ARIZONA DEPARTMENT OF TRANSPORTATION

ENVIRONMENTAL PLANNING

NOISE ANALYSIS TECHNICAL REPORT

I-10 Broadway Curve

Federal Project Number: NH 010-C(220)T
ADOT Project Number: 010 MA 150 F0072 01D

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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
GP	General Purpose
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 preparing an Environmental Assessment (EA) document for proposed improvements to a segment of Interstate 10 (I-10) from the I-10/I-17 (Split) Traffic Interchange (TI) (Milepost [MP] 149.5) to the State Route (SR) Loop 202 (202L) Santan Freeway (MP 160.9). The study area also includes the segment of SR 143 from Broadway Road (MP 000.25-) north to just south of the south bank of the Salt River (MP 001.3), and US60 (Superstition Freeway) from I-10 (MP 172.0) east to Hardy Drive (MP 173.0) within the cities of Phoenix, Tempe, and Chandler, and the town of Guadalupe, Maricopa County, Arizona.

The study area of the proposed I-10 Broadway Curve project serves the growing communities in the south and east valley, downtown Phoenix metropolitan area, and other major employment centers. Traffic demand is causing the I-10 corridor and adjacent local arterial street system to become increasingly congested during the morning and evening peak travel periods. Future traffic volume projections indicate the congestion will continue to worsen, causing further travel delays and increased travel times for those using the I-10 corridor. The purpose of this proposed project is to improve travel time reliability and regional mobility, and address congestion on I-10 while maintaining local and multimodal access.

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:

- **I-10 from I-17 to 40th Street –** Land use in this area is mainly office and light industrial, with two hotels (Activity Category E), one at Site FM1 and one near Site FM2 on University Drive. Sound levels in the area between the I-17 TI and the Salt River are mainly influenced by the

noise from Sky Harbor International Airport. Field measurements were taken at four sites in this portion the study area, FM1 to FM4 (see **Figure 6**).

- **I-10 from 40th Street to Fairmont Street –** This area is surrounded mainly by office and light industrial (Activity Category E), with one area of single family homes (Activity Category B) located on the eastbound (EB) side between 43rd Place and 48th Street, Site FM5. The portion of the SR 143 Hohokam Expressway within the project area is mainly office and light industrial land uses. However, there is a motel located on the westbound (WB) side and a hotel located on the southbound (SB) side south of University Drive (all Activity Category E). Field measurements were taken at four sites in this area, FM5; FM6 along I-10; and FM8 and FM9 along the Hohokam Expressway (see **Figure 6**).
- **I-10 from Fairmont Street to US 60 –** Land use in this section is a mix of single-family residences and apartments (Activity Category B), hotels (Activity Category E), a cemetery (Activity Category C), and office and shopping areas (Activity Category E and F). Nine field measurements were taken along I-10 in this area: FM7 and FM10 through FM17. Two field measurements, FM27 and FM28, were taken along the SR 60 Superstition Freeway at residential areas (Activity Category B) within the proposed area of improvements to US 60 associated with this project (see **Figure 6** and **Figure 7**).
- **I-10 from US 60 to Ray Road –** The land use in this section is a mix of shopping centers and office parks on the northbound side (Activity Category E and F), and residential (Activity Category B), golf courses, ball parks and shopping centers on the southbound side (Activity Categories C, E, and F). Nine field measurements, FM18 to FM26, were taken along this part of I-10 (see **Figure 7** and **Figure 8**).

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.

Seventeen barriers were evaluated to reduce the noise impacts of the Preferred Alternative. However, after performing the feasible and reasonableness analysis, ten of them did not meet the threshold. Based on the analysis, seven barriers are recommended as a mitigation measure benefiting 424 impacted receptors. These noise barriers are 14 feet to 18 feet high and are labeled NB-1 through NB-7 (see **Table 2**).

Table 1. Noise Modeling Summary

Study Area Subsection	Existing	No-Build	Build	Abatement Measure Consideration
I-10 from I-17 to 40th Street	61.6 dB(A) to 77.4 dB(A)	61.6 dB(A) to 77.4 dB(A)	63.5 dB(A) to 82.5 dB(A)	The modeled noise levels at 8 out of 10 receivers approach or exceed FHWA Noise Abatement Criteria (NAC) for Activity Category E, motels and hotels. Therefore, consideration of abatement measures is warranted.
I-10 from 40th Street to Fairmont Street	57.2 dB(A) to 78.8 dB(A)	58.0 dB(A) to 78.8 dB(A)	60.9 dB(A) to 82.4 dB(A)	The modeled noise levels at 28 out of 62 receivers approach or exceed FHWA NAC for Activity Category B/C for residences, and 11 receivers approach or exceed FHWA NAC for Activity Category E, hotels/motels/offices. Therefore, consideration of abatement measures is warranted.
I-10 from Fairmont Street to US 60	57.6 dB(A) to 79.6 dB(A)	57.6 dB(A) to 79.6 dB(A)	58.7 dB(A) to 83.4 dB(A)	The modeled noise levels at 47 out of 125 receivers approach or exceed FHWA NAC for Activity Category B/C, residences, and 2 receivers approach or exceed the FHWA NAC for Activity Category E, hotels/motels/offices. Therefore, consideration of abatement measures is warranted.
I-10 from US 60 to Ray Road	49.7 dB(A) to 80.1 dB(A)	49.7 dB(A) to 80.1 dB(A)	54.5 dB(A) to 81.5 dB(A)	The modeled noise levels at 104 out of 226 receivers approach or exceed FHWA NAC for Activity Category B/C, residences; and 8 receivers approach or exceed FHWA NAC for Activity Category E, hotels/motels/offices. Therefore, consideration of abatement measures is warranted.

Table 2. Recommended Noise Abatement Barrier Summary

Noise Barrier ID	Study Area Subsection	Barrier Height (ft)	Barrier Length (ft)	Area of Barrier (ft^2)	Total Barrier Cost[1]	Number of Benefited Receptors	Cost-Per-Benefited-Receptor	Cost Reasonable (Y/N) [2]	Station (Approximate from Mainline)
NB-1	40th Street to Fairmont Street	18	1,340	24,120	$844,200	82	$10,295	Y	SB 8061+00 to 8074+00
NB-2	Fairmont Street to US 60	16	900	14,400	$504,000	14	$36,000	Y	SB 8170+00 to 8176+40
NB-3	Fairmont Street to US 60	14	1592	22,288	$780,080	41	$19,026	Y	NB 8158+00 to 8142+00
NB-4	Fairmont Street to US 60	18	2018	36,324	$1,271,340	95	$13,382	Y	NB 8158+00 to ST 120+00
NB-5	Fairmont Street to US 60	16	1,205	19,280	$674,800	57	$11,838	Y	SC 124+00 to 135+60
NB-6	US 60 to Ray Road	16	2,804	44,864	$1,570,240	97	$16,188	Y	SB 8263+25 to 8291+10
NB-7	US 60 to Ray Road	14	1,395	19,530	$ 683,550	25	$27,342	Y	NB 8263+10 to 8277+00

[1] Total cost of the noise barrier is based on the unit cost of $35/$85 per square foot for off/on structure placement of noise barriers.
[2] Based on a cost of $49,000 per benefited receptor.

2 *INTRODUCTION*

2.1 PROJECT DESCRIPTION

The Arizona Department of Transportation (ADOT) is preparing an Environmental Assessment (EA) document for proposed improvements to a segment of Interstate 10 (I-10) from the I-10/I-17 (Split) Traffic Interchange (TI) (Milepost [MP] 149.5) to the Loop 202 (SR202L) Santan Freeway (MP 160.9) The study area also includes the segment of State Route (SR) 143 from Broadway Road (MP 000.25) north to just south of the south bank of the Salt River (MP 001.3), and US60 (Superstition Freeway) from I-10 (MP 172.0) east to Hardy Drive (MP 173.0) within the cities of Phoenix, Tempe, and Chandler, and the town of Guadalupe, Maricopa County, Arizona (**Figure 1** and **Figure 2**). The EA is being completed in accordance with the National Environmental Policy Act (NEPA) and other regulatory requirements.

The study area of the proposed I-10 improvements serves the growing communities in the south and east valley, downtown Phoenix metropolitan area, and other major employment centers. Traffic demand is causing the I-10 corridor and adjacent local arterial street system to become increasingly congested during the morning and evening peak travel periods. Future traffic volume projections indicate the congestion will continue to worsen, causing further travel delays and increased travel times for those using the I-10 corridor. The purpose of this proposed project is to improve travel time reliability and regional mobility, and address congestion on I-10 while maintaining local and multimodal access.

Improvements to this segment of I-10 have been considered over the past 30 years in the following transportation studies:

- Interstate 10 Corridor Study (1988)
- I-10 Corridor Improvement Study (2007)
- Spine Corridor Study (2014)
- Interstate 10 Near Term Improvements Study (2014)

Each of these previous studies systematically approached the development of viable improvement concepts and alternative options, through interdisciplinary team dialogues that included ADOT, Federal Highway Administration (FHWA), Maricopa Association of Governments (MAG), and agency stakeholders, as well as input obtained through public outreach.

The project evaluates a build and no-build alternative for improvements in this study area. The no-build alternative is evaluated to provide the baseline comparison for the build alternative. If selected, the build alternative improvements would consist of widening and restriping I-10 within the project limits to add general-purpose (GP) lanes, high-occupancy vehicle (HOV) lanes, and auxiliary (AUX) lanes; constructing collector-distributor (C-D) roads, reconstructing and improving I-10 interchanges along this segment of I-10; construction of and modifications to

bridges; various drainage improvements; installing and upgrading Freeway Management System (FMS) facilities and dynamic message signs (DMS) within the project limits; and other components such as fencing, utilities, traffic markers, and lighting systems.

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 land owners 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. The technical analysis 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 3**).

- I-17 to 40th Street
- 40th Street to Fairmont Street
- Fairmont Street to US 60
- US 60 to Ray Road

Figure 1. Project Map

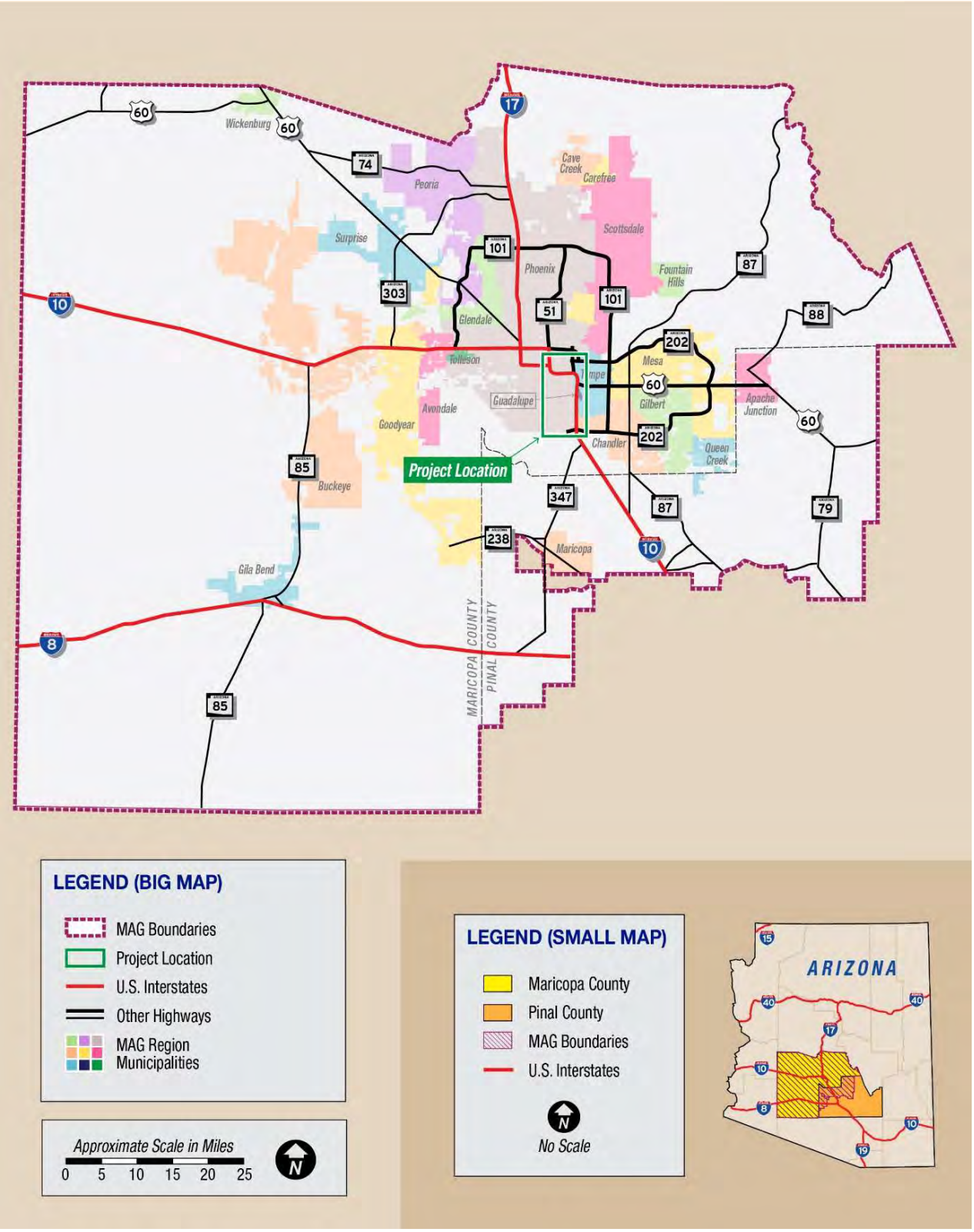


Figure 2. Project Vicinity with the Preferred Alternative Construction Limits

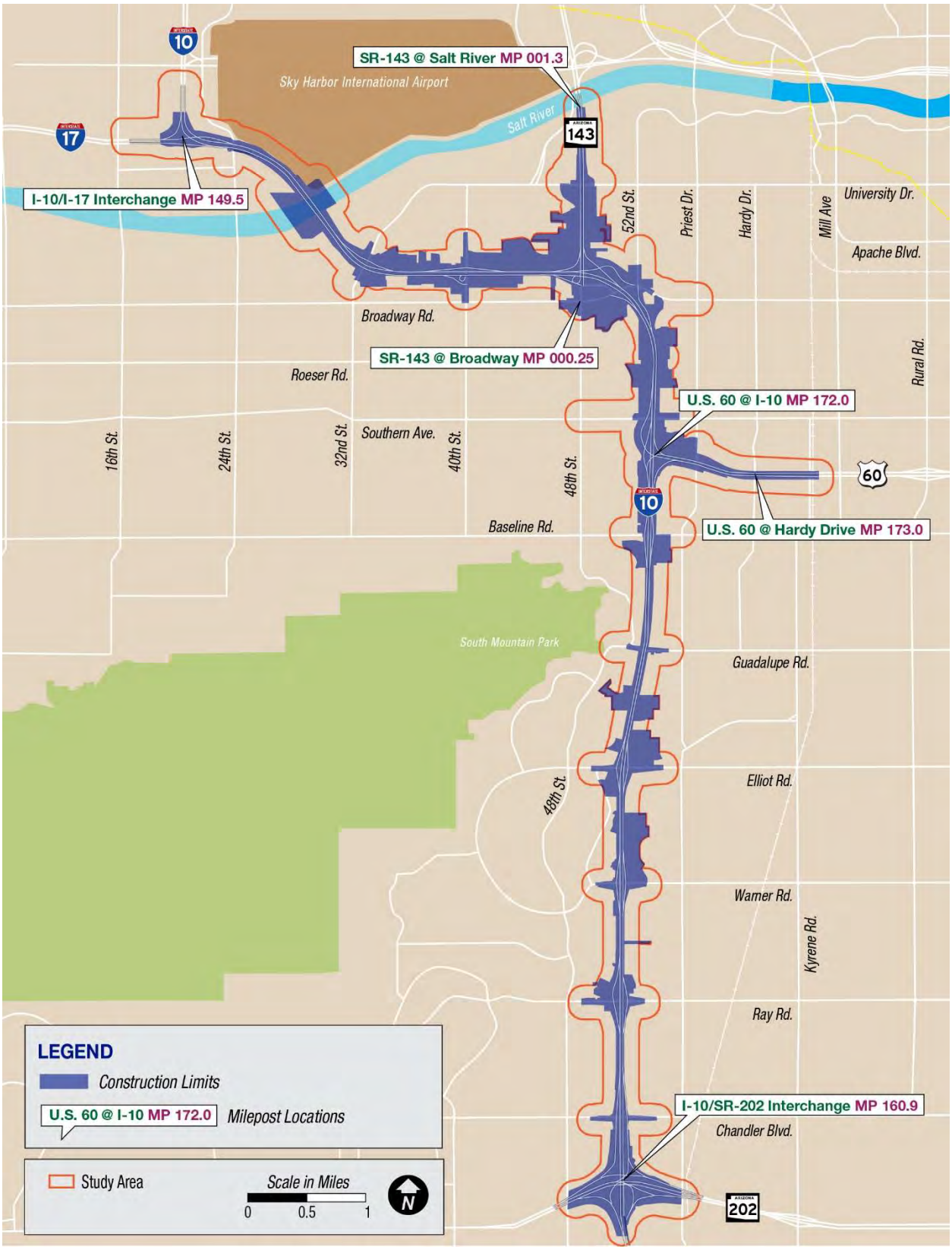
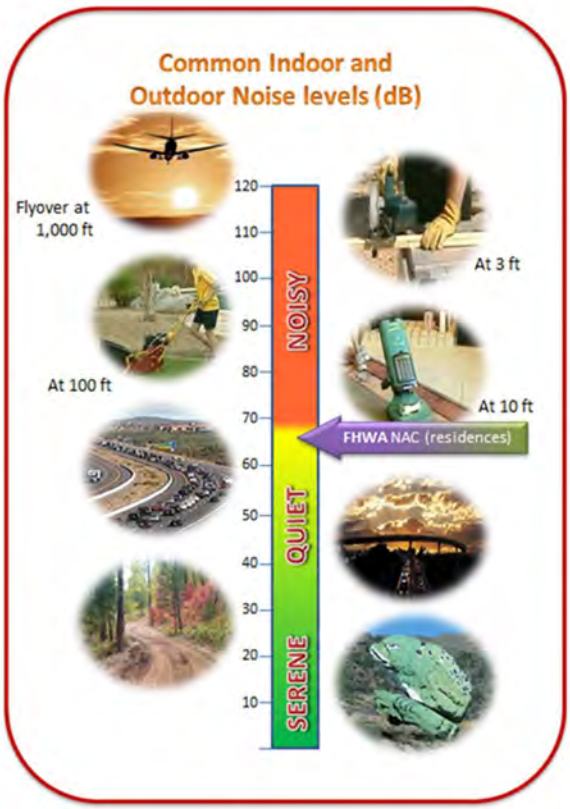


Figure 3. Project Study Area Subsections

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

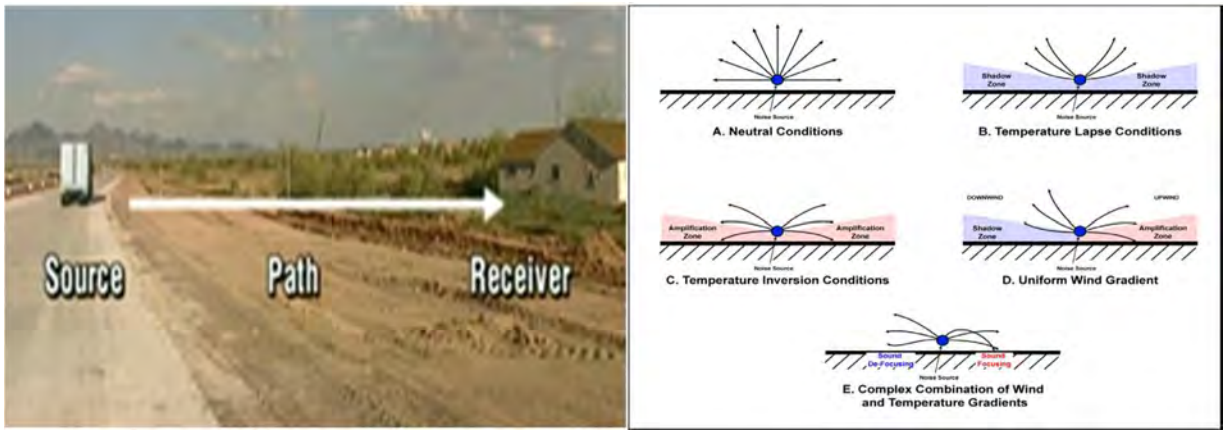
[$L_{Aeq(h)}$] is the energy average of A-weighted sound levels occurring during a one-hour period and is the basis for noise criteria used by ADOT.

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 4**, 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 4. 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 3**) 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 3. 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

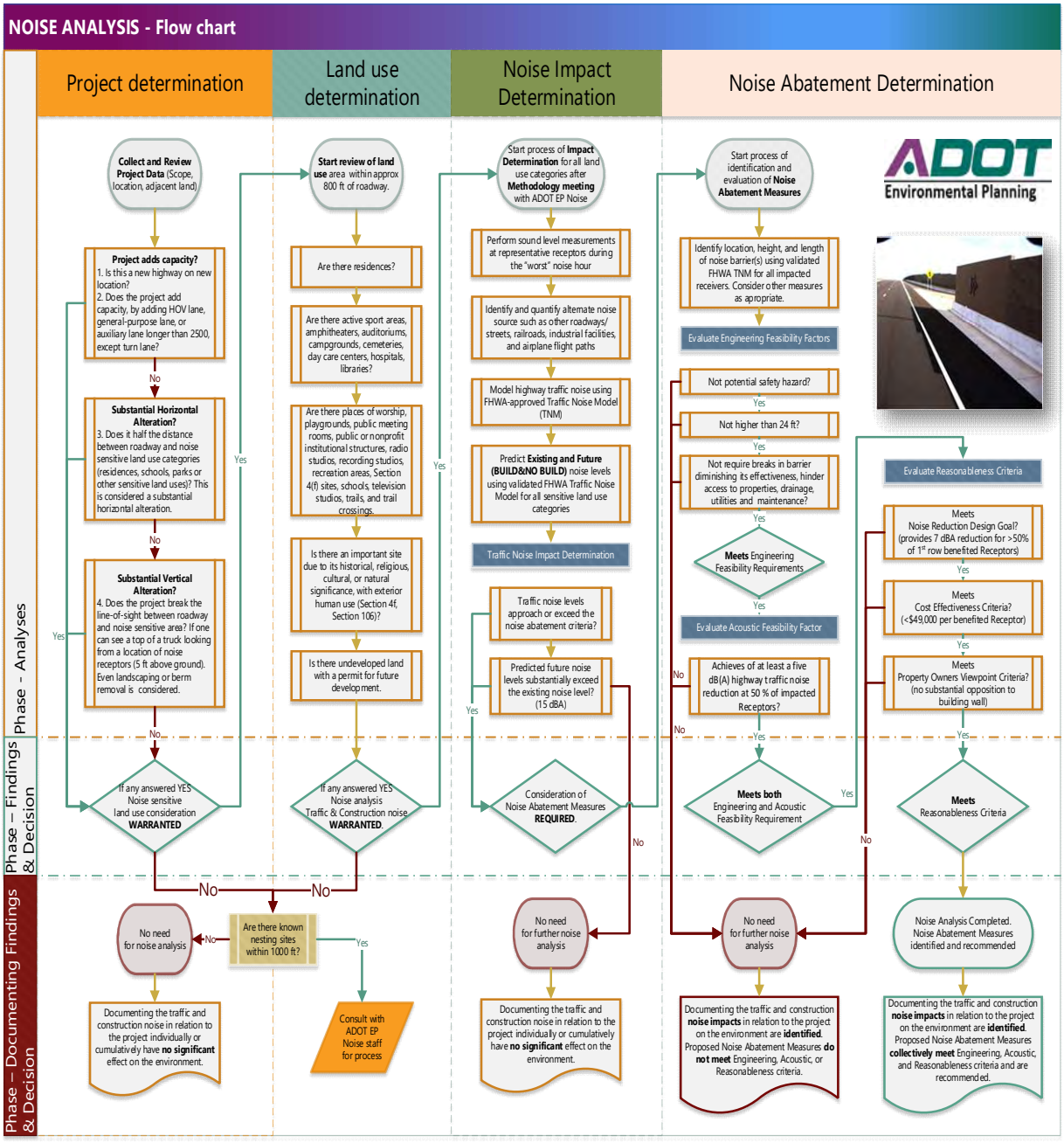
5 ANALYSIS METHODOLOGY

The noise analysis procedure of is exhibited on **Figure 5**. 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 3**. If there are noise sensitive areas within approximately 800-1,000 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.

   In case there is a railroad in proximity, the methodology in determining ambient noise levels requires an approach also determined in *Transit Noise and Vibration Impact Assessment* (FTA-VA-90-1003-06), Section 6, and particularly 6.6.3, Noise Exposure Computations from Partial Measurements.
3. Noise abatement measures, answering whether there are measures that meet all feasibility and reasonableness criteria, as per ADOT NAR.

Figure 5. 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*.

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 is 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 28 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 Noise 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. Outdoor use areas closest to the freeway were used as measurement sites at multi-family complexes. **Figure 6, Figure 7,** and **Figure 8** show the measurement locations.

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

- **I-10 from I-17 to 40th Street –** Land use in this area is mainly office and light industrial, with two hotels (Activity Category E), one at Site FM1 and one near Site FM2 on University Drive. Sound levels in the area between the I-17 TI and the Salt River are mainly influenced by the noise from Sky Harbor International Airport. Field measurements were taken at four sites in this portion the study area, FM1 to FM4 (see **Figure 6**).

- **I-10 from 40th Street to Fairmont Street –** This area is surrounded mainly by office and light industrial (Activity Category E), with one area of single family homes (Activity Category B) located on the eastbound (EB) side between 43rd Place and 48th Street, Site FM5. The portion of the SR 143 Hohokam Expressway within the project area is mainly office and light industrial land uses. However, there is a motel located on the westbound (WB) side and a hotel located on the southbound (SB) side south of University Drive (all Activity Category E). Field measurements were taken at four sites in this area, FM5; FM6 along I-10; and FM8 and FM9 along the Hohokam Expressway (see **Figure 6**).
- **I-10 from Fairmont Street to US 60 –** Land use in this section is a mix of single-family residences and apartments (Activity Category B), hotels (Activity Category E), a cemetery (Activity Category C), and office and shopping areas (Activity Category E and F). Nine field measurements were taken along I-10 in this area: FM7 and FM10 through FM17. Two field measurements, FM27 and FM28, were taken along the SR 60 Superstition Freeway at residential areas (Activity Category B) within the proposed area of improvements to US 60 associated with this project (see **Figure 6** and **Figure 7**).
- **I-10 from US 60 to Ray Road –** The land use in this section is a mix of shopping centers and office parks on the northbound side (Activity Category E and F), and residential (Activity Category B), golf courses, ball parks and shopping centers on the southbound side (Activity Categories C, E, and F). Nine field measurements, FM18 to FM26, were taken along this part of I-10 (see **Figure 7** and **Figure 8**).

Figure 6. 24th Street to Hohokam Expressway - Existing Noise Measurement Locations

Figure 7. Hohokam Expressway to Calle Guadalupe - Existing Noise Measurement Locations

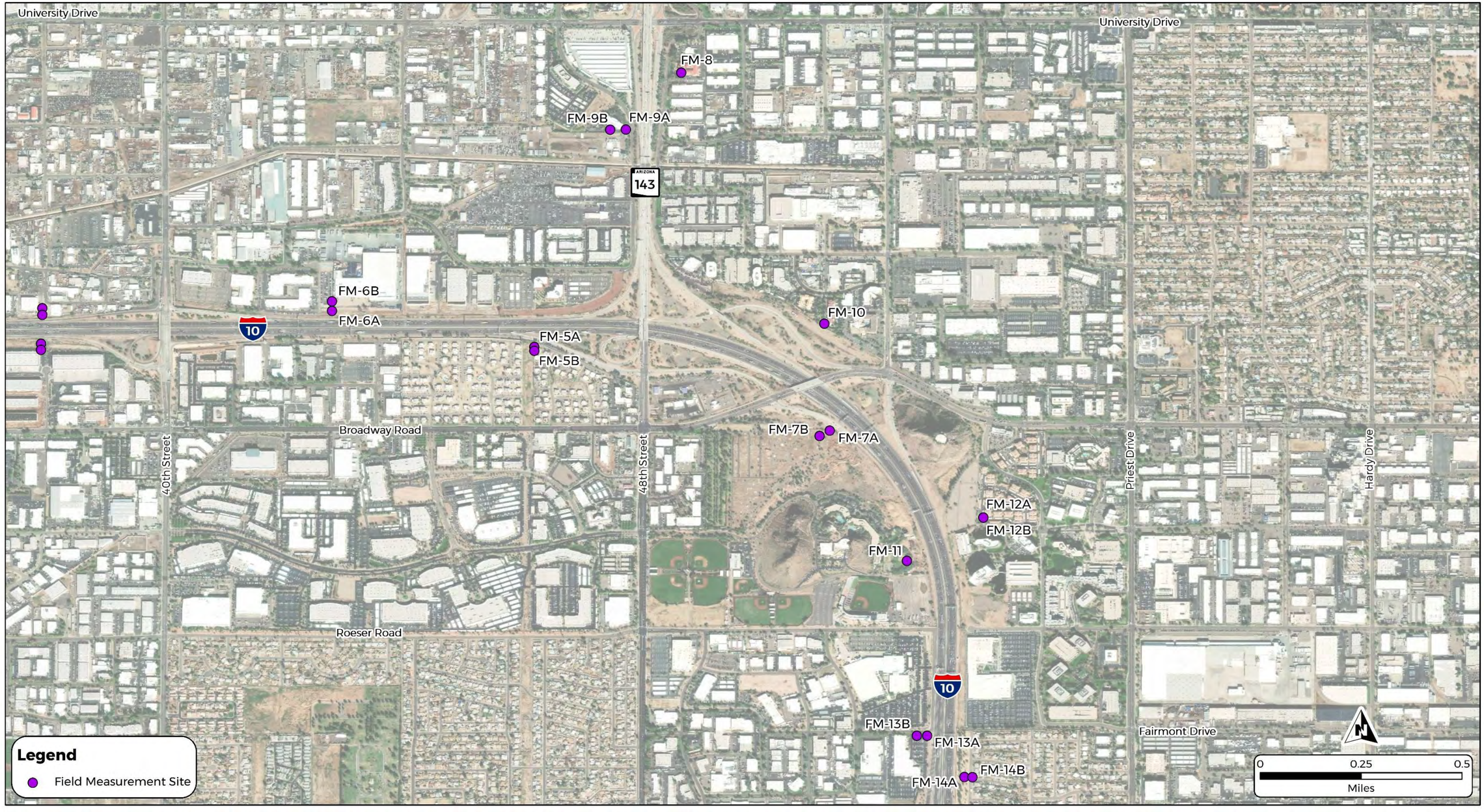
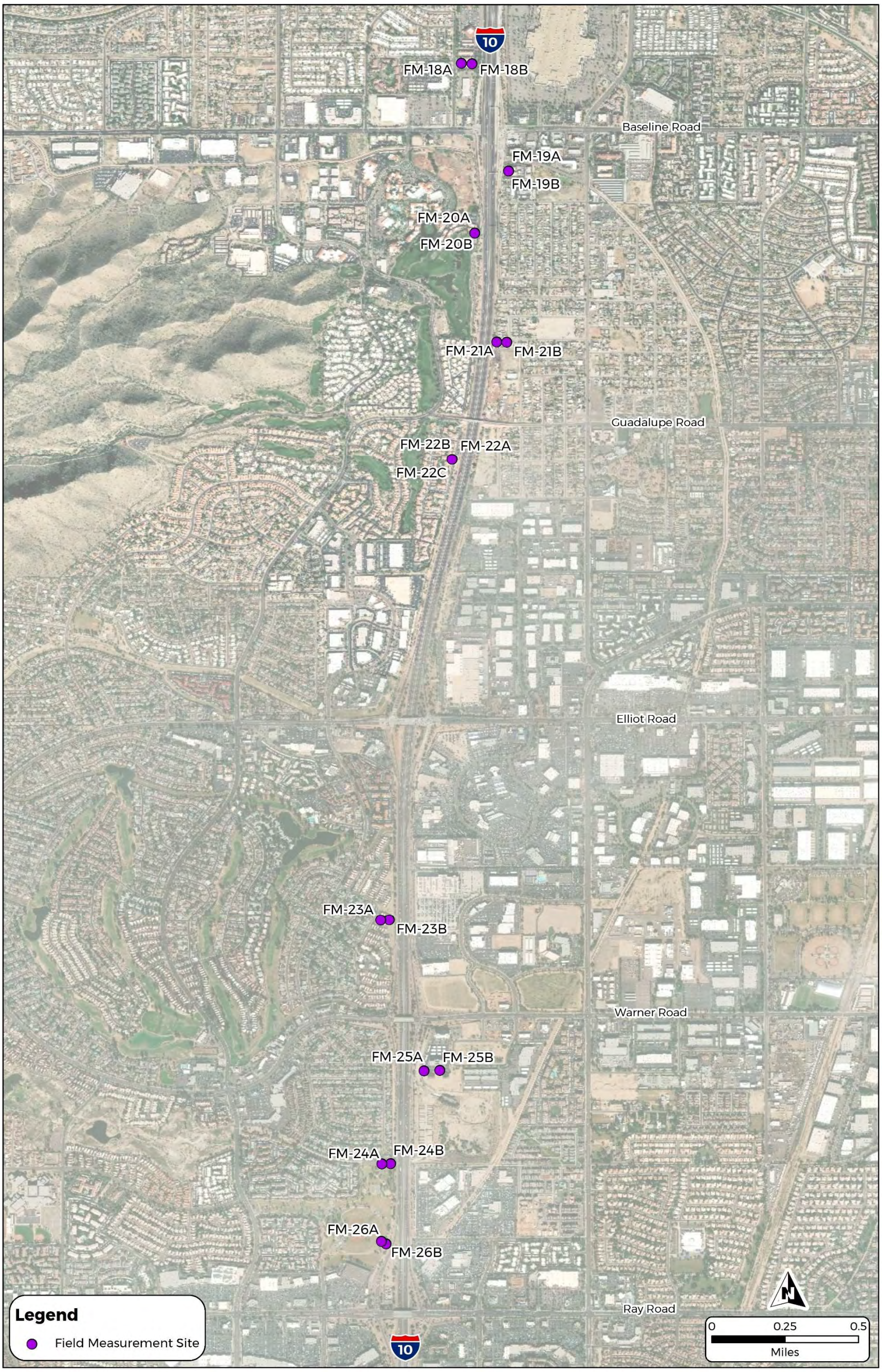


Figure 8. Calle Guadalupe to Ray Road - Existing Noise Measurement Locations

Figure 9. Calle Guadalupe to Ray Road - 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) Bruel and Kjaer model 2238 Meter with American National Standards Institute (ANSI) Type 1 accuracy.
2. Microphone System – One (1) Bruel and Kjaer model 4188, ½-inch pressure microphone; one (1) 4-inch diameter windscreen; and one (1) tripods.

- **Other Instrumentation:**

1. Acoustic Field Calibrator – One (1) Larson Davis model CA250
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) Panasonic Full High-Definition (HD) digital camcorder 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 other sources 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.

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. Based on validation results it was determined that the model was overpredicting by 2-3 dBA. The Existing noise levels are provided in **Table 4**.

Table 4. Existing Noise Levels

Receiver	Meas. Position	Facility type (MF, SF, etc.)	Number of represented receptors	NAC, L_{eq} dB(A)	Existing Noise Level, L_{eq} dB(A)	Remarks
FM-1(A)	1st Floor	Hotel/Motel	1	71	71.5	Model Validation
FM-1(B)	2nd Floor	Hotel/Motel	1	71	74.0	Model Validation
FM-2 (A)	1st Row	Parking Lot	0	71	65.1	Model Validation
FM-2 (B)	2nd Row	Parking Lot	0	71	61.7	Model Validation
FM-3(A)	1st Row	Parking Lot	0	71	75.4	Model Validation
FM-3 (B)	2nd Row	Parking Lot	0	71	71.3	Model Validation
FM-4(A)	1st Row	Parking Lot	0	71	73.7	Model Validation
FM-4 (B)	2nd Row	Parking Lot	0	71	68.0	Model Validation
FM-5(A)	1st Row	MF	2	66	71.2	Model Validation
FM-5(B)	2nd Row	MF	2	66	69.4	Model Validation
FM-6(A)	1st Row	Parking Lot	0	71	74.0	Model Validation
FM-6(B)	2nd Row	Parking Lot	0	71	67.6	Model Validation
FM-7(A)	1st Row	Cemetery	1	66	72.8	Model Validation
FM-7(B)	2nd Row	Cemetery	1	66	66.0	Model Validation
FM-8(A)	-----	Hotel/Motel (Pool)	1	66	63.9	Model Validation
FM-9(A)	1st Row	Parking Lot	4	71	70.7	Model Validation
FM-9(B)	2nd Row	Hotel/Motel (Pool)	10	66	61.7	Model Validation
FM-10(A)	-----	Hotel/Motel (Pool)	20	66	63.0	Model Validation
FM-11(A)	-----	Hotel/Motel (Outdoor)	1	66	68.3	Model Validation
FM-12(A)	1st Floor	MF	4	66	55.9	Model Validation
FM-12(B)	2nd Floor	MF	4	66	60.0	Model Validation
FM-13(A)	1st Row	Parking Lot	0	71	73.5	Model Validation
FM-13(B)	2nd Row	Parking Lot	0	71	71.1	Model Validation
FM-14(A)	1st Row	Park	3	66	65.1	Model Validation
FM-14(B)	2nd Row	SF	3	66	64.4	Model Validation
FM-15(A)	-----	SF	2	66	58.5	Model Validation
FM-16(A)	-----	SF	2	66	61.1	Model Validation
FM-17(A)	1st Floor	MF	2	66	61.3	Model Validation

Receiver	Meas. Position	Facility type (MF, SF, etc.)	Number of represented receptors	NAC, L_{eq} dB(A)	Existing Noise Level, L_{eq} dB(A)	Remarks
FM-17(B)	2nd Floor	MF	2	66	64.7	Model Validation
FM-18(A)	1st Row	Hotel/Motel	6	71	64.7	Model Validation
FM-18(B)	2nd Row	Hotel/Motel (Pool)	6	71	59.6	Model Validation
FM-19(A)	1st Floor	MF	5	66	65.9	Model Validation
FM-19(B)	2nd Floor	MF	5	66	70.3	Model Validation
FM-20(A)	1st Floor	Hotel/Motel	10	71	67.0	Model Validation
FM-20(B)	2nd Floor	Hotel/Motel	10	71	72.6	Model Validation
FM-21(A)	1st Row	SF	1	66	63.9	Model Validation
FM-21(B)	2nd Row	SF	1	66	61.9	Model Validation
FM-22(A)	1st Floor	MF	4	66	70.2	Model Validation
FM-22(B)	2nd Floor	MF	4	66	76.5	Model Validation
FM-23(A)	1st Row	SF	2	66	63.0	Model Validation
FM-23(B)	2nd Row	SF	2	66	56.3	Model Validation
FM-24(A)	1st Row	Park	10	66	61.0	Model Validation
FM-24(B)	2nd Row	Park	10	66	59.6	Model Validation
FM-25(A)	1st Row	Parking Lot	0	71	65.5	Model Validation
FM-25(B)	2nd Row	Parking Lot	0	71	60.1	Model Validation
FM-26(A)	1st Row	Park	10	66	69.3	Model Validation
FM-26(B)	2nd Row	Park	10	66	66.4	Model Validation
FM-27(A)	1st Floor	MF	3	66	62.4	Model Validation
FM-27(B)	2nd Floor	MF	3	66	65.2	Model Validation
FM-28(A)	1st Row	SF	4	66	59.4	Model Validation
FM-28(B)	2nd Row	SF	4	66	59.9	Model Validation

MF = Multi-Family Residential; SF = Single-Family Residential

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. 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 hard 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: 1,750 vehicles per hour (vph) / lane
- Auxiliary Lane Volume: 1,500 vph/Lane
- Ramp Volume: 1,000 vph / lane, or predicted future volume (whichever is less)
- Truck Percentage: 6% (4% Medium, 2% 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: 65 mph
- Ramp Speed: 10 to 65 mph
- Loop Ramp Speed: 25 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 5** through **Table 8**. 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 5** through **Table 8** show the list of receivers with predicted future noise levels. The location of the receivers is shown on **Figure 10** to **Figure 22**.

Table 5. Modeled Noise Levels (Existing, No-Build & Build Conditions): I-17 to 40th Street

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
FM1A	Motel	1	71	69.7	69.7	72.2	Yes
FM1B	Motel	1	71	73.3	73.3	74.5	Yes
FM2A	Office	0	71	69.3	69.3	76.8	Yes
FM2B	Office	0	71	66.6	66.6	73.3	Yes
FM3A	Office	0	71	76.8	76.9	82.0	Yes
FM3B	Office	0	71	73.6	73.6	79.5	Yes
FM4B	Office	0	71	72.9	72.9	78.5	Yes
FM4A	Office	0	71	77.4	77.4	82.5	Yes
SB1	Motel	15	71	61.6	61.6	63.5	No
NB1	Hotel	20	71	63.8	63.9	68.9	No

Table 6. Modeled Noise Levels (Existing, No-Build & Build Conditions): 40th Street to Fairmont Street

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
FM5A	MF	2	66	74.2	74.2	76.5	Yes
FM5B	MF	2	66	71.6	71.6	73.8	Yes
FM6A	Parking Lot	0	71	78.8	78.8	82.4	Yes
FM6B	Parking Lot	0	71	73.3	73.3	75.7	Yes
FM7A	Cemetery	1	66	76.6	76.6	80.3	Yes
FM7B	Cemetery	1	66	70.9	70.9	75.3	Yes
FM8	Hotel/Motel (Pool)	10	71	66.1	66.1	66.0	No
FM9A	Hotel No Outside Uses	1	-	73.6	73.6	72.0	N/A
FM9B	Hotel/Motel (Pool)	10	71	67.5	67.5	66.0	No
FM10	Hotel/Motel (Pool)	20	71	67.2	67.2	71.3	Yes
FM11	Hotel/Motel No Outdoor Uses	0	-	73.0	73.0	76.0	N/A
FM12A	MF	4	66	58.4	58.4	63.9	No
FM12B	MF	4	66	64.8	64.8	70.5	Yes
FM12C	MF	4	66	66.6	66.6	72.0	Yes
SB2	MF	2	66	68.2	68.2	70.2	Yes
SB3	MF	4	66	68.6	68.6	70.7	Yes
SB7	MF	2	66	67.4	67.4	69.7	Yes
SB4	MF	4	66	68.7	68.7	70.6	Yes
SB5	MF	4	66	68.4	68.4	70.3	Yes
SB6	MF	4	66	67.9	67.9	70.0	Yes
SB8	MF	2	66	66.0	66.0	68.0	Yes
SB9	MF	2	66	64.9	64.9	67.1	Yes
SB10	MF	4	66	64.4	64.4	66.1	Yes
SB11	MF	4	66	64.4	64.4	66.3	Yes
SB12	MF	4	66	64.1	64.1	65.9	Yes
SB13	MF	2	66	64.2	64.2	66.2	Yes
SB14	MF	2	66	63.9	63.9	65.9	Yes

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
SB15	MF	2	66	62.2	62.2	64.2	No
SB16	MF	4	66	62.1	62.1	63.8	No
SB17	MF	4	66	62.1	62.1	63.7	No
SB18	MF	4	66	62.2	62.2	63.9	No
SB19	MF	4	66	62.5	62.5	64.3	No
SB20	MF (Pool)	15	66	62.5	62.5	64.1	No
SB21	MF (Pool)	15	66	61.4	61.4	63.0	No
SB23	MF	4	66	70.0	70.0	72.0	Yes
SB24	MF	8	66	68.1	68.1	69.8	Yes
SB25	MF	8	66	67.3	67.3	68.7	Yes
SB26	MF	8	66	66.8	66.8	68.1	Yes
SB27	MF	8	66	65.9	65.9	67.1	Yes
SB28	MF	2	66	64.4	64.4	65.9	Yes
SB29	MF	10	66	64.2	64.2	65.7	Yes
SB30	MF	4	66	64.0	64.0	65.0	No
SB31	MF	4	66	64.0	64.0	64.5	No
SB32	MF	4	66	64.5	64.5	66.0	Yes
SB33	Hotel/Motel (Pool)	20	71	68.6	68.6	66.8	No
SB34A	Cemetery	1	66	68.9	68.9	71.8	Yes
SB34B	Cemetery	1	66	68.6	68.6	70.7	Yes
SB35	Cemetery	1	66	73.5	73.6	75.9	Yes
SB36	Cemetery	1	66	69.6	69.6	72.3	Yes
SB38	Hotel/Motel No Outdoor Uses	1	-	74.1	76.3	75.2	N/A
SB37A	Hotel No Outdoor Uses	1	-	70.5	72.3	72.2	N/A
SB37B	Hotel Outdoor Use	1	71	72.6	73.2	73.9	Yes
NB2	Hotel/Motel (Pool)	10	71	65.6	66.3	69.3	No
NB3	Hotel/Motel (Pool)	15	71	58.9	59.9	61.1	No
NB4	MF (Pool)	15	66	57.2	58.0	60.9	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
NB2A	Hotel Outdoor Use	1	71	67.6	68.2	70.7	No
NB2B	Hotel Outdoor Use	1	71	68.2	68.9	71.7	Yes
NB3A	Hotel Outdoor Use	1	71	65.2	65.9	71.1	Yes
NB3B	Hotel Outdoor Use	1	71	67.5	68.1	72.3	Yes
Marriot1	Hotel/Motel (Pool)	10	71	60.6	60.6	61.8	No
Marriot2	Hotel/Motel (Pool)	10	71	59.7	59.7	60.9	No
TB WT	Trail	2	66	68.9	68.9	70.6	Yes
TB1-TB63	Cemetery	63	66	64.9/76.6	64.9/76.6	64.9/76.6	Yes

Table 7. Modeled Noise Levels (Existing, No-Build & Build Conditions): Fairmont Street to SR60

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
FM14A	Park/Rec Area	3	66	68.0	69.2	78.4	Yes
FM14B	SF	3	66	69.8	69.8	78.4	Yes
FM17A	MF (Level 1)	2	66	68.4	68.4	73.6	Yes
FM17B	MF (Level 2)	2	66	72.0	72.0	75.9	Yes
FM27A	MF (Level 1)	3	66	63.8	63.9	64.8	No
FM27B	MF (Level 2)	3	66	67.0	67.7	67.9	Yes
FM28A	SF (Row 1)	4	66	63.6	64.0	64.1	No
FM28B	SF (Row 2)	4	66	61.9	62.3	62.5	No
NB5	SF	1	66	67.4	67.5	76.7	Yes
NB6	SF	3	66	68.0	68.0	78.4	Yes
NB7	SF	3	66	71.2	71.2	78.0	Yes
NB9	SF	1	66	65.0	65.0	72.6	Yes
NB8	SF	4	66	67.2	67.3	76.1	Yes
NB10	SF	3	66	64.3	64.3	72.2	Yes
NB11	SF	4	66	63.4	63.4	72.2	Yes
NB12	SF	4	66	61.0	61.0	69.2	Yes
NB13	SF	3	66	65.1	65.1	71.9	Yes
NB14	SF	3	66	62.4	62.4	69.3	Yes
NB15	SF	4	66	58.6	58.6	65.3	No
NB16	SF	4	66	58.0	58.0	64.8	No
NB17	SF	4	66	59.5	59.5	65.7	No
NB18	SF	3	66	60.7	60.7	63.6	No
NB19	MF	5	66	65.5	65.6	67.2	Yes
NB20	MF (Level 1)	5	66	67.8	67.8	72.6	Yes
NB20	MF (Level 2)	5	66	71.2	71.2	74.9	Yes
NB21A	MF (Level 1)	5	66	67.9	67.9	71.0	Yes

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
NB21B	MF (Level 2)	5	66	71.8	71.8	75.1	Yes
NB22A	MF (Level 1)	5	66	68.2	68.2	71.6	Yes
NB22B	MF (Level 2)	5	66	71.1	71.1	74.3	Yes
NB23A	MF (Level 1)	5	66	66.4	66.5	71.2	Yes
NB23B	MF (Level 2)	5	66	69.2	69.2	73.4	Yes
NB24	MF	5	66	65.5	65.5	68.3	Yes
NB25A	MF (Level 1)	5	66	62.4	62.4	64.3	No
NB25B	MF (Level 2)	5	66	63.6	63.6	65.9	Yes
NB26	MF	6	66	62.8	62.8	65.2	No
NB27	MF	5	66	62.7	62.7	64.3	No
NB28	MF	15	66	62.6	62.6	64.7	No
NB30	MF	6	66	62.1	62.1	63.8	No
NB29	MF	6	66	61.8	61.9	64.9	No
NB31	MF	4	66	65.2	65.2	68.5	Yes
NB32	MF	10	66	63.7	63.7	65.0	No
SB204	SF	4	66	69.4	69.5	70.0	Yes
SB205	SF	4	66	71.0	71.0	71.9	Yes
SB206	SF	4	66	72.2	72.3	73.3	Yes
SB207	SF	6	66	70.3	70.3	71.2	Yes
SB208	SF	3	66	71.1	71.2	72.1	Yes
SB209	SF	4	66	63.6	63.6	64.3	No
SB210	SF	4	66	69.0	69.0	69.6	Yes
SB211	SF	4	66	69.4	69.4	70.3	Yes
SB212	SF	4	66	69.2	69.2	70.1	Yes
SB213	SF	2	66	66.9	66.9	67.7	Yes
SB214	SF	2	66	60.9	60.9	61.5	No
SB215	SF	2	66	60.3	60.3	60.8	No
SB216	SF	2	66	59.0	59.0	59.6	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
SB217A	MF (Level 1)	6	66	63.3	63.3	64.4	No
SB217B	MF (Level 2)	6	66	66.6	66.6	67.5	Yes
SB218A	MF (Level 1)	10	66	62.6	62.6	63.6	No
SB218B	MF (Level 2)	10	66	65.2	65.2	66.0	Yes
SB219	SF	2	66	59.2	59.2	59.8	No
SB220	SF	2	66	58.7	58.8	59.7	No
NB81	SF	2	66	69.7	69.7	68.1	Yes
NB82	SF	3	66	67.9	67.9	67.0	Yes
NB83	SF	3	66	66.3	66.3	66.5	Yes
NB84	SF	4	66	66.4	66.4	66.6	Yes
NB85	SF	4	66	65.3	65.4	65.5	Yes
NB86	SF	3	66	65.3	65.3	65.6	Yes
NB87	SF	4	66	64.7	64.7	65.1	No
NB88	SF	5	66	63.4	63.4	63.8	No
NB89	SF	4	66	63.9	63.9	64.4	No
NB90	SF	4	66	62.9	63.0	63.5	No
NB91	SF	4	66	61.6	61.6	62.3	No
NB92	SF	4	66	62.2	62.3	63.2	No
NB93	SF	5	66	58.8	58.8	60.5	No
NB94	SF	4	66	66.0	66.0	66.1	Yes
NB95	SF	5	66	64.6	64.7	65.2	No
NB96	SF	6	66	64.2	64.2	64.8	No
NB97	SF	4	66	61.4	61.4	62.0	No
NB98	SF	4	66	60.9	61.0	61.6	No
NB99	SF	6	66	61.3	61.3	61.9	No
NB100	SF	4	66	59.7	59.8	60.6	No
NB101	SF	6	66	58.4	58.4	59.3	No
NB102	SF	6	66	58.5	58.5	59.6	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
NB103	SF	4	66	57.6	57.6	58.7	No
NB104	SF	6	66	58.2	58.2	60.8	No
NB105	SF	1	66	62.3	62.3	64.9	No
FM13A	Parking Lot	0	71	79.6	79.6	83.4	Yes
FM13B	Office	0	71	76.8	76.8	79.4	Yes
FM15	SF	2	66	63.7	63.7	65.4	No
FM16	SF	2	66	67.1	67.1	68.7	Yes
FM18A	Motel	6	71	67.7	67.7	70.9	No
FM18B	Motel Pool	6	71	61.3	61.3	62.2	No
SB39	SF	5	66	61.0	61.0	65.7	Yes
SB40	SF	4	66	59.3	59.3	61.8	No
SB41	SF	4	66	59.6	59.6	63.2	No
SB42	SF	4	66	59.2	59.2	62.2	No
SB43	SF	3	66	59.7	59.7	61.4	No
SB44	SF	4	66	63.6	63.6	62.0	No
SB45	SF	4	66	67.2	67.2	66.1	Yes
SB46	SF	3	66	68.2	68.2	67.5	Yes
SB47	SF	3	66	65.0	65.0	64.2	No
SB48	SF	4	66	63.5	63.6	64.3	No
SB49	SF	4	66	61.2	61.2	61.6	No
SB51	SF	6	66	61.5	61.5	62.2	No
SB50	SF	0	66	61.2	61.2	62.0	No
SB52	SF	3	66	61.8	61.8	62.1	No
SB53	SF	5	66	64.8	64.8	63.7	No
SB54	SF	3	66	65.8	65.8	64.7	No
SB55	SF	4	66	64.4	64.4	64.2	No
SB56	SF	6	66	63.3	63.3	64.2	No
SB57	SF	10	66	60.3	60.3	60.6	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
SB58	SF	6	66	62.1	62.1	61.9	No
SB59	SF	4	66	61.6	61.6	61.1	No
SB60	SF	2	66	64.2	64.2	63.2	No
SB61	SF	5	66	63.5	63.5	63.9	No
SB62	SF	2	66	64.1	64.1	64.7	No
SB63	SF	2	66	63.1	63.1	63.7	No
SB64	SF	2	66	63.1	63.1	63.7	No
SB65	SF	4	66	62.3	62.3	62.4	No
SB66	SF	3	66	59.8	59.8	60.5	No
SB67	SF	2	66	63.6	63.6	64.2	No
SB68	SF	2	66	63.7	63.7	64.0	No
SB69	SF	2	66	64.1	64.1	64.7	No
SB70	SF	4	66	59.8	59.8	60.2	No
SB71	SF	2	66	63.2	63.2	63.2	No
SB72	SF	2	66	63.4	63.4	62.1	No

Table 8. Modeled Noise Levels (Existing, No-Build & Build Conditions): SR60 to Ray Road

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
FM20A	Hotel Rooms, no outdoor uses (Level 1)	10	-	72.3	72.3	71.8	N/A
FM20B	Hotel Rooms, no outdoor uses (Level 2)	10	-	77.4	77.4	77.8	N/A
FM22A	MF (Level 1)	4	66	72.9	72.9	73.6	Yes
FM22B	MF (Level 2)	4	66	79.2	79.2	80.6	Yes
FM22C	MF (Level 3)	4	66	79.6	79.6	80.9	Yes
FM23A	SF (Row 1)	2	66	66.6	66.6	67.4	Yes
FM23B	SF (Row 2)	2	66	63.3	63.3	64.1	No
FM24A	Park	10	66	65.1	65.1	65.5	Yes
FM24B	Park	10	66	65.7	65.7	66.4	Yes
FM26A	Park	1	66	76.8	76.8	77.7	Yes
FM26B	Park	1	66	73.8	73.8	74.7	Yes
SB73A	Hotel Rooms, no outdoor uses (Level 1)	4	-	74.1	74.1	75.0	N/A
SB73B	Hotel Rooms, no outdoor uses (Level 2)	4	-	77.6	77.6	78.4	N/A
SB74	Golf Course	1	66	77.2	77.2	78.4	Yes
SB75	Golf Course	1	66	78.4	78.4	79.8	Yes
SB76	Golf Course	1	66	78.1	78.1	79.5	Yes
SB77	Hotel (Pool)	20	71	67.5	67.5	68.3	No
SB78	Golf Course	1	66	63.8	63.8	64.4	No
SB79	Golf Course	1	66	67.3	67.3	68.0	Yes
SB80A	MF (Level 1)	2	66	69.3	69.2	70.4	Yes
SB80B	MF (Level 2)	2	66	73.6	73.6	74.6	Yes
SB81A	MF (Level 1)	4	66	62.3	62.3	63.0	No
SB81B	MF (Level 2)	4	66	69.7	69.7	70.2	Yes
SB82A	MF (Level 1)	4	66	61.6	61.6	62.2	No
SB82B	MF (Level 2)	4	66	67.8	67.8	68.1	Yes
SB83A	MF (Level 1)	10	66	61.1	61.1	61.7	No
SB83B	MF (Level 2)	10	66	71.5	71.5	71.9	Yes

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
SB84A	MF (Level 1)	2	66	70.1	70.1	71.3	Yes
SB84B	MF (Level 2)	2	66	71.9	71.9	73.0	Yes
SB85A	MF (Level 1)	2	66	65.6	65.6	65.9	Yes
SB85B	MF (Level 2)	2	66	69.8	69.8	70.7	Yes
SB86A	MF (Level 1)	4	66	57.8	57.8	58.5	No
SB86B	MF (Level 2)	4	66	58.4	58.4	59.0	No
SB87A	MF (Level 1)	4	66	59.1	59.1	59.8	No
SB87B	MF (Level 2)	4	66	59.8	59.8	60.5	No
SB88A	MF (Level 1)	4	66	58.3	58.3	59.2	No
SB88B	MF (Level 2)	4	66	59.5	59.5	60.3	No
SB89A	MF (Level 1)	2	66	62.9	62.9	63.3	No
SB89B	MF (Level 2)	2	66	66.2	66.2	66.9	Yes
SB90A	MF (Level 1)	10	66	62.5	62.5	63.5	No
SB90B	MF (Level 2)	10	66	62.8	62.8	63.8	No
SB91A	MF (Level 1)	2	66	64.3	64.3	65.9	Yes
SB91B	MF (Level 2)	2	66	64.6	64.6	66.5	Yes
SB92A	MF (Level 1)	4	66	74.4	74.4	75.1	Yes
SB92B	MF (Level 2)	4	66	79.0	79.0	80.4	Yes
SB93A	MF (Level 1)	16	66	65.4	65.4	65.2	No
SB93B	MF (Level 2)	16	66	68.7	68.7	69.1	Yes
SB94A	MF (Level 1)	16	66	78.1	78.1	78.9	Yes
SB94B	MF (Level 2)	16	66	79.1	79.1	80.5	Yes
SB95A	MF (Level 1)	12	66	78.0	78.0	78.7	Yes
SB95B	MF (Level 2)	12	66	79.1	79.1	80.5	Yes
SB96A	MF (Level 1)	16	66	78.7	78.7	79.4	Yes
SB96B	MF (Level 2)	16	66	79.8	79.8	81.3	Yes
SB96C	MF (Level 3)	16	66	80.1	80.1	81.5	Yes
SB97A	MF (Level 1)	16	66	77.3	77.3	77.8	Yes

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
SB97B	MF (Level 2)	16	66	79.5	79.5	81.0	Yes
SB98	MF	4	66	69.3	69.3	69.7	Yes
SB99	Playground	20	66	72.0	72.0	72.8	Yes
SB100	MF (Pool)	20	66	59.9	59.9	60.3	No
SB101	MF	4	66	65.0	65.0	64.9	No
SB102	Hotel Pool	20	71	49.7	49.7	54.5	No
SB102A	Hotel (Level 1)	5	71	67.2	67.2	68.6	No
SB102B	Hotel (Level 2)	5	71	68.5	68.5	70.0	No
SB103	Hotel Pool	20	71	64.1	64.2	65.5	No
SB103A	Hotel (Level 1)	5	71	66.3	66.6	67.5	No
SB103B	Hotel (Level 2)	5	71	72.3	72.4	73.5	Yes
SB104	MF	10	66	63.6	63.6	64.7	No
SB104A	MF (Level 1)	5	66	69.7	69.8	71.1	Yes
SB104B	MF (Level 2)	5	66	77.4	77.4	78.6	Yes
SB105	MF	12	66	64.1	64.2	65.1	No
SB105A	MF (Level 1)	6	66	70.3	70.3	71.3	Yes
SB105B	MF (Level 2)	6	66	78.0	78.1	78.9	Yes
SB106	MF	16	66	56.6	56.6	58.2	No
SB107	MF	20	66	59.6	59.7	60.9	No
SB108	MF	4	66	58.3	58.4	59.3	No
SB109	MF	4	66	53.7	53.7	54.9	No
SB110	SF	6	66	66.8	66.8	67.5	Yes
SB111	SF	7	66	66.7	66.7	67.6	Yes
SB112	SF	4	66	67.0	67.0	67.8	Yes
SB113	SF	4	66	66.5	66.5	67.2	Yes
SB114	SF	5	66	67.7	67.7	68.5	Yes
SB115	SF	4	66	65.9	65.9	66.6	Yes
SB116	SF	2	66	63.7	63.6	64.5	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
SB117	SF	4	66	62.1	62.1	63.0	No
SB118	SF	3	66	65.8	65.8	66.7	Yes
SB119	SF	2	66	64.9	64.9	65.8	Yes
SB120	SF	4	66	63.3	63.3	64.3	No
SB121	SF	10	66	64.1	64.1	64.8	No
SB122	SF	4	66	64.8	64.8	65.5	Yes
SB123	SF	4	66	62.4	62.4	63.1	No
SB124	SF	4	66	64.9	64.9	65.6	Yes
SB125	SF	2	66	65.7	65.7	66.1	Yes
SB126	SF	4	66	63.2	63.1	64.0	No
SB127	SF	4	66	60.0	60.0	60.7	No
SB128	SF	4	66	61.4	61.4	62.4	No
SB129	SF	2	66	61.8	61.8	63.0	No
SB130	SF	4	66	58.9	58.9	60.5	No
SB131	SF	2	66	58.5	58.5	61.0	No
SB132	SF	2	66	57.3	57.3	60.8	No
SB133	SF	2	66	63.3	63.3	64.0	No
SB134	SF	4	66	60.5	60.5	61.3	No
SB135	SF	4	66	59.6	59.6	60.1	No
SB136	SF	2	66	58.0	57.9	58.9	No
SB137	SF	10	66	55.6	55.6	56.7	No
SB138	SF	6	66	60.5	60.5	61.6	No
SB139	SF	4	66	57.2	57.2	58.4	No
SB140	SF	6	66	57.1	57.1	59.4	No
SB141	SF	6	66	55.9	55.8	61.2	No
SB142	SF	4	66	60.0	60.0	61.4	No
SB143	SF	4	66	62.1	62.1	63.1	No
SB144	SF	4	66	62.4	62.4	63.3	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
SB145	SF	4	66	62.6	62.6	63.5	No
SB146	SF	4	66	62.7	62.7	63.6	No
SB147	SF	4	66	62.7	62.7	63.7	No
SB148	SF	4	66	62.9	62.9	63.8	No
SB149	SF	3	66	64.9	64.9	65.6	Yes
SB150	SF	3	66	58.3	58.3	60.5	No
SB151	SF	6	66	61.0	61.0	62.9	No
SB152	SF	2	66	58.1	58.1	60.6	No
SB153	SF	2	66	59.2	59.1	61.5	No
SB154	SF	2	66	58.2	58.2	60.6	No
SB155	SF	4	66	62.5	62.5	63.7	No
SB156	SF	2	66	61.5	61.5	61.8	No
SB157	SF	2	66	59.6	59.6	60.4	No
SB158	SF	2	66	64.2	64.2	65.4	No
SB159	SF	3	66	55.5	55.5	57.5	No
SB160	SF	4	66	57.8	57.8	59.1	No
SB161	SF	4	66	57.7	57.7	58.9	No
SB162	SF	4	66	58.0	58.0	59.2	No
SB163	SF	4	66	56.4	56.4	57.7	No
SB164	SF	4	66	58.8	58.8	60.1	No
SB165	SF	4	66	62.6	62.6	63.3	No
SB167	SF	2	66	63.7	63.7	64.6	No
SB168	Park	0	66	66.8	66.8	67.1	Yes
SB170	Park	0	66	68.8	68.8	69.1	Yes
SB171	Park	0	66	78.3	78.3	79.2	Yes
SB172	Park	0	66	78.7	78.7	79.6	Yes
SB173	Park	0	66	79.1	79.1	79.9	Yes
SB174	Park	0	66	78.5	78.5	79.3	Yes

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
SB175	Park	0	66	78.0	78.0	78.9	Yes
SB176	Park	0	66	76.6	76.6	77.4	Yes
SB177	Park	0	66	75.8	75.8	76.8	Yes
SB178	Park	0	66	74.8	74.8	75.5	Yes
SB179	Park	0	66	73.0	73.0	72.8	Yes
SB180	Park	0	66	67.0	67.0	67.7	Yes
SB181	Park	0	66	68.7	68.7	69.2	Yes
SB182	Park	0	66	75.7	75.7	76.4	Yes
SB183	Park	0	66	75.9	75.9	76.6	Yes
SB184	Park	0	66	75.6	75.6	76.3	Yes
SB185	Park	0	66	75.2	75.2	75.9	Yes
SB186	Park	0	66	74.5	74.5	75.4	Yes
SB188	Park	0	66	72.5	72.5	73.2	Yes
SB189	Park	0	66	69.0	69.0	69.6	Yes
SB190	Park	10	66	67.5	67.5	68.1	Yes
SB191	Park	6	66	72.1	72.1	72.8	Yes
SB192	Park	0	66	72.3	72.3	73.0	Yes
SB193	Park	0	66	72.8	72.8	73.5	Yes
SB194	Park	0	66	72.8	72.8	73.6	Yes
SB195	Park	0	66	72.3	72.3	73.2	Yes
SB196	Park	0	66	71.1	71.1	71.9	Yes
SB197	Park	0	66	68.1	68.1	68.9	Yes
SB198	Park	0	66	65.6	65.6	66.2	Yes
SB199	Park	0	66	68.6	68.6	69.3	Yes
SB200	Park	0	66	69.7	69.7	70.6	Yes
SB201	Park	0	66	69.7	69.7	70.6	Yes
SB202	SF	4	66	62.0	62.0	62.9	No
SB203A	Office (Level 1)	0	--	76.7	76.7	78.2	--

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
SB203A	Office (Level 2)	0	--	76.7	76.7	78.3	--
FM19A	MF (Level 1)	0	66	68.9	68.9	68.9	Yes
FM19B	MF (Level 2)	0	66	73.7	73.7	74.8	Yes
FM21A	SF (Row 1)	1	66	67.1	67.1	68.2	Yes
FM21B	SF (Row 2)	1	66	62.7	62.7	63.2	No
FM25A	Parking Lot	0	71	70.9	70.9	70.9	No
FM25B	Parking Lot	0	71	67.0	67.0	66.1	No
NB33	Motel Pool	10	66	65.6	65.6	66.1	No
NB34	MF	4	66	66.3	66.3	66.7	Yes
NB35	SF	4	66	67.6	67.6	68.3	Yes
NB36	SF	2	66	67.5	67.5	68.3	Yes
NB37	SF	4	66	67.8	67.8	68.7	Yes
NB38	SF	4	66	68.0	68.0	69.0	Yes
NB39	SF	3	66	68.3	68.3	69.2	Yes
NB40	SF	3	66	66.9	66.9	68.0	Yes
NB41	SF	2	66	67.1	67.1	68.0	Yes
NB42	SF	3	66	65.7	65.7	66.0	Yes
NB44	SF	4	66	64.8	64.8	65.1	No
NB45	SF	4	66	64.1	64.1	64.4	No
NB46	SF	3	66	62.3	62.3	62.8	No
NB47	SF	3	66	63.9	63.9	64.4	No
NB48	SF	4	66	64.5	64.5	65.0	No
NB49	SF	6	66	62.6	62.6	62.9	No
NB50	SF	6	66	61.4	61.4	61.9	No
NB51	SF	6	66	60.4	60.4	60.9	No
NB52	SF	3	66	61.9	61.9	62.4	No
NB53	SF	4	66	65.5	65.5	65.9	Yes
NB54	SF	4	66	62.1	62.1	62.6	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
NB55	SF	3	66	67.6	67.6	68.8	Yes
NB56	SF	2	66	67.4	67.4	68.6	Yes
NB56	SF	2	66	67.3	67.3	68.4	Yes
NB57	SF	2	66	65.7	65.7	67.1	Yes
NB58	SF	2	66	63.4	63.4	64.1	No
NB59	SF	3	66	60.9	60.9	61.6	No
NB60	SF	3	66	60.8	60.8	61.4	No
NB61	SF	3	66	64.1	64.1	65.0	No
NB62	SF	4	66	60.7	60.7	61.2	No
NB63	SF	3	66	58.5	58.5	59.2	No
NB64	SF	3	66	61.9	61.9	63.0	No
NB65	SF	3	66	60.7	60.7	61.6	No
NB66	SF	4	66	59.6	59.6	60.8	No
NB67	SF	4	66	63.0	63.0	64.0	No
NB68	SF	3	66	60.3	60.3	61.4	No
NB69	SF	4	66	69.0	69.0	69.6	Yes
NB70	SF	5	66	68.8	68.8	69.5	Yes
NB71	SF	5	66	66.0	66.0	67.1	Yes
NB72	SF	5	66	65.0	65.0	66.1	Yes
NB73	SF	2	66	60.7	60.7	61.3	No
NB74	SF	6	66	63.7	63.7	64.3	No
NB75	SF	2	66	58.5	58.5	59.4	No
NB76	SF	6	66	59.3	59.3	60.0	No
NB77	Future Park	0	66	74.2	74.2	73.7	Yes
NB78	Future Park	0	66	69.8	69.8	70.5	Yes
NB79	Future Park	0	66	70.6	70.6	71.6	Yes
NB80	Future Park	0	66	64.7	64.7	65.3	No
NB33A	Motel	10	71	69.4	69.4	70.1	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
NB33B	Motel	10	71	71.7	71.7	72.3	Yes
NB81	Future Park	0	66	65.6	65.6	66.5	Yes
Gau_Church	Church	1	76(51) *	65.0 (40)	65.0 (40)	65.8 (40.8)	No

* -No outside area of frequent human use, Site is Activity Category D. The NAC of 76 dBA outside assumes a noise reduction due to the building of 25 dBA, Interior NAC of 51 plus 25 equals exterior NAC 76 dBA.

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

- **I-17 to 40th Street**

– Existing – 61.6 dB(A) to 77.4 dB(A)

– No Build – 61.6 dB(A) to 77.4 dB(A)

– Build – 63.5 dB(A) to 82.5 dB(A)

The modeled noise levels at 8 out of 10 receivers approach or exceed FHWA NAC for Activity Category E, motels and hotels. Therefore, consideration of abatement measures is warranted.

- **40th Street to Fairmont Street**

– Existing – 57.2 dB(A) to 78.8 dB(A)

– No Build – 58.0 dB(A) to 78.8 dB(A)

– Build – 60.9 dB(A) to 82.4 dB(A)

The modeled noise levels at 28 out of 62 receivers approach or exceed FHWA NAC for Activity Category B/C, for residences, and 11 receivers approach or exceed FHWA NAC for Activity Category E, hotels/motels/offices. Therefore, consideration of abatement measures is warranted.

- **Fairmont Street to US 60**

– Existing – 57.6 dB(A) to 79.6 dB(A)

– No Build – 57.6 dB(A) to 79.6 dB(A)

– Build – 58.7 dB(A) to 83.4 dB(A)

The modeled noise levels at 47 out of 125 receivers approach or exceed FHWA NAC for Activity Category B/C, residences, and 2 receivers approach or exceed the FHWA NAC for Activity Category E, hotels/motels/offices. Therefore, consideration of abatement measures is warranted.

- **US 60 to Ray Road**

– Existing – 49.7 dB(A) to 80.1 dB(A)

– No Build – 49.7 dB(A) to 80.1 dB(A)

– Build – 54.5 dB(A) to 81.5 dB(A)

The modeled noise levels at 104 out of 226 receivers are approach or exceed FHWA NAC for Activity Category B/C, residences, and 8 receivers are approach or exceed the FHWA NAC for Activity Category E, hotels/motels/offices. Therefore, consideration of abatement measures is warranted.

Figure 10. I-17 to 40th Street – Receiver and Modeled Potential Barrier Locations (No. 1)

Figure 11. I-17 to 40th Street – Receiver and Modeled Potential Barrier Locations (No. 2)

Figure 12. I-17 to 40th Street – Receiver and Modeled Potential Barrier Locations (No. 3)

Figure 13. 40th Street to Fairmont Street – Receiver and Modeled Potential Barrier Locations (No. 1)

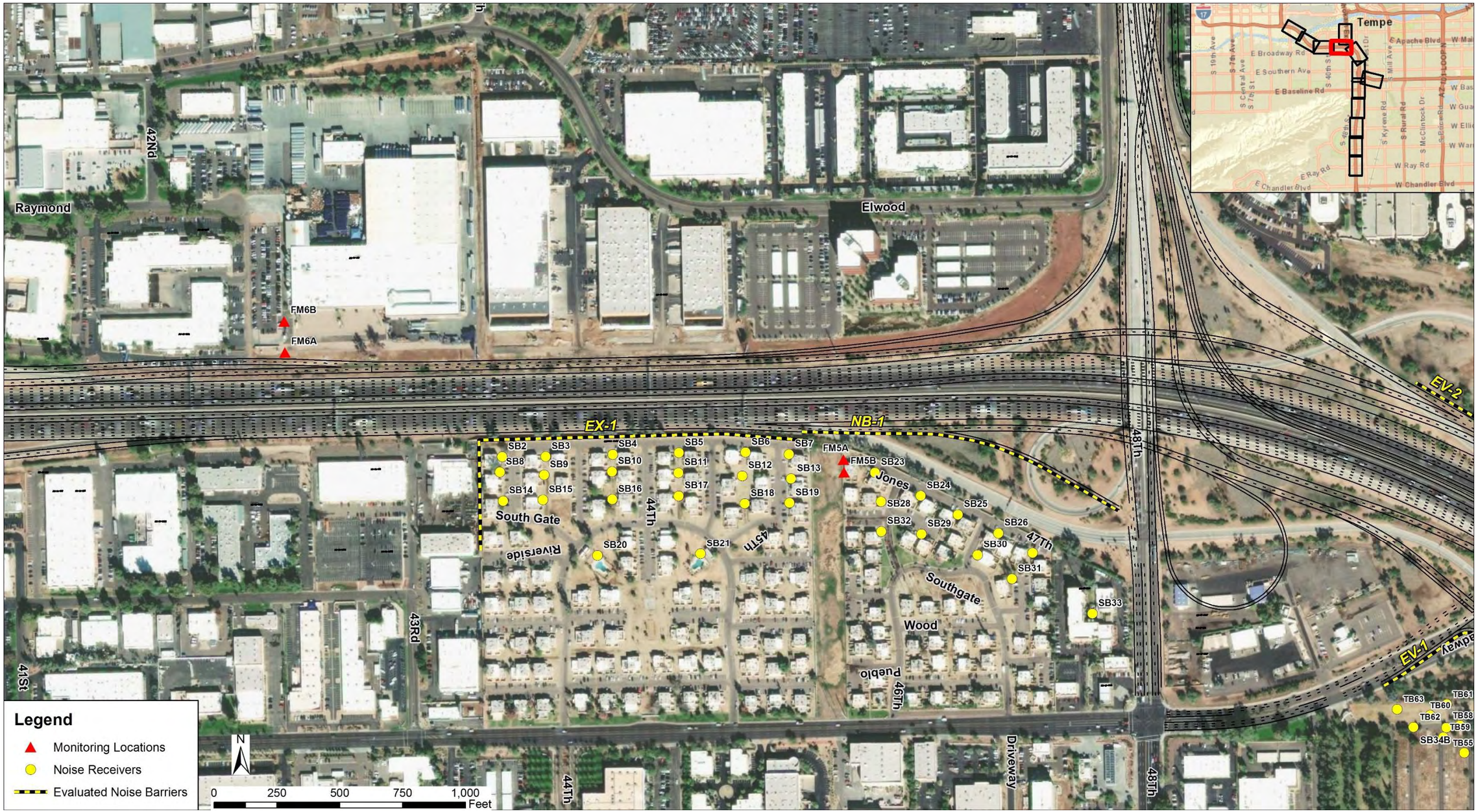


Figure 14. 40th Street to Fairmont Street – Receiver and Modeled Potential Barrier Locations (No. 2)

Figure 15. 40th Street to Fairmont Street – Receiver and Modeled Potential Barrier Locations (No. 3)

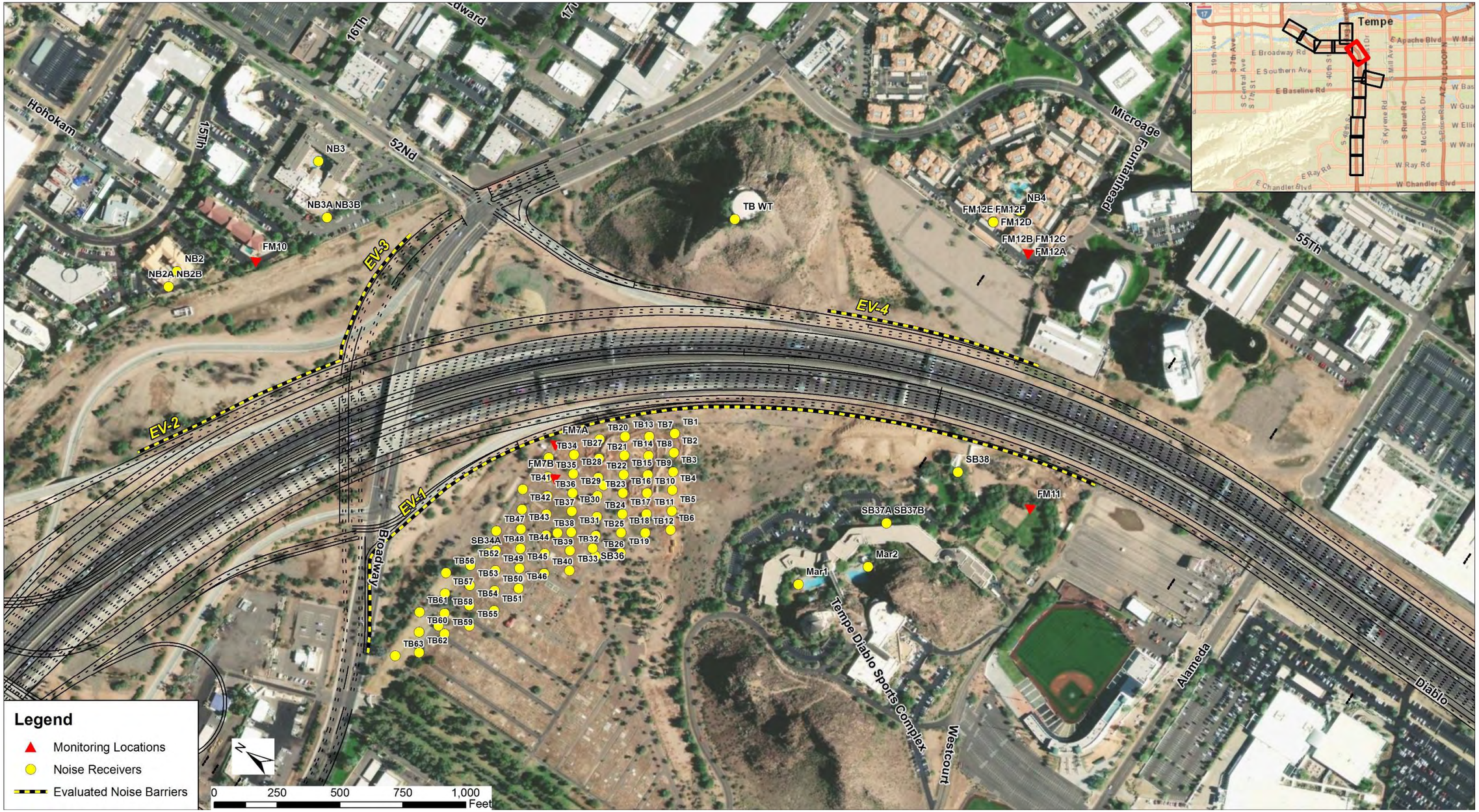


Figure 16. Fairmont Street to US 60 – Receiver and Modeled Potential Barrier Locations (No. 1)

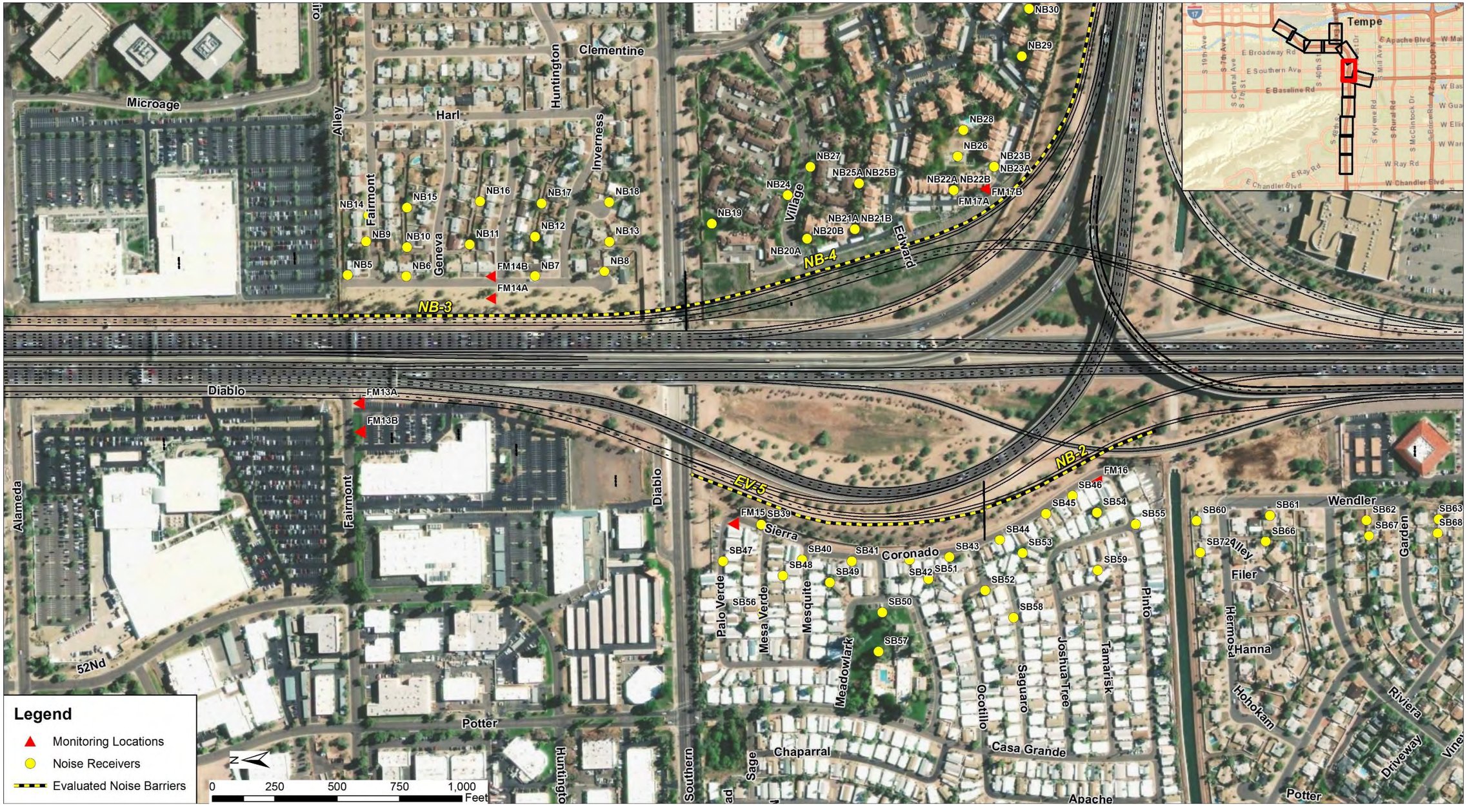


Figure 17. Fairmont Street to US 60 – Receiver and Modeled Potential Barrier Locations (No. 2)

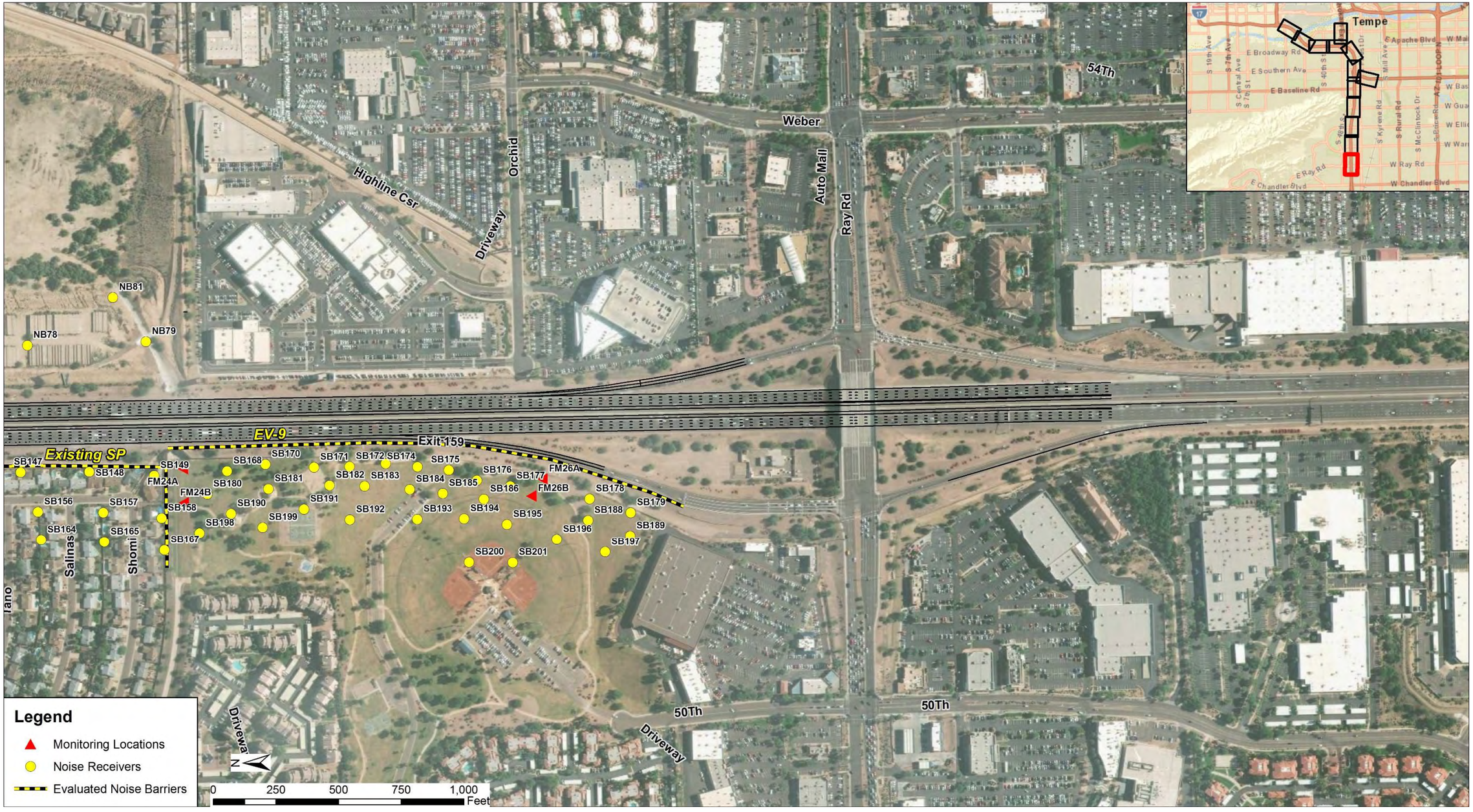
Figure 18. Fairmont Street to US 60 – Receiver and Modeled Potential Barrier Locations (No. 3)

Figure 19. US 60 to Ray Rd – Receiver and Modeled Potential Barrier Locations (No. 1)

Figure 20. US 60 to Ray Road – Receiver and Modeled Potential Barrier Locations (No. 2)

Figure 21. US 60 to Ray Road – Receiver and Modeled Potential Barrier Locations (No. 3)

Figure 22. US 60 to Ray Road – Receiver and Modeled Potential Barrier Locations (No. 4)



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 noise barriers were modeled to determine if they met the ADOT feasibility guidelines. A summary of the noise barriers that were evaluated for abatement but did not meet the ADOT acoustical feasibility guidelines is presented in **Table 9**. The recommended noise barriers that meet the ADOT feasibility and reasonability guidelines are presented in **Table 10**. The location of these noise barriers is presented in **Figure 10** through **Figure 22**.

- **EX-1 and NB-1 –** At this location, an existing 12-foot high noise barrier is located along the ROW line and an existing 8-foot barrier is located at the apartment complex property line. A noise barrier is proposed along the edge-of-shoulder of the reconfigured east-bound off-ramp to South 48th Street as noise abatement for 160 dwelling units. At a height of 18 feet and a length of 1,340 feet, 82 dwelling units (51%) would achieve a 5-decibel reduction. The noise barrier does achieve a 7-decibel reduction at 24 of the 48 first-row dwelling units. The maximum cost of abatement is $10,295 per benefited receptor. A noise barrier at this location is considered reasonable and is recommended for mitigation.
- **EV-1 –** At this location, a noise barrier is proposed at the ROW line as noise abatement for 10 dwelling units. At a height of 14 feet and length of 3,573 feet, 8 dwelling units would achieve a 5-decibel reduction. The noise barrier does achieve a 7-decibel reduction at 5 of the 10 first-row dwelling units. The maximum cost of abatement is $218,846 per benefited receptor. A noise barrier at this location would not be considered reasonable and is not recommended for mitigation.
- **EV-2 & EV-3 –** At this location, a noise barrier is proposed at the ROW line as noise abatement for 49 dwelling units. At a height of 24 feet and a length of 1,465 feet, 16 dwelling units (33%) would achieve a 5-decibel reduction. However, the noise barrier does not achieve a 7-decibel reduction at any of the first-row dwelling units. A noise barrier at this location is not recommended.
- **EV-4 –** At this location, an existing 6- to 8-foot wall is located along the property line. A noise barrier is proposed at the ROW line as noise abatement for 39 dwelling units. At a height of 22 feet and a length of 870 feet, 20 dwelling units (51%) would achieve a 5-decibel reduction. However, the noise barrier does not achieve a 7-decibel reduction at more than 4 of the 16 first-row dwelling units. A noise barrier at this location is not recommended.

- **NB-2 –** At this location, a noise barrier is proposed along the edge-of-shoulder of the connector ramp as noise abatement for 47 dwelling units. At a height of 16 feet and length of 900 feet, 14 dwelling units (30%) would achieve a 5-decibel reduction. The noise barrier does achieve a 7-decibel reduction at all 9 first-row benefitted receptors. The maximum cost of abatement is $36,000 per benefited receptor. A noise barrier at this location is considered reasonable and is recommended for mitigation.
- **EV-5 –** A 1,220-foot-long noise barrier, was evaluated as an extension of NB-2, a 900-foot-long noise barrier. The total noise barrier length of 2,120 feet was found not to be acoustically feasible. Without EV-11, the 900-foot-long NB-2 noise barrier was found to be feasible.
- **NB-3 –** At this location, an existing 14-foot noise barrier is located along the existing ROW line. A noise barrier is proposed at the new ROW line as noise abatement for 50 dwelling units. At a height of 14 feet and a length of 1,592 feet, 41 dwelling units (82%) would achieve a 5-decibel reduction. The noise barrier does achieve a 7-decibel reduction at 25 of the 50 first-row dwelling units. The cost of abatement is $19,026 per benefited receptor. A noise barrier at this location is considered reasonable and is recommended for mitigation.
- **NB-4 –** At this location, an existing 8-foot noise barrier is located along the existing ROW line from approximately Southern Avenue to Priest Drive, and a 4- to 6-foot barrier is located along the property line of the apartment complex. A noise barrier is proposed at the new ROW line (Edge of shoulder of connector ramp) as noise abatement for 116 dwelling units. At a height of 18 feet and length of 2,018 feet, 95 dwelling units (82%) would achieve a 5-decibel reduction. The noise barrier does achieve a 7-decibel reduction at 39 of the 61 first-row dwelling units. The maximum cost of abatement would be $13,382 per benefited receptor. A noise barrier at this location is considered reasonable and is recommended for mitigation.
- **NB-5 –** At this location, an existing 12- to 16-foot noise barrier is located along the ROW line. A noise barrier is proposed at the ROW line as noise abatement for 87 dwelling units. At a height of 16 feet and a length of 1,205 feet, 57 dwelling units (66%) would achieve a 5-decibel reduction. However, the noise barrier does not achieve a 7-decibel reduction at 41 of the 81 first-row dwelling units. The maximum cost of abatement would be $11,838 per benefited receptor. A noise barrier at this location is considered reasonable and is recommended for mitigation.
- **EV-6 –** At this location, an existing 10-foot noise barrier along the ROW line shields the apartment complex from the golf course to Calle Guadalupe. An evaluation to raise the existing the 10-feet tall, 1,510-foot long, barrier to provide abatement for the 88 dwelling units was determined to not achieve a 5-decibel reduction at 50% of the dwelling units. A noise barrier at this location is not recommended.
- **NB-6 –** At this location, an existing 6-foot noise barrier is located along the ROW line. A noise barrier is proposed at the ROW line as noise abatement for 124 dwelling

units. At a height of 16 feet and a length of 2,804 feet, 97 dwelling units (78%) would achieve a 5-decibel reduction. The noise barrier does achieve a 7-decibel reduction at 48 of the 68 first-row dwelling units. The maximum cost of abatement is $16,188 per benefited receptor. A noise barrier at this location is considered reasonable and is recommended for mitigation.

- **NB-7 –** At this location, a noise barrier is proposed at the ROW line as noise abatement for 35 dwelling units. At a height of 14 feet and a length of 1,395 feet, 25 dwelling units (71%) would achieve a 5-decibel reduction. The noise barrier does achieve a 7-decibel reduction at 14 of the 19 first-row dwelling units. The maximum cost of abatement is $27,342 per benefited receptor. A noise barrier at this location is considered reasonable and is recommended for mitigation.
- **EX-2 and EV-10 –** At this location, an existing 8-foot noise barrier is located along the ROW line. The existing noise barrier meets the noise abatement criteria as is. A 4-foot lightweight panel, with a length of 1,100 feet (which meets the reasonable and feasibleness criteria) was considered to be added to the existing noise barrier to achieve a 6-decibel reduction for 11 second floor dwelling units. The maximum cost of abatement is $33,600 per benefited receptor. However, based on an engineering review of the existing 8-foot barrier, the footing of the structure would not support the lightweight panels and will not meet the current code with an additional 4-feet lightweight panels based on overturning resistance and stem reinforcement.
- **EV-7 –** At this location, an existing 16- to 18-foot noise barrier is located along the ROW line. A noise barrier is proposed at the ROW line as noise abatement for 139 dwelling units. At a height of 24 feet and a length of 3,215 feet, none of dwelling units would achieve a 5-decibel reduction. A noise barrier at this location is not recommended.
- **EV-8 –** At this location, an existing 8- to 14-foot noise barrier is located along the ROW line. A noise barrier is proposed at the ROW line as noise abatement for 32 dwelling units. At a height of 24 feet and a length of 3,740 feet, 24 dwelling units (75%) would achieve a 5-decibel reduction. However, the noise barrier does not achieve a 7-decibel reduction at more than 14 of the 32 first-row dwelling units. A noise barrier at this location is not recommended.
- **EV-9 –** At this location, an existing 16- to 18-foot noise barrier is located along the ROW line on the north portion of the park. A noise barrier is proposed at the ROW line as noise abatement for 85 dwelling units. At a height of 24 feet and a length of 2,095 feet, 52 dwelling units (61%) would achieve a 5-decibel reduction. However, the noise barrier does not achieve a 7-decibel reduction at more than 12 of the 39 first row dwelling units. A noise barrier at this location is not recommended.

Table 9. Noise Barriers Considered for Mitigation

Noise Barrier	Length (ft)	Station	Feasible or Reasonable
EV-1	3,573	SB 8090+00 to 8123+00	Feasible, Not Reasonable
EV-2	580	PC 21+30 to 26+50	Not Feasible
EV-3	885	NB 8084+50 to 8093+00	Not Feasible
EV-4	870	NB 8111+50 to 8120+00	Not Feasible
EV-5	1,2205	SB 8158+25 to 8170+00	Not Feasible
EV-6	1,510	SB 8247+50 to 8260+50	Not Feasible
EV-7	3,740	SB 8213+50 to 8250+00	Not Feasible
EV-8	3,215	SB 8337+90 to 8369+85	Not Feasible
EV-9	2,095	SB 8396+20 to 8417+00	Not Feasible
EV-10	1,100	NB 8327+00 to 8337+75	Not Reasonable

Table 10. Proposed Noise Barrier Summary

Noise Barrier ID	Project Study Area Subsection	Barrier Height (ft)	Barrier Length (ft)	Area of Barrier (ft^2)	Total Barrier Cost[1]	Number of Benefited Receptors	Cost-Per-Benefited-Receptor	Cost Reasonable (Y/N) [2]	Station (Approximate from Mainline)
NB-1	40th Street to Fairmont Street	18	1,340	24,120	$844,200	82	$10,295	Y	SB 8061+00 to 8074+00
NB-2	Fairmont Street to US 60	16	900	14,400	$504,000	14	$36,000	Y	SB 8170+00 to 8176+40
NB-3	Fairmont Street to US 60	14	1592	22,288	$780,080	41	$19,026	Y	NB 8158+00 to 8142+00
NB-4	Fairmont Street to US 60	18	2018	36,324	$1,271,340	95	$13,382	Y	NB 8158+00 to ST 120+00
NB-5	Fairmont Street to US 60	16	1,205	19,280	$674,800	57	$11,838	Y	SC 124+00 to 135+60
NB-6	US 60 to Ray Road	16	2,804	44,864	$1,570,240	97	$16,188	Y	SB 8263+25 to 8291+10
NB-7	US 60 to Ray Road	14	1,395	19,530	$683,550	25	$27,342	Y	NB 8263+10 to 8277+00

(1) Total cost of the noise barrier is based on the unit cost of $35/$85 per square foot for off/on structure placement of noise barriers.
(2) Based on a cost of $49,000 per benefited receptor.

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 11**. ADOT has set forth guidelines for construction noise in their Standard Specifications for Road and Bridge Construction, 2008.

Table 11. Construction Noise Levels at Various Distances from the Equipment

Equipment	Land Use	Residential		Descriptor	L10
	R_300 ft	R_600 ft	R	R_1200 ft	R_1500 ft
Auger Drill Rig	64.8	58.8		52.8	50.8
Boring Jack Power Unit	67.4	61.4		55.4	53.4
Compactor (ground)	63.7	57.7		51.6	49.7
Concrete Mixer Truck	62.3	56.2		50.2	48.3
Dump Truck	59.9	53.9		47.9	45.9
Excavator	64.2	58.1		52.1	50.2
Generator	65.1	59		53	51.1
Compressor (air)	61.1	55.1		49.1	47.1
Grader	68.5	62.4		56.4	54.5
Warning Horn	57.6	51.6		45.6	43.6
All Other Equipment > 5 HP	69.4	63.4		57.4	55.4
Bar Bender	60.4	54.4		48.4	46.5
Concrete Pump Truck	61.8	55.8		49.8	47.9
Soil Mix Drill Rig	64.4	58.4		52.4	50.4
Concrete Saw	70	64		58	56
Auger Drill Rig	64.8	58.8		52.8	50.8
Roller	60.4	54.4		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

A general assessment of construction noise is warranted for projects in an early assessment stage when the equipment roster and schedule are undefined and only a rough estimate of construction noise levels is practical.

1) Provide qualitative descriptions in the environmental document of the following elements:
    a. Duration of construction both overall and at specific locations in the proximity of the project
    b. Equipment expected to be used particularly noisiest equipment
    c. Schedule with periods of operation
    d. Schedule of specific events particular to the location in question (festivals, fairs)
2) Monitoring of noise during the construction operations
3) Forum for communicating with the public
    a. Commitments in line with most current ADOT Standards and Specifications, including any local ordinances that may apply.
4) Consideration of application of noise control measures in course of the project in all phases

A detailed analysis of construction noise is warranted when many noise-sensitive sites are adjacent to a construction project or where contractors are faced with stringent local ordinances or heightened public concerns expressed in early outreach efforts. Major construction projects are accomplished in several different phases. Each phase has a specific equipment mix, depending on the work to be accomplished during that phase. As a result of the

equipment mix, each phase has its own noise characteristics; some phases have higher continuous noise levels than others, and some have higher impact noise levels than others.

Consider the following factors:

- Existing (common noise environment) and predicted (construction) noise levels during the day 7 AM – 6 PM, 6 PM – 10 PM, 10 PM – 7 AM.
- Phases of constructions, shown on the map, if applicable
- Map of the project with stationary and mobile operations clearly depicted
- Routes for Supply heavy trucks and construction equipment to/from site, and routes for detour vehicles from main roadways.
- the Proximity of noise-sensitive sites to the construction zones, with Category and Number of noise-sensitive receivers in the project area
- Duration of construction activities near noise-sensitive receivers
- Schedule, including the construction days, hours (day/night), and time periods
- Concern about construction noise expressed in comments by the general public (e.g., through scoping or public meetings)

Effective community outreach and relations are important for these projects. Disseminate information to the public early regarding the kinds of construction equipment, expected noise levels, and durations to forewarn potentially affected neighbors about the temporary inconvenience. Including a general description of the variation of noise levels during a typical construction day may also be helpful.

For Quantitative Construction Noise Assessments, include a description of the planned construction methods and any basic measures that have been identified to reduce the potential impact, such as temporary earthen berm or a barrier, prohibiting the noisiest construction activities during the nighttime, in the environmental document.

It may be prudent, however, to defer final decisions on noise control measures until the project and construction plans are defined in greater detail during the engineering phase.

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, since feasibility and reasonableness determinations may change due to modifications in project design after approval.

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), May 1996.
- 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 – RECOMMENDED NOISE BARRIER – MAP

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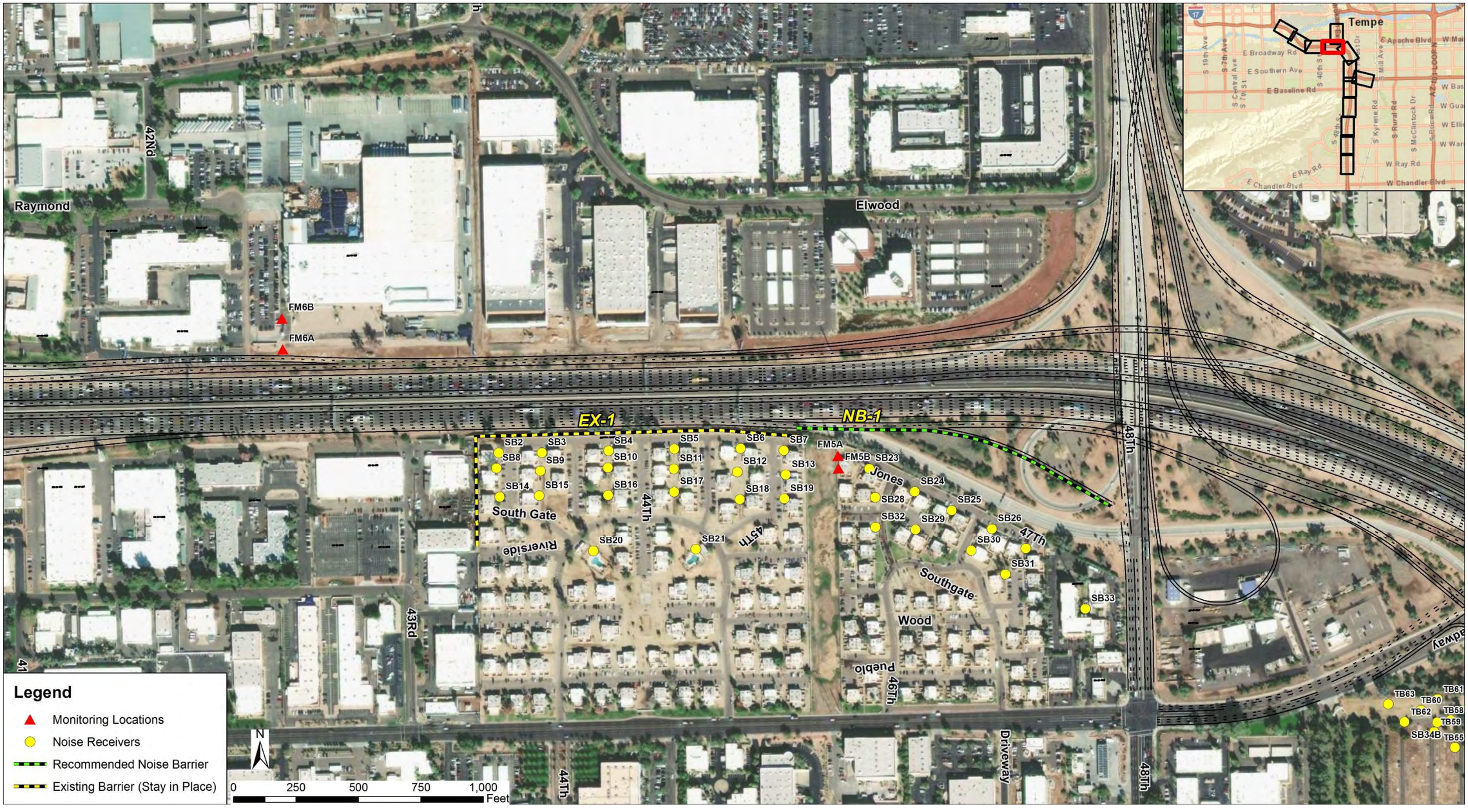
Tempe
E Broadway Rd
E Southern Ave
E Baseline Rd
E Ray Rd
W Ray Rd
E Chandler Blvd
W Chandler Blvd
S Rural Rd
S Mill Ave
S Central Ave
S 7th St
S 19th Ave
S Kyrene Rd
S McClintock Dr
AZ-101 LOOP N
Raymond
Elwood
42Nd
FM6B
FM6A
EX-1
NB-1
SB2
SB3
SB4
SB5
SB6
SB7
SB8
SB9
SB10
SB11
SB12
SB13
SB14
SB15
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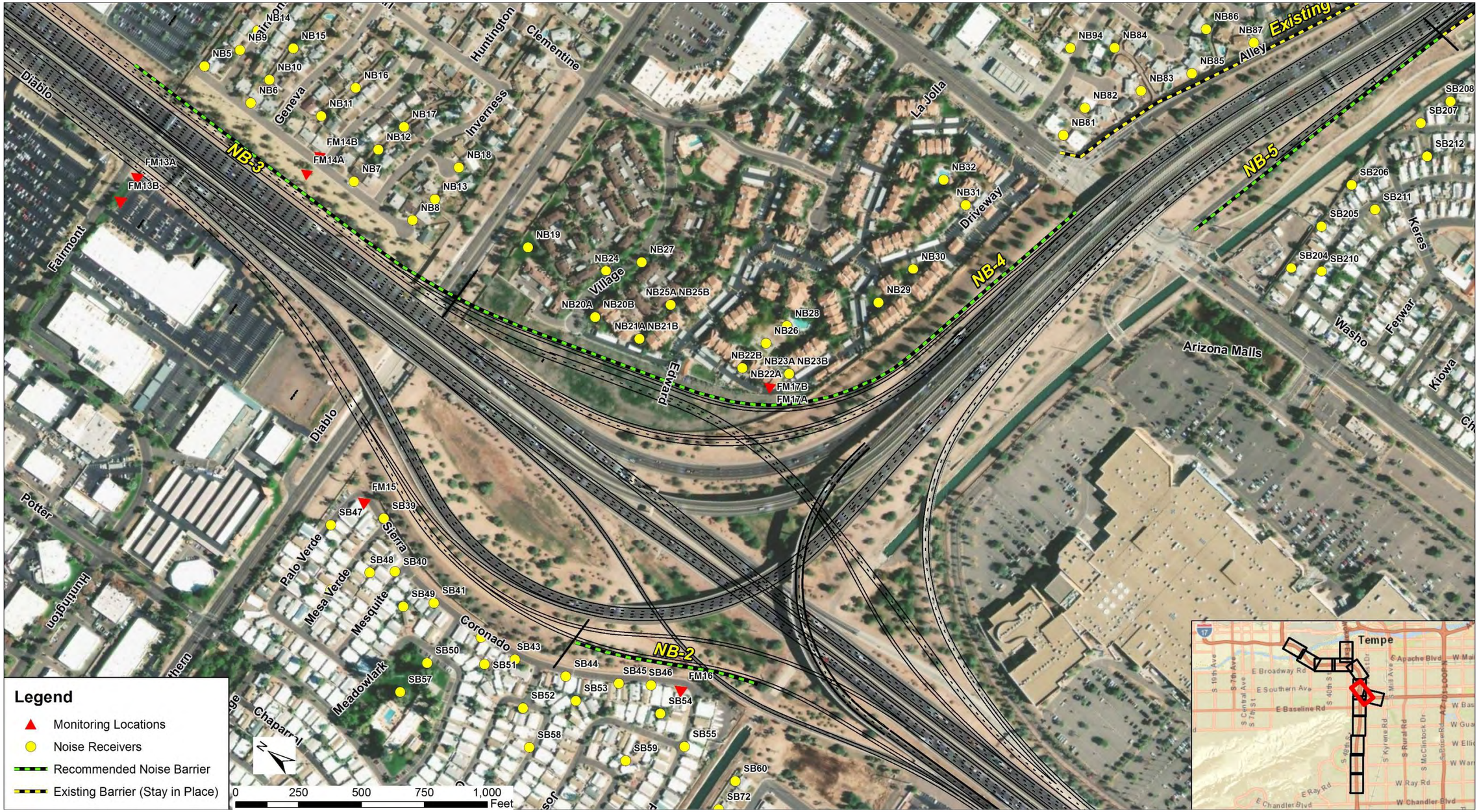
SB21
SB23
SB24
SB25
SB26
SB28
SB29
SB30
SB31
SB32
SB33
FM5A
FM5B
South Gate
Riverside
44Th
45Th
Jones
47Th
Southgate
Wood
Pueblo
46Th
43Rd
41
48Th
Driveway
TB63
TB61
TB60
TB62
TB58
TB59
SB34B
TB55
Legend
Monitoring Locations
Noise Receivers
Recommended Noise Barrier
Existing Barrier (Stay in Place)
N
0
250
500
750
1,000
Feet


NB-3
NB-4
NB-5
NB-2
Existing
Diablo
Fairmont
Potter
Huntington
Clementine
Geneva
Inverness
La Jolla
Driveway
Alley
Village
Edward
Arizona Malls
Palo Verde
Mesa Verde
Mesquite
Coronado
Meadowlark
Chaparral
Sierra
Keres
Washo
Ferwar
Kiowa
NB5
NB14
NB9
NB15
NB10
NB6
NB16
NB11
NB17
NB12
NB18
NB7
NB13
NB8
NB19
NB24
NB27
NB20A
NB20B
NB25A NB25B
NB21A NB21B
NB28
NB26
NB22B
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NB22A
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FM14A
FM14B
FM15
FM16
FM17A
FM17B
SB47
SB39
SB48
SB40
SB49
SB41
SB50
SB43
SB51
SB44
SB45
SB46
SB57
SB53
SB52
SB54
SB58
SB55
SB59
SB60
SB72
Legend
Monitoring Locations
Noise Receivers
Recommended Noise Barrier
Existing Barrier (Stay in Place)
0
250
500
750
1,000
Feet
N
Tempe
E Broadway Rd
E Southern Ave
E Baseline Rd
E Apache Blvd
S Rural Rd
W Ray Rd
E Chandler Blvd
W Chandler Blvd


Tempe
Iglesia
Encinas
Naranjo
Sahuaro
Calle Guadalupe
Barbarita
Carmen
Bell De Mar
Clementine
Mineral
NB63
NB59
NB60
NB64
NB61
NB65
NB66
NB67
NB68
NB73
NB74
NB75
NB76
NB69
NB70
NB71
NB72
Bella Vista
FM21B
FM21A
NB57
NB56
54 Th
NB-7
NB-6
EV-6
SB76
SB80A SB80B
SB79
SB81A SB81B
SB85A SB85B
SB86A SB86B
SB82B
SB82A
SB83B
SB83A
SB84A SB84B
SB87A SB87B
SB88A SB88B
SB89B SB90A SB90B
SB89A
SB91B
SB91A
Pointe
Guadalupe
SB92A SB92B
SB93A SB93B
FM22C
SB94B
SB94A
SB95A SB95B
SB96C
SB97A SB97B
SB100
SB96B
Driveway
SB98
SB99
SB101
51St
Siesta
Hazel
50Th
La Mirada
Paseo
48Th
Monte
Vaughn
Strahan
Sunrise
Legend
Monitoring Locations
Noise Receivers
Recommended Noise Barrier
Existing Barrier (Stay in Place)
N
0 250 500 750 1,000
Feet

APPENDIX B – TRAFFIC DATA

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	Roadway	VPH/Lane	%Car	%MT	%Heavy	Autos/Lane	MT/Lane	HT/Lane	Speed		2018 Traffic Per Lane								
	Main Lanes	1750	94%	4%	2%	1645	70	35	5 MPH above Post Speed										
	HOV	1750	96%	4%	0%	1680	70	0	5 MPH above Post Speed										
	Aux Lane	1500	94%	4%	2%	1410	60	30	5 MPH above Post Speed										
	Ramps										2 Lanes Cross Roadway			3 Lanes Cross Roadway			4 Lanes Cross Roadway		
EB	32nd St Off	1,000	96%	3%	1%	960	30	10	10 to 65 MP - loop 25 MPH		480	15	5	320	10	3	240	8	3
WB	32nd St Off	789	96%	3%	1%	757	24	8			379	12	4	252	8	3	189	6	2
EB	32nd St On	545	96%	3%	1%	523	16	5			262	8	3	174	5	2	131	4	1
WB	32nd St On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	40th St Off	720	96%	3%	1%	691	22	7			346	11	4	230	7	2	173	5	2
WB	40th St Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	40th St On	480	96%	3%	1%	461	14	5			230	7	2	154	5	2	115	4	1
WB	40th St On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	48th St/Broadway Rd Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	Broadway Rd Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	Broadway Rd On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	Broadway Rd On	911	96%	3%	1%	875	27	9			437	14	5	292	9	3	219	7	2
EB	SR 143 On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	SR 143 On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	SR 143 Off	206	96%	3%	1%	198	6	2			99	3	1	66	2	1	49	2	1
WB	SR 143 Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	SR 143 HOV On	0	96%	3%	1%	0	0	0			0	0	0	0	0	0	0	0	0
WB	SR 143 HOV Off	0	96%	3%	1%	0	0	0			0	0	0	0	0	0	0	0	0
EB	US 60 Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	US 60 Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	US 60 On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	US 60 On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	US 60 to CD	0	96%	3%	1%	0	0	0			0	0	0	0	0	0	0	0	0
EB	CD to I-10	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	I-10 to CD (near US60)	0	96%	3%	1%	0	0	0			0	0	0	0	0	0	0	0	0
EB	I-10 to US 60 HOV	685	96%	4%	0%	658	27	0			329	14	0	219	9	0	164	7	0
WB	US60 to I-10 HOV	644	96%	4%	0%	618	26	0			309	13	0	206	9	0	155	6	0
EB	Baseline Rd Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	CD to Baseline	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	Baseline Rd On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	Baseline Rd Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	Baseline Rd On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	I-10 to CD (near Baseline)	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	Elliot Rd Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	Elliot Rd Off	511	96%	3%	1%	491	15	5			245	8	3	164	5	2	123	4	1
EB	Elliot Rd On	539	96%	3%	1%	517	16	5			259	8	3	172	5	2	129	4	1
WB	Elliot Rd On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	Warner Rd Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	Warner Rd Off	578	96%	3%	1%	555	17	6			277	9	3	185	6	2	139	4	1
EB	Warner Rd On	598	96%	3%	1%	574	18	6			287	9	3	191	6	2	144	4	1
WB	Warner Rd On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	Ray Rd Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	Ray Rd Off	905	96%	3%	1%	869	27	9			434	14	5	290	9	3	217	7	2
EB	Ray Rd On	801	96%	3%	1%	769	24	8			384	12	4	256	8	3	192	6	2
WB	Ray Rd On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3

	Roadway	VPH/Lane	%Car	%MT	%Heavy	Autos/Lane	MT/Lane	HT/Lane	Speed		2040 No-Build Traffic Per Lane								
	Main Lanes	1750	94%	4%	2%	1645	70	35	5 MPH above Post Speed										
	HOV	1750	96%	4%	0%	1680	70	0	5 MPH above Post Speed										
	Aux Lane	1500	94%	4%	2%	1410	60	30	5 MPH above Post Speed										
	Ramps										2 Lanes Cross Roadway			3 Lanes Cross Roadway			4 Lanes Cross Roadway		
EB	32nd St Off	1,000	96%	3%	1%	960	30	10	10 to 65 MP - loop 25 MPH		480	15	5	320	10	3	240	8	3
WB	32nd St Off	865	96%	3%	1%	830	26	9			415	13	4	277	9	3	208	6	2
EB	32nd St On	628	96%	3%	1%	603	19	6			301	9	3	201	6	2	151	5	2
WB	32nd St On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	40th St Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	40th St Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	40th St On	583	96%	3%	1%	560	17	6			280	9	3	187	6	2	140	4	1
WB	40th St On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	48th St/Broadway Rd Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	Broadway Rd Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	Broadway Rd On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	Broadway Rd On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	SR 143 On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	SR 143 On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	SR 143 Off	507	96%	3%	1%	487	15	5			243	8	3	162	5	2	122	4	1
WB	SR 143 Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	SR 143 HOV On	0	96%	3%	1%	0	0	0			0	0	0	0	0	0	0	0	0
WB	SR 143 HOV Off	0	96%	3%	1%	0	0	0			0	0	0	0	0	0	0	0	0
EB	US 60 Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	US 60 Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	US 60 On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	US 60 On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	US 60 to CD	0	96%	3%	1%	0	0	0			0	0	0	0	0	0	0	0	0
EB	CD to I-10	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	I-10 to CD (near US60)	0	96%	3%	1%	0	0	0			0	0	0	0	0	0	0	0	0
EB	I-10 to US 60 HOV	770	96%	4%	0%	739	31	0			370	15	0	246	10	0	185	8	0
WB	US60 to I-10 HOV	650	96%	4%	0%	624	26	0			312	13	0	208	9	0	156	7	0
EB	Baseline Rd Off	890	96%	3%	1%	854	27	9			427	13	4	285	9	3	214	7	2
EB	CD to Baseline	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	Baseline Rd On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	Baseline Rd Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	Baseline Rd On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	I-10 to CD (near Baseline)	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	Elliot Rd Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	Elliot Rd Off	714	96%	3%	1%	685	21	7			343	11	4	228	7	2	171	5	2
EB	Elliot Rd On	796	96%	3%	1%	764	24	8			382	12	4	255	8	3	191	6	2
WB	Elliot Rd On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	Warner Rd Off	881	96%	3%	1%	846	26	9			423	13	4	282	9	3	211	7	2
WB	Warner Rd Off	657	96%	3%	1%	631	20	7			315	10	3	210	7	2	158	5	2
EB	Warner Rd On	698	96%	3%	1%	670	21	7			335	10	3	223	7	2	168	5	2
WB	Warner Rd On	950	96%	3%	1%	912	29	10			456	14	5	304	10	3	228	7	2
EB	Ray Rd Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	Ray Rd Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	Ray Rd On	989	96%	3%	1%	949	30	10			475	15	5	316	10	3	237	7	2
WB	Ray Rd On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3

	Roadway	VPH/Lane	%Car	%MT	%Heavy	Autos/Lane	MT/Lane	HT/Lane	Speed		2040 Build Traffic Per Lane								
	Main Lanes	1750	94%	4%	2%	1645	70	35	5 MPH above Post Speed										
	HOV	1750	96%	4%	0%	1680	70	0	5 MPH above Post Speed										
	Aux Lane	1500	94%	4%	2%	1410	60	30	5 MPH above Post Speed		705	30	15	470	20	10	353	15	8
	Ramps										2 Lanes Cross Roadway			3 Lanes Cross Roadway			4 Lanes Cross Roadway		
EB	32nd St Off	1,000	96%	3%	1%	960	30	10	10 to 65 MP - loop 25 MPH		480	15	5	320	10	3	240	8	3
WB	32nd St Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	32nd St On	876	96%	3%	1%	841	26	9			420	13	4	280	9	3	210	7	2
WB	32nd St On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	40th St Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	40th St Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	40th St On	731	96%	3%	1%	702	22	7			351	11	4	234	7	2	175	5	2
WB	40th St On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	48th St/Broadway Rd Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	Broadway Rd Off	975	96%	3%	1%	936	29	10			468	15	5	312	10	3	234	7	2
EB	Broadway Rd On	734	96%	3%	1%	705	22	7			352	11	4	235	7	2	176	6	2
WB	Broadway Rd On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	SR 143 On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	SR 143 On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	SR 143 Off	845	96%	3%	1%	811	25	8			406	13	4	270	8	3	203	6	2
WB	SR 143 Off	974	96%	3%	1%	935	29	10			468	15	5	312	10	3	234	7	2
EB	SR 143 HOV On	670	97%	3%	0%	650	20	0			325	10	0	217	7	0	162	5	0
WB	SR 143 HOV Off	511	97%	3%	0%	496	15	0			248	8	0	165	5	0	124	4	0
EB	US 60 Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	US 60 Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	US 60 On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	US 60 On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	US 60 to CD	860	96%	3%	1%	826	26	9			413	13	4	275	9	3	206	6	2
EB	CD to I-10	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	I-10 to CD (near US60)	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	I-10 to US 60 HOV	1,000	97%	3%	0%	970	30	0			485	15	0	323	10	0	243	8	0
WB	US60 to I-10 HOV	797	97%	3%	0%	773	24	0			387	12	0	258	8	0	193	6	0
EB	Baseline Rd Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	CD to Baseline	939	96%	3%	1%	901	28	9			451	14	5	300	9	3	225	7	2
EB	Baseline Rd On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	Baseline Rd Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	Baseline Rd On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	I-10 to CD (near Baseline)	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	Elliot Rd Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	Elliot Rd Off	961	96%	3%	1%	923	29	10			461	14	5	308	10	3	231	7	2
EB	Elliot Rd On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	Elliot Rd On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	Warner Rd Off	947	96%	3%	1%	909	28	9			455	14	5	303	9	3	227	7	2
WB	Warner Rd Off	721	96%	3%	1%	692	22	7			346	11	4	231	7	2	173	5	2
EB	Warner Rd On	784	96%	3%	1%	753	24	8			376	12	4	251	8	3	188	6	2
WB	Warner Rd On	957	96%	3%	1%	919	29	10			459	14	5	306	10	3	230	7	2
EB	Ray Rd Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	Ray Rd Off	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
EB	Ray Rd On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3
WB	Ray Rd On	1,000	96%	3%	1%	960	30	10			480	15	5	320	10	3	240	8	3

Ramp Volumes

Ramp Off/On I-10	Direction	Peak Hour Volume		
		2018	2040 No Build	2040 Build
32nd St Off	EB	1,344	1,637	1,582
32nd St Off	WB	789	865	1,160
32nd St On	EB	545	628	876
32nd St On	WB	1,518	1,867	1,746
40th St Off	EB	720	1,087	1,142
40th St Off	WB	1,236	1,219	1,691
40th St On	EB	480	583	731
40th St On	WB	1,096	1,394	1,398
48th St/Broadway Rd Off	EB	1,413	2,021	1,373
Broadway Rd Off	WB	1,371	1,499	975
Broadway Rd On	EB	1,939	1,866	734
Broadway Rd On	WB	911	1,206	1,232
SR 143 On	EB	1,191	1,280	2,039
SR 143 On	WB	1,493	1,942	2,253
SR 143 Off	EB	206	507	845
SR 143 Off	WB	3,685	3,129	1,949
SR 143 HOV On	EB	0	0	670
SR 143 HOV Off	WB	0	0	511
US 60 Off	EB	4,854	4,914	5,079
US 60 Off	WB	1,784	2,008	2,307
US 60 On	EB	2,109	2,599	2,058
US 60 On	WB	5,637	5,092	4,615
US 60 to CD	WB	0	0	860
CD to I-10	EB	1,983	1,883	1,496
I-10 to CD (near US60)	WB	0	0	1,213
I-10 to US 60 HOV	EB	685	770	1,023
US60 to I-10 HOV	WB	644	650	797
Baseline Rd Off	EB	1,337	890	1,887
CD to Baseline	EB	1,464	1,606	939
Baseline Rd On	EB	1,840	2,103	1,243
Baseline Rd Off	WB	1,509	1,679	1,372
Baseline Rd On	WB	1,346	1,403	1,530
I-10 to CD (near Baseline)	WB	2,634	2,554	1,700
Elliot Rd Off	EB	1,620	1,698	1,132
Elliot Rd Off	WB	511	714	961
Elliot Rd On	EB	539	796	1,149
Elliot Rd On	WB	1,467	1,794	1,422
Warner Rd Off	EB	1,011	881	947
Warner Rd Off	WB	578	657	721
Warner Rd On	EB	598	698	784
Warner Rd On	WB	1,159	950	957
Ray Rd Off	EB	1,242	1,138	1,324
Ray Rd Off	WB	905	1,096	1,097
Ray Rd On	EB	801	989	1,080
Ray Rd On	WB	1,453	1,273	1,406

APPENDIX C – TNM RUNS

No.	TNM run title	Description
1.	Existing I-17 to 40th Street	This file contains the existing modeling for the segment between I-17 to 40th Street. Validation files are also within this file folder.
2.	Existing 40th to SR60	This file contains the existing modeling for the segment between I-17 to 40th Street. Files for 40th to Fairmont, Fairmont-SR60 EB Receivers, Files for 40th to Fairmont, Fairmont-SR60 WB Receivers, Twin Buttes Cemetery. Validation files are also within this file folder.
3.	Existing SR60 to Ray Road	This file contains the existing modeling for the segment between SR60 to RayRd-EB Receivers and SR60 to RayRd-WB Receivers.
4.	NoBuild I-17 to 40th Street	This file contains the existing modeling for the segment between I-17 to 40th Street.
5.	NoBuild 40th to SR60	This file contains the existing modeling for the segment between I-17 to 40th Street. Files for 40th to Fairmont, Fairmont-SR60 EB Receivers, Files for 40th to Fairmont, Fairmont-SR60 WB Receivers, Twin Buttes Cemetary.
6.	NoBuild SR60 to Ray Road	This file contains the existing modeling for the segment between SR60 to RayRd-EB Receivers and SR60 to RayRd-WB Receivers.
7.	B I-17 to 40th Street	This file contains the Build modeling for the segment between I-17 to 40th Street.
8.	B 40th to SR60	This file contains the Build modeling for the segment between I-17 to 40th Street. Files for 40th to Fairmont, Fairmont-SR60 EB Receivers, Files for 40th to Fairmont, Fairmont-SR60 WB Receivers, Twin Buttes Cemetary.
9.	B SR60 to Ray Road	This file contains the Build modeling for the segment between SR60 to RayRd-EB Receivers and SR60 to RayRd-WB Receivers.
10	Extension to SR202	This file contains the modeling for existing and future predicted noise levels south of Ray Road.
11.	Mitigations Runs	This file contains the Evaluated Noise Barrier modeling.

APPENDIX D – FIELD DATA MEASUREMENTS

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Summary of Vehicle Classification for AZ Noise Study Project

Site	Start Time	Duration (Min)	Near Direction on Video					Far Direction on Video					WB On Ramp					EB Off Ramp					Sum	
			Auto	MT	HT	Bus	Motorcycle	Auto	MT	HT	Bus	Motorcycle	Auto	MT	HT	Bus	Motorcycle	Auto	MT	HT	Bus	Motorcycle	Near	Far
FM2 FM4	8:36 AM	15	1979	35	119	1	1	1751	55	107	0	0	180	30	2	0	0	98	21	6	0	0	2135	1913
FM14	3:33 PM	15	2309	74	98	4	5	2603	22	62	0	4											2490	2691
FM21 FM19	2:00 PM	15	1912	60	91	4	5	1760	30	81	4	1											2072	1876
FM20	12:42 PM	15	1793	32	113	1	2	1882	44	95	3	5											1941	2029
FM22-2	1:19 PM	5	540	9	48	2	2	623	16	39	1	1											601	680
FM23	10:50 AM	15	1316	28	120	5	0	1446	38	81	2	5											1469	1572
FM25 FM24	9:23 AM	15	1325	24	87	5	2	1213	29	100	3	2											1443	1347
	10:01 AM	15	1370	17	73	2	0	1369	36	129	1	0											1462	1535
FM27 FM28	1:06 PM	15	1554	29	42	6	3	1748	37	45	3	6											1634	1839

Site	Start Time	Duration (Min)	Near Direction on Video					Far Direction on Video					Sum	
			Auto	MT	HT	Bus	Motorcycle	Auto	MT	HT	Bus	Motorcycle	Near	Far
FM2 FM4	8:36 AM	15	92.7%	1.6%	5.6%	0.05%	0.05%	91.5%	2.9%	5.6%	0.00%	0.00%	100%	100%
FM14	3:33 PM	15	92.7%	3.0%	3.9%	0.16%	0.20%	96.7%	0.8%	2.3%	0.00%	0.15%	100%	100%
FM21 FM19	2:00 PM	15	92.3%	2.9%	4.4%	0.19%	0.24%	93.8%	1.6%	4.3%	0.21%	0.05%	100%	100%
FM20	12:42 PM	15	92.4%	1.6%	5.8%	0.05%	0.10%	92.8%	2.2%	4.7%	0.15%	0.25%	100%	100%
FM22-2	1:19 PM	5	89.9%	1.5%	8.0%	0.33%	0.33%	91.6%	2.4%	5.7%	0.15%	0.15%	100%	100%
FM23	10:50 AM	15	89.6%	1.9%	8.2%	0.34%	0.00%	92.0%	2.4%	5.2%	0.13%	0.32%	100%	100%
FM25 FM24	9:23 AM	15	91.8%	1.7%	6.0%	0.35%	0.14%	90.1%	2.2%	7.4%	0.22%	0.15%	100%	100%
	10:01 AM	15	93.7%	1.2%	5.0%	0.14%	0.00%	89.2%	2.3%	8.4%	0.07%	0.00%	100%	100%
FM27 FM28	1:06 PM	15	95.1%	1.8%	2.6%	0.37%	0.18%	95.1%	2.0%	2.4%	0.16%	0.33%	100%	100%

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

SITE IDENTIFICATION: FM-1 **OBSERVER(s):** Keller / Lien
START DATE & TIME: **END DATE & TIME:**
ADDRESS:
GPS coordinates:

ID

TEMP: 72 °F HUMIDITY: 38 % R.H. WIND: **CALM LIGHT MODERATE VARIABLE**
WINDSPEED: 0 MPH DIR: **N NE E SE S SW W NW** STEADY GUSTY 6 MPH
SKY: **CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN** Other:

Weather

INSTRUMENT: BK 2238 **TYPE:** (1) 2 **SERIAL #:** 2760297
CALIBRATOR: **SERIAL #:** 3216276

CALIBRATION CHECK: **PRE-TEST** 93.9 **dBA SPL** **POST-TEST** _____ **dBA SPL** **WINDSCREEN** ___

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

Acoustic Measurements

	Rec #	Start Time / End Time							
A	60	7:35 /	L_{eq} 71.5,	L_{max} 104.8	L_{min} 63.4,	L_{90} 69.5,	L_{50} 71,	L_{10} 73,	#5
B	20	7:35 /	L_{eq} 74,	L_{max} 78.9	L_{min} 70.9,	L_{90} 72.5,	L_{50} 73.5,	L_{10} 75,	#4
	___	___ / ___ / ___	L_{eq} ___,	L_{max} ___	L_{min} ___,	L_{90} ___,	L_{50} ___,	L_{10} ___,	___
	___	___ / ___ / ___	L_{eq} ___,	L_{max} ___	L_{min} ___,	L_{90} ___,	L_{50} ___,	L_{10} ___,	___

COMMENTS:

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

Source Info and Traffic Counts

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:	267 / ___	65 / ___	5 / ___	35-45 / ___
MED. TRUCKS:	124 / ___	___ / ___	3 / ___	___ / ___
HVY TRUCKS:	96 / ___	___ / ___	3 / ___	___ / ___
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:

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:

Description / Sketch

WSP

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

SITE IDENTIFICATION: FM-2 **OBSERVER(s):** IS / MC
START DATE & TIME: 7-26 5:27 **END DATE & TIME:**
ADDRESS:
GPS coordinates:

ID

TEMP: 51 ° F HUMIDITY: 63 % R.H. WIND: **CALM** (**LIGHT**) **MODERATE VARIABLE**
WINDSPEED: 0-3 MPH DIR: **N NE** (**E**) **SE S SW W NW** (STEADY) **GUSTY** 0 MPH
SKY: (**CLEAR**) **SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN** Other:

Weather

INSTRUMENT: SLM 2231 **TYPE:** (1) 2 **SERIAL #:** A
CALIBRATOR: **SERIAL #:**

CALIBRATION CHECK: **PRE-TEST** 93.9 **dBA SPL** **POST-TEST** _____ **dBA SPL** **WINDSCREEN** ___

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

Rec #	Start Time / End Time							
17	7/26 5:27 /	L_{eq} 65.1	L_{max} 77.5	L_{min} 61.7	L_{90} 63.5	L_{50} 64.5	L_{10} 66	65
13	7/26 5:27 /	L_{eq} 61.7	L_{max} 76.6	L_{min} 58.3	L_{90} 60	L_{50} 61	L_{10} 62.5	5
___/___/___		L_{eq} ___	L_{max} ___	L_{min} ___	L_{90} ___	L_{50} ___	L_{10} ___	___
___/___/___		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:

COUNT DURATION: ____ **-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:	___ / ___	___ / ___	___ / ___	___ / ___
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:

Description / Sketch

WSP

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

SITE IDENTIFICATION: FM-3 80-160 OFF **OBSERVER(s):**
START DATE & TIME: 1 05 **END DATE & TIME:**
ADDRESS:
GPS coordinates:

ID

TEMP: 70 °F HUMIDITY: 30 % R.H. WIND: (CALM) LIGHT MODERATE VARIABLE
WINDSPEED: 0 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: **TYPE:** 1 2 **SERIAL #:** A 2160274 2160277
CALIBRATOR: **SERIAL #:** D 2160276

CALIBRATION CHECK: **PRE-TEST**_____**dBA SPL** **POST-TEST**_____**dBA SPL** **WINDSCREEN** ___

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

Rec #	Start Time / End Time							
30	1:03 / ____:	L_{eq} 75.4	L_{max} 82	L_{min} 71.1	L_{90} 73.5	L_{50} 75.0	L_{10} 76.5	#3
100	1:03 / ____:	L_{eq} 71.3	L_{max} 78.7	L_{min} 65.6	L_{90} 69.0	L_{50} 71.0	L_{10} 73.0	#2
____	____/____/____:	L_{eq}____	L_{max}____	L_{min}____	L_{90}____	L_{50}____	L_{10}____	____
____	____/____/____:	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: I-10

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:	1935 / 1629	____/____	____/____	____/____
MED. TRUCKS:	95 / 107	____/____	____/____	____/____
HVY TRUCKS:	114 / 129	____/____	____/____	____/____
BUSES:	____/____	____/____	____/____	____/____
MOTORCYCLES:	____/____	____/____	____/____	____/____

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

Source Info and Traffic Counts

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

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:

Description / Sketch

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

SITE IDENTIFICATION: FM-4 **OBSERVER(s):**
START DATE & TIME: 9 02 2026 **END DATE & TIME:**
ADDRESS:
GPS coordinates:

ID

TEMP: 55 ° F HUMIDITY: 51 % R.H. WIND: (CALM) LIGHT MODERATE VARIABLE
WINDSPEED: 0 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: BK 2238 **TYPE:** 1-2 **SERIAL #:** A2160297
CALIBRATOR: **SERIAL #:** B2160216

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

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

	Rec #	Start Time / End Time								
A	301	9:02 /	L_{eq} 73.7,	L_{max} 84.8,	L_{min} 60.7,	L_{90} 71.5,	L_{50} 73,	L_{10} 75,	7
B	160	/	L_{eq} 65.0,	L_{max} 84.2,	L_{min} 63.7,	L_{90} 66,	L_{50} 67.5,	L_{10} 69.5,	6
	/	/	L_{eq} ____,	L_{max} ____,	L_{min} ____,	L_{90} ____,	L_{50} ____,	L_{10} ____,	
	/	/	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:

COUNT DURATION: ____ -MINUTE

	NB / (EB) / SB (WB)	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	1661 / 12526	65 / 65	____ / ____	____ / ____
MED. TRUCKS:	86 / 95	↓ / ↓	____ / ____	____ / ____
HVY TRUCKS:	151 / 142	↓ / ____	____ / ____	____ / ____
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:

Description / Sketch

WSP

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fr **Job #** 11607A

SITE IDENTIFICATION: FM-5 **OBSERVER(s):** BJG MC
START DATE & TIME: **END DATE & TIME:**
ADDRESS: FIELD LAND
GPS coordinates:

ID

TEMP: 76 °F HUMIDITY: 20 % R.H. WIND: **CALM LIGHT MODERATE VARIABLE**
WINDSPEED: 0 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: 216247 - 50 ft **TYPE:** (1) 2 **SERIAL #:** 216247-50 ft 216276-100 ft
CALIBRATOR: 216276-3 -100 ft **SERIAL #:**

CALIBRATION CHECK: **PRE-TEST** _____ **dBA SPL** **POST-TEST** _____ **dBA SPL** **WINDSCREEN** ___

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

	Rec #	Start Time / End Time								
A	50ft	12:14 /	L_{eq} 71.2	L_{max} 79.1	L_{min} 64.8	L_{90} 68.5	L_{50} 71	L_{10} 72.5		
B	100ft	12:29 /	L_{eq} 69.4	L_{max} 77.4	L_{min} 63.2	L_{90} 66.5	L_{50} 69	L_{10} 71		
	___ / ___ / ___		L_{eq} ___	L_{max} ___	L_{min} ___	L_{90} ___	L_{50} ___	L_{10} ___		
	___ / ___ / ___		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:

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:	1771 / 1594	___ / ___	___ / ___	65 / 65
MED. TRUCKS:	70 / 82	___ / ___	___ / ___	___ / ___
HVY TRUCKS:	116 / 142	___ / ___	___ / ___	___ / ___
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:

Description / Sketch

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

ID

SITE IDENTIFICATION: FM 6 **OBSERVER(s):**
START DATE & TIME: 2/26 **END DATE & TIME:**
ADDRESS:
GPS coordinates:

Weather

TEMP: 65 ° F HUMIDITY: 43 % R.H. WIND: CALM (LIGHT) MODERATE VARIABLE
WINDSPEED: 5 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: **TYPE:** 1 2 **SERIAL #:** A 2160 294
CALIBRATOR: **SERIAL #:** B 2160 276

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

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

	Rec #	Start Time / End Time								
A	120	10:01 / _____	L_{eq} 74,	L_{max} 88.2,	L_{min} 70,	L_{90} 72,	L_{50} 73.5,	L_{10} 75.5,	3
B	270	10:01 / _____	L_{eq} 67.6	L_{max} 79.3,	L_{min} 63.8	L_{90} 65.5,	L_{50} 67,	L_{10} 69,	7
	____ / ____ / ____		L_{eq} ____,	L_{max} ____,	L_{min} ____,	L_{90} ____,	L_{50} ____,	L_{10} ____,	____
	____ / ____ / ____		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:

COUNT DURATION: _____ **-MINUTE**

	NB (EB) / SB (WB)	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	1472 / 2308	____ / ____	_____ / _____	____ / ____
MED. TRUCKS:	103 / 123	____ / ____	_____ / _____	____ / ____
HVY TRUCKS:	165 / 147	____ / ____	_____ / _____	____ / ____
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:

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

SITE IDENTIFICATION: FM-1 **OBSERVER(s):**
START DATE & TIME: 2-26 2:16 **END DATE & TIME:**
ADDRESS:
GPS coordinates:

ID

TEMP:_____° F HUMIDITY:_____% R.H. WIND: **CALM LIGHT MODERATE VARIABLE**
WINDSPEED:_____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: BK 2238 **TYPE:** (1) 2 **SERIAL #:**
CALIBRATOR: **SERIAL #:**
CALIBRATION CHECK: **PRE-TEST** 93.9 **dBA SPL** **POST-TEST**_____**dBA SPL** **WINDSCREEN** Y
SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**_____

	Rec #	Start Time / End Time							
A	60	2:16 / _____	L_{eq} 72.3,	L_{max} 81.7,	L_{min} 65.5	L_{90} 68,	L_{50} 72,	L_{10} 75.5,	F#10
B	120	2:16 / _____	L_{eq} 66.,	L_{max} 75.9,	L_{min} 60.9	L_{90} 63,	L_{50} 65.5	L_{10} 67.5,	F#11
	____	____ / _____	L_{eq}_____,	L_{max}_____,	L_{min}_____,	L_{90}_____,	L_{50}_____,	L_{10}_____,	_____
	____	____ / _____	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:
COUNT DURATION:_____**-MINUTE**

	NB (EB) / SB (WB)	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	On Ramp	SPEED (mph) NB EB / SB WB
AUTOS:	265 / 265	____ / ____	150 4 / _____	212	____ / ____
MED. TRUCKS:	31 / 31	____ / ____	92 / _____		____ / ____
HVY TRUCKS:	113 / 113	____ / ____	109 / _____	2	____ / ____
BUSES:	_____ / _____	____ / ____	_____ / _____	1	____ / ____
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:

Description / Sketch

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

SITE IDENTIFICATION: FM 8 **OBSERVER(s):**
START DATE & TIME: 2-26 11:24 **END DATE & TIME:**
ADDRESS:
GPS coordinates:

ID

TEMP: 65 °F HUMIDITY: 35 % R.H. WIND: CALM (LIGHT) MODERATE VARIABLE
WINDSPEED: 0-5 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: BK 2238 **TYPE:** 1 2 **SERIAL #:** 2160276
CALIBRATOR: **SERIAL #:**
CALIBRATION CHECK: **PRE-TEST** 93.9 **dBA SPL** **POST-TEST** ____ **dBA SPL** **WINDSCREEN** ___
SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:** ____

Rec #	Start Time / End Time							
Roz	1 / 11:24 / ____	L_{eq} 63.9	L_{max} 73.4	L_{min} 56.1	L_{90} 60	L_{50} 62.5	L_{10} 65.5	9
____	____ / ____ / ____	L_{eq} ____	L_{max} ____	L_{min} ____	L_{90} ____	L_{50} ____	L_{10} ____	____
____	____ / ____ / ____	L_{eq} ____	L_{max} ____	L_{min} ____	L_{90} ____	L_{50} ____	L_{10} ____	____
____	____ / ____ / ____	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:
COUNT DURATION: ____ **-MINUTE**

	(NB) / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 ~~COUNT~~: (NB) / EB / (SB) / WB		SPEED (mph) NB EB / SB WB
AUTOS:	55 / ____	____ / ____	10 / 25	160	____ / ____
MED. TRUCKS:	18 / ____	____ / ____	1 / ____	4	____ / ____
HVY TRUCKS:	9 / ____	____ / ____	____ / ____		____ / ____
BUSES:	____ / ____	____ / ____	____ / ____	1	____ / ____
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:

Description / Sketch

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

SITE IDENTIFICATION: FM9 **OBSERVER(s):**
START DATE & TIME: 10:42 2/26 **END DATE & TIME:**
ADDRESS: Holiday Inn
GPS coordinates:

ID

TEMP: 63 ° F HUMIDITY: 38 % R.H. WIND: **CALM LIGHT MODERATE VARIABLE**
WINDSPEED: 7 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: 1 **TYPE: 1 2** **SERIAL #:** 2160 297
CALIBRATOR: **SERIAL #:** 2160 276

CALIBRATION CHECK: **PRE-TEST** 93.9 **dBA SPL** **POST-TEST** ____ **dBA SPL** **WINDSCREEN** 4

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

Acoustic Measurements

	Rec #	Start Time / End Time								
A	1285	10:42	L_{eq} 70.7,	L_{max} 81.4,	L_{min} 63.9,	L_{90} 67,	L_{50} 70,	L_{10} 72.5,	9	
B	2901	10:46	L_{eq} 64.7	L_{max} 732,	L_{min} 55,	L_{90} 56.5	L_{50} 61,	L_{10} 63.5,	8	
	___/___/___		L_{eq} ____,	L_{max} ____,	L_{min} ____,	L_{90} ____,	L_{50} ____,	L_{10} ____,	____	
	___/___/___		L_{eq} ____,	L_{max} ____,	L_{min} ____,	L_{90} ____,	L_{50} ____,	L_{10} ____,	____	

COMMENTS:

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

Source Info and Traffic Counts

COUNT DURATION: 15 -MINUTE **SPEED (mph)** **#2 COUNT:** 27 (WRD) **SPEED (mph)**

	NB / EB / SB / WB	NB EB / SB WB	NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	598 / 519	65 / ____	37 / 35	____ / ____
MED. TRUCKS:	13 / 37	↓ / ____	____ / ____	____ / ____
HVY TRUCKS:	7 / 11	↓ / ____	____ / ____	____ / ____
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:

TERRAIN: **HARD SOFT MIXED FLAT OTHER:** ____
PHOTOS:
OTHER COMMENTS / SKETCH:

Description / Sketch

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

SITE IDENTIFICATION: FM-10 **OBSERVER(s):**
START DATE & TIME: 12:03 **END DATE & TIME:**
ADDRESS:
GPS coordinates:

ID

TEMP:_____° F HUMIDITY:_____% R.H. WIND: **CALM LIGHT MODERATE VARIABLE**
WINDSPEED:_____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: BK 2238 **TYPE:** (1) 2 **SERIAL #:**
CALIBRATOR: **SERIAL #:**

CALIBRATION CHECK: **PRE-TEST** 113.9 **dBA SPL** **POST-TEST**_____**dBA SPL** **WINDSCREEN** Y

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

Rec #	Start Time / End Time							
10	12:03 /	L_{eq} 63,	L_{max} 75.9,	L_{min} 57.5,	L_{90} 60,	L_{50} 62,	L_{10} 65,	10
	/ /	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
	/ /	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
	/ /	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:
COUNT DURATION:_____-MINUTE

	NB / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 COUNT: BROADWAY NB / EB / SB / WB		SPEED (mph) NB EB / SB WB
AUTOS:	/	/	336 / 278	RAMP	/
MED. TRUCKS:	/	/	15 / 19	127	/
HVY TRUCKS:	/	/	3 / 4	11	/
BUSES:	/	/	/	9	/
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:

Description / Sketch

WSP

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

SITE IDENTIFICATION: Fm 11 **OBSERVER(s):**
START DATE & TIME: 2/27 **END DATE & TIME:**
ADDRESS:
GPS coordinates:

ID

TEMP: 63 °F HUMIDITY: 50 % R.H. WIND: **CALM** (**LIGHT**) **MODERATE VARIABLE**
WINDSPEED: 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: **TYPE: 1 2** **SERIAL #:**
CALIBRATOR: **SERIAL #:**
CALIBRATION CHECK: **PRE-TEST** 93.9 **dBA SPL** **POST-TEST** dBA SPL **WINDSCREEN** 4
SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**

Rec #	Start Time / End Time						
1	9:15 /	L_{eq} 68.3	L_{max} 79.4	L_{min} 67.3	L_{90} 66.5	L_{50} 68	L_{10} 69 #13
/	/	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}
/	/	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}
/	/	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:
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:	297 / 271	/	/	/
MED. TRUCKS:	79 / 93	/	/	/
HVY TRUCKS:	140 / 138	/	/	/
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:

Description / Sketch

WSP

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fr **Job #** 11607A

SITE IDENTIFICATION: FM 12 **OBSERVER(s):**
START DATE & TIME: 3:03pm 2/26 **END DATE & TIME:**
ADDRESS:
GPS coordinates:

ID

TEMP: 73 °F HUMIDITY: 19 % 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: **TYPE:** 1 2 **SERIAL #:** 2160376
CALIBRATOR: **SERIAL #:**
CALIBRATION CHECK: **PRE-TEST** ____ **dBA SPL** **POST-TEST** ____ **dBA SPL** **WINDSCREEN** ___
SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**

Rec #	Start Time / End Time							
Ground	/ 3:03 / 3:18	L_{eq} 55.9	L_{max} 83.2	L_{min} 50.8	L_{90} 52.5	L_{50} 54.5	L_{10} 57.0	1.2
15FT	/ /	L_{eq} 60.5	L_{max} 87	L_{min} 55.6	L_{90} 57.7	L_{50} 59.2	L_{10} 61.1	
	/ /	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
	/ /	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:
COUNT DURATION: ____-**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:	____ / ____	____ / ____	____ / ____	____ / ____
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:

Description / Sketch

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

ID

SITE IDENTIFICATION: FM 13 **OBSERVER(s):**
START DATE & TIME: 2/27 **END DATE & TIME:**
ADDRESS:
GPS coordinates:

Weather

TEMP: 65 ° F HUMIDITY: 30 % R.H. WIND: **CALM LIGHT MODERATE VARIABLE**
WINDSPEED: 0-1 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: **TYPE: 1 2** **SERIAL #:** 2160297 - A
CALIBRATOR: **SERIAL #:** 2160279 - B
CALIBRATION CHECK: **PRE-TEST** _____ **dBA SPL** **POST-TEST** _____ **dBA SPL** **WINDSCREEN** ___
SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**

Rec #	Start Time / End Time							
A	10:09 /	L_{eq} 73.5	L_{max} 77.5	L_{min} 68.7	L_{90} 72.0	L_{50} 73.5	L_{10} 74.5	- 11
B	10:12 /	L_{eq} 71.1	L_{max} 75.6	L_{min} 66.6	L_{90} 69.5	L_{50} 71.0	L_{10} 72	- 14
___	___ / ___ /	L_{eq} ___	L_{max} ___	L_{min} ___	L_{90} ___	L_{50} ___	L_{10} ___	___
___	___ / ___ /	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:
COUNT DURATION: ____ **-MINUTE**

	NB / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	2099 / 2069	___ / ___	___ / ___	___ / ___
MED. TRUCKS:	127 / 102	___ / ___	___ / ___	___ / ___
HVY TRUCKS:	142 / 114	___ / ___	___ / ___	___ / ___
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:

WSP

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fr **Job #** 11607A

SITE IDENTIFICATION: EM 14 **OBSERVER(s):**
START DATE & TIME: 2/27 **END DATE & TIME:**
ADDRESS:
GPS coordinates:

ID

TEMP: 75 °F HUMIDITY: 20 % R.H. WIND: **CALM** (**LIGHT**) **MODERATE VARIABLE**
WINDSPEED: 0-3 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: **TYPE: 1 2** **SERIAL #:** 2160297
CALIBRATOR: **SERIAL #:** 2160276

CALIBRATION CHECK: **PRE-TEST** _____ **dBA SPL** **POST-TEST** _____ **dBA SPL** **WINDSCREEN** ___

Dictaphone

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

Acoustic Measurements

Rec #	Start Time / End Time							
112 A	3:32 / 3:47	L_{eq} 65.1	L_{max} 70.5	L_{min} 60.1	L_{90} 63.5	L_{50} 65.0	L_{10} 66.5	File 18
224 B	/	L_{eq} 64.4	L_{max} 69.6	L_{min} 60.8	L_{90} 62.5	L_{50} 64.0	L_{10} 65.5	File 19
/	/	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
/	/	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	

COMMENTS:

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**
ROADWAY TYPE:
COUNT DURATION: _____ **-MINUTE**

Source Info and Traffic Counts

	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:	/	/	/	/
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:

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:

Description / Sketch

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

SITE IDENTIFICATION: Fm 15 **OBSERVER(s):** KK
START DATE & TIME: 2-21 10:25 **END DATE & TIME:**
ADDRESS:
GPS coordinates:

ID

TEMP: 64 °F HUMIDITY: 40 % R.H. WIND: (CALM) LIGHT MODERATE VARIABLE
WINDSPEED: 0 MPH DIR: N NE E SE S SW W NW STEADY GUSTY 0 MPH
SKY: (CLEAR) SUNNY DARK (PARTLY CLOUDY) OVRCST FOG DRIZZLE RAIN Other:

Weather

INSTRUMENT: 831 2238 **TYPE:** 1 2 **SERIAL #:** 2160216
CALIBRATOR: **SERIAL #:**
CALIBRATION CHECK: **PRE-TEST** 93.9 **dBA SPL** **POST-TEST** _____ **dBA SPL** **WINDSCREEN** Y
SETTINGS: (A-WEIGHTED) SLOW FAST FRONTAL RANDOM ANSI OTHER:

Rec #	Start Time / End Time							
1	10:25 /	L_{eq} 58.5	L_{max} 78.2	L_{min} 53.6	L_{90} 56	L_{50} 58	L_{10} 59.5	#15
/	/	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
/	/	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
/	/	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:
COUNT DURATION: _____-MINUTE

	SPEED (mph) NB / EB / SB / WB	NB EB / SB WB	#2 COUNT: NB / EB / SB / WB		SPEED (mph) NB EB / SB WB
AUTOS:	/	/	/	RAMP EB 10 60	/
MED. TRUCKS:	/	/	/	556	/
HVY TRUCKS:	/	/	/	44	/
BUSES:	/	/	/		/
MOTORCYCLES:	/	/	/	22	/

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:

Description / Sketch

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

SITE IDENTIFICATION: Fm 16 **OBSERVER(s):** ML
START DATE & TIME: 2-27 10:26 **END DATE & TIME:**
ADDRESS:
GPS coordinates:

ID

TEMP 64 ° F HUMIDITY: 40 % R.H. WIND: (CALM) LIGHT MODERATE VARIABLE
WINDSPEED: 0 MPH DIR: N NE E SE S SW W NW STEADY GUSTY 0 MPH
SKY: (CLEAR) SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN Other:

Weather

INSTRUMENT: B&K 2238 **TYPE:** (1) 2 **SERIAL #:** 2160291
CALIBRATOR: **SERIAL #:**

CALIBRATION CHECK: **PRE-TEST** 93.9 **dBA SPL** **POST-TEST** _____ **dBA SPL** **WINDSCREEN** ___

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

Rec #	Start Time / End Time							
1	10:26 /	L_{eq} 61.1	L_{max} 72	L_{min} 51.8	L_{90} 54.5	L_{50} 60.5	L_{10} 62	+12
___	___ / ___	L_{eq} ___	L_{max} ___	L_{min} ___	L_{90} ___	L_{50} ___	L_{10} ___	___
___	___ / ___	L_{eq} ___	L_{max} ___	L_{min} ___	L_{90} ___	L_{50} ___	L_{10} ___	___
___	___ / ___	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:
COUNT DURATION: 15 **-MINUTE**

	NB / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	EB RAMP EAST TO 60	SPEED (mph) NB EB / SB WB
AUTOS:	___ / ___	___ / ___	___ / ___		___ / ___
MED. TRUCKS:	___ / ___	___ / ___	___ / ___	556	___ / ___
HVY TRUCKS:	___ / ___	___ / ___	___ / ___		___ / ___
BUSES:	___ / ___	___ / ___	___ / ___	44	___ / ___
MOTORCYCLES:	___ / ___	___ / ___	___ / ___	22	___ / ___

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

Source Info and Traffic Counts

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

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:

Description / Sketch

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

SITE IDENTIFICATION: FM-19 **OBSERVER(s):**
START DATE & TIME: 2-27 2:44 **END DATE & TIME:**
ADDRESS:
GPS coordinates:

ID

TEMP: 75 ° F HUMIDITY: 20 % R.H. WIND: **CALM LIGHT MODERATE VARIABLE**
WINDSPEED: 0-4 MPH DIR: **N NE E SE S SW W NW** STEADY GUSTY 0 MPH
SKY: **CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN** Other:

Weather

INSTRUMENT: 2236 320 **TYPE: 1 2** **SERIAL #:** BY 2160299
CALIBRATOR: **SERIAL #:**
CALIBRATION CHECK: **PRE-TEST** 93.9 **dBA SPL** **POST-TEST** _____ **dBA SPL** **WINDSCREEN** ___
SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**

Acoustic Measurements

Rec #	Start Time / End Time							
GF 1	/	L_{eq} 61.3	L_{max} 66.3	L_{min} 56.5	L_{90} 59	L_{50} 61	L_{10} 63	17
15 1	/	L_{eq} 64.7	L_{max} 70.6	L_{min} 60.8	L_{90} 62.7	L_{50} 64.7	L_{10} 66.5	
___ /	/	L_{eq} ___	L_{max} ___	L_{min} ___	L_{90} ___	L_{50} ___	L_{10} ___	
___ /	/	L_{eq} ___	L_{max} ___	L_{min} ___	L_{90} ___	L_{50} ___	L_{10} ___	

COMMENTS:

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**
ROADWAY TYPE:
COUNT DURATION: _____ **-MINUTE**

Source Info and Traffic Counts

	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:	_____ / _____	____ / ____	_____ / _____	____ / ____
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:

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:

Description / Sketch

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

SITE IDENTIFICATION: EM18 **OBSERVER(s):**
START DATE & TIME: 2/17 **END DATE & TIME:**
ADDRESS:
GPS coordinates:

ID

TEMP: 69 ° F HUMIDITY: 34 % R.H. WIND: **CALM LIGHT MODERATE VARIABLE**
WINDSPEED: 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: **TYPE: 1 2** **SERIAL #:** 2160297
CALIBRATOR: **SERIAL #:** 2160276
CALIBRATION CHECK: **PRE-TEST** dBA SPL **POST-TEST** dBA SPL **WINDSCREEN**
SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**

Acoustic Measurements

Rec #	Start Time / End Time							
140	11:52 / 12:07:	L_{eq} 64.7,	L_{max} 74.3,	L_{min} 60.8,	L_{90} 62.5,	L_{50} 64,	L_{10} 66.0,	13
240	/ / :	L_{eq} 59.6,	L_{max} 71.4,	L_{min} 54.8,	L_{90} 57.0,	L_{50} 58.5,	L_{10} 61.0,	17
/	/ / :	L_{eq},	L_{max},	L_{min},	L_{90},	L_{50},	L_{10},	
/	/ / :	L_{eq},	L_{max},	L_{min},	L_{90},	L_{50},	L_{10},	

COMMENTS:

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**
ROADWAY TYPE:
COUNT DURATION: -MINUTE

Source Info and Traffic Counts

	NB EB / SB WB	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	699 / 1534	/	/	/
MED. TRUCKS:	62 / 86	/	/	/
HVY TRUCKS:	123 / 120	/	/	/
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:

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:

Description / Sketch

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

SITE IDENTIFICATION: FM 19 **OBSERVER(s):**
START DATE & TIME: 2/27 **END DATE & TIME:**
ADDRESS:
GPS coordinates:

ID

TEMP: 73 °F HUMIDITY: 33 % R.H. WIND: **CALM LIGHT MODERATE VARIABLE**
WINDSPEED: 0-7 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: **TYPE: 1 2** **SERIAL #:** 2160 0297
CALIBRATOR: **SERIAL #:**

CALIBRATION CHECK: **PRE-TEST**_____**dBA SPL** **POST-TEST**_____**dBA SPL** **WINDSCREEN** ___

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

Acoustic Measurements

Rec #	Start Time / End Time							
S-Flat	1:22 /	L_{eq} 65.9,	L_{max} 73.5,	L_{min} 60.4,	L_{90} 63.0,	L_{50} 65.5,	L_{10} 67.5,	File 15
15 Ft	/	L_{eq} 70.3,	L_{max} 77.6,	L_{min} 64.5,	L_{90} 67.7,	L_{50} 70.0,	L_{10} 72.0,	
/	/	L_{eq} _____,	L_{max} _____,	L_{min} _____,	L_{90} _____,	L_{50} _____,	L_{10} _____,	
/	/	L_{eq} _____,	L_{max} _____,	L_{min} _____,	L_{90} _____,	L_{50} _____,	L_{10} _____,	

COMMENTS:

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**
ROADWAY TYPE:
COUNT DURATION: _____-MINUTE

Source Info and Traffic Counts

	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:	_____ / _____	____ / ____	_____ / _____	____ / ____

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:

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:

Description / Sketch

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

SITE IDENTIFICATION: FM20 **OBSERVER(s):** 1414 ML
START DATE & TIME: 2-21 **END DATE & TIME:** 2-21
ADDRESS:

GPS coordinates:

ID

TEMP: 71 ° F HUMIDITY: 40 % R.H. WIND: CALM LIGHT MODERATE VARIABLE
WINDSPEED: 0 MPH DIR: N NE E SE S SW W NW STEADY GUSTY 0 MPH
SKY: CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN Other:

Weather

INSTRUMENT: 2250 B320 **TYPE:** 1 2 **SERIAL #:** ACL 2160249 B15 B20
CALIBRATOR: **SERIAL #:**

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

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

Rec #	Start Time / End Time							
GL1	12:48 :	L_{eq} 67,	L_{max} 73.6,	L_{min} 62.9,	L_{90} 65,	L_{50} 66.5,	L_{10} 68,	#14
ISHT1	12:42 :	L_{eq} 72.6,	L_{max} 75.8,	L_{min} 69.3,	L_{90} 71,	L_{50} 72.5,	L_{10} 73.9,	—
___/___/___ :		L_{eq} ___,	L_{max} ___,	L_{min} ___,	L_{90} ___,	L_{50} ___,	L_{10} ___,	___
___/___/___ :		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:

COUNT DURATION: ____-**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:	___ / ___	___ / ___	___ / ___	___ / ___
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:

Description / Sketch

WSP

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fr **Job #** 11607A

SITE IDENTIFICATION: FM21 **OBSERVER(s):**
START DATE & TIME: **END DATE & TIME:**
ADDRESS:
GPS coordinates:

ID

TEMP: 73 °F HUMIDITY: 25 % R.H. WIND: (CALM) LIGHT MODERATE VARIABLE
WINDSPEED: 0-3 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: **TYPE: 1 2** **SERIAL #:** 2160 297 - A
CALIBRATOR: **SERIAL #:** 2160 276 - B

CALIBRATION CHECK: **PRE-TEST** _____ **dBA SPL** **POST-TEST** _____ **dBA SPL** **WINDSCREEN** ___

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

Acoustic Measurements

Rec #	Start Time / End Time							
A	2:00 / _____ :	L_{eq} 63.9,	L_{max} 78.3,	L_{min} 58.9,	L_{90} 61.5,	L_{50} 63.5,	L_{10} 65.0,	File 16
B	2:00 / _____ :	L_{eq} 61.9,	L_{max} 79.6,	L_{min} 54.7,	L_{90} 58.5,	L_{50} 60.5,	L_{10} 63.0,	File 18
____ / _____ / _____ :		L_{eq} _____,	L_{max} _____,	L_{min} _____,	L_{90} _____,	L_{50} _____,	L_{10} _____,	_____
____ / _____ / _____ :		L_{eq} _____,	L_{max} _____,	L_{min} _____,	L_{90} _____,	L_{50} _____,	L_{10} _____,	_____

COMMENTS:

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

Source Info and Traffic Counts

COUNT DURATION: _____-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:	_____ / _____	_____ / _____	_____ / _____	_____ / _____
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:

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:

Description / Sketch

WSP

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

ID

SITE IDENTIFICATION: FM 22 **OBSERVER(s):**
START DATE & TIME: 11:37 2/28 **END DATE & TIME:**
ADDRESS:
GPS coordinates:

Weather

TEMP: 70 ° F HUMIDITY: 36 % R.H. WIND: CALM LIGHT MODERATE VARIABLE
WINDSPEED: 0-5 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: **TYPE: 1 2** **SERIAL #:** 2160297
CALIBRATOR: **SERIAL #:**

CALIBRATION CHECK: **PRE-TEST** _____ **dBA SPL** **POST-TEST** _____ **dBA SPL** **WINDSCREEN** ___

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

Rec #	Start Time / End Time							
Sound	/ 11:37 / 11:52 :	L_{eq} 70.2,	L_{max} 77.2,	L_{min} 66.1,	L_{90} 68.0,	L_{50} 70.6,	L_{10} 71.5,	#22
2nd Flow	/ 11:37 / 11:52 :	L_{eq} 76.5,	L_{max} 83.7,	L_{min} 72.1,	L_{90} 74.7,	L_{50} 76.3,	L_{10} 77.9,	
	/ / :	L_{eq} ,	L_{max} ,	L_{min} ,	L_{90} ,	L_{50} ,	L_{10} ,	
	/ / :	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:
COUNT DURATION: _____ **-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:	_____ / _____	____/____	_____ / _____	____/____
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:

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

SITE IDENTIFICATION: EM23 **OBSERVER(s):**
START DATE & TIME: **END DATE & TIME:**
ADDRESS:
GPS coordinates:

ID

TEMP: 65 °F HUMIDITY: 21 % R.H. WIND: **CALM LIGHT MODERATE VARIABLE**
WINDSPEED: 0-1 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: **TYPE: 1 2** **SERIAL #:** 2160297
CALIBRATOR: **SERIAL #:** 2160276
CALIBRATION CHECK: **PRE-TEST** ____ **dBA SPL** **POST-TEST** ____ **dBA SPL** **WINDSCREEN** Y
SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**

	Rec #	Start Time / End Time								
A	110	10:49 / 11:04	L_{eq} 63.0,	L_{max} 70.3,	L_{min} 57.4,	L_{90} 61.0,	L_{50} 62.5,	L_{10} 64.5,	#21
B	220	10:49 / 11:04	L_{eq} 56.3,	L_{max} 66.4,	L_{min} 51.6,	L_{90} 54.0,	L_{50} 56.0,	L_{10} 58.0,	#22
	____	____/____/____	L_{eq}____,	L_{max}____,	L_{min}____,	L_{90}____,	L_{50}____,	L_{10}____,	____
	____	____/____/____	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:
COUNT DURATION: ____ **-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:	____ / ____	____/____	____ / ____	____/____
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:

Description / Sketch

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

SITE IDENTIFICATION: FM24 **OBSERVER(s):**
START DATE & TIME: 2/28 **END DATE & TIME:**
ADDRESS:
GPS coordinates:

ID

TEMP:_____° F HUMIDITY:_____% R.H. WIND: **CALM LIGHT MODERATE VARIABLE**
WINDSPEED:_____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: **TYPE: 1 2** **SERIAL #:** 2160297
CALIBRATOR: **SERIAL #:** 2160276

CALIBRATION CHECK: **PRE-TEST**_____**dBA SPL** **POST-TEST**_____**dBA SPL** **WINDSCREEN** ___

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

Rec # Start Time / End Time

120 / 13:01 AM : L_{eq} 61, L_{max} 72.9, L_{min} 56.3 L_{90} 59, L_{50} 60.5 L_{10} 62, #20
240 / 13:11 : L_{eq} 59.6, L_{max} 66.2, L_{min} 55, L_{90} 57.2 L_{50} 59.3, L_{10} 60.5, #21
____/____/____: L_{eq}_____, L_{max}_____, L_{min}_____, L_{90}_____, L_{50}_____, L_{10}_____, _____
____/____/____: 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:
COUNT DURATION:_____**-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:	_____ / _____	____/____	_____ / _____	____/____
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:

* 16 FT Sound Barrier

Description / Sketch

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

SITE IDENTIFICATION: I-M25 **OBSERVER(s):**
START DATE & TIME: 9:22 AM 2/28 **END DATE & TIME:**
ADDRESS:
GPS coordinates:

ID

TEMP: 57 °F HUMIDITY: 57 % R.H. WIND: (CALM) LIGHT MODERATE VARIABLE
WINDSPEED: 0-4 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: BK2238 **TYPE: 1 2** **SERIAL #:** 2160297 - A
CALIBRATOR: BK4231 **SERIAL #:** 2140276 - B

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

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

	Rec #	Start Time / End Time								
A	i70	9:22AM / 9:37	L_{eq} 65.5,	L_{max} 72.7,	L_{min} 59.6,	L_{90} 63.0,	L_{50} 65.0,	L_{10} 67.5,	File 19
B	340	9:22 / 9:37	L_{eq} 60.1,	L_{max} 68.6,	L_{min} 58.4,	L_{90} 58.0,	L_{50} 59.5,	L_{10} 62.0,	File 20
	____	____/____/____	L_{eq}____,	L_{max}____,	L_{min}____,	L_{90}____,	L_{50}____,	L_{10}____,	____
	____	____/____/____	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:

COUNT DURATION:_____-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:	____ / ____	____/____	____ / ____	____/____
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:

Description / Sketch

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

ID

SITE IDENTIFICATION: FM-26 **OBSERVER(s):**
START DATE & TIME: **END DATE & TIME:**
ADDRESS:
GPS coordinates:

Weather

TEMP: 67 ° F HUMIDITY: 30 % R.H. WIND: (CALM) LIGHT MODERATE VARIABLE
WINDSPEED: 0 MPH DIR: N NE E SE S SW W NW STEADY GUSTY 0 MPH
SKY: (CLEAR) SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN Other:

Acoustic Measurements

INSTRUMENT: 1 + 3 **TYPE:** (1) 2 **SERIAL #:**
CALIBRATOR: **SERIAL #:**
CALIBRATION CHECK: **PRE-TEST** 93.9 **dBA SPL** **POST-TEST** 93.9 **dBA SPL** **WINDSCREEN** Y
SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**

Rec #	Start Time / End Time							
65FT	3:27 /	L_{eq} 69.3,	L_{max} 83.6,	L_{min} ,	L_{90} 58,	L_{50} 68,	L_{10} 70.5,	F4
130FT	3:27 /	L_{eq} 66.4,	L_{max} 76.7,	L_{min} 62.4,	L_{90} 64,	L_{50} 66,	L_{10} 67.5,	F3
/	/	L_{eq} ,	L_{max} ,	L_{min} ,	L_{90} ,	L_{50} ,	L_{10} ,	
/	/	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:
COUNT DURATION: -MINUTE

	(NB) / EB / (SB) / WB	NB EB / SB WB	#2 ~~COUNT~~: SIS OFF NB / EB / (SB) / WB	SPEED (mph) NB EB / SB WB
AUTOS:	1337 / 1462	65 / 65	~~270~~ 176	~~65~~ 60-45
MED. TRUCKS:	40 / 45	↓ / ↓	/	/
HVY TRUCKS:	57 / 38	/	/	/
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:

WSP

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

ID

SITE IDENTIFICATION: FM27 **OBSERVER(s):**
START DATE & TIME: **END DATE & TIME:**
ADDRESS:
GPS coordinates:

Weather

TEMP: 73 °F HUMIDITY: 28 % R.H. WIND: **CALM LIGHT MODERATE VARIABLE**
WINDSPEED: 03 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: **TYPE: 1 2** **SERIAL #:** 2160297
CALIBRATOR: **SERIAL #:** CD870-1232

CALIBRATION CHECK: **PRE-TEST**_____**dBA SPL** **POST-TEST**_____**dBA SPL** **WINDSCREEN** ___

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

Rec #	Start Time / End Time							
1	1:00 / 1:15	L_{eq} 62.4	L_{max} 71.3	L_{min} 58.8	L_{90} 60.5	L_{50} 62.0	L_{10} 63.5	File 24
2	/	L_{eq} 65.2	L_{max} 75.1	L_{min} 61.3	L_{90} 63.5	L_{50} 64.8	L_{10} 66.4	
/	/	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
/	/	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	

Green Road 15Ft

COMMENTS:

Source Info and Traffic Counts

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**
ROADWAY TYPE: EB 60
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:	1830 /	/	/	/
MED. TRUCKS:	88 /	/	/	/
HVY TRUCKS:	37 /	/	/	/
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:

18 Ft wall

FIELD MEASUREMENT DATA SHEET

Project Name: I-10, I17 to SR202 Santan/ South Mountain Fre **Job #** 11607A

SITE IDENTIFICATION: FM28 **OBSERVER(s):**
START DATE & TIME: **END DATE & TIME:**
ADDRESS:
GPS coordinates:

ID

TEMP: 70 °F HUMIDITY: 34 % R.H. WIND: **CALM** (**LIGHT**) **MODERATE VARIABLE**
WINDSPEED: 0-5 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: BK2238 **TYPE: 1 2** **SERIAL #:** 2160297
CALIBRATOR: **SERIAL #:** 2160276
CALIBRATION CHECK: **PRE-TEST** ____ **dBA SPL** **POST-TEST** ____ **dBA SPL** **WINDSCREEN** Y
SETTINGS: **A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:**

	Rec #	Start Time / End Time								
50 FT Round	A	12:24 / 12:38	L_{eq} 59.4,	L_{max} 80.0,	L_{min} 55.5,	L_{90} 57.0,	L_{50} 58.5,	L_{10} 60,	#23
	B	12:24 / 12:39	L_{eq} 59.9,	L_{max} 71.1,	L_{min} 54.9,	L_{90} 57.5,	L_{50} 59,	L_{10} 61,	#23
150 FT Round	____	____ / ____	L_{eq} ____,	L_{max} ____,	L_{min} ____,	L_{90} ____,	L_{50} ____,	L_{10} ____,	____
	____	____ / ____	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:
COUNT DURATION: ____-**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:	____ / ____	____ / ____	____ / ____	____ / ____
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:

Description / Sketch

APPENDIX D – FIELD MEASUREMENT PHOTOS

FM-1

Not Available

FM-2

FM-3

FM-4

FM-5

FM-6

FM-7

FM-8

FM-9

FM-10

FM-11

FM-12

FM-13

FM-14

FM-15

FM-16

Not Available

FM-17

FM-18

FM-19

FM-20

FM-21

FM-22

FM-23

FM-24

FM-25

FM-26

FM-27

FM-28

APPENDIX E – CONSIDERATION OF PROJECT AREA SOUTH OF E RAY RD TI TO SR202

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Further to the instruction from ADOT, the project area south of E Ray Rd TI was modeled and analyzed for impacts, to fully comply with the ADOT NAR, where it is stipulated that "*If a project is determined to be a Type I project under this definition then the entire project area as defined in the environmental document is a Type I project.*" There are multi-family dwelling units and hotels in the northwest and southwest areas of Chandler Boulevard. FHWA Highway Traffic Noise: Analysis and Abatement Guidance (FHWA-HEP-10-025) stipulates that "*when analyzing areas with multi-family dwelling units the analyst should choose an exterior area, such as a patio, playground, or picnic area between the highway and the actual building, if one exists. If there are no ground level exterior areas, the analyst may choose a balcony/deck location for analysis. A highway agency needs to evaluate the context and intensity of the land use when determining frequent human use.*"

Based on the field visit to the area to evaluate the context and intensity it has been observed that most of the areas of frequent human use activities are located within the interior of the facilities, presumably due to prevalent weather conditions, while the exterior areas of frequent human use (swimming pools, bark-park, tennis court, ramadas) were located on the ground level and successfully shielded by the structures, as confirmed by noise measurements and models. Since the worst-noise hour conditions remain the same (traffic at LOS C on the mainline, *Highway Capacity Manual 2010*) there is no perceivable change within common noise environments, and no impacts were identified in this area that warranted consideration of noise abatement measures in line with ADOT NAR.

Table 1 - Predicted existing and future noise levels

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
SB221A	Hotel	No outdoor use - façade	N/A	(65.9*)75	75.1	75.1	No
SB221B**	Hotel	No outdoor use - façade	N/A	(70.3)76.3	76.5	76.5	No
SB222A	Hotel	No outdoor use - façade	N/A	(63.9)76	75.8	75.8	No
SB222B	Hotel	No outdoor use - façade	N/A	(61.9)77.5	77.2	77.2	No
SB222-Pool	Hotel	20	71	(65.5)58	57.8	57.8	No
SB223A	Hotel	No outdoor use - façade	N/A	(60.1)74.2	74.1	74.1	No
SB223B	Hotel	No outdoor use - façade	N/A	75.6	75.4	75.4	No
SB223-Pool	Hotel	20	71	56.2	56	56	No
SB224A	MF	No outdoor use - façade	N/A	62	61.6	61.6	No
SB224B	MF	No outdoor use - façade	N/A	66.2	66.1	66.1	No
SB225A	MF	No outdoor use - façade	N/A	60.5	60.3	60.3	No
SB225B	MF	No outdoor use - façade	N/A	64.9	64.9	64.9	No
SB226A	MF	No outdoor use - façade	N/A	52.3	52.1	52.1	No
SB226B	MF	No outdoor use - façade	N/A	54.6	54.4	54.4	No
SB227A	MF	No outdoor use - façade	N/A	58.5	58.4	58.4	No
SB227B	MF	No outdoor use - façade	N/A	61.1	61.1	61.1	No
SB228A	MF	No outdoor use - façade	N/A	57.6	57.3	57.3	No
SB228B	MF	No outdoor use - façade	N/A	60.9	60.8	60.8	No
SB228-Pool	MF	20	66	53.7	53.3	53.3	No
SB229A	Hotel	No outdoor use - façade	N/A	63.8	64.2	64.2	No
SB229B	Hotel	No outdoor use - façade	N/A	71.9	72.1	72.1	No
SB230A	Hotel	No outdoor use - façade	N/A	58.6	58.7	58.7	No
SB230B	Hotel	No outdoor use - façade	N/A	61.9	62	62	No
SB230-Pool	Hotel	20	71	59.6	59.7	59.7	No
SB231A	MF	No outdoor use - façade	N/A	62	62.6	62.6	No

Receiver	Facility Type (MF, SF, etc.)	Dwelling Units	NAC	L_{aeq1h}, dB(A)			Impacted
				Existing	No-Build	Build	
SB231B	MF	No outdoor use - façade	N/A	66.7	66.8	66.8	No
SB232A	MF	No outdoor use - façade	N/A	62.9	63.5	63.5	No
SB232B	MF	No outdoor use - façade	N/A	67.6	67.7	67.7	No
SB231-Pool	MF	20	71	54.3	54.5	54.5	No
SB233A	MF	No outdoor use - façade	N/A	62.3	62.9	62.9	No
SB233B	MF	No outdoor use - façade	N/A	66.2	66.6	66.6	No
SB234A	MF	4	66	60.6	61.2	61.2	No
SB234B	MF	No outdoor use - façade	N/A	64.7	65.2	65.2	No
SB233-Pool	MF	40	66	50.9	51.3	51.3	No
SB235A	MF	No outdoor use - façade	N/A	61.1	61.9	61.9	No
SB235B	MF	No outdoor use - façade	N/A	63.5	64.1	64.1	No
SB236A	MF	No outdoor use - façade	N/A	56.5	57	57	No
SB236B	MF	No outdoor use - façade	N/A	59.3	60.1	60.1	No
SB237A	MF	No outdoor use - façade	N/A	59	60	60	No
SB237B	MF	No outdoor use - façade	N/A	61.8	62.5	62.5	No
SB238A	MF	No outdoor use - façade	N/A	57	57.9	57.9	No
SB238B	MF	No outdoor use - façade	N/A	59.6	60.2	60.2	No
SB239A	MF	No outdoor use - façade	N/A	55.6	56.4	56.4	No
SB239B	MF	No outdoor use - façade	N/A	58.4	58.9	58.9	No
SB240A	MF	No outdoor use - façade	N/A	52.1	52.5	52.5	No
SB240B	MF	No outdoor use - façade	N/A	54.5	54.6	54.6	No
SB241-Pool	MF	40	66	54.3	55.1	55.1	No
SB241-Park	MF	20	66	48.3	48.5	48.5	No
SB241-Rec	MF	10	66	62.4	63.1	63.1	No
NB106A	Hotel	No outdoor use - façade	N/A	64.8	64.9	64.9	No
NB106B	Hotel	No outdoor use - façade	N/A	68.3	68.3	68.3	No
NB106-Pool	Hotel	10	71	57.6	57.6	57.6	No
NB107A	Hotel	No outdoor use - façade	N/A	63.6	63.4	63.4	No
NB107B	Hotel	No outdoor use - façade	N/A	66.2	66	66	No
NB107-Pool	Hotel	16	71	52.3	52	52	No
NB108A	Hotel	No outdoor use - façade	N/A	62.7	62.6	62.6	No
NB108B	Hotel	No outdoor use - façade	N/A	65.3	65.2	65.2	No
NB108-Pool	Hotel	20	71	55.3	55.3	55.3	No
NB109A	Hotel	No outdoor use - façade	N/A	60.4	60.6	60.6	No
NB109B	Hotel	No outdoor use - façade	N/A	63.3	63.6	63.6	No
NB109-Pool	Hotel	20	71	60.4	60.8	60.8	No
NB110A	Hotel	No outdoor use - façade	N/A	58.9	59.5	59.5	No
NB110B	Hotel	No outdoor use - façade	N/A	61.3	61.8	61.8	No
NB110-Pool	Place of worship	20	66	60	60.6	60.6	No
NB111	Place of worship	No outdoor use - façade	N/A	61.2	61.6	61.6	No

* Measured existing worst-hour noise levels are in brackets; modeled noise levels are higher due to quiet pavement in place

** B stands for noise levels at 17 ft from the ground

Figure 1 - Location of modeled receivers

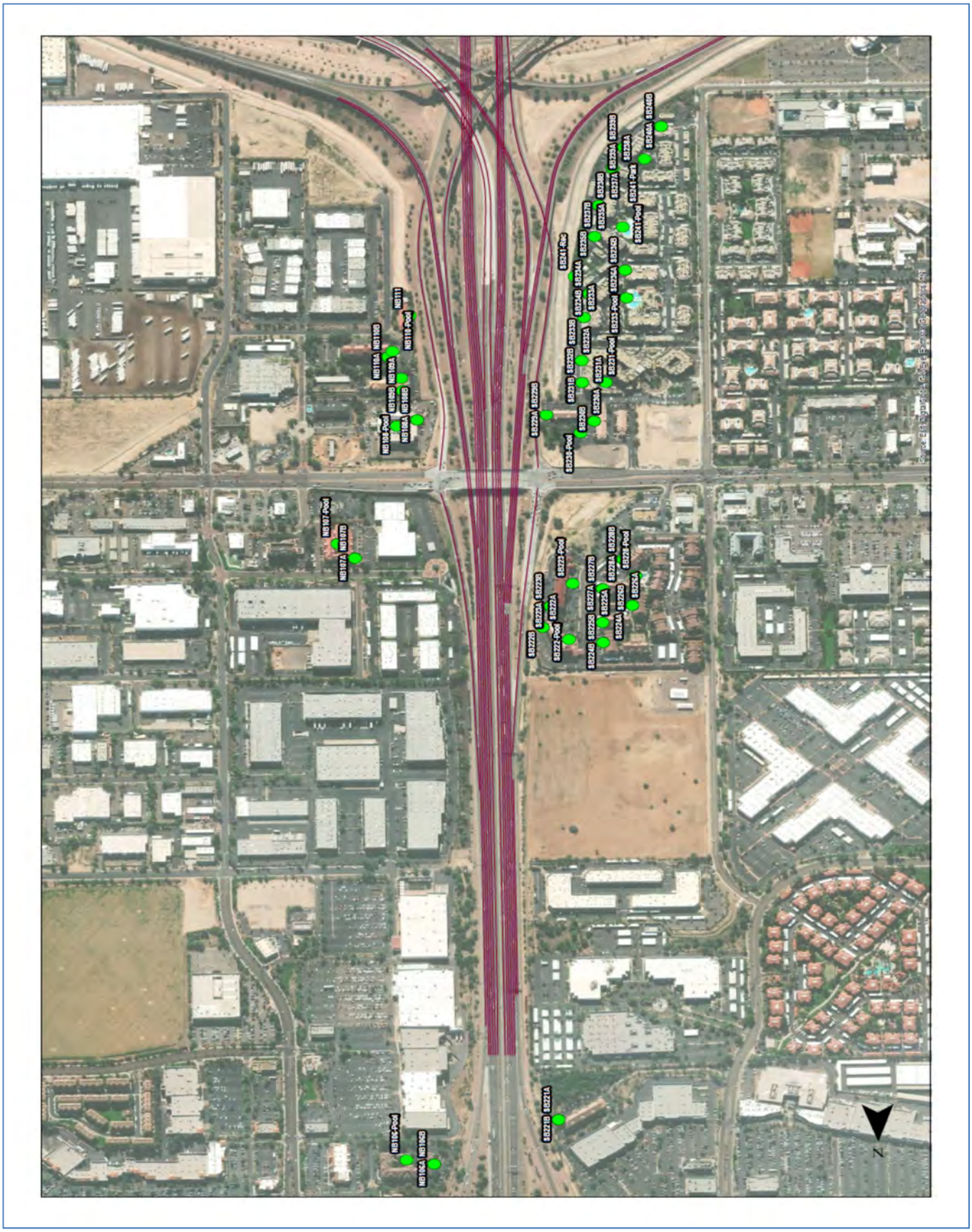


Figure 2 - Traffic data from ADOT TDMS -E Ray Rd TI

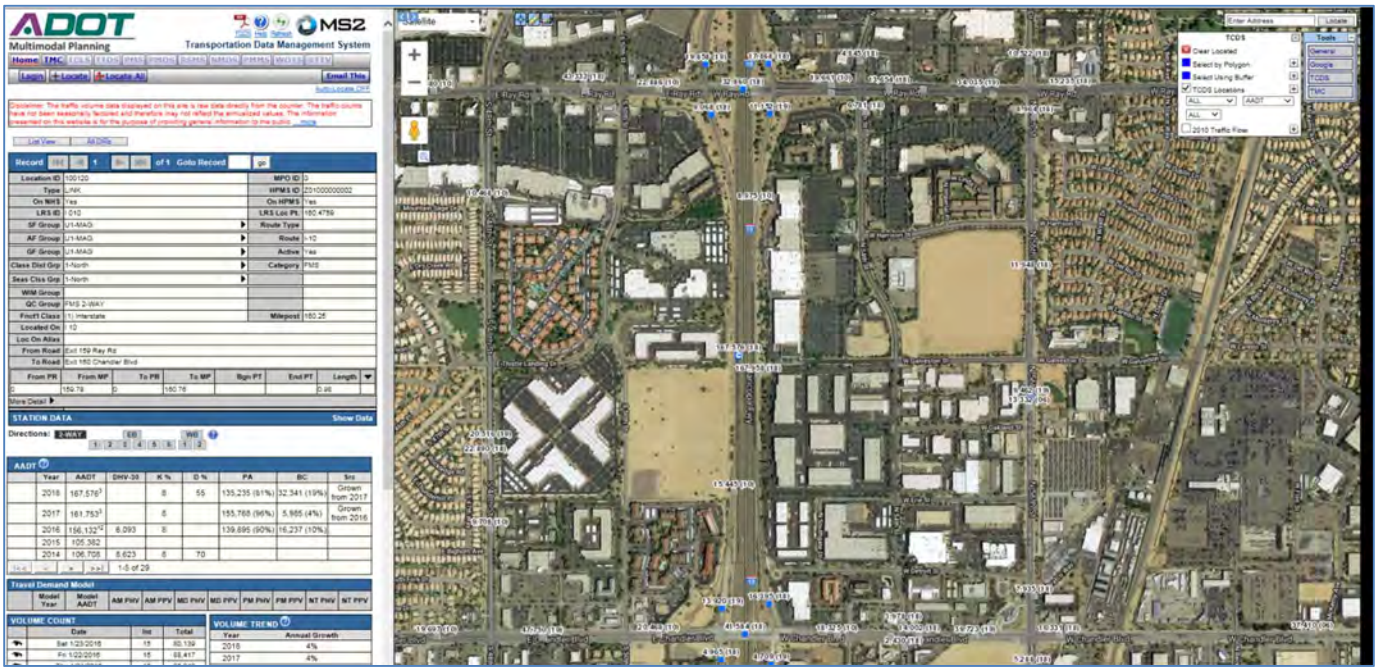
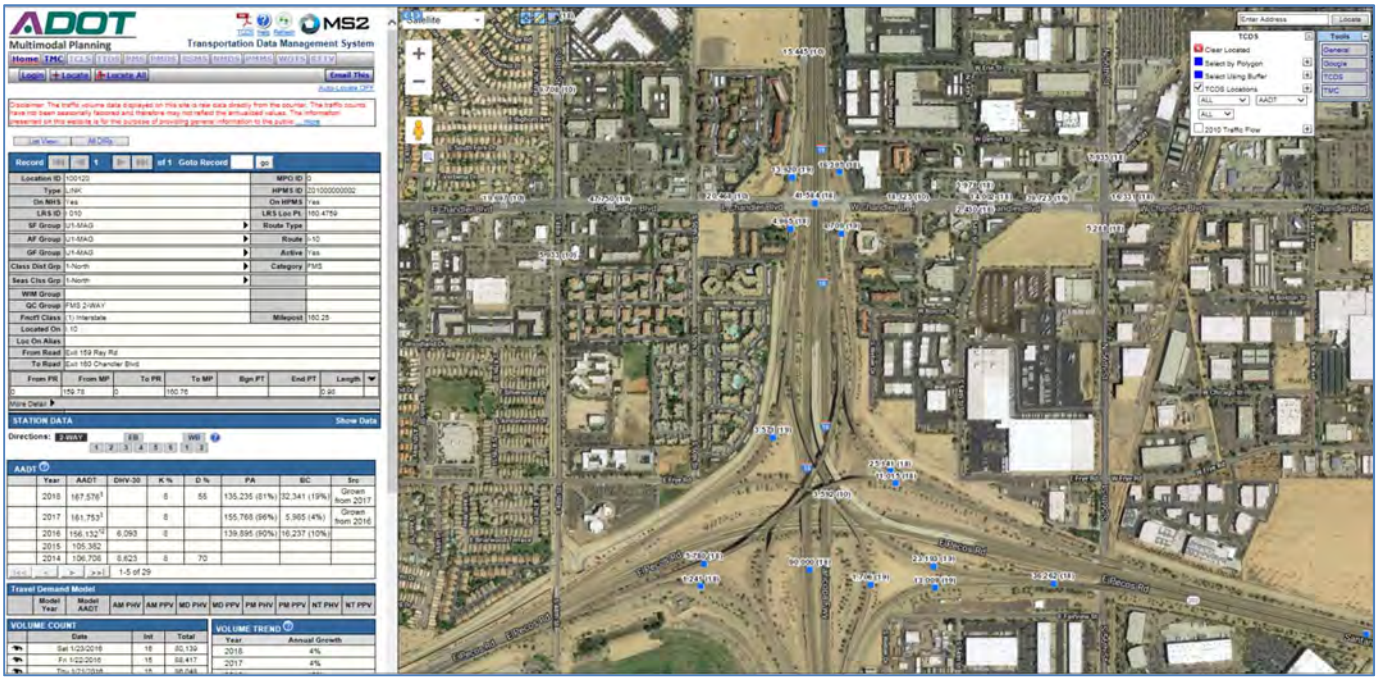


Figure 3 - Traffic data from ADOT TDMS - SR202 TI



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Carbon Copy Events	Status	Timestamp
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Witness Events	Signature	Timestamp

Notary Events	Signature	Timestamp

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Payment Events	Status	Timestamps