KUNZMAN ASSOCIATES, INC.

10234 4TH STREET PROJECT

NOISE IMPACT ANALYSIS

July 5, 2018

Traffic Engineering | Transportation Planning | Parking | Noise/Vibration | Expert Witness
Air Quality | Global Climate Change | Health Risk Assessment

10234 4TH STREET PROJECT

NOISE IMPACT ANALYSIS

July 5, 2018

Prepared by:

Roma Stromberg, INCE/M.S. ■ Catherine Howe, M.S.
Carl Ballard, LEED GA ■ William Kunzman, P.E.

KUNZMAN ASSOCIATES, INC.
1111 Town & Country Road, Suite 34 ■ Orange, California 92868
5005 La Mart Drive, Suite 201 ■ Riverside, California 92507
(714) 973-8383 ■ www.traffic-engineer.com
JN 7378a

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF FIGURES

I. INTRODUCTION AND SETTING

A. Purpose and Objectives

The purpose of this noise impact analysis is to provide an assessment of the noise impacts resulting from development of the proposed 10234 4th Street project and to identify mitigation measures that may be necessary to reduce those impacts. The noise issues related to the proposed land use and development have been evaluated in the context of the California Environmental Quality Act.

Although this is a technical report, every effort has been made to write the report clearly and concisely. To assist the reader with those terms unique to noise analysis, a glossary of terms is provided in Appendix A of this report.

B. Project Location

The project site (10234 4th Street) is located north of 4th Street between Hermosa Avenue and Center Avenue in the City of Rancho Cucamonga. A vicinity map showing the project location is provided on Figure 1.

C. Project Description

The 2.76 acre project site is proposed to be developed with one building containing 27,093 square feet of refrigerated warehouse use and 32,037 square feet of manufacturing and office uses. The project site is proposed to provide 80 parking spaces, one loading stall, and one trailer stall. Figure 2 illustrates the site plan.

In addition to adherence to the City of Rancho Cucamonga policies found in the Noise Element and Municipal Code limiting the construction hours of operation, the following measures will be implemented as part of the proposed project and required as conditions of project approval.:

1. During the entire construction period, the construction contractor will limit haul truck deliveries to the same hours specified for construction equipment (between the hours of 7:00 AM and 8:00 PM on weekdays, including Saturdays, with no activity allowed on Sundays and holidays).

2. During the entire construction period, construction contractors will equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturer standards.

3. During the entire construction period equipment will be shut off and not left to idle when not in use.

4. During the entire construction period, the contractor will locate equipment staging in areas that will create the greatest distance between construction-related noise sources and sensitive receptors nearest the project site during all project construction.

5. During the entire construction period crushing, grinding or chipping activities, concrete saws, hydraulic equipment, jackhammers, and pneumatic equipment noise sources will be shielded and noise shall be directed away from sensitive receptors.

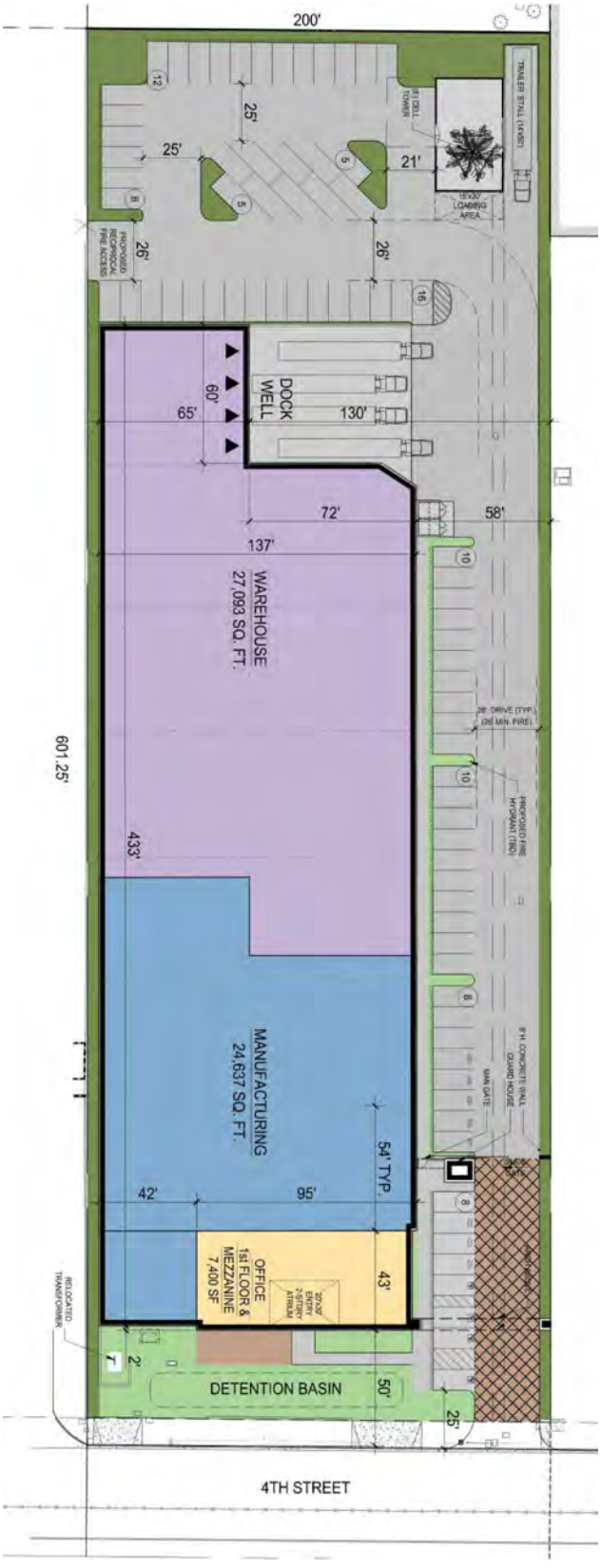
Figure 1
Project Location Map

KUNZMAN ASSOCIATES, INC.

OVER 40 YEARS OF EXCELLENT SERVICE

JN 7378a

Figure 2
Site Plan



KUNZMAN ASSOCIATES, INC.

OVER 40 YEARS OF EXCELLENT SERVICE

JN 7378a

II. NOISE AND VIBRATION FUNDAMENTALS

A. Noise Fundamentals

Sound is a pressure wave created by a moving or vibrating source that travels through an elastic medium such as air. Noise is defined as unwanted or objectionable sound. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and in extreme circumstances, hearing impairment.

Commonly used noise terms are presented in Appendix B. The unit of measurement used to describe a noise level is the decibel (dB). The human ear is not equally sensitive to all frequencies within the sound spectrum. Therefore, the "A-weighted" noise scale, which weights the frequencies to which humans are sensitive, is used for measurements. Noise levels using A-weighted measurements are written dB(A) or dBA.

From the noise source to the receiver, noise changes both in level and frequency spectrum. The most obvious is the decrease in noise as the distance from the source increases. The manner in which noise reduces with distance depends on whether the source is a point or line source as well as ground absorption, atmospheric effects and refraction, and shielding by natural and manmade features. Sound from point sources, such as air conditioning condensers, radiates uniformly outward as it travels away from the source in a spherical pattern. The noise drop-off rate associated with this geometric spreading is 6 dBA per each doubling of the distance (dBA/DD). Transportation noise sources such as roadways are typically analyzed as line sources, since at any given moment the receiver may be impacted by noise from multiple vehicles at various locations along the roadway. Because of the geometry of a line source, the noise drop-off rate associated with the geometric spreading of a line source is 3 dBA/DD.

Decibels are measured on a logarithmic scale, which quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Thus, a doubling of the energy of a noise source, such as a doubled traffic volume, would increase the noise levels by 3 dBA; halving of the energy would result in a 3 dBA decrease.

Figure 3 shows the relationship of various noise levels to commonly experienced noise events.

Average noise levels over a period of minutes or hours are usually expressed as dBA L_{eq}, or the equivalent noise level for that period of time. For example, $L_{eq(3)}$ would represent a 3-hour average. When no period is specified, a one-hour average is assumed.

Noise standards for land use compatibility are stated in terms of the Community Noise Equivalent Level (CNEL) and the Day-Night Average Noise Level (L_{dn}). CNEL is a 24-hour weighted average measure of community noise. CNEL is obtained by adding five decibels to sound levels in the evening (7:00 PM to 10:00 PM), and by adding ten decibels to sound levels at night (10:00 PM to 7:00 AM). This weighting accounts for the increased human sensitivity to noise during the evening and nighttime hours. L_{dn} is a very similar 24-hour average measure that weights only the nighttime hours.

It is widely accepted that the average healthy ear can barely perceive changes of 3 dBA; that a change of 5 dBA is readily perceptible, and that an increase (decrease) of 10 dBA sounds twice (half) as loud. This definition is recommended by the California Department of Transportation's Traffic Noise Analysis Protocol for New Highway and Reconstruction Projects (2013).

B. Vibration Fundamentals

The way in which vibration is transmitted through the earth is called propagation. Propagation of earthborn vibrations is complicated and difficult to predict because of the endless variations in the soil through which waves travel. There are three main types of vibration propagation: surface, compression and shear waves. Surface waves, or Raleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wave front, similar to ripples produced by throwing a rock into a pool of water. Compression waves, or P-waves, are body waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal (i.e., in a "push-pull" fashion). P-waves are analogous to airborne sound waves. Shear waves, or S-waves, are also body waves that carry energy along an expanding spherical wave front. 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 energy is spread over an ever-increasing area such that the energy level striking a given point is reduced with the distance from the energy source. This geometric spreading loss is inversely proportional to the square of the distance. Wave energy is also reduced with distance as a result of material damping in the form of internal friction, soil layering, and void spaces. The amount of attenuation provided by material damping varies with soil type and condition as well as the frequency of the wave.

Construction operations generally include a wide range of activities that can generate groundborne vibration. Vibratory compactors or rollers, pile drivers, and pavement breakers can generate perceptible amounts of vibration at up to 200 feet. Heavy trucks can also generate groundborne vibrations, which can vary depending on vehicle type, weight, and pavement conditions. Potholes, pavement joints, discontinuities, or the differential settlement of pavement all increase the vibration levels from vehicles passing over a road surface. Construction vibration is normally of greater concern than vibration from normal traffic flows on streets and freeways with smooth pavement conditions.

Typically, particle velocity or acceleration (measured in gravities) is used to describe vibration. Table 1 shows the peak particle velocities (PPV) of some common construction equipment and Table 2 shows typical human reactions to various levels of PPV as well as the effect of PPV on buildings.

Table 1

Vibration Source Levels for Construction Equipment[1]

Equipment	Peak Particle Velocity (inches/second) at 25 feet	Approximate Vibration Level LV (dVB) 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	0.21	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] Source: Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2006.

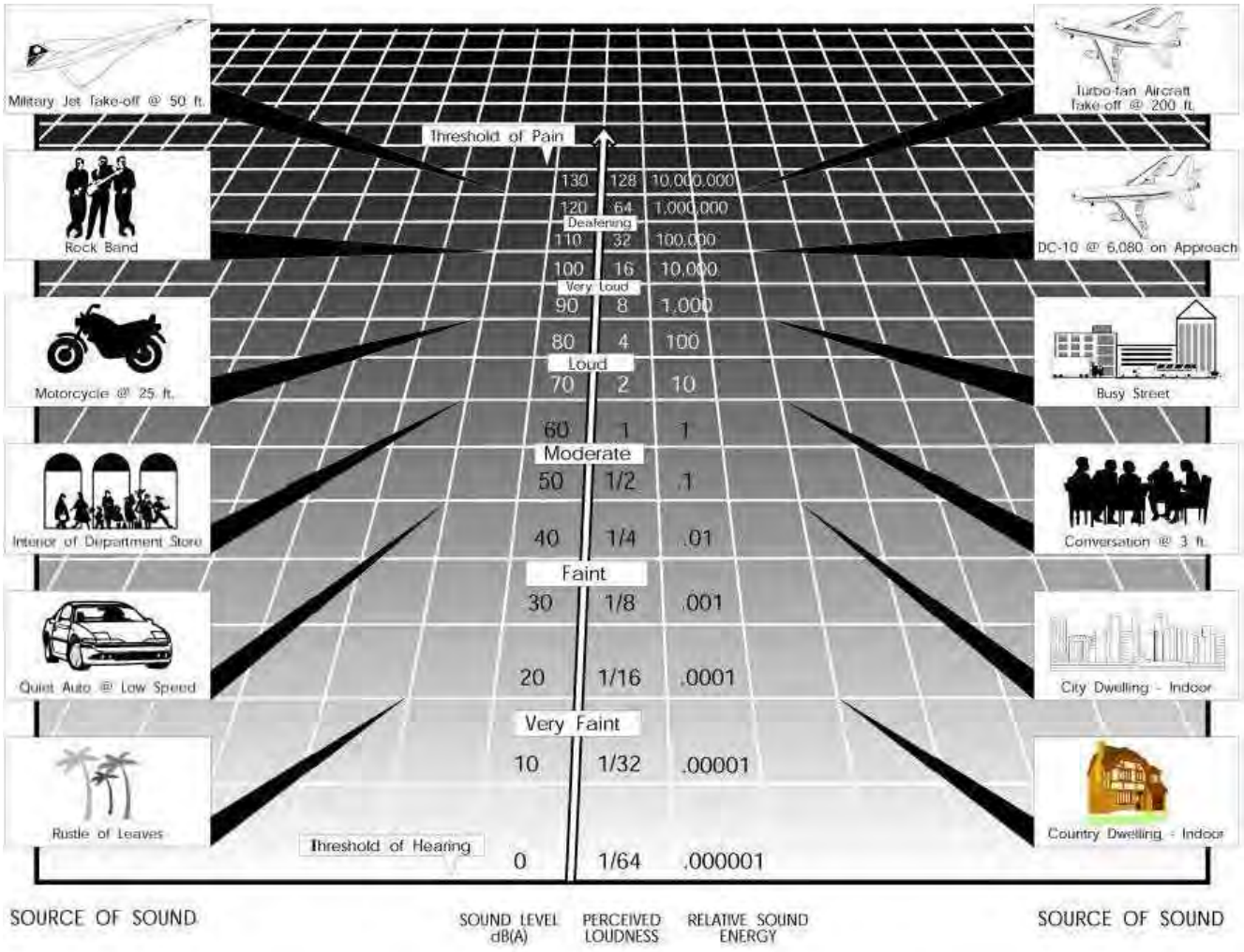
Table 2

Typical Human Reaction and Effect on Buildings Due to Groundborne Vibration [1]

Vibration Level Peak Particle Velocity (PPV)	Human Reaction	Effect on Buildings
0.006–0.019 in/sec	Threshold of perception, possibility of intrusion	Vibrations unlikely to cause damage of any type
0.08 in/sec	Vibrations readily perceptible	Recommended upper level of vibration to which ruins and ancient monuments should be subjected
0.10 in/sec	Level at which continuous vibration begins to annoy people	Virtually no risk of "architectural" (i.e., not structural) damage to normal buildings
0.20 in/sec	Vibrations annoying to people in buildings	Threshold at which there is a risk to "architectural" damage to normal dwelling – houses with plastered walls and ceilings
0.3 in/sec	-	Possible cosmetic structural damage to engineered concrete and masonry
0.4–0.6 in/sec	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage. At 0.5 PPV possible cosmetic structural damage to buildings built of reinforced concrete, steel or timber.

[1] Source: California Department of Transportation. Transportation and Construction Vibration Guidance Manual, Chapter 6 Tables 5 and 12, September 2013. Federal Transit Administration, 2006.

Figure 3
Common Noise Sources and Noise Levels



III. EXISTING NOISE ENVIRONMENT

A. Existing Land Uses and Sensitive Receptors

The project site is bordered by commercial uses to the north, 4th Street to the south, commercial and office uses to the east, and industrial uses to the west. Multi-family attached residential dwelling units are located south of the project site along 4th Street.

The State of California defines sensitive receptors as those land uses that require serenity or are otherwise adversely affected by noise events or conditions. Schools, libraries, churches, hospitals, single and multiple-family residential, including transient lodging, motels and hotel uses make up the majority of these areas. Sensitive receptors that may be affected by project generated noise include the multi-family detached residential dwelling units located approximately 100 feet south of the project site (across 4th Street). In addition, hotel uses are located approximately 320 feet east of the site; Ontario Motor Speedway Park is located approximately 0.16 miles south of the site; and Ontario Center School is located approximately 0.24 miles south of the project site. Although commercial and industrial land uses are not usually considered to be sensitive receptors, the City has established noise standards for the evaluation of impacts to these land uses as well. Industrial land uses border the site on the west and commercial/office land uses border the site to the north and east.

B. Ambient Noise Measurements

Short-Term Daytime Noise Measurements (10-minute)

One (1) 10-minute daytime representative noise measurement was obtained by Kunzman Associates, Inc. from 12:56 PM to 1:06 PM on March 23, 2018 with an American National Standards Institute (ANSI Section SI4 1979, Type 1) Larson Davis model LxT sound level meter in order to document existing ambient noise levels in the project area. Field worksheets and noise measurement output data are included in Appendix C.

As shown on Figure 4, the short-term noise measurement was taken near the existing multi-family attached residential dwelling units located to the south of the project site along 4th Street. Table 3 provides a summary of the short-term ambient noise data. The ambient noise level was measured at 71.5 dBA L_{eq}. The dominant noise source was from vehicles traveling on 4th Street and Center Avenue. Secondary noise sources included noise associated with aircrafts and birdsong.

C. Existing Noise Sources

The project area is located in an environment heavily dominated by existing transportation related noise sources. The dominant noise sources in the project area are discussed below.

I-10 Freeway

The I-10 Freeway lies to the south of the project site. The lanes of the I-10 Freeway are located approximately 3,400 feet south of the multi-family attached residential dwelling units located along 4th Street.

The I-10 Freeway in the vicinity of the proposed project has a vehicle mix of approximately 93.3% autos, 2.7% medium trucks, and 4.0% heavy trucks with an annual average daily traffic volume of 265,000 vehicles obtained in data provided by the California Department of Transportation (http://traffic-counts.dot.ca.gov/). The FHWA Traffic Noise Prediction Model FHWA-RD-77-108 was utilized to calculate the distance to the existing 65 noise contour from the I-10 Freeway. This effort did not take into account any intervening topography or buildings. Based on the modeling, noise levels associated with the I-10 Freeway currently exceed 65 CNEL up to 13,500 feet (approximately 2.6 miles) from the centerline.

Ontario International Airport

Ontario International Airport is located approximately 1.17 miles southwest of the multi-family attached residential dwelling units along 4th Street. The airport runway lies in an east/west direction. According to the City's General Plan Public Health and Safety Element, no aircraft safety zones affect the City of Rancho Cucamonga.

Table 3

Short-Term Noise Measurement Summary (dBA)[1, 2]

Daytime							
Site Location	Time Started	Leq	Lmax	L(2)	L(8)	L(25)	L(50)
STNM1	12:56 PM	71.5	89.8	47.6	75.8	71.4	65.8

[1] See Figure 4 for noise measurement locations. Each noise measurement was performed over a 10-minute duration.

[2] Noise measurements performed on March 23, 2018.

Figure 4
Noise Measurement Location Map

Kunzman Associates, Inc.

Over 40 Years of Excellent Service

JN 7378a

IV. REGULATORY SETTING

A. Federal Regulations

1. Federal Noise Control Act of 1972

The U.S. Environmental Protection Agency (EPA) Office of Noise Abatement and Control was originally established to coordinate federal noise control activities. After its inception, EPA's Office of Noise Abatement and Control issued the Federal Noise Control Act of 1972, establishing programs and guidelines to identify and address the effects of noise on public health, welfare, and the environment. In response, the EPA published Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (Levels of Environmental Noise). The Levels of Environmental Noise recommended that the Ldn should not exceed 55 dBA outdoors or 45 dBA indoors to prevent significant activity interference and annoyance in noise-sensitive areas.

In addition, the Levels of Environmental Noise identified five (5) dBA as an "adequate margin of safety" for a noise level increase relative to a baseline noise exposure level of 55 dBA Ldn (i.e., there would not be a noticeable increase in adverse community reaction with an increase of five dBA or less from this baseline level). The EPA did not promote these findings as universal standards or regulatory goals with mandatory applicability to all communities, but rather as advisory exposure levels below which there would be no risk to a community from any health or welfare effect of noise.

In 1981, EPA administrators determined that subjective issues such as noise would be better addressed at lower levels of government. Consequently, in 1982 responsibilities for regulating noise control policies were transferred to State and local governments. However, noise control guidelines and regulations contained in EPA rulings in prior years remain in place by designated Federal agencies, allowing more individualized control for specific issues by designated Federal, State, and local government agencies.

B. State Regulations

1. State of California General Plan Guidelines 2003

Though not adopted by law, the State of California General Plan Guidelines 2003, published by the California Governor's Office of Planning and Research (OPR) (OPR Guidelines), provide guidance for the compatibility of projects within areas of specific noise exposure. The OPR Guidelines identify the suitability of various types of construction relative to a range of outdoor noise levels and provide each local community some flexibility in setting local noise standards that allow for the variability in community preferences. Findings presented in the Levels of Environmental Noise Document (EPA 1974) influenced the recommendations of the OPR Guidelines, most importantly in the choice of noise exposure metrics (i.e., Ldn or CNEL) and in the upper limits for the Normally Acceptable outdoor exposure of noise-sensitive uses. The OPR Guidelines include a Noise and Land Use Compatibility Matrix identifies acceptable and

unacceptable community noise exposure limits for various land use categories. The City of Rancho Cucamonga utilizes the County of Riverside's version of the compatibility matrix (discussed below).

3. California Environmental Quality Act

The California Environmental Quality Act Guidelines (Appendix G) establishes thresholds for noise impact analysis. Two of these standards apply to what is referred to as a "substantial increase" in ambient noise levels. Neither the California Environmental Quality Act nor the City of Rancho Cucamonga General Plan Noise Element recognizes an official numerical increase as a "substantial increase." Industry-accepted standards for what is considered to be a "substantial increase" range from 3 dB to 12 dB. It should be noted that a change of 3 dB is considered to be "barely audible" to a trained ear and that a change of 5 dB is considered to be a readily audible change.

For purposes of this analysis, the following threshold was used to evaluate the project's potential to result in substantial increases in ambient noise levels.

Traffic Noise

Roadway noise impacts would be considered significant if the project increases noise levels at a noise sensitive land use by 3 CNEL and if: (1) the existing noise levels already exceed the residential land use compatibility standard for "clearly compatible" (65 CNEL), or (2) the project increases noise levels from below the applicable standard to above it.

Stationary Noise

Project operations (including noise from loading and unloading activities, and parking lot noise etc.) may produce an increase noise levels which disturbs the peace and quiet of adjacent residential areas or cause discomfort/annoyance to area residents. The California Department of Transportation considers a 5 dBA increase to be "readily audible", which correlates most closely to "substantial increase." For the purposes of this report, a substantial permanent increase in ambient noise levels due to stationary noise sources shall be considered 5 dBA L_{eq}.

C. Local Regulations

1. City of Rancho Cucamonga General Plan

The Public Health and Safety Element of the City of Rancho Cucamonga General Plan includes the noise compatibility guidelines shown in Table 4. These guidelines and applicable sections of the State building code are used to evaluate the proposed project's compatibility with future ambient noise levels.

The noise related goals and policies within the Public Health and Safety Element of the City of Rancho Cucamonga General Plan that are applicable to the proposed project include the following:

Goal PS-13: Minimize the impacts of excessive noise levels throughout the community, and adopt appropriate noise level requirements for all land uses.

Policies

Policy PS-13.1 Consider the compatibility of proposed land uses with the noise environment when preparing or revising community and/or specific plans and when reviewing development proposals. The General Plan contour map depicting future noise levels should be used by the City as a guide to land use/noise compatibility.

Policy PS-13.2 Consider noise impacts as part of the development review process, particularly the location of parking, ingress/egress/loading, and refuse collection areas relative to surrounding residential development and other noise sensitive land uses.

Policy PS-13.3 Consider the use of noise barriers or walls to reduce noise levels generated by ground transportation noise sources and industrial sources.

Policy PS-13.4 Require that acceptable noise levels are maintained near residences, schools, health care facilities, religious institutions, and other noise sensitive uses in accordance with the Development Code and noise standards contained in the General Plan.

Policy PS-13.5 Limit the hours of operation at noise generating sources that are adjacent to noise-sensitive uses, wherever practical.

Policy PS-13.6 Implement appropriate standard construction noise controls for all construction projects.

Policy PS-13.7 Require all exterior noise sources (construction operations, air compressors, pumps, fans, and leaf blowers) to use available noise suppression devices and techniques to bring exterior noise levels down to acceptable levels.

2. City of Rancho Cucamonga Municipal Ordinance

Exterior Noise Standards

Basic Noise Levels are presented in Table 5. City of Rancho Cucamonga Ordinance 17.66.050 C (1) states that it shall be unlawful for any person at any location within the city to create any noise or allow the creation of any noise on the property owned, leased, occupied, or otherwise controlled by such person, which causes the noise level

when measured on the property line of any other property to exceed the basic noise level as adjusted below:

a. Basic Noise Level for a cumulative period of not more than 15 minutes in any one hour; or
b. Basic Noise Level plus 5 dBA for a cumulative period of not more than 10 minutes in any one hour; or
c. Basic Noise Level plus 14 dBA for a cumulative period of not more than 5 minutes in any one hour; or
d. Basic Noise level plus 15 dBA at any time.

If the measurement location is a boundary between two different noise zones, the lower noise level standard shall apply.

If the intruding noise source is continuous and cannot reasonably be discontinued or stopped for a time period whereby the ambient noise level can be determined, the measured noise level obtained while the noise is in operation shall be compared directly to the allowable noise level standards as specified respective to the measurement's location, designated land use, and for the time of day the noise level is measured. The reasonableness of temporarily discontinuing the noise generation by an intruding noise source shall be determined by the planning director for the purpose of establishing the existing ambient noise level at the measurement location.

Special Exclusions

The following activities that may result annoying noise or vibration are exempt from the provisions of this section:

- City or school-approved activities conducted on public parks, public playgrounds, and public or private school grounds including, but not limited to, athletic and school entertainment events between the hours of 7:00 AM and 10:00 PM.
- Occasional outdoor gatherings, dances, shows, and sporting and entertainment events, provided said events are conducted pursuant to the approval of a temporary use permit issued by the City.
- Any mechanical device, apparatus, or equipment used, related to, or connected with emergency machinery, vehicle, work, or warning alarm or bell, provided the sounding of any bell or alarm on any building or motor vehicle shall terminate its operation within 30 minutes in any hour of its being activated.
- Noise sources associated with, or vibration created by, construction, repair, remodeling, or grading of any real property or during authorized seismic surveys, provided said activities:
    a. When adjacent to a residential land use, school, church or similar type of use, the noise generating activity does not take place between the hours of 8:00 PM and 7:00 AM on weekdays, including Saturday, or at any time on Sunday or a national holiday, and provided noise levels created do not exceed the noise standard of 65 dBA when measured at the adjacent property line.

b. When adjacent to a commercial or industrial use, the noise generating activity does not take place between the hours of 10:00 PM and 6:00 AM on weekdays, including Saturday and Sunday, and provided noise levels created do not exceed the noise standards of 70 dBA when measured at the adjacent property line.

- Noise sources associated with the maintenance of real property, provided said activities take place between the hours of 7:00 AM and 8:00 PM on any day.
- Any activity to the extent regulation thereof has been preempted by state or federal law.

Schools, churches, libraries, health care institutions.

It shall be unlawful for any person to create any noise which causes the noise level at any school, hospital or similar health care institution, church, or library while the same is in use, to exceed the noise standards specified in this section and prescribed for the assigned noise zone in which the school, hospital, church, or library is located.

Construction Noise Standards

Noise sources associated with, or vibration created by, construction, repair, remodeling, or grading of any real property or during authorized seismic surveys, provided that when adjacent to a residential land use, school, church or similar type of use, the noise generating activity does not take place between the hours of 8:00 PM and 7:00 AM on weekdays, including Saturday, or at any time on Sunday or a national holiday, and provided noise levels created do not exceed the noise standard of 65 dBA when measured at the adjacent property line.

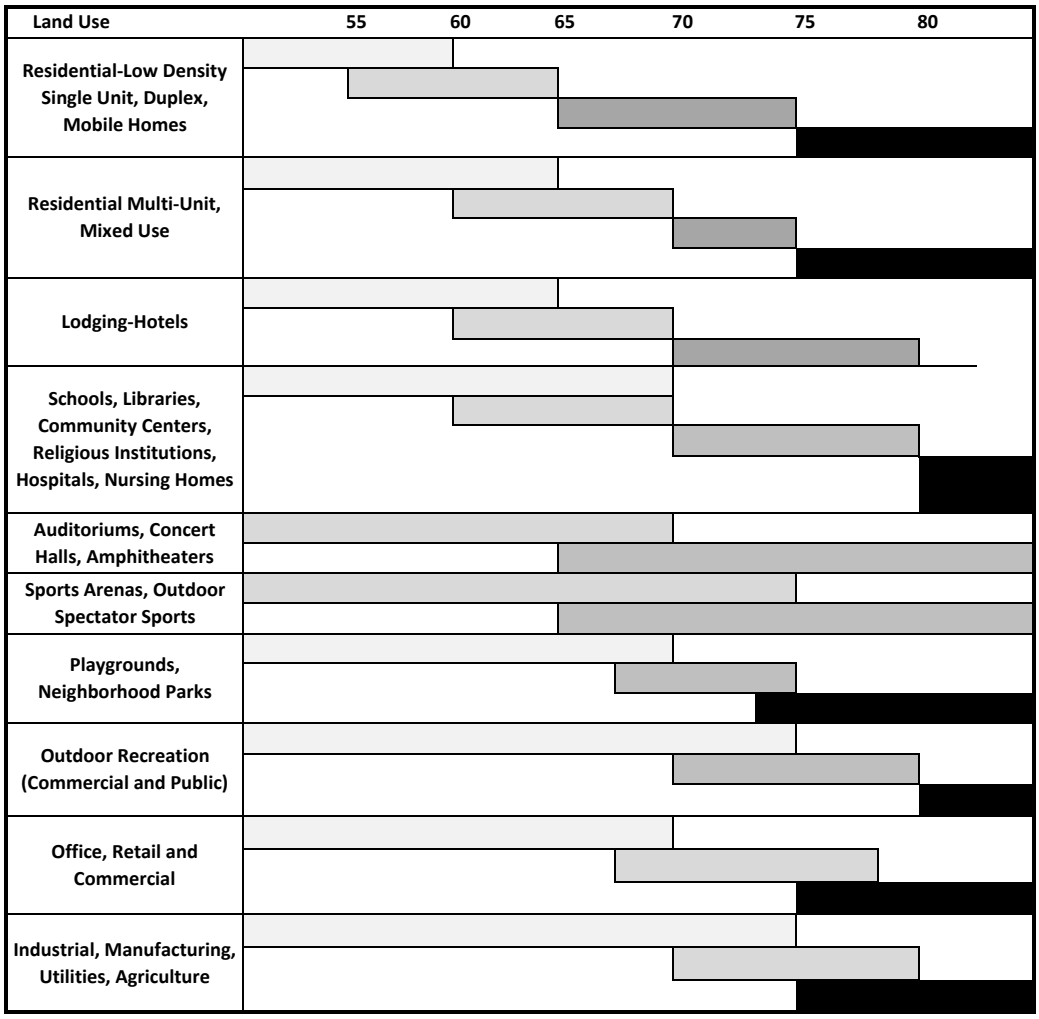
Property Maintenance Noise Standards

Ordinance 17.66.050 also sets forth standards intended to minimize noise associated with commercial land uses and property maintenance.

- All commercial and office activities shall not create any noise that would exceed an exterior noise level of 65 dBA during the hours of 10:00 PM to 7:00 AM and 70 dBA during the hours of 7:00 AM to 10:00 PM when measured at the adjacent property line.
- No person shall cause the loading, unloading, opening, closing, or other handling of boxes, crates, containers, building materials, garbage cans, or similar objects between the hours of 10:00 PM and 7:00 AM, in a manner which would cause a noise disturbance to a residential area.

Table 4

City of Rancho Cucamonga Noise Compatibility Matrix[1]
(dBA CNEL or L_{dn})



Normally Acceptable: Specified land uses is satisfactory based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation or 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. Outdoor environment will seem noisy.	**Normally Unacceptable:** New construction and development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made with needed noise insulation features included in the design. Outdoor areas must be shielded.	**Clearly Unacceptable:** New construction or development should generally not be undertaken. Construction costs to make the indoor environment acceptable would be prohibitive and the outdoor environment would not be usable.

[1] Source: City of Rancho Cucamonga 2010 General Plan, May 19, 2010

Table 5

Residential Noise Limits (Base Noise Levels) [1]

Location of Measurement	Maximum Allowable	
	10:00 PM to 7:00 AM	7:00 AM to 10:00 PM
Exterior	60 dBA	65 dBA
Interior	45 dBA	50 dBA

(A) It shall be unlawful for any person at any location within the city to create any noise or to allow the creation of any noise which causes the noise level when measured within any other fully enclosed (windows and doors shut) residential dwelling unit to exceed the interior noise standard in the manner described herein.

(B) If the intruding noise source is continuous and cannot reasonably be discontinued or stopped for a time period whereby the ambient noise level can be determined, each of the noise limits above shall be reduced five dBA for noise consisting of impulse or simple tone noise.

[1] Source: City of Rancho Cucamonga Municipal Ordinance Table 17.66.050-1.

V. ANALYTICAL METHODOLOGY AND MODEL PARAMETERS

A. Noise Modeling and Input

1. SoundPLAN

The SoundPLAN software utilizes algorithms (based on the inverse square law) to calculate noise level projections. The software allows the user to input specific noise sources, spectral content, sound barriers, building placement, topography, and sensitive receptor locations.

The SoundPLAN model was utilized to calculate construction noise and future operational noise levels associated with the proposed project using reference sound level data for the various pieces of construction equipment and stationary on-site sources. Construction equipment noise reference levels found in the FHWA RCNM Handbook were utilized for modeling purposes. Noise sources associated with the proposed parking areas, loading and unloading activities, and rooftop HVAC were included in the model. Noise associated with parking lots include, but are not limited to idling cars/trucks, doors closing, and starting engine noise. SoundPLAN input and output data is included in this report as Appendix D (construction) and Appendix F (operation).

The location of the rooftop HVAC equipment was estimated and modeled as point sources placed on-top of the structure's roof. No rooftop parapets or shielding was modeled. A representative sound power level of 86.1 dB (York RTU 150 (12.5) was utilized for modeling purposes. SoundPLAN' s reference sound power level of 92 dB was utilized for loading area modeling purposes. The project site is to include a 1250 kW Diesel Generator with level 3 enclosure at the northwest corner of the proposed building. Per manufacturer specifications, the generator is to have a sound power level of 106.8 dB at one meter. The sound power level was converted to a sound pressure level of 78.8 dB at 10 meters.

Noise levels associated with the proposed parking lots were determined based on the project trip generation rate and loading/unloading was modeled as an area source and includes activities such as trucks' diesel engines, exhaust systems, braking, and forklifts. Noise levels associated with loading/unloading can range between 65 to 80 dBA. The parking lot was modeled with 81 parking spaces and 24 peak hour trips per the Trip Generation Analysis prepared for the proposed project (Kunzman Associates, Inc., June 2018).

2. Federal Highway Administration (FHWA) Traffic Noise Prediction Model

Existing, Existing Plus Project, and Buildout noise levels along 4th Street and the I-10 Freeway (buildout) were modeled utilizing the FHWA Traffic Noise Prediction Model FHWA-RD-77-108 in order to quantify the proposed project's contribution to increases in ambient noise levels and to calculate future noise levels at the project site due to vehicular traffic traveling on the I-10 Freeway.

The FHWA Traffic Noise Prediction Model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). Adjustments are then made to the REMEL to account for: total average daily traffic volumes (ADT), roadway classification, width, speed and truck mix, roadway grade and site conditions (hard or soft ground surface). Surfaces adjacent to all modeled roadways were assumed to have a "hard site" to predict worst-case, conservative noise levels. A hard site, such as pavement, is highly reflective and does not attenuate noise as quickly as grass or other soft sites. Possible reductions in noise levels due to intervening topography and buildings were not accounted for in this analysis.

Existing average daily traffic volumes were obtained from average daily traffic counts performed by AimTD LLC on June 27, 2018 and the proposed project generated vehicle trips were from obtained from the trip generation analysis prepared by Kunzman Associates, Inc. (June 2018). This data was used to evaluate the impact of project generated trips on affected road segments with adjacent sensitive receptors. The proposed project is anticipated to generate approximately 223 average daily trips in passenger car equivalents, 14 two-axle truck trips, 16 three-axle truck trips, and 54 four-axle (and greater) truck trips. As neither the City of Rancho Cucamonga or the County of San Bernardino have published vehicle mixes, the Riverside County Department of Industrial Hygiene published vehicle mix for use in Noise Studies were utilized for existing road segments (Riverside County 2009). FHWA worksheets are included in Appendix E.

VI. IMPACT ANALYSIS

A. Noise Impacts

This impact discussion analyzes the potential for project construction noise and operational noise to cause an exposure of person to or generation of noise levels in excess of established City of Rancho Cucamonga noise standards related to construction noise, transportation, and stationary related noise impacts caused by the proposed project.

1. Construction Noise

Existing multi-family attached residential dwelling units to the south may be temporarily affected by short-term noise impacts associated with the transport of workers, the movement of construction materials to and from the project site, ground clearing, excavation, grading, and building activities.

As described by the City's Municipal Ordinance Section 17.66.050 and as presented in Section IV – C2 of this report, construction noise is considered a short-term impact and would be considered significant if construction activities are undertaken outside the allowable times or if they exceed 65 dBA at adjacent residential, school, church or similar types of land uses; or if they exceed 70 dBA at any adjacent commercial or industrial land uses. As stated in Section III(B) above, the existing ambient noise level at the northern property line of the multi-family dwelling units to the south of the project site was 71.5 dBA L_{eq}, which is already above both the residential and commercial/industrial noise standards.

Project generated construction noise will vary depending on the construction process, type of equipment involved, location of the construction site with respect to sensitive receptors, the schedule proposed to carry out each task (e.g., hours and days of the week) and the duration of the construction work.

A review and an analysis of proposed equipment lists by phase was conducted to determine which phase would result in the loudest noise levels. Based on the type and number of equipment proposed, the demolition phase is expected to be the loudest construction phase.

The SoundPLAN noise model was utilized to predict a likely worst-case demolition noise scenario. Equipment expected to be utilized during the demolition phase includes a concrete saw, a dozer, a tractor, a front end loader and a backhoe. Typical noise sources and noise levels associated with the demolition phase of construction are shown in Table 6. Equipment was placed on the site in the SoundPLAN model in a realistic fashion and not assumed to all be operating on the property line. Typical operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three to four minutes at lower power settings. SoundPLAN construction noise input and output is included in this report as Appendix D.

As shown on Figure 5, demolition activities may reach 59 dBA L_{eq} at the property line and 53 dBA L_{eq} at the multi-family attached residential dwelling units to the south with implementation of all project best management measures listed in the project description. Project construction will need to comply with the City's allowed hours for construction activities and implementation of all project best management measures listed in the project description to reduce demolition related construction noise to below significance.

2. Noise Impacts to Off-Site Receptors Due to Project Generated Traffic

A worst-case project generated traffic noise level was modeled utilizing the FHWA Traffic Noise Prediction Model - FHWA-RD-77-108. Traffic noise levels were calculated from the centerline of the analyzed roadway to the nearest sensitive receptor. The modeling is theoretical and does not take into account any existing barriers, structures, and/or topographical features that may further reduce noise levels. Therefore, the levels are shown for comparative purposes only to show the difference in with and without project conditions. Roadway input parameters including average daily traffic volumes (ADTs), speeds, and vehicle distribution data is shown in Table 7. The potential off-site noise impacts caused by an increase of trips from operation of the proposed project on the nearby roadways were calculated for the following scenarios:

Existing Year (without Project): This scenario refers to existing year traffic noise conditions and is demonstrated in Table 8.

Existing Year (Plus Project): This scenario refers to existing year traffic noise conditions with incorporation of the proposed project and is demonstrated in Table 8.

As stated previously, noise impacts would be considered significant if the project increases noise levels at a noise sensitive land use by 3 CNEL and if the existing noise levels already exceed the residential land use compatibility standard of 65 CNEL or the project increases noise levels from below the 60 CNEL standard to above 65 CNEL. As stated in Section IV - C2 above, the measured existing conditions at the multi-family attached residential dwelling units to the south of the project site have been identified as being above both the City's base ambient noise level standards identified in Section 8.44.050 of the City's Municipal Code as well as the normally acceptable residential noise standards in Table 4.

As shown in Table 8, existing traffic noise levels without the project exceed the residential land use compatibility standard of 65 CNEL for multi-family attached residential dwelling uses. Existing traffic noise modeling resulted in a noise level of 73.01 CNEL at the nearest sensitive receptors from the affected road segment; and Existing Plus Project traffic noise modeling resulted in a noise level of 73.11 CNEL at the nearest sensitive receptors from the affected roadway segment (see Table 8). In no case, however, would project generated vehicle trips cause an increase in the ambient noise levels that exceeds 3.0 CNEL. No mitigation is required. Traffic noise calculation outputs are included as Appendix E.

3. Traffic Noise Impacts to the Proposed Project

The City of Rancho Cucamonga land use compatibility guidelines set forth noise/land use compatibility criteria for various land use types. The guidelines state that the proposed warehouse and manufacturing use is "normally acceptable" in areas with noise levels of up to 75 CNEL and "conditionally acceptable" in areas with noise levels of up to 80 CNEL (see Table 4).

The City's General Plan identifies principal roadways and their classifications. Roadways in the vicinity of the proposed project that have the ability to impact noise levels at the proposed project site include 4th Street. 4th Street is classified as a Major Divided Arterial on the City of Rancho Cucamonga's General Plan Circulation Plan. The City's 2010 General Plan Update Draft Program Environmental Impact Report (Appendix H - Traffic Study) identifies the Year 2030 average daily traffic volume for 4th Street in the vicinity of the project site as approximately 26,100 average daily vehicle trips.

Buildout vehicle noise associated with 4th Street was modeled using the FHWA Traffic Noise Prediction Model - FHWA-RD-77-108 (see Appendix E). Buildout worst-case traffic noise levels are expected to reach up to approximately 77 dBA CNEL at the right of way of the roadway and up to approximately 75 dBA CNEL at the portion of the proposed building that lies closest to 4th Street, approximately 100 feet north of the centerline of the roadway. Therefore, noise levels at the project site would not exceed the City's noise/land use compatibility criteria for warehouse and manufacturing uses. No mitigation is required.

4. Noise Impacts to Off-Site Receptors Due to On-Site Operational Noise

Land uses immediately surrounding the project site consist of commercial uses to the north, 4th Street to the south, commercial and office uses to the east, and industrial uses to the west. The nearest sensitive receptors are the multi-family attached residential dwelling units located approximately 100 feet south of the project site.

A noisiest hour scenario was modeled utilizing the SoundPLAN model. The location of HVAC equipment was estimated based on other similar facilities. Each unit was given a sound power level of 80 dBA. Loading areas were assigned a sound power level of 92, the proposed on-site generator was assigned a sound pressure level of 78.8 dB at 10 meters from the noise source, and the parking lots were modeled based on the number of spaces, type (car or truck) and peak hour trip generation. As shown on Figure 6, project peak hour operational noise levels will not exceed the daytime noise criteria for residential land uses of 65 dBA nor the nighttime noise criteria of 60 dBA at the nearest residential land uses. No mitigation is required.

B. Vibration Impacts

This impact discussion analyzes the potential for the proposed project to cause an exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels. Vibration levels in the project area may be influenced by construction. A vibration impact

would generally be considered significant if it involves any construction-related or operations-related impacts in excess of 0.2 +inches per second (in/sec) PPV.

1. Construction Vibration

Construction activity can result in varying degrees of ground vibration, depending on the equipment used on the site. Operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Buildings respond to these vibrations with varying results ranging from no perceptible effects at the low levels to slight damage at the highest levels. Table 2 gives approximate vibration levels for particular construction activities. This data provides a reasonable estimate for a wide range of soil conditions.

The nearest existing structure (an office/commercial building) to the project site is located approximately 10 feet from the eastern project boundary. The nearest multi-family attached residential structure is located approximately 140 feet south of the project site. As shown in Table 2, the threshold at which there may be a risk of cosmetic architectural damage to engineered concrete and masonry buildings is 0.30 PPV in/second and the risk of architectural damage to normal dwellings with plastered walls and ceilings starts at 0.2 PPV. Primary sources of vibration during construction would be bulldozers. Vibratory rollers may also be utilized near the property line. As shown in Table 1, operation of large bulldozer could produce up to 0.089 PPV and a vibratory roller could generate up to 0.21 PPV; and operation of a large bulldozer could generate up to (0.089 PPV) at a distance of 25 feet (two of the most vibratory pieces of construction equipment). Groundborne vibration at sensitive receptors associated with this equipment would drop off as the equipment moves away. For example, as the vibratory roller moves further than 100 feet from the sensitive receptors, the vibration associated with it would drop below 0.0026 PPV.

Annoyance to Persons

As shown in Table 2, vibrations are annoying to people in buildings at 0.20 PPV. Project construction activities may result in groundborne vibration that is annoying but limited to activities occurring within 100 feet of sensitive receptors and occurring only during site grading and preparation activities. There is an existing commercial/office building located as close as ten feet from the eastern project property line. Groundborne vibration levels could reach up to 0.57 at ten feet from the equipment source. The closest residential structure is at least 140 feet from the project site. Vibration levels would fall to 0.03 at this distance. Annoyance related to project construction would be very short-term at the adjacent office building and would not be significant. Proposed project best management measures will minimize effects related to annoyance.

Architectural Damage

Table 2 identifies PPV levels between 0.3 as the level that possible cosmetic structural damage could occur to engineered concrete and masonry buildings. Use of a vibratory roller within 18 feet of the adjacent commercial building could result in cosmetic architectural damage. The closest multi-family attached residential structure is at least

140 feet from the project site. Vibration levels would fall to 0.03 at this distance. No structural damage would occur to residential structures. As discussed in the proposed project description, caution will be utilized if large equipment is utilized within 18 feet of existing structures. Proposed project best management measures will minimize effects related to annoyance.

Impacts related to groundborne vibration would be less than significant.

Table 6

Typical Construction Equipment Noise Levels[1]

Type of Equipment	Range of Maximum Sound Levels Measured (dBA at 50 feet)	Suggested Maximum Sound Levels for Analysis (dBA at 50 feet)
Air Compressors	76-89	86
Backhoe	80-85	78
Concrete Saw	85-95	90
Concrete Mixing Truck	75-85	79
Cranes	79-86	82
Dozers	77-90	85
Front-End Loaders	77-90	86
Graders	79-89	86
Haul Trucks	83-94	88
Hydraulic Excavators	81-90	86
Jack Hammers	75-85	82
Paver	75-85	82
Pavement Scarifier	85-95	90
Pneumatic Tools	78-88	85
Portable Generators	71-87	80
Pumps	74-84	80
Rock Drills	83-99	96
Rollers	75-82	80
Scrappers	83-91	87
Tractors	77-82	80
Trucks	81-87	86

[1] Sources: Bolt, Beranek & Newman; Noise Control for Buildings and Manufacturing Plants, 1987; and SoundPLAN Model Library.

Table 7

Project Average Daily Traffic Volumes and Roadway Parameters

Roadway	Segment	Average Daily Traffic Volume[1]		Posted Travel Speeds (MPH)
		Existing[3]	Existing Plus Project	
4th Street	West of Haven Avenue	15,701	15,875	50

Vehicle Distribution (Light Mix)[2]			
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)
Automobiles	75.56	13.96	10.49
Medium Trucks	48.91	2.17	48.91
Heavy Trucks	47.30	5.41	47.30

Vehicle Distribution (Heavy Mix)[2]			
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)
Automobiles	75.54	14.02	10.43
Medium Trucks	48.00	2.00	50.00
Heavy Trucks	48.00	2.00	50.00

[1] Project average daily traffic volumes and project vehicle percentages obtained from the project trip generation prepared by Kunzman Associates, Inc. (2018).

[2] Existing vehicle percentages are based on the Riverside County Industrial Hygiene Letter for Traffic Noise.

[3] Existing average daily traffic volumes obtained from average daily traffic counts completed by AimTD LLC on June 27, 2018 (see Appendix E).

Table 8

Change in Existing Noise Levels Along Roadways as a Result of Project (CNEL)

Roadway	Segment	Distance from roadway centerline to nearest sensitive receptor (feet)	Modeled Noise Levels (CNEL)					
			Existing	Existing Plus Project	Increase	Exceeds Land Use Compatibility Standards	Over 3 dB Increase?	Substantial Increase?
4th Street	West of Haven Avenue	90	73.01	73.11	0.10	YES	NO	NO

Figure 5

Project Construction Noise Levels (Leq) - Demolition

Signs and symbols

- Receiver
- Construction Equipment
- Noise Levels

1 : 150

0 37.5 75 150 225 300 feet

KUNZMAN ASSOCIATES, INC.
OVER 40 YEARS OF EXCELLENT SERVICE

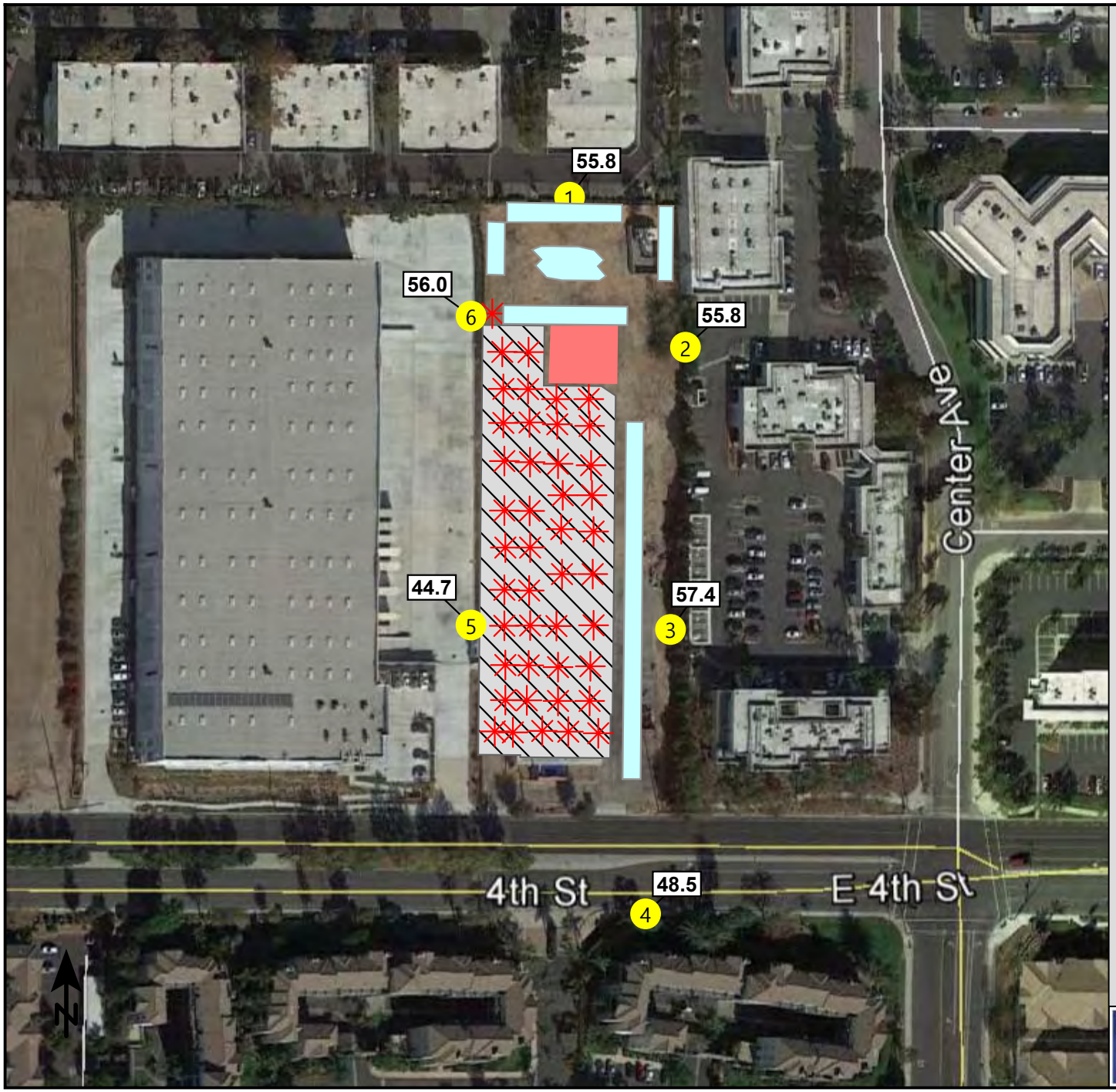


Figure 6

Project Operational Noise Levels (dBA Leq)

Signs and symbols

- Receiver
- HVAC & Generator
- Truck Loading/Unloading Area
- Parking lot
- Noise Levels

1 : 150

0 37.5 75 150 225 300 feet

Kunzman Associates, Inc.

Over 40 Years of Excellent Service

VII. REFERENCES

Bolt, Beranek & Newman

1987 Noise Control for Buildings and Manufacturing Plants.

California Department of Transportation

2002 Transportation Related Earthborne Vibrations (California Department of Transportation Experiences), Technical Advisory, Vibration TAV-02-01-R9601. February 20.

2013 Technical Noise Supplement to the Traffic Noise Analysis Protocol.

Environmental Protection Agency

1974 "Information on Levels of Environmental Noise Requisite to Protect Public Health And Welfare with an Adequate Margin of Safety," EPA/ONAC 550/9-74-004, March, 1974.

Federal Transit Administration

2006 Transit Noise and Vibration Impact Assessment. May.

Harris, Cyril M.

1991 Handbook of Acoustical Measurement and Noise Control. Acoustical Society of America. Woodbury, N.Y.

Office of Planning and Research

2003 State of California General Plan Guidelines

Rancho Cucamonga, City of

2010 Rancho Cucamonga 2010 General Plan Update Draft Program Environmental Impact Report. February 16.

2010 Rancho Cucamonga General Plan. May 19.

2018 Rancho Cucamonga Municipal Code. March.

Riverside, County of

2009 Riverside County Department of Public Health. Requirements for Determining and mitigating traffic noise impacts to residential structures. November 23.

U.S. Department of Transportation.

2006 FHWA Roadway Construction Noise Model User's Guide. January.

APPENDICES

Appendix A – List of Acronyms

Appendix B – Definitions of Acoustical Terms

Appendix C – Noise Monitoring Field Worksheets

Appendix D – SoundPLAN Construction Input and Output

Appendix E – Project Generated Traffic FHWA Worksheets and Vehicle Mix Data

Appendix F – SoundPLAN Operation Input and Output

APPENDIX A

List of Acronyms

Term	Definition
ADT	Average Daily Traffic
ANSI	American National Standard Institute
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
D/E/N	Day / Evening / Night
dB	Decibel
dBA or dB(A)	Decibel "A-Weighted"
dBA/DD	Decibel per Double Distance
dBA L_{eq}	Average Noise Level over a Period of Time
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
L_{02},L_{08},L_{50},L_{90}	A-weighted Noise Levels at 2 percent, 8 percent, 50 percent, and 90 percent, respectively, of the time period
L_{dn}	Day-Night Average Noise Level
$L_{eq(x)}$	Equivalent Noise Level for '"x" period of time
L_{eq}	Equivalent Noise Level
L_{max}	Maximum Level of Noise (measured using a sound level meter)
L_{min}	Minimum Level of Noise (measured using a sound level meter)
LOS C	Level of Service C
OPR	California Governor's Office of Planning and Research
PPV	Peak Particle Velocities
RCNM	Road Construction Noise Model
REMEL	Reference Energy Mean Emission Level
RMS	Root Mean Square

APPENDIX B

Definitions of Acoustical Terms

Term	Definition
Decibel, dB	A logarithmic unit of noise level measurement that relates the energy of a noise source to that of a constant reference level; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hertz	In a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., the number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear.
Root Mean Square (RMS)	A measure of the magnitude of a varying noise source quantity. The name derives from the calculation of the square root of the mean of the squares of the values. It can be calculated from either a series of lone values or a continuous varying function.
Fast/Slow Meter Response	The fast and slow meter responses are different settings on a sound level meter. The fast response setting takes a measurement every 100 milliseconds, while a slow setting takes one every second.
L_{02}, L_{08}, L_{50}, L_{90}	The A-weighted noise levels that are equaled or exceeded by a fluctuating sound level, 2 percent, 8 percent, 50 percent, and 90 percent of a stated time period, respectively.
Equivalent Continuous Noise Level, L_{eq}	A level of steady state sound that in a stated time period, and a stated location, has the same A-weighted sound energy as the time-varying sound.
L_{max}, L_{min}	L_{max} is the RMS (root mean squared) maximum level of a noise source or environment measured on a sound level meter, during a designated time interval, using fast meter response. L_{min} is the minimum level.
Ambient Noise Level	The all-encompassing noise environment associated with a given environment, at a specified time, usually a composite of sound from many sources, at many directions, near and far, in which usually no particular sound is dominant.
Offensive/ Offending/ Intrusive Noise	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of sound depends on its amplitude, duration, frequency, and time of occurrence, and tonal information content as well as the prevailing ambient noise level.

APPENDIX C

Noise Monitoring Field Worksheets

Noise Measurement
Field Data

Project Name: 10234 4th Street Project Date: 23-Mar-18

Project #: 7378a

Noise Measurement #: STNM1 3099 LxT_Data130.xlsx Technician: Ian Edward Gallagher

Nearest Address or Cross Street: Center Avenue & 4th Street

Site Description (Type of Existing Land Use and any other notable features): Closed "RV and Off Road "Warehouse, parking lot, empty area behind warehouse, lots of trash. Surrounding is mostly residential.

Weather: ~50% cloudy, cumulus above and heavy rain clouds to the North, sunshine and blue sky between the clouds. **Settings:** SLOW FAST (Circle one)

Temperature: 64 deg F **Wind:** 3 to 5 mph **Humidity:** 59% Flat

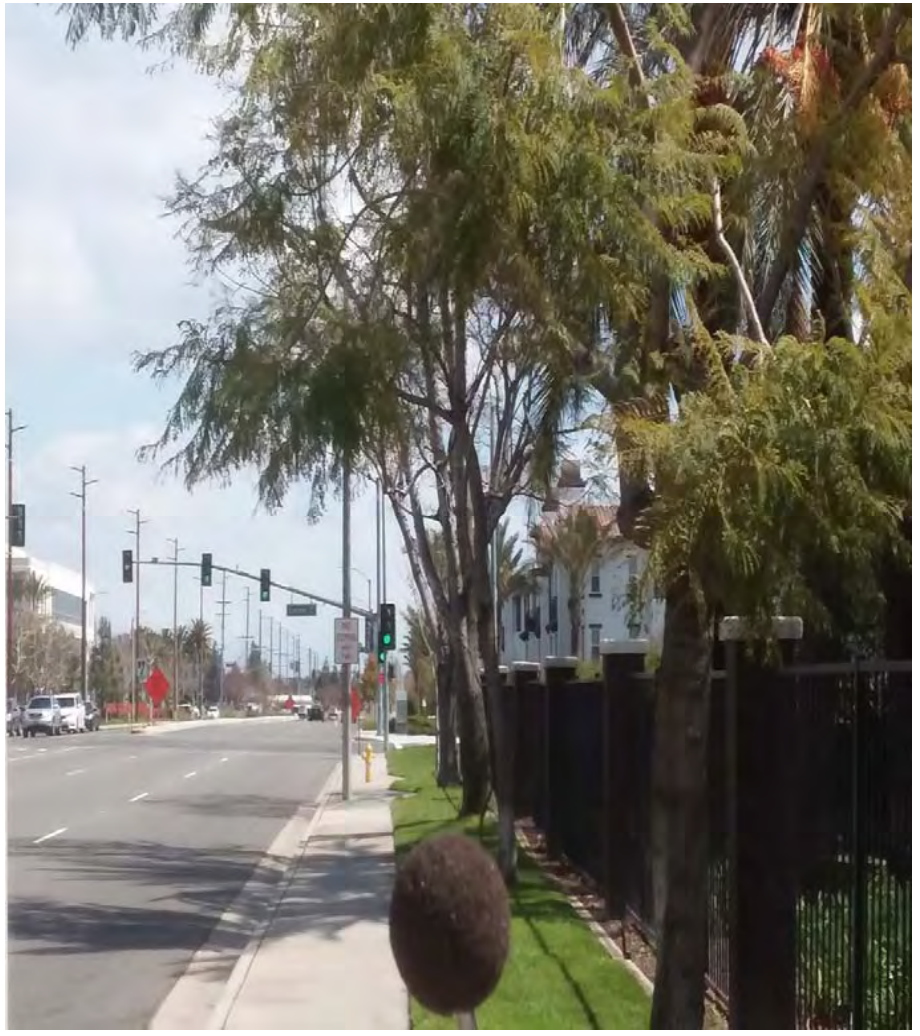
Start Time: 12:56 PM **End Time:** 1:06 PM **Run Time:** 10 minutes

Leq:	71.5 dB	**Primary Noise Source:**	Traffic noise from 4th Street & Center Avenue
Lmax	89.8 dB		
L2	78.2 dB	**Secondary Noise Sources:**	Overhead propellor planes and higher altitude commercial jet aircraft.
L8	75.8 dB		Bird song.
L25	71.4 dB		
L50	65.8 dB		

NOISE METER:	SoundTrack LxT Class 1 ;	**CALIBRATOR:**	Larson Davis CAL250 Acoustic Calibrator
MAKE:	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LxT1	**MODEL:**	Cal250
SERIAL NUMBER:	3099	**SERIAL NUMBER:**	2723
FACTORY CALIBRATION DATE:	6/23/2017	**FACTORY CALIBRATION DATE:**	6/9/2017
FIELD CALIBRATION DATE:	3/23/2018		

Additional Notes/Sketch

JN 7378a STNM1 looking North across 4th Street toward a warehouse.



JN7378a STNM1 looking East towards Center Avenue & 4th Street intersection.

Summary	
File Name	LxT_Data.130
Serial Number	0003099
Model	SoundTrack LxT®
Firmware Version	2.301
User	Ian Edward Gallagher
Location	JN 7378a STNM1
Job Description	10 minute noise sample
Start	2018-03-23 12:56:39
Stop	2018-03-23 13:06:39
Duration	0:10:00.0
Run Time	0:10:00.0
Pause	0:00:00.0
Pre Calibration	2018-03-23 12:56:23
Post Calibration	None
Calibration Deviation	---

Overall Settings				
RMS Weight	A Weighting			
Peak Weight	Z Weighting			
Detector	Slow			
Preamp	PRMLxT1L			
Microphone Correction	Off			
Integration Method	Linear			
OBA Range	Low			
OBA Bandwidth	1/1 and 1/3			
OBA Freq. Weighting	Z Weighting			
OBA Max Spectrum	Bin Max			
Overload	122.5 dB			
Results				
LAeq	71.5 dB			
LAE	99.3 dB			
EA	941.568 µPa²h			
EA8	45.195 mPa²h			
EA40	225.976 mPa²h			
LZpeak (max)	2018-03-23 12:58:08	117.7 dB		
LASmax	2018-03-23 12:58:09	89.8 dB		
LASmin	2018-03-23 13:06:06	47.6 dB		
SEA	-99.9 dB			
			Statistics	
LCeq	80.5 dB		**LAS2.00**	78.2 dB
LAeq	71.5 dB		**LAS8.00**	75.8 dB
LCeq - LAeq	9.0 dB		**LAS25.00**	71.4 dB
LAIeq	74.0 dB		**LAS50.00**	65.8 dB
LAeq	71.5 dB		**LAS66.60**	62.5 dB
LAIeq - LAeq	2.5 dB		**LAS90.00**	54.5 dB
# Overloads	0			

APPENDIX D

SoundPLAN Construction Input and Output

Industry

Source name	Reference	Level Leq1	Frequency spectrum [dB(A)]																												Corrections		
			50	63	80	100	125	160	200	250	315	400	500	630	800	1	1.3	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	Kwall	CI	CT
		dB(A)	Hz	Hz	Hz	Hz	Hz	Hz	Hz	Hz	Hz	Hz	Hz	Hz	Hz	kHz	kHz	kHz	kHz	kHz	kHz	kHz	kHz	kHz	kHz	kHz	kHz	kHz	kHz	dB(A)	dB(A)	dB(A)
Concrete Saw	Unit	-	-	94.2	97.9	103.3	106.3	109	103.5	105.8	107.8	109.6	111.2	112.5	112.6	113.4	114	115.4	115.6	115.7	119.6	119.4	119	116.3	115.3	-	-	-	-	-	-	-
Dozer	Unit	-	-	86.8	90.5	97.9	100.9	103.6	104.1	106.4	108.4	110.2	111.8	113.1	111.2	112	112.6	110	110.2	110.3	104.2	104	103.6	94.9	93.9	-	-	-	-	-	-	-
Tractor	Unit	-	72.9	75.9	79.9	89.9	91.6	90.9	91.1	93.4	92.9	93.9	96.9	99.9	99.6	101.1	103.1	102.6	99.9	100.9	98.4	94.9	94.6	93.4	88.9	84.6	81.9	78.9	74.9	-	-	-
Front End Loader	Unit	-	-	85	88.7	92	95	97.8	99.8	102	104.1	106.5	108	109.4	110.2	111	111.6	111.8	112	112.1	112.3	112	111.6	111	110	-	-	-	-	-	-	-
Backhoe	Unit	-	-	81.8	85.5	82.9	85.9	88.6	89.1	91.4	93.4	94.2	95.8	97.1	102.2	103	103.6	106	106.2	106.3	105.2	105	104.6	102.9	101.9	-	-	-	-	-	-	-

Contribution Levels of the Receivers

Source name		Level w/o NP Leq1 dB(A)	Level w. NP Leq1 dB(A)
1	Fl	90.4	74.0
Backhoe		63.6	51.0
Concrete Saw		90.0	73.3
Dozer		72.3	58.2
Front End Loader		74.8	61.4
Tractor		78.0	61.1
2	Fl	79.2	65.0
Backhoe		58.6	48.5
Concrete Saw		77.8	62.0
Dozer		71.1	59.1
Front End Loader		68.1	56.7
Tractor		63.5	52.8
3	Fl	82.5	69.4
Backhoe		67.4	52.3
Concrete Saw		76.2	64.4
Dozer		80.0	66.2
Front End Loader		74.7	61.2
Tractor		64.6	53.2
4	Fl	78.5	68.5
Backhoe		65.1	52.3
Concrete Saw		73.6	63.7
Dozer		74.5	64.9
Front End Loader		71.7	60.3
Tractor		62.3	55.2
5	Fl	83.0	70.5
Backhoe		61.2	51.0
Concrete Saw		82.1	69.1
Dozer		69.5	61.1
Front End Loader		71.4	60.2
Tractor		70.6	57.0

Receiver List

No.	Receiver name	Building side	Floor	Limit Leq1 dB(A)	Level w/o NP Leq1 dB(A)	Level w. NP Leq1 dB(A)	Difference Leq1 dB(A)	Conflict Leq1 dB(A)	Leq2 dB(A)	Leq3 dB(A)	Lmax dB(A)
1	1		Fl	-	90.4	74.0	-16.4	-	-	-	-
2	2		Fl	-	79.2	65.0	-14.2	-	-	-	-
3	3		Fl	-	82.5	69.4	-13.1	-	-	-	-
4	4		Fl	-	78.5	68.5	-10.0	-	-	-	-
5	5		Fl	-	83.0	70.5	-12.5	-	-	-	-

APPENDIX E

Project Generated Traffic FHWA Worksheets

FHWA Sound32 Spreadsheet

Existing Traffic Noise

Project: **7378a 10234 4th Street**

Road: **4th Street**

Segment: **West of Haven Avenue**

	DAYTIME			EVENING			NIGHTTIME			ADT	15701.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	50.00
										DISTANCE	90.00
INPUT PARAMETERS											
Vehicles per hour	909.35	18.84	31.40	675.14	3.14	5.23	167.48	26.17	43.61	% A	92
Speed in MPH	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	3
NOISE CALCULATIONS											
Reference levels	71.12	78.79	83.02	71.12	78.79	83.02	71.12	78.79	83.02	% HT	5
ADJUSTMENTS											
Flow	22.29	5.46	7.67	21.00	-2.33	-0.11	14.94	6.88	9.10		
Distance	-2.62	-2.62	-2.62	-2.62	-2.62	-2.62	-2.62	-2.62	-2.62	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	73.01
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	67.98
LEQ	65.79	56.63	63.07	64.50	48.84	55.29	58.44	58.05	64.50	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	67.98		EVENING LEQ	65.09		NIGHT LEQ	66.19		Use hour?	no
										GRADE dB	0.00
		CNEL	**73.01**								

FHWA Sound32 Spreadsheet

Existing Plus Project Traffic Noise

Project: **7378a 10234 4th Street**
Road: **4th Street**
Segment: **West of Haven Avenue**

	DAYTIME			EVENING			NIGHTTIME			ADT	15875.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	50.00
										DISTANCE	90.00
INPUT PARAMETERS											
Vehicles per hour	918.15	19.36	32.25	681.67	3.23	5.38	169.10	26.89	44.80	% A	91.87
Speed in MPH	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	3.05
NOISE CALCULATIONS											
Reference levels	71.12	78.79	83.02	71.12	78.79	83.02	71.12	78.79	83.02	% HT	5.08
ADJUSTMENTS											
Flow	22.33	5.57	7.79	21.04	-2.21	0.01	14.99	7.00	9.22		
Distance	-2.62	-2.62	-2.62	-2.62	-2.62	-2.62	-2.62	-2.62	-2.62	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	73.11
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	68.05
LEQ	65.83	56.74	63.19	64.54	48.96	55.41	58.48	58.17	64.61	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	68.05		EVENING LEQ	65.14		NIGHT LEQ	66.29		Use hour?	no
										GRADE dB	0.00
		CNEL	**73.11**								

Wednesday, June 27, 2018 Location: Rancho Cucamonga PROJECT:

ADT Fourth between Hermosa and Center **Prepared by AimTD tel. 714 253 7888**

AM Period	NB	SB	EB		WB			PM Period	NB	SB	EB		WB		
0:30			11		36			12:00			137		146		
0:15			20		25			12:15			116		141		
0:30			16		24			12:30			137		140		
0:45			13	60	20	105	165	12:45			132	522	124	551	1073
1:00			8		14			13:00			140		171		
1:15			11		16			13:15			156		141		
1:30			21		25			13:30			122		126		
1:45			7	47	9	64	111	13:45			133	551	132	570	1121
2:00			8		16			14:00			119		144		
2:15			5		9			14:15			110		152		
2:30			7		10			14:30			133		170		
2:45			7	27	12	47	74	14:45			119	481	152	618	1099
3:00			7		6			15:00			144		139		
3:15			7		14			15:15			129		162		
3:30			12		9			15:30			125		181		
3:45			18	44	35	64	108	15:45			148	546	157	639	1185
4:00			7		19			16:00			123		195		
4:15			11		11			16:15			148		188		
4:30			17		19			16:30			153		202		
4:45			25	60	32	81	141	16:45			141	565	183	768	1333
5:00			19		25			17:00			153		321		
5:15			30		35			17:15			149		237		
5:30			42		58			17:30			118		186		
5:45			43	134	78	196	330	17:45			138	558	185	929	1487
6:00			34		43			18:00			120		181		
6:15			48		56			18:15			130		129		
6:30			57		78			18:30			139		132		
6:45			83	222	78	255	477	18:45			91	480	110	552	1032
7:00			73		86			19:00			101		105		
7:15			85		83			19:15			59		104		
7:30			90		84			19:30			84		73		
7:45			121	369	96	349	718	19:45			76	320	86	368	688
8:00			91		81			20:00			66		77		
8:15			83		93			20:15			73		92		
8:30			81		101			20:30			60		105		
8:45			86	341	83	358	699	20:45			62	261	80	354	615
9:00			79		77			21:00			65		76		
9:15			64		73			21:15			43		89		
9:30			87		80			21:30			37		77		
9:45			78	308	100	330	638	21:45			27	172	50	292	464
10:00			98		86			22:00			63		64		
10:15			95		89			22:15			35		58		
10:30			88		87			22:30			33		43		
10:45			91	372	91	353	725	22:45			21	152	41	206	358
11:00			87		85			23:00			37		35		
11:15			111		116			23:15			23		33		
11:30			111		104			23:30			6		30		
11:45			124	433	118	423	856	23:45			16	82	24	122	204
Total Vol.				2417		2625	**5042**					4690		5969	**10659**

			Daily Totals		
	NB	SB	EB	WB	**Combined**
			7107	8594	**15701**

			AM					**PM**		
Split %			47.9%	52.1%	**32.1%**			44.0%	56.0%	**67.9%**
Peak Hour	0:30	0:30	11:45	11:45	**11:45**			16:30	16:30	**16:30**
Volume			514	545	**1059**			596	943	**1539**
P.H.F.			0.94	0.93	**0.94**			0.97	0.73	**0.81**

cs@aimtd.com Tell. 714 253 7888

FHWA Sound32 Spreadsheet
Riverside County Published Mix
Larger than Secondary

Buildout Traffic Noise

Interstate 10

	DAYTIME			EVENING			NIGHTTIME				
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	ADT	256000.00
										SPEED	65.00
							AUTOS			DISTANCE	13500.00
INPUT PARAMETERS											
Vehicles per hour	14987.14	204.80	512.00	11126.27	34.13	85.33	2759.08	284.44	711.11	% A	93.00
Speed in MPH	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	% MT	2.00
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	% HT	5.00
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	LEFT	-90.00
										RIGHT	90.00
NOISE CALCULATIONS											
Reference levels	75.54	81.71	85.21	75.54	81.71	85.21	75.54	81.71	85.21	CNEL	65.09
ADJUSTMENTS										DAY LEQ	60.86
Flow	33.32	14.68	18.66	32.03	6.90	10.88	25.97	16.11	20.08		
Distance	-24.38	-24.38	-24.38	-24.38	-24.38	-24.38	-24.38	-24.38	-24.38	Day hour	89.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Absorbtive?	no
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	Use hour?	no
LEQ	59.48	47.01	54.48	58.19	39.22	46.70	52.13	48.43	55.91	GRADE dB	0.00

DAY LEQ	60.86	EVENING LEQ	58.54	NIGHT LEQ	57.94	
CNEL	**65.09**					

FHWA Sound32 Spreadsheet
Riverside County Published Mix
Larger than Secondary

Buildout Traffic Noise
4th Street (at ROW)

	DAYTIME			EVENING			NIGHTTIME				
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	ADT	26100.00
							AUTOS			SPEED	50.00
										DISTANCE	60.00
INPUT PARAMETERS											
Vehicles per hour	1511.56	31.32	52.20	1122.16	5.22	8.70	278.27	43.50	72.50	% A	92.00
Speed in MPH	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	% MT	3.00
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	% HT	5.00
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	LEFT	-90.00
										RIGHT	90.00
NOISE CALCULATIONS											
Reference levels	71.12	78.79	83.02	71.12	78.79	83.02	71.12	78.79	83.02	CNEL	76.98
ADJUSTMENTS										DAY LEQ	71.95
Flow	24.50	7.66	9.88	23.21	-0.12	2.10	17.15	9.09	11.31		
Distance	-0.86	-0.86	-0.86	-0.86	-0.86	-0.86	-0.86	-0.86	-0.86	Day hour	89.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Absorbtive?	no
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	Use hour?	no
LEQ	69.76	60.59	67.04	68.46	52.81	59.26	62.41	62.02	68.47	GRADE dB	0.00

DAY LEQ 71.95 EVENING LEQ 69.06 NIGHT LEQ 70.15

CNEL **76.98**

FHWA Sound32 Spreadsheet
Riverside County Published Mix
Larger than Secondary

Buildout Traffic Noise

4th Street (at closest portion of proposed building)

	DAYTIME			EVENING			NIGHTTIME				
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	ADT	26100.00
							AUTOS			SPEED	50.00
										DISTANCE	100.00
INPUT PARAMETERS											
Vehicles per hour	1511.56	31.32	52.20	1122.16	5.22	8.70	278.27	43.50	72.50	% A	92.00
Speed in MPH	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	% MT	3.00
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	% HT	5.00
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	LEFT	-90.00
										RIGHT	90.00
NOISE CALCULATIONS											
Reference levels	71.12	78.79	83.02	71.12	78.79	83.02	71.12	78.79	83.02	CNEL	74.76
ADJUSTMENTS										DAY LEQ	69.73
Flow	24.50	7.66	9.88	23.21	-0.12	2.10	17.15	9.09	11.31		
Distance	-3.08	-3.08	-3.08	-3.08	-3.08	-3.08	-3.08	-3.08	-3.08	Day hour	89.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Absorbtive?	no
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	Use hour?	no
LEQ	67.54	58.38	64.82	66.24	50.59	57.04	60.19	59.80	66.25	GRADE dB	0.00

DAY LEQ	69.73	EVENING LEQ	66.84	NIGHT LEQ	67.93	
CNEL	**74.76**					

APPENDIX F

SoundPLAN Operation Input and Output

Noise Emissions of Industry Sources

Source name	Reference	Level		Frequency spectrum [dB(A)]								Corrections		
				63	125	250	500	1	2	4	8	Kwall	CI	CT
			dB(A)	Hz	Hz	Hz	Hz	kHz	kHz	kHz	kHz	dB(A)	dB(A)	dB(A)
HVAC1	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC2	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC3	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC4	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC5	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC6	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC7	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC8	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC9	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC10	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC11	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC12	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC13	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC14	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC15	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC16	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC17	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-

Source name	Reference	Level		Frequency spectrum [dB(A)]								Corrections		
				63	125	250	500	1	2	4	8	Kwall	CI	CT
			dB(A)	Hz	Hz	Hz	Hz	kHz	kHz	kHz	kHz	dB(A)	dB(A)	dB(A)
HVAC17	Unit	Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC18	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC19	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC20	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC21	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC22	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC23	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC24	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC25	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC26	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC27	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC28	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC29	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC30	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC31	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC32	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC33	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-

Noise Emissions of Industry Sources

Source name	Reference	Level		Frequency spectrum [dB(A)]								Corrections		
				63	125	250	500	1	2	4	8	Kwall	CI	CT
			dB(A)	Hz	Hz	Hz	Hz	kHz	kHz	kHz	kHz	dB(A)	dB(A)	dB(A)
HVAC33	Unit	Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC34	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC35	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC36	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC37	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC38	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC39	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC40	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC41	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC42	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC43	Unit	Leq1	86.1	63.4	74.9	76.9	80.8	81.0	77.7	72.0	61.4	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
HVAC44	Unit	Leq1	61.0	28.0	38.0	45.0	51.0	54.0	55.0	55.0	53.0	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-
Loading/Unloading	Unit	Leq1	92.0	59.0	69.0	76.0	82.0	85.0	86.0	86.0	84.0	-	-	-
		Leq2	-	-	-	-	-	-	-	-	-	-	-	-
		Leq3	-	-	-	-	-	-	-	-	-	-	-	-
		Lmax	-	-	-	-	-	-	-	-	-	-	-	-

Noise Emissions of Parking Lot Traffic

Name	Parking lot type	Low noise trolleys	Size	Movements per hour				Road surface	Separate method	Level
				Leq1	Leq2	Leq3	Lmax			dB(A)
Parking1	Visitors and staff	-	6 car places	1.000	0.000	0.000	0.000	Asphaltic lanes	no	70.8
Parking2	Visitors and staff	-	13 car places	3.000	0.000	0.000	0.000	Asphaltic lanes	no	75.6
Parking3	Visitors and staff	-	10 car places	2.000	0.000	0.000	0.000	Asphaltic lanes	no	73.0
Parking4	Visitors and staff	-	10 car places	14.00	0.000	0.000	0.000	Asphaltic lanes	no	73.0
Parking5	Visitors and staff	-	36 car places	52.00	0.000	0.000	0.000	Asphaltic lanes	no	82.1
Parking6	Rest stop (trucks)	-	1 car places	1.000	0.000	0.000	0.000	Asphaltic lanes	no	77.0

Contribution Levels of the Receivers

Source name	Level w/o NP Leq1	Leq2	Leq3	Lmax	Level w. NP Leq1	Leq2	Leq3	Lmax
	dB(A)				dB(A)			
1 Fl	56.2	-37.6	-37.6	0.0	0.0	0.0	0.0	0.0
HVAC1	36.7	-49.4	-49.4	0.0	0.0	0.0	0.0	0.0
HVAC2	31.9	-54.2	-54.2	0.0	0.0	0.0	0.0	0.0
HVAC3	29.3	-56.8	-56.8	0.0	0.0	0.0	0.0	0.0
HVAC4	27.3	-58.8	-58.8	0.0	0.0	0.0	0.0	0.0
HVAC5	25.4	-60.7	-60.7	0.0	0.0	0.0	0.0	0.0
HVAC6	24.7	-61.4	-61.4	0.0	0.0	0.0	0.0	0.0
HVAC7	24.2	-61.9	-61.9	0.0	0.0	0.0	0.0	0.0
HVAC8	23.8	-62.3	-62.3	0.0	0.0	0.0	0.0	0.0
HVAC9	23.6	-62.5	-62.5	0.0	0.0	0.0	0.0	0.0
HVAC10	22.9	-63.2	-63.2	0.0	0.0	0.0	0.0	0.0
HVAC11	22.1	-64.0	-64.0	0.0	0.0	0.0	0.0	0.0
HVAC12	36.9	-49.2	-49.2	0.0	0.0	0.0	0.0	0.0
HVAC13	32.0	-54.1	-54.1	0.0	0.0	0.0	0.0	0.0
HVAC14	30.5	-55.6	-55.6	0.0	0.0	0.0	0.0	0.0
HVAC15	30.0	-56.1	-56.1	0.0	0.0	0.0	0.0	0.0
HVAC16	28.5	-57.6	-57.6	0.0	0.0	0.0	0.0	0.0
HVAC17	27.0	-59.1	-59.1	0.0	0.0	0.0	0.0	0.0
HVAC18	25.7	-60.4	-60.4	0.0	0.0	0.0	0.0	0.0
HVAC19	24.6	-61.5	-61.5	0.0	0.0	0.0	0.0	0.0
HVAC20	23.7	-62.4	-62.4	0.0	0.0	0.0	0.0	0.0
HVAC21	22.8	-63.3	-63.3	0.0	0.0	0.0	0.0	0.0
HVAC22	22.3	-63.8	-63.8	0.0	0.0	0.0	0.0	0.0
HVAC23	39.3	-46.8	-46.8	0.0	0.0	0.0	0.0	0.0
HVAC24	35.0	-51.1	-51.1	0.0	0.0	0.0	0.0	0.0
HVAC25	31.4	-54.7	-54.7	0.0	0.0	0.0	0.0	0.0
HVAC26	29.5	-56.6	-56.6	0.0	0.0	0.0	0.0	0.0
HVAC27	27.8	-58.3	-58.3	0.0	0.0	0.0	0.0	0.0
HVAC28	26.3	-59.8	-59.8	0.0	0.0	0.0	0.0	0.0
HVAC29	24.6	-61.5	-61.5	0.0	0.0	0.0	0.0	0.0
HVAC30	23.6	-62.5	-62.5	0.0	0.0	0.0	0.0	0.0
HVAC31	22.9	-63.2	-63.2	0.0	0.0	0.0	0.0	0.0
HVAC32	22.2	-63.9	-63.9	0.0	0.0	0.0	0.0	0.0
HVAC33	22.3	-63.8	-63.8	0.0	0.0	0.0	0.0	0.0
HVAC34	22.3	-63.8	-63.8	0.0	0.0	0.0	0.0	0.0
HVAC35	37.9	-48.2	-48.2	0.0	0.0	0.0	0.0	0.0
HVAC36	34.5	-51.6	-51.6	0.0	0.0	0.0	0.0	0.0
HVAC37	31.1	-55.0	-55.0	0.0	0.0	0.0	0.0	0.0
HVAC38	29.4	-56.7	-56.7	0.0	0.0	0.0	0.0	0.0
HVAC39	27.5	-58.6	-58.6	0.0	0.0	0.0	0.0	0.0
HVAC40	26.0	-60.1	-60.1	0.0	0.0	0.0	0.0	0.0
HVAC41	24.7	-61.4	-61.4	0.0	0.0	0.0	0.0	0.0
HVAC42	23.6	-62.5	-62.5	0.0	0.0	0.0	0.0	0.0
HVAC43	22.9	-63.2	-63.2	0.0	0.0	0.0	0.0	0.0
HVAC44	14.0	-47.0	-47.0	0.0	0.0	0.0	0.0	0.0
Loading/Unloading	47.0	-45.0	-45.0	0.0	0.0	0.0	0.0	0.0
Parking1	33.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking2	53.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking3	40.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking4	44.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking5	44.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking6	36.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2 Fl	58.5	-33.1	-33.1	0.0	0.0	0.0	0.0	0.0
HVAC1	36.9	-49.2	-49.2	0.0	0.0	0.0	0.0	0.0
HVAC2	35.3	-50.8	-50.8	0.0	0.0	0.0	0.0	0.0
HVAC3	29.3	-56.8	-56.8	0.0	0.0	0.0	0.0	0.0
HVAC4	27.1	-59.0	-59.0	0.0	0.0	0.0	0.0	0.0
HVAC5	26.3	-59.8	-59.8	0.0	0.0	0.0	0.0	0.0
HVAC6	25.8	-60.3	-60.3	0.0	0.0	0.0	0.0	0.0
HVAC7	25.2	-60.9	-60.9	0.0	0.0	0.0	0.0	0.0
HVAC8	24.8	-61.3	-61.3	0.0	0.0	0.0	0.0	0.0
HVAC9	24.4	-61.7	-61.7	0.0	0.0	0.0	0.0	0.0
HVAC10	24.1	-62.0	-62.0	0.0	0.0	0.0	0.0	0.0

Contribution Levels of the Receivers

Source name	Level w/o NP				Level w. NP			
	Leq1	Leq2	Leq3	Lmax	Leq1	Leq2	Leq3	Lmax
	dB(A)				dB(A)			
HVAC11	23.4	-62.7	-62.7	0.0	0.0	0.0	0.0	0.0
HVAC12	41.2	-44.9	-44.9	0.0	0.0	0.0	0.0	0.0
HVAC13	39.0	-47.1	-47.1	0.0	0.0	0.0	0.0	0.0
HVAC14	30.2	-55.9	-55.9	0.0	0.0	0.0	0.0	0.0
HVAC15	28.6	-57.5	-57.5	0.0	0.0	0.0	0.0	0.0
HVAC16	27.6	-58.5	-58.5	0.0	0.0	0.0	0.0	0.0
HVAC17	27.1	-59.0	-59.0	0.0	0.0	0.0	0.0	0.0
HVAC18	26.4	-59.7	-59.7	0.0	0.0	0.0	0.0	0.0
HVAC19	26.2	-59.9	-59.9	0.0	0.0	0.0	0.0	0.0
HVAC20	25.6	-60.5	-60.5	0.0	0.0	0.0	0.0	0.0
HVAC21	25.2	-60.9	-60.9	0.0	0.0	0.0	0.0	0.0
HVAC22	24.2	-61.9	-61.9	0.0	0.0	0.0	0.0	0.0
HVAC23	35.4	-50.7	-50.7	0.0	0.0	0.0	0.0	0.0
HVAC24	31.9	-54.2	-54.2	0.0	0.0	0.0	0.0	0.0
HVAC25	30.6	-55.5	-55.5	0.0	0.0	0.0	0.0	0.0
HVAC26	30.7	-55.4	-55.4	0.0	0.0	0.0	0.0	0.0
HVAC27	29.8	-56.3	-56.3	0.0	0.0	0.0	0.0	0.0
HVAC28	29.0	-57.1	-57.1	0.0	0.0	0.0	0.0	0.0
HVAC29	27.9	-58.2	-58.2	0.0	0.0	0.0	0.0	0.0
HVAC30	27.4	-58.7	-58.7	0.0	0.0	0.0	0.0	0.0
HVAC31	27.1	-59.0	-59.0	0.0	0.0	0.0	0.0	0.0
HVAC32	25.8	-60.3	-60.3	0.0	0.0	0.0	0.0	0.0
HVAC33	27.5	-58.6	-58.6	0.0	0.0	0.0	0.0	0.0
HVAC34	31.0	-55.1	-55.1	0.0	0.0	0.0	0.0	0.0
HVAC35	38.8	-47.3	-47.3	0.0	0.0	0.0	0.0	0.0
HVAC36	36.1	-50.0	-50.0	0.0	0.0	0.0	0.0	0.0
HVAC37	35.4	-50.7	-50.7	0.0	0.0	0.0	0.0	0.0
HVAC38	34.6	-51.5	-51.5	0.0	0.0	0.0	0.0	0.0
HVAC39	33.9	-52.2	-52.2	0.0	0.0	0.0	0.0	0.0
HVAC40	32.7	-53.4	-53.4	0.0	0.0	0.0	0.0	0.0
HVAC41	31.8	-54.3	-54.3	0.0	0.0	0.0	0.0	0.0
HVAC42	30.6	-55.5	-55.5	0.0	0.0	0.0	0.0	0.0
HVAC43	30.0	-56.1	-56.1	0.0	0.0	0.0	0.0	0.0
HVAC44	23.7	-37.3	-37.3	0.0	0.0	0.0	0.0	0.0
Loading/Unloading	52.7	-39.3	-39.3	0.0	0.0	0.0	0.0	0.0
Parking1	24.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking2	35.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking3	33.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking4	44.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking5	56.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking6	37.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 Fl	64.6	-38.0	-38.0	0.0	0.0	0.0	0.0	0.0
HVAC1	23.9	-62.2	-62.2	0.0	0.0	0.0	0.0	0.0
HVAC2	24.5	-61.6	-61.6	0.0	0.0	0.0	0.0	0.0
HVAC3	24.9	-61.2	-61.2	0.0	0.0	0.0	0.0	0.0
HVAC4	25.6	-60.5	-60.5	0.0	0.0	0.0	0.0	0.0
HVAC5	26.3	-59.8	-59.8	0.0	0.0	0.0	0.0	0.0
HVAC6	26.9	-59.2	-59.2	0.0	0.0	0.0	0.0	0.0
HVAC7	27.3	-58.8	-58.8	0.0	0.0	0.0	0.0	0.0
HVAC8	27.5	-58.6	-58.6	0.0	0.0	0.0	0.0	0.0
HVAC9	27.6	-58.5	-58.5	0.0	0.0	0.0	0.0	0.0
HVAC10	27.0	-59.1	-59.1	0.0	0.0	0.0	0.0	0.0
HVAC11	26.1	-60.0	-60.0	0.0	0.0	0.0	0.0	0.0
HVAC12	25.1	-61.0	-61.0	0.0	0.0	0.0	0.0	0.0
HVAC13	25.7	-60.4	-60.4	0.0	0.0	0.0	0.0	0.0
HVAC14	26.3	-59.8	-59.8	0.0	0.0	0.0	0.0	0.0
HVAC15	27.0	-59.1	-59.1	0.0	0.0	0.0	0.0	0.0
HVAC16	27.8	-58.3	-58.3	0.0	0.0	0.0	0.0	0.0
HVAC17	28.5	-57.6	-57.6	0.0	0.0	0.0	0.0	0.0
HVAC18	29.0	-57.1	-57.1	0.0	0.0	0.0	0.0	0.0
HVAC19	29.4	-56.7	-56.7	0.0	0.0	0.0	0.0	0.0
HVAC20	29.2	-56.9	-56.9	0.0	0.0	0.0	0.0	0.0
HVAC21	28.4	-57.7	-57.7	0.0	0.0	0.0	0.0	0.0
HVAC22	27.0	-59.1	-59.1	0.0	0.0	0.0	0.0	0.0

Contribution Levels of the Receivers

Source name	Level w/o NP				Level w. NP			
	Leq1	Leq2	Leq3	Lmax	Leq1	Leq2	Leq3	Lmax
	dB(A)				dB(A)			
HVAC23	27.6	-58.5	-58.5	0.0	0.0	0.0	0.0	0.0
HVAC24	28.2	-57.9	-57.9	0.0	0.0	0.0	0.0	0.0
HVAC25	29.0	-57.1	-57.1	0.0	0.0	0.0	0.0	0.0
HVAC26	30.1	-56.0	-56.0	0.0	0.0	0.0	0.0	0.0
HVAC27	30.7	-55.4	-55.4	0.0	0.0	0.0	0.0	0.0
HVAC28	31.8	-54.3	-54.3	0.0	0.0	0.0	0.0	0.0
HVAC29	31.8	-54.3	-54.3	0.0	0.0	0.0	0.0	0.0
HVAC30	31.8	-54.3	-54.3	0.0	0.0	0.0	0.0	0.0
HVAC31	31.1	-55.0	-55.0	0.0	0.0	0.0	0.0	0.0
HVAC32	29.1	-57.0	-57.0	0.0	0.0	0.0	0.0	0.0
HVAC33	31.7	-54.4	-54.4	0.0	0.0	0.0	0.0	0.0
HVAC34	37.5	-48.6	-48.6	0.0	0.0	0.0	0.0	0.0
HVAC35	31.1	-55.0	-55.0	0.0	0.0	0.0	0.0	0.0
HVAC36	31.8	-54.3	-54.3	0.0	0.0	0.0	0.0	0.0
HVAC37	33.1	-53.0	-53.0	0.0	0.0	0.0	0.0	0.0
HVAC38	34.1	-52.0	-52.0	0.0	0.0	0.0	0.0	0.0
HVAC39	35.7	-50.4	-50.4	0.0	0.0	0.0	0.0	0.0
HVAC40	37.0	-49.1	-49.1	0.0	0.0	0.0	0.0	0.0
HVAC41	38.4	-47.7	-47.7	0.0	0.0	0.0	0.0	0.0
HVAC42	37.1	-49.0	-49.0	0.0	0.0	0.0	0.0	0.0
HVAC43	36.2	-49.9	-49.9	0.0	0.0	0.0	0.0	0.0
HVAC44	8.3	-52.7	-52.7	0.0	0.0	0.0	0.0	0.0
Loading/Unloading	32.4	-59.6	-59.6	0.0	0.0	0.0	0.0	0.0
Parking1	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking2	25.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking3	20.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking4	29.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking5	64.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking6	27.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 Fl	53.1	-39.9	-39.9	0.0	0.0	0.0	0.0	0.0
HVAC1	20.6	-65.5	-65.5	0.0	0.0	0.0	0.0	0.0
HVAC2	21.2	-64.9	-64.9	0.0	0.0	0.0	0.0	0.0
HVAC3	21.9	-64.2	-64.2	0.0	0.0	0.0	0.0	0.0
HVAC4	22.6	-63.5	-63.5	0.0	0.0	0.0	0.0	0.0
HVAC5	23.8	-62.3	-62.3	0.0	0.0	0.0	0.0	0.0
HVAC6	24.8	-61.3	-61.3	0.0	0.0	0.0	0.0	0.0
HVAC7	26.4	-59.7	-59.7	0.0	0.0	0.0	0.0	0.0
HVAC8	27.8	-58.3	-58.3	0.0	0.0	0.0	0.0	0.0
HVAC9	29.5	-56.6	-56.6	0.0	0.0	0.0	0.0	0.0
HVAC10	31.8	-54.3	-54.3	0.0	0.0	0.0	0.0	0.0
HVAC11	35.3	-50.8	-50.8	0.0	0.0	0.0	0.0	0.0
HVAC12	21.1	-65.0	-65.0	0.0	0.0	0.0	0.0	0.0
HVAC13	21.3	-64.8	-64.8	0.0	0.0	0.0	0.0	0.0
HVAC14	21.9	-64.2	-64.2	0.0	0.0	0.0	0.0	0.0
HVAC15	22.7	-63.4	-63.4	0.0	0.0	0.0	0.0	0.0
HVAC16	23.8	-62.3	-62.3	0.0	0.0	0.0	0.0	0.0
HVAC17	24.8	-61.3	-61.3	0.0	0.0	0.0	0.0	0.0
HVAC18	26.2	-59.9	-59.9	0.0	0.0	0.0	0.0	0.0
HVAC19	27.9	-58.2	-58.2	0.0	0.0	0.0	0.0	0.0
HVAC20	30.0	-56.1	-56.1	0.0	0.0	0.0	0.0	0.0
HVAC21	32.3	-53.8	-53.8	0.0	0.0	0.0	0.0	0.0
HVAC22	35.5	-50.6	-50.6	0.0	0.0	0.0	0.0	0.0
HVAC23	23.0	-63.1	-63.1	0.0	0.0	0.0	0.0	0.0
HVAC24	23.3	-62.8	-62.8	0.0	0.0	0.0	0.0	0.0
HVAC25	23.7	-62.4	-62.4	0.0	0.0	0.0	0.0	0.0
HVAC26	24.4	-61.7	-61.7	0.0	0.0	0.0	0.0	0.0
HVAC27	24.6	-61.5	-61.5	0.0	0.0	0.0	0.0	0.0
HVAC28	25.7	-60.4	-60.4	0.0	0.0	0.0	0.0	0.0
HVAC29	27.7	-58.4	-58.4	0.0	0.0	0.0	0.0	0.0
HVAC30	30.2	-55.9	-55.9	0.0	0.0	0.0	0.0	0.0
HVAC31	32.8	-53.3	-53.3	0.0	0.0	0.0	0.0	0.0
HVAC32	35.9	-50.2	-50.2	0.0	0.0	0.0	0.0	0.0
HVAC33	36.5	-49.6	-49.6	0.0	0.0	0.0	0.0	0.0
HVAC34	36.9	-49.2	-49.2	0.0	0.0	0.0	0.0	0.0

Contribution Levels of the Receivers

Source name	Level w/o NP				Level w. NP			
	Leq1	Leq2	Leq3	Lmax	Leq1	Leq2	Leq3	Lmax
	dB(A)				dB(A)			
HVAC35	25.7	-60.4	-60.4	0.0	0.0	0.0	0.0	0.0
HVAC36	26.0	-60.1	-60.1	0.0	0.0	0.0	0.0	0.0
HVAC37	26.6	-59.5	-59.5	0.0	0.0	0.0	0.0	0.0
HVAC38	27.1	-59.0	-59.0	0.0	0.0	0.0	0.0	0.0
HVAC39	27.8	-58.3	-58.3	0.0	0.0	0.0	0.0	0.0
HVAC40	28.3	-57.8	-57.8	0.0	0.0	0.0	0.0	0.0
HVAC41	29.9	-56.2	-56.2	0.0	0.0	0.0	0.0	0.0
HVAC42	30.1	-56.0	-56.0	0.0	0.0	0.0	0.0	0.0
HVAC43	33.0	-53.1	-53.1	0.0	0.0	0.0	0.0	0.0
HVAC44	-3.4	-64.4	-64.4	0.0	0.0	0.0	0.0	0.0
Loading/Unloading	21.9	-70.1	-70.1	0.0	0.0	0.0	0.0	0.0
Parking1	-2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking2	17.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking3	9.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking4	22.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking5	52.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking6	22.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 Fl	44.8	-41.5	-41.5	0.0	0.0	0.0	0.0	0.0
HVAC1	24.1	-62.0	-62.0	0.0	0.0	0.0	0.0	0.0
HVAC2	24.5	-61.6	-61.6	0.0	0.0	0.0	0.0	0.0
HVAC3	25.2	-60.9	-60.9	0.0	0.0	0.0	0.0	0.0
HVAC4	26.2	-59.9	-59.9	0.0	0.0	0.0	0.0	0.0
HVAC5	28.3	-57.8	-57.8	0.0	0.0	0.0	0.0	0.0
HVAC6	30.3	-55.8	-55.8	0.0	0.0	0.0	0.0	0.0
HVAC7	33.8	-52.3	-52.3	0.0	0.0	0.0	0.0	0.0
HVAC8	35.6	-50.5	-50.5	0.0	0.0	0.0	0.0	0.0
HVAC9	33.3	-52.8	-52.8	0.0	0.0	0.0	0.0	0.0
HVAC10	30.6	-55.5	-55.5	0.0	0.0	0.0	0.0	0.0
HVAC11	30.1	-56.0	-56.0	0.0	0.0	0.0	0.0	0.0
HVAC12	21.5	-64.6	-64.6	0.0	0.0	0.0	0.0	0.0
HVAC13	22.3	-63.8	-63.8	0.0	0.0	0.0	0.0	0.0
HVAC14	23.1	-63.0	-63.0	0.0	0.0	0.0	0.0	0.0
HVAC15	24.4	-61.7	-61.7	0.0	0.0	0.0	0.0	0.0
HVAC16	26.7	-59.4	-59.4	0.0	0.0	0.0	0.0	0.0
HVAC17	28.7	-57.4	-57.4	0.0	0.0	0.0	0.0	0.0
HVAC18	31.3	-54.8	-54.8	0.0	0.0	0.0	0.0	0.0
HVAC19	32.2	-53.9	-53.9	0.0	0.0	0.0	0.0	0.0
HVAC20	31.1	-55.0	-55.0	0.0	0.0	0.0	0.0	0.0
HVAC21	29.3	-56.8	-56.8	0.0	0.0	0.0	0.0	0.0
HVAC22	28.4	-57.7	-57.7	0.0	0.0	0.0	0.0	0.0
HVAC23	21.5	-64.6	-64.6	0.0	0.0	0.0	0.0	0.0
HVAC24	22.2	-63.9	-63.9	0.0	0.0	0.0	0.0	0.0
HVAC25	23.6	-62.5	-62.5	0.0	0.0	0.0	0.0	0.0
HVAC26	24.7	-61.4	-61.4	0.0	0.0	0.0	0.0	0.0
HVAC27	26.1	-60.0	-60.0	0.0	0.0	0.0	0.0	0.0
HVAC28	27.9	-58.2	-58.2	0.0	0.0	0.0	0.0	0.0
HVAC29	29.6	-56.5	-56.5	0.0	0.0	0.0	0.0	0.0
HVAC30	28.6	-57.5	-57.5	0.0	0.0	0.0	0.0	0.0
HVAC31	27.3	-58.8	-58.8	0.0	0.0	0.0	0.0	0.0
HVAC32	26.7	-59.4	-59.4	0.0	0.0	0.0	0.0	0.0
HVAC33	25.4	-60.7	-60.7	0.0	0.0	0.0	0.0	0.0
HVAC34	24.1	-62.0	-62.0	0.0	0.0	0.0	0.0	0.0
HVAC35	20.7	-65.4	-65.4	0.0	0.0	0.0	0.0	0.0
HVAC36	21.5	-64.6	-64.6	0.0	0.0	0.0	0.0	0.0
HVAC37	22.7	-63.4	-63.4	0.0	0.0	0.0	0.0	0.0
HVAC38	23.6	-62.5	-62.5	0.0	0.0	0.0	0.0	0.0
HVAC39	24.7	-61.4	-61.4	0.0	0.0	0.0	0.0	0.0
HVAC40	26.0	-60.1	-60.1	0.0	0.0	0.0	0.0	0.0
HVAC41	26.7	-59.4	-59.4	0.0	0.0	0.0	0.0	0.0
HVAC42	26.3	-59.8	-59.8	0.0	0.0	0.0	0.0	0.0
HVAC43	25.5	-60.6	-60.6	0.0	0.0	0.0	0.0	0.0
HVAC44	-12.9	-73.9	-73.9	0.0	0.0	0.0	0.0	0.0
Loading/Unloading	18.6	-73.4	-73.4	0.0	0.0	0.0	0.0	0.0
Parking1	11.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Contribution Levels of the Receivers

Source name	Level w/o NP				Level w. NP			
	Leq1	Leq2	Leq3	Lmax	Leq1	Leq2	Leq3	Lmax
	dB(A)				dB(A)			
Parking2	13.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking3	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking4	14.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking5	30.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking6	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Receiver List

No.	Receiver name	Build side	Floor	Limit Leq1	Limit Leq2	Limit Leq3	Limit Lmax	Level w/o NP Leq1	Level w/o NP Leq2	Level w/o NP Leq3	Level w/o NP Lmax	Level w. NP Leq1	Level w. NP Leq2	Level w. NP Leq3	Level w. NP Lmax	Difference Leq1	Difference Leq2	Difference Leq3	Difference Lmax	Conflict Leq1	Conflict Leq2	Conflict Leq3	Conflict Lmax
				dB(A)				dB(A)				dB(A)				dB(A)				dB(A)			
1	1		Fl	-	-	-	-	56.2	-37.6	-37.6	0.0	0.0	0.0	0.0	0.0	-56.2	37.6	37.6	0.0	-	-	-	-
2	2		Fl	-	-	-	-	58.5	-33.1	-33.1	0.0	0.0	0.0	0.0	0.0	-58.5	33.1	33.1	0.0	-	-	-	-
3	3		Fl	-	-	-	-	64.6	-38.0	-38.0	0.0	0.0	0.0	0.0	0.0	-64.6	38.0	38.0	0.0	-	-	-	-
4	4		Fl	-	-	-	-	53.1	-39.9	-39.9	0.0	0.0	0.0	0.0	0.0	-53.1	39.9	39.9	0.0	-	-	-	-
5	5		Fl	-	-	-	-	44.8	-41.5	-41.5	0.0	0.0	0.0	0.0	0.0	-44.8	41.5	41.5	0.0	-	-	-	-

Kunzman Associates, Inc.

OVER 40 YEARS OF EXCELLENT SERVICE

1111 Town & Country Road, Suite 34
Orange, California 92868
(714) 973-8383

www.kainc.us