



East Avenue

NOISE IMPACT ANALYSIS

CITY OF RANCHO CUCAMONGA

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LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
ANSI	American National Standards Institute
Calveno	California Vehicle Noise
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
CVWD	Cucamonga Valley Water District
dBA	A-weighted decibels
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
INCE	Institute of Noise Control Engineering
Leq	Equivalent continuous (average) sound level
Lmax	Maximum level measured over the time interval
Lmin	Minimum level measured over the time interval
mph	Miles per hour
MWD	Metropolitan Water District
PPV	Peak Particle Velocity
Project	East Avenue
REMEL	Reference Energy Mean Emission Level
RMS	Root-mean-square
VdB	Vibration Decibels

EXECUTIVE SUMMARY

Urban Crossroads, Inc. has prepared this noise study to determine the noise exposure and the necessary noise mitigation measures for the proposed East Avenue development ("Project"). The Project site is located west of East Avenue and north of Foothill Boulevard in the City of Rancho Cucamonga. The Project is proposed to include the development of up to 64 multi-family residential dwelling units. This noise impact analysis was prepared to satisfy the City of Rancho Cucamonga noise level standards and ensure that adequate noise mitigation measures are incorporated into the Project's development.

ON-SITE TRAFFIC NOISE ANALYSIS

The results of this analysis indicate that future vehicle noise from Foothill Boulevard and East Avenue is the principal source of community noise that will impact the Project site. The Project will also experience some background traffic noise impacts from the Project's internal parking lot, however, due to the low traffic volume/speeds, traffic noise from the parking areas will not make a significant contribution to the noise environment. With unmitigated exterior traffic noise levels approaching 70.5 dBA CNEL at buildings facing East Avenue, the Project's multi-family residential land use is considered *normally unacceptable* land use, and a detailed analysis of the interior noise reduction requirements is needed to satisfy the interior noise level standard of 45 dBA CNEL. Since there are no outdoor living areas requiring exterior noise mitigation at the buildings facing East Avenue, no exterior noise mitigation is required.

INTERIOR NOISE MITIGATION

To satisfy the City of Rancho Cucamonga 45 dBA CNEL interior noise level criteria, units facing Foothill Boulevard and East Avenue will require a Noise Reduction (NR) of up to 25.5 dBA and a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning). To meet the City of Rancho Cucamonga 45 dBA CNEL interior noise standards the Project shall provide the following or equivalent noise mitigation measures:

- Windows:
 - All windows and sliding glass doors shall be well fitted, well weather-stripped assemblies and shall have the following minimum sound transmission class (STC) ratings:
 - Windows facing East Avenue in Buildings 1, 2, 3, and 10 require upgraded windows with a minimum STC rating of 29;
 - All other buildings require standard windows with minimum STC ratings of 27.
- Doors: All exterior doors shall be well weather-stripped solid core assemblies at least one and three-fourths-inch thick.
- Walls: At any penetrations of exterior walls by pipes, ducts, or conduits, the space between the wall and pipes, ducts, or conduits shall be caulked or filled with mortar to form an airtight seal.
- Roof: Roof sheathing of wood construction shall be well fitted or caulked plywood of at least one-half inch thick. Ceilings shall be well fitted, fully sealed gypsum board of at least one-half inch thick. Insulation with at least a rating of R-19 shall be used in the attic space.

- **Ventilation:** Arrangements for any habitable room shall be such that any exterior door or window can be kept closed when the room is in use and still receive circulated air. A forced air circulation system (e.g. air conditioning) or active ventilation system (e.g. fresh air supply) shall be provided which satisfies the requirements of the Uniform Building Code.
- **Notices:** Occupancy disclosure notices are recommended for all future tenants of the residential units within the Project site. The disclosure notices should state that the units may be exposed to infrequent noise events from the adjacent CVWD well site.

With the interior noise mitigation measures shown on Exhibit ES-A, the proposed Project is expected to satisfy the City of Rancho Cucamonga 45 dBA CNEL interior noise level standards for residential development. While not required, this noise study recommends an interior noise level design goal of 40 dBA CNEL, which can be achieved using minimum STC ratings of 33 for all windows facing East Avenue in Buildings 1, 2, 3, and 10 and windows facing the CVWD well site in Buildings 7 and 8.

CONSTRUCTION NOISE AND VIBRATION ANALYSIS

Construction noise represents a short-term increase on the ambient noise levels. Construction-related noise impacts are expected to create temporary and intermittent high-level noise conditions at receivers surrounding the Project site when certain activities occur at the Project site boundary. Using sample reference noise levels to represent the construction activities of the East Avenue site, this analysis estimates the Project-related construction noise levels at nearby sensitive receiver locations.

The Project-related short-term construction noise levels are expected to approach 67.7 dBA Leq and will exceed the 65 dBA Leq threshold at nearby sensitive receiver locations. Therefore, recommended temporary noise barriers are required to reduce the noise levels due to Project construction activity. Based on the results of this analysis, the nearby sensitive receiver locations will experience *less than significant* impacts after mitigation. The construction noise analysis presents a conservative, worst-case approach with the highest noise-level-producing equipment for each stage of Project construction operating at the closest point from the center of construction activity to the nearby sensitive receiver locations. This scenario is unlikely to occur during typical construction activities and likely overstates the construction noise levels which will be experienced at each receiver location. With the installation of temporary noise control barriers, as shown on Exhibit ES-B, the worst-case construction noise levels at the nearby residential receivers would be reduced.

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods used, distance to the affected structures and soil type. It is expected that ground-borne vibration from Project construction activities would cause only intermittent, localized intrusion. Based on the reference vibration levels provided by the Federal Transit Administration (FTA), a large bulldozer represents the peak source of vibration with a reference velocity of 0.089 in/sec PPV at 25 feet. At distances ranging from 112 to 545 feet from Project construction activities, construction vibration velocity levels are expected to approach 0.0094 in/sec PPV. To assess the human perception of vibration levels in PPV, the velocities are converted to RMS vibration levels based on the Caltrans *Transportation and Construction*

Vibration Guidance Manual conversion factor of 0.71. The highest construction vibration levels in RMS are expected to approach 0.007 in/sec RMS at receiver location R5. Based on the City of Rancho Cucamonga vibration standards, the proposed Project construction activities will satisfy the vibration standard of 0.12 in/sec RMS at all receiver locations during Project construction. Further, Section 17.66.070 (D) of the City of Rancho Cucamonga Development Code exempts the equipment specific to temporary construction, demolition, and vehicles that leave a project site from the vibration level standards. (1) Therefore, the Project-related vibration impacts at location R2 represent a *less than significant* impact during the worst-case construction activities at the Project site boundary.

The vibration impacts due to Project construction represent temporary perceptible vibration levels which may cause annoyance in residential areas, however, they do not represent vibration levels capable of causing building damage to nearby residential homes. The FTA identifies construction vibration levels capable of building damage ranging from 0.12 to 0.5 in/sec PPV. (2) The peak Project-construction vibration levels shown on Table 9-5, approaching 0.009 in/sec PPV, will not exceed the FTA vibration levels for building damage at the residential homes near the Project site. Further, the impacts at the site of the closest sensitive receivers are unlikely to be sustained during the entire construction period, but will occur rather only during the times that heavy construction equipment is operating adjacent to the Project site perimeter. Construction at the Project site will be restricted to daytime hours consistent with City requirements thereby eliminating potential vibration impact during the sensitive nighttime hours.

CONSTRUCTION NOISE AND VIBRATION ABATEMENT MEASURES

Though construction noise is temporary, intermittent and of short duration, and will not present any long-term impacts, the following mitigation measures would reduce any noise level increases produced by the construction equipment to the nearby noise-sensitive residential land uses.

- If the future residential land use at receiver location R5 is fully built and occupied at the time of Project construction, install minimum 9-foot high temporary construction noise barriers at the Project's southern site boundary, as shown on Exhibit 9-A, for the duration of mobile-equipment construction activities. The noise control barriers must present a solid face from top to bottom. The noise control barriers must meet the minimum height and be constructed as follows:
 - The barriers shall provide a minimum transmission loss of 20 dBA (Federal Highway Administration, Noise Barrier Design Handbook). The noise barrier shall be constructed using an acoustical blanket (e.g. vinyl acoustic curtains or quilted blankets) attached to the construction site perimeter fence or equivalent temporary fence posts;
 - The noise barrier must be maintained and any damage promptly repaired. Gaps, holes, or weaknesses in the barrier or openings between the barrier and the ground shall be promptly repaired;
 - The noise control barrier and associated elements shall be completely removed and the site appropriately restored upon the conclusion of the construction activity.
- Prior to approval of grading plans and/or issuance of building permits, plans shall include a note indicating that noise-generating Project construction activities shall only occur between the hours

of 7:00 a.m. to 8:00 p.m. on weekdays, including on Saturdays, with no activity allowed on Sundays and holidays. (3)

- During all Project site construction, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards. The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from the noise sensitive receptors nearest the Project site.
- The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receivers nearest the Project site (i.e., to the center) during all Project construction.
- The construction contractor shall limit haul truck deliveries to the same hours specified for construction equipment (between the hours of 7:00 a.m. to 8:00 p.m. on weekdays, including on Saturdays, with no activity allowed on Sundays and holidays). The contractor shall prepare a haul route exhibit and shall design delivery routes to minimize the exposure of sensitive land uses or residential dwellings to delivery truck-related noise.

EXISTING STATIONARY NOISE SOURCES

Located adjacent to the Project's southwestern site boundaries, the CVWD Well 43 site includes a well pump and enclosed electrical equipment. While an existing 6-foot high perimeter wall surrounds the well site, the well pump itself is taller than the wall, and therefore represents a potential unmitigated noise source adjacent to the Project. Therefore, to reduce the potential stationary-source noise levels from the existing well pump, the following exterior and interior noise attenuation measures are recommended, but not required.

EXTERIOR WELL PUMP NOISE ATTENUATION

Due to the existing height of the well pump, its exposed equipment (no enclosure), and clear line-of-sight to the noise source, any height increases to the existing barrier will provide little additional noise level attenuation. The existing barrier height would need to be increased to be equal to, or greater than, the top of the well pump equipment to block the line-of-sight from the first-floor Project receivers to the noise source. However, second floor receivers at the Project site are unlikely to benefit from a barrier height increase. At the time this noise study was prepared, any planned CVWD noise attenuation measures were unknown.

Therefore, to reduce the noise levels experienced at the Project site, noise attenuation measures such as lowering the well pump below grade, or enclosing the existing equipment, are recommended. However, this will require coordination with the CVWD.

INTERIOR WELL PUMP NOISE ATTENUATION

Project design features capable of reducing the potential noise levels due to the existing well pump include upgrading the windows facing the CVWD well site at both the first and second floors of Buildings 7 and 8. With upgraded windows for Buildings 7 and 8, with minimum STC ratings of 29, the interior noise levels would be reduced. However, it is important to note that

noise abatement at the noise source (i.e. the well pump), is still the most effective method of reducing the potential noise levels experienced at the Project site.

While not required, this noise study recommends an interior noise level design goal of 40 dBA CNEL, which as previously mentioned can be achieved using minimum STC ratings of 33 for all windows facing the CVWD well site in Buildings 7 and 8.

SUMMARY OF SIGNIFICANCE FINDINGS

The results of this East Avenue Noise Impact Analysis are summarized below based on the significance criteria in Section 4 of this report. Table ES-1 shows the findings of significance for each potential noise impact before and after any needed mitigation measures.

TABLE ES-1: NOISE IMPACT SIGNIFICANCE SUMMARY

Analysis	Report Section	Significance	
		Without Mitigation	With Mitigation
On-Site Traffic Noise	7	<i>Potentially Significant</i>	<i>Less Than Significant</i>
Construction Noise	9	<i>Potentially Significant</i>	<i>Less Than Significant</i>
Construction Vibration		<i>Less than significant</i>	<i>n/a</i>

"n/a" = No mitigation required since the impact will be less than significant.

EXHIBIT ES-A: SUMMARY OF ON-SITE RECOMMENDATIONS

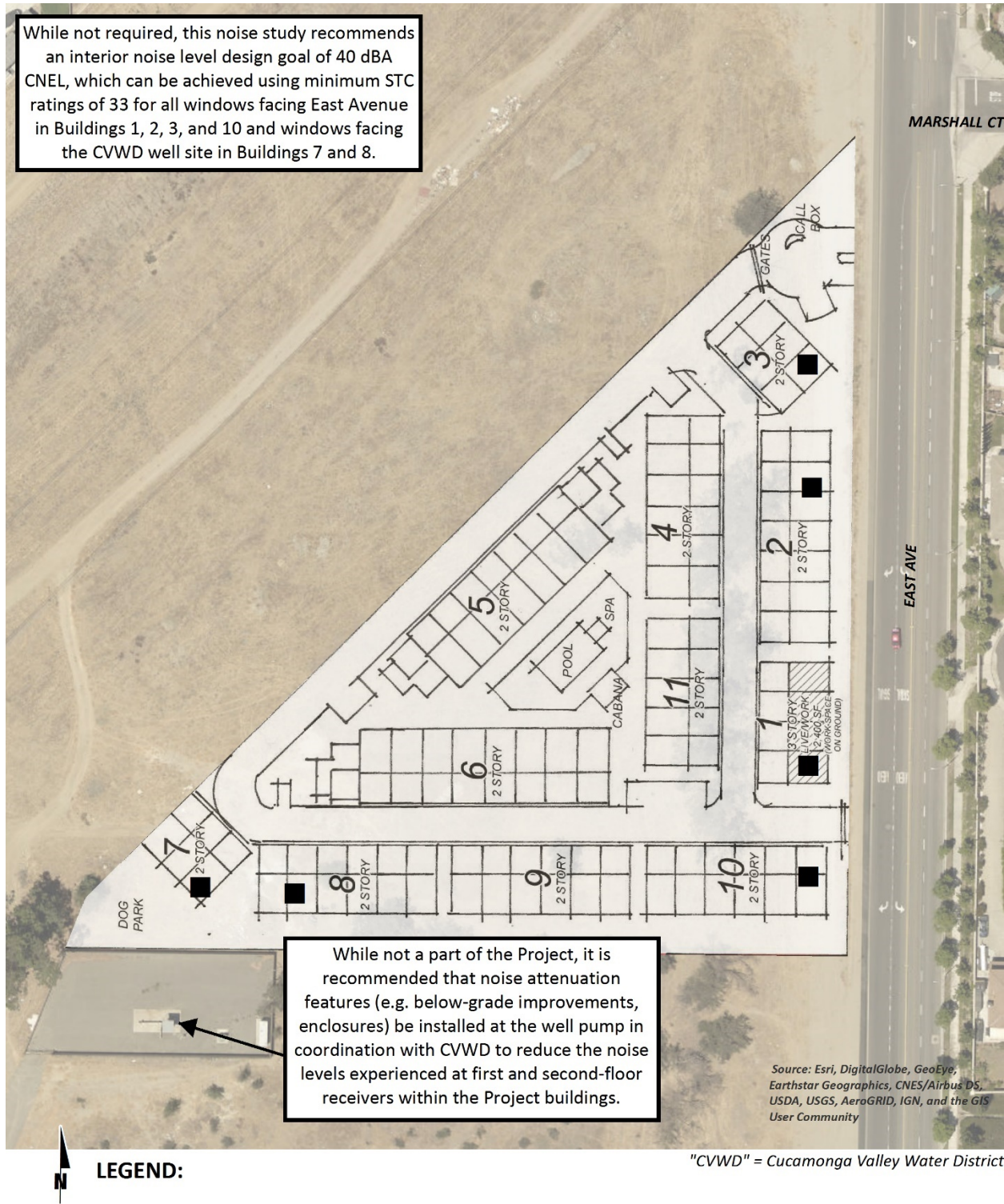
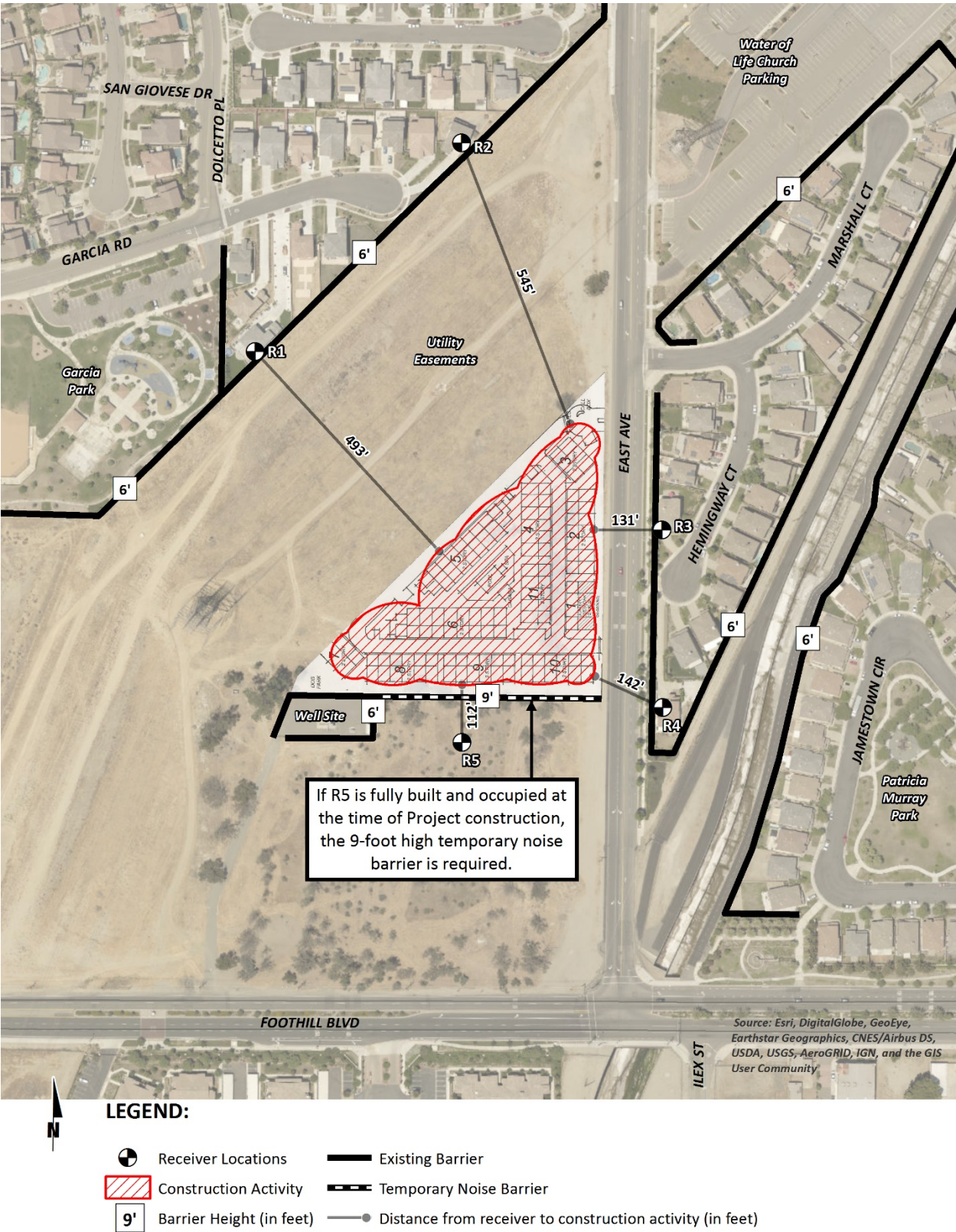


EXHIBIT ES-B: SUMMARY OF CONSTRUCTION MITIGATION MEASURES



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1 INTRODUCTION

This noise analysis has been completed to determine the noise impacts associated with the development of the proposed East Avenue (“Project”). This noise study describes the proposed Project, provides information regarding noise fundamentals, outlines the local regulatory setting, provides the study methods and procedures for traffic noise analysis, and evaluates the future exterior noise environment. In addition, this study includes an analysis of the potential Project-related short-term construction noise and vibration impacts.

1.1 SITE LOCATION

The proposed East Avenue Project is located west of East Avenue and north of Foothill Boulevard in the City of Rancho Cucamonga, as shown on Exhibit 1-A. Existing residential land uses in the Project study area are located north and west across existing utility easements, east across East Avenue, and south on Foothill Boulevard. Garcia Park is located northwest of the Project site at roughly 465 feet. An existing Cucamonga Valley Water District (CVWD) well pump (number 43) site is located immediately adjacent to the Project’s southwest corner.

1.2 PROJECT DESCRIPTION

The Project is proposed to include the development of up to 64 multi-family residential dwelling units, as shown on Exhibit 1-B. The proposed residential land use is considered noise-sensitive receiving land use and is not expected to include any specific type of operational noise levels beyond the typical noise sources associated with existing residential land use in the Project study area. Further, the site has been designed with the community amenities (e.g., dog park, pool) located far from existing noise-sensitive land uses in the Project study area and surrounded by the proposed Project buildings.

EXHIBIT 1-A: LOCATION MAP



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2 FUNDAMENTALS

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

EXHIBIT 2-A: TYPICAL NOISE LEVELS

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

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

2.1 RANGE OF NOISE

Since the range of intensities that the human ear can detect is so large, the scale frequently used to measure intensity is a scale based on multiples of 10, the logarithmic scale. The scale for measuring intensity is the decibel scale. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud. (4) The most common sounds vary between 40 dBA (very quiet) to 100 dBA (very loud). Normal conversation at three feet is roughly at 60 dBA, while loud jet engine noises equate to 110 dBA

at approximately 100 feet, which can cause serious discomfort. (5) Another important aspect of noise is the duration of the sound and the way it is described and distributed in time.

2.2 NOISE DESCRIPTORS

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

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

2.3 SOUND PROPAGATION

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

2.3.1 GEOMETRIC SPREADING

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

2.3.2 GROUND ABSORPTION

The propagation path of noise from a highway to a receptor is usually very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 ft. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receptor, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receptor such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance from a line source.

2.3.3 ATMOSPHERIC EFFECTS

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

2.3.4 SHIELDING

A large object or barrier in the path between a noise source and a receptor can substantially attenuate noise levels at the receptor. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Shielding by trees and other such vegetation typically only has an “out of sight, out of mind” effect. That is, the perception of noise impact tends to decrease when vegetation blocks the line-of-sight to nearby resident. However, for vegetation to provide a substantial, or even noticeable, noise reduction, the vegetation area must be at least 15 feet in height, 100 feet wide and dense enough to completely obstruct the line-of sight between the source and the receiver. This size of vegetation may provide up to 5 dBA of noise reduction. The FHWA does not consider the planting of vegetation to be a noise abatement measure.

2.4 NOISE CONTROL

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

2.5 NOISE BARRIER ATTENUATION

Effective noise barriers can reduce noise levels by 10 to 15 dBA, cutting the loudness of traffic noise in half. A noise barrier is most effective when placed close to the noise source or receptor. Noise barriers, however, do have limitations. For a noise barrier to work, it must be high enough and long enough to block the path of the noise source. (6)

2.6 LAND USE COMPATIBILITY WITH NOISE

Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches, and residences are more sensitive to noise intrusion than are commercial or industrial developments and related activities. As ambient noise levels affect the perceived amenity or livability of a development, so too can the mismanagement of noise impacts impair the economic health and growth potential of a community by reducing the area's desirability as a place to live, shop and work. For this reason, land use compatibility with the noise environment is an important consideration in the planning and design process. The FHWA encourages State and Local government to regulate land development in such a way that noise-sensitive land uses are either prohibited from being located adjacent to a highway, or that the developments are planned, designed, and constructed in such a way that noise impacts are minimized. (7)

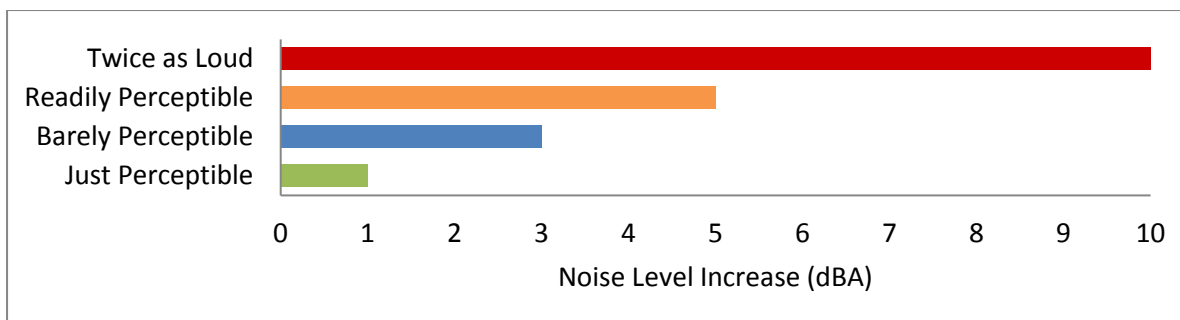
2.7 COMMUNITY RESPONSE TO NOISE

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

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

Approximately ten percent of the population has a very low tolerance for noise and will object to any noise not of their making. Consequently, even in the quietest environment, some complaints will occur. Another twenty-five percent of the population will not complain even in very severe noise environments. Thus, a variety of reactions can be expected from people exposed to any given noise environment. (8) Surveys have shown that about ten percent of the people exposed to traffic noise of 60 dBA will report being highly annoyed with the noise, and each increase of one dBA is associated with approximately two percent more people being highly annoyed. When traffic noise exceeds 60 dBA or aircraft noise exceeds 55 dBA, people may begin to complain. (8)

Despite this variability in behavior on an individual level, the population can be expected to exhibit the following responses to changes in noise levels as shown on Exhibit 2-B. An increase or decrease of 1 dBA cannot be perceived except in carefully controlled laboratory experiments, a change of 3 dBA are considered *barely perceptible*, and changes of 5 dBA are considered *readily perceptible*. (6)

EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION

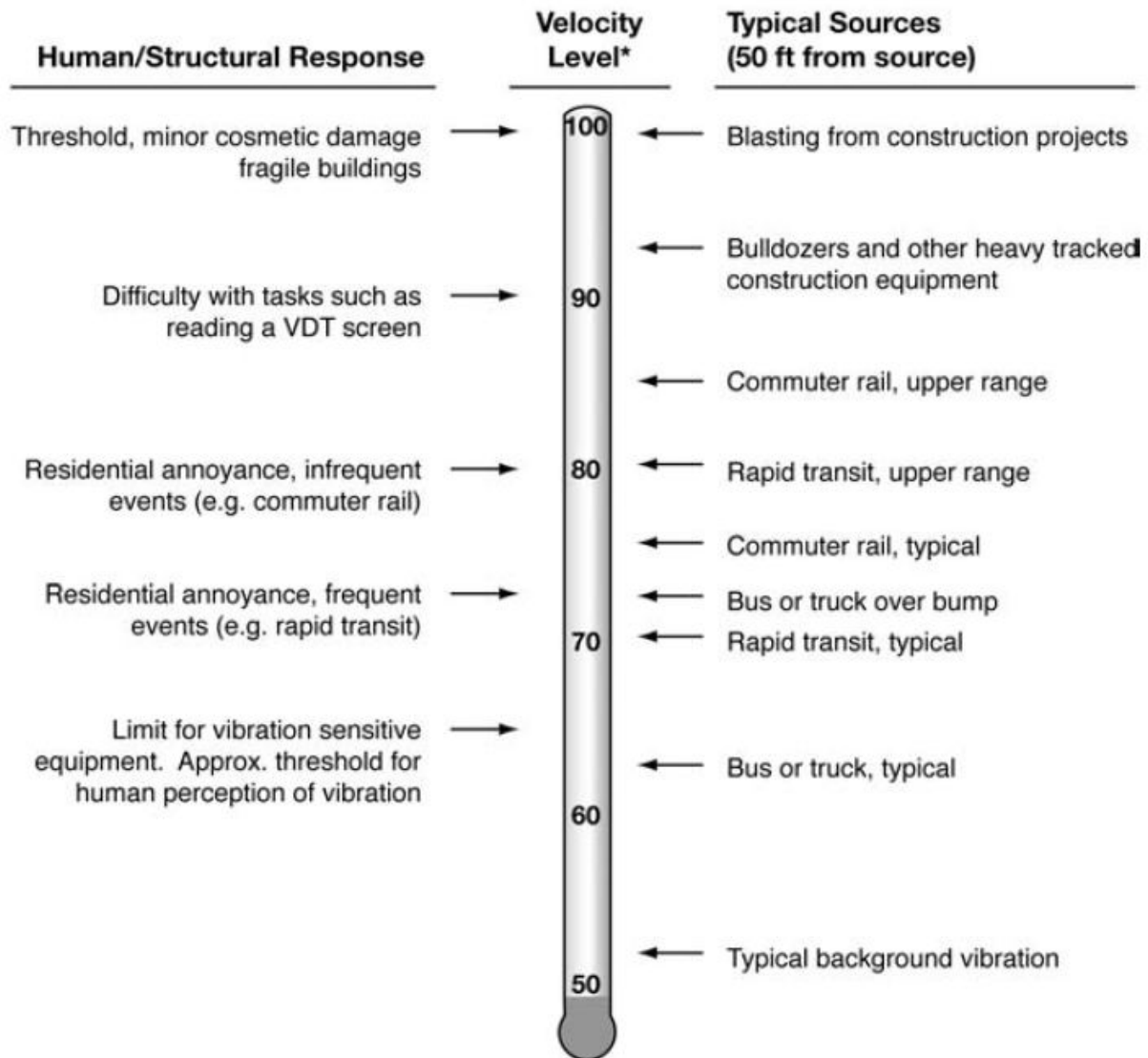
2.8 VIBRATION

Per the Federal Transit Administration (FTA) *Transit Noise Impact and Vibration Assessment* (2), vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structure-borne noise. Sources of ground-borne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as factory machinery, or transient, such as explosions. As is the case with airborne sound, amplitude and frequency may describe ground-borne vibrations.

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

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

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



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

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

3 REGULATORY SETTING

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

3.1 STATE OF CALIFORNIA NOISE REQUIREMENTS

The State of California regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise standards, and provides guidance for local land use compatibility. State law requires that each county and city adopt a General Plan that includes a Noise Element which is to be prepared per guidelines adopted by the Governor's Office of Planning and Research. (9) The purpose of the Noise Element is to *limit the exposure of the community to excessive noise levels*. In addition, the California Environmental Quality Act (CEQA) requires that all known environmental effects of a project be analyzed, including the potential environmental noise impacts.

3.2 STATE OF CALIFORNIA BUILDING CODE

The State of California's noise insulation standards are codified in the California Code of Regulations, Title 24, Building Standards Administrative Code, Part 2, and the California Building Code. These noise standards are applied to new construction in California for controlling interior noise levels resulting from exterior noise sources. The regulations specify that acoustical studies must be prepared when noise-sensitive structures, such as residential buildings, schools, or hospitals, are developed near major transportation noise sources, and where such noise sources create an exterior noise level of 60 dBA CNEL or higher. Acoustical studies that accompany building plans for noise-sensitive land uses must demonstrate that the structure has been designed to limit interior noise in habitable rooms to acceptable noise levels. For new residential buildings, schools, and hospitals, the acceptable interior noise limit for new construction is 45 dBA CNEL.

3.3 CITY OF RANCHO CUCAMONGA PUBLIC HEALTH AND SAFETY ELEMENT

The City of Rancho Cucamonga has adopted a Public Health and Safety Element of the General Plan to minimize noise impacts on the community and to coordinate with surrounding jurisdictions and other entities regarding noise control. (10) The Public Health and Safety Element identifies noise-sensitive land uses and establishes compatibility guidelines for land use and noise. In addition, the Public Health and Safety Element identifies goals and policies to minimize the impacts of excessive noise levels throughout the community. The noise-related Public Health and Safety Element goals are as follows:

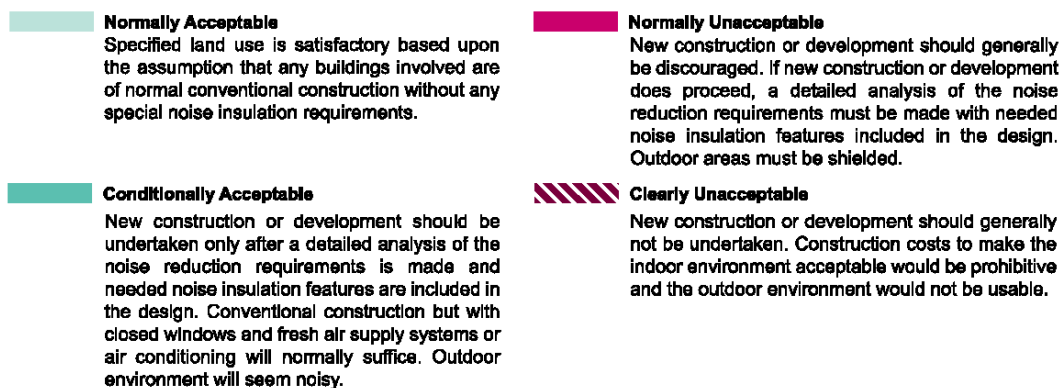
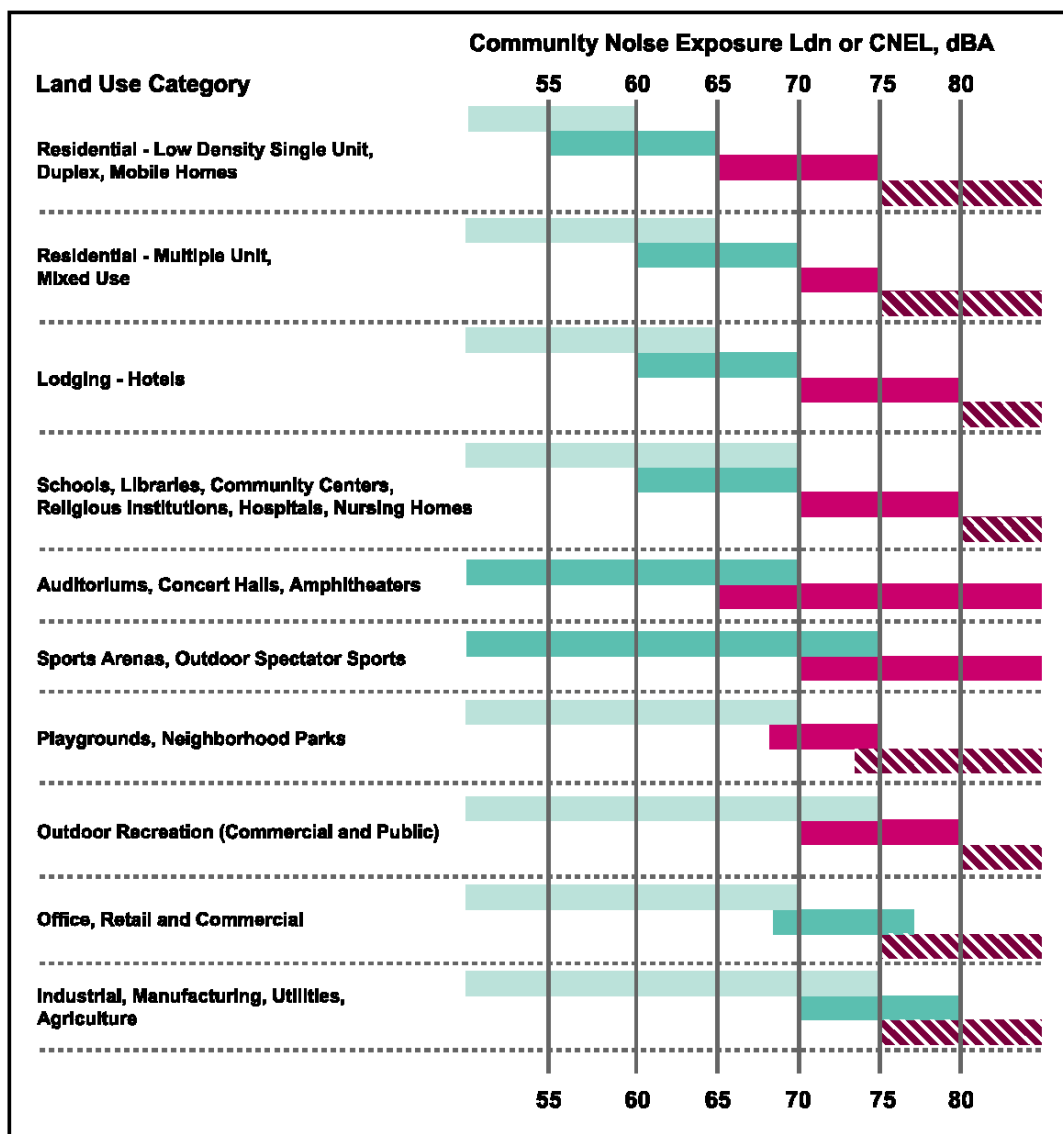
PS-13: Minimize the impacts of excessive noise levels throughout the community, and adopt appropriate noise level requirements for all land uses.

PS-14: Minimize the impacts of transportation-related noise.

The noise criteria identified in the City of Rancho Cucamonga Public Health and Safety Element (Figure PS-8) are guidelines to evaluate the land use compatibility of transportation-related noise. The compatibility criteria, shown on Exhibit 3-A, provides the City with a planning tool to gauge the compatibility of land uses relative to existing and future exterior noise levels.

The *Noise Compatibility Matrix* describes categories of compatibility and not specific noise standards. The Project includes multi-family residential land use which is considered *normally acceptable* with exterior noise levels of up to 65 dBA CNEL, and considered *conditionally acceptable* with exterior noise levels approaching 70 dBA CNEL. For *conditionally acceptable* exterior noise levels, *new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and the needed noise insulation features are included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.* (10)

EXHIBIT 3-A: NOISE COMPATIBILITY MATRIX



Source: City of Rancho Cucamonga General Plan Public Health and Safety Element, Figure PS-8.

3.4 CONSTRUCTION NOISE STANDARDS

To control noise impacts associated with the construction of the proposed Project the City of Rancho Cucamonga has established permitted hours of operation and noise level limits. Per Section 17.66.050(D)(4)(a) of the City of Rancho Cucamonga Development Code the following activities are exempt from the provisions of the noise standards: (3) *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 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a national holiday, and provided that noise levels created do not exceed the base noise level 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 p.m. and 6:00 a.m. on weekdays, including Saturday and Sunday, and provided noise levels created do not exceed the standards of 70 dBA at the adjacent property line.*

The City of Rancho Cucamonga General Plan Land Use Element, Figure LU-2, shows that the Project site is adjacent to residential land uses. Therefore, the permitted hours of construction activity at the Project site shall be between 7:00 a.m. to 8:00 p.m. on weekdays, including on Saturdays, with no activity allowed on Sundays and holidays. In addition, the noise level standard of 65 dBA Leq shall apply to noise levels generated by Project construction at the nearby land uses. The City of Rancho Cucamonga Development Code Noise Standards for construction activities are shown on Table 3-1 and included in Appendix 3.1.

TABLE 3-1: CONSTRUCTION NOISE STANDARDS

City	Adjacent Land Use	Permitted Hours of Construction Activity	Noise Level Standard (dBA Leq)
Rancho Cucamonga ¹	Residential, School, & Church	7:00 a.m. to 8:00 p.m. Monday to Saturday; no activity on Sundays or national holidays	65

¹ Source: City of Rancho Cucamonga Development Code, Section 17.66.050(D)(4) Special Exclusions (Appendix 3.1).

3.5 CONSTRUCTION VIBRATION STANDARDS

The City of Rancho Cucamonga Development Code, Section 17.66.050(D)(4)(a), identifies exemptions from the noise standards for: *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...do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or any time on Sunday or a national holiday.* (3) Based on these standards, vibration activity associated with Project construction will be exempt from the Noise Standards of the City of Rancho Cucamonga if the construction activity occurs within the permitted hours of 7:00 a.m. and 8:00 p.m., with no activity on Sundays or national holidays.

For analysis purposes, the potential vibration impacts created by Project construction are evaluated based on the City of Rancho Cucamonga established vibration standards (Section 17.66.070) for: *Uses that generate vibrations that may be considered a public nuisance or hazard on any adjacent property shall be cushioned or isolated to prevent generation of vibrations.* (1) The standards are presented in acceleration (of gravity) at a given frequency (cycles per second) as measured at the property line of adjacent land uses. At a frequency of 50 cycles per second (CPS), the vibration standard is 0.002g. Vibrations that occur at frequencies above 50 CPS shall not exceed 0.001g. Single-impulse periodic vibrations may not exceed 0.01g when they occur in intervals averaging greater than five minutes. For the purposes of the construction vibration analysis, the accelerations for vibrations up to and greater than 50 CPS will be used to assess the impact of Project construction. However, it is important to note that Section 17.66.070 (D) also exempts the equipment specific to temporary construction, demolition, and vehicles that leave a project site from the vibration level standards. (1)

To apply the City of Rancho Cucamonga vibration standards to the potential impacts of the Project they must be converted to root-mean-square (RMS) velocities since the human body responds to the average vibration amplitude often described as the RMS. The RMS of a signal is the average of the squared amplitude of the signal, typically calculated over a one-second period. As with airborne sound, the RMS velocity is often expressed in decibel notation as vibration decibels (VdB), which serves to reduce the range of numbers used to describe human response to vibration. Therefore, the City of Rancho Cucamonga vibration standard of 0.12 in/sec RMS is used to assess the human perception of vibration levels due to Project-related construction activities.

TABLE 3-2: CONSTRUCTION VIBRATION STANDARDS

Vibration Standard (in peak g's)	Frequency (CPS) ¹	Root-Mean-Square Velocity (in/sec)
0.002	50	0.12

¹ Source: City of Rancho Cucamonga Development Code, Section 17.66.070 (Appendix 3.1).

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4 SIGNIFICANCE CRITERIA

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

- A. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- B. Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.
- C. A substantial permanent increase in ambient noise levels in the Project vicinity above existing levels without the proposed Project; or
- D. A substantial temporary or periodic increase in ambient noise levels in the Project vicinity above noise levels existing without the proposed Project.
- E. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the Project area to excessive noise levels.
- F. For a project within the vicinity of a private airstrip, expose people residing or working in the Project area to excessive noise levels.

While the CEQA Guidelines and the City of Rancho Cucamonga General Plan Guidelines provide direction on noise compatibility and establish noise standards by land use type that are sufficient to assess the significance of noise impacts under CEQA Guideline A, they do not define the levels at which increases are considered substantial for use under Guidelines B, C, and D. CEQA Guidelines E and F apply to nearby public and private airports, if any, and the Project's land use compatibility. However, the Project site is not located within two miles of a public airport or within the vicinity of a private airstrip, and therefore, would not expose people residing or working in the Project area to excessive noise levels. No further noise analysis is conducted in relation to Guidelines E and F.

Under CEQA Guidelines C and D, consideration must be given to the magnitude of the increase, the existing ambient noise levels, and the location of noise-sensitive receivers to determine if a noise increase represents a significant adverse environmental impact. This approach recognizes *that there is no single noise increase that renders the noise impact significant.* (11) Unfortunately, there is no completely satisfactory way to measure the subjective effects of noise or of the corresponding human reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance and differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment to which one has adapted—the so-called *ambient* environment.

In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will typically be judged. The Federal Interagency Committee on Noise

(FICON) developed guidance to be used for the assessment of project-generated increases in noise levels that consider the ambient noise level. (12) The FICON recommendations are based on studies that relate aircraft noise levels to the percentage of persons highly annoyed by aircraft noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, these recommendations are often used in environmental noise impact assessments involving the use of cumulative noise exposure metrics, such as the average-daily noise level (i.e., CNEL).

For example, if the ambient noise environment is quiet (<60 dBA) and the new noise source greatly increases the noise levels, an impact may occur even though the noise criteria might not be exceeded. Therefore, for this analysis, FICON identifies a *readily perceptible* 5 dBA or greater project related noise level increase is considered a significant impact when nearby noise-sensitive receivers are affected. Per the FICON, in areas where the without project noise levels range from 60 to 65 dBA, a 3 dBA *barely perceptible* noise level increase appears to be appropriate for most people. When the without project noise levels already exceed 65 dBA, any increase in community noise louder than 1.5 dBA or greater is considered a significant impact if noise-sensitive receivers are affected, since it likely contributes to an existing noise exposure exceedance. Table 4-1 below provides a summary of the potential noise impact significance criteria, based on guidance from FICON.

TABLE 4-1: SIGNIFICANCE OF NOISE LEVEL INCREASES

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

Source: Federal Interagency Committee on Noise (FICON), 1992.

Based on the significance of noise impacts outlined below on Table 4-2, noise impacts shall be considered significant if any of the following occur as a direct result of the proposed development.

ON-SITE TRAFFIC NOISE

- If the on-site exterior noise levels exceed 70 dBA CNEL at the multi-family residential use and the interior noise levels exceed 45 dBA CNEL (City of Rancho Cucamonga General Plan Public Health & Safety Element, Figure PS-8).

CONSTRUCTION NOISE AND VIBRATION

- If Project-related construction activities occur at any time other than the permitted hours of 7:00 a.m. to 8:00 p.m. on weekdays, including Saturdays, with no activity allowed on Sundays and holidays and generate noise levels which exceed the 65 dBA Leq noise level limit at adjacent sensitive residential land uses (City of Rancho Cucamonga Development Code, Section 17.66.050 (D) (4));

- If short-term Project generated construction vibration levels exceed the City of Rancho Cucamonga acceptable vibration standard of 0.12 in/sec RMS at sensitive receiver locations (City of Rancho Cucamonga Development Code, Section 17.66.070).

TABLE 4-2: SIGNIFICANCE CRITERIA SUMMARY

Analysis	Condition(s)	Significance Criteria	
		Daytime	Nighttime
On-Site Traffic Noise ¹	Exterior Noise Level Criteria	70 dBA CNEL <i>conditionally acceptable</i>	
	Interior Noise Level Criteria	45 dBA CNEL	
Construction Noise & Vibration	Permitted hours of 7:00 a.m. to 8:00 p.m. on weekdays, including Saturdays, with no activity allowed on Sundays and holidays. ²		
	Noise Level Threshold	65 dBA Leq	n/a
	Vibration Level Threshold ³	0.12 in/sec RMS	n/a

¹ Source: City of Rancho Cucamonga General Plan Public Health and Safety Element, Figure PS-8.

² Source: City of Rancho Cucamonga Development Code, Section 17.66.050(D)(4) (Appendix 3.1).

³ Source: City of Rancho Cucamonga Development Code, Section 17.66.070 (Appendix 3.1).

"Daytime" = 7:00 a.m. - 10:00 p.m.; "Nighttime" = 10:00 p.m. - 7:00 a.m.; "n/a" = No nighttime construction activity is permitted and therefore, no nighttime construction noise level threshold is identified.

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5 EXISTING NOISE LEVEL MEASUREMENTS

To assess the existing noise level environment, five 24-hour noise level measurements were taken at sensitive receiver locations in the Project study area. The receiver locations were selected to describe and document the existing noise environment within the Project study area. Exhibit 5-A provides the boundaries of the Project study area and the noise level measurement locations. To fully describe the existing noise conditions, noise level measurements were collected by Urban Crossroads, Inc. on Wednesday, December 14th, 2016. Appendix 5.1 includes study area photos.

5.1 MEASUREMENT PROCEDURE AND CRITERIA

To describe the existing noise environment, the hourly noise levels were measured during typical weekday conditions over a 24-hour period. By collecting individual hourly noise level measurements, it is possible to describe the daytime and nighttime hourly noise levels and calculate the 24-hour CNEL. The long-term noise readings were recorded using Piccolo Type 2 integrating sound level meter and dataloggers. The Piccolo sound level meters were calibrated using a Larson-Davis calibrator, Model CAL 150. All noise meters were programmed in "slow" mode to record noise levels in "A" weighted form. The sound level meters and microphones were equipped with a windscreen during all measurements. All noise level measurement equipment satisfies the American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-2014/IEC 61672-1:2013. (13)

5.2 NOISE MEASUREMENT LOCATIONS

The long-term noise level measurements were positioned as close to the nearest sensitive receiver locations as possible to assess the existing ambient hourly noise levels surrounding the Project site. Both Caltrans and the FTA recognize that it is not reasonable to collect noise level measurements that can fully represent any part of a private yard, patio, deck, or balcony normally used for human activity when estimating impacts for new development projects. This is demonstrated in the Caltrans general site location guidelines which indicate that, *sites must be free of noise contamination by sources other than sources of interest. Avoid sites located near sources such as barking dogs, lawnmowers, pool pumps, and air conditioners unless it is the express intent of the analyst to measure these sources.* (4) Further, FTA guidance states, *that it is not necessary nor recommended that existing noise exposure be determined by measuring at every noise-sensitive location in the project area. Rather, the recommended approach is to characterize the noise environment for clusters of sites based on measurements or estimates at representative locations in the community.* (14)

Based on recommendations of Caltrans and the FTA, it is not necessary to collect measurements at each individual building or residence, because each receiver measurement represents a group of buildings that share acoustical equivalence. (14) In other words, the area represented by the receiver shares similar shielding, terrain, and geometric relationship to the reference noise source. Receivers represent a location of noise sensitive areas and are used to estimate the future noise level impacts. Collecting reference ambient noise level measurements at the nearby

sensitive receiver locations allows for a comparison of the before and after Project noise levels and is necessary to assess potential noise impacts due to the Project's contribution to the ambient noise levels.

5.3 NOISE MEASUREMENT RESULTS

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

- Location L1 represents the noise levels north of the Project site adjacent to an existing 6-foot high barrier at existing residential homes on Garcia Road. The noise level measurements collected show an overall 24-hour exterior noise level of 64.4 dBA CNEL. The hourly noise levels measured at location L1 ranged from 55.2 to 59.2 dBA Leq during the daytime hours and from 54.6 to 60.7 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 57.2 dBA Leq with an average nighttime noise level of 57.8 dBA Leq.
- Location L2 represents the noise levels east of the Project site adjacent to a 6-foot high barrier at existing residential homes on East Avenue. The noise level measurements collected show an overall 24-hour exterior noise level of 68.7 dBA CNEL. The hourly noise levels measured at location L2 ranged from 60.5 to 67.0 dBA Leq during the daytime hours and from 56.4 to 66.2 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 63.7 dBA Leq with an average nighttime noise level of 61.7 dBA Leq.
- Location L3 represents the noise levels within the Project site, north of the existing Cucamonga Valley Water District (CVWD) well number 43. The 24-hour CNEL indicates that the overall exterior noise level is 68.2 dBA CNEL. At location L3 the background ambient noise levels ranged from 58.3 to 62.5 dBA Leq during the daytime hours to levels of 59.6 to 63.3 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 61.3 dBA Leq with an average nighttime noise level of 61.6 dBA Leq.
- Located south of the Project site, location L4 represents the existing noise levels east of the CVWD well site. The noise level measurements collected show an overall 24-hour exterior noise level of 65.5 dBA CNEL. The hourly noise levels measured at location L4 ranged from 57.1 to 60.9 dBA Leq during the daytime hours and from 56.0 to 60.3 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 59.0 dBA Leq with an average nighttime noise level of 58.8 dBA Leq.
- Location L5 represents the noise levels south of the Project site across Foothill Boulevard adjacent to existing residential homes. The noise level measurements collected show an overall 24-hour exterior noise level of 71.0 dBA CNEL. The hourly noise levels measured at location L5 ranged from 64.7 to 68.2 dBA Leq during the daytime hours and from 59.9 to 65.4 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 66.3 dBA Leq with an average nighttime noise level of 63.7 dBA Leq.

Table 5-1 provides the (energy average) noise levels used to describe the daytime and nighttime ambient conditions. These daytime and nighttime energy average noise levels represent the average of all hourly noise levels observed during these time periods expressed as a single number. Appendix 5.2 provides summary worksheets of the noise levels for each hour as well as the minimum, maximum, L₁, L₂, L₅, L₈, L₂₅, L₅₀, L₉₀, L₉₅, and L₉₉ percentile noise levels observed during the daytime and nighttime periods. The background ambient noise levels in the Project study area are dominated by the transportation-related noise associated with the arterial roadway network. This includes the auto and heavy truck activities near the noise level measurement locations on Foothill Boulevard and East Avenue. Additional stationary noise sources in the Project study area, observed during the noise level measurements, include the CVWD well (number 43) and existing Metropolitan Water District (MWD) construction activity, as described below:

5.3.1 CVWD WELL SITE

Located adjacent to the Project's southwestern site boundaries, the CVWD well site includes a well pump and enclosed electrical equipment. While an existing 6-foot high perimeter wall surrounds the well site, the well pump itself is taller than the wall, and therefore represents a potential unmitigated noise source adjacent to the Project. Measurement locations L3 and L4 were chosen to describe the existing noise levels due to the operation of the well pump. Based on these measurement locations, the noise levels are shown to range from 59.0 to 61.3 dBA Leq during the daytime hours, and 58.8 to 61.6 dBA Leq during the nighttime hours. The exterior noise levels represent those typical of a residential neighborhood during the daytime hours as previously shown on Exhibit 2-A, with slightly higher noise levels during the nighttime hours, likely due to the operation of the well pump, background construction activities, and traffic noise levels from Foothill Boulevard and East Avenue. While the exterior noise levels adjacent to the well site are generally consistent with those of typical residential areas, some single-event noise levels may be heard at the Project site when the well pump equipment cycles on and off.

Due to the existing height of the well pump, its exposed equipment (no enclosure), and clear line-of-sight to the noise source, any height increases to the existing barrier will provide little additional noise level attenuation. The existing barrier height would need to be increased to be equal to, or greater than, the top of the well pump equipment to block the line-of-sight from the first-floor Project receivers to the noise source. However, second floor receivers at the Project site are unlikely to benefit from a barrier height increase. Therefore, it is more effective to mitigate the well pump noise levels at the source, with potential abatement measures such as lowering the well pump to below-grade, or enclosing the pump itself to reduce the noise levels at the Project site.

5.3.2 MWD CONSTRUCTION ACTIVITIES

Existing construction activity was observed in the Project study area during the noise level measurements at the locations shown on Exhibit 5-A. The Metropolitan Water District (MWD) Etiwanda Pipeline Repair Project construction activities include the relining of deteriorated cement mortar pipe linings. During the construction process, dehumidification and ventilation

equipment operates 24-hours a day to keep the pipeline segments dry in preparation for the relining treatment. (15) Based on observations made during the noise level measurements, the MWD construction activities include the use of temporary noise barriers constructed using plywood and acoustical blankets to reduce the noise levels at adjacent homes.

While some background construction noise levels may be included in the existing ambient noise level measurements, the measurement locations were selected to reduce their influence on the measured results. This includes measuring both without an intervening noise barrier between the source (construction activity) and receiver (L3), and with the existing perimeter wall at the CVWD well site for location L4. The exterior noise levels with the background construction activities are shown to still be representative of a typical residential environment, consistent with the noise level ranges previously shown on Exhibit 2-A. Further, the traffic noise levels measured at locations L2 and L5, adjacent to East Avenue and Foothill Boulevard respectively, show that the greatest noise source in the Project study area is traffic on existing roadways.

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

Location ¹	Distance to Project Boundary (Feet)	Description	Energy Average Hourly Noise Level (dBA Leq) ²		CNEL
			Daytime	Nighttime	
L1	445'	Located north of the Project site adjacent to an existing 6-foot high barrier at existing residential homes on Garcia Road.	57.2	57.8	64.4
L2	90'	Located east of the Project site adjacent to a 6-foot high barrier at existing residential homes on East Avenue.	63.7	61.7	68.7
L3	0'	Located within the Project site, north of an existing well pump.	61.3	61.6	68.2
L4	35'	Located south of the Project site and east of an existing well pump.	59.0	58.8	65.5
L5	660'	Located south of the Project site across Foothill Boulevard adjacent to existing residential homes.	66.3	63.7	71.0

¹ See Exhibit 5-A for the noise level measurement locations.

² Energy (logarithmic) average hourly levels. The long-term 24-hour measurement printouts are included in Appendix 5.2.

"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS



LEGEND:

▲ Noise Measurement Locations

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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6 METHODS AND PROCEDURES

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

6.1 FHWA TRAFFIC NOISE PREDICTION MODEL

The estimated roadway noise impacts from vehicular traffic were calculated using a computer program that replicates the Federal Highway Administration (FHWA) Traffic Noise Prediction Model- FHWA-RD-77-108. (16) The FHWA Model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). In California the national REMELs are substituted with the California Vehicle Noise (Calveno) Emission Levels. (17) Adjustments are then made to the REMEL to account for: the roadway classification (e.g., collector, secondary, major or arterial), the roadway active width (i.e., the distance between the center of the outermost travel lanes on each side of the roadway), the total average daily traffic (ADT), the travel speed, the percentages of automobiles, medium trucks, and heavy trucks in the traffic volume, the roadway grade, the angle of view (e.g., whether the roadway view is blocked), the site conditions ("hard" or "soft" relates to the absorption of the ground, pavement, or landscaping), and the percentage of total ADT which flows each hour throughout a 24-hour period.

6.2 ON-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

The on-site roadway parameters including the average daily traffic (ADT) volumes used for this study are presented on Table 6-1. Based on the City of Rancho Cucamonga General Plan Community Mobility Element, Figure CM-2, Foothill Boulevard is classified as 6-lane Major Divided Arterial and East Avenue is classified as a 4-lane Secondary. The traffic volumes shown on Table 6-1 were obtained from the capacity volumes by roadway type on Page CM-2 in the City of Rancho Cucamonga General Plan Community Mobility Element, and reflect future long-range traffic conditions needed to assess the future on-site traffic noise environment and to identify the appropriate noise mitigation measures that address the worst-case future noise conditions. (18) Soft site conditions were used to analyze the traffic noise impacts within the Project study area which account for the sound propagation loss over natural surfaces such as normal earth and ground vegetation. Research conducted by Caltrans has shown that the use of soft site conditions is appropriate for the application of the FHWA traffic noise prediction model used in this analysis. (19)

TABLE 6-1: ON-SITE ROADWAY PARAMETERS

Roadway	Lanes	Classification ¹	Average Daily Traffic Volume ²	Posted Speed Limits (mph) ³	Site Conditions
Foothill Bl.	6	Major Divided Arterial	40,000	55	Soft
East Av.	4	Secondary	30,000	45	Soft

¹ Road classifications based upon the City of Rancho Cucamonga General Plan Community Mobility Element, Figure CM-2.

² Source: City of Rancho Cucamonga General Plan Community Mobility Element, Page CM-5.

³ Posted speed limits on each roadway.

Table 6-2 presents the time of day vehicle splits by vehicle type, and Table 6-3 presents the total traffic flow distributions (vehicle mixes) used for this analysis. The vehicle mix provides the hourly distribution percentages of automobile, medium trucks, and heavy trucks for input into the FHWA Model based on roadway types.

TABLE 6-2: TIME OF DAY VEHICLE SPLITS

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

TABLE 6-3: DISTRIBUTION OF TRAFFIC FLOW BY VEHICLE TYPE (VEHICLE MIX)

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

To predict the future noise environment at units within the Project site, coordinate information was collected to identify the noise transmission path between the noise source and receiver. The coordinate information is based on the Project site plan showing the plotting of the Project building in relationship to Foothill Boulevard and East Avenue as shown in Appendix 6.1.

The exterior noise level impacts at the first-floor building façades were located at five feet above the pad elevation. All second-floor receivers were located 14 feet above the proposed finished floor elevation, and all third-floor receivers were located 23 feet above the proposed finished floor elevation.

6.3 VIBRATION ASSESSMENT

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

However, while vehicular traffic is rarely perceptible, construction has the potential to result in varying degrees of temporary ground vibration, depending on the specific construction activities and equipment used. Ground vibration levels associated with various types of construction equipment are summarized on Table 6-4. Based on the representative vibration levels presented for various construction equipment types, it is possible to estimate the human response (annoyance) using the following vibration assessment methods defined by the FTA. To describe the human response (annoyance) associated with vibration impacts the FTA provides the following equation: $PPV_{\text{equip}} = PPV_{\text{ref}} \times (25/D)^{1.5}$

TABLE 6-4: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

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

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

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7 ON-SITE TRANSPORTATION NOISE IMPACTS

An on-site exterior noise impact analysis has been completed to determine the traffic noise exposure and to identify potential necessary noise abatement measures for the proposed East Avenue Project. It is expected that the primary source of noise impacts to the Project site will be traffic noise from Foothill Boulevard and East Avenue. The Project will also experience some background traffic noise impacts from the Project's internal parking lot, however, due to the low traffic volume/speeds, traffic noise from the parking areas will not make a significant contribution to the noise environment.

7.1 ON-SITE EXTERIOR NOISE ANALYSIS

Using the FHWA traffic noise prediction model and the parameters outlined in Tables 6-1 to 6-3, the expected future exterior noise levels for the on-site building were calculated. Table 7-1 presents a summary of future exterior noise level impacts at the first-floor Project building façades. The on-site traffic noise level impacts indicate that the units facing Foothill Boulevard and East Avenue will experience unmitigated exterior noise levels ranging from 58.9 to 70.5 dBA CNEL. The on-site traffic noise analysis calculations are provided in Appendix 7.1.

With unmitigated exterior traffic noise levels approaching 70.5 dBA CNEL at buildings facing East Avenue, the Project's multi-family residential land use is considered *normally unacceptable* land use, requiring a detailed analysis of the interior noise reduction requirements needed to satisfy the interior noise level standard of 45 dBA CNEL. Since there are no outdoor living areas requiring exterior noise mitigation at the buildings facing East Avenue, no exterior noise mitigation is required.

TABLE 7-1: EXTERIOR NOISE LEVELS (CNEL)

Receiver Location	Roadway	Unmitigated Noise Level (dBA CNEL)
South Buildings	Foothill Bl.	58.9
East Buildings	East Av.	70.5

7.2 ON-SITE INTERIOR NOISE ANALYSIS

To ensure that the interior noise levels comply with the City of Rancho Cucamonga 45 dBA CNEL interior noise standards, future noise levels were calculated at the first, second, and third floor building facades.

7.2.1 NOISE REDUCTION METHODOLOGY

The interior noise level is the difference between the predicted exterior noise level at the building facade and the noise reduction of the structure. Typical building construction will provide a Noise Reduction (NR) of approximately 12 dBA with "windows open" and a minimum 25 dBA noise

reduction with "windows closed." However, sound leaks, cracks and openings within the window assembly can greatly diminish its effectiveness in reducing noise. Several methods are used to improve interior noise reduction, including: (1) weather-stripped solid core exterior doors; (2) upgraded dual glazed windows; (3) mechanical ventilation/air conditioning; and (4) exterior wall/roof assemblies free of cut outs or openings.

7.2.2 INTERIOR NOISE LEVEL ASSESSMENT

To provide the necessary interior noise level reduction, Tables 7-2 to 7-4 indicate that residential buildings facing Foothill Boulevard and East Avenue will require a windows closed condition and a means of mechanical ventilation (e.g. air conditioning). Table 7-2 shows that the future unmitigated noise levels at the first-floor building façade are expected to range from 58.9 to 70.5 dBA CNEL. The first-floor interior noise level analysis shows that the City of Rancho Cucamonga 45 dBA CNEL interior noise level standard can be satisfied using upgraded windows with a minimum STC rating of 29 for buildings adjacent to East Avenue, and standard windows with a minimum STC rating of 27 for all other buildings.

Tables 7-3 and 7-4 show that the future noise levels at the second and third floor building façades are expected to range from 58.9 to 70.4 dBA CNEL, and upgraded windows with a minimum STC rating of 29 for buildings adjacent to East Avenue, and standard windows with a minimum STC rating of 27 for all other buildings are required to satisfy the City of Rancho Cucamonga 45 dBA CNEL interior noise level standard. While not required, this noise study recommends an interior noise level design goal of 40 dBA CNEL using upgraded windows with a minimum STC rating of 33 for buildings 1, 2, 3, and 10 adjacent to East Avenue.

The interior noise analysis shows that with the recommended interior noise mitigation measures described in the Executive Summary the Project will satisfy the City of Rancho Cucamonga 45 dBA CNEL interior noise level standards for residential development.

TABLE 7-2: FIRST FLOOR INTERIOR NOISE IMPACTS (CNEL)

Receiver Location	Noise Level at Façade ¹	Required Interior Noise Reduction ²	Estimated Interior Noise Reduction ³	Upgraded Windows ⁴	Interior Noise Level ⁵
South Buildings	58.9	13.9	24.0	No	34.9
East Buildings	70.5	25.5	27.0	Yes	43.5

¹ Exterior noise level at the facade with a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning).

² Noise reduction required to satisfy the 45 dBA CNEL interior noise standards.

³ A minimum of 25 dBA noise reduction is assumed with standard building construction.

⁴ Does the required interior noise reduction trigger upgraded with a minimum STC rating of greater than 27?

⁵ Estimated interior noise level with minimum STC rating for all windows.

TABLE 7-3: SECOND FLOOR INTERIOR NOISE IMPACTS (CNEL)

Receiver Location	Noise Level at Façade ¹	Required Interior Noise Reduction ²	Estimated Interior Noise Reduction ³	Upgraded Windows ⁴	Interior Noise Level ⁵
South Buildings	58.9	13.9	25.0	No	33.9
East Buildings	70.4	25.4	27.0	Yes	43.4

¹ Exterior noise level at the facade with a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning).

² Noise reduction required to satisfy the 45 dBA CNEL interior noise standards.

³ A minimum of 25 dBA noise reduction is assumed with standard building construction.

⁴ Does the required interior noise reduction trigger upgraded with a minimum STC rating of greater than 27?

⁵ Estimated interior noise level with minimum STC rating for all windows.

TABLE 7-4: THIRD FLOOR INTERIOR NOISE IMPACTS (CNEL)

Receiver Location	Noise Level at Façade ¹	Required Interior Noise Reduction ²	Estimated Interior Noise Reduction ³	Upgraded Windows ⁴	Interior Noise Level ⁵
South Buildings	n/a	n/a	n/a	n/a	n/a
East Buildings	70.1	25.1	27.0	Yes	43.1

¹ Exterior noise level at the facade with a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning).

² Noise reduction required to satisfy the 45 dBA CNEL interior noise standards.

³ A minimum of 25 dBA noise reduction is assumed with standard building construction.

⁴ Does the required interior noise reduction trigger upgraded with a minimum STC rating of greater than 27?

⁵ Estimated interior noise level with minimum STC rating for all windows.

"n/a" = Buildings without a third floor, and therefore, do not require interior noise analysis.

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8 RECEIVER LOCATIONS

To assess the potential for short-term construction noise impacts, the following five receiver locations as shown on Exhibit 8-A were identified as representative locations for analysis. Sensitive receivers are generally defined as locations where people reside or where the presence of unwanted sound could otherwise adversely affect the use of the land. Noise-sensitive land uses are generally considered to include: schools, hospitals, single-family dwellings, mobile home parks, churches, libraries, and recreation areas. Moderately noise-sensitive land uses typically include: multi-family dwellings, hotels, motels, dormitories, out-patient clinics, cemeteries, golf courses, country clubs, athletic/tennis clubs, and equestrian clubs. Land uses that are considered relatively insensitive to noise include business, commercial, and professional developments. Land uses that are typically not affected by noise include: industrial, manufacturing, utilities, agriculture, natural open space, undeveloped land, parking lots, warehousing, liquid and solid waste facilities, salvage yards, and transit terminals.

Sensitive receivers near the Project site include the existing single-family residential homes located at receiver locations R1 to R4. Receiver location R5 represents the proposed residential use adjacent to the southern Project site boundary. The closest sensitive receiver is represented by location R5 at approximately 80 feet south of the Project site boundary. Other sensitive land uses in the Project study area that are located at greater distances than those identified in this noise study will experience lower noise levels than those presented in this report due to the additional attenuation from distance and the shielding of intervening structures.

- R1: Located approximately 464 feet northwest of the Project site, R1 represents existing residential homes on Garcia Road.
- R2: Location R2 represents existing residential homes located approximately 483 feet northwest of the Project site on Garcia Road. A 24-hour noise level measurement was taken near this location, L1, to describe the existing ambient noise environment.
- R3: Location R3 represents the existing single-family residential homes located roughly 105 feet east of the Project site across East Avenue. A 24-hour noise level measurement was taken near this location, L2, to describe the existing ambient noise environment.
- R4: Location R4 represents existing single-family residential homes located approximately 110 feet east of the Project site.
- R5: Location R5 represents a proposed residential community which is situated approximately 80 feet south of the Project site. This analysis assumes these residential homes will be fully developed and occupied at the time of Project construction, and therefore, represent noise-sensitive land use.

EXHIBIT 8-A: RECEIVER LOCATIONS



LEGEND:

- Receiver Locations
- Existing Barrier
- Distance from receiver to Project site boundary (in feet)
- Planned Barrier
- Barrier Height (in feet)

9 CONSTRUCTION IMPACTS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project. Exhibit 9-A shows the construction activity boundaries in relation to the nearby sensitive receiver locations.

9.1 CONSTRUCTION NOISE STANDARDS

To control noise impacts associated with the construction of the proposed Project the City of Rancho Cucamonga has established permitted hours of operation and noise level limits. Per Section 17.66.050(D)(4)(a) of the City of Rancho Cucamonga Development Code the following activities are exempt from the provisions of the noise standards: *(3) 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 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a national holiday, and provided that noise levels created do not exceed the base noise level 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 p.m. and 6:00 a.m. on weekdays, including Saturday and Sunday, and provided noise levels created do not exceed the standards of 70 dBA at the adjacent property line.*

The City of Rancho Cucamonga General Plan Land Use Element, Figure LU-2, shows that the Project site is adjacent to residential land uses. Therefore, the permitted hours of construction activity at the Project site shall be between 7:00 a.m. to 8:00 p.m. on weekdays, including on Saturdays, with no activity allowed on Sundays and holidays. In addition, the noise level standard of 65 dBA Leq shall apply to noise levels generated by Project construction at the nearby land uses. The City of Rancho Cucamonga Development Code Noise Standards for construction activities are shown on Table 3-1 and included in Appendix 3.1.

9.2 CONSTRUCTION NOISE LEVELS

Noise generated by the Project construction equipment will include a combination of trucks, power tools, concrete mixers, and portable generators that when combined can reach high levels. This construction noise analysis was prepared using reference noise level measurements taken by Urban Crossroads, Inc. to describe the typical construction activity noise levels for residential construction. Noise levels generated by heavy construction equipment can range from approximately 62 dBA to in excess of 80 dBA when measured at 50 feet. However, these noise levels diminish with distance from the construction site at a rate of 6 dBA per doubling of distance. For example, a noise level of 80 dBA measured at 50 feet from the noise source to the receiver would be reduced to 74 dBA at 100 feet from the source to the receiver, and would be further reduced to 68 dBA at 200 feet from the source to the receiver.

9.3 CONSTRUCTION REFERENCE NOISE LEVELS

To describe the Project construction noise levels, measurements were collected for similar activities at several construction sites. Table 9-1 provides a summary of the 16-construction reference noise level measurements. Since the reference noise levels were collected at varying distances, all construction noise level measurements presented on Table 9-1 have been adjusted to describe a common reference distance of 50 feet.

TABLE 9-1: CONSTRUCTION REFERENCE NOISE LEVELS

ID	Noise Source	Reference Distance From Source (Feet)	Reference Noise Levels @ Reference Distance (dBA Leq)	Reference Noise Levels @ 50 Feet (dBA Leq) ⁶
1	Truck Pass-Bys & Dozer Activity ¹	30'	63.6	59.2
2	Dozer Activity ¹	30'	68.6	64.2
3	Construction Vehicle Maintenance Activities ²	30'	71.9	67.5
4	Foundation Trenching ²	30'	72.6	68.2
5	Rough Grading Activities ²	30'	77.9	73.5
6	Residential Framing ³	30'	66.7	62.3
7	Water Truck Pass-By & Backup Alarm ⁴	30'	76.3	71.9
8	Dozer Pass-By ⁴	30'	84.0	79.6
9	Two Scrapers & Water Truck Pass-By ⁴	30'	83.4	79.0
10	Two Scrapers Pass-By ⁴	30'	83.7	79.3
11	Scraper, Water Truck, & Dozer Activity ⁴	30'	79.7	75.3
12	Concrete Mixer Truck Movements ⁵	50'	71.2	71.2
13	Concrete Paver Activities ⁵	30'	70.0	65.6
14	Concrete Mixer Pour & Paving Activities ⁵	30'	70.3	65.9
15	Concrete Mixer Backup Alarms & Air Brakes ⁵	50'	71.6	71.6
16	Concrete Mixer Pour Activities ⁵	50'	67.7	67.7

¹ As measured by Urban Crossroads, Inc. on 10/14/15 at a business park construction site located at the northwest corner of Barranca Parkway and Alton Parkway in the City of Irvine.

² As measured by Urban Crossroads, Inc. on 10/20/15 at a construction site located in Rancho Mission Viejo.

³ As measured by Urban Crossroads, Inc. on 10/20/15 at a residential construction site located in Rancho Mission Viejo.

⁴ As measured by Urban Crossroads, Inc. on 10/30/15 during grading operations within an industrial construction site located in the City of Ontario.

⁵ Reference noise level measurements were collected from a nighttime concrete pour at an industrial construction site, located at 27334 San Bernardino Avenue in the City of Redlands, between 1:00 a.m. to 2:00 a.m. on 7/1/15.

⁶ Reference noise levels are calculated at 50 feet using a drop off rate of 6 dBA per doubling of distance (point source).

9.4 CONSTRUCTION NOISE ANALYSIS

Table 9-2 shows the construction equipment reference levels used in residential construction such as the Project. Table 9-3 provides a summary of the noise levels from each stage of construction at each of the sensitive receiver locations in the City of Rancho Cucamonga. Based on the reference construction noise levels, the Project-related construction noise levels when the peak reference noise level is operating at a single point nearest the sensitive receiver location from the center of construction activity will range from 52.8 to 67.7 dBA Leq at the sensitive receiver locations in the City of Rancho Cucamonga. Exhibit 9-A shows the construction activity noise source location and the distance to each nearby sensitive receiver location.

TABLE 9-2: CONSTRUCTION EQUIPMENT NOISE LEVELS

Reference Construction Activity ¹	Reference Noise Level @ 50 Feet (dBA Leq)
Truck Pass-Bys & Dozer Activity	59.2
Dozer Activity	64.2
Construction Vehicle Maintenance Activities	67.5
Foundation Trenching	68.2
Rough Grading Activities	73.5
Residential Framing	62.3
Dozer Pass-By	79.6
Concrete Mixer Backup Alarms & Air Brakes	71.6
Peak Reference Noise Level at 50 Feet (dBA Leq):	79.6

Receiver Location	Distance To Construction Activity (Feet) ²	Distance Attenuation (dBA Leq) ³	Calculated Noise Barrier Attenuation (dBA Leq) ⁴	Construction Noise Level (dBA Leq)
R1	493'	-19.9	-6.0	53.7
R2	545'	-20.7	-6.0	52.8
R3	131'	-8.4	-8.6	62.6
R4	142'	-9.1	-5.7	64.8
R5	112'	-7.0	-4.9	67.7

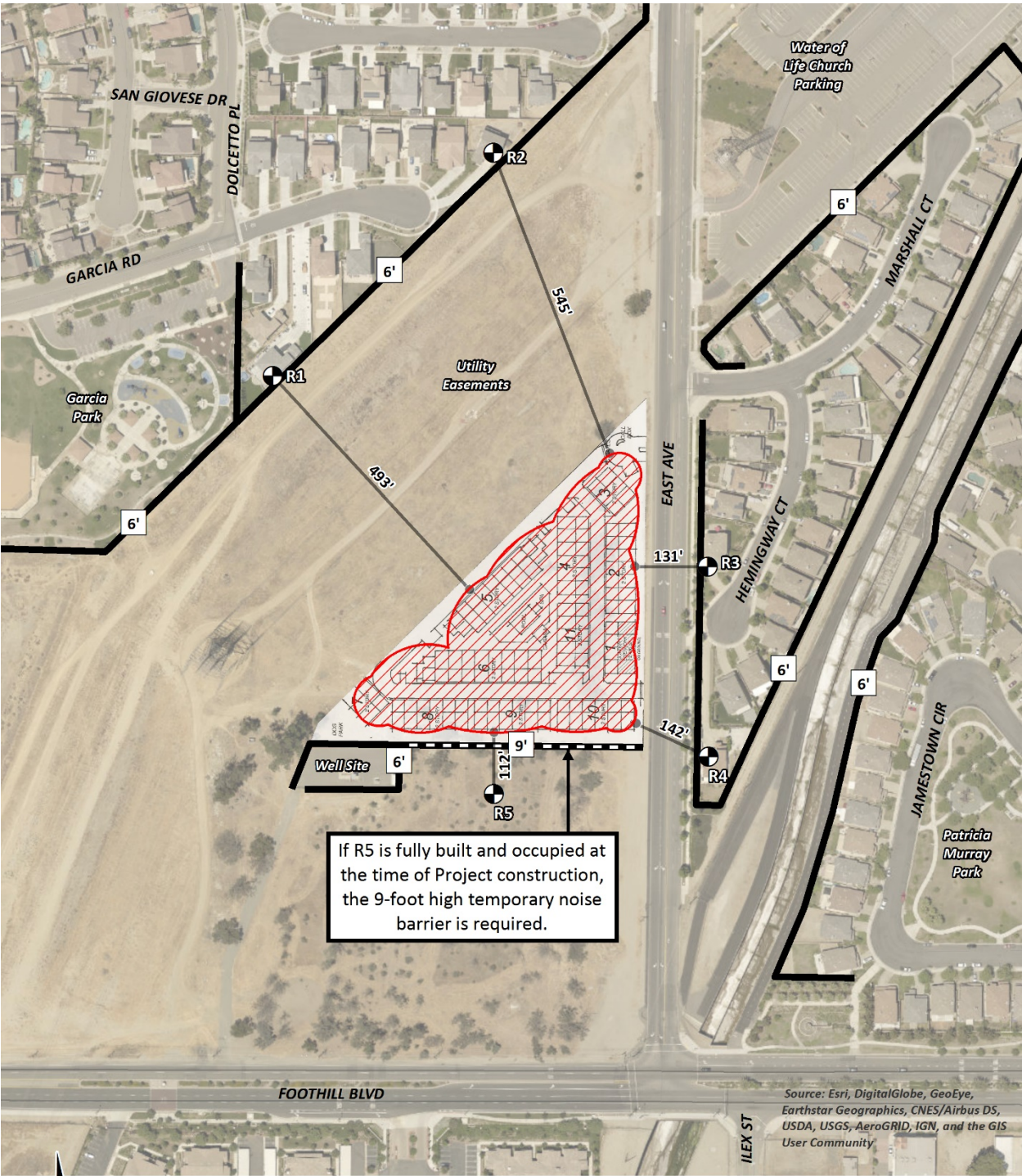
¹ Reference construction noise level measurements taken by Urban Crossroads, Inc.

² Distance from the nearest point of construction activity to the nearest receiver.

³ Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.

⁴ Barrier/berm attenuation from existing barriers/berms in the Project study area (Appendix 9.1).

EXHIBIT 9-A: CONSTRUCTION ACTIVITY AND RECEIVER LOCATIONS



LEGEND:

-  Receiver Locations
-  Construction Activity
-  Barrier Height (in feet)
-  Existing Barrier
-  Temporary Noise Barrier
-  Distance from receiver to construction activity (in feet)

9.5 CONSTRUCTION NOISE THRESHOLDS OF SIGNIFICANCE

The construction noise analysis shows that the highest construction noise levels will occur when construction activities take place at the edge of the Project site. As shown on Table 9-3, the unmitigated construction noise levels are expected to range from 52.8 to 67.7 dBA Leq at the sensitive receiver locations and will exceed the 65 dBA Leq construction noise level threshold at receiver location R5. Appendix 9.1 includes the construction noise level calculations at each receiver location.

TABLE 9-7: UNMITIGATED CONSTRUCTION NOISE LEVEL COMPLIANCE (DBA LEQ)

Receiver Location ¹	Construction Noise Levels (dBA Leq)		
	Peak Activity ²	Threshold ³	Threshold Exceeded? ⁴
R1	53.7	65	No
R2	52.8	65	No
R3	62.6	65	No
R4	64.8	65	No
R5	67.7	65	Yes

¹ Noise receiver locations are shown on Exhibit 9-A.

² Estimated construction noise levels during peak operating conditions, as shown on Table 9-2.

³ Construction noise level threshold as shown on Table 4-2.

⁴ Do the estimated Project construction noise levels meet the construction noise level thresholds?

Therefore, temporary construction noise mitigation barriers are required at the construction boundaries near the impacted receiver locations where Project construction noise levels could potentially exceed the noise level thresholds, as shown on Exhibit 9-A. The construction noise analysis presents a conservative, worst-case approach with the highest noise-level-producing equipment for each stage of Project construction operating at the closest point from the center of construction activity to the nearby sensitive receiver locations. This scenario is unlikely to occur during typical construction activities and likely overstates the construction noise levels which will be experienced at each receiver location. With the installation of temporary exterior noise control barriers at the minimum height shown on Table 9-4 and Exhibit 9-A, the worst-case construction noise levels at the nearby residential receivers would be reduced.

This analysis does not evaluate the feasibility of temporary noise barrier installation. If it is not feasible to install temporary barriers, construction noise levels would not be reduced, because no other measures exist to reasonably reduce construction noise levels. The noise attenuation provided through temporary noise barriers depends on many factors including cost, wind loading, the location of the receiver, and the ability to place barriers such that the line-of-sight of the receiver is blocked to the noise source, among others. This analysis assumes a temporary noise barrier constructed using frame-mounted materials such as vinyl acoustic curtains or quilted blankets attached to the construction site perimeter fence.

Table 9-4 shows the peak construction noise levels at the potentially impacted receiver locations are expected to range from 52.8 to 64.8 dBA Leq with the attenuation provided by the temporary construction noise barriers. As shown on Table 9-4, the temporary noise barrier mitigation will reduce the construction noise levels at receiver location R5 to satisfy the 65 dBA Leq significance threshold during temporary Project construction activities. It is important to note that receiver location R5 only requires temporary construction noise barrier attenuation if fully constructed and occupied at the time of Project construction. The noise impact due to Project construction is considered a *less than significant* impact after mitigation, which includes the use of temporary noise barriers, as shown on Exhibit 9-A. The temporary construction noise barrier attenuation calculations are provided in Appendix 9.2.

TABLE 9-4: MITIGATED CONSTRUCTION NOISE LEVEL COMPLIANCE (DBA LEQ)

Receiver Location ¹	Construction Noise Levels (dBA Leq)			With Temporary Noise Barriers (dBA Leq)			
	Peak Activity ²	Threshold ³	Threshold Exceeded? ⁴	Temporary Barrier Height (Feet)	Attenuation	Construction Noise Levels ⁵	Threshold Exceeded? ⁴
R5 ⁶	67.7	65	Yes	9'	-8.5	59.2	No

¹ Noise receiver locations are shown on Exhibit 9-A.

² Estimated construction noise levels during peak operating conditions, as shown on Table 9-2.

³ Construction noise level threshold as shown on Table 4-2.

⁴ Do the estimated Project construction noise levels exceed the construction noise level thresholds?

⁵ Construction noise levels with the temporary noise barrier attenuation.

⁶ Receiver location R5 only requires temporary construction noise barrier attenuation if fully constructed and occupied at the time of Project construction.

9.6 CONSTRUCTION VIBRATION IMPACTS

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

- **Heavy Construction Equipment:** Although all heavy mobile construction equipment has the potential of causing at least some perceptible vibration while operating close to building, the vibration is usually short-term and is not of sufficient magnitude to cause building damage. It is not expected that heavy equipment such as large bulldozers would operate close enough to any residences to cause a vibration impact.
- **Trucks:** Trucks hauling building materials to construction sites can be sources of vibration intrusion if the haul routes pass through residential neighborhoods on streets with bumps or potholes. Repairing the bumps and potholes generally eliminates the problem.

Ground-borne vibration levels resulting from construction activities occurring within the Project site were estimated by data published by the Federal Transit Administration. Construction

activities that would have the potential to generate low levels of ground-borne vibration within the Project site include grading. Using the vibration source level of construction equipment provided on Table 6-4 and the construction vibration assessment methodology published by the FTA, it is possible to estimate the Project vibration impacts. Table 9-5 presents the expected Project related vibration levels at each of the sensitive receiver locations.

Based on the reference vibration levels provided by the FTA, a large bulldozer represents the peak source of vibration with a reference velocity of 0.089 in/sec PPV at 25 feet. At distances ranging from 112 to 545 feet from Project construction activities, construction vibration velocity levels are expected to approach 0.0094 in/sec PPV, as shown on Table 9-5. To assess the human perception of vibration levels in PPV, as previously discussed in Section 3.5, the velocities are converted to RMS vibration levels based on the Caltrans *Transportation and Construction Vibration Guidance Manual* conversion factor of 0.71. Table 9-5 shows the highest construction vibration levels in RMS are expected to approach 0.007 in/sec RMS at receiver location R5. Based on the City of Rancho Cucamonga vibration standards, the proposed Project construction activities will satisfy the vibration standard of 0.12 in/sec RMS at all receiver locations during Project construction. Further, Section 17.66.070 (D) of the City of Rancho Cucamonga Development Code exempts the equipment specific to temporary construction, demolition, and vehicles that leave a project site from the vibration level standards. (1) Therefore, the Project-related vibration impacts at location R2 represent a *less than significant* impact during the worst-case construction activities at the Project site boundary.

The vibration impacts due to Project construction represent temporary perceptible vibration levels which may cause annoyance in residential areas, however, they do not represent vibration levels capable of causing building damage to nearby residential homes. The FTA identifies construction vibration levels capable of building damage ranging from 0.12 to 0.5 in/sec PPV. (2) The peak Project-construction vibration levels shown on Table 9-5, approaching 0.009 in/sec PPV, will not exceed the FTA vibration levels for building damage at the residential homes near the Project site. Further, the impacts at the site of the closest sensitive receivers are unlikely to be sustained during the entire construction period, but will occur rather only during the times that heavy construction equipment is operating adjacent to the Project site perimeter. Construction at the Project site will be restricted to daytime hours consistent with City requirements thereby eliminating potential vibration impact during the sensitive nighttime hours.

TABLE 9-5: CONSTRUCTION EQUIPMENT VIBRATION LEVELS

Receiver ¹	Distance to Const. Activity (Feet)	Receiver PPV Levels (in/sec) ²					RMS Velocity Levels (in/sec) ³	Threshold Exceeded? ⁴
		Small Bulldozer	Jack-hammer	Loaded Trucks	Large Bulldozer	Peak Vibration		
R1	493'	0.000	0.000	0.001	0.001	0.001	0.001	No
R2	545'	0.000	0.000	0.001	0.001	0.001	0.001	No
R3	131'	0.000	0.003	0.006	0.007	0.007	0.005	No
R4	142'	0.000	0.003	0.006	0.007	0.007	0.005	No
R5	112'	0.000	0.004	0.008	0.009	0.009	0.007	No

¹ Receiver locations are shown on Exhibit 9-A.

² Based on the Vibration Source Levels of Construction Equipment included on Table 6-4.

³ Vibration levels in PPV are converted to RMS velocity using a 0.71 conversion factor identified in the Caltrans Transportation and Construction Vibration Guidance Manual, September 2013.

⁴ Does the vibration exceed the maximum acceptable vibration threshold?

9.7 CONSTRUCTION NOISE AND VIBRATION MITIGATION MEASURES

Though construction noise is temporary, intermittent and of short duration, and will not present any long-term impacts, the following mitigation measures would reduce any noise level increases produced by the construction equipment to the nearby noise-sensitive residential land uses.

- If the future residential land use at receiver location R5 is fully built and occupied at the time of Project construction, install minimum 9-foot high temporary construction noise barriers at the Project's southern site boundary, as shown on Exhibit 9-A, for the duration of mobile-equipment construction activities. The noise control barriers must present a solid face from top to bottom. The noise control barriers must meet the minimum height and be constructed as follows:
 - The barriers shall provide a minimum transmission loss of 20 dBA (Federal Highway Administration, Noise Barrier Design Handbook). The noise barrier shall be constructed using an acoustical blanket (e.g. vinyl acoustic curtains or quilted blankets) attached to the construction site perimeter fence or equivalent temporary fence posts;
 - The noise barrier must be maintained and any damage promptly repaired. Gaps, holes, or weaknesses in the barrier or openings between the barrier and the ground shall be promptly repaired;
 - The noise control barrier and associated elements shall be completely removed and the site appropriately restored upon the conclusion of the construction activity.
- Prior to approval of grading plans and/or issuance of building permits, plans shall include a note indicating that noise-generating Project construction activities shall only occur between the hours of 7:00 a.m. to 8:00 p.m. on weekdays, including on Saturdays, with no activity allowed on Sundays and holidays. (3)
- During all Project site construction, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards. The construction contractor shall place all stationary construction

equipment so that emitted noise is directed away from the noise sensitive receptors nearest the Project site.

- The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receivers nearest the Project site (i.e., to the center) during all Project construction.
- The construction contractor shall limit haul truck deliveries to the same hours specified for construction equipment (between the hours of 7:00 a.m. to 8:00 p.m. on weekdays, including on Saturdays, with no activity allowed on Sundays and holidays). The contractor shall prepare a haul route exhibit and shall design delivery routes to minimize the exposure of sensitive land uses or residential dwellings to delivery truck-related noise.

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10 REFERENCES

1. **City of Rancho Cucamonga.** *Development Code, Performance Standards, Section 17.66.070 - Vibration Standards.*
2. **U.S. Department of Transportation, Federal Transit Administration.** *Transit Noise and Vibration Impact Assessment.* May 2006. FTA-VA-90-1003-06.
3. **City of Rancho Cucamonga.** *Development Code, Performance Standards, Section 17.66.050 - Noise Standards.*
4. **California Department of Transportation Environmental Program.** *Technical Noise Supplement - A Technical Supplement to the Traffic Noise Analysis Protocol.* Sacramento, CA : s.n., September 2013.
5. **Environmental Protection Agency Office of Noise Abatement and Control.** *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* March 1974. EPA/ONAC 550/9/74-004.
6. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning, Noise and Air Quality Branch.** *Highway Traffic Noise Analysis and Abatement Policy and Guidance.* June, 1995.
7. **U.S. Department of Transportation, Federal Highway Administration.** *Highway Traffic Noise in the United States, Problem and Response.* April 2000. p. 3.
8. **U.S. Environmental Protection Agency Office of Noise Abatement and Control.** *Noise Effects Handbook-A Desk Reference to Health and Welfare Effects of Noise.* October 1979 (revised July 1981). EPA 550/9/82/106.
9. **Office of Planning and Research.** *State of California General Plan Guidelines 2003.* October 2003.
10. **City of Rancho Cucamonga.** *General Plan Public Health and Safety Element.* May 2010.
11. **California Court of Appeal.** *Gray v. County of Madera, F053661.* 167 Cal.App.4th 1099; - Cal.Rptr.3d, October 2008.
12. **Federal Interagency Committee on Noise.** *Federal Agency Review of Selected Airport Noise Analysis Issues.* August 1992.
13. **American National Standards Institute (ANSI).** *Specification for Sound Level Meters ANSI S1.4-2014/IEC 61672-1:2013.*
14. **U.S. Department of Transportation, Federal Transit Administration.** *Transit Noise and Vibration Impact Assessment.* May 2006. FTA-VA-90-1003-06.
15. **The Metropolitan Water District of Southern California.** *Etiwanda Pipeline Repair Project, Letter to Local Businesses and Area Residents.* March 2016.
16. **U.S. Department of Transportation, Federal Highway Administration.** *FHWA Highway Traffic Noise Prediction Model.* December 1978. FHWA-RD-77-108.
17. **California Department of Transportation Environmental Program, Office of Environmental Engineering.** *Use of California Vehicle Noise Reference Energy Mean Emission Levels (Calveno REMELs) in FHWA Highway Traffic Noise Prediction.* September 1995. TAN 95-03.
18. **City of Rancho Cucamonga.** *General Plan Community Mobility Element.* May 2010.
19. **California Department of Transportation.** *Traffic Noise Attenuation as a Function of Ground and Vegetation Final Report.* June 1995. FHWA/CA/TL-95/23.

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11 CERTIFICATION

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

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Principal
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Costa Mesa, CA 92626
(949) 336-5979
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EDUCATION

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

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

PROFESSIONAL REGISTRATIONS

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

PROFESSIONAL AFFILIATIONS

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

PROFESSIONAL CERTIFICATIONS

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

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APPENDIX 3.1:

CITY OF RANCHO CUCAMONGA DEVELOPMENT CODE

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CHAPTER 17.66. - PERFORMANCE STANDARDS^[4]

Footnotes:

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State Law reference— Noise standards, Health and Safety Code § 17920 et seq.; hazardous materials, Government Code § 65850.2; plans regarding hazardous waste, Health and Safety Code § 25500 et seq.

Sec. 17.66.010. - Purpose and intent.

The performance standards established in this chapter are intended to ensure that uses and activities shall occur in a manner to protect the public health and safety and that do not produce adverse impacts on surrounding properties nor the community at large. The standards contained in this chapter apply to all zoning districts. If necessary, the city will retain a professional expert or designated regulatory agency to assist in assessing possible impacts, and the applicant or business owner will pay any cost incurred.

(Code 1980, § 17.66.010; Ord. No. 855, § 4(attach. 1), 8-1-2012)

Sec. 17.66.020. - General requirements.

Land or buildings shall not be used or occupied in a manner creating any dangerous injurious, noxious, fire, explosive or other hazard; noise, vibration, smoke, dust, odor, or form of air pollution; heat, cold, dampness, electrical, or other disturbance; glare, refuse, or wastes; or other substances, conditions, or elements which would adversely affect the surrounding area. All uses shall conform to the regulations of this chapter in addition to the regulations set forth for the district in which the use is situated.

(Code 1980, § 17.66.020; Ord. No. 855, § 4(attach. 1), 8-1-2012)

Sec. 17.66.030. - Points of measurement.

Measurements necessary for enforcement of performance standards set forth in this chapter shall be taken at the property line of the establishment or use.

(Code 1980, § 17.66.030; Ord. No. 855, § 4(attach. 1), 8-1-2012)

Sec. 17.66.040. - Hazardous materials.

The following standards are intended to ensure that the use, handling, storage, and transportation of hazardous materials comply with all applicable state laws (including but not limited to Government Code § 65850.2 and Health and Safety Code § 25505, et seq.) and that appropriate information is reported to the Rancho Cucamonga Fire District as the regulatory authority.

A.

Reporting requirements. All businesses required by state law (Health and Safety Code § 6.95) to prepare hazardous materials release response plans and hazardous materials inventory statements shall, upon request, submit copies of these plans, including any revisions, to the fire district.

- B. *Underground storage.* Underground storage of hazardous materials shall comply with all applicable requirements of state law (including but not limited to Health and Safety Code § 6.7). Businesses that use underground storage tanks shall comply with the following procedures:
1. Notify the fire district of any unauthorized release of hazardous materials prescribed by city, county, state, and federal regulations.
 2. Notify the fire district and the county health department of any proposed abandoning, closing, or ceasing operation of an underground storage tank and actions to be taken to dispose of any hazardous materials.
 3. Submit copies of the closure plan to the fire district.
- C. *Aboveground storage.* Aboveground storage tanks for hazardous materials and flammable and combustible materials may be allowed subject to the approval of the fire district.
- D. *New development.* Structures adjacent to a commercial supply bulk transfer delivery system with at least six-inch pipes shall be designed to accommodate a setback of at least 100 feet from that delivery system. The setback may be reduced if the planning director, with recommendation from the fire district, can make one or more of the following findings:
1. The structure would be protected from the radiant heat of an explosion by berming or other physical barriers.
 2. A 100-foot setback would be impractical or unnecessary because of existing topography, streets, parcel lines, or easements.
 3. A secondary containment system for petroleum pipelines and transition points shall be constructed. The design of the system shall be subject to the approval of the fire district.
- E. *Notification required.* A subdivider of a development within 500 feet of a pipeline shall notify a new/potential owner before the time of purchase and the close of escrow of the location, size, and type of pipeline.

(Code 1980, § 17.66.040; Ord. No. 855, § 4(attach. 1), 8-1-2012)

Sec. 17.66.050. - Noise standards.

- A. *Purpose.* In order to control unnecessary, excessive, and annoying noise and vibration in the city, it is hereby declared to be the policy of the city to prohibit such noise generated from or by all sources as specified in this section. The provisions apply within all jurisdictions within all zoning districts. Provisions apply based on the designated noise zones:
- Noise Zone I: All single- and multiple-family residential properties.

Noise Zone II: All commercial properties.

- B. Decibel measurement criteria. Any decibel measurement made pursuant to the provisions of this section shall be based on a reference sound pressure of 20 micropascals as measured with a sound level meter using the A-weighted network (scale) at slow response.
- C. Exterior noise standards.
1. 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 five dBA for a cumulative period of not more than ten minutes in any one hour; or
 - c. Basic noise level plus 14 dBA for a cumulative period of not more than five minutes in any one hour; or
 - d. Basic noise level plus 15 dBA at any time.
 2. If the measurement location is a boundary between two different noise zones, the lower noise level standard shall apply.
 3. 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.
- D. Special exclusions. The following activities shall be exempted from the provisions of this section:
1. 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 a.m. and 10:00 p.m.
 2. 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.
 3. 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.
 4. 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 p.m. and 7:00 a.m. 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 p.m. and 6:00 a.m. on weekdays, including Saturday and Sunday, and provided noise levels created do not exceed the noise standards of 70 dBA at the when measured at the adjacent property line.
5. All devices, apparatus, or equipment associated with agricultural operations, provided:
 - a. Operations do not take place between 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a national holiday.
 - b. Such operations and equipment are utilized for protection or salvage of agricultural crops during periods of potential or actual frost damage or other adverse weather conditions.
 - c. Such operations and equipment are associated with agricultural pest control through pesticide application, provided the application is made in accordance with permits issued by, or regulations enforced by, the state department of agriculture.
6. Noise sources associated with the maintenance of real property, provided said activities take place between the hours of 7:00 a.m. and 8:00 p.m. on any day.
7. Any activity to the extent regulation thereof has been preempted by state or federal law.
- E. 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.
- F. Residential noise standards.
 1. Table 17.66.050-1 (Residential Noise Limits) includes the maximum noise limits in residential zones. These are the noise limits when measured at the adjacent residential property line (exterior) or within a neighboring home (interior).

TABLE 17.66.050-1 RESIDENTIAL NOISE LIMITS

Location of Measurement	Maximum Allowable	
	10:00 p.m. to 7:00 a.m.	7:00 a.m. to 10:00 p.m.
Exterior	60 dBA	65dBA
Interior	45 dBA	50dBA

Additional:

- (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.

2. Other residential noise limitations.

- a. *Peddlers; use of loud noise, etc., to advertise goods, etc.* No peddler or mobile vendor or any person in their behalf shall shout, cry out, or use any device or instrument to make sounds for the purpose of advertising in such a manner as to create a noise disturbance.
- b. *Animal noises.* No person owning or having the charge, care, custody, or control of any dog or other animal or fowl shall allow or permit the same to habitually howl, bark, yelp, or make other noises, in such a manner as to create a noise disturbance.
- c. *Radios, television sets, musical instruments, and similar devices.* No person shall operate or permit the operation or playing of any device which reproduces, produces, or amplifies sound, such as a radio, musical instrument, phonograph, or sound amplifier, in such a manner as to create a noise disturbance[.]
 - i. Across any real property boundary or within Noise Zone I, between the hours of 10:00 p.m. and 7:00 a.m. on the following day (except for activities for which a temporary use permit has been issued).
 - ii. At 50 feet from any such device, if operated on or over any public right-of-way.

G. Commercial and office noise provisions. All operations and businesses shall be conducted to comply with the following standards:

- 1. 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 p.m. to 7:00 a.m. and 70 dBA during the hours of 7:00 a.m. to 10:00 p.m. when measured at the adjacent property line.
- 2. Loading and unloading. 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 p.m. and 7:00 a.m., in a manner which would cause a noise disturbance to a residential area.
- 3. Vehicle repairs and testing. No person shall cause or permit the repairing, rebuilding, modifying, or testing of any motor vehicle, motorcycle, or motorboat in such a manner as to increase a noise disturbance between the hours of 10:00 p.m. and 8:00 a.m. adjacent to a residential area.

- H. Industrial noise provision included in Table 17.66.110-1 (Industrial Performance Standards).
(Code 1980, § 17.66.050; Ord. No. 855, § 4(attach. 1), 8-1-2012)

Sec. 17.66.060. - Odor, particulate matter, and air containment standards.

- A. Sources of odorous emissions, particulate matter, and air containment standards shall comply with the rules and regulations of the air pollution control district and the state Health and Safety Code.
- B. Noxious odorous emissions in a manner or quantity that is detrimental to or endanger the public health, safety, comfort, or welfare is declared to be a public nuisance and unlawful, and shall be modified to prevent further emissions release, except for agricultural operations in compliance with this title. No emission of odors shall be permitted in such quantities as to be readily detectable when diluted in the ratio of one volume of odorous air to four volumes of clean air at the property line as specified in section 17.66.030 (Points of Measurement) of this chapter. Any process which may involve the creation or emission of any odors shall be provided with a secondary safeguard system, so that control will be maintained if the primary safeguard system should fail.
- C. No dust or particulate matter shall be emitted that is detectable by a reasonable person without instruments.
- D. Exhaust air ducts shall be located or directed away from abutting residentially zoned properties.
(Code 1980, § 17.66.060; Ord. No. 855, § 4(attach. 1), 8-1-2012)

Sec. 17.66.070. - Vibration.

Uses that generate vibrations that may be considered a public nuisance or hazard on any adjacent property shall be cushioned or isolated to prevent generation of vibrations. Uses shall be operated in compliance with the following provisions:

- A. No vibration shall be produced that is transmitted through the ground and is discernible without the aid of instruments at the points of measurement specified in section 17.66.030 (Points of Measurement) of this chapter, nor shall any vibration produced exceed 0.002g peak at up to 50 CPS frequency, measured at the point of measurement specified in section 17.66.030 (Points of Measurement) of this chapter using either seismic or electronic vibration measuring equipment. Vibrations occurring at higher than 50 CPS frequency of a periodic vibration shall not induce accelerations exceeding 0.001g. Single-impulse periodic vibrations occurring at an average interval greater than five minutes shall not induce accelerations exceeding 0.01g.
- B. Uses, activities, and processes shall not generate vibrations that cause discomfort or annoyance to reasonable persons of normal sensitivity or which endangers the comfort, repose, health, or peace of residents whose property abuts the property line of the parcel.
- C. Uses shall not generate ground vibration that interferes with the operations of equipment and facilities of adjoining parcels.

- D. Vibrations from temporary construction/demolition and vehicles that leave the subject parcel (e.g., trucks, trains, and aircraft) are exempt from the provisions of this section.

(Code 1980, § 17.66.070; Ord. No. 855, § 4(attach. 1), 8-1-2012)

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APPENDIX 5.1:

STUDY AREA PHOTOS

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JN:10744 East Avenue



L1_N

34, 6' 36.830000", 117, 30' 57.320000"



L1_NE

34, 6' 36.940000", 117, 30' 57.320000"



L1_S

34, 6' 36.940000", 117, 30' 57.320000"



L1_SW

34, 6' 36.910000", 117, 30' 57.350000"



L2

34, 6' 33.530000", 117, 30' 52.050000"



L2_E

34, 6' 33.240000", 117, 30' 52.130000"

JN:10744 East Avenue



L2_N

34, 6' 33.310000", 117, 30' 51.940000"



L2_S

34, 6' 33.530000", 117, 30' 52.050000"



L3

34, 6' 29.070000", 117, 30' 59.110000"



L3_N

34, 6' 29.040000", 117, 30' 59.080000"



L3_S

34, 6' 29.070000", 117, 30' 59.110000"



L3_W

34, 6' 29.070000", 117, 30' 59.110000"

JN:10744 East Avenue



L3_W_Construction
34, 6' 29.040000", 117, 30' 59.080000"



L4
34, 6' 28.060000", 117, 30' 57.050000"



L4_E
34, 6' 28.060000", 117, 30' 57.050000"



L4_E2
34, 6' 28.160000", 117, 30' 57.350000"



L4_N
34, 6' 28.060000", 117, 30' 57.050000"



L4_W
34, 6' 28.130000", 117, 30' 57.070000"

JN:10744 East Avenue



L5

34, 6' 21.730000", 117, 31' 1.140000"



L5_E

34, 6' 22.040000", 117, 31' 1.170000"



L5_N

34, 6' 22.040000", 117, 31' 1.190000"



L5_S

34, 6' 21.940000", 117, 31' 1.170000"



L5_S2

34, 6' 22.210000", 117, 31' 1.140000"



L5_W

34, 6' 22.020000", 117, 31' 1.190000"

APPENDIX 5.2:

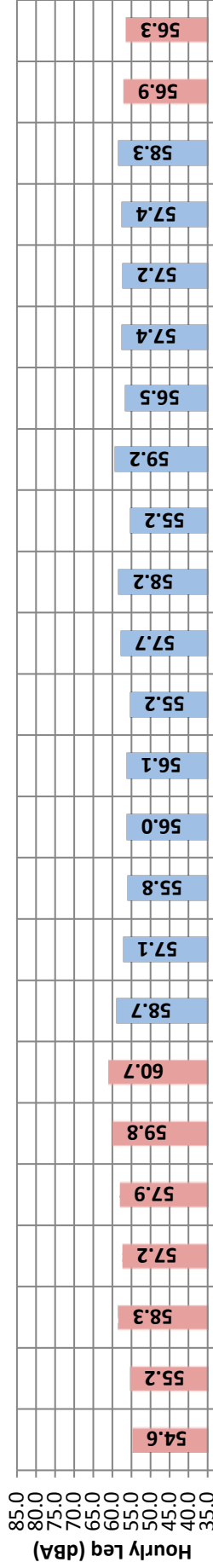
NOISE LEVEL MEASUREMENT WORKSHEETS

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24-Hour Noise Level Measurement Summary

Project Name: East Avenue		JN: 10744		24-Hour	
Location: L1 - Located north of the Project site adjacent to an existing 6-foot high barrier at existing residential homes on Garcia Road.		Analyst: A. Wolfe		Energy Average Leq	
				Day	Night
		Date: 12/14/2016		57.2	57.8
				CNEL	
				64.4	

Hourly Leq dBA Readings (unadjusted)



Hour Beginning

Time Period	Hour	Leq	Lmax	Lmin	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	55.2	67.3	49.1	59.0	58.0	57.0	56.0	55.0	54.0	51.0	51.0	50.0
	Max	59.2	80.1	54.3	68.0	64.0	61.0	60.0	59.0	57.0	55.0	55.0	54.0
	Energy Average:	57.2	Average:	Average:	63.7	61.2	58.6	57.7	56.4	55.5	53.9	53.5	52.9
Night	Min	54.6	67.1	52.4	58.0	57.0	56.0	55.0	54.0	54.0	53.0	53.0	52.0
	Max	60.7	81.0	56.5	70.0	67.0	64.0	63.0	60.0	59.0	57.0	57.0	57.0
	Energy Average:	57.8	Average:	Average:	62.7	60.8	58.8	58.3	56.8	56.0	54.8	54.6	54.0

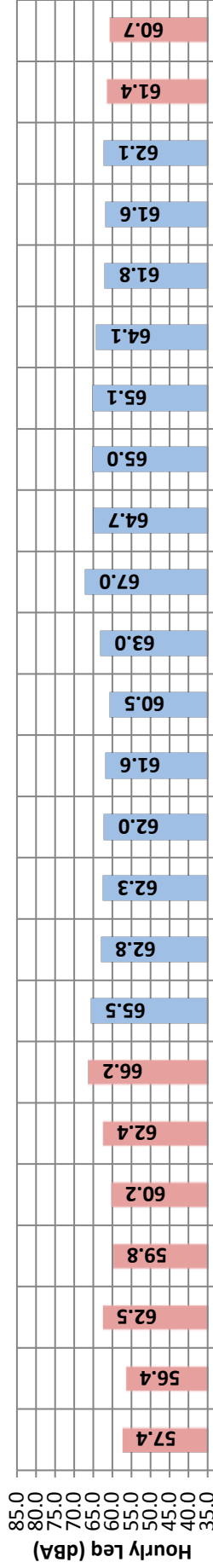
Hourly Summary

Time Period	Hour	Leq	Lmax	Lmin	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Night	0	54.6	68.8	52.5	58.0	57.0	56.0	55.0	54.0	54.0	53.0	53.0	53.0
	1	55.2	74.5	52.4	59.0	58.0	56.0	56.0	54.0	54.0	53.0	53.0	52.0
	2	58.3	81.0	54.2	61.0	59.0	58.0	58.0	57.0	56.0	55.0	55.0	54.0
	3	57.2	74.1	54.2	62.0	60.0	58.0	58.0	57.0	56.0	55.0	55.0	54.0
	4	57.9	67.1	54.0	63.0	62.0	60.0	59.0	58.0	57.0	55.0	55.0	54.0
	5	59.8	74.9	54.1	68.0	66.0	64.0	63.0	59.0	57.0	56.0	55.0	54.0
Day	6	60.7	76.5	56.5	70.0	67.0	62.0	61.0	60.0	59.0	57.0	57.0	57.0
	7	58.7	72.3	54.3	66.0	63.0	61.0	60.0	59.0	57.0	55.0	55.0	54.0
	8	57.1	73.6	54.0	63.0	61.0	58.0	58.0	56.0	56.0	55.0	54.0	54.0
	9	55.8	68.7	53.7	59.0	58.0	57.0	56.0	55.0	55.0	54.0	54.0	54.0
	10	56.0	77.0	52.6	61.0	60.0	57.0	56.0	55.0	55.0	54.0	53.0	53.0
	11	56.1	74.5	50.1	64.0	60.0	57.0	56.0	55.0	54.0	53.0	52.0	51.0
	12	55.2	69.0	51.8	60.0	59.0	57.0	56.0	55.0	54.0	53.0	52.0	52.0
	13	57.7	73.1	53.8	66.0	62.0	59.0	58.0	57.0	56.0	55.0	55.0	54.0
	14	58.2	77.9	49.9	67.0	63.0	59.0	58.0	57.0	56.0	53.0	52.0	51.0
	15	55.2	67.3	49.1	62.0	60.0	58.0	57.0	55.0	54.0	51.0	51.0	50.0
	16	59.2	80.1	52.0	68.0	64.0	60.0	59.0	57.0	56.0	54.0	54.0	53.0
	17	56.5	69.0	51.7	63.0	61.0	59.0	58.0	56.0	55.0	53.0	53.0	52.0
	18	57.4	70.0	53.3	62.0	61.0	60.0	59.0	58.0	56.0	54.0	54.0	53.0
	19	57.2	69.6	53.3	62.0	61.0	59.0	58.0	57.0	56.0	55.0	54.0	54.0
	20	57.4	73.1	53.7	64.0	61.0	59.0	58.0	57.0	56.0	55.0	54.0	54.0
	21	58.3	73.0	53.9	68.0	64.0	59.0	58.0	57.0	56.0	55.0	55.0	54.0
Night	22	56.9	72.7	53.3	63.0	60.0	58.0	58.0	56.0	56.0	55.0	54.0	54.0
	23	56.3	73.9	53.5	60.0	58.0	57.0	57.0	56.0	55.0	54.0	54.0	54.0

24-Hour Noise Level Measurement Summary

Project Name: East Avenue		JN: 10744		24-Hour	
Location: L2 - Located east of the Project site adjacent to a 6-foot high barrier at existing residential homes on East Avenue.		Analyst: A. Wolfe		Energy Average Leq	
				Day	Night
		Date: 12/14/2016		63.7	61.7
				CNEL	
				68.7	

Hourly Leq dBA Readings (unadjusted)



Hour Beginning

Time Period	Hour	Leq	Lmax	Lmin	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	60.5	73.8	51.4	69.0	68.0	66.0	64.0	59.0	56.0	54.0	53.0	52.0
	Max	67.0	95.8	57.1	74.0	72.0	70.0	69.0	66.0	63.0	59.0	58.0	57.0
	Energy Average:	63.7	Average:		71.5	69.9	68.0	66.7	62.3	59.0	56.3	55.7	54.9
Night	Min	56.4	74.5	52.4	64.0	61.0	58.0	57.0	55.0	54.0	53.0	53.0	53.0
	Max	66.2	94.5	57.2	74.0	72.0	71.0	70.0	66.0	63.0	59.0	59.0	57.0
	Energy Average:	61.7	Average:		68.7	66.3	63.6	62.0	58.6	57.4	56.2	55.9	55.2

Hourly Summary

Night	0	57.4	78.5	52.4	67.0	64.0	60.0	58.0	55.0	55.0	54.0	53.0	53.0
	1	56.4	76.2	52.9	64.0	61.0	58.0	57.0	55.0	54.0	53.0	53.0	53.0
	2	62.5	94.5	56.3	66.0	63.0	60.0	59.0	58.0	57.0	57.0	57.0	56.0
	3	59.8	84.7	54.9	67.0	65.0	60.0	59.0	57.0	57.0	56.0	55.0	55.0
	4	60.2	81.6	55.1	69.0	67.0	64.0	62.0	58.0	57.0	56.0	56.0	55.0
	5	62.4	82.3	55.9	72.0	69.0	66.0	65.0	60.0	58.0	57.0	57.0	56.0
Day	6	66.2	81.9	57.2	74.0	72.0	71.0	70.0	66.0	63.0	59.0	59.0	57.0
	7	65.5	81.7	55.1	72.0	71.0	68.0	69.0	66.0	63.0	58.0	57.0	56.0
	8	62.8	82.5	54.0	72.0	70.0	68.0	66.0	61.0	58.0	56.0	55.0	55.0
	9	62.3	84.5	53.0	70.0	69.0	67.0	65.0	61.0	58.0	55.0	54.0	54.0
	10	62.0	80.8	51.4	71.0	69.0	67.0	66.0	61.0	57.0	54.0	54.0	52.0
	11	61.6	82.6	52.1	71.0	69.0	67.0	65.0	60.0	57.0	54.0	53.0	53.0
	12	60.5	76.7	52.4	69.0	68.0	66.0	64.0	59.0	56.0	54.0	54.0	53.0
	13	63.0	80.4	52.5	72.0	70.0	68.0	67.0	62.0	58.0	55.0	54.0	53.0
	14	67.0	95.8	52.9	74.0	72.0	69.0	68.0	65.0	60.0	56.0	56.0	54.0
	15	64.7	84.1	52.8	74.0	71.0	69.0	68.0	64.0	59.0	56.0	55.0	54.0
	16	65.0	82.3	55.5	72.0	71.0	69.0	69.0	65.0	62.0	59.0	58.0	57.0
	17	65.1	80.3	56.6	73.0	72.0	70.0	69.0	65.0	62.0	59.0	58.0	57.0
	18	64.1	83.0	57.1	71.0	70.0	69.0	68.0	64.0	61.0	58.0	57.0	56.0
	19	61.8	75.9	55.7	70.0	69.0	67.0	65.0	61.0	58.0	57.0	56.0	56.0
	20	61.6	73.8	55.8	70.0	69.0	67.0	66.0	60.0	58.0	56.0	56.0	56.0
	21	62.1	84.4	55.7	71.0	69.0	67.0	65.0	60.0	58.0	57.0	56.0	56.0
Night	22	61.4	81.3	55.8	70.0	68.0	66.0	64.0	59.0	58.0	57.0	56.0	56.0
	23	60.7	74.5	55.3	69.0	68.0	67.0	64.0	59.0	58.0	57.0	56.0	56.0

24-Hour Noise Level Measurement Summary

Project Name: East Avenue

JN: 10744

24-Hour
CNEL

Analyst: A. Wolfe

Day

Night

Location: L3 - Located within the Project site, north of an existing well pump.

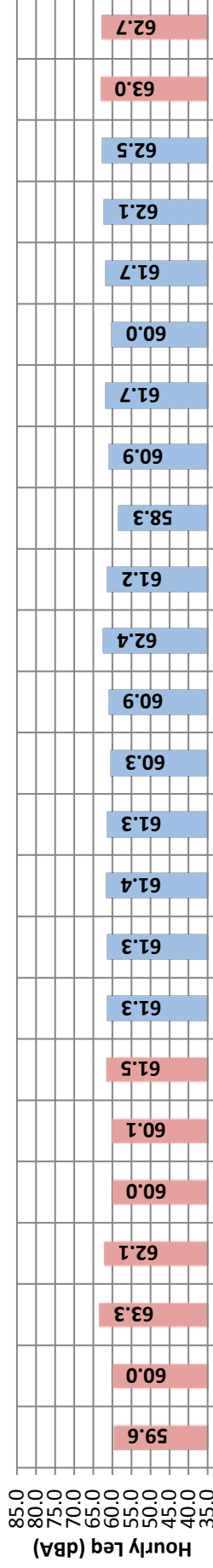
Date: 12/14/2016

61.3

61.6

68.2

Hourly Leq dBA Readings (unadjusted)



Hour Beginning

Time Period	Hour	Leq	Lmax	Lmin	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	58.3	63.8	54.4	61.0	64.0	60.0	60.0	59.0	58.0	56.0	55.0	55.0
	Max	62.5	78.5	61.0	66.0	64.0	63.0	63.0	62.0	62.0	61.0	61.0	61.0
	Energy Average:	61.3	Average:		63.2	62.5	62.1	61.9	61.1	60.6	59.3	59.1	58.5
Night	Min	59.6	62.5	58.1	60.0	60.0	60.0	60.0	59.0	59.0	59.0	58.0	58.0
	Max	63.3	70.9	61.4	65.0	64.0	64.0	64.0	63.0	63.0	62.0	62.0	61.0
	Energy Average:	61.6	Average:		62.8	62.3	61.9	61.8	61.1	60.9	60.3	60.0	59.6

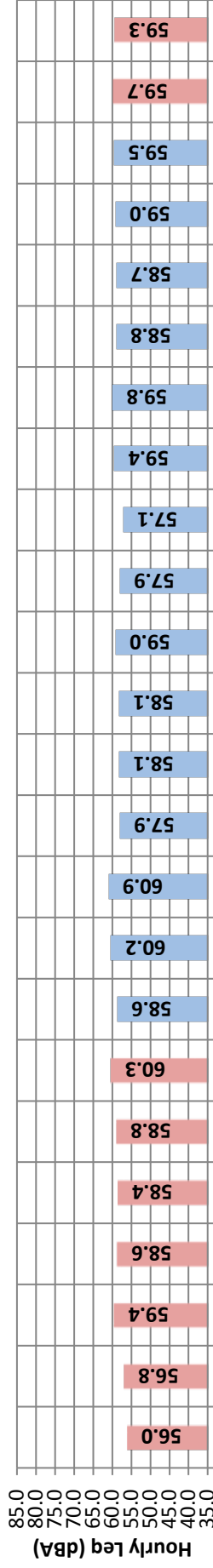
Hourly Summary

Night	0	59.6	63.2	58.1	60.0	60.0	60.0	60.0	59.0	59.0	59.0	58.0	58.0
	1	60.0	70.9	58.4	63.0	62.0	61.0	60.0	60.0	59.0	59.0	59.0	58.0
	2	63.3	68.2	60.9	64.0	62.0	64.0	64.0	63.0	63.0	62.0	62.0	61.0
	3	62.1	66.9	60.2	63.0	63.0	63.0	63.0	62.0	62.0	61.0	60.0	60.0
	4	60.0	62.5	58.7	61.0	61.0	60.0	60.0	60.0	60.0	59.0	59.0	59.0
	5	60.1	67.0	58.4	63.0	62.0	61.0	61.0	60.0	59.0	59.0	59.0	58.0
	6	61.5	67.3	59.4	63.0	62.0	62.0	62.0	61.0	61.0	60.0	60.0	60.0
Day	7	61.3	73.3	58.2	65.0	64.0	63.0	63.0	61.0	60.0	59.0	59.0	58.0
	8	61.3	78.5	58.8	62.0	62.0	62.0	62.0	61.0	61.0	60.0	59.0	59.0
	9	61.4	76.4	59.2	62.0	62.0	62.0	62.0	61.0	61.0	60.0	60.0	59.0
	10	61.3	70.7	58.4	63.0	62.0	62.0	62.0	61.0	61.0	60.0	60.0	59.0
	11	60.3	63.8	57.8	62.0	61.0	61.0	61.0	60.0	60.0	59.0	59.0	58.0
	12	60.9	65.6	58.3	63.0	63.0	62.0	62.0	61.0	60.0	59.0	59.0	58.0
	13	62.4	72.4	59.9	66.0	64.0	63.0	63.0	62.0	62.0	61.0	60.0	60.0
	14	61.2	67.0	55.2	65.0	64.0	63.0	62.0	62.0	61.0	58.0	57.0	56.0
	15	58.3	64.0	54.4	61.0	60.0	60.0	60.0	59.0	58.0	56.0	55.0	55.0
	16	60.9	71.3	57.6	63.0	62.0	62.0	62.0	61.0	60.0	59.0	59.0	58.0
	17	61.7	70.5	58.5	65.0	64.0	62.0	62.0	61.0	61.0	60.0	60.0	59.0
	18	60.0	66.6	57.9	62.0	61.0	61.0	60.0	60.0	59.0	58.0	58.0	58.0
	19	61.7	65.7	57.9	63.0	63.0	63.0	62.0	62.0	61.0	59.0	58.0	58.0
	20	62.1	64.1	60.9	63.0	62.0	62.0	62.0	61.0	61.0	61.0	61.0	61.0
	21	62.5	67.3	61.0	63.0	63.0	63.0	63.0	62.0	62.0	61.0	61.0	61.0
Night	22	63.0	69.5	60.9	65.0	64.0	63.0	63.0	63.0	63.0	62.0	61.0	61.0
	23	62.7	68.8	61.4	63.0	63.0	63.0	63.0	62.0	62.0	62.0	62.0	61.0

24-Hour Noise Level Measurement Summary

Project Name: East Avenue		JN: 10744		24-Hour	
		Analyst: A. Wolfe		Energy Average Leq	
		Date: 12/14/2016		Day	Night
Location: L4 - Located south of the Project site and east of an existing well pump.				59.0	58.8
				CNEL	
				65.5	

Hourly Leq dBA Readings (unadjusted)



Hour Beginning

Time Period	Hour	Leq	Lmax	Lmin	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	57.1	66.9	51.0	60.0	59.0	58.0	58.0	56.0	55.0	53.0	52.0	52.0
	Max	60.9	87.1	57.5	71.0	68.0	61.0	61.0	60.0	59.0	58.0	58.0	58.0
	Energy Average:	59.0	Average:		63.5	62.1	60.1	59.3	58.3	57.5	56.2	55.7	55.2
Night	Min	56.0	63.3	53.8	58.0	58.0	57.0	56.0	56.0	55.0	55.0	54.0	54.0
	Max	60.3	70.9	57.8	64.0	62.0	62.0	61.0	60.0	60.0	59.0	58.0	58.0
	Energy Average:	58.8	Average:		61.4	60.6	59.9	59.2	58.6	58.0	57.1	56.6	56.4

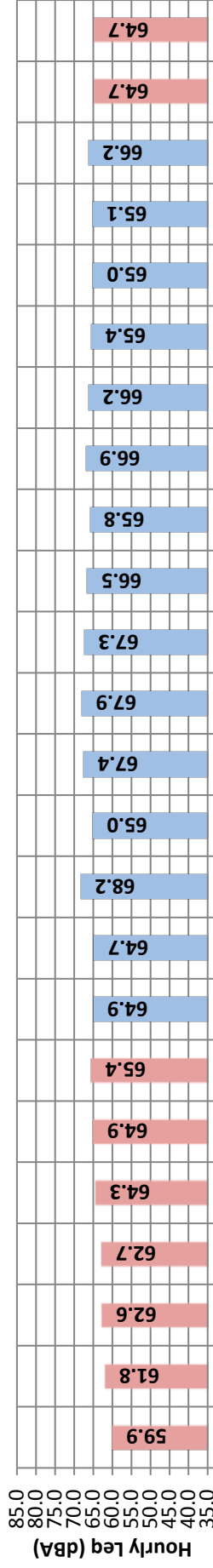
Hourly Summary

Night	0	56.0	63.3	54.3	58.0	58.0	57.0	56.0	56.0	55.0	55.0	54.0	54.0
	1	56.8	67.7	53.8	60.0	59.0	59.0	58.0	57.0	56.0	55.0	54.0	54.0
	2	59.4	70.9	57.2	62.0	61.0	60.0	60.0	59.0	59.0	58.0	58.0	57.0
	3	58.6	66.8	56.3	61.0	60.0	59.0	59.0	59.0	58.0	57.0	57.0	57.0
	4	58.4	65.2	56.1	61.0	61.0	60.0	59.0	58.0	58.0	57.0	56.0	56.0
	5	58.8	67.5	55.4	64.0	62.0	61.0	60.0	59.0	58.0	57.0	56.0	56.0
	6	60.3	67.0	57.5	63.0	62.0	62.0	61.0	60.0	60.0	59.0	58.0	58.0
Day	7	58.6	69.8	55.0	62.0	61.0	60.0	60.0	59.0	58.0	56.0	56.0	55.0
	8	60.2	87.1	55.1	67.0	63.0	60.0	59.0	58.0	57.0	56.0	56.0	55.0
	9	60.9	85.3	55.0	71.0	68.0	61.0	59.0	58.0	57.0	56.0	56.0	55.0
	10	57.9	77.4	54.8	61.0	60.0	59.0	58.0	58.0	57.0	56.0	56.0	55.0
	11	58.1	83.4	54.8	60.0	59.0	58.0	58.0	57.0	57.0	56.0	55.0	55.0
	12	58.1	79.1	54.6	63.0	61.0	59.0	59.0	58.0	57.0	56.0	56.0	55.0
	13	59.0	77.9	55.7	66.0	63.0	60.0	59.0	58.0	58.0	57.0	56.0	56.0
	14	57.9	68.7	52.4	62.0	62.0	61.0	60.0	58.0	57.0	55.0	54.0	53.0
	15	57.1	81.0	51.0	63.0	61.0	59.0	58.0	56.0	55.0	53.0	52.0	52.0
	16	59.4	78.9	53.1	65.0	63.0	61.0	60.0	59.0	58.0	56.0	55.0	54.0
	17	59.8	69.5	55.4	65.0	64.0	62.0	61.0	60.0	59.0	57.0	57.0	56.0
	18	58.8	70.3	55.4	63.0	62.0	61.0	60.0	59.0	58.0	56.0	56.0	56.0
	19	58.7	67.4	55.6	61.0	61.0	60.0	59.0	59.0	58.0	57.0	56.0	56.0
	20	59.0	67.0	56.9	61.0	61.0	60.0	59.0	59.0	58.0	58.0	57.0	57.0
	21	59.5	66.9	57.5	63.0	62.0	61.0	60.0	59.0	59.0	58.0	58.0	58.0
	22	59.7	70.0	57.7	63.0	62.0	61.0	60.0	60.0	59.0	58.0	58.0	58.0
	23	59.3	65.0	57.8	61.0	60.0	60.0	60.0	59.0	59.0	58.0	58.0	58.0

24-Hour Noise Level Measurement Summary

Project Name: East Avenue		JN: 10744		24-Hour	
Location: L5 - Located south of the Project site across Foothill Boulevard adjacent to existing residential homes.		Analyst: A. Wolfe		Energy Average Leq	
Date: 12/14/2016				Day	Night
				66.3	63.7
				CNEL	
				71.0	

Hourly Leq dBA Readings (unadjusted)



Hour Beginning

Time Period	Hour	Leq	Lmax	Lmin	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	64.7	79.3	54.4	72.0	71.0	69.0	68.0	64.0	61.0	57.0	56.0	55.0
	Max	68.2	90.1	57.2	80.0	76.0	73.0	71.0	67.0	64.0	57.0	58.0	58.0
	Energy Average:	66.3	Average:		74.9	72.9	69.9	68.8	65.7	62.6	58.1	57.3	56.4
Night	Min	59.9	75.4	53.9	68.0	67.0	65.0	63.0	59.0	56.0	55.0	55.0	54.0
	Max	65.4	88.7	57.6	74.0	72.0	69.0	68.0	66.0	63.0	60.0	59.0	58.0
	Energy Average:	63.7	Average:		71.6	69.6	67.1	65.8	62.4	59.8	57.7	57.2	56.6

Hourly Summary

Night	0	59.9	75.4	54.0	68.0	67.0	65.0	63.0	59.0	56.0	55.0	55.0	54.0
	1	61.8	87.6	53.9	70.0	68.0	65.0	63.0	59.0	57.0	55.0	55.0	54.0
	2	62.6	80.8	57.4	71.0	68.0	66.0	64.0	62.0	60.0	58.0	58.0	58.0
	3	62.7	84.0	56.2	71.0	69.0	66.0	65.0	62.0	59.0	57.0	57.0	56.0
	4	64.3	88.7	55.9	72.0	70.0	68.0	67.0	63.0	61.0	58.0	57.0	57.0
	5	64.9	81.9	55.5	73.0	72.0	69.0	68.0	64.0	61.0	58.0	57.0	56.0
	6	65.4	78.5	56.8	72.0	71.0	69.0	68.0	66.0	63.0	60.0	59.0	58.0
Day	7	64.9	81.4	55.5	72.0	71.0	69.0	68.0	65.0	62.0	58.0	57.0	56.0
	8	64.7	85.2	55.3	73.0	71.0	69.0	68.0	64.0	61.0	57.0	56.0	56.0
	9	68.2	86.7	55.2	79.0	76.0	73.0	71.0	67.0	63.0	58.0	58.0	56.0
	10	65.0	83.0	55.9	73.0	71.0	69.0	68.0	65.0	62.0	58.0	57.0	56.0
	11	67.4	83.7	54.9	79.0	76.0	71.0	70.0	66.0	62.0	57.0	57.0	56.0
	12	67.9	89.7	54.4	80.0	76.0	70.0	69.0	66.0	62.0	57.0	56.0	56.0
	13	67.3	85.7	55.8	77.0	75.0	71.0	70.0	66.0	64.0	59.0	58.0	58.0
	14	66.5	88.4	55.7	75.0	73.0	70.0	69.0	66.0	63.0	58.0	57.0	56.0
	15	65.8	82.0	54.7	74.0	72.0	70.0	69.0	66.0	63.0	57.0	56.0	55.0
	16	66.9	86.0	56.2	75.0	73.0	70.0	69.0	67.0	64.0	59.0	58.0	57.0
	17	66.2	82.6	56.2	74.0	72.0	70.0	69.0	66.0	64.0	59.0	58.0	57.0
	18	65.4	82.4	55.7	73.0	71.0	69.0	68.0	66.0	63.0	58.0	57.0	56.0
	19	65.0	80.2	55.3	73.0	71.0	69.0	68.0	65.0	62.0	58.0	58.0	56.0
	20	65.1	79.3	57.1	73.0	72.0	69.0	68.0	65.0	62.0	59.0	58.0	57.0
	21	66.2	90.1	57.2	74.0	73.0	70.0	68.0	65.0	62.0	59.0	58.0	58.0
Night	22	64.7	81.3	57.6	74.0	71.0	68.0	67.0	64.0	61.0	59.0	59.0	58.0
	23	64.7	88.1	57.6	73.0	70.0	68.0	67.0	63.0	60.0	59.0	58.0	58.0

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APPENDIX 6.1:

SITE PLAN

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APPENDIX 7.1:

ON-SITE TRAFFIC NOISE CALCULATIONS

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
 Road Name: Foothill Bl.
 Lot No: South Buildings

Project Name: East Avenue
 Job Number: 10744
 Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS					
Highway Data		Site Conditions (Hard = 10, Soft = 15)					
Average Daily Traffic (Adt): 40,000 vehicles		Autos: 15					
Peak Hour Percentage: 10%		Medium Trucks (2 Axles): 15					
Peak Hour Volume: 4,000 vehicles		Heavy Trucks (3+ Axles): 15					
Vehicle Speed: 55 mph		Vehicle Mix					
Near/Far Lane Distance: 73 feet		VehicleType	Day	Evening	Night	Daily	
Site Data		Autos:	77.5%	12.9%	9.6%	97.42%	
Barrier Height: 0.0 feet		Medium Trucks:	84.8%	4.9%	10.3%	1.84%	
Barrier Type (0-Wall, 1-Berm): 0.0		Heavy Trucks:	86.5%	2.7%	10.8%	0.74%	
Centerline Dist. to Barrier: 585.0 feet		Noise Source Elevations (in feet)					
Centerline Dist. to Observer: 585.0 feet		Autos:	0.000				
Barrier Distance to Observer: 0.0 feet		Medium Trucks:	2.297				
Observer Height (Above Pad): 5.0 feet		Heavy Trucks:	8.006	Grade Adjustment:			0.0
Pad Elevation: 0.0 feet		Lane Equivalent Distance (in feet)					
Road Elevation: 0.0 feet		Autos:	583.882				
Barrier Elevation: 0.0 feet		Medium Trucks:	583.866				
Road Grade: 0.0%		Heavy Trucks:	583.868				

FHWA Noise Model Calculations								
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten	
Autos:	72.73	3.20	-16.11	-1.20	-4.87	0.000	0.000	
Medium Trucks:	79.85	-14.04	-16.11	-1.20	-4.89	0.000	0.000	
Heavy Trucks:	83.81	-18.00	-16.11	-1.20	-4.94	0.000	0.000	

Unmitigated Noise Levels (without Topo and barrier attenuation)							
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL	
Autos:	58.6	56.7	54.9	48.9	57.5	58.1	
Medium Trucks:	48.5	47.0	40.6	39.1	47.5	47.8	
Heavy Trucks:	48.5	47.1	38.0	39.3	47.7	47.8	
Vehicle Noise:	59.4	57.6	55.2	49.7	58.3	58.9	

Mitigated Noise Levels (with Topo and barrier attenuation)							
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL	
Autos:	58.6	56.7	54.9	48.9	57.5	58.1	
Medium Trucks:	48.5	47.0	40.6	39.1	47.5	47.8	
Heavy Trucks:	48.5	47.1	38.0	39.3	47.7	47.8	
Vehicle Noise:	59.4	57.6	55.2	49.7	58.3	58.9	

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
 Road Name: East Av.
 Lot No: East Buildings

Project Name: East Avenue
 Job Number: 10744
 Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS					
Highway Data		Site Conditions (Hard = 10, Soft = 15)					
Average Daily Traffic (Adt): 30,000 vehicles		Autos: 15					
Peak Hour Percentage: 10%		Medium Trucks (2 Axles): 15					
Peak Hour Volume: 3,000 vehicles		Heavy Trucks (3+ Axles): 15					
Vehicle Speed: 45 mph		Vehicle Mix					
Near/Far Lane Distance: 38 feet		VehicleType	Day	Evening	Night	Daily	
Site Data		Autos:	77.5%	12.9%	9.6%	97.42%	
Barrier Height: 0.0 feet		Medium Trucks:	84.8%	4.9%	10.3%	1.84%	
Barrier Type (0-Wall, 1-Berm): 0.0		Heavy Trucks:	86.5%	2.7%	10.8%	0.74%	
Centerline Dist. to Barrier: 60.0 feet		Noise Source Elevations (in feet)					
Centerline Dist. to Observer: 60.0 feet		Autos:	0.000				
Barrier Distance to Observer: 0.0 feet		Medium Trucks:	2.297				
Observer Height (Above Pad): 5.0 feet		Heavy Trucks:	8.006	Grade Adjustment:			0.0
Pad Elevation: 0.0 feet		Lane Equivalent Distance (in feet)					
Road Elevation: 0.0 feet		Autos:	57.131				
Barrier Elevation: 0.0 feet		Medium Trucks:	56.976				
Road Grade: 0.0%		Heavy Trucks:	56.992				

FHWA Noise Model Calculations								
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten	
Autos:	69.34	2.82	-0.97	-1.20	-4.69	0.000	0.000	
Medium Trucks:	77.62	-14.42	-0.95	-1.20	-4.88	0.000	0.000	
Heavy Trucks:	82.14	-18.37	-0.96	-1.20	-5.34	0.000	0.000	

Unmitigated Noise Levels (without Topo and barrier attenuation)							
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL	
Autos:	70.0	68.1	66.3	60.3	68.9	69.5	
Medium Trucks:	61.0	59.5	53.2	51.6	60.1	60.3	
Heavy Trucks:	61.6	60.2	51.2	52.4	60.8	60.9	
Vehicle Noise:	71.0	69.2	66.7	61.4	70.0	70.5	

Mitigated Noise Levels (with Topo and barrier attenuation)							
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL	
Autos:	70.0	68.1	66.3	60.3	68.9	69.5	
Medium Trucks:	61.0	59.5	53.2	51.6	60.1	60.3	
Heavy Trucks:	61.6	60.2	51.2	52.4	60.8	60.9	
Vehicle Noise:	71.0	69.2	66.7	61.4	70.0	70.5	

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Second Floor With Wall
 Road Name: Foothill Bl.
 Lot No: South Buildings

Project Name: East Avenue
 Job Number: 10744
 Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS					
Highway Data		Site Conditions (Hard = 10, Soft = 15)					
Average Daily Traffic (Adt): 40,000 vehicles		Autos: 15					
Peak Hour Percentage: 10%		Medium Trucks (2 Axles): 15					
Peak Hour Volume: 4,000 vehicles		Heavy Trucks (3+ Axles): 15					
Vehicle Speed: 55 mph		Vehicle Mix					
Near/Far Lane Distance: 73 feet		VehicleType	Day	Evening	Night	Daily	
Site Data		Autos:	77.5%	12.9%	9.6%	97.42%	
Barrier Height: 0.0 feet		Medium Trucks:	84.8%	4.9%	10.3%	1.84%	
Barrier Type (0-Wall, 1-Berm): 0.0		Heavy Trucks:	86.5%	2.7%	10.8%	0.74%	
Centerline Dist. to Barrier: 585.0 feet		Noise Source Elevations (in feet)					
Centerline Dist. to Observer: 585.0 feet		Autos:	0.000				
Barrier Distance to Observer: 0.0 feet		Medium Trucks:	2.297				
Observer Height (Above Pad): 14.0 feet		Heavy Trucks:	8.006	Grade Adjustment:	0.0		
Pad Elevation: 0.0 feet		Lane Equivalent Distance (in feet)					
Road Elevation: 0.0 feet		Autos:	584.028				
Barrier Elevation: 0.0 feet		Medium Trucks:	583.977				
Road Grade: 0.0%		Heavy Trucks:	583.891				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	3.20	-16.12	-1.20	-13.53	0.000	0.000
Medium Trucks:	79.85	-14.04	-16.11	-1.20	-13.59	0.000	0.000
Heavy Trucks:	83.81	-18.00	-16.11	-1.20	-13.72	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.6	56.7	54.9	48.9	57.5	58.1
Medium Trucks:	48.5	47.0	40.6	39.1	47.5	47.8
Heavy Trucks:	48.5	47.1	38.0	39.3	47.7	47.8
Vehicle Noise:	59.4	57.6	55.2	49.7	58.3	58.9

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.6	56.7	54.9	48.9	57.5	58.1
Medium Trucks:	48.5	47.0	40.6	39.1	47.5	47.8
Heavy Trucks:	48.5	47.1	38.0	39.3	47.7	47.8
Vehicle Noise:	59.4	57.6	55.2	49.7	58.3	58.9

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Second Floor With Wall
 Road Name: East Av.
 Lot No: East Buildings

Project Name: East Avenue
 Job Number: 10744
 Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS					
Highway Data		Site Conditions (Hard = 10, Soft = 15)					
Average Daily Traffic (Adt): 30,000 vehicles		Autos: 15					
Peak Hour Percentage: 10%		Medium Trucks (2 Axles): 15					
Peak Hour Volume: 3,000 vehicles		Heavy Trucks (3+ Axles): 15					
Vehicle Speed: 45 mph		Vehicle Mix					
Near/Far Lane Distance: 38 feet		VehicleType	Day	Evening	Night	Daily	
Site Data		Autos:	77.5%	12.9%	9.6%	97.42%	
Barrier Height: 0.0 feet		Medium Trucks:	84.8%	4.9%	10.3%	1.84%	
Barrier Type (0-Wall, 1-Berm): 0.0		Heavy Trucks:	86.5%	2.7%	10.8%	0.74%	
Centerline Dist. to Barrier: 60.0 feet		Noise Source Elevations (in feet)					
Centerline Dist. to Observer: 60.0 feet		Autos:	0.000				
Barrier Distance to Observer: 0.0 feet		Medium Trucks:	2.297				
Observer Height (Above Pad): 14.0 feet		Heavy Trucks:	8.006	Grade Adjustment:	0.0		
Pad Elevation: 0.0 feet		Lane Equivalent Distance (in feet)					
Road Elevation: 0.0 feet		Autos:	58.609				
Barrier Elevation: 0.0 feet		Medium Trucks:	58.103				
Road Grade: 0.0%		Heavy Trucks:	57.227				

FHWA Noise Model Calculations								
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten	
Autos:	69.34	2.82	-1.14	-1.20	-12.12	0.000	0.000	
Medium Trucks:	77.62	-14.42	-1.08	-1.20	-12.63	0.000	0.000	
Heavy Trucks:	82.14	-18.37	-0.98	-1.20	-13.93	0.000	0.000	

Unmitigated Noise Levels (without Topo and barrier attenuation)							
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL	
Autos:	69.8	67.9	66.2	60.1	68.7	69.3	
Medium Trucks:	60.9	59.4	53.1	51.5	60.0	60.2	
Heavy Trucks:	61.6	60.2	51.1	52.4	60.7	60.9	
Vehicle Noise:	70.9	69.1	66.5	61.3	69.8	70.4	

Mitigated Noise Levels (with Topo and barrier attenuation)							
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL	
Autos:	69.8	67.9	66.2	60.1	68.7	69.3	
Medium Trucks:	60.9	59.4	53.1	51.5	60.0	60.2	
Heavy Trucks:	61.6	60.2	51.1	52.4	60.7	60.9	
Vehicle Noise:	70.9	69.1	66.5	61.3	69.8	70.4	

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Third Floor With Wall
 Road Name: Foothill Bl.
 Lot No: South Buildings

Project Name: East Avenue
 Job Number: 10744
 Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt):	40,000 vehicles	Autos: 15				
Peak Hour Percentage:	10%	Medium Trucks (2 Axles): 15				
Peak Hour Volume:	4,000 vehicles	Heavy Trucks (3+ Axles): 15				
Vehicle Speed:	55 mph	Vehicle Mix				
Near/Far Lane Distance:	73 feet	VehicleType	Day	Evening	Night	Daily
Site Data		Autos:	77.5%	12.9%	9.6%	97.42%
Barrier Height:	0.0 feet	Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Barrier Type (0-Wall, 1-Berm):	0.0	Heavy Trucks:	86.5%	2.7%	10.8%	0.74%
Centerline Dist. to Barrier:	585.0 feet	Noise Source Elevations (in feet)				
Centerline Dist. to Observer:	585.0 feet	Autos:	0.000			
Barrier Distance to Observer:	0.0 feet	Medium Trucks:	2.297			
Observer Height (Above Pad):	23.0 feet	Heavy Trucks:	8.006	Grade Adjustment:	0.0	
Pad Elevation:	0.0 feet	Lane Equivalent Distance (in feet)				
Road Elevation:	0.0 feet	Autos:	584.313			
Barrier Elevation:	0.0 feet	Medium Trucks:	584.227			
Road Grade:	0.0%	Heavy Trucks:	584.053			

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	3.20	-16.12	-1.20	-22.06	0.000	0.000
Medium Trucks:	79.85	-14.04	-16.12	-1.20	-22.15	0.000	0.000
Heavy Trucks:	83.81	-18.00	-16.12	-1.20	-22.37	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.6	56.7	54.9	48.9	57.5	58.1
Medium Trucks:	48.5	47.0	40.6	39.1	47.5	47.8
Heavy Trucks:	48.5	47.1	38.0	39.3	47.7	47.8
Vehicle Noise:	59.4	57.6	55.2	49.7	58.3	58.9

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.6	56.7	54.9	48.9	57.5	58.1
Medium Trucks:	48.5	47.0	40.6	39.1	47.5	47.8
Heavy Trucks:	48.5	47.1	38.0	39.3	47.7	47.8
Vehicle Noise:	59.4	57.6	55.2	49.7	58.3	58.9

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Third Floor With Wall
 Road Name: East Av.
 Lot No: East Buildings

Project Name: East Avenue
 Job Number: 10744
 Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS					
Highway Data		Site Conditions (Hard = 10, Soft = 15)					
Average Daily Traffic (Adt): 30,000 vehicles		Autos: 15					
Peak Hour Percentage: 10%		Medium Trucks (2 Axles): 15					
Peak Hour Volume: 3,000 vehicles		Heavy Trucks (3+ Axles): 15					
Vehicle Speed: 45 mph		Vehicle Mix					
Near/Far Lane Distance: 38 feet		VehicleType	Day	Evening	Night	Daily	
Site Data		Autos:	77.5%	12.9%	9.6%	97.42%	
Barrier Height: 0.0 feet		Medium Trucks:	84.8%	4.9%	10.3%	1.84%	
Barrier Type (0-Wall, 1-Berm): 0.0		Heavy Trucks:	86.5%	2.7%	10.8%	0.74%	
Centerline Dist. to Barrier: 60.0 feet		Noise Source Elevations (in feet)					
Centerline Dist. to Observer: 60.0 feet		Autos:	0.000				
Barrier Distance to Observer: 0.0 feet		Medium Trucks:	2.297				
Observer Height (Above Pad): 23.0 feet		Heavy Trucks:	8.006	Grade Adjustment:	0.0		
Pad Elevation: 0.0 feet		Lane Equivalent Distance (in feet)					
Road Elevation: 0.0 feet		Autos:	61.384				
Barrier Elevation: 0.0 feet		Medium Trucks:	60.561				
Road Grade: 0.0%		Heavy Trucks:	58.854				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	69.34	2.82	-1.44	-1.20	-18.34	0.000	0.000
Medium Trucks:	77.62	-14.42	-1.35	-1.20	-19.15	0.000	0.000
Heavy Trucks:	82.14	-18.37	-1.17	-1.20	-21.22	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.5	67.6	65.9	59.8	68.4	69.0
Medium Trucks:	60.7	59.1	52.8	51.2	59.7	59.9
Heavy Trucks:	61.4	60.0	50.9	52.2	60.5	60.7
Vehicle Noise:	70.6	68.8	66.2	61.0	69.6	70.1

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.5	67.6	65.9	59.8	68.4	69.0
Medium Trucks:	60.7	59.1	52.8	51.2	59.7	59.9
Heavy Trucks:	61.4	60.0	50.9	52.2	60.5	60.7
Vehicle Noise:	70.6	68.8	66.2	61.0	69.6	70.1

APPENDIX 9.1:

CONSTRUCTION NOISE CALCULATIONS

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STATIONARY SOURCE NOISE PREDICTION MODEL

1/4/2017

Observer Location: R1

Source: Peak Construction Mobile Equipment
Condition: Construction

Project Name: East Avenue

Job Number: 10744

Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	493.0 feet	Barrier Height:	6.0 feet
Noise Distance to Barrier:	483.0 feet	Noise Source Height:	8.0 feet
Barrier Distance to Observer:	10.0 feet	Observer Height:	5.0 feet
Observer Elevation:	1,224.0 feet	Barrier Type (0-Wall, 1-Berm):	0
Noise Source Elevation:	1,199.0 feet	Drop Off Coefficient:	20.0
Barrier Elevation:	1,224.0 feet	20 = 6 dBA per doubling of distance 15 = 4.5 dBA per doubling of distance	

NOISE MODEL PROJECTIONS

Noise Level	Distance (feet)	Leq	L50	L25	L8	L2	Lmax
Reference (Sample)	50.0	79.6	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	493.0	-19.9	-19.9	-19.9	-19.9	-19.9	-19.9
Shielding (Barrier Attenuation)	483.0	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Raw (Distance + Barrier)		53.7	-25.9	-25.9	-25.9	-25.9	-25.9
60 Minute Hourly Adjustment		53.7	-25.9	-25.9	-25.9	-25.9	-25.9

STATIONARY SOURCE NOISE PREDICTION MODEL

1/4/2017

Observer Location: R2

Source: Peak Construction Mobile Equipment
Condition: Construction

Project Name: East Avenue

Job Number: 10744

Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	545.0 feet	Barrier Height:	6.0 feet
Noise Distance to Barrier:	535.0 feet	Noise Source Height:	8.0 feet
Barrier Distance to Observer:	10.0 feet	Observer Height:	5.0 feet
Observer Elevation:	1,225.0 feet	Barrier Type (0-Wall, 1-Berm):	0
Noise Source Elevation:	1,199.0 feet	Drop Off Coefficient:	20.0
Barrier Elevation:	1,225.0 feet	20 = 6 dBA per doubling of distance 15 = 4.5 dBA per doubling of distance	

NOISE MODEL PROJECTIONS

Noise Level	Distance (feet)	Leq	L50	L25	L8	L2	Lmax
Reference (Sample)	50.0	79.6	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	545.0	-20.7	-20.7	-20.7	-20.7	-20.7	-20.7
Shielding (Barrier Attenuation)	535.0	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Raw (Distance + Barrier)		52.9	-26.7	-26.7	-26.7	-26.7	-26.7
60 Minute Hourly Adjustment		52.9	-26.7	-26.7	-26.7	-26.7	-26.7

STATIONARY SOURCE NOISE PREDICTION MODEL

1/4/2017

Observer Location: R3

Source: Peak Construction Mobile Equipment
Condition: Construction

Project Name: East Avenue

Job Number: 10744

Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	131.0 feet	Barrier Height:	6.0 feet
Noise Distance to Barrier:	121.0 feet	Noise Source Height:	8.0 feet
Barrier Distance to Observer:	10.0 feet	Observer Height:	5.0 feet
Observer Elevation:	1,204.0 feet	Barrier Type (0-Wall, 1-Berm):	0
Noise Source Elevation:	1,199.0 feet	Drop Off Coefficient:	20.0
Barrier Elevation:	1,206.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	Distance (feet)	Leq	L50	L25	L8	L2	Lmax
Reference (Sample)	50.0	79.6	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	131.0	-8.4	-8.4	-8.4	-8.4	-8.4	-8.4
Shielding (Barrier Attenuation)	121.0	-8.6	-8.6	-8.6	-8.6	-8.6	-8.6
Raw (Distance + Barrier)		62.6	-17.0	-17.0	-17.0	-17.0	-17.0
60 Minute Hourly Adjustment		62.6	-17.0	-17.0	-17.0	-17.0	-17.0

STATIONARY SOURCE NOISE PREDICTION MODEL

1/4/2017

Observer Location: R4

Source: Peak Construction Mobile Equipment
Condition: Construction

Project Name: East Avenue

Job Number: 10744

Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	142.0 feet	Barrier Height:	6.0 feet
Noise Distance to Barrier:	132.0 feet	Noise Source Height:	8.0 feet
Barrier Distance to Observer:	10.0 feet	Observer Height:	5.0 feet
Observer Elevation:	1,204.0 feet	Barrier Type (0-Wall, 1-Berm):	0
Noise Source Elevation:	1,199.0 feet	Drop Off Coefficient:	20.0
Barrier Elevation:	1,204.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	Distance (feet)	Leq	L50	L25	L8	L2	Lmax
Reference (Sample)	50.0	79.6	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	142.0	-9.1	-9.1	-9.1	-9.1	-9.1	-9.1
Shielding (Barrier Attenuation)	132.0	-5.7	-5.7	-5.7	-5.7	-5.7	-5.7
Raw (Distance + Barrier)		64.8	-14.8	-14.8	-14.8	-14.8	-14.8
60 Minute Hourly Adjustment		64.8	-14.8	-14.8	-14.8	-14.8	-14.8

STATIONARY SOURCE NOISE PREDICTION MODEL

1/4/2017

Observer Location: R5

Project Name: East Avenue

Source: Peak Construction Mobile Equipment

Job Number: 10744

Condition: Construction

Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	112.0 feet	Barrier Height:	6.0 feet
Noise Distance to Barrier:	10.0 feet	Noise Source Height:	8.0 feet
Barrier Distance to Observer:	102.0 feet	Observer Height:	5.0 feet
Observer Elevation:	1,199.0 feet	Barrier Type (0-Wall, 1-Berm):	0
Noise Source Elevation:	1,197.0 feet	Drop Off Coefficient:	20.0
Barrier Elevation:	1,199.0 feet	20 = 6 dBA per doubling of distance 15 = 4.5 dBA per doubling of distance	

NOISE MODEL PROJECTIONS

Noise Level	Distance (feet)	Leq	L50	L25	L8	L2	Lmax
Reference (Sample)	50.0	79.6	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	112.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0
Shielding (Barrier Attenuation)	10.0	-4.9	-4.9	-4.9	-4.9	-4.9	-4.9
Raw (Distance + Barrier)		67.7	-11.9	-11.9	-11.9	-11.9	-11.9
60 Minute Hourly Adjustment		67.7	-11.9	-11.9	-11.9	-11.9	-11.9

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APPENDIX 9.2:

TEMPORARY CONSTRUCTION NOISE BARRIER ATTENUATION

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STATIONARY SOURCE NOISE PREDICTION MODEL

1/4/2017

Observer Location: R5

Project Name: East Avenue

Source: Peak Construction Mobile Equipment

Job Number: 10744

Condition: Construction (Mitigated)

Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	112.0 feet	Barrier Height:	9.0 feet
Noise Distance to Barrier:	10.0 feet	Noise Source Height:	8.0 feet
Barrier Distance to Observer:	102.0 feet	Observer Height:	5.0 feet
Observer Elevation:	1,199.0 feet	Barrier Type (0-Wall, 1-Berm):	0
Noise Source Elevation:	1,197.0 feet	Drop Off Coefficient:	20.0
Barrier Elevation:	1,199.0 feet	20 = 6 dBA per doubling of distance 15 = 4.5 dBA per doubling of distance	

NOISE MODEL PROJECTIONS

Noise Level	Distance (feet)	Leq	L50	L25	L8	L2	Lmax
Reference (Sample)	50.0	79.6	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	112.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0
Shielding (Barrier Attenuation)	10.0	-8.5	-8.5	-8.5	-8.5	-8.5	-8.5
Raw (Distance + Barrier)		64.1	-15.5	-15.5	-15.5	-15.5	-15.5
60 Minute Hourly Adjustment		64.1	-15.5	-15.5	-15.5	-15.5	-15.5

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