Appendix L

Noise Impact Analysis, Urban Crossroads, October 15, 2019

Lake Street / I-15 Property

NOISE IMPACT ANALYSIS

CITY OF LAKE ELSINORE

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LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
ANSI	American National Standards Institute
Calveno	California Vehicle Noise
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dBA	A-weighted decibels
EA	Existing plus Ambient Growth
EAC	EA plus Cumulative
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
I-15	Interstate 15
INCE	Institute of Noise Control Engineering
L_{eq}	Equivalent continuous (average) sound level
L_{max}	Maximum level measured over the time interval
L_{min}	Minimum level measured over the time interval
mph	Miles per hour
PPV	Peak Particle Velocity
Project	Lake Street / I-15 Property
REMEL	Reference Energy Mean Emission Level
RMS	Root-mean-square
VdB	Vibration Decibels

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EXECUTIVE SUMMARY

Urban Crossroads, Inc. has prepared this noise study to determine the noise exposure and the necessary noise mitigation measures for the proposed Lake Street / I-15 Property development ("Project"). The Project site is located east of Lake Street and south of Interstate 15 (I-15) in the City of Lake Elsinore. The Project is proposed to consist of a gas station, indoor and outdoor RV storage, and self-storage buildings. This study has been prepared to satisfy applicable City of Lake Elsinore noise standards and significance criteria based on guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1) In addition, since the Project site is located adjacent to potentially suitable habitat areas for least Bell's vireo, to the east and south, Project-related noise levels are also evaluated based on a 65 dBA L_{eq} threshold established in the *LEAP 2018-02/Lake Street Storage Project MSHCP Consistency Findings*. (2)

OFF-SITE TRAFFIC NOISE ANALYSIS

Traffic generated by the operation of the proposed Project will influence the traffic noise levels in surrounding off-site areas. To quantify the traffic noise increases on the surrounding off-site areas, the changes in traffic noise levels on eight roadway segments surrounding the Project site were calculated based on the change in the average daily traffic (ADT) volumes. The traffic noise levels provided in this analysis are based on the traffic forecasts found in the *Lake Street / I-15 Property Traffic Impact Analysis* prepared by Urban Crossroads, Inc. (3) To assess the off-site noise level impacts associated with the proposed Project, noise contour boundaries were developed for Existing (2017), Existing plus Ambient (EA) 2018, EA plus Cumulative (EAC) 2018, and Horizon Year 2035 traffic conditions. The analysis shows that the Project-related traffic noise level increases under all traffic scenarios will be *less than significant*.

PROJECT BUILDING NOISE ATTENUATION

Existing noise levels south of the Project site adjacent to the potentially suitable habitat area approach 67.8 dBA CNEL (measurement location L2) and are largely influenced by existing traffic noise levels on I-15 and Lake Street. With the construction of the proposed Project buildings, noise levels at this location are anticipated to benefit from the barrier attenuation provided by the buildings themselves. The FHWA indicates that a noise barrier is most effective when placed close to the noise source or receiver, and it must be high enough and long enough to block the path of the noise source. (4) While not a continuous noise barrier, the Project buildings would be expected to provide up to 4.5 dBA CNEL of barrier attenuation within the shadow zone of each building, or the area being shielded, based on guidance for the first row of intervening buildings provided by the Federal Transit Administration. (5) As such, the Project buildings are anticipated to provide barrier attenuation for the sensitive habitat area south of the Project site, where receiver locations are shielded by the buildings themselves.

OPERATIONAL NOISE ANALYSIS

Using reference noise levels to represent the potential noise sources within the Lake Street / I-15 Property site, this analysis estimates the Project-related operational (stationary-source) noise levels at the nearby noise-sensitive receiver locations, including the adjacent least Bell's vireo potential habitat areas. The Project-related operational noise sources are expected to include: roof-top air conditioning units, gas station activity, RV storage/parking activity, and vehicle washing (e.g., pressure washers) activity.

The analysis shows that the Project-related operational noise levels will satisfy the exterior noise level thresholds at all receiver locations. Further, this analysis demonstrates that the Project will contribute a *less than significant* operational noise level increase over the existing ambient noise environment at all nearby sensitive receiver locations. Therefore, the operational noise level impacts associated with the proposed Project activities, such as the roof-top air conditioning units, gas station activity, RV storage/parking activity, and vehicle washing (e.g., pressure washers) activity will be *less than significant*.

CONSTRUCTION NOISE ANALYSIS

Construction-related noise impacts are expected to create temporary and intermittent high-level noise conditions at receivers surrounding the Project site. Using sample reference noise levels to represent the planned construction activities of the Lake Street / I-15 Property site, this analysis estimates the Project-related construction noise levels at nearby sensitive receiver locations. The Project-related short-term construction noise levels are expected to approach 60.2 dBA L_{eq} which are below the 65 dBA L_{eq} threshold identified for the adjacent potentially sensitive habitat areas. Moreover, construction noise levels at the closest non-noise sensitive locations in the City of Lake Elsinore are shown to approach 46.0 dBA L_{max} and will remain below the City of Lake Elsinore Municipal Code 80 dBA L_{max} threshold for general commercial land use at receiver location R5. Therefore, based on the results of this analysis, all nearby sensitive receiver locations will experience *less than significant* impacts due to Project construction noise levels.

The construction noise analysis presents a conservative approach with the highest noise-level-producing equipment for each stage of Project construction operating at the closest point from construction activity to the nearby sensitive receiver locations. This scenario is unlikely to occur during typical construction activities and likely overstates the construction noise levels which will be experienced at each receiver location.

CONSTRUCTION VIBRATION ANALYSIS

Based on the reference vibration levels provided by the Federal Transit Administration (FTA), Project-related construction vibration velocity levels are expected to approach 0.009 in/sec root-mean-square (RMS) at the nearby receiver locations at distances ranging from 91 to 1,104 feet. Based on the City of Lake Elsinore vibration threshold of 0.01 in/sec RMS, the construction-related vibration impacts are considered *less than significant.*

Further, vibration levels at the site of the closest sensitive receiver are unlikely to be sustained during the entire construction period but will occur rather only during the times that heavy construction equipment is operating at the Project site perimeter.

SUMMARY OF SIGNIFICANCE FINDINGS

The results of this Lake Street / I-15 Property Noise Impact Analysis are summarized below based on the significance criteria in Section 4 of this report. Table ES-1 shows the findings of significance for each potential noise and/or vibration impact before and after any required mitigation measures.

TABLE ES-1: SUMMARY OF SIGNIFICANCE FINDINGS

Analysis	Report Section	Significance Findings	
		Unmitigated	Mitigated
Off-Site Traffic Noise	7	*Less Than Significant*	-
Operational Noise	10	*Less Than Significant*	-
Construction Noise	11	*Less Than Significant*	-
Construction Vibration		*Less Than Significant*	-

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1 INTRODUCTION

This noise analysis has been completed to determine the noise impacts associated with the development of the proposed Lake Street / I-15 Property ("Project"). This noise study briefly describes the proposed Project, provides information regarding noise fundamentals, describes the local regulatory setting, provides the study methods and procedures for traffic noise analysis, and evaluates the future exterior noise environment. In addition, this study includes an analysis of the potential Project-related long-term operational and short-term construction noise impacts.

1.1 SITE LOCATION

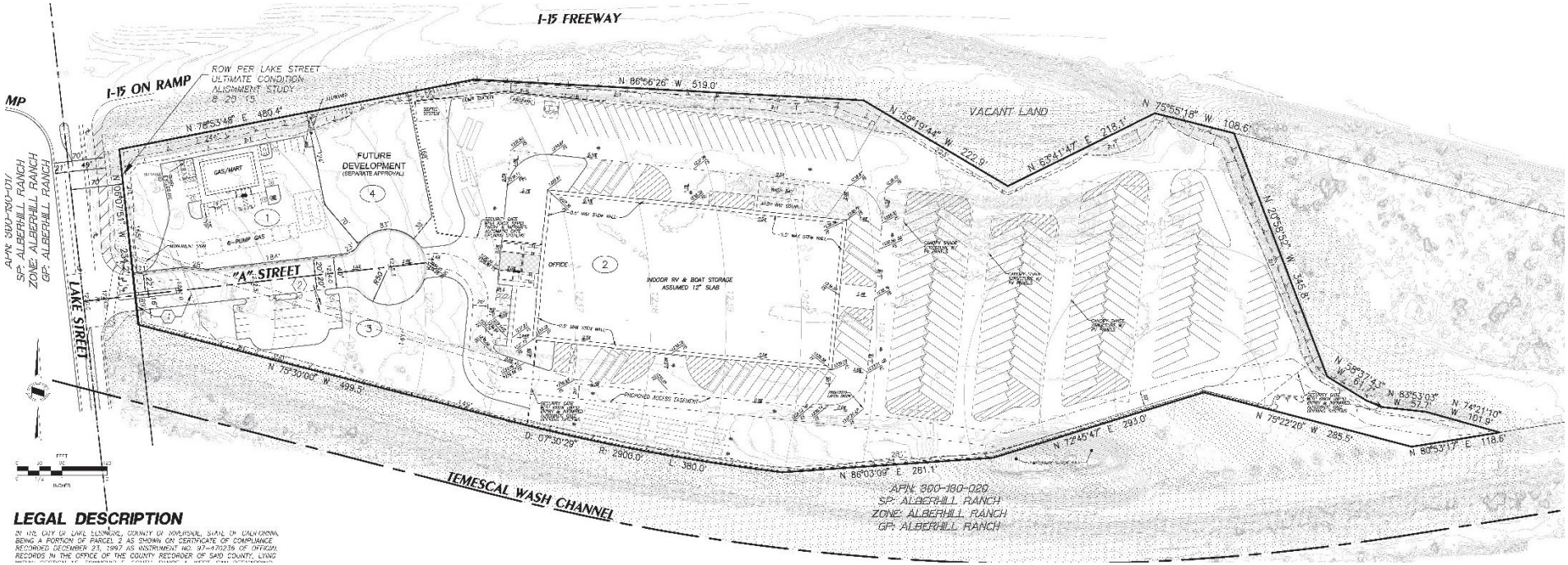
The proposed Lake Street / I-15 Property Project is located east of Lake Street and south of Interstate 15 (I-15) in the City of Lake Elsinore, as shown on Exhibit 1-A. Potentially sensitive least Bell's vireo habitat areas are located east and south of the Project site.

1.2 PROJECT DESCRIPTION

The site plan includes indoor RV and Boat Storage facility of approximately 80,000 square feet, 3,528 square feet of gas station/mini mart use and outdoor RV storage of 192 spaces as shown on Exhibit 1-B. The on-site Project-related operational noise sources are expected to include: roof-top air conditioning units, gas station activity, RV storage/parking activity, and vehicle washing (e.g., pressure washers) activity.

EXHIBIT 1-A: LOCATION MAP

EXHIBIT 1-B: SITE PLAN



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2 FUNDAMENTALS

Noise has been simply defined as "unwanted sound." Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm or when it has adverse effects on health. Noise is measured on a logarithmic scale of sound pressure level known as a decibel (dB). A-weighted decibels (dBA) approximate the subjective response of the human ear to broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear. Exhibit 2-A presents a summary of the typical noise levels and their subjective loudness and effects that are described in more detail below.

EXHIBIT 2-A: TYPICAL NOISE LEVELS

COMMON OUTDOOR ACTIVITIES	COMMON INDOOR ACTIVITIES	A - WEIGHTED SOUND LEVEL dBA	SUBJECTIVE LOUDNESS	EFFECTS OF NOISE
THRESHOLD OF PAIN		140	INTOLERABLE OR DEAFENING	HEARING LOSS
NEAR JET ENGINE		130		
		120		
JET FLY-OVER AT 300m (1000 ft)	ROCK BAND	110		
LOUD AUTO HORN		100	VERY NOISY	
GAS LAWN MOWER AT 1m (3 ft)		90		
DIESEL TRUCK AT 15m (50 ft), at 80 km/hr (50 mph)	FOOD BLENDER AT 1m (3 ft)	80		SPEECH INTERFERENCE
NOISY URBAN AREA, DAYTIME	VACUUM CLEANER AT 3m (10 ft)	70	LOUD	
HEAVY TRAFFIC AT 90m (300 ft)	NORMAL SPEECH AT 1m (3 ft)	60		
QUIET URBAN DAYTIME	LARGE BUSINESS OFFICE	50	MODERATE	SLEEP DISTURBANCE
QUIET URBAN NIGHTTIME	THEATER, LARGE CONFERENCE ROOM (BACKGROUND)	40		
QUIET SUBURBAN NIGHTTIME	LIBRARY	30	FAINT	NO EFFECT
QUIET RURAL NIGHTTIME	BEDROOM AT NIGHT, CONCERT HALL (BACKGROUND)	20		
	BROADCAST/RECORDING STUDIO	10	VERY FAINT	
LOWEST THRESHOLD OF HUMAN HEARING	LOWEST THRESHOLD OF HUMAN HEARING	0		

Source: Environmental Protection Agency Office of Noise Abatement and Control, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (EPA/ONAC 550/9-74-004) March 1974.

2.1 RANGE OF NOISE

Since the range of intensities that the human ear can detect is so large, the scale frequently used to measure intensity is a scale based on multiples of 10, the logarithmic scale. The scale for measuring intensity is the decibel scale. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud. (7) The most common sounds vary between 40 dBA (very quiet) to 100 dBA (very loud). Normal conversation at three feet is roughly at 60 dBA, while loud jet engine noises equate to 110 dBA

at approximately 100 feet, which can cause serious discomfort. (8) Another important aspect of noise is the duration of the sound and the way it is described and distributed in time.

2.2 NOISE DESCRIPTORS

Environmental noise descriptors are generally based on averages, rather than instantaneous, noise levels. The most commonly used figure is the equivalent level (Leq). Equivalent sound levels are not measured directly but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (Leq) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period and is commonly used to describe the "average" noise levels within the environment.

Peak hour or average noise levels, while useful, do not completely describe a given noise environment. Noise levels lower than peak hour may be disturbing if they occur during times when quiet is most desirable, namely evening and nighttime (sleeping) hours. To account for this, the Community Noise Equivalent Level (CNEL), representing a composite 24-hour noise level is utilized. The CNEL is the weighted average of the intensity of a sound, with corrections for time of day, and averaged over 24 hours. The time of day corrections require the addition of 5 decibels to dBA Leq sound levels in the evening from 7:00 p.m. to 10:00 p.m., and the addition of 10 decibels to dBA Leq sound levels at night between 10:00 p.m. and 7:00 a.m. These additions are made to account for the noise sensitive time periods during the evening and night hours when sound appears louder. CNEL does not represent the actual sound level heard at any time, but rather represents the total sound exposure. The City of Lake Elsinore relies on the 24-hour CNEL level to assess land use compatibility with transportation related noise sources.

2.3 SOUND PROPAGATION

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

2.3.1 GEOMETRIC SPREADING

Sound from a localized source (i.e., a stationary point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source. (7)

2.3.2 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 ft. 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 dB 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 dB per doubling of distance from a line source. (4)

2.3.3 ATMOSPHERIC EFFECTS

Receivers located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects. (7)

2.3.4 SHIELDING

A large object or barrier 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 source. Shielding by trees and other such vegetation typically only has an "out of sight, out of mind" effect. That is, the perception of noise impact tends to decrease when vegetation blocks the line-of-sight to nearby resident. However, for vegetation to provide a substantial, or even noticeable, noise reduction, the vegetation area must be at least 15 feet in height, 100 feet wide and dense enough to completely obstruct the line-of sight between the source and the receiver. This size of vegetation may provide up to 5 dBA of noise reduction. The FHWA does not consider the planting of vegetation to be a noise abatement measure. (4)

2.4 NOISE CONTROL

Noise control is the process of obtaining an acceptable noise environment for an observation point or receiver by controlling the noise source, transmission path, receiver, or all three. This concept is known as the source-path- receiver concept. In general, noise control measures can be applied to these three elements.

2.5 NOISE BARRIER ATTENUATION

Effective noise barriers can reduce noise levels by 10 to 15 dBA, cutting the loudness of traffic noise in half. A noise barrier is most effective when placed close to the noise source or receiver. Noise barriers, however, do have limitations. For a noise barrier to work, it must be high enough and long enough to block the path of the noise source. (4)

2.6 LAND USE COMPATIBILITY WITH NOISE

Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches, and residences are more sensitive to noise intrusion than are commercial or industrial developments and related activities. As ambient noise levels affect the perceived amenity or livability of a development, so too can the mismanagement of noise impacts impair the economic health and growth potential of a community by reducing the area's desirability as a place to live, shop and work. For this reason, land use compatibility with the noise environment is an important consideration in the planning and design process. The FHWA encourages State and Local government to regulate land development in such a way that noise-sensitive land uses are either prohibited from being located adjacent to a highway, or that the developments are planned, designed, and constructed in such a way that noise impacts are minimized. (9)

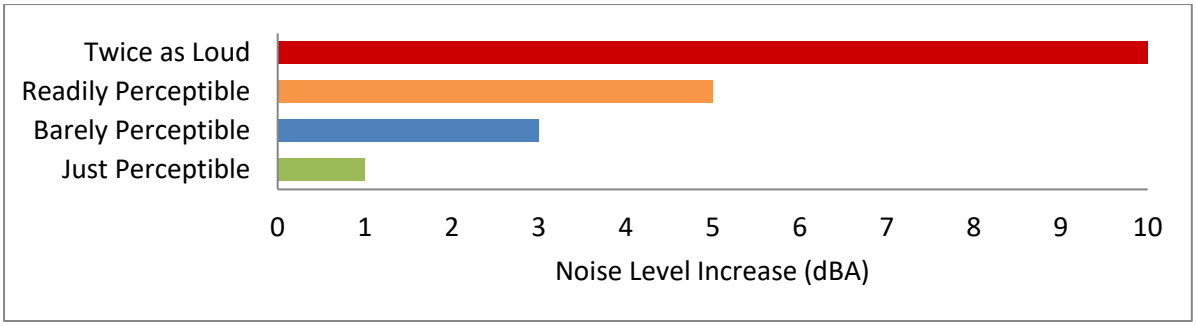
2.7 COMMUNITY RESPONSE TO NOISE

Community responses to noise may range from registering a complaint by telephone or letter, to initiating court action, depending upon everyone's susceptibility to noise and personal attitudes about noise. Several factors are related to the level of community annoyance including:

- Fear associated with noise producing activities;
- Socio-economic status and educational level;
- Perception that those affected are being unfairly treated;
- Attitudes regarding the usefulness of the noise-producing activity;
- Belief that the noise source can be controlled.

Approximately ten percent of the population has a very low tolerance for noise and will object to any noise not of their making. Consequently, even in the quietest environment, some complaints will occur. Another twenty-five percent of the population will not complain even in very severe noise environments. Thus, a variety of reactions can be expected from people exposed to any given noise environment. (10) Surveys have shown that about ten percent of the people exposed to traffic noise of 60 dBA will report being highly annoyed with the noise, and each increase of one dBA is associated with approximately two percent more people being highly annoyed. When traffic noise exceeds 60 dBA or aircraft noise exceeds 55 dBA, people may begin to complain. (10) Despite this variability in behavior on an individual level, the population can be expected to exhibit the following responses to changes in noise levels as shown on Exhibit 2-B. An increase or decrease of 1 dBA cannot be perceived except in carefully controlled laboratory experiments, a change of 3 dBA are considered *barely perceptible*, and changes of 5 dBA are considered *readily perceptible*. (4)

EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION



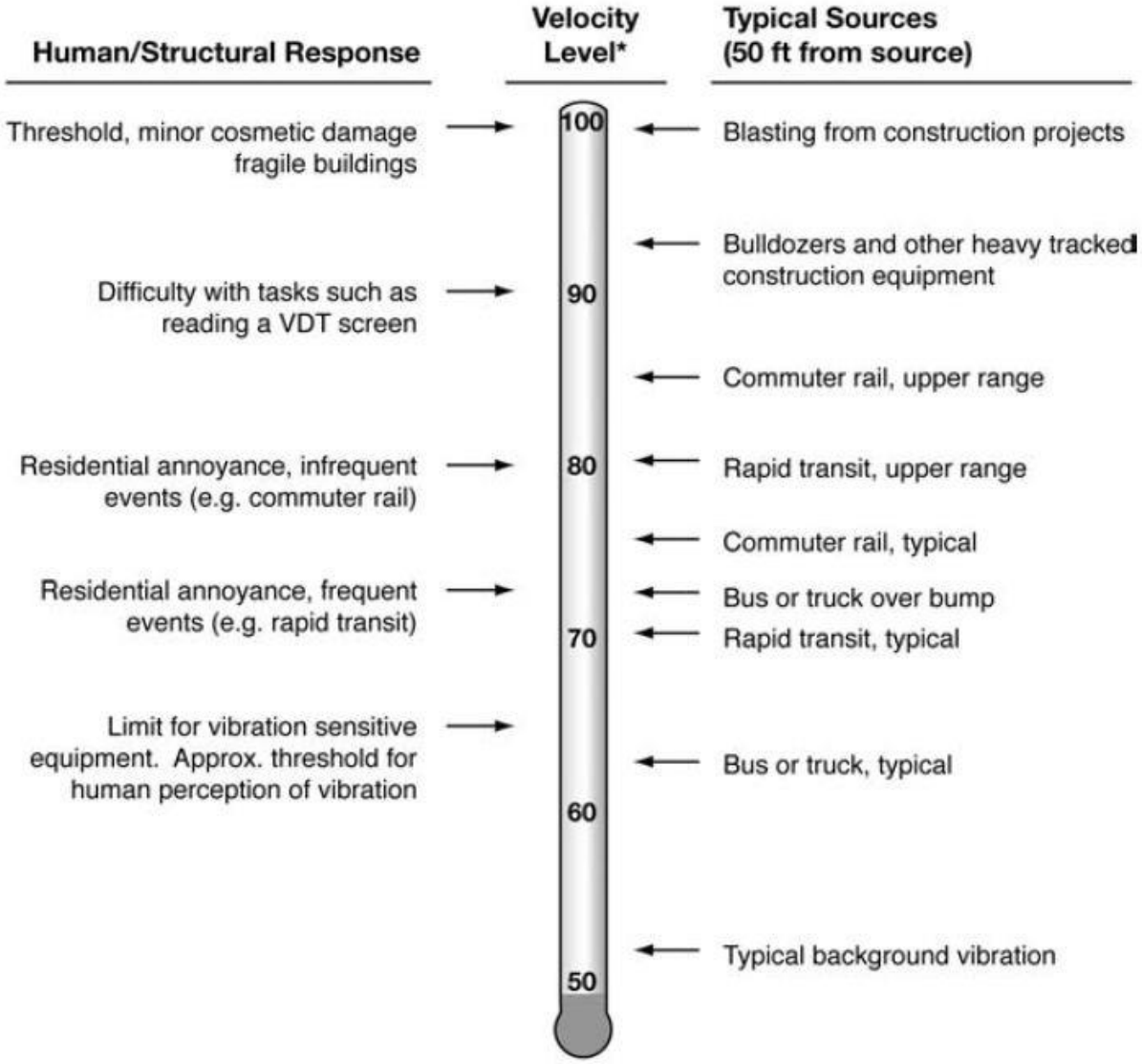
2.8 VIBRATION

Per the Federal Transit Administration (FTA) *Transit Noise Impact and Vibration Assessment* (5), vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structure-borne noise. Sources of ground-borne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as factory machinery, or transient, such as explosions. As is the case with airborne sound, ground-borne vibrations may be described by amplitude and frequency.

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings, but is not always suitable for evaluating human response (annoyance) because it takes some time for the human body to respond to vibration signals. Instead, the human body responds to average vibration amplitude often described as the root mean square (RMS). The RMS amplitude is defined as the average of the squared amplitude of the signal, and is most frequently used to describe the effect of vibration on the human body. Decibel notation (VdB) is commonly used to measure RMS. Decibel notation (VdB) serves to reduce the range of numbers used to describe human response to vibration. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Sensitive receivers for vibration include structures (especially older masonry structures), people (especially residents, the elderly, and sick), and vibration-sensitive equipment.

The background vibration-velocity level in residential areas is generally 50 VdB. Ground-borne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground-borne vibration is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Exhibit 2-C illustrates common vibration sources and the human and structural response to ground-borne vibration.

EXHIBIT 2-C: TYPICAL LEVELS OF GROUND-BORNE VIBRATION



** RMS Vibration Velocity Level in VdB relative to 10^{-6} inches/second*

Source: Federal Transit Administration (FTA) Transit Noise Impact and Vibration Assessment.

3 REGULATORY SETTING

To limit population exposure to physically and/or psychologically damaging as well as intrusive noise levels, the federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. In most areas, automobile and truck traffic is the major source of environmental noise. Traffic activity generally produces an average sound level that remains constant with time. Air and rail traffic, and commercial and industrial activities are also major sources of noise in some areas. Federal, state, and local agencies regulate different aspects of environmental noise. Federal and state agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies.

3.1 STATE OF CALIFORNIA NOISE REQUIREMENTS

The State of California regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise standards, and provides guidance for local land use compatibility. State law requires that each county and city adopt a General Plan that includes a Noise Element which is to be prepared per guidelines adopted by the Governor's Office of Planning and Research. (11) The purpose of the Noise Element is to *limit the exposure of the community to excessive noise levels*. In addition, the California Environmental Quality Act (CEQA) requires that all known environmental effects of a project be analyzed, including environmental noise impacts.

3.2 STATE OF CALIFORNIA BUILDING STANDARDS

The 2016 State of California's Green Building Standards Code contains mandatory measures for non-residential building construction in Section 5.507 on Environmental Comfort. (12) These noise standards are applied to new construction in California for the purpose of controlling interior noise levels resulting from exterior noise sources. The regulations specify that acoustical studies must be prepared when non-residential structures are developed in areas where the exterior noise levels exceed 65 dBA CNEL, such as within a noise contour of an airport, freeway, railroad, and other areas where noise contours are not readily available. If the development falls within an airport or freeway 65 dBA CNEL noise contour, the combined sound transmission class (STC) rating of the wall and roof-ceiling assemblies must be at least 50. For those developments in areas where noise contours are not readily available, and the noise level exceeds 65 dBA L_{eq} for any hour of operation, a wall and roof-ceiling combined STC rating of 45, and exterior windows with a minimum STC rating of 40 are required (Section 5.507.4.1).

3.3 CITY OF LAKE ELSINORE GENERAL PLAN

The City of Lake Elsinore has adopted Section 3.7, *Noise,* of the Public Safety and Welfare Element (13) of the General Plan to control and abate environmental noise, and to protect the citizens of Lake Elsinore from excessive exposure to noise. The Noise section specifies the maximum exterior noise levels allowable for new developments impacted by transportation noise sources such as arterial roads, freeways, airports, and railroads. In addition, the Noise section identifies

noise polices designed to protect, create, and maintain an environment free from noise that may jeopardize the health or welfare of sensitive receivers, or degrade quality of life. To protect City of Lake Elsinore residents from excessive noise, the Noise section contains the following goal related to the Project:

Goal 7 *Maintain an environment for all City residents and visitors free of unhealthy, obtrusive, or otherwise excessive noise.*

To ensure noise-sensitive land uses are protected from excessive noise levels (Goal 7), the Noise section identifies the following policies:

7.1 Apply the noise standards set forth in the Lake Elsinore Noise and Land Use Compatibility Matrix (see Table 3-1) and Interior and Exterior Noise Standards (see Table 3-2) when considering all new development and redevelopment proposed within the City.

7.2 Require that mixed-use structures and areas be designed to prevent transfer of noise and vibration from commercial areas to residential areas.

7.3 Strive to reduce the effect of transportation noise on the I-15.

7.4 Consider estimated roadway noise contours based upon Figure 3.6, Noise Contours, when making land use design decisions along busy roadways throughout the City.

7.5 Participate and cooperate with other agencies and jurisdictions in the development of noise abatement plans for highways.

3.3.1 LAND USE COMPATIBILITY

The *Noise and Land Use Compatibility Matrix* (Table 3-1) in the City of Lake Elsinore General Plan Noise section provides guidelines to evaluate the land use compatibility of transportation related noise. The compatibility criteria, shown on Exhibit 3-A, provides the City with a planning tool to gauge the compatibility of land uses relative to existing and future exterior noise levels.

The *Noise and Land Use Compatibility Matrix* describes categories of compatibility and not specific noise standards. According to these categories of compatibility, sensitive residential land use in the Project Study area is considered *clearly compatible* with exterior noise levels below 60 dBA CNEL and *normally compatible* with exterior noise levels below 70 dBA CNEL. For *normally compatible* land use, *new construction or development should be undertaken only after a detailed analysis of noise reduction requirements is made and needed noise insulation features are included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.* (13)

EXHIBIT 3-A: NOISE AND LAND USE COMPATIBILITY MATRIX

Land Use Categories		Day-Night Noise Level (LDN)						
Categories	**Uses**	**≤55**	**60**	**65**	**70**	**75**	**80≥**	
Residential	Single, Family, Duplex, Multiple Family	A	A	B	B	C	D	D
Residential	Mobile Homes	A	A	B	C	C	D	D
Commercial Regional District	Hotel, Motel, Transient Lodging	A	A	B	B	C	C	D
Commercial Regional Village, District Special	Commercial, Retail, Bank, Restaurant, Movie Theatre	A	A	A	A	B	B	C
Commercial Industrial Institutional	Office Building, Research and Development, Professional Offices, City Office Building	A	A	A	B	B	C	D
Commercial Regional Institutional Civic Center	Amphitheatre, Concert Hall Auditorium, Meeting Hall	B	B	C	C	D	D	D
Commercial Recreation	Children's Amusement Park, Miniature Golf Course, Go-cart Track, Equestrian Center, Sports Club	A	A	A	B	B	D	D
Commercial General, Special Industrial Institutional	Automobile Service Station, Auto Dealership, Manufacturing, Warehousing, Wholesale, Utilities	A	A	A	A	B	B	B
Institutional General	Hospital, Church, Library, Schools, Classroom	A	A	B	C	C	D	D
Open Space	Parks	A	A	A	B	C	D	D
Open Space	Golf Course, Cemeteries, Nature Centers, Wildlife Reserves, Wildlife Habitat	A	A	A	A	B	C	C
Agriculture	Agriculture	A	A	A	A	A	A	A

Interpretation	
Zone A Clearly Compatible	Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.
Zone B Normally Compatible	New construction or development should be undertaken only after detailed analysis of the noise reduction requirements are made and needed nose insulation features in the design are determined. Conventional construction, with closed windows and fresh air supply systems or air conditioning, will normally suffice.
Zone C Normally Incompatible	New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of noise reduction requirements must be made and needed noise insulation features included in the design.
Zone D Clearly Incompatible	New construction or development should generally not be undertaken.

Source: City of Lake Elsinore General Plan, Public Safety and Welfare Element, Table 3-1.

3.4 OPERATIONAL NOISE STANDARDS

To analyze noise impacts originating from a designated fixed location or private property such as the Lake Street / I-15 Property Project, stationary-source (operational) noise such as roof-top air conditioning units, gas station activity, RV storage/parking activity, and vehicle washing (e.g., pressure washers) activity are typically evaluated against standards established under a City's Municipal Code.

3.4.1 POTENTIALLY SUITABLE LEAST BELL'S VIREO HABITAT THRESHOLD

To evaluate potential impacts at the adjacent (e.g., east and south) potentially suitable least Bell's vireo habitat areas, the 65 dBA L_{eq} threshold identified in the *LEAP 2018-02/Lake Street Storage Project MSHCP Consistency Findings* is used in this analysis. (2) The LEAP document indicates that *in the presence of LBV nests, the noise level from Project activities is not to exceed 65 dBA. If this is not possible, a noise barrier shall be constructed to avoid adverse impacts to the LBV nest(s).* Further, the LEAP document specifies that *if Project noise levels exceed either the 65 dBA threshold or exceed ambient noise levels, whichever is higher, mitigation measures such as noise walls or berms shall be implemented at the direction of the project acoustician in consultation with the City to reduce noise levels at the nest site to either the 65 dBA threshold or ambient noise levels, whichever is higher.*

Therefore, to present conservative approach, this analysis relies on the 65 dBA L_{eq} threshold to evaluate potential Project-related operational noise level impacts at the adjacent sensitive habitat areas.

3.4.2 CITY OF LAKE ELSINORE MUNICIPAL CODE

Section 17.176.060 of the City of Lake Elsinore Municipal Code states the following: *No person shall, operate or cause to be operated, any source of sound at any location within the incorporated City or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person which causes the noise level when measured on any other property, either incorporated or unincorporated to exceed*…the maximum permissible sound levels by receiving land use. For general commercial land use , the Municipal Code identifies base exterior noise level limits for the daytime (7:00 a.m. to 10:00 p.m.) hours of 65 dBA L_{50} and 60 dBA L_{50} during the nighttime (10:00 p.m. to 7:00 a.m.) hours. These standards shall apply for a cumulative period of 30 minutes in any hour (L_{50}), as well as the standard plus 5 dBA cannot be exceeded for a cumulative period of more than 15 minutes in any hour (L_{25}), or the standard plus 10 dBA for a cumulative period of more than 5 minutes in any hour (L_8), or the standard plus 15 dBA for a cumulative period of more than 1 minute in any hour (L_2), or the standard plus 20 dBA for any period of time (L_{max}). (6). Table 3-1 shows the City of Lake Elsinore noise standards by land use.

TABLE 3-1: OPERATIONAL EXTERIOR NOISE LEVEL STANDARDS

Land Use	Condition	Based Exterior Noise Level Standards (dBA)[2]				
		L_{50} (30 mins)	L_{25} (15 mins)	L_8 (5 mins)	L_2 (1 min)	L_{max} (Anytime)
Single-Family Residential	Daytime	50	55	60	65	70
	Nighttime	40	45	50	55	60
Multi-Family Residential	Daytime	50	55	60	65	70
	Nighttime	45	50	55	60	65
Public Space/ Light Comm.	Daytime	60	65	70	75	80
	Nighttime	55	60	65	70	75
General Commercial	Daytime	65	70	75	80	85
	Nighttime	60	65	70	75	80
Light Industrial	Anytime	70	75	80	85	90
Heavy Industrial	Anytime	75	80	85	90	95

[1] Source: City of Lake Elsinore Municipal Code, Section 17.176.060(A)(2) & Table 1 (Appendix 3.1).
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

3.5 CONSTRUCTION NOISE STANDARDS

To analyze noise impacts originating from the construction of the Lake Street / I-15 Property Project, noise from construction activities are typically limited to the hours of operation established under a City's Municipal Code. The Municipal Code noise standards for construction are described below for the City of Lake Elsinore. The construction-related noise standards are summarized in Tables 3-2 and 3-3.

3.5.1 POTENTIALLY SUITABLE LEAST BELL'S VIREO HABITAT THRESHOLD

As previously described in Section 3.4.1, the 65 dBA L_{eq} threshold for potential habitat areas is also used in this analysis to evaluate potential Project-related construction noise level impacts at the adjacent sensitive habitat areas.

3.5.2 CITY OF LAKE ELSINORE MUNICIPAL CODE

The City of Lake Elsinore has set restrictions to control noise impacts associated with the construction of the proposed Project. Section 17.176.080 (F), Construction/Demolition indicates that *operating or causing the operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between the weekday hours of 7:00 p.m. and 7:00 a.m., or at any time on weekends or holidays, such that the sound therefrom creates a noise disturbance across a residential or commercial real property line, except for emergency work by public service utilities or by variance issued by the City is prohibited*. The Municipal code further requires construction activities to be conducted in such a manner that the maximum (L_{max}) noise levels at affected residential and commercial properties will not exceed the mobile (less than 10-day duration) and stationary equipment (greater than 10-day duration) noise standards provided below on Tables 3-2 and 3-3, respectively. (6)

TABLE 3-2: MOBILE EQUIPMENT NOISE LEVEL LIMITS

Type	Receiving Land Use Category	Time Period	Maximum Noise Levels (dBA L_{max})[1]
I	Single-Family Residential	Daytime (7:00 a.m. - 7:00 p.m.)	75
		Nighttime (7:00 p.m. - 7:00 a.m.)	60
II	Multi-Family Residential	Daytime (7:00 a.m. - 7:00 p.m.)	80
		Nighttime (7:00 p.m. - 7:00 a.m.)	65
III	Semi-Residential/ Commercial	Daytime (7:00 a.m. - 7:00 p.m.)	85
		Nighttime (7:00 p.m. - 7:00 a.m.)	70

[1] Maximum noise levels for nonscheduled, intermittent, short-term operation (less than 10 days) of mobile equipment, City of Lake Elsinore Municipal Code 17.176.080 (F) (Appendix 3.1).

TABLE 3-3: STATIONARY EQUIPMENT NOISE LEVEL LIMITS

Type	Receiving Land Use Category	Time Period	Maximum Noise Levels (dBA L_{max})[1]
I	Single-Family Residential	Daytime (7:00 a.m. - 7:00 p.m.)	60
		Nighttime (7:00 p.m. - 7:00 a.m.)	50
II	Multi-Family Residential	Daytime (7:00 a.m. - 7:00 p.m.)	65
		Nighttime (7:00 p.m. - 7:00 a.m.)	55
III	Semi-Residential/ Commercial	Daytime (7:00 a.m. - 7:00 p.m.)	70
		Nighttime (7:00 p.m. - 7:00 a.m.)	60

[1] Maximum noise levels for repetitively scheduled and relatively long-term operation (period of 10 days or more) of stationary equipment, City of Lake Elsinore Municipal Code 17.176.080 (F) (Appendix 3.1).

3.6 CONSTRUCTION VIBRATION STANDARDS

To analyze the vibration impacts originating from the construction of the Project, vibration from construction activities are typically evaluated against standards established under a City's Municipal Code. The Municipal Code vibration standards for construction are described below for the City of Lake Elsinore to determine the potential vibration impacts at sensitive receiver locations. The construction-related vibration standards for each jurisdiction are summarized in Table 3-4.

3.6.1 CITY OF LAKE ELSINORE CONSTRUCTION VIBRATION STANDARDS

The City of Lake Elsinore Municipal Code, Section 17.176.080(G), states that *operating or permitting the operation of any device that creates a vibration which is above the vibration perception threshold of any individual at or beyond the property boundary of the source if on private property or at 150 feet (46 meters) from the source if on public space or public right-of-*

way is prohibited. The Municipal Code defines the vibration perception threshold to be a motion velocity of 0.01 in/sec over the range of one to 100 Hz, as shown on Table 3-4. (6)

3.6.2 HUMAN PERCEPTION OF VIBRATION

Typically, the human response at the perception threshold for vibration includes annoyance in residential areas as previously shown on Exhibit 2-B, when vibration levels expressed in vibration decibels (VdB) approach 75 VdB. The City of Lake Elsinore, however, identifies a vibration perception threshold of 0.01 in/sec. For vibration levels expressed in velocity, the human body responds to the average vibration amplitude often described as the root-mean-square (RMS). The RMS of a signal is the average of the squared amplitude of the signal, typically calculated over a one-second period. As with airborne sound, the RMS velocity is often expressed in decibel notation as vibration decibels (VdB), which serves to reduce the range of numbers used to describe human response to vibration. Therefore, the City of Lake Elsinore vibration standard of 0.01 in/sec in RMS velocity levels is used in this analysis to assess the human perception of vibration levels due to Project-related construction activities.

TABLE 3-4: CONSTRUCTION VIBRATION STANDARDS

Jurisdiction	Root-Mean-Square (RMS) Velocity (in/sec)
City of Lake Elsinore[1]	0.01

[1] Source: City of Lake Elsinore Municipal Code, Section 17.176.080(G) (Appendix 3.1).

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4 SIGNIFICANCE CRITERIA

The following significance criteria are based on currently adopted guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1) For the purposes of this report, impacts would be potentially significant if the Project results in or causes:

A. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

B. Generation of excessive ground-borne vibration or ground-borne noise levels?

C. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

While the City of Lake Elsinore General Plan Guidelines provide direction on noise compatibility and establish noise standards by land use type that are sufficient to assess the significance of noise impacts, they do not define the levels at which increases are considered substantial for use under Guideline A. CEQA Appendix G Guideline C applies to nearby public and private airports, if any, and the Project's land use compatibility.

The Project site is not located within an airport land use plan or within 2 miles of a public airport, or within the vicinity of a private airstrip. Therefore, the Project would not result in potential noise impacts for people residing or working at the Project site. As such, the Project does not have the potential to expose people residing or working in the Project area to excessive noise levels and no impact would occur. No further analysis of CEQA Guideline C is required.

4.1 NOISE-SENSITIVE RECEIVERS

Noise level increases resulting from the Project are evaluated based on the Appendix G CEQA Guidelines described above at the closest sensitive receiver locations. Under CEQA, consideration must be given to the magnitude of the increase, the existing ambient noise levels, and the location of noise-sensitive receivers to determine if a noise increase represents a significant adverse environmental impact. This approach recognizes *that there is no single noise increase that renders the noise impact significant.* (14) Unfortunately, there is no completely satisfactory way to measure the subjective effects of noise or of the corresponding human reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance and differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment to which one has adapted—the so-called *ambient* environment.

In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will typically be judged. The Federal Interagency Committee on Noise (FICON) (15) developed guidance to be used for the assessment of project-generated increases in noise levels that consider the ambient noise level. The FICON recommendations are based on studies that relate aircraft noise levels to the percentage of persons highly annoyed by aircraft

noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, these recommendations are often used in environmental noise impact assessments involving the use of cumulative noise exposure metrics, such as the average-daily noise level (i.e., CNEL).

For example, if the ambient noise environment is quiet (<60 dBA) and the new noise source greatly increases the noise levels, an impact may occur if the noise criteria may be exceeded. Therefore, for this analysis, FICON identifies a *readily perceptible* 5 dBA or greater project-related noise level increase is considered a significant impact when the noise criteria for a given land use is exceeded. Per FICON, in areas where the without project noise levels range from 60 to 65 dBA, a 3 dBA *barely perceptible* noise level increase appears to be appropriate for most people. When the without project noise levels already exceed 65 dBA, any increase in community noise louder than 1.5 dBA or greater is considered a significant impact if the noise criteria for a given land use is exceeded, since it likely contributes to an existing noise exposure exceedance. Table 4-1 below provides a summary of the potential noise impact significance criteria, based on guidance from FICON.

TABLE 4-1: SIGNIFICANCE OF NOISE IMPACTS AT NOISE-SENSITIVE RECEIVERS

Without Project Noise Level	Potential Significant Impact
< 60 dBA	5 dBA or more
60 - 65 dBA	3 dBA or more
> 65 dBA	1.5 dBA or more

Federal Interagency Committee on Noise (FICON), 1992.

4.2 NON-NOISE-SENSITIVE RECEIVERS

The City of Lake Elsinore General Plan, Table 3-1, *Noise and Land Use Compatibility Matrix* is used to establish the satisfactory noise levels of significance for non-noise-sensitive land uses in the Project study area. As previously shown on Exhibit 3-A, the *normally compatible* exterior noise levels for non-noise-sensitive land uses (e.g., commercial, industrial) is 70 dBA CNEL. Noise levels greater than 70 dBA CNEL are considered *normally incompatible*. (13)

To determine if Project-related traffic noise level increases are significant at off-site non-noise-sensitive land uses, a *readily perceptible* 5 dBA and *barely perceptible* 3 dBA criteria were used. When the without Project noise levels at the non-noise-sensitive land uses are below the *normally acceptable* 70 dBA CNEL compatibility criteria, a *readily perceptible* 5 dBA or greater noise level increase is considered a significant impact. When the without Project noise levels are greater than the *normally acceptable* 70 dBA CNEL land use compatibility criteria, a *barely perceptible* 3 dBA or greater noise level increase is considered a significant impact since the noise level criteria is already exceeded. The noise level increases used to determine significant impacts for non-noise-sensitive land uses is generally consistent with the FICON noise level increase thresholds s for noise-sensitive land uses but instead rely on the City of Lake Elsinore General Plan 70 dBA CNEL exterior noise level criteria.

4.3 SIGNIFICANCE CRITERIA SUMMARY

Noise impacts shall be considered significant if any of the following occur as a direct result of the proposed development. Table 4-2 shows the significance criteria summary matrix.

OFF-SITE TRAFFIC NOISE

- When the noise levels at existing and future noise-sensitive land uses (e.g. residential, school, etc.):
    - are less than 60 dBA and the Project creates a *readily perceptible* 5 dBA or greater Project-related noise level increase; or
    - range from 60 to 65 dBA and the Project creates a *barely perceptible* 3 dBA or greater Project-related noise level increase; or
    - already exceed 65 dBA, and the Project creates a community noise level increase of greater than 1.5 dBA (FICON, 1992).
- When the noise levels at existing and future non-noise-sensitive land uses (e.g., commercial, industrial):
    - are less than the 70 dBA CNEL criteria and the Project creates a *readily perceptible* 5 dBA CNEL or greater Project related noise level increase; or
    - are greater than the 70 dBA CNEL criteria and the Project creates a *barely perceptible* 3 dBA CNEL or greater Project noise level increase.

OPERATIONAL NOISE

- If Project-related operational (stationary-source) noise levels exceed:
    - the 65 dBA L_{eq} threshold for potentially suitable least Bell's vireo habitat areas east and south of the Project site; or
    - the exterior noise level standard at nearby sensitive receiver locations identified on Table 3-1 by land use category (City of Lake Elsinore Municipal Code, Chapter 17.176 Noise Control);
- If the existing ambient noise levels at the nearby noise-sensitive receivers near the Project site:
    - are less than 60 dBA and the Project creates a *readily perceptible* 5 dBA or greater Project-related noise level increase; or
    - range from 60 to 65 dBA and the Project creates a *barely perceptible* 3 dBA or greater Project-related noise level increase; or
    - already exceed 65 dBA, and the Project creates a community noise level increase of greater than 1.5 dBA (FICON, 1992).

CONSTRUCTION NOISE AND VIBRATION

- If Project-related construction activities generate noise levels which exceed:
    - the 65 dBA L_{eq} threshold for potentially suitable least Bell's vireo habitat areas east and south of the Project site; or
    - the mobile or stationary equipment noise level limits described on Tables 3-2 and 3-3 (City of Lake Elsinore Municipal Code, Section 17.176.080(F)).

- If short-term Project generated construction vibration levels exceed the City of Lake Elsinore maximum acceptable vibration standard of 0.01 in/sec (RMS) at sensitive receiver locations (City of Lake Elsinore Municipal Code, Section 17.176.080(G)).

TABLE 4-2: SIGNIFICANCE CRITERIA SUMMARY

Analysis	Receiving Land Use	Condition(s)	Significance Criteria	
			Daytime	Nighttime
Off-Site	Noise-Sensitive[1]	If ambient is < 60 dBA CNEL	≥ 5 dBA CNEL Project increase	
		If ambient is 60 - 65 dBA CNEL	≥ 3 dBA CNEL Project increase	
		If ambient is > 65 dBA CNEL	≥ 1.5 dBA CNEL Project increase	
	Non-Noise-Sensitive[2]	If ambient is < 70 dBA CNEL	≥ 5 dBA CNEL Project increase	
		If ambient is > 70 dBA CNEL	≥ 3 dBA CNEL Project increase	
Operational	Varied[3]	≥ 30 Minutes L_{50}	See Table 3-1 for the Exterior Noise Level Standards by Land Use	
		≥ 15 Minutes L_{25}		
		≥ 5 Minutes L_8		
		≥ 1 Minute L_2		
		Anytime L_{max}		
	Habitat[6]	Exterior Noise Level	65 dBA L_{eq}	
	Noise-Sensitive[1]	if ambient is < 60 dBA	≥ 5 dBA Project increase	
		if ambient is 60 - 65 dBA	≥ 3 dBA Project increase	
		if ambient is > 65 dBA	≥ 1.5 dBA Project increase	
Construction	Noise-Sensitive	Noise Level Threshold (<10 Days)[4]	See Table 3-2	
		Noise Level Threshold (>10 Days)[4]	See Table 3-3	
	Habitat[6]	Exterior Noise Level	65 dBA L_{eq}	
	Sensitive	Vibration Level Threshold[5]	0.01 in/sec RMS	

[1] Source: FICON, 1992.
[2] Source: City of Lake Elsinore General Plan, Public Safety & Welfare Element, Section 3.7 Noise, Tables 3-1 & 3-2.
[3] Source: City of Lake Elsinore Municipal Code, Chapter 17.176 Noise Control (Appendix 3.1).
[4] Source: City of Lake Elsinore Municipal Code, Section 17.176.080(F) (Appendix 3.1).
[5] Source: City of Lake Elsinore Municipal Code, Section 17.176.080(G) (Appendix 3.1).
[6] Source: LEAP 2018-02/Lake Street Storage Project MSHCP Consistency Findings
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

5 EXISTING NOISE LEVEL MEASUREMENTS

To assess the existing noise level environment, three 24-hour noise level measurements were taken at sensitive receiver locations in the Project study area. The receiver locations were selected to describe and document the existing noise environment within the Project study area. Exhibit 5-A provides the boundaries of the Project study area and the noise level measurement locations. To fully describe the existing noise conditions, noise level measurements were collected by Urban Crossroads, Inc. on Tuesday, November 27th, 2018.

5.1 MEASUREMENT PROCEDURE AND CRITERIA

To describe the existing noise environment, the hourly noise levels were measured during typical weekday conditions over a 24-hour period. By collecting individual hourly noise level measurements, it is possible to describe the daytime and nighttime hourly noise levels and calculate the 24-hour CNEL. The long-term noise readings were recorded using Piccolo Type 2 integrating sound level meter and dataloggers. The Piccolo sound level meters were calibrated using a Larson-Davis calibrator, Model CAL 150. All noise meters were programmed in "slow" mode to record noise levels in "A" weighted form. The sound level meters and microphones were equipped with a windscreen during all measurements. All noise level measurement equipment satisfies the American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-2014/IEC 61672-1:2013. (16)

5.2 NOISE MEASUREMENT LOCATIONS

The long-term noise level measurements were positioned as close to the nearest sensitive receiver locations as possible to assess the existing ambient hourly noise levels surrounding the Project site. Both Caltrans and the FTA recognize that it is not reasonable to collect noise level measurements that can fully represent any part of a private yard, patio, deck, or balcony normally used for human activity when estimating impacts for new development projects. This is demonstrated in the Caltrans general site location guidelines which indicate that, *sites must be free of noise contamination by sources other than sources of interest. Avoid sites located near sources such as barking dogs, lawnmowers, pool pumps, and air conditioners unless it is the express intent of the analyst to measure these sources*. (7) Further, FTA guidance states, t*hat it is not necessary nor recommended that existing noise exposure be determined by measuring at every noise-sensitive location in the project area. Rather, the recommended approach is to characterize the noise environment for clusters of sites based on measurements or estimates at representative locations in the community*. (5)

Based on recommendations of Caltrans and the FTA, it is not necessary to collect measurements at each individual building or residence, because each receiver measurement represents a group of buildings that share acoustical equivalence. (5) In other words, the area represented by the receiver shares similar shielding, terrain, and geometric relationship to the reference noise source. Receivers represent a location of noise sensitive areas and are used to estimate the future noise level impacts. Collecting reference ambient noise level measurements at the nearby sensitive receiver locations allows for a comparison of the before and after Project noise levels

and is necessary to assess potential noise impacts due to the Project's contribution to the ambient noise levels.

5.3 NOISE MEASUREMENT RESULTS

The noise measurements presented below focus on the average or equivalent sound levels (L_{eq}). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. Table 5-1 identifies the hourly daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) noise levels at each noise level measurement location. Appendix 5.2 provides a summary of the existing hourly ambient noise levels described below:

- Location L1 represents the noise levels at the intersection of Lake Street and Walker Canyon Road, near a Riverside County Regional Conservation area, north of the Project site. The noise level measurements collected show an overall 24-hour exterior noise level of 65.9 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 58.0 dBA L_{eq} with an average nighttime noise level of 59.4 dBA L_{eq}.
- Location L2 represents the noise levels on the Project site's southern boundary, near an undeveloped forest and habitat area, east of Lake Street. The noise level measurements collected show an overall 24-hour exterior noise level of 67.8 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 60.7 dBA L_{eq} with an average nighttime noise level of 61.2 dBA L_{eq}.
- Location L3 represents the noise levels on Lake Street, south of the Project site, near an abandoned non-residential building within an area zoned for commercial land use. The 24-hour CNEL indicates that the overall exterior noise level is 62.9 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 56.8 dBA L_{eq} with an average nighttime noise level of 56.1 dBA L L_{eq}.

Table 5-1 provides the (energy average) noise levels used to describe the daytime and nighttime ambient conditions. These daytime and nighttime energy average noise levels represent the average of all hourly noise levels observed during these time periods expressed as a single number. Appendix 5.2 provides summary worksheets of the noise levels for each hour as well as the minimum, maximum, L_1, L_2, L_5, L_8, L_{25}, L_{50}, L_{90}, L_{95}, and L_{99} percentile noise levels observed during the daytime and nighttime periods.

The background ambient noise levels in the Project study area are dominated by the transportation-related noise associated with the arterial roadway network. This includes the auto and heavy truck activities on I-15 near the noise level measurement locations. The 24-hour existing noise level measurements shown on Table 5-1 present the existing ambient noise conditions.

TABLE 5-1: 24-HOUR AMBIENT NOISE LEVEL MEASUREMENTS

Location[1]	Distance to Project Boundary (Feet)	Description	Energy Average Noise Level (dBA L_{eq})[2]		Median Noise Level (dBA L_{50})[2]		CNEL
			Daytime	Nighttime	Daytime	Nighttime	
L1	1,115'	Located at the intersection of Lake Street and Walker Canyon Road, near a Riverside County Regional Conservation area, north of the Project site.	58.0	59.4	56.9	57.7	65.9
L2	0'	Located on the Project site's southern boundary, near an undeveloped forest and habitat area, east of Lake Street.	60.7	61.2	58.5	58.3	67.8
L3	800'	Located on Lake Street, south of the Project site, near an abandoned non-residential building.	56.8	56.1	54.7	53.3	62.9

[1] See Exhibit 5-A for the noise level measurement locations.
[2] The long-term 24-hour measurement printouts are included in Appendix 5.2.
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS

6 METHODS AND PROCEDURES

The following section outlines the methods and procedures used to model and analyze the future traffic noise environment.

6.1 FHWA TRAFFIC NOISE PREDICTION MODEL

The estimated roadway noise impacts from vehicular traffic were calculated using a computer program that replicates the Federal Highway Administration (FHWA) Traffic Noise Prediction Model- FHWA-RD-77-108. (17) The FHWA Model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). In California the national REMELs are substituted with the California Vehicle Noise (Calveno) Emission Levels. (18) Adjustments are then made to the REMEL to account for: the roadway classification (e.g., collector, secondary, major or arterial), the roadway active width (i.e., the distance between the center of the outermost travel lanes on each side of the roadway), the total average daily traffic (ADT), the travel speed, the percentages of automobiles, medium trucks, and heavy trucks in the traffic volume, the roadway grade, the angle of view (e.g., whether the roadway view is blocked), the site conditions ("hard" or "soft" relates to the absorption of the ground, pavement, or landscaping), and the percentage of total ADT which flows each hour throughout a 24-hour period.

6.2 OFF-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

Table 6-1 presents the roadway parameters used to assess the Project's off-site transportation noise impacts. Table 6-1 identifies the eight study area roadway segments, the distance from the centerline to adjacent land use based on the functional roadway classifications per the City of Lake Elsinore General Plan Community Form Element, and the posted vehicle speeds. For this analysis, soft site conditions are used to analyze the traffic noise impacts within the Project study area. Soft site conditions account for the sound propagation loss over natural surfaces such as normal earth and ground vegetation. Research conducted by Caltrans has shown that the use of soft site conditions is appropriate for the application of the FHWA traffic noise prediction model used in this noise study. (19)

The average daily traffic volumes used for this study are presented on Tables 6-2 and 6-3, and are provided by the *Lake Street / I-15 Property Traffic Impact Analysis* prepared by Urban Crossroads, Inc. for Existing (2017), Existing plus Ambient (EA) 2018, EA plus Cumulative (EAC) 2018, and Horizon Year 2035 traffic conditions. (3)

TABLE 6-1: OFF-SITE ROADWAY PARAMETERS

ID	Roadway	Segment	Adjacent Planned Land Use[1]	Distance from Centerline to Nearest Adjacent Land Use (Feet)[2]	Vehicle Speed (mph)[3]
1	Lake St.	n/o Temescal Cyn. Rd.	Commercial	67'	50
2	Lake St.	s/o Temescal Cyn. Rd.	Commercial (Habitat)	67'	50
3	Lake St.	s/o A St.	Public	60'	50
4	Lake St.	s/o B St.	Public	60'	50
5	Lake St.	s/o D St.	Residential	60'	50
6	Lake St.	s/o Nichols Rd.	Commercial	60'	50
7	Temescal Cyn Rd.	w/o Lake St.	Commercial	60'	50
8	Nichols Rd.	e/o Lake St.	Commercial/Residential	60'	50

[1] Sources: City of Lake Elsinore General Plan, Community Form Element, Figure 2.1A Land Use Plan and Google Earth aerial imagery.
[2] Distance to adjacent land use is based upon the right-of-way distances for each functional roadway classification provided in the City of Lake Elsinore General Plan.
[3] Source: Lake Street / I-15 Property Traffic Impact Analysis, Urban Crossroads, Inc.

TABLE 6-2: AVERAGE DAILY TRAFFIC VOLUMES (1 OF 2)

ID	Roadway	Segment	Average Daily Traffic (1,000's)[1]					
			Existing (2017)		Existing + Ambient 2018		EA + Cumulative 2018	
			Without Project	With Project	Without Project	With Project	Without Project	With Project
1	Lake St.	n/o Temescal Cyn. Rd.	20.5	21.4	20.9	21.8	23.0	23.9
2	Lake St.	s/o Temescal Cyn. Rd.	18.1	18.7	18.5	19.1	20.5	21.1
3	Lake St.	s/o A St.	18.1	18.7	18.5	19.1	20.5	21.1
4	Lake St.	s/o B St.	18.1	18.7	18.5	19.1	20.5	21.1
5	Lake St.	s/o D St.	18.1	18.7	18.5	19.1	20.5	21.1
6	Lake St.	s/o Nichols Rd.	22.5	22.9	22.9	23.3	24.2	24.6
7	Temescal Cyn Rd.	w/o Lake St.	7.3	7.5	7.5	7.7	7.5	7.7
8	Nichols Rd.	e/o Lake St.	7.6	7.9	7.7	8.0	9.3	9.6

[1] Source: Lake Street / I-15 Property Traffic Impact Analysis, Urban Crossroads, Inc.

TABLE 6-3: AVERAGE DAILY TRAFFIC VOLUMES (2 OF 2)

ID	Roadway	Segment	Average Daily Traffic (1,000's)[1]	
			Horizon Year 2035	
			Without Project	With Project
1	Lake St.	n/o Temescal Cyn. Rd.	48.0	49.0
2	Lake St.	s/o Temescal Cyn. Rd.	44.5	45.3
3	Lake St.	s/o A St.	60.0	60.6
4	Lake St.	s/o B St.	52.0	52.5
5	Lake St.	s/o D St.	51.0	51.5
6	Lake St.	s/o Nichols Rd.	38.0	38.2
7	Temescal Cyn Rd.	w/o Lake St.	35.0	35.1
8	Nichols Rd.	e/o Lake St.	47.0	47.1

[1] Source: Lake Street / I-15 Property Traffic Impact Analysis, Urban Crossroads, Inc.

Table 6-4 presents the time of day vehicle splits and Table 6-5 presents the traffic flow distributions (vehicle mix) used for this analysis. The vehicle mix provides the hourly distribution percentages of automobile, medium trucks, and heavy trucks for input into the FHWA noise prediction model.

TABLE 6-4: TIME OF DAY VEHICLE SPLITS

Time Period	Vehicle Type		
	Autos	Medium Trucks	Heavy Trucks
Daytime (7:00 a.m. - 7:00 p.m.)	77.5%	84.8%	86.5%
Evening (7:00 p.m. - 10:00 p.m.)	12.9%	4.9%	2.7%
Nighttime (10:00 p.m. - 7:00 a.m.)	9.6%	10.3%	10.8%
Total:	100.0%	100.0%	100.0%

Source: Typical Southern California vehicle mix.

TABLE 6-5: DISTRIBUTION OF TRAFFIC FLOW BY VEHICLE TYPE (VEHICLE MIX)

Roadway	Total % Traffic Flow			Total
	Autos	Medium Trucks	Heavy Trucks	
All Roadways[2]	97.42%	1.84%	0.74%	100.00%

[1] Source: County of Riverside Office of Industrial Hygiene.

6.3 CONSTRUCTION VIBRATION ASSESSMENT METHODOLOGY

This analysis focuses on the potential ground-borne vibration associated with vehicular traffic and construction activities. Ground-borne vibration levels from automobile traffic are generally overshadowed by vibration generated by heavy trucks that roll over the same uneven roadway surfaces. However, due to the rapid drop-off rate of ground-borne vibration and the short duration of the associated events, vehicular traffic-induced ground-borne vibration is rarely perceptible beyond the roadway right-of-way, and rarely results in vibration levels that cause damage to buildings in the vicinity.

While vehicular traffic is rarely perceptible, construction has the potential to result in varying degrees of temporary ground vibration, depending on the specific construction activities and equipment used. Ground vibration levels associated with various types of construction equipment are summarized on Table 6-6. Based on the representative vibration levels presented for various construction equipment types, it is possible to estimate the human response (annoyance) using the following vibration assessment methods defined by the FTA. To describe the human response (annoyance) associated with vibration impacts the FTA provides the following equation: $PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$

TABLE 6-6: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	PPV (in/sec) at 25 feet
Small bulldozer	0.003
Jackhammer	0.035
Loaded Trucks	0.076
Large bulldozer	0.089

Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment, May 2006.

7 OFF-SITE TRANSPORTATION NOISE IMPACTS

To assess the off-site transportation CNEL noise level impacts associated with development of the proposed Project, noise contours were developed based on the *Lake Street / I-15 Property Traffic Impact Analysis*. (3) Noise contour boundaries represent the equal levels of noise exposure and are measured in CNEL from the center of the roadway. Noise contours were developed for the following traffic scenarios:

- Existing Without / With Project: This scenario refers to the existing present-day noise conditions, without and with the proposed Project.
- Existing plus Ambient Growth (EA) 2018 Without / With Project: This scenario refers to the background noise conditions without and with the proposed Project plus ambient growth.
- EA plus Cumulative (EAC) 2018 Without / With Project: This scenario refers to the background noise conditions without and with the proposed Project plus ambient growth. This scenario corresponds to 2020 conditions, and includes all cumulative projects identified in the Traffic Impact Analysis.
- Horizon Year 2035 Without / With Project: This scenario refers to the background noise conditions at future Year 2035 without and with Project plus ambient growth. This scenario corresponds to 2035 conditions, and includes all cumulative projects identified in the Traffic Impact Analysis.

7.1 TRAFFIC NOISE CONTOURS

Noise contours were used to assess the Project's incremental traffic-related noise impacts at land uses adjacent to roadways conveying Project traffic. The noise contours represent the distance to noise levels of a constant value and are measured from the center of the roadway for the 70, 65, and 60 dBA noise levels. The noise contours do not consider the effect of any existing noise barriers or topography that may attenuate ambient noise levels. In addition, because the noise contours reflect modeling of vehicular noise on area roadways, they appropriately do not reflect noise contributions from the surrounding stationary noise sources within the Project study area. Tables 7-1 through 7-8 present a summary of the exterior traffic noise levels, without barrier attenuation, for the study area roadway segments analyzed from the without Project to the with Project conditions in each traffic scenario. Appendix 7.1 includes a summary of the traffic noise level contours for each of the traffic scenarios.

TABLE 7-1: EXISTING WITHOUT PROJECT NOISE CONTOURS

ID	Road	Segment	Adjacent Planned (Existing) Land Use[1]	dBA CNEL			
				@ Adj. Land Use	70	65	60
					CL to Contour Distance (Feet)[2]		
1	Lake St.	n/o Temescal Cyn. Rd.	Commercial	71.1	80	172	371
2	Lake St.	s/o Temescal Cyn. Rd.	Commercial (Habitat)	70.6	74	158	341
3	Lake St.	s/o A St.	Public	70.4	64	138	298
4	Lake St.	s/o B St.	Public	70.4	64	138	298
5	Lake St.	s/o D St.	Residential	70.4	64	138	298
6	Lake St.	s/o Nichols Rd.	Commercial	71.4	74	160	344
7	Temescal Cyn Rd.	w/o Lake St.	Commercial	66.5	RW	75	163
8	Nichols Rd.	e/o Lake St.	Commercial/Residential	66.7	RW	77	167

[1] Sources: City of Lake Elsinore General Plan, Community Form Element, Figure 2.1A Land Use Plan and Google Earth aerial imagery.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-2: EXISTING WITH PROJECT NOISE CONTOURS

ID	Road	Segment	Adjacent Planned (Existing) Land Use[1]	dBA CNEL			
				@ Adj. Land Use	70	65	60
					CL to Contour Distance (Feet)[2]		
1	Lake St.	n/o Temescal Cyn. Rd.	Commercial	71.3	82	177	382
2	Lake St.	s/o Temescal Cyn. Rd.	Commercial (Habitat)	70.7	75	162	349
3	Lake St.	s/o A St.	Public	70.6	66	141	304
4	Lake St.	s/o B St.	Public	70.6	66	141	304
5	Lake St.	s/o D St.	Residential	70.6	66	141	304
6	Lake St.	s/o Nichols Rd.	Commercial	71.5	75	162	348
7	Temescal Cyn Rd.	w/o Lake St.	Commercial	66.6	RW	77	165
8	Nichols Rd.	e/o Lake St.	Commercial/Residential	66.8	RW	80	171

[1] Sources: City of Lake Elsinore General Plan, Community Form Element, Figure 2.1A Land Use Plan and Google Earth aerial imagery.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-3: EA 2018 WITHOUT PROJECT NOISE CONTOURS

ID	Road	Segment	Adjacent Planned (Existing) Land Use[1]	dBA CNEL			
				@ Adj. Land Use	70	65	60
					CL to Contour Distance (Feet)[2]		
1	Lake St.	n/o Temescal Cyn. Rd.	Commercial	71.2	81	174	376
2	Lake St.	s/o Temescal Cyn. Rd.	Commercial (Habitat)	70.7	75	161	346
3	Lake St.	s/o A St.	Public	70.5	65	140	302
4	Lake St.	s/o B St.	Public	70.5	65	140	302
5	Lake St.	s/o D St.	Residential	70.5	65	140	302
6	Lake St.	s/o Nichols Rd.	Commercial	71.5	75	162	348
7	Temescal Cyn Rd.	w/o Lake St.	Commercial	66.6	RW	77	165
8	Nichols Rd.	e/o Lake St.	Commercial/Residential	66.7	RW	78	168

[1] Sources: City of Lake Elsinore General Plan, Community Form Element, Figure 2.1A Land Use Plan and Google Earth aerial imagery.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-4: EA 2018 WITH PROJECT NOISE CONTOURS

ID	Road	Segment	Adjacent Planned (Existing) Land Use[1]	dBA CNEL			
				@ Adj. Land Use	70	65	60
					CL to Contour Distance (Feet)[2]		
1	Lake St.	n/o Temescal Cyn. Rd.	Commercial	71.4	83	179	386
2	Lake St.	s/o Temescal Cyn. Rd.	Commercial (Habitat)	70.8	76	164	354
3	Lake St.	s/o A St.	Public	70.7	66	143	309
4	Lake St.	s/o B St.	Public	70.7	66	143	309
5	Lake St.	s/o D St.	Residential	70.7	66	143	309
6	Lake St.	s/o Nichols Rd.	Commercial	71.5	76	164	352
7	Temescal Cyn Rd.	w/o Lake St.	Commercial	66.7	RW	78	168
8	Nichols Rd.	e/o Lake St.	Commercial/Residential	66.9	RW	80	173

[1] Sources: City of Lake Elsinore General Plan, Community Form Element, Figure 2.1A Land Use Plan and Google Earth aerial imagery.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-5: EAC 2018 WITHOUT PROJECT NOISE CONTOURS

ID	Road	Segment	Adjacent Planned (Existing) Land Use[1]	dBA CNEL			
				@ Adj. Land Use	70	65	60
					CL to Contour Distance (Feet)[2]		
1	Lake St.	n/o Temescal Cyn. Rd.	Commercial	71.6	86	186	400
2	Lake St.	s/o Temescal Cyn. Rd.	Commercial (Habitat)	71.1	80	172	371
3	Lake St.	s/o A St.	Public	71.0	70	150	323
4	Lake St.	s/o B St.	Public	71.0	70	150	323
5	Lake St.	s/o D St.	Residential	71.0	70	150	323
6	Lake St.	s/o Nichols Rd.	Commercial	71.7	78	168	361
7	Temescal Cyn Rd.	w/o Lake St.	Commercial	66.6	RW	77	165
8	Nichols Rd.	e/o Lake St.	Commercial/Residential	67.5	RW	89	191

[1] Sources: City of Lake Elsinore General Plan, Community Form Element, Figure 2.1A Land Use Plan and Google Earth aerial imagery.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-6: EAC 2018 WITH PROJECT NOISE CONTOURS

ID	Road	Segment	Adjacent Planned (Existing) Land Use[1]	dBA CNEL			
				@ Adj. Land Use	70	65	60
					CL to Contour Distance (Feet)[2]		
1	Lake St.	n/o Temescal Cyn. Rd.	Commercial	71.8	89	191	411
2	Lake St.	s/o Temescal Cyn. Rd.	Commercial (Habitat)	71.3	81	175	378
3	Lake St.	s/o A St.	Public	71.1	71	153	330
4	Lake St.	s/o B St.	Public	71.1	71	153	330
5	Lake St.	s/o D St.	Residential	71.1	71	153	330
6	Lake St.	s/o Nichols Rd.	Commercial	71.8	79	170	365
7	Temescal Cyn Rd.	w/o Lake St.	Commercial	66.7	RW	78	168
8	Nichols Rd.	e/o Lake St.	Commercial/Residential	67.7	RW	91	195

[1] Sources: City of Lake Elsinore General Plan, Community Form Element, Figure 2.1A Land Use Plan and Google Earth aerial imagery.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-7: HORIZON YEAR 2035 WITHOUT PROJECT NOISE CONTOURS

ID	Road	Segment	Adjacent Planned (Existing) Land Use[1]	dBA CNEL			
				@ Adj. Land Use	70	65	60
					CL to Contour Distance (Feet)[2]		
1	Lake St.	n/o Temescal Cyn. Rd.	Commercial	74.8	141	304	654
2	Lake St.	s/o Temescal Cyn. Rd.	Commercial (Habitat)	74.5	134	289	622
3	Lake St.	s/o A St.	Public	75.6	143	307	662
4	Lake St.	s/o B St.	Public	75.0	130	279	602
5	Lake St.	s/o D St.	Residential	74.9	128	276	594
6	Lake St.	s/o Nichols Rd.	Commercial	73.7	105	227	488
7	Temescal Cyn Rd.	w/o Lake St.	Commercial	73.3	100	214	462
8	Nichols Rd.	e/o Lake St.	Commercial/Residential	74.6	121	261	562

[1] Sources: City of Lake Elsinore General Plan, Community Form Element, Figure 2.1A Land Use Plan and Google Earth aerial imagery.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-8: HORIZON YEAR 2035 WITH PROJECT NOISE CONTOURS

ID	Road	Segment	Adjacent Planned (Existing) Land Use[1]	dBA CNEL			
				@ Adj. Land Use	70	65	60
					CL to Contour Distance (Feet)[2]		
1	Lake St.	n/o Temescal Cyn. Rd.	Commercial	74.9	143	308	663
2	Lake St.	s/o Temescal Cyn. Rd.	Commercial (Habitat)	74.6	136	292	629
3	Lake St.	s/o A St.	Public	75.7	144	309	666
4	Lake St.	s/o B St.	Public	75.1	130	281	606
5	Lake St.	s/o D St.	Residential	75.0	129	277	598
6	Lake St.	s/o Nichols Rd.	Commercial	73.7	106	227	490
7	Temescal Cyn Rd.	w/o Lake St.	Commercial	73.3	100	215	463
8	Nichols Rd.	e/o Lake St.	Commercial/Residential	74.6	121	261	563

[1] Sources: City of Lake Elsinore General Plan, Community Form Element, Figure 2.1A Land Use Plan and Google Earth aerial imagery.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

7.2 EXISTING CONDITION PROJECT TRAFFIC NOISE LEVELS

An analysis of existing traffic noise levels plus traffic noise generated by the proposed Project has been included in this report. However, the analysis of existing traffic noise levels plus traffic noise generated by the proposed Project scenario will not actually occur since the Project would not be fully constructed and operational until future cumulative conditions.

Table 7-1 presents the Existing without Project conditions CNEL noise levels. The exterior noise levels are shown to range from 66.5 to 71.4 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography.

Table 7-2 shows the Existing with Project conditions will range from 66.6 to 71.5 dBA CNEL. As shown on Table 7-9 the Project will generate a noise level increase of up to 0.2 dBA CNEL on the study area roadway segments.

TABLE 7-9: EXISTING OFF-SITE PROJECT-RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	CNEL at Adjacent Land Use (dBA)[1]			Noise-Sensitive?
			No Project	With Project	Project Addition	
1	Lake St.	n/o Temescal Cyn. Rd.	71.1	71.3	0.2	No
2	Lake St.	s/o Temescal Cyn. Rd.	70.6	70.7	0.1	Yes
3	Lake St.	s/o A St.	70.4	70.6	0.2	No
4	Lake St.	s/o B St.	70.4	70.6	0.2	No
5	Lake St.	s/o D St.	70.4	70.6	0.2	Yes
6	Lake St.	s/o Nichols Rd.	71.4	71.5	0.1	No
7	Temescal Cyn Rd.	w/o Lake St.	66.5	66.6	0.1	No
8	Nichols Rd.	e/o Lake St.	66.7	66.8	0.1	Yes

[1] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
[2] Significance Criteria (Section 4).

7.3 EXISTING PLUS AMBIENT CONDITION PROJECT TRAFFIC NOISE LEVELS

Table 7-3 presents the EA 2018 without Project conditions CNEL noise levels which are expected to range from 66.6 to 71.5 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-4 shows the EA 2018 with Project conditions will range from 66.7 to 71.5 dBA CNEL. As shown on Table 7-10 the Project will generate a noise level increase of up to 0.2 dBA CNEL on the study area roadway segments. Based on the significance criteria in Section 4, the Project-related noise level increases are considered *less than significant* under EA 2018 with Project conditions at the land uses adjacent to roadways conveying Project traffic.

TABLE 7-10: EA 2018 OFF-SITE PROJECT-RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	CNEL at Adjacent Land Use (dBA)[1]			Noise-Sensitive?	Threshold Exceeded?[2]
			No Project	With Project	Project Addition		
1	Lake St.	n/o Temescal Cyn. Rd.	71.2	71.4	0.2	No	No
2	Lake St.	s/o Temescal Cyn. Rd.	70.7	70.8	0.1	Yes	No
3	Lake St.	s/o A St.	70.5	70.7	0.2	No	No
4	Lake St.	s/o B St.	70.5	70.7	0.2	No	No
5	Lake St.	s/o D St.	70.5	70.7	0.2	Yes	No
6	Lake St.	s/o Nichols Rd.	71.5	71.5	0.0	No	No
7	Temescal Cyn Rd.	w/o Lake St.	66.6	66.7	0.1	No	No
8	Nichols Rd.	e/o Lake St.	66.7	66.9	0.2	Yes	No

[1] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
[2] Significance Criteria (Section 4).

7.4 EA PLUS CUMULATIVE CONDITION PROJECT TRAFFIC NOISE LEVELS

Table 7-5 presents the EAC 2018 without Project conditions CNEL noise levels which are expected to range from 66.6 to 71.7 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-6 shows the EAC 2018 with Project conditions will range from 66.7 to 71.8 dBA CNEL. As shown on Table 7-11 the Project will generate a noise level increase of up to 0.2 dBA CNEL on the study area roadway segments. Based on the significance criteria in Section 4, the Project-related noise level increases are considered *less than significant* under EAC 2018 with Project conditions at the land uses adjacent to roadways conveying Project traffic.

TABLE 7-11: EAC 2018 OFF-SITE PROJECT-RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	CNEL at Adjacent Land Use (dBA)[1]			Noise-Sensitive?	Threshold Exceeded?[2]
			No Project	With Project	Project Addition		
1	Lake St.	n/o Temescal Cyn. Rd.	71.6	71.8	0.2	No	No
2	Lake St.	s/o Temescal Cyn. Rd.	71.1	71.3	0.2	Yes	No
3	Lake St.	s/o A St.	71.0	71.1	0.1	No	No
4	Lake St.	s/o B St.	71.0	71.1	0.1	No	No
5	Lake St.	s/o D St.	71.0	71.1	0.1	Yes	No
6	Lake St.	s/o Nichols Rd.	71.7	71.8	0.1	No	No
7	Temescal Cyn Rd.	w/o Lake St.	66.6	66.7	0.1	No	No
8	Nichols Rd.	e/o Lake St.	67.5	67.7	0.2	Yes	No

[1] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
[2] Significance Criteria (Section 4).

7.5 HORIZON YEAR 2035 CONDITION PROJECT TRAFFIC NOISE LEVELS

Table 7-7 presents the Horizon Year 2035 without Project conditions CNEL noise levels which are expected to range from 73.3 to 75.6 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-8 shows the Horizon Year 2035 with Project conditions will range from 73.3 to 75.7 dBA CNEL. As shown on Table 7-12 the Project will generate a noise level increase of up to 0.1 dBA CNEL on the study area roadway segments. Based on the significance criteria in Section 4, the Project-related noise level increases are considered *less than significant* under Horizon Year 2035 with Project conditions at the land uses adjacent to roadways conveying Project traffic.

TABLE 7-12: HORIZON YEAR 2035 OFF-SITE PROJECT-RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	CNEL at Adjacent Land Use (dBA)[1]			Noise-Sensitive?	Threshold Exceeded?[2]
			No Project	With Project	Project Addition		
1	Lake St.	n/o Temescal Cyn. Rd.	74.8	74.9	0.1	No	No
2	Lake St.	s/o Temescal Cyn. Rd.	74.5	74.6	0.1	Yes	No
3	Lake St.	s/o A St.	75.6	75.7	0.1	No	No
4	Lake St.	s/o B St.	75.0	75.1	0.1	No	No
5	Lake St.	s/o D St.	74.9	75.0	0.1	Yes	No
6	Lake St.	s/o Nichols Rd.	73.7	73.7	0.0	No	No
7	Temescal Cyn Rd.	w/o Lake St.	73.3	73.3	0.0	No	No
8	Nichols Rd.	e/o Lake St.	74.6	74.6	0.0	Yes	No

[1] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
[2] Significance Criteria (Section 4).

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8 PROJECT BUILDING NOISE ATTENUATION

As previously indicated in Section 5 and Table 5-1, existing noise levels south of the Project site adjacent to the potentially suitable habitat area approach 67.8 dBA CNEL (measurement location L2) and are largely influenced by existing traffic noise levels on I-15 and Lake Street. With the construction of the proposed Project buildings, noise levels at this location are anticipated to benefit from the barrier attenuation provided by the buildings themselves. The FHWA indicates that a noise barrier is most effective when placed close to the noise source or receiver, and it must be high enough and long enough to block the path of the noise source. (4) While not a continuous noise barrier, the Project buildings would be expected to provide up to 4.5 dBA CNEL of barrier attenuation within the shadow zone of each building, or the area being shielded, based on guidance for the first row of intervening buildings provided by the Federal Transit Administration. (5) As such, the Project buildings are anticipated to provide barrier attenuation for the sensitive habitat area south of the Project site, where receiver locations are shielded by the buildings themselves.

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9 RECEIVER LOCATIONS

To assess the potential for long-term operational and short-term construction noise impacts, the following receiver locations as shown on Exhibit 9-A were identified as representative locations for focused analysis. Sensitive receivers are generally defined as locations where people reside or where the presence of unwanted sound could otherwise adversely affect the use of the land. Noise-sensitive land uses are generally considered to include: schools, hospitals, single-family dwellings, mobile home parks, churches, libraries, and recreation areas. Moderately noise-sensitive land uses typically include: multi-family dwellings, hotels, motels, dormitories, out-patient clinics, cemeteries, golf courses, country clubs, athletic/tennis clubs, and equestrian clubs. Land uses that are considered relatively insensitive to noise include business, commercial, and professional developments. Land uses that are typically not affected by noise include: industrial, manufacturing, utilities, agriculture, undeveloped land, parking lots, warehousing, liquid and solid waste facilities, salvage yards, and transit terminals.

Sensitive receivers near the Project site include potentially suitable habitat areas as described below. Other sensitive land uses in the Project study area that are located at greater distances than those identified in this noise study will experience lower noise levels than those presented in this report due to the additional attenuation from distance and the shielding of intervening structures.

R1: Located approximately 1,091 feet north of the Project site, R1 represents an existing Riverside County Conservation Area north of Walker Canyon Road. A 24-hour noise level measurement was taken near this location, L1, to describe the existing ambient noise environment.

R2: Location R2 represents existing potentially suitable habitat areas located approximately 71 feet east of the Project site, south of I-15. A 24-hour noise level measurement was taken near this location, L2, to describe the existing ambient noise environment.

R3: Location R3 represents the existing potentially suitable habitat areas located south of the Projects site at roughly 147 feet. A 24-hour noise level measurement was taken near this location, L2, to describe the existing ambient noise environment.

R4: Location R4 represents the existing potentially suitable habitat areas south of the Project site located at roughly 107 feet. A 24-hour noise level measurement was taken near this location, L2, to describe the existing ambient noise environment.

R5: Location R5 represents an abandon non-residential building southwest of the Project site at a distance of roughly 1,034 feet. A 24-hour noise level measurement was taken near this location, L3, to describe the existing ambient noise environment.

EXHIBIT 9-A: RECEIVER LOCATIONS

10 OPERATIONAL IMPACTS

This section analyzes the potential operational noise impacts due to the Project's stationary noise sources on the off-site sensitive receiver locations identified in Section 9. Exhibit 10-A identifies the receiver locations and noise source locations used to assess the Project-related operational noise levels.

10.1 REFERENCE NOISE LEVELS

To estimate the Project operational noise impacts, reference noise level measurements were collected from similar types of activities to represent the noise levels expected with the development of the proposed Project. This section provides a detailed description of the reference noise level measurements shown on Table 10-1 used to estimate the Project operational noise impacts. It is important to note that the following projected noise levels assume the worst-case noise environment with the roof-top air conditioning units, gas station activity, RV storage/parking activity, and vehicle washing (e.g., pressure washers) activity all operating simultaneously. These noise level impacts will vary throughout the day.

All noise sources were modeled assuming peak operational activity with no periods of inactivity, and are assumed to operate simultaneously, to present a conservative approach.

TABLE 10-1: REFERENCE NOISE LEVEL MEASUREMENTS

Noise Source	Measurement Duration (hh:mm:ss)	Distance From Source (Feet)	Noise Source Height (Feet)	Reference Noise Levels (dBA L_{eq})		Reference Noise Levels (dBA L_{50})	
				@ Ref. Dist.	@ 50 Feet	@ Ref. Dist.	@ 50 Feet
Roof-Top Air Conditioning Units[1]	96:00:00	5'	5'	77.2	57.2	74.4	54.4
Gas Station Activity[2]	00:03:00	5'	5'	68.2	48.2	65.6	45.6
RV Storage/Parking Activity[3]	00:01:00	10'	6'	76.4	65.9	76.5	66.0
Vehicle Washing (Pressure Washer)[4]	00:00:13	10'	5'	82.4	68.4	82.2	68.2
Parking Lot Vehicle Movements[5]	01:00:00	10'	5'	52.2	41.7	49.0	38.5

[1] As measured by Urban Crossroads, Inc. on 7/27/2015 at the Santee Walmart located at 170 Town Center Parkway.
[2] As measured by Urban Crossroads, Inc. on 4/26/2016 at the ARCO gas station located at 6501 Quail Hill Parkway in Irvine.
[3] As measured by Urban Crossroads, Inc. on 9/16/2015 at the Giant RV located at 41150 Juniper Street in the City of Murrieta.
[4] As measured by Urban Crossroads, Inc. at the Audi Mission Viejo dealership on 6/10/2016.
[5] As measured by Urban Crossroads, Inc. on 5/17/2017 at the Panasonic Avionics Corporation parking lot in the City of Lake Forest.

10.1.1 ROOF-TOP AIR CONDITIONING UNITS

To assess the noise levels created by the roof-top air conditioning units at the Project site, reference noise levels measurements were taken at the Santee Walmart on July 27th, 2015. Located at 170 Town Center Parkway in the City of Santee, the noise level measurements describe a single mechanical roof-top air conditioning unit on the roof of an existing Walmart store with additional background units. The reference noise level represents a Lennox SCA120 series 10-ton model packaged air conditioning unit in addition to background units operating simultaneously. Using a uniform reference distance of 50 feet, the reference noise level noise level is 54.4 dBA L_{50}. The operating conditions of the reference noise level measurement reflect peak summer cooling requirements with measured temperatures approaching 96 degrees Fahrenheit (°F) with average daytime temperatures of 82°F.

10.1.2 GAS STATION ACTIVITIES

To describe the potential noise level impacts created by the gas station of the Project, a reference noise level measurement was collected on Tuesday, April 26th, 2016 at an ARCO gas station located at 6501 Quail Hill Parkway in the City of Irvine. The reference noise level measurement includes six cars fueling at once, car doors closing, engines starting, fuel pump TV sounds and background car pass-by events within a 3-minute period. At 50 feet from the gas station, a reference noise level of 45.6 dBA L_{50} was measured.

10.1.3 RV STORAGE/PARKING ACTIVITY

On Wednesday, September 16th, 2015, Urban Crossroads, Inc. collected short-term operational noise level measurements at the Giant RV Parts and Service Center located at 41150 Juniper Street in the City of Murrieta. An RV engine idle and air brake noise reference measurement was taken over a one-minute period outside of the Giant RV Murrieta service garage, with background service garage and RV towing noise sources. The reference measurement results in a noise level of 66.0 dBA L_{50} at a uniform distance of 50 feet.

10.1.4 VEHICLE WASHING (PRESSURE WASHER) ACTIVITY

To describe pressure washers at the Project site vehicle washing area, a reference noise level measurement was collected at the Audi Mission Viejo dealership on June 10th, 2016. The reference pressure washer activity noise level was measured at 68.2 dBA L_{50} at a uniform reference distance of 50 feet. It is expected that pressure washers would be in the outdoor vehicle wash area within the Project site.

10.1.5 PARKING LOT VEHICLE MOVEMENTS

To determine the noise levels associated with parking lot vehicle movements, Urban Crossroads collected reference noise level measurements over a 24-hour period on May 17th, 2017 at the parking lot for the Panasonic Avionics Corporation office and warehouse building (approximately 75,000 square feet), and additional office buildings (roughly 55,000 square feet) in the City of Lake Forest. The peak hour of activity measured over the 24-hour noise level measurement period occurred between 12:00 p.m. to 1:00 p.m., or the typical lunch hour for employees

working in the area. The measured reference noise level at 50 feet from parking lot vehicle movements was measured at 38.5 dBA L_{50}. The parking lot noise levels are mainly due to cars pulling in and out of spaces during peak lunch hour activity and employees talking, and represents peak activity observed over a 24-hour period. Noise associated with parking lot vehicle movements is expected to operate for the entire hour (60 minutes).

10.2 OPERATIONAL NOISE LEVELS

Based upon the reference noise levels, it is possible to estimate the Project operational stationary-source noise levels at each of the sensitive receiver locations. The operational noise level calculations shown on Table 10-2 account for the distance attenuation provided due to geometric spreading, when sound from a localized stationary source (i.e., a point source) propagates uniformly outward in a spherical pattern. Hard site conditions are used in the operational noise analysis which result in noise levels that attenuate (or decrease) at a rate of 6 dBA for each doubling of distance from a point source. The basic noise attenuation equation shown below is used to calculate the distance attenuation based on a reference noise level (SPL_1):

$$SPL_2 = SPL_1 - 20\log(D_2/D_1)$$

Where SPL_2 is the resulting noise level after attenuation, SPL_1 is the source noise level, D_2 is the distance to the reference sound pressure level (SPL_1), and D_1 is the distance to the receiver location. RV storage/parking activity is modeled as a line source which assumes soft site conditions and distance attenuation of 4.5 dBA per doubling of distance, to present a conservative approach. Table 10-2 indicates that the noise levels associated with the roof-top air conditioning units, gas station activity, RV storage/parking activity, and vehicle washing (e.g., pressure washers) activity are expected to range from 46.2 to 58.1 dBA L_{eq} at the habitat areas in the Project study area, and approach 45.7 dBA L_{50} at the non-noise sensitive receiver location R5. The operational noise level calculation worksheets are included in Appendix 10.1.

EXHIBIT 10-A: OPERATIONAL NOISE SOURCE AND RECEIVER LOCATIONS

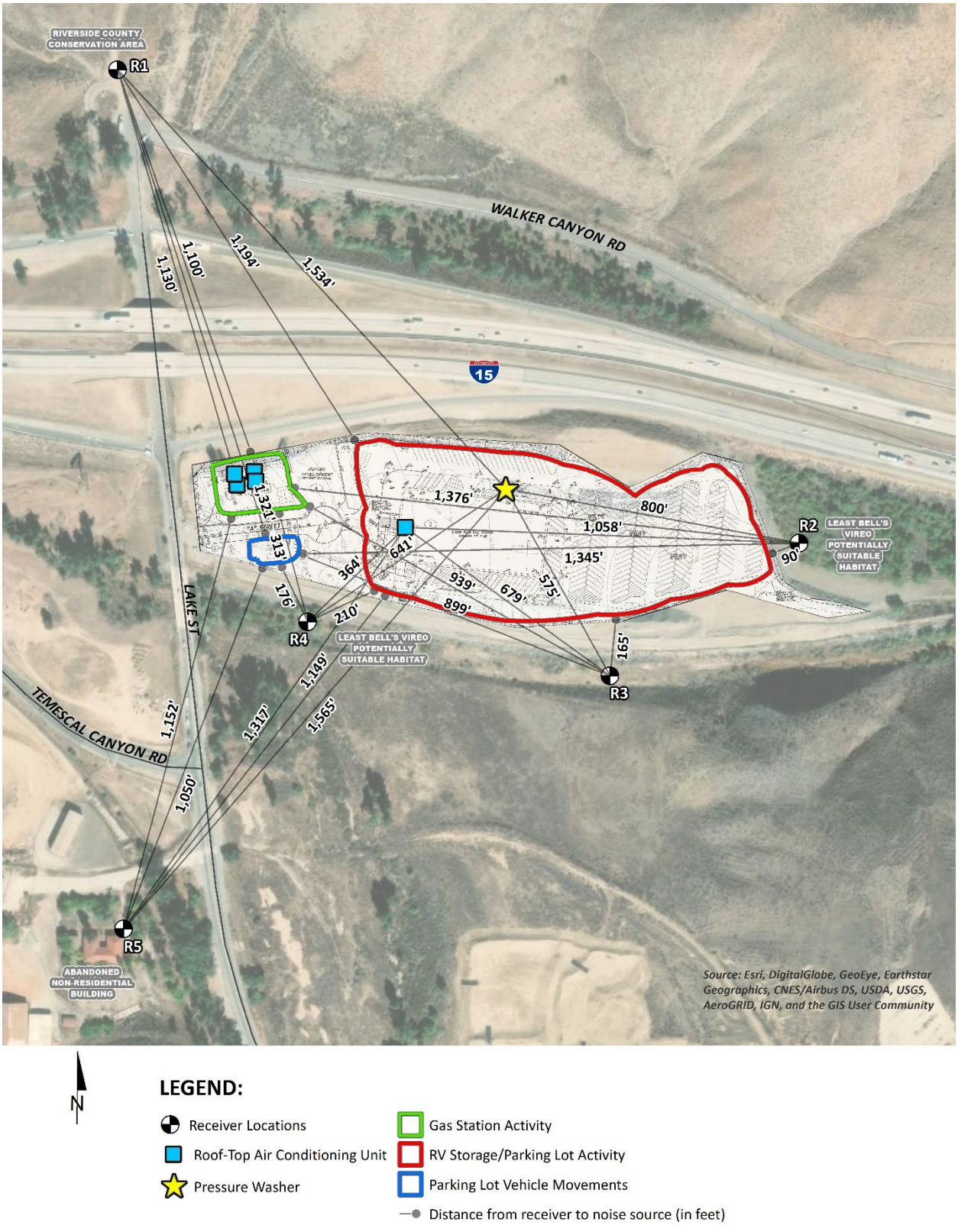

TABLE 10-2: UNMITIGATED PROJECT OPERATIONAL NOISE LEVELS

Receiver Location[1]	Land Use	Noise Sources[2]	Operational Noise Levels (dBA)[3]					
			L_{eq} (Hourly)	L_{50} (30 mins)	L_{25} (15 mins)	L_8 (5 mins)	L_2 (1 min)	L_{max} (Anytime)
R1	Habitat	Roof-Top Air Conditioning Units	30.1	-	-	-	-	-
		Gas Station Activity	21.4	-	-	-	-	-
		RV Parking Lot Activity	45.2	-	-	-	-	-
		Parking Lot Vehicle Movements	20.4	-	-	-	-	-
		Pressure Washer	38.7	-	-	-	-	-
		Combined Noise Level:	46.2	-	-	-	-	-
R2	Habitat	Roof-Top Air Conditioning Units	30.7	-	-	-	-	-
		Gas Station Activity	19.4	-	-	-	-	-
		RV Parking Lot Activity	46.8	-	-	-	-	-
		Parking Lot Vehicle Movements	20.3	-	-	-	-	-
		Pressure Washer	29.1	-	-	-	-	-
		Combined Noise Level:	47.0	-	-	-	-	-
R3	Habitat	Roof-Top Air Conditioning Units	34.5	-	-	-	-	-
		Gas Station Activity	22.7	-	-	-	-	-
		RV Parking Lot Activity	58.1	-	-	-	-	-
		Parking Lot Vehicle Movements	22.9	-	-	-	-	-
		Pressure Washer	28.7	-	-	-	-	-
		Combined Noise Level:	58.1	-	-	-	-	-
R4	Habitat	Roof-Top Air Conditioning Units	40.0	-	-	-	-	-
		Gas Station Activity	32.3	-	-	-	-	-
		RV Parking Lot Activity	56.6	-	-	-	-	-
		Parking Lot Vehicle Movements	33.5	-	-	-	-	-
		Pressure Washer	27.8	-	-	-	-	-
		Combined Noise Level:	56.7	-	-	-	-	-
R5	General Commercial	Roof-Top Air Conditioning Units	-	26.0	27.7	29.0	29.3	29.8
		Gas Station Activity	-	18.4	19.7	22.3	27.2	35.2
		RV Parking Lot Activity	-	45.6	46.1	46.8	48.7	50.5
		Parking Lot Vehicle Movements	-	18.7	19.7	24.7	30.7	41.6
		Pressure Washer	-	19.8	20.5	21.3	21.5	21.7
		Combined Noise Level:	-	45.7	46.2	46.9	48.9	51.2

[1] See Exhibit 10-A for the receiver and noise source locations.
[2] Reference noise sources as shown on Table 10-1.
[3] Stationary source noise level calculations are provided in Appendix 10.1.

10.3 OPERATIONAL NOISE LEVEL COMPLIANCE

To demonstrate compliance with local noise regulations, the Project-only operational noise levels are evaluated against exterior noise level thresholds identified in this study of 65 dBA L_{eq} for the potentially suitable habitat areas, and the general commercial exterior noise level limits of the City of Lake Elsinore. Table 10-3 shows the operational noise levels associated with the Lake Street / I-15 Property Project satisfy the daytime and nighttime exterior noise level standards at all receiver locations. Therefore, the unmitigated Project operational noise impacts are considered *less than significant* impacts at the nearby land uses.

TABLE 10-3: UNMITIGATED OPERATIONAL NOISE LEVEL COMPLIANCE

Receiver Location[1]	Land Use	Noise Level at Receiver Locations (dBA)[2]						Threshold Exceeded?[3]	
		L_{eq} (Hourly)	L_{50} (30 mins)	L_{25} (15 mins)	L_8 (5 mins)	L_2 (1 min)	L_{max} (Anytime)	Daytime	Nighttime
Exterior Noise Level Standards	**Daytime GC**	-	**65**	**70**	**75**	**80**	**85**	-	-
	Nighttime GC	-	**60**	**65**	**70**	**75**	**80**	-	-
	Habitat Area	**65**	-	-	-	-	-	-	-
			-	-	-	-	-	-	-
R1	Habitat Area	46.2	-	-	-	-	-	No	No
R2	Habitat Area	47.0	-	-	-	-	-	No	No
R3	Habitat Area	58.1	-	-	-	-	-	No	No
R4	Habitat Area	56.7	-	-	-	-	-	No	No
R5	General Commercial	-	45.7	46.2	46.9	48.9	51.2	No	No

[1] See Exhibit 10-A for the receiver and noise source locations.
[2] Estimated Project operational noise levels as shown on Table 10-2.
[3] Do the Project operational noise levels satisfy the operational noise level standards?
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.; "GC" = General Commercial

10.4 PROJECT OPERATIONAL NOISE CONTRIBUTION

To describe the Project operational noise level contributions, the Project operational noise levels were combined with the existing ambient noise levels measurements for the off-site receiver locations potentially impacted by Project operational noise sources. Since the units used to measure noise, decibels (dB), are logarithmic units, the Project-operational and existing ambient noise levels cannot be combined using standard arithmetic equations. (7) Instead, they must be logarithmically added using the following base equation:

$$SPL_{Total} = 10\log_{10}[10^{SPL1/10} + 10^{SPL2/10} + \ldots 10^{SPLn/10}]$$

Where "SPL1," "SPL2," etc. are equal to the sound pressure levels being combined, or in this case, the Project-operational and existing ambient noise levels. The difference between the combined Project and ambient noise levels describe the Project noise level contributions. Noise levels that would be experienced at receiver locations when unmitigated Project-source noise is added to the ambient daytime and nighttime conditions are presented on Tables 10-4 and 10-5,

respectively. As indicated on Tables 10-4 and 10-5, the Project will contribute operational noise level increases over the existing ambient noise levels which ranging from 0.2 to 1.9 dBA during the daytime hours and no measurable increase during the nighttime hours. Since the Project-related operational noise level contributions will satisfy the significance criteria discussed in Section 4, the increases at the sensitive receiver locations will be *less than significant*.

TABLE 10-4: DAYTIME OPERATIONAL NOISE LEVEL CONTRIBUTIONS

Receiver Location[1]	Unmitigated Project Operational Noise Level (dBA)[2]		Measurement Location[3]	Reference Ambient Noise Levels (dBA)[4]		Combined Project and Ambient (dBA)[5]		Project Increase (dBA)[6]		Threshold (dBA)[7]	Threshold Exceeded?[7]
	L_{eq}	L_{50}		L_{eq}	L_{50}	L_{eq}	L_{50}	L_{eq}	L_{50}		
R1	46.2	-	L1	58.0	-	58.3	-	0.3	-	5.0	No
R2	47.0	-	L2	60.7	-	60.9	-	0.2	-	3.0	No
R3	58.1	-	L2	60.7	-	62.6	-	1.9	-	3.0	No
R4	56.7	-	L2	60.7	-	62.2	-	1.5	-	3.0	No
R5	-	45.7	L3	-	54.7	-	55.2	-	0.5	5.0	No

[1] See Exhibit 10-A for the sensitive receiver locations.
[2] Total Project operational noise levels as shown on Table 10-3.
[3] Reference noise level measurement locations as shown on Exhibit 5-A.
[4] Observed daytime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] FICON significance criteria as defined in Section 4, Table 4-1, based on the ambient noise level without the Project.

TABLE 10-5: NIGHTTIME OPERATIONAL NOISE LEVEL CONTRIBUTIONS

Receiver Location[1]	Mitigated Project Operational Noise Level (dBA)[2]		Measurement Location[3]	Reference Ambient Noise Levels (dBA)[4]		Combined Project and Ambient (dBA)[5]		Project Increase (dBA)[6]		Threshold (dBA)[7]	Threshold Exceeded?[7]
	L_{eq}	L_{50}		L_{eq}	L_{50}	L_{eq}	L_{50}	L_{eq}	L_{50}		
R1	46.2	-	L1	59.4	-	59.6	-	0.2	-	5.0	No
R2	47.0	-	L2	61.2	-	61.4	-	0.2	-	3.0	No
R3	58.1	-	L2	61.2	-	62.9	-	1.7	-	3.0	No
R4	56.7	-	L2	61.2	-	62.5	-	1.3	-	3.0	No
R5	-	45.7	L3	-	53.3	-	54.0	-	0.7	5.0	No

[1] See Exhibit 10-A for the sensitive receiver locations.
[2] Total Project operational noise levels as shown on Table 10-3.
[3] Reference noise level measurement locations as shown on Exhibit 5-A.
[4] Observed nighttime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] FICON significance criteria as defined in Section 4, Table 4-1, based on the ambient noise level without the Project.

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11 CONSTRUCTION IMPACTS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project. Exhibit 11-A shows the construction activity boundaries in relation to the nearby sensitive receiver locations.

11.1 CONSTRUCTION NOISE LEVELS

Noise generated by the Project construction equipment will include a combination of trucks, power tools, concrete mixers, and portable generators that when combined can reach high levels. The number and mix of construction equipment is expected to occur in the following stages:

- Site Preparation
- Grading
- Building Construction
- Paving
- Architectural Coating

This construction noise analysis was prepared using reference noise level measurements taken by Urban Crossroads, Inc. to describe the typical construction activity noise levels for each stage of Project construction. The construction reference noise level measurements represent a list of typical construction activity noise levels. Noise levels generated by heavy construction equipment can range from approximately 68 dBA to in excess of 80 dBA when measured at 50 feet. Hard site conditions are used in the construction noise analysis which result in noise levels that attenuate (or decrease) at a rate of 6 dBA for each doubling of distance from a point source (i.e. construction equipment). For example, a noise level of 80 dBA measured at 50 feet from the noise source to the receiver would be reduced to 74 dBA at 100 feet from the source to the receiver, and would be further reduced to 68 dBA at 200 feet from the source to the receiver. The construction stages used in this analysis are consistent with the data used to support the construction emissions in the *Lake Street / I-15 Property Air Quality Impact Analysis* prepared by Urban Crossroads, Inc. (20)

11.2 CONSTRUCTION REFERENCE NOISE LEVELS

To describe the Project construction noise levels, measurements were collected for similar activities at several construction sites. Table 11-1 provides a summary of the construction reference noise level measurements. Since the reference noise levels were collected at varying distances, all construction noise level measurements presented on Table 11-1 have been adjusted to describe a common reference distance of 50 feet.

TABLE 11-1: CONSTRUCTION REFERENCE NOISE LEVELS

ID	Noise Source	Reference Distance From Source (Feet)	Reference Noise Levels @ Reference Distance (dBA L_{eq})	Reference Noise Levels @ 50 Feet (dBA L_{eq})[5]	Reference Noise Levels @ Reference Distance (dBA L_{max})	Reference Noise Levels @ 50 Feet (dBA L_{max})[5]
1	Truck Pass-Bys & Dozer Activity[1]	30'	64'	59'	68.1	63.7
2	Dozer Activity[1]	30'	69'	64'	76.4	72.0
3	Construction Vehicle Maintenance Activities[2]	30'	72'	67'	74.8	70.4
4	Foundation Trenching[2]	30'	73'	68'	74.9	70.5
5	Framing[3]	30'	67'	62'	76.7	72.3
6	Concrete Paver Activities[4]	30'	70'	66'	75.7	71.3
7	Concrete Mixer Pour & Paving Activities[4]	30'	70'	66'	76.3	71.9

[1] As measured by Urban Crossroads, Inc. on 10/14/15 at a business park construction site located at the northwest corner of Barranca Parkway and Alton Parkway in the City of Irvine.
[2] As measured by Urban Crossroads, Inc. on 10/20/15 at a construction site located in Rancho Mission Viejo.
[3] As measured by Urban Crossroads, Inc. on 10/20/15 at a residential construction site located in Rancho Mission Viejo.
[4] Reference noise level measurements were collected from a nighttime concrete pour at an industrial construction site, located at 27334 San Bernardino Avenue in the City of Redlands, between 1:00 a.m. to 2:00 a.m. on 7/1/15.
[5] Reference noise levels are calculated at 50 feet using a drop off rate of 6 dBA per doubling of distance (point source).

EXHIBIT 11-A: CONSTRUCTION ACTIVITY AND RECEIVER LOCATIONS

11.3 CONSTRUCTION NOISE ANALYSIS

Tables 11-2 to 11-6 show the Project construction stages and the reference construction noise levels used for each stage. Table 11-7 provides a summary of the noise levels from each stage of construction at each of the sensitive receiver locations.

TABLE 11-2: SITE PREPARATION EQUIPMENT NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})	Reference Noise Level @ 50 Feet (dBA L_{max})
Truck Pass-Bys & Dozer Activity	59.2	63.7
Dozer Activity	64.2	72.0
Highest Reference Noise Level at 50 Feet:	64.2	72.0

Receiver Location	Distance to Construction Activity (Feet)[2]	Distance Attenuation (dBA)[3]	Estimated Noise Barrier Attenuation (dBA)[4]	Construction Noise Level (dBA Leq)	Construction Noise Level (dBA L_{max})
R1	1,104'	-26.9	0.0	37.3	-
R2	91'	-5.2	0.0	59.0	-
R3	165'	-10.4	0.0	53.8	-
R4	125'	-8.0	0.0	56.2	-
R5	1,051'	-26.5	0.0	-	45.5

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc.
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Estimated barrier attenuation from existing barriers in the Project study area.

TABLE 11-3: GRADING EQUIPMENT NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})	Reference Noise Level @ 50 Feet (dBA L_{max})
Truck Pass-Bys & Dozer Activity	59.2	63.7
Dozer Activity	64.2	72.0
Highest Reference Noise Level at 50 Feet:	64.2	72.0

Receiver Location	Distance to Construction Activity (Feet)[2]	Distance Attenuation (dBA)[3]	Estimated Noise Barrier Attenuation (dBA)[4]	Construction Noise Level (dBA Leq)	Construction Noise Level (dBA L_{max})
R1	1,104'	-26.9	0.0	37.3	-
R2	91'	-5.2	0.0	59.0	-
R3	165'	-10.4	0.0	53.8	-
R4	125'	-8.0	0.0	56.2	-
R5	1,051'	-26.5	0.0	-	45.5

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc.
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Estimated barrier attenuation from existing barriers in the Project study area.

TABLE 11-4: BUILDING CONSTRUCTION EQUIPMENT NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})	Reference Noise Level @ 50 Feet (dBA L_{max})
Construction Vehicle Maintenance Activities	67.5	70.4
Foundation Trenching	68.2	70.5
Framing	62.3	72.3
Highest Reference Noise Level at 50 Feet:	68.2	72.3

Receiver Location	Distance to Construction Activity (Feet)[2]	Distance Attenuation (dBA)[3]	Estimated Noise Barrier Attenuation (dBA)[4]	Construction Noise Level (dBA Leq)	Construction Noise Level (dBA L_{max})
R1	1,104'	-26.9	0.0	41.3	-
R2	91'	-5.2	0.0	63.0	-
R3	165'	-10.4	0.0	57.8	-
R4	125'	-8.0	0.0	60.2	-
R5	1,051'	-26.5	0.0	-	45.8

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc.
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Estimated barrier attenuation from existing barriers in the Project study area.

TABLE 11-5: PAVING EQUIPMENT NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})	Reference Noise Level @ 50 Feet (dBA L_{max})
Concrete Paver Activities	65.6	71.3
Concrete Mixer Pour & Paving Activities	65.9	71.9
Highest Reference Noise Level at 50 Feet:	65.9	71.9

Receiver Location	Distance to Construction Activity (Feet)[2]	Distance Attenuation (dBA)[3]	Estimated Noise Barrier Attenuation (dBA)[4]	Construction Noise Level (dBA Leq)	Construction Noise Level (dBA L_{max})
R1	1,104'	-26.9	0.0	39.0	-
R2	91'	-5.2	0.0	60.7	-
R3	165'	-10.4	0.0	55.5	-
R4	125'	-8.0	0.0	57.9	-
R5	1,051'	-26.5	0.0	-	45.4

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc.
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Estimated barrier attenuation from existing barriers in the Project study area.

TABLE 11-6: ARCHITECTURAL COATING EQUIPMENT NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})	Reference Noise Level @ 50 Feet (dBA L_{max})
Construction Vehicle Maintenance Activities	67.5	70.4
Framing	62.3	72.3
Highest Reference Noise Level at 50 Feet:	67.5	72.3

Receiver Location	Distance to Construction Activity (Feet)[2]	Distance Attenuation (dBA)[3]	Estimated Noise Barrier Attenuation (dBA)[4]	Construction Noise Level (dBA Leq)	Construction Noise Level (dBA L_{max})
R1	1,104'	-26.9	0.0	40.6	-
R2	91'	-5.2	0.0	62.3	-
R3	165'	-10.4	0.0	57.1	-
R4	125'	-8.0	0.0	59.5	-
R5	1,051'	-26.5	0.0	-	45.8

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc. Framing activities are used to describe the similar painting activities that require the use of an air compressor.
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Estimated barrier attenuation from existing barriers in the Project study area.

11.4 CONSTRUCTION NOISE THRESHOLDS OF SIGNIFICANCE

The construction noise analysis shows that the highest construction noise levels will occur when construction activities take place at the closest point from primary Project construction activity to each of the nearby receiver locations. As shown on Table 11-7, the unmitigated construction noise levels are expected to range from 37.3 to 63.0 dBA L_{eq} at the potentially suitable habitat areas, and from 45.4 to 45.8 dBA L_{max} at receiver location R5 (e.g., non-noise sensitive general commercial use). To evaluate whether the Project will generate potentially significant short-term noise levels at off-site sensitive receiver locations the 65 dBA L_{eq} threshold for sensitive habitat areas and the City of Lake Elsinore stationary construction equipment noise level standard of 80 dBA L_{max}, previously described in Section 3, is used as the acceptable construction noise threshold at the nearby non-noise sensitive general commercial receiver locations R5 since Project construction will occur for greater than 10 consecutive days.

TABLE 11-7: UNMITIGATED CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Receiver Location[1]	Land Use	Construction Stage Hourly Noise Level (dBA L_{eq})					
		Site Preparation	Grading	Building Construction	Paving	Architectural Coating	Highest Noise Levels[2]
R1	Habitat Area	37.3	37.3	41.3	39.0	40.6	41.3
R2		59.0	59.0	63.0	60.7	62.3	63.0
R3		53.8	53.8	57.8	55.5	57.1	57.8
R4		56.2	56.2	60.2	57.9	59.5	60.2
Receiver Location[1]	**Land Use**	**Construction Stage Hourly Noise Level (dBA L_{max})**					
		Site Preparation	**Grading**	**Building Construction**	**Paving**	**Architectural Coating**	**Highest Noise Levels[2]**
R5	Gen. Comm.	45.5	45.5	45.8	45.4	45.8	45.8

[1] Noise receiver locations are shown on Exhibit 11-A.
[2] Estimated construction noise levels during peak operating conditions.

Table 11-8 shows the highest construction noise levels at the potentially impacted receiver locations are expected to range from 41.3 to 63.0 dBA L_{eq} at the potentially suitable habitat areas and will satisfy the 65 dBA L_{eq} threshold for sensitive habitat areas. In addition, Table 11-8 shows that the noise levels of 45.8 L_{max} at receiver location R5 (e.g., General Commercial land use) will satisfy the stationary construction equipment noise level standard of 80 dBA $L_{max.}$ Therefore, the noise impacts due to unmitigated Project construction noise levels is considered a *less than significant* impact at all receiver locations.

TABLE 11-8: UNMITIGATED CONSTRUCTION EQUIPMENT NOISE LEVEL COMPLIANCE

Receiver Location[1]	Land Use Category	Highest Construction Activity Noise Levels (dBA)[2]		Threshold (dBA)[3]		Threshold Exceeded?[4]
		L_{eq}	L_{max}	L_{eq}	L_{max}	
R1	Habitat Area	41.3	-	65	-	No
R2	Habitat Area	63.0	-	65	-	No
R3	Habitat Area	57.8	-	65	-	No
R4	Habitat Area	60.2	-	65	-	No
R5	Gen. Comm.	-	45.8	-	80	No

[1] Noise receiver locations are shown on Exhibit 11-A.
[2] Estimated construction noise levels during peak operating conditions, as shown on Tables 11-7.
[3] Construction noise level thresholds by land use category.
[4] Do the estimated Project construction noise levels meet the construction noise level thresholds?

11.5 CONSTRUCTION VIBRATION IMPACTS

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods used, distance to the affected structures and soil type. It is expected that ground-borne vibration from Project construction activities would cause only intermittent, localized intrusion. The proposed Project's construction activities most likely to cause vibration impacts are:

- Heavy Construction Equipment: Although all heavy mobile construction equipment has the potential of causing at least some perceptible vibration while operating close to buildings, the vibration is usually short-term and is not of sufficient magnitude to cause building damage.
- Trucks: Trucks hauling building materials to construction sites can be sources of vibration intrusion if the haul routes pass through residential neighborhoods on streets with bumps or potholes. Repairing the bumps and potholes generally eliminates the problem.

Ground-borne vibration levels resulting from construction activities occurring within the Project site were estimated by data published by the Federal Transit Administration (FTA). Construction activities that would have the potential to generate low levels of ground-borne vibration within the Project site include grading. Using the vibration source level of construction equipment provided on Table 6-6 and the construction vibration assessment methodology published by the FTA, it is possible to estimate the Project vibration impacts. Table 11-9 presents the expected Project related vibration levels at each of the sensitive receiver locations.

At distances ranging from 91 to 1,104 feet from the Project construction activities, construction vibration velocity levels are expected to approach 0.013 in/sec (PPV), as shown on Table 11-9. To assess the human perception of vibration levels in PPV, the velocities are converted to RMS vibration levels based on the Caltrans *Transportation and Construction Vibration Guidance Manual* conversion factor of 0.71. Table 11-9 shows the construction vibration levels in RMS are expected to approach 0.009 in/sec (RMS) at the nearby receiver locations. Based on the vibration

threshold of 0.01 in/sec, the construction-related vibration impacts are considered *less than significant* at the nearby receiver locations.

TABLE 11-9: UNMITIGATED CONSTRUCTION EQUIPMENT VIBRATION LEVELS

Receiver Location[1]	Distance to Const. Activity (Feet)	Receiver PPV Levels (in/sec)[2]					RMS Velocity Levels (in/sec)[3]	Threshold (RMS)	Threshold Exceeded?[4]
		Small Bulldozer (<80k lbs)	Jack-hammer	Loaded Trucks	Large Bulldozer (>80k lbs)	Peak Vibration (PPV)			
R1	1,104'	0.000	0.000	0.000	0.000	0.000	0.000	0.01	No
R2	91'	0.000	0.005	0.011	0.013	0.013	0.009	0.01	No
R3	165'	0.000	0.002	0.004	0.005	0.005	0.004	0.01	No
R4	125'	0.000	0.003	0.007	0.008	0.008	0.006	0.01	No
R5	1,051'	0.000	0.000	0.000	0.000	0.000	0.000	0.01	No

[1] Receiver locations are shown on Exhibit 11-A.
[2] Based on the Vibration Source Levels of Construction Equipment included on Table 6-6.
[3] Vibration levels in PPV are converted to RMS velocity using a 0.71 conversion factor identified in the Caltrans Transportation and Construction Vibration Guidance Manual, September 2013.
[4] Does the peak vibration exceed the maximum acceptable vibration threshold shown on Table 3-4?

Further, vibration levels at the site of the closest sensitive receiver are unlikely to be sustained during the entire construction period but will occur rather only during the times that heavy construction equipment is operating at the Project site perimeter.

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12 REFERENCES

1. **State of California.** *California Environmental Quality Act, Appendix G.* 2019.
2. **City of Lake Elsinore.** *LEAP 2018-02/Lake Street Storage Project MSHCP Consistency Findings.* November 2018.
3. **Urban Crossroads, Inc.** *Lake Street / I-15 Property Traffic Impact Analysis.* September 2018.
4. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning, Noise and Air Quality Branch.** *Highway Traffic Noise Analysis and Abatement Policy and Guidance.* June, 1995.
5. **U.S. Department of Transportation, Federal Transit Administration.** *Transit Noise and Vibration Impact Assessment.* May 2006. FTA-VA-90-1003-06.
6. **City of Lake Elsinore.** *Municipal Code, Chapter 17.176 Noise Control.*
7. **California Department of Transportation Environmental Program.** *Technical Noise Supplement - A Technical Supplement to the Traffic Noise Analysis Protocol.* Sacramento, CA : s.n., September 2013.
8. **Environmental Protection Agency Office of Noise Abatement and Control.** *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* March 1974. EPA/ONAC 550/9/74-004.
9. **U.S. Department of Transportation, Federal Highway Administration.** *Highway Traffic Noise in the United States, Problem and Response.* April 2000. p. 3.
10. **U.S. Environmental Protection Agency Office of Noise Abatement and Control.** *Noise Effects Handbook-A Desk Reference to Health and Welfare Effects of Noise.* October 1979 (revised July 1981). EPA 550/9/82/106.
11. **Office of Planning and Research.** *State of California General Plan Guidlines.* 2017.
12. **State of California.** *2016 California Green Building Standards Code.* January 2017.
13. **City of Lake Elsinore.** *City of Lake Elsinore General Plan Section 3.0: Public Safety & Welfare.* December 2011.
14. **California Court of Appeal.** *Gray v. County of Madera, F053661.* 167 Cal.App.4th 1099; - Cal.Rptr.3d, October 2008.
15. **Federal Interagency Committee on Noise.** *Federal Agency Review of Selected Airport Noise Analysis Issues.* August 1992.
16. **American National Standards Institute (ANSI).** *Specification for Sound Level Meters ANSI S1.4-2014/IEC 61672-1:2013.*
17. **U.S. Department of Transportation, Federal Highway Administration.** *FHWA Highway Traffic Noise Prediction Model.* December 1978. FHWA-RD-77-108.
18. **California Department of Transportation Environmental Program, Office of Environmental Engineering.** *Use of California Vehicle Noise Reference Energy Mean Emission Levels (Calveno REMELs) in FHWA Highway Traffic Noise Prediction.* September 1995. TAN 95-03.
19. **California Department of Transportation.** *Traffic Noise Attenuation as a Function of Ground and Vegetation Final Report.* June 1995. FHWA/CA/TL-95/23.
20. **Urban Crossroads, Inc.** *Lake Street / I-15 Property Air Quality Impact Analysis.* December 2018.

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13 CERTIFICATION

The contents of this noise study report represent an accurate depiction of the noise environment and impacts associated with the proposed Lake Street / I-15 Property Project. The information contained in this noise study report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 336-5979.

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EDUCATION

Master of Science in Civil and Environmental Engineering
California Polytechnic State University, San Luis Obispo • December, 1993

Bachelor of Science in City and Regional Planning
California Polytechnic State University, San Luis Obispo • June, 1992

PROFESSIONAL REGISTRATIONS

PE – Registered Professional Traffic Engineer – TR 2537 • January, 2009
AICP – American Institute of Certified Planners – 013011 • June, 1997–January 1, 2012
PTP – Professional Transportation Planner • May, 2007 – May, 2013
INCE – Institute of Noise Control Engineering • March, 2004

PROFESSIONAL AFFILIATIONS

ASA – Acoustical Society of America
ITE – Institute of Transportation Engineers

PROFESSIONAL CERTIFICATIONS

Certified Acoustical Consultant – County of Orange • February, 2011
FHWA-NHI-142051 Highway Traffic Noise Certificate of Training • February, 2013

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APPENDIX 3.1:

CITY OF LAKE ELSINORE MUNICIPAL CODE

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Chapter 17.176
NOISE CONTROL

Sections:

17.176.010 Purpose.

In order to control unnecessary, excessive and annoying noise and vibration in the City, it is hereby declared to be the policy of the City to prohibit such noise and vibration generated from or by all sources as specified in this chapter. It shall be the policy of the City to maintain quiet in those areas which exhibit low noise levels and to implement programs aimed at reducing noise in those areas within the City where noise levels are above acceptable values.

It is determined that certain noise levels and vibrations are detrimental to the public health, welfare and safety, and are contrary to public interest. Therefore, the City Council does ordain and declare that creating, maintaining, causing or allowing to be created, caused or maintained, any noise or vibration in a manner prohibited by or not in conformity with the provisions of this chapter, is a public nuisance and shall be punishable as such. [Ord. 772 § 17.78.010, 1986. Code 1987 § 17.78.010].

17.176.020 Definitions.

All terminology used in this chapter, not defined below, shall be in conformance with applicable publications of the. American National Standards Institute (ANSI) or its successor body.

The following words, phrases and terms as used in this chapter shall have the meaning as indicated below:

“A-weighted sound level” means the sound level in decibels as measured on a sound level meter using the A-weighting network. The level so read is designated dB(A) or dBA.

“Agricultural property” means a parcel of real property of not less than 10 contiguous acres in size, which is undeveloped for any use other than agricultural purposes.

“Ambient noise level” means the composite of noise from all sources near and far. In this context, the ambient noise level constitutes the normal of existing level of environmental noise at a given location.

“Commercial area” means property which is zoned for commercial purposes, including, but not limited to, retail and wholesale businesses, personal services, and professional offices.

“Construction” means any site preparation, assembly, erection, substantial repair, alteration, or similar action, for or of public or private rights-of-way, structures, utilities or similar property.

“Cumulative period” means an additive period of time composed of individual time segments which may be continuous or interrupted.

“Decibel” means a unit for measuring the amplitude of a sound, equal to 20 times the logarithm to the ratio of the sound measured to the reference pressure, which is 20 micropascals.

“Demolition” means any dismantling, intentional destruction or removal of structures, utilities, public or private right-of-way surfaces, or similar property.

“Emergency work” means any work performed for the purpose of preventing or alleviating the physical trauma or property damage threatened or caused by an emergency.

“Fixed noise source” means a stationary device which creates sounds while fixed or motionless, including, but not limited to, residential, agricultural, industrial and commercial machinery and equipment, pumps, fans, compressors, air conditioners, and refrigeration.

“Gross vehicle weight rating (GVWR)” means the value specified by the manufacturer as the recommended maximum loaded weight of a single motor vehicle. In cases where trailers and tractors are separable, the gross combination weight rating, which is the value specified by the manufacturer as the recommended maximum loaded weight of the combination vehicle, shall be used.

“Impulsive sound” means sound of short duration, usually less than one second, with an abrupt onset and rapid decay. Examples of sources of impulsive sound include explosions, drop forge impacts, and the discharge of firearms.

“Industrial area” means property which is zoned for manufacturing and related uses.

“Intrusive noise” means that noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency and time of occurrence, and tonal or informational content as well as the prevailing ambient noise level.

“Licensed” means the possession of a formal license or a permit issued by the appropriate jurisdictional authority; or, where no permits or licenses are issued, the sanctioning of the activity by the jurisdiction as noted in public record.

“Mobile noise source” means any noise source other than a fixed source.

“Motor vehicle” shall include any and all self-propelled vehicles as defined in the California Motor Vehicle Code, including all on-highway type motor vehicles subject to registration under said code, and all off-highway type motor vehicles subject to identification under said code.

“Motorboat” means any vessel propelled by machinery, whether or not such machinery is the principal source of propulsion but shall not include a vessel which has a valid marine document issued by the Bureau of Customs of the United States government or any Federal agency successor thereto (Section 651(d), Harbors and Navigation Code).

“Muffler or sound dissipative device” means a device consisting of a series of chambers or baffle plates, or other mechanical design, for the purpose of receiving exhaust gas from an internal combustion engine, and effective in reducing noise.

“Noise Control Officer (NCO)” means a person or persons designated by the Community Development Director as responsible for enforcement of this chapter.

“Noise disturbance” means any sound which, as judged by the Noise Control Officer, (1) endangers or injures the safety or health of human beings or animals, or (2) annoys or disturbs reasonable persons of normal sensitivities, or (3) endangers or injures personal or real property, or (4) violates the factors set forth in LEMC 17.176.040. Compliance with the quantitative standards as listed herein shall constitute elimination of a noise disturbance.

“Noise sensitive zone” means any area designated pursuant to LEMC 17.176.070 for the purpose of ensuring exceptional quiet.

“Noise zone” means any defined areas or regions of a generally consistent land use wherein the ambient noise levels are within a range of five dB.

“Person” means any individual, association, partnership, or corporation, and includes any officer, employee, department, agency or instrumentality of a State or any political subdivision of a State.

“Powered model vehicle” means any self-propelled, airborne, waterborne, or land-borne plane, vessel, or vehicle, which is not designed to carry persons, including, but not limited to, any model airplane, boat, car, or rocket.

“Public right-of-way” means any street, avenue, boulevard, highway, sidewalk or alley or similar place which is owned or controlled by a governmental entity.

“Public space” means any real property or structures thereon which are owned or controlled by a governmental entity.

“Pure tone” means any sound which can be judged as audible as a single pitch or a set of single pitches by the Noise Control Officer. For the purposes of this chapter, a pure tone shall exist if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the sound pressure levels of the two contiguous one-third octave bands by five dB for center frequencies of 500 Hz and above and by eight dB for center frequencies between 160 and 400 Hz and by 15 dB for center frequencies less than or equal to 125 Hz.

“Real property boundary” means an imaginary line along the ground surface, and its vertical extension, which separates the real property owned by one person from that owned by another person, but not including intrabuilding real property divisions.

“Residential area” means property which is zoned for residential uses.

“Sound amplifying equipment” means any device for the amplification of the human voice, music, or any other sound, excluding standard automobile radios when used and heard only by the occupants of the vehicle in which the radio is installed, and, as used in this chapter, warning devices on authorized emergency vehicles or horns or other warning devices on any vehicle used only for traffic safety purposes.

“Sound level meter” means an instrument, including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement of sound levels, which meets or exceeds the requirements pertinent for type S2A meters in American National Standards Institute specifications for sound level meters, S1.4-1971, or the most recent revision thereof.

“Sound truck” means any motor vehicle, or any other vehicle, regardless of motive power, whether in motion or stationary, having mounted thereon, or attached thereto, any sound amplifying equipment.

“Vibration perception threshold” means the minimum ground- or structure-borne vibrational motion necessary to cause a normal person to be aware of the vibration by such direct means as, but not limited to, sensation by touch or visual observation of moving objects. The perception threshold shall be presumed to be a motion velocity of 0.01 inches per second over the range of one to 100 Hz.

"Weekday" means any day, Monday through Friday, which is not a legal holiday. [Ord. 772 § 17.78.020, 1986. Code 1987 § 17.78.020].

17.176.030 Authority and duties of the Noise Control Office(r) (NCO).

A. Lead Agency. The noise control program established by this chapter shall be administered by the Community Development Director.

B. Powers. In order to implement and enforce this chapter and for the general purpose of noise abatement and control, the NCO shall have, in addition to any other authority vested in it, the power to:

1. Conduct, or cause to be conducted, studies, research, and monitoring related to noise, including joint cooperative investigation with public or private agencies, and the application for, and acceptance of, grants.

2. On all public and private projects which are likely to cause noise in violation of this chapter and which are subject to mandatory review or approval by other departments.

a. Review for compliance with the intent and provisions of this chapter.

b. Require sound analyses which identify existing and projected noise sources and associated noise levels.

c. Require usage of adequate measures to avoid violation of any provision of this chapter.

3. Upon presentation of proper credentials, enter and/or inspect any private property, place, report, or records at any time when granted permission by the owner or by some other person with apparent authority to act for the owner. When permission is refused or cannot be obtained, a search warrant may be obtained from a court of competent jurisdiction upon showing of probable cause to believe that a violation of this chapter may exist. Such inspection may include administration of any necessary tests.

4. Prepare recommendations, to be approved by the City Council, for the designation of noise sensitive zones which contain noise sensitive activities.

5. Prepare recommendations, based upon noise survey data and analytical studies, to be approved by the City Council, for the designation of zones of similar ambient environmental noise within regions of generally consistent land use. These zones shall be identified in terms of their day and nighttime ambient noise levels and their land use classifications as given in LEMC 17.176.060, Table 1. [Ord. 772 § 17.78.030, 1986. Code 1987 § 17.78.030].

17.176.040 General noise regulations.

Notwithstanding any other provision of this chapter, and in addition thereto, it shall be unlawful for

any person to willfully or negligently make or continue, or cause to be made or continued, any loud, unnecessary, or unusual noise which disturbs the peace and quiet of any neighborhood or which causes any discomfort or annoyance to any reasonable person of normal sensitiveness residing in the area.

The factors which shall be considered in determining whether a violation of the provisions of this section exists shall include, but not be limited to, the following:

A. The sound level of the objectionable noise.

B. The sound level of the ambient noise.

C. The proximity of the noise to residential sleeping facilities.

D. The nature and zoning of the area within which the noise emanates.

E. The number of persons affected by the noise source.

F. The time of day or night the noise occurs.

G. The duration of the noise and its tonal, informational or musical content.

H. Whether the noise is continuous, recurrent, or intermittent.

I. Whether the noise is produced by a commercial or noncommercial activity. [Ord. 772 § 17.78.040, 1986. Code 1987 § 17.78.040].

17.176.050 Noise measurement procedure.

A. Upon receipt of a complaint from a citizen, the Noise Control Office(r) or his agent, equipped with sound level measurement equipment satisfying the requirements specified in LEMC 17.176.020, shall investigate the complaint. The investigation shall consist of a measurement and the gathering of data to adequately define the noise problem and shall include the following:

1. Nonacoustic Data.

    a. Type of noise source.

    b. Location of noise source relative to complainant's property.

    c. Time period during which noise source is considered by complainant to be intrusive.

    d. Total duration of noise produced by noise source.

    e. Date and time of noise measurement survey.

B. Noise Measurement Procedure. Utilizing the A-weighting scale of the sound level meter and the

"slow" meter response (use "fast" response for impulsive type sounds), the noise level shall be measured at a position or positions at any point on the receiver's property.

In general, the microphone shall be located four to five feet above the ground; 10 feet or more from the nearest reflective surface where possible. However, in those cases where another elevation is deemed appropriate, the latter shall be utilized. If the noise complaint is related to interior noise levels, interior noise measurements shall be made within the affected residential unit. The measurements shall be made at a point at least four feet from the wall, ceiling, or floor nearest the noise source, with windows in the normal seasonal configuration. Calibration of the measurement equipment, utilizing an acoustic calibration, shall be performed immediately prior to recording any noise data. [Ord. 772 § 17.78.050, 1986. Code 1987 § 17.78.050].

17.176.060 Exterior noise limits.

A. Maximum Permissible Sound Levels by Receiving Land Use.

1. The noise standards for the various categories of land use identified by the Noise Control Office(r) as presented in Table 1 shall, unless otherwise specifically indicated, apply to all such property within a designated zone.

2. No person shall operate, or cause to be operated, any source of sound at any location within the incorporated City or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person, which causes the noise level when measured on any other property, either incorporated or unincorporated, to exceed:

a. The noise standard for that land use as specified in Table 1 for a cumulative period of more than 30 minutes in any hour; or

b. The noise standard plus five dB for a cumulative period of more than 15 minutes in any hour; or

c. The noise standard plus 10 dB for a cumulative period of more than five minutes in any hour; or

d. The noise standard plus 15 dB for a cumulative period of more than one minute in any hour; or

e. The noise standard plus 20 dB or the maximum measured ambient level, for any period of time.

3. If the measured ambient level differs from that permissible within any of the fast four noise limit categories above, the allowable noise exposure standard shall be adjusted in five dB increments in each category as appropriate to encompass or reflect said ambient noise level.

In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable

noise level under this category shall be increased to reflect the maximum ambient noise level

4. If the measurement location is on a boundary between two different zones, the noise level limit applicable to the lower noise zone plus six dB shall apply.

5. If possible, the ambient noise shall be measured at the same location along the property line utilized in subsection (A)(2) of this section with the alleged offending noise source inoperative. If, for any reason, the alleged offending noise source cannot be shut down, the ambient noise must be estimated by performing a measurement in the same general area of the source but at a sufficient distance such that the noise from the source is at least 10 dB below the ambient in order that only the ambient level be measured. If the difference between the ambient and the noise source is five to 10 dB, then the level of the ambient itself can be reasonably determined by subtracting a one-decibel correction to account for the contribution of the source.

B. Correction for Character of Sound. In the event the alleged offensive noise, as judged by the Noise Control Officer, contains a steady, audible tone such as a whine, screech, or hum, or is a repetitive noise such as hammering or riveting, or contains music or speech conveying informational content, the standard limits set forth in Table 1 shall be reduced by five dB.

TABLE 1

EXTERIOR NOISE LIMITS

(Levels Not to Be Exceeded More Than 30 Minutes in Any Hour)

Receiving Land Use Category	Time Period	Noise Level (dBA)
Single-Family Residential	10:00 p.m. – 7:00 a.m.	40
	7:00 a.m. – 10:00 p.m.	50
Multiple Dwelling Residential	10:00 p.m. – 7:00 a.m.	45
	7:00 a.m. – 10:00 p.m.	50
Public Space		
Limited Commercial and Office	10:00 p.m. – 7:00 a.m.	55
	7:00 a.m. – 10:00 p.m.	60
General Commercial	10:00 p.m. – 7:00 a.m.	60
	7:00 a.m. – 10:00 p.m.	65
Light Industrial	Anytime	70
Heavy Industrial	Anytime	75

[Ord. 772 § 17.78.060, 1986. Code 1987 § 17.78.060].

17.176.070 Interior noise standards.

A. Maximum Permissible Dwelling Interior Sound Levels.

1. The interior noise standards for multifamily residential dwellings as presented in Table 2 shall apply, unless otherwise specifically indicated, within all such dwellings with windows in their normal seasonal configuration.

TABLE 2

Noise Zone	Type of Land Use	Time Internal	Allowable Interior Noise Level (dBA)
All	Multifamily Residential	10:00 p.m. – 7:00 a.m. 7:00 a.m. – 10:00 p.m.	35 45

2. No person shall operate or cause to be operated within a dwelling unit, any source of sound or allow the creation of any noise which causes the noise level when measured inside a neighboring receiving dwelling unit to exceed:

a. The noise standard as specified in Table 2 for a cumulative period of more than five minutes in any hour; or

b. The noise standard plus five dB for a cumulative period of more than one minute in any hour; or

c. The noise standard plus 10 dB or the maximum measured ambient, for any period of time.

3. If the measured ambient level differs from that permissible within any of the noise limit categories above, the allowable noise exposure standard shall be adjusted in five dB increments in each category as appropriate to reflect said ambient noise level.

B. Correction for Character of Sound. In the event the alleged offensive noise, as judged by the Noise Control Officer, contains a steady, audible tone such as a whine, screech, or hum, or is a repetitive noise such as hammering or riveting, or contains music or speech conveying informational content, the standard limits set forth in Table 2 shall be reduced by five dB. [Ord. 772 § 17.78.070, 1986. Code 1987 § 17.78.070].

17.176.080 Prohibited acts.

No person shall unnecessarily make, continue, or cause to be made or continued, any noise disturbance. The following acts, and the causing or permitting thereof, are declared to be in

violation of this chapter:

A. Operating, playing or permitting the operation or playing of any radio, television set, phonograph, drum, musical instrument, or similar device which produces or reproduces sound:

1. Between the hours of 10:00 p.m. and 7:00 a.m. in such a manner as to create a noise disturbance across a residential or commercial real property line or at any time to violate the provisions of LEMC 17.176.060(A), except for which a variance has been issued by the City.

2. In such a manner as to exceed the levels set forth for public space in Table 1, measured at a distance of at least 50 feet (15 meters) from such device operating on a public right-of-way or public space.

B. Using or operating for any purpose any loudspeaker, loudspeaker system, or similar device between the hours of 10:00 p.m. and 7:00 a.m., such that the sound therefrom creates a noise disturbance across a residential real property line, or at any time violates the provisions of LEMC 17.176.060(A), except for any noncommercial public speaking, public assembly or other activity for which a variance has been issued by the City.

C. Offering for sale, selling anything, or advertising by shouting or outcry within any residential or commercial area or noise sensitive zone of the City except by variance issued by the City. The provisions of this section shall not be construed to prohibit the selling by outcry of merchandise, food, and beverages at licensed sporting events, parades, fairs, circuses, or other similar licensed public entertainment events.

D. Owning, possessing or harboring any animal or bird which frequently or for long duration, howls, barks, meows, squawks, or makes other sounds which create a noise disturbance across a residential or commercial real property line or within a noise sensitive zone. This provision shall not apply to public zoos.

E. Loading, unloading, opening, closing or other handling of boxes, crates, containers, building materials, garbage cans, or similar objects between the hours of 10:00 p.m. and 7:00 a.m. in such a manner as to cause a noise disturbance across a residential real property line or at any time to violate the provisions of LEMC 17.176.060(A).

F. Construction/Demolition.

1. Operating or causing the operation of any tools or equipment used in construction, drilling, repair, alteration, or demolition work between weekday hours of 7:00 p.m. and 7:00 a.m., or at any time on weekends or holidays, such that the sound therefrom creates a noise disturbance across a residential or commercial real property line, except for emergency work of public service utilities or by variance issued by the City.

2. Noise Restrictions at Affected Properties. Where technically and economically feasible, construction activities shall be conducted in such a manner that the maximum noise levels at affected properties will not exceed those listed in the following schedule:

AT RESIDENTIAL PROPERTIES:

Mobile Equipment

Maximum noise levels for nonscheduled, intermittent, short-term operation (less than 10 days) of mobile equipment:

	Type I Areas Single-Family Residential	Type II Areas Multifamily Residential	Type III Areas Semi-Residential/Commercial
Daily, except Sundays and Legal Holidays 7:00 a.m. to 7:00 p.m.	75 dBA	80 dBA	85 dBA
Daily, 7:00 p.m. to 7:00 a.m. and all day Sunday and Legal Holidays	60 dBA	65 dBA	70 dBA

Stationary Equipment

Maximum noise levels for repetitively scheduled and relatively long-term operation (period of 10 days or more) of stationary equipment:

	Type I Areas Single-Family Residential	Type II Areas Multifamily Residential	Type III Areas Semi-Residential/Commercial
Daily, except Sundays and Legal Holidays 7:00 a.m. to 7:00 p.m.	60 dBA	65 dBA	70 dBA
Daily, 7:00 p.m. to 7:00 a.m. and all day Sunday and Legal Holidays	50 dBA	55 dBA	60 dBA

AT BUSINESS PROPERTIES:

Mobile Equipment

Maximum noise levels for nonscheduled, intermittent, short-term operation of mobile equipment:

Daily, including Sundays and Legal Holidays, all hours: maximum of 85 dBA.

Stationary Equipment

Maximum noise levels for repetitively scheduled and relatively long-term operation of stationary

equipment:

Daily, including Sundays and Legal Holidays, all hours: maximum of 75 dBA.

3. All mobile or stationary internal combustion engine powered equipment or machinery shall be equipped with suitable exhaust and air intake silencers in proper working order.

G. Operating or permitting the operation of any device that creates a vibration which is above the vibration perception threshold of any individual at or beyond the property boundary of the source if on private property or at 150 feet (46 meters) from the source if on a public space or public right-of-way.

H. Powered Model Vehicles. Operating or permitting the operation of powered model vehicles:

1. Between the hours of 7:00 p.m. and 7:00 a.m. so as to create a noise disturbance across a residential or commercial real property line or at any time to violate the provisions of LEMC 17.176.060(A).

2. In such a manner as to exceed the levels set forth for public space land use in Table 1, measured at a distance not less than 100 feet (30 meters) from any point on the path of a vehicle operating on public space or public right-of-way.

I. Stationary Nonemergency Signaling Devices.

1. Sounding or permitting the sounding of any electronically amplified signal from any stationary bell, chime, siren, whistle, or similar device, intended primarily for nonemergency purposes, from any place, for more than 10 seconds in any hourly period.

2. Houses of religious worship shall be exempt from the operation of this provision.

3. Sound sources covered by this provision and not exempted under subsection (I)(2) of this section shall be exempted by a variance issued by the City.

J. Emergency Signaling Devices.

1. The intentional sounding or permitting the sounding outdoors of any fire, burglar, or civil defense alarm, siren, whistle, or similar stationary emergency signaling device, except for emergency purposes or for testing, as provided in subsection (J)(2) of this section.

2. a. Testing of a stationary emergency signaling system shall not occur before 7:00 a.m. or after 7:00 p.m. Any such testing shall use only the minimum cycle test time. In no case shall such test time exceed 60 seconds.

b. Testing of the complete emergency signaling system, including the functioning of the signaling device and the personnel response to the signaling device, shall not occur more

than once in each calendar month. Such testing shall not occur before 7:00 a.m., or after 10:00 p.m. The time limit specified in subsection (J)(2)(a) of this section shall not apply to such complete system testing.

3. Sounding or permitting the sounding of any exterior burglar or fire alarm or any motor vehicle burglar alarm unless such alarm is terminated within 15 minutes of activation.

K. Noise Sensitive Zones.

1. Creating or causing the creation of any sound within any noise sensitive zone, so as to exceed the specified land use noise standards set forth in LEMC 17.176.060(A); provided, that conspicuous signs are displayed indicating the zone; or

2. Creating or causing the creation of any sound within or adjacent to any noise sensitive zone, containing a hospital, nursing home, school, court or other designated area, so as to interfere with the functions of such activity or annoy the occupants in the activity; provided, that conspicuous signs are displayed indicating the presence of the zone.

L. Domestic Power Tools and Machinery.

1. Operating or permitting the operation of any mechanically powered saw, sander, drill, grinder, lawn or garden tool, or similar tool between 10:00 p.m. and 7:00 a.m., so as to create a noise disturbance across a residential or commercial real property line.

2. Any motor, machinery, pump, such as swimming pool equipment, etc., shall be sufficiently enclosed or muffled and maintained so as not to create a noise disturbance in accordance with LEMC 17.176.060.

M. Residential Air-Conditioning or Air-Handling Equipment. Operating or permitting the operation of any air-conditioning or air-handling equipment in such a manner as to exceed any of the following sound levels:

Measurement Location	Units Installed before 1-1-80 dB(A)	Units Installed on or after 1-1-80 dB(A)
Any point on neighboring property line, 5 feet above grade level, no closer than 3 feet from any wall.	60	55
Center of neighboring patio, 5 feet above grade level, no closer than 3 feet from any wall.	55	50
Outside the neighboring living area window nearest the equipment location, not more than 3 feet from the window opening, but at		

least 3 feet from any other surface.	55	50

N. Places of Public Entertainment. Operating or permitting the operation or playing of any loudspeaker, musical instrument, motorized racing vehicle, or other source of sound in any place of public entertainment that exceeds 95 dBA as read on the slow response of a sound level meter at any point normally occupied by a customer, without a conspicuous and legible sign stating:

WARNING! SOUND LEVELS WITHIN MAY CAUSE HEARING IMPAIRMENT.

[Ord. 772 § 17.78.080, 1986. Code 1987 § 17.78.080].

17.176.090 Motor vehicles operating on public right-of-way.

Motor vehicles noise limits on a public right-of-way are regulated as set forth in the California Motor Vehicle Code, Sections 23130 and 23130.5. Equipment violations which create noise problems are covered under Sections 27150 and 27151. Any peace officer of any jurisdiction in California may enforce these provisions. Therefore, it shall be the policy of the City to enforce these sections of the California Motor Vehicle Code.

A. Refuse Collection Vehicles.

1. No person shall collect refuse with a refuse collection vehicle between the hours of 7:00 p.m. and 7:00 a.m. within or adjacent to a residential area or noise sensitive zone.

2. No person authorized to engage in waste disposal service or garbage collection shall operate any truck-mounted waste or garbage loading and/or compacting equipment or similar device in any manner so as to create any noise exceeding the following levels, measured at a distance of 50 feet from the equipment in an open area:

a. New equipment purchased or leased on or after a date six months from the effective date of the ordinance codified in this chapter: 80 dBA.

b. New equipment purchased or leased on or after 36 months from the effective date of the ordinance codified in this chapter: 75 dBA.

c. Existing equipment, on or after five years from the effective date of the ordinance codified in this chapter: 80 dBA.

B. Motor Vehicle Horns. It is unlawful for any person to sound a vehicular horn except as a warning signal (Motor Vehicle Code, Section 27001).

C. Motorized Recreational Vehicles Operating off Public Right-of-Way. No person shall operate or cause to be operated any motorized recreational vehicle off a public right-of-way in such a manner that the sound levels emitted therefrom violate the provisions of LEMC 17.176.060(A). This section shall apply to all motorized recreational vehicles whether or not duly licensed and registered,

including, but not limited to, commercial or noncommercial racing vehicles, motorcycles, go carts, amphibious craft, campers, snowmobiles and dune buggies, but not including motorboats.

D. *Reserved*.

E. Vehicle, Motorboat, or Aircraft Repair and Testing.

1. Repairing, rebuilding, modifying, or testing any motor vehicle, motorboat, or aircraft in such a manner as to create a noise disturbance across a residential real property line, or at any time to violate the provisions of LEMC 17.176.060(A).

2. Nothing in this section shall be construed to prohibit, restrict, penalize, enjoin, or in any manner regulate the movement of aircraft which are in all respects conducted in accordance with, or pursuant to, applicable Federal laws or regulations.

F. Standing Motor Vehicles. No person shall operate or permit the operation of any motor vehicle with a gross vehicle weight rating (GVWR) in excess of 10,000 pounds, or any auxiliary equipment attached to such a vehicle, for a period longer than 15 minutes in any hour while the vehicle is stationary, for reasons other than traffic congestion, on a public right-of-way or public space within 150 feet (46 meters) of a residential area or designated noise sensitive zone, between the hours of 10:00 p.m. and 7:00 a.m. [Ord. 984, 1994; Ord. 772 § 17.78.090, 1986. Code 1987 § 17.78.090].

17.176.100 Special provisions – Exemptions.

The following activities shall be exempted from the provisions of this chapter:

A. The emission of sound for the purpose of alerting persons to the existence of an emergency.

B. The emission of sound in the performance of emergency work.

C. Warning devices necessary for the protection of public safety, as for example, police, fire and ambulance sirens, and train horns.

D. Regularly scheduled school bands, school athletic and school entertainment events between the hours of 8:45 a.m. and 10:00 p.m., provided a special events permit is also required for band activities on City streets.

E. Regularly scheduled activities conducted on public parks, public playgrounds, and public or private school grounds. However, the use of public address or amplified music systems is not permitted to exceed the exterior noise standard of adjacent property at the property line.

F. All mechanical devices, apparatus or equipment which are utilized for the protection or salvage of agricultural crops during periods of potential or actual frost damage or other adverse weather conditions.

G. Mobile noise sources associated with agricultural pest control through pesticide application; provided, that the application is made in accordance with restricted material permits issued by or regulations enforced by the Agricultural Commissioner.

H. Mobile noise sources associated with agricultural operations, provided such operations take place on Monday through Friday, excepting legal holidays, between the hours of 7:00 a.m. and 6:00 p.m. All other operations shall comply with this chapter.

I. Noise sources associated with the maintenance of real property, provided such operations take place on Monday through Friday, excepting legal holidays, between the hours of 7:00 a.m. and 6:00 p.m., or on holidays and weekends between the hours of 9:00 a.m. and 6:00 p.m. All other operations shall comply with this chapter.

J. Any activity to the extent that regulation thereof has been preempted by State or Federal law. [Ord. 772 § 17.78.100, 1986. Code 1987 § 17.78.100].

17.176.110 Special variances.

A. The NCO is authorized to grant variances for exemption from any provision of this chapter, subject to limitations as to area, noise levels, time limits, and other terms and conditions as the NCO determines are appropriate to protect the public health, safety, and welfare from the noise emanating therefrom. This section shall in no way affect the duty to obtain any permit or license required by law for such activities.

B. Any person seeking a variance pursuant to this section shall file an application with the NCO. The application shall contain information which demonstrates that bringing the source of sound or activity for which the variance is sought into compliance with this chapter would constitute an unreasonable hardship on the applicant, on the community, or on other persons. The application shall be accompanied by a fee. A separate application shall be filed for each noise source; provided, however, that several mobile sources under common ownership, or several fixed sources on a single property may be combined into one application. Notice of an application for a variance shall be published according to City code. Any individual who claims to be adversely affected by allowance of the variance may file a statement with the NCO containing any information to support his claim. If at any time the NCO finds that a sufficient controversy exists regarding an application, a public hearing will be held.

C. In determining whether to grant or deny the application, the NCO shall balance the hardship on the applicant, the community, and other persons of not granting the variance against the adverse impact on the health, safety, and welfare of persons affected, the adverse impact on property affected, and any other adverse impacts of granting the variance. Applicants for variances and persons contesting variances may be required to submit such information as the NCO may reasonably require. In granting or denying an application, the NCO shall keep on public file a copy of the decision and the reasons for denying or granting the variance.

D. Variances shall be granted by notice to the applicant containing all necessary conditions, including a time limit on the permitted activity. The variance shall not become effective until all conditions are agreed to by the applicant. Noncompliance with any condition of the variance shall terminate the variance and subject the person holding it to those provisions of this chapter for which the variance was granted.

E. A variance will not exceed 365 days from the date on which it was granted. Application for extension of time limits specified in variances or for modification of other substantial conditions shall be treated like applications for initial variances under subsection (B) of this section. [Ord. 772 § 17.78.110, 1986. Code 1987 § 17.78.110].

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APPENDIX 5.1:

STUDY AREA PHOTOS

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JN:12137 Study Area Photos

L1 East
33, 43' 55.370000", 117, 23' 38.010000"

L1 North
33, 43' 55.400000", 117, 23' 38.010000"

L1 South
33, 43' 55.400000", 117, 23' 38.030000"

L1 West
33, 43' 55.430000", 117, 23' 38.010000"

L2 East (2)
33, 43' 41.790000", 117, 23' 34.350000"

L2 East
33, 43' 42.350000", 117, 23' 35.750000"

JN:12137 Study Area Photos

L2 North
33, 43' 41.790000", 117, 23' 34.320000"

L2 South
33, 43' 42.330000", 117, 23' 35.840000"

L2 West
33, 43' 41.790000", 117, 23' 34.350000"

L3 East
33, 43' 34.030000", 117, 23' 35.290000"

L3 North
33, 43' 34.050000", 117, 23' 35.260000"

L3 South
33, 43' 34.020000", 117, 23' 35.200000"

JN:12137 Study Area Photos

L3 West
33, 43' 34.090000", 117, 23' 35.290000"

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APPENDIX 5.2:

NOISE LEVEL MEASUREMENT WORKSHEETS

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24-Hour Noise Level Measurement Summary

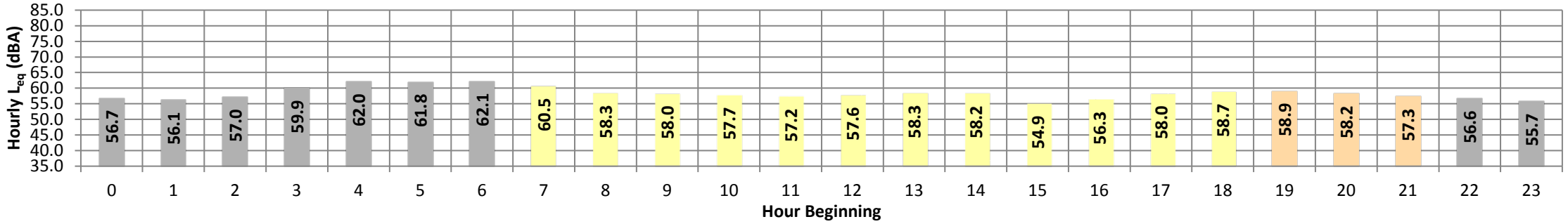
Date: Tuesday, November 27, 2018
Project: Lake Street Storage

Location: L1 - Located at the intersection of Lake Street and Walker Canyon Road, near a Riverside County Regional Conservation area, north of the Project site.

Meter: Piccolo I

JN: 12137
Analyst: R. Saber

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	56.7	64.4	47.9	62.0	61.0	60.0	59.0	57.0	55.0	52.0	51.0	50.0	56.7	10.0	66.7
	1	56.1	65.8	44.9	61.0	61.0	59.0	59.0	57.0	55.0	50.0	49.0	47.0	56.1	10.0	66.1
	2	57.0	66.3	48.5	61.0	60.0	59.0	59.0	58.0	56.0	52.0	51.0	50.0	57.0	10.0	67.0
	3	59.9	67.8	47.9	64.0	63.0	62.0	62.0	60.0	59.0	56.0	55.0	53.0	59.9	10.0	69.9
	4	62.0	68.7	54.6	65.0	65.0	64.0	64.0	62.0	61.0	59.0	58.0	56.0	62.0	10.0	72.0
	5	61.8	71.1	57.0	65.0	64.0	64.0	63.0	62.0	61.0	59.0	59.0	58.0	61.8	10.0	71.8
	6	62.1	78.4	56.5	67.0	66.0	64.0	63.0	62.0	61.0	59.0	59.0	57.0	62.1	10.0	72.1
Day	7	60.5	71.7	53.2	65.0	64.0	63.0	62.0	61.0	59.0	57.0	56.0	55.0	60.5	0.0	60.5
	8	58.3	72.9	51.2	62.0	61.0	60.0	60.0	58.0	57.0	55.0	55.0	53.0	58.3	0.0	58.3
	9	58.0	74.6	50.7	63.0	61.0	60.0	59.0	58.0	57.0	54.0	54.0	52.0	58.0	0.0	58.0
	10	57.7	73.2	49.7	62.0	60.0	59.0	59.0	58.0	57.0	54.0	54.0	52.0	57.7	0.0	57.7
	11	57.2	68.9	50.5	63.0	62.0	60.0	59.0	57.0	56.0	54.0	53.0	51.0	57.2	0.0	57.2
	12	57.6	73.7	49.0	62.0	61.0	60.0	59.0	58.0	57.0	54.0	54.0	52.0	57.6	0.0	57.6
	13	58.3	63.8	52.1	61.0	61.0	60.0	60.0	59.0	58.0	55.0	54.0	53.0	58.3	0.0	58.3
	14	58.2	68.1	49.9	63.0	62.0	61.0	60.0	58.0	57.0	55.0	54.0	52.0	58.2	0.0	58.2
	15	54.9	65.0	48.8	60.0	59.0	57.0	57.0	55.0	54.0	51.0	51.0	49.0	54.9	0.0	54.9
	16	56.3	75.3	48.7	62.0	61.0	59.0	58.0	56.0	55.0	53.0	52.0	51.0	56.3	0.0	56.3
	17	58.0	71.5	51.8	62.0	61.0	60.0	59.0	58.0	57.0	55.0	54.0	53.0	58.0	0.0	58.0
	18	58.7	69.4	52.6	63.0	62.0	61.0	60.0	59.0	58.0	56.0	55.0	54.0	58.7	0.0	58.7
Evening	19	58.9	70.6	50.9	63.0	62.0	61.0	61.0	59.0	58.0	55.0	54.0	53.0	58.9	5.0	63.9
	20	58.2	71.9	51.4	64.0	62.0	61.0	60.0	58.0	57.0	55.0	54.0	53.0	58.2	5.0	63.2
	21	57.3	67.8	49.3	63.0	61.0	60.0	59.0	58.0	56.0	54.0	53.0	51.0	57.3	5.0	62.3
Night	22	56.6	64.5	48.2	60.0	60.0	59.0	59.0	57.0	56.0	53.0	52.0	50.0	56.6	10.0	66.6
	23	55.7	66.4	45.3	61.0	60.0	59.0	58.0	56.0	55.0	51.0	50.0	48.0	55.7	10.0	65.7

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	54.9	63.8	48.7	60.0	59.0	57.0	57.0	55.0	54.0	51.0	51.0	49.0
	Max	60.5	75.3	53.2	65.0	64.0	63.0	62.0	61.0	59.0	57.0	56.0	55.0
Energy Average		58.0	Average:		62.3	61.3	60.0	59.3	57.9	56.8	54.4	53.8	52.3
Evening	Min	57.3	67.8	49.3	63.0	61.0	60.0	59.0	58.0	56.0	54.0	53.0	51.0
	Max	58.9	71.9	51.4	64.0	62.0	61.0	61.0	59.0	58.0	55.0	54.0	53.0
Energy Average		58.2	Average:		63.3	61.7	60.7	60.0	58.3	57.0	54.7	53.7	52.3
Night	Min	55.7	64.4	44.9	60.0	60.0	59.0	58.0	56.0	55.0	50.0	49.0	47.0
	Max	62.1	78.4	57.0	67.0	66.0	64.0	64.0	62.0	61.0	59.0	59.0	58.0
Energy Average		59.4	Average:		62.9	62.2	61.1	60.7	59.0	57.7	54.6	53.8	52.1

L_{eq} (dBA)		
24-Hour	Daytime	Nighttime
58.6	58.0	59.4

24-Hour CNEL (dBA)
65.9

24-Hour Noise Level Measurement Summary

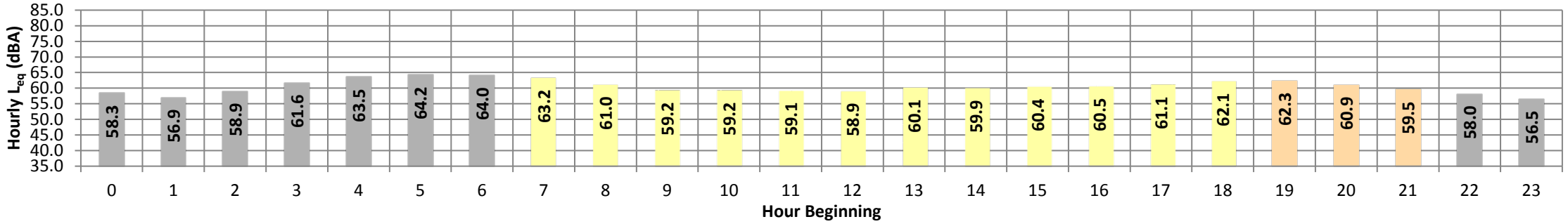
Date: Tuesday, November 27, 2018
Project: Lake Street Storage

Location: L2 - Located on the Project site's southern boundary, near an undeveloped forest and habitat area, east of Lake Street.

Meter: Piccolo I

JN: 12137
Analyst: R. Saber

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	58.3	73.0	50.2	66.0	64.0	61.0	60.0	58.0	56.0	53.0	53.0	51.0	58.3	10.0	68.3
	1	56.9	68.4	46.2	65.0	64.0	61.0	60.0	57.0	55.0	50.0	49.0	47.0	56.9	10.0	66.9
	2	58.9	72.8	48.9	67.0	65.0	64.0	63.0	59.0	56.0	53.0	52.0	51.0	58.9	10.0	68.9
	3	61.6	71.1	53.7	68.0	67.0	66.0	65.0	62.0	59.0	56.0	55.0	54.0	61.6	10.0	71.6
	4	63.5	71.1	55.5	68.0	67.0	66.0	66.0	64.0	63.0	59.0	58.0	57.0	63.5	10.0	73.5
	5	64.2	75.9	56.6	69.0	68.0	67.0	66.0	65.0	63.0	60.0	59.0	58.0	64.2	10.0	74.2
	6	64.0	75.9	57.4	69.0	68.0	66.0	66.0	64.0	63.0	60.0	59.0	58.0	64.0	10.0	74.0
Day	7	63.2	80.4	56.1	69.0	68.0	66.0	65.0	63.0	62.0	58.0	58.0	57.0	63.2	0.0	63.2
	8	61.0	74.7	52.1	69.0	67.0	65.0	64.0	61.0	59.0	55.0	54.0	53.0	61.0	0.0	61.0
	9	59.2	73.0	47.8	67.0	65.0	63.0	62.0	59.0	57.0	53.0	52.0	50.0	59.2	0.0	59.2
	10	59.2	78.2	48.6	66.0	65.0	63.0	62.0	59.0	56.0	53.0	51.0	50.0	59.2	0.0	59.2
	11	59.1	74.5	47.3	68.0	66.0	63.0	62.0	59.0	56.0	52.0	51.0	50.0	59.1	0.0	59.1
	12	58.9	74.1	48.3	68.0	66.0	63.0	62.0	58.0	56.0	52.0	51.0	50.0	58.9	0.0	58.9
	13	60.1	75.2	50.7	67.0	66.0	64.0	63.0	60.0	58.0	55.0	55.0	53.0	60.1	0.0	60.1
	14	59.9	75.0	51.3	67.0	66.0	63.0	62.0	60.0	58.0	55.0	55.0	53.0	59.9	0.0	59.9
	15	60.4	74.2	54.2	67.0	65.0	63.0	62.0	60.0	59.0	57.0	56.0	55.0	60.4	0.0	60.4
	16	60.5	73.0	54.4	67.0	65.0	63.0	62.0	61.0	59.0	57.0	56.0	55.0	60.5	0.0	60.5
	17	61.1	73.1	53.2	68.0	66.0	65.0	64.0	61.0	59.0	57.0	56.0	55.0	61.1	0.0	61.1
	18	62.1	73.5	56.2	67.0	66.0	65.0	64.0	62.0	61.0	59.0	58.0	57.0	62.1	0.0	62.1
Evening	19	62.3	81.0	53.6	68.0	66.0	65.0	64.0	62.0	61.0	58.0	57.0	56.0	62.3	5.0	67.3
	20	60.9	74.4	52.9	67.0	66.0	64.0	63.0	61.0	59.0	56.0	55.0	54.0	60.9	5.0	65.9
	21	59.5	74.0	51.2	66.0	65.0	63.0	62.0	60.0	58.0	55.0	54.0	52.0	59.5	5.0	64.5
Night	22	58.0	70.2	48.4	64.0	63.0	62.0	61.0	58.0	56.0	53.0	52.0	50.0	58.0	10.0	68.0
	23	56.5	72.7	45.7	64.0	62.0	61.0	59.0	56.0	54.0	50.0	49.0	47.0	56.5	10.0	66.5

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	58.9	73.0	47.3	66.0	65.0	63.0	62.0	58.0	56.0	52.0	51.0	50.0
	Max	63.2	80.4	56.2	69.0	68.0	66.0	65.0	63.0	62.0	59.0	58.0	57.0
Energy Average		60.6	Average:		67.5	65.9	63.8	62.8	60.3	58.3	55.3	54.4	53.2
Evening	Min	59.5	74.0	51.2	66.0	65.0	63.0	62.0	60.0	58.0	55.0	54.0	52.0
	Max	62.3	81.0	53.6	68.0	66.0	65.0	64.0	62.0	61.0	58.0	57.0	56.0
Energy Average		61.0	Average:		67.0	65.7	64.0	63.0	61.0	59.3	56.3	55.3	54.0
Night	Min	56.5	68.4	45.7	64.0	62.0	61.0	59.0	56.0	54.0	50.0	49.0	47.0
	Max	64.2	75.9	57.4	69.0	68.0	67.0	66.0	65.0	63.0	60.0	59.0	58.0
Energy Average		61.2	Average:		66.7	65.3	63.8	62.9	60.3	58.3	54.9	54.0	52.6

L_{eq} (dBA)

24-Hour	*Daytime*	*Nighttime*
60.9	**60.7**	**61.2**

24-Hour CNEL (dBA)

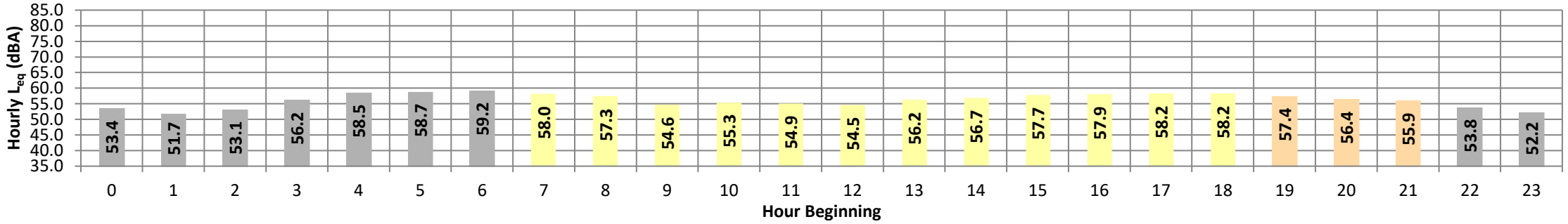
67.8

24-Hour Noise Level Measurement Summary

Date: Tuesday, November 27, 2018 *Location:* L3 - Located on Lake Street, south of the Project site, near an abandoned non-residential building. *Meter:* Piccolo I *JN:* 12137

Project: Lake Street Storage *Analyst:* R. Saber

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	53.4	65.7	42.5	61.0	58.0	57.0	56.0	54.0	51.0	48.0	47.0	44.0	53.4	10.0	63.4
	1	51.7	65.1	39.5	59.0	58.0	56.0	55.0	52.0	49.0	45.0	43.0	41.0	51.7	10.0	61.7
	2	53.1	64.7	43.5	60.0	59.0	57.0	56.0	53.0	51.0	47.0	46.0	45.0	53.1	10.0	63.1
	3	56.2	67.7	46.1	62.0	61.0	60.0	59.0	57.0	54.0	50.0	49.0	47.0	56.2	10.0	66.2
	4	58.5	67.5	50.6	62.0	61.0	61.0	60.0	59.0	58.0	54.0	53.0	52.0	58.5	10.0	68.5
	5	58.7	77.2	51.2	63.0	62.0	61.0	60.0	59.0	58.0	54.0	53.0	52.0	58.7	10.0	68.7
	6	59.2	72.5	51.5	64.0	63.0	61.0	61.0	60.0	58.0	55.0	54.0	53.0	59.2	10.0	69.2
Day	7	58.0	74.2	50.8	64.0	63.0	61.0	60.0	58.0	57.0	53.0	52.0	51.0	58.0	0.0	58.0
	8	57.3	73.3	44.2	65.0	63.0	61.0	60.0	58.0	55.0	50.0	48.0	46.0	57.3	0.0	57.3
	9	54.6	67.1	42.3	62.0	61.0	59.0	58.0	56.0	52.0	45.0	44.0	43.0	54.6	0.0	54.6
	10	55.3	72.9	41.1	63.0	61.0	59.0	58.0	56.0	52.0	45.0	44.0	42.0	55.3	0.0	55.3
	11	54.9	72.2	40.9	63.0	61.0	59.0	58.0	55.0	52.0	45.0	43.0	42.0	54.9	0.0	54.9
	12	54.5	70.4	39.5	63.0	61.0	59.0	58.0	55.0	52.0	45.0	43.0	41.0	54.5	0.0	54.5
	13	56.2	70.0	46.3	64.0	62.0	60.0	59.0	57.0	55.0	49.0	48.0	47.0	56.2	0.0	56.2
	14	56.7	77.5	45.1	64.0	62.0	60.0	59.0	57.0	54.0	49.0	48.0	46.0	56.7	0.0	56.7
	15	57.7	68.1	50.1	64.0	62.0	61.0	60.0	58.0	57.0	53.0	52.0	50.0	57.7	0.0	57.7
	16	57.9	76.4	49.5	65.0	63.0	61.0	60.0	58.0	56.0	52.0	51.0	50.0	57.9	0.0	57.9
	17	58.2	73.7	47.9	65.0	63.0	61.0	60.0	58.0	57.0	52.0	51.0	49.0	58.2	0.0	58.2
	18	58.2	71.0	48.6	65.0	63.0	61.0	60.0	59.0	57.0	52.0	52.0	50.0	58.2	0.0	58.2
Evening	19	57.4	75.6	48.1	64.0	62.0	60.0	59.0	58.0	56.0	52.0	51.0	49.0	57.4	5.0	62.4
	20	56.4	70.2	47.3	63.0	61.0	59.0	59.0	57.0	55.0	50.0	49.0	48.0	56.4	5.0	61.4
	21	55.9	75.7	46.0	62.0	61.0	59.0	58.0	56.0	54.0	49.0	48.0	47.0	55.9	5.0	60.9
Night	22	53.8	66.4	43.4	60.0	59.0	57.0	57.0	54.0	52.0	47.0	46.0	44.0	53.8	10.0	63.8
	23	52.2	66.7	42.1	60.0	58.0	56.0	55.0	53.0	49.0	45.0	44.0	43.0	52.2	10.0	62.2

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	54.5	67.1	39.5	62.0	61.0	59.0	58.0	55.0	52.0	45.0	43.0	41.0
	Max	58.2	77.5	50.8	65.0	63.0	61.0	60.0	59.0	57.0	53.0	52.0	51.0
Energy Average		56.8	Average:		63.9	62.1	60.2	59.2	57.1	54.7	49.2	48.0	46.4
Evening	Min	55.9	70.2	46.0	62.0	61.0	59.0	58.0	56.0	54.0	49.0	48.0	47.0
	Max	57.4	75.7	48.1	64.0	62.0	60.0	59.0	58.0	56.0	52.0	51.0	49.0
Energy Average		56.6	Average:		63.0	61.3	59.3	58.7	57.0	55.0	50.3	49.3	48.0
Night	Min	51.7	64.7	39.5	59.0	58.0	56.0	55.0	52.0	49.0	45.0	43.0	41.0
	Max	59.2	77.2	51.5	64.0	63.0	61.0	61.0	60.0	58.0	55.0	54.0	53.0
Energy Average		56.1	Average:		61.2	59.9	58.4	57.7	55.7	53.3	49.4	48.3	46.8

L_{eq} (dBA)		
24-Hour	Daytime	Nighttime
56.6	56.8	56.1

24-Hour CNEL (dBA)
62.9

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APPENDIX 7.1:

OFF-SITE TRAFFIC NOISE LEVEL CONTOURS

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Lake St.
Road Segment: n/o Temescal Cyn. Rd.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,050 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	96 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	67.0 feet
Centerline Dist. to Observer:	67.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.011
Medium Trucks:	46.822
Heavy Trucks:	46.841

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.71	0.30	-1.20	-4.71	0.000	0.000
Medium Trucks:	81.00	-16.53	0.32	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.49	0.32	-1.20	-5.29	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.0	68.1	66.3	60.3	68.9	69.5
Medium Trucks:	63.6	62.1	55.7	54.2	62.6	62.9
Heavy Trucks:	64.0	62.6	53.6	54.8	63.2	63.3
Vehicle Noise:	71.7	70.0	66.9	62.1	70.7	71.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	74	160	345	744
CNEL:	80	172	371	799

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Lake St.
Road Segment: s/o Temescal Cyn. Rd.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,810 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	96 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	67.0 feet
Centerline Dist. to Observer:	67.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.011
Medium Trucks:	46.822
Heavy Trucks:	46.841

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.17	0.30	-1.20	-4.71	0.000	0.000
Medium Trucks:	81.00	-17.07	0.32	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-21.03	0.32	-1.20	-5.29	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.5	67.6	65.8	59.8	68.4	69.0
Medium Trucks:	63.1	61.5	55.2	53.6	62.1	62.3
Heavy Trucks:	63.5	62.1	53.0	54.3	62.6	62.7
Vehicle Noise:	71.2	69.4	66.4	61.6	70.1	70.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	68	147	318	684
CNEL:	74	158	341	735

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Lake St.
Road Segment: s/o A St.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,810 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.17	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-17.07	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-21.03	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.3	67.4	65.6	59.6	68.2	68.8
Medium Trucks:	62.9	61.4	55.0	53.5	61.9	62.2
Heavy Trucks:	63.3	61.9	52.8	54.1	62.4	62.6
Vehicle Noise:	71.0	69.2	66.2	61.4	70.0	70.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	60	129	277	597
CNEL:	64	138	298	641

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Lake St.
Road Segment: s/o B St.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,810 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.17	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-17.07	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-21.03	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.3	67.4	65.6	59.6	68.2	68.8
Medium Trucks:	62.9	61.4	55.0	53.5	61.9	62.2
Heavy Trucks:	63.3	61.9	52.8	54.1	62.4	62.6
Vehicle Noise:	71.0	69.2	66.2	61.4	70.0	70.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	60	129	277	597
CNEL:	64	138	298	641

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: s/o D St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,810 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.17	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-17.07	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-21.03	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.3	67.4	65.6	59.6	68.2	68.8
Medium Trucks:	62.9	61.4	55.0	53.5	61.9	62.2
Heavy Trucks:	63.3	61.9	52.8	54.1	62.4	62.6
Vehicle Noise:	71.0	69.2	66.2	61.4	70.0	70.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	60	129	277	597
CNEL:	64	138	298	641

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: s/o Nichols Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,250 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.11	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-16.13	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.08	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.2	68.3	66.6	60.5	69.1	69.8
Medium Trucks:	63.8	62.3	56.0	54.4	62.9	63.1
Heavy Trucks:	64.2	62.8	53.8	55.0	63.4	63.5
Vehicle Noise:	71.9	70.2	67.1	62.4	70.9	71.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	69	149	320	690
CNEL:	74	160	344	742

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project | Project Name: Lake Street
Road Name: Temescal Cyn Rd. | Job Number: 12137
Road Segment: w/o Lake St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	730 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-3.78	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-21.01	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-24.97	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.4	63.5	61.7	55.6	64.3	64.9
Medium Trucks:	58.9	57.4	51.1	49.5	58.0	58.2
Heavy Trucks:	59.4	57.9	48.9	50.2	58.5	58.6
Vehicle Noise:	67.1	65.3	62.3	57.5	66.0	66.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	33	70	151	326
CNEL:	35	75	163	350

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project | Project Name: Lake Street
Road Name: Nichols Rd. | Job Number: 12137
Road Segment: e/o Lake St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	760 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-3.60	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-20.84	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-24.79	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.5	63.6	61.9	55.8	64.4	65.0
Medium Trucks:	59.1	57.6	51.2	49.7	58.2	58.4
Heavy Trucks:	59.5	58.1	49.1	50.3	58.7	58.8
Vehicle Noise:	67.2	65.5	62.4	57.7	66.2	66.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	33	72	155	335
CNEL:	36	77	167	360

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: n/o Temescal Cyn. Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,400	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,140	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	96	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	67.0	feet
Centerline Dist. to Observer:	67.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.011
Medium Trucks:	46.822
Heavy Trucks:	46.841

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.90	0.30	-1.20	-4.71	0.000	0.000
Medium Trucks:	81.00	-16.34	0.32	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.30	0.32	-1.20	-5.29	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.2	68.3	66.5	60.5	69.1	69.7
Medium Trucks:	63.8	62.3	55.9	54.4	62.8	63.1
Heavy Trucks:	64.2	62.8	53.7	55.0	63.3	63.5
Vehicle Noise:	71.9	70.1	67.1	62.3	70.9	71.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	77	165	355	765
CNEL:	82	177	382	822

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: s/o Temescal Cyn. Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,700	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,870	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	96	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	67.0	feet
Centerline Dist. to Observer:	67.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.011
Medium Trucks:	46.822
Heavy Trucks:	46.841

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.31	0.30	-1.20	-4.71	0.000	0.000
Medium Trucks:	81.00	-16.93	0.32	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.88	0.32	-1.20	-5.29	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.6	67.7	65.9	59.9	68.5	69.1
Medium Trucks:	63.2	61.7	55.3	53.8	62.2	62.5
Heavy Trucks:	63.6	62.2	53.2	54.4	62.8	62.9
Vehicle Noise:	71.3	69.6	66.5	61.7	70.3	70.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	70	151	325	700
CNEL:	75	162	349	752

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: s/o A St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,700	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,870	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	72	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.31	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-16.93	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.88	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.4	67.5	65.8	59.7	68.3	68.9
Medium Trucks:	63.0	61.5	55.2	53.6	62.1	62.3
Heavy Trucks:	63.4	62.0	53.0	54.2	62.6	62.7
Vehicle Noise:	71.1	69.4	66.3	61.6	70.1	70.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	61	131	283	610
CNEL:	66	141	304	656

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: s/o B St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,700	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,870	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	72	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.31	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-16.93	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.88	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.4	67.5	65.8	59.7	68.3	68.9
Medium Trucks:	63.0	61.5	55.2	53.6	62.1	62.3
Heavy Trucks:	63.4	62.0	53.0	54.2	62.6	62.7
Vehicle Noise:	71.1	69.4	66.3	61.6	70.1	70.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	61	131	283	610
CNEL:	66	141	304	656

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Lake St.
Road Segment: s/o D St.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,700	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,870	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	72	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000	
Medium Trucks:	2.297	
Heavy Trucks:	8.006	Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.31	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-16.93	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.88	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.4	67.5	65.8	59.7	68.3	68.9
Medium Trucks:	63.0	61.5	55.2	53.6	62.1	62.3
Heavy Trucks:	63.4	62.0	53.0	54.2	62.6	62.7
Vehicle Noise:	71.1	69.4	66.3	61.6	70.1	70.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	61	131	283	610
CNEL:	66	141	304	656

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Lake St.
Road Segment: s/o Nichols Rd.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,900	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,290	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	72	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000	
Medium Trucks:	2.297	
Heavy Trucks:	8.006	Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.19	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-16.05	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.00	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.3	68.4	66.7	60.6	69.2	69.8
Medium Trucks:	63.9	62.4	56.0	54.5	63.0	63.2
Heavy Trucks:	64.3	62.9	53.9	55.1	63.5	63.6
Vehicle Noise:	72.0	70.3	67.2	62.4	71.0	71.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	70	150	324	698
CNEL:	75	162	348	750

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Temescal Cyn Rd.
Road Segment: w/o Lake St.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,500	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	750	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	72	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000	
Medium Trucks:	2.297	
Heavy Trucks:	8.006	Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-3.66	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-20.90	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-24.85	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.5	63.6	61.8	55.8	64.4	65.0
Medium Trucks:	59.1	57.5	51.2	49.6	58.1	58.3
Heavy Trucks:	59.5	58.1	49.0	50.3	58.6	58.7
Vehicle Noise:	67.2	65.4	62.4	57.6	66.1	66.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	33	71	154	332
CNEL:	36	77	165	357

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Nichols Rd.
Road Segment: e/o Lake St.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,900	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	790	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	72	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000	
Medium Trucks:	2.297	
Heavy Trucks:	8.006	Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-3.43	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-20.67	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-24.63	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.7	63.8	62.0	56.0	64.6	65.2
Medium Trucks:	59.3	57.8	51.4	49.9	58.3	58.6
Heavy Trucks:	59.7	58.3	49.2	50.5	58.8	59.0
Vehicle Noise:	67.4	65.6	62.6	57.8	66.4	66.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	34	74	159	344
CNEL:	37	80	171	369

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA
Road Name: Lake St.
Road Segment: n/o Temescal Cyn. Rd.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,090 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	96 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	67.0 feet
Centerline Dist. to Observer:	67.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.011
Medium Trucks:	46.822
Heavy Trucks:	46.841

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.79	0.30	-1.20	-4.71	0.000	0.000
Medium Trucks:	81.00	-16.45	0.32	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.40	0.32	-1.20	-5.29	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.1	68.2	66.4	60.4	69.0	69.6
Medium Trucks:	63.7	62.2	55.8	54.3	62.7	63.0
Heavy Trucks:	64.1	62.7	53.6	54.9	63.2	63.4
Vehicle Noise:	71.8	70.0	67.0	62.2	70.8	71.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	75	162	350	753
CNEL:	81	174	376	809

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA
Road Name: Lake St.
Road Segment: s/o Temescal Cyn. Rd.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,850 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	96 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	67.0 feet
Centerline Dist. to Observer:	67.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.011
Medium Trucks:	46.822
Heavy Trucks:	46.841

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.26	0.30	-1.20	-4.71	0.000	0.000
Medium Trucks:	81.00	-16.98	0.32	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.93	0.32	-1.20	-5.29	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.6	67.7	65.9	59.8	68.5	69.1
Medium Trucks:	63.1	61.6	55.3	53.7	62.2	62.4
Heavy Trucks:	63.6	62.1	53.1	54.4	62.7	62.8
Vehicle Noise:	71.3	69.5	66.5	61.7	70.2	70.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	69	150	322	695
CNEL:	75	161	346	746

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA
Road Name: Lake St.
Road Segment: s/o A St.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,850 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.26	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-16.98	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.93	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.4	67.5	65.7	59.7	68.3	68.9
Medium Trucks:	63.0	61.5	55.1	53.6	62.0	62.3
Heavy Trucks:	63.4	62.0	52.9	54.2	62.5	62.7
Vehicle Noise:	71.1	69.3	66.3	61.5	70.1	70.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	61	131	281	606
CNEL:	65	140	302	651

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA
Road Name: Lake St.
Road Segment: s/o B St.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,850 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.26	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-16.98	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.93	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.4	67.5	65.7	59.7	68.3	68.9
Medium Trucks:	63.0	61.5	55.1	53.6	62.0	62.3
Heavy Trucks:	63.4	62.0	52.9	54.2	62.5	62.7
Vehicle Noise:	71.1	69.3	66.3	61.5	70.1	70.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	61	131	281	606
CNEL:	65	140	302	651

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA
Road Name: Lake St.
Road Segment: s/o D St.

Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,500	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,850	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	72	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.26	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-16.98	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.93	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.4	67.5	65.7	59.7	68.3	68.9
Medium Trucks:	63.0	61.5	55.1	53.6	62.0	62.3
Heavy Trucks:	63.4	62.0	52.9	54.2	62.5	62.7
Vehicle Noise:	71.1	69.3	66.3	61.5	70.1	70.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	61	131	281	606
CNEL:	65	140	302	651

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA
Road Name: Lake St.
Road Segment: s/o Nichols Rd.

Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,900	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,290	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	72	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.19	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-16.05	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.00	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.3	68.4	66.7	60.6	69.2	69.8
Medium Trucks:	63.9	62.4	56.0	54.5	63.0	63.2
Heavy Trucks:	64.3	62.9	53.9	55.1	63.5	63.6
Vehicle Noise:	72.0	70.3	67.2	62.4	71.0	71.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	70	150	324	698
CNEL:	75	162	348	750

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA
Road Name: Temescal Cyn Rd.
Road Segment: w/o Lake St.

Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,500	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	750	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	72	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-3.66	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-20.90	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-24.85	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.5	63.6	61.8	55.8	64.4	65.0
Medium Trucks:	59.1	57.5	51.2	49.6	58.1	58.3
Heavy Trucks:	59.5	58.1	49.0	50.3	58.6	58.7
Vehicle Noise:	67.2	65.4	62.4	57.6	66.1	66.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	33	71	154	332
CNEL:	36	77	165	357

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA
Road Name: Nichols Rd.
Road Segment: e/o Lake St.

Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,700	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	770	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	72	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-3.54	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-20.78	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-24.74	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.6	63.7	61.9	55.9	64.5	65.1
Medium Trucks:	59.2	57.7	51.3	49.8	58.2	58.4
Heavy Trucks:	59.6	58.2	49.1	50.4	58.7	58.9
Vehicle Noise:	67.3	65.5	62.5	57.7	66.3	66.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	34	73	157	338
CNEL:	36	78	168	363

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: n/o Temescal Cyn. Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,180 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	96 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	67.0 feet
Centerline Dist. to Observer:	67.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.011
Medium Trucks:	46.822
Heavy Trucks:	46.841

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.98	0.30	-1.20	-4.71	0.000	0.000
Medium Trucks:	81.00	-16.26	0.32	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.22	0.32	-1.20	-5.29	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.3	68.4	66.6	60.6	69.2	69.8
Medium Trucks:	63.9	62.4	56.0	54.4	62.9	63.1
Heavy Trucks:	64.3	62.9	53.8	55.1	63.4	63.6
Vehicle Noise:	72.0	70.2	67.2	62.4	70.9	71.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	77	167	360	775
CNEL:	83	179	386	832

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: s/o Temescal Cyn. Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,910 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	96 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	67.0 feet
Centerline Dist. to Observer:	67.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.011
Medium Trucks:	46.822
Heavy Trucks:	46.841

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.40	0.30	-1.20	-4.71	0.000	0.000
Medium Trucks:	81.00	-16.84	0.32	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.79	0.32	-1.20	-5.29	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.7	67.8	66.0	60.0	68.6	69.2
Medium Trucks:	63.3	61.8	55.4	53.9	62.3	62.6
Heavy Trucks:	63.7	62.3	53.3	54.5	62.9	63.0
Vehicle Noise:	71.4	69.7	66.6	61.8	70.4	70.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	71	153	329	709
CNEL:	76	164	354	762

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: s/o A St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,910 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.40	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-16.84	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.79	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.5	67.6	65.9	59.8	68.4	69.0
Medium Trucks:	63.1	61.6	55.2	53.7	62.2	62.4
Heavy Trucks:	63.5	62.1	53.1	54.3	62.7	62.8
Vehicle Noise:	71.2	69.5	66.4	61.7	70.2	70.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	62	133	287	619
CNEL:	66	143	309	665

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: s/o B St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,910 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.40	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-16.84	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.79	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.5	67.6	65.9	59.8	68.4	69.0
Medium Trucks:	63.1	61.6	55.2	53.7	62.2	62.4
Heavy Trucks:	63.5	62.1	53.1	54.3	62.7	62.8
Vehicle Noise:	71.2	69.5	66.4	61.7	70.2	70.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	62	133	287	619
CNEL:	66	143	309	665

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP
Road Name: Lake St.
Road Segment: s/o D St.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,100	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,910	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	72	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.40	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-16.84	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.79	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.5	67.6	65.9	59.8	68.4	69.0
Medium Trucks:	63.1	61.6	55.2	53.7	62.2	62.4
Heavy Trucks:	63.5	62.1	53.1	54.3	62.7	62.8
Vehicle Noise:	71.2	69.5	66.4	61.7	70.2	70.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	62	133	287	619
CNEL:	66	143	309	665

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP
Road Name: Lake St.
Road Segment: s/o Nichols Rd.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,300	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,330	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	72	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.26	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-15.97	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-19.93	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.4	68.5	66.7	60.7	69.3	69.9
Medium Trucks:	64.0	62.5	56.1	54.6	63.0	63.3
Heavy Trucks:	64.4	63.0	53.9	55.2	63.5	63.7
Vehicle Noise:	72.1	70.3	67.3	62.5	71.1	71.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	71	152	328	707
CNEL:	76	164	352	759

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP
Road Name: Temescal Cyn Rd.
Road Segment: w/o Lake St.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,700	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	770	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	72	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-3.54	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-20.78	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-24.74	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.6	63.7	61.9	55.9	64.5	65.1
Medium Trucks:	59.2	57.7	51.3	49.8	58.2	58.4
Heavy Trucks:	59.6	58.2	49.1	50.4	58.7	58.9
Vehicle Noise:	67.3	65.5	62.5	57.7	66.3	66.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	34	73	157	338
CNEL:	36	78	168	363

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP
Road Name: Nichols Rd.
Road Segment: e/o Lake St.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	800	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	72	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-3.38	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-20.62	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-24.57	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.8	63.9	62.1	56.0	64.7	65.3
Medium Trucks:	59.3	57.8	51.5	49.9	58.4	58.6
Heavy Trucks:	59.8	58.3	49.3	50.5	58.9	59.0
Vehicle Noise:	67.5	65.7	62.7	57.9	66.4	66.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	35	75	161	346
CNEL:	37	80	173	372

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAC
Road Name: Lake St.
Road Segment: n/o Temescal Cyn. Rd.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,300 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	96 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	67.0 feet
Centerline Dist. to Observer:	67.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.011
Medium Trucks:	46.822
Heavy Trucks:	46.841

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.21	0.30	-1.20	-4.71	0.000	0.000
Medium Trucks:	81.00	-16.03	0.32	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-19.99	0.32	-1.20	-5.29	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.5	68.6	66.8	60.8	69.4	70.0
Medium Trucks:	64.1	62.6	56.2	54.7	63.1	63.4
Heavy Trucks:	64.5	63.1	54.1	55.3	63.7	63.8
Vehicle Noise:	72.2	70.5	67.4	62.6	71.2	71.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	80	173	373	803
CNEL:	86	186	400	863

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAC
Road Name: Lake St.
Road Segment: s/o Temescal Cyn. Rd.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,050 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	96 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	67.0 feet
Centerline Dist. to Observer:	67.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.011
Medium Trucks:	46.822
Heavy Trucks:	46.841

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.71	0.30	-1.20	-4.71	0.000	0.000
Medium Trucks:	81.00	-16.53	0.32	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.49	0.32	-1.20	-5.29	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.0	68.1	66.3	60.3	68.9	69.5
Medium Trucks:	63.6	62.1	55.7	54.2	62.6	62.9
Heavy Trucks:	64.0	62.6	53.6	54.8	63.2	63.3
Vehicle Noise:	71.7	70.0	66.9	62.1	70.7	71.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	74	160	345	744
CNEL:	80	172	371	799

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAC
Road Name: Lake St.
Road Segment: s/o A St.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,050 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.71	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-16.53	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.49	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.8	67.9	66.2	60.1	68.7	69.3
Medium Trucks:	63.4	61.9	55.6	54.0	62.5	62.7
Heavy Trucks:	63.8	62.4	53.4	54.6	63.0	63.1
Vehicle Noise:	71.5	69.8	66.7	62.0	70.5	71.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	65	140	301	649
CNEL:	70	150	323	697

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAC
Road Name: Lake St.
Road Segment: s/o B St.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,050 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.71	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-16.53	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.49	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.8	67.9	66.2	60.1	68.7	69.3
Medium Trucks:	63.4	61.9	55.6	54.0	62.5	62.7
Heavy Trucks:	63.8	62.4	53.4	54.6	63.0	63.1
Vehicle Noise:	71.5	69.8	66.7	62.0	70.5	71.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	65	140	301	649
CNEL:	70	150	323	697

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAC | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: s/o D St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,050 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.71	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-16.53	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.49	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.8	67.9	66.2	60.1	68.7	69.3
Medium Trucks:	63.4	61.9	55.6	54.0	62.5	62.7
Heavy Trucks:	63.8	62.4	53.4	54.6	63.0	63.1
Vehicle Noise:	71.5	69.8	66.7	62.0	70.5	71.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	65	140	301	649
CNEL:	70	150	323	697

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAC | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: s/o Nichols Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	24,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,420 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.43	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-15.81	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-19.76	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.6	68.7	66.9	60.8	69.5	70.1
Medium Trucks:	64.1	62.6	56.3	54.7	63.2	63.4
Heavy Trucks:	64.6	63.1	54.1	55.4	63.7	63.8
Vehicle Noise:	72.3	70.5	67.5	62.7	71.2	71.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	72	156	336	725
CNEL:	78	168	361	778

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAC | Project Name: Lake Street
Road Name: Temescal Cyn Rd. | Job Number: 12137
Road Segment: w/o Lake St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	750 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-3.66	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-20.90	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-24.85	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.5	63.6	61.8	55.8	64.4	65.0
Medium Trucks:	59.1	57.5	51.2	49.6	58.1	58.3
Heavy Trucks:	59.5	58.1	49.0	50.3	58.6	58.7
Vehicle Noise:	67.2	65.4	62.4	57.6	66.1	66.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	33	71	154	332
CNEL:	36	77	165	357

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAC | Project Name: Lake Street
Road Name: Nichols Rd. | Job Number: 12137
Road Segment: e/o Lake St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	930 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-2.72	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-19.96	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-23.92	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.4	64.5	62.7	56.7	65.3	65.9
Medium Trucks:	60.0	58.5	52.1	50.6	59.0	59.3
Heavy Trucks:	60.4	59.0	50.0	51.2	59.6	59.7
Vehicle Noise:	68.1	66.4	63.3	58.5	67.1	67.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	38	83	178	383
CNEL:	41	89	191	411

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAPC | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: n/o Temescal Cyn. Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,390 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	96 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	67.0 feet
Centerline Dist. to Observer:	67.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.011
Medium Trucks:	46.822
Heavy Trucks:	46.841

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.38	0.30	-1.20	-4.71	0.000	0.000
Medium Trucks:	81.00	-15.86	0.32	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-19.82	0.32	-1.20	-5.29	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.7	68.8	67.0	61.0	69.6	70.2
Medium Trucks:	64.3	62.8	56.4	54.8	63.3	63.5
Heavy Trucks:	64.7	63.3	54.2	55.5	63.8	64.0
Vehicle Noise:	72.4	70.6	67.6	62.8	71.3	71.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	82	177	382	824
CNEL:	89	191	411	885

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAPC | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: s/o Temescal Cyn. Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,110 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	96 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	67.0 feet
Centerline Dist. to Observer:	67.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.011
Medium Trucks:	46.822
Heavy Trucks:	46.841

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.83	0.30	-1.20	-4.71	0.000	0.000
Medium Trucks:	81.00	-16.40	0.32	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.36	0.32	-1.20	-5.29	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.1	68.2	66.5	60.4	69.0	69.6
Medium Trucks:	63.7	62.2	55.9	54.3	62.8	63.0
Heavy Trucks:	64.1	62.7	53.7	54.9	63.3	63.4
Vehicle Noise:	71.8	70.1	67.0	62.3	70.8	71.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	76	163	352	758
CNEL:	81	175	378	815

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAPC | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: s/o A St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,110 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.83	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-16.40	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.36	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.0	68.1	66.3	60.2	68.9	69.5
Medium Trucks:	63.5	62.0	55.7	54.1	62.6	62.8
Heavy Trucks:	64.0	62.5	53.5	54.8	63.1	63.2
Vehicle Noise:	71.7	69.9	66.9	62.1	70.6	71.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	66	142	307	661
CNEL:	71	153	330	710

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAPC | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: s/o B St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,110 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.83	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-16.40	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.36	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.0	68.1	66.3	60.2	68.9	69.5
Medium Trucks:	63.5	62.0	55.7	54.1	62.6	62.8
Heavy Trucks:	64.0	62.5	53.5	54.8	63.1	63.2
Vehicle Noise:	71.7	69.9	66.9	62.1	70.6	71.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	66	142	307	661
CNEL:	71	153	330	710

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAPC | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: s/o D St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,110 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.83	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-16.40	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-20.36	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.0	68.1	66.3	60.2	68.9	69.5
Medium Trucks:	63.5	62.0	55.7	54.1	62.6	62.8
Heavy Trucks:	64.0	62.5	53.5	54.8	63.1	63.2
Vehicle Noise:	71.7	69.9	66.9	62.1	70.6	71.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	66	142	307	661
CNEL:	71	153	330	710

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAPC | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: s/o Nichols Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	24,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,460 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.50	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-15.74	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-19.69	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.6	68.7	67.0	60.9	69.5	70.1
Medium Trucks:	64.2	62.7	56.3	54.8	63.3	63.5
Heavy Trucks:	64.6	63.2	54.2	55.4	63.8	63.9
Vehicle Noise:	72.3	70.6	67.5	62.8	71.3	71.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	73	158	340	733
CNEL:	79	170	365	787

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAPC | Project Name: Lake Street
Road Name: Temescal Cyn Rd. | Job Number: 12137
Road Segment: w/o Lake St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	770 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-3.54	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-20.78	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-24.74	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.6	63.7	61.9	55.9	64.5	65.1
Medium Trucks:	59.2	57.7	51.3	49.8	58.2	58.4
Heavy Trucks:	59.6	58.2	49.1	50.4	58.7	58.9
Vehicle Noise:	67.3	65.5	62.5	57.7	66.3	66.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	34	73	157	338
CNEL:	36	78	168	363

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAPC | Project Name: Lake Street
Road Name: Nichols Rd. | Job Number: 12137
Road Segment: e/o Lake St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	960 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-2.59	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-19.82	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-23.78	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.5	64.6	62.9	56.8	65.4	66.1
Medium Trucks:	60.1	58.6	52.3	50.7	59.2	59.4
Heavy Trucks:	60.5	59.1	50.1	51.3	59.7	59.8
Vehicle Noise:	68.2	66.5	63.4	58.7	67.2	67.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	39	84	182	391
CNEL:	42	91	195	420

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Lake St.
Road Segment: n/o Temescal Cyn. Rd.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	48,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,800 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	96 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	67.0 feet
Centerline Dist. to Observer:	67.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.011
Medium Trucks:	46.822
Heavy Trucks:	46.841

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.40	0.30	-1.20	-4.71	0.000	0.000
Medium Trucks:	81.00	-12.83	0.32	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-16.79	0.32	-1.20	-5.29	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.7	71.8	70.0	64.0	72.6	73.2
Medium Trucks:	67.3	65.8	59.4	57.9	66.3	66.6
Heavy Trucks:	67.7	66.3	57.3	58.5	66.9	67.0
Vehicle Noise:	75.4	73.7	70.6	65.8	74.4	74.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	131	283	609	1,311
CNEL:	141	304	654	1,409

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Lake St.
Road Segment: s/o Temescal Cyn. Rd.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,450 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	96 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	67.0 feet
Centerline Dist. to Observer:	67.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.011
Medium Trucks:	46.822
Heavy Trucks:	46.841

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.08	0.30	-1.20	-4.71	0.000	0.000
Medium Trucks:	81.00	-13.16	0.32	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-17.12	0.32	-1.20	-5.29	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.4	71.5	69.7	63.7	72.3	72.9
Medium Trucks:	67.0	65.5	59.1	57.5	66.0	66.2
Heavy Trucks:	67.4	66.0	56.9	58.2	66.5	66.7
Vehicle Noise:	75.1	73.3	70.3	65.5	74.0	74.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	125	269	579	1,247
CNEL:	134	289	622	1,340

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Lake St.
Road Segment: s/o A St.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	60,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	6,000 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	5.37	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-11.87	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-15.82	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	74.5	72.6	70.8	64.8	73.4	74.0
Medium Trucks:	68.1	66.6	60.2	58.7	67.1	67.4
Heavy Trucks:	68.5	67.1	58.0	59.3	67.7	67.8
Vehicle Noise:	76.2	74.5	71.4	66.6	75.2	75.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	133	286	616	1,327
CNEL:	143	307	662	1,426

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Lake St.
Road Segment: s/o B St.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	52,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	5,200 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.75	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-12.49	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-16.44	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.9	72.0	70.2	64.2	72.8	73.4
Medium Trucks:	67.5	66.0	59.6	58.1	66.5	66.7
Heavy Trucks:	67.9	66.5	57.4	58.7	67.0	67.2
Vehicle Noise:	75.6	73.8	70.8	66.0	74.6	75.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	121	260	560	1,207
CNEL:	130	279	602	1,296

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Lake St.
Road Segment: s/o D St.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	51,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	5,100 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.67	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-12.57	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-16.53	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.8	71.9	70.1	64.1	72.7	73.3
Medium Trucks:	67.4	65.9	59.5	58.0	66.4	66.7
Heavy Trucks:	67.8	66.4	57.3	58.6	66.9	67.1
Vehicle Noise:	75.5	73.7	70.7	65.9	74.5	74.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	119	257	553	1,191
CNEL:	128	276	594	1,280

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Lake St.
Road Segment: s/o Nichols Rd.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	38,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,800 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.39	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-13.85	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-17.80	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.5	70.6	68.9	62.8	71.4	72.0
Medium Trucks:	66.1	64.6	58.2	56.7	65.2	65.4
Heavy Trucks:	66.5	65.1	56.1	57.3	65.7	65.8
Vehicle Noise:	74.2	72.5	69.4	64.6	73.2	73.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	98	211	454	979
CNEL:	105	227	488	1,052

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Temescal Cyn Rd.
Road Segment: w/o Lake St.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,500 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.03	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-14.21	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-18.16	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.2	70.3	68.5	62.4	71.1	71.7
Medium Trucks:	65.7	64.2	57.9	56.3	64.8	65.0
Heavy Trucks:	66.2	64.7	55.7	57.0	65.3	65.4
Vehicle Noise:	73.9	72.1	69.1	64.3	72.8	73.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	93	200	430	927
CNEL:	100	214	462	996

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Nichols Rd.
Road Segment: e/o Lake St.
Project Name: Lake Street
Job Number: 12137

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	47,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,700 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.31	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-12.93	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-16.88	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.4	71.5	69.8	63.7	72.3	73.0
Medium Trucks:	67.0	65.5	59.2	57.6	66.1	66.3
Heavy Trucks:	67.4	66.0	57.0	58.2	66.6	66.7
Vehicle Noise:	75.1	73.4	70.3	65.6	74.1	74.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	113	243	524	1,128
CNEL:	121	261	562	1,212

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: n/o Temescal Cyn. Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	49,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,900 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	96 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	67.0 feet
Centerline Dist. to Observer:	67.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.011
Medium Trucks:	46.822
Heavy Trucks:	46.841

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.49	0.30	-1.20	-4.71	0.000	0.000
Medium Trucks:	81.00	-12.74	0.32	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-16.70	0.32	-1.20	-5.29	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.8	71.9	70.1	64.1	72.7	73.3
Medium Trucks:	67.4	65.9	59.5	58.0	66.4	66.7
Heavy Trucks:	67.8	66.4	57.3	58.6	66.9	67.1
Vehicle Noise:	75.5	73.7	70.7	65.9	74.5	74.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	133	286	617	1,330
CNEL:	143	308	663	1,428

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: s/o Temescal Cyn. Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	45,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,530 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	96 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	67.0 feet
Centerline Dist. to Observer:	67.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.011
Medium Trucks:	46.822
Heavy Trucks:	46.841

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.15	0.30	-1.20	-4.71	0.000	0.000
Medium Trucks:	81.00	-13.09	0.32	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-17.04	0.32	-1.20	-5.29	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.5	71.6	69.8	63.7	72.4	73.0
Medium Trucks:	67.0	65.5	59.2	57.6	66.1	66.3
Heavy Trucks:	67.5	66.0	57.0	58.3	66.6	66.7
Vehicle Noise:	75.2	73.4	70.4	65.6	74.1	74.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	126	272	586	1,262
CNEL:	136	292	629	1,356

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: s/o A St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	60,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	6,060 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	5.42	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-11.82	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-15.78	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	74.5	72.6	70.9	64.8	73.4	74.1
Medium Trucks:	68.1	66.6	60.3	58.7	67.2	67.4
Heavy Trucks:	68.5	67.1	58.1	59.3	67.7	67.8
Vehicle Noise:	76.2	74.5	71.4	66.7	75.2	75.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	134	288	620	1,336
CNEL:	144	309	666	1,436

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: s/o B St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	52,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	5,250 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.79	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-12.45	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-16.40	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.9	72.0	70.3	64.2	72.8	73.4
Medium Trucks:	67.5	66.0	59.6	58.1	66.6	66.8
Heavy Trucks:	67.9	66.5	57.5	58.7	67.1	67.2
Vehicle Noise:	75.6	73.9	70.8	66.0	74.6	75.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	121	262	564	1,214
CNEL:	130	281	606	1,305

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: s/o D St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	51,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	5,150 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.71	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-12.53	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-16.48	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.8	71.9	70.2	64.1	72.7	73.3
Medium Trucks:	67.4	65.9	59.6	58.0	66.5	66.7
Heavy Trucks:	67.8	66.4	57.4	58.6	67.0	67.1
Vehicle Noise:	75.5	73.8	70.7	66.0	74.5	75.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	120	258	556	1,199
CNEL:	129	277	598	1,288

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Lake Street
Road Name: Lake St. | Job Number: 12137
Road Segment: s/o Nichols Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	38,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,820 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.41	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-13.83	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-17.78	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.5	70.6	68.9	62.8	71.4	72.1
Medium Trucks:	66.1	64.6	58.3	56.7	65.2	65.4
Heavy Trucks:	66.5	65.1	56.1	57.3	65.7	65.8
Vehicle Noise:	74.2	72.5	69.4	64.7	73.2	73.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	98	212	456	982
CNEL:	106	227	490	1,055

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Lake Street
Road Name: Temescal Cyn Rd. | Job Number: 12137
Road Segment: w/o Lake St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,510 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.04	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-14.19	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-18.15	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.2	70.3	68.5	62.5	71.1	71.7
Medium Trucks:	65.8	64.3	57.9	56.3	64.8	65.0
Heavy Trucks:	66.2	64.8	55.7	57.0	65.3	65.5
Vehicle Noise:	73.9	72.1	69.1	64.3	72.8	73.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	93	200	431	928
CNEL:	100	215	463	997

Thursday, December 20, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Lake Street
Road Name: Nichols Rd. | Job Number: 12137
Road Segment: e/o Lake St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	47,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,710 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	72 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	48.260
Medium Trucks:	48.076
Heavy Trucks:	48.094

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.32	0.13	-1.20	-4.69	0.000	0.000
Medium Trucks:	81.00	-12.92	0.15	-1.20	-4.88	0.000	0.000
Heavy Trucks:	85.38	-16.87	0.15	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.5	71.6	69.8	63.7	72.4	73.0
Medium Trucks:	67.0	65.5	59.2	57.6	66.1	66.3
Heavy Trucks:	67.5	66.0	57.0	58.2	66.6	66.7
Vehicle Noise:	75.2	73.4	70.4	65.6	74.1	74.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	113	243	524	1,130
CNEL:	121	261	563	1,214

Thursday, December 20, 2018

APPENDIX 10.1:

OPERATIONAL NOISE LEVEL CALCULATIONS

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STATIONARY SOURCE NOISE PREDICTION MODEL

10/1/2019

Observer Location: **R1**
Source: Roof-Top Air Conditioning Units
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	1,130.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,130.0	feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	30.0	feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	0.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	77.2	74.4	76.1	77.4	77.7	78.2
Distance Attenuation	1,130.0	-47.1	-47.1	-47.1	-47.1	-47.1	-47.1
Shielding (Barrier Attenuation)	1,130.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		30.1	27.3	29.0	30.3	30.6	31.1
60 Minute Hourly Adjustment		**30.1**	**27.3**	**29.0**	**30.3**	**30.6**	**31.1**

STATIONARY SOURCE NOISE PREDICTION MODEL

10/1/2019

Observer Location: **R1**
Source: Gas Station Activity
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	1,100.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,100.0	feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0	feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	0.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	68.2	65.6	66.9	69.5	74.4	82.4
Distance Attenuation	1,100.0	-46.8	-46.8	-46.8	-46.8	-46.8	-46.8
Shielding (Barrier Attenuation)	1,100.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		21.4	18.8	20.1	22.7	27.6	35.6
60 Minute Hourly Adjustment		**21.4**	**18.8**	**20.1**	**22.7**	**27.6**	**35.6**

STATIONARY SOURCE NOISE PREDICTION MODEL 10/1/2019

Observer Location: **R1**
Source: RV Parking Lot Activity
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	1,194.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,194.0	feet	*Noise Source Height:*	6.0 feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0	feet	*Drop Off Coefficient:*	15.0
Barrier Elevation:	0.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	76.4	76.5	77.0	77.7	79.6	81.4
Distance Attenuation	1,194.0	-31.2	-31.2	-31.2	-31.2	-31.2	-31.2
Shielding (Barrier Attenuation)	1,194.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		45.2	45.3	45.8	46.5	48.4	50.2
60 Minute Hourly Adjustment		**45.2**	**45.3**	**45.8**	**46.5**	**48.4**	**50.2**

STATIONARY SOURCE NOISE PREDICTION MODEL 10/1/2019

Observer Location: **R1**
Source: Parking Lot Vehicle Movements
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	1,321.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,321.0	feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0	feet	*Drop Off Coefficient:*	15.0
Barrier Elevation:	0.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	52.2	49.0	50.0	55.0	61.0	71.9
Distance Attenuation	1,321.0	-31.8	-31.8	-31.8	-31.8	-31.8	-31.8
Shielding (Barrier Attenuation)	1,321.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		20.4	17.2	18.2	23.2	29.2	40.1
60 Minute Hourly Adjustment		**20.4**	**17.2**	**18.2**	**23.2**	**29.2**	**40.1**

STATIONARY SOURCE NOISE PREDICTION MODEL 10/1/2019

Observer Location: **R1**
Source: Pressure Washer
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	1,534.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,534.0	feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0	feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	0.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	82.4	82.2	82.9	83.7	83.9	84.1
Distance Attenuation	1,534.0	-43.7	-43.7	-43.7	-43.7	-43.7	-43.7
Shielding (Barrier Attenuation)	1,534.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		38.7	38.5	39.2	40.0	40.2	40.4
60 Minute Hourly Adjustment		**38.7**	**38.5**	**39.2**	**40.0**	**40.2**	**40.4**

STATIONARY SOURCE NOISE PREDICTION MODEL 10/1/2019

Observer Location: **R2**
Source: Roof-Top Air Conditioning Units
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	1,058.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,058.0	feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	30.0	feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	0.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	77.2	74.4	76.1	77.4	77.7	78.2
Distance Attenuation	1,058.0	-46.5	-46.5	-46.5	-46.5	-46.5	-46.5
Shielding (Barrier Attenuation)	1,058.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		30.7	27.9	29.6	30.9	31.2	31.7
60 Minute Hourly Adjustment		**30.7**	**27.9**	**29.6**	**30.9**	**31.2**	**31.7**

STATIONARY SOURCE NOISE PREDICTION MODEL

10/1/2019

Observer Location: **R2**
Source: Gas Station Activity
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	1,376.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,376.0 feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	0.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	68.2	65.6	66.9	69.5	74.4	82.4
Distance Attenuation	1,376.0	-48.8	-48.8	-48.8	-48.8	-48.8	-48.8
Shielding (Barrier Attenuation)	1,376.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		19.4	16.8	18.1	20.7	25.6	33.6
60 Minute Hourly Adjustment		**19.4**	**16.8**	**18.1**	**20.7**	**25.6**	**33.6**

STATIONARY SOURCE NOISE PREDICTION MODEL

10/1/2019

Observer Location: **R2**
Source: RV Parking Lot Activity
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	90.0 feet	***Barrier Height:***	**10.0 feet**
Noise Distance to Barrier:	90.0 feet	*Noise Source Height:*	6.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0 feet	*Drop Off Coefficient:*	15.0
Barrier Elevation:	0.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	76.4	76.5	77.0	77.7	79.6	81.4
Distance Attenuation	90.0	-14.3	-14.3	-14.3	-14.3	-14.3	-14.3
Shielding (Barrier Attenuation)	90.0	-15.3	-15.3	-15.3	-15.3	-15.3	-15.3
Raw (Distance + Barrier)		46.8	46.9	47.4	48.1	50.0	51.8
60 Minute Hourly Adjustment		**46.8**	**46.9**	**47.4**	**48.1**	**50.0**	**51.8**

STATIONARY SOURCE NOISE PREDICTION MODEL

10/1/2019

Observer Location: **R2**
Source: Parking Lot Vehicle Movements
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	1,345.0	feet	***Barrier Height:***	**0.0**	**feet**
Noise Distance to Barrier:	1,345.0	feet	*Noise Source Height:*	5.0	feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	0.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	0.0	feet	*Drop Off Coefficient:*	15.0	
Barrier Elevation:	0.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	52.2	49.0	50.0	55.0	61.0	71.9
Distance Attenuation	1,345.0	-31.9	-31.9	-31.9	-31.9	-31.9	-31.9
Shielding (Barrier Attenuation)	1,345.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		20.3	17.1	18.1	23.1	29.1	40.0
60 Minute Hourly Adjustment		**20.3**	**17.1**	**18.1**	**23.1**	**29.1**	**40.0**

STATIONARY SOURCE NOISE PREDICTION MODEL

10/1/2019

Observer Location: **R2**
Source: Pressure Washer
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	800.0	feet	***Barrier Height:***	**10.0**	**feet**
Noise Distance to Barrier:	800.0	feet	*Noise Source Height:*	5.0	feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	0.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	0.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	0.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	82.4	82.2	82.9	83.7	83.9	84.1
Distance Attenuation	800.0	-38.1	-38.1	-38.1	-38.1	-38.1	-38.1
Shielding (Barrier Attenuation)	800.0	-15.2	-15.2	-15.2	-15.2	-15.2	-15.2
Raw (Distance + Barrier)		29.1	28.9	29.6	30.4	30.6	30.8
60 Minute Hourly Adjustment		**29.1**	**28.9**	**29.6**	**30.4**	**30.6**	**30.8**

STATIONARY SOURCE NOISE PREDICTION MODEL

10/1/2019

Observer Location: **R3**
Source: Roof-Top Air Conditioning Units
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	679.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	679.0 feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	30.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	0.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	77.2	74.4	76.1	77.4	77.7	78.2
Distance Attenuation	679.0	-42.7	-42.7	-42.7	-42.7	-42.7	-42.7
Shielding (Barrier Attenuation)	679.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		34.5	31.7	33.4	34.7	35.0	35.5
60 Minute Hourly Adjustment		**34.5**	**31.7**	**33.4**	**34.7**	**35.0**	**35.5**

STATIONARY SOURCE NOISE PREDICTION MODEL

10/1/2019

Observer Location: **R3**
Source: Gas Station Activity
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	939.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	939.0 feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	0.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	68.2	65.6	66.9	69.5	74.4	82.4
Distance Attenuation	939.0	-45.5	-45.5	-45.5	-45.5	-45.5	-45.5
Shielding (Barrier Attenuation)	939.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		22.7	20.1	21.4	24.0	28.9	36.9
60 Minute Hourly Adjustment		**22.7**	**20.1**	**21.4**	**24.0**	**28.9**	**36.9**

STATIONARY SOURCE NOISE PREDICTION MODEL 10/1/2019

Observer Location: **R3**
Source: RV Parking Lot Activity
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	165.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	165.0 feet	*Noise Source Height:*	6.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0 feet	*Drop Off Coefficient:*	15.0
Barrier Elevation:	0.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	76.4	76.5	77.0	77.7	79.6	81.4
Distance Attenuation	165.0	-18.3	-18.3	-18.3	-18.3	-18.3	-18.3
Shielding (Barrier Attenuation)	165.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		58.1	58.2	58.7	59.4	61.3	63.1
60 Minute Hourly Adjustment		**58.1**	**58.2**	**58.7**	**59.4**	**61.3**	**63.1**

STATIONARY SOURCE NOISE PREDICTION MODEL 10/1/2019

Observer Location: **R3**
Source: Parking Lot Vehicle Movements
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	899.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	899.0 feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0 feet	*Drop Off Coefficient:*	15.0
Barrier Elevation:	0.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	52.2	49.0	50.0	55.0	61.0	71.9
Distance Attenuation	899.0	-29.3	-29.3	-29.3	-29.3	-29.3	-29.3
Shielding (Barrier Attenuation)	899.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		22.9	19.7	20.7	25.7	31.7	42.6
60 Minute Hourly Adjustment		**22.9**	**19.7**	**20.7**	**25.7**	**31.7**	**42.6**

STATIONARY SOURCE NOISE PREDICTION MODEL

10/1/2019

Observer Location: **R3**
Source: Pressure Washer
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	575.0 feet	***Barrier Height:***	**30.0 feet**
Noise Distance to Barrier:	575.0 feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	0.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	82.4	82.2	82.9	83.7	83.9	84.1
Distance Attenuation	575.0	-35.2	-35.2	-35.2	-35.2	-35.2	-35.2
Shielding (Barrier Attenuation)	575.0	-18.5	-18.5	-18.5	-18.5	-18.5	-18.5
Raw (Distance + Barrier)		28.7	28.5	29.2	30.0	30.2	30.4
60 Minute Hourly Adjustment		**28.7**	**28.5**	**29.2**	**30.0**	**30.2**	**30.4**

STATIONARY SOURCE NOISE PREDICTION MODEL

10/1/2019

Observer Location: **R4**
Source: Roof-Top Air Conditioning Units
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	364.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	364.0 feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	30.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	0.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	77.2	74.4	76.1	77.4	77.7	78.2
Distance Attenuation	364.0	-37.2	-37.2	-37.2	-37.2	-37.2	-37.2
Shielding (Barrier Attenuation)	364.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		40.0	37.2	38.9	40.2	40.5	41.0
60 Minute Hourly Adjustment		**40.0**	**37.2**	**38.9**	**40.2**	**40.5**	**41.0**

STATIONARY SOURCE NOISE PREDICTION MODEL 10/1/2019

Observer Location: **R4**
Source: Gas Station Activity
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	313.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	313.0 feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	0.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	68.2	65.6	66.9	69.5	74.4	82.4
Distance Attenuation	313.0	-35.9	-35.9	-35.9	-35.9	-35.9	-35.9
Shielding (Barrier Attenuation)	313.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		32.3	29.7	31.0	33.6	38.5	46.5
60 Minute Hourly Adjustment		**32.3**	**29.7**	**31.0**	**33.6**	**38.5**	**46.5**

STATIONARY SOURCE NOISE PREDICTION MODEL 10/1/2019

Observer Location: **R4**
Source: RV Parking Lot Activity
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	210.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	210.0 feet	*Noise Source Height:*	6.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0 feet	*Drop Off Coefficient:*	15.0
Barrier Elevation:	0.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	76.4	76.5	77.0	77.7	79.6	81.4
Distance Attenuation	210.0	-19.8	-19.8	-19.8	-19.8	-19.8	-19.8
Shielding (Barrier Attenuation)	210.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		56.6	56.7	57.2	57.9	59.8	61.6
60 Minute Hourly Adjustment		**56.6**	**56.7**	**57.2**	**57.9**	**59.8**	**61.6**

STATIONARY SOURCE NOISE PREDICTION MODEL

10/1/2019

Observer Location: **R4**
Source: Parking Lot Vehicle Movements
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	176.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	176.0 feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0 feet	*Drop Off Coefficient:*	15.0
Barrier Elevation:	0.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	52.2	49.0	50.0	55.0	61.0	71.9
Distance Attenuation	176.0	-18.7	-18.7	-18.7	-18.7	-18.7	-18.7
Shielding (Barrier Attenuation)	176.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		33.5	30.3	31.3	36.3	42.3	53.2
60 Minute Hourly Adjustment		**33.5**	**30.3**	**31.3**	**36.3**	**42.3**	**53.2**

STATIONARY SOURCE NOISE PREDICTION MODEL

10/1/2019

Observer Location: **R4**
Source: Pressure Washer
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	641.0 feet	***Barrier Height:***	**30.0 feet**
Noise Distance to Barrier:	641.0 feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	0.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	82.4	82.2	82.9	83.7	83.9	84.1
Distance Attenuation	641.0	-36.1	-36.1	-36.1	-36.1	-36.1	-36.1
Shielding (Barrier Attenuation)	641.0	-18.5	-18.5	-18.5	-18.5	-18.5	-18.5
Raw (Distance + Barrier)		27.8	27.6	28.3	29.1	29.3	29.5
60 Minute Hourly Adjustment		**27.8**	**27.6**	**28.3**	**29.1**	**29.3**	**29.5**

STATIONARY SOURCE NOISE PREDICTION MODEL

10/1/2019

Observer Location: **R5**
Source: Roof-Top Air Conditioning Units
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	1,317.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,317.0 feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	30.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	0.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	77.2	74.4	76.1	77.4	77.7	78.2
Distance Attenuation	1,317.0	-48.4	-48.4	-48.4	-48.4	-48.4	-48.4
Shielding (Barrier Attenuation)	1,317.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		28.8	26.0	27.7	29.0	29.3	29.8
60 Minute Hourly Adjustment		**28.8**	**26.0**	**27.7**	**29.0**	**29.3**	**29.8**

STATIONARY SOURCE NOISE PREDICTION MODEL

10/1/2019

Observer Location: **R5**
Source: Gas Station Activity
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	1,152.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,152.0 feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	0.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	68.2	65.6	66.9	69.5	74.4	82.4
Distance Attenuation	1,152.0	-47.2	-47.2	-47.2	-47.2	-47.2	-47.2
Shielding (Barrier Attenuation)	1,152.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		21.0	18.4	19.7	22.3	27.2	35.2
60 Minute Hourly Adjustment		**21.0**	**18.4**	**19.7**	**22.3**	**27.2**	**35.2**

STATIONARY SOURCE NOISE PREDICTION MODEL 10/1/2019

Observer Location: **R5**
Source: RV Parking Lot Activity
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	1,149.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,149.0	feet	*Noise Source Height:*	6.0 feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0	feet	*Drop Off Coefficient:*	15.0
Barrier Elevation:	0.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	76.4	76.5	77.0	77.7	79.6	81.4
Distance Attenuation	1,149.0	-30.9	-30.9	-30.9	-30.9	-30.9	-30.9
Shielding (Barrier Attenuation)	1,149.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		45.5	45.6	46.1	46.8	48.7	50.5
60 Minute Hourly Adjustment		**45.5**	**45.6**	**46.1**	**46.8**	**48.7**	**50.5**

STATIONARY SOURCE NOISE PREDICTION MODEL 10/1/2019

Observer Location: **R5**
Source: Parking Lot Vehicle Movements
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	1,050.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,050.0	feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0	feet	*Drop Off Coefficient:*	15.0
Barrier Elevation:	0.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	52.2	49.0	50.0	55.0	61.0	71.9
Distance Attenuation	1,050.0	-30.3	-30.3	-30.3	-30.3	-30.3	-30.3
Shielding (Barrier Attenuation)	1,050.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		21.9	18.7	19.7	24.7	30.7	41.6
60 Minute Hourly Adjustment		**21.9**	**18.7**	**19.7**	**24.7**	**30.7**	**41.6**

STATIONARY SOURCE NOISE PREDICTION MODEL

10/1/2019

Observer Location: **R5**
Source: Pressure Washer
Condition: Operational

Project Name: Lake Street
Job Number: 12137
Analyst: B. Lawson

NOISE MODEL INPUTS

Noise Distance to Observer	1,565.0	feet	***Barrier Height:***	**30.0 feet**
Noise Distance to Barrier:	1,565.0	feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	0.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	0.0	feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	0.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	10.0	82.4	82.2	82.9	83.7	83.9	84.1
Distance Attenuation	1,565.0	-43.9	-43.9	-43.9	-43.9	-43.9	-43.9
Shielding (Barrier Attenuation)	1,565.0	-18.5	-18.5	-18.5	-18.5	-18.5	-18.5
Raw (Distance + Barrier)		20.0	19.8	20.5	21.3	21.5	21.7
60 Minute Hourly Adjustment		**20.0**	**19.8**	**20.5**	**21.3**	**21.5**	**21.7**

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