Eckhoff Street

NOISE IMPACT ANALYSIS

CITY OF ORANGE

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LIST OF ABBREVIATED TERMS

(1)	Reference
ANSI	American National Standards Institute
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dBA	A-weighted decibels
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
INCE	Institute of Noise Control Engineering
L_{eq}	Equivalent continuous (average) sound level
PPV	Peak Particle Velocity
Project	Eckhoff Street
RMS	Root-mean-square
VdB	Vibration Decibels

EXECUTIVE SUMMARY

Urban Crossroads, Inc. has prepared this noise study to determine the noise exposure and the necessary noise mitigation measures, if any, for the proposed Eckhoff Street development ("Project") located south of Collins Avenue and east of Eckhoff Street in the City of Orange. The Project is to consist of two buildings totaling 292,762 square feet (sf) of warehousing use. This study has been prepared consistent with applicable City of Orange noise standards, and significance criteria based on guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1)

The results of this Eckhoff Street Noise Impact Analysis are summarized below based on the significance criteria in Section 4 of this report consistent with Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1). Table ES-1 shows the findings of significance for each potential noise and/or vibration impact under CEQA before and after any required mitigation measures described below.

OFF-SITE TRAFFIC NOISE IMPACTS

Traffic generated by the operation of the proposed Project is not expected to meaningfully influence the traffic noise levels on nearby roadway segments or land uses surrounding the off-site areas. The expected Project traffic represents an incremental increase to the existing roadway volumes is not expected to generate a barely perceptible noise level increase of 3 dBA CNEL at nearby sensitive land uses adjacent to study area roadways, since a doubling of the existing traffic volumes would be required to generate a 3 dBA CNEL increase. (2) Due to the low traffic volumes generated by the Project, the off-site traffic noise levels generated by the Project are considered less than significant and no further analysis is required.

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS

Analysis	Report Section	Significance Findings	
		Unmitigated	Mitigated
Off-Site Traffic	ES	*Less Than Significant*	-
Operational Noise	7	*Less Than Significant*	-
Construction Noise	8	*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 Eckhoff Street ("Project"). This noise study briefly describes the proposed Project, provides information regarding noise fundamentals, sets out the local regulatory setting, presents the study methods and procedures for noise and vibration analysis, and evaluates the future exterior noise environment.

1.1 SITE LOCATION

The proposed Project is located south of West Collins Avenue and east of North Eckhoff Street at 759 North Eckhoff Street in the City of Orange, as shown on Exhibit 1-A. The State Route 57 (SR-57) freeway is located approximately 0.50 mile west of the Project site boundary.

The Project is located adjacent to existing industrial uses to the north, south, and east, and the Orange County Department of Education/Foster building west of the Project site. The Orange County Children and Family Services to the west and the Orangeland RV Park to the north representing the nearest noise sensitive residential use to the Project site.

1.2 PROJECT DESCRIPTION

The proposed Project is to consist of two buildings totaling 292,762 square feet of warehousing use, as shown on Exhibit 1-B. The on-site Project-related noise sources are expected to include: loading dock activity, roof-top air conditioning units, trash enclosure activity, parking lot vehicle movements, and truck movements. This noise analysis is intended to describe the noise level impacts associated with the expected typical operational activities at the Project site. This report assumes the Project will operate 24-hours daily for seven days per week.

EXHIBIT 1-A: LOCATION MAP

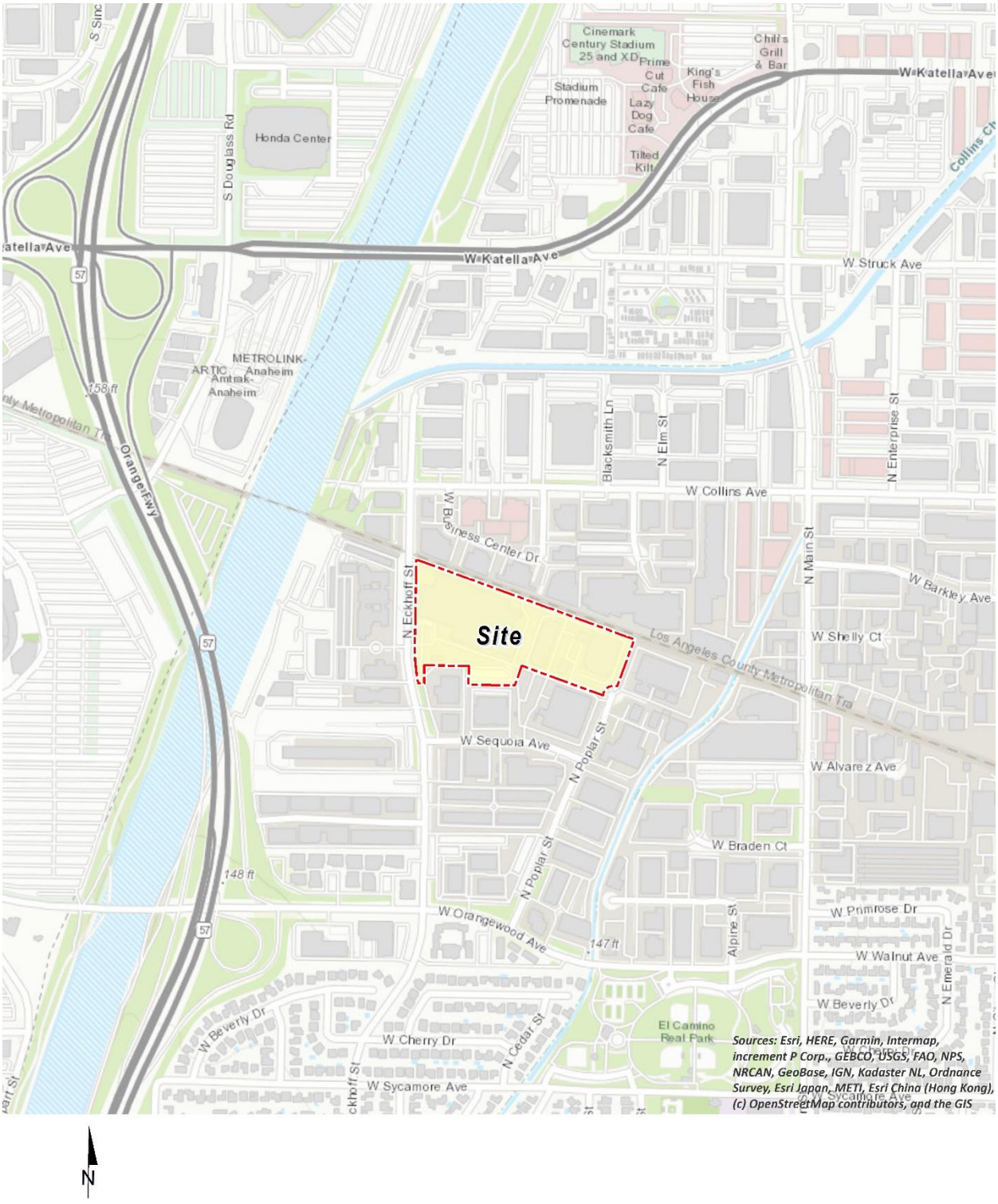
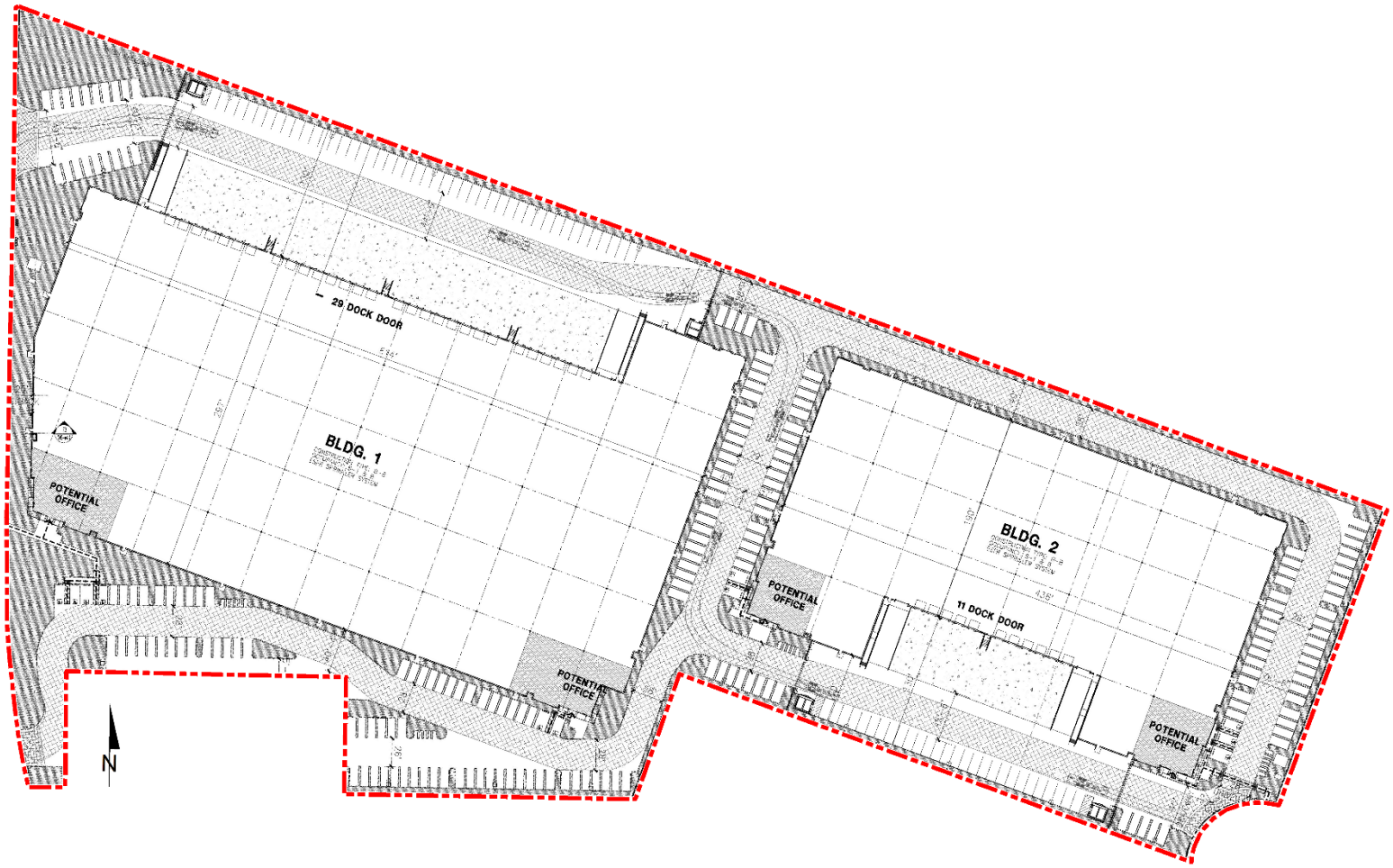


EXHIBIT 1-B: SITE PLAN



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2 FUNDAMENTALS

Noise is 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. (3) 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. (4) 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 (L_{eq}). 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 (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period (typically one hour) 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 L_{eq} sound levels in the evening from 7:00 p.m. to 10:00 p.m., and the addition of 10 decibels to dBA L_{eq} 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 Orange 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. (3)

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. (2)

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. (3)

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 residents. 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 Federal Highway Administration (FHWA) does not consider the planting of vegetation to be a noise abatement measure. (2)

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 up to 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. (2)

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. (5)

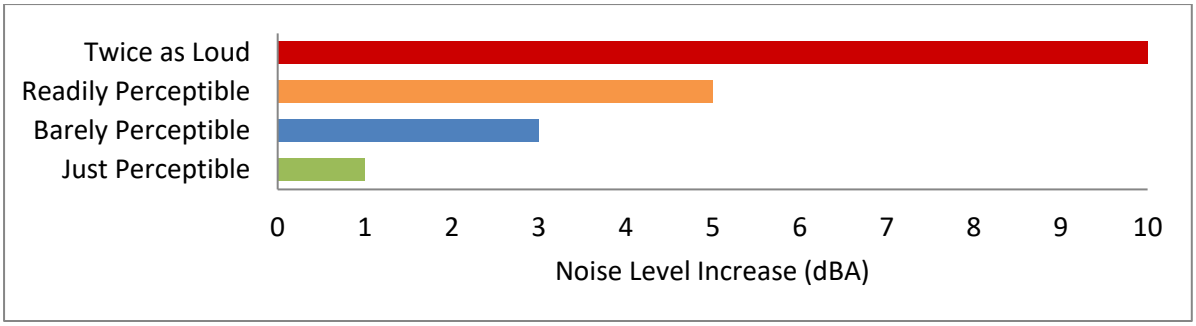
2.7 COMMUNITY RESPONSE TO NOISE

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. 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. (6) 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. (6) 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. A change of 3 dBA are considered *barely perceptible*, and changes of 5 dBA are considered *readily perceptible*. (2)

EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION



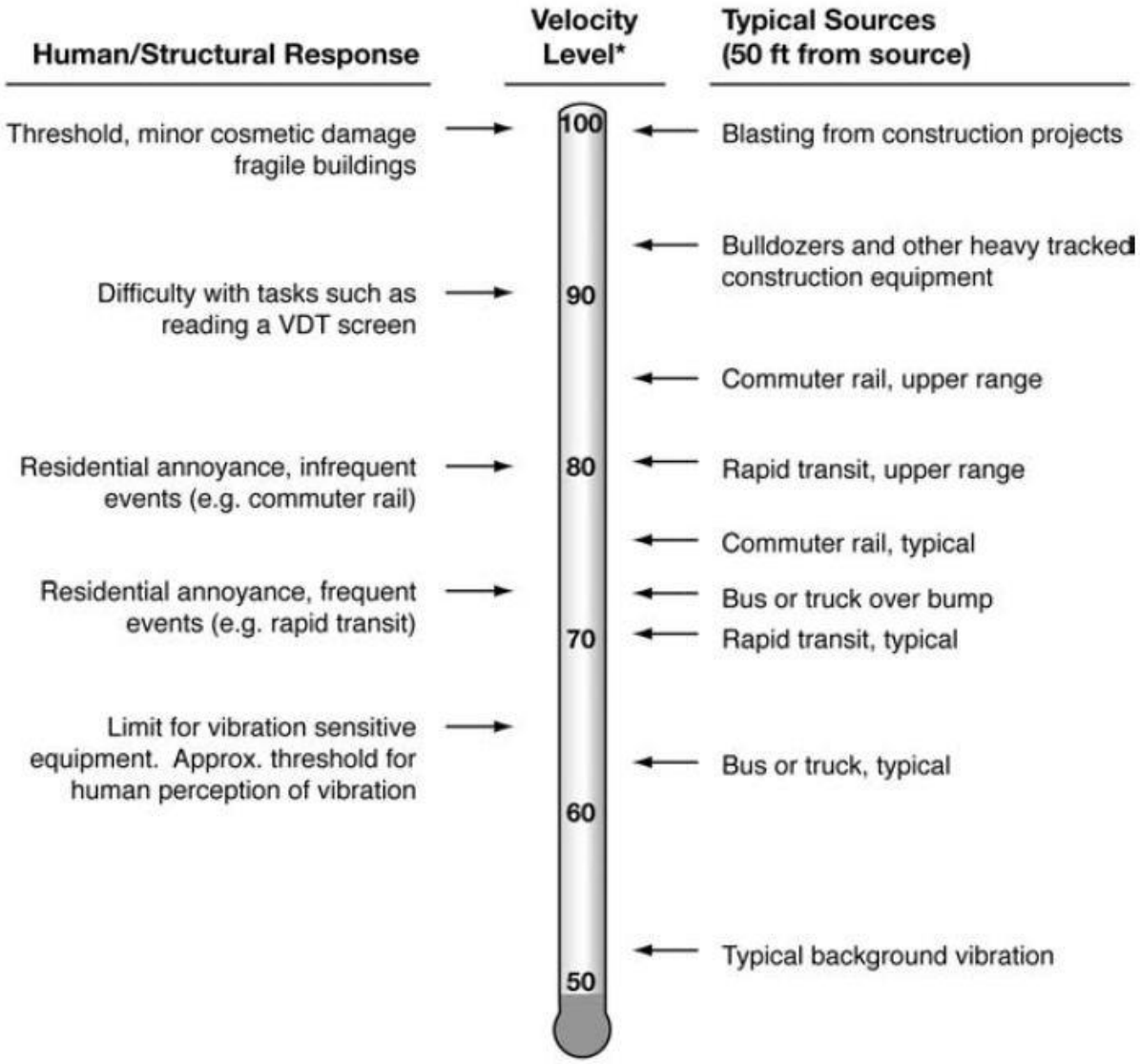
2.8 VIBRATION

Per the Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual* (7), 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 and/or activities

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 and Vibration Impact Assessment Manual.

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 (OPR). (8) 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 CITY OF ORANGE GENERAL PLAN NOISE ELEMENT

The City of Orange has adopted a Noise Element of the General Plan to control and abate environmental noise, and to protect the citizens of the City of Orange from excessive exposure to noise. (9) The Noise Element specifies the maximum allowable exterior noise levels for new developments impacted by transportation noise sources such as arterial roads, freeways, airports and railroads. In addition, the Noise Element identifies several polices to minimize the impacts of excessive noise levels throughout the community and establishes noise level requirements for all land uses. To protect City of Orange residents from excessive noise, the Noise Element contains the following policies related to the Project:

Policy 1.1: Consider potential excessive noise levels when making land use planning decisions.

Policy 1.2: Encourage new development projects to provide sufficient spatial buffers to separate excessive noise generating land uses and noise-sensitive land uses.

Policy 1.4: Ensure that acceptable noise levels are maintained near noise-sensitive uses.

Policy 1.5: Reduce impacts of high-noise activity centers located near residential areas.

Policy 6.1: Encourage the design and construction of industrial uses to minimize excessive noise through project design features that include noise control.

Policy 6.2: Encourage industrial uses to locate vehicular traffic and operations away from abutting residential zones as much as possible.

Policy 7.2: Require developers and contractors to employ noise minimizing techniques during construction and maintenance operations.

Policy 7.3: Limit the hours of construction and maintenance operations located adjacent to noise-sensitive land uses.

To ensure noise-sensitive land uses are protected from high levels of noise the City of Orange has developed its own land use compatibility standards, based on recommended parameters from the Governor's Office of Planning and Research (OPR) (8). The City's Land Use Compatibility standards use the CNEL noise descriptor, are intended to be applicable for land use designations exposed to noise levels generated by transportation related sources. Land use compatibility noise exposure limits are generally established as 65 dBA CNEL for most land use designations throughout the City. Higher exterior noise levels are permitted for multiple-family housing and housing in mixed-use contexts than for single-family houses. This is because multiple-family complexes are generally located in transitional areas between single-family and commercial districts or in proximity to major arterials served by transit, and a more integrated mix of residential and commercial activity (accompanied by higher noise levels) is often desired in mixed-use areas close to transit routes.

3.3 CITY OF ORANGE MUNICIPAL CODE STANDARDS

To analyze noise impacts originating from a designated fixed location or private property such as the Eckhoff Street Project, stationary-source (operational) noise levels and noise from construction activities are typically evaluated against standards established under the City's Municipal Code.

3.3.1 OPERATIONAL NOISE STANDARDS

For noise-sensitive residential property, the City of Orange Municipal Code, Section 8.24.040, identifies exterior noise levels standards of 55 dBA L_{eq} for the daytime hours (7:00 a.m. to 10:00 p.m.) and 50 dBA L_{eq} during the nighttime (10:00 p.m. to 7:00 a.m.) hours. The City of Orange Municipal Code Noise Standards are included in Appendix 3.1. Per Section 8.24.040(B) for multi-family residential or mixed-use developments located within the City's Urban Mixed Use, Neighborhood Mixed Use, Old Towne Mixed Use or Medium Density Residential General Plan land use districts, exterior noise standards shall apply to common recreation areas only and shall not apply to private exterior space (such as a private yard, patio, or balcony).

3.3.2 CONSTRUCTION NOISE STANDARDS

The City of Orange has set restrictions to control noise impacts associated with the construction of the proposed Project. Section 8.24.50(E) of the City's Municipal Code states: *Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities take place between the hours of 7:00 a.m. and 8:00 p.m. on any day except for Sunday or a Federal holiday, or between the hours of 9:00 a.m. and 8:00 p.m. on Sunday or a Federal holiday.* Neither the City's General Plan nor Municipal Code establish numeric maximum acceptable construction source noise levels at potentially affected receivers, which would allow for a quantified determination of what CEQA constitutes a *substantial temporary or periodic noise increase*. Therefore, a numerical construction threshold based on Federal Transit

Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual* is used for analysis of daytime construction impacts, as discussed below.

According to the FTA, local noise ordinances are typically not very useful in evaluating construction noise. They usually relate to nuisance and hours of allowed activity, and sometimes specify limits in terms of maximum levels, but are generally not practical for assessing the impact of a construction project. Project construction noise criteria should account for the existing noise environment, the absolute noise levels during construction activities, the duration of the construction, and the adjacent land use. Due to the lack of standardized construction noise thresholds, the FTA provides guidelines that can be considered reasonable criteria for construction noise assessment. The FTA considers a daytime exterior construction noise level of 80 dBA L_{eq} as a reasonable threshold for noise sensitive residential land use. (7 p. 179)

3.5 VIBRATION STANDARDS

Construction activity can result in varying degrees of ground-borne vibration, depending on the equipment and methods used, distance to the affected structures and soil type. Construction vibration is generally associated with pile driving and rock blasting. Other construction equipment such as air compressors, light trucks, hydraulic loaders, etc., generates little or no ground vibration. (7)

To analyze vibration impacts originating from the operation and construction of the Eckhoff Street, vibration-generating activities are appropriately evaluated against standards established under a City's Municipal Code, if such standards exist. However, the City of Orange does not identify specific vibration level limits. Therefore, for analysis purposes, the Caltrans *Transportation and Construction Vibration Guidance Manual*, (10 p. 38) Table 19, vibration damage are used in this noise study to assess potential temporary construction-related impacts at adjacent building locations. The construction vibration damage potential criteria include consideration of the building conditions. (4 p. 182) Table 3-1 describes the maximum acceptable transient and continuous vibration building damage potential levels by structure type and condition. The nearest noise sensitive buildings adjacent to the Project site can best be described as "older residential structures" with a maximum acceptable continuous vibration threshold of 0.3 PPV (in/sec).

TABLE 3-1: BUILDING DAMAGE VIBRATION CRITERIA

Structure and Condition	Maximum Transient Vibration Levels PPV (in/sec)	Maximum Continuous Vibration Levels PPV (in/sec)
Extremely fragile historic buildings	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Caltrans Transportation and Construction Vibration Guidance Manual, April 2020, Tables 19, p. 38.

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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 Orange 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.

4.1 CEQA GUIDELINES NOT FURTHER ANALYZED

The Project site is not located within two miles of a public airport or within an airport land use plan. The closest airport is the Fullerton Municipal Airport located approximately 7.8 miles northwest of the Project site. As such, the Project site would not be exposed to excessive noise levels from airport operations, and therefore, impacts are considered *less than significant,* and no further noise analysis is conducted in relation to Guideline C.

4.2 INCREMENTAL NOISE LEVEL INCREASES

Noise level increases resulting from the Project are evaluated based on the Appendix G CEQA Guidelines described above at the closest 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. (11)

There is no completely satisfactory way to measure the subjective effects of noise or of the corresponding human reactions of annoyance and dissatisfaction, primarily because of the wide variation in individual thresholds of annoyance and differing individual experiences with noise. Thus, an effective 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.

To describe the amount to which a given noise level increase is considered acceptable, the City Orange General Plan has adopted criteria for determining appropriate mitigation under the California Environmental Quality Act (CEQA). An increase in ambient noise levels is assumed to be a significant noise impact if a project causes ambient noise levels to exceed the following:

- Where the existing ambient noise level is less than 65 dBA, a project related permanent increase in ambient noise levels of 5 dBA CNEL or greater.
- Where the existing ambient noise level is greater than 65 dBA, a project related permanent increase in ambient noise levels of 3 dBA CNEL or greater.

4.3 SIGNIFICANCE CRITERIA

Noise impacts shall be considered significant if any of the following occur as a direct result of the proposed development. Table 4-1 shows the significance criteria summary matrix.

TABLE 4-1: SIGNIFICANCE CRITERIA SUMMARY

Analysis	Condition(s)	Significance Criteria	
		Daytime	Nighttime
Operational	Exterior Noise Level Standards[1]	55 dBA L_{eq}	50 dBA L_{eq}
	If ambient is < 65 dBA L_{eq}[2]	≥ 5 dBA L_{eq} Project increase	
	If ambient is > 65 dBA L_{eq}[2]	≥ 3 dBA L_{eq} Project increase	
Construction	Permitted between 7:00 a.m. and 8:00 p.m. on any day except for Sunday or a Federal holiday[3]		
	Noise Level Threshold[4]	80 dBA L_{eq}	
	Vibration Level Threshold[5]	0.3 PPV (in/sec)	

[1] City of Orange General Plan Noise Element, Table N-4.
[2] City Orange General Plan Noise Element, Table N-3.
[3] City Orange Municipal Code Section 8.24.50(E).
[4] Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual.
[5] Caltrans Transportation and Construction Vibration Manual, April 2020 Table 19.
"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, 24-hour noise level measurements were taken at four 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 Wednesday, March 31st, 2021. Appendix 5.1 includes study area photos.

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. (12)

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 every 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*. (3) 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*. (7)

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. (7) 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.

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

Location[1]	Description	Energy Average Noise Level (dBA L_{eq})[2]		CNEL
		Daytime	Nighttime	
L1	Located north of the Project site south of Struck Avenue and on the western boundary of the Orangeland RV Park.	55.2	54.4	61.2
L2	Located southeast of the Project site on Alvarez near the Elevate Ministries Church.	59.3	55.5	63.0
L3	Located south of the Project site near the Azusa Pacific University.	55.3	55.5	62.2
L4	Located west of the Project site on Eckhoff Street near the Orange County Children and Family Services.	61.7	61.5	68.1

[1] See Exhibit 5-A for the noise level measurement locations.
[2] Energy (logarithmic) average levels. The long-term 24-hour measurement worksheets 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.

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.

EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS

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6 RECEIVER LOCATIONS

To assess the potential for long-term operational and short-term construction noise impacts, the following receiver locations, as shown on Exhibit 6-A, were identified as representative locations for 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.

To describe the potential off-site Project noise levels, four receiver locations in the vicinity of the Project site were identified. All distances are measured from the Project site boundary to the outdoor living areas (e.g., private backyards) or at the building façade, whichever is closer to the Project site. The selection of receiver locations is based on FHWA guidelines and is consistent with additional guidance provided by Caltrans and the FTA, as previously described in Section 5.2. 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. Distance is measured in a straight line from the project boundary to each receiver location.

R1: Location R1 represents the Orangeland RV Park. at 1600 W Struck Avenue, approximately 1,470 feet north of the Project site. Since there are no private outdoor living areas (backyards) facing the Project site, receiver R1 is placed at the closest RV. A 24-hour noise measurement was taken near this location, L1, to describe the existing ambient noise environment.

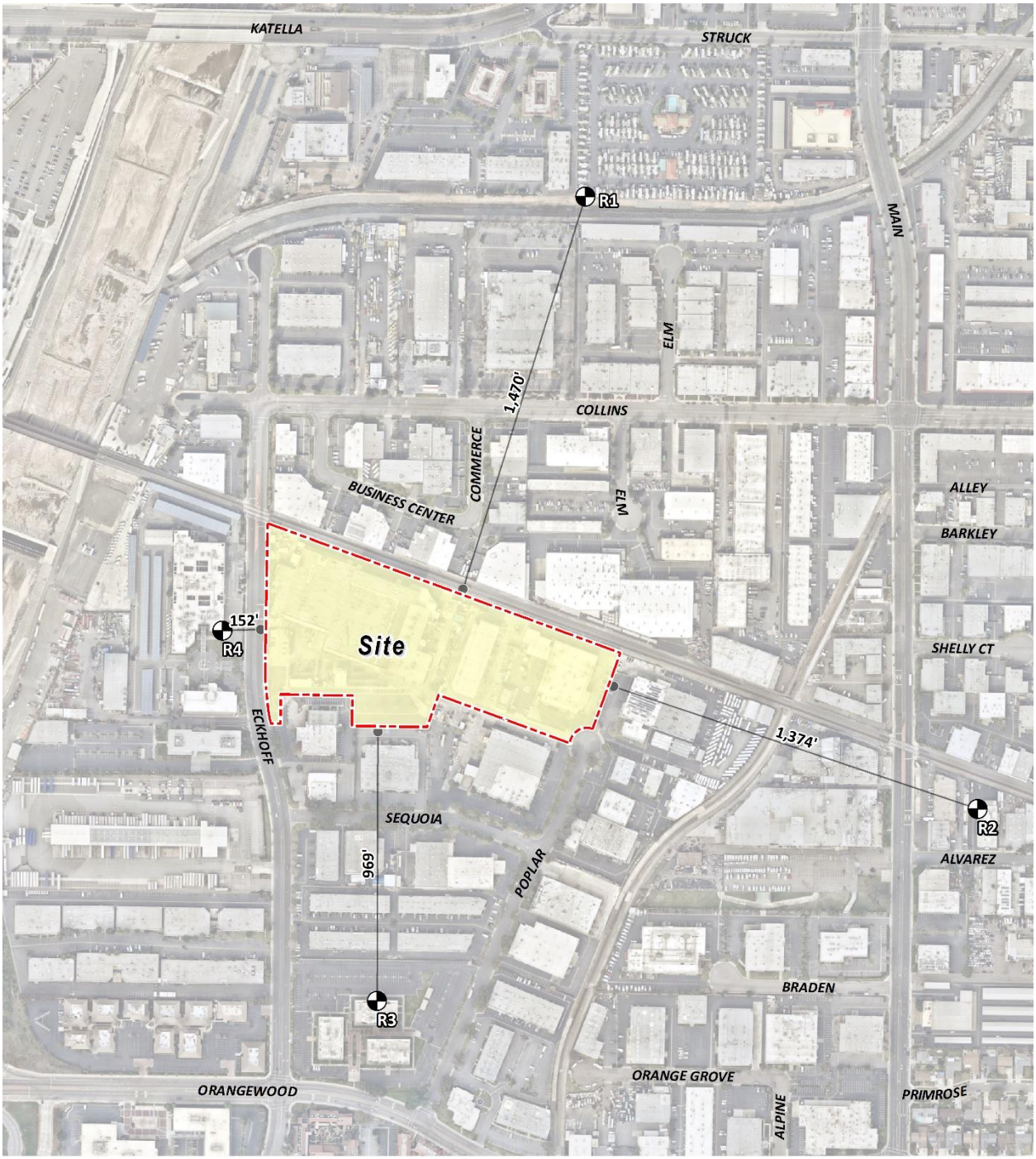
R2: Location R2 represents the Elevate Ministries church at 1200 W Alvarez Avenue, approximately 1,374 feet southeast of the Project site. Since there are no private outdoor areas facing the Project site, receiver R2 is placed at the building façade. A 24-hour noise measurement was taken near this location, L2, to describe the existing ambient noise environment.

R3: Location R3 represents the existing Azusa Pacific University-Orange County Regional Campus at 1915 W Orangewood Avenue, approximately 969 feet south of the Project site. Since there are no private outdoor areas facing the Project site, receiver R3 is placed at the building façade. A 24-hour noise measurement was taken near this location, L3, to describe the existing ambient noise environment.

R4: Location R4 represents Orange County Children and Family Services at 800 N Eckhoff Street, approximately 152 feet west of the Project site. Since there are no private outdoor areas (backyards) facing the Project site, receiver R4 is placed at the building façade. A

24-hour noise measurement near this location, L4, is used to describe the existing ambient noise environment.

EXHIBIT 6-A: RECEIVER LOCATIONS



7 OPERATIONAL NOISE ANALYSIS

This section analyzes the potential stationary-source operational noise impacts at the nearby receiver locations, identified in Section 6, resulting from the operation of the proposed Eckhoff Street Project. Exhibit 7-A identifies the noise source locations used to assess the operational noise levels.

7.1 OPERATIONAL NOISE SOURCES

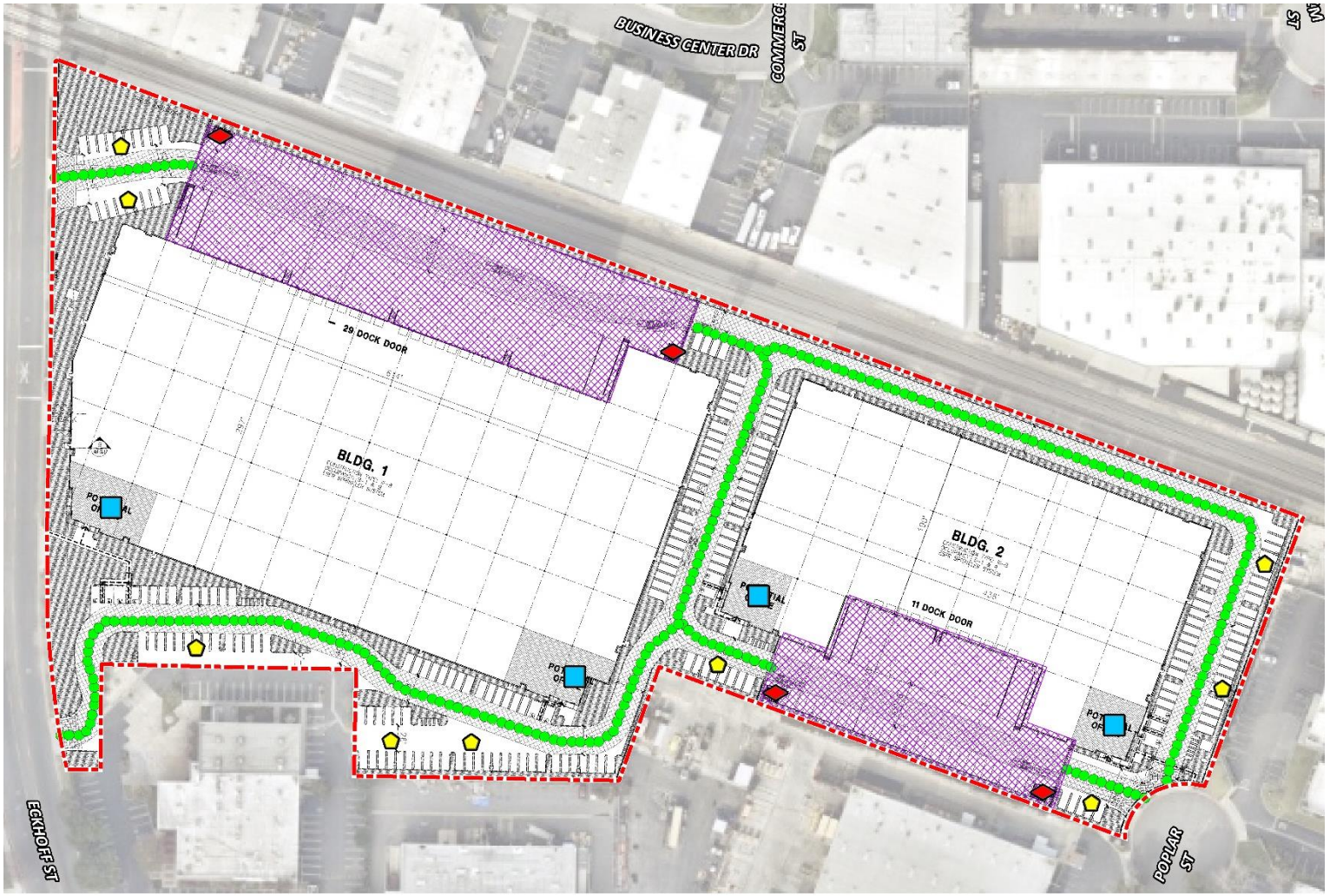
This operational noise analysis is intended to describe noise level impacts associated with the expected typical of daytime and nighttime activities at the Project site. To present the potential worst-case noise conditions, this analysis assumes the Project would be operational 24 hours per day, seven days per week. Consistent with similar warehouse uses, the Project business operations would primarily be conducted within the enclosed buildings, except for traffic movement, parking, as well as loading and unloading of trucks at designated loading bays. The on-site Project-related noise sources are expected to include: loading dock activity, roof-top air conditioning units, trash enclosure activity, parking lot vehicle movements, and truck movements.

7.2 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. While sound pressure levels (e.g., L_{eq}) quantify in decibels the intensity of given sound sources at a reference distance, sound power levels (L_w) are connected to the sound source and are independent of distance. Sound pressure levels vary substantially with distance from the source and diminish because of intervening obstacles and barriers, air absorption, wind, and other factors. Sound power is the acoustical energy emitted by the sound source and is an absolute value that is not affected by the environment. The reference project operational noise levels are based on the Project related noise sources shown on Exhibit 7-A. The reference project operational sound power levels are summarized below:

- Loading Activity: 112 dBA L_w based on reference noise level measurements collected by Urban Crossroads, Inc. This includes truck idling, reefers, deliveries, backup alarms, unloading/loading, docking including a combination of tractor trailer semi-trucks, two-axle delivery trucks, and background forklift operations.
- A/C Condenser Units: Represents a Lennox SCA120 series 10-ton model packaged air conditioning unit with a reference sound power level of 89 dBA L_w.
- Parking Lot Vehicle Movements: 79 dBA L_w based on reference noise level measurements describing warehouse parking lot vehicle activity collected by Urban Crossroads, Inc.
- Trash Enclosure Activity: 89 dBA L_w based on reference noise level measurements describing trash enclosure event activity collected by Urban Crossroads, Inc.
- Truck Movements: 93 dBA L_w based on reference noise level measurements describing truck movements collected by Urban Crossroads, Inc. This includes trucks entering and existing the Project driveways and maneuvering in and out of the outdoor loading dock activity area.

EXHIBIT 7-A: OPERATIONAL NOISE SOURCE LOCATIONS



7.3 CADNAA NOISE PREDICTION MODEL

To fully describe the exterior operational noise levels from the Project, Urban Crossroads, Inc. developed a noise prediction model using the CadnaA (Computer Aided Noise Abatement) computer program. CadnaA can analyze multiple types of noise sources using the spatially accurate Project site plan, georeferenced Nearmap aerial imagery, topography, buildings, and barriers in its calculations to predict outdoor noise levels.

Using the ISO 9613 protocol, CadnaA will calculate the distance from each noise source to the noise receiver locations, using the ground absorption, distance, and barrier/building attenuation inputs to provide a summary of noise level at each receiver and the partial noise level contributions by noise source. Consistent with the ISO 9613 protocol, the CadnaA noise prediction model relies on the reference sound power level (L_w) to describe individual noise sources. While sound pressure levels (e.g., L_{eq}) quantify in decibels the intensity of given sound sources at a reference distance, sound power levels (L_w) are connected to the sound source and are independent of distance. Sound pressure levels vary substantially with distance from the source and diminish because of intervening obstacles and barriers, air absorption, wind, and other factors. Sound power is the acoustical energy emitted by the sound source and is an absolute value that is not affected by the environment.

The operational noise level calculations provided in this noise study 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. A default ground attenuation factor of 0.5 was used in the noise analysis to account for mixed ground representing a combination of hard and soft surfaces. Appendix 7.1 includes the detailed noise model inputs used to estimate the Project operational noise levels presented in this section including the proposed noise barriers.

7.4 PROJECT OPERATIONAL NOISE LEVELS

Using the reference noise levels to represent the proposed Project operations that include loading dock activity, roof-top air conditioning units, trash enclosure activity, parking lot vehicle movements, and truck movements, Urban Crossroads, Inc. calculated the operational source noise levels that are expected to be generated at the Project site and the Project-related noise level increases that would be experienced at each of the sensitive receiver locations. Table 7-1 shows the Project operational noise levels during the daytime hours of 7:00 a.m. to 10:00 p.m. The daytime hourly noise levels at the off-site receiver locations are expected to range from 43.6 to 49.3 dBA L_{eq}.

TABLE 7-1: DAYTIME PROJECT OPERATIONAL NOISE LEVELS

Noise Source[1]	Operational Noise Levels by Receiver Location (dBA Leq)			
	R1	R2	R3	R4
Loading Dock Activity	46.4	43.2	49.1	38.3
Roof-Top Air Conditioning Units	21.6	24.8	30.3	34.3
Parking Lot Vehicle Movements	17.9	19.8	23.5	31.2
Trash Enclosure Activity	17.8	17.6	20.7	20.9
Truck Movements	31.7	31.6	35.1	42.4
Total (All Noise Sources)	**46.6**	**43.6**	**49.3**	**44.5**

[1] See Exhibit 7-A for the noise source locations. CadnaA noise model calculations are included in Appendix 7.1.

Tables 7-2 shows the Project operational noise levels during the nighttime hours of 10:00 p.m. to 7:00 a.m. The nighttime hourly noise levels at the off-site receiver locations are expected to range from 43.5 to 49.3 dBA L_{eq}. The differences between the daytime and nighttime noise levels are largely related to the estimated duration of noise activity as outlined in Appendix 7.1.

TABLE 7-2: NIGHTTIME PROJECT OPERATIONAL NOISE LEVELS

Noise Source[1]	Operational Noise Levels by Receiver Location (dBA Leq)			
	R1	R2	R3	R4
Loading Dock Activity	46.4	43.2	49.1	38.3
Roof-Top Air Conditioning Units	19.2	22.4	27.9	31.9
Parking Lot Vehicle Movements	16.9	18.8	22.5	30.3
Trash Enclosure Activity	16.8	16.6	19.8	20.0
Truck Movements	31.7	31.6	35.1	42.4
Total (All Noise Sources)	**46.6**	**43.5**	**49.3**	**44.3**

[1] See Exhibit 7-A for the noise source locations. CadnaA noise model calculations are included in Appendix 7.1.

7.5 PROJECT OPERATIONAL NOISE LEVEL COMPLIANCE

To demonstrate compliance with local noise regulations, the Project-only operational noise levels are evaluated against exterior noise level thresholds based on the City of Orange exterior noise level standards at nearby noise-sensitive receiver locations. Table 7-5 shows the operational noise levels associated with Eckhoff Street Project will satisfy the City of Orange daytime and nighttime exterior noise level standards. Therefore, the operational noise impacts are considered *less than significant* at the nearby noise-sensitive receiver locations.

TABLE 7-3: OPERATIONAL NOISE LEVEL COMPLIANCE

Receiver Location[1]	Project Operational Noise Levels (dBA Leq)[2]		Noise Level Standards (dBA Leq)[3]		Noise Level Standards Exceeded?[4]	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
R1	46.6	46.6	55	50	No	No
R2	43.6	43.5	55	50	No	No
R3	49.3	49.3	55	50	No	No
R4	44.5	44.3	55	50	No	No

[1] See Exhibit 6-A for the receiver locations.
[2] Proposed Project operational noise levels as shown on Tables 7-1 and 7-2.
[3] Exterior noise level standards, as shown on Table 4-1.
[4] Do the estimated Project operational noise source activities exceed the noise level standards?
"Daytime" = 7:00 a.m. - 10:00 p.m.; "Nighttime" = 10:00 p.m. - 7:00 a.m.

7.5 PROJECT OPERATIONAL NOISE LEVEL INCREASES

To describe the Project operational noise level increases, the Project operational noise levels are combined with the existing ambient noise levels measurements for the nearby 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. (3) 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 describes the Project noise level increases to the existing ambient noise environment. Noise levels that would be experienced at receiver locations when Project-source noise is added to the daytime and nighttime ambient conditions are presented on Tables 7-4 and 7-5, respectively. As indicated on Tables 7-4 and 7-5, the Project will generate a daytime and nighttime operational noise level increases ranging from 0.0 to 1.0 dBA L_{eq} at the nearest receiver locations. Project-related operational noise level increases will satisfy the operational noise level increase significance criteria presented in Table 4-1, the increases at the sensitive receiver locations will be *less than significant.*

TABLE 7-4: DAYTIME PROJECT OPERATIONAL NOISE LEVEL INCREASES

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Increase[6]	Increase Criteria[7]	Increase Criteria Exceeded?
R1	46.6	L1	55.2	55.8	0.6	5.0	No
R2	43.6	L2	59.3	59.4	0.1	5.0	No
R3	49.3	L3	55.3	56.3	1.0	5.0	No
R4	44.5	L4	61.7	61.8	0.1	5.0	No

[1] See Exhibit 6-A for the receiver locations.
[2] Total Project daytime operational noise levels as shown on Table 7-1.
[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] Significance increase criteria as shown on Table 4-1.

TABLE 7-5: NIGHTTIME OPERATIONAL NOISE LEVEL INCREASES

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Increase[6]	Increase Criteria[7]	Increase Criteria Exceeded?
R1	46.6	L1	54.4	55.1	0.7	5.0	No
R2	43.5	L2	55.5	55.8	0.3	5.0	No
R3	49.3	L3	55.5	56.4	0.9	5.0	No
R4	44.3	L4	61.5	61.6	0.1	5.0	No

[1] See Exhibit 6-A for the receiver locations.
[2] Total Project nighttime operational noise levels as shown on Table 7-2.
[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] Significance increase criteria as shown on Table 4-1.

8 CONSTRUCTION ANALYSIS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project. Exhibit 8-A shows the construction noise source locations in relation to the nearest sensitive receiver locations previously described in Section 6.

8.1 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 are expected to occur in the following stages:

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

8.2 TYPICAL CONSTRUCTION REFERENCE NOISE LEVELS

To describe peak construction noise activities, this construction noise analysis was prepared using reference noise level measurements published in the *Update of Noise Database for Prediction of Noise on Construction and Open Sites* by the Department for Environment, Food and Rural Affairs (DEFRA). (13). The DEFRA database provides the most recent and comprehensive source of reference construction noise levels. Table 8-1 provides a summary of the DEFRA construction reference noise level measurements expressed in hourly average dBA L_{eq} using the estimated FHWA Roadway Construction Noise Model (RCNM) usage factors (14) to describe the typical construction activities for each stage of Project construction.

EXHIBIT 8-A: CONSTRUCTION NOISE SOURCE AND RECEIVER LOCATIONS

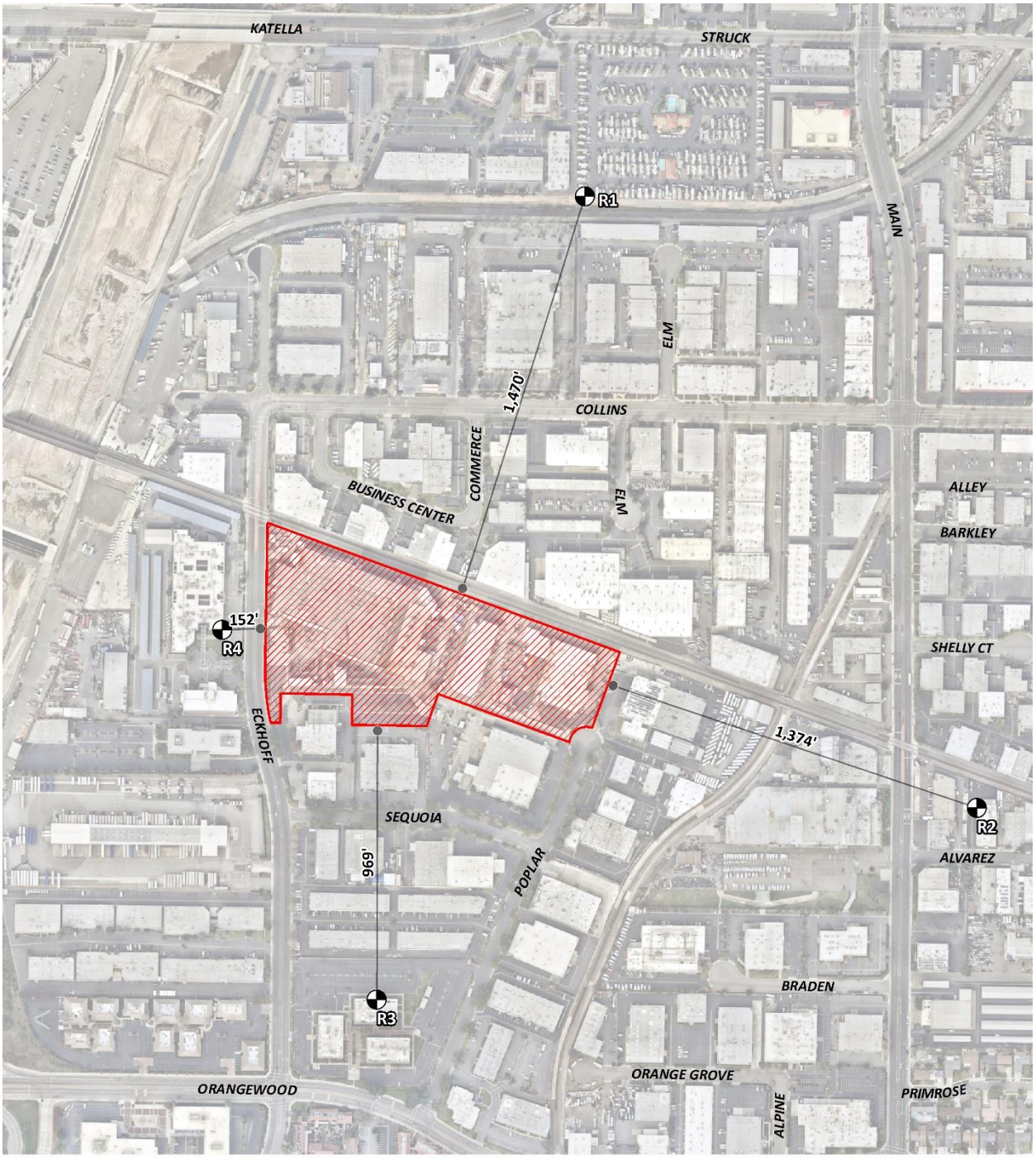


TABLE 8-1: CONSTRUCTION REFERENCE NOISE LEVELS

Construction Stage	Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})	Highest Reference Noise Level (dBA L_{eq})
Demolition	Demolition Equipment	69	71
	Excavators	64	
	Rubber Tired Dozers	71	
Site Preparation	Crawler Tractors	77	77
	Hauling Trucks	71	
	Rubber Tired Dozers	71	
Grading	Graders	79	79
	Excavators	64	
	Compactors	67	
Building Construction	Cranes	67	72
	Tractors	72	
	Welders	65	
Paving	Pavers	70	70
	Paving Equipment	69	
	Rollers	69	
Architectural Coating	Cranes	67	67
	Air Compressors	67	
	Generator Sets	67	

[1] Update of Noise Database for Prediction of Noise on Construction and Open Sites by the Department for Environment, Food and Rural Affairs (DEFRA) expressed in hourly average Leq based on estimated usage factors from the FHWA Roadway Construction Noise Model (RCNM).

8.3 CONSTRUCTION NOISE ANALYSIS

Using the reference construction equipment noise levels and the CadnaA noise prediction model, calculations of the Project construction noise level impacts at the nearest sensitive receiver locations were completed. To assess the worst-case construction noise levels, the Project construction noise analysis relies on the highest noise level impacts when the equipment with the highest reference noise level is operating at the closest point from the edge of primary construction activity (Project site boundary) to each receiver location. As shown on Table 8-2, the construction noise levels are expected to range from 46.2 to 70.8 dBA L_{eq}, and the highest construction levels are expected to range from 58.2 to 70.8 dBA L_{eq} at the nearest receiver locations. Appendix 8.1 includes the detailed CadnaA construction noise model inputs.

TABLE 8-2: TYPICAL CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Receiver Location[1]	Construction Noise Levels (dBA L_{eq})						
	Demolition	Site Preparation	Grading	Building Construction	Paving	Architectural Coating	Highest Levels[2]
R1	51.6	57.6	59.6	52.6	50.6	47.6	59.6
R2	50.2	56.2	58.2	51.2	49.2	46.2	58.2
R3	54.2	60.2	62.2	55.2	53.2	50.2	62.2
R4	62.8	68.8	70.8	63.8	61.8	58.8	70.8

[1] Construction noise source and receiver locations are shown on Exhibit 8-A.
[2] Construction noise level calculations based on distance from the project site boundaries (construction activity area) to nearby receiver locations. CadnaA construction noise model inputs are included in Appendix 8.1.

8.4 CONSTRUCTION NOISE LEVEL COMPLIANCE

To evaluate whether the Project will generate potentially significant short-term noise levels at nearest receiver locations, a construction-related daytime noise level threshold of 80 dBA L_{eq} is used as a reasonable threshold to assess the daytime construction noise level impacts. The construction noise analysis shows that the nearest receiver locations will satisfy the reasonable daytime 80 dBA L_{eq} significance threshold during Project construction activities as shown on Table 8-3. Therefore, the noise impacts due to Project construction noise is considered *less than significant* at all receiver locations.

TABLE 8-3: TYPICAL CONSTRUCTION NOISE LEVEL COMPLIANCE

Receiver Location[1]	Construction Noise Levels (dBA L_{eq})		
	Highest Construction Noise Levels[2]	Threshold[3]	Threshold Exceeded?[4]
R1	59.6	80	No
R2	58.2	80	No
R3	62.2	80	No
R4	70.8	80	No

[1] Noise receiver locations are shown on Exhibit 8-A.
[2] Highest construction noise level operating at the Project site boundary to nearby receiver locations (Table 8-2).
[3] Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual.
[4] Do the estimated Project construction noise levels exceed the construction noise level threshold?

8.5 CONSTRUCTION VIBRATION ANALYSIS

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods employed. Operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Ground vibration levels associated with various types of construction equipment are summarized on Table 8-4. Based on the representative vibration levels presented for various construction equipment types, it is possible to estimate the potential for human response (annoyance) and building damage using the following vibration assessment methods defined by the FTA. To

describe the vibration impacts the FTA provides the following equation: $PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$

TABLE 8-4: 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

Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual

Table 8-5 presents the expected Project related vibration levels at the nearby receiver locations. At distances ranging from 152 to 1,470 feet from Project construction activities, construction vibration velocity levels are estimated to range from 0.000 to 0.006 in/sec PPV. Based on maximum acceptable continuous vibration threshold of 0.3 PPV (in/sec), the typical Project construction vibration levels will satisfy the building damage thresholds at all the noise sensitive receiver locations. In addition, the typical construction vibration levels at the nearest sensitive receiver locations are unlikely to be sustained during the entire construction period but will occur rather only during the times that heavy construction equipment is operating adjacent to the Project site boundaries.

TABLE 8-5: CONSTRUCTION EQUIPMENT VIBRATION LEVELS

Receiver[1]	Distance to Const. Activity (Feet)[2]	Typical Construction Vibration Levels PPV (in/sec)[3]					Thresholds PPV (in/sec)[4]	Thresholds Exceeded?[5]
		Small bulldozer	Jackhammer	Loaded Trucks	Large bulldozer	Highest Vibration Level		
R1	1,470'	0.000	0.000	0.000	0.000	0.000	0.3	No
R2	1,374'	0.000	0.000	0.000	0.000	0.000	0.3	No
R3	969'	0.000	0.000	0.000	0.000	0.000	0.3	No
R4	152'	0.000	0.002	0.005	0.006	0.006	0.3	No

[1] Receiver locations are shown on Exhibit 8-A.
[2] Distance from receiver location to Project construction boundary (Project site boundary).
[3] Based on the Vibration Source Levels of Construction Equipment (Table 8-4).
[4] Caltrans Transportation and Construction Vibration Guidance Manual, April 2020, Tables 19, p. 38.
[5] Does the peak vibration exceed the acceptable vibration thresholds?
"PPV" = Peak Particle Velocity

9 REFERENCES

1. **State of California.** *California Environmental Quality Act, Environmental Checklist Form Appendix G.* 2019.
2. **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.* December 2011.
3. **California Department of Transportation Environmental Program.** *Technical Noise Supplement - A Technical Supplement to the Traffic Noise Analysis Protocol.* Sacramento, CA : s.n., September 2013.
4. **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.
5. **U.S. Department of Transportation, Federal Highway Administration.** *Highway Traffic Noise in the United States, Problem and Response.* April 2000. p. 3.
6. **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.
7. **U.S. Department of Transportation, Federal Transit Administration.** *Transit Noise and Vibration Impact Assessment Manual.* September 2018.
8. **Office of Planning and Research.** *State of California General Plan Guidlines.* 2018.
9. **City of Orange.** *General Plan Noise Element.* December 2015.
10. **California Department of Transportation.** *Transportation and Construction Vibration Guidance Manual.* April 2020.
11. **California Court of Appeal.** *Gray v. County of Madera, F053661.* 167 Cal.App.4th 1099; - Cal.Rptr.3d, October 2008.
12. **American National Standards Institute (ANSI).** *Specification for Sound Level Meters ANSI S1.4-2014/IEC 61672-1:2013.*
13. **Department of Environment, Food and Rural Affiars (Defra).** *Update of Noise Database for Prediction of Noise on Construction and Open Sites.* 2004.
14. **FHWA.** *Roadway Construction Noise Model.* January 2006.

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10 CERTIFICATIONS

The contents of this noise study report represent an accurate depiction of the noise environment and impacts associated with the proposed Eckhoff Street 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) 584-3148.

Bill Lawson, P.E., INCE
Principal
URBAN CROSSROADS, INC.
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Newport Beach, CA 92658
(949) 581-3148
blawson@urbanxroads.com

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 San Diego • March, 2018
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 ORANGE MUNICIPAL CODE

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Chapter 8.24 - NOISE CONTROL

Sections:

Footnotes:
*--- (**2**) ---*
***Editor's note—** Ord. No. 1-14, § I, adopted August 12, 2014, repealed the former Ch. 8.24, §§ 8.24.010—8.24.110 and enacted a new Ch. 8.24 as set out herein. The former Ch. 8.24 pertained to similar subject matter and derived from Prior Code 9500.1—9500.16; Ord. Nos. 49-74, 17-74, 1-80, and 26-96.*

8.24.010 - Policy.

A. In order to control unnecessary, excessive and annoying sounds emanating from the City, it is the policy of the City to regulate such sounds generated from all sources as specified in this chapter. The intent of this chapter is to protect residential land uses from unnecessary, excessive and annoying sounds.

B. It is determined that certain sound levels are detrimental to the public health, welfare and safety, and contrary to public interest.

(Ord. No. 1-14, § I, 8-12-14)

8.24.020 - Definitions.

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

A. "Ambient noise level" means the all-encompassing noise level associated with a given environment, being a composite of sounds from all sources, excluding the alleged offensive noise, at the location and approximate time at which a comparison with the alleged offensive noise is to be made.

B. "Adjusted ambient noise level" means the measured ambient noise level plus 3 dB (A). Three (3) dB (A) is the industry-accepted threshold of human perceptibility for a change in the noise environment.

C. "Decibel (dB)" means a unit which denotes the ratio between two quantities which are proportional to power: the number of decibels corresponding to the ratio of two amounts of power is ten times the logarithm to the base ten of this ratio.

D. "Emergency machinery, vehicle or work" means any machinery, vehicle or work used, employed or performed in an effort to protect, provide or restore safe conditions in the community or for the citizenry, or work by private or public utilities when restoring utility service.

E. "Fixed noise source" means a stationary noise source which creates sounds while fixed or motionless, including but not limited to construction equipment, industrial and commercial machinery and equipment, pumps, fans, compressors, generators, air conditioners and refrigeration equipment.

F. "Grading" means any excavating or filling of earth material or any combination thereof conducted to prepare a site for construction or other improvements thereon.

G. "Hourly Average" (L_{eq}) means the energy mean or average sound level over a one (1) hour period of time.

H. "Impact noise" means the noise produced by the collision of one mass in motion with a second mass

which may be either in motion or at rest.

I. "Mobile noise source" means any noise source other than a fixed noise source.

J. "Noise level" means the "A" weighted sound pressure level in decibels obtained by using a sound level meter at slow response with a reference pressure of twenty (20) micronewtons per square meter. The unit of measurement shall be designated as dB(A).

K. "Person" means a person, firm, association, co-partnership, joint venture, corporation or any entity, public or private in nature.

L. "Recurring impulsive noise" means a noise of short duration, usually less than one (1) second, with an abrupt onset and rapid decay, which occurs repeatedly or in a cyclical manner. Examples include jack hammering, pile driving, or operational noise from a generator or other mechanical equipment that is cyclical in nature.

M. "Residential property" means a parcel of real property which is developed and used either in part or in whole for residential purposes, other than transient uses such as hotels and motels.

N. "Simple tone noise" means a noise characterized by a predominant frequency or frequencies so that other frequencies cannot be readily distinguished.

O. "Sound level meter" means an instrument meeting American National Standard Institute's Standard Sl.4-1983 for Type 1 sound level meters or an instrument and the associated recording and analyzing equipment which will provide equivalent data.

P. "Sound pressure level" of a sound, in decibels, means twenty times the logarithm to the base ten of the ratio of the pressure of the sound to a reference pressure, which reference pressure shall be explicitly stated.

(Ord. No. 1-14, § I, 8-12-14)

8.24.030 - Noise Level Measurement Criteria.

Any noise level measurements made pursuant to the provisions of this chapter shall be performed using a sound level meter as defined in Section 8.24.020P.

(Ord. No. 1-14, § I, 8-12-14)

8.24.040 - Exterior Standards.

A. The following noise standards for fixed noise sources, unless otherwise specifically indicated, shall apply to all residential property:

Table 8.24.040 Exterior Noise Standards

	Noise Level	Time Period
Hourly Average (L_{eq})	55 dB (A)	7:00 a.m.—10:00 p.m.
	50 dB (A)	10:00 p.m.—7:00 a.m.

Maximum Level	70 dB (A)	7:00 a.m.—10:00 p.m.
	65 dB (A)	10:00 p.m.—7:00 a.m.

B. It is unlawful for any person at any location within the City to create any noise, or to 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 residential property to exceed the noise standards identified in Table 8.24.040. For multi-family residential or mixed use developments located within the City's Urban Mixed Use, Neighborhood Mixed Use, Old Towne Mixed Use or Medium Density Residential General Plan land use districts, exterior noise standards shall apply to common recreation areas only and shall not apply to private exterior space (such as a private yard, patio, or balcony).

C. In the event the ambient noise level exceeds the noise standards identified in Table 8.24.040 of this section, the "adjusted ambient noise level" shall be applied as the noise standard. In cases where the noise standard is adjusted due to a high ambient noise level, the noise standard shall not exceed the "adjusted ambient noise level", or 70 dB (A), whichever is less. In cases where the ambient noise level is already greater than 70 dB (A), the ambient noise level shall be applied as the noise standard.

D. Each of the noise limits specified in Table 8.24.040 shall be reduced by 5 dB(A) for impact or simple tone noises, recurring impulsive noises, or for noises consisting of speech or music.

(Ord. No. 1-14, § I, 8-12-14)

8.24.050 - Exemptions from Chapter Provisions.

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

A. School bands, school athletic and school entertainment events;

B. Outdoor gatherings, public dances, shows, and sporting and entertainment events provided such events are conducted pursuant to any permit requirements established by the City;

C. Activities conducted on public parks, public playgrounds, and public or private school grounds;

D. Any mechanical device, apparatus or equipment used, related to or connected with emergency machinery, vehicle or work;

E. Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities take place between the hours of 7:00 a.m. and 8:00 p.m. on any day except for Sunday or a Federal holiday, or between the hours of 9:00 a.m. and 8:00 p.m. on Sunday or a Federal holiday. Noise generated outside of the hours specified are subject to the noise standards identified in Table 8.24.040;

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. Noise sources associated with agricultural operations provided such operations take place between the hours of 7:00 a.m. and 8:00 p.m. on any day except Sunday or a Federal holiday, or between the hours of 9:00 a.m. and 8:00 p.m. on Sunday or a Federal holiday;

H. 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;

I. Noise sources associated with the maintenance of real property, provided such activities take place between the hours of 7:00 a.m. and 8:00 p.m. on any day except Sunday or a Federal holiday, or between the hours of 9:00 a.m. and 8:00 p.m. on Sunday or a Federal holiday. Operation of leaf blowers are regulated under OMC Chapter 8.26;

J. Industrial or commercial noise affecting residential units, when the residential unit is associated with said industrial or commercial use (e.g. caretaker's dwellings);

K. Any maintenance or construction activity undertaken by a public agency or utility within street right of way;

L. Mobile noise sources including but not limited to operational noise from trains, or automobiles or trucks traveling on roadways. Transportation noise as related to noise/land use compatibility is subject to the City's General Plan Noise Element;

M. Any activity to the extent regulation thereof has been preempted by State or Federal Law.

(Ord. No. 1-14, § I, 8-12-14)

8.24.060 - Special Provisions for Schools, Hospitals and Churches.

It is unlawful for any person to create any noise which causes the noise level at any school, hospital or church, while the same is in use, to exceed the noise limits as specified in Section 8.24.040, or which noise level unreasonably interferes with the use of such institutions.

(Ord. No. 1-14, § I, 8-12-14)

8.24.070 - Measurement of Noise Levels.

The location selected for measuring exterior noise levels shall be the point closest to the noise source along the perimeter of the outdoor activity area (such as a private yard, patio, balcony, or common recreation area, as applicable pursuant to Section 8.24.040B. of this chapter) of the affected residential receiving property. If the location of the outdoor activity area is unknown or unclear, the noise standard shall be applied at the point closest to the noise source along the property line of the affected residential receiving property.

(Ord. No. 1-14, § I, 8-12-14)

8.24.080 - Enforcement Authority.

A. The Chief Building Official or his/her designee are directed to enforce the provisions of this chapter. The Chief Building Official or his/her designee are authorized, pursuant to Penal Code Section 836.5, to arrest any person without a warrant when they have reasonable cause to believe that such person has committed a misdemeanor in their presence.

B. No person shall interfere with, oppose or resist any authorized person charged with the enforcement of this chapter while such person is engaged in the performance of his duty.

(Ord. No. 1-14, § I, 8-12-14)

8.24.090 - Violation—Public Nuisance.

Any violation of this chapter is a public nuisance and may be abated in accordance with law. The expense of such abatement may, by resolution of the City Council, be declared to be a lien against the property on which such nuisance is maintained, and such lien shall be made a personal obligation of the property owner.

(Ord. No. 1-14, § I, 8-12-14)

8.24.100 - Alternative Noise Prohibition.

Notwithstanding any other provisions of this chapter and in addition thereto, it is unlawful for any person to willfully make, continue, maintain, permit or cause to be made, continued, maintained, or permitted, any loud, unnecessary and unusual noise which disturbs the peace or quiet of any residential property or which causes discomfort or annoyance to any reasonable person of normal sensitivity residing in the area. It shall be a prima facie violation of this section if any power tool, radio, receiving set, television, music amplifier, tape player, record player, compact disc player, musical instrument or similar device is played, used or permitted to be played or used between the hours of 10:00 p.m. and 7:00 a.m. when audible from a distance of one hundred (100) feet from the property line of the noise source or from a distance of one hundred fifty (150) feet from any non-stationary noise source. For the purpose of this chapter, these prohibitions shall also be applied to stationary vehicles parked on the street or on private property. The determination may be made by a peace officer or may be proven by the testimony of any other person. Furthermore, and in addition to the provisions of this chapter, noise prohibitions pursuant to Penal Code Section 415 and Orange Municipal Code Chapter 9.39 may also be applied.

(Ord. No. 1-14, § I, 8-12-14)

8.24.110 - Violation—Misdemeanor.

Any person violating any of the provisions of this chapter shall be deemed guilty of a misdemeanor. Each day such violation is committed or permitted to continue shall constitute a separate offense and shall be punishable as such. The provisions of this chapter shall not be construed as permitting conduct not prescribed herein and shall not affect the enforceability of any other applicable provisions of law.

(Ord. No. 1-14, § I, 8-12-14)

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APPENDIX 5.1:

STUDY AREA PHOTOS

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JN: 13996 Study Area Photos

L1_E
33, 48' 19.070000"117, 52' 13.550000"

L1_N
33, 48' 19.140000"117, 52' 13.550000"

L1_S
33, 48' 19.040000"117, 52' 13.580000"

L1_W
33, 48' 19.000000"117, 52' 13.630000"

L2_E
33, 47' 53.080000"117, 51' 57.590000"

L2_N
33, 47' 53.050000"117, 51' 57.560000"

JN: 13996 Study Area Photos

L2_S
33, 47' 53.090000"117, 51' 57.590000"

L2_W
33, 47' 53.120000"117, 51' 57.590000"

L3_E
33, 47' 49.110000"117, 52' 19.700000"

L3_N
33, 47' 48.960000"117, 52' 20.330000"

L3_S
33, 47' 49.040000"117, 52' 19.730000"

L3_W
33, 47' 49.020000"117, 52' 19.810000"

JN: 13996 Study Area Photos

L4_E
33, 48' 0.880000"117, 52' 27.390000"

L4_N
33, 48' 0.860000"117, 52' 27.390000"

L4_S
33, 48' 0.890000"117, 52' 27.390000"

L4_W
33, 48' 0.890000"117, 52' 27.390000"

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APPENDIX 5.2:

NOISE LEVEL MEASUREMENT WORKSHEETS

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24-Hour Noise Level Measurement Summary

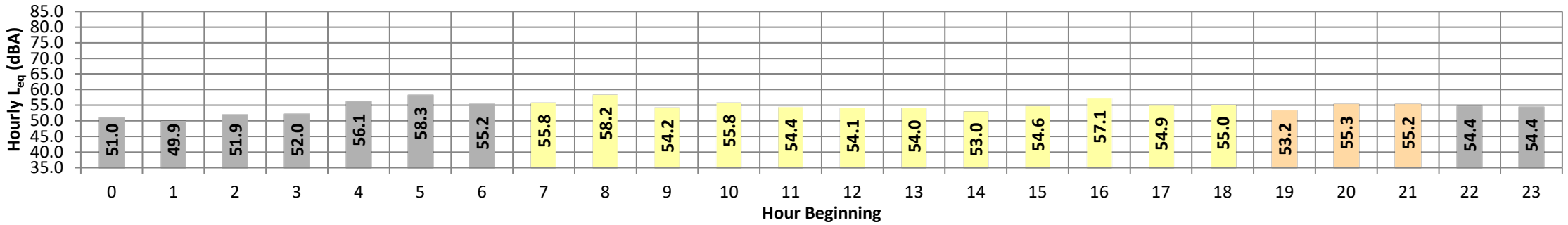
Date: Wednesday, March 31, 2021
Project: Eckoff Street

Location: L1 -Located north of the Project site south of Struck Avenue and on the western boundary of the Orangeland RV Park.

Meter: Piccolo II

JN: 13996
Analyst: S. Shami

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	51.0	57.3	49.2	56.5	55.5	53.8	52.8	50.8	50.2	49.6	49.5	49.3	51.0	10.0	61.0
	1	49.9	51.8	48.9	51.6	51.5	51.1	50.8	50.1	49.7	49.3	49.2	49.0	49.9	10.0	59.9
	2	51.9	56.5	49.6	56.2	56.1	55.6	54.9	51.8	51.3	50.0	49.9	49.7	51.9	10.0	61.9
	3	52.0	54.4	50.9	54.1	53.9	53.4	53.0	52.3	51.8	51.3	51.2	51.0	52.0	10.0	62.0
	4	56.1	62.4	54.6	61.3	60.0	57.9	57.1	56.2	55.7	55.0	54.9	54.7	56.1	10.0	66.1
	5	58.3	63.1	56.8	62.8	62.3	61.1	60.4	58.7	58.0	57.2	57.1	56.9	58.3	10.0	68.3
	6	55.2	62.2	51.3	61.7	61.0	59.4	58.4	55.7	53.5	51.9	51.7	51.5	55.2	10.0	65.2
Day	7	55.8	63.5	51.5	63.0	62.4	60.7	59.3	55.9	54.0	52.2	51.9	51.6	55.8	0.0	55.8
	8	58.2	70.6	51.7	69.8	68.5	64.1	60.9	56.2	54.3	52.4	52.1	51.8	58.2	0.0	58.2
	9	54.2	62.2	50.8	61.0	59.8	57.4	56.4	54.5	53.3	51.5	51.3	50.9	54.2	0.0	54.2
	10	55.8	62.0	52.5	61.4	60.8	59.7	58.7	56.2	54.8	53.3	53.1	52.6	55.8	0.0	55.8
	11	54.4	60.7	50.9	60.2	59.8	58.4	57.5	54.8	53.3	51.7	51.4	51.0	54.4	0.0	54.4
	12	54.1	60.7	51.4	59.8	58.8	57.4	56.5	54.5	53.2	52.0	51.8	51.5	54.1	0.0	54.1
	13	54.0	61.7	50.6	61.1	60.3	58.3	57.0	54.2	52.6	51.2	51.0	50.7	54.0	0.0	54.0
	14	53.0	60.3	49.3	59.5	58.6	57.0	56.1	53.5	51.9	50.0	49.7	49.5	53.0	0.0	53.0
	15	54.6	62.8	50.4	62.1	61.5	59.3	57.9	54.8	52.6	51.0	50.8	50.5	54.6	0.0	54.6
	16	57.1	71.1	62.1	70.3	69.5	67.5	66.7	65.4	64.3	63.8	62.9	62.2	57.1	0.0	57.1
	17	54.9	62.6	49.8	62.1	61.3	59.7	58.5	55.5	52.8	50.7	50.4	49.9	54.9	0.0	54.9
	18	55.0	60.7	51.6	60.3	60.0	58.8	57.7	55.4	54.0	52.5	52.3	51.9	55.0	0.0	55.0
Evening	19	53.2	74.6	50.5	73.8	73.0	69.5	64.9	55.0	52.8	51.2	51.0	50.6	53.2	5.0	58.2
	20	55.3	71.6	50.2	71.5	71.4	71.2	70.9	69.5	67.4	57.6	56.7	50.4	55.3	5.0	60.3
	21	55.2	64.0	50.8	63.2	62.1	60.2	59.4	55.0	52.9	51.4	51.2	50.9	55.2	5.0	60.2
Night	22	54.4	60.2	52.0	59.8	59.3	57.6	56.9	54.6	53.5	52.5	52.4	52.2	54.4	10.0	64.4
	23	54.4	61.3	51.8	60.6	59.8	58.5	57.6	54.0	53.1	52.3	52.1	51.9	54.4	10.0	64.4

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day (7am-7pm)	Min	53.0	60.3	49.3	59.5	58.6	57.0	56.1	53.5	51.9	50.0	49.7	49.5
	Max	58.2	71.1	62.1	70.3	69.5	67.5	66.7	65.4	64.3	63.8	62.9	62.2
Energy Average		55.4	Average:		62.6	61.8	59.9	58.6	55.9	54.3	52.7	52.4	52.0
Evening (7pm-10pm)	Min	53.2	64.0	50.2	63.2	62.1	60.2	59.4	55.0	52.8	51.2	51.0	50.4
	Max	55.3	74.6	50.8	73.8	73.0	71.2	70.9	69.5	67.4	57.6	56.7	50.9
Energy Average		54.7	Average:		69.5	68.9	67.0	65.1	59.8	57.7	53.4	52.9	50.6
Night (10pm-7am)	Min	49.9	51.8	48.9	51.6	51.5	51.1	50.8	50.1	49.7	49.3	49.2	49.0
	Max	58.3	63.1	56.8	62.8	62.3	61.1	60.4	58.7	58.0	57.2	57.1	56.9
Energy Average		54.4	Average:		58.3	57.7	56.5	55.8	53.8	53.0	52.1	52.0	51.8

L_{eq} (dBA)		
24-Hour	Daytime (7am-10pm)	Nighttime (10pm-7am)
54.9	55.2	54.4

24-Hour CNEL (dBA)
61.2

24-Hour Noise Level Measurement Summary

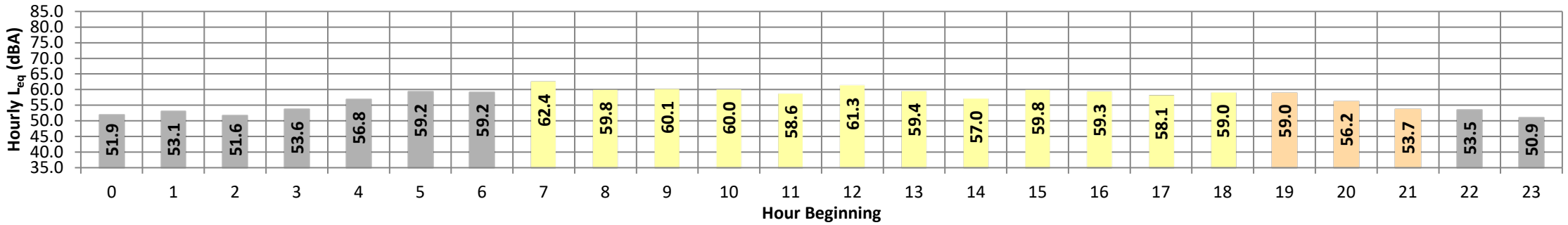
Date: Wednesday, March 31, 2021
Project: Eckoff Street

Location: L2 -Located southeast of the Project site on Alvarez near the Elevate Ministries Church.

Meter: Piccolo II

JN: 13996
Analyst: S. Shami

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	51.9	59.4	48.7	59.1	58.6	57.0	55.6	51.5	49.9	49.0	48.9	48.8	51.9	10.0	61.9
	1	53.1	61.6	47.4	61.3	60.9	59.1	57.6	53.2	49.8	47.9	47.7	47.5	53.1	10.0	63.1
	2	51.6	58.3	49.2	58.1	57.6	56.2	54.7	51.1	50.3	49.6	49.5	49.3	51.6	10.0	61.6
	3	53.6	60.4	51.0	60.1	59.7	58.3	56.7	53.2	52.1	51.4	51.3	51.1	53.6	10.0	63.6
	4	56.8	64.5	53.6	63.8	62.8	61.1	60.2	56.8	55.1	54.0	53.8	53.7	56.8	10.0	66.8
	5	59.2	65.5	56.3	65.1	64.6	63.4	62.2	59.4	57.9	56.7	56.5	56.3	59.2	10.0	69.2
	6	59.2	84.9	60.4	84.6	84.2	83.0	81.9	76.9	66.8	62.4	61.8	60.7	59.2	10.0	69.2
Day	7	62.4	82.5	60.9	82.3	82.0	79.6	78.8	76.3	71.7	64.1	63.0	61.5	62.4	0.0	62.4
	8	59.8	69.4	52.7	68.7	67.9	65.5	63.5	59.9	57.4	54.0	53.4	52.9	59.8	0.0	59.8
	9	60.1	69.0	53.5	68.3	67.7	65.6	64.2	60.3	57.7	54.6	54.1	53.6	60.1	0.0	60.1
	10	60.0	67.2	54.2	66.4	65.8	64.4	63.5	60.8	58.4	55.5	54.9	54.3	60.0	0.0	60.0
	11	58.6	67.3	52.5	66.7	65.8	64.0	62.6	58.6	56.5	53.7	53.1	52.6	58.6	0.0	58.6
	12	61.3	72.5	51.9	71.3	70.4	67.6	65.6	60.5	57.2	53.4	52.6	52.1	61.3	0.0	61.3
	13	59.4	69.2	52.2	68.7	67.9	65.4	63.5	59.0	56.2	53.7	52.8	52.3	59.4	0.0	59.4
	14	57.0	67.1	49.8	66.6	66.2	63.4	60.9	56.3	53.7	50.9	50.3	49.9	57.0	0.0	57.0
	15	59.8	70.2	51.5	69.6	68.8	66.3	64.1	58.9	56.3	53.2	52.7	51.8	59.8	0.0	59.8
	16	59.3	69.2	51.1	68.6	67.9	65.7	63.9	58.6	55.8	52.4	51.9	51.3	59.3	0.0	59.3
	17	58.1	67.3	50.0	66.8	66.3	64.3	62.5	58.0	55.5	51.5	50.8	50.2	58.1	0.0	58.1
	18	59.0	68.5	49.1	67.8	67.4	65.6	63.8	59.5	54.8	50.3	49.7	49.3	59.0	0.0	59.0
Evening	19	59.0	69.3	51.4	68.1	67.0	64.9	63.3	59.1	55.7	52.5	51.9	51.5	59.0	5.0	64.0
	20	56.2	67.7	48.3	67.0	66.0	63.3	60.3	54.5	51.8	49.1	48.8	48.5	56.2	5.0	61.2
	21	53.7	61.9	48.4	61.4	60.9	59.0	57.6	53.6	51.4	49.2	48.9	48.6	53.7	5.0	58.7
Night	22	53.5	63.8	46.1	63.5	63.0	60.5	57.5	52.1	49.4	46.9	46.6	46.2	53.5	10.0	63.5
	23	50.9	59.2	45.9	58.8	58.3	56.6	55.0	50.7	48.4	46.5	46.3	46.1	50.9	10.0	60.9

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day (7am-7pm)	Min	57.0	67.1	49.1	66.4	65.8	63.4	60.9	56.3	53.7	50.3	49.7	49.3
	Max	62.4	82.5	60.9	82.3	82.0	79.6	78.8	76.3	71.7	64.1	63.0	61.5
Energy Average		59.8	Average:		69.3	68.7	66.4	64.8	60.5	57.6	53.9	53.3	52.6
Evening (7pm-10pm)	Min	53.7	61.9	48.3	61.4	60.9	59.0	57.6	53.6	51.4	49.1	48.8	48.5
	Max	59.0	69.3	51.4	68.1	67.0	64.9	63.3	59.1	55.7	52.5	51.9	51.5
Energy Average		56.8	Average:		65.5	64.6	62.4	60.4	55.8	53.0	50.3	49.9	49.5
Night (10pm-7am)	Min	50.9	58.3	45.9	58.1	57.6	56.2	54.7	50.7	48.4	46.5	46.3	46.1
	Max	59.2	84.9	60.4	84.6	84.2	83.0	81.9	76.9	66.8	62.4	61.8	60.7
Energy Average		55.5	Average:		63.8	63.3	61.7	60.2	56.1	53.3	51.6	51.4	51.1

L_{eq} (dBA)		
24-Hour	Daytime (7am-10pm)	Nighttime (10pm-7am)
58.3	59.3	55.5

24-Hour CNEL (dBA)

63.0

24-Hour Noise Level Measurement Summary

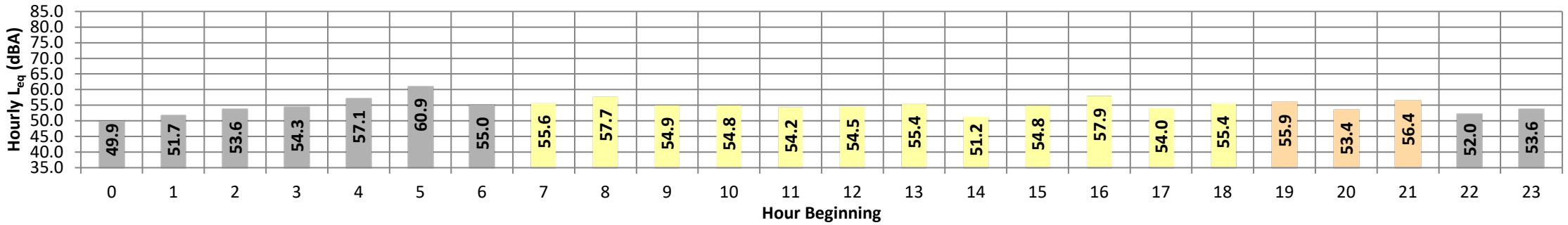
Date: Wednesday, March 31, 2021
Project: Eckoff Street

Location: L3 - Located south of the Project site near the Azusa Pacific University.

Meter: Piccolo II

JN: 13996
Analyst: S. Shami

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	49.9	53.2	48.1	52.9	52.5	52.0	51.5	50.3	49.5	48.5	48.4	48.2	49.9	10.0	59.9
	1	51.7	55.1	49.3	54.9	54.5	54.0	53.5	52.2	51.3	50.0	49.8	49.4	51.7	10.0	61.7
	2	53.6	57.0	51.4	56.7	56.5	55.8	55.3	54.1	53.2	52.0	51.8	51.5	53.6	10.0	63.6
	3	54.3	58.7	52.2	58.3	57.9	57.2	56.5	54.5	53.7	52.7	52.5	52.3	54.3	10.0	64.3
	4	57.1	60.7	55.5	60.3	59.9	58.9	58.5	57.4	56.8	56.0	55.8	55.6	57.1	10.0	67.1
	5	60.9	63.7	59.5	63.5	63.3	62.6	62.1	61.2	60.7	59.9	59.7	59.6	60.9	10.0	70.9
	6	55.0	60.7	52.1	60.4	60.0	58.6	57.8	55.1	54.1	52.7	52.5	52.2	55.0	10.0	65.0
Day	7	55.6	61.5	52.3	61.1	60.7	59.4	58.5	56.1	54.4	53.0	52.8	52.5	55.6	0.0	55.6
	8	57.7	68.5	51.7	68.1	67.3	64.2	61.2	55.7	54.0	52.3	52.1	51.8	57.7	0.0	57.7
	9	54.9	60.6	51.9	60.1	59.5	58.2	57.5	55.3	54.1	52.6	52.3	52.0	54.9	0.0	54.9
	10	54.8	60.0	51.9	59.6	59.1	58.0	57.2	55.3	54.1	52.6	52.3	52.0	54.8	0.0	54.8
	11	54.2	60.9	50.7	60.5	60.0	58.7	57.2	54.3	52.8	51.3	51.1	50.8	54.2	0.0	54.2
	12	54.5	64.1	49.7	63.4	62.5	59.8	58.1	54.2	51.9	50.3	50.1	49.8	54.5	0.0	54.5
	13	55.4	67.4	47.4	66.3	65.4	62.2	59.5	53.4	50.1	48.1	47.8	47.5	55.4	0.0	55.4
	14	51.2	57.1	47.9	56.7	56.3	55.2	54.3	51.8	50.0	48.4	48.2	48.0	51.2	0.0	51.2
	15	54.8	61.5	51.5	60.8	60.2	58.9	57.9	54.9	53.5	52.0	51.8	51.6	54.8	0.0	54.8
	16	57.9	67.0	53.2	66.7	66.0	63.7	61.2	57.2	55.1	53.8	53.5	53.3	57.9	0.0	57.9
	17	54.0	60.9	50.1	60.3	59.7	58.2	56.8	54.4	52.8	50.8	50.5	50.2	54.0	0.0	54.0
	18	55.4	60.7	52.7	60.2	59.7	58.6	57.9	55.8	54.7	53.3	53.1	52.8	55.4	0.0	55.4
Evening	19	55.9	61.6	53.4	61.2	60.7	59.3	58.2	56.1	55.1	53.8	53.7	53.5	55.9	5.0	60.9
	20	53.4	58.6	51.1	58.0	57.3	55.9	55.3	53.8	52.9	51.7	51.4	51.2	53.4	5.0	58.4
	21	56.4	62.8	53.2	62.4	61.6	60.4	59.2	56.6	55.3	53.8	53.6	53.3	56.4	5.0	61.4
Night	22	52.0	57.4	49.1	57.0	56.4	55.5	54.7	52.6	50.9	49.6	49.4	49.2	52.0	10.0	62.0
	23	53.6	58.2	50.8	57.6	57.1	56.2	55.6	54.2	53.2	51.5	51.2	50.9	53.6	10.0	63.6

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day (7am-7pm)	Min	51.2	57.1	47.4	56.7	56.3	55.2	54.3	51.8	50.0	48.1	47.8	47.5
	Max	57.9	68.5	53.2	68.1	67.3	64.2	61.2	57.2	55.1	53.8	53.5	53.3
Energy Average		55.3	Average:		62.0	61.4	59.6	58.1	54.9	53.1	51.6	51.3	51.0
Evening (7pm-10pm)	Min	53.4	58.6	51.1	58.0	57.3	55.9	55.3	53.8	52.9	51.7	51.4	51.2
	Max	56.4	62.8	53.4	62.4	61.6	60.4	59.2	56.6	55.3	53.8	53.7	53.5
Energy Average		55.4	Average:		60.5	59.9	58.5	57.6	55.5	54.4	53.1	52.9	52.7
Night (10pm-7am)	Min	49.9	53.2	48.1	52.9	52.5	52.0	51.5	50.3	49.5	48.5	48.4	48.2
	Max	60.9	63.7	59.5	63.5	63.3	62.6	62.1	61.2	60.7	59.9	59.7	59.6
Energy Average		55.5	Average:		57.9	57.6	56.8	56.2	54.6	53.7	52.6	52.3	52.1

L_{eq} (dBA)		
24-Hour	Daytime (7am-10pm)	Nighttime (10pm-7am)
55.4	55.3	55.5

24-Hour CNEL (dBA)
62.2

24-Hour Noise Level Measurement Summary

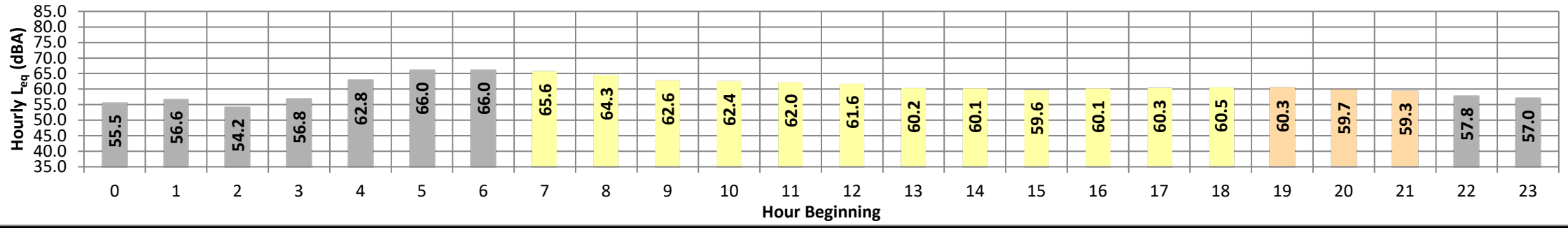
Date: Wednesday, March 31, 2021
Project: Eckoff Street

Location: L4 - Located west of the Project site on Eckhoff Street near the Orange County Children and Family Services.

Meter: Piccolo II

JN: 13996
Analyst: S. Shami

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	55.5	64.5	51.3	64.1	63.3	61.6	59.9	54.6	52.7	51.7	51.6	51.4	55.5	10.0	65.5
	1	56.6	65.6	51.5	65.4	65.1	63.2	61.4	55.0	52.8	51.9	51.7	51.6	56.6	10.0	66.6
	2	54.2	60.6	51.8	60.3	59.9	58.5	57.2	53.9	53.0	52.2	52.1	51.9	54.2	10.0	64.2
	3	56.8	65.1	53.3	64.8	64.1	62.0	60.5	56.2	54.6	53.7	53.5	53.4	56.8	10.0	66.8
	4	62.8	68.9	60.1	68.6	68.3	67.0	66.0	62.7	61.5	60.5	60.3	60.2	62.8	10.0	72.8
	5	66.0	74.8	63.4	74.4	74.0	72.1	70.2	66.6	65.0	63.8	63.6	63.5	66.0	10.0	76.0
	6	66.0	79.7	61.1	79.2	78.4	75.1	72.3	66.9	64.2	61.8	61.5	61.2	66.0	10.0	76.0
Day	7	65.6	73.3	61.1	73.0	72.7	71.3	70.0	66.4	64.3	61.8	61.5	61.3	65.6	0.0	65.6
	8	64.3	72.2	59.4	71.6	70.8	69.0	67.9	64.7	62.6	60.2	59.9	59.5	64.3	0.0	64.3
	9	62.6	70.4	58.2	70.0	69.4	67.6	66.0	62.8	60.9	58.9	58.6	58.3	62.6	0.0	62.6
	10	62.4	71.4	57.2	70.9	70.2	67.9	66.2	62.1	59.9	58.0	57.7	57.3	62.4	0.0	62.4
	11	62.0	71.1	56.6	70.5	69.9	67.7	65.9	61.8	59.5	57.4	57.0	56.7	62.0	0.0	62.0
	12	61.6	69.3	56.7	68.9	68.5	66.6	65.1	61.9	59.9	57.5	57.2	56.9	61.6	0.0	61.6
	13	60.2	69.5	53.7	69.1	68.5	66.1	64.4	60.0	57.0	54.4	54.1	53.8	60.2	0.0	60.2
	14	60.1	75.5	53.2	74.9	73.7	70.2	66.8	59.7	56.8	54.0	53.7	53.3	60.1	0.0	60.1
	15	59.6	70.2	52.4	69.8	68.7	65.5	63.3	59.0	56.1	53.1	52.9	52.5	59.6	0.0	59.6
	16	60.1	72.0	52.2	71.3	69.8	65.8	63.5	59.2	56.5	53.0	52.6	52.3	60.1	0.0	60.1
	17	60.3	70.2	52.7	69.7	69.0	66.4	64.4	60.1	57.0	53.7	53.3	52.8	60.3	0.0	60.3
	18	60.5	70.0	54.4	69.5	68.8	66.4	64.4	60.3	57.5	54.9	54.7	54.6	60.5	0.0	60.5
Evening	19	60.3	73.2	56.1	72.7	72.1	69.6	67.6	61.0	58.2	56.5	56.3	56.2	60.3	5.0	65.3
	20	59.7	67.5	55.9	67.2	66.6	64.7	63.1	59.8	57.9	56.3	56.1	56.0	59.7	5.0	64.7
	21	59.3	67.2	54.4	66.9	66.3	64.8	63.3	59.6	56.9	55.0	54.7	54.5	59.3	5.0	64.3
Night	22	57.8	66.0	52.5	65.8	65.4	63.9	62.4	57.6	54.9	53.0	52.8	52.6	57.8	10.0	67.8
	23	57.0	64.8	53.7	64.5	63.9	62.0	60.6	56.6	55.0	54.0	53.9	53.7	57.0	10.0	67.0

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day (7am-7pm)	Min	59.6	69.3	52.2	68.9	68.5	65.5	63.3	59.0	56.1	53.0	52.6	52.3
	Max	65.6	75.5	61.1	74.9	73.7	71.3	70.0	66.4	64.3	61.8	61.5	61.3
Energy Average		62.0	Average:		70.8	70.0	67.6	65.7	61.5	59.0	56.4	56.1	55.8
Evening (7pm-10pm)	Min	59.3	67.2	54.4	66.9	66.3	64.7	63.1	59.6	56.9	55.0	54.7	54.5
	Max	60.3	73.2	56.1	72.7	72.1	69.6	67.6	61.0	58.2	56.5	56.3	56.2
Energy Average		59.8	Average:		68.9	68.4	66.3	64.7	60.1	57.7	55.9	55.7	55.5
Night (10pm-7am)	Min	54.2	60.6	51.3	60.3	59.9	58.5	57.2	53.9	52.7	51.7	51.6	51.4
	Max	66.0	79.7	63.4	79.2	78.4	75.1	72.3	66.9	65.0	63.8	63.6	63.5
Energy Average		61.5	Average:		67.4	66.9	65.0	63.4	58.9	57.1	55.8	55.7	55.5

L_{eq} (dBA)		
24-Hour	Daytime (7am-10pm)	Nighttime (10pm-7am)
61.6	61.7	61.5

24-Hour CNEL (dBA)

68.1

APPENDIX 7.1:

CADNAA OPERATIONAL NOISE MODEL INPUTS

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13996 - Eckhoff Street

CadnaA Noise Prediction Model: 13996_02.cna
Date: 20.05.21
Analyst: S. Shami

Calculation Configuration

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (#(Unit,LEN))	2000.01
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (#(Unit,LEN))	999.99
Min. Length of Section (#(Unit,LEN))	1.01
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	5.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	2
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Incl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (#(Unit,TEMP))	10
rel. Humidity (%)	70
Ground Absorption G	0.50
Wind Speed for Dir. (#(Unit,SPEED))	3.0
Roads (RLS-90)	
Strictly acc. to RLS-90	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
RECEIVERS		R1	46.5	46.5	53.2	55.0	50.0	0.0				5.00	a	6069443.61	2240184.08	5.00
RECEIVERS		R2	43.6	43.6	50.3	55.0	50.0	0.0				5.00	a	6070827.00	2238024.94	5.00
RECEIVERS		R3	49.3	49.3	56.0	55.0	50.0	0.0				5.00	a	6068709.32	2237348.49	5.00
RECEIVERS		R4	44.5	44.3	50.9	55.0	50.0	0.0				5.00	a	6068164.57	2238653.86	5.00

Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			K0	Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night				X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(dB)	(ft)		(ft)	(ft)	(ft)
POINTSOURCE		PARKING09	79.0	79.0	79.0	Lw	79.0		900.00	0.00	540.00	0.0	5.00	a	6068388.73	2238945.12	5.00
POINTSOURCE		PARKING08	79.0	79.0	79.0	Lw	79.0		900.00	0.00	540.00	0.0	5.00	a	6068395.92	2238891.89	5.00
POINTSOURCE		PARKING07	79.0	79.0	79.0	Lw	79.0		900.00	0.00	540.00	0.0	5.00	a	6068463.73	2238446.35	5.00
POINTSOURCE		PARKING06	79.0	79.0	79.0	Lw	79.0		900.00	0.00	540.00	0.0	5.00	a	6068657.61	2238353.96	5.00
POINTSOURCE		PARKING05	79.0	79.0	79.0	Lw	79.0		900.00	0.00	540.00	0.0	5.00	a	6068737.88	2238352.45	5.00
POINTSOURCE		PARKING04	79.0	79.0	79.0	Lw	79.0		900.00	0.00	540.00	0.0	5.00	a	6069355.84	2238291.86	5.00
POINTSOURCE		PARKING03	79.0	79.0	79.0	Lw	79.0		900.00	0.00	540.00	0.0	5.00	a	6068983.25	2238429.69	5.00
POINTSOURCE		PARKING02	79.0	79.0	79.0	Lw	79.0		900.00	0.00	540.00	0.0	5.00	a	6069528.51	2238529.66	5.00
POINTSOURCE		PARKING01	79.0	79.0	79.0	Lw	79.0		900.00	0.00	540.00	0.0	5.00	a	6069486.10	2238405.46	5.00
POINTSOURCE		AC01	88.9	88.9	88.9	Lw	88.9		585.00	0.00	252.00	0.0	5.00	g	6069378.56	2238369.11	50.00
POINTSOURCE		AC02	88.9	88.9	88.9	Lw	88.9		585.00	0.00	252.00	0.0	5.00	g	6069024.14	2238497.85	50.00
POINTSOURCE		AC03	88.9	88.9	88.9	Lw	88.9		585.00	0.00	252.00	0.0	5.00	g	6068840.87	2238417.57	50.00

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			K0	Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night				X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(dB)	(ft)		(ft)	(ft)	(ft)
POINTSOURCE		AC04	88.9	88.9	88.9	Lw	88.9		585.00	0.00	252.00	0.0	5.00	g	6068378.92	2238585.70	50.00
POINTSOURCE		TRASH01	89.0	89.0	89.0	Lw	89.0		150.00	0.00	90.00	0.0	5.00	a	6068487.48	2238955.09	5.00
POINTSOURCE		TRASH02	89.0	89.0	89.0	Lw	89.0		150.00	0.00	90.00	0.0	5.00	a	6068938.90	2238740.38	5.00
POINTSOURCE		TRASH03	89.0	89.0	89.0	Lw	89.0		150.00	0.00	90.00	0.0	5.00	a	6069040.75	2238401.34	5.00
POINTSOURCE		TRASH04	89.0	89.0	89.0	Lw	89.0		150.00	0.00	90.00	0.0	5.00	a	6069307.11	2238302.35	5.00

Line Source(s)

Name	M.	ID	Result. PWL			Result. PWL'			Lw / Li			Operating Time			Moving Pt. Src				Height
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	Number			Speed	
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	Day	Evening	Night	(mph)	(ft)
LINESOURCE		TRUCK01	93.2	93.2	93.2	76.9	76.9	76.9	Lw	93.2									8
LINESOURCE		TRUCK02	93.2	93.2	93.2	71.7	71.7	71.7	Lw	93.2									8
LINESOURCE		TRUCK03	93.2	93.2	93.2	79.2	79.2	79.2	Lw	93.2									8
LINESOURCE		TRUCK04	93.2	93.2	93.2	69.2	69.2	69.2	Lw	93.2									8
LINESOURCE		TRUCK05	93.2	93.2	93.2	69.3	69.3	69.3	Lw	93.2									8

Name	Height			Coordinates			
	Begin		End	x	y	z	Ground
	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)
LINESOURCE	8.00	a		6068461.12	2238925.69	8.00	0.00
				6068447.17	2238927.38	8.00	0.00
				6068386.87	2238919.64	8.00	0.00
				6068322.00	2238913.53	8.00	0.00
LINESOURCE	8.00	a		6068956.47	2238766.96	8.00	0.00
				6069024.81	2238742.32	8.00	0.00
				6069029.93	2238734.64	8.00	0.00
				6069033.34	2238722.27	8.00	0.00
				6069027.80	2238707.34	8.00	0.00
				6068943.75	2238477.40	8.00	0.00
				6068950.58	2238466.30	8.00	0.00
				6068958.26	2238459.91	8.00	0.00
				6068968.92	2238453.08	8.00	0.00
				6069036.54	2238426.68	8.00	0.00
LINESOURCE	8.00	a		6069330.83	2238325.31	8.00	0.00
				6069408.93	2238296.60	8.00	0.00
LINESOURCE	8.00	a		6068327.90	2238358.98	8.00	0.00
				6068347.86	2238359.06	8.00	0.00
				6068357.16	2238365.11	8.00	0.00
				6068359.49	2238378.14	8.00	0.00
				6068363.21	2238396.75	8.00	0.00
				6068361.35	2238413.50	8.00	0.00
				6068354.83	2238433.51	8.00	0.00
				6068356.23	2238448.86	8.00	0.00
				6068361.81	2238461.89	8.00	0.00
				6068373.45	2238472.59	8.00	0.00
				6068544.21	2238473.53	8.00	0.00
				6068628.43	2238443.75	8.00	0.00
				6068667.52	2238405.59	8.00	0.00
				6068824.32	2238353.01	8.00	0.00
				6068863.41	2238352.08	8.00	0.00
				6068879.23	2238362.32	8.00	0.00
				6068907.61	2238433.04	8.00	0.00
				6068915.05	2238446.07	8.00	0.00
				6068947.10	2238471.95	8.00	0.00
LINESOURCE	8.00	a		6069028.04	2238737.48	8.00	0.00
				6069037.89	2238745.16	8.00	0.00
				6069046.01	2238744.68	8.00	0.00
				6069515.13	2238571.10	8.00	0.00
				6069514.17	2238559.14	8.00	0.00
				6069514.17	2238548.14	8.00	0.00
				6069434.79	2238332.48	8.00	0.00
				6069430.13	2238307.82	8.00	0.00

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	
AREASOURCE		DOCK01	112.0	112.0	112.0	74.5	74.5	74.5	Lw	112					8
AREASOURCE		DOCK02	112.0	112.0	112.0	76.8	76.8	76.8	Lw	112					8

Name	Height			Coordinates			
	Begin		End	x	y	z	Ground
	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)
AREASOURCE	8.00	a		6068433.35	2238852.22	8.00	0.00
				6068476.31	2238965.90	8.00	0.00

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
					6068965.03	2238789.26	8.00	0.00
					6068941.93	2238729.10	8.00	0.00
					6068894.65	2238746.09	8.00	0.00
					6068875.12	2238689.96	8.00	0.00
AREASOURCE	8.00	a			6069114.33	2238498.46	8.00	0.00
					6069310.95	2238426.84	8.00	0.00
					6069291.71	2238371.78	8.00	0.00
					6069340.37	2238353.85	8.00	0.00
					6069316.89	2238283.57	8.00	0.00
					6069023.77	2238390.90	8.00	0.00
					6069048.90	2238461.28	8.00	0.00
					6069095.38	2238444.15	8.00	0.00

Building(s)

Name	M.	ID	RB	Residents	Absorption	Height		Coordinates			
						Begin		x	y	z	Ground
						(ft)		(ft)	(ft)	(ft)	(ft)
BUILDING		BUILDING00001	x	0		45.00	a	6069070.73	2238714.80	45.00	0.00
								6069095.74	2238705.77	45.00	0.00
								6069095.11	2238703.98	45.00	0.00
								6069099.52	2238702.09	45.00	0.00
								6069100.25	2238704.03	45.00	0.00
								6069480.36	2238565.62	45.00	0.00
								6069395.73	2238333.45	45.00	0.00
								6069291.71	2238371.78	45.00	0.00
								6069310.95	2238426.84	45.00	0.00
								6069114.33	2238498.46	45.00	0.00
								6069095.38	2238444.15	45.00	0.00
								6068986.11	2238484.42	45.00	0.00
BUILDING		BUILDING00002	x	0		45.00	a	6068340.03	2238732.67	45.00	0.00
								6068390.06	2238868.12	45.00	0.00
								6068875.12	2238689.96	45.00	0.00
								6068894.65	2238746.09	45.00	0.00
								6068988.00	2238712.53	45.00	0.00
								6068864.14	2238382.45	45.00	0.00
								6068340.64	2238573.42	45.00	0.00

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APPENDIX 8.1:

CADNAA CONSTRUCTION NOISE MODEL INPUTS

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13996 - Eckhoff Street

CadnaA Noise Prediction Model: 13996_02_Construction.cna
Date: 20.05.21
Analyst: S. Shami

Calculation Configuration

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (#(Unit,LEN))	2000.01
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (#(Unit,LEN))	999.99
Min. Length of Section (#(Unit,LEN))	1.01
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	5.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	2
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Incl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (#(Unit,TEMP))	10
rel. Humidity (%)	70
Ground Absorption G	0.50
Wind Speed for Dir. (#(Unit,SPEED))	3.0
Roads (RLS-90)	
Strictly acc. to RLS-90	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
RECEIVERS		R1	59.6	59.6	66.2	55.0	50.0	0.0				5.00	a	6069443.61	2240184.08	5.00
RECEIVERS		R2	58.2	58.2	64.8	55.0	50.0	0.0				5.00	a	6070827.00	2238024.94	5.00
RECEIVERS		R3	62.2	62.2	68.9	55.0	50.0	0.0				5.00	a	6068709.32	2237348.49	5.00
RECEIVERS		R4	70.8	70.8	77.5	55.0	50.0	0.0				5.00	a	6068164.57	2238653.86	5.00

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	
SITEBOUNDARY		CONSTRUCTION	126.1	126.1	126.1	79.0	79.0	79.0	Lw''	79					8

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
SITEBOUNDARY	8.00	a			6068326.07	2239030.81	8.00	0.00
					6069566.35	2238575.26	8.00	0.00
					6069468.44	2238308.59	8.00	0.00
					6069460.10	2238309.98	8.00	0.00
					6069452.77	2238311.14	8.00	0.00
					6069444.95	2238310.70	8.00	0.00
					6069433.45	2238308.97	8.00	0.00

Name	Height		Coordinates			
	Begin	End	x	y	z	Ground
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
			6069420.87	2238304.62	8.00	0.00
			6069408.93	2238296.60	8.00	0.00
			6069400.68	2238287.91	8.00	0.00
			6069396.34	2238281.40	8.00	0.00
			6069391.79	2238271.20	8.00	0.00
			6069389.62	2238264.04	8.00	0.00
			6069389.18	2238259.27	8.00	0.00
			6069389.18	2238257.10	8.00	0.00
			6068925.05	2238427.04	8.00	0.00
			6068884.95	2238314.02	8.00	0.00
			6068620.89	2238318.71	8.00	0.00
			6068622.97	2238424.44	8.00	0.00
			6068369.33	2238429.65	8.00	0.00
			6068368.28	2238324.96	8.00	0.00
			6068334.95	2238324.96	8.00	0.00
			6068331.30	2238340.58	8.00	0.00
			6068326.10	2238368.71	8.00	0.00
			6068321.93	2238402.04	8.00	0.00
			6068318.28	2238437.98	8.00	0.00
			6068315.68	2238468.71	8.00	0.00
			6068315.16	2238568.71	8.00	0.00
			6068321.93	2238908.29	8.00	0.00
			6068323.49	2239029.65	8.00	0.00