No
R-B2-22	SFR	1	66	57.3	57.3	58.0	No
R-B2-23	SFR	1	66	56.7	56.7	57.4	No
R-B2-24	SFR	1	66	55.9	55.9	56.6	No
R-B2-25	SFR	1	66	56.0	56.0	56.9	No
R-B2-26	SFR	1	66	55.9	55.9	56.8	No
R-B2-27	SFR	1	66	56.9	56.9	57.7	No
R-B2-28	SFR	1	66	56.1	56.1	56.9	No
R-B2-29	SFR	1	66	56.0	56.0	56.9	No
R-B2-30	SFR	1	66	56.1	56.1	57.0	No
R-B2-31	SFR	1	66	57.9	57.9	58.5	No
R-B2-32	SFR	1	66	57.3	57.3	57.9	No
R-B2-33	SFR	1	66	58.3	58.3	59.0	No
R-B2-34	SFR	1	66	58.6	58.6	59.1	No
R-B2-35	SFR	1	66	58.8	58.8	59.4	No
R-B2-36	SFR	1	66	57.0	57.0	57.7	No
R-B2-37	SFR	1	66	58.1	58.1	58.8	No
R-B2-38	SFR	1	66	56.9	56.9	57.6	No
R-B2-39	SFR	1	66	57.7	57.7	58.4	No
R-B2-40	SFR	1	66	55.5	55.5	56.5	No
R-B2-41	SFR	1	66	55.2	55.2	56.3	No
R-B2-42	SFR	1	66	54.7	54.7	55.9	No
R-B2-43	SFR	1	66	54.6	54.6	55.9	No
R-B2-44	SFR	1	66	54.8	54.8	56.1	No
R-B2-45	SFR	1	66	55.4	55.4	56.7	No
R-B2-46	SFR	1	66	56.1	56.1	57.3	No
R-B2-47	SFR	1	66	57.8	57.8	58.8	No
R-B2-48	SFR	1	66	59.6	59.6	60.7	No
R-B2-49	SFR	1	66	57.2	57.2	58.4	No
R-B2-50	SFR	1	66	57.2	57.2	58.5	No
R-B2-51	SFR	1	66	56.0	56.0	57.4	No
R-B2-52	SFR	1	66	54.7	54.7	56.2	No
R-B2-53	SFR	1	66	53.9	53.9	55.6	No
R-B2-54	SFR	1	66	55.1	55.1	56.7	No
R-B3-1	SFR	1	66	56.0	56.0	56.9	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Laeq1h, dB(A)			Impacted
				Existing	No-Build	Build	
R-B3-2	SFR	1	66	42.6	42.6	43.3	No
R-B3-3	SFR	1	66	57.0	57.0	57.6	No
R-B3-4	SFR	1	66	57.3	57.3	57.9	No
R-B3-5	SFR	1	66	53.9	53.9	54.8	No
R-B3-6	SFR	1	66	54.0	54.0	54.8	No
R-B3-7	SFR	1	66	55.8	55.8	56.4	No
R-B3-8	SFR	1	66	56.8	56.8	57.4	No
R-B3-9	SFR	1	66	57.8	57.8	58.1	No
R-B3-10	SFR	1	66	54.1	54.1	54.8	No
R-B3-11	SFR	1	66	55.0	55.0	55.6	No
R-B3-12	SFR	1	66	54.9	54.9	55.5	No
R-B3-13	SFR	1	66	55.2	55.2	55.8	No
R-B3-14	SFR	1	66	58.4	58.4	58.9	No
R-B3-15	SFR	1	66	58.7	58.7	59.2	No
R-B3-16	SFR	1	66	59.6	59.6	60.1	No
R-B3-17	SFR	1	66	58.7	58.7	59.2	No
R-B3-18	SFR	1	66	56.8	56.8	57.3	No
R-B3-19	SFR	1	66	56.2	56.2	56.7	No
R-B3-20	SFR	1	66	54.1	54.1	55.0	No
R-B3-21	SFR	1	66	55.3	55.3	56.2	No
R-B3-22	SFR	1	66	54.7	54.7	55.5	No
R-B3-23	SFR	1	66	54.4	54.4	55.2	No
R-B3-24	SFR	1	66	54.1	54.1	55.1	No
R-B3-25	SFR	1	66	54.5	54.5	55.4	No
R-B3-26	SFR	1	66	54.6	54.6	55.5	No
R-B3-27	SFR	1	66	54.2	54.2	55.1	No
R-B3-28	SFR	1	66	53.5	53.5	54.5	No
R-B3-29	SFR	1	66	53.7	53.7	54.7	No
R-B3-30	SFR	1	66	54.5	54.5	55.3	No
R-B3-31	SFR	1	66	55.3	55.3	56.1	No
R-B3-32	SFR	1	66	53.7	53.7	54.8	No
R-B3-33	SFR	1	66	55.2	55.2	56.0	No
R-B3-34	SFR	1	66	54.5	54.5	55.6	No
R-B3-35	SFR	1	66	54.7	54.7	55.5	No
R-B3-36	SFR	1	66	53.6	53.6	55.1	No
R-B3-37	SFR	1	66	55.7	55.7	56.4	No
R-B3-38	SFR	1	66	53.6	53.6	54.8	No
R-B3-39	Community Pool	10	66	51.5	51.5	53.0	No
R-B3-40	SFR	1	66	57.9	57.9	58.7	No
R-B3-41	SFR	1	66	55.6	55.6	57.1	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Laeq1h, dB(A)			Impacted
				Existing	No-Build	Build	
R-B3-42	SFR	1	66	53.8	53.8	55.3	No
R-B3-43	SFR	1	66	53.5	53.5	55.0	No
R-B3-44	SFR	1	66	53.6	53.6	55.2	No
R-B3-45	SFR	1	66	52.1	52.1	53.9	No
R-B3-46	SFR	1	66	52.6	52.6	54.3	No
R-B3-47	SFR	1	66	55.5	55.5	57.0	No

Table 6. Modeled Noise Levels (Existing, No-Build & Build Conditions): SR 101L from Raintree Drive to Cactus Avenue (Modeling Area C)

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
R-C1-1	SFR	1	66	54.1	54.1	54.6	No
R-C1-2	SFR	1	66	62.8	62.8	63.3	No
R-C1-3	SFR	1	66	63.6	63.6	64.2	No
R-C1-4	SFR	1	66	67.2	67.2	67.8	Yes
R-C1-5	SFR	1	66	66.6	66.6	67.1	Yes
R-C1-6	SFR	1	66	64.1	64.1	64.7	No
R-C1-7	SFR	1	66	65.6	65.6	66.4	Yes
R-C1-8	SFR	1	66	64.5	64.5	65.3	No
R-C1-9	SFR	1	66	64.4	64.4	65.8	Yes
R-C1-10	SFR	1	66	63.1	63.1	63.7	No
R-C1-11	SFR	1	66	60.8	60.8	61.4	No
R-C1-12	SFR	1	66	58.0	58.0	58.6	No
R-C1-13	SFR	1	66	58.6	58.6	59.0	No
R-C1-14	SFR	1	66	60.4	60.4	61.2	No
R-C1-15	SFR	1	66	58.6	58.6	59.2	No
R-C1-16	SFR	1	66	55.6	55.6	56.4	No
R-C1-17	SFR	1	66	62.3	62.3	62.9	No
R-C1-18	SFR	1	66	62.6	62.6	63.2	No
R-C1-19	SFR	1	66	63.2	63.2	64.0	No
R-C1-20	SFR	1	66	62.5	62.5	63.1	No
R-C1-21	SFR	1	66	62.2	62.3	63.0	No
R-C1-22	SFR	1	66	61.9	61.9	62.6	No
R-C1-23	SFR	1	66	61.6	61.7	62.4	No
R-C1-24	SFR	1	66	58.2	58.2	59.0	No
R-C1-25	SFR	1	66	58.3	58.3	59.4	No
R-C1-26	SFR	1	66	59.5	59.5	60.5	No
R-C1-27	SFR	1	66	60.2	60.2	61.3	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
R-C1-28	SFR	1	66	60.7	60.7	61.6	No
R-C1-29	SFR	1	66	59.5	59.5	60.7	No
R-C2-1	SFR	1	66	60.3	60.3	60.7	No
R-C2-2	SFR	1	66	58.2	58.2	58.6	No
R-C2-3	SFR	1	66	61.4	61.4	61.9	No
R-C2-4	SFR	1	66	60.1	60.1	60.7	No
R-C2-5	SFR	1	66	59.5	59.5	60.0	No
R-C2-6	SFR	1	66	56.8	56.8	57.5	No
R-C2-7	SFR	1	66	55.4	55.4	56.1	No
R-C2-8	SFR	1	66	58.0	58.0	58.7	No
R-C2-9	SFR	1	66	56.6	56.6	57.5	No
R-C2-10	SFR	1	66	55.6	55.6	56.2	No
R-C2-11	SFR	1	66	54.0	54.0	54.6	No
R-C2-12	SFR	1	66	53.5	53.5	54.2	No
R-C2-13	SFR	1	66	51.7	51.8	52.6	No
R-C2-14	SFR	1	66	52.8	52.8	53.7	No
R-C2-15	SFR	1	66	54.0	54.0	54.8	No
R-C2-16	SFR	1	66	56.5	56.5	57.3	No
R-C2-17	SFR	1	66	56.4	56.4	57.1	No
R-C2-18	SFR	1	66	56.3	56.3	57.2	No
R-C2-19	SFR	1	66	55.5	55.5	56.4	No
R-C2-20	SFR	1	66	56.6	56.7	57.7	No
R-C2-21	SFR	1	66	56.1	56.1	56.8	No
R-C2-22	SFR	1	66	54.9	55.0	56.0	No
R-C2-23	SFR	1	66	56.4	56.4	57.4	No
R-C2-24	SFR	1	66	52.4	52.4	53.9	No
R-C2-25	SFR	1	66	54.0	54.1	55.1	No
R-C2-26	SFR	1	66	53.9	53.9	55.3	No
R-C2-27	SFR	1	66	53.7	53.7	54.9	No
R-C2-28	SFR	1	66	56.4	56.4	57.7	No
R-C3-1	SFR	1	66	57.5	57.5	58.1	No
R-C3-2	SFR	1	66	53.3	53.3	53.6	No
R-C3-3	SFR	1	66	50.3	50.4	51.1	No
R-C3-4	SFR	1	66	54.2	54.2	54.8	No
R-C3-5	SFR	1	66	52.3	52.3	52.8	No
R-C3-6	SFR	1	66	53.3	53.3	53.9	No
R-C3-7	SFR	1	66	52.8	52.8	53.5	No
R-C3-8	SFR	1	66	54.9	54.9	55.5	No
R-C3-9	SFR	1	66	53.8	53.8	54.7	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
R-C3-10	SFR	1	66	53.9	53.9	54.8	No
R-C3-11	SFR	1	66	54.4	54.4	55.4	No
R-C3-12	SFR	1	66	54.6	54.6	55.6	No
R-C3-13	SFR	1	66	54.1	54.1	55.1	No
R-C3-14	SFR	1	66	54.3	54.3	55.4	No
R-C3-15	SFR	1	66	54.4	54.4	55.3	No
R-C3-16	SFR	1	66	53.7	53.8	54.8	No
R-C3-17	SFR	1	66	52.9	53.0	54.2	No
R-C3-18	SFR	1	66	52.3	52.3	53.7	No
R-C3-19	SFR	1	66	52.6	52.6	53.9	No
R-C3-20	SFR	1	66	53.2	53.2	54.6	No
R-C3-21	SFR	1	66	53.3	53.3	54.7	No
R-C3-22	SFR	1	66	54.5	54.5	55.8	No

Table 7. Modeled Noise Levels (Existing, No-Build & Build Conditions): SR 101L from Cactus Avenue to Shea Boulevard (Modeling Area D)

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
R-D1-1A	MFR (Level 1)	1	66	58.0	58.0	61.3	No
R-D1-1B	MFR (Level 2)	1	66	61.5	61.5	63.0	No
R-D1-2A	MFR (Level 1)	1	66	57.0	57.0	62.2	No
R-D1-2B	MFR (Level 2)	1	66	62.2	62.2	59.2	No
R-D1-3A	MFR (Level 1)	1	66	57.2	57.2	59.4	No
R-D1-3B	MFR (Level 2)	1	66	62.0	62.0	63.1	No
R-D1-4A	MFR (Level 1)	1	66	58.4	58.4	58.1	No
R-D1-4B	MFR (Level 2)	1	66	62.2	62.2	63.3	No
R-D1-5A	MFR (Level 1)	1	66	57.5	57.5	58.4	No
R-D1-5B	MFR (Level 2)	1	66	62.1	62.1	63.2	No
R-D1-6A	MFR (Level 1)	1	66	57.5	57.5	59.5	No
R-D1-6B	MFR (Level 2)	1	66	64.3	64.3	63.4	No
R-D1-7	SFR	1	66	59.9	59.9	58.7	No
R-D1-8	SFR	1	66	60.8	60.8	63.3	No
R-D1-9	SFR	1	66	60.9	60.9	59.4	No
R-D1-10	SFR	1	66	61.7	61.7	65.3	No
R-D1-11	SFR	1	66	62.7	62.7	61.0	No
R-D1-12	SFR	1	66	63.8	63.8	61.9	No
R-D1-13	SFR	1	66	63.7	63.7	61.9	No
R-D1-14	SFR	1	66	63.7	63.7	62.8	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
R-D1-15	SFR	1	66	63.9	63.9	63.7	No
R-D1-16	SFR	1	66	62.2	62.2	64.8	No
R-D1-17	SFR	1	66	63.6	63.6	64.7	No
R-D1-18	SFR	1	66	63.1	63.1	64.7	No
R-D1-19	SFR	1	66	63.0	63.0	64.9	No
R-D1-20	SFR	1	66	63.2	63.2	63.1	No
R-D1-21	SFR	1	66	62.9	62.9	64.5	No
R-D1-22	SFR	1	66	62.3	62.3	64.0	No
R-D1-23	SFR	1	66	61.3	61.3	62.2	No
R-D1-24	Church	1	66	60.1	60.1	64.1	No
R-D1-25	Church Playground	1	66	61.8	61.8	62.6	No
R-D1-26	SFR	1	66	61.5	61.5	63.3	No
R-D1-27	SFR	1	66	59.4	59.4	62.2	No
R-D1-28	SFR	1	66	64.2	64.2	61.1	No
R-D2-1A	MFR (Level 1)	1	66	56.9	56.9	62.6	No
R-D2-1B	MFR (Level 2)	1	66	59.7	59.7	62.2	No
R-D2-2A	MFR (Level 1)	1	66	55.8	55.8	59.9	No
R-D2-2B	MFR (Level 2)	1	66	61.9	61.9	64.3	No
R-D2-3	SFR	1	66	57.6	57.6	58.5	No
R-D2-4	SFR	1	66	56.8	56.8	61.6	No
R-D2-5	SFR	1	66	56.7	56.7	57.7	No
R-D2-6	SFR	1	66	59.1	59.1	63.8	No
R-D2-7	SFR	1	66	55.5	55.5	58.8	No
R-D2-8	SFR	1	66	56.7	56.7	58.1	No
R-D2-9	SFR	1	66	57.9	57.9	58.0	No
R-D2-10	SFR	1	66	58.8	58.8	60.2	No
R-D2-11	SFR	1	66	57.3	57.3	56.9	No
R-D2-12	SFR	1	66	57.4	57.4	58.1	No
R-D2-13	SFR	1	66	56.5	56.5	59.0	No
R-D2-14	SFR	1	66	59.1	59.1	59.9	No
R-D2-15	SFR	1	66	55.9	55.9	58.4	No
R-D2-16	SFR	1	66	55.2	55.2	58.5	No
R-D2-17	SFR	1	66	57.6	57.6	57.6	No
R-D2-18	SFR	1	66	57.3	57.3	60.0	No
R-D2-19	SFR	1	66	61.2	61.2	56.9	No
R-D2-20	Hotel Pool	5	66	54.0	54.0	56.2	No
R-D3-1A	MFR (Level 1)	1	66	56.6	56.6	58.5	No
R-D3-1B	MFR (Level 2)	1	66	59.2	59.3	58.1	No
R-D3-2A	MFR (Level 1)	1	66	54.7	54.7	61.3	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
R-D3-2B	MFR (Level 2)	1	66	60.3	60.3	54.0	No
R-D3-3	SFR	1	66	54.7	54.7	58.4	No
R-D3-4	SFR	1	66	55.3	55.3	61.4	No
R-D3-5	SFR	1	66	54.5	54.5	56.4	No
R-D3-6	SFR	1	66	56.7	56.7	62.0	No
R-D3-7	SFR	1	66	54.4	54.4	56.3	No
R-D3-8	SFR	1	66	54.3	54.3	56.8	No
R-D3-9	SFR	1	66	54.9	54.9	56.0	No
R-D3-10	SFR	1	66	54.9	54.9	58.0	No
R-D3-11	SFR	1	66	53.5	53.5	55.8	No
R-D3-12	SFR	1	66	53.8	53.8	55.7	No
R-D3-13	SFR	1	66	54.0	54.0	56.1	No
R-D3-14	SFR	1	66	53.8	53.8	56.1	No
R-D3-15	SFR	1	66	53.1	53.1	55.0	No
R-D3-16	SFR	1	66	53.3	53.3	55.2	No
R-D3-17	SFR	1	66	56.7	56.7	55.4	No
R-D3-18	SFR	1	66	56.7	56.7	55.2	No
R-D3-19	SFR	1	66	56.4	56.4	54.5	No
R-D3-20	SFR	1	66	56.3	56.3	54.6	No
R-D3-21	SFR	1	66	56.3	56.3	57.6	No
R-D3-22	SFR	1	66	56.0	56.0	57.6	No
R-D3-23	SFR	1	66	55.7	55.7	57.2	No
R-D3-24	SFR	1	66	58.4	58.5	57.1	No

Table 8. Modeled Noise Levels (Existing, No-Build & Build Conditions): SR 101L from Cactus Avenue to Shea Boulevard (Modeling Area E)

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
R-E1-1	SFR	1	66	60.0	60.0	61.1	No
R-E1-2	SFR	1	66	61.0	61.0	61.9	No
R-E1-3	SFR	1	66	60.4	60.4	61.3	No
R-E1-4	SFR	1	66	61.5	61.5	62.3	No
R-E1-5	SFR	1	66	60.5	60.5	61.4	No
R-E1-6	SFR	1	66	61.9	61.9	62.8	No
R-E1-7	SFR	1	66	62.0	62.0	62.8	No
R-E1-8	SFR	1	66	62.0	62.0	62.9	No
R-E1-9	SFR	1	66	62.2	62.2	63.2	No
R-E1-10	SFR	1	66	61.9	61.9	62.9	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
R-E1-11	SFR	1	66	62.3	62.3	63.3	No
R-E1-12	SFR	1	66	61.8	61.8	62.8	No
R-E1-13	SFR	1	66	60.2	60.2	61.1	No
R-E1-14	SFR	1	66	59.3	59.3	60.2	No
R-E1-15	SFR	1	66	59.3	59.4	60.0	No
R-E1-16	SFR	1	66	57.6	57.6	58.3	No
R-E1-17	SFR	1	66	59.5	59.5	60.0	No
R-E1-18	SFR	1	66	59.4	59.4	59.9	No
R-E1-19	SFR	1	66	59.6	59.6	60.1	No
R-E1-20	SFR	1	66	60.6	60.6	61.0	No
R-E1-21	SFR	1	66	61.1	61.1	61.4	No
R-E1-22	SFR	1	66	63.6	63.6	63.7	No
R-E2-1	SFR	1	66	57.7	57.7	59.0	No
R-E2-2	SFR	1	66	57.6	57.6	58.8	No
R-E2-3	SFR	1	66	55.9	55.9	57.1	No
R-E2-4	SFR	1	66	53.4	53.4	54.6	No
R-E2-5	SFR	1	66	56.5	56.5	57.4	No
R-E2-6	SFR	1	66	55.3	55.3	56.4	No
R-E2-7	SFR	1	66	54.9	54.9	55.9	No
R-E2-8	SFR	1	66	54.1	54.1	55.1	No
R-E2-9	SFR	1	66	55.1	55.1	56.1	No
R-E2-10	SFR	1	66	55.5	55.5	56.5	No
R-E2-11	SFR	1	66	54.8	54.8	55.9	No
R-E2-12	SFR	1	66	54.8	54.8	55.8	No
R-E2-13	SFR	1	66	55.1	55.1	56	No
R-E2-14	SFR	1	66	54.6	54.6	55.5	No
R-E2-15	SFR	1	66	54.1	54.1	54.8	No
R-E2-16	SFR	1	66	52.7	52.7	53.7	No
R-E2-17	SFR	1	66	54.1	54.1	54.4	No
R-E2-18	SFR	1	66	54.1	54.1	54.6	No
R-E2-19	SFR	1	66	60.6	60.6	60.9	No
R-E3-1	SFR	1	66	55.2	55.2	56.3	No
R-E3-2	SFR	1	66	53.3	53.3	54.4	No
R-E3-3	SFR	1	66	53.4	53.4	54.6	No
R-E3-4	SFR	1	66	52.8	52.8	54.1	No
R-E3-5	SFR	1	66	53.9	53.9	54.9	No
R-E3-6	SFR	1	66	51.6	51.6	52.6	No
R-E3-7	SFR	1	66	51.8	51.8	52.7	No
R-E3-8	SFR	1	66	52.4	52.4	53.5	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
R-E3-9	SFR	1	66	52.4	52.4	53.4	No
R-E3-10	SFR	1	66	51.3	51.4	52.3	No
R-E3-11	SFR	1	66	51.6	51.6	52.6	No
R-E3-12	SFR	1	66	51.7	51.7	52.7	No
R-E3-13	SFR	1	66	52.1	52.1	53.1	No
R-E3-14	SFR	1	66	52.7	52.7	53.6	No
R-E3-15	SFR	1	66	52.7	52.7	53.6	No
R-E3-16	SFR	1	66	53.8	53.8	54.5	No
R-E3-17	SFR	1	66	53.1	53.1	54.0	No
R-E3-18	SFR	1	66	53.7	53.7	54.3	No
R-E3-19	SFR	1	66	53.8	53.9	54.5	No
R-E3-20	SFR	1	66	58.3	58.3	58.6	No

Table 9. Modeled Noise Levels (Existing, No-Build & Build Conditions): SR 101L at Shea Boulevard Interchange (Southern Project Terminus, Modeling Area F)

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
R-F1-1	SFR	1	66	58.7	58.7	58.7	No
R-F1-2	SFR	1	66	60.5	60.5	60.5	No
R-F1-3	SFR	1	66	60.0	60.0	60.0	No
R-F1-4	SFR	1	66	57.2	57.2	57.3	No
R-F1-5	SFR	1	66	58.5	58.5	58.6	No
R-F1-6	SFR	1	66	57.8	57.8	57.8	No
R-F1-7	SFR	1	66	58.2	58.2	58.2	No
R-F1-8	SFR	1	66	57.4	57.4	57.3	No
R-F1-9	SFR	1	66	57.9	57.9	58.1	No
R-F1-10	SFR	1	66	57.4	57.4	57.9	No
R-F1-11	SFR	1	66	58.0	58.0	58.3	No
R-F2-1	SFR	1	66	59.3	59.3	59.2	No
R-F2-2	SFR	1	66	56.7	56.7	56.7	No
R-F2-3	SFR	1	66	57.0	57.0	57.0	No
R-F2-4	SFR	1	66	57.0	57	56.9	No
R-F2-5	SFR	1	66	56.9	56.9	56.9	No
R-F2-6	SFR	1	66	56.7	56.7	56.7	No
R-F2-7	SFR	1	66	56.7	56.7	56.7	No
R-F2-8	SFR	1	66	56.8	56.8	56.9	No
R-F2-9	SFR	1	66	56.8	56.8	56.9	No
R-F2-10	SFR	1	66	57.2	57.2	57.3	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
R-F3-1	SFR	1	66	58.3	58.3	58.2	No
R-F3-2	SFR	1	66	55.2	55.2	55.1	No
R-F3-3	SFR	1	66	55.5	55.5	55.5	No
R-F3-4	SFR	1	66	55.5	55.5	55.6	No
R-F3-5	SFR	1	66	56.0	56.0	56.2	No
R-F3-6	SFR	1	66	57.1	57.1	57.3	No
R-F3-7	SFR	1	66	57.3	57.3	57.4	No

Below is a summary of the modeled existing, no-build, and build traffic noise levels:

- **SR 101L from Princess Drive to Raintree Drive (Modeling Area A)**

– Existing – 57.7 dB(A) to 69.6 dB(A)

– No Build – 57.7 dB(A) to 69.6 dB(A)

– Build – 58.6 dB(A) to 69.8 dB(A)

The modeled noise levels at 8 receivers no not approach or exceed FHWA NAC for Activity Category E (private golf course) and Activity Category C (soccer fields). Therefore, consideration of abatement measures is not warranted.

- **SR 101L from Raintree Drive to Cactus Avenue (Modeling Area B)**

– Existing – 42.6 dB(A) to 64.6 dB(A)

– No Build – 42.6 dB(A) to 64.6 dB(A)

– Build – 43.3 dB(A) to 65.0 dB(A)

The modeled noise levels at 164 receivers do not approach or exceed FHWA NAC for Activity Category B/C, for residences and community park. Therefore, consideration of abatement measures is not warranted.

- **SR 101L from Raintree Drive to Cactus Avenue (Modeling Area C)**

– Existing – 50.3 dB(A) to 67.2 dB(A)

– No Build – 50.4 dB(A) to 67.2 dB(A)

– Build – 51.1 dB(A) to 67.8 dB(A)

The modeled noise levels at 4 out of 79 receivers approach or exceed FHWA NAC for Activity Category B, residences. However, the existing noise wall meets the acoustic feasibility and noise reduction design goals, therefore, consideration of abatement measures is not warranted.

- **SR 101L from Cactus Avenue to Shea Boulevard (Modeling Area D)**

– Existing – 53.1 dB(A) to 64.3 dB(A)
– No Build – 53.1 dB(A) to 64.3 dB(A)
– Build – 54.0 dB(A) to 65.3 dB(A)

The modeled noise levels at 82 receivers are do not approach or exceed FHWA NAC for Activity Category B/C, residences, church playground, church and hotel pool. Therefore, consideration of abatement measures is not warranted.

- **SR 101L from Cactus Avenue to Shea Boulevard (Modeling Area E)**

– Existing – 51.4 dB(A) to 63.6 dB(A)
– No Build – 51.4 dB(A) to 63.6 dB(A)
– Build – 52.3 dB(A) to 63.7 dB(A)

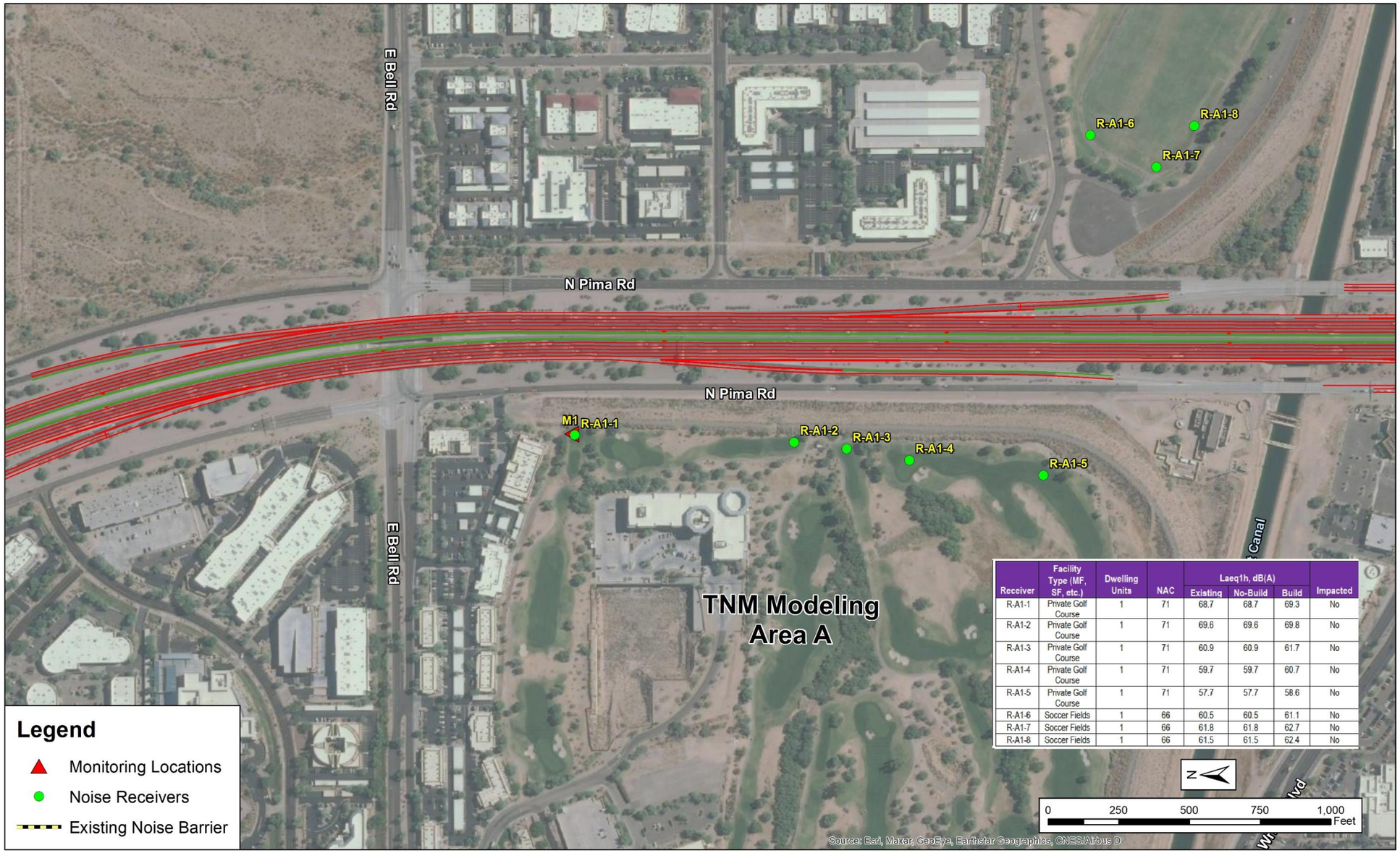
The modeled noise levels at 61 receivers do not approach or exceed FHWA NAC for Activity Category B, residences. Therefore, consideration of abatement measures is not warranted.

- **SR 101L at Shea Boulevard Interchange (Southern Project Terminus, Modeling Area F)**

– Existing – 55.2 dB(A) to 60.5 dB(A)
– No Build – 55.2 dB(A) to 60.5 dB(A)
– Build – 55.1 dB(A) to 60.5 dB(A)

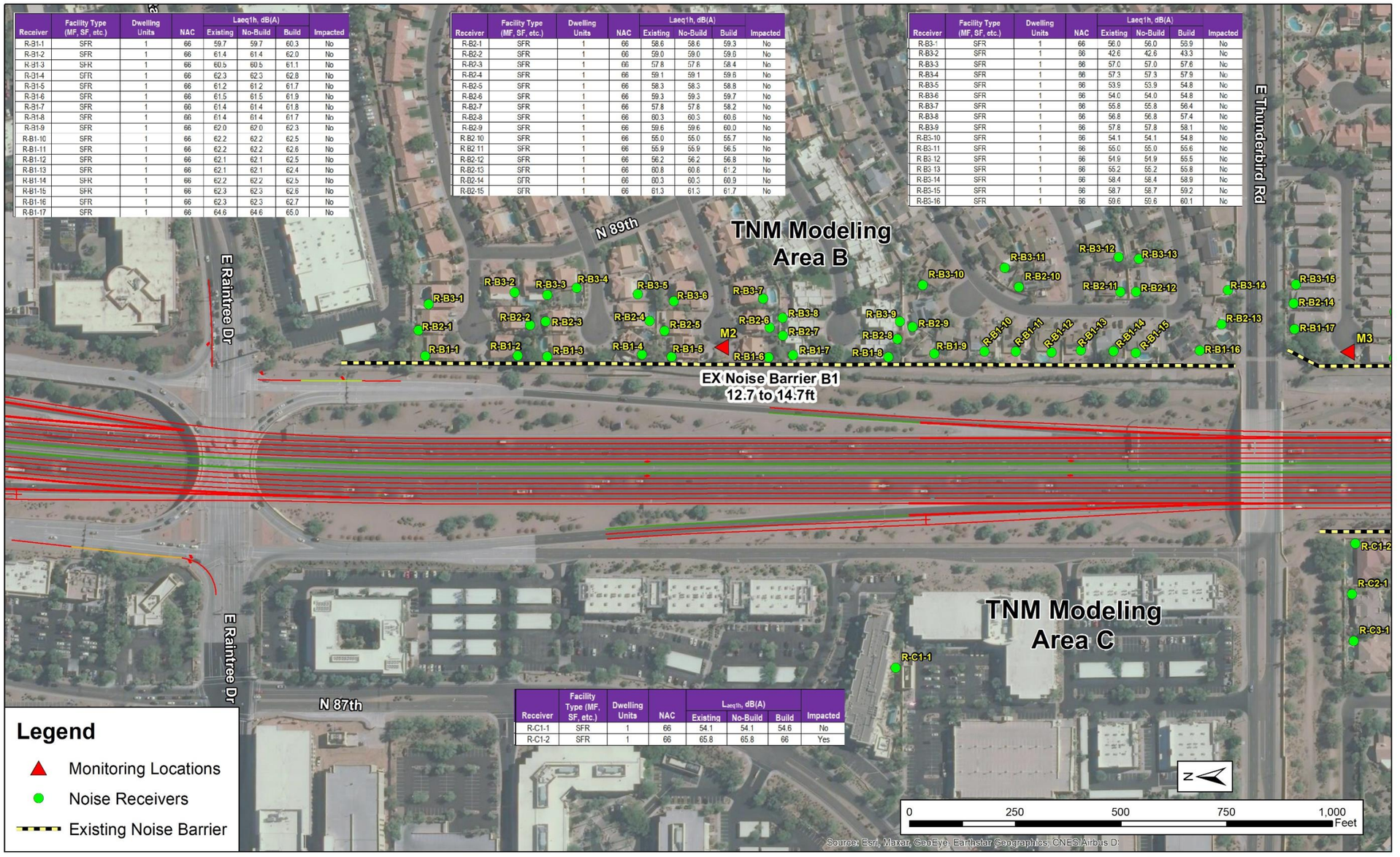
The modeled noise levels at 28 receivers do not approach or exceed FHWA NAC for Activity Category B. Therefore, consideration of abatement measures is not warranted.

Figure 11. E Bell Rd. to Frank Lloyd Wright Blvd. – Receiver and Existing Barrier Locations



Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Laeq1h, dB(A)			Impacted
				Existing	No-Build	Build	
R-A1-1	Private Golf Course	1	71	68.7	68.7	69.3	No
R-A1-2	Private Golf Course	1	71	69.6	69.6	69.8	No
R-A1-3	Private Golf Course	1	71	60.9	60.9	61.7	No
R-A1-4	Private Golf Course	1	71	59.7	59.7	60.7	No
R-A1-5	Private Golf Course	1	71	57.7	57.7	58.6	No
R-A1-6	Soccer Fields	1	66	60.5	60.5	61.1	No
R-A1-7	Soccer Fields	1	66	61.8	61.8	62.7	No
R-A1-8	Soccer Fields	1	66	61.5	61.5	62.4	No

Figure 12. Raintree Dr. to E Thunderbird Rd. – Receiver and Existing Barrier Locations



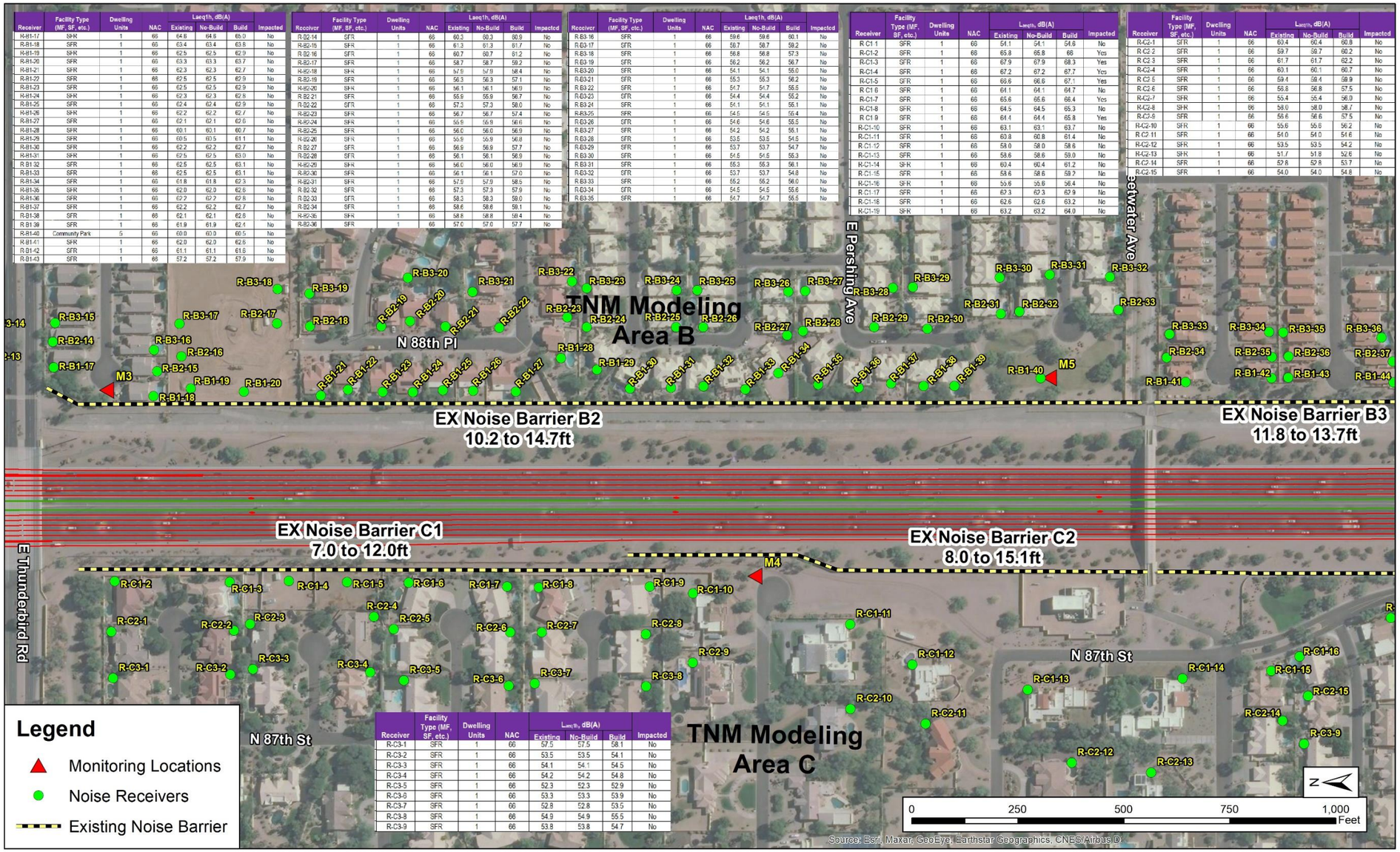
Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Laeq1h, dB(A) Existing	No-Build	Build	Impacted
R-B1-1	SFR	1	66	59.7	59.7	60.3	No
R-B1-2	SFR	1	66	61.4	61.4	62.0	No
R-B1-3	SFR	1	66	60.5	60.5	61.1	No
R-B1-4	SFR	1	66	62.3	62.3	62.8	No
R-B1-5	SFR	1	66	61.2	61.2	61.7	No
R-B1-6	SFR	1	66	61.5	61.5	61.9	No
R-B1-7	SFR	1	66	61.4	61.4	61.8	No
R-B1-8	SFR	1	66	61.4	61.4	61.7	No
R-B1-9	SFR	1	66	62.0	62.0	62.3	No
R-B1-10	SFR	1	66	62.2	62.2	62.5	No
R-B1-11	SFR	1	66	62.2	62.2	62.6	No
R-B1-12	SFR	1	66	62.1	62.1	62.5	No
R-B1-13	SFR	1	66	62.1	62.1	62.4	No
R-B1-14	SFR	1	66	62.2	62.2	62.5	No
R-B1-15	SFR	1	66	62.3	62.3	62.6	No
R-B1-16	SFR	1	66	62.3	62.3	62.7	No
R-B1-17	SFR	1	66	64.6	64.6	65.0	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Laeq1h, dB(A) Existing	No-Build	Build	Impacted
R-B2-1	SFR	1	66	58.6	58.6	59.3	No
R-B2-2	SFR	1	66	59.0	59.0	59.6	No
R-B2-3	SFR	1	66	57.8	57.8	58.4	No
R-B2-4	SFR	1	66	59.1	59.1	59.6	No
R-B2-5	SFR	1	66	58.3	58.3	58.8	No
R-B2-6	SFR	1	66	59.3	59.3	59.7	No
R-B2-7	SFR	1	66	57.8	57.8	58.2	No
R-B2-8	SFR	1	66	60.3	60.3	60.6	No
R-B2-9	SFR	1	66	59.6	59.6	60.0	No
R B2 10	SFR	1	66	55.0	55.0	55.7	No
R B2 11	SFR	1	66	55.9	55.9	56.5	No
R-B2-12	SFR	1	66	56.2	56.2	56.8	No
R-B2-13	SFR	1	66	60.8	60.8	61.2	No
R-B2-14	SFR	1	66	60.3	60.3	60.9	No
R-B2-15	SFR	1	66	61.3	61.3	61.7	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Laeq1h, dB(A) Existing	No-Build	Build	Impacted
R-B3-1	SFR	1	66	56.0	56.0	55.9	No
R-B3-2	SFR	1	66	42.6	42.6	43.3	No
R-B3-3	SFR	1	66	57.0	57.0	57.6	No
R-B3-4	SFR	1	66	57.3	57.3	57.9	No
R-B3-5	SFR	1	66	53.9	53.9	54.8	No
R-B3-6	SFR	1	66	54.0	54.0	54.8	No
R-B3-7	SFR	1	66	55.8	55.8	56.4	No
R-B3-8	SFR	1	66	56.8	56.8	57.4	No
R-B3-9	SFR	1	66	57.8	57.8	58.1	No
R-B3-10	SFR	1	66	54.1	54.1	54.8	No
R-B3-11	SFR	1	66	55.0	55.0	55.6	No
R-B3-12	SFR	1	66	54.9	54.9	55.5	No
R-B3-13	SFR	1	66	55.2	55.2	55.8	No
R-B3-14	SFR	1	66	58.4	58.4	58.9	No
R-B3-15	SFR	1	66	58.7	58.7	59.2	No
R-B3-16	SFR	1	66	59.6	59.6	60.1	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{eq1h}, dB(A) Existing	No-Build	Build	Impacted
R-C1-1	SFR	1	66	54.1	54.1	54.6	No
R-C1-2	SFR	1	66	65.8	65.8	66	Yes

Figure 13. E Thunderbird Rd. to E Sweetwater Ave. – Receiver and Existing Barrier Locations



Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Laeq1h, dB(A) Existing	No-Build	Build	Impacted
R-B1-17	SFR	1	66	64.6	64.6	65.0	No
R-B1-18	SFR	1	66	63.4	63.4	63.8	No
R-B1-19	SFR	1	66	62.5	62.5	62.9	No
R-B1-20	SFR	1	66	63.3	63.3	63.7	No
R-B1-21	SFR	1	66	62.3	62.3	62.7	No
R-B1-22	SFR	1	66	62.5	62.5	62.9	No
R-B1-23	SFR	1	66	62.5	62.5	62.9	No
R-B1-24	SFR	1	66	62.3	62.3	62.8	No
R-B1-25	SFR	1	66	62.4	62.4	62.9	No
R-B1-26	SFR	1	66	62.2	62.2	62.7	No
R-B1-27	SFR	1	66	62.1	62.1	62.6	No
R-B1-28	SFR	1	66	60.1	60.1	60.7	No
R-B1-29	SFR	1	66	60.5	60.5	61.1	No
R-B1-30	SFR	1	66	62.2	62.2	62.7	No
R-B1-31	SFR	1	66	62.5	62.5	63.0	No
R B1 32	SFR	1	66	62.5	62.5	63.1	No
R-B1-33	SFR	1	66	62.5	62.5	63.1	No
R-B1-34	SFR	1	66	61.8	61.8	62.3	No
R-B1-35	SFR	1	66	62.0	62.0	62.6	No
R-B1-36	SFR	1	66	62.7	62.7	62.8	No
R-B1-37	SFR	1	66	62.2	62.2	62.7	No
R-B1-38	SFR	1	66	62.1	62.1	62.6	No
R B1 39	SFR	1	66	61.9	61.9	62.4	No
R-B1-40	Community Park	5	66	60.0	60.0	60.5	No
R-B1-41	SFR	1	66	62.0	62.0	62.6	No
R-B1-42	SFR	1	66	61.1	61.1	61.6	No
R-B1-43	SFR	1	66	57.2	57.2	57.9	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Laeq1h, dB(A) Existing	No-Build	Build	Impacted
R-B2-14	SFR	1	66	60.3	60.3	60.9	No
R-B2-15	SFR	1	66	61.3	61.3	61.7	No
R-B2-16	SFR	1	66	60.7	60.7	61.2	No
R-B2-17	SFR	1	66	58.7	58.7	59.2	No
R-B2-18	SFR	1	66	57.9	57.9	58.4	No
R-B2-19	SFR	1	66	56.3	56.3	57.1	No
R-B2-20	SFR	1	66	56.1	56.1	56.9	No
R B2 21	SFR	1	66	55.9	55.9	56.7	No
R-B2-22	SFR	1	66	57.3	57.3	58.0	No
R-B2-23	SFR	1	66	56.7	56.7	57.4	No
R-B2-24	SFR	1	66	55.9	55.9	56.6	No
R-B2-25	SFR	1	66	56.0	56.0	56.9	No
R-B2-26	SFR	1	66	55.9	55.9	56.8	No
R B2 27	SFR	1	66	56.9	56.9	57.7	No
R-B2-28	SFR	1	66	56.1	56.1	56.9	No
R-B2-29	SFR	1	66	56.0	56.0	56.9	No
R-B2-30	SFR	1	66	56.1	56.1	57.0	No
R-B2-31	SFR	1	66	57.9	57.9	58.5	No
R B2 32	SFR	1	66	57.3	57.3	57.9	No
R-B2-33	SFR	1	66	58.3	58.3	59.0	No
R-B2-34	SFR	1	66	58.6	58.6	59.1	No
R-B2-35	SFR	1	66	58.8	58.8	59.4	No
R-B2-36	SFR	1	66	57.0	57.0	57.7	No

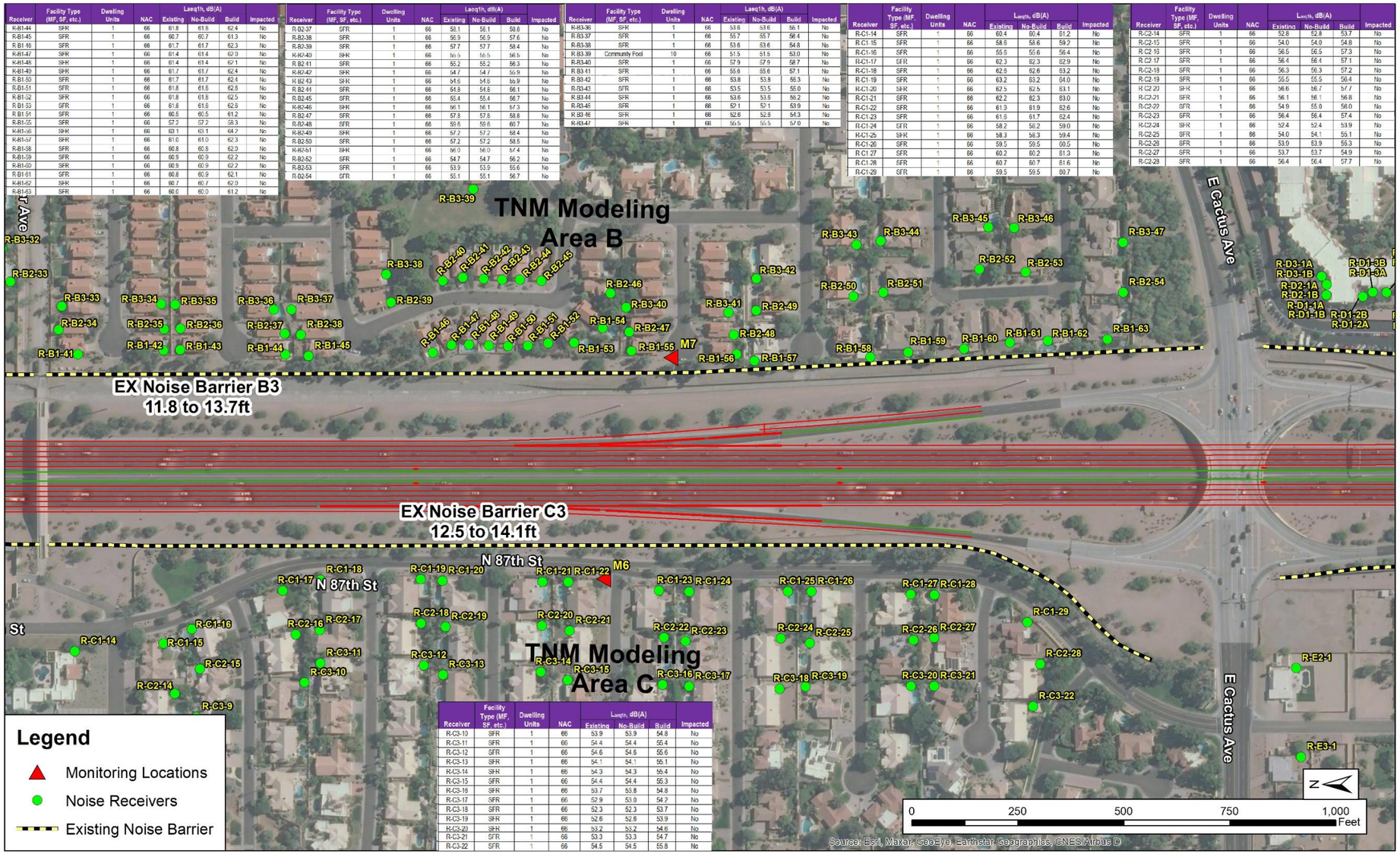
Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Laeq1h, dB(A) Existing	No-Build	Build	Impacted
R-B3-16	SFR	1	66	59.6	59.6	60.1	No
R-B3-17	SFR	1	66	59.7	59.7	59.2	No
R-B3-18	SFR	1	66	56.8	56.8	57.3	No
R-B3-19	SFR	1	66	56.2	56.2	56.7	No
R-B3-20	SFR	1	66	54.1	54.1	55.0	No
R-B3-21	SFR	1	66	55.3	55.3	56.2	No
R-B3-22	SFR	1	66	54.7	54.7	55.5	No
R-B3-23	SFR	1	66	54.4	54.4	55.2	No
R-B3-24	SFR	1	66	54.1	54.1	55.1	No
R-B3-25	SFR	1	66	54.5	54.5	55.4	No
R-B3-26	SFR	1	66	54.6	54.6	55.5	No
R-B3-27	SFR	1	66	54.2	54.2	55.1	No
R-B3-28	SFR	1	66	53.5	53.5	54.5	No
R-B3-29	SFR	1	66	53.7	53.7	54.7	No
R-B3-30	SFR	1	66	54.5	54.5	55.3	No
R B3 31	SFR	1	66	55.3	55.3	56.1	No
R-B3-32	SFR	1	66	53.7	53.7	54.8	No
R-B3-33	SFR	1	66	55.2	55.2	56.0	No
R-B3-34	SFR	1	66	54.5	54.5	55.6	No
R-B3-35	SFR	1	66	54.7	54.7	55.5	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Laeq1h, dB(A) Existing	No-Build	Build	Impacted
R C1 1	SFR	1	66	54.1	54.1	54.6	No
R-C1-2	SFR	1	66	65.8	65.8	66	Yes
R-C1-3	SFR	1	66	67.9	67.9	68.3	Yes
R-C1-4	SFR	1	66	67.2	67.2	67.7	Yes
R-C1-5	SFR	1	66	66.6	66.6	67.1	Yes
R C1 6	SFR	1	66	64.1	64.1	64.7	No
R-C1-7	SFR	1	66	65.6	65.6	66.4	Yes
R-C1-8	SFR	1	66	64.5	64.5	65.3	No
R C1 9	SFR	1	66	64.4	64.4	65.8	Yes
R-C1-10	SFR	1	66	63.1	63.1	63.7	No
R-C1-11	SFR	1	66	60.8	60.8	61.4	No
R-C1-12	SFR	1	66	58.0	58.0	58.6	No
R-C1-13	SFR	1	66	58.6	58.6	59.0	No
R-C1-14	SHR	1	66	60.4	60.4	61.2	No
R-C1-15	SFR	1	66	58.6	58.6	59.2	No
R-C1-16	SFR	1	66	55.6	55.6	56.4	No
R-C1-17	SFR	1	66	62.3	62.3	62.9	No
R-C1-18	SFR	1	66	62.6	62.6	63.2	No
R-C1-19	SFR	1	66	63.2	63.2	64.0	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Laeq1h, dB(A) Existing	No-Build	Build	Impacted
R-C2-1	SFR	1	66	60.4	60.4	60.8	No
R-C2 2	SFR	1	66	59.7	59.7	60.2	No
R C2 3	SFR	1	66	61.7	61.7	62.2	No
R-C2-4	SFR	1	66	60.1	60.1	60.7	No
R C2 5	SFR	1	66	59.4	59.4	59.9	No
R-C2-6	SFR	1	66	56.8	56.8	57.5	No
R-C2-7	SFR	1	66	55.4	55.4	56.0	No
R-C2-8	SFR	1	66	58.0	58.0	58.7	No
R-C2-9	SFR	1	66	56.6	56.6	57.5	No
R-C2-10	SFR	1	66	55.6	55.6	56.2	No
R-C2 11	SFR	1	66	54.0	54.0	54.6	No
R-C2-12	SFR	1	66	53.5	53.5	54.2	No
R-C2-13	SHR	1	66	51.7	51.8	52.6	No
R-C2-14	SFR	1	66	52.8	52.8	53.7	No
R-C2-15	SFR	1	66	54.0	54.0	54.8	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Laeq1h, dB(A) Existing	No-Build	Build	Impacted
R-C3-1	SFR	1	66	57.5	57.5	58.1	No
R-C3-2	SFR	1	66	53.5	53.5	54.1	No
R-C3-3	SFR	1	66	54.1	54.1	54.5	No
R-C3-4	SFR	1	66	54.2	54.2	54.8	No
R-C3-5	SFR	1	66	52.3	52.3	52.9	No
R-C3-6	SFR	1	66	53.3	53.3	53.9	No
R-C3-7	SFR	1	66	52.8	52.8	53.5	No
R-C3-8	SFR	1	66	54.9	54.9	55.5	No
R-C3-9	SFR	1	66	53.8	53.8	54.7	No

Figure 14. E Sweetwater Ave. to E Cactus Ave – Receiver and Existing Barrier Locations



Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Leq1h, dB(A) Existing	No-Build	Build	Impacted
R-B1-44	SFR	1	66	61.8	61.8	62.4	No
R-B1-45	SFR	1	66	60.7	60.7	61.3	No
R-B1-46	SFR	1	66	61.7	61.7	62.3	No
R-B1-47	SFR	1	66	61.4	61.4	62.0	No
R-B1-48	SHR	1	66	61.4	61.4	62.1	No
R-B1-49	SHR	1	66	61.7	61.7	62.4	No
R-B1-50	SFR	1	66	61.7	61.7	62.4	No
R-B1-51	SFR	1	66	61.8	61.8	62.5	No
R-B1-52	SFR	1	66	61.8	61.8	62.5	No
R-B1-53	SFR	1	66	61.8	61.8	62.5	No
R-B1-54	SFR	1	66	60.5	60.5	61.2	No
R-B1-55	SFR	1	66	57.2	57.2	58.3	No
R-B1-56	SHR	1	66	63.1	63.1	64.2	No
R-B1-57	SFR	1	66	61.0	61.0	62.3	No
R-B1-58	SFR	1	66	60.8	60.8	62.0	No
R-B1-59	SFR	1	66	60.9	60.9	62.2	No
R-B1-60	SFR	1	66	60.9	60.9	62.2	No
R-B1-61	SFR	1	66	60.8	60.9	62.1	No
R-B1-62	SHR	1	66	60.7	60.7	62.0	No
R-B1-63	SFR	1	66	60.0	60.0	61.2	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Leq1h, dB(A) Existing	No-Build	Build	Impacted
R-B2-37	SFR	1	66	58.1	58.1	58.8	No
R-B2-38	SFR	1	66	56.9	56.9	57.6	No
R-B2-39	SFR	1	66	57.7	57.7	58.4	No
R-B2-40	SHR	1	66	56.5	56.5	56.5	No
R-B2-41	SFR	1	66	55.2	55.2	56.3	No
R-B2-42	SFR	1	66	54.7	54.7	55.9	No
R-B2-43	SHR	1	66	54.6	54.6	55.9	No
R-B2-44	SFR	1	66	54.8	54.8	56.1	No
R-B2-45	SFR	1	66	55.4	55.4	56.7	No
R-B2-46	SHR	1	66	56.1	56.1	57.3	No
R-B2-47	SFR	1	66	57.8	57.8	58.8	No
R-B2-48	SFR	1	66	59.6	59.6	60.7	No
R-B2-49	SFR	1	66	57.2	57.2	58.4	No
R-B2-50	SFR	1	66	57.2	57.2	58.5	No
R-B2-51	SHR	1	66	56.0	56.0	57.4	No
R-B2-52	SFR	1	66	54.7	54.7	56.2	No
R-B2-53	SFR	1	66	53.9	53.9	55.6	No
R-B2-54	SFR	1	66	55.1	55.1	56.7	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Leq1h, dB(A) Existing	No-Build	Build	Impacted
R-B3-36	SHR	1	66	53.6	53.6	55.1	No
R-B3-37	SFR	1	66	55.7	55.7	56.4	No
R-B3-38	SFR	1	66	53.6	53.6	54.8	No
R-B3-39	Community Pool	10	66	51.5	51.5	53.0	No
R-B3-40	SFR	1	66	57.9	57.9	58.7	No
R-B3-41	SFR	1	66	55.6	55.6	57.1	No
R-B3-42	SFR	1	66	53.8	53.8	55.3	No
R-B3-43	SFR	1	66	53.5	53.5	55.0	No
R-B3-44	SFR	1	66	53.6	53.6	55.2	No
R-B3-45	SFR	1	66	52.1	52.1	53.9	No
R-B3-46	SFR	1	66	52.8	52.8	54.3	No
R-B3-47	SFR	1	66	55.5	55.5	57.0	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Leq1h, dB(A) Existing	No-Build	Build	Impacted
R-C1-14	SFR	1	66	60.4	60.4	61.2	No
R-C1-15	SFR	1	66	58.6	58.6	59.2	No
R-C1-16	SFR	1	66	55.6	55.6	56.4	No
R-C1-17	SFR	1	66	62.3	62.3	62.9	No
R-C1-18	SFR	1	66	62.6	62.6	63.2	No
R-C1-19	SFR	1	66	63.2	63.2	64.0	No
R-C1-20	SHR	1	66	62.5	62.5	63.1	No
R-C1-21	SFR	1	66	62.2	62.3	63.0	No
R-C1-22	SFR	1	66	61.9	61.9	62.6	No
R-C1-23	SFR	1	66	61.6	61.7	62.4	No
R-C1-24	SFR	1	66	58.2	58.2	59.0	No
R-C1-25	SHR	1	66	58.3	58.3	59.4	No
R-C1-26	SFR	1	66	59.5	59.5	60.5	No
R-C1-27	SFR	1	66	60.2	60.2	61.3	No
R-C1-28	SFR	1	66	60.7	60.7	61.6	No
R-C1-29	SFR	1	66	59.5	59.5	60.7	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Leq1h, dB(A) Existing	No-Build	Build	Impacted
R-C2-14	SFR	1	66	52.8	52.8	53.7	No
R-C2-15	SFR	1	66	54.0	54.0	54.8	No
R-C2-16	SFR	1	66	56.5	56.5	57.3	No
R-C2-17	SFR	1	66	56.4	56.4	57.1	No
R-C2-18	SFR	1	66	56.3	56.3	57.2	No
R-C2-19	SFR	1	66	55.5	55.5	56.4	No
R-C2-20	SHR	1	66	56.6	56.7	57.7	No
R-C2-21	SFR	1	66	56.1	56.1	56.8	No
R-C2-22	SFR	1	66	54.9	55.0	56.0	No
R-C2-23	SFR	1	66	56.4	56.4	57.4	No
R-C2-24	SHR	1	66	52.4	52.4	53.9	No
R-C2-25	SFR	1	66	54.0	54.1	55.1	No
R-C2-26	SFR	1	66	53.9	53.9	55.3	No
R-C2-27	SFR	1	66	53.7	53.7	54.9	No
R-C2-28	SFR	1	66	56.4	56.4	57.7	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	Leq1h, dB(A) Existing	No-Build	Build	Impacted
R-C3-10	SFR	1	66	53.9	53.9	54.8	No
R-C3-11	SFR	1	66	54.4	54.4	55.4	No
R-C3-12	SFR	1	66	54.6	54.6	55.6	No
R-C3-13	SFR	1	66	54.1	54.1	55.1	No
R-C3-14	SHR	1	66	54.3	54.3	55.4	No
R-C3-15	SFR	1	66	54.4	54.4	55.3	No
R-C3-16	SHR	1	66	53.7	53.8	54.8	No
R-C3-17	SFR	1	66	52.9	53.0	54.2	No
R-C3-18	SFR	1	66	52.3	52.3	53.7	No
R-C3-19	SHR	1	66	52.6	52.6	53.9	No
R-C3-20	SHR	1	66	53.2	53.2	54.6	No
R-C3-21	SFR	1	66	53.3	53.3	54.7	No
R-C3-22	SFR	1	66	54.5	54.5	55.8	No

Figure 15. E Cactus Ave. to E Gary Rd. – Receiver and Existing Barrier Locations

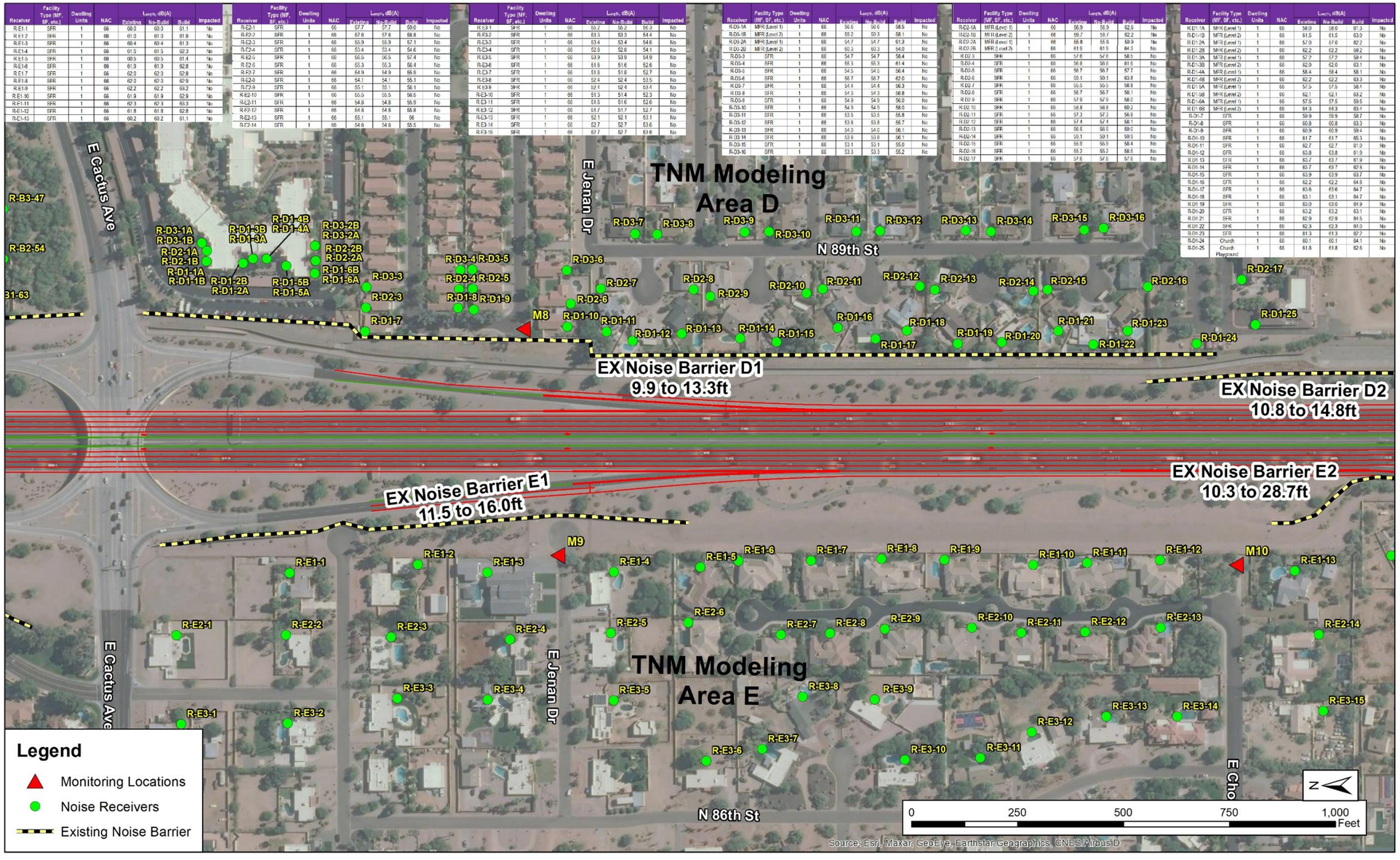
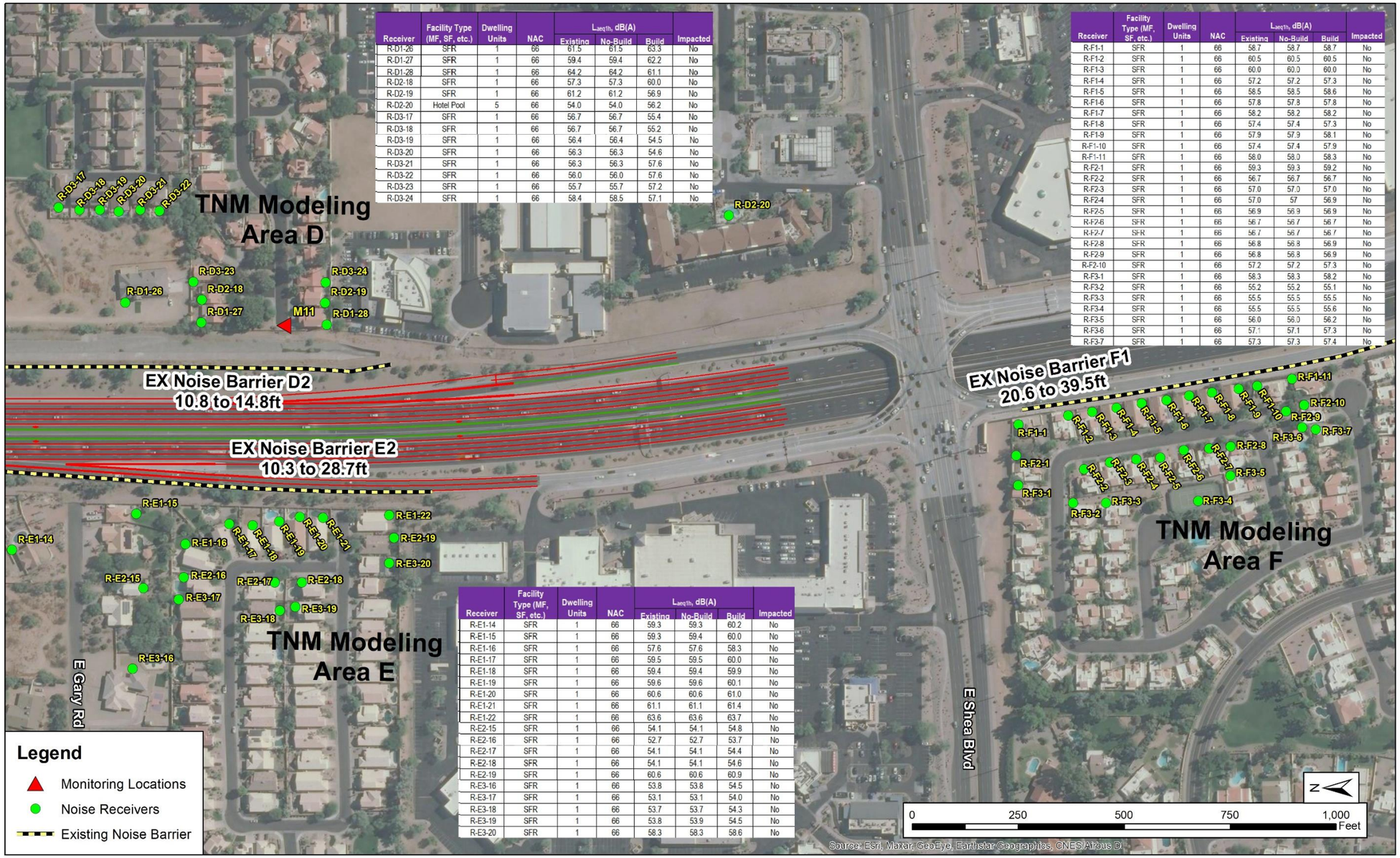


Figure 16. E Gary Rd. to E Shea Blvd. – Receiver and Existing Barrier Locations



Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{eq1h}, dB(A) Existing	No-Build	Build	Impacted
R-D1-26	SFR	1	66	61.5	61.5	63.3	No
R-D1-27	SFR	1	66	59.4	59.4	62.2	No
R-D1-28	SFR	1	66	64.2	64.2	61.1	No
R-D2-18	SFR	1	66	57.3	57.3	60.0	No
R-D2-19	SFR	1	66	61.2	61.2	56.9	No
R-D2-20	Hotel Pool	5	66	54.0	54.0	56.2	No
R-D3-17	SFR	1	66	56.7	56.7	55.4	No
R-D3-18	SFR	1	66	56.7	56.7	55.2	No
R-D3-19	SFR	1	66	56.4	56.4	54.5	No
R-D3-20	SFR	1	66	56.3	56.3	54.6	No
R-D3-21	SFR	1	66	56.3	56.3	57.6	No
R-D3-22	SFR	1	66	56.0	56.0	57.6	No
R-D3-23	SFR	1	66	55.7	55.7	57.2	No
R-D3-24	SFR	1	66	58.4	58.5	57.1	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{eq1h}, dB(A) Existing	No-Build	Build	Impacted
R-F1-1	SFR	1	66	58.7	58.7	58.7	No
R-F1-2	SFR	1	66	60.5	60.5	60.5	No
R-F1-3	SFR	1	66	60.0	60.0	60.0	No
R-F1-4	SFR	1	66	57.2	57.2	57.3	No
R-F1-5	SFR	1	66	58.5	58.5	58.6	No
R-F1-6	SFR	1	66	57.8	57.8	57.8	No
R-F1-7	SFR	1	66	58.2	58.2	58.2	No
R-F1-8	SFR	1	66	57.4	57.4	57.3	No
R-F1-9	SFR	1	66	57.9	57.9	58.1	No
R-F1-10	SFR	1	66	57.4	57.4	57.9	No
R-F1-11	SFR	1	66	58.0	58.0	58.3	No
R-F2-1	SFR	1	66	59.3	59.3	59.2	No
R-F2-2	SFR	1	66	56.7	56.7	56.7	No
R-F2-3	SFR	1	66	57.0	57.0	57.0	No
R-F2-4	SFR	1	66	57.0	57	56.9	No
R-F2-5	SFR	1	66	56.9	56.9	56.9	No
R-F2-6	SFR	1	66	56.7	56.7	56.7	No
R-F2-7	SFR	1	66	56.7	56.7	56.7	No
R-F2-8	SFR	1	66	56.8	56.8	56.9	No
R-F2-9	SFR	1	66	56.8	56.8	56.9	No
R-F2-10	SFR	1	66	57.2	57.2	57.3	No
R-F3-1	SFR	1	66	58.3	58.3	58.2	No
R-F3-2	SFR	1	66	55.2	55.2	55.1	No
R-F3-3	SFR	1	66	55.5	55.5	55.5	No
R-F3-4	SFR	1	66	55.5	55.5	55.6	No
R-F3-5	SFR	1	66	56.0	56.0	56.2	No
R-F3-6	SFR	1	66	57.1	57.1	57.3	No
R-F3-7	SFR	1	66	57.3	57.3	57.4	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{eq1h}, dB(A) Existing	No-Build	Build	Impacted
R-E1-14	SFR	1	66	59.3	59.3	60.2	No
R-E1-15	SFR	1	66	59.3	59.4	60.0	No
R-E1-16	SFR	1	66	57.6	57.6	58.3	No
R-E1-17	SFR	1	66	59.5	59.5	60.0	No
R-E1-18	SFR	1	66	59.4	59.4	59.9	No
R-E1-19	SFR	1	66	59.6	59.6	60.1	No
R-E1-20	SFR	1	66	60.6	60.6	61.0	No
R-E1-21	SFR	1	66	61.1	61.1	61.4	No
R-E1-22	SFR	1	66	63.6	63.6	63.7	No
R-E2-15	SFR	1	66	54.1	54.1	54.8	No
R-E2-16	SFR	1	66	52.7	52.7	53.7	No
R-E2-17	SFR	1	66	54.1	54.1	54.4	No
R-E2-18	SFR	1	66	54.1	54.1	54.6	No
R-E2-19	SFR	1	66	60.6	60.6	60.9	No
R-E3-16	SFR	1	66	53.8	53.8	54.5	No
R-E3-17	SFR	1	66	53.1	53.1	54.0	No
R-E3-18	SFR	1	66	53.7	53.7	54.3	No
R-E3-19	SFR	1	66	53.8	53.9	54.5	No
R-E3-20	SFR	1	66	58.3	58.3	58.6	No

8 CONSIDERATION OF ABATEMENT

ADOT considers abatement measures as mitigation for receivers predicted to be impacted by traffic noise associated with a proposed transportation improvement project. For a mitigation measure, such as a noise barrier to be proposed in the project, it must meet criteria for being both feasible and reasonable.

Pursuant to 23 CFR 772.13(d)(1), the initial considerations for each potential abatement measure are both the engineering and acoustic factors that determine whether it is possible to design and construct .

Per Chapter 5.1 of ADOT NAR, engineering feasibility factors are:

- Safety, Barrier height, curvature, and breaks in barriers
- Topography, Drainage, Utilities
- Maintenance requirements, Access to adjacent properties
- Overall project purpose

Per Chapter 5.2 of ADOT NAR, for a noise abatement measure to be acoustically feasible, ADOT requires achievement of at least a five dB(A) highway traffic noise reduction at 50 percent of impacted receptors. In some instances, the noise level at a location may be affected by an alternate noise source, such as other roadways/streets, railroads, industrial facilities, and airplane flight paths. In such locations, noise abatement for the proposed transportation project may not be acoustically feasible, since a substantial overall noise reduction cannot be achieved due to other noise sources.

As per Chapter 6 ADOT NAR, there are three reasonableness factors or “tests” that must collectively be achieved for a noise abatement measure to be deemed reasonable.

These are:

- Viewpoints or Preferences of Property Owners and Residents
- Noise Reduction Design Goal, and
- Cost-effectiveness

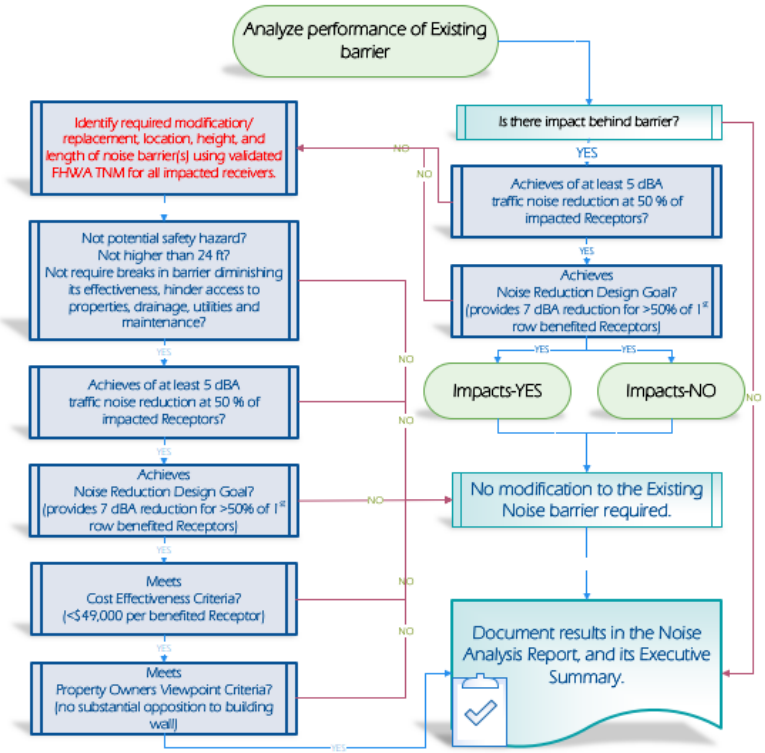
Noise barriers should be designed to reduce projected unmitigated noise levels by at least seven dB(A) for benefited receptors closest to the transportation facility. To be considered reasonable, at least half of the benefited receptors in the first row would need to achieve this level of noise reduction. 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. The cost of removing any previously built walls, drainage, and other similar construction work is included in the cost assessment.

A noise barrier analysis was conducted using TNM to abate the noise impacts and achieve at least 5-decibel or higher noise reductions. Possible noise barriers (berms may be considered too) may be located at the freeway shoulder, right-of-way line, or on the top of slopes (if that is the case), whichever would provide maximum noise reduction and be more desirable for other considerations, such as freeway expansion and maintenance. If more than one barrier location (alignment) was possible and appeared feasible, all such locations were studied, modeled, and presented in the report with the same level of detail and accuracy.

As part of this project, the following existing noise barrier was modeled to determine if they met the ADOT feasibility and reasonability guidelines at areas with NAC impacts.

- **Wall C1 -** At this location, an existing 7 to 12-foot high (1,383ft in length) noise barrier is located along the ROW line. Four of the nine receptors behind this wall approach or exceeds the FHWA NAC for Activity Category B. Analysis of the effectiveness of the existing noise barrier determined that the existing noise barrier meets the acoustic feasibility criteria with a minimum 5-dBA reduction at all four impacted sites. The wall also meets the noise reduction design goal of 7 dBA reduction at 50% or more of the impacted sites. Three of the four impacted sites have a 7-dBA or greater reduction with 2 additional benefitted first-row receptors. The existing noise barrier provides noise reduction that meets the acoustic feasibility and noise reduction design goals; therefore, consideration of abatement measures is not warranted.

Consideration of Existing Barriers (FHWA-HEP-12-051)



Source: *Arizona Department of Transportation; Instructions on using FHWA TNM in Noise Analysis, Nov. 2018*

9 CONSTRUCTION NOISE AND VIBRATION

Depending on the nature of construction operations, the duration of the associated 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 of the distance from it, as opposed to a 3 dB(A) decrease for a line source. Noise levels at various distances, using listed equipment, are shown in Table 10. ADOT has set forth guidelines for construction noise in their Standard Specifications for Road and Bridge Construction, 2008.

Table 10. 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	55.5	53	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	64	60.5	58	56
Auger Drill Rig	64.8	58.8	55.3	52.8	50.8
Roller	60.4	54.4	50.9	48.4	46.5

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 of a

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

Ground vibration and ground-borne 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-seal operations are the primary sources of vibration, while the impact of 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

10 COORDINATION WITH LOCAL OFFICIALS

At the time of the preparation of this noise analysis technical report, results had not been presented to the local officials. Upon request of the local land use planning agency or local public agency, noise contour lines may be produced during the noise analysis process for project alternative screening and planning purposes only, as per ADOT NAR, Section 4, Point (e).

11 STATEMENT OF LIKELIHOOD

Per 23 CFR 772.13(g)(3), the noise analysis was completed to the extent of currently available design information. A statement of likelihood is being included in the environmental since feasibility and reasonableness determinations may change due to modifications in project design after approval. This report has determined that no abatement is recommended for inclusion with the project at this time.

12 REFERENCES

- Arizona Department of Transportation, Noise Abatement Requirement, 2017
- Arizona Department of Transportation, Standard Specifications for Road and Bridge Construction, ADOT, 2008.
- Federal Highway Administration, FHWA Traffic Noise Model, Version 1.0: Technical Manual and Addendums (FHWA PD-96-010,) February 1998.
- Federal Highway Administration, Highway Traffic Noise Analysis and Abatement Policy and Guidance, June 1995.
- Recommended Best Practices for the Use of the FHWA Traffic Noise Model (TNM), FHWA-HEP-16-018, December 2015
- Federal Highway Administration, Measurement of Highway Related Noise (FHWA PD-96-010), June 2018.
- FHWA Construction Noise Handbook, FHWA-HEP-06-015, August 2006
- U.S. Code of Federal Regulations, Title 23, Part 772. Procedures for Abatement of Highway Traffic Noise and Construction Noise.

APPENDIX A – TRAFFIC DATA

Existing Traffic

TNM Modeling Area A

Roadway Name	Cars	Speed	MT	Speed	HT	Speed
SB101 - HOV	1536	70	64	70	0	0
SB101 - Lane1	1488	70	64	70	48	70
SB101 - Lane2	1488	70	64	70	48	70
SB101 - Lane3	1488	70	64	70	48	70
SB101 - Aux Lane1	960	65	30	65	10	65
SB101 - Aux Lane-2	960	65	30	65	10	65
SB OnRamp from Via Princessa-In	480	65	15	65	5	65
SB OnRamp from Via Princessa-Out	480	65	15	65	5	65
SB OnRamp from Via Princessa-Single	960	65	30	65	10	65
SB OffRamp to Via Princessa	960	65	30	65	10	65
SB OffRamp to Via Princessa-2	960	45	30	45	10	45
SB OffRamp to Via Princessa-A	240	25	8	25	3	25
SB OffRamp to Via Princessa-B	240	25	7	25	2	25
SB OffRamp to Via Princessa-C	240	25	7	25	2	25
SB OffRamp to Via Princessa-D	240	25	8	25	3	25
SB101 - Off Ramp to FLW	960	65	30	65	10	65
SB101 - Off Ramp to FLW-2	960	55	30	55	10	55
SB101 - Off Ramp to FLW-2-2	960	50	30	50	10	50
SB Off Ramp to Pima/Raintree	960	65	30	65	10	65
SB Off Ramp to Pima/Raintree-2	960	55	30	55	10	55
SB Off Ramp to Pima/Raintree-2-2	960	50	30	50	10	50
SB101 On Ramp from Pima Rd	960	65	30	65	10	65
SB On Ramp from Raintree-In	480	65	15	65	5	65
SB On Ramp from Raintree-Out	480	65	15	65	5	65
SB On Ramp from Raintree-Merge	960	65	30	65	10	65
NB Off Ramp to Raintree	960	65	30	65	10	65
NB Off Ramp to Raintree-2	960	55	30	55	10	55
NB Off Ramp to Raintree-2-2	960	45	30	45	10	45
NB Off Ramp to WB Raintree-1	240	25	8	25	3	25
NB Off Ramp to WB Raintree-2	240	25	7	25	2	25
NB Off Ramp to EB Raintree-1	240	25	7	25	2	25
NB Off Ramp to EB Raintree-2	240	25	8	25	3	25
NB On Ramp from Raintree - Single Lane	960	65	30	65	10	65
NB On Ramp from Raintree - 2 Lane	960	65	30	65	10	65
NB On Ramp from FLW-1	480	65	15	65	5	65
NB On Ramp from FLW-2	480	65	15	65	5	65
NB On Ramp from FLW-Merge	960	65	30	65	10	65
NB Princessa - South2	480	20	15	20	5	20

Roadway Name	Cars	Speed	MT	Speed	HT	Speed
NB Princessa - South1	480	20	15	20	5	20
NB Off Ramp to Princessa-Mainline	960	65	30	65	10	65
NB Off Ramp to Princessa-2	480	45	15	45	5	45
NB Off Ramp to Princessa-1	480	45	15	45	5	45
NB Off Ramp to Princessa-2-2	240	25	8	25	3	25
NB Off Ramp to Princessa-1-2	480	25	15	25	5	25
NB Off Ramp to Princessa-3	240	25	7	25	2	25
NB Off Ramp to Pima Rd	960	65	30	65	10	65
NB Off Ramp to Pima Rd-2	960	55	30	55	10	55
NB Off Ramp to Pima Rd-2-2	960	45	30	45	10	45
NB On Ramp from Princessa	960	65	30	65	10	65
NB HOV-2	1536	70	64	70	0	0
NB 101 - Lane1-2	1488	70	64	70	48	70
NB 101 - Lane2-2	1488	70	64	70	48	70
NB 101 - Lane3-2	1488	70	64	70	48	70
NB Aux Lane 3	960	65	30	65	10	65
NB Aux Lane 2-2-2	960	65	30	65	10	65
NB Aux Lane 2-1-2	960	65	30	65	10	65

TNM Modeling Area B-C

Roadway Name	Cars	Speed	MT	Speed	HT	Speed
SB101-FLW/PimaOn to Raintree On-Ln4	1488	70	64	70	48	70
SB101-FLW/PimaOn to Raintree On-Ln3	1488	70	64	70	48	70
SB101-FLW/PimaOn to Raintree On-Ln2	1488	70	64	70	48	70
SB101-FLW/PimaOn to Raintree On-Ln1	1488	70	64	70	48	70
SB101-HOV-FLW/PimaOn to Raintree On	1536	70	64	70	0	0
SB101-RaintreeOn to Cactus Off-Lane3	1488	70	64	70	48	70
SB101-RaintreeOn to Cactus Off-Lane2	1488	70	64	70	48	70
SB101-RaintreeOn to Cactus Off-Lane1	1488	70	64	70	48	70
SB101-HOV RaintreeOn to Cactus Off	1536	70	64	70	0	0
SB101-RaintreeOn to Cactus Off-Lane4	1488	70	64	70	48	70
SB101-Bwt Cactus On/Off-Lane3	1488	70	64	70	48	70
SB101-Bwt Cactus On/Off-Lane2	1488	70	64	70	48	70
SB101-Bwt Cactus On/Off-Lane1	1488	70	64	70	48	70
SB101-HOV Bwt Cactus On/Off	1536	70	64	70	0	0
SB Off Ramp to Cactus-65mph	710	65	22	65	8	65
SB Off Ramp to Cactus-45mph	710	45	22	45	8	45
SB Off Ramp to Cactus-25mph	710	25	22	25	8	25

Roadway Name	Cars	Speed	MT	Speed	HT	Speed
SB Off Ramp to Cactus-15mph	355	15	11	15	4	15
SB Off Ramp to Cactus-EB1	177	15	5	15	2	15
SB Off Ramp to Cactus-EB2	178	15	6	15	2	15
SB101-FLW to FLW/PimaOnRmp-Lane3	1488	70	64	70	48	70
SB101-FLW to FLW/PimaOnRmp-Lane2	1488	70	64	70	48	70
SB101-FLW to FLW/PimaOnRmp-Lane1	1488	70	64	70	48	70
SB101-HOV-FLW to FLW/PimaOnRmp	1536	70	64	70	0	0
SB101 On Ramp from FLW/Pima Rd	960	65	30	65	10	65
SB On Ramp from Raintree-In	480	65	15	65	5	65
SB On Ramp from Raintree-Out	480	65	15	65	5	65
SB On Ramp from Raintree-Merge	960	65	30	65	10	65
SB On Ramp from WB Cactus	417	20	13	20	4	20
SB On Ramp from EB Cactus	418	20	13	20	5	20
SB On Ramp from Cactus	835	65	26	65	9	65
NB 101-FLW/Bell Off to FrontOn-Lane3	1488	70	64	70	48	70
NB 101-FLW/Bell Off to FrontOn-Lane2	1488	70	64	70	48	70
NB 101-FLW/Bell Off to FrontOn-Lane1	1488	70	64	70	48	70
NB HOV-FLW/Bell Off to FrontOn	1536	70	64	70	0	0
NB 101-RaintreeOFF-FLW/BellOFF-Ln4	1488	70	64	70	48	70
NB 101-RaintreeOFF-FLW/BellOFF-Ln3	1488	70	64	70	48	70
NB 101-RaintreeOFF-FLW/BellOFF-Ln2	1488	70	64	70	48	70
NB 101-RaintreeOFF-FLW/BellOFF-Ln1	1488	70	64	70	48	70
NB HOV-RaintreeOFF to FLW/BellOFF	1536	70	64	70	0	0
NB 101-CactusOn to RaintreeOff-Lane4	1488	70	64	70	48	70
NB 101-CactusOn to RaintreeOff-Lane3	1488	70	64	70	48	70
NB 101-CactusOn to RaintreeOff-Lane2	1488	70	64	70	48	70
NB 101-CactusOn to RaintreeOff-Lane1	1488	70	64	70	48	70
NB HOV-CactusOn to RaintreeOff	1536	70	64	70	0	0
NB 101 - Btw Cactus Off/On Rmps-Ln3	1488	70	64	70	48	70
NB 101 - Btw Cactus Off/On Rmps-Ln2	1488	70	64	70	48	70
NB 101 - Btw Cactus Off/On Rmps-Ln1	1488	70	64	70	48	70
NB HOV-Btw Cactus Off/On Rmps	1536	70	64	70	0	0
NB Aux Merge-CactusOn to RaintreeOff	960	65	30	65	10	65
NB Off Ramp to FLW/Bell Rd	960	65	30	65	10	65
NB Off Ramp to FLW/Bell Rd-2	960	50	30	50	10	50
NB Off Ramp to Raintree-65mph	960	65	30	65	10	65
NB Off Ramp to Raintree-45mph	960	45	30	45	10	45
NB Off Ramp to Raintree-25mph	960	25	30	25	10	25
NB Off Ramp to WB Raintree-1	240	25	7	25	2	25
NB Off Ramp to WB Raintree-2	240	25	8	25	3	25
NB Off Ramp to EB Raintree-1	240	25	7	25	2	25

Roadway Name	Cars	Speed	MT	Speed	HT	Speed
NB Off Ramp to EB Raintree-2	240	25	8	25	3	25
NB Off Ramp to Cactus-65mph	960	65	30	65	10	65
NB Off Ramp to Cactus-55pmh	960	55	30	55	10	55
NB Off Ramp to Cactus-45mph	960	45	30	45	10	45
NB Off Ramp to Cactus-30mph	960	30	30	30	10	30
NB Off Ramp to Cactus - WB1	240	20	7	20	2	20
NB Off Ramp to Cactus - WB2	240	20	8	20	3	20
NB Off Ramp to Cactus - EB1	480	20	15	20	5	20
NB On Ramp from WB Cactus 1	144	20	4	20	1	20
NB On Ramp from WB Cactus 2	144	20	5	20	2	20
NB On Ramp from EB Cactus 1	288	20	9	20	3	20
NB On Ramp from WB Cactus 2-2	288	65	9	65	3	65
NB On Ramp from WB Cactus 1-2	288	65	9	65	3	65

TNM Modeling Area D-E

Roadway Name	Cars	Speed	MT	Speed	HT	Speed
SB101-RaintreeOn to Cactus Off-Lane4-2	1488	70	64	70	48	70
SB101-RaintreeOn to Cactus Off-Lane3-2	1488	70	64	70	48	70
SB101-RaintreeOn to Cactus Off-Lane2-2	1488	70	64	70	48	70
SB101-RaintreeOn to Cactus Off-Lane1-2	1488	70	64	70	48	70
SB101-HOV RaintreeOn to Cactus Off-2	1536	70	64	70	0	0
SB101-Bwt Cactus On/Off-Lane3	1488	70	64	70	48	70
SB101-Bwt Cactus On/Off-Lane2	1488	70	64	70	48	70
SB101-Bwt Cactus On/Off-Lane1	1488	70	64	70	48	70
SB101-HOV Bwt Cactus On/Off	1536	70	64	70	0	0
SB On/Off Ramp Merge Aux Lane	960	65	30	65	10	65
SB101-CactusOn-SheaOff-Lane3	1488	70	64	70	48	70
SB101-CactusOn-SheaOff-Lane2	1488	70	64	70	48	70
SB101-CactusOn-SheaOff-Lane1	1488	70	64	70	48	70
SB101-HOV_CactusOn-SheaOff	1536	70	64	70	0	0
SB101-SheaOn to SheaOff-Lane4	1488	70	64	70	48	70
SB101-SheaOn to SheaOff-Lane3	1488	70	64	70	48	70
SB101-SheaOn to SheaOff-Lane2	1488	70	64	70	48	70
SB101-SheaOn to SheaOff-Lane1	1488	70	64	70	48	70
SB101-HOV-SheaOn to SheaOff	1536	70	64	70	0	0
SB On Ramp from WB Cactus	417	20	13	20	4	20
SB On Ramp from EB Cactus	418	20	13	20	5	20
SB On Ramp from Cactus	835	65	26	65	9	65
SB Off Ramp to Cactus-65mph	710	65	22	65	8	65

Roadway Name	Cars	Speed	MT	Speed	HT	Speed
SB Off Ramp to Cactus-45mph	710	45	22	45	8	45
SB Off Ramp to Cactus-25mph	710	25	22	25	8	25
SB Off Ramp to Cactus-15mph	355	15	11	15	4	15
SB Off Ramp to Cactus-EB1	355	15	11	15	4	15
SB Off Ramp to Shea Blvd-Ln3-25mph	480	25	15	25	5	25
SB Off Ramp to Shea Blvd-Ln2-65mph	480	65	15	65	5	65
SB Off Ramp to Shea Blvd-Ln1-65mph	480	65	15	65	5	65
SB On Ramp from Shea Blvd -1 2Lanes	960	65	30	65	10	65
SB On Ramp from Shea Blvd -2 1Lane	960	65	30	65	10	65
SB Off Ramp to Shea Blvd-Ln2-55mph	480	55	15	55	5	55
SB Off Ramp to Shea Blvd-Ln1-55mph	480	55	15	55	5	55
SB Off Ramp to Shea Blvd-Ln2-45mph	480	45	15	45	5	45
SB Off Ramp to Shea Blvd-Ln1-45mph	480	45	15	45	5	45
SB Off Ramp to Shea Blvd-Ln2-25mph	480	25	15	25	5	25
SB Off Ramp to Shea Blvd-Ln1-25mph	480	25	15	25	5	25
SB Off Ramp to Shea Blvd-Ln1-25mph-2	240	25	7	25	2	25
SB Off Ramp to Shea Blvd-Ln2-25mph-2	240	25	8	25	3	25
NB HOV-Shea Off to Shea On	1536	70	64	70	0	0
NB 101 - Shea Off to Shea On-Lane1	1488	70	64	70	48	70
NB 101 - Shea Off to Shea On-Lane2	1488	70	64	70	48	70
NB 101 - Shea Off to Shea On-Lane3	1488	70	64	70	48	70
NB 101 - Shea Off to Shea On-Lane4	1488	70	64	70	48	70
NB 101 - Shea On to Cactus Off-Lane3	1488	70	64	70	48	70
NB 101 - Shea On to Cactus Off-Lane2	1488	70	64	70	48	70
NB 101 - Shea On to Cactus Off-Lane1	1488	70	64	70	48	70
NB HOV-Shea On to Cactus Off	1536	70	64	70	0	0
NB 101 - Btw Cactus Off/On Rmps-Ln3	1488	70	64	70	48	70
NB 101 - Btw Cactus Off/On Rmps-Ln2	1488	70	64	70	48	70
NB 101 - Btw Cactus Off/On Rmps-Ln1	1488	70	64	70	48	70
NB HOV-Btw Cactus Off/On Rmps	1536	70	64	70	0	0
NB OffRamp to Shea-Ln1-65	960	65	30	65	10	65
NB OffRamp to Shea-Ln2-65	960	65	30	65	10	65
NB OffRamp to Shea-Ln2-45	960	45	30	45	10	45
NB OffRamp to Shea-Ln1-45	960	45	30	45	10	45
NB OffRamp to Shea-Ln2-25	960	25	30	25	10	25
NB OffRamp to Shea-Ln1-25	960	25	30	25	10	25
NB OffRamp to WB Shea-Ln2	480	25	15	25	5	25
NB OffRamp to WB Shea-Ln1	480	25	15	25	5	25
NB OffRamp to EB Shea-Ln1	480	25	15	25	5	25
NB OffRamp to EB Shea-Ln2	480	25	15	25	5	25
NB OnRamp from EB Shea-1	480	65	15	65	5	65

Roadway Name	Cars	Speed	MT	Speed	HT	Speed
NB OnRamp from EB Shea-2	480	65	15	65	5	65
NB OnRamp from Shea-Merge	960	65	30	65	10	65
NB Aux Lane-SheaOn/CactusOff-Merge	960	65	30	65	10	65
NB Aux Merge-CactusOn to RaintreeOff	960	65	30	65	10	65
NB 101-CactusOn to RaintreeOff-Lane4	1488	70	64	70	48	70
NB 101-CactusOn to RaintreeOff-Lane3	1488	70	64	70	48	70
NB 101-CactusOn to RaintreeOff-Lane2	1488	70	64	70	48	70
NB 101-CactusOn to RaintreeOff-Lane1	1488	70	64	70	48	70
NB HOV-CactusOn to RaintreeOff	1536	70	64	70	0	0
NB Off Ramp to Cactus-65mph	960	65	30	65	10	65
NB Off Ramp to Cactus-55pmh	960	55	30	55	10	55
NB Off Ramp to Cactus-45mph	960	45	30	45	10	45
NB Off Ramp to Cactus-30mph	960	30	30	30	10	30
NB Off Ramp to Cactus - WB1	240	20	7	20	2	20
NB Off Ramp to Cactus - WB2	240	20	8	20	3	20
NB Off Ramp to Cactus - EB1	480	20	15	20	5	20
NB On Ramp from WB Cactus 1-2	288	65	9	65	3	65
NB On Ramp from WB Cactus 2-2	288	65	9	65	3	65
NB On Ramp from WB Cactus 1	144	20	5	20	2	20
NB On Ramp from WB Cactus 2	144	20	4	20	1	20
NB On Ramp from EB Cactus 1	288	20	9	20	3	20

TNM Modeling Area F

Roadway Name	Cars	Speed	MT	Speed	HT	Speed
SB101-CactusOn-SheaOff-Lane3	1488	70	64	70	48	70
SB101-CactusOn-SheaOff-Lane2	1488	70	64	70	48	70
SB101-CactusOn-SheaOff-Lane1	1488	70	64	70	48	70
SB101-HOV_CactusOn-SheaOff	1536	70	64	70	0	0
SB101-SheaOn to SheaOff-Lane4	1488	70	64	70	48	70
SB101-SheaOn to SheaOff-Lane3	1488	70	64	70	48	70
SB101-SheaOn to SheaOff-Lane2	1488	70	64	70	48	70
SB101-SheaOn to SheaOff-Lane1	1488	70	64	70	48	70
SB101-HOV-SheaOn to SheaOff	1536	70	64	70	0	0
SB On/Off Ramp Merge Lane	960	65	30	65	10	65
SB On Ramp from EB Shea Blvd	480	20	15	20	5	20
SB On Ramp from WB Shea Blvd	480	20	15	20	5	20
SB On Ramp from Shea Blvd -1 2Lanes	960	65	30	65	10	65
SB On Ramp from Shea Blvd -2 1Lane	960	65	30	65	10	65

Roadway Name	Cars	Speed	MT	Speed	HT	Speed
SB Off Ramp to Shea Blvd-Ln2-65mph	480	65	15	65	5	65
SB Off Ramp to Shea Blvd-Ln1-65mph	480	65	15	65	5	65
SB Off Ramp to Shea Blvd-Ln2-55mph	480	55	15	55	5	55
SB Off Ramp to Shea Blvd-Ln1-55mph	480	55	15	55	5	55
SB Off Ramp to Shea Blvd-Ln2-45mph	480	45	15	45	5	45
SB Off Ramp to Shea Blvd-Ln1-45mph	480	45	15	45	5	45
SB Off Ramp to Shea Blvd-Ln2-25mph	480	25	15	25	5	25
SB Off Ramp to Shea Blvd-Ln1-25mph	480	25	15	25	5	25
SB Off Ramp to Shea Blvd-Ln3-25mph	480	25	15	25	5	25
SB Off Ramp to Shea Blvd-Ln1-25mph-2	240	25	7	25	2	25
SB Off Ramp to Shea Blvd-Ln2-25mph-2	240	25	8	25	3	25
NB HOV-Shea Off to Shea On	1536	70	64	70	0	0
NB 101 - Shea Off to Shea On-Lane1	1488	70	64	70	48	70
NB 101 - Shea Off to Shea On-Lane2	1488	70	64	70	48	70
NB 101 - Shea Off to Shea On-Lane3	1488	70	64	70	48	70
NB 101 - Shea Off to Shea On-Lane4	1488	70	64	70	48	70
NB 101 - Shea On to Cactus Off-Lane3	1488	70	64	70	48	70
NB 101 - Shea On to Cactus Off-Lane2	1488	70	64	70	48	70
NB 101 - Shea On to Cactus Off-Lane1	1488	70	64	70	48	70
NB HOV-Shea On to Cactus Off	1536	70	64	70	0	0
NB OnRamp from Shea-Merge	960	65	30	65	10	65
NB Aux Lane-SheaOn/CactusOff-Merge	960	65	30	65	10	65
NB OffRamp to Shea-Ln1-65	480	65	15	65	5	65
NB OffRamp to Shea-Ln2-65	480	65	15	65	5	65
NB OffRamp to Shea-Ln2-45	480	45	15	45	5	45
NB OffRamp to Shea-Ln1-45	480	45	15	45	5	45
NB OffRamp to Shea-Ln2-25	480	25	15	25	5	25
NB OffRamp to Shea-Ln1-25	480	25	15	25	5	25
NB OffRamp to WB Shea-Ln2	240	25	8	25	3	25
NB OffRamp to WB Shea-Ln1	240	25	7	25	2	25
NB OffRamp to EB Shea-Ln1	240	25	7	25	2	25
NB OffRamp to EB Shea-Ln2	240	25	8	25	3	25
NB OnRamp from EB Shea-1	240	20	7	20	2	20
NB OnRamp from EB Shea-2	240	20	7	20	2	20
NB OnRamp from WB Shea-1	480	20	15	20	5	20
NB OnRamp from EB Shea-1-2	480	65	15	65	5	65
NB OnRamp from EB Shea-2-2	480	65	15	65	5	65

APPENDIX B – TNM RUNS

Please provide details on the electronically submitted files, with:

- Titles
- The segment of the roadway
- Existing or future scenario
- Barriers evaluation or other purpose

No.	TNM run title	Description
1.	Validations	Validation Models for Measurement Site M1 through M11
2.	Ex_Area_A_Princess_to_Raintree	Model of existing conditions in TNM Modeling Area A.
3.	Ex_Area_B_Raintree_to Cactus	Model of existing conditions in TNM Modeling Area B.
4.	Ex_Area_C_Raintree_to Cactus	Model of existing conditions in TNM Modeling Area C.
5.	EX_Area_D_Cactus_to_Shea	Model of existing conditions in TNM Modeling Area D.
6.	EX_Area_E_Cactus_to_Shea	Model of existing conditions in TNM Modeling Area E.
7.	Ex_Area_F_Shea	Model of existing conditions in TNM Modeling Area F.
8.	NB_Area_A_Princess_to_Raintree	Model of No Build conditions in TNM Modeling Area A.
9.	NB_Area_B_Raintree_to Cactus	Model of No Build conditions in TNM Modeling Area B.
10.	NB_Area_C_Raintree_to Cactus	Model of No Build conditions in TNM Modeling Area C.
11.	NB_Area_D_Cactus_to_Shea	Model of No Build conditions in TNM Modeling Area D.
12.	NB_Area_E_Cactus_to_Shea	Model of No Build conditions in TNM Modeling Area E.
13.	NB_Area_F_Shea	Model of No Build conditions in TNM Modeling Area F.
14.	Build_Area_A_Princess_to_Raintree	Model of Build conditions in TNM Modeling Area A.
15.	Build _Area_B_Raintree_to Cactus	Model of Build conditions in TNM Modeling Area B.
16.	Build _Area_C_Raintree_to Cactus	Model of Build conditions in TNM Modeling Area C.
17.	Build _Area_D_Cactus_to_Shea	Model of Build conditions in TNM Modeling Area D.
18.	Build _Area_E_Cactus_to_Shea	Model of Build conditions in TNM Modeling Area E.
19.	Build _Area_F_Shea	Model of Build conditions in TNM Modeling Area F.
20.	Build_Area_C-NoWall-C1	Model of Build condition at Area C with Zero-height barrier for Existing Wall C1.

APPENDIX C – ZERO HEIGHT BARRIER FOR EXISTING WALL C1

Site	USE	DU	NAC	Existing	No Build	Build	Build w/No Wall	DIF (Build No Wall minus Build)	>5.0 Reduction	>7.0 Reduction
R-C1-2	SFR	1	66	62.8	62.8	63.3	65.9	2.6	N	N
R-C1-3	SFR	1	66	63.6	63.6	64.2	68.6	4.4	N	N
R-C1-4	SFR	1	66	67.2	67.2	***67.8***	74.9	***7.1***	Y	Y
R-C1-5	SFR	1	66	66.6	66.6	***67.1***	74.8	***7.7***	Y	Y
R-C1-6	SFR	1	66	64.1	64.1	64.7	76.7	**12.0**	Y*	Y*
R-C1-7	SFR	1	66	65.6	65.6	***66.4***	76.8	***10.4***	Y	Y
R-C1-8	SFR	1	66	64.5	64.5	65.3	75.2	**9.9**	Y*	Y*
R-C1-9	SFR	1	66	64.4	64.4	**65.8**	72.5	**6.7**	Y	N
R-C1-10	SFR	1	66	63.1	63.1	63.7	64.4	0.7	N	N

*Addtiional No Impact benefitted receiver

APPENDIX D – FIELD DATA MEASUREMENTS

West Caldwell Calibration Laboratories Inc.

Certificate of Calibration

for

SOUND LEVEL METER

Manufactured by:	**SVANTEK**
Model No:	**971**
Serial No:	**80359**
Calibration Recall No:	**32581**

Submitted By:

Customer:	**ERICH THALHEIMER**
Company:	**WSP USA, INC.**
Address:	**100 SUMMER STREET, 13TH FLOOR**
	BOSTON MA 02110

The subject instrument was calibrated to the indicated specification using standards traceable to SI through the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Procedure No. 971 SVAN

Upon receipt for Calibration, the instrument was found to be:

Within (X)

tolerance of the indicated specification. See attached Report of Calibration.
The information supplied relates to the calibrated item listed above and statement of conformance for ALL given specifications and standards fall under the decision rule: A= (L-(U95)*M), where A is acceptance limit, L is manufacturer specifications, U95 is confidence level of 95% at k=2, and M is managed guard-band mulitiplier. The guard-band multiplier increases false-accept risk in favor of decreasing false-reject risk. Although the false accept risk increases, it is still below the Z540.3 2% risk requirement. The decision rule has been communicated and approved by customer during contract review.

West Caldwell Calibration Laboratories' calibration control system meets the following requirements: ANSI/NCSL Z540-1, ISO 9001, and ISO 17025.

Note: With this Certificate, Report of Calibration is included.

Approved by:

James Zhu

Quality Manager

ISO/IEC 17025:2017

Calibration Date:	**02-Dec-21**
Calibration Due:	**02-Dec-22**
Certificate No:	**32581 - 2**

West Caldwell Calibration Laboratories, Inc.
uncompromised calibration
1575 State Route 96, Victor, NY 14564, U.S.A.

ACCREDITED

Calibration Lab. Cert. # 1533.01

Odin Metrology, Inc.
Calibration of Sound & Vibration Instruments

Certificate Number: **26916-9**

Certificate of Calibration for Brüel & Kjær Sound Level Calibrator

This calibration is performed by comparison with measurement reference standard pistonphones:

Type No.	4228	4228
Serial No.	1793011	1504084
Calibrated by	HL	HL
Cal Date	19 NOV 2021	19 NOV 2022
Due Date	19 NOV 2022	19 NOV 2022

a) Estimated uncertainty of comparison: ± **0.05** dB
b) Estimated uncertainty of calibration service for standard pistonphone: ± **0.06** dB
c) Total uncertainty: $\sqrt{a^2+b^2}$ = ± **0.08** dB
d) Expanded uncertainty (coverage factor k = 2 for 95% confidence level): = ± **0.16** dB

This acoustic calibrator has been calibrated using standards with values traceable to the National Institute of Standards and Technology. This calibration is traceable to NIST Test Number **683/289533-17.**

CONDITION OF TEST		
Ambient Pressure	**997.74**	hPa
Temperature	**23**	°C
Relative Humidity	**27**	%
Date of Calibration	**17 FEB 2022**	
Re-calibration due on	**17 FEB 2023**	

The calibration of this acoustic calibrator was performed using a test system conforming to the requirements of ANSI/NCSLZ540-1, 1994, ISO 17025, and ISO 9001:2015, Certification NQA No. 11252.

Calibration procedure: **OM-P-1001-Acoustic_Calibrator, Rev. 1.0 20130522.**

Calibration performed by Harold Lynch

Harold Lynch, Service Manager

Calibrator type	**4231**
Serial no.	**2175632**
Submitted by	**WSP USA**
	Orange, CA 92868
Purchase order no.	**Project# 7330**
Asset no.	**N/A**

This calibrator has been found to perform **within** the specifications listed below at the normalized conditions stated.

SPL produced in coupler terminated by a loading volume of 1.333 cm^3	94.0 ± 0.2 dB
Level Step	20 ± 0.1 dB
Frequency	1,000 Hz ± 0.1%
Distortion	< 1%
At 1,013 hPa, 23°C, and 65% relative humidity	

PERFORMANCE AS RECEIVED		
Frequency	**999.8**	Hz
SPL	**93.99**	dB
SPL+20 dB	**113.97**	dB
Distortion	**0.3**	%
Battery Voltage	**1.50**	V

Was repair or adjustment performed? **No**
Were parts replaced? **No**
Were batteries replaced? **No**

FINAL PERFORMANCE		
Frequency	**999.8**	Hz
SPL	**93.99**	dB
SPL+20 dB	**113.97**	dB
Distortion	**0.3**	%

Note: This calibrator was **within** manufacturer's specifications as received.

ODIN METROLOGY, INC.
3533 OLD CONEJO ROAD, SUITE 125
THOUSAND OAKS, CA 91320
PHONE: (805) 375-0830; FAX: (805) 375-0405

FIELD MEASUREMENT DATA SHEET

Project Name: Pima Freeway (SR 101) Princess Drive to Shea Boulevard

SITE IDENTIFICATION: M1 **OBSERVER(s):** Michael Lieu, William Hye & Edson Santos

START DATE & TIME: *6/22/2022 - 8:40AM* **END DATE & TIME:** *6/22/2022 - 8:55AM*

ADDRESS TPC Scottsdale Golf Course (E Bell & N Pima Rd)

GPS coordinates: *33°38'18.33"N , 111°53'29.37"W*

ID

TEMP: 85 ° F HUMIDITY: 0-5 % R.H. WIND: **CALM** LIGHT **MODERATE VARIABLE**

WINDSPEED: 0-2 MPH DIR: **N NE E SE S SW W NW** **STEADY GUSTY** ____MPH

SKY: **CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN** Other: _____

Weather

INSTRUMENT: Svantel SVAN-971 **TYPE:** 1 2 **SERIAL #** SN 80359

CALIBRATOR: Bruel & Kjaer 4231 **SERIAL #** SN2175632

CALIBRATION CHECK: **PRE-TEST** 93.9 dBA SPL **POST-TEST** 94.0 dBA SPL **WINDSCREEN** Y

SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**_____

Rec # Start Time / End Time

1 / 8:40am / 8:55am : L_{eq} 67.5 , L_{max} 82.1 , L_{min} 63.7 , L_{90} 64.9 , L_{50} 66.4 , L_{10} 68.6 , L_{1} 73.0

_____/ _____/_____: L_{eq}_____, L_{max}_____, L_{min}_____, L_{90}_____, L_{50}_____, L_{10}_____, _____

COMMENTS:

Acoustic Measurements

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**

ROADWAY TYPE: **SR 101L (Freeway/Highway)**

COUNT DURATION: 15 -MINUTE	NB / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	_____ / _____	_____/_____	_____ / _____	_____ / _____
MED. TRUCKS:	_____ / _____	See Attached Traffic	_____ / _____	_____ / _____
HVY TRUCKS:	_____ / _____		_____ / _____	_____ / _____
BUSES:	_____ / _____	_____ / _____	_____ / _____	_____ / _____
MOTORCYCLES:	_____ / _____	_____ / _____	_____ / _____	_____ / _____

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**

OTHER: _____

Source Info and Traffic Counts

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**

PHOTOS:

OTHER COMMENTS / SKETCH:

See Attached graphics/Photos

Description / Sketch

1100 Town Country Road, Suite 200, Orange, CA 92868, 714-835-6886

						15 Min Count					1-hour				
Measurement Site	**Location**	**Traffic Direction**	**Start Time**	**End Time**	**Date**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**
M1	Golf Course (Adjacent to Bell Rd)	NB SR 101L	8:40 AM	8:55 AM	(06/22/22)	1,112	47	34	1		4,448	188	136	4	0
M1	Golf Course (Adjacent to Bell Rd)	SB SR 101L	8:40 AM	8:55 AM	(06/22/22)	1,574	33	32	1	2	6,296	132	128	4	8

VALIDATION Results			
Site	**Field Measured LEQ**	**TNM Validation**	**Dif**
M1	67.5	67.8	-0.3

Measurement Location – M1

Meter Facing SB SR 101L

Meter Facing South towards SB SR101L

FIELD MEASUREMENT DATA SHEET

Project Name: Pima Freeway (SR 101) Princess Drive to Shea Boulevard

ID

SITE IDENTIFICATION: M2 **OBSERVER(s):** Michael Lieu, William Hye & Edson Santos

START DATE & TIME: *6/21/2022 - 6:19am* **END DATE & TIME:** *6/21/2022 - 6:34AM*

ADDRESS Adjacent to 8806 E Conieson Rd

GPS coordinates: *33°36'54.35"N , 111°53'25.78"W*

Weather

TEMP: 75 ° F HUMIDITY: 0-5 % R.H. WIND: **CALM** LIGHT **MODERATE VARIABLE**

WINDSPEED: 0-2 MPH DIR: **N NE E SE S SW W NW** **STEADY GUSTY** ____MPH

SKY: **CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN** Other: _____

Acoustic Measurements

INSTRUMENT: Svantel SVAN-971 **TYPE:** 1 2 **SERIAL #** SN 80359

CALIBRATOR: Bruel & Kjaer 4231 **SERIAL #** SN2175632

CALIBRATION CHECK: **PRE-TEST** 93.9 dBA SPL **POST-TEST** 94.0 dBA SPL **WINDSCREEN** Y

SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:** _____

Rec # Start Time / End Time

1 / 6:19am / 6:34am : L_{eq} 60.2 , L_{max} 68.8 , L_{min} 56.3 , L_{90} 58.1 , L_{50} 59.7 , L_{10} 61.6 , L_{1} 65.5

_____/ _____/_____: L_{eq}_____, L_{max}_____, L_{min}_____, L_{90}_____, L_{50}_____, L_{10}_____, _____

COMMENTS:

Source Info and Traffic Counts

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**

ROADWAY TYPE: **SR 101L (Freeway/Highway)**

COUNT DURATION: 15 -MINUTE

	#1 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	_____ / _____	_____/_____	_____ / _____	_____ / _____
MED. TRUCKS:	_____ / _____	See Attached Traffic	_____ / _____	_____ / _____
HVY TRUCKS:	_____ / _____		_____ / _____	_____ / _____
BUSES:	_____ / _____	_____ / _____	_____ / _____	_____ / _____
MOTORCYCLES:	_____ / _____	_____ / _____	_____ / _____	_____ / _____

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**

OTHER: _____

Description / Sketch

TERRAIN: **HARD SOFT MIXED FLAT OTHER:** _____

PHOTOS: _____

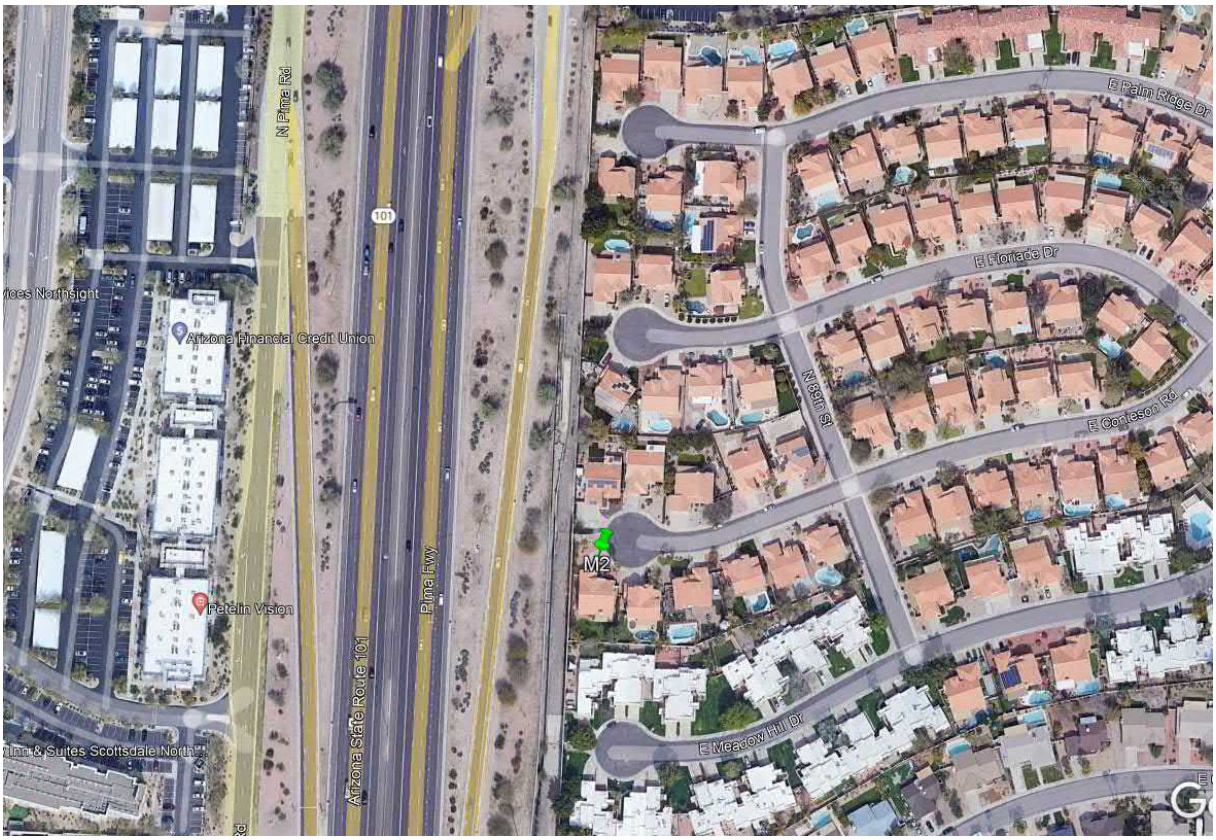
OTHER COMMENTS / SKETCH:

See Attached graphics/Photos

						15 Min Count					1-hour				
Measurement Site	**Location**	**Traffic Direction**	**Start Time**	**End Time**	**Date**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**
M2	8806 E Conison Rd	NB SR 101L	6:19 AM	6:34 AM	(06/21/22)	905	26	20	6	1	3,620	104	80	24	4
M2	8806 E Conison Rd	NB Off Ramp to Raintree	6:19 AM	6:34 AM	(06/21/22)	153	3	1	2	0	612	12	4	8	0
M2	8806 E Conison Rd	SB SR 101L	6:19 AM	6:34 AM	(06/21/22)	938	23	19	3	0	3,752	92	76	12	0
M2	8806 E Conison Rd	SB On Ramp from Raintree	6:19 AM	6:34 AM	(06/21/22)	107	0	2	0	0	428	0	8	0	0

VALIDATION Results			
Site	**Field Measured LEQ**	**TNM Validation**	**Dif**
M2	60.2	58	2.2

Measurement Location – M2



Meter Facing South along NB SR 101L

Meter Facing North along NB SR 101L

Facing East of NB SR 101L

FIELD MEASUREMENT DATA SHEET

Project Name: Pima Freeway (SR 101) Princess Drive to Shea Boulevard

SITE IDENTIFICATION: M3 **OBSERVER(s):** Michael Lieu, William Hye & Edson Santos

START DATE & TIME: *6/21/2022 - 6:48am* **END DATE & TIME:** *6/21/2022 - 7:03AM*

ADDRESS Adjacent to 8801 E Sharon Dr

GPS coordinates: *33°36'39.54"N , 111°53'26.01"W*

ID

TEMP: 75 ° F HUMIDITY: 0-5 % R.H. WIND: **CALM** LIGHT **MODERATE VARIABLE**
WINDSPEED: 0-2 MPH DIR: **N NE E SE S SW W NW** **STEADY GUSTY** MPH
SKY: **CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN** Other: _____

Weather

INSTRUMENT: Svantel SVAN-971 **TYPE:** 1 2 **SERIAL #** SN 80359
CALIBRATOR: Bruel & Kjaer 4231 **SERIAL #** SN2175632

CALIBRATION CHECK: **PRE-TEST** 94.0 dBA SPL **POST-TEST** 94.0 dBA SPL **WINDSCREEN** Y

SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:** _____

Rec # Start Time / End Time

1 / 6:48am / 7:03am : L_{eq} 60.1 , L_{max} 72.0 , L_{min} 56.3 , L_{90} 58.3 , L_{50} 59.7 , L_{10} 60.9 , L_1 62.7

_____/ _____/_____: L_{eq}_____, L_{max}_____, L_{min}_____, L_{90}_____, L_{50}_____, L_{10}_____, _____

Acoustic Measurements

COMMENTS:

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**

ROADWAY TYPE: **SR 101L (Freeway/Highway)**

COUNT DURATION: 15 -MINUTE	NB / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	_____ / _____	_____/_____	_____ / _____	_____ / _____
MED. TRUCKS:	_____ / _____	See Attached Traffic	_____ / _____	_____ / _____
HVY TRUCKS:	_____ / _____		_____ / _____	_____ / _____
BUSES:	_____ / _____	_____ / _____	_____ / _____	_____ / _____
MOTORCYCLES:	_____ / _____	_____ / _____	_____ / _____	_____ / _____

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**

OTHER: _____

Source Info and Traffic Counts

TERRAIN: **HARD SOFT MIXED FLAT OTHER:** _____

PHOTOS: _____

OTHER COMMENTS / SKETCH:

See Attached graphics/Photos

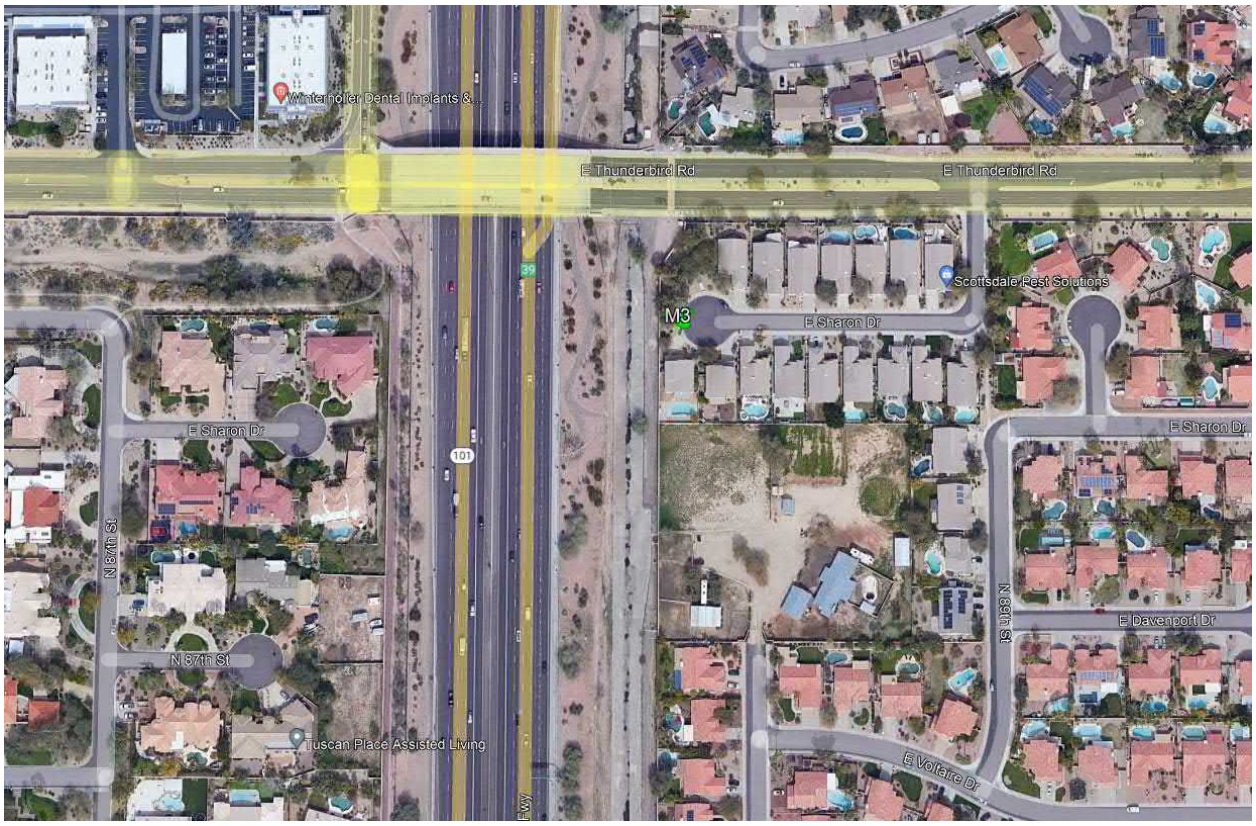
Description / Sketch

1100 Town Country Road, Suite 200, Orange, CA 92868, 714-835-6886

						15 Min Count					1-hour				
Measurement Site	**Location**	**Traffic Direction**	**Start Time**	**End Time**	**Date**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**
M3	8801 E Sharon Dr	NB SR 101L	6:48 AM	7:03 AM	(06/21/22)	1,176	30	15	4	0	4,704	120	60	16	0
M3	8801 E Sharon Dr	SB SR 101L	6:19 AM	6:34 AM	(06/21/22)	1,027	27	13	1	1	4,108	108	52	4	4

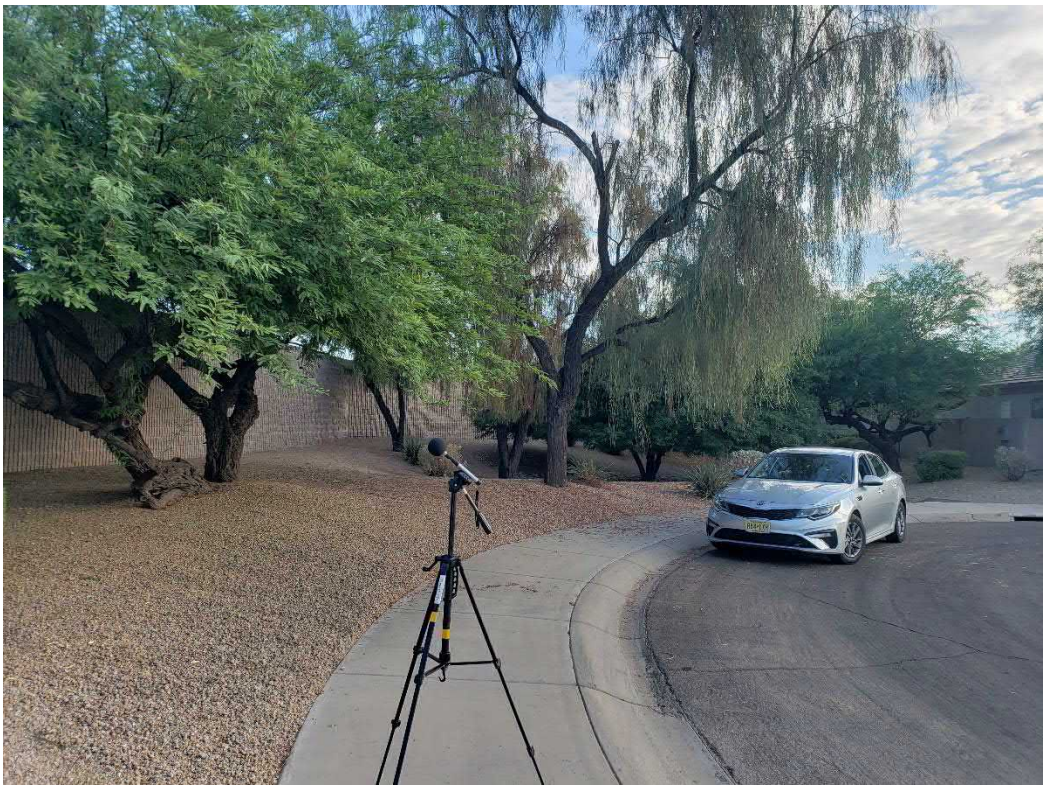
VALIDATION Results			
Site	**Field Measured LEQ**	**TNM Validation**	**Dif**
M3	60.1	59.3	0.8

Measurement Location – M3



Meter Facing South along NB SR 101L

Meter Facing North along NB SR 101L



Facing East of NB SR 101L

FIELD MEASUREMENT DATA SHEET

Project Name: Pima Freeway (SR 101) Princess Drive to Shea Boulevard

SITE IDENTIFICATION: M4 **OBSERVER(s):** Michael Lieu, William Hye & Edson Santos

START DATE & TIME: *6/21/2022 - 7:21am* **END DATE & TIME:** *6/21/2022 - 7:36AM*

ADDRESS Adjacent to 8806 E Sutton Dr

GPS coordinates: *33°36'24.58"N , 111°53'31.28"W*

ID

TEMP: 80 ° F HUMIDITY: 0-5 % R.H. WIND: **CALM** LIGHT **MODERATE VARIABLE**

WINDSPEED: 0-2 MPH DIR: **N NE E SE S SW W NW** **STEADY GUSTY** ____MPH

SKY: **CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN** Other: _____

Weather

INSTRUMENT: Svantel SVAN-971 **TYPE:** 1 2 **SERIAL #** SN 80359

CALIBRATOR: Bruel & Kjaer 4231 **SERIAL #** SN2175632

CALIBRATION CHECK: **PRE-TEST** 94.0 dBA SPL **POST-TEST** 94.0 dBA SPL **WINDSCREEN** Y

SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**_____

Rec # Start Time / End Time

1 / 7:21am / 7:36am : L_{eq} 63.3, L_{max} 67.4, L_{min} 60.6, L_{90} 62.0, L_{50} 63.2, L_{10} 64.3, L_1 65.6

_____/ _____/_____: L_{eq}_____, L_{max}_____, L_{min}_____, L_{90}_____, L_{50}_____, L_{10}_____, _____

COMMENTS:

Acoustic Measurements

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**

ROADWAY TYPE: **SR 101L (Freeway/Highway)**

COUNT DURATION: 15 -MINUTE

	#1 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	_____ / _____	_____/_____	_____ / _____	_____ / _____
MED. TRUCKS:	_____ / _____	See Attached Traffic	_____ / _____	_____ / _____
HVY TRUCKS:	_____ / _____		_____ / _____	_____ / _____
BUSES:	_____ / _____	_____ / _____	_____ / _____	_____ / _____
MOTORCYCLES:	_____ / _____	_____ / _____	_____ / _____	_____ / _____

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**

OTHER: _____

Source Info and Traffic Counts

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**

PHOTOS:

OTHER COMMENTS / SKETCH:

See Attached graphics/Photos

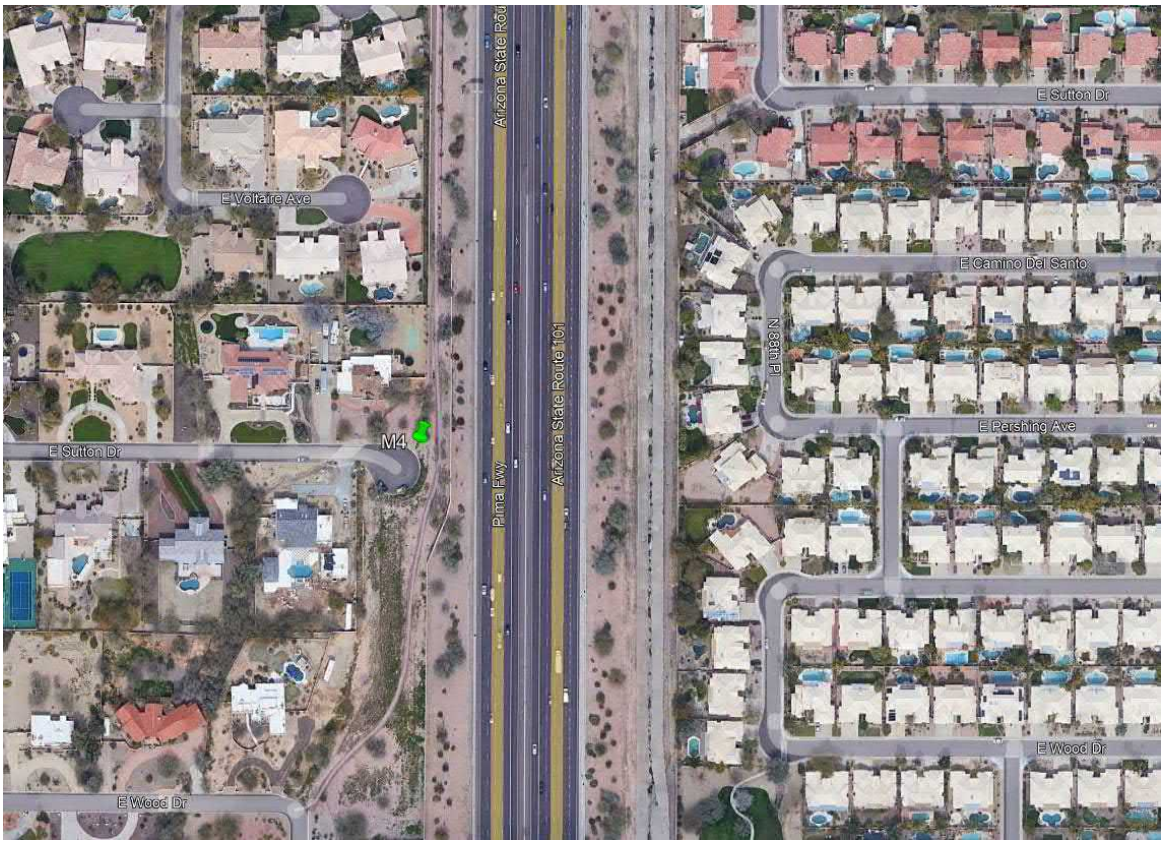
Description / Sketch

1100 Town Country Road, Suite 200, Orange, CA 92868, 714-835-6886

						15 Min Count					1-hour				
Measurement Site	**Location**	**Traffic Direction**	**Start Time**	**End Time**	**Date**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**
M4	8802 E Sutton Dr	NB SR 101L	7:21 AM	7:36 AM	(06/21/22)	1,514	32	19	4	2	6,056	128	76	16	8
M4	8802 E Sutton Dr	SB SR 101L	7:21 AM	7:36 AM	(06/21/22)	1,581	18	18	5	0	6,324	72	72	20	0

VALIDATION Results			
Site	**Field Measured LEQ**	**TNM Validation**	**Dif**
M4	63.3	64	-0.7

Measurement Location – M4



Meter Facing North along SB SR 101L

Meter Facing South along NB SR 101L

Facing Northwest of SB SR 101L

FIELD MEASUREMENT DATA SHEET

Project Name: Pima Freeway (SR 101) Princess Drive to Shea Boulevard

SITE IDENTIFICATION: M5 **OBSERVER(s):** Michael Lieu, William Hye & Edson Santos

START DATE & TIME: *6/21/2022 - 7:50am* **END DATE & TIME:** *6/21/2022 - 8:05AM*

ADDRESS Park as end of 8841 E Captain Dreyfus Ave

GPS coordinates: *33°36'17.60"N , 111°53'25.67"W*

ID

TEMP: 80 ° F HUMIDITY: 0-5 % R.H. WIND: **CALM** LIGHT **MODERATE VARIABLE**

WINDSPEED: 0-2 MPH DIR: **N NE E SE S SW W NW** **STEADY GUSTY** MPH

SKY: **CLEAR SUNNY DARK** ***PARTLY CLOUDY*** **OVRCST FOG DRIZZLE RAIN** Other:

Weather

INSTRUMENT: Svantel SVAN-971 **TYPE:** 1 2 **SERIAL #** SN 80359

CALIBRATOR: Bruel & Kjaer 4231 **SERIAL #** SN2175632

CALIBRATION CHECK: **PRE-TEST** 94.0 dBA SPL **POST-TEST** 94.0 dBA SPL **WINDSCREEN** Y

SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**

Rec # Start Time / End Time

1 / 7:50am / 8:05am : L_{eq} 57.0, L_{max} 62.9, L_{min} 54.1, L_{90} 55.2, L_{50} 56.6, L_{10} 58.4, L_1 60.4

/ / : L_{eq}, L_{max}, L_{min}, L_{90}, L_{50}, L_{10},

COMMENTS:

Acoustic Measurements

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**

ROADWAY TYPE: **SR 101L (Freeway/Highway)**

COUNT DURATION: 15 -MINUTE

	SPEED (mph)	#2 COUNT:	SPEED (mph)
	NB / EB / SB / WB	NB EB / SB WB	NB / EB / SB / WB	NB EB / SB WB
AUTOS:	/	/	/	/
MED. TRUCKS:	/	/	/	/
HVY TRUCKS:	/	/	/	/
BUSES:	/	/	/	/
MOTORCYCLES:	/	/	/	/

See Attached Traffic

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**

distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**

OTHER:

Source Info and Traffic Counts

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**

PHOTOS:

OTHER COMMENTS / SKETCH:

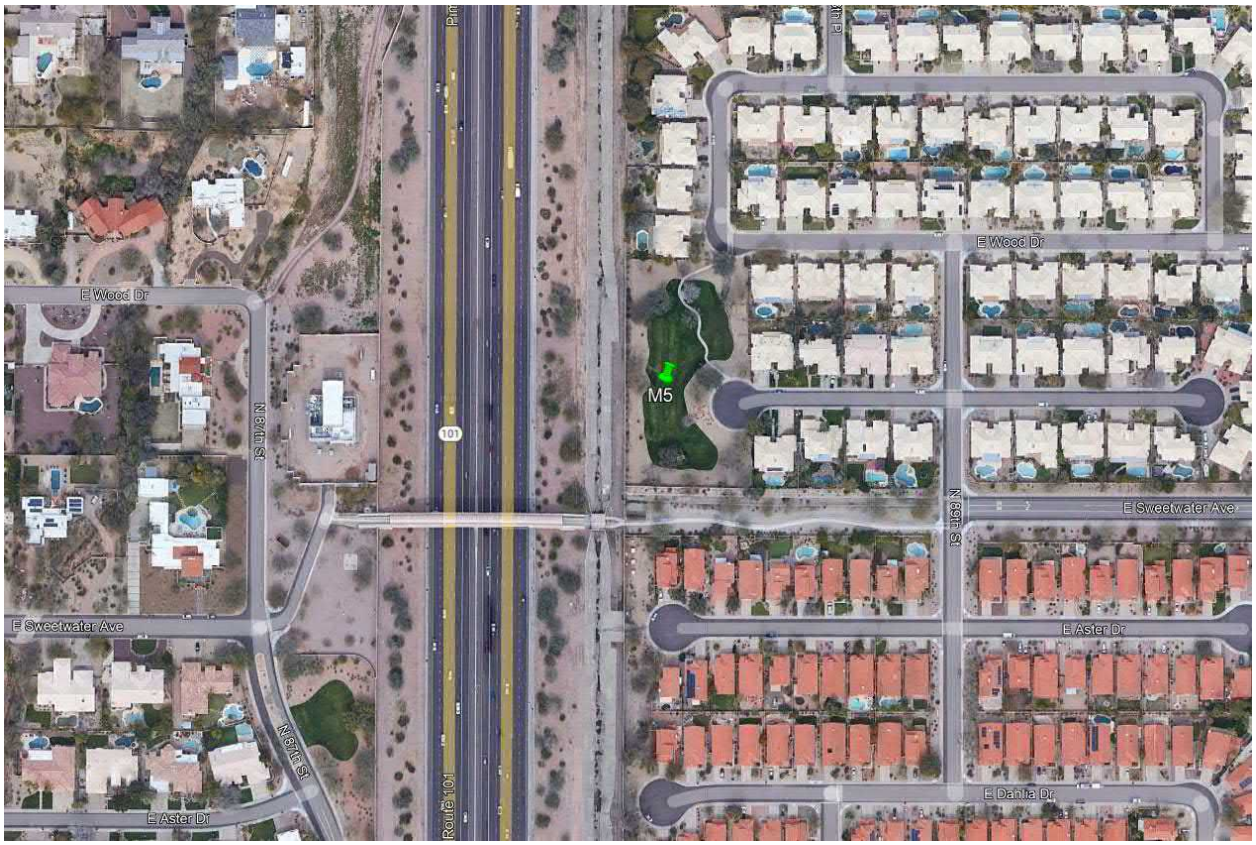
See Attached graphics/Photos

Description / Sketch

						15 Min Count					1-hour				
Measurement Site	**Location**	**Traffic Direction**	**Start Time**	**End Time**	**Date**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**
M5	Community Park adjacent to 8841 E Captain Dreyfus Ave	NB SR 101L	7:50 AM	8:05 AM	(06/21/22)	1,562	27	23	5	0	6,248	108	92	20	0
M5	Community Park adjacent to 8841 E Captain Dreyfus Ave	SB SR 101L	7:50 AM	8:05 AM	(06/21/22)	1,690	33	22	1	0	6,760	132	88	4	0

VALIDATION Results			
Site	**Field Measured LEQ**	**TNM Validation**	**Dif**
M5	57.0	58.4	-1.4

Measurement Location – M5



Meter Facing North along NB SR 101L

Meter Facing South along NB SR 101L

Facing East of NB SR 101L

FIELD MEASUREMENT DATA SHEET

Project Name: Pima Freeway (SR 101) Princess Drive to Shea Boulevard

SITE IDENTIFICATION: M6 **OBSERVER(s):** Michael Lieu, William Hye & Edson Santos

START DATE & TIME: *6/22/2022 - 7:57am* **END DATE & TIME:** *6/22/2022 - 8:12AM*

ADDRESS Adjacent to 8688 E Corrine Ave

GPS coordinates: *33°36'39.54"N , 111°53'26.01"W*

ID

TEMP: 80 ° F HUMIDITY: 0-5 % R.H. WIND: **CALM** LIGHT **MODERATE VARIABLE**

WINDSPEED: 0-2 MPH DIR: **N NE E SE S SW W NW** **STEADY GUSTY** MPH

SKY: **CLEAR SUNNY DARK** ***PARTLY CLOUDY*** **OVRCST FOG DRIZZLE RAIN** Other: _____

Weather

INSTRUMENT: Svantel SVAN-971 **TYPE:** 1 2 **SERIAL #** SN 80359

CALIBRATOR: Bruel & Kjaer 4231 **SERIAL #** SN2175632

CALIBRATION CHECK: **PRE-TEST** 94.0 dBA SPL **POST-TEST** 94.0 dBA SPL **WINDSCREEN** Y

SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:** _____

Rec # Start Time / End Time

1 / 7:57am / 8:12am : L_{eq} 61.8, L_{max} 67.6, L_{min} 58.7, L_{90} 59.9, L_{50} 61.6, L_{10} 62.9, L_1 65.4

_____ / _____ / _____ : L_{eq} _____, L_{max} _____, L_{min} _____, L_{90} _____, L_{50} _____, L_{10} _____, _____

Acoustic Measurements

COMMENTS:

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER** _____

ROADWAY TYPE: **SR 101L (Freeway/Highway)**

COUNT DURATION: 15 -MINUTE

	SPEED (mph)	#2 COUNT:	SPEED (mph)
	NB / EB / SB / WB	NB EB / SB WB	NB / EB / SB / WB	NB EB / SB WB
AUTOS:	_____ / _____	_____ / _____	_____ / _____	_____ / _____
MED. TRUCKS:	_____ / _____	See Attached Traffic	_____ / _____	_____ / _____
HVY TRUCKS:	_____ / _____		_____ / _____	_____ / _____
BUSES:	_____ / _____	_____ / _____	_____ / _____	_____ / _____
MOTORCYCLES:	_____ / _____	_____ / _____	_____ / _____	_____ / _____

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**

distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**

OTHER: _____

Source Info and Traffic Counts

TERRAIN: **HARD SOFT MIXED FLAT OTHER:** _____

PHOTOS: _____

OTHER COMMENTS / SKETCH:

See Attached graphics/Photos

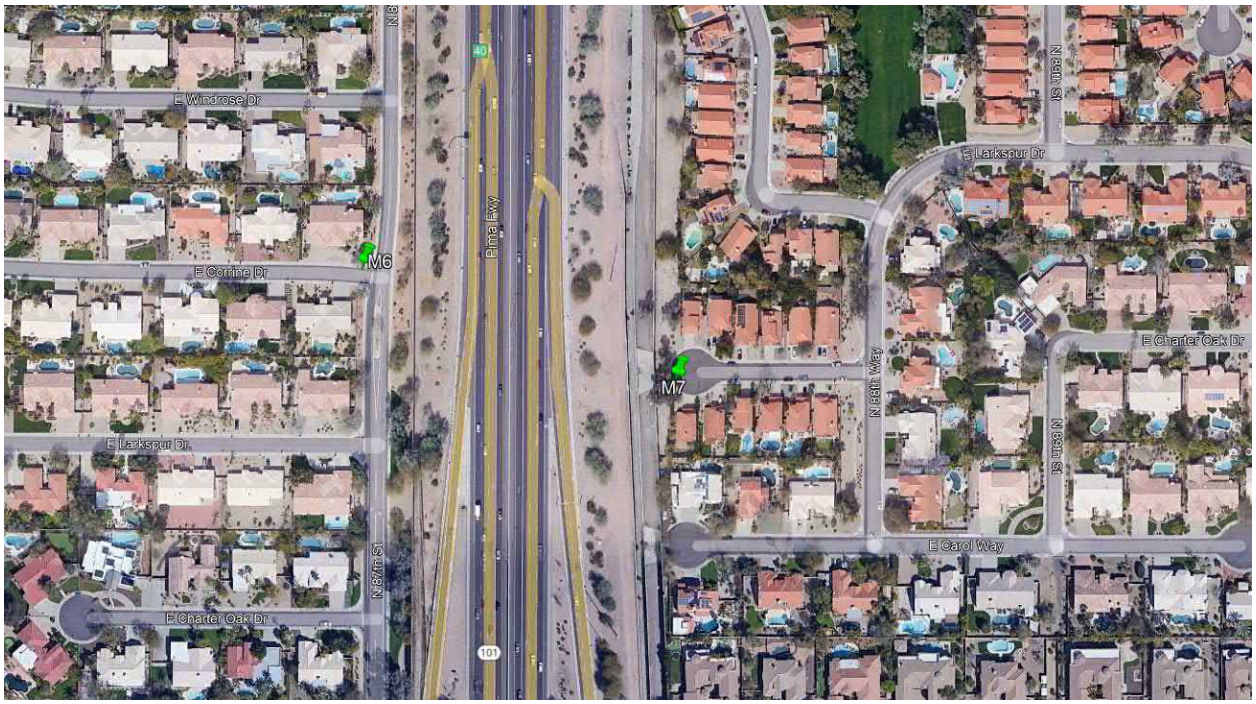
Description / Sketch

1100 Town Country Road, Suite 200, Orange, CA 92868, 714-835-6886

						15 Min Count					1-hour				
Measurement Site	**Location**	**Traffic Direction**	**Start Time**	**End Time**	**Date**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**
M6	8688 E Corrine Ave	NB SR 101L	7:57 AM	8:12 AM	(06/22/22)	1,365	33	18	5	1	5,460	132	72	20	4
M6	8688 E Corrine Ave	NB SR101L On Ramp from Cactus	7:57 AM	8:12 AM	(06/22/22)	100	1	1	0	0	400	4	4	0	0
M6	8688 E Corrine Ave	SB SR 101L	7:57 AM	8:12 AM	(06/22/22)	1,455	35	27	3	0	5,820	140	108	12	0
M6	8688 E Corrine Ave	SB SR101L Off Ramp to Cactus	7:57 AM	8:12 AM	(06/22/22)	119	4	3	0	0	476	16	12	0	0

VALIDATION Results			
Site	**Field Measured LEQ**	**TNM Validation**	**Dif**
M6	61.8	62	-0.2

Measurement Location – M6



Meter Facing North along SB SR 101L

Meter Facing South along SB SR 101L

Facing West of SB SR 101L

Facing East towards SB SR 101L

FIELD MEASUREMENT DATA SHEET

Project Name: Pima Freeway (SR 101) Princess Drive to Shea Boulevard

SITE IDENTIFICATION: M7 **OBSERVER(s):** Michael Lieu, William Hye & Edson Santos

START DATE & TIME: *6/21/2022 - 8:37am* **END DATE & TIME:** *6/21/2022 - 8:52AM*

ADDRESS Adjacent to 8804 E Charter Oak Dr

GPS coordinates: *33°36'0.72"N , 111°53'26.02"W*

ID

TEMP: 85 ° F HUMIDITY: 0-5 % R.H. WIND: **CALM** LIGHT **MODERATE VARIABLE**

WINDSPEED: 0-2 MPH DIR: **N NE E SE S SW W NW** **STEADY GUSTY** MPH

SKY: **CLEAR SUNNY DARK** ***PARTLY CLOUDY*** **OVRCST FOG DRIZZLE RAIN** Other: _____

Weather

INSTRUMENT: **Svantel SVAN-971** **TYPE:** 1 2 **SERIAL #** **SN 80359**

CALIBRATOR: **Bruel & Kjaer 4231** **SERIAL #** **SN2175632**

CALIBRATION CHECK: **PRE-TEST 94.0 dBA SPL POST-TEST 94.0 dBA SPL WINDSCREEN _Y_**

SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:** _____

Rec # Start Time / End Time

1 / 8:37am / 8:52am : L_{eq} 59.0 , L_{max} 63.5 , L_{min} 55.7 , L_{90} 57.5 , L_{50} 58.7 , L_{10} 60.4 , L_{1} 62.1

_____/_____/_____: L_{eq}_____, L_{max}_____, L_{min}_____, L_{90}_____, L_{50}_____, L_{10}_____, _____

COMMENTS:

Acoustic Measurements

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**

ROADWAY TYPE: **SR 101L (Freeway/Highway)**

COUNT DURATION: 15 -MINUTE

	SPEED (mph)	#2 COUNT:	SPEED (mph)
	NB / EB / SB / WB	NB EB / SB WB	NB / EB / SB / WB	NB EB / SB WB
AUTOS:	_____ / _____	_____ / _____	_____ / _____	_____ / _____
MED. TRUCKS:	_____ / _____	See Attached Traffic	_____ / _____	_____ / _____
HVY TRUCKS:	_____ / _____		_____ / _____	_____ / _____
BUSES:	_____ / _____	_____ / _____	_____ / _____	_____ / _____
MOTORCYCLES:	_____ / _____	_____ / _____	_____ / _____	_____ / _____

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**

OTHER: _____

Source Info and Traffic Counts

TERRAIN: **HARD SOFT MIXED FLAT OTHER:** _____

PHOTOS: _____

OTHER COMMENTS / SKETCH:

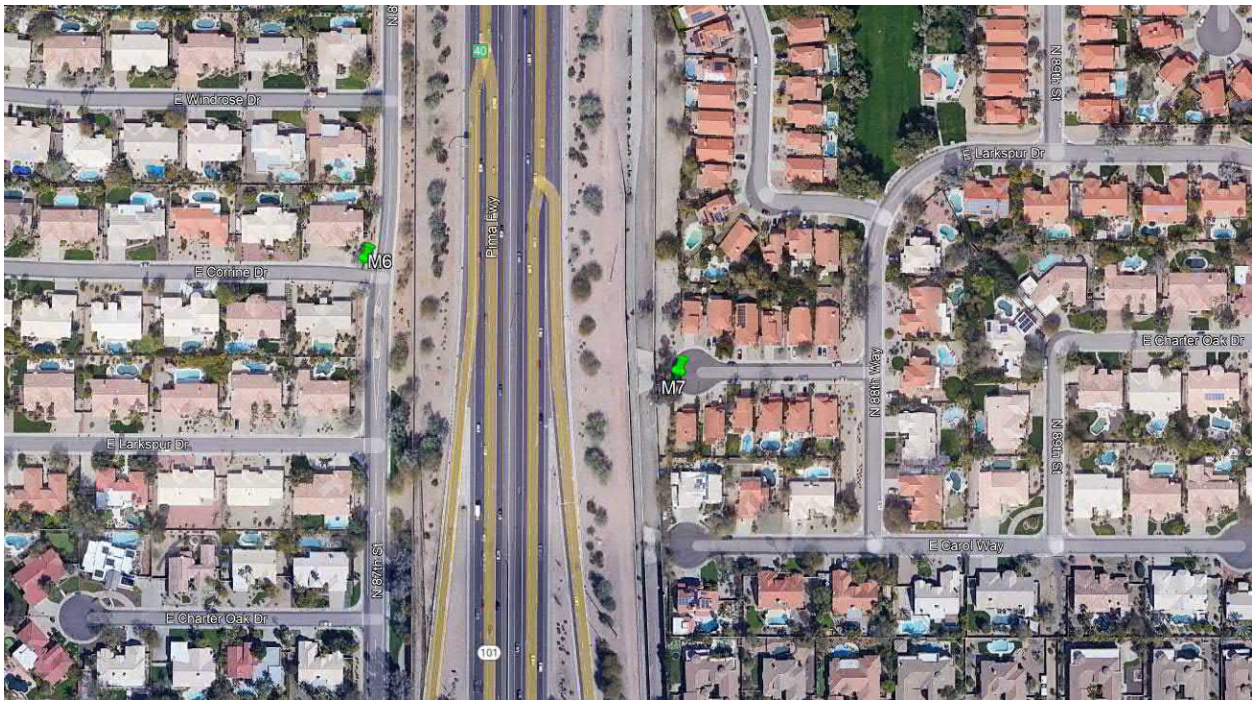
See Attached graphics/Photos

Description / Sketch

						15 Min Count					1-hour				
Measurement Site	**Location**	**Traffic Direction**	**Start Time**	**End Time**	**Date**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**
M7	8804 E Charter Oak Dr	NB SR 101L	8:37 AM	8:52 AM	(06/21/22)	1,610	47	13	5	0	6,440	188	52	20	0
M7	8804 E Charter Oak Dr	SB SR 101L	8:37 AM	8:52 AM	(06/21/22)	1,573	36	19	5	1	6,292	144	76	20	4

VALIDATION Results			
Site	**Field Measured LEQ**	**TNM Validation**	**Dif**
M7	59.3	61.4	-2.1

Measurement Location – M7



Meter Facing North along NB SR 101L

Meter Facing South along NB SR 101L

FIELD MEASUREMENT DATA SHEET

Project Name: Pima Freeway (SR 101) Princess Drive to Shea Boulevard

SITE IDENTIFICATION: M8 **OBSERVER(s):** Michael Lieu, William Hye & Edson Santos

START DATE & TIME: *6/22/2022 - 7:09am* **END DATE & TIME:** *6/22/2022 - 7:24AM*

ADDRESS Adjacent to 8805 E Rivera Dr

GPS coordinates: *33°35'37.89"N , 111°53'26.39"W*

ID

TEMP: 85 ° F HUMIDITY: 0-5 % R.H. WIND: **CALM** LIGHT **MODERATE VARIABLE**

WINDSPEED: 0-2 MPH DIR: **N NE E SE S SW W NW** **STEADY GUSTY** MPH

SKY: **CLEAR SUNNY DARK** ***PARTLY CLOUDY*** **OVRCST FOG DRIZZLE RAIN** Other:

Weather

INSTRUMENT: Svantel SVAN-971 **TYPE:** 1 2 **SERIAL #** SN 80359

CALIBRATOR: Bruel & Kjaer 4231 **SERIAL #** SN2175632

CALIBRATION CHECK: **PRE-TEST** 94.0 dBA SPL **POST-TEST** 94.0 dBA SPL **WINDSCREEN** Y

SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**

Rec # Start Time / End Time

1 / 7:09am / 7:24am : L_{eq} 57.8 , L_{max} 65.4 , L_{min} 54.6 , L_{90} 56.1 , L_{50} 57.4 , L_{10} 58.9, L_{1} 61.8

/ / : L_{eq} , L_{max} , L_{min} , L_{90} , L_{50} , L_{10} ,

COMMENTS:

Acoustic Measurements

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**

ROADWAY TYPE: **SR 101L (Freeway/Highway)**

COUNT DURATION: 15 **-MINUTE**

	SPEED (mph)	#2 COUNT:	SPEED (mph)
	NB / EB / SB / WB	NB EB / SB WB	NB / EB / SB / WB	NB EB / SB WB
AUTOS:	/	/	/	/
MED. TRUCKS:	/	/	/	/
HVY TRUCKS:	/	/	/	/
BUSES:	/	/	/	/
MOTORCYCLES:	/	/	/	/

See Attached Traffic

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**

OTHER:

Source Info and Traffic Counts

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**

PHOTOS:

OTHER COMMENTS / SKETCH:

See Attached graphics/Photos

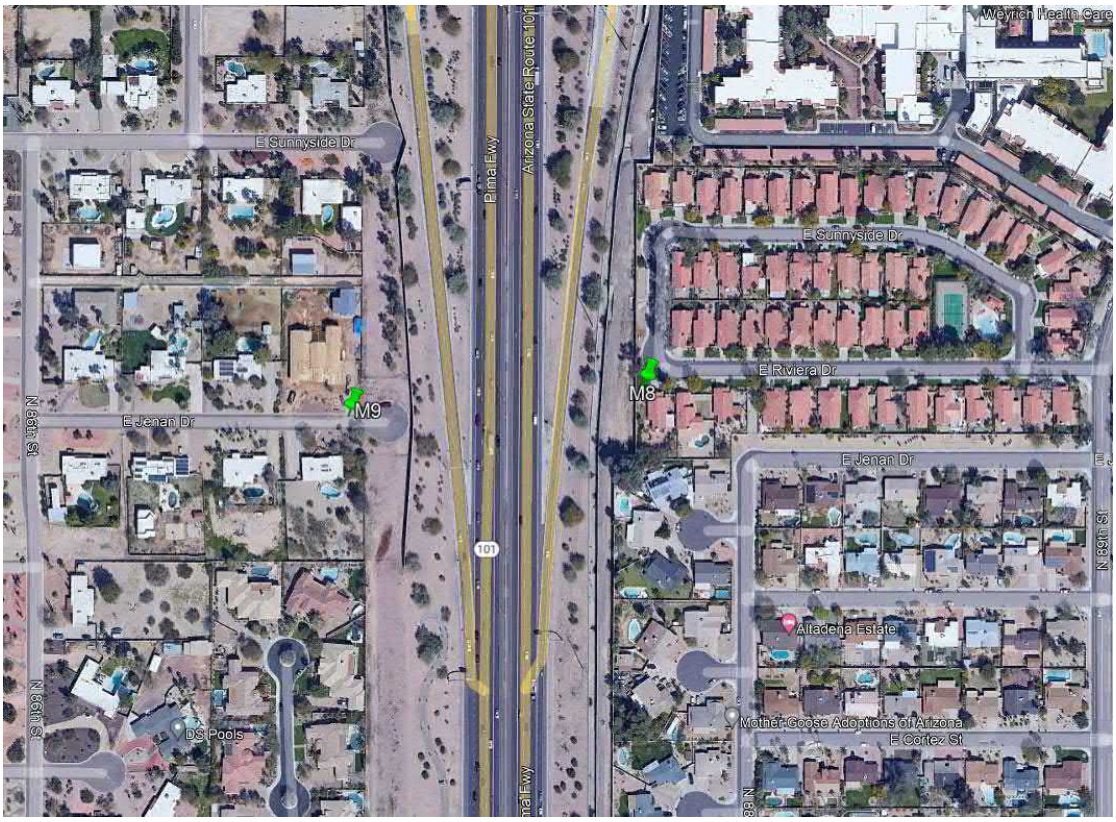
Description / Sketch

1100 Town Country Road, Suite 200, Orange, CA 92868, 714-835-6886

						15 Min Count					1-hour				
Measurement Site	**Location**	**Traffic Direction**	**Start Time**	**End Time**	**Date**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**
M8	8805 E Rivera Dr	NB SR 101L	6:09 AM	6:24 AM	(06/22/22)	1,205	27	37	7	0	4,820	108	148	28	0
M8	8805 E Rivera Dr	NB Off ramp to Cactus Ave	6:09 AM	6:24 AM	(06/22/22)	97	3	1	0	0	388	12	4	0	0
M8	8805 E Rivera Dr	SB SR 101L	6:09 AM	6:24 AM	(06/22/22)	1,106	36	19	7	0	4,424	144	76	28	0
M8	8805 E Rivera Dr	SB On ramp from Cactus Ave	6:09 AM	6:24 AM	(06/22/22)	204	4	2	0	0	816	16	8	0	0

VALIDATION Results			
Site	**Field Measured LEQ**	**TNM Validation**	**Dif**
M8	57.8	59.1	-1.3

Measurement Location – M8



Meter Facing North along NB SR 101L

Meter Facing South along NB SR 101L

Facing Southeast along NB SR 101L

FIELD MEASUREMENT DATA SHEET

Project Name: Pima Freeway (SR 101) Princess Drive to Shea Boulevard

SITE IDENTIFICATION: M9 **OBSERVER(s):** Michael Lieu, William Hye & Edson Santos

START DATE & TIME: *6/22/2022 - 7:33am* **END DATE & TIME:** *6/22/2022 - 7:48AM*

ADDRESS Adjacent to 8701 E Jenan Dr

GPS coordinates: *33°35'37.25"N , 111°53'32.87"W*

ID

TEMP: 85 ° F HUMIDITY: 0-5 % R.H. WIND: **CALM** LIGHT **MODERATE VARIABLE**

WINDSPEED: 0-2 MPH DIR: **N NE E SE S SW W NW** **STEADY GUSTY** MPH

SKY: **CLEAR SUNNY DARK** ***PARTLY CLOUDY*** **OVRCST FOG DRIZZLE RAIN** Other:

Weather

INSTRUMENT: Svantel SVAN-971 **TYPE:** 1 2 **SERIAL #** SN 80359

CALIBRATOR: Bruel & Kjaer 4231 **SERIAL #** SN2175632

CALIBRATION CHECK: **PRE-TEST** 94.0 dBA SPL **POST-TEST** 94.0 dBA SPL **WINDSCREEN** Y

SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**

Rec # Start Time / End Time

1 / 7:33am / 7:48am : L_{eq} 62.2 , L_{max} 71.5 , L_{min} 58.4 , L_{90} 60.3 , L_{50} 61.7 , L_{10} 63.5, L_{1} 66.9

/ / : L_{eq} , L_{max} , L_{min} , L_{90} , L_{50} , L_{10} ,

COMMENTS:

Acoustic Measurements

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**

ROADWAY TYPE: **SR 101L (Freeway/Highway)**

COUNT DURATION: 15 **-MINUTE**

	SPEED (mph)	#2 COUNT:	SPEED (mph)
	NB / EB / SB / WB	NB EB / SB WB	NB / EB / SB / WB	NB EB / SB WB
AUTOS:	/	/	/	/
MED. TRUCKS:	/	/	/	/
HVY TRUCKS:	/	/	/	/
BUSES:	/	/	/	/
MOTORCYCLES:	/	/	/	/

See Attached Traffic

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**

OTHER:

Source Info and Traffic Counts

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**

PHOTOS:

OTHER COMMENTS / SKETCH:

See Attached graphics/Photos

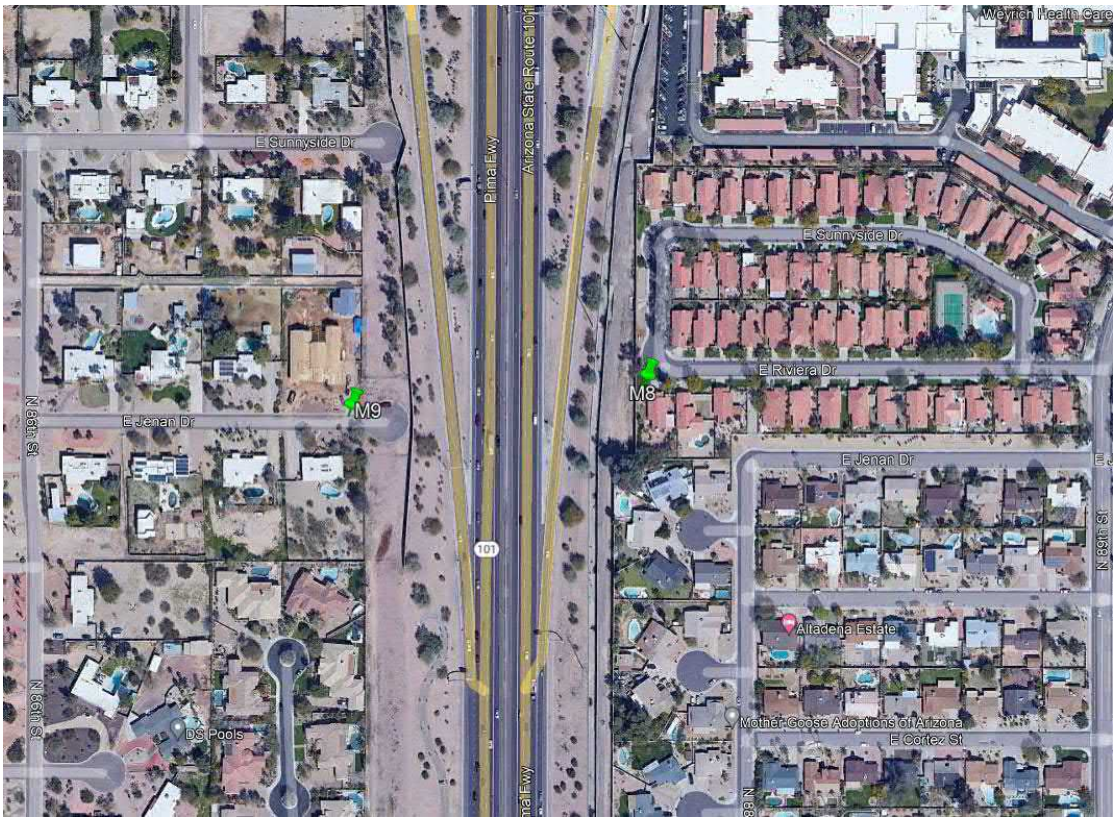
Description / Sketch

1100 Town Country Road, Suite 200, Orange, CA 92868, 714-835-6886

						15 Min Count					1-hour				
Measurement Site	**Location**	**Traffic Direction**	**Start Time**	**End Time**	**Date**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**
M9	8709 E Jenan Dr	NB SR 101L	7:33 AM	7:48 AM	(06/22/22)	1,545	29	15	4	1	6,180	116	60	16	4
M9	8709 E Jenan Dr	NB Off ramp to Cactus Ave	7:33 AM	7:48 AM	(06/22/22)	207	9	2	0	0	828	36	8	0	0
M9	8709 E Jenan Dr	SB SR 101L	7:33 AM	7:48 AM	(06/22/22)	1,640	25	24	5	0	6,560	100	96	20	0
M9	8709 E Jenan Dr	SB On ramp from Cactus Ave	7:33 AM	7:48 AM	(06/22/22)	236	2	3	1	0	944	8	12	4	0

VALIDATION Results			
Site	**Field Measured LEQ**	**TNM Validation**	**Dif**
M9	62.2	61.8	0.4

Measurement Location – M9



Meter Facing North along SB SR 101L

Meter Facing South along SB SR 101L

Facing West along SB SR 101L – Existing Sound wall

FIELD MEASUREMENT DATA SHEET

Project Name: Pima Freeway (SR 101) Princess Drive to Shea Boulevard

SITE IDENTIFICATION: M10 **OBSERVER(s):** Michael Lieu, William Hye & Edson Santos

START DATE & TIME: *6/22/2022 - 6:03am* **END DATE & TIME:** *6/22/2022 - 6:18AM*

ADDRESS Adjacent to 8749 E Cholla St along service road path

GPS coordinates: *33°35'21.41"N , 111°53'33.07"W*

ID

TEMP: 80 ° F HUMIDITY: 0-5 % R.H. WIND: **CALM** LIGHT **MODERATE VARIABLE**

WINDSPEED: 0-2 MPH DIR: **N NE E SE S SW W NW** **STEADY GUSTY** MPH

SKY: **CLEAR SUNNY DARK** ***PARTLY CLOUDY*** **OVRCST FOG DRIZZLE RAIN** Other:

Weather

INSTRUMENT: Svantel SVAN-971 **TYPE:** 1 2 **SERIAL #** SN 80359

CALIBRATOR: Bruel & Kjaer 4231 **SERIAL #** SN2175632

CALIBRATION CHECK: **PRE-TEST** 93.9 dBA SPL **POST-TEST** 94.0 dBA SPL **WINDSCREEN** Y

SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**

Rec # Start Time / End Time

1 / 6:03am / 6:18am : L_{eq} 60.2 , L_{max} 70.7 , L_{min} 56.0 , L_{90} 57.7 , L_{50} 59.5 , L_{10} 61.6, L_{1} 66.0

_____/ _____/_____: L_{eq}_____, L_{max}_____, L_{min}_____, L_{90}_____, L_{50}_____, L_{10}_____, _____

Acoustic Measurements

COMMENTS:

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**

ROADWAY TYPE: **SR 101L (Freeway/Highway)**

COUNT DURATION: 15 -MINUTE

	SPEED (mph)	#2 COUNT:	SPEED (mph)
	NB / EB / SB / WB	NB EB / SB WB	NB / EB / SB / WB	NB EB / SB WB
AUTOS:	_____ / _____	_____/_____	_____ / _____	_____ / _____
MED. TRUCKS:	_____ / _____	See Attached Traffic	_____ / _____	_____ / _____
HVY TRUCKS:	_____ / _____	_____ / _____	_____ / _____	_____ / _____
BUSES:	_____ / _____	_____ / _____	_____ / _____	_____ / _____
MOTORCYCLES:	_____ / _____	_____ / _____	_____ / _____	_____ / _____

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**

OTHER:

Source Info and Traffic Counts

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**

PHOTOS:

OTHER COMMENTS / SKETCH:

See Attached graphics/Photos

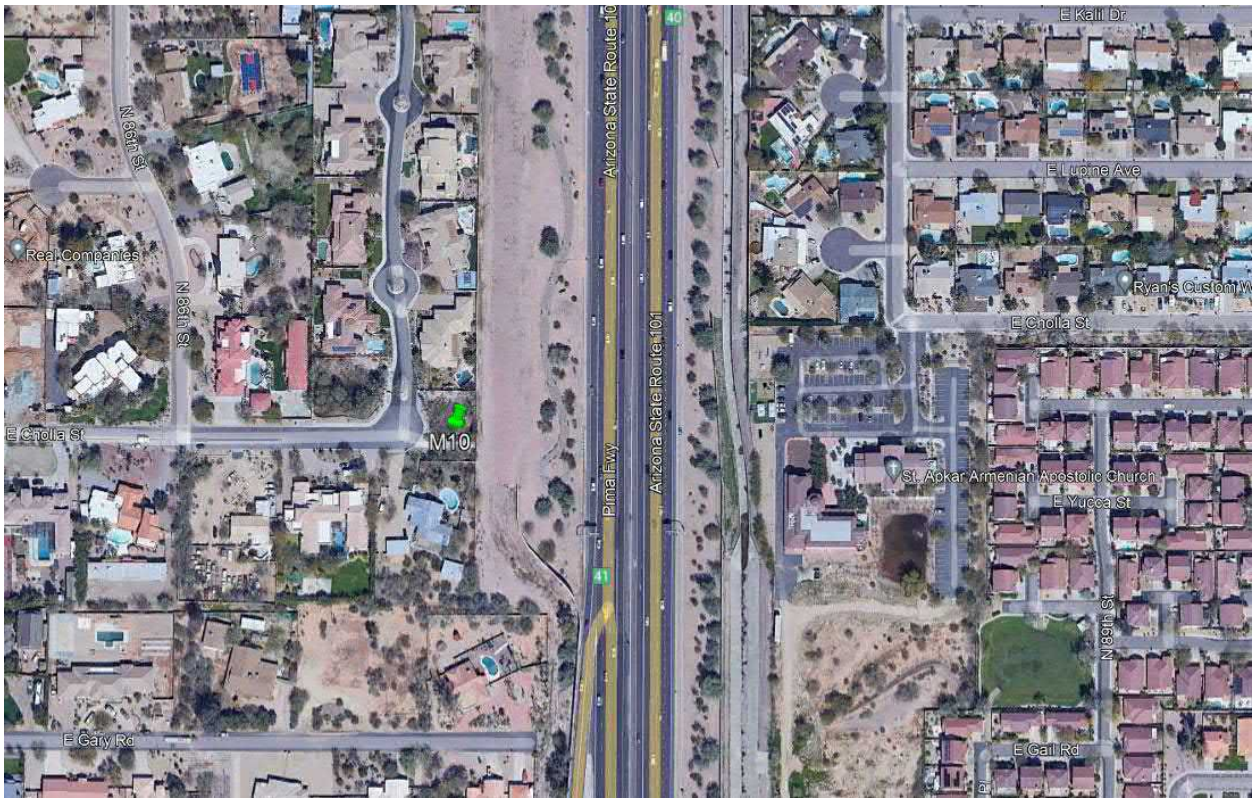
Description / Sketch

1100 Town Country Road, Suite 200, Orange, CA 92868, 714-835-6886

						15 Min Count					1-hour				
Measurement Site	**Location**	**Traffic Direction**	**Start Time**	**End Time**	**Date**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**
M10	8749 E Cholla Dr	NB SR 101L	6:03 AM	6:18 AM	(06/22/22)	836	30	21	7	0	3,344	120	84	28	0
M10	8749 E Cholla Dr	NB On ramp to Cactus Ave	6:03 AM	6:18 AM	(06/22/22)	72	2	2	0	0	288	8	8	0	0
M10	8749 E Cholla Dr	SB SR 101L	6:03 AM	6:18 AM	(06/22/22)	696	32	16	6	0	2,784	128	64	24	0
M10	8749 E Cholla Dr	SB On ramp from Cactus Ave	6:03 AM	6:18 AM	(06/22/22)	128	3	3	0	0	512	12	12	0	0

VALIDATION Results			
Site	**Field Measured LEQ**	**TNM Validation**	**Dif**
M10	60.2	58.6	1.6

Measurement Location – M10



Meter Facing East toward SR 101L

Meter Facing South along SB SR 101L

FIELD MEASUREMENT DATA SHEET

Project Name: Pima Freeway (SR 101) Princess Drive to Shea Boulevard

SITE IDENTIFICATION: M11 **OBSERVER(s):** Michael Lieu, William Hye & Edson Santos

START DATE & TIME: *6/22/2022 - 6:29am* **END DATE & TIME:** *6/22/2022 - 6:44AM*

ADDRESS Adjacent to 8749 E Cholla St along service road path

GPS coordinates: *33°35'11.65"N , 111°53'26.59"W*

ID

TEMP: 80 ° F HUMIDITY: 0-5 % R.H. WIND: **CALM** LIGHT **MODERATE VARIABLE**

WINDSPEED: 0-2 MPH DIR: **N NE E SE S SW W NW** **STEADY GUSTY** MPH

SKY: **CLEAR SUNNY DARK** ***PARTLY CLOUDY*** **OVRCST FOG DRIZZLE RAIN** Other:

Weather

INSTRUMENT: Svantel SVAN-971 **TYPE:** 1 2 **SERIAL #** SN 80359

CALIBRATOR: Bruel & Kjaer 4231 **SERIAL #** SN2175632

CALIBRATION CHECK: **PRE-TEST** 94.0 dBA SPL **POST-TEST** 94.0 dBA SPL **WINDSCREEN** Y

SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**

Rec # Start Time / End Time

1 / 6:29am / 6:44am : L_{eq} 56.6 , L_{max} 60.8 , L_{min} 53.5 , L_{90} 54.9 , L_{50} 56.3 , L_{10} 57.9, L_{1} 59.8

_____/ _____/_____: L_{eq}_____, L_{max}_____, L_{min}_____, L_{90}_____, L_{50}_____, L_{10}_____, _____

COMMENTS:

Acoustic Measurements

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**

ROADWAY TYPE: **SR 101L (Freeway/Highway)**

COUNT DURATION: 15 -MINUTE

	SPEED (mph)	#2 COUNT:	SPEED (mph)
	NB / EB / SB / WB	NB EB / SB WB	NB / EB / SB / WB	NB EB / SB WB
AUTOS:	_____ / _____	_____/_____	_____ / _____	_____ / _____
MED. TRUCKS:	_____ / _____	See Attached Traffic	_____ / _____	_____ / _____
HVY TRUCKS:	_____ / _____	_____ / _____	_____ / _____	_____ / _____
BUSES:	_____ / _____	_____ / _____	_____ / _____	_____ / _____
MOTORCYCLES:	_____ / _____	_____ / _____	_____ / _____	_____ / _____

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**

OTHER:

Source Info and Traffic Counts

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**

PHOTOS:

OTHER COMMENTS / SKETCH:

See Attached graphics/Photos

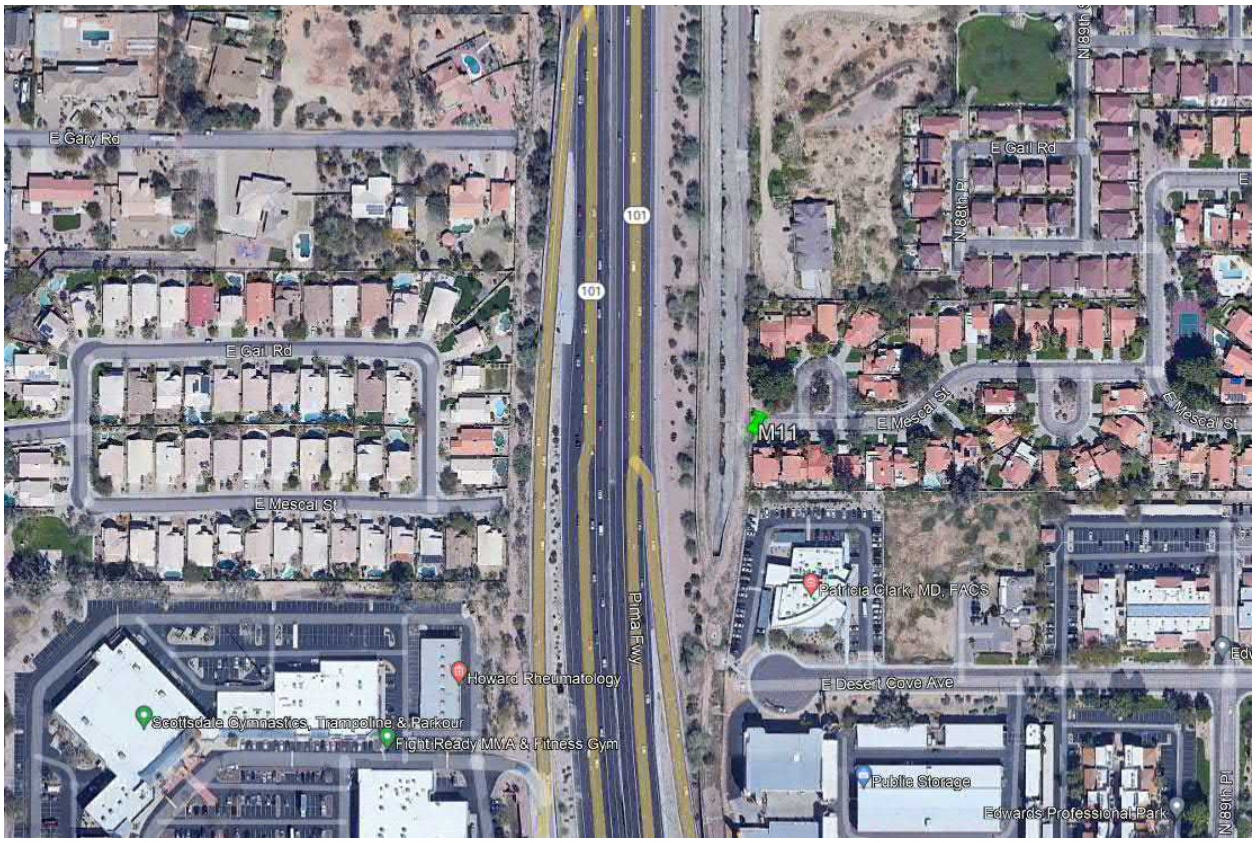
Description / Sketch

1100 Town Country Road, Suite 200, Orange, CA 92868, 714-835-6886

						15 Min Count					1-hour				
Measurement Site	**Location**	**Traffic Direction**	**Start Time**	**End Time**	**Date**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**	**Cars**	**MT**	**HT**	**Motorcycles**	**Buses**
M11	8803 E Mescal St	NB SR 101L	6:29 AM	6:44 AM	(06/22/22)	1,205	27	37	7	0	4,820	108	148	28	0
M11	8803 E Mescal St	NB On ramp from Shea Blvd	6:29 AM	6:44 AM	(06/22/22)	97	3	1	0		388	12	4	0	0
M11	8803 E Mescal St	SB SR 101L	6:29 AM	6:44 AM	(06/22/22)	1,106	36	19	7	0	4,424	144	76	28	0
M11	8803 E Mescal St	SB Off ramp from Shea Blvd	6:29 AM	6:44 AM	(06/22/22)	204	4	2	0	0	816	16	8	0	0

VALIDATION Results			
Site	**Field Measured LEQ**	**TNM Validation**	**Dif**
M11	56.6	57.2	-0.6

Measurement Location – M11



Meter Facing North along NB SR 101L

Meter Facing South along NB SR 101L

Facing North along NB SR 101L – Existing Sound wall

DocuSign

Certificate Of Completion

Envelope Id: 4036B05AB88D4EA39968CAD4FC533D33
Status: Completed
Subject: Approved: ADOT Noise Report F0123 SR101L_Princess to Shea_FINAL October 2022.pdf
Source Envelope:
Document Pages: 123
Signatures: 1
Certificate Pages: 2
Initials: 0
AutoNav: Disabled
EnvelopeId Stamping: Disabled
Time Zone: (UTC-07:00) Arizona

Envelope Originator:
Ivan Racic
206 S 17th Ave
Phoenix, AZ 85007
IRacic@azdot.gov
IP Address: 162.59.200.193

Record Tracking

Status: Original
10/27/2022 9:39:12 AM
Holder: Ivan Racic
IRacic@azdot.gov
Location: DocuSign

Signer Events	Signature	Timestamp
Ivan Racic IRacic@azdot.gov Air and Noise Planner/Environmental planning Arizona Dept of Transportation Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via DocuSign	DocuSigned by: Ivan Racic D00D4A7BCC34420... Signature Adoption: Pre-selected Style Using IP Address: 136.226.64.81	Sent: 10/27/2022 9:39:59 AM Viewed: 10/27/2022 9:40:13 AM Signed: 10/27/2022 9:42:22 AM Freeform Signing
In Person Signer Events	**Signature**	**Timestamp**
Editor Delivery Events	**Status**	**Timestamp**
Agent Delivery Events	**Status**	**Timestamp**
Intermediary Delivery Events	**Status**	**Timestamp**
Certified Delivery Events	**Status**	**Timestamp**
Carbon Copy Events	**Status**	**Timestamp**
Michael.Lieu@wsp.com Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via DocuSign	COPIED	Sent: 10/27/2022 9:42:29 AM
Anthony Scolaro Anthony.Scolaro@wsp.com Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via DocuSign	COPIED	Sent: 10/27/2022 9:42:29 AM Viewed: 10/27/2022 9:44:14 AM
EP Air Noise adotairnoise@azdot.gov Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via DocuSign	COPIED	Sent: 10/27/2022 9:42:29 AM

Witness Events	Signature	Timestamp

Notary Events	Signature	Timestamp

Envelope Summary Events	Status	Timestamps
Envelope Sent	Hashed/Encrypted	10/27/2022 9:40:00 AM
Certified Delivered	Security Checked	10/27/2022 9:40:13 AM
Signing Complete	Security Checked	10/27/2022 9:42:22 AM
Completed	Security Checked	10/27/2022 9:42:29 AM

Payment Events	Status	Timestamps