Noise Study Report

State Route 99/120 Interchange Project

City of Manteca, San Joaquin County, California

10-SJ-99 PM3.15-6.22, 120 PM5.13/T7.15

EA 10-1E740

October 2018

Caltrans

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Summary

This Noise Study Report (NSR) discusses potential noise impacts and related noise abatement measures associated with the construction and operation of the proposed State Route (SR) 99/120 Interchange Project in San Joaquin County. This report has been prepared to comply with 23 Code of Federal Regulations (CFR) 772, "Procedures for Abatement of Highway Traffic Noise," and California Department of Transportation (Caltrans) noise analysis policy as described in the *Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction, Retrofit Barrier Projects* (Protocol).

Caltrans, as the lead agency under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA), in cooperation with the San Joaquin Council of Governments (SJCOG), and the City of Manteca proposes to add an additional lane to each the connectors for the SR 99/120 interchange. The need for the project has been prompted by recurring traffic congestion at the existing interchange and safety and congestion issues resulting from Southbound (SB) SR 99 merging vehicles interacting with SB SR 99 through vehicles and diverging vehicles exiting to access the SR 99/Austin Road Interchange. The purpose of the project is to relieve existing traffic congestion and improve the overall safety of the interchange.

There is only one Build Alternative for the project. The project would add an additional lane to each of the connectors and replace the Austin Road Overcrossing. To eliminate weaving, braiding the SB SR 99 and Eastbound (EB) SR 120 to SB SR 99 connector ramps accessing the Austin Road interchange and extend the Northbound (NB) SR 99/Austin Road on-ramp, connecting it to SR 99. The need is to increase the capacity of the EB to SB and NB to Westbound (WB) connector ramps and eliminate the weaving/merge/diverge between SR 99/l20 and Austin Road interchanges. Due to funding limitations, the project may be constructed in two phases. The analysis also includes a No-Build Alternative.

The project area west of the SR 99 and south of SR 120 consists of residential uses and commercial properties. To the west of SR 99 and north of SR 120, uses consist of commercial uses, warehouse, and some agricultural properties. The project area to the east of SR 99 consists mostly of agricultural properties. The topography of the area is relatively flat, with the SR 120 elevated approximately 20 feet above ground level.

Noise monitoring was conducted to describe and document existing conditions within the project area. Single- and multi-family residences were identified as Activity Category B

land uses. Places of worship and parks were identified as Activity Category C land uses. Numerous commercial and industrial uses in the area were classified as Activity Category E and F land uses. Agricultural uses were categorized as Activity Category F land uses.

Short-term (15 minutes) and long-term (24 hours) noise measurements were conducted. Short-term monitoring was performed at five locations and results ranged from 66.5 hourly equivalent sound level (L_{eq}) to dBA-71.2 L_{eq}. Long-term monitoring was performed at one location and results ranged from 57 to 71.1 dBA L_{eq}.

The Federal Highway Administration (FHWA) Traffic Noise Prediction Model Version 2.5 was used in this analysis to evaluate traffic noise conditions for existing (2017), construction-year (2023) and design-year (2043).

Modeling results indicate that predicted traffic noise levels under construction-year and design-year conditions would approach or exceed the noise abatement criterion (NAC) of 67 dBA-L_{eq}(h) (A-weighted equivalent sound level) for Activity Category B land uses and for Activity Category C land uses at parks and places of worship. Predicted noise levels in construction-year 2023 would range from 61 to 75 dBA-L_{eq}(h) and 62 to 72 dBA-L_{eq}(h) in the design-year 2043.

In accordance with Caltrans Protocol, noise abatement was not considered at Activity Category E and F land uses because the commercial land uses identified in the project area do not include areas of frequent outdoor human use.

Noise barriers were evaluated for areas where noise impacts were identified. All areas except for H were evaluated for a noise barrier. Noise barrier NB-2 was found to be feasible and meet the design goal of 7 dB for Areas C, D, and E. In Area C, a 16-foot noise barrier would break the line of sight between a 11.5-foot truck stack and the majority of first row receptors, but total coverage was not achieved; an 8-foot barrier would meet the 7 dB design goal. In the construction year 2023, a 16-foot noise barrier would benefit 293 receptors and an 8-foot noise barrier would benefit 68 receptors. In design year 2043, a 16-foot noise barrier would benefit 297 receptors and an 8-foot barrier would benefit 82 receptors.

In Area D, a 12-foot noise barrier would break the line of sight between a 11.5-foot truck stack and receptors and would meet the 7 dB design goal. The noise barrier would benefit 158 receptors in both construction-year 2023 and design-year 2043.

In Area E a 12-foot noise barrier would break the line of sight between a 11.5-foot truck stack and receptors and would meet the 7 dB design goal. The barrier would benefit 118 receptors in the construction-year 2023 and 100 receptors in the design-year 2043.

In total, given the criteria of meeting the 7 dB design goal, barrier NB-2 would benefit 344 receptors in construction-year 2023 and 340 receptors in design-year 2043.

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List of Abbreviated Terms

Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNEL	Community Noise Equivalent Level
dB	Decibels
FHWA	Federal Highway Administration
Hz	Hertz
kHz	Kilohertz
L_{dn}	Day-Night Level
L_{eq}	Equivalent Sound Level
$L_{eq(h)}$	Equivalent Sound Level over one hour
L_{max}	Maximum Sound Level
LOS	Level of Service
L_{xx}	Percentile-Exceeded Sound Level
mPa	Micro-Pascals
mph	Miles Per Hour
NAC	Noise Abatement Criteria
NADR	Noise Abatement Decision Report
NEPA	National Environmental Policy Act
NSR	Noise Study Report
Protocol	Caltrans Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects
SPL	Sound Pressure Level
TeNS	Technical Noise Supplement
TNM 2.5	Traffic Noise Model Version 2.5
NB	Northbound
EB	Eastbound
WB	Westbound
SB	Southbound

Chapter 1. Introduction

Caltrans, as the lead agency under CEQA and NEPA, in cooperation with SJCOG, and the City of Manteca proposes to add an additional lane to each the connectors for the SR 99/SR 120 interchange.

There is only one Build Alternative for the project. The project would add an additional lane to each of the connectors and replace the Austin Road Overcrossing. To eliminate weaving, braiding the SB SR 99 and EB SR 120 to SB SR 99 connector ramps accessing the Austin Rd interchange and extend the NB SR 99/Austin Road on-ramp, connecting it to SR 99. The need is to increase the capacity of the EB to SB and NB to WB connector ramps and eliminate the weaving/merge/diverge between SR 99/l20 and Austin Road interchanges. Due to funding limitations, the project may be constructed in two phases. The analysis also includes a No-Build Alternative.

1.1. Purpose of the Noise Study Report

The purpose of this NSR is to evaluate noise impacts and abatement under the requirements of Title 23, Part 772 of the Code of Federal Regulations (23 CFR 772) "Procedures for Abatement of Highway Traffic Noise." 23 CFR 772 provides procedures for preparing operational and construction noise studies and evaluating noise abatement considered for federal and Federal-aid highway projects. According to 23 CFR 772.3, all highway projects that are developed in conformance with this regulation are deemed to be in conformance with FHWA noise standards. Compliance with 23 CFR 772 provides compliance with the noise impact assessment requirements of the NEPA.

The Caltrans Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects (Protocol) (Caltrans 2011) provides Caltrans policy for implementing 23 CFR 772 in California. The Protocol outlines the requirements for preparing noise study reports (NSR). Noise impacts associated with this project under the CEQA are evaluated separately in the project's environmental document.

1.2. Project Purpose and Need

The purpose of the project is to relieve traffic congestion and improve operations of SR 99 with the SR 120 and Austin Road interchanges. Caltrans has identified deficiencies between SR 99 and the SR 120 and Austin Road Interchanges. The following are necessary improvements that would increase the traffic capacity and improve the operation of weaving, merge, and diverge traffic movements between SR 99 and the SR 120 and Austin Road Interchanges:

- The EB SR 120 to SB SR 99 and the NB SR 99 to WB SR 120 single lane connector ramps need to be expanded to two lanes because they currently queue traffic on the mainline freeway lanes during the morning and evening peak hours. These queues result in traffic congestion and a higher than average accident rate due to impatient drivers cutting into the queued travelled lane.

- The existing Austin Road Overcrossing needs to be removed and replaced with a longer structure because the existing horizontal clearance at SR 99 only provides for three travel lanes in each direction of travel along SR 99. The restricted horizontal clearance requires the existing SR 99 number one lane to be dropped prior to the overcrossing which creates congestion on SR 99 in both directions. The existing overcrossing also will not accommodate the eight-lane ultimate facility recommended as the SR 99 Concept Facility in the SR 99 Transportation Concept Report.

- The SB exit and NB entrance ramps for the Austin Road interchange overlap the SR 99/120 freeway connector ramps causing a merging and congestion problem at the SR 99/120 interchange. These ramps need to be braided to lessen conflicts as the City of Manteca does not support their permanent removal.

The need is to increase the capacity of the EB to SB and NB to WB connector ramps and eliminate the weaving/merge/diverge between SR 99/l20 and Austin Road interchanges.

Chapter 2. Project Description

The project would add an additional lane to each of the connectors and replace the Austin Road Overcrossing. To eliminate weaving, braiding the SB SR 99 and EB SR 120 to SB SR 99 connector ramps accessing the Austin Road interchange and extend the NB SR 99/Austin Road on-ramp, connecting it to SR 99. Due to funding limitations, the project may be constructed in phases.

2.1. No-Build

Under the No-Build Alternative, no changes would be made to SR 99 or SR 120 in the project area.

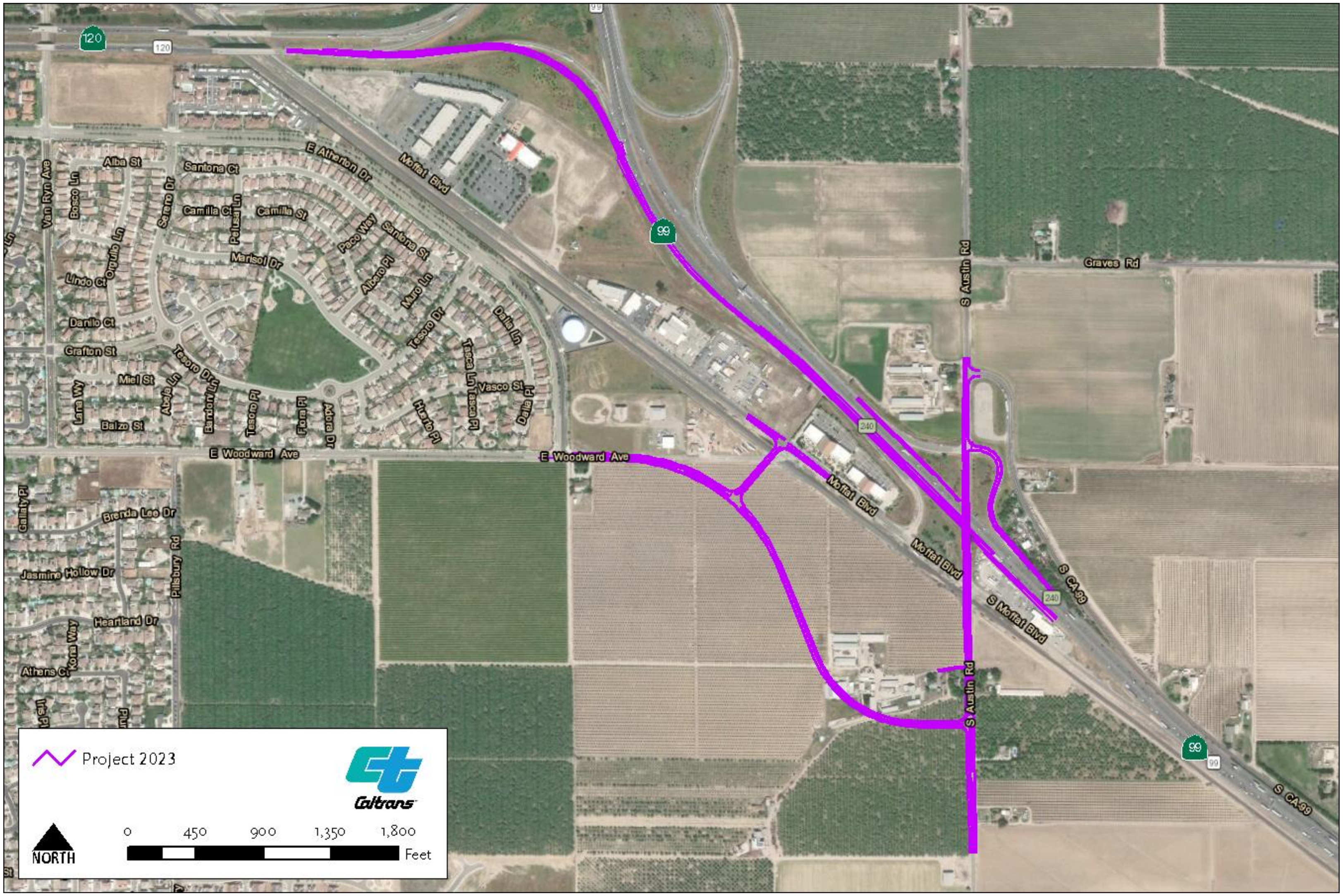
2.2. Construction Year 2023 (Phase 1A)

For Phase 1, the EB SR 120 to SB SR 99 traffic movement will be improved. This work, at a minimum, includes:

- Widen the EB SR 120 to SB SR 99 connector ramp from one-lane to two-lanes;
- Remove the Austin Road overcrossing and replace with a longer and wider structure spanning SR 99 and Union Pacific Railroad (UPRR). A two-lane structure may be initially constructed until Phase 3 requires a four-lane structure;
- Add an auxiliary lane/ pavement widening on SR 99 from SR 120 to approximately one mile south by shifting the SR 99 median to the east;
- Add a new connector road from Austin Road to Woodward Avenue to Moffat Boulevard and improve the existing UPRR gated crossing at Woodward Avenue;
- Relocate a portion of the SR 99 Frontage Road and realign the existing NB SR 99 off-ramp to Austin Road;
- Close the existing SB SR 99 off-ramp and the NB on ramp at Austin Road; and
- Relocate conflicting utilities.

The construction-year 2023 configuration is shown in **Figure 2-1**.

Figure 2-1. Construction-Year 2023 Project Configuration



2.3. Design Year 2043 (Phase 1B)

For Phase 2, the NB SR 99 traffic to WB SR 120 traffic movement will be improved. This phase may be constructed concurrently with Phase 1, however, Phase 2 requires that the Phase 1 be completed because Phase 2 cannot be completed without the removal of the Austin Road overcrossing. This work includes:

- Widen the NB SR 99 to WB SR 120 connector ramp from one-lane to two-lanes;
- Add an auxiliary lane in the median of WB SR 120 from Main Street to SR 99;
- Restripe NB SR 99 median pavement widening constructed in Phase 1;
- Construct a new structure over SR 99 to serve EB SR 120 to SB SR 99 traffic and modify the existing structure over SR 99 to serve WB traffic; and
- Relocate conflicting utilities.

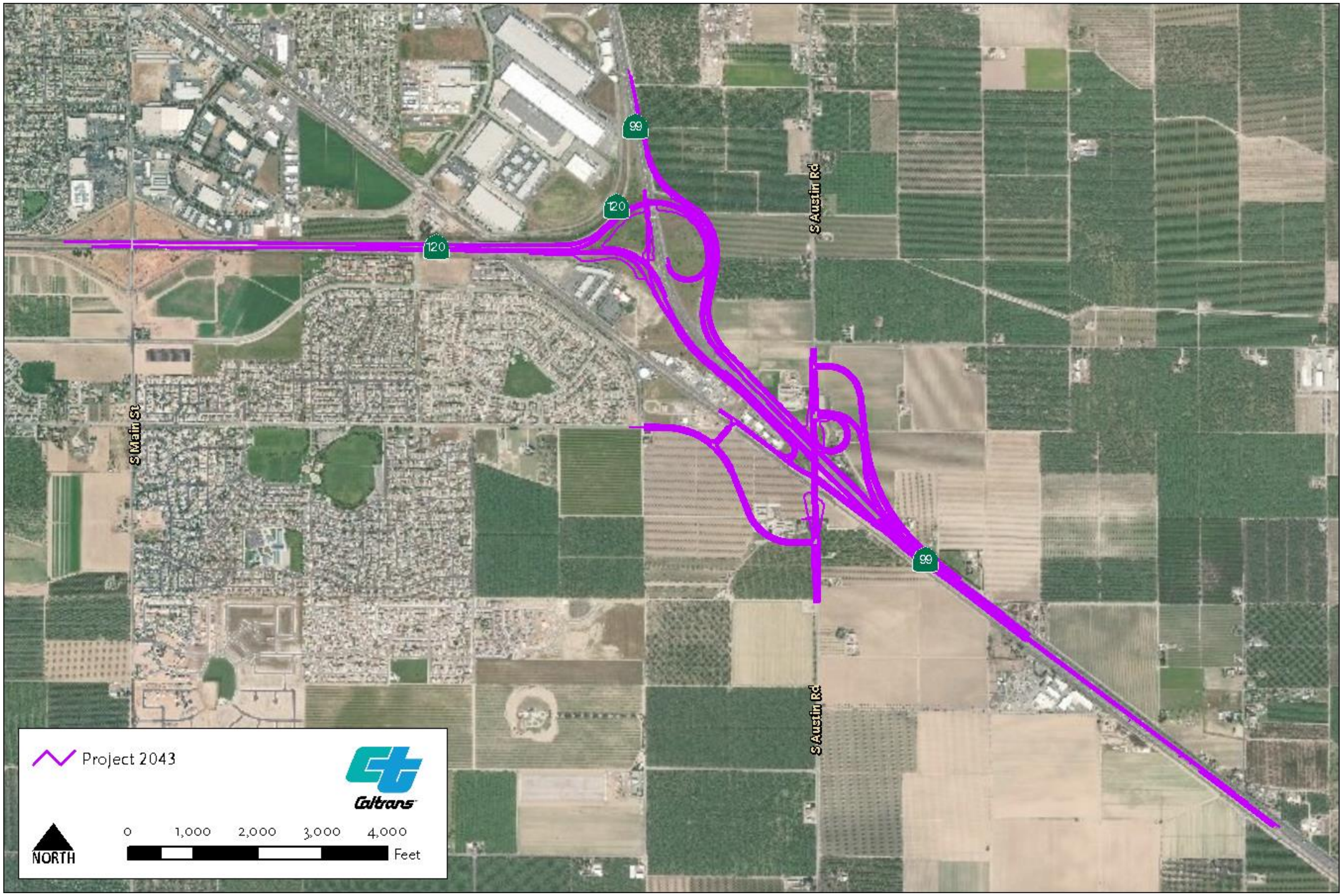
2.4. Design Year 2043 (Phase 1C)

For Phase 3, the SB SR 99 off ramp and the NB on-ramp at Austin Road will be restored. This work includes:

- Restore the NB on-ramp from Austin Road to NB SR 99 and to WB SR 120 to a loop ramp that will provide separate traffic lanes to SR 99 and SR 120;
- Replace the SB exit ramp from SR 99 to Austin Road with a grade separated (braided) ramp to eliminate the weaving with SR 120 merging traffic;
- Widen the SB SR 99 on-ramp from Austin Road to provide storage for two ramp metered lanes;
- Relocate the SR 99 Frontage Road and the NB Austin Road off-ramp from SR 99; and
- Relocate conflicting utilities.

The design-year 2043 configuration with both Phase 1 and Phase 2 is shown in **Figure 2-2**.

Figure 2-2. Design-Year 2043 Project Configuration



Chapter 3. Fundamentals of Traffic Noise

The following is a brief discussion of fundamental traffic noise concepts. For a detailed discussion, please refer to Caltrans' Technical Noise Supplement (TeNS) (Caltrans 2013), a technical supplement to the Protocol that is available on Caltrans website (http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013B.pdf).

3.1. Sound, Noise, and Acoustics

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

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

3.2. Frequency

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

3.3. Sound Pressure Levels and Decibels

The amplitude of pressure waves generated by a sound source determines the loudness of that source. Sound pressure amplitude is measured in micro-Pascals (mPa). One mPa is approximately one hundred billionth (00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 to 100,000,000 mPa. Because of this huge range of values, sound is rarely expressed in terms of mPa. Instead, a logarithmic scale is used to describe sound pressure level (SPL) in terms of decibels (dB). The threshold of hearing for young people is about 0 dB, which corresponds to 20 mPa.

3.4. Addition of Decibels

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

3.5. A-Weighted Decibels

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

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

The A-weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments of the relative loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Other weighting networks have been devised to address high noise levels or other special problems (e.g., B-, C-, and D-scales), but these scales are rarely used in conjunction with highway-traffic noise. Noise levels for traffic noise reports are typically reported in terms of A-weighted decibels or dBA. **Table 3-1** describes typical A-weighted noise levels for various noise sources.

Table 3-1. Typical A-Weighted Noise Levels

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

Source: Caltrans 2013.

3.6. Human Response to Changes in Noise Levels

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

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

3.7. Noise Descriptors

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

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

- **Percentile-Exceeded Sound Level (L_{xx}):** L_{xx} represents the sound level exceeded for a given percentage of a specified period (e.g., L_{10} is the sound level exceeded 10% of the time, and L_{90} is the sound level exceeded 90% of the time).

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

- **Day-Night Level (L_{dn}):** L_{dn} is the energy average of A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to A-weighted sound levels occurring during nighttime hours between 10 p.m. and 7 a.m.

- **Community Noise Equivalent Level (CNEL):** Similar to L_{dn}, CNEL is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to A-weighted sound levels occurring during the nighttime hours between 10 p.m. and 7 a.m., and a 5-dB penalty applied to the A-weighted sound levels occurring during evening hours between 7 p.m. and 10 p.m.

3.8. Sound Propagation

When sound propagates over a distance, it changes in level and frequency content. The manner in which noise reduces with distance depends on the following factors.

3.8.1. Geometric Spreading

Sound from a localized source (i.e., a point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 decibels for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path, and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 decibels for each doubling of distance from a line source.

3.8.2. Ground Absorption

The propagation path of noise from a highway to a receptor is usually very close to the ground. Noise attenuation from ground absorption and reflective-wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 feet. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receptor, such as a parking lot or body of water,), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receptor, such as soft dirt, grass, or scattered bushes and trees), an excess ground-attenuation value of 1.5 decibels per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 decibels per doubling of distance.

3.8.3. Atmospheric Effects

Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) from the highway due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects.

3.8.4. Shielding by Natural or Human-Made Features

A large object or barrier in the path between a noise source and a receptor can substantially attenuate noise levels at the receptor. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receptor specifically to reduce noise. A barrier that breaks the line of sight between a source and a receptor will typically result in at least 5 dB of noise reduction. Taller barriers provide increased noise reduction. Vegetation between the highway and receptor is rarely effective in reducing noise because it does not create a solid barrier.

Chapter 4. Federal Regulations and State Policies

This report focuses on the requirements of 23 CFR 772, as discussed below.

4.1. Federal Regulations

4.1.1. 23 CFR 772

23 CFR 772 provides procedures for preparing operational and construction noise studies and evaluating noise abatement considered for federal and Federal-aid highway projects. Under 23 CFR 772.7, projects are categorized as Type I, Type II, or Type III projects.

- FHWA defines a Type I project as a proposed federal or federal-aid highway project for the construction of a highway on a new location or the physical alteration of an existing highway which significantly changes either the horizontal or vertical alignment of the highway. The following projects are also considered to be Type I projects:
- The addition of a through-traffic lane(s). This includes the addition of a through-traffic lane that functions as a high-occupancy vehicle (HOV) lane, high-occupancy toll (HOT) lane, bus lane, or truck climbing lane,
- The addition of an auxiliary lane, except for when the auxiliary lane is a turn lane,
- The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange,
- Restriping existing pavement for the purpose of adding a through traffic lane or an auxiliary lane,
- The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot, or toll plaza.

If a project is determined to be a Type I project under this definition, the entire project area as defined in the environmental document is a Type I project.

A Type II project is a noise barrier retrofit project that involves no changes to highway capacity or alignment. A Type III project is a project that does not meet the classifications of a Type I or Type II project. Type III projects do not require a noise analysis.

Under 23 CFR 772.11, noise abatement must be considered for Type I projects if the project is predicted to result in a traffic noise impact. In such cases, 23 CFR 772 requires that the project sponsor "consider" noise abatement before adoption of the final NEPA document. This process involves identification of noise abatement measures that are reasonable, feasible, and likely to be incorporated into the project, and of noise impacts for which no apparent solution is available.

Traffic noise impacts, as defined in 23 CFR 772.5, occur when the predicted noise level in the design-year approaches or exceeds the NAC specified in 23 CFR 772, or a predicted noise level substantially exceeds the existing noise level (a "substantial" noise increase). 23 CFR 772 does not specifically define the terms "substantial increase" or "approach"; these criteria are defined in the Protocol, as described below.

Table 4-1 summarizes NAC corresponding to various land use activity categories. Activity categories and related traffic noise impacts are determined based on the actual or permitted land use in a given area.

4.1.2. Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects

The Protocol specifies the policies, procedures, and practices to be used by agencies that sponsor new construction or reconstruction of federal or Federal-aid highway projects. The Protocol defines a noise increase as substantial when the predicted noise levels with project implementation exceed existing noise levels by 12 dBA or more. The Protocol also states that a sound level is considered to approach a NAC level when the sound level is within 1 dB of the NAC identified in 23 CFR 772 (e.g., 66 dBA is considered to approach the NAC of 67 dBA, but 65 dBA is not).

The Technical Noise Supplement to the Protocol provides detailed technical guidance for the evaluation of highway traffic noise. This includes field measurement methods, noise modeling methods, and report preparation guidance.

Table 4-1. Activity Categories and Noise Abatement Criteria (23 CFR 772)

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

[1] The L_{eq}(h) activity criteria values are for impact determination only and are not design standards for noise abatement measures. All values are A-weighted decibels (dBA).

[2] Includes undeveloped lands permitted for this activity category.

4.2. State Regulations and Policies

4.2.1. California Environmental Quality Act (CEQA)

Noise analysis under the CEQA may be required regardless of whether or not the project is a Type I project. The CEQA noise analysis is completely independent of the 23 CFR 772 analysis done for NEPA. Under CEQA Guidelines, the baseline noise level is compared to the build noise level. The assessment entails looking at the setting of the noise impact and then how large or perceptible any noise increase would be in the given area. Key considerations include: the uniqueness of the setting, the sensitive nature of the noise receptors, the magnitude of the noise increase, the number of residences affected, and the absolute noise level.

The significance of noise impacts under CEQA Guidelines are addressed in the environmental document rather than the NSR. Even though the NSR (or noise technical memorandum) does not specifically evaluate the significance of noise impacts under

CEQA Guidelines, it must contain the technical information that is needed to make that determination in the environmental document.

4.2.2. Section 216 of the California Streets and Highways Code

Section 216 of the California Streets and Highways Code relates to the noise effects of a proposed freeway project on public and private elementary and secondary schools. Under this code, a noise impact occurs if, as a result of a proposed freeway project, noise levels exceed 52 dBA-L_{eq}(h) in the interior of public or private elementary or secondary classrooms, libraries, multipurpose rooms, or spaces. This requirement does not replace the "approach or exceed" NAC criterion for FHWA Activity Category E for classroom interiors, but it is a requirement that must be addressed in addition to the requirements of 23 CFR 772.

If a project results in a noise impact under this code, noise abatement must be provided to reduce classroom noise to a level that is at or below 52 dBA-L_{eq}(h). If the noise levels generated from freeway and roadway sources exceed 52 dBA-L_{eq}(h) prior to the construction of the proposed freeway project, then noise abatement must be provided to reduce the noise to the level that existed prior to construction of the project.

Chapter 5. Study Methods and Procedures

5.1. Methods for Identifying Land Uses and Selecting Noise Measurement and Modeling Receiver Locations

A field investigation was conducted to identify land uses that could be subject to traffic and construction noise impacts from the project. Existing land uses in the project area were categorized by land use type and Activity Category as defined in Table 4-1, and the extent of frequent human use. As stated in the Protocol, noise abatement is only considered where frequent human use occurs and where a lowered noise level would be of benefit. Although all land uses are evaluated in this analysis, the focus is on locations of frequent human use that would benefit from a lowered noise level. Accordingly, this impact analysis focuses on locations with defined outdoor activity areas, such as residential backyards and common use areas at multi-family residences.

The geometry of the project relative to nearby existing and planned land uses was also identified.

Short-term measurement locations were selected to represent each major developed area within the project area. A single long-term measurement site was selected to capture the diurnal traffic noise level pattern in the project area. Short-term measurement locations were selected to serve as representative modeling locations. Several other non-measurement locations were selected as modeling locations.

5.2. Field Measurement Procedures

A field noise study was conducted in accordance with recommended procedures in the 2013 version of TeNS. The following is a summary of the procedures used to collect short-term and long-term sound level data.

5.2.1. Short-Term Measurements

Short-term monitoring was conducted at five locations on Wednesday, January 10, 2018, using Soundpro sound level meter (serial number BGH050010). The calibration of the meter was checked before and after the measurement using a Quest Technologies Systems Model QC-10 calibrator (serial number QIH050123). Measurements were taken over a 20-minute period at each site. Short-term monitoring was conducted at Activity Category B land uses. The short-term measurement locations are identified in **Figure 5-1a** through **Figure 5-2c**.

During the short-term measurements, field staff attended the meter. Dominant noise sources observed during each measurement were identified and logged. Traffic noise was observed to be a dominant contributor to noise levels at each measurement location.

Temperature, wind speed, and humidity were recorded manually during the short-term monitoring session using local weather data. During the short-term measurements, wind speeds typically ranged from 1 to 7 miles per hour (mph). Temperatures ranged from 10–12°C (50–54°F), with relative humidity typically 70–90%.

Traffic was not visible on SR 99 and SR 120 from the monitoring locations and counts were not conducted. Count were conducted along local roadways and classified as automobiles, medium trucks, and heavy trucks.

Long-term monitoring was conducted at one location (LT-1) using a Soundpro sound level meter (serial number BGH050010). The purpose of this measurements was to identify variations in sound levels throughout the day. The long-term sound level data was collected over one 24-hour period, beginning Tuesday, January 10, 2018, and ending Wednesday January 11, 2018.

Long-term monitoring location LT-1 was located on a landing of an apartment unit at Juniper Apartments located at 1201 Atherton Drive in Manteca on the south side of SR 120, approximately 235 feet from the SR 120 edge-of-pavement (refer to **Figure 5-1a** and **Figure 5-2a**).

5.3. Traffic Noise Levels Prediction Methods

Traffic noise levels were predicted using the FHWA Traffic Noise Model Version 2.5 (TNM 2.5). TNM 2.5 is a computer model based on two FHWA reports: FHWA-PD-96-009 and FHWA-PD-96-010 (FHWA 1998a, 1998b). Key inputs to the traffic noise model were the locations of roadways, traffic mix and speed, shielding features (e.g., topography and buildings), noise barriers, ground type, and receptors. Three-dimensional representations of these inputs were developed using CAD drawings, aerials, and topographic contours.

Traffic noise was evaluated under existing conditions, construction-year 2023 no-project conditions, design-year 2043 no-project conditions, construction-year 2023 conditions with the project alternative and design-year conditions with the project alternative. Loudest-hour traffic volumes, vehicle classification percentages, and traffic speeds under existing (2017), construction year (2023) and design-year (2043) conditions were provided by the project team for input into the traffic noise model. The highest average traffic volumes on SR 99, SR 120 and the local roadway network are predicted to occur during the PM peak hour; therefore, PM peak hour traffic volumes were used in the model. Tables A-1 to A-5 in Appendix A summarize the traffic volumes and assumptions used for modeling existing, construction year and design-year conditions with and without the project alternative.

The loudest hour is generally characterized by free-flowing traffic at the highway design speed (i.e., Level of Service [LOS] C or better). Although the addition of lanes on SR 99 and SR 120 and the reconfiguration of ramps will improve LOS, some segments on SR 99 and SR 120 are forecast to be at LOS D or worse during peak hours in the construction-year 2023. In the design-year 2043 traffic on SR 99 and SR 120 is expected to operate at LOS C or better. As a result of available data, speeds have been modified to represent decreases in LOS, but would still be representative of the operating noise condition.

To validate the accuracy of the model calculations, TNM 2.5 was used to compare measured traffic noise levels to modeled noise levels at field measurement locations. Traffic counts during measurements were not possible due to limited view and the speed of traffic. As such, the measured ambient noise levels were used to compare with modeled noise levels during the PM peak hour. Modeled and measured sound levels were compared to determine the accuracy of the model and if additional adjustment of the model was necessary.

Figure 5-1a. Analysis Areas, Noise Monitoring Positions, and Location of Evaluated Noise Barrier (2023)

Figure 5-1b. Analysis Areas, Noise Monitoring Positions, and Location of Evaluated Noise Barrier (2023)

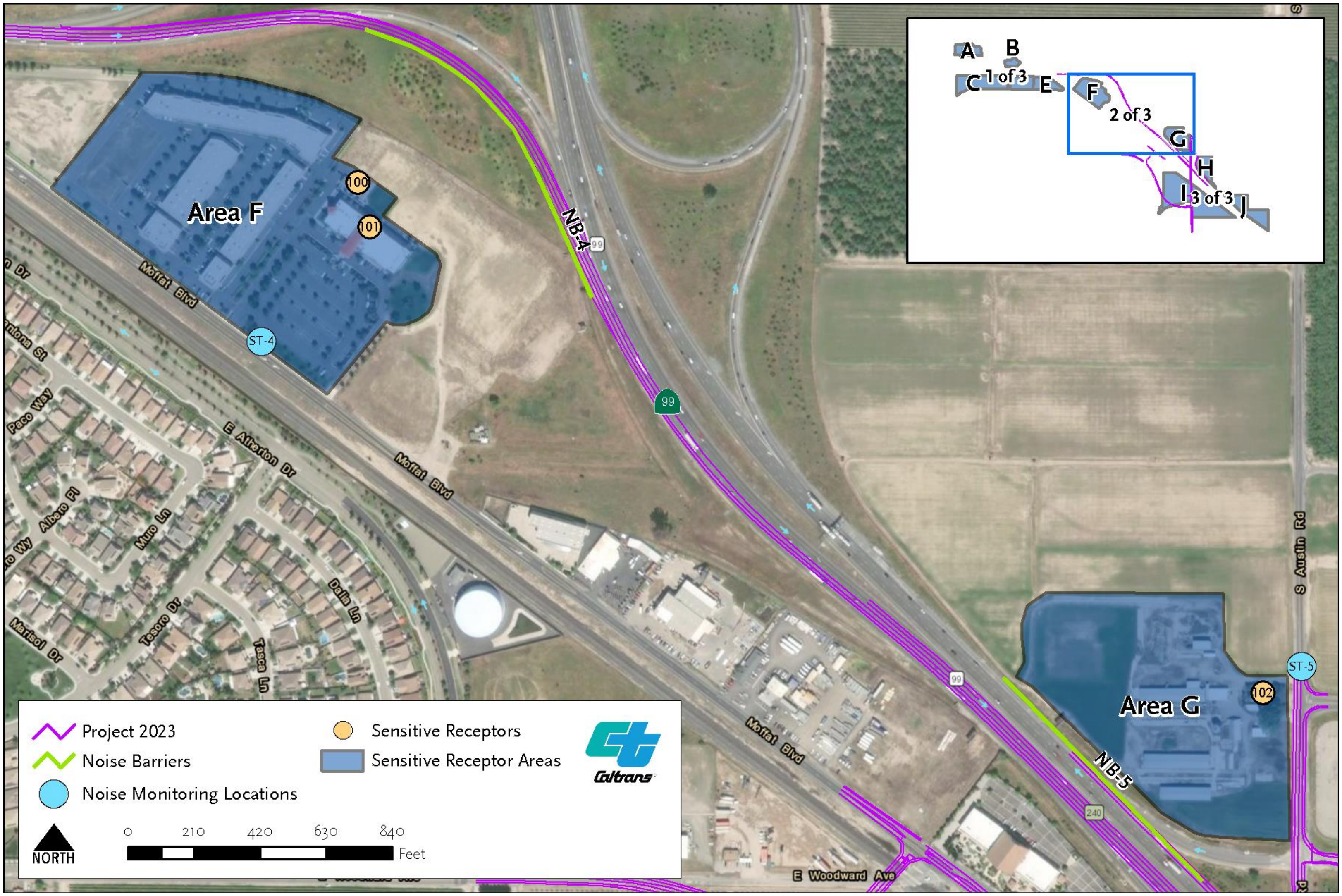


Figure 5-1c. Analysis Areas, Noise Monitoring Positions, and Location of Evaluated Noise Barrier (2023)

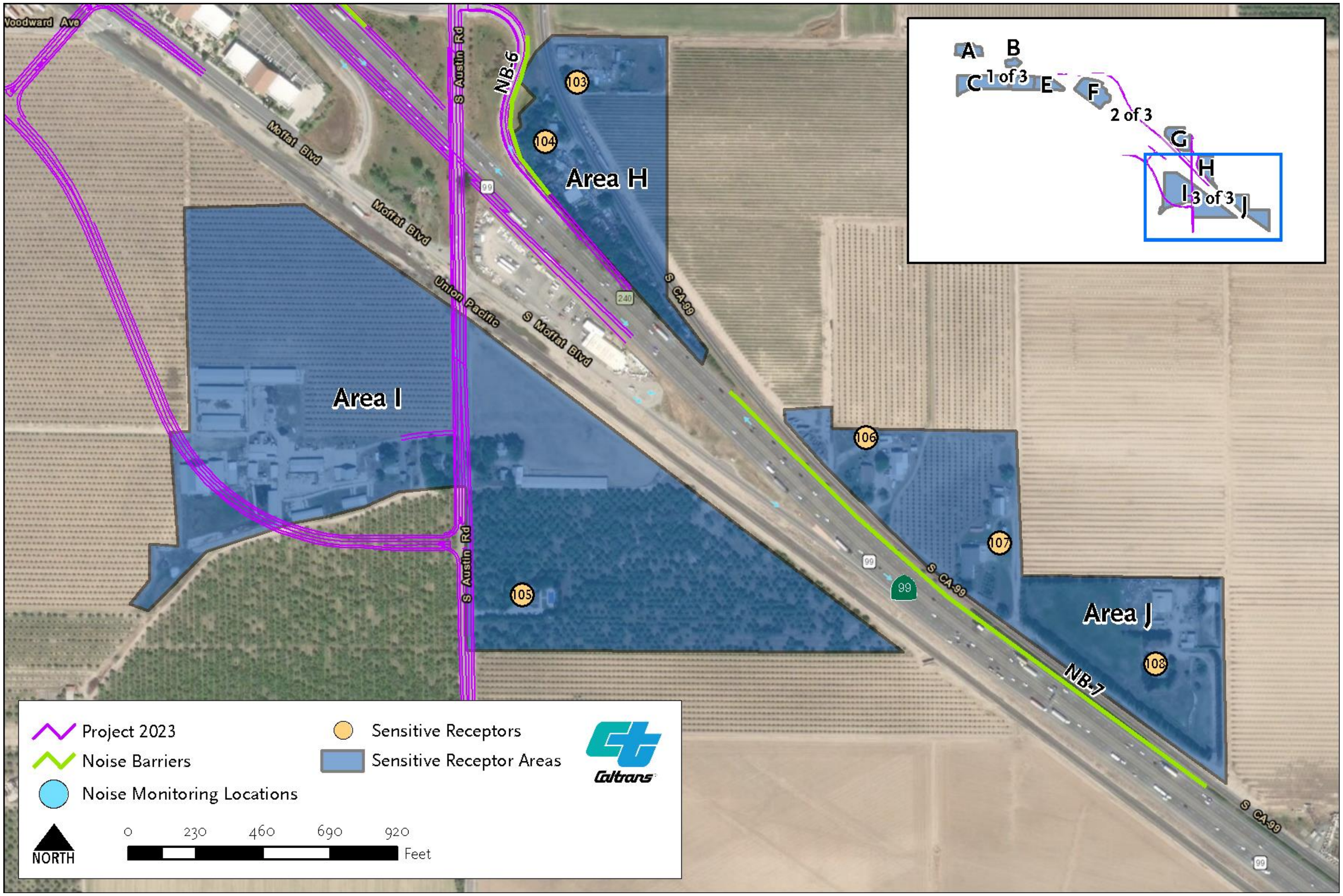


Figure 5-2a. Analysis Areas, Noise Monitoring Positions, and Location of Evaluated Noise Barrier (2043)

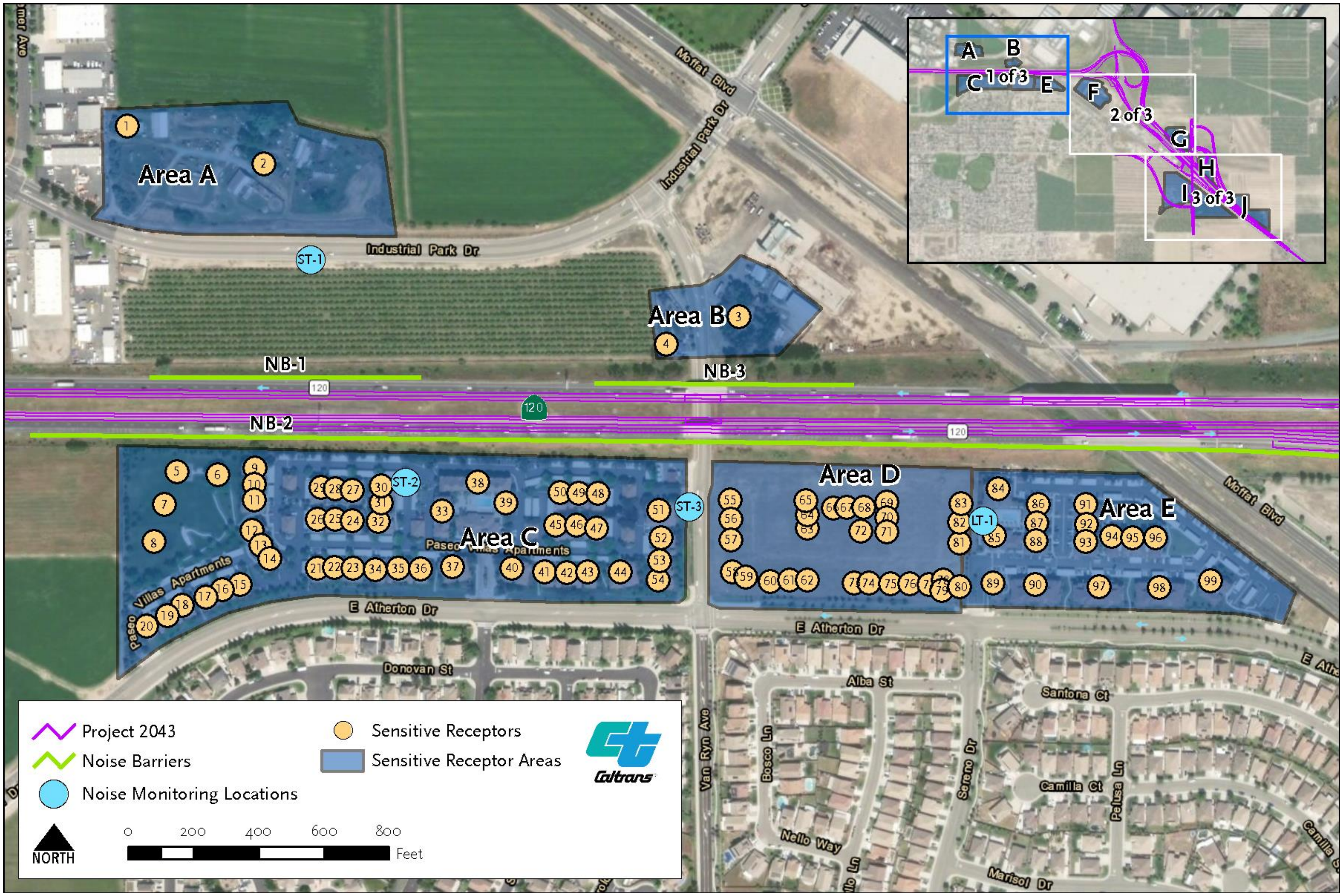


Figure 5-2b. Analysis Areas, Noise Monitoring Positions, and Location of Evaluated Noise Barrier (2043)

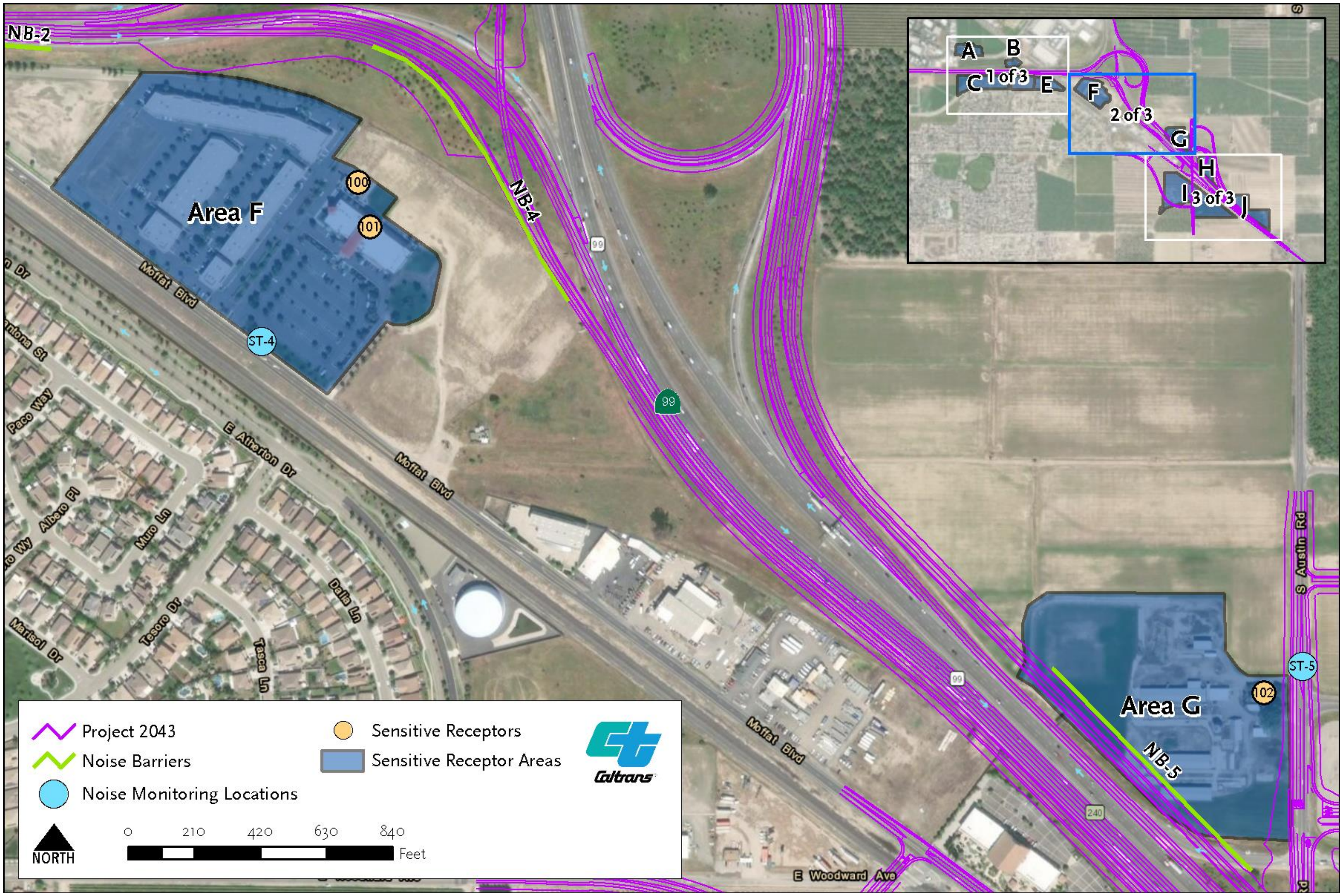
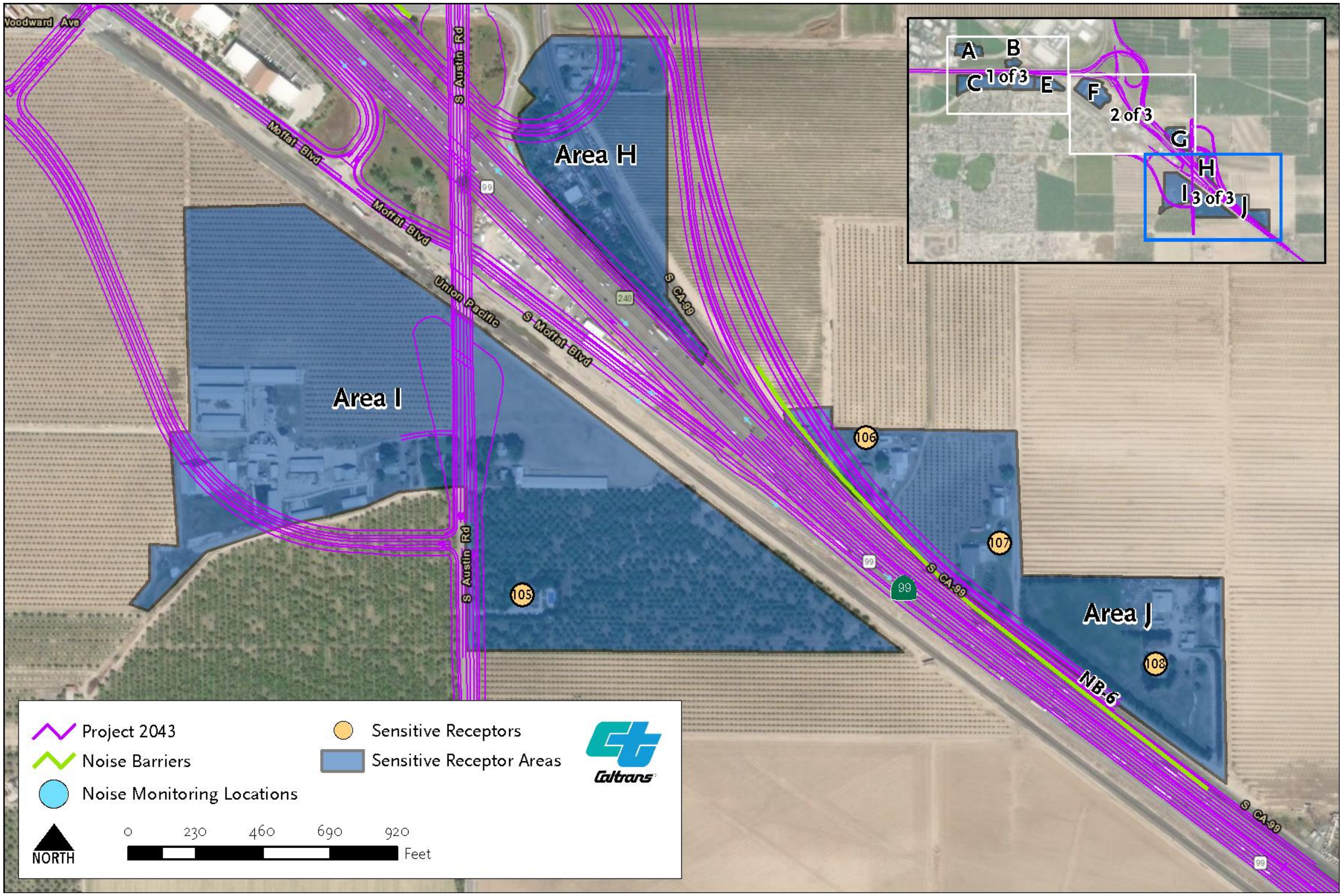


Figure 5-2c. Analysis Areas, Noise Monitoring Positions, and Location of Evaluated Noise Barrier (2043)



5.4. Methods for Identifying Traffic Noise Impacts and Consideration of Abatement

Traffic noise impacts are considered to occur at receptor locations where predicted design-year noise levels are 12 dB or greater than existing noise levels, or where predicted design-year noise levels approach or exceed the NAC for the applicable activity category. Where traffic noise impacts are identified, noise abatement must be considered for reasonableness and feasibility as required by 23 CFR 772 and the Protocol.

According to the Protocol, abatement measures are considered acoustically feasible if a minimum noise reduction of 5 dB at impacted receptor locations is predicted with implementation of the abatement measures. In addition, barriers should be designed to intercept the line-of-sight from the exhaust stack of a truck to the first tier of receptors, as required by the Highway Design Manual, Chapter 1100. Other factors that affect feasibility include topography, access requirements for driveways and ramps, presence of local cross streets, utility conflicts, other noise sources in the area, and safety considerations.

The overall reasonableness of noise abatement is determined by the following three factors:

- The noise reduction design goal.
- The cost of noise abatement.
- The viewpoints of benefited receptors (including property owners and residents of the benefited receptors).

The Caltrans' acoustical design goal is that a barrier must be predicted to provide at least 7 dB of noise reduction at one benefited receptor. This design goal applies to any receptor and is not limited to impacted receptors.

The Protocol defines the procedure for assessing reasonableness of noise barriers from a cost perspective. Based on 2018 construction costs an allowance of $95,000 is provided for each benefited receptor (i.e., receptors that receive at least 5 dB of noise reduction from a noise barrier). The total allowance for each barrier is calculated by multiplying the number of benefited receptors by $95,000. If the estimated construction cost of a barrier is less than the total calculated allowance for the barrier, the barrier is considered reasonable from a cost perspective. The viewpoints of benefits receptors are determined by a survey that is typically conducted after completion of the noise study report. The process for conducting the survey is described in detail in the Protocol.

The noise study report identifies traffic noise impacts and evaluates noise abatement for acoustical feasibility. It also reports information that will be used in the reasonableness analysis including if the 7 dB design goal reduction in noise can be achieved and the abatement allowances. The noise study report does not make any conclusions regarding reasonableness. The feasibility and reasonableness of noise abatement is reported in the Noise Abatement Decision Report.

Chapter 6. Existing Noise Environment

6.1. Existing Land Uses

A field investigation was conducted to identify land uses that could be subject to traffic and construction noise impacts from the project. The following land uses were identified in the project area:

- Single-family and multi-family residences: Activity Category B
- Places of worship: Activity Category C (exterior), Activity Category D (interior)
- Parks: Activity Category C (exterior)
- Commercial retail uses, industrial uses, warehousing uses, and agricultural uses: Activity Category F

Although all developed land uses are evaluated in this analysis, noise abatement is only considered for areas of frequent human use that would benefit from a lowered noise level. Accordingly, this impact analysis focuses on locations with defined outdoor activity areas, such as residential backyards and common use areas at multi-family residences.

Land uses in the project area have been grouped into a series of lettered analysis areas that are identified in **Figure 5-1a** through **Figure 5-1c**. Each of these analysis areas is considered to be acoustically equivalent. The concept of acoustical equivalence incorporates equivalences in noise sources, distances from these sources, topography, and other pertinent parameters.

- **Area A:** Area A is located on the north side of SR 120 between Van Ryn Avenue and Main Street. Single-family residences (Activity Category B) and agricultural uses (Activity Category F) are located in this area. This area is generally flat. No sound barrier or topographical shielding occurs between SR 120 and this area.

- **Area B:** Area B is located on the north side of SR 120 adjacent to Van Ryn Avenue. Several single-family residences (Activity Category B) are located in this area. This area is generally flat, with exception of a steep grade descending from SR 120. Residences are lower than the highway. The first row of buildings may be topographically shielded from highway noise.

- **Area C:** Area C is located on the south side of SR 120 west of Van Ryn Avenue. Paseo Villas Apartments, multi-family residences (Activity Category B) and a park (Activity Category C) are located in this area. This area is generally flat, with exception of a steep grade descending from SR 120. Residences are lower than the highway. A sound barrier with a nominal height of 10 to 15 feet is located between SR 120 and the residential area.

- **Area D:** Area D is located on the south side of SR 120 at the corner of Van Ryn Avenue and Atherton Drive. The Tesoro Apartments development, multi-family residences (Activity Category B), several outdoor recreation areas (Activity Category C), and a fitness center (Activity Category C), is currently being constructed in this area. This area is generally flat, with exception of a steep grade descending from SR 120. Residences are lower than the highway.

- **Area E:** Area D is located on the south side of SR 120 east of Van Ryn Avenue and bordered to the south by Atherton Drive. Juniper Apartments, multi-family residences (Activity Category B), are located in this area. This area is generally flat, with exception of a steep grade descending from SR 120. Residences are lower than the highway. A sound barrier with a nominal height of 13 feet is located between SR 120 and the residential area.

- **Area F:** Area F is located on the south side of SR 99 SB on-ramp, northeast of Moffat Boulevard. Commercial uses (Activity Category E) and Crossroads Grace Community Church, a place of worship (Activity Category C), and a small playground (Activity Category C) are located in this area. This area is generally flat. There is a gradual grade descending from the on-ramp. No sound barrier or topographical shielding occurs between the SR 99 and this area.

- **Area G:** Area G is located on the northeastern side of the SR 99 NB on-ramp and to the west of Austin Road. Agricultural uses (Activity Category E) and isolated single-family residences (Activity Category B) are located in this area. This area is generally flat. No sound barrier or topographical shielding occurs between the SR 99 and this area.

- **Area H:** Area H is located on the northeastern side of the SR 99 NB off-ramp and to the east of Austin Road. Agricultural uses (Activity Category E) and isolated single-family residences (Activity Category B) are located in this area. This area is generally flat. No sound barrier or topographical shielding occurs between the highway and this area.

- **Area I:** Area I is located south of SR 99 adjacent to Austin Road. Agricultural uses (Activity Category E) and isolated single-family residences (Activity Category B) are located in this area. This area is generally flat. No sound barrier or topographical shielding occurs between the highway and this area.

- **Area J:** Area J is located east of SR 99 adjacent to Frontage Road. Agricultural uses (Activity Category E) and isolated single-family residences (Activity Category B) are located in this area. This area is generally flat. No sound barrier or topographical shielding occurs between the highway and this area.

6.2. Noise Measurement Results

The existing noise environment in the project area is characterized below based on short- and long-term noise monitoring that was conducted.

6.2.1. Short-Term Monitoring

Table 6-1 summarizes the results of the short-term noise monitoring conducted in the project area.

6.2.2. Long-Term Monitoring

The long-term sound level data was collected over one 24-hour period, beginning Tuesday, January 10, 2018, and ending Wednesday January 11, 2018. **Table 6-2** summarizes the results of the long-term noise monitoring and **Figure 6-1** illustrates noise levels over time.

Long-term monitoring location LT-1 was located on a landing of an apartment unit at Juniper Apartments located at 1201 Atherton Drive in Manteca on the south side of SR 120, approximately 235 feet from the SR 120 edge-of-pavement (refer to **Figure 5-1a** and **Figure 5-2a**).

Table 6-1. Summary of Short-Term Measurements

Position	Address	Area	Land Uses	Start Time	Duration (minutes)	Measured L_{eq}	Autos	Medium Trucks	Heavy Trucks	Observed Speed (mph)
ST-1	Single-Family Residence (713 Industrial Park Dr.)	A	Residential/ Agricultural	7:13 a.m.	20	70.5	111	11	2	7
ST-2	Paseo Villas Apartments (801 Atherton Dr.)	C	Residential	10:15 a.m.	20	66.5	N/A	N/A	N/A	70
ST-3	Paseo Villas Apartments (801 Atherton Dr.)	C/B	Residential	8:02 a.m.	20	71.2	367	N/A	1	2
ST-4	Crossroads Grace Community Church (1505 Moffat Blvd.)	E	Church/ Commercial	8:44 a.m.	20	70	105	5	3	N/A
ST-5	Single-Family Residence (20179 Austin Rd.)	F/G/H	Residential/ Agricultural	9:20 a.m.	20	70.7	65	5	3	N/A

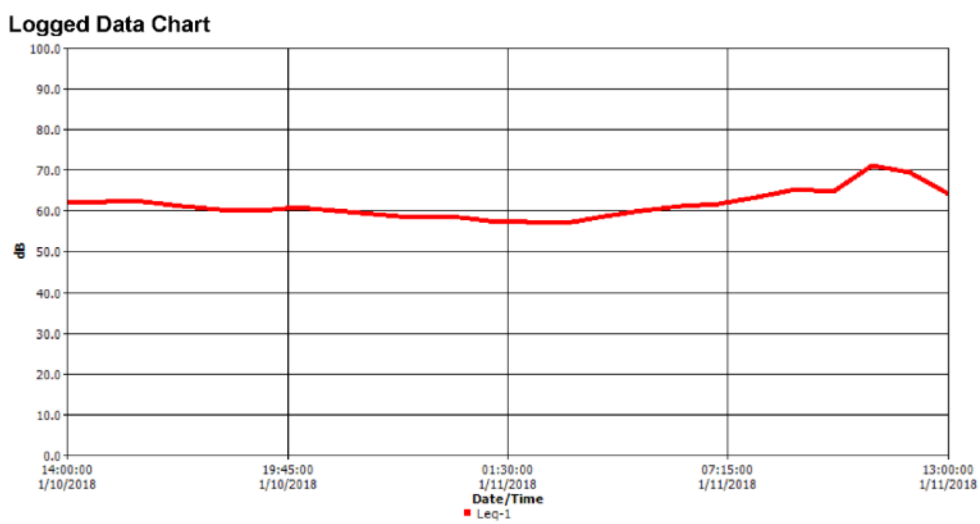
Note: Refer to **Figure 5-1a** through **Figure 5-2c** for measurement locations and boundaries of each area.

Table 6-2. Summary of Long-Term Monitoring at Location LT-1

Hour Beginning	Hourly Average (dBA L_{eq}[h])	Difference from Loudest Hour (dB)
2:00 p.m.	61.9	-9.2
3:00 p.m.	62.2	-8.9
4:00 p.m.	62.2	-8.9
5:00 p.m.	61.1	-10
6:00 p.m.	60.2	-10.9
7:00 p.m.	60.1	-11
8:00 p.m.	60.9	-10.2
9:00 p.m.	60	-11.1
10:00 p.m.	59.2	-11.9
11:00 p.m.	58.3	-12.8
12:00 a.m.	58.7	-12.4
1:00 a.m.	57.6	-13.5
2:00 a.m.	57.3	-13.8
3:00 a.m.	57	-14.1
4:00 a.m.	58.6	-12.5
5:00 a.m.	59.9	-11.2
6:00 a.m.	61.2	-9.9
7:00 a.m.	61.6	-9.5
8:00 a.m.	63.2	-7.9
9:00 a.m.	65.2	-5.9
10:00 a.m.	64.7	-6.4
11:00 a.m.	**71.1**	0
12:00 p.m.	69.3	-1.8
1:00 p.m.	64.1	-7

Note: Worst noise hour noise level is bolded.

Figure 6-1. Long-Term Monitoring at Location LT-1, January 10–11, 2018



TNM 2.5 was used to compare measured traffic noise levels to modeled noise levels at field measurement locations. **Table 6-3** compares measured and modeled noise levels at each measurement location (see **Figure 5-1a** through **Figure 5-2c**). The predicted sound levels for ST-2, ST-4 and ST-5 are within 3 dB of the measured sound levels and are, therefore, considered to be in reasonable agreement with the measured sound levels. ST-1 was 8.9 dBA below the measured sound level. ST-3 was 5.3 below the measured sound level. The discrepancy between the measured and predicted noise levels is likely because the local roadways were not modeled at these locations. Therefore, adjustments have been applied at receptors represented by ST-1 and ST-3. Table B-1 in Appendix B presents existing noise levels at each receptor.

Table 6-3. Comparison of Measured to Predicted Sound Levels in the TNM Model

Measurement Position	Measured Sound Level (dBA)	Predicted Sound Level (dBA)	Measured minus Predicted (dB)
ST-1	70.5	61.6	+ 8.9
ST-2	66.5	65.5	+ 1
ST-3	71.2	65.9	+ 5.3
ST-4	70	72.2	+ 2.2
ST-5	70.7	71.1	- 0.4

Chapter 7. Future Noise Environment, Impacts, and Considered Abatement

7.1. Future Noise Environment and Impacts

Table B-1 in Appendix B summarizes the traffic noise modeling results for existing conditions and construction year-conditions with and without the project. Table B-2 in Appendix B summarizes the traffic noise modeling results for existing and design-year conditions with and without the project. Predicted construction year and design-year traffic noise levels with the project are compared to existing conditions and to construction year and design-year no-project conditions. The comparison to existing conditions is included in the analysis to identify traffic noise impacts as defined under 23 CFR 772. The comparison to no-project conditions indicates the direct effect of the project.

As stated in the TeNS, modeling results are rounded to the nearest decibel before comparisons are made. In some cases, this can result in relative changes that may not appear intuitive. An example would be a comparison between calculated sound levels of 64.4 and 64.5 dBA. The difference between these two values is 0.1 dB. However, after rounding, the difference is reported as 1 dB.

Construction Year (2023) Analysis

Modeling results in Table B-1 indicate the following results for each sensitive receptor area. Unmitigated construction-year 2023 impacts are illustrated in **Figure 7-1a** through **Figure 7-1c**.

Area A

The traffic noise modeling results in Table B-1 indicate that traffic noise levels at residences in Area A are predicted to be in the range of 64 to 66 dBA L_{eq}(h) in the construction-year without the project. The results also indicate that the no change in noise levels would occur between the existing year and construction year with and without project. Predicted traffic noise levels would approach the NAC of 67 dBA L_{eq}(h). As such, traffic noise impacts are predicted at residences in this area, and noise abatement must be considered in this area.

Area B

The traffic noise modeling results in Table B-1 indicate that traffic noise levels at residences in Area B are predicted to be in the range of 66 to 68 dBA L_{eq}(h) in the construction-year without the project. The results also indicate that the no change in noise levels would occur between the existing year and construction year with and without project. Predicted traffic noise levels would exceed the NAC of 67 dBA L_{eq}(h). As such, traffic noise impacts are predicted at residences in this area, and noise abatement must be considered in this area.

Area C

The traffic noise modeling results in Table B-1 indicate that traffic noise levels at residences in Area C are predicted to be in the range of 61 to 74 dBA L_{eq}(h) in the construction-year without the project. The results also indicate that the increase in noise between existing conditions and the construction-year is predicted to be 1 dB. The construction year with project noise levels would increase by a maximum of 1 dB compared to the construction year without project and are predicted to be in the range of 61 to 75 dBA L_{eq}(h). Predicted traffic noise levels would exceed the NAC of 67 dBA L_{eq}(h). As such, traffic noise impacts are predicted at residences in this area, and noise abatement must be considered in this area.

Area D

The traffic noise modeling results in Table B-1 indicate that traffic noise levels at residences in Area D are predicted to be in the range of 62 to 71 dBA L_{eq}(h) in the construction-year without the project. The results also indicate that the increase in noise between existing conditions and the construction-year is predicted to be 1 dB. The construction year with project noise levels would be increased by a maximum of 1 dB compared to the construction year without project and are predicted to be in the range of 62 to 71 dBA L_{eq}(h). Predicted traffic noise levels would exceed the NAC of 67 dBA L_{eq}(h). As such, traffic noise impacts are predicted at residences in this area, and noise abatement must be considered in this area.

Area E

The traffic noise modeling results in Table B-1 indicate that traffic noise levels at residences in Area E are predicted to be in the range of 65 to 71 dBA L_{eq}(h) in the construction-year without the project. The results also indicate that the increase in noise between existing conditions and the construction-year is predicted to be 1 dB. The construction year with project noise levels would be increased by a maximum of 1 dB compared to the construction year without project and are predicted to be in the range of 66 to 71 dBA L_{eq}(h). Predicted traffic noise levels would exceed the NAC of 67 dBA L_{eq}(h). As such, traffic noise impacts are predicted at residences in this area, and noise abatement must be considered in this area.

Area F

The traffic noise modeling results in Table B-1 indicate exterior traffic noise levels at the playground and church will be 63 and 66 dBA L_{eq}(h) construction-year without the project, respectively. The results also indicate that the increase in noise between existing conditions and the construction-year is predicted to be 1 dB. The increase in noise associated with the construction year with project would be 0 dB at the playground and 1 dB at the church. Exterior noise levels are predicted to be 63 to 67 dBA L_{eq}(h) at the playground and the church in the construction year with the project, respectively. Predicted traffic noise levels would exceed the NAC of 67 dBA L_{eq}(h). As such, traffic noise impacts are predicted at residences in this area, and noise abatement must be considered in this area.

Because the church has an interior noise abatement criterion in addition to the exterior criterion, interior noise must be considered at the church as well. From Table 6 in the FHWA Highway Traffic Noise Analysis and Abatement Guidance document, the building noise reduction factor for standard construction with ordinary windows closed is 20 dB. The interior noise level in the church in the design-year is therefore predicted to be 47 dBA L_{eq}(h). Because this predicted design-year noise level does not exceed the interior NAC of 52 dBA L_{eq}(h), no interior traffic noise impacts are predicted at the church.

Area G

The traffic noise modeling results in Table B-1 indicate that traffic noise levels at residence in Area G is predicted to be 66 dBA L_{eq}(h) in the construction-year without the project. The results also indicate that the increase in noise between existing conditions and the construction-year is predicted to be 1 dB. The construction year with project noise level is predicted to be 67 dBA L_{eq}(h) and would result in a 2 dB increase. Predicted traffic noise levels would approach the NAC of 67 dBA L_{eq}(h). As such, traffic noise impacts are predicted at the residence in this area, and noise abatement must be considered in this area.

Area H

The traffic noise modeling results in Table B-1 indicate that traffic noise levels at residences in Area H are predicted to be in the range of 66 to 72 dBA L_{eq}(h) in the construction-year without the project. The results also indicate that the increase in noise between existing conditions and the construction-year is predicted to be 0 dB. The increase in noise associated with the construction year with project would be 1 dB compared to the construction year without the project and noise levels are predicted to be in the range of 67 to 73 dBA L_{eq}(h). Predicted traffic noise levels would exceed the NAC of 67 dBA L_{eq}(h). As such, traffic noise impacts are predicted at residences in this area, and noise abatement must be considered in this area.

Area I

The traffic noise modeling results in Table B-1 indicate that traffic noise levels at residence in Area I is predicted to be 62 dBA L_{eq}(h) in the construction-year without the project. The results also indicate that the increase in noise between existing conditions and the construction-year is predicted to be 1 dB. The construction year with project noise levels would result in an increase of 1 dB compared to the construction year without project and is predicted to be 63 dBA L_{eq}(h). Predicted traffic noise levels would not approach or exceed the NAC of 67 dBA L_{eq}(h), no traffic noise impacts are predicted to occur.

Area J

The traffic noise modeling results in Table B-1 indicate that traffic noise levels at residences in Area J are predicted to be in the range of 69 to 75 dBA L_{eq}(h) in the construction-year without the project. The results also indicate no change in noise levels between existing conditions and the construction-year is predicted to occur. Similarly, no change between the construction year and construction year without the project is expected to occur. Construction year with project noise levels are predicted to be in the range of 69 to 75 dBA L_{eq}(h). Predicted traffic noise levels would exceed the NAC of 67 dBA L_{eq}(h). As such, traffic noise impacts are predicted at residences in this area, and noise abatement must be considered.

Figure 7-1a. Construction-Year 2023 Unmitigated

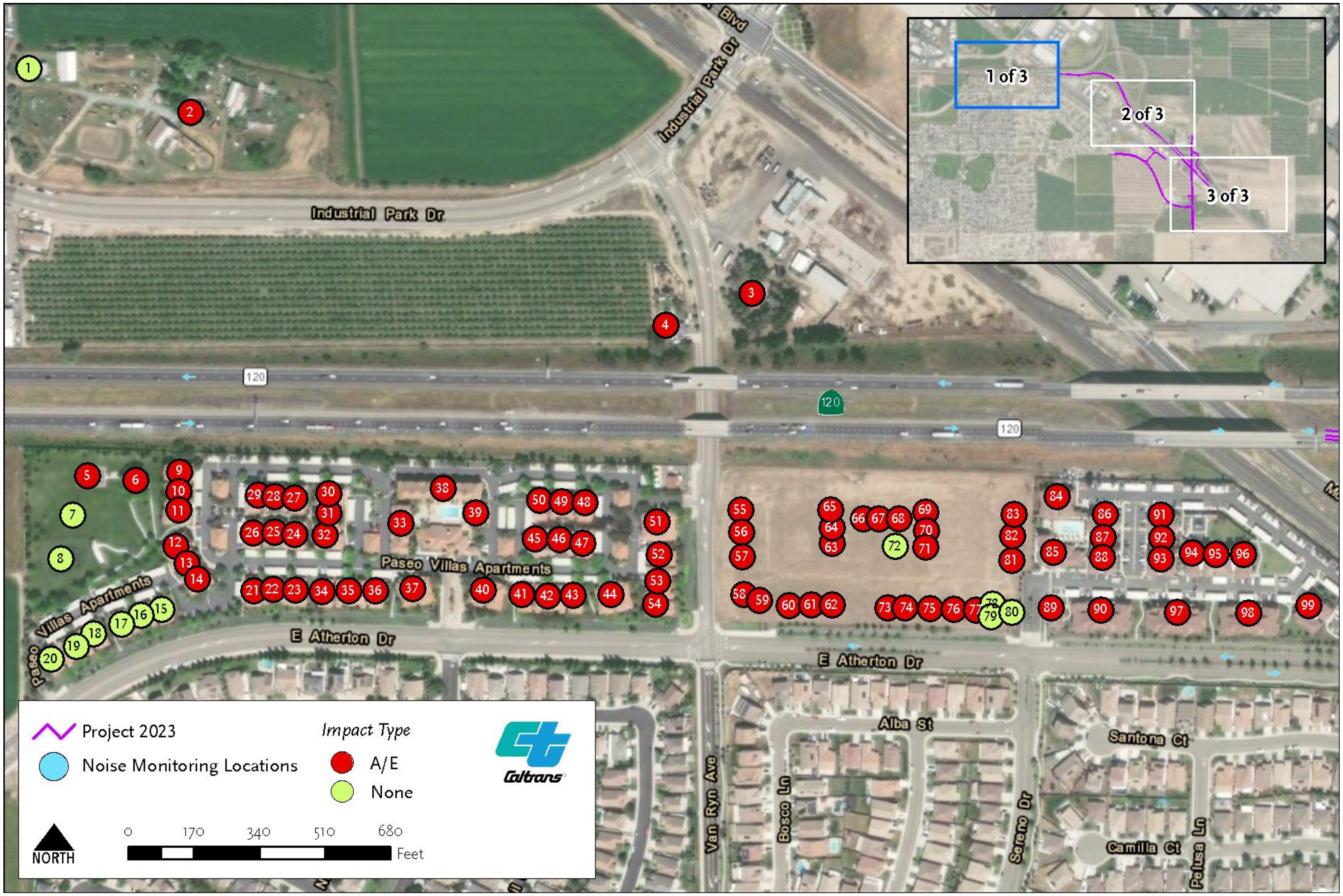


Figure 7-1b. Construction-Year 2023 Unmitigated

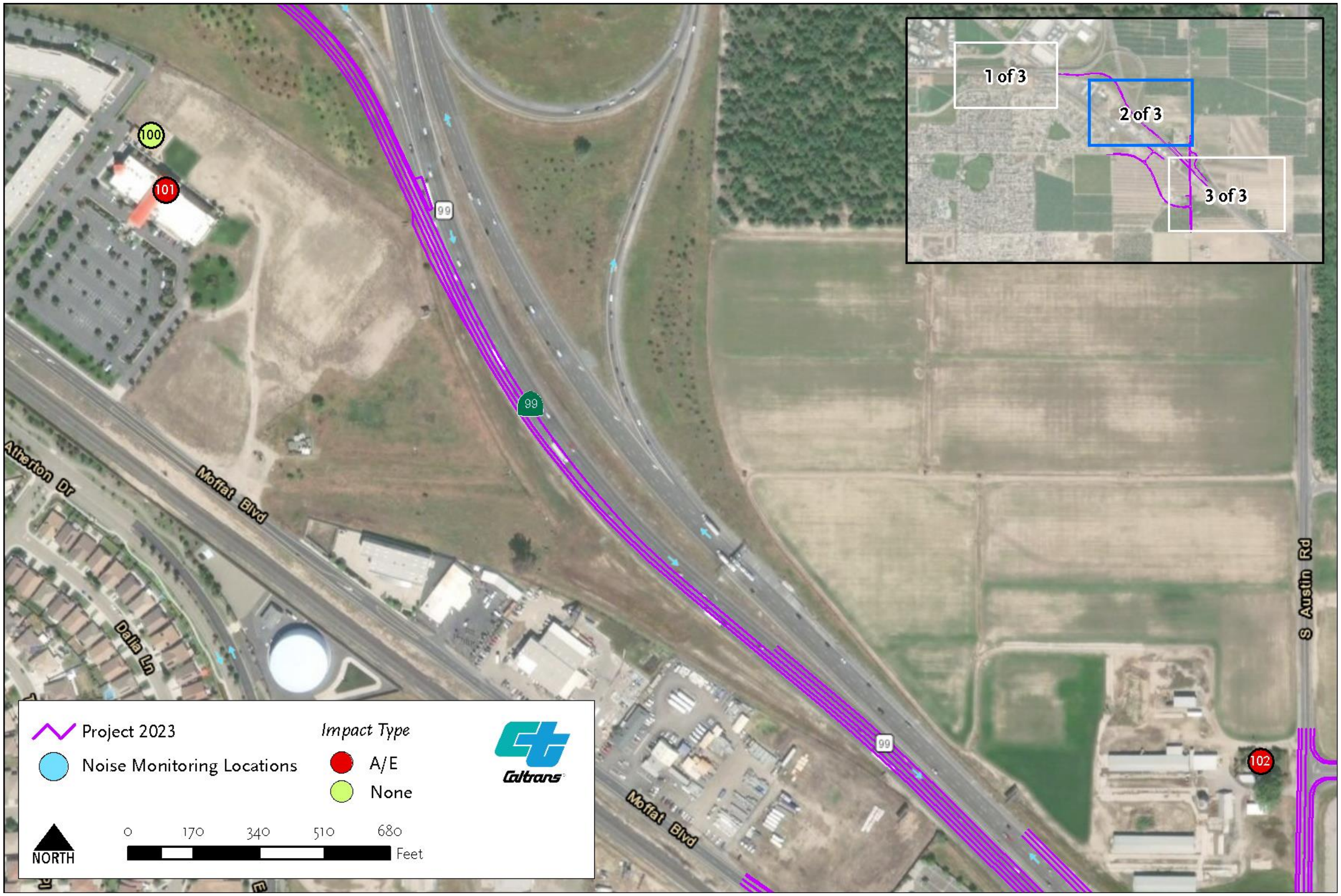
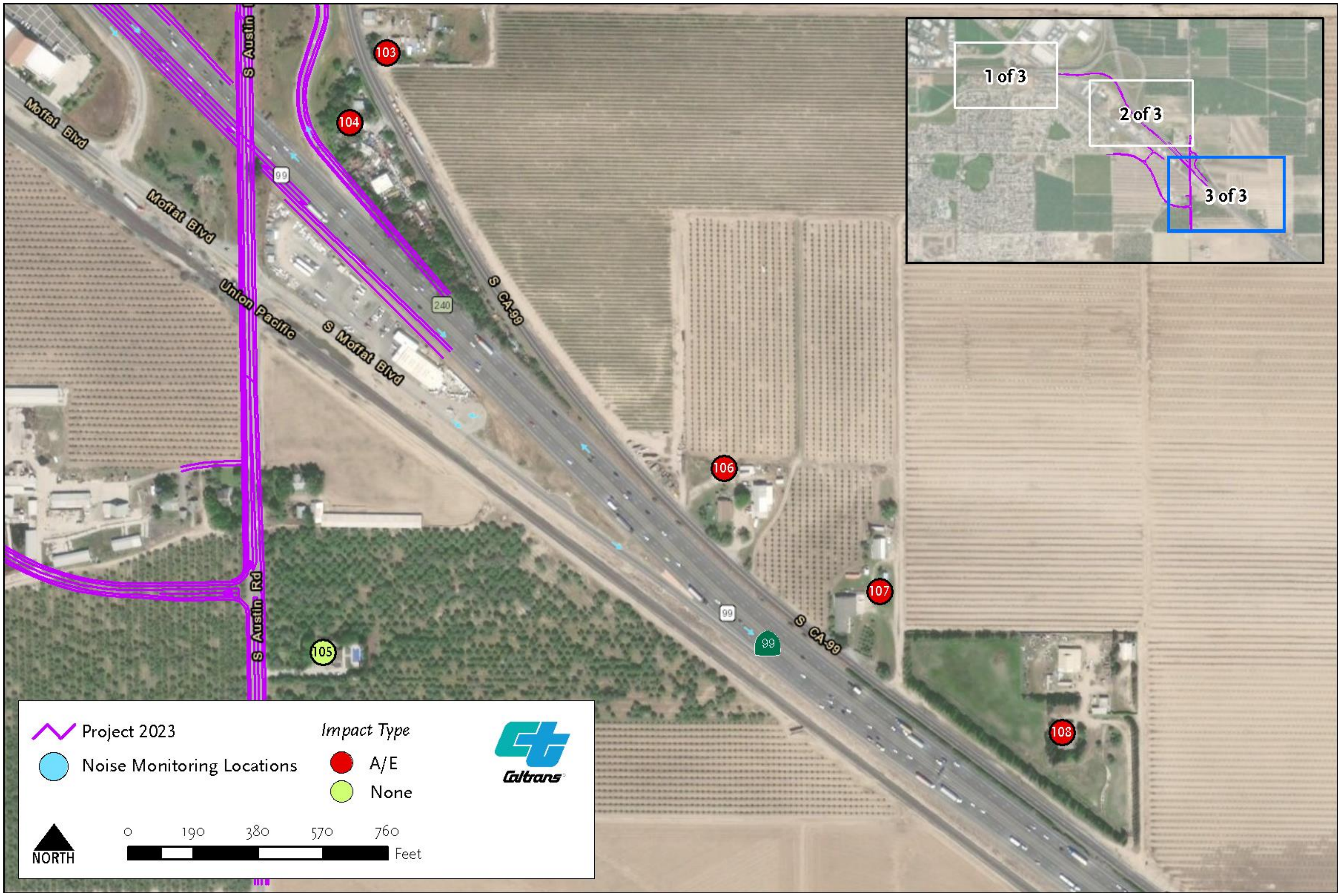


Figure 7-1c. Construction-Year 2023 Unmitigated



Design Year (2043) Analysis

Modeling results in Table B-2 indicate the following results for each sensitive receptor area. Unmitigated design-year 2043 impacts are illustrated in **Figure 7-2a** through **Figure 7-2c**.

Area A

The traffic noise modeling results in Table B-2 indicate that traffic noise levels at residences in Area A are predicted to be in the range of 65 to 67 dBA L_{eq}(h) in the design-year without the project. The results also indicate that the increase in noise between existing conditions and the design-year is predicted to be 2 dB. The design-year with project noise levels would result in an increase of 3 dB compared to the design-year without project and are predicted to be in the range of 67 to 69 dBA L_{eq}(h). Predicted traffic noise levels would approach the NAC of 67 dBA L_{eq}(h). As such, traffic noise impacts are predicted at residences in this area, and noise abatement must be considered in this area.

Area B

The traffic noise modeling results in Table B-2 indicate that traffic noise levels at residences in Area B are predicted to be in the range of 67 to 69 dBA L_{eq}(h) in the design-year without the project. The results also indicate that the increase in noise between existing conditions and the design-year is predicted to be 1 dB. The design-year with project noise levels would result in an increase of 1 dB compared to the design-year without project and are predicted to be in the range of 68 to 69 dBA L_{eq}(h). Predicted traffic noise levels would exceed the NAC of 67 dBA L_{eq}(h). As such, traffic noise impacts are predicted at residences in this area, and noise abatement must be considered in this area.

Area C

The traffic noise modeling results in Table B-2 indicate that traffic noise levels at residences in Area C are predicted to be in the range of 62 to 75 dBA L_{eq}(h) in the design-year without the project. The results also indicate that the increase in noise between existing conditions and the design-year is predicted to be 2 dB. The design-year with project noise levels would increase by a maximum of 3 dB compared to the design-year without project and are predicted to be in the range of 63 to 75 dBA L_{eq}(h). Predicted traffic noise levels would exceed the NAC of 67 dBA L_{eq}(h). As such, traffic noise impacts are predicted at residences in this area, and noise abatement must be considered in this area.

Area D

The traffic noise modeling results in Table B-2 indicate that traffic noise levels at residences in Area D are predicted to be in the range of 63 to 72 dBA L_{eq}(h) in the design-year without the project. The results also indicate that the increase in noise between existing conditions and the design-year is predicted to be 2 dB. The design-year with project noise levels would be increase by a maximum of 2 dB compared to the design-year without project and are predicted to be in the range of 64 to 73 dBA L_{eq}(h). Predicted traffic noise levels would exceed the NAC of 67 dBA L_{eq}(h). As such, traffic noise impacts are predicted at residences in this area, and noise abatement must be considered in this area.

Area E

The traffic noise modeling results in Table B-2 indicate that traffic noise levels at residences in Area D are predicted to be in the range of 66 to 70 dBA L_{eq}(h) in the design-year without the project. The results also indicate that the increase in noise between existing conditions and the design-year is predicted to be 2 dB. The design-year with project noise levels would increase a maximum of 1 dB compared to the design-year without project and are predicted to be in the range of 66 to 70 dBA L_{eq}(h). Predicted traffic noise levels would exceed the NAC of 67 dBA L_{eq}(h). As such, traffic noise impacts are predicted at residences in this area, and noise abatement must be considered in this area.

Area F

The traffic noise modeling results in Table B-2 indicate exterior traffic noise levels at the playground and church will be 63 and 66 dBA L_{eq}(h) design-year without the project, respectively. The results also indicate that the increase in noise between existing conditions and the design-year is predicted to be 1 dB. The change in noise associated with the design-year with project would be a reduction of 1 dB at the playground and an increase of 1 dB at the church. Exterior noise levels are predicted to be 62 and 67 dBA L_{eq}(h) at the playground and the church in the design-year with the project, respectively. Predicted traffic noise levels would exceed the NAC of 67 dBA L_{eq}(h). As such, traffic noise impacts are predicted at residences in this area, and noise abatement must be considered in this area.

Because the church has an interior noise abatement criterion in addition to the exterior criterion, interior noise must be considered at the church as well. From Table 6 in the FHWA Highway Traffic Noise Analysis and Abatement Guidance document, the building noise reduction factor for standard construction with ordinary windows closed is 20 dB. The interior noise level in the church in the design-year is therefore predicted to be 47 dBA L_{eq}(h). Because this predicted design-year noise level does not exceed the interior NAC of 52 dBA L_{eq}(h), no interior traffic noise impacts are predicted at the church.

Area G

The traffic noise modeling results in Table B-2 indicate that traffic noise levels at residence in Area G is predicted to be 66 dBA L_{eq}(h) in the design-year without the project. The results also indicate that the increase in noise between existing conditions and the design-year is predicted to be 2 dB. The design-year with project noise level is predicted to be 69 dBA L_{eq}(h) and would result in a 3 dB increase. Predicted traffic noise levels would exceed the NAC of 67 dBA L_{eq}(h). As such, traffic noise impacts are predicted at the residence in this area, and noise abatement must be considered in this area.

Area H

In Area H, receptors 103 and 104 would be fully acquired as part of the project in the design-year and as such have been removed from the analysis.

Area I

The traffic noise modeling results in Table B-2 indicate that traffic noise levels at residence in Area I is predicted to be 63 dBA L_{eq}(h) in the design-year without the project. The results also indicate that the increase in noise between existing conditions and the design-year is predicted to be 2 dB. The design-year with project noise levels would result in an increase of 0 dB compared to the design-year without project and is predicted to be 63 dBA L_{eq}(h). Predicted traffic noise levels would not approach or exceed the NAC of 67 dBA L_{eq}(h), no traffic noise impacts are predicted at to occur.

Figure 7-2a. Design-Year 2043 Unmitigated

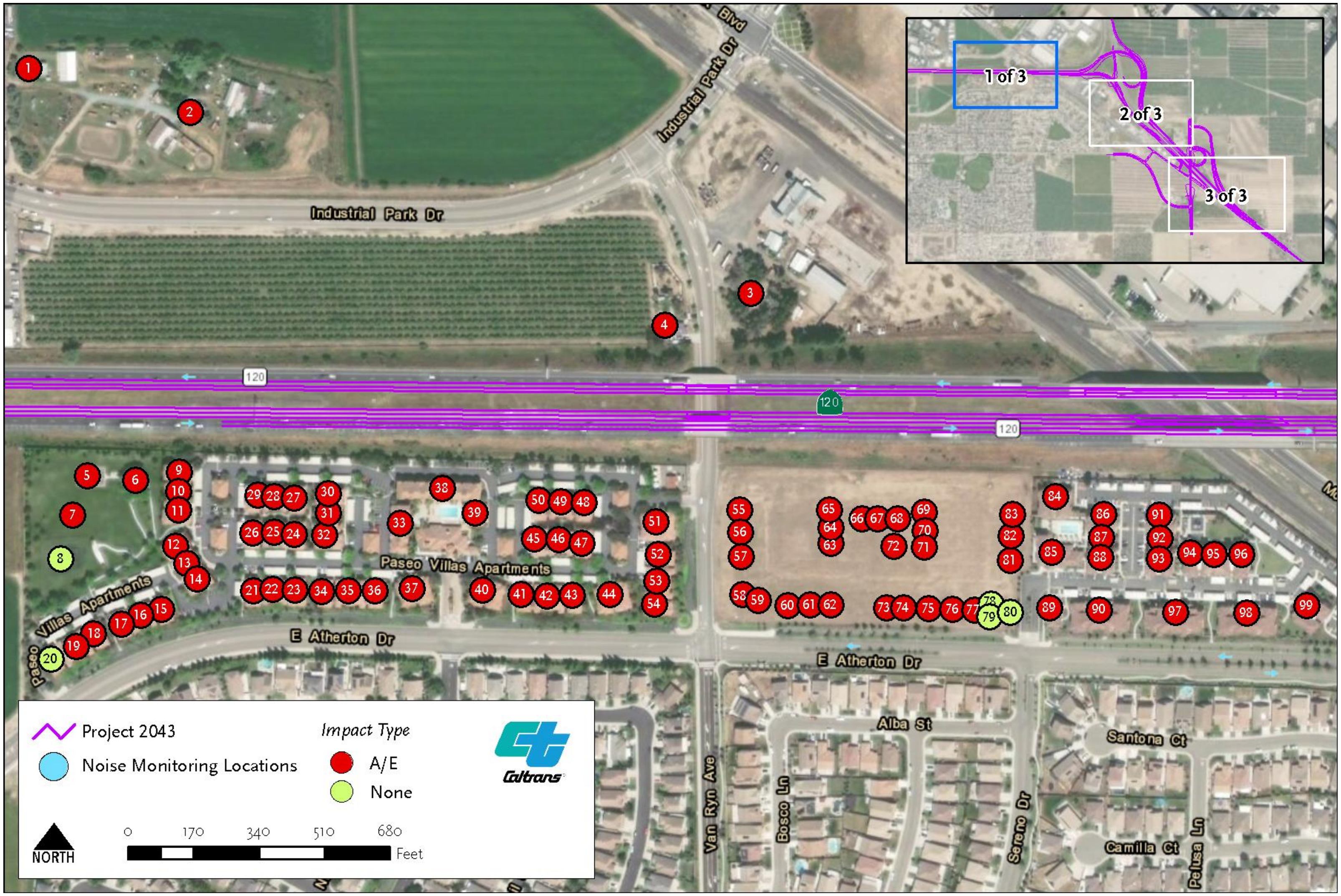


Figure 7-2b. Design-Year 2043 Unmitigated

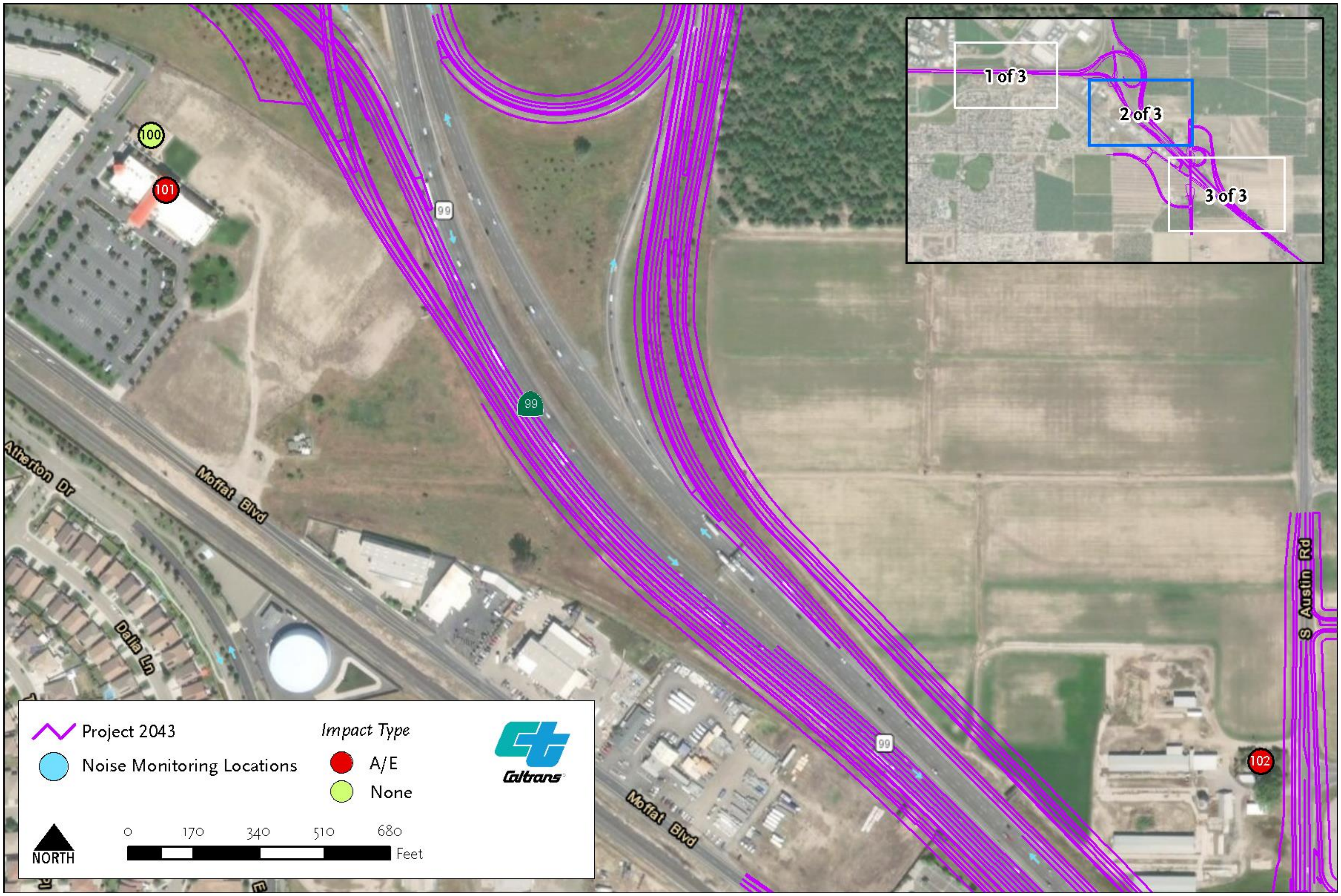
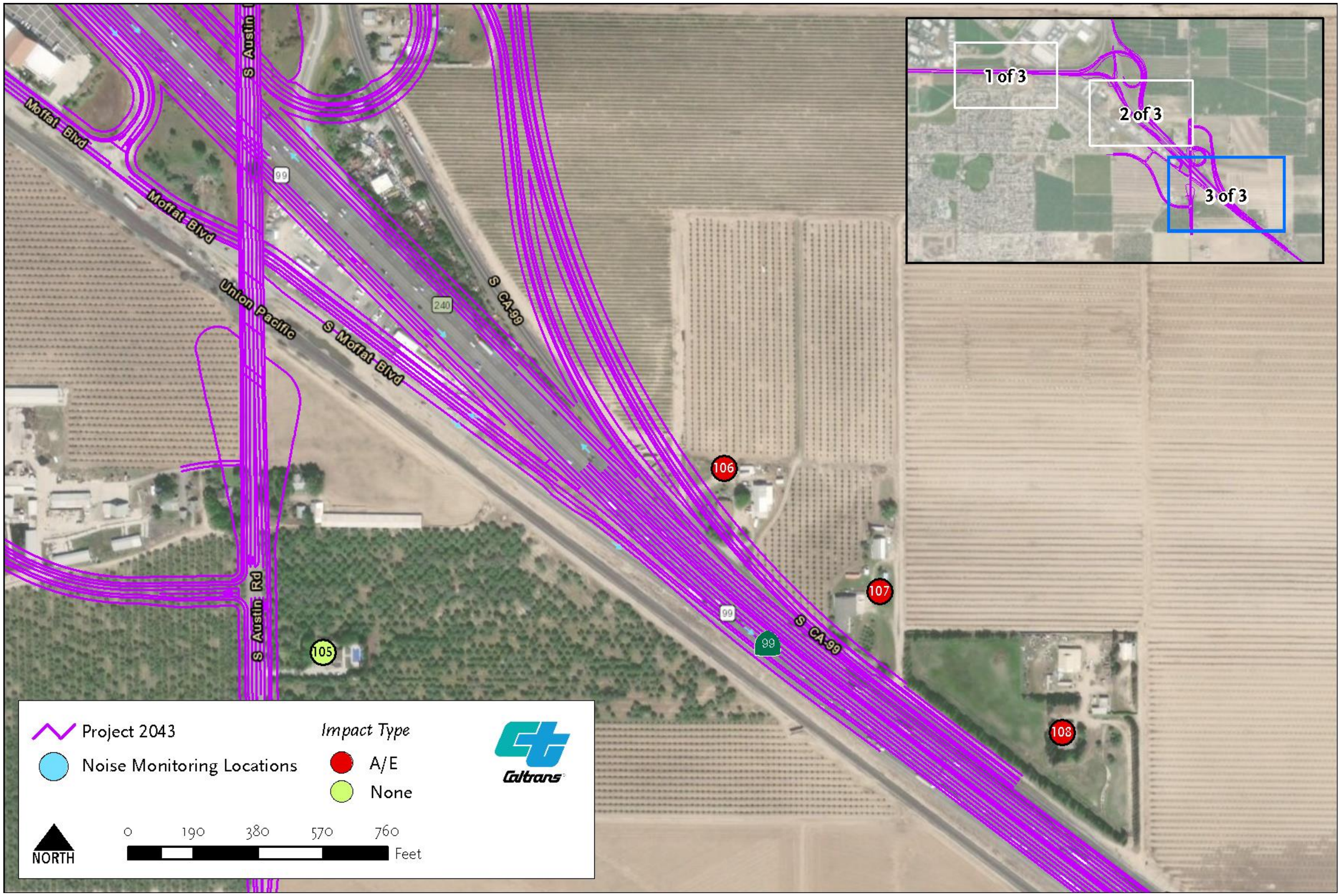


Figure 7-2c. Design-Year 2043 Unmitigated



Area J

The traffic noise modeling results in Table B-2 indicate that traffic noise levels at residences in Area J are predicted to be in the range of 68 to 74 dBA Leq(h) in the design-year without the project. The results also indicate that a reduction of 1 dB would occur between existing conditions and the design-year. The design-year with project noise levels would result in a maximum reduction of 6 dB compared to the design-year without project and are predicted to be in the range of 68 to 70 dBA Leq(h). The reduction is likely a result of the movement of the receptors further away from the mainline of the freeway due to partial property acquisitions. Predicted traffic noise levels would exceed the NAC of 67 dBA Leq(h). As such, traffic noise impacts are predicted at residences in this area, and noise abatement must be considered in this area.

7.2. Preliminary Noise Abatement Analysis

Noise abatement is considered where noise impacts are predicted in areas of frequent human use that would benefit from a lowered noise level. According to 23 CFR 772(13)(c) and 772(15)(c), federal funding may be used for the following abatement measures:

- Construction of noise barriers, including acquisition of property rights, either within or outside the highway right-of-way.
- Traffic management measures including, but not limited to, traffic control devices and signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, and exclusive lane designations.
- Alteration of horizontal and vertical alignments.
- Acquisition of real property or interests therein (predominantly unimproved property) to serve as a buffer zone to preempt development which would be adversely impacted by traffic noise.
- Noise insulation of Activity Category D land use facilities listed in Table 1. Post-installation maintenance and operational costs for noise insulation are not eligible for Federal-aid funding.

Noise barriers are the only form of noise abatement considered for this project. Each noise barrier evaluated has been evaluated for feasibility based on achievable noise reduction. For each noise barrier found to be acoustically feasible, reasonable cost allowances were calculated by multiplying the number of benefited receptors by $95,000. Table B-1 in Appendix B summarizes results at receptor locations for the noise barriers

(NB-1 through NB-7) that have been evaluated in detail for this project for construction-year 2023. Table B-2 in Appendix B summarizes results at receptor locations for the noise barriers (NB-1 through NB-6) that have been evaluated in detail for this project for design-year 2043.

For any noise barrier to be considered reasonable from a cost perspective the estimated cost of the noise barrier should be equal to or less than the total cost allowance calculated for the barrier. The cost calculations of the noise barrier must include all items appropriate and necessary for construction of the barrier, such as traffic control, drainage modification, retaining walls, landscaping for graffiti abatement, and right-of-way costs. Construction cost estimates are not provided in this NSR, but are presented in the NADR. The NADR is a design responsibility and is prepared to compile information from the NSR, other relevant environmental studies, and design considerations into a single, comprehensive document before public review of the project. The NADR is prepared by the project engineer after completion of the NSR and prior to publication of the draft environmental document. The NADR includes noise abatement construction cost estimates that have been prepared and signed by the project engineer based on site-specific conditions. Construction cost estimates are compared to reasonableness allowances in the NADR to identify which wall configurations are reasonable from a cost perspective.

The design of noise barriers presented in this report is preliminary and has been conducted at a level appropriate for environmental review and not for final design of the project. Preliminary information on the physical location, length, and height of noise barriers is provided in this report. If pertinent parameters change substantially during the final project design, preliminary noise barrier designs may be modified or eliminated from the final project. A final decision on the construction of the noise abatement will be made upon completion of the project design.

The following is a discussion of noise abatement considered for each evaluation area where traffic noise impacts are predicted.

Construction Year (2023)

7.2.1. Area A

Traffic noise impacts are predicted at residences in this area, and noise abatement must be considered. Receptors 1 and 2 represent a total of two residences in Area A. Detailed modeling analysis was conducted for a barrier located at the edge of the shoulder. The barrier evaluated is identified as Barrier NB-1 in **Figure 5-1a**. Barrier heights in the range of 6 to 16 feet were evaluated in 2-foot increments. Table B-1 in Appendix B summarizes the results of the barrier analysis for each receptor location in Area A. **Table 7-1** summarizes the calculated noise reductions and reasonable allowances for each barrier height.

Table 7-1. Summary of Reasonableness Allowances —Barrier NB-1

Barrier I.D.: NB-1 in Area A						
Construction Year Noise Level, dBA L_{eq}(h): 66						
Construction Year Noise Level with Project Minus Existing Noise Level: 0						
Construction Year with Barrier	**6-Foot Barrier**	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	1	1	1	2	3	3
Number of Benefited Receptors	0	0	0	0	0	0
Reasonable Allowance Per Benefited Receptor	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000
Total Reasonable Allowance	$0	$0	$0	$0	$0	$0

Note: No line of sight break was noted and the 7 dB noise reduction goal was not achieved.

7.2.2. Area B

Traffic noise impacts are predicted at residences in this area, and noise abatement must be considered. Receptors 3 and 4 represent a total of two residences in Area B. Detailed modeling analysis was conducted for a barrier located at the edge of the shoulder. The barrier evaluated is identified as Barrier NB-3 in **Figure 5-1a**. Barrier heights in the range of 6 to 16 feet were evaluated in 2-foot increments. Table B-1 in Appendix B summarizes the results of the barrier analysis for each receptor location in Area B. **Table 7-2** summarizes the calculated noise reductions and reasonable allowances for each barrier height.

Table 7-2. Summary of Reasonableness Allowances —Barrier NB-3

Barrier I.D.: NB-3 in Area B						
Construction Year Noise Level, dBA L_{eq}(h): 68						
Construction Year Noise Level with Project Minus Existing Noise Level: 0						
Construction Year with Barrier	**6-Foot Barrier**	**8-Foot Barrier[1]**	**10-Foot Barrier[2]**	**12-Foot Barrier**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	3	7	8	9	9	10
Number of Benefited Receptors	0	1	2	2	2	2
Reasonable Allowance Per Benefited Receptor	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000
Total Reasonable Allowance	$0	$95,000	$190,000	$190,000	$190,000	$190,000

1. Minimum height need to achieve 7 dB noise reduction design goal
2. Minimum height needed to break the line of sight between 11.5-foot truck stack and first row receptor.

7.2.3. Area C

Traffic noise impacts are predicted at residences in this area, and noise abatement must be considered. Receptors 5 through 54 represent approximately 293 residences and one park (with four receptors) in Area C. Detailed modeling analysis was conducted for a barrier located at the edge of the shoulder. The barrier evaluated is identified as Barrier NB-2 in **Figure 5-1a**. Barrier heights in the range of 6 to 16 feet were evaluated in 2-foot increments. Table B-1 in Appendix B summarizes the results of the barrier analysis for each receptor location in Area C. **Table 7-3** summarizes the calculated noise reductions and reasonable allowances for each barrier height.

Table 7-3. Summary of Reasonableness Allowances —Barrier NB-2

Barrier I.D.: NB-2 in Area C						
Construction Year Noise Level, dBA L_{eq}(h): 75						
Construction Year Noise Level with Project Minus Existing Noise Level: 2						
Construction Year with Barrier	**6-Foot Barrier**	**8-Foot Barrier[1]**	**10-Foot Barrier**	**12-Foot Barrier**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	6	7	7	11	12	13
Number of Benefited Receptors	36	68	168	252	287	293
Reasonable Allowance Per Benefited Receptor	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000
Total Reasonable Allowance	$3.420 million	$6.460 million	$15.960 million	$23.940 million	$27.265 million	$27.835 million

Note: A line of sight break was not achieved at all first row receptors.
1. Minimum height need to achieve 7 dB noise reduction design goal.

7.2.4. Area D

Traffic noise impacts are predicted at residences in this area, and noise abatement must be considered. Receptors 55 through 83 represent approximately 154 residences, two outdoor recreational areas (three receptors), and one fitness center in Area D. Detailed modeling analysis was conducted for a barrier located at the edge of the shoulder. The barrier evaluated is identified as Barrier NB-2 in **Figure 5-1a**. Barrier heights in the range of 6 to 16 feet were evaluated in 2-foot increments. Table B-1 in Appendix B summarizes the results of the barrier analysis for each receptor location in Area D. **Table 7-4** summarizes the calculated noise reductions and reasonable allowances for each barrier height.

Table 7-4. Summary of Reasonableness Allowances —Barrier NB-2

Barrier I.D.: NB-2 in Area D						
Construction Year Noise Level, dBA L_{eq}(h): 71						
Construction Year Noise Level with Project Minus Existing Noise Level: 1						
Construction Year with Barrier	**6-Foot Barrier**	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier[1,2]**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	5	5	6	9	10	11
Number of Benefited Receptors	42	154	155	158	158	158
Reasonable Allowance Per Benefited Receptor	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000
Total Reasonable Allowance	$3.990 million	$14.630 million	$14.725 million	$15.010 million	$15.010 million	$15.010 million

1. Minimum height needed to break the line of sight between 11.5-foot truck stack and first row receptor.
2. Minimum height need to achieve 7 dB noise reduction design goal.

7.2.5. Area E

Traffic noise impacts are predicted at residences in this area, and noise abatement must be considered. Receptors 84 through 99 represent approximately 153 residences in Area E. Detailed modeling analysis was conducted for a barrier located at the edge of the shoulder. The barrier evaluated is identified as Barrier NB-2 in **Figure 5-1a**. Barrier heights in the range of 6 to 16 feet were evaluated in 2-foot increments. Table B-1 in Appendix B summarizes the results of the barrier analysis for each receptor location in Area E. **Table 7-5** summarizes the calculated noise reductions and reasonable allowances for each barrier height.

Table 7-5. Summary of Reasonableness Allowances —Barrier NB-2

Barrier I.D.: NB-2 in Area E						
Construction Year Noise Level, dBA L_{eq}(h): 71						
Construction Year Noise Level with Project Minus Existing Noise Level: 1						
Construction Year with Barrier	**6-Foot Barrier**	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier[1,2]**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	5	5	6	9	10	10
Number of Benefited Receptors	27	39	82	118	136	136
Reasonable Allowance Per Benefited Receptor	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000
Total Reasonable Allowance	$2.565 million	$3.705 million	$7.790 million	$11.210 million	$12.920 million	$12.920 million

1. Minimum height needed to break the line of sight between 11.5-foot truck stack and first row receptor.
2. Minimum height need to achieve 7 dB noise reduction design goal.

7.2.6. Area F

Traffic noise impacts are predicted at uses in this area, and noise abatement must be considered. Receptors 100 and 101 represent a playground and church within this area. Detailed modeling analysis was conducted for a barrier located at the edge of the shoulder. The barrier evaluated is identified as Barrier NB-4 in **Figure 5-1a**. Barrier heights in the range of 6 to 16 feet were evaluated in 2-foot increments. Table B-1 in Appendix B summarizes the results of the barrier analysis for each receptor location in Area F. **Table 7-6** summarizes the calculated noise reductions and reasonable allowances for each barrier height.

Because the church has an interior noise abatement criterion in addition to the exterior criterion, interior noise must be analyzed at the church as well. The interior noise abatement criterion (52 dBA L_{eq}[h]) is not predicted to be approached or exceeded so abatement does not need to be considered relative to the interior noise abatement criterion.

Table 7-6. Summary of Reasonableness Allowances —Barrier NB-4

Barrier I.D.: NB-4 in Area F						
Construction Year Noise Level, dBA L_{eq}(h): 66						
Construction Year Noise Level with Project Minus Existing Noise Level: 1						
Construction Year with Barrier	**6-Foot Barrier**	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier[1]**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	1	1	2	2	2	3
Number of Benefited Receptors	0	0	0	0	0	0
Reasonable Allowance Per Benefited Receptor	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000
Total Reasonable Allowance	$0	$0	$0	$0	$0	$0

Note: The 7 dB noise reduction design goal was not achieved.
1. Minimum height needed to break the line of sight between 11.5-foot truck stack and first row receptor.

7.2.7. Area G

Traffic noise impacts are predicted at the residence in this area, and noise abatement must be considered. Receptor 102 represents one residence in Area G. Detailed modeling analysis was conducted for a barrier located at the edge of the shoulder. The barrier evaluated is identified as Barrier NB-5 in **Figure 5-1b**. Barrier heights in the range of 6 to 16 feet were evaluated in 2-foot increments. Table B-1 in Appendix B summarizes the results of the barrier analysis for each receptor location in Area G. **Table 7-7** summarizes the calculated noise reductions and reasonable allowances for each barrier height.

Table 7-7. Summary of Reasonableness Allowances —Barrier NB-5

Barrier I.D.: NB-5 in Area G						
Construction Year Noise Level, dBA L_{eq}(h): 67						
Construction Year Noise Level with Project Minus Existing Noise Level: 3						
Construction Year with Barrier	**6-Foot Barrier**	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	1	1	1	2	2	2
Number of Benefited Receptors	0	0	0	0	0	0
Reasonable Allowance Per Benefited Receptor	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000
Total Reasonable Allowance	$0	$0	$0	$0	$0	$0

Note: No line of sight break was noted and the 7 dB noise reduction goal was not achieved.

7.2.8. Area H

Traffic noise impacts are predicted at residences in this area, and noise abatement must be considered. Receptors 104 and 105 represent two residences in Area H. Detailed modeling analysis was conducted for a barrier located at the edge of the shoulder. The barrier evaluated is identified as Barrier NB-6 in **Figure 5-1c**. Barrier heights in the range of 6 to 16 feet were evaluated in 2-foot increments. Table B-1 in Appendix B summarizes the results of the barrier analysis for each receptor location in Area H.

Table 7-8 summarizes the calculated noise reductions and reasonable allowances for each barrier height.

Table 7-8. Summary of Reasonableness Allowances —Barrier NB-6

Barrier I.D.: NB-6 in Area H						
Construction Year Noise Level, dBA L_{eq}(h): 73						
Construction Year Noise Level with Project Minus Existing Noise Level: 1						
Construction Year with Barrier	**6-Foot Barrier**	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier**	**14-Foot Barrier[1,2]**	**16-Foot Barrier**
Barrier Noise Reduction, dB	3	3	6	6	7	7
Number of Benefited Receptors	0	0	1	1	1	2
Reasonable Allowance Per Benefited Receptor	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000
Total Reasonable Allowance	$95,000	$95,000	$95,000	$95,000	$95,000	$190,000

1. Minimum height needed to break the line of sight between 11.5 foot-truck stack and first row receptor.
2. Minimum height need to achieve 7 dB noise reduction design goal.

7.2.9. Area I

The traffic noise modeling results in Table B-1 indicate exterior traffic noise levels at the residences represented by receptor 105 in Area I will be 63 dBA L_{eq}(h) in the construction-year with project and that the change in noise will be 2 dB. Because the predicted construction-year noise level does not approach or exceed the 67 dBA L_{eq}(h) NAC no traffic noise impacts are predicted at to occur.

7.2.10. Area J

Traffic noise impacts are predicted at residences in this area, and noise abatement must be considered. Receptors 106 through 108 represent three residences in Area J. Detailed modeling analysis was conducted for a barrier located at the edge of the shoulder. The barrier evaluated is identified as Barrier NB-7 in **Figure 5-1c**. Barrier heights in the range of 6 to 16 feet were evaluated in 2-foot increments. Table B-1 in Appendix B summarizes the results of the barrier analysis for each receptor location in Area J. **Table 7-9** summarizes the calculated noise reductions and reasonable allowances for each barrier height.

Table 7-9. Summary of Reasonableness Allowances —Barrier NB-7

Barrier I.D.: NB-7 in Area J						
Design Year Noise Level, dBA L_{eq}(h): 75						
Design Year Noise Level with Project Minus Existing Noise Level: 0						
Design Year with Barrier	**6-Foot Barrier**	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier[1,2]**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	4	5	6	9	9	10
Number of Benefited Receptors	1	2	2	3	3	3
Reasonable Allowance Per Benefited Receptor	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000
Total Reasonable Allowance	$95,000	$190,000	$190,000	$285,000	$285,000	$285,000

1. Minimum height needed to break the line of sight between 11.5-foot truck stack and first row receptor.
2. Minimum height need to achieve 7 dB noise reduction design goal.

Design Year (2043)

7.2.11. Area A

Traffic noise impacts are predicted at residences in this area, and noise abatement must be considered. Receptors 1 and 2 represent a total of two residences in Area A. Detailed modeling analysis was conducted for a barrier located at the edge of the shoulder. The barrier evaluated is identified as Barrier NB-1 in **Figure 5-2a**. Barrier heights in the range of 6 to 16 feet were evaluated in 2-foot increments. Table B-2 in Appendix B summarizes the results of the barrier analysis for each receptor location in Area A. **Table 7-10** summarizes the calculated noise reductions and reasonable allowances for each barrier height.

Table 7-10. Summary of Reasonableness Allowances —Barrier NB-1

Barrier I.D.: NB-1 in Area A						
Design Year Noise Level, dBA L_{eq}(h): 69						
Design Year Noise Level with Project Minus Existing Noise Level: 3						
Design Year with Barrier	**6-Foot Barrier**	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	1	2	2	3	3	3
Number of Benefited Receptors	0	0	0	0	0	0
Reasonable Allowance Per Benefited Receptor	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000
Total Reasonable Allowance	0	0	0	0	0	0

Note: No line of sight break was noted and the 7 dB noise reduction goal was not achieved.

7.2.12. Area B

Traffic noise impacts are predicted at residences in this area, and noise abatement must be considered. Receptors 3 and 4 represent a total of two residences in Area B. Detailed modeling analysis was conducted for a barrier located at the edge of the shoulder. The barrier evaluated is identified as Barrier NB-3 in **Figure 5-2a**. Barrier heights in the range of 6 to 16 feet were evaluated in 2-foot increments. Table B-2 in Appendix B summarizes the results of the barrier analysis for each receptor location in Area B. **Table 7-11** summarizes the calculated noise reductions and reasonable allowances for each barrier height.

Table 7-11. Summary of Reasonableness Allowances —Barrier NB-3

Barrier I.D.: NB-3 in Area B						
Design Year Noise Level, dBA L_{eq}(h): 69						
Design Year Noise Level with Project Minus Existing Noise Level: 1						
Design Year with Barrier	**6-Foot Barrier**	**8-Foot Barrier**	**10-Foot Barrier[1,2]**	**12-Foot Barrier**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	3	6	7	8	8	8
Number of Benefited Receptors	0	1	2	2	2	2
Reasonable Allowance Per Benefited Receptor	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000
Total Reasonable Allowance	$0	$95,000	$190,000	$190,000	$190,000	$190,000

1. Minimum height needed to break the line of sight between 11.5-foot truck stack and first row receptor.
2. Minimum height need to achieve 7 dB noise reduction design goal.

7.2.13. Area C

Traffic noise impacts are predicted at residences in this area, and noise abatement must be considered. Receptors 5 through 54 represent approximately 293 residences and one park (with four receptors) in Area C. Detailed modeling analysis was conducted for a barrier located at the edge of the shoulder. The barrier evaluated is identified as Barrier NB-2 in **Figure 5-2a**. Barrier heights in the range of 6 to 16 feet were evaluated in 2-foot increments. Table B-2 in Appendix B summarizes the results of the barrier analysis for each receptor location in Area C. **Table 7-12** summarizes the calculated noise reductions and reasonable allowances for each barrier height.

Table 7-12. Summary of Reasonableness Allowances —Barrier NB-2

Barrier I.D.: NB-2 in Area C						
Design Year Noise Level, dBA L_{eq}(h): 75						
Design Year Noise Level with Project Minus Existing Noise Level: 2						
Design Year with Barrier	**6-Foot Barrier**	**8-Foot Barrier[1]**	**10-Foot Barrier**	**12-Foot Barrier**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	6	9	10	11	12	12
Number of Benefited Receptors	40	82	186	257	287	297
Reasonable Allowance Per Benefited Receptor	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000
Total Reasonable Allowance	$3.8 million	$7.790 million	$17.670 million	$24.415 million	$27.265 million	$28.215 million

Note: A line of sight break was not achieved at all first row receptors.
1. Minimum height need to achieve 7 dB noise reduction design goal.

7.2.14. Area D

Traffic noise impacts are predicted at residences in this area, and noise abatement must be considered. Receptors 55 through 83 represent approximately 154 residences, two outdoor recreational areas (three receptors), and one fitness center in Area D. Detailed modeling analysis was conducted for a barrier located at the edge of the shoulder. The barrier evaluated is identified as Barrier NB-2 in **Figure 5-1a**. Barrier heights in the range of 6 to 16 feet were evaluated in 2-foot increments. Table B-2 in Appendix B summarizes the results of the barrier analysis for each receptor location in Area D. **Table 7-13** summarizes the calculated noise reductions and reasonable allowances for each barrier height.

Table 7-13. Summary of Reasonableness Allowances —Barrier NB-2

Barrier I.D.: NB-2 in Area D						
Construction Year Noise Level, dBA L_{eq}(h): 73						
Construction Year Noise Level with Project Minus Existing Noise Level: 2						
Construction Year with Barrier	**6-Foot Barrier**	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier[1,2]**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	5	6	6	10	12	12
Number of Benefited Receptors	36	149	152	158	158	158
Reasonable Allowance Per Benefited Receptor	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000
Total Reasonable Allowance	$3.420 million	$14.155 million	$14.440 million	$15.010 million	$15.010 million	$15.010 million

1. Minimum height needed to break the line of sight between 11.5-foot truck stack and first row receptor.
2. Minimum height need to achieve 7 dB noise reduction design goal.

7.2.15. Area E

Traffic noise impacts are predicted at residences in this area, and noise abatement must be considered. Receptors 84 through 99 represent approximately 153 residences in Area E. Detailed modeling analysis was conducted for a barrier located at the edge of the shoulder. The barrier evaluated is identified as Barrier NB-2 in **Figure 5-2a**. Barrier heights in the range of 6 to 16 feet were evaluated in 2-foot increments. Table B-2 in Appendix B summarizes the results of the barrier analysis for each receptor location in Area E. **Table 7-14** summarizes the calculated noise reductions and reasonable allowances for each barrier height.

Table 7-14. Summary of Reasonableness Allowances —Barrier NB-2

Barrier I.D.: NB-2 in Area E						
Design Year Noise Level, dBA L_{eq}(h): 72						
Design Year Noise Level with Project Minus Existing Noise Level: 2						
Design Year with Barrier	**6-Foot Barrier**	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier[1,2]**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	4	5	6	8	9	9
Number of Benefited Receptors	0	26	36	100	100	100
Reasonable Allowance Per Benefited Receptor	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000
Total Reasonable Allowance	$0	$2.470 million	$3.420 million	$9.5 million	$9.5 million	$9.5 million

1. Minimum height needed to break the line of sight between 11.5-foot truck stack and first row receptor.
2. Minimum height need to achieve 7 dB noise reduction design goal.

7.2.16. Area F

Traffic noise impacts are predicted at uses in this area, and noise abatement must be considered. Receptors 100 and 101 represent a playground and church within this area. Detailed modeling analysis was conducted for a barrier located at the edge of the shoulder. The barrier evaluated is identified as Barrier NB-4 in **Figure 5-1a**. Barrier heights in the range of 6 to 16 feet were evaluated in 2-foot increments. Table B-2 in Appendix B summarizes the results of the barrier analysis for each receptor location in Area F. **Table 7-15** summarizes the calculated noise reductions and reasonable allowances for each barrier height.

Because the church has an interior noise abatement criterion in addition to the exterior criterion, interior noise must be analyzed at the church as well. The interior noise abatement criterion (52 dBA L_{eq}[h]) is not predicted to be approached or exceeded so abatement does not need to be considered relative to the interior noise abatement criterion.

Table 7-15. Summary of Reasonableness Allowances —Barrier NB-4

Barrier I.D.: NB-4 in Area F						
Construction Year Noise Level, dBA L_{eq}(h): 67						
Construction Year Noise Level with Project Minus Existing Noise Level: 1						
Construction Year with Barrier	**6-Foot Barrier**	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier[1]**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	1	1	1	1	2	2
Number of Benefited Receptors	0	0	0	0	0	0
Reasonable Allowance Per Benefited Receptor	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000
Total Reasonable Allowance	$0	$0	$0	$0	$0	$0

Note: The 7 dB noise reduction design goal was not achieved.
1. Minimum height needed to break the line of sight between 11.5-foot truck stack and first row receptor.

7.2.17. Area G

Traffic noise impacts are predicted at the residence in this area, and noise abatement must be considered. Receptor 102 represents one residence in Area G. Detailed modeling analysis was conducted for a barrier located at the edge of the shoulder. The barrier evaluated is identified as Barrier NB-5 in **Figure 5-2b**. Barrier heights in the range of 6 to 16 feet were evaluated in 2-foot increments. Table B-2 in Appendix B summarizes the results of the barrier analysis for each receptor location in Area G. **Table 7-16** summarizes the calculated noise reductions and reasonable allowances for each barrier height.

Table 7-16. Summary of Reasonableness Allowances —Barrier NB-5

Barrier I.D.: NB-5 in Area G						
Design Year Noise Level, dBA L_{eq}(h): 69						
Design Year Noise Level with Project Minus Existing Noise Level: 5						
Design Year with Barrier	**6-Foot Barrier**	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier[1]**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	3	3	3	4	4	4
Number of Benefited Receptors	0	0	0	0	0	0
Reasonable Allowance Per Benefited Receptor	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000
Total Reasonable Allowance	0	0	0	0	0	0

Note: The 7 dB noise reduction design goal was not achieved.
1. Minimum height needed to break the line of sight between 11.5-foot truck stack and first row receptor.

7.2.18. Area H

In Area H, receptors 103 and 104 would be fully acquired as part of the project in the design-year and as such have been removed from the analysis.

7.2.19. Area I

The traffic noise modeling results in Table B-1 indicate exterior traffic noise levels at the residences represented by receptor 105 in Area I will be 63 dBA L_{eq}(h) in the construction-year with project and that the change in noise will be 2 dB. Because the predicted construction-year noise level does not approach or exceed the 67 dBA L_{eq}(h) NAC no traffic noise impacts are predicted at to occur.

7.2.20. Area J

Traffic noise impacts are predicted at residences in this area, and noise abatement must be considered. Receptors 106 through 108 represent three residences in Area J. Detailed modeling analysis was conducted for a barrier located at the edge of the shoulder. The barrier evaluated is identified as Barrier NB-6 in Figure 5-2b. Barrier heights in the range of 6 to 16 feet were evaluated in 2-foot increments. Table B-2 in Appendix B summarizes the results of the barrier analysis for each receptor location in Area J. **Table 7-17** summarizes the calculated noise reductions and reasonable allowances for each barrier height.

Table 7-17. Summary of Reasonableness Allowances —Barrier NB-6

Barrier I.D.: NB-6 in Area J						
Design Year Noise Level, dBA L_{eq}(h): 70						
Design Year Noise Level with Project Minus Existing Noise Level: -5						
Design Year with Barrier	**6-Foot Barrier**	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier[1]**	**14-Foot Barrier[2]**	**16-Foot Barrier**
Barrier Noise Reduction, dB	2	2	4	6	7	7
Number of Benefited Receptors	0	0	0	3	3	3
Reasonable Allowance Per Benefited Receptor	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000
Total Reasonable Allowance	$0	$0	$0	$285,000	$285,000	$285,000

1. Minimum height needed to break the line of sight between 11.5-foot truck stack and first row receptor.
2. Minimum height need to achieve 7 dB noise reduction design goal.

Chapter 8. Construction Noise

During construction of the project, noise from construction activities may intermittently dominate the noise environment in the immediate area of construction. Noise associated with construction is controlled by Caltrans Standard Specification Section 14-82, "Noise Control," which states the following:

> Do not exceed 86 dBA L_{max} at 50 feet from the job site activities from 9 p.m. to 6 a.m.
>
> Equip an internal combustion engine with the manufacturer-recommended muffler. Do not operate an internal combustion engine on the job site without the appropriate muffler.

Table 8-1 summarizes noise levels produced by construction equipment that is commonly used on roadway construction projects. Construction equipment is expected to generate noise levels ranging from 67.7 to 94.3 dB at a distance of 50 feet, and noise produced by construction equipment would be reduced over distance at a rate of about 6 dB per doubling of distance.

Table 8-1. Construction Equipment Noise

Equipment	Maximum Noise Level (dBA, L_{eq} at 50 feet)
Auger Drill	77.4
Backhoe	73.6
Compressor (air)	73.7
Concrete Mixer Truck	74.8
Concrete Pump Truck	74.4
Concrete Saw	82.6
Crane	72.6
Dump Truck	72.5
Excavator	76.7
Front End Loader	75.1
Generator	77.6
Gradall	79.4
Grader	81
Impact Pile Driver	94.3
Man Lift	67.7
Mounted Impact Hammer (hoe ram)	83.3
Paver	74.2
Pneumatic Tools	82.2
Roller	73
Scraper	79.6
Tractor	80
Vacuum Street Sweeper	71.6

Source: Federal Highway Administration, 2008.

Construction noise at off-site receptor locations would be dependent on the loudest piece of equipment operating. The majority of the noise sensitive receptors identified for the project and those most affected by construction noise are located south of SR 120 and West of SR 99, or near Frontage Rd. Due to the proximity of these receptors to both SR 99 and SR 120 construction noise is anticipated to be overshadowed by traffic noise.

Construction of Phase 1A is anticipated to last approximately 16 months and would begin October of 2021. Construction of Phases 1B and 1C would last approximately 17 months and would begin March of 2030. The entire construction period is anticipated to take approximately 33 months. Construction activities would be temporary and would mostly occur during normal daytime hours. The City of Manteca’s noise ordinance allows construction activities during the hours of 7:00 a.m. to 7:00 p.m. If construction activities occur outside of these hours coordination, with the City, including potential measures to reduce noise levels, would be required. Some construction activities may require limited work during nighttime hours. A variance or waiver would be required from the City prior to commencement of construction activities during nighttime hours. Impact pile driving would only occur during daytime hours, which would reduce the potential for impacts at sensitive receptors.

No adverse noise impacts from construction are anticipated because construction would be conducted in accordance with Caltrans Standard Specifications Section 14.8-02. If possible, it is advisable to construct approved soundwalls before project construction to reduce construction noise levels at nearby sensitive receptors. Construction noise would be short-term, intermittent, and overshadowed by local traffic noise. Further, implementing the following measure would minimize the temporary noise impacts from construction.

> As directed by Caltrans, the contractor will implement appropriate additional noise mitigation measures, including changing the location of stationary construction equipment, turning off idling equipment, rescheduling construction activity, notifying adjacent residents in advance of construction work, and installing acoustic barriers around stationary construction noise sources.

Chapter 9. References

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Appendix A Traffic Data

This appendix contains tables presenting the traffic data for existing conditions, design-year conditions without the project, and design-year conditions with the project for each alternative. The tables present traffic data as follows.

- Tables A-1: Traffic Data for Existing Conditions
- Table A-2: Traffic Data for Construction Year (2023) No Project Conditions
- Table A-3: Traffic Data for Design Year (2043) No Project Conditions
- Table A-4 Traffic Data for Construction Year (2023) with Project Conditions
- Table A-5 Traffic Data for Design Year (2043) with Project Conditions

Table A-1. Traffic Data for Existing Conditions

	Segment	Number of Lanes	Total Volume p.m. Peak Hour Volume	Auto		Medium Trucks		Heavy Trucks		Speed (A/MT/HT)
				%	Volume	%	Volume	%	Volume	
Mainline										
SR 120 WB	East of Main St.	2	2,615	85%	2,222	4%	105	11%	288	55/55/55
SR 120 EB	East of Main St.	2	2,885	85%	2,453	4%	115	11%	317	40/40/40
SR 120 EB off-ramp to SR 99 SB	SR 120 EB to SR 99 SB	2	2,365	85%	2,010	4%	95	11%	260	25/25/25
SR 120 EB off-ramp to SR 99 NB	SR 120 EB to SR 99 NB	2	520	85%	442	4%	21	11%	57	35/35/25
SR 99 SB off-ramp to SR 120 WB	SR 99 SB to SR 120 WB	1	775	85%	659	4%	31	11%	85	45/45/35
SR 99 NB off-ramp to SR 120 WB	SR 99 NB to SR 120 WB	1	1,840	85%	1,564	4%	74	11%	202	40/40/30
SR 99 SB off-ramp to Moffat Blvd.	SR 99 SB to Moffat Blvd.	1	250	94%	235	2%	5	4%	10	40/40/30
SR 99 NB off-ramp to Austin Rd.	SR 99 NB to Austin Rd.	1	365	94%	343	2%	7	4%	15	40/40/30
SR 99 NB on-ramp from Austin Rd.	Austin Rd. to SR 99 NB	1	115	94%	108	2%	2	4%	5	45/45/45
SR 99 NB	Austin Rd. to SR 120	3	4,290	85%	3,646	4%	172	11%	472	55/55/55
SR 99 SB	SR 120 to Austin Rd.	3	4,760	85%	4,046	4%	190	11%	524	50/50/50
Moffat Blvd. SB	Austin Rd. to SR 99 SB	1	485	94%	456	2%	10	4%	19	40/40/40
Surface Streets										
Moffat Blvd. SB	South of SR 120 to Austin Rd.	2	605	94%	569	2%	12	4%	24	55/55/55
Moffat Blvd. NB	South of SR 120 to Austin Rd.	2	500	94%	470	2%	10	4%	20	55/55/55
Austin Rd. SB 1	Frontage Rd. SR 99 NB on-ramp	1	225	94%	211	2%	5	4%	9	55/55/55
Austin Rd. SB 2	SR 99 NB on-ramp to Moffat Blvd.	1	225	94%	211	2%	5	4%	9	35/35/35
Austin Rd. SB 3	Moffat Blvd. to Palm Ave.	1	225	94%	211	2%	5	4%	9	55/55/55
Austin Rd. NB 1	Palm Avenue to Moffat Blvd.	1	310	94%	292	2%	6	4%	12	55/55/55
Austin Rd. NB 2	Moffat Blvd. to SR 99 NB on-ramp	1	310	94%	292	2%	6	4%	12	35/35/35
Austin Rd. NB 3	SR 99 NB on-ramp to Frontage Rd.	1	310	94%	292	2%	6	4%	12	55/55/55
Frontage Rd.	Olive Ave. to Austin Rd.	1	10	94%	8	2%	1	4%	1	45/45/45

Table A-2. Traffic Data for Construction Year (2023) No-Project Conditions

	Segment	Number of Lanes	Total Volume p.m. Peak Hour Volume	Auto		Medium Trucks		Heavy Trucks		Speed (A/MT/HT)
				%	Volume	%	Volume	%	Volume	
Mainline										
SR 120 WB	East of Main St.	2	3,065	85%	2,605	4%	123	11%	337	50/50/50
SR 120 EB	East of Main St.	2	3,305	85%	2,809	4%	132	11%	364	40/40/40
SR 120 EB off-ramp to SR 99 SB	SR 120 EB to SR 99 SB	2	2,660	85%	2,261	4%	106	11%	293	25/25/25
SR 120 EB off-ramp to SR 99 NB	SR 120 EB to SR 99 NB	2	645	85%	548	4%	26	11%	71	45/45/25
SR 99 SB off-ramp to SR 120 WB	SR 99 SB to SR 120 WB	1	810	85%	689	4%	32	11%	89	40/40/30
SR 99 NB off-ramp to SR 120 WB	SR 99 NB to SR 120 WB	1	2,255	85%	1,917	4%	90	11%	248	35/35/25
SR 99 SB off-ramp to Moffat Blvd.	SR 99 SB to Moffat Blvd.	1	750	94%	705	2%	15	4%	30	35/35/25
SR 99 NB off-ramp to Austin Rd.	SR 99 NB to Austin Rd.	1	615	94%	578	2%	12	4%	25	40/40/30
SR 99 NB on-ramp from Austin Rd.	Austin Rd. to SR 99 NB	1	620	94%	583	2%	12	4%	25	40/40/40
SR 99 NB	Austin Rd. to SR 120	3	5,540	85%	4,709	4%	222	11%	609	50/50/50
SR 99 SB	SR 120 to Austin Rd.	3	7,200	85%	6,120	4%	288	11%	792	45/45/45
Moffat Blvd. SB	Austin Rd. to SR 99 SB	1	745	94%	700	2%	15	4%	30	35/35/35
Surface Streets										
Moffat Blvd. SB	South of SR 120 to Austin Rd.	2	805	94%	757	2%	16	4%	32	55/55/55
Moffat Blvd. NB	South of SR 120 to Austin Rd.	2	830	94%	780	2%	17	4%	33	55/55/55
Austin Rd. SB 1	Frontage Rd. SR 99 NB on-ramp	1	260	94%	245	2%	5	4%	10	55/55/55
Austin Rd. SB 2	SR 99 NB on-ramp to Moffat Blvd.	1	260	94%	245	2%	5	4%	10	35/35/35
Austin Rd. SB 3	Moffat Blvd. to Palm Avenue	1	260	94%	245	2%	5	4%	10	55/55/55
Austin Rd. NB 1	Palm Avenue to Moffat Blvd.	1	490	94%	460	2%	10	4%	20	55/55/55
Austin Rd. NB 2	Moffat Blvd. to SR 99 NB on-ramp	1	490	94%	460	2%	10	4%	20	35/35/35
Austin Rd. NB 3	SR 99 NB on-ramp to Frontage Rd.	1	490	94%	460	2%	10	4%	20	55/55/55
Frontage Rd.	Olive Ave. to Austin Rd.	1	10	94%	8	2%	1	4%	1	45/45/45

Table A-3. Traffic Data for Design Year (2043) No-Project Conditions

	Segment	Number of Lanes	Total Volume p.m. Peak Hour Volume	Auto		Medium Trucks		Heavy Trucks		Speed (A/MT/HT)
				%	Volume	%	Volume	%	Volume	
Mainline										
SR 120 WB	East of Main St.	2	4,485	85%	3,813	4%	179	11%	493	50/50/50
SR 120 EB	East of Main St.	2	4,405	85%	3,744	4%	176	11%	485	40/40/40
SR 120 EB off-ramp to SR 99 SB	SR 120 EB to SR 99 SB	2	3,570	85%	3,034	4%	143	11%	393	25/25/25
SR 120 EB off-ramp to SR 99 NB	SR 120 EB to SR 99 NB	2	853	85%	725	4%	34	11%	94	35/35/25
SR 99 SB off-ramp to SR 120 WB	SR 99 SB to SR 120 WB	1	1,270	85%	1,079	4%	51	11%	140	40/40/30
SR 99 NB off-ramp to SR 120 WB	SR 99 NB to SR 120 WB	1	3,215	85%	2,732	4%	129	11%	354	25/25/25
SR 99 SB off-ramp to Moffat Blvd.	SR 99 SB to Moffat Blvd.	1	1,260	94%	1,185	2%	25	4%	50	25/25/25
SR 99 NB off-ramp to Austin Rd.	SR 99 NB to Austin Rd.	1	1,105	94%	1,039	2%	22	4%	44	25/25/25
SR 99 NB on-ramp from Austin Rd.	Austin Rd. to SR 99 NB	1	1,450	94%	1,363	2%	29	4%	58	25/25/25
SR 99 NB	Austin Rd. to SR 120	3	6,755	85%	5,742	4%	270	11%	743	40/40/40
SR 99 SB	SR 120 to Austin Rd.	3	8,195	85%	6,966	4%	328	11%	901	40/40/40
Moffat Blvd. SB	Austin Rd. to SR 99 SB	1	1,105	94%	1,039	2%	22	4%	44	25/25/25
Surface Streets										
Moffat Blvd. SB	South of SR 120 to Austin Rd.	2	805	94%	757	2%	16	4%	32	55/55/55
Moffat Blvd. NB	South of SR 120 to Austin Rd.	2	1,250	94%	1,175	2%	25	4%	50	55/55/55
Austin Rd. SB 1	Frontage Rd. SR 99 NB on-ramp	1	560	94%	527	2%	11	4%	22	55/55/55
Austin Rd. SB 2	SR 99 NB on-ramp to Moffat Blvd.	1	560	94%	527	2%	11	4%	22	35/35/35
Austin Rd. SB 3	Moffat Blvd. to Palm Avenue	1	560	94%	527	2%	11	4%	22	55/55/55
Austin Rd. NB 1	Palm Avenue to Moffat Blvd.	1	700	94%	658	2%	14	4%	28	55/55/55
Austin Rd. NB 2	Moffat Blvd. to SR 99 NB on-ramp	1	700	94%	658	2%	14	4%	28	35/35/35
Austin Rd. NB 3	SR 99 NB on-ramp to Frontage Rd.	1	700	94%	658	2%	14	4%	28	55/55/55
Frontage Rd.	Olive Ave. to Austin Rd.	1	20	94%	18	2%	1	4%	1	45/45/45

Table A-4. Traffic Data for Construction Year (2023) with Project Conditions

	Segment	Number of Lanes	Total Volume p.m. Peak Hour Volume	Auto		Medium Trucks		Heavy Trucks		Speed (A/MT/HT)
				%	Volume	%	Volume	%	Volume	
Mainline										
SR 120 WB	East of Main St.	2	2,670	85	2,269	4	107	11	294	50/50/50
SR 120 EB	East of Main St.	2	2,815	85	2,392	4	113	11	310	50/50/50
SR 120 WB	East of Main St.	2	3,065	85%	2,605	4%	123	11%	337	40/40/40
SR 120 EB	East of Main St.	2	3,305	85%	2,809	4%	132	11%	364	50/50/50
SR 120 EB off-ramp to SR 99 SB	SR 120 EB to SR 99 SB	1	2,190	85	1,861	4	88	11	241	45/45/35
SR 120 EB off-ramp to SR 99 NB	SR 120 EB to SR 99 NB	1	625	85	531	4	25	11	69	45/45/25
SR 99 SB off-ramp to SR 120 WB	SR 99 SB to SR 120 WB	1	830	85	706	4	33	11	91	40/40/30
SR 99 NB off-ramp to SR 120 WB	SR 99 NB to SR 120 WB	1	1,840	85	1,564	4	74	11	202	40/40/30
SR 99 SB off-ramp to Moffat Blvd.	SR 99 SB to Moffat Blvd.	1	0	-	-	-	-	-	-	-
SR 99 NB off-ramp to Austin Rd.	SR 99 NB to Austin Rd.	1	615	94	578	2	12	4	25	40/40/30
SR 99 NB on-ramp from Austin Rd.	Austin Rd. to SR 99 NB	1	0	-	-	-	-	-	-	-
SR 99 NB 1	Ripon to Austin Rd.	3	5,535	85	4,705	4	221	11	609	50/50/50
SR 99 NB 2	Austin Rd. to SR 99 NB off-ramp to SR 120 WB	3	4,920	85	4,182	4	197	11	541	55/55/55
SR 99 NB 3	Off-ramp to SR 120 WB to SR 120	4	3,705	85	3,149	4	148	11	408	55/55/55
SR 99 SB 1	SR 120 to SR 120 EB to SR 99 SB on-ramp	3	6,450	85	5,482	4	258	11	710	55/55/55
SR 99 SB 2	SR 120 EB to SR 99 SB on-ramp to Austin Rd.	4	6,450	85	5,482	4	258	11	710	50/50/50
SR 99 SB 3	Austin Rd. to Ripon.	3	7,195	85	6,116	4	288	11	791	45/45/45
Moffat Blvd. SB	Austin Rd. to SR 99 SB	1	745	94	700	2	15	4	30	35/35/35
Surface Streets										
Moffat Blvd. NB	South of SR 120 to Austin Rd.	2	760	94	715	2	15	4	30	55/55/55
Moffat Blvd. SB	South of SR 120 to Austin Rd.	2	40	94	38	2	1	4	2	55/55/55
Austin Rd. SB 1	Frontage Rd. SR 99 NB on-ramp	1	440	94	413	2	9	4	18	55/55/55
Austin Rd. SB 2	SR 99 NB on-ramp to Moffat Blvd.	2	440	94	413	2	9	4	18	35/35/35

	Segment	Number of Lanes	Total Volume p.m. Peak Hour Volume	Auto		Medium Trucks		Heavy Trucks		Speed (A/MT/HT)
				%	Volume	%	Volume	%	Volume	
Austin Rd. SB 3	Moffat Blvd. to Palm Ave.	1	440	94	413	2	9	4	18	55/55/55
Austin Rd. NB 1	Palm Ave. to Moffat Blvd.	1	715	94	672	2	14	4	29	55/55/55
Austin Rd. NB 2	Moffat Blvd. to SR 99 NB on-ramp	2	715	94	672	2	14	4	29	35/35/35
Austin Rd. NB 3	SR 99 NB on-ramp to Frontage Rd.	1	715	94	672	2	14	4	29	55/55/55
Frontage Rd.	Olive Ave. to Austin Rd.	1	10	94	8	2	1	4	1	45/45/45
Woodward Ave. NB	Austin Rd. to Atherton Dr.	1	840	94	789	2	17	4	34	35/35/35
Woodward Ave. SB	Atherton Dr. to Austin Rd.	1	550	94	517	2	11	4	22	35/35/35

Table A-5. Traffic Data for Design Year (2043) with Project Conditions

	Segment	Number of Lanes	Total Volume p.m. Peak Hour Volume	Auto		Medium Trucks		Heavy Trucks		Speed (A/MT/HT)
				%	Volume	%	Volume	%	Volume	
Mainline										
SR 120 WB	East of Main St.	3	4,560	85	3,876	4	182	11	502	50/50/50
SR 120 EB	East of Main St.	3	4,600	85	3,910	4	184	11	506	45/45/45
SR 120 EB off-ramp to SR 99 SB	SR 120 EB to SR 99 SB	2	2,830	85	2,406	4	113	11	311	35/35/35
SR 120 EB off-ramp to SR 99 NB	SR 120 EB to SR 99 NB	1	885	85	753	4	35	11	97	35/35/25
SR 120 EB to off-ramp to Moffat Blvd.	SR 120 EB to Off Ramp to Moffat Blvd.	1	885	85	753	4	35	11	97	35/35/35
SR 99 SB off-ramp to SR 120 WB	SR 99 SB to SR 120 WB	1	1,285	85	1,093	4	51	11	141	40/40/30
SR 99 NB off-ramp to SR 120 WB	SR 99 NB to SR 120 WB	1	3,275	85	2,784	4	131	11	360	45/45/35
SR 99 SB to off-ramp to Moffat Boulevard	SR 99 SB to off-ramp to Moffat Boulevard	1	375	85	319	4	15	11	41	45/45/45
Off-ramp to Moffat Blvd.	SR 99 SB to Moffat Blvd.	2	1,260	94	1,185	2	25	4	50	40/40/30
SR 99 NB off-ramp to Austin Road	SR 99 NB to Austin Road	1	1,105	85	939	4	44	11	122	35/35/25
SR 99 NB on-ramp from Austin Rd.	Austin Road to SR 99 NB	1	1,450	85	1,233	4	58	11	160	45/45/35
SR 99 NB 1	Ripon to Austin Road	3	6,410	85	5,449	4	256	11	705	40/40/40
SR 99 NB 2	Austin Road to SR 99 NB off-ramp to SR 120 WB	3	6,755	85	5,742	4	270	11	743	55/55/55
SR 99 NB 3	Off-ramp to SR 120 WB to SR 120	4	4,365	85	3,710	4	175	11	480	50/50/50
SR 99 SB 1	SR 120 to SR 120 EB to SR 99 SB on-ramp	3	5,765	85	4,900	4	231	11	634	50/50/50
SR 99 SB 2	SR 120 EB to SR 99 SB on-ramp to Austin Road	4	8,195	85	6,966	4	328	11	901	55/55/55
SR 99 SB 3	Austin Road to Ripon.	3	8,040	85	6,834	4	322	11	884	40/40/40
Moffat Blvd. SB	Austin Road to SR 99 SB	1	1,105	94	1,039	2	22	4	44	45/45/45
Surface Streets										
Moffat Blvd. NB	South of SR 120 to Austin Road	2	1,105	94	1,039	2	22	4	44	55/55/55
Moffat Blvd. SB	South of SR 120 to Austin Road	2	1,260	94	1,185	2	25	4	50	55/55/55
Moffat Blvd. SB	Austin Road to SR 99 SB	1	560	94	526	2	11	4	22	55/55/55
Austin Rd. SB 1	Frontage Road SR 99 NB on-ramp	1	560	94	526	2	11	4	22	35/35/35

	Segment	Number of Lanes	Total Volume p.m. Peak Hour Volume	Auto		Medium Trucks		Heavy Trucks		Speed (A/MT/HT)
				%	Volume	%	Volume	%	Volume	
Austin Rd. SB 2	SR 99 NB on-ramp to Moffat Boulevard	2	560	94	526	2	11	4	22	55/55/55
Austin Rd. SB 3	Moffat Boulevard to Palm Avenue	1	700	94	658	2	14	4	28	55/55/55
Austin Rd. NB 1	Palm Avenue to Moffat Boulevard	1	700	94	658	2	14	4	28	35/35/35
Austin Rd. NB 2	Moffat Boulevard to SR 99 NB on-ramp	2	700	94	658	2	14	4	28	55/55/55
Austin Rd. NB 3	SR 99 NB on-ramp to Frontage road	1	20	94	18	2	1	4	1	55/55/55
Frontage Rd.	Olive Ave. to Austin Rd.	1	975	94	916	2	20	4	39	45/45/45
Woodward Ave. NB	Austin Rd. to Atherton Dr.	1	820	94	771	2	16	4	33	35/35/35
Woodward Ave. SB	Atherton Dr. to Austin Rd.	1	1,105	94	1,039	2	22	4	44	35/35/35

Appendix B Predicted Future Noise Levels and Noise Barrier Analysis

This appendix contains a table that summarizes the traffic noise modeling results for existing and construction-year conditions with and without the project and design-year conditions with and without the project. These tables also compare the predicted noise reductions by barrier height for each noise barrier analyzed. The construction-year analysis is shown in Table B-1 and the design-year analysis is shown in Table B-2

Table B-1. Predicted Construction Year (2023) Future Noise and Barrier Analysis

Future Worst Hour Noise Levels - L_{eq}(h), dBA

Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)

Receptor I.D.	Area	Barrier I.D.	Land Use	Number of Dwelling Units	Address	Existing Noise Level L_{eq}(h), dBA	Construction Year Noise Level without Project L_{eq}(h), dBA	Construction Year Noise Level with Project L_{eq}(h), dBA	Construction Year Noise Level without Project minus Existing Conditions L_{eq}(h), dBA	Construction Year Noise Level with Project Minus No Project Conditions L_{eq}(h), dBA	Construction Year Noise Level with Projects Mus Existing Conditions L_{eq} (h) dBA	Activity Category (NAC)	Impact Type	6 feet L_{eq}(h)	6 feet I.L.	6 feet NBR	8 feet L_{eq}(h)	8 feet I.L.	8 feet NBR	10 feet L_{eq}(h)	10 feet I.L.	10 feet NBR	12 feet L_{eq}(h)	12 feet I.L.	12 feet NBR	14 feet L_{eq}(h)	14 feet I.L.	14 feet NBR	16 feet L_{eq}(h)	16 feet I.L.	16 feet NBR
1	A	NB-1	Residential	1	711 Industrial Park Dr.	64	64	64	0	0	0	B (67)	None	64	0	0	64	0	0	64	0	0	63	1	0	63	1	0	63	1	0
2	A	NB-1	Residential	1	713 Industrial Park Dr.	66	66	66	0	0	0	B (67)	A/E	65	1	0	65	1	0	65	1	0	64	2	0	63	3	0	63	3	0
3	B	NB-3	Residential	1	1252 Van Ryn Ave.	66	66	66	0	0	0	B (67)	A/E	62	4	0	62	4	0	59[a]	7	1	59	7	1	58	8	1	58	8	1
4	B	NB-3	Residential	1	1255 Van Ryn Ave.	68	68	68	0	0	0	B (67)	A/E	65	3	0	61	7	1	60[a]	8	1	59	9	1	59	9	1	58	10	1
5	C	NB-2	Park	None	801 Atherton Dr.	65	65	66	0	1	1	C (67)	A/E	64	2	0	64	2	0	62	4	0	60	6	1	59	7	1	58	8	1
6	C	NB-2	Park	None	801 Atherton Dr.	65	66	66	1	0	1	C (67)	A/E	65	1	0	65	1	0	61	5	1	60	6	1	59	7	1	58	8	1
7	C	NB-2	Park	None	801 Atherton Dr.	63	63	64	0	1	1	C (67)	None	63	1	0	62	2	0	62	2	0	58	6	1	57	7	1	57	7	1
8	C	NB-2	Park	None	801 Atherton Dr.	61	61	61	0	0	0	C (67)	None	60	1	0	60	1	0	59	2	0	57	4	0	56	5	1	55	6	1
9	C	NB-2	Residential	6	801 Atherton Dr.	72	72	73	0	1	1	B (67)	A/E	71	2	0	70	3	0	70	3	0	70	3	0	69	4	0	66	7	6
10	C	NB-2	Residential	12	801 Atherton Dr.	71	71	71	0	0	0	B (67)	A/E	69	2	0	69	2	0	69	2	0	68	3	0	65	6	12	64	7	12
11	C	NB-2	Residential	6	801 Atherton Dr.	70	70	70	0	0	0	B (67)	A/E	68	2	0	68	2	0	68	2	0	66	4	0	63	7	6	63	7	6
12	C	NB-2	Residential	4	801 Atherton Dr.	67	67	68	0	1	1	B (67)	A/E	64	4	0	64	4	0	63	5	4	61	7	4	59	9	4	59	9	4
13	C	NB-2	Residential	8	801 Atherton Dr.	66	66	67	0	1	1	B (67)	A/E	63	4	0	63	4	0	63	4	0	60	7	8	59	8	8	58	9	8
14	C	NB-2	Residential	4	801 Atherton Dr.	65	66	66	1	0	1	B (67)	A/E	63	3	0	62	4	0	62	4	0	59	7	4	58	8	4	57	9	4
15	C	NB-2	Residential	4	801 Atherton Dr.	64	64	64	0	0	0	C (67)	None	62	2	0	62	2	0	61	3	0	59	5	4	58	6	4	57	7	4
16	C	NB-2	Residential	8	801 Atherton Dr.	63	64	64	1	0	1	B (67)	None	62	2	0	62	2	0	61	3	0	59	5	8	58	6	8	57	7	8
17	C	NB-2	Residential	4	801 Atherton Dr.	63	63	64	0	1	1	B (67)	None	62	2	0	61	3	0	61	3	0	60	4	0	58	6	4	57	7	4
18	C	NB-2	Residential	4	801 Atherton Dr.	63	63	63	0	0	0	B (67)	None	62	1	0	61	2	0	61	2	0	61	2	0	58	5	4	58	5	4

Receptor I.D.	Area	Barrier I.D.	Land Use	Number of Dwelling Units	Address	Existing Noise Level L_{eq}(h), dBA	Future Worst Hour Noise Levels - L_{eq}(h), dBA							Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
							Construction Year Noise Level without Project L_{eq}(h), dBA	Construction Year Noise Level with Project L_{eq}(h), dBA	Construction Year Noise Level without Project minus Existing Conditions L_{eq}(h), dBA	Construction Year Noise Level with Project Minus No Project Conditions L_{eq}(h), dBA	Construction Year Noise Level with Projects Mus Existing Conditions L_{eq} (h) dBA	Activity Category (NAC)	Impact Type	6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
														L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR
19	C	NB-2	Residential	8	801 Atherton Dr.	62	62	63	0	1	1	B (67)	None	61	2	0	61	2	0	61	2	0	61	2	0	58	5	8	58	5	8
20	C	NB-2	Residential	4	801 Atherton Dr.	62	62	62	0	0	0	B (67)	None	61	1	0	61	1	0	61	1	0	60	2	0	58	4	0	58	4	0
21	C	NB-2	Residential	4	801 Atherton Dr.	65	65	66	0	1	1	B (67)	A/E	62	4	0	62	4	0	62	4	0	59	7	4	57	9	4	57	9	4
22	C	NB-2	Residential	8	801 Atherton Dr.	65	65	66	0	1	1	B (67)	A/E	62	4	0	62	4	0	62	4	0	59	7	8	57	9	8	57	9	8
23	C	NB-2	Residential	4	801 Atherton Dr.	65	65	66	0	1	1	B (67)	A/E	62	4	0	62	4	0	62	4	0	58	8	4	57	9	4	56	10	4
24	C	NB-2	Residential	4	801 Atherton Dr.	68	68	69	0	1	1	B (67)	A/E	64	5	4	64	5	4	63	6	4	60	9	4	59	10	4	58	11	4
25	C	NB-2	Residential	8	801 Atherton Dr.	68	68	69	0	1	1	B (67)	A/E	64	5	8	64	5	8	63	6	8	60	9	8	59	10	8	58	11	8
26	C	NB-2	Residential	4	801 Atherton Dr.	68	68	69	0	1	1	B (67)	A/E	64	5	4	64	5	4	64	5	4	60	9	4	59	10	4	58	11	4
27	C	NB-2	Residential	6	801 Atherton Dr.	70	71	71	1	0	1	B (67)	A/E	69	2	0	69	2	0	68	3	0	66	5	6	64	7	6	63	8	6
28	C	NB-2	Residential	12	801 Atherton Dr.	70	71	71	1	0	1	B (67)	A/E	69	2	0	69	2	0	68	3	0	66	5	12	64	7	12	63	8	12
29	C	NB-2	Residential	6	801 Atherton Dr.	70	70	71	0	1	1	B (67)	A/E	69	2	0	68	3	0	67	4	0	66	5	6	63	8	6	62	9	6
30	C	NB-2	Residential	6	801 Atherton Dr.	71	71	71	0	0	0	B (67)	A/E	69	2	0	69	2	0	67	4	0	66	5	6	64	7	6	63	8	6
31	C	NB-2	Residential	12	801 Atherton Dr.	70	70	70	0	0	0	B (67)	A/E	68	2	0	68	2	0	66	4	0	65	5	12	62	8	12	60	10	12
32	C	NB-2	Residential	6	801 Atherton Dr.	69	69	69	0	0	0	B (67)	A/E	67	2	0	65	4	0	64	5	6	64	5	6	61	8	6	59	10	6
33	C	NB-2	Residential	8	801 Atherton Dr.	69	69	70	0	1	1	B (67)	A/E	67	3	0	65	5	8	65	5	8	64	6	8	61	9	8	59	11	8
34	C	NB-2	Residential	4	801 Atherton Dr.	65	65	66	0	1	1	B (67)	A/E	62	4	0	62	4	0	61	5	4	58	8	4	57	9	4	56	10	4
35	C	NB-2	Residential	8	801 Atherton Dr.	65	65	66	0	1	1	B (67)	A/E	62	4	0	62	4	0	61	5	8	58	8	8	57	9	8	56	10	8
36	C	NB-2	Residential	4	801 Atherton Dr.	65	66	66	1	0	1	B (67)	A/E	62	4	0	62	4	0	61	5	4	58	8	4	57	9	4	56	10	4
37	C	NB-2	Residential	6	801 Atherton Dr.	66	66	66	0	0	0	B (67)	A/E	62	4	0	62	4	0	61	5	6	58	8	6	57	9	6	56	10	6
38	C	NB-2	Residential	14	801 Atherton Dr.	71	71	72	0	1	1	B (67)	A/E	70	2	0	69	3	0	67	5	14	66	6	14	63	9	14	60	12	14

Receptor I.D.	Area	Barrier I.D.	Land Use	Number of Dwelling Units	Address	Existing Noise Level L_{eq}(h), dBA	Future Worst Hour Noise Levels - L_{eq}(h), dBA																									
							Construction Year Noise Level without Project L_{eq}(h), dBA	Construction Year Noise Level with Project L_{eq}(h), dBA	Construction Year Noise Level without Project minus Existing Conditions L_{eq}(h), dBA	Construction Year Noise Level with Project Minus No Project Conditions L_{eq}(h), dBA	Construction Year Noise Level with Projects Mus Existing Conditions L_{eq} (h) dBA	Activity Category (NAC)	Impact Type	Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
														6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
														L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR
39	C	NB-2	Residential	3	801 Atherton Dr.	70	70	70	0	0	0	B (67)	A/E	68	2	0	66	4	0	65	5	3	65	5	3	60	10	3	59	11	3
40	C	NB-2	Residential	6	801 Atherton Dr.	66	66	66	0	0	0	B (67)	A/E	62	4	0	62	4	0	61	5	6	58	8	6	57	9	6	56	10	6
41	C	NB-2	Residential	4	801 Atherton Dr.	65	65	66	0	1	1	B (67)	A/E	62	4	0	62	4	0	60	6	4	58	8	4	56	10	4	56	10	4
42	C	NB-2	Residential	8	801 Atherton Dr.	65	65	66	0	1	1	B (67)	A/E	62	4	0	61	5	8	60	6	8	58	8	8	56	10	8	56	10	8
43	C	NB-2	Residential	4	801 Atherton Dr.	65	65	66	0	1	1	B (67)	A/E	62	4	0	62	4	0	60	6	4	58	8	4	56	10	4	56	10	4
44	C	NB-2	Residential	8	801 Atherton Dr.	65	65	66	0	1	1	B (67)	A/E	62	4	0	62	4	0	60	6	8	58	8	8	56	10	8	56	10	8
45	C	NB-2	Residential	4	801 Atherton Dr.	68	68	69	0	1	1	B (67)	A/E	64	5	4	63	6	4	62	7	4	59	10	4	58	11	4	57	12	4
46	C	NB-2	Residential	8	801 Atherton Dr.	67	68	68	1	0	1	B (67)	A/E	64	4	0	63	5	8	62	6	8	59	9	8	58	10	8	57	11	8
47	C	NB-2	Residential	4	801 Atherton Dr.	67	67	68	0	1	1	B (67)	A/E	63	5	4	62	6	4	62	6	4	59	9	4	57	11	4	57	11	4
48	C	NB-2	Residential	6	801 Atherton Dr.	70	70	71	0	1	1	B (67)	A/E	67	4	0	67	4	0	66	5	6	65	6	6	60	11	6	59	12	6
49	C	NB-2	Residential	12	801 Atherton Dr.	70	70	71	0	1	1	B (67)	A/E	68	3	0	67	4	0	66	5	12	65	6	12	60	11	12	59	12	12
50	C	NB-2	Residential	6	801 Atherton Dr.	70	70	71	0	1	1	B (67)	A/E	69	2	0	67	4	0	66	5	6	65	6	6	60	11	6	59	12	6
51	C	NB-2	Residential	8	801 Atherton Dr.	73	74	75	1	1	2	B (67)	A/E	69	6	8	68	7	8	68	7	8	64	11	8	63	12	8	62	13	8
52	C	NB-2	Residential	4	801 Atherton Dr.	72	72	73	0	1	1	B (67)	A/E	68	5	4	67	6	4	67	6	4	64	9	4	62	11	4	62	11	4
53	C	NB-2	Residential	8	801 Atherton Dr.	71	71	72	0	1	1	B (67)	A/E	68	4	0	67	5	8	66	6	8	63	9	8	62	10	8	61	11	8
54	C	NB-2	Residential	4	801 Atherton Dr.	70	70	71	0	1	1	B (67)	A/E	67	4	0	67	4	0	66	5	4	63	8	4	62	9	4	61	10	4
55	D	NB-2	Residential	6	1005 Atherton Dr.	70	70	71	0	1	1	B (67)	A/E	67	4	0	66	5	6	65	6	6	61[a]	10	6	60	11	6	59	12	6
56	D	NB-2	Residential	14	1005 Atherton Dr.	69	69	70	0	1	1	B (67)	A/E	66	4	0	65	5	14	64	6	14	61[a]	9	14	59	11	14	58	12	14
57	D	NB-2	Residential	6	1005 Atherton Dr.	68	68	69	0	1	1	B (67)	A/E	64	5	6	64	5	6	63	6	6	60[a]	9	6	59	10	6	58	11	6
58	D	NB-2	Residential	4	1005 Atherton Dr.	65	66	67	1	1	2	B (67)	A/E	62	5	4	61	6	4	61	6	4	58[a]	9	4	57	10	4	56	11	4

Receptor I.D.	Area	Barrier I.D.	Land Use	Number of Dwelling Units	Address	Existing Noise Level L_{eq}(h), dBA	Construction Year Noise Level without Project L_{eq}(h), dBA	Construction Year Noise Level with Project L_{eq}(h), dBA	Construction Year Noise Level without Project minus Existing Conditions L_{eq}(h), dBA	Construction Year Noise Level with Project Minus No Project Conditions L_{eq}(h), dBA	Construction Year Noise Level with Projects Mus Existing Conditions L_{eq} (h) dBA	Activity Category (NAC)	Impact Type	6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
														L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR
59	D	NB-2	Residential	4	1005 Atherton Dr.	65	65	66	0	1	1	B (67)	A/E	62	4	0	61	5	4	61	5	4	58[a]	8	4	57	9	4	56	10	4
60	D	NB-2	Residential	4	1005 Atherton Dr.	65	65	66	0	1	1	B (67)	A/E	62	4	0	61	5	4	61	5	4	58[a]	8	4	57	9	4	56	10	4
61	D	NB-2	Residential	8	1005 Atherton Dr.	65	65	66	0	1	1	B (67)	A/E	62	4	0	61	5	8	61	5	8	58[a]	8	8	57	9	8	57	9	8
62	D	NB-2	Residential	4	1005 Atherton Dr.	65	65	66	0	1	1	B (67)	A/E	62	4	0	61	5	4	61	5	4	58[a]	8	4	57	9	4	57	9	4
63	D	NB-2	Residential	6	1005 Atherton Dr.	69	69	69	0	0	0	B (67)	A/E	65	4	0	64	5	6	64	5	6	60[a]	9	6	59	10	6	58	11	6
64	D	NB-2	Residential	6	1005 Atherton Dr.	70	70	70	0	0	0	B (67)	A/E	66	4	0	65	5	6	64	6	6	61[a]	9	6	59	11	6	58	12	6
65	D	NB-2	Residential	6	1005 Atherton Dr.	71	71	71	0	0	0	B (67)	A/E	67	4	0	66	5	6	65	6	6	61[a]	10	6	60	11	6	59	12	6
66	D	NB-2	Residential	6	1005 Atherton Dr.	71	71	71	0	0	0	B (67)	A/E	67	4	0	66	5	6	65	6	6	61[a]	10	6	60	11	6	59	12	6
67	D	NB-2	Residential	6	1005 Atherton Dr.	71	71	71	0	0	0	B (67)	A/E	67	4	0	66	5	6	65	6	6	61[a]	10	6	60	11	6	59	12	6
68	D	NB-2	Residential	6	1005 Atherton Dr.	71	71	71	0	0	0	B (67)	A/E	67	4	0	66	5	6	65	6	6	62[a]	9	6	60	11	6	59	12	6
69	D	NB-2	Residential	6	1005 Atherton Dr.	71	71	71	0	0	0	B (67)	A/E	66	5	6	66	5	6	65	6	6	62[a]	9	6	60	11	6	59	12	6
70	D	NB-2	Residential	6	1005 Atherton Dr.	70	70	70	0	0	0	B (67)	A/E	66	4	0	65	5	6	65	5	6	61[a]	9	6	60	10	6	59	11	6
71	D	NB-2	Residential	6	1005 Atherton Dr.	69	69	69	0	0	0	B (67)	A/E	65	4	0	64	5	6	64	5	6	61[a]	8	6	60	9	6	59	10	6
72	D	NB-2	Pool	1	1005 Atherton Dr.	63	64	64	1	0	1	C (67)	None	62	2	0	61	3	0	58	6	1	57[a]	7	1	56	8	1	55	9	1
73	D	NB-2	Residential	4	1005 Atherton Dr.	65	65	66	0	1	1	B (67)	A/E	62	4	0	61	5	4	61	5	4	58[a]	8	4	58	8	4	57	9	4
74	D	NB-2	Residential	4	1005 Atherton Dr.	65	65	66	0	1	1	B (67)	A/E	62	4	0	61	5	4	61	5	4	58[a]	8	4	58	8	4	57	9	4
75	D	NB-2	Residential	4	1005 Atherton Dr.	65	65	66	0	1	1	B (67)	A/E	62	4	0	61	5	4	61	5	4	59[a]	7	4	58	8	4	58	8	4
76	D	NB-2	Residential	8	1005 Atherton Dr.	65	65	66	0	1	1	B (67)	A/E	62	4	0	61	5	8	61	5	8	59[a]	7	8	58	8	8	58	8	8
77	D	NB-2	Residential	4	1005 Atherton Dr.	65	65	66	0	1	1	B (67)	A/E	62	4	0	61	5	4	61	5	4	59[a]	7	4	58	8	4	58	8	4
78	D	NB-2	Playground	1	1005 Atherton Dr.	62	62	63	0	1	1	C (67)	None	60	3	0	60	3	0	60	3	0	57[a]	6	1	57	6	1	56	7	1

Future Worst Hour Noise Levels - L_{eq}(h), dBA; Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)

Receptor I.D.	Area	Barrier I.D.	Land Use	Number of Dwelling Units	Address	Existing Noise Level $L_{eq}(h)$, dBA	Future Worst Hour Noise Levels - $L_{eq}(h)$, dBA																									
							Construction Year Noise Level without Project $L_{eq}(h)$, dBA	Construction Year Noise Level with Project $L_{eq}(h)$, dBA	Construction Year Noise Level without Project minus Existing Conditions $L_{eq}(h)$, dBA	Construction Year Noise Level with Project Minus No Project Conditions $L_{eq}(h)$, dBA	Construction Year Noise Level with Projects Mus Existing Conditions L_{eq} (h) dBA	Activity Category (NAC)	Impact Type	Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
														6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
														$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
79	D	NB-2	Playground	1	1005 Atherton Dr.	61	62	62	1	0	1	C (67)	None	60	2	0	60	2	0	59	3	0	57[a]	5	1	56	6	1	56	6	1
80	D	NB-2	Fitness Center	1	1005 Atherton Dr.	61	62	62	1	0	1	C (67)	None	60	2	0	60	2	0	60	2	0	57[a]	5	1	57	5	1	56	6	1
81	D	NB-2	Residential	6	1005 Atherton Dr.	68	68	69	0	1	1	B (67)	A/E	64	5	6	64	5	6	64	5	6	61[a]	8	6	60	9	6	60	9	6
82	D	NB-2	Residential	14	1005 Atherton Dr.	69	69	70	0	1	1	B (67)	A/E	65	5	14	65	5	14	64	6	14	61[a]	9	14	61	9	14	60	10	14
83	D	NB-2	Residential	6	1005 Atherton Dr.	70	71	71	1	0	1	B (67)	A/E	66	5	6	66	5	6	65	6	6	62[a]	9	6	61	10	6	60	11	6
84	E	NB-2	Residential	8	120 Atherton Dr.	67	67	68	0	1	1	B (67)	A/E	65	3	0	65	3	0	61	7	8	60[a]	8	8	59	9	8	59	9	8
85	E	NB-2	Residential	1	120 Atherton Dr.	66	66	67	0	1	1	B (67)	A/E	63	4	0	62	5	1	62	5	1	59[a]	8	1	59	8	1	58	9	1
86	E	NB-2	Residential	9	120 Atherton Dr.	70	70	71	0	1	1	B (67)	A/E	66	5	9	66	5	9	65	6	9	62[a]	9	9	61	10	9	61	10	9
87	E	NB-2	Residential	9	120 Atherton Dr.	69	69	70	0	1	1	B (67)	A/E	65	5	9	65	5	9	64	6	9	62[a]	8	9	61	9	9	61	9	9
88	E	NB-2	Residential	9	120 Atherton Dr.	68	68	69	0	1	1	B (67)	A/E	64	5	9	64	5	9	63	6	9	61[a]	8	9	61	8	9	60	9	9
89	E	NB-2	Residential	2	120 Atherton Dr.	65	65	66	0	1	1	B (67)	A/E	62	4	0	61	5	2	61	5	2	59[a]	7	2	58	8	2	58	8	2
90	E	NB-2	Residential	18	120 Atherton Dr.	66	66	67	0	1	1	B (67)	A/E	63	4	0	63	4	0	62	5	18	60[a]	7	18	60	7	18	60	7	18
91	E	NB-2	Residential	8	120 Atherton Dr.	70	71	71	1	0	1	B (67)	A/E	67	4	0	67	4	0	66	5	8	64[a]	7	8	63	8	8	63	8	8
92	E	NB-2	Residential	9	120 Atherton Dr.	69	69	70	0	1	1	B (67)	A/E	66	4	0	65	5	9	65	5	9	63[a]	7	9	63	7	9	63	7	9
93	E	NB-2	Residential	9	120 Atherton Dr.	68	68	69	0	1	1	B (67)	A/E	65	4	0	65	4	0	64	5	9	62[a]	7	9	62	7	9	62	7	9
94	E	NB-2	Residential	9	120 Atherton Dr.	68	69	69	1	0	1	B (67)	A/E	66	3	0	65	4	0	65	4	0	64[a]	5	9	63	6	9	63	6	9
95	E	NB-2	Residential	9	120 Atherton Dr.	69	69	69	0	0	0	B (67)	A/E	66	3	0	66	3	0	65	4	0	64[a]	5	9	64	5	9	64	5	9
96	E	NB-2	Residential	9	120 Atherton Dr.	69	69	69	0	0	0	B (67)	A/E	66	3	0	66	3	0	66	3	0	65[a]	4	0	65	4	0	65	4	0
97	E	NB-2	Residential	18	120 Atherton Dr.	66	66	67	0	1	1	B (67)	A/E	63	4	0	63	4	0	63	4	0	61[a]	6	18	61	6	18	61	6	18
98	E	NB-2	Residential	18	120 Atherton Dr.	67	67	67	0	0	0	B (67)	A/E	64	3	0	64	3	0	64	3	0	63[a]	4	0	62	5	18	62	5	18

Receptor I.D.	Area	Barrier I.D.	Land Use	Number of Dwelling Units	Address	Existing Noise Level $L_{eq}(h)$, dBA	Future Worst Hour Noise Levels - $L_{eq}(h)$, dBA																									
							Construction Year Noise Level without Project $L_{eq}(h)$, dBA	Construction Year Noise Level with Project $L_{eq}(h)$, dBA	Construction Year Noise Level without Project minus Existing Conditions $L_{eq}(h)$, dBA	Construction Year Noise Level with Project Minus No Project Conditions $L_{eq}(h)$, dBA	Construction Year Noise Level with Projects Mus Existing Conditions L_{eq} (h) dBA	Activity Category (NAC)	Impact Type	Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
														6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
														$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
99	E	NB-2	Residential	8	120 Atherton Dr.	65	65	66	0	1	1	B (67)	A/E	63	3	0	63	3	0	63	3	0	62[a]	4	0	62	4	0	62	4	0
100	F	NB-4	Playground	None	1505 Moffat Blvd.	62	63	63	1	0	1	C (67)	None	62	1	0	62	1	0	61	2	0	61[a]	2	0	60	3	0	60	3	0
101	F	NB-4	Church	None	1505 Moffat Blvd.	66	66	67	0	1	1	C (67)	A/E	66	1	0	66	1	0	65	2	0	65[a]	2	0	65	2	0	64	3	0
102	G	NB-5	Residential	1	20179 Austin Rd.	64	65	67	1	2	3	B (67)	A/E	66	1	0	66	1	0	66	1	0	65	2	0	65	2	0	65	2	0
103	H	NB-6	Residential	1	20270 99 Frontage Rd.	72	72	73	0	1	1	B (67)	A/E	70	3	0	70	3	0	67	6	1	67	6	1	66	7	1	66[a]	7	1
104	H	NB-6	Residential	1	20405 99 Frontage Rd.	66	66	67	0	1	1	B (67)	A/E	65	2	0	65	2	0	64	3	0	63	4	0	63	4	0	62[a]	5	1
105	I		Residential	1	20700 Austin Rd.	61	62	63	1	1	2	B (67)	None	63	0	0	63	0	0	63	0	0	63	0	0	63	0	0	63	0	0
106	J	NB-7	Residential	1	20782 99 Frontage Rd.	75	75	75	0	0	0	B (67)	A/E	71	4	0	70	5	1	69	6	1	66[a]	9	1	66	9	1	65	10	1
107	J	NB-7	Residential	1	20782 99 Frontage Rd.	75	75	75	0	0	0	B (67)	A/E	70	5	1	70	5	1	69	6	1	65[a]	10	1	64	11	1	63	12	1
108	J	NB-7	Residential	1	20900 99 Frontage Rd.	69	69	69	0	0	0	B (67)	A/E	67	2	0	67	2	0	66	3	0	63[a]	6	1	63	6	1	62	7	1

Note: All NAC are exterior unless note. A/E= Future noise conditions approach or exceed the Noise Abatement Criteria; SI = Substantial Increase

[a] Minimum height needed to break the line of sight between 11.5 foot truck stack and first row receptors.

Table B2. Predicted Design Year (2043) Future Noise and Barrier Analysis

Receptor I.D.	Area	Barrier I.D.	Land Use	Number of Dwelling Units	Address	Existing Noise Level $L_{eq}(h)$, dBA	Future Worst Hour Noise Levels $L_{eq}(h)$, dBA: Design Year Noise Level without Project $L_{eq}(h)$, dBA	Design Year Noise Level with Project $L_{eq}(h)$, dBA	Design Year Noise Level without Project minus Existing Conditions $L_{eq}(h)$, dBA	Design Year Noise Level with Project Minus No Project Conditions $L_{eq}(h)$, dBA	Design Year Noise Level with Project Minus Existing Conditions $L_{eq}(h)$, dBA	Activity Category (NAC)	Impact Type	Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR): 6 feet $L_{eq}(h)$	6 feet I.L.	6 feet NBR	8 feet $L_{eq}(h)$	8 feet I.L.	8 feet NBR	10 feet $L_{eq}(h)$	10 feet I.L.	10 feet NBR	12 feet $L_{eq}(h)$	12 feet I.L.	12 feet NBR	14 feet $L_{eq}(h)$	14 feet I.L.	14 feet NBR	16 feet $L_{eq}(h)$	16 feet I.L.	16 feet NBR
1	A	NB-1	Residential	1	711 Industrial Park Dr.	64	65	67	1	2	3	B (67)	A/E	67	0	0	67	0	0	67	0	0	66	1	0	66	1	0	66	1	0
2	A	NB-1	Residential	1	713 Industrial Park Dr.	66	67	69	1	2	3	B (67)	A/E	68	1	0	67	2	0	67	2	0	66	3	0	66	3	0	66	3	0
3	B	NB-3	Residential	1	1252 Van Ryn Ave.	66	67	68	1	1	2	B (67)	A/E	65	3	0	64	4	0	61[a]	7	1	61	7	1	60	8	1	60	8	1
4	B	NB-3	Residential	1	1255 Van Ryn Ave.	68	69	69	1	0	1	B (67)	A/E	66	3	0	63	6	1	62[a]	7	1	61	8	1	61	8	1	61	8	1
5	C	NB-2	Park	None	801 Atherton Dr.	65	65	66	1	1	1	C (67)	A/E	65	1	0	65	1	0	62	4	0	62	4	0	61	5	1	60	6	1
6	C	NB-2	Park	None	801 Atherton Dr.	65	66	68	1	2	3	C (67)	A/E	66	2	0	66	2	0	62	6	1	62	6	1	61	7	1	60	8	1
7	C	NB-2	Park	None	801 Atherton Dr.	63	64	66	1	2	3	C (67)	A/E	64	2	0	64	2	0	62	4	0	60	6	1	59	7	1	59	7	1
8	C	NB-2	Park	None	801 Atherton Dr.	61	62	63	1	1	2	C (67)	None	62	1	0	62	1	0	61	2	0	59	4	0	58	5	1	57	6	1
9	C	NB-2	Residential	6	801 Atherton Dr.	72	73	74	1	1	2	B (67)	A/E	74	0	0	73	1	0	72	2	0	72	2	0	70	4	0	68	6	6
10	C	NB-2	Residential	12	801 Atherton Dr.	71	72	73	1	1	2	B (67)	A/E	72	1	0	71	2	0	71	2	0	69	4	0	68	5	12	66	7	12
11	C	NB-2	Residential	6	801 Atherton Dr.	70	71	72	1	1	2	B (67)	A/E	70	2	0	70	2	0	68	4	0	67	5	6	66	6	6	65	7	6
12	C	NB-2	Residential	4	801 Atherton Dr.	67	68	69	1	1	2	B (67)	A/E	66	3	0	65	4	0	65	4	0	62	7	4	61	8	4	60	9	4
13	C	NB-2	Residential	8	801 Atherton Dr.	66	67	69	1	2	3	B (67)	A/E	65	4	0	65	4	0	64	5	8	62	7	8	61	8	8	60	9	8
14	C	NB-2	Residential	4	801 Atherton Dr.	65	67	68	2	1	3	B (67)	A/E	65	3	0	64	4	0	64	4	0	61	7	4	60	8	4	60	8	4
15	C	NB-2	Residential	4	801 Atherton Dr.	64	65	67	1	2	3	B (67)	A/E	64	3	0	64	3	0	63	4	0	61	6	4	60	7	4	60	7	4

Receptor I.D.	Area	Barrier I.D.	Land Use	Number of Dwelling Units	Address	Existing Noise Level L_{eq}(h), dBA	Future Worst Hour Noise Levels L_{eq}(h), dBA																									
							Design Year Noise Level without Project L_{eq}(h), dBA	Design Year Noise Level with Project L_{eq}(h), dBA	Design Year Noise Level without Project minus Existing Conditions L_{eq}(h), dBA	Design Year Noise Level with Project Minus No Project Conditions L_{eq}(h), dBA	Design Year Noise Level with Project Minus Existing Conditions L_{eq}(h), dBA	Activity Category (NAC)	Impact Type	Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
														6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
														L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR
16	C	NB-2	Residential	8	801 Atherton Dr.	63	65	67	2	2	4	B (67)	A/E	64	3	0	64	3	0	63	4	0	61	6	8	60	7	8	60	7	8
17	C	NB-2	Residential	4	801 Atherton Dr.	63	64	66	1	2	3	B (67)	A/E	64	2	0	63	3	0	63	3	0	62	4	0	60	6	4	60	6	4
18	C	NB-2	Residential	4	801 Atherton Dr.	63	64	66	1	2	3	B (67)	A/E	64	2	0	64	2	0	63	3	0	63	3	0	61	5	4	61	5	4
19	C	NB-2	Residential	8	801 Atherton Dr.	62	63	66	1	3	4	B (67)	A/E	64	2	0	63	3	0	63	3	0	63	3	0	61	5	8	60	6	8
20	C	NB-2	Residential	4	801 Atherton Dr.	62	63	65	1	2	3	B (67)	None	63	2	0	63	2	0	63	2	0	63	2	0	61	4	0	60	5	4
21	C	NB-2	Residential	4	801 Atherton Dr.	65	66	68	1	2	3	B (67)	A/E	64	4	0	64	4	0	63	5	4	61	7	4	60	8	4	59	9	4
22	C	NB-2	Residential	8	801 Atherton Dr.	65	66	68	1	2	3	B (67)	A/E	64	4	0	64	4	0	63	5	8	61	7	8	60	8	8	59	9	8
23	C	NB-2	Residential	4	801 Atherton Dr.	65	66	68	1	2	3	B (67)	A/E	64	4	0	64	4	0	63	5	4	60	8	4	59	9	4	59	9	4
24	C	NB-2	Residential	4	801 Atherton Dr.	68	69	70	1	1	2	B (67)	A/E	66	4	0	65	5	4	65	5	4	62	8	4	61	9	4	60	10	4
25	C	NB-2	Residential	8	801 Atherton Dr.	68	69	70	1	1	2	B (67)	A/E	66	4	0	65	5	8	65	5	8	62	8	8	61	9	8	60	10	8
26	C	NB-2	Residential	4	801 Atherton Dr.	68	69	70	1	1	2	B (67)	A/E	66	4	0	66	4	0	65	5	4	62	8	4	61	9	4	60	10	4
27	C	NB-2	Residential	6	801 Atherton Dr.	70	72	73	2	1	3	B (67)	A/E	71	2	0	71	2	0	69	4	0	68	5	6	67	6	6	65	8	6
28	C	NB-2	Residential	12	801 Atherton Dr.	70	72	73	2	1	3	B (67)	A/E	71	2	0	71	2	0	69	4	0	68	5	12	66	7	12	65	8	12
29	C	NB-2	Residential	6	801 Atherton Dr.	70	71	73	1	2	3	B (67)	A/E	71	2	0	71	2	0	69	4	0	68	5	6	66	7	6	64	9	6
30	C	NB-2	Residential	6	801 Atherton Dr.	71	72	73	1	1	2	B (67)	A/E	71	2	0	71	2	0	69	4	0	68	5	6	66	7	6	63	10	6
31	C	NB-2	Residential	12	801 Atherton Dr.	70	71	72	1	1	2	B (67)	A/E	70	2	0	68	4	0	67	5	12	67	5	12	65	7	12	62	10	12
32	C	NB-2	Residential	6	801 Atherton Dr.	69	70	71	1	1	2	B (67)	A/E	69	2	0	67	4	0	66	5	6	65	6	6	64	7	6	61	10	6
33	C	NB-2	Residential	8	801 Atherton Dr.	69	70	71	1	1	2	B (67)	A/E	70	1	0	67	4	0	66	5	8	66	5	8	64	7	8	61	10	8
34	C	NB-2	Residential	4	801 Atherton Dr.	65	66	68	1	2	3	B (67)	A/E	64	4	0	64	4	0	63	5	4	60	8	4	59	9	4	59	9	4
35	C	NB-2	Residential	8	801 Atherton Dr.	65	67	68	2	1	3	B (67)	A/E	64	4	0	64	4	0	63	5	8	60	8	8	59	9	8	58	10	8

Receptor I.D.	Area	Barrier I.D.	Land Use	Number of Dwelling Units	Address	Existing Noise Level $L_{eq}(h)$, dBA	Design Year Noise Level without Project $L_{eq}(h)$, dBA	Design Year Noise Level with Project $L_{eq}(h)$, dBA	Design Year Noise Level without Project minus Existing Conditions $L_{eq}(h)$, dBA	Design Year Noise Level with Project Minus No Project Conditions $L_{eq}(h)$, dBA	Design Year Noise Level with Project Minus Existing Conditions $L_{eq}(h)$, dBA	Activity Category (NAC)	Impact Type	Future Worst Hour Noise Levels $L_{eq}(h)$, dBA — Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR) — 6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
														$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
36	C	NB-2	Residential	4	801 Atherton Dr.	65	67	68	2	1	3	B (67)	A/E	64	4	0	64	4	0	63	5	4	60	8	4	59	9	4	58	10	4
37	C	NB-2	Residential	6	801 Atherton Dr.	66	67	68	1	1	2	B (67)	A/E	64	4	0	64	4	0	63	5	6	60	8	6	59	9	6	58	10	6
38	C	NB-2	Residential	14	801 Atherton Dr.	71	72	73	1	1	2	B (67)	A/E	72	1	0	71	2	0	69	4	0	68	5	14	66	7	14	63	10	14
39	C	NB-2	Residential	3	801 Atherton Dr.	70	71	72	1	1	2	B (67)	A/E	70	2	0	68	4	0	67	5	3	66	6	3	62	10	3	61	11	3
40	C	NB-2	Residential	6	801 Atherton Dr.	66	67	68	1	1	2	B (67)	A/E	64	4	0	63	5	6	62	6	6	60	8	6	59	9	6	58	10	6
41	C	NB-2	Residential	4	801 Atherton Dr.	65	67	68	2	1	3	B (67)	A/E	64	4	0	63	5	4	62	6	4	59	9	4	58	10	4	58	10	4
42	C	NB-2	Residential	8	801 Atherton Dr.	65	67	68	2	1	3	B (67)	A/E	64	4	0	63	5	8	62	6	8	59	9	8	58	10	8	58	10	8
43	C	NB-2	Residential	4	801 Atherton Dr.	65	66	68	1	2	3	B (67)	A/E	64	4	0	63	5	4	62	6	4	59	9	4	58	10	4	58	10	4
44	C	NB-2	Residential	8	801 Atherton Dr.	65	66	68	1	2	3	B (67)	A/E	64	4	0	63	5	8	62	6	8	59	9	8	58	10	8	58	10	8
45	C	NB-2	Residential	4	801 Atherton Dr.	68	69	70	1	1	2	B (67)	A/E	65	5	4	64	6	4	63	7	4	60	10	4	60	10	4	59	11	4
46	C	NB-2	Residential	8	801 Atherton Dr.	67	69	70	2	1	3	B (67)	A/E	65	5	8	64	6	8	63	7	8	60	10	8	59	11	8	59	11	8
47	C	NB-2	Residential	4	801 Atherton Dr.	67	68	70	1	2	3	B (67)	A/E	65	5	4	64	6	4	63	7	4	60	10	4	59	11	4	58	12	4
48	C	NB-2	Residential	6	801 Atherton Dr.	70	72	73	2	1	3	B (67)	A/E	70	3	0	69	4	0	67	6	6	67	6	6	62	11	6	61	12	6
49	C	NB-2	Residential	12	801 Atherton Dr.	70	72	72	2	0	2	B (67)	A/E	70	2	0	69	3	0	67	5	12	67	5	12	62	10	12	61	11	12
50	C	NB-2	Residential	6	801 Atherton Dr.	70	72	73	2	1	3	B (67)	A/E	71	2	0	69	4	0	67	6	6	67	6	6	62	11	6	61	12	6
51	C	NB-2	Residential	8	801 Atherton Dr.	73	75	75	2	0	2	B (67)	A/E	69	6	8	66	9	8	65	10	8	64	11	8	63	12	8	63	12	8
52	C	NB-2	Residential	4	801 Atherton Dr.	72	73	74	1	1	2	B (67)	A/E	69	5	4	66	8	4	65	9	4	64	10	4	63	11	4	63	11	4
53	C	NB-2	Residential	8	801 Atherton Dr.	71	72	73	1	1	2	B (67)	A/E	68	5	8	67	6	8	64	9	8	63	10	8	63	10	8	62	11	8
54	C	NB-2	Residential	4	801 Atherton Dr.	70	71	73	1	2	3	B (67)	A/E	67	6	4	67	6	4	64	9	4	63	10	4	62	11	4	62	11	4

Receptor I.D.	Area	Barrier I.D.	Land Use	Number of Dwelling Units	Address	Existing Noise Level L_{eq}(h), dBA	Future Worst Hour Noise Levels L_{eq}(h), dBA																								
							Design Year Noise Level without Project L_{eq}(h), dBA	Design Year Noise Level with Project L_{eq}(h), dBA	Design Year Noise Level without Project minus Existing Conditions L_{eq}(h), dBA	Design Year Noise Level with Project Minus No Project Conditions L_{eq}(h), dBA	Design Year Noise Level with Project Minus Existing Conditions L_{eq}(h), dBA	Activity Category (NAC)	Impact Type	Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
														6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
														L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR
55	D	NB-2	Residential	6	1005 Atherton Dr.	70	71	72	1	1	2	B (67)	A/E	69	3	0	67	5	6	67	5	6	63[a]	9	6	61	11	6	60	12	69
56	D	NB-2	Residential	14	1005 Atherton Dr.	69	71	71	2	0	2	B (67)	A/E	68	3	0	66	5	14	66	5	14	62[a]	9	14	61	10	14	60	11	68
57	D	NB-2	Residential	6	1005 Atherton Dr.	68	69	70	1	1	2	B (67)	A/E	66	4	0	65	5	6	65	5	6	61[a]	9	6	60	10	6	59	11	66
58	D	NB-2	Residential	4	1005 Atherton Dr.	65	67	68	2	1	3	B (67)	A/E	64	4	0	62	6	4	62	6	4	59[a]	9	4	58	10	4	58	10	64
59	D	NB-2	Residential	4	1005 Atherton Dr.	65	66	68	1	2	3	B (67)	A/E	64	4	0	62	6	4	62	6	4	59[a]	9	4	58	10	4	58	10	64
60	D	NB-2	Residential	4	1005 Atherton Dr.	65	66	67	1	1	2	B (67)	A/E	64	3	0	62	5	4	62	5	4	59[a]	8	4	58	9	4	58	9	64
61	D	NB-2	Residential	8	1005 Atherton Dr.	65	66	67	1	1	2	B (67)	A/E	63	4	0	62	5	8	62	5	8	59[a]	8	8	58	9	8	58	9	63
62	D	NB-2	Residential	4	1005 Atherton Dr.	65	66	67	1	1	2	B (67)	A/E	63	4	0	62	5	4	62	5	4	59[a]	8	4	58	9	4	58	9	63
63	D	NB-2	Residential	6	1005 Atherton Dr.	69	70	71	1	1	2	B (67)	A/E	68	3	0	67	4	0	67	4	0	63[a]	8	6	61	10	6	61	10	68
64	D	NB-2	Residential	6	1005 Atherton Dr.	70	71	72	1	1	2	B (67)	A/E	68	4	0	66	6	6	66	6	6	62[a]	10	6	61	11	6	60	12	68
65	D	NB-2	Residential	6	1005 Atherton Dr.	71	72	73	1	1	2	B (67)	A/E	67	6	6	66	7	6	65	8	6	62[a]	11	6	60	13	6	60	13	67
66	D	NB-2	Residential	6	1005 Atherton Dr.	71	72	73	1	1	2	B (67)	A/E	68	5	6	67	6	6	67	6	6	63[a]	10	6	61	12	6	61	12	68
67	D	NB-2	Residential	6	1005 Atherton Dr.	71	72	73	1	1	2	B (67)	A/E	68	5	6	67	6	6	67	6	6	63[a]	10	6	61	12	6	61	12	68
68	D	NB-2	Residential	6	1005 Atherton Dr.	71	72	73	1	1	2	B (67)	A/E	68	5	6	67	6	6	67	6	6	63[a]	10	6	61	12	6	61	12	68

Receptor I.D.	Area	Barrier I.D.	Land Use	Number of Dwelling Units	Address	Existing Noise Level $L_{eq}(h)$, dBA	Design Year Noise Level without Project $L_{eq}(h)$, dBA	Design Year Noise Level with Project $L_{eq}(h)$, dBA	Design Year Noise Level without Project minus Existing Conditions $L_{eq}(h)$, dBA	Design Year Noise Level with Project Minus No Project Conditions $L_{eq}(h)$, dBA	Design Year Noise Level with Project Minus Existing Conditions $L_{eq}(h)$, dBA	Activity Category (NAC)	Impact Type	6 feet $L_{eq}(h)$	6 feet I.L.	6 feet NBR	8 feet $L_{eq}(h)$	8 feet I.L.	8 feet NBR	10 feet $L_{eq}(h)$	10 feet I.L.	10 feet NBR	12 feet $L_{eq}(h)$	12 feet I.L.	12 feet NBR	14 feet $L_{eq}(h)$	14 feet I.L.	14 feet NBR	16 feet $L_{eq}(h)$	16 feet I.L.	16 feet NBR
						Future Worst Hour Noise Levels $L_{eq}(h)$, dBA — Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																									
69	D	NB-2	Residential	6	1005 Atherton Dr.	71	72	73	1	1	2	B (67)	A/E	68	5	6	67	6	6	67	6	6	63[a]	10	6	61	12	6	61	12	68
70	D	NB-2	Residential	6	1005 Atherton Dr.	70	71	72	1	1	2	B (67)	A/E	68	4	0	66	6	6	66	6	6	62[a]	10	6	61	11	6	60	12	68
71	D	NB-2	Residential	6	1005 Atherton Dr.	69	70	71	1	1	2	B (67)	A/E	66	5	6	66	5	6	65	6	6	62[a]	9	6	61	10	6	60	11	66
72	D	NB-2	Pool	1	1005 Atherton Dr.	63	64	66	1	2	3	C (67)	A/E	63	3	0	60	6	1	59	7	1	58[a]	8	1	57	9	1	57	9	63
73	D	NB-2	Residential	4	1005 Atherton Dr.	65	66	67	1	1	2	B (67)	A/E	63	4	0	62	5	4	61	6	4	59[a]	8	4	58	9	4	58	9	63
74	D	NB-2	Residential	4	1005 Atherton Dr.	65	66	67	1	1	2	B (67)	A/E	63	4	0	62	5	4	61	6	4	59[a]	8	4	58	9	4	58	9	63
75	D	NB-2	Residential	4	1005 Atherton Dr.	65	66	67	1	1	2	B (67)	A/E	63	4	0	62	5	4	61	6	4	59[a]	8	4	59	8	4	58	9	63
76	D	NB-2	Residential	8	1005 Atherton Dr.	65	66	67	1	1	2	B (67)	A/E	63	4	0	62	5	8	61	6	8	59[a]	8	8	59	8	8	58	9	63
77	D	NB-2	Residential	4	1005 Atherton Dr.	65	66	67	1	1	2	B (67)	A/E	63	4	0	62	5	4	62	5	4	59[a]	8	4	59	8	4	58	9	63
78	D	NB-2	Playground	1	1005 Atherton Dr.	62	63	64	1	1	2	C (67)	None	61	3	0	61	3	0	59	5	1	58[a]	6	1	57	7	1	57	7	61
79	D	NB-2	Playground	1	1005 Atherton Dr.	61	62	63	1	1	2	C (67)	None	61	2	0	61	2	0	58	5	1	57[a]	6	1	57	6	1	56	7	61
80	D	NB-2	Fitness Center	1	1005 Atherton Dr.	61	63	64	2	1	3	C (67)	None	61	3	0	61	3	0	59	5	1	58[a]	6	1	57	7	1	57	7	61
81	D	NB-2	Residential	6	1005 Atherton Dr.	68	69	70	1	1	2	B (67)	A/E	66	4	0	65	5	6	65	5	6	62[a]	8	6	61	9	6	60	10	66
82	D	NB-2	Residential	14	1005 Atherton Dr.	69	70	71	1	1	2	B (67)	A/E	67	4	0	66	5	14	65	6	14	62[a]	9	14	62	9	14	61	10	67

Receptor I.D.	Area	Barrier I.D.	Land Use	Number of Dwelling Units	Address	Existing Noise Level $L_{eq}(h)$, dBA	Future Worst Hour Noise Levels $L_{eq}(h)$, dBA: Design Year Noise Level without Project $L_{eq}(h)$, dBA	Design Year Noise Level with Project $L_{eq}(h)$, dBA	Design Year Noise Level without Project minus Existing Conditions $L_{eq}(h)$, dBA	Design Year Noise Level with Project Minus No Project Conditions $L_{eq}(h)$, dBA	Design Year Noise Level with Project Minus Existing Conditions $L_{eq}(h)$, dBA	Activity Category (NAC)	Impact Type	Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR): 6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
														$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR	$L_{eq}(h)$	I.L.	NBR
83	D	NB-2	Residential	6	1005 Atherton Dr.	70	72	72	2	0	2	B (67)	A/E	68	4	0	67	5	6	66	6	6	63[a]	9	6	62	10	6	61	11	68
84	E	NB-2	Residential	8	120 Atherton Dr.	67	68	69	1	1	2	B (67)	A/E	66	3	0	63	6	8	62	7	8	61[a]	8	8	60	9	8	60	9	8
85	E	NB-2	Residential	1	120 Atherton Dr.	66	67	67	1	0	1	B (67)	A/E	64	3	0	63	4	0	61	6	1	60[a]	7	1	60	7	1	59	8	1
86	E	NB-2	Residential	9	120 Atherton Dr.	70	71	72	1	1	2	B (67)	A/E	68	4	0	67	5	9	66	6	9	64[a]	8	9	63	9	9	63	9	9
87	E	NB-2	Residential	9	120 Atherton Dr.	69	70	71	1	1	2	B (67)	A/E	67	4	0	66	5	9	65	6	9	63[a]	8	9	63	8	9	62	9	9
88	E	NB-2	Residential	9	120 Atherton Dr.	68	69	70	1	1	2	B (67)	A/E	66	4	0	66	4	0	65	5	9	63[a]	7	9	62	8	9	62	8	9
89	E	NB-2	Residential	2	120 Atherton Dr.	65	66	66	1	0	1	B (67)	A/E	63	3	0	62	4	0	62	4	0	60[a]	6	2	59	7	2	59	7	2
90	E	NB-2	Residential	18	120 Atherton Dr.	66	67	68	1	1	2	B (67)	A/E	64	4	0	64	4	0	64	4	0	62[a]	6	18	61	7	18	61	7	18
91	E	NB-2	Residential	8	120 Atherton Dr.	70	72	72	2	0	2	B (67)	A/E	69	3	0	68	4	0	68	4	0	66[a]	6	8	66	6	8	66	6	8
92	E	NB-2	Residential	9	120 Atherton Dr.	69	70	71	1	1	2	B (67)	A/E	68	3	0	67	4	0	67	4	0	65[a]	6	9	65	6	9	65	6	9
93	E	NB-2	Residential	9	120 Atherton Dr.	68	69	70	1	1	2	B (67)	A/E	67	3	0	66	4	0	66	4	0	64[a]	6	9	64	6	9	64	6	9
94	E	NB-2	Residential	9	120 Atherton Dr.	68	70	70	2	0	2	B (67)	A/E	68	2	0	68	2	0	67	3	0	66[a]	4	0	66	4	0	66	4	0
95	E	NB-2	Residential	9	120 Atherton Dr.	69	70	71	1	1	2	B (67)	A/E	68	3	0	68	3	0	68	3	0	67[a]	4	0	67	4	0	67	4	0
96	E	NB-2	Residential	9	120 Atherton Dr.	69	70	71	1	1	2	B (67)	A/E	69	2	0	69	2	0	68	3	0	68[a]	3	0	68	3	0	68	3	0
97	E	NB-2	Residential	18	120 Atherton Dr.	66	67	68	1	1	2	B (67)	A/E	65	3	0	65	3	0	65	3	0	63[a]	5	18	63	5	18	63	5	18
98	E	NB-2	Residential	18	120 Atherton Dr.	67	68	68	1	0	1	B (67)	A/E	66	2	0	66	2	0	66	2	0	65[a]	3	0	65	3	0	65	3	0
99	E	NB-2	Residential	8	120 Atherton Dr.	65	66	66	1	0	1	B (67)	A/E	65	1	0	65	1	0	64	2	0	64[a]	2	0	64	2	0	64	2	0
100	F	NB-4	Playground	None	1505 Moffat Blvd.	62	63	62	1	-1	0	C (67)	None	62	0	0	62	0	0	61	1	0	61[a]	1	0	61	1	0	61	1	0

Receptor I.D.	Area	Barrier I.D.	Land Use	Number of Dwelling Units	Address	Existing Noise Level L_{eq}(h), dBA	Future Worst Hour Noise Levels L_{eq}(h), dBA																								
							Design Year Noise Level without Project L_{eq}(h), dBA	Design Year Noise Level with Project L_{eq}(h), dBA	Design Year Noise Level without Project minus Existing Conditions L_{eq}(h), dBA	Design Year Noise Level with Project Minus No Project Conditions L_{eq}(h), dBA	Design Year Noise Level with Project Minus Existing Conditions L_{eq}(h), dBA	Activity Category (NAC)	Impact Type	Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receptors (NBR)																	
														6 feet			8 feet			10 feet			12 feet			14 feet			16 feet		
														L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR	L_{eq}(h)	I.L.	NBR
101	F	NB-4	Church	None	1505 Moffat Blvd.	66	66	67	0	1	1	C (67)	A/E	66	1	0	66	1	0	66	1	0	66[a]	1	0	65	2	0	65	2	0
102	G	NB-5	Residential	1	20179 Austin Rd.	64	66	69	2	3	5	B (67)	A/E	66	3	0	66	3	0	66	3	0	65[a]	4	0	65	4	0	65	4	0
103	H	-	Residential	1	20270 99 Frontage Rd.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
104	H	-	Residential	1	20405 99 Frontage Rd.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
105	I	-	Residential	1	20700 Austin Rd.	61	63	63	2	0	2	B (67)	None	63	0	0	63	0	0	63	0	0	63[a]	0	0	63	0	0	63	0	0
106	J	NB-6	Residential	1	20782 99 Frontage Rd.	75	74	70	-1	-4	-5	B (67)	A/E	68	2	0	68	2	0	66	4	0	64[a]	6	1	63	7	1	63	7	1
107	J	NB-6	Residential	1	20782 99 Frontage Rd.	75	74	68	-1	-6	-7	B (67)	A/E	67	1	0	66	2	0	65	3	0	63[a]	5	1	62	6	1	61	7	1
108	J	NB-6	Residential	1	20900 99 Frontage Rd.	69	68	68	-1	0	-1	B (67)	A/E	66	2	0	66	2	0	65	3	0	62[a]	6	1	62	6	1	61	7	1

Note: All NAC are exterior unless note. A/E= Future noise conditions approach or exceed the Noise Abatement Criteria; SI = Substantial Increase; N/A = sensitive receptor has been removed.

[a] Minimum height needed to break the line of sight between 11.5 foot truck stack and first row receptors.

Appendix C Supplemental Data

Noise monitoring data and site photographs are included here.

Short-Term 1

Single-Family Residence (713 Industrial Park Drive)

SR99/SR120_SITE_1

1/16/2018

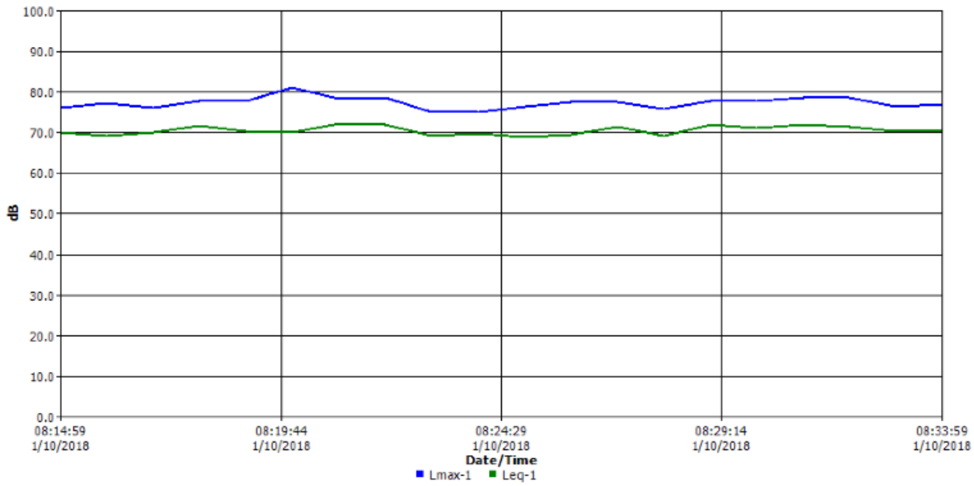
Information Panel

Name	SR99/SR120_SITE_1
Start Time	Wednesday, January 10, 2018 08:13:59
Stop Time	Wednesday, January 10, 2018 08:33:59
Device Model Type	SoundPro DL
Comments	

General Data Panel

Description	Meter	Value	Description	Meter	Value
Leq	1	70.5 dB	Exchange Rate	1	3 dB
Weighting	1	A	Response	1	SLOW
Bandwidth	1	OFF	Exchange Rate	2	3 dB
Weighting	2	A	Response	2	SLOW

Logged Data Chart

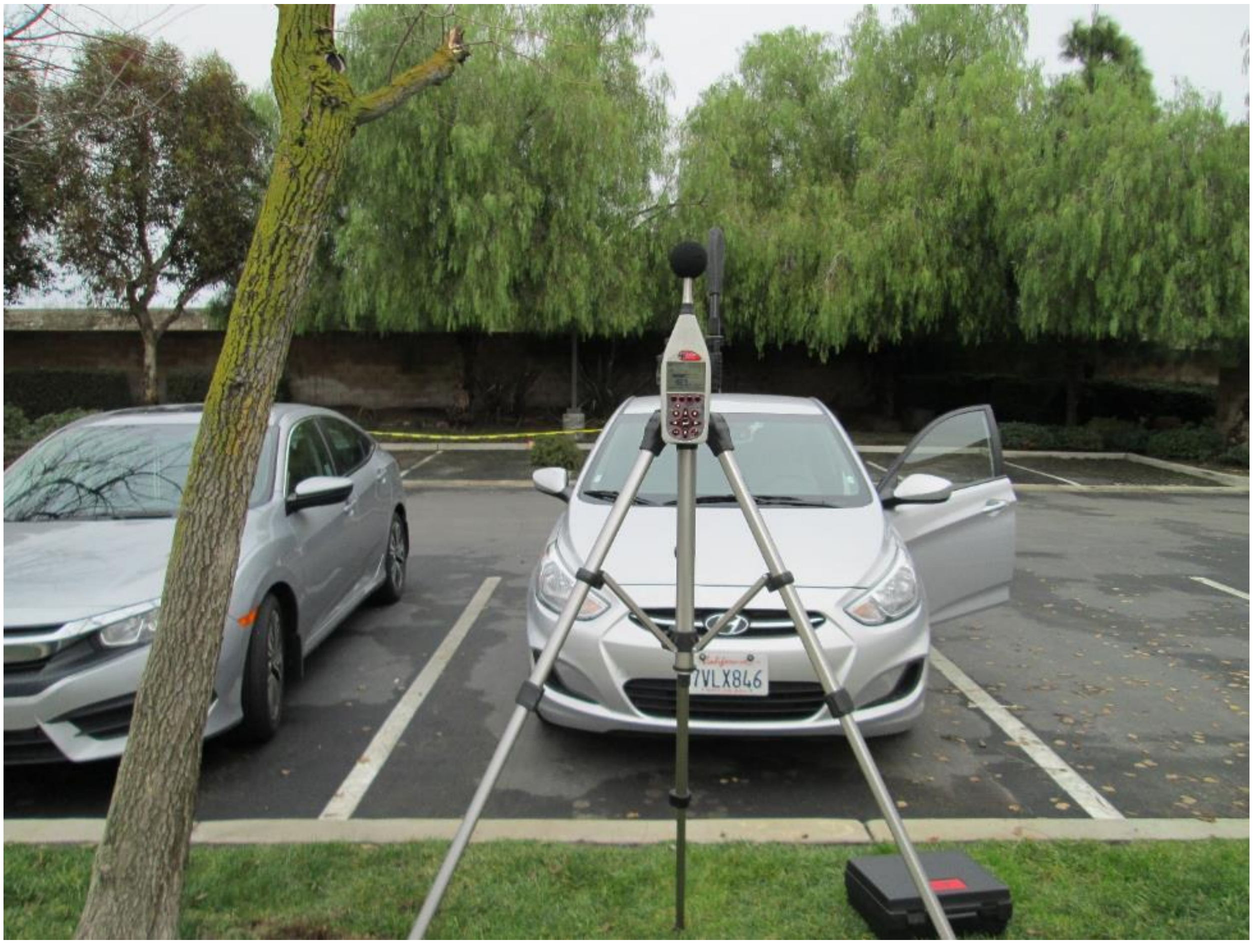


Logged Data Table

Timestamp	Lmax-1	Leq-1
1/10/2018 8:14:59 AM	76.1	70.0
1/10/2018 8:15:59 AM	77.1	69.2
1/10/2018 8:16:59 AM	76.0	69.9
1/10/2018 8:17:59 AM	77.7	71.5
1/10/2018 8:18:59 AM	77.7	70.2
1/10/2018 8:19:59 AM	80.9	70.0
1/10/2018 8:20:59 AM	78.3	72.2
1/10/2018 8:21:59 AM	78.4	71.9
1/10/2018 8:22:59 AM	74.9	69.2
1/10/2018 8:23:59 AM	75.0	69.8
1/10/2018 8:24:59 AM	76.3	68.8
1/10/2018 8:25:59 AM	77.5	69.3
1/10/2018 8:26:59 AM	77.3	71.3
1/10/2018 8:27:59 AM	75.7	69.0
1/10/2018 8:28:59 AM	77.8	71.8
1/10/2018 8:29:59 AM	77.8	71.1
1/10/2018 8:30:59 AM	78.4	72.0
1/10/2018 8:31:59 AM	78.4	71.2
1/10/2018 8:32:59 AM	76.4	70.2
1/10/2018 8:33:59 AM	76.8	70.3

1

Short-Term 2



Paseo Villas Apartments (801 Atherton Drive)

SR99/SR120_SITE_2

1/16/2018

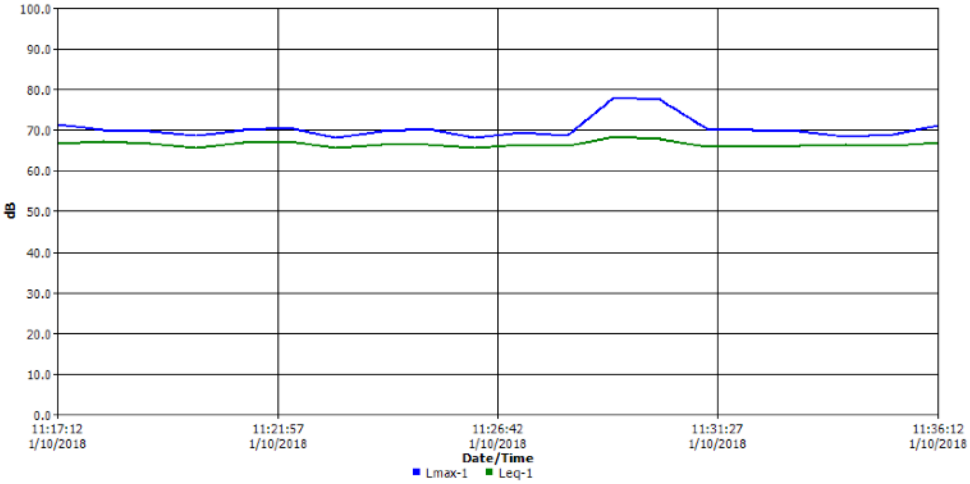
Information Panel

Name	SR99/SR120_SITE_2
Start Time	Wednesday, January 10, 2018 11:16:12
Stop Time	Wednesday, January 10, 2018 11:36:12
Device Model Type	SoundPro DL
Comments	

General Data Panel

Description	Meter	Value	Description	Meter	Value
Leq	1	66.4 dB	Exchange Rate	1	3 dB
Weighting	1	A	Response	1	SLOW
Bandwidth	1	OFF	Exchange Rate	2	3 dB
Weighting	2	A	Response	2	SLOW

Logged Data Chart



Logged Data Table

Timestamp	Lmax-1	Leq-1
1/10/2018 11:17:12 AM	71.3	66.5
1/10/2018 11:18:12 AM	69.9	67.1
1/10/2018 11:19:12 AM	69.7	66.7
1/10/2018 11:20:12 AM	68.5	65.6
1/10/2018 11:21:12 AM	70.0	66.8
1/10/2018 11:22:12 AM	70.6	67.1
1/10/2018 11:23:12 AM	67.9	65.6
1/10/2018 11:24:12 AM	69.8	66.4
1/10/2018 11:25:12 AM	70.2	66.3
1/10/2018 11:26:12 AM	68.0	65.4
1/10/2018 11:27:12 AM	69.3	66.4
1/10/2018 11:28:12 AM	68.6	66.1
1/10/2018 11:29:12 AM	78.1	68.3
1/10/2018 11:30:12 AM	77.3	67.6
1/10/2018 11:31:12 AM	70.3	65.8
1/10/2018 11:32:12 AM	69.9	65.8
1/10/2018 11:33:12 AM	69.8	66.1
1/10/2018 11:34:12 AM	68.2	66.4
1/10/2018 11:35:12 AM	68.9	66.2
1/10/2018 11:36:12 AM	71.0	66.8

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Short-Term 3

Paseo Villas Apartments (801 Atherton Drive) on Van Ryn Avenue

SR99/SR120_SITE_3

1/16/2018

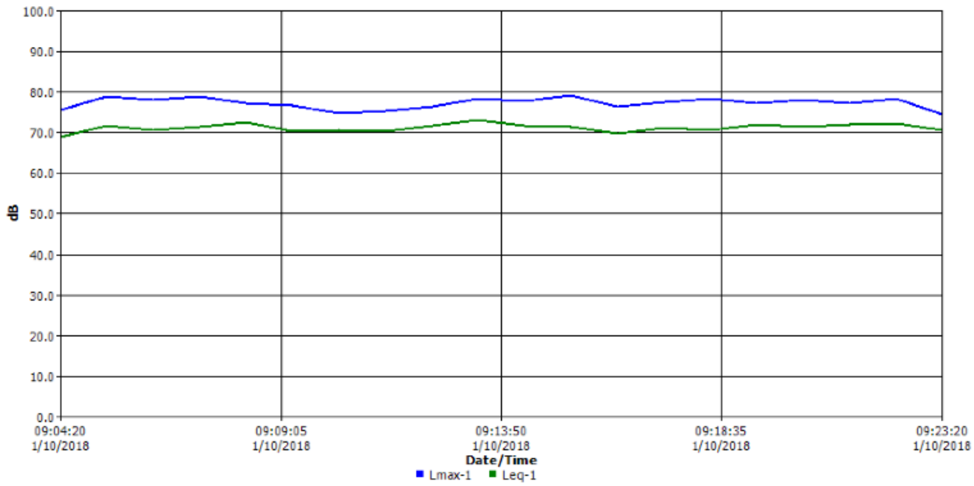
Information Panel

Name	SR99/SR120_SITE_3
Start Time	Wednesday, January 10, 2018 09:03:20
Stop Time	Wednesday, January 10, 2018 09:23:20
Device Model Type	SoundPro DL
Comments	

General Data Panel

Description	Meter	Value	Description	Meter	Value
Leq	1	71.1 dB	Exchange Rate	1	3 dB
Weighting	1	A	Response	1	SLOW
Bandwidth	1	OFF	Exchange Rate	2	3 dB
Weighting	2	A	Response	2	SLOW

Logged Data Chart



Logged Data Table

Timestamp	Lmax-1	Leq-1
1/10/2018 9:04:20 AM	75.5	68.8
1/10/2018 9:05:20 AM	78.8	71.5
1/10/2018 9:06:20 AM	78.0	70.4
1/10/2018 9:07:20 AM	78.9	71.4
1/10/2018 9:08:20 AM	77.2	72.4
1/10/2018 9:09:20 AM	76.5	70.1
1/10/2018 9:10:20 AM	74.7	70.5
1/10/2018 9:11:20 AM	75.3	70.2
1/10/2018 9:12:20 AM	76.4	71.6
1/10/2018 9:13:20 AM	78.2	72.9
1/10/2018 9:14:20 AM	77.6	71.7
1/10/2018 9:15:20 AM	79.0	71.4
1/10/2018 9:16:20 AM	76.2	69.8
1/10/2018 9:17:20 AM	77.5	71.1
1/10/2018 9:18:20 AM	78.3	70.6
1/10/2018 9:19:20 AM	77.2	71.9
1/10/2018 9:20:20 AM	78.1	71.2
1/10/2018 9:21:20 AM	77.2	71.9
1/10/2018 9:22:20 AM	78.2	72.2
1/10/2018 9:23:20 AM	74.3	70.5

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Short-Term 4

Crossroads Grace Community Church (1505 Moffat Boulevard)

SR99/SR120_SITE_4

1/16/2018

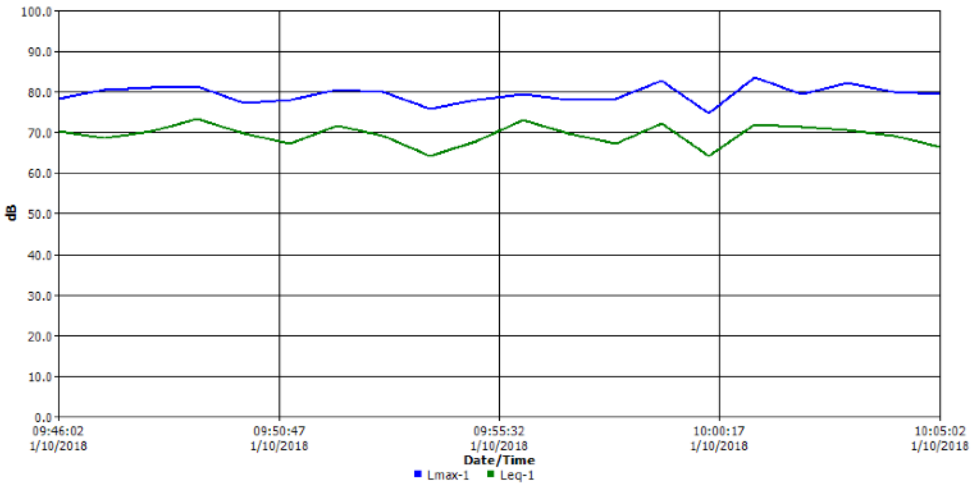
Information Panel

Name	SR99/SR120_SITE_4
Start Time	Wednesday, January 10, 2018 09:45:02
Stop Time	Wednesday, January 10, 2018 10:05:02
Device Model Type	SoundPro DL
Comments	

General Data Panel

Description	Meter	Value	Description	Meter	Value
Leq	1	69.9 dB	Exchange Rate	1	3 dB
Weighting	1	A	Response	1	SLOW
Bandwidth	1	OFF	Exchange Rate	2	3 dB
Weighting	2	A	Response	2	SLOW

Logged Data Chart



Logged Data Table

Timestamp	Lmax-1	Leq-1
1/10/2018 9:46:02 AM	78.3	70.1
1/10/2018 9:47:02 AM	80.5	68.6
1/10/2018 9:48:02 AM	81.0	70.1
1/10/2018 9:49:02 AM	81.2	73.3
1/10/2018 9:50:02 AM	77.2	69.8
1/10/2018 9:51:02 AM	77.9	67.2
1/10/2018 9:52:02 AM	80.4	71.5
1/10/2018 9:53:02 AM	79.9	69.1
1/10/2018 9:54:02 AM	75.8	64.2
1/10/2018 9:55:02 AM	78.0	67.8
1/10/2018 9:56:02 AM	79.3	72.9
1/10/2018 9:57:02 AM	77.9	69.6
1/10/2018 9:58:02 AM	78.3	67.1
1/10/2018 9:59:02 AM	82.7	72.1
1/10/2018 10:00:02 AM	74.7	64.2
1/10/2018 10:01:02 AM	83.4	71.9
1/10/2018 10:02:02 AM	79.3	71.2
1/10/2018 10:03:02 AM	82.1	70.6
1/10/2018 10:04:02 AM	79.9	69.1
1/10/2018 10:05:02 AM	79.4	66.3

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Short-Term 5

Single-Family Residence (20179 Austin Road)

SR99/SR120_SITE_5

1/16/2018

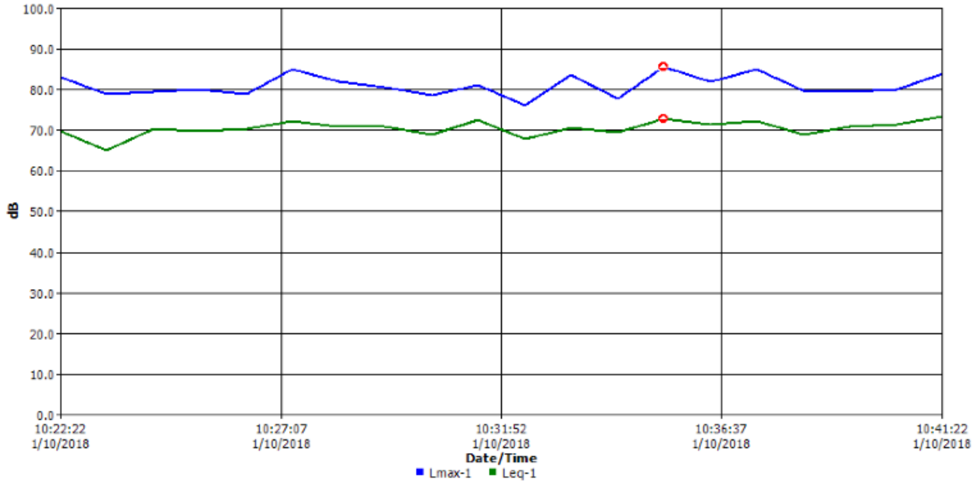
Information Panel

Name	SR99/SR120_SITE_5
Start Time	Wednesday, January 10, 2018 10:21:22
Stop Time	Wednesday, January 10, 2018 10:41:22
Device Model Type	SoundPro DL
Comments	

General Data Panel

Description	Meter	Value	Description	Meter	Value
Leq	1	70.7 dB	Exchange Rate	1	3 dB
Weighting	1	A	Response	1	SLOW
Bandwidth	1	OFF	Exchange Rate	2	3 dB
Weighting	2	A	Response	2	SLOW

Logged Data Chart



Logged Data Table

Timestamp	Lmax-1	Leq-1
1/10/2018 10:22:22 AM	82.9	69.7
1/10/2018 10:23:22 AM	78.9	64.9
1/10/2018 10:24:22 AM	79.5	70.3
1/10/2018 10:25:22 AM	79.8	69.8
1/10/2018 10:26:22 AM	78.8	70.2
1/10/2018 10:27:22 AM	84.8	72.1
1/10/2018 10:28:22 AM	81.9	70.9
1/10/2018 10:29:22 AM	80.4	70.8
1/10/2018 10:30:22 AM	78.6	68.9
1/10/2018 10:31:22 AM	80.9	72.4
1/10/2018 10:32:22 AM	76.0	67.6
1/10/2018 10:33:22 AM	83.5	70.5
1/10/2018 10:34:22 AM	77.7	69.5
1/10/2018 10:35:22 AM	85.4	72.8
1/10/2018 10:36:22 AM	81.9	71.2
1/10/2018 10:37:22 AM	85.0	72.2
1/10/2018 10:38:22 AM	79.6	68.9
1/10/2018 10:39:22 AM	79.5	70.8
1/10/2018 10:40:22 AM	79.9	71.2
1/10/2018 10:41:22 AM	83.9	73.2

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Long Term 1

Juniper Apartments (1201 Atherton Drive)

SR99/SR120_LT1

1/16/2018

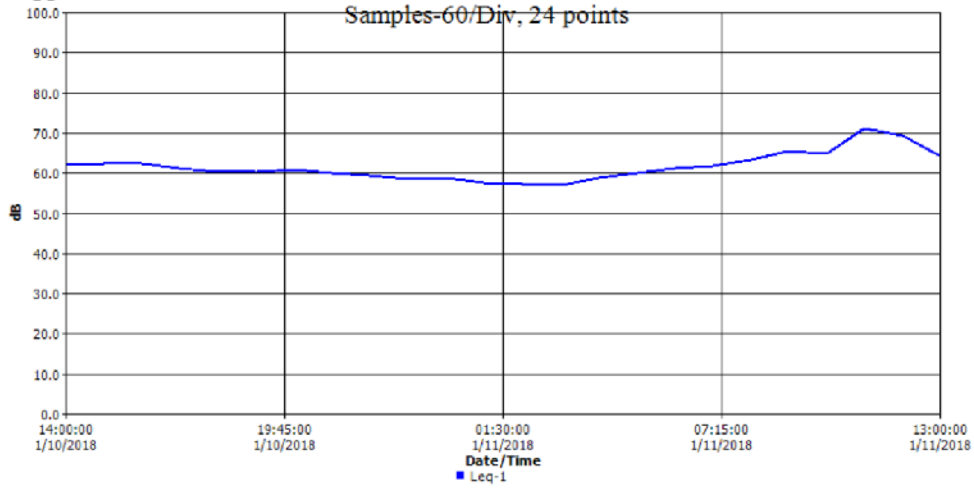
Information Panel

Name	SR99/SR120_LT_1
Start Time	Wednesday, January 10, 2018 13:00:00
Stop Time	Thursday, January 11, 2018 13:00:00
Device Model Type	SoundPro DL
Comments	

General Data Panel

Description	Meter	Value	Description	Meter	Value
Leq	1	63.2 dB	Exchange Rate	1	3 dB
Weighting	1	A	Response	1	SLOW
Bandwidth	1	OFF	Exchange Rate	2	3 dB
Weighting	2	A	Response	2	SLOW

Logged Data Chart



Logged Data Table

Timestamp	Leq-1
1/10/2018 2:00:00 PM	61.9
1/10/2018 3:00:00 PM	62.2
1/10/2018 4:00:00 PM	62.2
1/10/2018 5:00:00 PM	61.1
1/10/2018 6:00:00 PM	60.2
1/10/2018 7:00:00 PM	60.1
1/10/2018 8:00:00 PM	60.9
1/10/2018 9:00:00 PM	60.0
1/10/2018 10:00:00 PM	59.2
1/10/2018 11:00:00 PM	58.3
1/11/2018 12:00:00 AM	58.7
1/11/2018 1:00:00 AM	57.6
1/11/2018 2:00:00 AM	57.3
1/11/2018 3:00:00 AM	57.0
1/11/2018 4:00:00 AM	58.6
1/11/2018 5:00:00 AM	59.9
1/11/2018 6:00:00 AM	61.2
1/11/2018 7:00:00 AM	61.6
1/11/2018 8:00:00 AM	63.2
1/11/2018 9:00:00 AM	65.2
1/11/2018 10:00:00 AM	64.7

Logged Data Table (cont'd)

Timestamp	Leq-1
1/11/2018 11:00:00 AM	71.1
1/11/2018 12:00:00 PM	69.3
1/11/2018 1:00:00 PM	64.1