Appendix R. Noise Study Report (NSR)

Noise Study Report

State Route 1 (Lincoln Boulevard)
Multi-Modal Improvement Project

Los Angeles County

District 7 – LA – Los Angeles County

EA 33880 / Project ID 0717000061

October 2021

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EA 33880 / Project ID 0717000061

October 2021

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Summary

The City of Los Angeles (City), in cooperation with Caltrans District 7, proposes to improve circulation and safety along Lincoln Boulevard by constructing an additional southbound lane, installing sidewalks and bicycle lanes, and making other related improvements along an approximate 0.61-mile segment of Lincoln Boulevard between Jefferson Boulevard (PM 30.15) and just south of Fiji Way (PM 30.74). The project occurs in the City of Los Angeles and is bordered immediately to the north and northwest by unincorporated Los Angeles County.

The project's Build Alternative includes: realignment of Lincoln Boulevard to the east; addition of one southbound lane along Lincoln Boulevard for a length of approximately 1,800 feet; demolition, replacement, and widening of the Lincoln Boulevard Bridge over Ballona Creek; demolition, replacement, and widening of the Culver Boulevard overcrossing; demolition, replacement, and realignment of the on- and off-ramps between Lincoln Boulevard and Culver Boulevard; construction of sidewalks and bicycle lanes on both sides of Lincoln Boulevard; and installation of landscaping, street lighting, and signage. The project would also install a center median with space to accommodate a future center-running transit facility within the project limits.

Existing Environment

The project study area is located in the City of Los Angeles where the terrain is generally flat relative to the local roadways. The project area was reviewed to identify land uses that would be subject to traffic and construction noise impacts from the proposed project. Aerial and digital mapping provided by the project Engineer, street views in Google Maps and field photographs of the project area were used to identify noise sensitive land uses. Sensitive receivers were identified in those areas where outdoor frequent human use would occur, such as multi-family residences and parks and recreation facilities. These sensitive receivers fall into FHWA and Caltrans NAC Activity Categories B and C, each with an activity level of 67 dBA $L_{eq\ (h).}$ Land uses near Lincoln Boulevard consist of multi-family residences and a park.

Short-term noise monitoring was conducted at six (6) locations in the area on March 14 and 15, 2018. Measurements were taken for a duration of 20 minutes. Meteorological conditions (temperature, wind speed and direction, relative humidity) were logged for each measurement session on field data forms, provided in Appendix C. Manual vehicle classification counts were conducted for adjacent roadways at each measurement location for subsequent use in validating the noise prediction model. Long-term noise monitoring was conducted at one location to establish the existing noise environment. Noise measurements were conducted using a Larson-Davis Model824 Type 1 sound level meter. Noise measurement locations are shown in Figure 4.

Existing noise levels in the proposed project area range from 43 to 70 dBA L_{eq} (Table B-1,

Appendix B). Existing traffic noise levels were found to exceed the applicable NAC at representative residential receiver locations as shown in Table B-1, Appendix B.

Future Traffic Noise Impacts

Under the 2045 No-Build Alternative no improvements would be constructed. The traffic noise modeling results for the design-year 2045 No-Build Alternative range from 43 to 70 dBA L_{eq}, as shown in Table B-1 of Appendix B. Noise levels for design-year 2045 No-Build conditions are expected to increase up to 1 dB over existing noise levels. This increase is due to an increase in traffic volumes from Existing to future 2045 No-Build conditions. Noise levels at evaluated receivers under 2045 No-Build conditions exceed their respective NAC Activity Category standard.

Build Alternative - The 2045 design-year traffic noise modeling results for the Build Alternative range from 44 to 72 dBA L_{eq} as shown in Table B-1 of Appendix B. Noise levels for the design-year under the Build Alternative are expected to increase up to 2 dB over design-year 2045 No-Build noise levels. Noise levels exceed their respective NAC Activity Category standard. The proposed project will cause a noise impact to the surrounding area; therefore, a noise abatement evaluation is required.

Balconies of the multi-family residential units are the outdoor frequent human use areas located along Lincoln Boulevard near Ballona Creek represented by Receivers R1-g, R1-u, R2-g, R2-u, R3-g and R3-u. No existing wall currently shields these receivers from noise generated from Lincoln Boulevard. However, existing noise levels at some of the outdoor frequent human use areas at this location currently exceed the NAC and would continue to exceed under the No Build condition. The Build Alternative would slightly increase noise levels compared to No Build conditions and would continue to exceed the NAC; therefore, a noise abatement evaluation was required.

Barrier NB-1 was evaluated along the right of way (ROW) line of Lincoln Boulevard. This is the closest location for barrier placement. Barrier NB-1 was found to be effective in achieving a minimum 5-dB reduction at a wall height of 10 feet for Receiver R1-g. The Caltrans design goal of 7-dB was achieved at a height of 14 feet for Receiver R1-g. Receivers R1-u and R2-u meet the Caltrans minimum 5-dB reduction at a wall height of 14 feet. Only Receiver R1-u was able to achieve the Caltrans design foal of 7-dB at a height of 16 feet.

Construction Noise Impacts

No adverse noise impacts from construction are anticipated because construction would be conducted in accordance with the Caltrans' Standard Specifications 14-8.02, "Noise Control" and SSP 14-8.02. Construction noise would be short-term, intermittent and overshadowed by traffic noise within the project area.

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List of Abbreviated Terms

AASHTO	American Association of State Highway and Transportation Officials
Caltrans	California Department of Trasnportation
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
County	Los Angeles County
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_n	Percentile-Exceeded Sound Level
µPa	Mcro-Pascals
Mph	Miles Per Hour
NAC	Noise Abatement Criteria
NEPA	National Environmental Policy Act
Protocol	Caltrans Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects
SPL	Sound Pressure Level
TeNS	Caltrans' Technical Noise Supplement
TNM 2.5	FHWA Traffic Noise Model Version 2.5

Chapter 1. Introduction

1.1 Purpose of the Noise Study Report

The purpose of this Noise Study Report 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." Title 23, Part 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 Federal Highway Administration (FHWA) noise standards.

The California Department of Transportation (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. Noise impacts associated with this project under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) will be evaluated in the Environmental Impact Report/Environmental Assessment for State Route 1 (Lincoln Boulevard) Multimodal Improvement Project.

1.2 Project Description

Caltrans, in cooperation with the City of Los Angeles, proposes to improve circulation and safety along Lincoln Boulevard by constructing an additional southbound lane, installing sidewalks and bicycle lanes, and making other related improvements along an approximate 0.61-mile segment of Lincoln Boulevard between Jefferson Boulevard (PM 30.15) and just south of Fiji Way (PM 30.74). The project occurs in the City of Los Angeles and is bordered immediately to the north and northwest by unincorporated Los Angeles County.

The Project's build alternative includes: realignment of the Lincoln Boulevard centerline approximately 50 feet to the east; addition of one southbound lane along Lincoln Boulevard for a length of approximately 1,800 feet; demolition, replacement, and widening of the Lincoln Boulevard Bridge over Ballona Creek; demolition, replacement, and widening of the Culver Boulevard Bridge over Lincoln Boulevard; demolition, replacement, and realignment of the connector ramps between Lincoln Boulevard and Culver Boulevard; construction of active transportation improvements including sidewalks and Class IV protected bicycle lanes on both sides of Lincoln Boulevard. The Project would also include utility relocation, landscaping, low-intensity street lighting, striping, signage, drainage, and water quality improvements. The Project would install a striped center median that would allow space to accommodate a future center-running transit facility within the Project limits, which is not included as part of the Project. Construction of the Project build alternative would result in three through lanes in the northbound and southbound directions of Lincoln Boulevard between Fiji Way and Jefferson Boulevard, with additional turning lanes at intersections.

Construction of proposed project is anticipated to begin in Spring/summer 2023. The construction of the proposed project will consist of the following stages: Demolition and Replacement of CulverBlvd, Construction of North half of Ballona Creek Bridge, Construction of Loop Ramp and Construction of South half of Ballona Creek Bridge. Final completion of construction is expected by Fall 2025.

1.2.1. Purpose

The purpose of this project is to create a new multi-modal corridor along SR-1/ Lincoln Boulevard between Fiji way and Jefferson Boulevard to improve traffic operations and to serve transit, bicyclists and pedestrians while minimizing impacts to Ballona Wetlands Reserve, Ballona Creek, and other environmental resources.

1.2.2. Need

Lincoln Boulevard serves as a critical north-south connection on the Westside. There are few arterial connections that provide continuous access through the Westside, which results in Lincoln Boulevard being oversaturated during peak commute periods. Lincoln Boulevard narrows from three to two lanes in the southbound direction, approximately 1,050 feet north of the existing Lincoln Bridge over Ballona Creek, and from four to three lanes in the northbound direction, approximately 320 feet north of the intersection with Jefferson Blvd, to the intersection with Fiji Way. These lane reductions create a major bottleneck.

The average vehicle travel speeds along Lincoln Boulevard are 15 mph during peak periods when measured between Ozone Ave in the City of Santa Monica and Sepulveda Boulevard while the design speed is 50 mph. Travel times are greatly impacted by bottlenecks resulting in slower speeds along much of the corridor.

In addition, access for pedestrians along Lincoln Boulevard is disjointed north and south of the Ballona Creek bridge which does not have sidewalks. Lincoln Boulevard also lacks bicycle facilities across the bridge. Pedestrian and bicycle facilities are also deficient along Culver Boulevard.

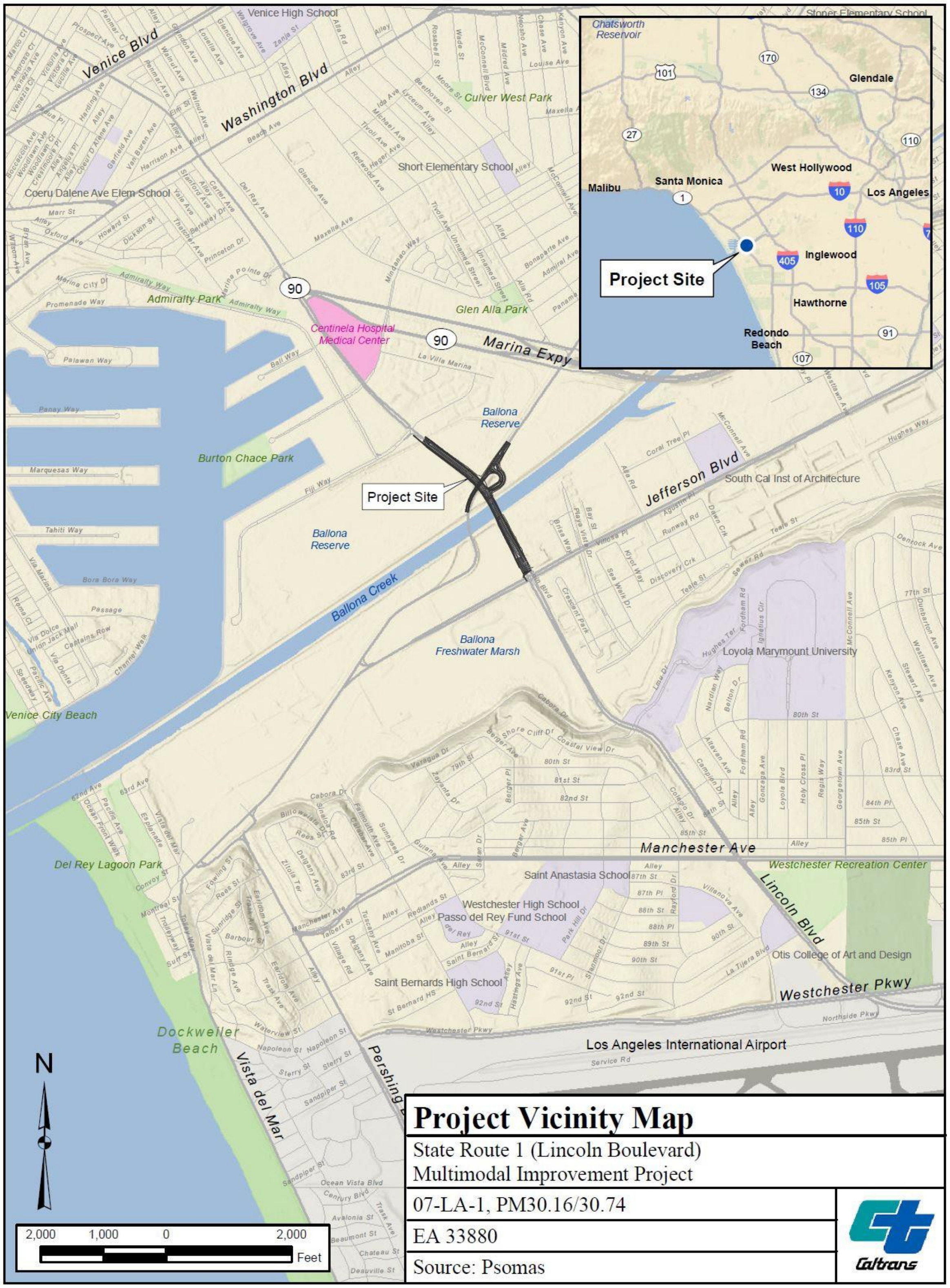
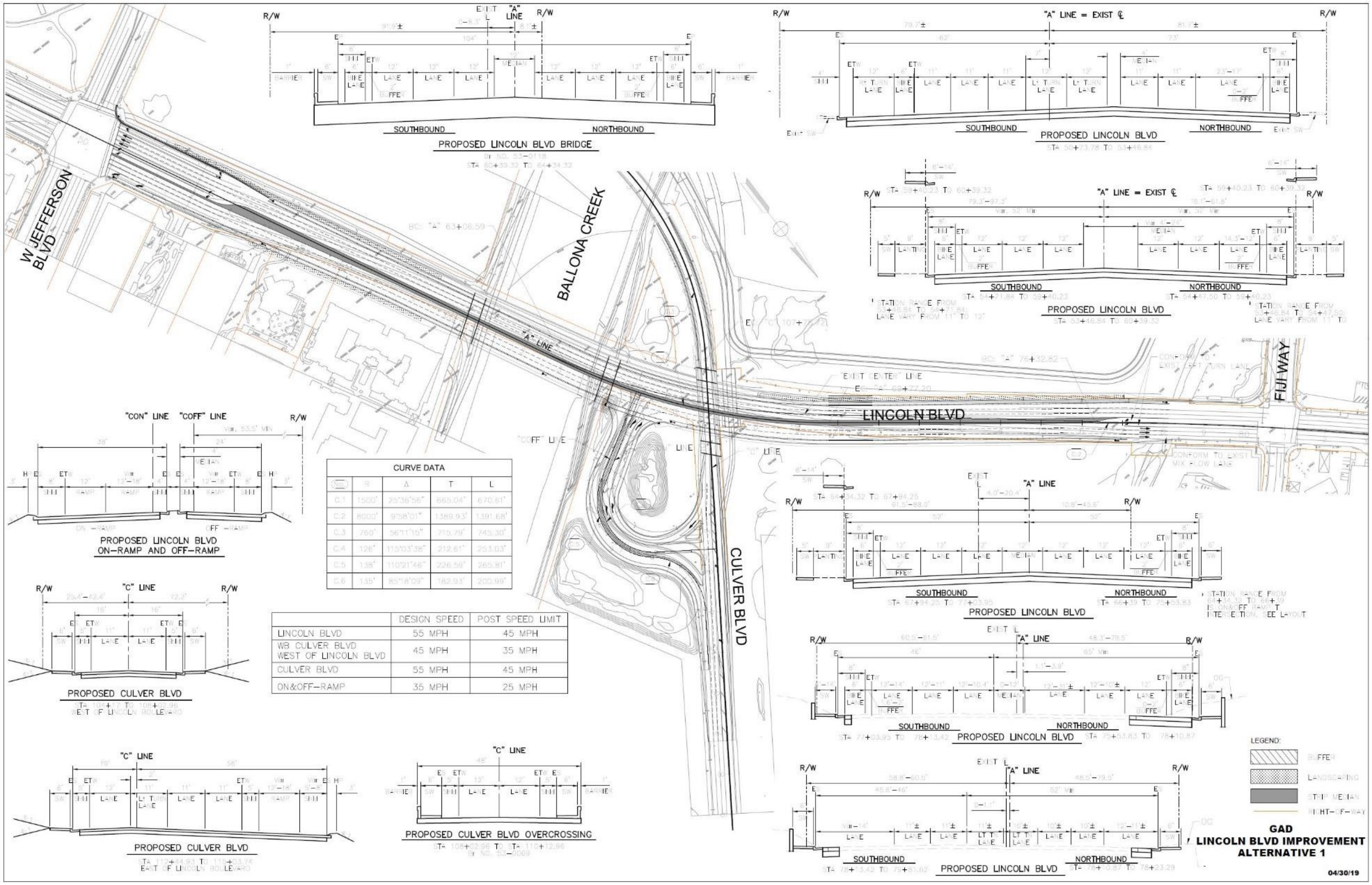


Figure 1. Regional Map

Figure 2. Project Location



CURVE DATA				
No.	R	Δ	T	L
C.1	1500'	25°36'56"	665.04'	670.61'
C.2	8000'	9°58'01"	1389.93'	1391.68'
C.3	760'	56°11'15"	715.79'	745.30'
C.4	126'	115°03'38"	212.61'	253.03'
C.5	138'	110°21'46"	226.59'	265.81'
C.6	135'	85°18'09"	182.93'	200.99'

	DESIGN SPEED	POST SPEED LIMIT
LINCOLN BLVD	55 MPH	45 MPH
WB CULVER BLVD WEST OF LINCOLN BLVD	45 MPH	35 MPH
CULVER BLVD	55 MPH	45 MPH
ON&OFF-RAMP	35 MPH	25 MPH

Figure 3. Project Footprint

Chapter 2. 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 Web site [http://www.dot.ca.gov/hq/env/noise/pub/tens_complete.pdf].

2.1 Sound, Noise, and Acoustics

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

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

2.2 Frequency

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

2.3 Sound Pressure Levels and Decibels

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

2.4 Addition of Decibels

Because decibels are logarithmic units, SPL cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be approximately 3 dB higher than one source under the same conditions (10log[2]). 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 approximately 73 dB. Under the decibel scale, three sources of equal loudness together produce a sound level approximately 5 dB louder than one source (10log[3]).

2.5 A-Weighted Decibels

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

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

The A-weighting network approximates the frequency response of average human hearing when listening to most ordinary sounds. When we make judgments regarding the relative loudness or annoyance of a given sound, these judgments generally correlate well with A-weighted sound levels. Other weighting networks have been devised to address high noise levels or other special acoustical characteristics (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 2-1 describes typical A-weighted noise levels for various noise sources.

Table 2-1. Typical A-Weighted Noise Levels

Common Outdoor Noise	Noise Level (dBA)	Common Indoor Noise
	— 110 —	Rock band (noise to some, music to others)
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 in neighboring room
Quiet urban nighttime	**— 40 —**	Theater, large conference room (background)
Quiet suburban nighttime		
	— 30 —	Library
Quiet rural nighttime		Bedroom at night
	— 20 —	
		Broadcast/recording studio
	— 10 —	
Lowest threshold of human hearing	**— 0 —**	Lowest threshold of human hearing

Source: Caltrans 1998.

2.6 Human Response to Changes in Noise Levels

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

2.7 Noise Descriptors

Noise in our daily environment fluctuates over time. Some fluctuations are minor, but others 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 one-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_n):** L_n represents the sound level exceeded for a given percentage of a specified period (e.g., L_{10} is the sound level exceeded 10 percent of the time, and L_{90} is the sound level exceeded 90 percent 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 (10 p.m.-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.-7 a.m.) and a 5 dB penalty applied to the A-weighted sound levels occurring during evening hours (7 p.m.-10 p.m.).

2.8 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.

2.9 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 this 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.

2.10 Ground Absorption

The propagation path of noise from a highway to a receiver 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 receiver, 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 receiver – 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.

2.11 Atmospheric Effects

Receivers located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have reduced 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 substantial effects.

2.12 Shielding by Natural or Man-Made Features

A large object or sound wall in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise. Natural terrain features (e.g., hills and dense woods) and man-made features (e.g., buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receiver specifically to reduce noise. A sound wall that breaks the line of sight between a source and a receiver will typically result in at least 5 dB of noise reduction. Taller sound walls provide increased noise reduction. Vegetation between the highway and receiver is rarely effective in reducing noise unless it is sufficiently dense.

Chapter 3. Federal Regulations and State Policies

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

3.1 Federal Regulations

3.1.1. 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.

Title 23, Part 772 of the Code of Federal Regulations provides procedures for preparing operational and construction noise studies and evaluating noise abatement considered for federal and federal-aid highway projects. The proposed project is a Type I project. A technical noise analysis has been prepared consistent with the Caltrans Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects for comparison and informational purposes only.

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). Noise levels are expressed in terms the A-weighted decibel (dBA) and the one-hour equivalent sound level ($L_{eq[h]}$).

Table 3-1 summarizes NAC corresponding to various land use activity categories. Activity categories and related traffic noise impacts are determined based on the actual land use in a given area.

Table 3-1. Activity Categories and Noise Abatement Criteria

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.

Activity Category	Activity L_{eq} [h][1]	Evaluation Location	Description of Activities
D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, schools, and television studios.
E	72	Exterior	Hotels, motels, offices, restaurant/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, 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.

Predicted exterior traffic noise levels at land uses in Activity Categories listed in Table 3-1 to determine whether traffic noise impacts are predicted to occur. In determining traffic noise impacts for these Activity Categories, primary consideration is given to exterior areas where frequent human use occurs that would benefit from a lowered noise level. In general, an area of frequent human use is an area where people are exposed to traffic noise for an extended period of time on a regular basis.

As an example, a parking lot or a place of worship is not considered to be an area of frequent human use that would benefit from a lowered noise level because people only spend a few minutes there getting in and out of their cars and there would be no benefit to a lowered noise level. However, if outdoor worship services are held at this location, this would be an area where people are exposed to noise for an extended period of time and where the ability to hear is important. This then would be considered an area of frequent human use that would benefit from a lowered noise level.

Other examples are outdoor seating areas at restaurants or outdoor use areas at hotels, if those are areas where people spend an extended period of time on a regular basis. One practical test for determining frequent human use is the presence of existing facilities that invite human use such as benches, barbeque facilities, covered group picnic areas, and uncovered picnic tables.

Further, under 23 CFR 772.13, noise abatement must be considered and evaluated for feasibility and reasonableness 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 NEPA Categorical Exclusion (CE), Finding of No Significant Impact (FONSI), or Record of Decision (ROD). This process involves identification of noise abatement measures that are feasible, reasonable, and likely to be incorporated into the project, and noise impacts for which no noise abatement measures are feasible and reasonable.

3.1.2. 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.

3.2 State Regulations and Policies

3.2.1. California Environmental Quality Act (CEQA)

Noise analysis under the California Environmental Quality Act (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, 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 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, it must contain the technical information that is needed to make that determination in the environmental document.

3.2.2. 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. In California a noise level is considered to approach the NAC for a given activity category if it is within 1 dBA of the NAC. In California a substantial noise increase is considered to occur when the project's predicted worst-hour design-year noise level exceeds the existing worst hour noise level by 12 dBA or more. The use of 12 dB was established in California many years ago and is based on the concept that a 10 dB increase generally is perceived as a doubling of loudness. A collective decision by Caltrans staff, which was approved by FHWA, was made to use 12 dB.

The Technical Noise Supplement (TeNS) 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.

3.2.3. 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 other noise-sensitive 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 non-freeway 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 4. Study Methods and Procedures

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

A review of aerial photography and a detailed field investigation were conducted to identify land uses that could be subject to traffic and construction noise impacts from the proposed project. Specifically, land uses in the project area were categorized by land use Activity Category as defined in Table 3-1 and outdoor activity areas were noted. As stated in the Protocol, noise abatement is only considered for areas of frequent human use that would benefit from a lowered noise level. Accordingly, this impact analysis primarily focuses on locations with defined outdoor activity areas, such as single-family residential backyards and common areas of multi-family residences.

4.1.1. Identified Land Uses within Project Study Area

Developed and undeveloped land uses in the project vicinity were identified through inspection of aerial photography and a detailed field investigation. Within each land use category, sensitive receivers were then identified. Land uses in the project vicinity include multi-family residences, outdoor recreational land use, commercial land use, and undeveloped lands.

The generalized land use data and location of particular sensitive receivers were the basis for the selection of representative analysis sites. As shown in Figure 4, the light blue areas indicate locations of sensitive residences. For purposes of this study, sensitive residences that were in the direct impact area were evaluated for noise impacts.

4.1.2. Extent of Frequent Human Use at Land Uses in Project Area

As noted previously, in determining traffic noise impacts primary consideration is given to exterior areas where frequent human use occurs that would benefit from a lowered noise level. In general, an area of frequent human use is an area where people are exposed to traffic noise for an extended period of time on a regular basis.

For this project, exterior areas where frequent human use occurs that would benefit from a lowered noise level are limited primarily to outdoor activity areas of individual residences, such as back yards or patios.

4.1.3. Geometry of the Project Area Relative to Existing/Planned Land Use

The topography of the project area is generally flat within the proposed project right of way. Land uses located within the project study area are not appreciably elevated or depressed relative to Lincoln Boulevard.

4.2 Field Measurement Equipment and Procedures

Noise measurements were taken at pertinent locations within the proposed project area to help determine proper shielding and background noise levels. Measurements were taken in accordance with the procedures cited in the TeNS document (Caltrans 2013). The following instruments were used for field noise measurements:

- Sound Level Meter – A Larson Davis (LD) 824 System sound level meter was used to measure existing noise levels. This sound level meter and its microphone conform to the Institute of Electronic and Electric Engineers and the American National Standards Institute standards for Type 1 instruments.
- Microphone System – LD Model 2560 1.27-centimeter (0.5-inch) pressure microphone; LD Model 900 microphone preamplifier.
- Acoustic Field Calibrator – LD Model CAL250 Precision Acoustic Calibrator.
- Sony DSC-W50 Cybershot 6.0 Mega Pixel MPEG camera.

4.2.1. Short-Term Measurements

Short-term monitoring was conducted at Activity Category B land uses. The short-term measurement locations are identified in Figure 4. Short-term measurements were conducted using a Larson Davis Model 824 Type 1 sound level meter. All short-term field measurements were 20 minutes in duration and noise levels are in terms of A-weighted decibel equivalent sound level.

The following is a brief description of the short-term measurement procedures utilized during field monitoring.

- Microphones were placed 5 feet above the ground elevation for first-floor measurement locations. The second story measurement at ST-5 was placed 5 feet above the terrace at the apartments south of Jefferson and west of Lincoln Blvd.
- Sound level meters were calibrated before and after each measurement.
- Following the calibration of equipment, a windscreen was placed over the microphone. Frequency weighting was set on “A” and slow response
- Results of the noise measurements were recorded on field data sheets.

- During the noise measurements, any excessive noise contamination such as barking dogs, lawn mowers, and/or aircraft fly overs were noted.
- Wind speed, temperature, humidity, and weather conditions were observed and documented.

Traffic on adjacent roadways were classified and counted during each short-term noise measurements. Vehicles were classified as automobiles, medium-duty trucks, or heavy-duty trucks. Automobiles are vehicles with two axles and four tires that are designed primarily to carry passengers. Small vans and light trucks are included in this category. Medium-duty trucks included all cargo vehicles with two axles and six tires. Heavy-duty trucks include all vehicles with three or more axles.

4.2.2. Long-Term Measurement

One long-term measurement was conducted over a 24-hour period. The purpose of this measurement was to describe variations in sound levels throughout the day, rather than absolute sound levels at a specific receiver of concern. This measurement was utilized to determine when the traffic peak hour occurs. Long-term noise monitoring was conducted at one location.

4.3 Traffic Noise Level 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, shielding features (e.g., topography and buildings), existing and proposed privacy walls, ground type, and receivers. Three-dimensional representations of these inputs were developed using CAD drawings, aerials, and a topographic map.

The existing traffic volume counts during field measurements, measured vehicle speeds, and measured noise levels were used to calibrate the TNM 2.5 model under existing roadway conditions. The existing traffic noise levels were calculated using the traffic volumes provided in the project’s Traffic Engineer and posted travel speeds.

The TNM 2.5 model is sensitive to the volume of trucks on the roadway because trucks contribute disproportionately to the traffic noise. Truck percentages on the adjacent roadways were obtained from the project’s Traffic Engineer and traffic counts collected during the short-term noise level measurement. A summary of traffic data used for the existing and design year conditions with and without the proposed project are presented in Appendix A.

To validate the accuracy of field noise measurements results, TNM 2.5 was used to compare measured noise levels to modeled noise levels at field measurement locations. For each location, traffic volumes counted during a 20-minute period during the short-term measurements were normalized to one-hour volumes. These normalized volumes were assigned to the corresponding proposed project area roadways to simulate the noise source strength during the actual measurement period. Modeled and measured noise levels were then compared to determine if a K-factor would need to be applied to any monitoring location.

4.4 Process for Evaluating Noise Abatement

Traffic noise impacts are considered to occur at receiver locations where predicted design-year noise levels are at least 12 dBA 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 dBA at impacted receiver locations is predicted with implementation of the abatement measures. 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. In addition, sound walls should be designed to intercept the line-of-sight from the exhaust stack of a truck to the first tier of receivers, as required by the Highway Design Manual, Chapter 1100 (Caltrans, September 2006).

After a particular sound wall is found to meet the minimum noise reduction goal of 5 dB at and impacted receiver, overall reasonableness of the noise abatement must be determined. The overall reasonableness of noise abatement is determined by considering factors such as the noise reduction design goal, the cost of noise abatement and the viewpoints of benefited receivers (including property owners and residents of the benefited receivers). Caltrans' acoustical design goal states that a sound wall must be predicted to provide at least 7 dB of noise reduction at one or more benefited receivers. For a wall to be considered reasonable, the 7-dB design goal must be achieved at one or more benefited receivers. This design goal applies to any receiver and is not limited to impacted receivers. The design goal only applies to sound wall design considerations and is not meant to be associated with the increase in noise from a project. Once the noise abatement criteria is triggered by a receiver approaching or exceeding its' respective NAC, the design goal guides the noise abatement evaluation by permitting for the greatest of noise reduction within allowable cost limits for all receivers near the proposed sound wall.

Cost considerations for determining noise abatement reasonableness are evaluated by comparing reasonableness allowances and projected abatement costs. The Protocol defines the procedure for assessing reasonableness of sound walls from a cost perspective. A cost-per-residence allowance is calculated for each benefited residence (i.e., residences that receive at least 5 dBA of noise reduction from a sound wall). The 2019 cost allowance is $107,000 per benefited residence. Total allowances are calculated by multiplying the cost-per-residence by the number of benefited residences. The engineer's cost estimate for a given proposed noise abatement measure is compared to the total reasonableness allowance for all benefited receivers. If the engineer's cost estimate is less than the total reasonable allowance, then the sound wall is considered to be reasonable from a cost perspective.

Chapter 5. Existing Noise Environment

5.1 Existing Land Uses

An investigation of the proposed project area was performed to identify land uses that would be subject to traffic and construction noise impacts from the proposed project. Aerial and digital mapping provided by the project Engineer, street views in Google Maps and field photographs of the project area were used to identify noise sensitive land uses. Sensitive receivers were identified in those areas where outdoor frequent human use would occur, such as single residences. These sensitive receivers fall into FHWA and Caltrans NAC Activity Category B and C, each with activity levels of 67 dBA L_{eq}.

As required by the Protocol, noise abatement is only considered for areas of outdoor 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 outdoor active sports areas.

One (1) long-term location and six (6) short-term locations were identified within the proposed project area. A total of six (6) receiver locations were evaluated in the model. All receiver locations are shown in Figure 4. The associated NAC Activity Category for each identified land use is listed in Table B-1 of Appendix B.

Figure 4. Receiver Locations

5.2 Existing Conditions

The land uses located in the project area include multi-family residences and commercial areas. Crescent Park at Playa Vista represent multi-family residences located at southeast end of the project near the intersection of Jefferson Boulevard and Lincoln Boulevard. Continuing north from the Jefferson Boulevard/Lincoln Boulevard intersection, a grouping of commercial buildings contains LA Fitness and other businesses. Fountain Park is another residential multi-family residential area located adjacent to Ballona Creek. Additional commercial areas are located near Fiji Way with another multi-family residential community located behind the Shell gas station. The dominant noise source is traffic travelling on SR1 (Lincoln Boulevard).

South of Fiji Way: Two multi-family residential properties are located south of Fiji Way, represented by receivers R13 and R14. One short-term measurement (ST-1) was used to obtain background noise levels in this area. Terrain in this area is approximately the same as Fiji Way and there are no existing barriers within this area. The dominant noise source in this area is traffic travelingalong Fiji Way.

South of Culver Boulevard: The Culver Marina Baseball Fields are located south of Culver Boulevard, represented by receiver R12. One short-term measurement (ST-4) and one long-term measurement (LT-1) were used to validate the TNM model in this area. Terrain in this area is approximately the same as Culver Boulevard and there are no existing barriers within this area. The dominant noise source in this area is traffic traveling along Culver Boulevard.

North of Fountain Park Drive: A multi-family residential complex is located north of Fountain Park Drive represented by receivers R1 through R11 and R1-u through R8u. R1 through R8 represent ground floor balconies. R1u through R8u are the upper floor balconies at a height of 15 feet. Two short-term measurements site (ST-2 and ST-3) represent the short-term measurement site. ST-2 was used to validate the TNM model and ST-3 is a background measurement. Terrain in this area is approximately the same as Fountain Park Drive and there are no existing barriers within this area. The dominant noise source in this area is traffic traveling along Fountain Park Drive.

South of Fountain Park Drive: A park is located south of Fountain Park Drive, represented by receiver R12. Terrain in this area is approximately the same as Fountain Park Drive and there are no existing barriers within this area. The dominant noise source in this area is traffic traveling along Fountain Park Drive.

South of Jefferson Boulevard: The short-term measurement (ST-5) was used to validate the TNM model at the Crescent Park at Playa Vista multi-family residential complex. The complex is located southeast of the intersection between Jefferson Boulevard and Lincoln Boulevard. Terrain in this area is approximately the same as Jefferson Boulevard and there are no existing barriers within this area. The dominant noise source in this area is traffic traveling along Jefferson Boulevard.

5.3 Noise Measurement Results

The existing noise environment of the project area was characterized by conducting one (1) long-term and six (6) short-term noise measurements locations.

5.3.1. Short-Term Noise Level Measurement Results

Short-term monitoring was conducted at six (6) locations on March 14, 2018 and March 15, 2018 using a Larson David Model 824 Type 1 sound level meter. These six locations were identified as being in proximity to the project's direct impacts. Measurements were taken for a duration of 20 minutes at each site. Short-term monitoring was conducted at or adjacent to Activity Category B and C land uses. The short-term measurement locations are identified in Figure 4. Noise measurement field monitoring forms are located in Appendix C.

Table 5-1 summarizes the results of the short-term noise monitoring conducted in the project area. Table 5-2 describes the physical locations of the noise monitoring sites. These short-term noise measurements were used to validate the noise model and to calculate the noise levels at all modeled sensitive receivers in the project area.

During the short-term measurements, field staff attended each meter. During the measurement period (20 minutes in duration), dominant noise sources were also identified and logged. The calibration of the meter was checked before and after the measurement using Larson-Davis Model CAL250 calibrator.

Table 5-1. Summary of Short-Term Measurements

Position	Address	Land Uses	Start Time & Date	Duration (minutes)	Measured L_{eq}
ST-1	13240 Fiji Way, Marina del Rey	MFR	12:23 p.m. 03/14/2018	20	53.3
ST-2	13175A Fountain Park Drive, Los Angeles	MFR	1:47 p.m. 03/14/2019	20	52.2
ST-3	5399-E Playa Vista Drive, Los Angeles	MFR	1:21 p.m. 03/14/2019	20	51.6
ST-4/LT-1	Culver Marina Baseball Field, Marina del Rey	Park	2:28 p.m. 03/14/2018	20	59.5
ST-5	13298 W Jefferson Boulevard, Los Angeles	MFR	4:35 p.m. 03/15/2018	20	72.0

Note: Concurrent traffic counts were taken during the 20-minute short-term measurements, a breakdown of traffic by roadway and direction are provided in Appendix A.
ST – Short-term measurement identifier
MFR – Multi-family residence
dBA – decibel or A-weighted sound level
mph – miles per hour

Table 5-2. Physical Location of Noise Level Measurements

Receiver ID	Location Description	Noise Sources	Comments
ST-1	Multi-family residence along Fiji Way	No dominant noise source	The SLM was placed next to the pool at the multi-family residence along Fiji Way. Currently, there is no existing barrier shielding the property.
ST-2	Multi-family residence along Fountain Park Drive	Dominant noise source is traffic on Fountain Park Drive	The SLM was placed next to the pool at the multi-family residence along Fountain Park Drive. Currently, there is no existing barrier shielding the property.
ST-3	Multi-family residence along Playa Vista Drive	No dominant noise source	The SLM was placed next to the pool at the multi-family residence along Playa Vista Drive. Currently, there is no existing barrier shielding the property.
ST-4	Baseball field at the Culver Marina Baseball fields along Culver Boulevard	Dominant noise source is traffic on Culver Boulevard	The SLM was placed next to a baseball field at the Culver Marina Baseball fields along Culver Boulevard. Currently, there is no existing barrier shielding the property.
ST-5	Second story of Multi-family residence at the southeast corner of the JeffersonBoulevard and Pacific Coast Highway intersection	Dominant noise source is the traffic at the intersection of Jefferson Boulevard and Pacific Coast Highway	The SLM was placed at the corner of the multi-family residence at the intersection of Jefferson Boulevard and Pacific Coast Highway.

Source: Entech Consulting Group, March 2018
ST – Short-term measurement identifier
SLM – sound level meter

5.3.2. Long-Term Noise Level Measurement Results

Long-term noise monitoring was conducted at one location to characterize the existing noise environment. The purpose of long-term monitoring is to gather sound level data over a 24-hour period to find the noisiest hour for traffic and describe sound levels throughout the day rather than absolute levels at a specific receiver location. A Larson-Davis Model 824 Type 1 sound level meter was used to collect noise measurements. The long-term noise level measurement was performed at the park at 13084 Culver Boulevard over a 24-hour period.

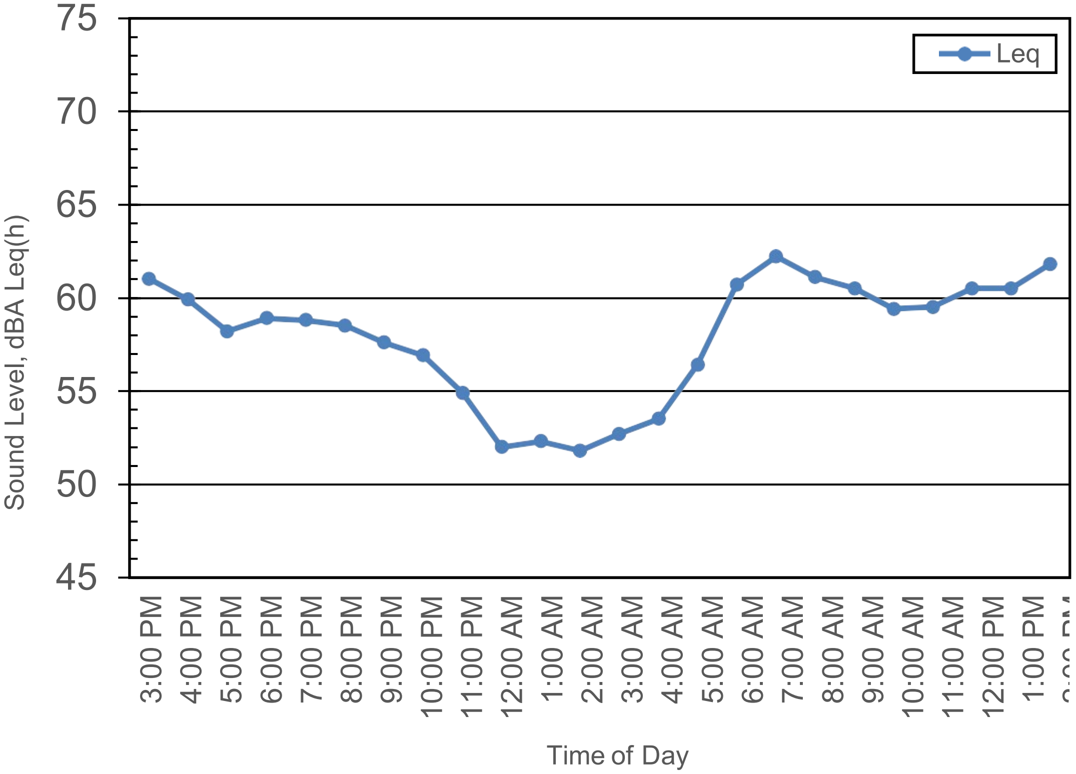
Table 5-3 and Figure 5 show that traffic noise peaks during the 7:00 a.m. hour for the long-term monitoring location. It should be noted that during the nosiest hour, existing noise levels do not exceed the NAC Activity Category C of 67 dBA $L_{eq\ (h)}$.

Table 5-3. Long Term Measurement

Hour Beginning	dBA $L_{eq[h]}$	Difference from Loudest Hour (dB)
3:00 PM	61	-1.2
4:00 PM	59.9	-2.3
5:00 PM	58.2	-4
6:00 PM	58.9	-3.3
7:00 PM	58.8	-3.4
8:00 PM	58.5	-3.7
9:00 PM	57.6	-4.6
10:00 PM	56.9	-5.3
11:00 PM	54.9	-7.3
12:00 AM	52	-10.2
1:00 AM	52.3	-9.9
2:00 AM	51.8	-10.4
3:00 AM	52.7	-9.5
4:00 AM	53.5	-8.7
5:00 AM	56.4	-5.8
6:00 AM	60.7	-1.5
7:00 AM	**62.2**	0
8:00 AM	61.1	-1.1
9:00 AM	60.5	-1.7
10:00 AM	59.4	-2.8
11:00 AM	59.5	-2.7
12:00 PM	60.5	-1.7
1:00 PM	60.5	-1.7
2:00 PM	61.8	-0.4

Note:
Source: Entech Consulting Group March 2018
Worst noise hour noise level is bolded
dBA – decibels or A-weighted sound level
L_{eq} - Equivalent Sound Level

Figure 5. Summary of Long-Term Measurement Result



5.4 Model Calibration

Noise measurements were conducted at six (6) short-term monitoring locations on March 14, 2018 and March 15, 2018 while concurrent traffic volumes were recorded through the use of a video camera. These measurements were conducted to calibrate the TNM 2.5 model. Traffic speeds were recorded by driving on the roadways immediately after a noise measurement. The traffic counts were tabulated according to three vehicle types, including automobiles, medium trucks (2-axle with 6-wheels but not including pick-up trucks) and heavy trucks (3 or more axles). As a general rule, the noise model is considered to be calibrated if the field measured noise levels versus the modeled noise levels (using field collected traffic data) agree within 3 dB of each other. If differences are more than 3 dB, refinement of the noise model is performed until there is agreement between the two values. If after thorough reevaluation calibration still cannot be achieved due to complex topography or other unusual circumstances, then a calibration constant is added such that the measured versus modeled values agree before any predictions can be made with the model.

Table 5-4 shows the representative modeled receiver locations, measured ambient noise level, the modeled noise levels using traffic counts and measured vehicle speeds during noise monitoring. The traffic volumes that were used in the calibration process are located in Appendix A. TNM 2.5 was used to compare measured traffic noise levels to modeled noise levels at field measurement locations. Table 5-4 compares the noise measurements from dominant traffic noise with modeled noise levels at each measurement location. The predicted sound levels are within 2 dB of the measured sound levels and considered to be in reasonable agreement with the measured sound levels. Therefore, no calibration of the model wasmade.

Table 5-4. Comparison of Measured to Predicted Sound Levels

Measurement Position	Measured Sound Level (dBA)	Predicted Sound Level (dBA)	Measured minus Predicted (dB)
ST-2	67.3	66.3	1.0
ST-4	59.5	58.5	1.0
ST-5	72	71.1	0.9

Source: Entech Consulting Group, March 2018.
ST-1 and ST-3 measurements were background measurements only and were not used for model calibration.

5.5 Existing Noise Levels

The land uses within the project area are single residential properties that fall into exterior FHWA NAC Activity Categories B. Existing noise levels were identified at sensitive receptor locations that were within the project's direct impact area.

Existing noise levels were estimated utilizing existing peak hour traffic data provided by the County. Existing peak hour traffic was entered into the TNM 2.5 with existing roadway coordinates to estimate existing peak hour traffic noise levels. The results of the existing traffic noise modeling are shown in Table 5-5. As shown in Table 5-5, existing noise levels during the noisiest hour range from 43 to 70 dBA L_{eq}; several receiver locations approach or exceed their respective FHWA NAC activity standard.

Table 5-5. Summary of Modeled Existing Peak Hour Noise Levels

Receiver ID	Location	Type of Land Use	Number of Dwelling Units	Noise Abatement Category	Modeled Existing Peak Noise Level, dBA L_{eq}
R1-g[1]	13175A Fountain Park Drive	MFR	6	B (67)	68
R2-g[1]	13175A Fountain Park Drive	MFR	4	B (67)	68
R3-g[1]	13175A Fountain Park Drive	MFR	6	B (67)	67
R4-g[1]	13175A Fountain Park Drive	MFR	4	B (67)	62
R5-g[1]	13163B Fountain Park Drive	MFR	4	B (67)	60
R6-g[1]	13163B Fountain Park Drive	MFR	4	B (67)	58
R7-g[1]	13151C Fountain Park Drive	MFR	4	B (67)	57
R8-g[1]	13151C Fountain Park Drive	MFR	4	B (67)	55
R9	Pool at 13175A Fountain Park Drive	Pool	0	C (67)	52
R10	Pool between 5399E and 5389D Playa Vista Drive	Pool	0	C (67)	43
R11	Park on Fountain Park Drive	Park	0	C (67)	54
R12	Culver Marina Baseball Field at 13120 Culver Boulevard	Park	0	C (67)	58
R13	Pool at 13240 Fiji Way	Pool	0	C (67)	46
R14	Pool at 13232 Fiji Way	Pool	0	C (67)	46
R1-u[2]	13175A Fountain Park Drive	MFR	6	B (67)	70
R2-u[2]	13175A Fountain Park Drive	MFR	4	B (67)	70
R3-u[2]	13175A Fountain Park Drive	MFR	6	B (67)	70
R4-u[2]	13175A Fountain Park Drive	MFR	4	B (67)	63
R5-u[2]	13163B Fountain Park Drive	MFR	4	B (67)	62
R6-u[2]	13163B Fountain Park Drive	MFR	4	B (67)	59
R7-u[2]	13151C Fountain Park Drive	MFR	4	B (67)	58
R8-u[2]	13151C Fountain Park Drive	MFR	4	B (67)	56

Source: Entech Consulting Group, March 2018
MFR – multi-family residence
1. ground floor balconies
2. upper floor balconies, 15 feet above the ground

Chapter 6. Future Noise Environment, Impacts and Considered Abatement

6.1 Future Noise Environment and Impacts

The noise study was conducted to determine the future traffic noise impacts at sensitive receivers along Lincoln Boulevard. Potential long-term noise impacts associated with project operations are solely from traffic noise. Traffic noise was evaluated for future scenarios (Future 2045 No-Build and Build) as worst-case conditions. Using coordinates obtained from the topographic maps, six (6) receiver locations with frequently used outdoor use areas associated with existing multi-family residences in the project's area of direct impact.

The predicted future worst-case traffic noise levels for the Build Alternative were determined using project traffic volumes as presented in Appendix A.

The TNM 2.5 model is sensitive to the volume of trucks on the roadway because trucks contribute disproportionately to the traffic noise. Truck percentages on the adjacent roadways were obtained from the traffic counts collected during the short-term noise level measurements. A summary of traffic data used for the existing and design year conditions with and without the proposed project are presented in Appendix A.

Table B-1 in Appendix B summarizes the traffic noise modeling results for the design-year conditions with and without the proposed project. Predicted design-year traffic noise levels with the proposed Project are compared to Existing conditions and to design-year 2045 No-Build conditions. The modeled future noise levels with the project were compared to the modeled existing peak noise levels (after calibration) from TNM 2.5 to determine whether a substantial noise increase would occur. The modeled future noise levels for the Build Alternative were also compared to the respective NAC land use Activity Category to determine whether a traffic noise impact would occur.

Traffic noise impacts occur when either of the following occurs: (1) if the traffic noise level at a sensitive receptor location is predicted to "approach or exceed" the NAC, or (2) if the predicted traffic noise level is 12 dBA or more over the corresponding modeled existing peak noise level at the sensitive receptor locations analyzed. When traffic noise impacts occur, noise abatement measures must be considered.

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 sound levels of 64.4 and 64.5 dBA L_{eq}. The difference between these two values is 0.1 dB. However, after rounding, the difference is reported as 1 dB.

Modeling results in Table B-1 indicate that predicted traffic noise levels for the design-year with-project conditions will exceed the respective NAC land use Activity Category within the project area; therefore, noise abatement measures will be evaluated.

Under the 2045 No-Build Alternative no improvements would be constructed. The traffic noise modeling results for the design-year 2045 No-Build Alternative range from 43 to 70 dBA L_{eq}, as shown in Table B-1 of Appendix B. Noise levels for design-year 2045 No-Build conditions are expected to increase up to 1 dB over existing noise levels. This increase is due to an increase in traffic volumes from Existing to future 2045 No-Build conditions. Noise levels at evaluated receivers under 2045 No-Build conditions exceed their respective NAC Activity Category standard.

Build Alternative - The 2045 design-year traffic noise modeling results for the Build Alternative range from 44 to 72 dBA L_{eq} as shown in Table B-1 of Appendix B. Noise levels for the design-year under the Build Alternative are expected to increase by up to 2 dB over design-year 2045 No-Build noise levels. Noise levels exceed their respective NAC Activity Category standard. Therefore, a noise abatement evaluation is required.

The proposed project will cause a noise impact to the surrounding area; therefore, noise abatement was evaluated.

6.2 Preliminary Noise Abatement Decision

According to 23 CFR 772(13)(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. Landscaping is not a viable noise abatement measure.
- Traffic management measures, including, but not limited to, traffic control devices and signing for the 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 create a buffer zone and preempt development that would be adversely affected by traffic noise. This measure may be included in Type I projects only.

The noise barrier identified has been evaluated for feasibility according to the achievable noise reduction. For each noise barrier found to be acoustically feasible, reasonable cost allowances were calculated. The barrier analysis table provided summarizes the number of benefitted receptors versus the relative height of the barrier (8–16 feet for right of way barrier). While the Protocol suggests that barrier heights beyond 16 feet may be analyzed, it was found that a maximum height of 16 feet was appropriate and provided appropriate abatement for the purposes of this analysis. Table B-1 in Appendix B summarize the results of the calculations at the receptor locations for the six noise barriers that were evaluated in detail for this project.

For any noise barrier to be considered reasonable from a cost perspective, the estimated construction cost of the noise barrier should be equal to or less than the total cost allowance calculated for the barrier. The cost calculations for the noise barrier should include all items appropriate and necessary for construction of the barrier, such as traffic control systems, drainage modifications, and retaining walls. Construction cost estimates are not provided in this NSR but are presented in the Noise Abatement Decision Report (NADR). The NADR, which is a design responsibility, 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 are based on site-specific conditions. These estimates are prepared and signed by the project engineer. Construction cost estimates are compared with the reasonableness allowances in the NADR to identify which wall configurations are reasonable from a cost perspective.

The design of the noise barriers discussed in this report is preliminary. It has been developed to a level appropriate for environmental review but not for final design of the project. The preliminary information provided in this report pertains to the physical location, length, and height of the noise barriers. If pertinent parameters change substantially during final project design, preliminary noise barrier designs may be modified or eliminated from the final project. A final decision on the construction of 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.

Barrier-NB-1

Balconies of the multi-family residential units are the outdoor frequent human use areas located along Lincoln Boulevard near Ballona Creek represented by Receivers R1-g, R1-u, R2-g, R2-u, R3-g and R3-u. No existing wall currently shields these receivers from noise generated from Lincoln Boulevard. However, existing noise levels at some of the outdoor frequent human use areas at thislocation currently exceed the NAC and would continue to exceed under the No Build condition. The Build Alternative would slightly increase noise levels; therefore, a barrier evaluation was required.

As shown on the Proposed Sound Wall figure in Appendix F, Barrier NB-1 was evaluated along the right of way (ROW) line of Lincoln Boulevard. This is the closest location for barrier placement. Barrier NB-1 was found to be effective in achieving a minimum 5-dB reduction at a wall height of 10 feet for Receiver R1-g. The Caltrans design goal of 7-dB was achieved at a height of 14 feet for Receiver R1-g. Receivers R1-u and R2-u meet the Caltrans minimum 5-dB reduction at a wall height of 14 feet. Only Receiver R1-u was able to achieve the Caltrans design goal of 7-dB at a height of 16 feet.

Table 6-1 summarizes the calculated noise reductions and reasonable allowances for each sound wall height.

Table 6-1. Summary of Reasonableness Determination Data—Barrier NB-1

Barrier ID: **NB-1**						
Predicted Noise Level without Noise Barrier						
Receiver: R-1						
Design Year Noise Level dBA L_{eq}(h): 70						
Design Year Noise Level Minus Existing Noise Level:						
Barrier Heights	**6-feet**	**8-feet**	**10-feet**	**12-feet**	**14-feet**	**16-feet**
Barrier Noise Reduction, dB			5	6	6	7
Number of Benefited Residences			10	20	20	20
Reasonable Allowance Per Benefitted Residence			$107,000	$107,000	$107,000	$107,000
Total Reasonable Allowance			$1,070,000	$2,140,000	$2,140,000	$2,140,000
Note: Shaded Areas-Noise Barrier does not provide a 5-dB noise reduction						
A NADR will be prepared that will identify noise barrier construction cost information and noise barriers that are reasonable from a cost perspective.						

Chapter 7. Construction Noise

During construction of the project, noise from construction activities may intermittently dominant the noise environment in the immediate area of construction. For the proposed project impact hammers will be used at both the Ballona Creek Bridge and for the replacement of the Culver Boulevard Overcrossing. The duration of the pile driving would occur for 70 days at the Ballona Creek Bridge and 25 days for the Culver Boulevard Overcrossing. Pile driving would not occur from 9pm-7am on Mondays-Fridays, 6pm-8am on Saturdays/Holidays, and not at all on Sundays. This will be included in the project specifications and will be in accordance with the City’s noise ordinance.

Table 7-1 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 70 to 90 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. To minimize the construction-generated noise, abatement measures in standard Specification 14-8.02, “Noise Control” and SSP 14-8.02 must be followed. This requirement shall not relieve the Contractor from responsibility for complying with local ordinances regulating noise levels.

- Do not exceed 86 dBA 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 7-1. Construction Equipment Noise

Equipment	Maximum Noise Level (dBA at 50 feet)
Impact Hammer	89
Scrapers	89
Bulldozers	85
Heavy Trucks	88
Backhoe	80
Pneumatic Tools	85
Concrete Pump	82

Source: Federal Transit Administration 1995

No adverse noise impacts from construction are anticipated because construction would be conducted in accordance with Standard Specification 14-8.02, SSP 14-8.02 and applicable local noise standards. Construction noise would be short-term, intermittent, and overshadowed by local traffic noise.

Chapter 8. References

Caltrans, 2013. Technical Noise Supplement. November. Sacramento, CA: Division of Environmental Analysis. Sacramento, CA. Available: (http://www.dot.ca.gov/hq/env/noise/pub/tens_complete.pdf).

Caltrans, 2011. Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects. May. Sacramento, CA: Division of Environmental Analysis. Sacramento, CA.

County of San Joaquin, 2016. Traffic Engineering Memo February 2016.

Federal Highway Administration. 2004. FHWA Traffic Noise Model, Version 2.5

Fehr Peers, 2020. Final Transportation Analysis Report (TAR): Lincoln Bridge Multi-Modal Improvement Project

Appendix A Traffic Data

Table A-1. Traffic Data for Noise Model Calibration

	Number of Lanes	Total 1-Hour Adjusted Traffic[1]	Auto		Medium Trucks		Heavy Trucks		Speed[2] (A/MT/HT)
			%	Volume	%	Volume	%	Volume	
Calibration Site ST2 - 1:47 PM to 2:07 PM - 3/14/2018									
NB Lincoln Boulevard	3	1,944	99.38%	1,932	0.31%	6	0.31%	6	45/45/45
SB Lincoln Boulevard	2	3,060	99.80%	3,054	0.20%	6	0.00%	0	45/45/45
Calibration Site ST4 - 2:28 PM to 2:48 PM - 3/14/2018									
NB Culver Boulevard	3	1,284	99.30%	1,275	0.47%	6	0.23%	3	55/55/55
SB Culver Boulevard	1	1,032	99.71%	1,029	0.00%	0	0.29%	3	55/55/55
NB Lincoln to Culver Ramp	1	456	98.68%	450	0.66%	3	0.66%	3	35/35/35
Culver to NB Lincoln Ramp	1	303	100.00%	303	0.00%	0	0.00%	0	35/35/35
Calibration Site ST5 - 2:35 PM to 2:55 PM - 3/15/2018									
EB Jefferson Boulevard	3	933	99.36%	927	0.64%	6	0.00%	0	45/45/45
WB Jefferson Boulevard	6	1,299	99.54%	1,293	0.23%	3	0.23%	3	45/45/45
NB Lincoln Boulevard	5	1,944	99.38%	1,932	0.31%	6	0.31%	6	45/45/45
SB Lincoln Boulevard	4	3,060	99.80%	3,054	0.20%	6	0.00%	0	45/45/45

Notes:

1 - It is assumed that the traffic volumes are equally distributed across the lanes.

2 - Observed speeds were used for modeling.

Table A-2. Traffic Data for Existing TNM Noise Models

	Segment	Number of Lanes	Total Peak Hour Volume[1]	Auto		Medium Trucks[2]		Heavy Trucks[2]		Speed[3]
				%	Volume	%	Volume	%	Volume	(A/MT/HT), mph
NB Lincoln Boulevard	**South of Jefferson**	6	2830	99.48%	2815	0.26%	7	0.22%	6	45/45/45
SB Lincoln Boulevard		4	1561	99.48%	1553	0.26%	4	0.22%	3	
NB Lincoln Boulevard	**Jefferson to 5510 Lincoln**	4	3764	99.48%	3744	0.26%	10	0.22%	8	
SB Lincoln Boulevard		6	1898	99.48%	1888	0.26%	5	0.22%	4	
NB Lincoln Boulevard	**5510 Lincoln to Culver Ramp**	3	3764	99.48%	3744	0.26%	10	0.22%	8	
SB Lincoln Boulevard		2	1898	99.48%	1888	0.26%	5	0.22%	4	
NB Lincoln Boulevard	**Culver Ramp to Marina Ditch**	3	2967	99.48%	2952	0.26%	8	0.22%	7	
SB Lincoln Boulevard		2	1791	99.48%	1782	0.26%	5	0.22%	4	
NB Lincoln Boulevard	**Marina Ditch to Fiji Way**	5	2967	99.48%	2952	0.26%	8	0.22%	7	
SB Lincoln Boulevard		3	1792	99.48%	1783	0.26%	5	0.22%	4	
NB Culver Boulevard	**South of Lincoln Ramp**	1	1905	99.48%	1895	0.26%	5	0.22%	4	45/45/45
SB Culver Boulevard		1	695	99.48%	691	0.26%	2	0.22%	2	
NB Culver Boulevard	**North of Lincoln Ramp**	3	2750	99.48%	2736	0.26%	7	0.22%	6	
SB Culver Boulevard		1	834	99.48%	830	0.26%	2	0.22%	2	
Lincoln to Culver Ramp	**N/A**	1	1089	99.48%	1083	0.26%	3	0.22%	2	35/35/35
Culver to Lincoln Ramp		1	383	99.48%	381	0.26%	1	0.22%	1	
EB Jefferson Boulevard	**West of Lincoln Boulevard**	4	510	99.48%	507	0.26%	1	0.22%	1	35/35/35
WB Jefferson Boulevard		2	351	99.48%	349	0.26%	1	0.22%	1	
EB Jefferson Boulevard	**East of Lincoln Boulevard**	3	903	99.48%	898	0.26%	2	0.22%	2	
WB Jefferson Boulevard		6	1341	99.48%	1334	0.26%	3	0.22%	3	

Notes:

1 - Total volume based on existing peak hour traffic volumes from Lincoln Bridge Multi-Modal Improvement Project TAR, Fehr & Peers, January 2020.

2 - Truck percentages were based on field measurements.

3 - Posted speeds were used for modeling.

Table A-3. Traffic Data for No Build 2025 TNM Noise Models

	Segment	Number of Lanes	Total Peak Hour Volume[1]	Auto		Medium Trucks[2]		Heavy Trucks[2]		Speed[3]
				%	Volume	%	Volume	%	Volume	(A/MT/HT), mph
NB Lincoln Boulevard	**South of Jefferson**	6	2770	99.48%	2756	0.26%	7	0.22%	6	45/45/45
SB Lincoln Boulevard		4	1700	99.48%	1691	0.26%	4	0.22%	4	
NB Lincoln Boulevard	**Jefferson to 5510 Lincoln**	4	3650	99.48%	3631	0.26%	9	0.22%	8	
SB Lincoln Boulevard		6	2170	99.48%	2159	0.26%	6	0.22%	5	
NB Lincoln Boulevard	**5510 Lincoln to Culver Ramp**	3	3650	99.48%	3631	0.26%	9	0.22%	8	
SB Lincoln Boulevard		2	2170	99.48%	2159	0.26%	6	0.22%	5	
NB Lincoln Boulevard	**Culver Ramp to Marina Ditch**	3	3120	99.48%	3104	0.26%	8	0.22%	7	
SB Lincoln Boulevard		2	2170	99.48%	2159	0.26%	6	0.22%	5	
NB Lincoln Boulevard	**Marina Ditch to Fiji Way**	5	3120	99.48%	3104	0.26%	8	0.22%	7	
SB Lincoln Boulevard		3	2170	99.48%	2159	0.26%	6	0.22%	5	
NB Culver Boulevard	**South of Lincoln Ramp**	1	1950	99.48%	1940	0.26%	5	0.22%	4	45/45/45
SB Culver Boulevard		1	720	99.48%	716	0.26%	2	0.22%	2	
NB Culver Boulevard	**North of Lincoln Ramp**	3	2840	99.48%	2825	0.26%	7	0.22%	6	
SB Culver Boulevard		1	800	99.48%	796	0.26%	2	0.22%	2	
Lincoln to Culver Ramp	**N/A**	1	1180	99.48%	1174	0.26%	3	0.22%	3	35/35/35
Culver to Lincoln Ramp		1	370	99.48%	368	0.26%	1	0.22%	1	
EB Jefferson Boulevard	**West of Lincoln Boulevard**	4	590	99.48%	587	0.26%	2	0.22%	1	35/35/35
WB Jefferson Boulevard		2	350	99.48%	348	0.26%	1	0.22%	1	
EB Jefferson Boulevard	**East of Lincoln Boulevard**	3	1110	99.48%	1104	0.26%	3	0.22%	2	
WB Jefferson Boulevard		6	1280	99.48%	1273	0.26%	3	0.22%	3	

Notes:

1 - Total volume based on existing peak hour traffic volumes from Lincoln Bridge Multi-Modal Improvement Project TAR, Fehr & Peers, January 2020.

2 - Truck percentages were based on field measurements.

3 - Posted speeds were used for modeling.

Table A-4. Traffic Data for No Build 2045 TNM Noise Models

	Segment	Number of Lanes	Total Peak Hour Volume[1]	Auto		Medium Trucks[2]		Heavy Trucks[2]		Speed[3]
				%	Volume	%	Volume	%	Volume	(A/MT/HT), mph
NB Lincoln Boulevard	**South of Jefferson**	6	2930	99.48%	2915	0.26%	8	0.22%	6	45/45/45
SB Lincoln Boulevard		4	2250	99.48%	2238	0.26%	6	0.22%	5	
NB Lincoln Boulevard	**Jefferson to 5510 Lincoln**	4	3950	99.48%	3929	0.26%	10	0.22%	8	
SB Lincoln Boulevard		6	2660	99.48%	2646	0.26%	7	0.22%	6	
NB Lincoln Boulevard	**5510 Lincoln to Culver Ramp**	3	3950	99.48%	3929	0.26%	10	0.22%	8	
SB Lincoln Boulevard		2	2670	99.48%	2656	0.26%	7	0.22%	6	
NB Lincoln Boulevard	**Culver Ramp to Marina Ditch**	3	3230	99.48%	3213	0.26%	8	0.22%	7	
SB Lincoln Boulevard		2	2540	99.48%	2527	0.26%	7	0.22%	6	
NB Lincoln Boulevard	**Marina Ditch to Fiji Way**	5	3320	99.48%	3303	0.26%	9	0.22%	7	
SB Lincoln Boulevard		3	2540	99.48%	2527	0.26%	7	0.22%	6	
NB Culver Boulevard	**South of Lincoln Ramp**	1	2000	99.48%	1990	0.26%	5	0.22%	4	45/45/45
SB Culver Boulevard		1	830	99.48%	826	0.26%	2	0.22%	2	
NB Culver Boulevard	**North of Lincoln Ramp**	3	2800	99.48%	2785	0.26%	7	0.22%	6	
SB Culver Boulevard		1	1000	99.48%	995	0.26%	3	0.22%	2	
Lincoln to Culver Ramp	**N/A**	1	1110	99.48%	1104	0.26%	3	0.22%	3	35/35/35
Culver to Lincoln Ramp		1	480	99.48%	478	0.26%	1	0.22%	1	
EB Jefferson Boulevard	**West of Lincoln Boulevard**	4	560	99.48%	557	0.26%	1	0.22%	1	35/35/35
WB Jefferson Boulevard		2	430	99.48%	428	0.26%	1	0.22%	1	
EB Jefferson Boulevard	**East of Lincoln Boulevard**	3	1030	99.48%	1025	0.26%	3	0.22%	3	
WB Jefferson Boulevard		6	1510	99.48%	1502	0.26%	4	0.22%	3	

Notes:

1 - Total volume based on existing peak hour traffic volumes from Lincoln Bridge Multi-Modal Improvement Project TAR, Fehr & Peers, January 2020.

2 - Truck percentages were based on field measurements.

3 - Posted speeds were used for modeling.

Table A-5. Traffic Data for Build 2025 TNM Noise Models

	Segment	Number of Lanes	Total Peak Hour Volume[1]	Auto		Medium Trucks[2]		Heavy Trucks[2]		Speed[3]
				%	Volume	%	Volume	%	Volume	(A/MT/HT), mph
NB Lincoln Boulevard	**South of Jefferson**	6	2870	99.48%	2855	0.26%	7	0.22%	6	45/45/45
SB Lincoln Boulevard		4	1760	99.48%	1751	0.26%	5	0.22%	4	
NB Lincoln Boulevard	**Jefferson to 5510 Lincoln**	4	3810	99.48%	3790	0.26%	10	0.22%	8	
SB Lincoln Boulevard		6	2130	99.48%	2119	0.26%	6	0.22%	5	
NB Lincoln Boulevard	**5510 Lincoln to Culver Ramp**	3	3810	99.48%	3790	0.26%	10	0.22%	8	
SB Lincoln Boulevard		2	2140	99.48%	2129	0.26%	6	0.22%	5	
NB Lincoln Boulevard	**Culver Ramp to Marina Ditch**	3	3040	99.48%	3024	0.26%	8	0.22%	7	
SB Lincoln Boulevard		2	2020	99.48%	2009	0.26%	5	0.22%	4	
NB Lincoln Boulevard	**Marina Ditch to Fiji Way**	5	3050	99.48%	3034	0.26%	8	0.22%	7	
SB Lincoln Boulevard		3	2010	99.48%	2000	0.26%	5	0.22%	4	
NB Culver Boulevard	**South of Lincoln Ramp**	1	1940	99.48%	1930	0.26%	5	0.22%	4	45/45/45
SB Culver Boulevard		1	730	99.48%	726	0.26%	2	0.22%	2	
NB Culver Boulevard	**North of Lincoln Ramp**	3	2770	99.48%	2756	0.26%	7	0.22%	6	
SB Culver Boulevard		1	890	99.48%	885	0.26%	2	0.22%	2	
Lincoln to Culver Ramp	**N/A**	1	1100	99.48%	1094	0.26%	3	0.22%	2	35/35/35
Culver to Lincoln Ramp		1	430	99.48%	428	0.26%	1	0.22%	1	
EB Jefferson Boulevard	**West of Lincoln Boulevard**	4	520	99.48%	517	0.26%	1	0.22%	1	35/35/35
WB Jefferson Boulevard		2	390	99.48%	388	0.26%	1	0.22%	1	
EB Jefferson Boulevard	**East of Lincoln Boulevard**	3	950	99.48%	945	0.26%	2	0.22%	2	
WB Jefferson Boulevard		6	1390	99.48%	1383	0.26%	4	0.22%	3	

Notes:

1 - Total volume based on existing peak hour traffic volumes from Lincoln Bridge Multi-Modal Improvement Project TAR, Fehr & Peers, January 2020.

2 - Truck percentages were based on field measurements.

3 - Posted speeds were used for modeling.

Table A-6. Traffic Data for Build 2045 TNM Noise Models

	Segment	Number of Lanes	Total Peak Hour Volume[1]	Auto		Medium Trucks[2]		Heavy Trucks[2]		Speed[3]
				%	Volume	%	Volume	%	Volume	(A/MT/HT), mph
NB Lincoln Boulevard	**South of Jefferson**	6	2940	99.48%	2925	0.26%	8	0.22%	6	45/45/45
SB Lincoln Boulevard		4	2360	99.48%	2348	0.26%	6	0.22%	5	
NB Lincoln Boulevard	**Jefferson to 5510 Lincoln**	4	3930	99.48%	3910	0.26%	10	0.22%	9	
SB Lincoln Boulevard		6	2880	99.48%	2865	0.26%	7	0.22%	6	
NB Lincoln Boulevard	**5510 Lincoln to Culver Ramp**	3	3930	99.48%	3910	0.26%	10	0.22%	9	
SB Lincoln Boulevard		2	2880	99.48%	2865	0.26%	7	0.22%	6	
NB Lincoln Boulevard	**Culver Ramp to Marina Ditch**	3	3240	99.48%	3223	0.26%	8	0.22%	7	
SB Lincoln Boulevard		2	2710	99.48%	2696	0.26%	7	0.22%	6	
NB Lincoln Boulevard	**Marina Ditch to Fiji Way**	5	3230	99.48%	3213	0.26%	8	0.22%	7	
SB Lincoln Boulevard		3	2710	99.48%	2696	0.26%	7	0.22%	6	
NB Culver Boulevard	**South of Lincoln Ramp**	1	2030	99.48%	2019	0.26%	5	0.22%	4	45/45/45
SB Culver Boulevard		1	830	99.48%	826	0.26%	2	0.22%	2	
NB Culver Boulevard	**North of Lincoln Ramp**	3	2810	99.48%	2795	0.26%	7	0.22%	6	
SB Culver Boulevard		1	1020	99.48%	1015	0.26%	3	0.22%	2	
Lincoln to Culver Ramp	**N/A**	1	1110	99.48%	1104	0.26%	3	0.22%	2	35/35/35
Culver to Lincoln Ramp		1	520	99.48%	517	0.26%	1	0.22%	1	
EB Jefferson Boulevard	**West of Lincoln Boulevard**	4	540	99.48%	537	0.26%	1	0.22%	1	35/35/35
WB Jefferson Boulevard		2	520	99.48%	517	0.26%	1	0.22%	1	
EB Jefferson Boulevard	**East of Lincoln Boulevard**	3	1060	99.48%	1054	0.26%	3	0.22%	2	
WB Jefferson Boulevard		6	1510	99.48%	1502	0.26%	4	0.22%	3	

Notes:

1 - Total volume based on existing peak hour traffic volumes from Lincoln Bridge Multi-Modal Improvement Project TAR, Fehr & Peers, January 2020.

2 - Truck percentages were based on field measurements.

3 - Posted speeds were used for modeling.

Appendix B Future Noise Levels

Table B-1. Predicted Future Noise and Sound Wall Analysis - Alternative 1

Table B-1. Predicted Future Noise and Sound Wall Analysis

Receiver I.D.	Barrier I.D.	Number of Dwelling Units	Land Use[1]	Address	Existing Noise Level L_{eq}(h), dBA[1]	Lincoln Bridge Multi-Modal Improvement Project Future Worst Hour Noise Levels - L_{eq}(h), dBA																														
						Design Year Noise Level without Project	Design Year Noise Level with Project	Design Year Noise Level without Project minus Existing Conditions	Design Year Noise Level with Project minus No Project Conditions	Design Year Noise Level with Project minus Existing Conditions	Activity Category (NAC)	Impact Type[2]	Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receivers (NBR)																							
													6 feet				8 feet				10 feet				12 feet				14 feet				16 feet			
														L_{eq}(h)	I.L.[3]	NBR		L_{eq}(h)	I.L.[3]	NBR		L_{eq}(h)	I.L.[3]	NBR		L_{eq}(h)	I.L.[3]	NBR		L_{eq}(h)	I.L.[3]	NBR		L_{eq}(h)	I.L.[3]	NBR
R1-g	NB-1	6	MFR	13175A Fountain Park Drive	68	68	70	0	2	2	B (67)	A/E	--	68	2	--	--	66	4	--	--	65	5	6	T	64	6	6	T	64	6	6	T	63	7	6
R2-g	NB-1	4	MFR	13175A Fountain Park Drive	68	68	71	0	3	3	B (67)	A/E	--	68	3	--	--	67	4	--	--	66	5	4	T	66	5	4	T	65	6	4	T	65	6	4
R3-g	NB-1	6	MFR	13175A Fountain Park Drive	67	68	71	1	3	4	B (67)	A/E	--	69	2	--	--	69	2	--	--	69	2	--	--	69	2	--	--	69	2	--	--	69	2	--
R4-g	No Barrier	4	MFR	13175A Fountain Park Drive	62	63	64	1	1	2	B (67)	None	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R5-g	No Barrier	4	MFR	13163B Fountain Park Drive	60	61	62	1	1	2	B (67)	None	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R6-g	No Barrier	4	MFR	13163B Fountain Park Drive	58	59	60	1	1	2	B (67)	None	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R7-g	No Barrier	4	MFR	13151C Fountain Park Drive	57	57	58	0	1	1	B (67)	None	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R8-g	No Barrier	4	MFR	13151C Fountain Park Drive	55	56	57	1	1	2	B (67)	None	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R9	No Barrier	0	Pool	13175A Fountain Park Drive	52	53	53	1	0	1	C (67)	None	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R10	No Barrier	0	Pool	5389D Playa Vista Drive	43	43	44	0	1	1	C (67)	None	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R11	No Barrier	0	Park	13141 Fountain Park Drive	54	54	55	0	1	1	C (67)	None	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R12	No Barrier	0	Park	Culver Marina Baseball Field	58	58	59	0	1	1	C (67)	None	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R13	No Barrier	0	Pool	Villa San Remo	46	46	47	0	1	1	C (67)	None	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R14	No Barrier	0	Pool	Villa San Remo	46	46	46	0	0	0	C (67)	None	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R1-u	NB-1	6	MFR	13175A Fountain Park Drive	70	70	72	0	2	2	B (67)	A/E	--	71	1	--	--	70	2	--	--	69	3	--	--	67	5	6	--	66	6	6	--	65	7	6
R2-u	NB-1	4	MFR	13175A Fountain Park Drive	70	70	72	0	2	2	B (67)	A/E	--	71	1	--	--	70	2	--	--	69	3	--	--	68	4	4	--	67	5	4	--	66	6	4
R3-u	NB-1	6	MFR	13175A Fountain Park Drive	70	70	72	0	2	2	B (67)	A/E	--	71	1	--	--	71	2	--	--	70	2	--	--	70	2	--	T	70	2	--	T	70	2	--
R4-u	No Barrier	4	MFR	13175A Fountain Park Drive	63	64	65	1	1	2	B (67)	None	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R5-u	No Barrier	4	MFR	13163B Fountain Park Drive	62	62	63	0	1	1	B (67)	None	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R6-u	No Barrier	4	MFR	13163B Fountain Park Drive	59	60	61	1	1	2	B (67)	None	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R7-u	No Barrier	4	MFR	13151C Fountain Park Drive	58	59	59	1	0	1	B (67)	None	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R8-u	No Barrier	4	MFR	13151C Fountain Park Drive	56	57	57	1	0	1	B (67)	None	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:
1. SFR = Single Family Residence, MFR = Multiple Family Residence. g-ground floor; u-upper floor
2. Impact types: A/E - Future noise conditions approach (within 1 dBA) or exceed the Noise Abatement Criteria (NAC).
3. I.L. = Insertion Loss
4. T=Breaks the truck line of sight with an exhaust height of 11.5 feet

Appendix C Barrier Analysis

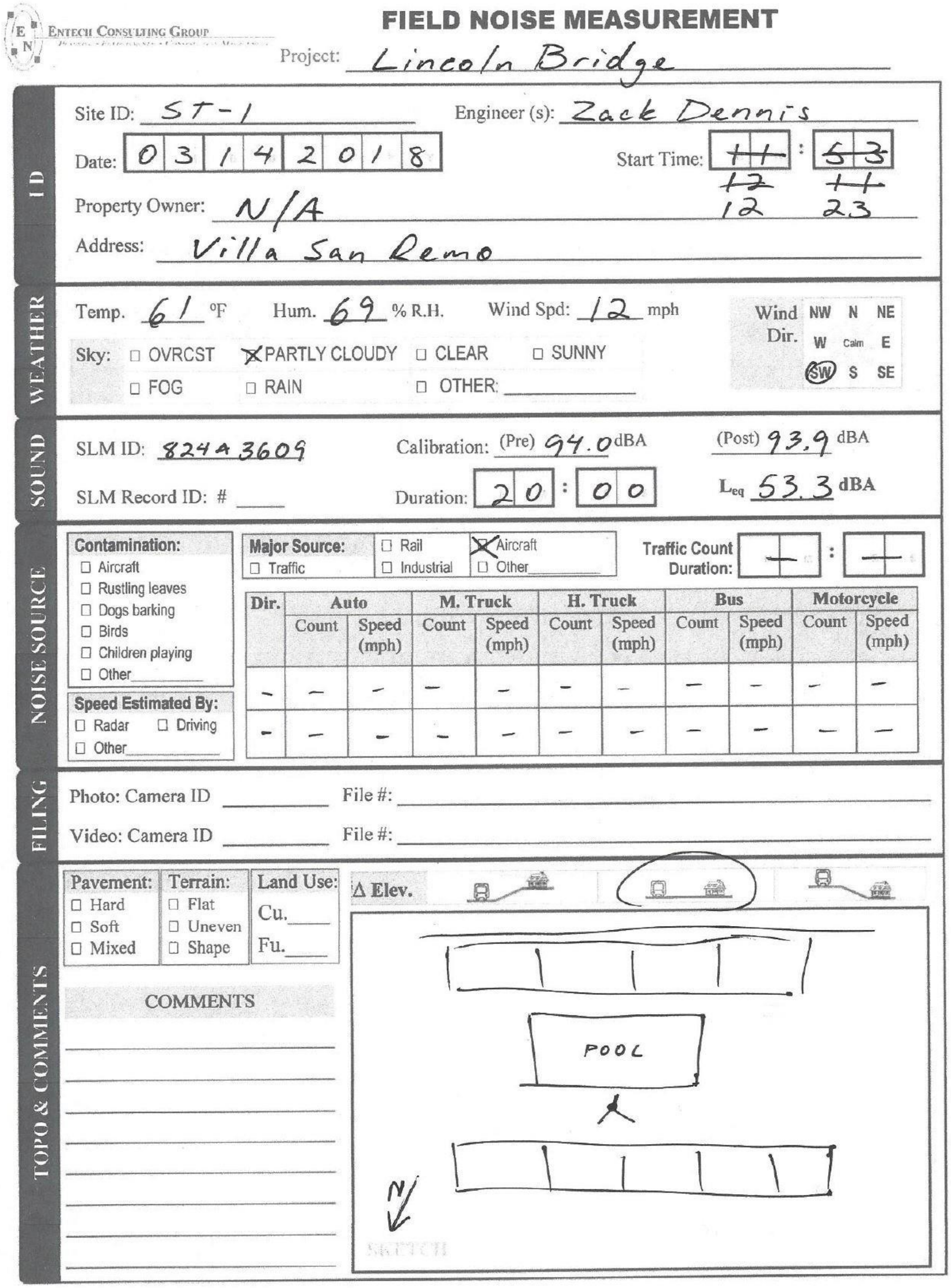
Table C-1. Analysis of Barrier NB-1

	Position						Total Number of Benefited Receptors
	R1	R2	R3	R1-u	R2-u	R3-u	
Number of Units Represented	6	4	6	6	4	6	
Existing Traffic Noise Level (dBA L_{eq}[h])	**68**	**68**	**67**	**70**	**70**	**70**	
Design Year with Project Traffic Noise Level (dBA L_{eq}[h])	**70**	**71**	**71**	**72**	**72**	**72**	
Design Year with Project minus Existing Traffic Noise Level (dBA L_{eq}[h])	+2	+3	+4	+2	+2	+3	
6-Foot Barrier							
Design Year with Project Traffic Noise Level (dBA L_{eq}[h])	**68**	**68**	**69**	**71**	**71**	**71**	
Predicted Noise Reduction (dB)	-2	-2	-1	-1	-1	-1	
Number of Benefited Receptors							
8-Foot Barrier							
Design Year with Project Traffic Noise Level (dBA L_{eq}[h])	**66**	**67**	**69**	**70**	**70**	**71**	
Predicted Noise Reduction (dB)	-4	-4	-2	-2	-2	-1	
Number of Benefited Receptors							
10-Foot Barrier							
Design Year with Project Traffic Noise Level (dBA L_{eq}[h])	65	**66**	**69**	**69**	**71**	**70**	
Predicted Noise Reduction (dB)	-5	-4	-2	-3	-3	-2	
Number of Benefited Receptors							10
12-Foot Barrier[b]							
Design Year with Project Traffic Noise Level (dBA L_{eq}[h])	64	65	**69**	**70**	**70**	**70**	
Predicted Noise Reduction (dB)	-6	-4	-2	-5	-4	-2	
Number of Benefited Receptors							20
14-Foot Barrier[b]							
Design Year with Project Traffic Noise Level (dBA L_{eq}[h])	64	65	**69**	**66**	**67**	**70**	
Predicted Noise Reduction (dB)	-6	-5	-2	-6	-5	-2	
Number of Benefited Receptors							20
16-Foot Barrier[b]							
Design Year with Project Traffic Noise Level (dBA L_{eq}[h])	63	65	**69**	**65**	**66**	**70**	
Predicted Noise Reduction (dB)	-7	-5	-2	-7	-6	-2	
Number of Benefited Receptors							20

[a] Traffic noise levels that approach or exceed 67 dBA L_{eq}(h) are shown in bold.

[b] 12-foot-high barrier breaks the line of sight to an 11.5-foot truck stack.

Appendix D Field Data Sheets



Entech Consulting Group

FIELD NOISE MEASUREMENT

Project: Lincoln Bridge

ID

Site ID: ST-1

Engineer (s): Zack Dennis

Date: 0 3 1 4 2 0 1 8

Start Time: ~~1 1~~ : ~~5 3~~
~~12~~ ~~11~~
12 23

Property Owner: N/A

Address: Villa San Remo

WEATHER

Temp. 61 °F

Hum. 69 % R.H.

Wind Spd: 12 mph

Sky: ☐ OVRCST ☒ PARTLY CLOUDY ☐ CLEAR ☐ SUNNY ☐ FOG ☐ RAIN ☐ OTHER: ______

Wind Dir.: NW N NE W Calm E [✓ SW] S SE

SOUND

SLM ID: 824A 3609

Calibration: (Pre) 94.0 dBA (Post) 93.9 dBA

SLM Record ID: # ____

Duration: 2 0 : 0 0

L_{eq} 53.3 dBA

NOISE SOURCE

Contamination:
- ☐ Aircraft
- ☐ Rustling leaves
- ☐ Dogs barking
- ☐ Birds
- ☐ Children playing
- ☐ Other______

Speed Estimated By:
- ☐ Radar ☐ Driving
- ☐ Other______

Major Source: ☐ Traffic ☐ Rail ☐ Industrial ☒ Aircraft ☐ Other______

Traffic Count Duration: – : –

Dir.	Auto		M. Truck		H. Truck		Bus		Motorcycle	
	Count	Speed (mph)	Count	Speed (mph)	Count	Speed (mph)	Count	Speed (mph)	Count	Speed (mph)
–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–

FILING

Photo: Camera ID ______ File #: ______

Video: Camera ID ______ File #: ______

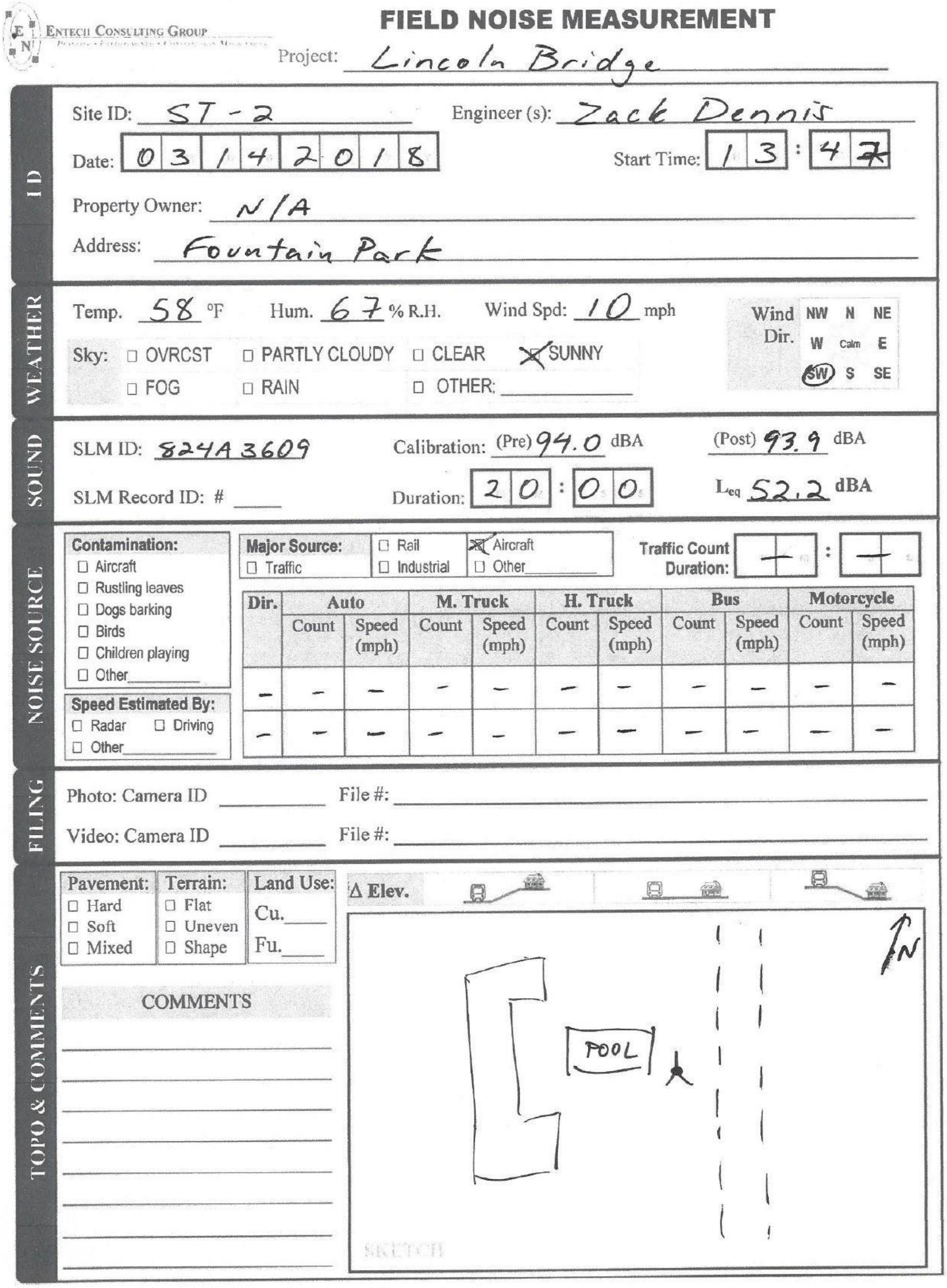
TOPO & COMMENTS

Pavement: ☐ Hard ☐ Soft ☐ Mixed

Terrain: ☐ Flat ☐ Uneven ☐ Shape

Land Use: Cu.____ Fu.____

COMMENTS



ENTECH CONSULTING GROUP

FIELD NOISE MEASUREMENT

Project: Lincoln Bridge

ID

Site ID: ST-2 Engineer (s): Zack Dennis

Date: 03/14/2018 Start Time: 13:47

Property Owner: N/A

Address: Fountain Park

WEATHER

Temp. 58 °F Hum. 67 % R.H. Wind Spd: 10 mph

Sky: ☐ OVRCST ☐ PARTLY CLOUDY ☐ CLEAR ☒ SUNNY ☐ FOG ☐ RAIN ☐ OTHER: ____

Wind Dir.: NW N NE W Calm E [✓ SW] S SE

SOUND

SLM ID: 824A 3609 Calibration: (Pre) 94.0 dBA (Post) 93.9 dBA

SLM Record ID: # ____ Duration: 20:00 Leq 52.2 dBA

NOISE SOURCE

Contamination:
- ☐ Aircraft
- ☐ Rustling leaves
- ☐ Dogs barking
- ☐ Birds
- ☐ Children playing
- ☐ Other____

Major Source: ☐ Traffic ☐ Rail ☐ Industrial ☒ Aircraft ☐ Other____

Traffic Count Duration: – : –

Dir.	Auto		M. Truck		H. Truck		Bus		Motorcycle	
	Count	Speed (mph)	Count	Speed (mph)	Count	Speed (mph)	Count	Speed (mph)	Count	Speed (mph)
–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–

Speed Estimated By: ☐ Radar ☐ Driving ☐ Other____

FILING

Photo: Camera ID ____ File #: ____

Video: Camera ID ____ File #: ____

TOPO & COMMENTS

Pavement: ☐ Hard ☐ Soft ☐ Mixed

Terrain: ☐ Flat ☐ Uneven ☐ Shape

Land Use: Cu.____ Fu.____

Δ Elev.

COMMENTS

ENTECH CONSULTING GROUP

FIELD NOISE MEASUREMENT

Project: Lincoln Bridge

I D

Site ID: ST-3

Engineer (s): Zack Dennis

Date: 03/14/2018

Start Time: 13:21

Property Owner: N/A

Address: Fountain Park

WEATHER

Temp. 61 °F

Hum. 69 % R.H.

Wind Spd: 12 mph

Wind Dir.: NW N NE / W Calm E / [✓ SW] S SE

Sky: ☐ OVRCST ☐ PARTLY CLOUDY ☐ CLEAR ☒ SUNNY ☐ FOG ☐ RAIN ☐ OTHER: ______

SOUND

SLM ID: 82443609

Calibration: (Pre) 94.0 dBA (Post) 93.9 dBA

SLM Record ID: # ____

Duration: 20:00

L_{eq} 51.6 dBA

NOISE SOURCE

Contamination:
- ☐ Aircraft
- ☐ Rustling leaves
- ☐ Dogs barking
- ☐ Birds
- ☐ Children playing
- ☐ Other______

Speed Estimated By:
- ☐ Radar ☐ Driving
- ☐ Other______

Major Source: ☐ Traffic ☐ Rail ☐ Industrial ☒ Aircraft ☐ Other______

Traffic Count Duration: — : —

Dir.	Auto		M. Truck		H. Truck		Bus		Motorcycle	
	Count	Speed (mph)	Count	Speed (mph)	Count	Speed (mph)	Count	Speed (mph)	Count	Speed (mph)
–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–

FILING

Photo: Camera ID ________ File #: ________

Video: Camera ID ________ File #: ________

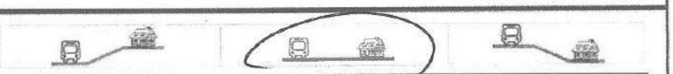
TOPO & COMMENTS

Pavement: ☐ Hard ☐ Soft ☐ Mixed

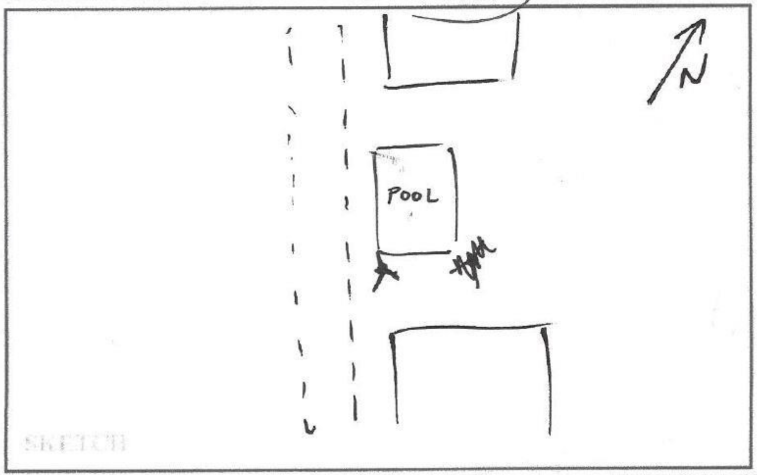
Terrain: ☐ Flat ☐ Uneven ☐ Shape

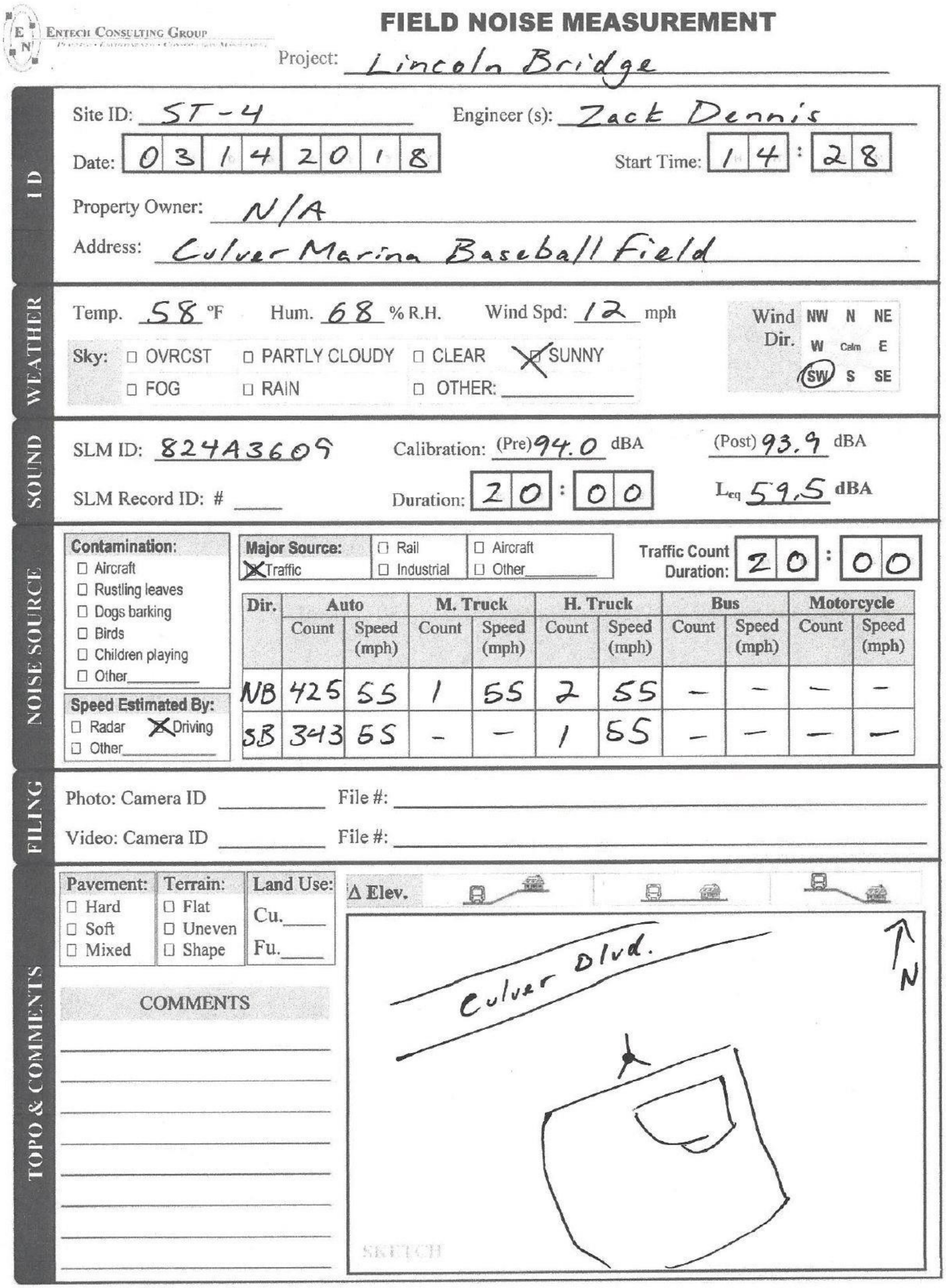
Land Use: Cu.____ Fu.____

Δ Elev.



COMMENTS





Entech Consulting Group

FIELD NOISE MEASUREMENT

Project: Lincoln Bridge

I D

Site ID: ST-4 Engineer (s): Zack Dennis

Date: 03 14 2018 Start Time: 14 : 28

Property Owner: N/A

Address: Culver Marina Baseball Field

WEATHER

Temp. 58 °F Hum. 68 % R.H. Wind Spd: 12 mph

Sky: ☐ OVRCST ☐ PARTLY CLOUDY ☐ CLEAR ☒ SUNNY ☐ FOG ☐ RAIN ☐ OTHER: ____

Wind Dir. NW N NE W Calm E [✓ SW] S SE

SOUND

SLM ID: 824A3609 Calibration: (Pre) 94.0 dBA (Post) 93.9 dBA

SLM Record ID: # ____ Duration: 20 : 00 L_{eq} 59.5 dBA

NOISE SOURCE

Contamination:
- ☐ Aircraft
- ☐ Rustling leaves
- ☐ Dogs barking
- ☐ Birds
- ☐ Children playing
- ☐ Other____

Speed Estimated By:
- ☐ Radar
- ☒ Driving
- ☐ Other____

Major Source: ☒ Traffic ☐ Rail ☐ Industrial ☐ Aircraft ☐ Other____

Traffic Count Duration: 20 : 00

Dir.	Auto		M. Truck		H. Truck		Bus		Motorcycle	
	Count	Speed (mph)	Count	Speed (mph)	Count	Speed (mph)	Count	Speed (mph)	Count	Speed (mph)
NB	425	55	1	55	2	55	-	-	-	-
SB	343	55	-	-	1	55	-	-	-	-

FILING

Photo: Camera ID ____ File #: ____

Video: Camera ID ____ File #: ____

TOPO & COMMENTS

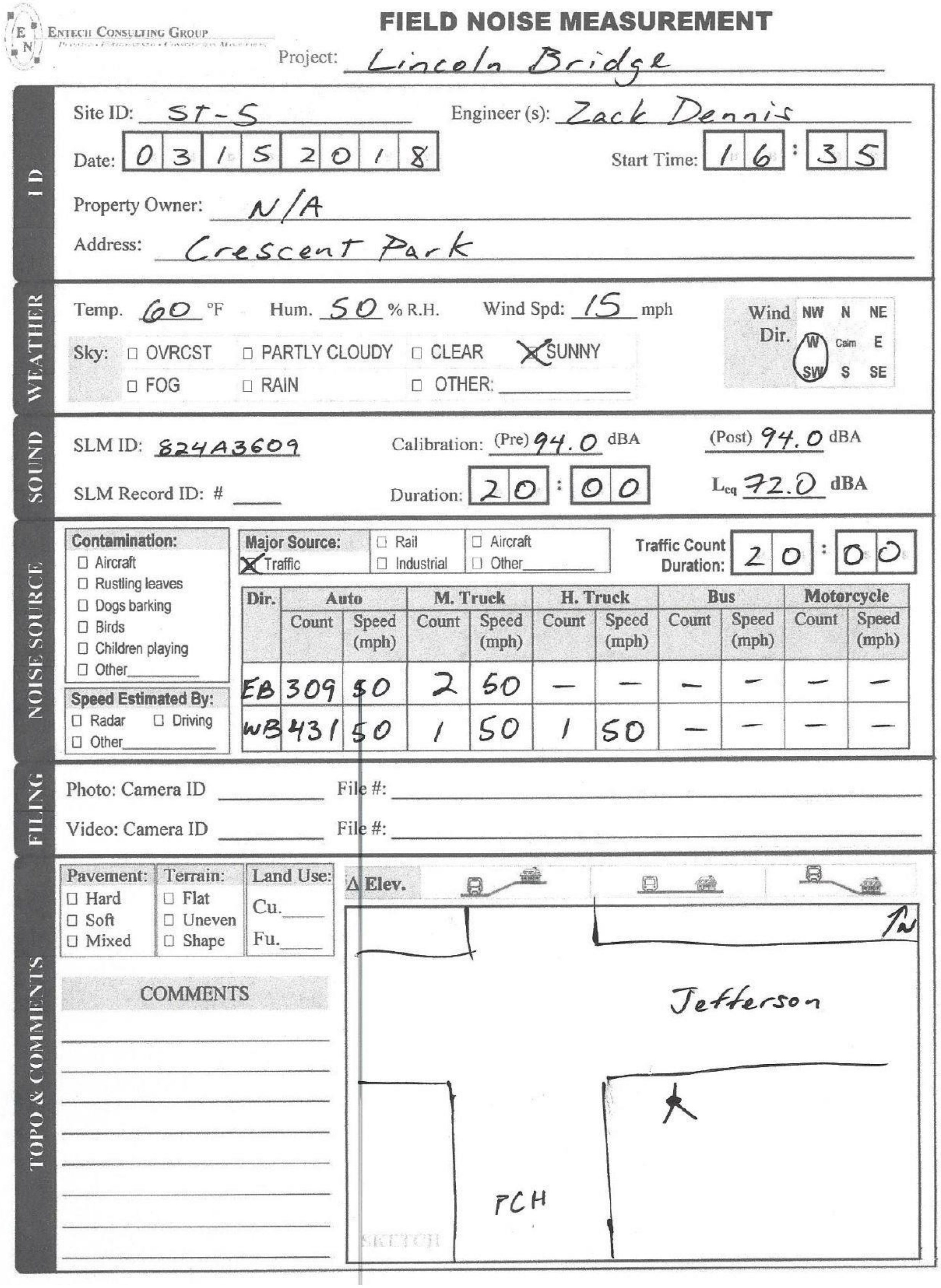
Pavement: ☐ Hard ☐ Soft ☐ Mixed

Terrain: ☐ Flat ☐ Uneven ☐ Shape

Land Use: Cu.____ Fu.____

Δ Elev.

COMMENTS



Entech Consulting Group

FIELD NOISE MEASUREMENT

Project: Lincoln Bridge

I D

Site ID: ST-5

Engineer (s): Zack Dennis

Date: 03 15 2018

Start Time: 16 : 35

Property Owner: N/A

Address: Crescent Park

WEATHER

Temp. 60 °F Hum. 50 % R.H. Wind Spd: 15 mph

Sky: ☐ OVRCST ☐ PARTLY CLOUDY ☐ CLEAR ☒ SUNNY ☐ FOG ☐ RAIN ☐ OTHER: ______

Wind Dir.: NW N NE [✓ W] Calm E [✓ SW] S SE

SOUND

SLM ID: 824A3609

Calibration: (Pre) 94.0 dBA (Post) 94.0 dBA

SLM Record ID: # ____

Duration: 20 : 00

L_{eq} 72.0 dBA

NOISE SOURCE

Contamination:
- ☐ Aircraft
- ☐ Rustling leaves
- ☐ Dogs barking
- ☐ Birds
- ☐ Children playing
- ☐ Other______

Major Source: ☒ Traffic ☐ Rail ☐ Industrial ☐ Aircraft ☐ Other______

Traffic Count Duration: 20 : 00

Speed Estimated By: ☐ Radar ☐ Driving ☐ Other______

Dir.	Auto		M. Truck		H. Truck		Bus		Motorcycle	
	Count	Speed (mph)	Count	Speed (mph)	Count	Speed (mph)	Count	Speed (mph)	Count	Speed (mph)
EB	309	50	2	50	—	—	—	—	—	—
WB	431	50	1	50	1	50	—	—	—	—

FILING

Photo: Camera ID ______ File #: ______

Video: Camera ID ______ File #: ______

TOPO & COMMENTS

Pavement: ☐ Hard ☐ Soft ☐ Mixed

Terrain: ☐ Flat ☐ Uneven ☐ Shape

Land Use: Cu.____ Fu.____

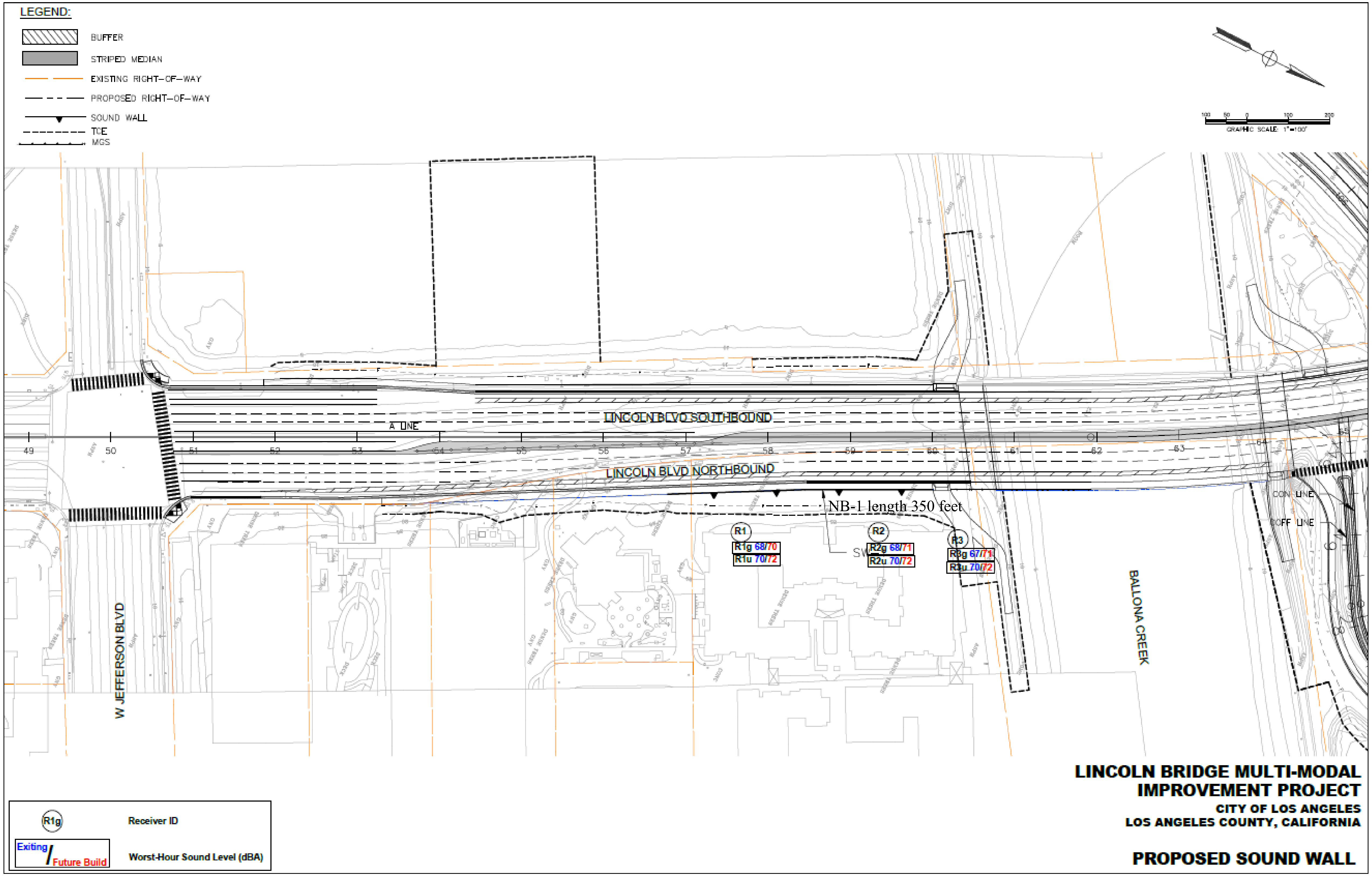
Δ Elev.

COMMENTS

Appendix E TNM Inputs

TNM Files Provided Digitally

Appendix F Proposed Sound Wall Location


LEGEND:
BUFFER
STRIPED MEDIAN
EXISTING RIGHT-OF-WAY
PROPOSED RIGHT-OF-WAY
SOUND WALL
TOE
MGS
GRAPHIC SCALE: 1"=100'
100
50
0
100
200
LINCOLN BLVD SOUTHBOUND
LINCOLN BLVD NORTHBOUND
A LINE
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
CON LINE
OFF LINE
NB-1 length 350 feet
R1
R1g 68/70
R1u 70/72
R2
R2g 68/71
R2u 70/72
R3
R3g 67/71
R3u 70/72
SW
BALLONA CREEK
W JEFFERSON BLVD
R1g
Receiver ID
Exiting/Future Build
Worst-Hour Sound Level (dBA)
LINCOLN BRIDGE MULTI-MODAL IMPROVEMENT PROJECT
CITY OF LOS ANGELES
LOS ANGELES COUNTY, CALIFORNIA
PROPOSED SOUND WALL