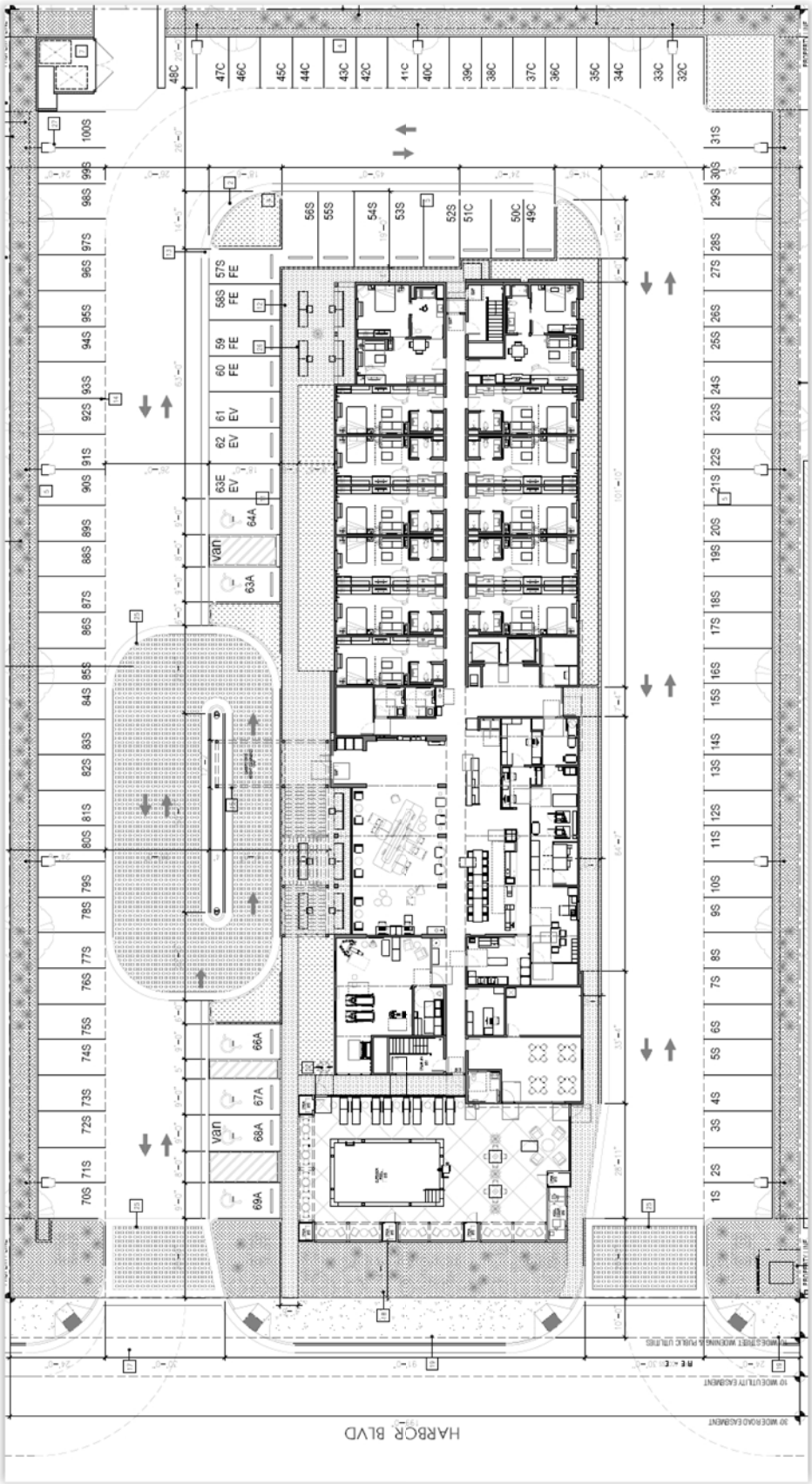
13650 HARBOR BOULEVARD HOTEL
NOISE IMPACT STUDY
City of Garden Grove



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NOISE IMPACT STUDY
City of Garden Grove, California

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Table of Contents

Section		Page
1.0	**Introduction**	**1-1**
1.1	Purpose of Analysis and Study Objectives	1-1
1.2	Site Location	1-1
1.3	Project Description	1-2
1.4	Summary of Analysis Results	1-2
1.5	Recommended Mitigation Measures (MM)	1-3
1.6	Recommended Project Design Features (DF)	1-4
2.0	**Fundamentals of Noise and Vibration**	**2-1**
2.1	Sound, Noise and Acoustics	2-1
2.2	Frequency and Hertz	2-1
2.3	Sound Pressure Levels and Decibels	2-1
2.4	Addition of Decibels	2-1
2.5	Human Responses to Changes in Noise Levels	2-2
2.6	Noise Descriptors	2-2
2.7	Traffic Noise Prediction	2-5
2.8	Sound Propagation	2-5
2.9	Vibration Descriptors	2-7
2.10	Vibration Perception	2-7
2.11	Vibration Propagation	2-8
2.12	Construction Related Vibration Level Prediction	2-8
3.0	**Regulatory Setting**	**3-1**
3.1	Federal Regulations	3-1
3.2	State Regulations	3-2
3.3	City of Garden Grove Noise Regulations	3-3
4.0	**Study Method and Procedures**	**4-1**
4.1	Measurement Procedures and Criteria	4-1
4.2	Traffic Noise Modeling	4-2
4.3	Stationary Noise Modeling	4-3
4.4	Interior Noise Modeling	4-4
4.5	Construction Noise Modeling	4-4
4.6	Construction Vibration Modeling	4-5

5.0 Existing Noise Environment 5-1
5.1 Short-term (10-Minute) Noise Measurement Results 5-1

6.0 Operational Noise Impacts 6-1
6.1 Stationary Source Noise 6-1
6.2 Traffic Source Noise 6-5
6.3 Interior Noise Analysis 6-6
6.4 Operational Mitigation Measures (MM) 6-7
6.5 Operational Design Features (DF) 6-8

7.0 Construction Noise and Vibration Impacts 7-1
7.1 Construction Noise 7-1
7.2 Construction Vibration 7-4
7.3 Construction Design Features (DF) 7-5

List of Attachments

Exhibits

Location Map ..... A

Site Plan ..... B

Noise Monitoring Locations C

Recommendations ..... D

Attic Vent Acoustical Baffle Detail E-1

Roof Vent Acoustical Baffle Detail E-2

Tables

Land Use Summary 1

CEQA Noise Impact Criteria 2

Vibration Annoyance Potential Criteria 3

Vibration Damage Potential Threshold Criteria 4

Suggested "n" Values Based on Soil Classes 5

Noise/Land Use Compatibility Guidelines 6

Interior and Exterior CNEL Noise Standards 7

City of Garden Grove Municipal Code Noise Control Standards 8

Roadway Parameters 9

Vehicle Distribution (Truck Mix) 10

Reference Stationary Noise Level Measurements 11

Short Term (10-Minute) Noise Measurement Results 12

24-Hour Noise Measurement Results 13

Stationary Noise Impact Analysis (Daytime) 14

List of Attachments (continued)

Tables

Stationary Noise Impact Analysis (Nighttime) 15

Traffic Noise Impact Analysis – Exterior Areas 16

Interior Noise Impact Analysis 17

Typical Construction Noise Levels 18

Construction Noise Impact Analysis 19

Typical Construction Vibration Levels 20

Construction Vibration Analysis – South 21

Construction Vibration Analysis – West 22

Appendices

City of Garden Grove Noise Element and Noise Ordinance ..... A

Field Data and Photos ..... B

Stationary Noise Calculations Worksheets C

Roadway Noise Calculations Worksheets ..... D

Construction Noise and Vibration Calculations Worksheets ..... E

1.0 Introduction

1.1 Purpose of Analysis and Study Objectives

The purpose of this acoustical assessment is to evaluate the potential noise impacts from the proposed 13650 Harbor Boulevard Hotel (project) and provide recommended mitigation measures, if necessary, to minimize any project noise impacts. The assessment was conducted within the context of the California Environmental Quality Act (CEQA) and utilizes the noise standards set forth by the Federal, State, and local agencies.

The following is provided in this report:

- A description of the study area and the proposed project
- Information regarding the fundamentals of noise
- Identification of the regulatory setting and applicable noise standards
- Analysis of the existing noise environment
- Analysis of the project's noise/land use compatibility
- Analysis of interior noise levels for the habitable areas the project site
- Analysis of the project's operational noise impact to adjacent sensitive receptors
- Analysis of the project's construction noise and vibration impact to adjacent sensitive receptors
- Summary of recommended mitigation measures and project design features to reduce noise level impacts.

1.2 Site Location

The project site is located at 13650 Harbor Boulevard, in the City of Garden Grove. The project site is bounded by commercial/retail units to the north, residential units to the north-east, commercial/retail units to the south, Santiago High School to the east and Harbor Boulevard to the west.

The project site is currently vacant and has a net area of 1.48 acres. The site is located approximately 91 feet above sea level and is relatively flat, sloping downward at approximately 3% from east to west. The site was previously occupied by the former auto dealership, however, all previously occupied buildings on the project site were demolished prior to initiating this analysis.

The project site is a designated for Heavy Commercial use, per the Garden Grove Land Use Map. The nearest noise sensitive land uses to the project site are residential homes located approximately 50 feet to the northeast and high school (civic/institutional) uses located immediately adjacent to the site to the east.

The project site location map is provided in Exhibit A.

1.3 Project Description

The project consists of constructing and operating a five-story, 124 room hotel building. The project site is currently vacant and the previous existing use was demolished prior to initiating this analysis. The site plan used for this analysis, provided by ZBT GROUP LAND DEVELOPMENT CONSULTANTS, is illustrated in Exhibit B.

Table 1 lists the proposed land uses for the project.

Table 1
Land Use Summary

Land Use	Quantity[1]	Metric
Hotel	124	Rooms
Parking Lot	100	Spaces

Project construction and operational activities are analyzed for both short-term and long term impacts. Short-term noise impacts may occur from construction activities, including; site preparation, grading, building construction, paving, and architectural coating. The primary sources of long-term noise impacts would be associated with vehicular traffic along surrounding roadways, truck loading and delivery activities, trash pickup, and stationary HVAC mechanical equipment.

1.4 Summary of Analysis Results

Table 2 provides a summary of the noise analysis results, per the CEQA impact criteria checklist.

Table 2
CEQA Noise Impact Criteria

Noise Impact Criteria	Potentially Significant	Potentially Significant Unless Mitigated	Less Than Significant Impact	No Impact
Would the project result in?				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.		X		
b) Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.			X	
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.			X	
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.			X	
e) For a project located within 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 the people residing or working in the project area to excessive noise levels?				X
f) For a project within the vicinity of a private airstrip, would the project expose the people residing or working in the project area to excessive noise levels?				X

1.5 Recommended Mitigations Measures (MM)

The following recommended mitigation measures are provided to reduce potential project impacts identified in the CEQA Noise Impact Criteria Checklist to be less than significant.

MM-1 Prior to issuance of building permits, the project proponent shall demonstrate to the City building department that the proposed building shell assembly and window assemblies will achieve exterior to interior noise reduction that will meet the State/City building code requirement of 45 dBA CNEL.

MM-2 Based on the preliminary findings of this report, a "windows closed" condition is required for all habitable hotel rooms to meet interior noise standards. To accommodate a window closed conditions, all residential units shall be equipped with adequate fresh air ventilation, per the requirements of the California Uniform Building Code (UBC).

MM-3 Based on the preliminary findings of this report, a "windows closed" condition is Windows and sliding glass doors will require a minimum STC rating of 31 or higher on all the floors.

MM-4 The project shall comply with California Title 24 insulation building requirements for common separating assemblies (e.g. floor/ceiling assemblies and demising walls).

1.6 Recommended Project Design Features (DF)

The following recommended project design features include standard rules and requirements, best practices and recognized design guidelines for reducing noise levels. Design features are assumed to be part of the conditions of the project and integrated into its design.

DF-1 All rooftop mounted HVAC equipment should be shielded or enclosed from the line of sight of adjacent properties. Shielding/parapet wall should be at least as high as the equipment.

DF-2 Provide a six (6) foot high block wall along the northern and eastern property line to shield adjacent sensitive land uses from project noise.

DF-3 Provide a seven-foot-high block wall with transparent glass to surround the outdoor pool area.

- The designed noise screening will only be accomplished if the barrier's weight is at least 3.5 pounds per square foot of face area without decorative cutouts, line-of-site openings or gaps between the masonry block and transparent glass material.

- The noise control barrier should be constructed using masonry block and 3/8" thick acrylic, polycarbonate, laminated glass, or other transparent material with sufficient weight per sqaure foot.

DF-4 Provide CMU block wall enclosure around trash area to shield adjacent properties.

DF-5 Delivery, loading/unloading activity, and trash pick-up hours should be limited to daytime (7 a.m. – 10 p.m.) hours only.

DF-6 Limit engine idling time for all delivery vehicles and trucks to 5 minutes or less.

DF-7 For proper interior acoustical performance, all exterior windows, doors, and sliding glass doors must have a positive seal and leaks/cracks must be kept to a minimum.

DF-8 Construction-related noise activities shall comply with the requirements set forth in the City of Garden Grove Municipal Code Section 8.47.

DF-9 Construction activities shall not take place between the hours of 10:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a federal holiday.

DF-10 No impact pile driving activities shall be allowed on the project site.

DF-11 During construction, the contractor shall ensure all construction equipment is equipped with appropriate noise attenuating devices and equipment shall be maintained so that vehicles and their loads are secured from rattling and banging. Idling equipment should be turned off when not in use.

DF-12 Locate staging area, generators and stationary construction equipment as far from the north and east property line, as reasonably feasible.

DF-13 Obtain a construction work permit from the City of Garden Grove prior to starting construction.

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2.0 Fundamentals of Noise and Vibration

This section of the report provides basic information about noise and vibration and presents some of the terms used in the report.

2.1 Sound, Noise, and Acoustics

The sound is a disturbance created by a moving or vibrating source and is capable of being detected by the hearing organs. The sound may be thought of as mechanical energy of a moving object transmitted by pressure waves through a medium to a human ear. For traffic or stationary noise, the medium of concern is air. *Noise* is defined as sound that is loud, unpleasant, unexpected, or unwanted.

2.2 Frequency and Hertz

A continuous sound is described by its *frequency* (pitch) and its *amplitude* (loudness). Frequency relates to the number of pressure oscillations per second. Low-frequency sounds are low in pitch (bass sounding) and high-frequency sounds are high in pitch (squeak). These oscillations per second (cycles) are commonly referred to as Hertz (Hz). The human ear can hear from the bass pitch starting out at 20 Hz all the way to the high pitch of 20,000 Hz.

2.3 Sound Pressure Levels and Decibels

The *amplitude* of a sound determines its loudness. The loudness of sound increases or decreases, as the amplitude increases or decreases. Sound pressure amplitude is measured in units of micro-Newton per square inch meter (N/m2), also called micro-Pascal (μPa). One μPa is approximately one hundred billionths (0.00000000001) of normal atmospheric pressure. Sound pressure level (SPL or L_p) is used to describe in logarithmic units the ratio of actual sound pressures to a reference pressure squared. These units are called decibels and abbreviated as dB.

2.4 Addition of Decibels

Because decibels are on a logarithmic scale, sound pressure levels cannot be added or subtracted by simple plus or minus addition. When two (2) sounds or equal SPL are combined, they will produce an SPL 3 dB greater than the original single SPL.

In other words, sound energy must be doubled to produce a 3dB increase. If two (2) sounds differ by approximately 10 dB the higher sound level is the predominant sound.

2.5 Human Response to Changes in Noise Levels

In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz, (A-weighted scale) and it perceives a sound within that range as being more intense than a sound with a higher or lower frequency with the same magnitude. For purposes of this report as well as with most environmental documents, the A-scale weighing is typically reported in terms of A-weighted decibel (dBA). Typically, the human ear can barely perceive the change in the noise level of 3 dB. A change in 5 dB is readily perceptible, and a change in 10 dB is perceived as being twice or half as loud. As previously discussed, a doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g. doubling the volume of traffic on a highway), would result in a barely perceptible change in sound level.

2.6 Noise Descriptors

Noise in our daily environment fluctuates over time. Some noise levels occur in regular patterns, others are random. Some noise levels are constant, while others are sporadic. Noise descriptors were created to describe the different time-varying noise levels. Following are the most commonly used noise descriptors along with brief definitions.

A-Weighted Sound Level

The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high-frequency components of the sound in a manner similar to the response of the human ear. A numerical method of rating human judgment of loudness.

Ambient Noise Level

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

Community Noise Equivalent Level (CNEL)

The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five (5) decibels to sound levels in the evening from 7:00 to 10:00 PM and after addition of ten (10) decibels to sound levels in the night before 7:00 AM and after 10:00 PM.

Decibel (dB)

A unit for measuring the amplitude of a sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micro-pascals.

dB(A)

A-weighted sound level (see definition above).

Equivalent Sound Level (LEQ)

The sound level corresponding to a steady noise level over a given sample period with the same amount of acoustic energy as the actual time-varying noise level. The energy average noise level during the sample period.

Habitable Room

Any room meeting the requirements of the Uniform Building Code or other applicable regulations which is intended to be used for sleeping, living, cooking or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms, and similar spaces.

L(n)

The A-weighted sound level exceeded during a certain percentage of the sample time. For example, L10 in the sound level exceeded 10 percent of the sample time. Similarly, L50, L90, and L99, etc.

Noise

Any unwanted sound or sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying. The State Noise Control Act defines noise as "...excessive undesirable sound...".

Outdoor Living Area

Outdoor spaces that are associated with residential land uses typically used for passive recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, jacuzzi areas, etc. associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or other noise-sensitive activities; and outdoor school facilities routinely used for educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are: front yard areas, driveways, greenbelts, maintenance areas and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and, outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).

Percent Noise Levels

See L(n).

Sound Level (Noise Level)

The weighted sound pressure level obtained by use of a sound level meter having a standard frequency-filter for attenuating part of the sound spectrum.

Sound Level Meter

An instrument, including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement and determination of noise and sound levels.

Single Event Noise Exposure Level (SENEL)

The dBA level which, if it lasted for one (1) second, would produce the same A-weighted sound energy as the actual event.

2.7 Traffic Noise Prediction

Noise levels associated with traffic depends on a variety of factors: (1) volume of traffic, (2) speed of traffic, (3) auto, medium truck (2 – 6 wheels) and heavy truck percentage (3 axles and greater), and sound propagation. The greater the volume of traffic, higher speeds and truck percentages equate to a louder volume of noise. A doubling of the Average Daily Traffic (ADT) along a roadway will increase noise levels by approximately 3 dB; reasons for this are discussed in the sections above.

2.8 Sound Propagation

As sound propagates from a source it spreads geometrically. The sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates at a rate of 6 dB per doubling of distance. The movement of vehicles down a roadway makes the source of the sound appear to propagate from a line (i.e., line source) rather than a point source. This line source results in the noise propagating from a roadway in a cylindrical spreading versus a spherical spreading that results from a point source. The sound level attenuates for a line source at a rate of 3 dB per doubling of distance.

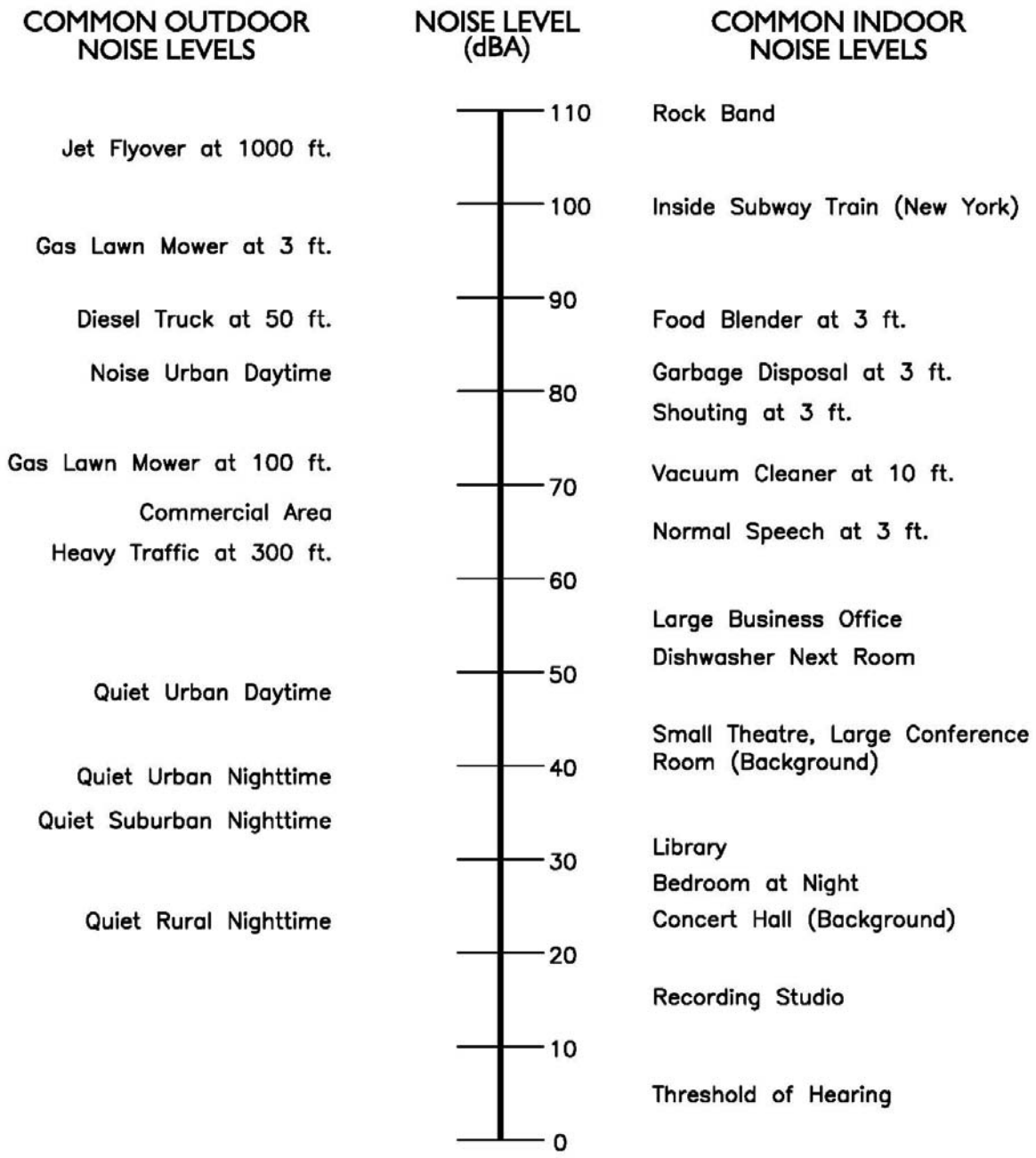
As noise propagates from the source, it is affected by the ground and atmosphere. Noise models use the hard site (reflective surfaces) and soft site (absorptive surfaces) to help calculate predicted noise levels. Hard site conditions assume no excessive ground absorption between the noise source and the receiver. Soft site conditions such as grass, soft dirt or landscaping attenuate noise at an additional rate of 1.5 dB per doubling of distance. When added to the geometric spreading, the excess ground attenuation results in an overall noise attenuation of 4.5 dB per doubling of distance for a line source and 6.0 dB per doubling of distance for a point source.

Research has demonstrated that atmospheric conditions can have a significant effect on noise levels when noise receivers are located 200 feet from a noise source. Wind, temperature, air humidity, and turbulence can further impact how far sound can travel.

Figure 1 shows typical sound levels from indoor and outdoor noise sources.

Figure 1

TYPICAL SOUND LEVELS FROM INDOOR AND OUTDOOR NOISE SOURCES



2.9 Vibration Descriptors

Ground-borne vibrations consist of rapidly fluctuating motions within the ground that have an average motion of zero. The effects of ground-borne vibrations typically only cause a nuisance to people, but at extreme vibration levels, damage to buildings may occur. Although ground-borne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. Ground-borne noise is an effect of ground-borne vibration and only exists indoors since it is produced from noise radiated from the motion of the walls and floors of a room and may also consist of the rattling of windows or dishes on shelves.

Several different methods are used to quantify vibration amplitude.

PPV

Known as the peak particle velocity (PPV) which is the maximum instantaneous peak in vibration velocity, typically given in inches per second.

RMS

Known as the root mean squared (RMS) can be used to denote vibration amplitude.

VdB

A commonly used abbreviation to describe the vibration level (VdB) for a vibration source.

2.10 Vibration Perception

Typically, developed areas are continuously affected by vibration velocities of 50 VdB or lower. These continuous vibrations are not noticeable to humans whose threshold of perception is around 65 VdB. Outdoor sources that may produce perceptible vibrations are usually caused by construction equipment, steel-wheeled trains, and traffic on rough roads, while smooth roads rarely produce perceptible ground-borne noise or vibration. To counter the effects of ground-borne vibration, the Federal Transit Administration (FTA) has published guidance relative to vibration impacts. According to the FTA, fragile buildings can be exposed to ground-borne vibration levels of 0.3 inches per second without experiencing structural damage.

2.11 Vibration Propagation

There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wavefront, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along an expanding spherical wavefront. The particle motion in these waves is longitudinal (i.e., in a "push-pull" fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wavefront. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the vibration energy decreases in a logarithmic nature and the vibration levels typically decrease by 6 VdB per doubling of the distance from the vibration source. As stated above, this drop-off rate can vary greatly depending on the soil but has been shown to be effective enough for screening purposes, in order to identify potential vibration impacts that may need to be studied through actual field tests.

2.12 Construction Related Vibration Level Prediction

Operational activities are separated into two different categories. The vibration can be transient or continuous in nature. Each category can result in varying degrees of ground vibration, depending on the equipment used on the site. Operation of equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Buildings in the vicinity of the project area site respond to these vibrations with varying results ranging from no perceptible effects at the low levels to slight damage at the highest levels. The thresholds from Caltrans Transportation and Construction Induced Vibration Guidance Manual in the table below provide general guidelines as to the maximum vibration limits for when vibration becomes potentially annoying.

Table 3
Vibration Annoyance Potential Criteria

Human Response	PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.90	0.10
Severe	2.00	0.40

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

The Caltrans Transportation and Construction Induced Vibration Guidance Manual provides general thresholds and guidelines as to the vibration damage potential from vibratory impacts. The table below provides general vibration damage potential thresholds:

Table 4
Vibration Damage Potential Threshold Criteria

Structure and Condition	PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings ruin ancient monuments	0.12	0.08
Fragile buildings	0.20	0.10
Historic and some old buildings	0.50	0.25
Older residential structures	0.50	0.30
New residential structures	1.00	0.50
Modern industrial/commercial buildings	2.00	0.50

Soil conditions have an impact on how vibration propagates through the ground. The Caltrans Transportation and Construction Induced Vibration Guidance Manual provides suggested "n" values based on soil class. The table below outlines the manual's suggested values and description.

Table 5
Suggested "n" Values Based on Soil Classes

Soil Class	Description of Soil Material	Suggested Value of "n"
I	Weak or soft soils: loose soils, dry or partially saturated peat and muck, mud, loose beach sand, and dune sand.	1.4
II	Most sands, sandy clays, silty clays, gravel, silts, weathered rock.	1.3
III	Hard soils: densely compacted sand, dry consolidated clay, consolidated glacial till, some exposed rock.	1.1
IV	Hard, component rock: bedrock, freshly exposed hard rock.	1.0

3.0 Regulatory Setting

The proposed project is located in the City of Garden Grove and noise regulations are addressed through the various federal, state, and local government agencies. The agencies responsible for regulating noise are discussed below.

3.1 Federal Regulations

The adverse impact of noise was officially recognized by the federal government in the Noise Control Act of 1972, which serves three (3) purposes:

- Publicize noise emission standards for interstate commerce
- Assist state and local abatement efforts
- Promote noise education and research

The Federal Office of Noise Abatement and Control (ONAC) was originally tasked with implementing the Noise Control Act. However, it was eventually eliminated leaving other federal agencies and committees to develop noise policies and programs. Some examples of these agencies are as follows: The Department of Transportation (DOT) assumed a significant role in noise control through its various agencies. The Federal Aviation Agency (FAA) is responsible to regulate noise from aircraft and airports. The Federal Highway Administration (FHWA) is responsible to regulate noise from the interstate highway system. The Occupational Safety and Health Administration (OSHA) is responsible for the prohibition of excessive noise exposure to workers.

The Federal government and the State advocate that local jurisdiction use their land use regulatory authority to arrange new development in such a way that "noise sensitive" uses are either prohibited from being constructed adjacent to a highway or, or alternatively that the developments are planned and constructed in such a manner that potential noise impacts are minimized.

Since the Federal government and the State have preempted the setting of standards for noise levels that can be emitted by the transportation source, the County is restricted to regulating the noise generated by the transportation system through nuisance abatement ordinances and land use planning.

3.2 State Regulations

Established in 1973, the California Department of Health Services Office of Noise Control (ONC) was instrumental in developing regularity tools to control and abate noise for use by local agencies. One significant model is the "Land Use Compatibility for Community Noise Environments Matrix." The matrix allows the local jurisdiction to clearly delineate compatibility of sensitive uses with various incremental levels of noise.

The State of California has established noise insulation standards as outlined in Title 24 and the Uniform Building Code (UBC) which in some cases requires acoustical analyses to outline exterior noise levels and to ensure interior noise levels do not exceed the interior threshold. The State mandates that the legislative body of each county and city adopt a noise element as a part of its comprehensive general plan. The local noise element must recognize the land use compatibility guidelines published by the State Department of Health Services. The guidelines rank noise land use compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable.

Transient lodging, hotels and motels should typically follow multifamily housing noise insulation and design standards. Noise insulation design standards for multi-family residences have been established by the State of California Uniform Building Code (UBC) Chapter 12, Division II and by the Title 24 noise insulation standards of the California Administrative Code. In brief, the Title 24 noise standards require the following for multi-family dwellings.

1. Party wall and floor-ceiling assembly designs must provide a minimum STC of 50, based on lab tests. Field tested assemblies must provide a minimum noise isolation class (NIC) of 45.

2. Floor-ceiling assembly designs must provide for a minimum impact insulation class (IIC) of 50, based on lab tests. Field tested assemblies must provide a minimum FIIC of 45.

3. Entry doors from interior corridors must provide an STC of 26 or more.

4. Penetrations or openings in sound rated assemblies must be treated to maintain required ratings.

5. Interior noise levels due to exterior sources must not exceed a community noise equivalent level (CNEL) or a day-night level (LDN) of 45 dBA, in any habitable room.

Thus, the interior limit is 45 dBA CNEL between dwelling units and from exterior noise sources to interior living spaces. In addition, to provide a reasonable expectation that this standard can be met under normal conditions, the design of party walls and floor/ceiling assemblies for multi-family dwelling units must be based on laboratory-tested assemblies which test at a sound transmission class of 50 STC, or better.

3.3 City of Garden Grove Noise Regulations

The City of Garden Grove outlines their noise regulations and standards within the General Plan Noise Element and Title 8.47 of the Municipal Code. For purposes of this analysis, the City of Garden Grove's Noise Element is used to evaluate the project's noise/land use compatibility and ensure the project is consistent with the established plans, policies and programs for noise control within the City. The City's Municipal Code, Chapter 8.47, Noise Control, identifies the stationary and construction noise regulations within the City.

The Garden Grove General Plan Noise Element and Municipal Code Noise Control chapter are provided in Appendix A.

Noise/Land Use Compatibility

The City of Garden Grove Noise Element establishes planning criteria for determining a development's noise/land use compatibility based on the community noise equivalent level (CNEL).

Table 6 summarizes the City's Noise/Land Use Compatibility guidelines for land uses applicable to this project:

Table 6
Noise/Land Use Compatibility Guidelines

Land Use	Noise Limit (CNEL)			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Transient Lodging – Motel, Hotels	50 - 65	60 - 70	70 - 80	80 - 85

NORMALLY ACCEPTABLE: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.

CONDITIONALLY ACCEPTABLE: New construction or development should be undertaken only after detailed analysis of the noise reduction requirements are made and needed noise insulation features in the design are determined. Conventional construction, with closed windows and fresh air supply systems or air conditioning, will normally suffice.

NORMALLY UNACCEPTABLE: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of noise reduction requirements must be made and needed noise insulation features included in the design.

CLEARLY UNACCEPTABLE: New construction or development should generally not be undertaken.

Municipal Code Noise Standards

The City's Municipal Code, Chapter 8.47, Noise Control, identifies the noise regulations for controlling unnecessary, excessive and annoying sounds in the City. The Garden Grove noise standards are shown in Table 7. Noise levels shown in Table 7 are applicable to the project site and surrounding land uses.

Table 7
Garden Grove Noise Standards

Land Use Designation		Ambient Base Noise Level	Time of Day
Sensitive Uses	Residential Use	55 dBA	7:00 AM – 10:00 PM
		50 dBA	10:00 PM – 7:00 AM
Conditionally Sensitive	Institutional Use	65 dBA	Any Time
	Office-Professional Use	65 dBA	Any Time
	Hotels & Motels	65 dBA	Any Time
Non-Sensitive	Commercial Uses	70 dBA	Any Time
	Commercial/ Industrial Uses within 150 feet of Residential	65 dBA	7:00 AM – 10:00 PM
		50 dBA	10:00 PM – 7:00 AM
	Industrial Use	70 dBA	Any Time

Section 8.47.050C allows increases in noise levels if it is accordance with the following:

Table 8
Permitted Increases in Noise, by Duration

Duration of Increase (percent of hour)	Permitted Noise Increase
30 min. (L_{50})	- -
15 min. (L_{25})	5 dBA
5 min. (L_8)	10 dBA
1 min. (L_2)	15 dBA
Less than 1 minute (L_{MAX})	20 dBA

[1] Per Section 8.47.050C of the Garden Grove Municipal Code

In the event the ambient noise level exceeds any of the first four noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.

The Municipal Code noise regulations are used to evaluate offending stationary noise sources (e.g., loading/unloading, condenser units, etc.) and construction activity. The noise disturbance criteria is states that it shall be unlawful for any person to willfully make, continue, or cause to be made or continued, any loud, unnecessary, or unusual noise that disturbs the peace or quiet of any neighborhood, or that causes discomfort or annoyance to any person of normal sensitiveness.

Construction Noise Regulation

Section 8.47.060d of the municipal code indicates the following with regard to construction noise:

"It shall be unlawful for any person within a residential area, or within a radius of 500 feet there from, to operate equipment or perform any outside construction or repair work on buildings, structures, or projects, or to operate any pile driver, power shovel, pneumatic hammer, derrick, power hoist, or any other construction type device between the hours of 10:00 p.m. of one day and 7:00 a.m. of the next day in such a manner that a person of normal sensitiveness, as determined utilizing the criteria established in Section 8.47.050(B), is caused discomfort or annoyance unless such operations are of an emergency nature."

4.0 Study Method and Procedures

The following section describes the measurement procedures, measurement locations, and noise modeling procedures and assumptions used in the noise analysis.

4.1 Measurement Procedures and Criteria

Noise measurements are taken to determine the existing noise levels. A noise receiver or receptor is any location in the noise analysis in which noise might produce an impact. The following criteria are used to select measurement locations and receptors:

- Locations expected to receive the highest noise impacts, such as the first row of houses
- Locations that are acoustically representative and equivalent of the area of concern
- Human land usage
- Sites clear of major obstruction and contamination

RK conducted the sound level measurements in accordance with Caltrans technical noise specifications. All measurement equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA).

A Larson Davis 712 Type 2 sound level meter and Piccolo II Type 2 sound level meter were used to conduct the short-term (10-minute) noise measurement.

The Leq, Lmin, Lmax, L2, L8, L25, and L50 statistical data were recorded over the measurement time period intervals and the information was utilized to define the noise characteristics for the project. The following gives a brief description of the Caltrans Technical Noise Supplement procedures for sound level measurements:

- Microphones for sound level meters were placed five (5) feet above the ground for all short-term noise measurements
- Sound level meters were calibrated before and after each measurement
- Following the calibration of equipment, a windscreen was placed over the microphone
- Frequency weighting was set on “A” and slow response
- Results of the short-term noise measurements were recorded on field data sheets

- During any short-term noise measurements, any noise contaminations such as barking dogs, local traffic, lawn mowers, or aircraft fly-overs were noted
- Temperature and sky conditions were observed and documented

Appendix B includes photos, field sheets, and measured noise data.

4.2 Traffic Noise Modeling

Traffic noise from vehicular traffic was projected using a version of the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108). The FHWA model arrives at the predicted noise level through a series of adjustments to the key input parameters. The following outlines the key adjustments made to the computer model for the roadway inputs:

- Roadway classification – (e.g. freeway, major arterial, arterial, secondary, collector, etc),
- Roadway Active Width – (distance between the center of the outer most travel lanes on each side of the roadway)
- Average Daily Traffic (ADT) Volumes, Travel Speeds, Percentages of automobiles, medium trucks, and heavy trucks
- Roadway grade and angle of view
- Site Conditions (e.g. soft vs. hard)
- Percentage of total ADT which flows each hour throughout a 24-hour period

The following outlines key adjustments to the computer model for the project site parameter inputs:

- Vertical and horizontal distances (Sensitive receptor distance from noise source)
- Noise barrier vertical and horizontal distances (Noise barrier distance from sound source and receptor).
- Traffic noise source spectra
- Topography

Table 9 indicates the roadway parameters utilized for this study.

Table 9
Roadway Parameters[1]

Roadway	Segment	Class.	Lanes	ADT[2]	Speed (MPH)	Site
Harbor Boulevard	Westminster Avenue to Trask Avenue	Major Arterial	6	62,305	40	Hard/Soft

[1] Roadway parameters based on City of Garden Grove General Plan Circulation Element
[2] ADT = Average Daily Traffic.

Table 10 indicates the vehicle distribution and truck mix utilized for all roadways in this study area.

Table 10
Vehicle Distribution (Truck Mix)[1]

Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	77.5	12.9	9.6	97.42
Medium Trucks	84.8	4.9	10.3	1.84
Heavy Trucks	86.5	2.7	10.8	0.74

[1] Vehicle percentages consistent with typical Orange County Traffic Data.

RK projected traffic noise levels to the nearest building façades on the project site. and all habitable exterior areas.

4.3 Stationary Noise Modeling

The stationary noise was projected using a computer program that replicates the FHWA Noise Prediction Model (FHWA-RD-77-108). The FHWA model arrives at the predicted noise level through a series of adjustments to the reference energy noise level. For each stationary source, the referenced noise level was applied to the model. The model outputs the projected noise level based on the following key parameters:

- Measured referenced noise level – (e.g. how loud a source is at a specific distance)
- Vertical and horizontal distances (sensitive receptor distance from noise source)
- Noise barrier vertical and horizontal distances (noise barrier distance from sound source and receptor).
- Typical noise source spectra
- Topography

Table 11 indicates the measured referenced noise level measurements conducted by RK. The noise measurement data indicates the distance the microphone was placed from the noise source and the statistical data. Measurements were taken over a 10-minute interval.

Table 11
Reference Stationary Noise Level Measurements

Source[1]	Distance from Source (feet)	Noise Levels (dBA)					
		L_{eq}	L_{max}	L_2	L_8	L_{25}	L_{50}
Loading/Unloading, Delivery and Trash Trucks	6.0	66.3	84.0	78.5	68.0	61.5	58.5
HVAC Condenser Unit	3.0	88.5	88.5	88.5	88.5	88.5	88.5
Parking Lot	6.0	63.8	79.5	68.5	65.5	64.5	63.0

[1] Referenced noise levels measured by RK over a 10-minute period.

To estimate the future noise levels during typical conditions, RK adjusted the reference noise levels to the nearest adjacent sensitive receptors and/or property line. Adjusted noise levels are based on the distance of the receptor location relative to the noise source, local topography and the recommended parapet wall shielding wall for the equipment. The noise levels assume that the stationary sources are operating continuously when in reality all noise sources will operate intermittently throughout the daily operation.

4.4 Interior Noise Modeling

The interior noise level is the difference between the projected exterior noise level at the structure's façade and the noise reduction provided by the structure itself. Typical building construction will provide a conservative 12 dBA noise level reduction with a "windows open" condition and a very conservative 20 dBA noise level reduction with "windows closed". RK estimated the interior noise level by subtracting the building shell design from the estimated exterior noise level.

4.5 Construction Noise Modeling

The construction noise analysis utilizes the Federal Highway Administration (FHWA) Roadway Construction Noise Model Version 1.1, together with several key construction

parameters, to estimate future construction noise impacts. Key inputs include distance to the sensitive receiver, equipment usage, and baseline parameters for the project site.

Construction noise impacts are analyzed for each phase of construction anticipated for the project. Noise levels are calculated based on the average distance of equipment over an 8-hour period to the property line.

4.6 Construction Vibration Modeling

The construction vibration assessment utilizes referenced worst-case vibration levels and methodology set-forth within the Caltrans Transportation and Construction Induced Vibration Guidance Manual.

The main sources of vibration impacts during construction of the project would be from bulldozer activity during site preparation and truck loading activities throughout the construction process. The vibratory activity required to comply with the applicable guidance thresholds criteria.

Vibration impacts are assessed to the nearest adjacent structures to the site. Residential structures are located approximately 50 feet northeast of the property line and commercial/retail structures are located at the property line to the south. All buildings within the study area are considered to be new residential structures and/or modern commercial buildings.

Vibratory impacts were calculated using the reference vibration levels, soil conditions and the reference equation *PPV= PPV ref (25/D)^n (in/sec)* (from Caltrans Manual) where:

PPV = reference measurement at 25 feet from the vibration source
D = distance from equipment to the property line
n= vibration attenuation rate through the ground (n=1.0 was utilized for this study)

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5.0 Existing Noise Environment

Noise measurement data was collected on the project site to determine the existing noise environment. Noise measurement data indicates that traffic noise propagating from Harbor Boulevard and activities from the adjacent auto body/repair shop are the main sources of ambient noise at the project site and surrounding area. Noise monitoring locations were selected based on locations that are representative of the existing noise environment and exposure to sensitive noise areas.

5.1 Short-Term (10-Minute) Noise Measurement Results

Using a Larson Davis 712 Type 2 sound level meter, four (4) short-term (10-minute) noise measurements were recorded on-site near the adjacent property lines. Short term noise measurements are conducted during normal daytime hours and considered samples of typical ambient conditions. The Leq, Lmin, Lmax, L2, L8, L25, and L50 statistical data were recorded over the 10-minute period. The information was utilized to define the noise characteristics for the project.

The results of the short-term (ST) measurements are presented in Table 12. Noise measurement data indicates that the existing site and surrounding area experience daytime noise levels ranging from approximately 53.5 dBA near the eastern property line to 69.6 dBA Leq along Harbor Boulevard.

Table 12
Short Term (10-Minute) Noise Measurement Results

Site No.	Time Started	Leq	Lmin	Lmax	L_2	L_8	L_{25}	L_{50}
ST-1	11.21 AM	69.6	52.8	85.4	77.2	72.6	69.3	66.6
ST-2	11.24 AM	56.1	47.7	73.3	62.4	58.9	56.5	54.5
ST-3	11.42 AM	53.5	47.3	64.4	58.8	56.4	54.6	52.4
ST-4	11.36 AM	67.7	47.5	79.0	74.4	73.3	71.9	53.3

Exhibit C shows the noise measurement locations. The following details and observations are provided for the short-term noise measurement:

ST-1 Noise meter placed along the western property line of the project site, approximately 90 feet from the north property line. Ambient traffic noise from Harbor Boulevard and pedestrians.

ST-2 Noise meter placed along the north property line of the project site, approximately 155 feet from the west property line. Traffic noise from Harbor Boulevard was the main sources of ambient noise.

ST-3 Noise meter placed along the north-eastern corner of the site. Noise meter located approximately 10 feet from north and east property line. Ambient traffic noise from Harbor Boulevard.

ST-4 Noise meter placed along the south-eastern corner of the site. Noise meter located approximately 10 feet from south and east property line. Ambient traffic noise from Harbor Boulevard and an adjacent car repair shop.

Appendix B includes photos, field sheets, and measured noise data.

6.0 Operational Noise Impacts

This assessment analyzes the operational noise impacts generated by the project to surrounding residential and institutional (high school) land uses. Traffic noise impacts from Harbor Boulevard are also analyzed on the project site with respect to the conditionally sensitive Hotel land use. Noise level impacts are compared to the City's noise standards in the General Plan Noise Element and Municipal Code. Mitigation measures are provided, as needed, to ensure the project's noise impact is less than significant.

It should be noted that noise impacts have been conservatively analyzed at the property line of the adjacent high school's athletic field. The nearest classrooms are located approximately 1,000 feet from the property line of the project and would experience significantly lower noise level impacts from the project than what is reported in this analysis. Therefore, noise impacts from the project to the adjacent high school are conservative.

6.1 Stationary Source Noise Impacts

The main source of stationary noise impacting the adjacent residential homes and high school/institutional land uses would be from typical operational activities of a hotel, such as noise from truck loading and delivery activities, parking lot noise, trash truck collection, and rooftop HVAC equipment. The pool area faces west, away from the sensitive land uses and shielded by the hotel and a perimeter wall, and would not be considered a major source of noise impacting the adjacent sensitive uses.

Loading and delivery activities are expected to take place in the porte-cochere area near the main entrance of the hotel. The loading area is located approximately 225 feet from the adjacent residential homes and 205 feet from the high school property line. Loading activities would mainly consist of box truck deliveries. Heavy duty semi tractor-trailer deliveries would not be common for this type of project.

Parking lot noise would occur from vehicle engine idling and exhaust, doors slamming, tires screeching, people talking, and the occasional horn honking. Parking lot noise would occur throughout the site and is conservatively assessed center of drive aisles closest to adjacent uses; approximately 75 feet from the residential homes and 37 feet from the property line of the high school.

Trash collection would occur in the northeast corner of the project site at the trash enclosure area. Trash truck noise would be considered an infrequent event, typically only

occurring a few times per week. The trash enclosure area is located approximately 66 feet from the residential homes and 18 feet from the high school property line. The trash enclosure area would be surrounded by a 10 foot concrete/masonry block wall, shielding the adjacent uses from noise and sight.

Two (2) HVAC air handler equipment units are expected to be located on the roof, approximately 50 feet above pad level. The closest HVAC units will be located approximately 187 feet from the nearest residential units and 175 feet from the high school property line.

6.1.1 Residential Properties to the North - Daytime

Table 13 shows the stationary noise impact analysis results for all sources operating simultaneously during daytime hours (7 a.m. to 10 p.m.) at the nearest residential homes to the north of the site. The change in existing daytime ambient noise levels at the residential homes, as a result of the project's stationary noise sources, would be approximately 0.2 dBA Leq.

Table 13
Stationary Noise Impact Analysis
Residential Properties to the North

	Source	Noise Level (dBA)					
		L_{eq}	L_{max} (max)	L_2 (1 min)	L_8 (5 min)	L_{25} (15 min)	L_{50} (30 min)
Daytime (7:00 AM - 10:00 PM)	Loading Area and Delivery Trucks	29.9	47.6	42.1	31.6	25.1	22.1
	Parking Lot	36.4	52.1	41.1	38.1	37.1	35.6
	Trash Pick-up	37.7	55.4	49.9	39.4	32.9	29.9
	Rooftop HVAC Units	40.6	40.6	40.6	40.6	40.6	40.6
	Existing Ambient Measurement	53.5	64.4	58.8	56.4	54.6	52.4
	Total Combined Exterior Noise Impact	53.9	65.2	59.5	56.7	54.9	52.8
	City of Garden Grove Noise Criteria[1]	n/a	75.0	70.0	65.0	60.0	55.0
	Change in Noise Level as a Result of Project	0.4	0.8	0.7	0.3	0.3	0.4
	Significant Impact?[2]	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

[1] City of Garden Grove Municipal Code Chapter 8.47.060 Noise Control.
[2] A significant noise impact is considered to occur when the project causes a 3 dBA or more increase in noise levels above ambient without project conditions.

A significant noise impact is considered to occur when the project causes a 3 dBA or more increase in noise levels above ambient without project conditions, which is typically considered the threshold for the human ear to perceive a noise level change. Therefore, during daytime hours at the nearest adjacent residential homes, the project would not result in the exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies. The project would also not result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

6.1.2 Residential Properties to the North - Nighttime

Table 14 shows the stationary noise impact analysis results for all sources operating simultaneously during nighttime hours (10 p.m. to 7 a.m.) at the nearest residential homes to the north of the site. The change in existing daytime ambient noise levels at the residential homes, as a result of the project's stationary noise sources, would be approximately 0.2 dBA Leq.

Table 14
Stationary Noise Impact Analysis
Residential Properties to the North

	Source	Noise Level (dBA)					
		L_{eq}	L_{max} (max)	L_2 (1 min)	L_8 (5 min)	L_{25} (15 min)	L_{50} (30 min)
Nighttime (10:00 PM – 7:00 AM)	Loading Area and Delivery Trucks	35.6	53.3	47.8	37.3	30.8	27.8
	Parking Lot	48.0	63.7	52.7	49.7	48.7	47.2
	Trash Pick-up	46.3	64.0	58.5	48.0	41.5	38.5
	Rooftop HVAC Units	39.2	39.2	39.2	39.2	39.2	39.2
	Existing Ambient Measurement[3]	48.5	59.4	53.8	51.4	49.6	47.4
	Total Combined Exterior Noise Impact	49.7	61.6	55.8	52.2	50.4	48.5
	City of Garden Grove Noise Criteria[1]	n/a	70.0	65.0	60.0	55.0	50.0
	Change in Noise Level as a Result of Project	1.2	2.2	2.0	0.8	0.8	1.1
	Significant Impact?[2]	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

[1] City of Garden Grove Municipal Code Chapter 8.47.060 Noise Control.
[2] A significant noise impact is considered to occur when the project causes a 3 dBA or more increase in noise levels above ambient without project conditions.
[3] Nighttime ambient noise levels estimated by decreasing daytime ambient noise levels by 5 dBA.

A significant noise impact is considered to occur when the project causes a 3 dBA or more increase in noise levels above ambient without project conditions, which is typically considered the threshold for the human ear to perceive a noise level change. Therefore, during daytime hours at the nearest adjacent residential homes, the project would not result in the exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies. The project would also not result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

6.1.3 Santiago High School to the East - Daytime

Table 15 shows the stationary noise impact analysis results for all sources operating simultaneously during daytime hours (7 a.m. to 10 p.m.) at the adjacent high school property line to the east of the site. The change in existing daytime ambient noise levels at the high school property, as a result of the project's stationary noise sources, would be approximately 0.2 dBA Leq.

Table 15
Stationary Noise Impact Analysis
Santiago High School Property Line to the East

	Source	Noise Level (dBA)					
		L_{eq}	L_{max} (max)	L_2 (1 min)	L_8 (5 min)	L_{25} (15 min)	L_{50} (30 min)
Daytime (7:00 AM - 10:00 PM)	Loading Area and Delivery Trucks	35.6	53.3	47.8	37.3	30.8	27.8
	Parking Lot	48.0	63.7	52.7	49.7	48.7	47.2
	Trash Pick-up	46.3	64.0	58.5	48.0	41.5	38.5
	Rooftop HVAC Units	39.0	39.0	39.0	39.0	39.0	39.0
	Existing Ambient Measurement	67.7	79.0	74.4	73.3	71.9	53.3
	Total Combined Exterior Noise Impact	67.8	79.3	74.6	73.3	71.9	54.5
	City of Garden Grove Noise Criteria[1]	n/a	85.0	80.0	75.0	70.0	65.0
	Change in Noise Level as a Result of Project	0.1	0.3	0.2	0.0	0.0	1.2
	Significant Impact?[2]	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

[1] City of Garden Grove Municipal Code Chapter 8.47.060 Noise Control.
[2] A significant noise impact is considered to occur when the project causes a 3 dBA or more increase in noise levels above ambient without project conditions.

A significant noise impact is considered to occur when the project causes a 3 dBA or more increase in noise levels above ambient without project conditions, which is typically considered the threshold for the human ear to perceive a noise level change. Therefore, during daytime hours at the nearest adjacent residential homes, the project would not result in the exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies. The project would also not result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

The high school land use is not expected to operate at

6.2 Traffic Source Noise

Traffic source noise is analyzed to determine the project's noise/land use compatibility setting and to determine exterior/interior noise level impacts to the habitable areas of the hotel.

Table 16 indicates the estimated future exterior noise levels at the project site. The noise levels will range from approximately 62.9 dBA CNEL at the ground floor outdoor pool area to 68.6 at the 2nd-floor building facade facing harbor boulevard. The outdoor pool area will be shielded by a seven (7) foot high block wall with transparent glass.

Traffic noise calculation worksheets can be found in Appendix D.

Table 16
Traffic Noise Impact Analysis – Exterior Areas

Floor / Receptor Location	Exterior Noise Level (dBA CNEL)	Noise/Land Use Compatibility
Ground Floor – Swimming Pool / Outdoor Area	62.9	Normally Acceptable
Ground Floor Building Façade	62.3	Normally Acceptable
2nd Floor Building Façade	68.6	Conditionally Acceptable
3rd Floor Building Façade	68.5	Conditionally Acceptable
4th Floor Building Façade	68.3	Conditionally Acceptable
5th Floor Building Facade	68.1	Conditionally Acceptable

[1] Exterior noise levels calculated 5-feet above pad/floor elevation, perpendicular to the subject roadway.

6.3 Interior Noise Analysis

A preliminary interior noise analysis has been prepared for the sensitive receptor locations (i.e. interior hotel rooms) using a typical "windows open" and "windows closed" condition. A "windows open" condition assumes 12 dBA of noise attenuation from the exterior noise level. A "windows closed" condition" assumes 20 dBA of noise attenuation from the exterior noise level.

Table 17 indicates the interior noise levels for the 2nd through 5th floor hotel rooms facing Harbor Boulevard.

Table 17
Interior Noise Impact Analysis

Floor / Receptor Location	Exterior Noise Level at Building Façade (CNEL)	Interior Noise Standard (CNEL)	Required Building Shell Noise Reduction (CNEL)	Interior Noise Level with Standard California Construction Windows (STC ≥ 25)		STC Rating for Windows Facing Subject Roadway[3]
				"Windows Open" [2]	"Windows Closed" [3]	
2nd Floor	71.4	45	26.4	59.4	51.4	31
3rd Floor	71.3	45	26.3	59.3	51.3	31
4th Floor	71.2	45	26.2	59.2	51.2	31
5th Floor	71.1	45	26.1	59.1	51.1	31

To meet the habitable room interior noise standard of 45 dBA CNEL, the project must incorporate building construction techniques that achieve a minimum noise reduction of 26.4 dBA on the second floor to 26.1 dBA on the fifth floor. A "windows closed" condition and upgraded STC rated windows are required for all habitable hotel rooms facing Habor Boulevard.

To accommodate a window closed conditions, the building design shall be equipped with adequate fresh air ventilation, per the requirements of the California Uniform Building Code (UBC).

Prior to issuance of building permits, the project proponent shall demonstrate to the City building department that the proposed building shell assembly and window assemblies will achieve exterior to interior noise reduction that will meet the State/City building code requirement of 45 dBA CNEL.

Furthermore, the project should comply with California Title 24 insulation building requirements for common separating assemblies (e.g. floor/ceiling assemblies and demising walls).

1. Party wall and floor-ceiling assembly designs must provide a minimum STC of 50, based on lab tests. Field tested assemblies must provide a minimum noise isolation class (NIC) of 45.

2. Floor-ceiling assembly designs must provide for a minimum impact insulation class (IIC) of 50, based on lab tests. Field tested assemblies must provide a minimum FIIC of 45.

3. Entry doors from interior corridors must provide an STC of 26 or more.

4. Penetrations or openings in sound rated assemblies must be treated to maintain required ratings.

5. Interior noise levels due to exterior sources must not exceed a community noise equivalent level (CNEL) or a day-night level (LDN) of 45 dBA, in any habitable room.

Exhibit D indicates the required mitigation measures.

To help ensure interior noise levels remain below the standard, fresh air inlet ducts shall be of sound attenuating construction and shall consist of a minimum of ten (10) feet of straight or curved duct or six (6) feet plus one (1) sharp 90° bend. Attic vents for the project, if applicable, should include an acoustical baffle to prevent vehicle noise intrusion.

Exhibit E-1 and E-2 illustrate examples of an attic vent acoustical baffle and a roof vent acoustical baffle, respectively. The Contractor may install similar measures to provide noise reduction.

6.4 Operational Mitigations Measures (MM)

MM-1 Prior to issuance of building permits, the project proponent shall demonstrate to the City building department that the proposed building shell assembly and window assemblies will achieve exterior to interior noise reduction that will meet the State/City building code requirement of 45 dBA CNEL.

MM-2 Based on the preliminary findings of this report, a "windows closed" condition is required for all habitable hotel rooms to meet interior noise standards. To accommodate a window closed conditions, all residential units shall be equipped with adequate fresh air ventilation, per the requirements of the California Uniform Building Code (UBC).

MM-3 Based on the preliminary findings of this report, a "windows closed" condition is Windows and sliding glass doors will require a minimum STC rating of 31 or higher on all the floors.

MM-4 The project shall comply with California Title 24 insulation building requirements for common separating assemblies (e.g. floor/ceiling assemblies and demising walls).

6.5 Operational Project Design Features (DF)

DF-1 All rooftop mounted HVAC equipment should be shielded or enclosed from the line of sight of adjacent properties. Shielding/parapet wall should be at least as high as the equipment.

DF-2 Provide a six (6) foot high block wall along the northern and eastern property line to shield adjacent sensitive land uses from project noise.

DF-3 Provide a seven-foot-high block wall with transparent glass to surround the outdoor pool area.

- The designed noise screening will only be accomplished if the barrier's weight is at least 3.5 pounds per square foot of face area without decorative cutouts, line-of-site openings or gaps between the masonry block and transparent glass material.

- The noise control barrier should be constructed using masonry block and 3/8" thick acrylic, polycarbonate, laminated glass, or other transparent material with sufficient weight per sqaure foot.

DF-4 Provide CMU block wall enclosure around trash area to shield adjacent properties.

DF-5 Delivery, loading/unloading activity, and trash pick-up hours should be limited to daytime (7 a.m. – 10 p.m.) hours only.

DF-6 Limit engine idling time for all delivery vehicles and trucks to 5 minutes or less.

DF-7 For proper interior acoustical performance, all exterior windows, doors, and sliding glass doors must have a positive seal and leaks/cracks must be kept to a minimum.

7.0 Construction Noise and Vibration Impacts

7.1 Construction Noise

The degree of construction noise may vary for different areas of the project site and also vary depending on the construction activities.

Table 18 shows typical construction noise levels for different types of equipment. This data was compiled by the Environmental Protection Agency (EPA). These noise levels would diminish rapidly with distance from the construction site at a rate of 6 dBA per doubling of distance. For example, a noise level of 86 dBA measured 50 feet from the noise source would reduce to 80 dBA at 100 feet. At 200 feet from the noise source, the noise level would reduce to 74 dBA. At 400 feet the noise source would reduce by another 6 dBA to 68 dBA. During the construction period, the contractors would be required to comply with the Noise Ordinance of the City of Garden Grove as described in Appendix A.

Table 18
Typical Construction Noise Levels[1]

Type	Noise Levels (dBA) at 50 Feet
Earth Moving	
Compactors (Rollers)	73 - 76
Front Loaders	73 - 84
Backhoes	73 - 92
Tractors	75 - 95
Scrapers, Graders	78 - 92
Pavers	85 - 87
Trucks	81 - 94
Materials Handling	
Concrete Mixers	72 - 87
Concrete Pumps	81 - 83
Cranes (Movable)	72 - 86
Cranes (Derrick)	85 - 87
Stationary	
Pumps	68 - 71
Generators	71 - 83
Compressors	75 - 86
Impact Equipment	
Pneumatic Wrenches	82 - 87
Jack Hammers, Rock Drills	80 - 99
Pile Drivers (Peak)	95-105
Other	
Vibrators	68 - 82
Saws	71 - 82

[1] Referenced Noise Levels from the Environmental Protection Agency (EPA)

The City's Municipal Code exempts noise created during construction provided construction is limited to certain hours during the day. In the event the project requires construction to occur outside the City's permissible hours, the project would need to mitigate noise levels to comply with the City's standards.

Section 8.47.060 of the Garden Grove Municipal Code states that it shall be unlawful for any person within a residential area, or within a radius of 500 feet therefrom, to operate equipment or perform any outside construction or repair work on buildings, structures, or projects, or to operate any pile driver, power shovel, pneumatic hammer, derrick, power hoist, or any other construction type device between the hours of 10:00 p.m. of one day and 7:00 a.m. of the next day in such a manner that a person of normal sensitiveness, as determined utilizing the criteria established in Section 8.47.050(B), is caused discomfort or annoyance unless such operations are of an emergency nature.

Although construction activity is exempt from the noise standards in the City's Municipal Code, CEQA requires that potential noise impacts still be evaluated for significance. For purposes of this analysis, the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment (2006) criteria is used. The FTA provides reasonable criteria for assessing construction noise impacts based on the potential for adverse community reaction. For residential uses, the daytime noise threshold is 80 dBA Leq for an 8-hour period. In compliance with the City's Municipal Code, it is assumed construction would not occur during the noise-sensitive nighttime hours.

Table 19 shows the results of the construction noise impact analysis for typical phases of construction and equipment usage. As shown in Table 19, construction activity would be below the 8-hour Leq noise criteria threshold.

Construction noise calculation worksheets can found in Appendix E.

Table 19
Construction Noise Levels (dBA)[1]

Phase	Equipment	Quantity	Calculated Noise Level (dBA)		Combined Noise Level (dBA)	
			Lmax	Leq	Lmax	Leq
Site Preparation	Graders	1	79.0	75.0	79.0	78.5
	Rubber Tired Dozers	1	75.6	71.7		
	Tractors/Loaders/Backhoes	1	78.0	74.0		
Grading	Graders	1	79	75	79.0	78.5
	Rubber Tired Dozers	1	75.6	71.7		
	Tractors/Loaders/Backhoes	1	78.0	74.0		
Building Construction	Cranes	1	74.5	66.6	78.0	77.4
	Forklifts	1	69	65		
	Generator Sets	1	74.6	71.6		
	Tractors/Loaders/Backhoes	1	78	74		
	Welders	3	68	64		
Paving	Cement and Mortar Mixers	1	72.8	68.8	78.0	76.9
	Pavers	1	71.2	68.2		
	Paving Equipment	1	74	67		
	Rollers	1	74	67		
	Tractors/Loaders/Backhoes	1	78	74		
Architectural Coating	Air Compressors	1	71.6	67.7	71.6	67.7
Maximum Construction Phase Noise Level - Leq (dBA)					78.5	
FTA Construction Noise Criteria (Detailed Assessment: 8-Hour Leq)					80	
Potentially Significant Short-Term Noise Impact (Yes/No?)					No	

[1] Construction noise levels calculated using the Federal Highway Administration Roadway Construction Noise Model Version 1.1. Noise levels calculated based on average distance of equipment over an 8-hour period (near center of site); 100 feet from property line.

[2] Construction noise criteria based on the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment (May 2006).

7.2 Construction Vibration

To determine the vibratory impacts during construction, reference construction equipment vibration levels were utilized and then extrapolated to the façade of the nearest adjacent structures. For this project, the nearest structures are located along the southern property line. For purposes of assessing structural impacts from vibration, the nearest sensitive receptors are considered "modern industrial/commercial buildings". No historical or fragile buildings are known to be located within the vicinity of the site.

The construction of the proposed project would not require the use of substantial vibration inducing equipment or activities, such as pile drivers or blasting. The main sources of vibration impacts during construction of the project would be from bulldozer activity during site preparation and truck loading activity throughout the construction process.

The construction vibration assessment utilizes the referenced vibration levels and methodology set-forth within the Caltrans Transportation and Construction Induced Vibration Guidance Manual. Table 20 shows the referenced vibration levels.

Table 20
Typical Construction Vibration Levels[1]

Equipment	Peak Particle Velocity (PPV) (inches/second) at 25 feet	Approximate Vibration Level (LV) at 25 feet
Pile driver (impact)	1.518 (upper range)	112
	0.644 (typical)	104
Pile driver (sonic)	0.734 upper range	105
	0.170 typical	93
Clam shovel drop (slurry wall)	0.202	94
Hydromill	0.008 in soil	66
(slurry wall)	0.017 in rock	75
Vibratory Roller	0.210	94
Hoe Ram	0.089	87
Large bulldozer	0.089	87
Caisson drill	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

[1] Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2006.

Table 21 shows the project's construction related vibration analysis at the residential structures to the south.

Table 21
Construction Vibration Analysis - South

Construction Activity	Distance to Nearest Structure (ft) at South	Duration	Calculated Vibration Level - PPV (in/sec)	Damage Potential
Loaded Trucks	10	Continuous/Frequent	0.208	Fragile Buildings[1]
Large Bulldozer	10	Continuous/Frequent	0.244	Fragile Buildings[1]

[1] Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2006.

The estimated vibration noise levels at the nearest sensitive receptors are compared to the Caltrans Vibration Manual thresholds. The damage potential to the nearest structures would be within the "fragile buildings" category. No potential damage would be expected to the modern commercial buildings in the nearby vicinity. Therefore, **the project would not result in generation of excessive ground-borne vibration.**

Construction vibration calculation worksheets are shown in Appendix E.

7.3 Construction Project Design Features (DF)

DF-8 Construction-related noise activities shall comply with the requirements set forth in the City of Garden Grove Municipal Code Section 8.47.

DF-9 Construction activities shall not take place between the hours of 10:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a federal holiday.

DF-10 No impact pile driving activities shall be allowed on the project site.

DF-11 During construction, the contractor shall ensure all construction equipment is equipped with appropriate noise attenuating devices and equipment shall be maintained so that vehicles and their loads are secured from rattling and banging. Idling equipment should be turned off when not in use.

DF-12 Locate staging area, generators and stationary construction equipment as far from the north and east property line, as reasonably feasible.

DF-13 Obtain a construction work permit from the City of Garden Grove prior to starting construction.

Exhibits

Exhibit A

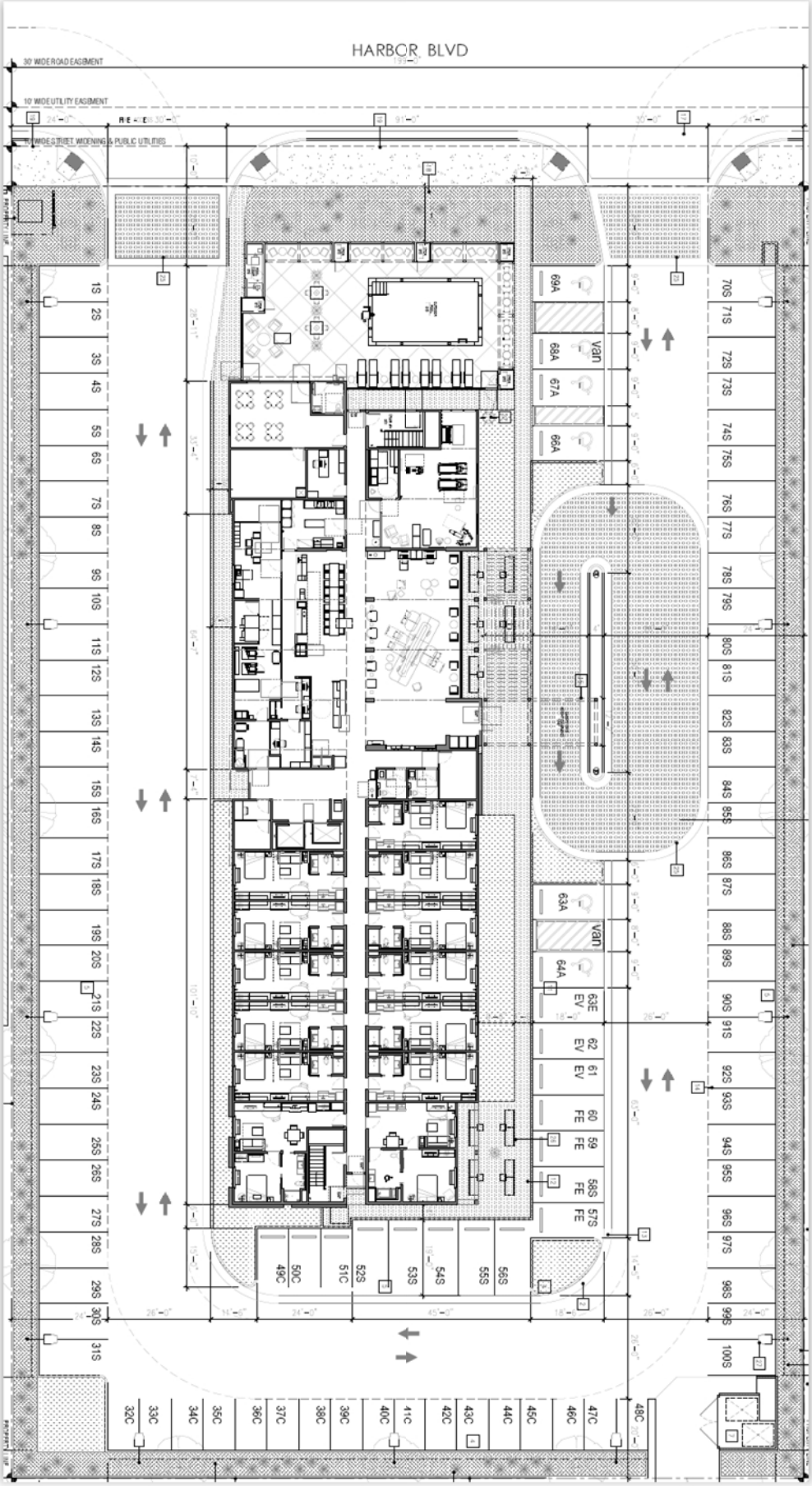
Location Map

N

RK engineering group, inc.

Exhibit B

Site Plan



N

Exhibit C

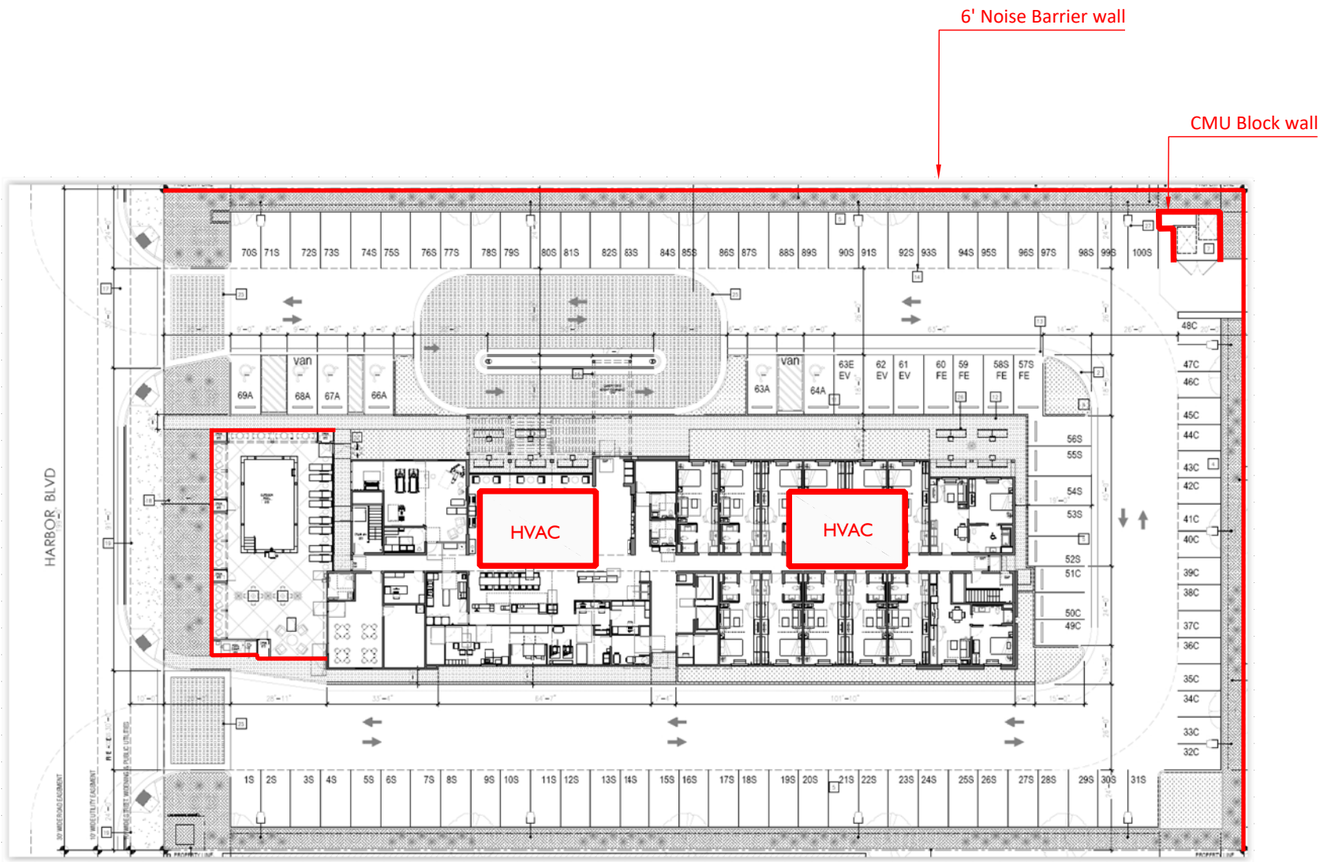
Location Map

Legend:

1 = Short Term (10-min) Noise Monitoring Location

N

Recommendations



Legend:

HVAC = Rooftop HVAC equipment should be shielded by parapet wall

= Noise Barrier Wall

OPERATIONAL MITIGATIONS MEASURES (MM):

MM-1 Prior to issuance of building permits, the project proponent shall demonstrate to the City building department that the proposed building shell assembly and window assemblies will achieve exterior to interior noise reduction that will meet the State/City building code requirement of 45 dBA CNEL.

MM-2 Based on the preliminary findings of this report, a "windows closed" condition is required for all habitable hotel rooms to meet interior noise standards. To accommodate a windows closed conditions, all residential units shall be equipped with adequate fresh air ventilation, per the requirements of the California Uniform Building Code (UBC).

MM-3 Based on the preliminary findings of this report, a "windows closed" condition is Windows and sliding glass doors will require a minimum STC rating of 28 or higher for fourth and fifth floor units and a minimum STC rating of 29 or higher for second and third floor units.

MM-4 The project shall comply with California Title 24 insulation building requirements for for common separating assemblies (e.g. floor/ceiling assemblies and demising walls).

OPERATIONAL PROJECT DESIGN FEATURES (DF):

DF-1 All rooftop mounted HVAC equipment should be shielded or enclosed from the line of sight of adjacent properties. Shielding/parapet wall should be at least as high as the equipment.

DF-2 Provide a six (6) foot high block wall along the northern and eastern property line to shield adjacent sensitive land uses from project noise.

DF-3 Provide a seven foot high block wall with transparent glass to surround the outdoor pool area.

- The designed noise screening will only be accomplished if the barrier's weight is at least 3.5 pounds per square foot of face area without decorative cutouts, line-of-site openings or gaps between the masonry block and transparent glass material.
- The noise control barrier should be constructed using masonry block and 3/8" thick acrylic, polycarbonate, laminated glass, or other transparent material with sufficient weight per sqaure foot.

DF-4 Provide CMU block wall enclosure around trash area to shield adjacent properties.

DF-5 Delivery, loading/unloading activity, and trash pick-up hours should be limited to daytime (7 a.m. – 10 p.m.) hours only.

DF-6 Limit engine idling time for all delivery vehicles and trucks to 5 minutes or less.

DF-7 For proper interior acoustical performance, all exterior windows, doors, and sliding glass doors must have a positive seal and leaks/cracks must be kept to a minimum.

N

Appendices

Appendix A

City of Garden Grove
General Plan Noise Element and
Municipal Code Noise Control

Chapter 7

NOISE ELEMENT

7.1 INTRODUCTION

The Noise Element of the General Plan examines noise sources in the City to identify and appraise the potential for noise conflicts and problems, and to identify ways to reduce existing and potential noise impacts. Existing and future noise environments and the compatibility of land uses are considered in the Element, as well as sensitive receptors and generators of stationary noise. The Element identifies projected noise levels, and contains policies and programs to achieve and maintain noise levels compatible with various types of land uses, as well as prevent high noise levels in sensitive areas. It is important to note that the Element addresses noise that affects the community at large, rather than noise associated with site-specific conditions. The regulatory framework, background information, and existing and future conditions can be found in the General Plan EIR.

7.2 AUTHORITY FOR ELEMENT

Government Code Section 65302(f) requires that a General Plan include:

> *"... a noise element which shall identify and appraise noise problems in the community. The Noise Element shall recognize the guidelines established by the Office of Noise Control in the State Department of Health Services and shall analyze and quantify...current and projected noise levels for all of the following sources: (1) highways and freeways; (2) primary arterials and major local streets; (3) passenger and freight on-line railroad operations and ground rapid transit systems; (4) commercial, general aviation, heliport, and military airport operations, aircraft overflights, jet engine test stands, and all other ground facilities and maintenance functions related to airport operation; (5) local industrial plants, including but not limited to, railroad classification yards; (6) other ground stationary noise sources identified by local agencies as contributing to the community noise environment."*

7.3 NOISE DEFINITIONS

Noise often is defined as annoying or unwanted sound. Health studies have shown that excessive noise can cause adverse psychological or physiological effects on human beings.

Defining noise problems and establishing a regulatory scheme to deal with noise that is both fair and effective requires an understanding of some of the basic characteristics of sound and how it affects people and their activities. While sound levels can be easily measured, the variability in subjective and physical responses to sound complicates the analysis of its impact on people. Sound is created when an object vibrates and radiates part of its energy as acoustic pressure waves through a medium such as air, water, or a solid. The ear, the hearing mechanism of humans and most animals, receives these sound pressure waves and converts them to neurological impulses which are transmitted to the brain for interpretation. The interpretation by the auditory system and the brain depends on the characteristics of the sound and on the characteristics of the person hearing it.

STANDARD UNIT OF MEASUREMENT

Sound is described in terms of the loudness (amplitude) of the sound and frequency (pitch) of the sound. The standard unit of measurement of the loudness of sound is the decibel (dB). Since the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale has been devised to relate noise to human sensitivity. The A-weighted decibel scale (dBA) performs this compensation by differentiating among frequencies in a manner approximating the sensitivity of the human ear.

Decibels are based on the logarithmic scale. The logarithmic scale compresses the wide range in sound pressure levels to a more usable range of numbers in a manner similar to the Richter scale used to measure earthquakes. In terms of human response to noise, a sound ten dBA higher than another is perceived to be twice as loud, and 20 dBA higher is perceived to be four times as loud, and so forth. Everyday sounds normally range from 30 dBA (very quiet) to 100 dBA (very loud). Various methods have been developed for evaluating community noise to account for, among other things:

- The variation of noise levels over time;
- The influence of periodic individual loud events; and
- The community response to changes in the community noise environment.

NOISE SCALES AND DEFINITIONS

Sound pressure level is a measure of the sound pressure of a given noise source relative to a standard reference value. The reference pressure is typical of the quietest sound that a young person with good hearing is able to detect. Sound pressure levels are measured in decibels (dB). Decibels are logarithmic quantities, relating the sound pressure level of a noise source to the reference pressure level.

An important characteristic of sound is frequency. This is the rate of repetition of sound pressure oscillations (waves) as they reach our ears; frequency is expressed in hertz (Hz). When analyzing the total noise of any source, the frequency components are sometimes analyzed to determine the relative amounts of low-frequency, middle-frequency, and high-frequency noise. This breakdown is important for two reasons:

- Our ear is better equipped to hear mid- and high-range frequencies than lower frequencies. Thus, we find mid- and high-frequency noise to be more annoying. High-frequency noise is also more capable of producing hearing loss.

- Engineering solutions to a noise problem are different for different frequency ranges. Low-frequency noise is generally harder to control.

The normal frequency range of hearing for most people extends from a low frequency of about 20 Hz to a high frequency of about 10,000 to 15,000 Hz. People respond to sound most readily when the predominant frequency is in the range of normal conversation, typically around 1,000 to 2,000 Hz. Several filters have been developed that match the sensitivity of our ear and thus help us to judge the relative loudness of various sounds made up of many different frequencies. The so-called "A" filter is the best measure for most environmental noise sources. Sound pressure levels measured through this filter are referred to as A-weighted levels, and are measured in A-weighted decibels or (dBA).

The A-weighted filter significantly de-emphasizes those parts of the total noise that occur at lower frequencies (those below about 500 Hz) and also those at very high frequencies (above 10,000 Hz) the frequencies that we do not hear as well. The filter has very little effect, or is nearly "flat," in the middle range of frequencies (between 500 and 10,000 Hz), where our ears are most sensitive. Because this filter generally matches our ears' sensitivity, sounds having a higher A-weighted sound level are usually judged to be louder than those with lower A-weighted sound levels, a relationship that otherwise might not be true.

Community Noise Equivalent Level (CNEL)

Cumulative noise metrics were developed to assess community response to noise. They are useful because they attempt to take into account the loudness and duration of the noise, the total number of noise events, and the time of day these events occur in one single-number rating scale. They are designed to account for the known health effects of noise on people. The community noise equivalent level (CNEL) is a 24-hour, time-weighted energy-average noise level based on dBA that measures the overall noise during an entire day. Noise that occurs during certain sensitive time periods is penalized for occurring at these times (by adding decibels to its Leq measurement). On the CNEL scale, noise between 7:00 a.m. and 10:00 p.m. is penalized by approximately five dB, to account for the greater potential for noise to interfere during these hours, as well as the typically lower ambient (background) noise levels during these hours. Noise during the night (from 10:00 p.m. to 7:00 a.m.) is penalized by 10 dB to attempt to account for our higher sensitivity to noise in the nighttime and the expected further decrease in ambient noise levels that typically occur in the night.

Equivalent Noise Level (L_{EQ})

The equivalent sound level, abbreviated Leq, is a measure of the exposure resulting from the accumulation of A-weighted sound levels over a particular time period (e.g., 1 hour, 8 hour, a school day, nighttime, or a full 24-hour day). However, because the length of the period can be different depending on the time frame of interest, the applicable period should always be identified or clearly understood when discussing the metric. Such durations are often identified through a subscript, for example, "Leq (24)".

Conceptually, Leq may be thought of as a constant sound level over the period of interest that contains as much sound energy as the actual time-varying sound level with its normal peaks and valleys. It is important to realize, however, that the two signals (the constant one and the time-varying one) would sound very different from each other if compared in real life. Variations in the "average" sound level suggested by Leq is not an arithmetic value, but a logarithmic ("energy-averaged") sound level. Thus, loud events clearly dominate any noise environment described by the metric.

Day Night Average (Ldn)

Another commonly used noise metric is the day/night average noise level (Ldn). The Ldn is a measure of the 24-hour average noise level at a given location. It was adopted by the EPA for developing criteria to evaluate community noise exposure. Ldn is based on a measure of the average noise level over a given time period. The Ldn is calculated by averaging the Leq for each hour of the day at a given location after penalizing the sleeping hours (from 10:00 p.m. to 7:00 a.m.) by 10 dBA to take into account the increased sensitivity of people to noises that occur at night. The sound level exceeded over a specified time frame can be expressed as Ln (i.e., L90, L50, L10, etc.). L50 equals the level exceeded 50 percent of the time; L10, 10 percent of the time; etc.

Other Noise Matrices

As previously mentioned, people tend to respond to changes in sound pressure in a logarithmic manner. In general, a 1 dBA change in the sound pressure levels of a given sound is detectable only under laboratory conditions. A 3 dBA change in sound pressure level is considered a detectable difference in most situations. A 5 dBA change is readily noticeable and a 10 dBA change is considered a doubling (or halving) of the subjective loudness. It should be noted that a 3 dBA increase or decrease in the average traffic noise level is realized by a doubling or halving of the traffic volume; or by about a 7 mile per hour (mph) increase or decrease in speed.

For each doubling of distance from a point noise source, the sound level will decrease by 6 dBA. In other words, if a person is 100 feet from a machine, and moves to 200 feet from that source, sound levels will drop approximately 6 dBA. For each doubling of distance from a line source, like a roadway, noise levels are reduced by 3 to 5 decibels, depending on the ground cover between the source and the receiver.

Noise barriers can provide approximately a 5 dBA CNEL noise reduction (additional reduction may be provided with a barrier of appropriate height, material, location and length). A row of buildings provides up to 5 dBA CNEL noise reduction with a 1.5 dBA CNEL reduction for each additional row up to a maximum reduction of approximately 10 dBA. The exact degree of noise attenuation depends on the nature and orientation of the structure and intervening barriers.

7.4 KEY THEMES AND VISION FOR GENERAL PLAN

It is the general objective of the City to regulate and control unnecessary, excessive, and annoying sounds emanating from uses and activities within the City, and to prohibit such sounds that are detrimental to the public health, welfare, and safety of its residents. With the objective, the City is focused on maintaining or improving the quality of life for both existing and future residents. The Land Use Element proposes a variety of mixed use development types along major arterials in the City. The Noise Element will ensure that the residential and non-residential uses within the mixed use development meet established noise standards.

AMBIENT NOISE

Ambient noise is described as the all-encompassing background noise associated with a given environment, usually being a composite of sounds from many sources near and far.

Garden Grove's noise environment is dominated by vehicular traffic noise along State Route 22 (SR-22) as well as major and primary arterials. The major arterials that serve the City are Valley View Street, Brookhurst Street, Harbor Boulevard, Bolsa Avenue, Westminster Avenue, Fairview

Road, and Knott Avenue. The primary arterials that serve the City are Magnolia Street, Euclid Street, Haster Street, Chapman Avenue, Garden Grove Boulevard, and Westminster Boulevard,. In addition, Katella Avenue, Harbor Boulevard, Bolsa Avenue, and Valley View Streets are designated as Smart Streets.

NOISE SENSITIVE RECEPTORS

Human response to noise varies widely depending on the type of noise, time of day, and sensitivity of the receptor. The effects of noise on humans can range from temporary or permanent hearing loss to mild stress and annoyance due to such things as speech interference and sleep deprivation. Prolonged stress, regardless of the cause, is known to contribute to a variety of health disorders. The sensitive receptors located within the City are listed in Appendix D, Air Quality Data, of the General Plan EIR.[1]

NOISE AND LAND USE COMPATIBLITY MATRIX

The State of California Office of Planning and Research (OPR) Noise Element Guidelines include recommended interior and exterior level standards for local jurisdictions to identify and prevent the creation of incompatible land uses due to noise. The OPR Guidelines describe the compatibility of various land uses with a range of environmental noise levels in terms of dBA CNEL (Community Noise Equivalent Level).

A noise environment of 50 dBA CNEL to 60 dBA CNEL is considered to be "normally acceptable" for residential uses. The State indicates that locating residential units, parks, and institutions (such as churches, schools, libraries, and hospitals) in areas where exterior ambient noise levels exceed 65 dBA CNEL is undesirable. The OPR recommendations also note that, under certain conditions, more restrictive standards than the maximum levels cited may be appropriate. As an example, the standards for quiet suburban and rural communities may be reduced by 5 to 10 dB to reflect their lower existing outdoor noise levels in comparison with urban environments.

In addition, *Title 25, Section 1092 of the California Code of Regulations,* sets forth requirements for the insulation of multiple-family residential dwelling units from excessive and potentially harmful noise. Whenever multiple-family residential dwelling units are proposed in areas with excessive noise exposure, the developer must incorporate construction features into the building's design that reduce interior noise levels to 45 dBA CNEL.

Table 7-1, *Noise and Land Use Compatibility Matrix,* illustrates the State guidelines established by the State Department of Health Services for acceptable noise levels for each county and city. These standards and criteria are incorporated into the land use planning process to reduce future noise and land use incompatibilities. This table is the primary tool that allows the City to ensure integrated planning for compatibility between land uses and outdoor noise.

CITY OF GARDEN GROVE NOISE STANDARDS

The City of Garden Grove maintains a comprehensive Noise Ordinance within its Municipal Code that establishes citywide interior and exterior noise level standards. The City has adopted a number of policies that are directed at controlling or mitigating environmental noise effects. The City's Noise Ordinance (Municipal Code Section 8.47, Noise Control,) establishes daytime and nighttime noise standards; refer to *Table 7-2*, *Garden Grove Noise Ordinance Standards*. The ordinance is designed to control unnecessary, excessive and annoying sounds generated

[1] Similar uses are sensitive to both air quality and noise impacts. Therefore, the sensitive receptor list for both issue areas is the same.

from a stationary source impacting an adjacent property. It differentiates between environmental and nuisance noise. Environmental noise is measured under a time average period while nuisance noise cannot exceed the established Noise Ordinance levels at any time. At the boundary line between a residential property and a commercial and manufacturing property, the noise level of the quieter zone is required to be used.

Table 7-1
Noise and Land Use Compatibility Matrix

Land Use Category	Community Noise Exposure (L_{dn} or CNEL, dBA)			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential - Low Density, Single-Family, Duplex, Mobile Homes	50 - 60	55 - 70	70-75	75-85
Residential - Multiple Family	50 - 65	60 - 70	70 - 75	70 – 85
Transient Lodging - Motel, Hotels	50 - 65	60 - 70	70 - 80	80 – 85
Schools, Libraries, Churches, Hospitals, Nursing Homes	50 - 70	60 - 70	70 - 80	80 – 85
Auditoriums, Concert Halls, Amphitheaters	NA	50 - 70	NA	65 – 85
Sports Arenas, Outdoor Spectator Sports	NA	50 - 75	NA	70 – 85
Playgrounds, Neighborhood Parks	50 - 70	NA	67.5 - 75	72.5 – 85
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50 - 70	NA	70 - 80	80 – 85
Office Buildings, Business Commercial and Professional	50 - 70	67.5 - 77.5	75 - 85	NA
Industrial, Manufacturing, Utilities, Agriculture	50 - 75	70 - 80	75 - 85	NA

NA: Not Applicable

Source: Office of Planning and Research, California, *General Plan Guidelines*, October 2003.

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

Table 7-2
Garden Grove Noise Ordinance Standards

Land Use Designation		Ambient Base Noise Level	Time Of Day
Sensitive Uses	Residential Use	55 dBA	7:00 AM – 10:00 PM
		50 dBA	10:00 PM – 7:00 AM
Conditionally Sensitive Uses	Institutional Use	65 dBA	Any Time
	Office-Professional Use	65 dBA	Any Time
	Hotels and Motels	65 dBA	Any Time
Non-Sensitive Uses	Commercial Uses	70 dBA	Any Time
	Commercial/Industrial Uses within 150 feet of Residential Uses	65 dBA	7:00 AM – 10:00 PM
		50 dBA	10:00 PM – 7:00 AM
	Industrial Uses	70 dBA	Any Time

Source: City of Garden Grove, *Municipal Code, Section 8.47, Noise Control*, 2005.

Municipal Code Section 8.47.060, Special Noise Sources, also includes the following provisions for construction and maintenance activities:

> *(d) Construction of Buildings and Projects. It shall be unlawful for any person within a residential area, or within a radius of 500 feet there from, to operate equipment or perform any outside construction or repair work on buildings, structures, or projects, or to operate any pile driver, power shovel, pneumatic hammer, derrick, power hoist, or any other construction type device between the hour of 10:00 p.m. of one day and 7:00 a.m. of the next day in such a manner that a person of normal sensitiveness, as determined utilizing the criteria established in Section 8.47.050(a), is caused discomfort or annoyance unless such operations are of an emergency nature.*

MINIMIZE COMMUNITY EXPOSURE TO NOISE

The primary goal with regard to community noise is to minimize the exposure of new residential development, schools, hospitals and similar noise-sensitive uses to excessive or unhealthy noise levels to the greatest extent possible. Toward this end, this Element establishes the noise/land use compatibility guidelines set forth in *Table 7-1* for outdoor noise. The compatibility guidelines recognize and respond to the many different noise environments in Garden Grove.

The City supports new residential development within already urbanized areas where ambient noise levels may be higher than those experienced in neighborhoods located on the urban periphery. This is in an effort to promote "smart growth," mixed use development, making more efficient use of land and resources.

Interior noise levels for new residential development, regardless of location within the City will be required to comply with standards set forth in Title 24 of the State Health and Safety Code. New construction may need to incorporate special insulation, windows, and sealants in order to ensure that interior noise levels meet Title 24 standards.

The City will utilize the noise/land use compatibility guidelines outlined in *Table 7-1* and *Table 7-2* in making land use decisions. These compatibility guidelines show a range of noise standards for various land use categories. Depending on the ambient environment of a particular community, these basic guidelines may be tailored to reflect existing noise and land use characteristics. The matrix defines noise in terms of Community Noise Equivalent Level (CNEL) and expressed in dB that measure sound intensity. Noise levels occurring during nighttime hours are weighted more heavily than during the daytime.

7.5 GOALS, POLICIES, AND IMPLEMENTATION PROGRAMS

This Element is organized into goals, policies, and implementation programs. A description of each is provided in Chapter 1, Introduction. It is important to note that the implementation programs are specific actions to carry out all of the preceding goals and policies.

Goal N-1	**Noise considerations must be incorporated into land use planning decisions.**
Policy N-1.1	Require all new residential construction in areas with an exterior noise level greater than 55 dBA to include sound attenuation measures.
Policy N-1.2	Incorporate a noise assessment study into the environmental review process, when needed for a specific project for the purposes of identifying potential noise impacts and noise abatement procedures.

Policy N-1.3	Require noise reduction techniques in site planning, architectural design, and construction, where noise reduction is necessary consistent with the standards in Tables 7-1 and 7-2, Title 24 of the California Code of Regulations, and Section 8.47 of the Municipal Code.
Policy N-1.4	Ensure acceptable noise levels are maintained near schools, hospitals, convalescent homes, churches, and other noise sensitive areas.
Policy N-1.5	Require the design of mixed use structures to incorporate techniques to prevent the transfer of noise and vibration from the commercial to residential use.
Policy N-1.6	Encourage commercial uses in mixed use developments that are not noise intensive.
Policy N-1.7	Avoid locating noise-sensitive land use in existing and noise-impacted areas.
N-IMP-1A	Maintain a technical resource for builders, developers, and operators of construction equipment that discusses a variety of sound attenuation measures (e.g., temporary noise attenuation fences, preferential location of equipment, use of current technology and types of noise suppression equipment), the amount of noise reduction each produces, and how to combine them to meet City requirements.
N-IMP-1B	Require that new commercial, industrial, any redevelopment project, or any proposed development near existing residential land use demonstrate compliance with the City's Noise Ordinance prior to approval of the project.
N-IMP-1C	Implement noise mitigation by placing conditions of approval on development projects, and require a clear description of mitigation on subdivision maps, site plans, and building plans for inspection purposes.
N-IMP-1D	Require construction activity to comply with the limits established in the City's Noise Ordinance.
N-IMP-1E	Require buffers or appropriate mitigation of potential noise sources on noise sensitive areas.
N-IMP-1F	Require that vehicle access to commercial properties that are located adjacent to residential parcels or other noise sensitive uses be located at the maximum practical distance from these uses.
N-IMP-1G	Encourage truck deliveries to commercial or industrial properties abutting residential or noise sensitive uses after 7:00 AM and before 10:00 PM.
N-IMP-1H	Orient residential units away from major noise sources, particularly in mixed use projects.
N-IMP-1I	Encourage the location of balconies and operable windows of residential units in mixed use projects away from arterials and other major noise sources.

N-IMP-1J	Review the noise performance standards in the Zoning Code to determine if additional or modified standards are necessary to address mixed use development, particularly along major arterial roadways, or address and mitigate noise-generating land uses.
N-IMP-1K	Enforce the Noise Ordinance to ensure that stationary noise and noise emanating from construction activities, private development, and/or special events are minimized.
N-IMP-1L	Continue to enforce noise abatement and control measures.

Goal N-2	**Maximized efficiency in noise abatement efforts through clear and effective policies and ordinances.**

Policy N-2.1	Incorporate noise considerations into land use planning decisions by establishing acceptable limits of noise for various land uses throughout the community.
Policy N-2.2	Fully integrate noise considerations into land use planning decisions to prevent new noise/land use conflicts.
Policy N-2.3	Incorporate noise reduction features for items such as but not limited to parking and loading areas, ingress/egress point, and refuse collection areas, during site planning to mitigate anticipated noise impacts on affected noise sensitive land uses.
Policy N-2.4	Permit only those new development or redevelopment projects that have incorporated appropriate mitigation measures, so that standards contained in the Noise Element or adopted ordinance are met.
Policy N-2.5	Ensure the effective enforcement of City, State, and Federal noise levels by all appropriate City Divisions.
N-IMP-2A	Require a noise impact evaluation for projects, if determined necessary through the environmental review process. Should noise abatement be necessary, the City shall require the implementation of mitigation measures based on a technical study prepared by a qualified acoustical professional.
N-IMP-2B	Consider establishing a periodic noise monitoring program to identify progress in achieving noise abatement and to perform necessary updating of the Noise Element and community noise standards.
N-IMP-2C	Amend, and combine if deemed appropriate, ordinances and policies relating to noise control. The amended ordinance(s) shall more clearly address mitigation of noise conflicts between adjacent uses, construction noise, noise associated with maintenance equipment (e.g., leaf blowers, street sweepers, etc), hours of operation of construction or maintenance equipment, noise standards, abatement, enforcement, procedures, and other like issues.

N-IMP-2D	Use code enforcement to enforce the appropriate noise standards in the City's noise ordinance(s).
N-IMP-2E	Use the Police unit to enforce the appropriate noise standards in the State's motor vehicle code.
N-IMP-2F	Require that new equipment purchased by the City of Garden Grove comply with noise performance standards.
N-IMP-2G	Disseminate information to the public regarding City noise regulations and programs, the health effects of high noise levels, means of mitigating such levels, as well as abatement and enforcement procedures.
N-IMP-2H	Coordinate with California Occupational Safety and Health Administration (Cal-OSHA) to provide information on occupational noise requirements within the City.
N-IMP-2I	Examine the potential to establish a Violators Fee for persons requiring a second call/visit for violating the noise ordinance(s).

Goal N-3	**Minimized noise impacts from freeways, ensuring that City and State interior and exterior noise standards are not exceeded.**

Policy N-3.1	Encourage Caltrans to meet the State standard of 65 dBA CNEL for exterior noise levels for the Garden Grove Freeway (SR-22) and the San Diego Freeway (I-405).
Policy N-3.2	Encourage Caltrans to keep the interior residential noise levels below the State standard of 45 dBA CNEL, where appropriate and feasible.
N-IMP-3A	Continue to work with Caltrans to ensure that similar soundwalls or other appropriate mitigations to those installed along the Garden Grove Freeway (SR-22) be provided where the San Diego Freeway (I-405) abuts residential areas or areas with sensitive receptors within the City.
N-IMP-3B	Encourage Caltrans to develop a range of sound attenuation alternatives to mitigate noise impacts from the San Diego Freeway (I-405).

Goal N-4	**Minimize noise impacts for residential uses and noise sensitive receptors along the City's arterial streets, ensuring that City and State interior and exterior noise levels are not exceeded.**

Policy N-4.1	Examine the feasibility of implementing sound attenuation measures along the City's arterial streets. Prioritize the areas in need of sound attenuation based on degree of sensitivity, excess of maximum allowable standards, length of time the noise impact has existed, and the number or residential uses or sensitive receptors impacted.
Policy N-4.2	Minimize potential transportation noise through proper design of street circulation, coordination of routing, and other traffic control measures (e.g., shifting travel lanes away from impacted units, adding bike ways, etc.)

Policy N-4.3	Discourage through traffic on residential local streets to reduce noise.
N-IMP-4A	Install sound attenuation measures, including but not limited to, retrofitting existing residential units or sensitive receptors with double-glazed windows and sound insulation; construction of sound walls and landscaping, use of low walls and landscaped berms, enclose courtyards, rubberized asphalt, or relocation of driveways.
N-IMP-4B	Develop a streamlined process to expedite approval of noise reducing techniques identified in the noise ordinance(s).
N-IMP-4C	Ensure the inclusion of noise mitigation measures in the design of new roadway projects in the City of Garden Grove.
N-IMP-4D	Provide for continued evaluation of truck movements and routes in the City to provide effective separation from residential or other noise sensitive land uses.
N-IMP-4E	Conduct periodic noise monitoring and abatement to identify sound levels on residential local streets that may be affected by increased traffic volumes and speed limits.

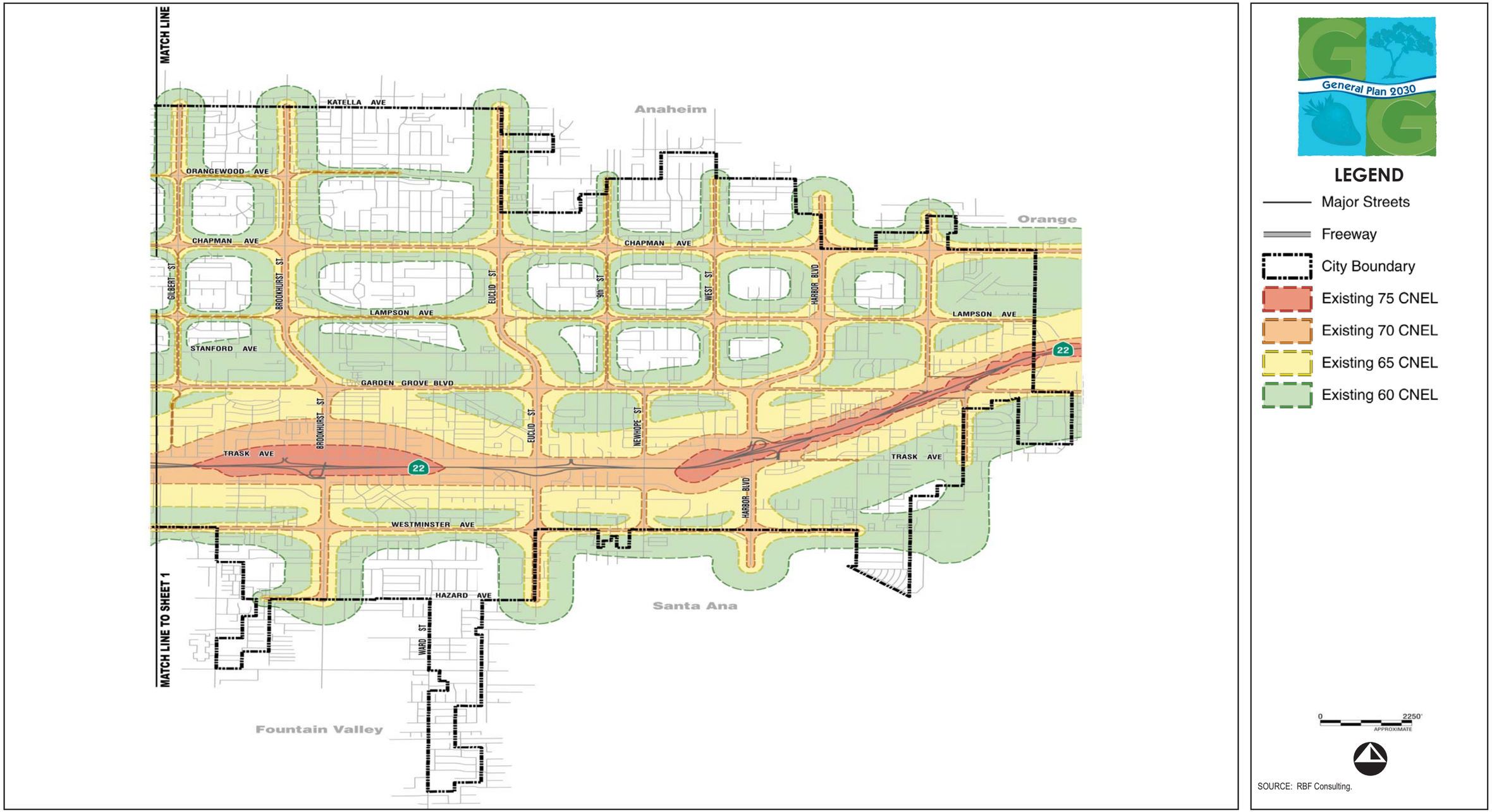
Goal N-5	**Minimize noise impacts on residential areas from rail and/or transit operations.**

Policy N-5.1	Continue to encourage the Southern Pacific Transportation Company to schedule trains during the daylight hours, when possible.
Policy N-5.2	Require noise attenuation measures for residential construction in areas affected by the 65 dBA CNEL railroad noise contour. Sound attenuation measures shall reduce interior noise to a maximum of 45 dBA CNEL. These measures shall be applicable to all residential construction in a railroad noise impact area, both for new structures and for renovations, remodels, and building additions.
Policy N-5.3	Work with the Orange County Transit Authority (OCTA) in the development of the OCTA right-of-way or other rail/transit lines to ensure that noise attenuation measures are addressed in the selection of the rail or vehicle technology for use along the right-of-way or rail/transit line, and in the siting, design, and construction of stations.
N-IMP-5A	Require the Orange County Transit Authority (OCTA) to comprehensively analyze and mitigate the noise impacts associated with transit development of the OCTA right-of-way or other rail/transit lines.

Goal N-6	**Maintain or work to reduce noise levels associated with the Joint Forces Training Base (JFTB) Los Alamitos.**

Policy N-6.1	Coordinate with the Airport Land Use Commission to monitor any expansion plans and/or increased activities at the Joint Forces Training Base (JFTB) Los Alamitos.

N-IMP-6A Support development at the Joint Forces Training Base (JFTB) Los Alamitos that adheres to the Airport Environs Land Use Plan (AELUP) and the City of Garden Grove and State noise requirements or ordinances.



SOURCE: RBF Consulting.

RBF CONSULTING

05/08 • JN 10-104660

Future Noise Contours • East

EXHIBIT N-2B

Chapter 8.47 NOISE CONTROL

Note

* **Prior ordinance history**: Ord. Nos. 1949, 1950, and 2258.

8.47.020 Definitions

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

"Actual measured ambient noise level" shall mean that noise level existing in the general area of the noise problem, excluding the noise generated by the noise source being evaluated.

"Ambient base noise level" shall mean the maximum loudness level normally found to be acceptable for given land uses and that serves as the basis for determining loudness noise violations pursuant to the provisions of Section 8.48.040 of this chapter.

"Ambient noise level" shall mean the all-encompassing background noise associated with a given environment, being usually a composite of sounds from many sources near and far.

"Commercial use" shall mean any enterprise whose principal endeavor is the sale of goods and/or services.

"Decibel (dB)" shall mean a unit that denotes the ratio between two quantities that are proportional to power: the number of decibels corresponding to the ratio of two amounts of power is 10 times the logarithm to the base 10 of this ratio. The commonly used unit for measuring sound pressure levels.

"Emergency" means operations made necessary to restore property to a safe condition following a public calamity, or work required to protect persons or property from an imminent exposure to danger or work by private or public utilities when restoring utility service.

"Industrial use" means any facility or operations involved in the manufacturing, repairing, testing, processing, warehousing, wholesaling, researching, and treatment of products.

"Institutional use" means an establishment maintained and operated by a society, church, corporation, individual, foundation, or public agency for the purpose of providing religious, charitable, social, educational, fraternal, or similar services.

"Noise" means any sound that exceeds the appropriate actual or presumed ambient noise level, that annoys or tends to disturb humans, or that causes or tends to cause an adverse psychological or physiological effect on humans of normal sensitiveness.

"Office-professional use" means any enterprise engaged in providing business or professional services.

"Residential use" means any structure utilized principally for human habitation, excluding hotels, motels, and recreational vehicle parks.

"Sound amplifying equipment" means any device for the amplification of the human voice, music, or any other sound and does not include standard automobile radios when used and heard only by the occupants of the vehicle in which the automobile radio is installed or devices on authorized emergency vehicles or horns or other warning devices on any vehicle used only for traffic safety purposes.

"Sound level in decibels (dB)" means the sound measured utilizing the A-weighting scale and the slow needle response by a sound level meter.

"Sound level meter" means an instrument meeting American National Standard Institutes Standard S1.4-1971 for Type 1 or Type 2 sound level meters or an equivalent standard. (2802 § 1, 2011; 2660 § 2, 2005)

8.47.030 Noise Level Measurement

All noise level measurements made pursuant to the provisions of this chapter shall be performed using a sound level meter as defined in Section 8.47.020, using a fast needle response, utilizing the dB(A) scale. (2802 § 1, 2011; 2660 § 2, 2005)

8.47.040 Ambient Base Noise Levels

The ambient base noise levels contained in the following chart shall be utilized as the basis for determining noise levels in excess of those allowed by this chapter unless the actual measured ambient noise level occurring at the same time as the noise under review is being investigated exceeds the ambient base noise level contained in the chart. When the actual measured ambient noise level exceeds the ambient base noise level, the actual measured ambient noise level shall be utilized as the basis for determining whether or not the subject noise exceeds the level allowed by this section. In situations where two adjoining properties exist within two different use designations, the most restrictive ambient base noise level will apply. This section permits any noise level that does not exceed either the ambient base noise level or the actual measured ambient noise level by 5 dB(A), as measured at the property line of the noise generation property.

USE CATEGORIES	USE DESIGNATIONS	AMBIENT BASE NOISE LEVELS	TIME OF DAY
Sensitive	Residential Use	55 dB(A)	7:00 a.m.—10:00 p.m.
		50 dB(A)	10:00 p.m.—7:00 a.m.
Conditionally Sensitive	Institutional Use	65 dB(A)	Any Time
	Office-Professional Use	65 dB(A)	Any Time
	Hotels & Motels	65 dB(A)	Any Time
Non-Sensitive	Commercial Uses	70 dB(A)	Any Time
	Commercial/ Industrial Uses within 150 feet of Residential	65 dB(A)	7:00 a.m.—10:00 p.m.
		50 dB(A)	10:00 p.m.—7:00 a.m.
	Industrial Use	70 dB(A)	Any Time

(2802 § 1, 2011; 2660 § 2, 2005)

8.47.050 General Noise Regulation

A. NOISE DISTURBANCE CRITERIA. It shall be unlawful for any person to willfully make, continue, or cause to be made or continued, any loud, unnecessary, or unusual noise that disturbs the peace or quiet of any neighborhood, or that causes discomfort or annoyance to any person of normal sensitiveness.

B. The criteria that shall be utilized in determining whether a violation of the provisions of this section exists shall include, but not be limited to, the following:

1. The level of the noise.
2. The frequency of occurrence of the noise.
3. Whether the nature of the noise is usual or unusual.
4. The level and intensity of the background noise, if any.
5. The proximity of the noise to residential sleeping facilities.
6. The nature and zoning of the area within which the noise emanates.
7. The density of the inhabitation of the area within which the noise is received.
8. The time of day or night the noise occurs.
9. The duration of the noise.

C. DURATION OF NOISE. The following criteria shall be used whenever the noise level exceeds:

1. The noise standard for a cumulative period of more than 30 minutes in any hour;

2. The noise standard plus five dB(A) for a cumulative period of more than 15 minutes in any hour;

3. The noise standard plus 10 dB(A) for a cumulative period of more than five minutes in any hour;

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

5. The noise standard plus 20 dB(A) for any period of time.

D. In the event the ambient noise level exceeds any of the first four noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level. (2802 § 1, 2011; 2660 § 2, 2005)

8.47.060 Special Noise Sources

A. RADIOS, TELEVISION SETS, AND SIMILAR DEVICES.

1. USE RESTRICTED. It shall be unlawful for any person within any residential area of the City to use or operate any radio receiving set, musical instrument, stereo equipment, television set, or other machine or device for the producing or reproducing of sound between the hours of 10:00 p.m. of one day and 7:00 a.m. of the following day in such a manner as to disturb the peace, quiet, and comfort of any person of normal sensitiveness residing in the area, as determined utilizing the criteria established in Section 8.47.050(A).

2. PRIMA FACIE VIOLATION. Any noise level exceeding the ambient base level at the property line of any property (or, if a condominium or apartment house, within any adjoining apartment) by more than five decibels shall be deemed to be prima facie evidence of a violation of the provisions of this section.

B. MUSICAL INSTRUMENTS—USE RESTRICTED. It shall be unlawful for any person to use any drum or other instrument or device of any kind for the purpose of attracting attention by the creation of noise within the City. This section shall not apply to any person who is a participant in a duly licensed parade or who has been otherwise duly authorized to engage in such conduct.

C. MACHINERY, EQUIPMENT, FANS, AND AIR CONDITIONING. It shall be unlawful for any person to operate any machinery, equipment, pump, fan, air conditioning apparatus, or similar mechanical device in any manner so as to create any noise that would cause the noise level at the property line of any property to exceed either the ambient base noise level or the actual measured ambient noise level by more than five decibels.

D. CONSTRUCTION OF BUILDINGS AND PROJECTS. It shall be unlawful for any person within a residential area, or within a radius of 500 feet therefrom, to operate equipment or perform any outside construction or repair work on buildings, structures, or projects, or to operate any pile driver, power shovel, pneumatic hammer, derrick, power hoist, or any other construction type device between the hours of 10:00 p.m. of one day and 7:00 a.m. of the next day in such a manner that a person of normal sensitiveness, as determined utilizing the criteria established in Section 8.47.050(B), is caused discomfort or annoyance unless such operations are of an emergency nature.

E. VEHICLE REPAIRS. It shall be unlawful for any person within any residential area of the City to repair, rebuild, or test any motor vehicle in such a manner that a person of normal sensitiveness residing in the area is caused discomfort or annoyance, as determined utilizing the criteria established in Section 8.47.050, unless such operations are of an emergency nature.

F. MOTOR DRIVEN VEHICLES. It shall be unlawful for any person to operate any motor driven vehicle within the City in such a manner that a person of normal sensitiveness residing in the area is caused discomfort or annoyance, as determined utilizing the criteria established in Section 8.47.050(B), unless such operations are of an emergency nature; provided, however, any such vehicle that is operated upon any public highway, street, or right-of-way shall be excluded from the provisions of this section.

G. AMPLIFIED SOUND.

1. PURPOSE. While recognizing the constitutional rights of freedom of speech and assembly, the City nevertheless feels obligated to reasonably regulate the use of sound amplifying equipment in order to protect the rights of the citizens of the City to privacy and freedom from excessively loud and unnecessary noise.

2. REGISTRATION. It shall be unlawful for any person, other than personnel of law enforcement or governmental agencies, to install, use, or operate within the City a loudspeaker or sound amplifying equipment mounted upon any vehicle for the purposes of warnings, giving instructions, directions, talks, addresses, lectures, or transmitting music to any persons or assemblages of persons without first filing a registration statement at least seven days prior to the date on which the sound amplifying equipment is intended to be used and obtaining approval from the Zoning Administrator.

3. APPROVAL. The Zoning Administrator shall return to the applicant an approved copy of the registration statement unless he or she finds that:

a. The conditions of the motor vehicle movement are such that use of the equipment would constitute a detriment to traffic safety; or

b. The conditions of pedestrian movement are such that use of the equipment would constitute a detriment to traffic safety.

4. DISAPPROVAL. In the event the registration statement is disapproved, the Zoning Administrator shall endorse upon the statement the reason for disapproval and return it to the applicant.

5. APPEALS. Any decision by the Zoning Administrator may be appealed to the City Council within seven days of action of the Zoning Administrator by filing a notice of appeal with the City Clerk.

H. WASTE HAULERS/COMMERCIAL SWEEPERS AND LEAF BLOWERS. It shall be unlawful for any person within any commercial, industrial, or office complex area of the City to operate any refuse compacting, processing or collection vehicle, parking lot sweeper or leaf blower within 150 feet of residential property between the hours of 10:00 p.m. of one day and 7:00 a.m. of the following day.

I. LOADING/UNLOADING. It shall be unlawful for any person in any commercial or industrial area of the City that abuts or is located adjacent to any residential property between the hours of 10:00 p.m. of one day and 7:00 a.m. of the following day to load or unload any vehicle, or operate any dollies, carts, forklifts, or other wheeled equipment that causes any noise that disturbs the peace or quiet of the residential neighborhood. (2802 § 1, 2011; 2660 § 2, 2005)

8.47.070 Exemptions

A. EMERGENCY ACTIVITIES. The provisions of this chapter shall not preclude the operation, maintenance, and repair of equipment, apparatus, or facilities of essential public services, including those of governmental agencies and public utilities providing those activities are of an emergency nature or are necessary to maintain the health, safety, and welfare of the citizenry.

B. COMMUNITY ACTIVITIES. Community events, as described in Section 8.08.060 of the Municipal Code, outdoor gatherings, school bands, dances, shows, and athletic events are hereby exempted from the provisions of this chapter provided such activities are conducted pursuant to a duly authorized license or permit.

C. STATE AND FEDERAL PREEMPTIONS. Motor vehicle and aircraft operations and any other activity whose regulation has been preempted by state or federal law is hereby exempted from the provisions of this chapter. (2802 § 1, 2011; 2660 § 2, 2005)

8.47.080 Abatement

The City Manager or his or her designee and his or her duly authorized representatives are hereby directed to enforce the provisions of this chapter by requiring that the alleged offender correct violations and achieve compliance with the provisions of this chapter within a reasonable period of time.

A. The City Manager or his or her designee shall have the power and duty to enforce the following noise control provisions of this Code: Section 8.47.050, Section 8.47.060(A)(2), (C), (H), and (I).

B. The Police Department shall have the power and duty to enforce the following noise control provisions of this Code: Section 8.47.060 (A)(1), (B), (E), (F), (G)(1) and (2).

C. The Building Official shall have the power and duty to enforce the following noise control provisions of this Code: Section 8.47.060(D). (2802 § 1, 2011; 2660 § 2, 2005)

Appendix B

Field Data and Photos

Field Sheet

Project: Garden Grove Hotel	**Engineer:** B. Estrada	**Date:** 6/22/2018	
		JN: 1268-2018-01	
Measurement Address: 13650 Harbor Blvd.	**City:** Garden Grove	**Site No.:** 1	

Sound Level Meter:
LD-712
Serial # A0520

Calibrator:
LD-250 250
Serial # 1322

Calibration Record:

	Input, dB/	Reading, dB/	Offset, dB/	Time
Before	114.0/	114.0/	26.7/	11.20AM
After	114.0/	114.0/	26.7/	11:20AM
Before	/	/	/	
After	/	/	/	

Notes:

Temp:	77
Windspeed:	8mph
Direction:	sw
Skies:	Clear
Camera:	
Photo Nos.	

Meter Settings:
☒ A-WTD ☐ LINEAR ☒ SLOW ☐ 1/1 OCT ☒ INTERVALS ___10____- MINUTE
☐ C-WTD ☐ IMPULSE ☐ FAST ☐ 1/3 OCT ☒ L_N PERCENTILE VALUES

Notes:

Measurement Type:
Long-term
Short-term X

		Start Time	Stop Time	Leq	Lmin	Lmax	L2	L8	L25	L50
Locations	1	11.21	11.31	69.6	52.8	85.4	77.2	72.6	69.3	66.6
		10 Feet away from the west P/L. Ambient noise includes noise from Harbor Blvd.								
	2	11.24	11.34	56.1	47.7	73.3	62.4	58.9	56.5	54.5
		10 Feet away from north the P/L. Ambient noise includes noise from Harbor Blvd.								
	3	11.42	11.52	53.5	47.3	64.4	58.8	56.4	54.6	52.4
		10 Feet away from north and east P/L. Ambient noise includes noise from Harbor Blvd.								
	4	11.36	11.46	67.7	47.5	79.0	74.4	73.3	71.9	53.3
		10 Feet away from south and east P/L. Ambient noise includes noise from Harbor Blvd and car repair from the adjacent property from the south.								
	5									

RK engineering group, inc.

Field Sheet - ST1 Location Photos

Project: Garden Grove Hotel	**Engineer:** B. Estrada	**Date:** 6/22/2018 **JN:** 1268-2018-01	
Measurement Address: 13650 Harbor Blvd.	**City:** Garden Grove	**Site No.:** 1	

RK engineering group, inc.

Field Sheet - ST2 Location Photos

Project: Garden Grove Hotel	**Engineer:** B. Estrada	**Date:**	6/22/2018
		JN:	1268-2018-01
Measurement Address: 13650 Harbor Blvd.	**City:** Garden Grove	**Site No.:**	2

RK engineering group, inc.

Field Sheet - ST3 Location Photos

Project: Garden Grove Hotel	**Engineer:** B. Estrada	**Date:** 6/22/2018 **JN:** 1268-2018-01	
Measurement Address: 13650 Harbor Blvd.	**City:** Garden Grove	**Site No.:** 3	

RK engineering group, inc.

Field Sheet - ST4 Location Photos

Project: Garden Grove Hotel	**Engineer:** B. Estrada	**Date:**	6/22/2018
		JN:	1268-2018-01
Measurement Address: 13650 Harbor Blvd.	**City:** Garden Grove	**Site No.:**	4

RK engineering group, inc.

Appendix C

Stationary Noise Calculation Worksheets

NOISE BARRIER CALCULATIONS - BASED UPON FHWA - RD-77-108

PROJECT:	13650 HARBOR BOULEVARD HOTEL	JOB #:	1268-18-01
SOURCE:	LOADING AREA / DELIVERY TRUCK	DATE:	29-Jun-18
LOCATION:	RESIDENTIAL PROPERTY TO THE SOUTH	BY:	B. Estrada

NOISE INPUT DATA

OBS DIST=	225.1			
DT WALL=	172.0			
DT W/OB=	53.1			
HTH WALL=	5.0	********		
BARRIER =	0.0	(0=WALL,1=BERM)		
OBS HTH=	5.0			
NOISE HTH=	5.0		BARRIER+	
OBS EL =	0.0		TOPO SHIELDING =	-4.96
NOISE EL =	0.0		NOISE HTH EL=	5.0
DROP-OFF=	20.0	(20 = 6 dBA PER DOUBLING OF DISTANCE)		
COFF				

NOISE OUTPUT DATA (dBA)

	DIST (FT)	Leq	Lmax	L2	L8	L25	L50
REF LEVEL	6	66.3	84.0	78.5	68.0	61.5	58.5
PROJ LEVEL	225.11	34.8	52.5	47.0	36.5	30.0	27.0
SHIELDING	225.11	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0
ADJ LEVEL	225.11	***29.9***	***47.6***	***42.1***	***31.6***	***25.1***	***22.1***

NOISE LEVEL REDUCTION DUE TO DISTANCE = -31.4848708

NOISE BARRIER CALCULATIONS - BASED UPON FHWA - RD-77-108

PROJECT:	13650 HARBOR BOULEVARD HOTEL	JOB #:	1268-18-01
SOURCE:	PARKING LOT	DATE:	29-Jun-18
LOCATION:	RESIDENTIAL PROPERTY TO THE SOUTH	BY:	B. Estrada

NOISE INPUT DATA

OBS DIST=	75.0			
DT WALL=	24.0			
DT W/OB=	51.0			
HTH WALL=	5.0	********		
BARRIER =	0.0	(0=WALL,1=BERM)		
OBS HTH=	5.0			
NOISE HTH=	3.0		BARRIER+	
OBS EL =	0.0		TOPO SHIELDING =	-5.51
NOISE EL =	0.0		NOISE HTH EL=	3.0
DROP-OFF=	20.0	(20 = 6 dBA PER DOUBLING OF DISTANCE)		
COFF				

NOISE OUTPUT DATA (dBA)

	DIST (FT)	Leq	Lmax	L2	L8	L25	L50
REF LEVEL	6	63.8	79.5	68.5	65.5	64.5	63.0
PROJ LEVEL	75	41.9	57.6	46.6	43.6	42.6	41.1
SHIELDING	75	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5
ADJ LEVEL	75	***36.4***	***52.1***	***41.1***	***38.1***	***37.1***	***35.6***

NOISE LEVEL REDUCTION DUE TO DISTANCE = -21.9382003

NOISE BARRIER CALCULATIONS - BASED UPON FHWA - RD-77-108

PROJECT:	13650 HARBOR BOULEVARD HOTEL	JOB #:	1268-18-01
SOURCE:	TRASH PICK-UP	DATE:	29-Jun-18
LOCATION:	RESIDENTIAL PROPERTY TO THE SOUTH	BY:	B. Estrada

NOISE INPUT DATA

OBS DIST=	66.0			
DT WALL=	9.0			
DT W/OB=	57.0			
HTH WALL=	10.0	********		
BARRIER =	0.0	(0=WALL,1=BERM)		
OBS HTH=	5.0			
NOISE HTH=	8.0		BARRIER+	
OBS EL =	0.0		TOPO SHIELDING =	-7.80
NOISE EL =	0.0		NOISE HTH EL=	8.0
DROP-OFF=	20.0	(20 = 6 dBA PER DOUBLING OF DISTANCE)		
COFF				

NOISE OUTPUT DATA (dBA)

	DIST (FT)	Leq	Lmax	L2	L8	L25	L50
REF LEVEL	6	66.3	84.0	78.5	68.0	61.5	58.5
PROJ LEVEL	66	45.5	63.2	57.7	47.2	40.7	37.7
SHIELDING	66	-7.8	-7.8	-7.8	-7.8	-7.8	-7.8
ADJ LEVEL	66	***37.7***	***55.4***	***49.9***	***39.4***	***32.9***	***29.9***

NOISE LEVEL REDUCTION DUE TO DISTANCE = -20.8278537

NOISE BARRIER CALCULATIONS - BASED UPON FHWA - RD-77-108

PROJECT:	13650 Harbor Bvld	JOB #:	1268-18-01
SOURCE:	ROOFTOP HVAC EQUIPMENT	DATE:	29-Jun-18
LOCATION:	RESIDENTIAL PROPERTY TO THE SOUTH	BY:	B. Estrada

NOISE INPUT DATA

OBS DIST=	187.2			
DT WALL=	76.8			
DT W/OB=	110.4			
HTH WALL=	43.5	********		
BARRIER =	0.0	(0=WALL,1=BERM)		
OBS HTH=	5.0			
NOISE HTH=	43.0		BARRIER+	
OBS EL =	0.0		TOPO SHIELDING =	-13.10
NOISE EL =	0.0		NOISE HTH EL=	43.0
DROP-OFF=	20.0	(20 = 6 dBA PER DOUBLING OF DISTANCE)		
COFF				

NOISE OUTPUT DATA (dBA)

	DIST (FT)	Leq	Lmax	L2	L8	L25	L50
REF LEVEL	3	88.5	88.5	88.5	88.5	88.5	88.5
PROJ LEVEL	187.21	52.6	52.6	52.6	52.6	52.6	52.6
SHIELDING	187.21	-13.1	-13.1	-13.1	-13.1	-13.1	-13.1
ADJ LEVEL	187.21	***39.5***	***39.5***	***39.5***	***39.5***	***39.5***	***39.5***

NOISE LEVEL REDUCTION DUE TO DISTANCE = -35.9041558

NOISE BARRIER CALCULATIONS - BASED UPON FHWA - RD-77-108

PROJECT:	13650 Harbor Bvld	JOB #:	1268-18-01
SOURCE:	ROOFTOP HVAC EQUIPMENT	DATE:	29-Jun-18
LOCATION:	RESIDENTIAL PROPERTY TO THE SOUTH	BY:	B. Estrada

NOISE INPUT DATA

OBS DIST=	297.2			
DT WALL=	187.0			
DT W/OB=	110.2			
HTH WALL=	43.5	********		
BARRIER =	0.0	(0=WALL,1=BERM)		
OBS HTH=	5.0			
NOISE HTH=	43.0		BARRIER+	
OBS EL =	0.0		TOPO SHIELDING =	-14.40
NOISE EL =	0.0		NOISE HTH EL=	43.0
DROP-OFF=	20.0	(20 = 6 dBA PER DOUBLING OF DISTANCE)		
COFF				

NOISE OUTPUT DATA (dBA)

	DIST (FT)	Leq	Lmax	L2	L8	L25	L50
REF LEVEL	3	88.5	88.5	88.5	88.5	88.5	88.5
PROJ LEVEL	297.2	48.6	48.6	48.6	48.6	48.6	48.6
SHIELDING	297.2	-14.4	-14.4	-14.4	-14.4	-14.4	-14.4
ADJ LEVEL	297.2	***34.2***	***34.2***	***34.2***	***34.2***	***34.2***	***34.2***

NOISE LEVEL REDUCTION DUE TO DISTANCE = -39.918551

PROJECT:	13650 HARBOR BLVD HOTEL	JOB #:	1268-18-01
LOCATION:	ROOFTOP HVAC EQUIPMENT	DATE:	29-Jun-18
SOURCE:	RESIDENTIAL PROPERTY TO THE SOUTH	BY:	B. Estrada

NOISE LEVEL MEASUREMENTS (dBA)

	NOISE SOURCE	LEQ	L(MAX)	L(2)	L(8)	L(25)	L(50)
1	HVAC Equipment-1	39.5	39.5	39.5	39.5	39.5	39.5
2	HVAC Equipment-2	34.2	34.2	34.2	34.2	34.2	34.2
	TOTAL	40.6	40.6	40.6	40.6	40.6	40.6

NOISE BARRIER CALCULATIONS - BASED UPON FHWA - RD-77-108

PROJECT:	13650 Harbor Bvld	JOB #:	1268-18-01
SOURCE:	DELIVERY TRUCK	DATE:	29-Jun-18
LOCATION:	SCHOOL TO THE EAST	BY:	B. Estrada

NOISE INPUT DATA

OBS DIST=	205.0			
DT WALL=	200.0			
DT W/OB=	5.0			
HTH WALL=	0.0	********		
BARRIER =	0.0	(0=WALL,1=BERM)		
OBS HTH=	5.0			
NOISE HTH=	5.0		BARRIER+	
OBS EL =	0.0		TOPO SHIELDING =	0.00
NOISE EL =	0.0		NOISE HTH EL=	5.0
DROP-OFF=	20.0	(20 = 6 dBA PER DOUBLING OF DISTANCE)		
COFF				

NOISE OUTPUT DATA (dBA)

	DIST (FT)	Leq	Lmax	L2	L8	L25	L50
REF LEVEL	6	66.3	84.0	78.5	68.0	61.5	58.5
PROJ LEVEL	205	35.6	53.3	47.8	37.3	30.8	27.8
SHIELDING	205	0.0	0.0	0.0	0.0	0.0	0.0
ADJ LEVEL	205	***35.6***	***53.3***	***47.8***	***37.3***	***30.8***	***27.8***

NOISE LEVEL REDUCTION DUE TO DISTANCE = -30.6720522

NOISE BARRIER CALCULATIONS - BASED UPON FHWA - RD-77-108

PROJECT:	13650 Harbor Bvld	JOB #:	1268-18-01
SOURCE:	PARKING LOT	DATE:	29-Jun-18
LOCATION:	SCHOOL TO THE EAST	BY:	B. Estrada

NOISE INPUT DATA

OBS DIST=	37.0			
DT WALL=	32.0			
DT W/OB=	5.0			
HTH WALL=	0.0	********		
BARRIER =	0.0	(0=WALL,1=BERM)		
OBS HTH=	5.0			
NOISE HTH=	3.0		BARRIER+	
OBS EL =	0.0		TOPO SHIELDING =	0.00
NOISE EL =	0.0		NOISE HTH EL=	3.0
DROP-OFF=	20.0	(20 = 6 dBA PER DOUBLING OF DISTANCE)		
COFF				

NOISE OUTPUT DATA (dBA)

	DIST (FT)	Leq	Lmax	L2	L8	L25	L50
REF LEVEL	6	63.8	79.5	68.5	65.5	64.5	63.0
PROJ LEVEL	37	48.0	63.7	52.7	49.7	48.7	47.2
SHIELDING	37	0.0	0.0	0.0	0.0	0.0	0.0
ADJ LEVEL	37	***48.0***	***63.7***	***52.7***	***49.7***	***48.7***	***47.2***

NOISE LEVEL REDUCTION DUE TO DISTANCE = -15.8010095

NOISE BARRIER CALCULATIONS - BASED UPON FHWA - RD-77-108

PROJECT:	13650 Harbor Bvld	JOB #:	1268-18-01
SOURCE:	TRASH PICK-UP	DATE:	29-Jun-18
LOCATION:	SCHOOL TO THE EAST	BY:	B. Estrada

NOISE INPUT DATA

OBS DIST=	18.4			
DT WALL=	6.5			
DT W/OB=	11.9			
HTH WALL=	10.0	********		
BARRIER =	0.0	(0=WALL,1=BERM)		
OBS HTH=	5.0			
NOISE HTH=	8.0		BARRIER+	
OBS EL =	0.0		TOPO SHIELDING =	-10.20
NOISE EL =	0.0		NOISE HTH EL=	8.0
DROP-OFF=	20.0	(20 = 6 dBA PER DOUBLING OF DISTANCE)		
COFF				

NOISE OUTPUT DATA (dBA)

	DIST (FT)	Leq	Lmax	L2	L8	L25	L50
REF LEVEL	6	66.3	84.0	78.5	68.0	61.5	58.5
PROJ LEVEL	18.44	56.5	74.2	68.7	58.2	51.7	48.7
SHIELDING	18.44	-10.2	-10.2	-10.2	-10.2	-10.2	-10.2
ADJ LEVEL	18.44	***46.3***	***64.0***	***58.5***	***48.0***	***41.5***	***38.5***

NOISE LEVEL REDUCTION DUE TO DISTANCE = -9.75219333

NOISE BARRIER CALCULATIONS - BASED UPON FHWA - RD-77-108

PROJECT:	13650 Harbor Bvld	JOB #:	1268-18-01
SOURCE:	ROOFTOP HVAC EQUIPMENT	DATE:	29-Jun-18
LOCATION:	SCHOOL TO THE EAST	BY:	B. Estrada

NOISE INPUT DATA

OBS DIST=	175.0			
DT WALL=	100.0			
DT W/OB=	75.0			
HTH WALL=	53.0	********		
BARRIER =	0.0	(0=WALL,1=BERM)		
OBS HTH=	5.0			
NOISE HTH=	60.0		BARRIER+	
OBS EL =	0.0		TOPO SHIELDING =	-15.10
NOISE EL =	0.0		NOISE HTH EL=	60.0
DROP-OFF=	20.0	(20 = 6 dBA PER DOUBLING OF DISTANCE)		
COFF				

NOISE OUTPUT DATA (dBA)

	DIST (FT)	Leq	Lmax	L2	L8	L25	L50
REF LEVEL	3	88.5	88.5	88.5	88.5	88.5	88.5
PROJ LEVEL	175	53.2	53.2	53.2	53.2	53.2	53.2
SHIELDING	175	-15.1	-15.1	-15.1	-15.1	-15.1	-15.1
ADJ LEVEL	175	***38.1***	***38.1***	***38.1***	***38.1***	***38.1***	***38.1***

NOISE LEVEL REDUCTION DUE TO DISTANCE = -35.3183359

NOISE BARRIER CALCULATIONS - BASED UPON FHWA - RD-77-108

PROJECT:	13650 Harbor Bvld	JOB #:	1268-18-01
SOURCE:	ROOFTOP HVAC EQUIPMENT	DATE:	29-Jun-18
LOCATION:	SCHOOL TO THE EAST	BY:	B. Estrada

NOISE INPUT DATA

OBS DIST=	295.0			
DT WALL=	220.0			
DT W/OB=	75.0			
HTH WALL=	53.0	********		
BARRIER =	0.0	(0=WALL,1=BERM)		
OBS HTH=	5.0			
NOISE HTH=	60.0		BARRIER+	
OBS EL =	0.0		TOPO SHIELDING =	-16.60
NOISE EL =	0.0		NOISE HTH EL=	60.0
DROP-OFF=	20.0	(20 = 6 dBA PER DOUBLING OF DISTANCE)		
COFF				

NOISE OUTPUT DATA (dBA)

	DIST (FT)	Leq	Lmax	L2	L8	L25	L50
REF LEVEL	3	88.5	88.5	88.5	88.5	88.5	88.5
PROJ LEVEL	295	48.6	48.6	48.6	48.6	48.6	48.6
SHIELDING	295	-16.6	-16.6	-16.6	-16.6	-16.6	-16.6
ADJ LEVEL	295	***32.0***	***32.0***	***32.0***	***32.0***	***32.0***	***32.0***

NOISE LEVEL REDUCTION DUE TO DISTANCE = -39.8540152

PROJECT:	13650 Harbor Bvld	JOB #:	1268-18-01
LOCATION:	ROOFTOP HVAC EQUIPMENT	DATE:	29-Jun-18
SOURCE:	SCHOOL TO THE EAST	BY:	B. Estrada

NOISE LEVEL MEASUREMENTS (dBA)

NOISE SOURCE		LEQ	L(MAX)	L(2)	L(8)	L(25)	L(50)
1	HVAC Equipment	38.1	38.1	38.1	38.1	38.1	38.1
2	HVAC Equipment	32.0	32.0	32.0	32.0	32.0	32.0
3							
4							
6							
	TOTAL	39.0	39.0	39.0	39.0	39.0	39.0

NOISE INTERVAL AVERAGER (2.0)

PROJECT:	13650 HARBOR BOULEVARD HOTEL	JOB #:	2250-2016-08
LOCATION:	RESIDENTIAL - DAYTIME	DATE:	29-Jun-18
SOURCE:	ALL NOISE SOURCES	BY:	B. Estrada

NOISE LEVEL MEASUREMENTS (dBA)

	NOISE SOURCE	LEQ	L(MAX)	L(2)	L(8)	L(25)	L(50)
1	HVAC Equipment	29.9	47.6	42.1	31.6	25.1	22.1
2	Parking Structure	36.4	52.1	41.1	38.1	37.1	35.6
3	Delivery/Trash Trucks	37.7	55.4	49.9	39.4	32.9	29.9
4	Pool/Music	40.6	40.6	40.6	40.6	40.6	40.6
6	Daytime Ambient	53.5	64.4	58.8	56.4	54.6	52.4
	TOTAL	53.9	65.2	59.5	56.7	54.9	52.8
	CHANGE FROM PROJECT	0.4	0.8	0.7	0.3	0.3	0.4

NOISE INTERVAL AVERAGER (2.0)

PROJECT:	13650 HARBOR BOULEVARD HOTEL	JOB #:	2250-2016-08
LOCATION:	RESIDENTIAL - NIGHTTIME	DATE:	29-Jun-18
SOURCE:	ALL NOISE SOURCES	BY:	B. Estrada

NOISE LEVEL MEASUREMENTS (dBA)

	NOISE SOURCE	LEQ	L(MAX)	L(2)	L(8)	L(25)	L(50)
1	HVAC Equipment	29.9	47.6	42.1	31.6	25.1	22.1
2	Parking Structure	36.4	52.1	41.1	38.1	37.1	35.6
3	Delivery/Trash Trucks	37.7	55.4	49.9	39.4	32.9	29.9
4	Pool/Music	40.6	40.6	40.6	40.6	40.6	40.6
6	Nighttime Ambient	48.5	59.4	53.8	51.4	49.6	47.4
	TOTAL	49.7	61.6	55.8	52.2	50.4	48.5
	CHANGE FROM PROJECT	1.2	2.2	2.0	0.8	0.8	1.1

NOISE INTERVAL AVERAGER (2.0)

PROJECT:	13650 HARBOR BOULEVARD HOTEL	JOB #:	2250-2016-08
LOCATION:	HIGH SCHOOL	DATE:	29-Jun-18
SOURCE:	ALL NOISE SOURCES	BY:	B. Estrada

NOISE LEVEL MEASUREMENTS (dBA)

	NOISE SOURCE	LEQ	L(MAX)	L(2)	L(8)	L(25)	L(50)
1	HVAC Equipment	35.6	53.3	47.8	37.3	30.8	27.8
2	Parking Structure	48.0	63.7	52.7	49.7	48.7	47.2
3	Delivery/Trash Trucks	46.3	64.0	58.5	48.0	41.5	38.5
4	Pool/Music	39.0	39.0	39.0	39.0	39.0	39.0
6	Nighttime Ambient	67.7	79.0	74.4	73.3	71.9	53.3
	TOTAL	67.8	79.3	74.6	73.3	71.9	54.5
	CHANGE FROM PROJECT	0.1	0.3	0.2	0.0	0.0	1.2

Appendix D

Roadway Noise Calculation Worksheets

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

PROJECT:	13650 Harbor Blvd Hotel	JOB #:	1268-18-01
ROADWAY:	Harbor Bvld	DATE:	29-Jun-18
LOCATION:	Swimming Pool Area	ENGINEER:	B. ESTRADA

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	62,305	
SPEED =	40	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	81	
ROAD ELEVATION =	0.0	
GRADE =	0.0	%
PK HR VOL =	6,231	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		80
DIST C/L TO WALL =		75
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		5
PAD ELEVATION =		0.5
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15	
MEDIUM TRUCKS =	15	(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	15	

WALL INFORMATION

HTH WALL=	7.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9742
MEDIUM TRUCKS	0.848	0.049	0.103	0.0184
HEAVY TRUCKS	0.865	0.027	0.108	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	68.75	- -
MEDIUM TRUCKS	4.0	68.61	- -
HEAVY TRUCKS	8.0	68.51	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	70.5	68.6	66.8	60.8	69.4	70.0
MEDIUM TRUCKS	62.2	60.7	54.3	52.8	61.3	61.5
HEAVY TRUCKS	63.1	61.7	52.7	53.9	62.3	62.4
NOISE LEVELS (dBA)	71.7	69.9	67.2	62.1	70.7	71.2

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	62.1	60.2	58.4	52.4	61.0	61.6
MEDIUM TRUCKS	54.0	52.5	46.1	44.6	53.1	53.3
HEAVY TRUCKS	55.4	54.0	45.0	46.2	54.6	54.7
NOISE LEVELS (dBA)	63.5	61.7	58.9	53.8	62.4	62.9

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	96	207	445	959
LDN	89	191	413	889

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

PROJECT:	13650 Harbor Blvd Hotel	JOB #:	1268-18-01
ROADWAY:	Harbor Bvld	DATE:	29-Jun-18
LOCATION:	Residence Balcony/Facade Facing West Ground Floor	ENGINEER:	B. ESTRADA

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	62,305	
SPEED =	40	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	81	
ROAD ELEVATION =	0.0	
GRADE =	0.0	%
PK HR VOL =	6,231	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		109
DIST C/L TO WALL =		75
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		34
PAD ELEVATION =		1.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15	
MEDIUM TRUCKS =	15	(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	15	

WALL INFORMATION

HTH WALL=	7.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9742
MEDIUM TRUCKS	0.848	0.049	0.103	0.0184
HEAVY TRUCKS	0.865	0.027	0.108	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	97.47	- -
MEDIUM TRUCKS	4.0	97.31	- -
HEAVY TRUCKS	8.0	97.18	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	68.2	66.3	64.5	58.5	67.1	67.7
MEDIUM TRUCKS	59.9	58.4	52.1	50.5	59.0	59.2
HEAVY TRUCKS	60.8	59.4	50.4	51.6	60.0	60.1
NOISE LEVELS (dBA)	69.5	67.7	64.9	59.8	68.4	68.9

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	61.3	59.4	57.6	51.6	60.2	60.8
MEDIUM TRUCKS	53.6	52.1	45.7	44.2	52.7	52.9
HEAVY TRUCKS	55.5	54.1	45.1	46.3	54.7	54.8
NOISE LEVELS (dBA)	62.9	61.1	58.4	53.3	61.8	62.3

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	92	199	428	922
LDN	85	184	396	854

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

PROJECT:	13650 Harbor Blvd Hotel	JOB #:	1268-18-01
ROADWAY:	Harbor Bvld	DATE:	29-Jun-18
LOCATION:	Residence Balcony/Facade Facing West 2nd Floor	ENGINEER:	B. ESTRADA

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	62,305	
SPEED =	40	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	81	
ROAD ELEVATION =	0.0	
GRADE =	0.0	%
PK HR VOL =	6,231	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		109
DIST C/L TO WALL =		109
RECEIVER HEIGHT =		16.5
WALL DISTANCE FROM RECEIVER =		0
PAD ELEVATION =		1.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	10	
MEDIUM TRUCKS =	10	(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	10	

WALL INFORMATION

HTH WALL=	0.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9742
MEDIUM TRUCKS	0.848	0.049	0.103	0.0184
HEAVY TRUCKS	0.865	0.027	0.108	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	102.38	- -
MEDIUM TRUCKS	4.0	102.09	- -
HEAVY TRUCKS	8.0	101.64	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	70.7	68.8	67.0	61.0	69.6	70.2
MEDIUM TRUCKS	62.4	60.9	54.5	53.0	61.5	61.7
HEAVY TRUCKS	63.3	61.9	52.9	54.1	62.5	62.6
NOISE LEVELS (dBA)	71.9	70.1	67.4	62.3	70.9	71.4

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	70.7	68.8	67.0	61.0	69.6	70.2
MEDIUM TRUCKS	62.4	60.9	54.5	53.0	61.5	61.7
HEAVY TRUCKS	63.3	61.9	52.9	54.1	62.5	62.6
NOISE LEVELS (dBA)	71.9	70.1	67.4	62.3	70.9	71.4

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	150	474	1498	4738
LDN	134	422	1336	4225

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

PROJECT:	13650 Harbor Blvd Hotel	JOB #:	1268-18-01
ROADWAY:	Harbor Bvld	DATE:	29-Jun-18
LOCATION:	Residence Balcony/Facade Facing West 3rd Floor	ENGINEER:	B. ESTRADA

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	62,305	
SPEED =	40	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	81	
ROAD ELEVATION =	0.0	
GRADE =	0.0	%
PK HR VOL =	6,231	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		109
DIST C/L TO WALL =		109
RECEIVER HEIGHT =		25.8
WALL DISTANCE FROM RECEIVER =		0
PAD ELEVATION =		1.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	10	
MEDIUM TRUCKS =	10	(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	10	

WALL INFORMATION

HTH WALL=	0.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9742
MEDIUM TRUCKS	0.848	0.049	0.103	0.0184
HEAVY TRUCKS	0.865	0.027	0.108	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	104.18	- -
MEDIUM TRUCKS	4.0	103.72	- -
HEAVY TRUCKS	8.0	102.92	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	70.6	68.7	66.9	60.9	69.5	70.1
MEDIUM TRUCKS	62.3	60.8	54.5	52.9	61.4	61.6
HEAVY TRUCKS	63.3	61.8	52.8	54.1	62.4	62.5
NOISE LEVELS (dBA)	71.9	70.1	67.3	62.2	70.8	71.3

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	70.6	68.7	66.9	60.9	69.5	70.1
MEDIUM TRUCKS	62.3	60.8	54.5	52.9	61.4	61.6
HEAVY TRUCKS	63.3	61.8	52.8	54.1	62.4	62.5
NOISE LEVELS (dBA)	71.9	70.1	67.3	62.2	70.8	71.3

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	147	466	1474	4660
LDN	131	416	1314	4155

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

PROJECT:	13650 Harbor Blvd Hotel	JOB #:	1268-18-01
ROADWAY:	Harbor Bvld	DATE:	29-Jun-18
LOCATION:	Residence Balcony/Facade Facing West 4th Floor	ENGINEER:	B. ESTRADA

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	62,305	
SPEED =	40	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	81	
ROAD ELEVATION =	0.0	
GRADE =	0.0	%
PK HR VOL =	6,231	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		109
DIST C/L TO WALL =		109
RECEIVER HEIGHT =		35.0
WALL DISTANCE FROM RECEIVER =		0
PAD ELEVATION =		1.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	10	
MEDIUM TRUCKS =	10	(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	10	

WALL INFORMATION

HTH WALL=	0.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9742
MEDIUM TRUCKS	0.848	0.049	0.103	0.0184
HEAVY TRUCKS	0.865	0.027	0.108	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	106.76	- -
MEDIUM TRUCKS	4.0	106.14	- -
HEAVY TRUCKS	8.0	105.00	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	70.5	68.6	66.8	60.8	69.4	70.0
MEDIUM TRUCKS	62.2	60.7	54.4	52.8	61.3	61.5
HEAVY TRUCKS	63.2	61.8	52.7	54.0	62.3	62.5
NOISE LEVELS (dBA)	71.8	70.0	67.2	62.1	70.7	71.2

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	70.5	68.6	66.8	60.8	69.4	70.0
MEDIUM TRUCKS	62.2	60.7	54.4	52.8	61.3	61.5
HEAVY TRUCKS	63.2	61.8	52.7	54.0	62.3	62.5
NOISE LEVELS (dBA)	71.8	70.0	67.2	62.1	70.7	71.2

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	144	455	1439	4551
LDN	128	406	1283	4058

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

PROJECT:	13650 Harbor Blvd Hotel	JOB #:	1268-18-01
ROADWAY:	Harbor Bvld	DATE:	29-Jun-18
LOCATION:	Residence Balcony/Facade Facing West 5th Floor	ENGINEER:	B. ESTRADA

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	62,305	
SPEED =	40	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	81	
ROAD ELEVATION =	0.0	
GRADE =	0.0	%
PK HR VOL =	6,231	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		109
DIST C/L TO WALL =		109
RECEIVER HEIGHT =		44.3
WALL DISTANCE FROM RECEIVER =		0
PAD ELEVATION =		1.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	10	
MEDIUM TRUCKS =	10	(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	10	

WALL INFORMATION

HTH WALL=	0.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9742
MEDIUM TRUCKS	0.848	0.049	0.103	0.0184
HEAVY TRUCKS	0.865	0.027	0.108	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	110.05	- -
MEDIUM TRUCKS	4.0	109.28	- -
HEAVY TRUCKS	8.0	107.83	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	70.4	68.5	66.7	60.7	69.3	69.9
MEDIUM TRUCKS	62.1	60.6	54.2	52.7	61.2	61.4
HEAVY TRUCKS	63.1	61.6	52.6	53.9	62.2	62.3
NOISE LEVELS (dBA)	71.6	69.8	67.1	62.0	70.6	71.1

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	70.4	68.5	66.7	60.7	69.3	69.9
MEDIUM TRUCKS	62.1	60.6	54.2	52.7	61.2	61.4
HEAVY TRUCKS	63.1	61.6	52.6	53.9	62.2	62.3
NOISE LEVELS (dBA)	71.6	69.8	67.1	62.0	70.6	71.1

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	140	442	1397	4417
LDN	125	394	1246	3939

Appendix E

Construction Noise and Vibration Calculation Worksheets

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 6/28/2018
Case Description: 13650 Harbor Bvld Hotel

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Site Preparation	Residential	65	65	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85		100	0
Tractor	No	40	84		100	0
Dozer	No	40		81.7	100	0

Results

Equipment		Calculated (dBA) *Lmax	Leq
Grader		79	75
Tractor		78	74
Dozer		75.6	71.7
	Total	79	78.5

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 6/28/2018
Case Description: 13650 Harbor Bvld Hotel

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Grading	Residential	65	65	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85		100	0
Tractor	No	40	84		100	0
Dozer	No	40		81.7	100	0

Results

		Calculated (dBA)	
Equipment		*Lmax	Leq
Grader		79	75
Tractor		78	74
Dozer		75.6	71.7
	Total	79	78.5

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 6/28/2018
Case Description: 13650 Harbor Bvld Hotel

				---- Receptor #1 ----
		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Building Construction	Residential	65	65	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	100	0
Generator	No	50		80.6	100	0
Pickup Truck	No	40		75	100	0
Tractor	No	40	84		100	0
Welder / Torch	No	40		74	100	0
Welder / Torch	No	40		74	100	0
Welder / Torch	No	40		74	100	0

Results

		Calculated (dBA)	
Equipment		*Lmax	Leq
Crane		74.5	66.6
Generator		74.6	71.6
Pickup Truck		69	65
Tractor		78	74
Welder / Torch		68	64
Welder / Torch		68	64
Welder / Torch		68	64
	Total	78	77.4

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 6/28/2018
Case Description: 13650 Harbor Bvld Hotel

				---- Receptor #1 ----
		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Paving	Residential	65	65	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Mixer Truck	No	40		78.8	100	0
Roller	No	20		80	100	0
Paver	No	50		77.2	100	0
Roller	No	20		80	100	0
Tractor	No	40	84		100	0

Results

		Calculated (dBA)	
Equipment		*Lmax	Leq
Concrete Mixer Truck		72.8	68.8
Roller		74	67
Paver		71.2	68.2
Roller		74	67
Tractor		78	74
	Total	78	76.9

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 6/28/2018
Case Description: 13650 Harbor Bvld Hotel

				---- Receptor #1 ----
		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Architectural Coating	Residential	65	65	45

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Compressor (air)	No	40		77.7	100	0

		Results	
		Calculated (dBA)	
Equipment		*Lmax	Leq
Compressor (air)		71.6	67.7
	Total	71.6	67.7

*Calculated Lmax is the Loudest value.

PROJECT:	13650 Harbor Bvld Hotel	JOB #:	1268-2018-01
ACTIVITY:	Loaded Truck	DATE:	29-Jun-18
LOCATION:	Residential Unit to the North	ENGINEER:	Bryan Estrado

VIBRATION INPUT/OUTPUT DATA

OTHER CONSTRUCTION EQUIPMENT

$$PPV = PPV_{ref}(25/D)^{n} \text{ (in/sec)}$$

PPV =	**0.208**	**in/sec**

Equipment Type =	4	Loaded Trucks
PPV_{ref} =	0.076	Reference PPV at 25 ft.
D =	10.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

EQUIPMENT PPV REFERENCE LEVELS

Type	Equipment	Reference PPV
1	Vibratory Roller	0.210
2	Large Bulldozer	0.089
3	Caisson Drilling	0.089
4	Loaded Trucks	0.076
5	Jackhammer	0.035
6	Small Bulldozer	0.003
7	Crack and Seat	2.400

PROJECT:	13650 Harbor Bvld Hotel	JOB #:	1268-2018-01
ACTIVITY:	Large Bulldozer	DATE:	29-Jun-18
LOCATION:	Residential Unit to the North	ENGINEER:	Bryan Estrado

VIBRATION INPUT/OUTPUT DATA

OTHER CONSTRUCTION EQUIPMENT

$$PPV = PPV_{ref}(25/D)^{n} \text{ (in/sec)}$$

PPV =	**0.244**	**in/sec**

Equipment Type =	2	Large Bulldozer
PPV_{ref} =	0.089	Reference PPV at 25 ft.
D =	10.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

EQUIPMENT PPV REFERENCE LEVELS

Type	Equipment	Reference PPV
1	Vibratory Roller	0.210
2	Large Bulldozer	0.089
3	Caisson Drilling	0.089
4	Loaded Trucks	0.076
5	Jackhammer	0.035
6	Small Bulldozer	0.003
7	Crack and Seat	2.400

Suggested "n" Values Based on Soil Classes		
Soil Class	**Description of Soil Material**	**Suggested Value of "n"**
I	Weak or soft soils: loose soils, dry or partially saturated peat and muck, mud, loose beach sand, and dune sand.	1.4
II	Most sands, sandy clays, silty clays, gravel, silts, weathered rock.	1.3
III	Hard soils: dense compacted sand, dry consolidated clay, consolidated glacial till, some exposed rock.	1.1
IV	Hard, component rock: bedrock, freshly exposed hard rock.	1.0

Guideline Vibration Damage Potential Threshold Criteria		
Structure and Condition	**Maximum PPV (in/sec)**	
	Transient Sources	**Continuous/Frequent Intermittent Sources**
Extremely fragile historic buildings, ruins ancient monuments	0.12	0.08
Fragile buildings	0.20	0.10
Historic and some old buildings	0.50	0.25
Older residential structures	0.50	0.30
New residential structures	1.00	0.50
Modern industrial/commercial buildings	2.00	0.50

Guideline Vibration Annoyance Potential Criteria		
Human Response	**Maximum PPV (in/sec)**	
	Transient Sources	**Continuous/Frequent Intermittent Sources**
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.90	0.10
Severe	2.00	0.40

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Source: Caltrans Transportation and Construction-Induced Vibration Guidance Manual, June 2004