Discovery Village

NOISE IMPACT ANALYSIS

CITY OF MURRIETA

PREPARED BY:

Bill Maddux
bmaddux@urbanxroads.com
(619) 788-1971

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LIST OF ABBREVIATED TERMS

•	Reference
ANSI	American National Standards Institute
Calveno	California Vehicle Noise
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dBA	A-weighted decibels
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
I-215	Interstate 215
HVAC	Heating, Ventilation, and Air Conditioning
IEC	International Electrotechnical Commission
INCE	Institute of Noise Control Engineering
L_{eq}	Equivalent continuous (average) sound level
L_{max}	Maximum level measured over the time interval
L_{min}	Minimum level measured over the time interval
mph	Miles per hour
PPV	Peak Particle Velocity
Project	Discovery Village
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 and vibration exposure and the necessary noise mitigation measures for the proposed Discovery Village development ("Project"). The Project site is located east of Interstate 215 (I-215) on the southeast corner of Baxter Road and Whitewood Road in the City of Murrieta. For purposes of analysis, and based on existing General Plan and zoning designations, it is anticipated that future development at the Project site could include: business park uses and commercial uses; and multifamily (low-rise) housing units (condo) and single family detached residential dwelling units. This analysis assumes that future development associated with the Project would consist of up to 199 multifamily (low-rise) housing units (condo), 237 single family detached residential dwelling units, 267,000 square feet (sf) of business park use, and 5,000 sf of commercial uses. The proposed Project is anticipated to generate up to 7,104 two-way trips per day. This noise study has been prepared to satisfy applicable City of Murrieta noise standards and significance criteria based on Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1)

ON-SITE TRAFFIC NOISE ANALYSIS

The results of this analysis indicate that future vehicle noise from Baxter Road, Warm Springs Road, and Whitewood Road represents 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 streets, however due to the low traffic volume/speeds, traffic noise from these roads will not make a significant contribution to the noise environment. With the recommended Project specific mitigation the on-site noise impacts will be *less than significant*.

EXTERIOR NOISE ANALYSIS

Non-residential land uses on lot 1 may be exposed to *normally unacceptable* noise levels. The residential lots are also shown to experience *normally unacceptable* exterior noise levels. Therefore, as required by the City of Murrieta General Plan, interior noise analyses are required to demonstrate the interior noise standards are met. (2)

INTERIOR NOISE ANALYSIS

This noise study evaluates the interior noise levels at the Project buildings based on the City of Murrieta 45 dBA CNEL residential interior noise level standard and the State's 50 dBA L_{eq} non-residential interior noise standard. Based on the modeled exterior noise level, Project residential buildings would require Noise Reduction (NR) ranging from 30.6 to 50.4 dBA and a windows-closed condition requiring a means of mechanical ventilation (e.g. air conditioning). To meet the City of Murrieta and State interior noise standards the following on-site noise control measures are recommended for all structures:

- Windows: All buildings require standard windows and sliding glass doors with a minimum STC rating of 27 (all windows/glass doors, all floors).
- Exterior Doors (Non-Glass): All residential building exterior doors shall be well weather-stripped. Well-sealed perimeter gaps around the doors are essential to achieve the optimal STC rating. (3)

- 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.
- Residential Roofs: Roof sheathing of wood construction shall be per manufacturer's specification or caulked plywood of at least one-half inch thick. Ceilings shall be per manufacturer's specification or well-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 or occupied rooms 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.

In addition to these recommendations, Noise-1 is recommended for residential buildings located adjacent to Baxter Road, Warm Springs Road, and Whitewood Road:

Noise-1: All windows or entry doors facing Baxter Road and Whitewood Road shall have a minimum Sound Transmission Class (STC) rating of 28.

The first-floor interior noise level analysis shows that non-residential buildings on Lot 1 facing I-215, would require window and entry door to have STC 31 to comply with the State 50 dBA L_{eq} interior noise standard. All other lots can satisfy the 50 dBA L_{eq} interior noise standards with standard windows and dwelling unit entry doors and mechanical ventilation.

The following measure (Noise-2) is recommended to comply with the State 50 dBA L_{eq} interior noise standards for occupied spaced in non-residential buildings:

Noise-2: All commercial windows or entry doors on Lot 1 facing I-215 shall have a minimum Sound Transmission Class (STC) rating of 31.

Operational Noise

The Discovery Village residential development on Lots 4 through 8 is not expected to include any specific type of operational noise levels beyond the typical noise sources associated with similar residential land uses in the Project study area, such as people and children, parking lot activity, garage doors, small air conditioners, and trash collection, and is considered a noise-sensitive receiving land use. Therefore, potential operational noise impacts for the residential land use are anticipated to result less than significant impacts.

Similar to the residential portion of the Project, the proposed innovation portion of the Project on Lot 1-3 has not been designed and building or lot layouts are available. Unlike the residential portion of the Project, the innovation portion is anticipated to include potential noise sources that may impact the residential uses proposed on Lot 4 through 8 as well as surrounding land uses.

Therefore, measure Noise-3 would require best engineering practices to be used in the placement of noise generating equipment when developing site plans for commercial land uses containing HVAC units and loading docks such that noise levels at the property line comply with City standards. Development plans shall be accompanied by an acoustical analysis demonstrating compliance with City standards for approval prior to issuance of building permits.

Noise-3: Prior to the issuance of a building permit, the applicant, or its designee, will prepare an acoustical study(s) of proposed commercial land use site plans, which will identify all noise-generating areas and associated equipment, predict noise levels at property lines from all identified areas, and recommended mitigation to be implemented (e.g., enclosures, barriers, site orientation, reduction of parking stalls), as necessary, to comply with the City Municipal Code Section 16.030.090.

TYPICAL CONSTRUCTION NOISE ANALYSIS

Construction noise levels are expected to create temporary and intermittent high-level noise conditions at receivers surrounding the Project site when certain activities occur at the closest point to the nearby receiver locations from the edge of primary Project construction activity. Using sample reference noise levels to represent the construction activities at the Project site, this analysis estimates the Project-related construction noise levels at nearby sensitive receiver locations. The results of the analysis show the highest construction noise levels at the potentially impacted receiver locations are expected to approach 73.9 dBA.

The Project related construction equipment noise levels are anticipated to satisfy the City of Murrieta Municipal Code construction noise level standards of 75 dBA L_{max} for mobile equipment during typical Project construction activities at all receiver locations. Therefore, the short-term Project construction impacts are considered a *less than significant.*

TYPICAL CONSTRUCTION VIBRATION ANALYSIS

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. Project construction vibration velocity levels are expected to approach 0.024 in/sec PPV at the nearby receiver locations, and will therefore, not exceed the City of Murrieta vibration threshold of 0.04 in/sec PPV. Therefore, construction related vibration impacts would be *less than significant*.

ROCK CRUSHING NOISE ANALYSIS

Rock crushing noise levels are expected to create temporary and intermittent high-level noise conditions at receivers surrounding the Project site. Using sample reference noise levels to represent the rock crushing activities at the Project site, this analysis estimates the Project-related construction noise levels at nearby sensitive receiver locations. The results of the analysis show the rock crushing construction noise levels are estimated to range from 53.2 to 68.7 dBA L_{eq} at the nearest receiver locations.

Rock crushing noise levels are anticipated to satisfy the City of Murrieta Municipal Code construction noise level standards of for stationary equipment during daytime rock crushing activities at all receiver locations. Therefore, the short-term Project construction impacts are considered a *less than significant.*

ROCK CRUSHING VIBRATION ANALYSIS

Rock crushing 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. Project construction vibration velocity levels are expected to approach 0.0012 in/sec PPV at the nearby receiver locations, and will therefore, not exceed the City of Murrieta vibration threshold of 0.01s in/sec RMS (0.04 in/sec PPV). Therefore, rock crushing related vibration impacts would be less than significant.

BLASTING NOISE AND VIBRATION IMPACTS

Specific blasting regulations and standards that have been designed to ensure that adverse impacts would not result from blasting operations. There are no City thresholds for actual blasting. Based on the limits provided by the U.S. Bureau of Mines, ground vibrations and air overpressure shall be monitored during each blast. Following each blast, seismographs shall be checked to ensure that the blasting has not exceeded relevant standards. See Section 3.7 for more information. The relevant standards are as follows:

- Pursuant to 30 CFR Ch. VII, §816.67(b)(1)(i) of U.S. Bureau of Mines publication RI8485, airblasts shall not exceed 133 dB at the location of any dwelling, public building, school, church, or community or institutional building outside the permit area.
- Pursuant to 30 CFR Ch. VII, §816.67(d)(2)(i) of U.S. Bureau of Mines publication RI8508, the maximum ground vibration shall not exceed the limits in said section at the location of any dwelling, public building, school, church, or community or institutional building outside the permit area.

However, since there is no specific information on where or how much blasting would be required, the project's compliance with such regulations cannot be verified in this analysis. Therefore, if blasting is required, the project will implement Noise-4 to demonstrate any required blasting activities comply with the limits identified by U.S. Bureau of Mines:

Noise-4: Where blasting is required, the following measures should be employed:

1) Blasting will be conducted only between the hours of 9:00 a.m. to 5:00 p.m. on weekdays only. Explosives will not be detonated on weekends or the following holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day.
2) All blasting will be done by a licensed blaster.
3) Pursuant to 30 CFR Ch. VII, §816.67(b)(1)(i) of U.S. Bureau of Mines publication RI8485, airblasts shall not exceed 133 dB at the location of any dwelling, public building, school, church, or community or institutional building outside the permit area.
4) Pursuant to 30 CFR Ch. VII, §816.67(d)(2)(i) of U.S. Bureau of Mines publication RI8508, the maximum ground vibration shall not exceed the limits in said section at the location of any dwelling, public building, school, church, or community or institutional building outside the permit area.
5) Blasting Notification
   a) All owners of non-vacant property within ¼ mile of the blast location will be notified at least 24 hours prior to blasting.

   b) Notify the City Of Murrieta Police Department at least 24 hours prior to blasting.
6) A record of notifications will be maintained and will be available for inspection by the City of Murietta.
7) All persons who conduct blasting operations will comply with all applicable State and federal laws governing the use and storage of explosives.
8) Blasting will be conducted in a manner that prevents injury to persons and damage to public or private property outside the project area.
9) A record of each blast will be made and provided to the City of Murietta within one week of the blast. The record is to be completed by the end of the work day during which the blast occurred, including the seismograph reading, if available, and will contain the following:
   a) Name of operator conducting the blast.
   b) The location, date and time of the blast.
   c) Name, signature and license number of the licensed blaster.
   d) Type of material blasted.
   e) Number of holes, burden and spacing.
   f) Diameter and depth of holes.
   g) Type of explosives used.
   h) Total weight of explosives used.
   i) Weight of explosives per hole.
   j) Maximum weight of explosives detonated within any eight (8) millisecond period.
   k) Maximum number of holes or decks detonated within any eight (8) millisecond period.
   l) Initiation system, including number of circuits and the time interval, if sequential timer is used.
   m) Type and length of stemming (deck and top).
   n) Type and detonator and delay periods used, in milliseconds.
   o) Distance and scaled distance to the closest protected structure.
   p) Maximum peak particle velocity will not exceed limits as set by U.S. Bureau of Mines 8507 Report at the location of any dwelling, public building, school, church or community or institutional building outside the blast area.
10) All blasting will be done with small charges and with the following protective best management practices, whenever feasible:
11) Two to four feet of rippable material will be left over the solid material to be blasted to serve as a cover to prevent excessive fly rock. Blasting mats may be used if overburden is not available. The blasting mats must be of suitable size and material to dampen noise and contain blasted materials.
12) The size of the shot will be limited by sound and vibration control levels and amount of area that can be blasted with good results.
13) Small diameter drilling with high-speed equipment will be used to reduce the amount of explosives used in each hole.
14) The use of delay blasting techniques will be used to reduce vibrations associated with the blast.
15) Material stockpiles will be placed, if available to help block blasting and material processing noise transmission off-site.
16) Blasting shots will be designed to minimize ground vibration and air blast.
17) Blasting will not occur during adverse weather conditions, such as high winds, unless a loaded charge must be detonated before the end of the day for safety reasons.

With the implementation of Noise-4 impacts related to vibration from blasting would result in a *less-than-significant impact*.

SUMMARY OF SIGNIFICANCE FINDINGS

The results of this Discovery Village Noise Impact Analysis are summarized below based on the significance criteria in Section 4 of this report. Table ES-1 shows the findings of significance for each potential noise and/or vibration impact before and after incorporation of Project design features.

TABLE ES-1: SUMMARY OF SIGNIFICANCE FINDINGS

Analysis	Report Section	Significance Findings	
		Unmitigated	Mitigated
On-Site Exterior Traffic Noise Levels	7	*Less Than Significant*	*n/a*
On-Site Interior Traffic Noise Levels		*Potentially Significant*	*Less Than Significant*
Off-Site Traffic Noise Level	8	*Less Than Significant*	*n/a*
Operational Noise	10	*Potentially Significant*	*Less Than Significant*
Construction Noise Levels	11	*Less Than Significant*	*n/a*
Construction Vibration Levels		*Less Than Significant*	*n/a*
Rock Crushing Noise Level		*Less Than Significant*	*n/a*
Rock Crushing Vibration Levels		*Less Than Significant*	*n/a*
Blasting Noise Levels		*Less Than Significant*	*n/a*
Blasting Vibration Levels		*Potentially Significant*	*Less Than Significant*

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

1 INTRODUCTION

This noise analysis has been completed to determine the noise impacts associated with the development of the proposed Discovery Village ("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 and construction noise analysis, and evaluates the future exterior noise environment.

1.1 SITE LOCATION

This report presents the results of the noise study for the proposed Discovery Village ("Project"), which is located east of Interstate 215 (I-215), at the southwest corner of Whitewood Road and Baxter Road in the City of Murrieta. The Project's location in relation to the surrounding area is shown on Exhibit 1-A.

The Project site is surrounded by residential land uses, health care land uses, commercial land uses, and open space, with the nearest residential land use is north of the Project site across Baxter Road. Residential land uses are located to the north and northwest across Baxter Road. The Loma Linda University Heath facility and Compass Health Rehabilitation are located to the northwest and southeast of the Project site respectively. The recently adopted General Plan designates the eastern portion of the Project site for "Multiple-Family Residential (10.1-30 dwelling units per acre)," and designates the western portion of the Project site located west of the future alignment of Warm Springs Road for "Innovation (0.6-2.5 FAR)" land uses.

The eastern portion of the Project site is zoned MF-2 (Multi-Family Residential 2) District, with an allowable density range of 15.1 to 18 dwelling units per net acre. The western portion of the size is zoned "Innovation".

1.2 PROJECT DESCRIPTION

The current Project involves a large lot Tentative Tract Map (TTM) No. 38228 (eight individual parcels) (refer to Exhibit 1-B), and associated grading and infrastructure installation. A portion of the Project site would be preserved as open space. The large pads and infrastructure would facilitate future development of the Project site compliant with current General Plan and zoning designations. For purposes of analysis, and based on existing General Plan and zoning designations, it is anticipated that future development at the Project site could include: business park uses and commercial uses on Lot 1 through Lot 3 consistent with the "Innovation" land use designation; and multifamily (low-rise) housing units (condo) and single family detached residential dwelling units on Lot 4 through Lot 8 (28.5 net acres), consistent with the existing zoning (MF-2, Multi-Family Residential). This analysis assumes that future development associated with the Project would consist of 199 multifamily (low-rise) housing units (condo), 237 single family detached residential dwelling units, 267,000 square feet (sf) of business park use, and 5,000 sf of commercial use. The Project would also involve approximately 1.4 acres of offsite roadway improvements. It is anticipated that the Project would be developed in a single phase

with an anticipated Opening Year of 2027. The proposed Project is anticipated to generate 7,104 two-way trips per day, with 618 AM peak hour trips and 675 PM peak hour trips.

EXHIBIT 1-A: LOCATION MAP

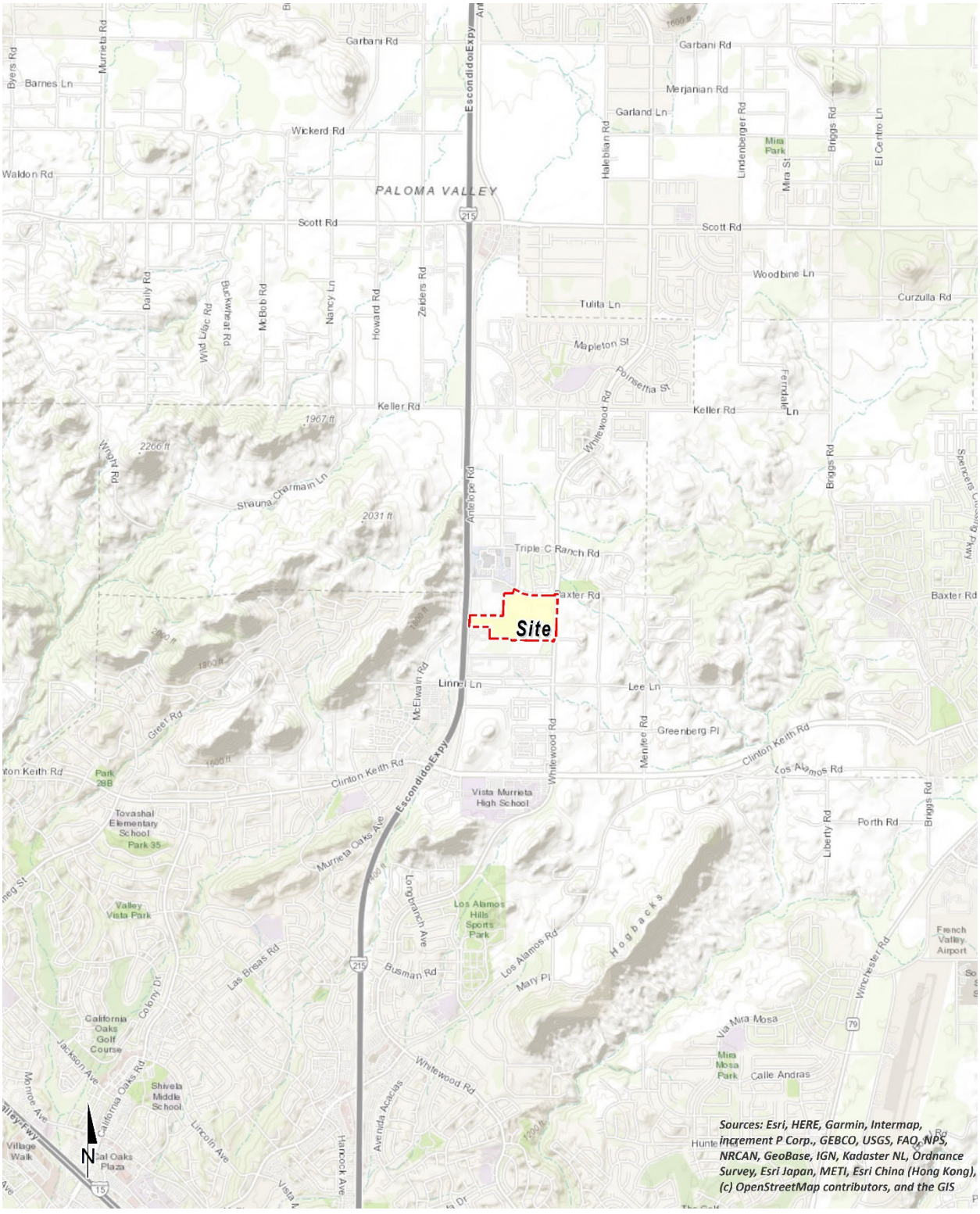
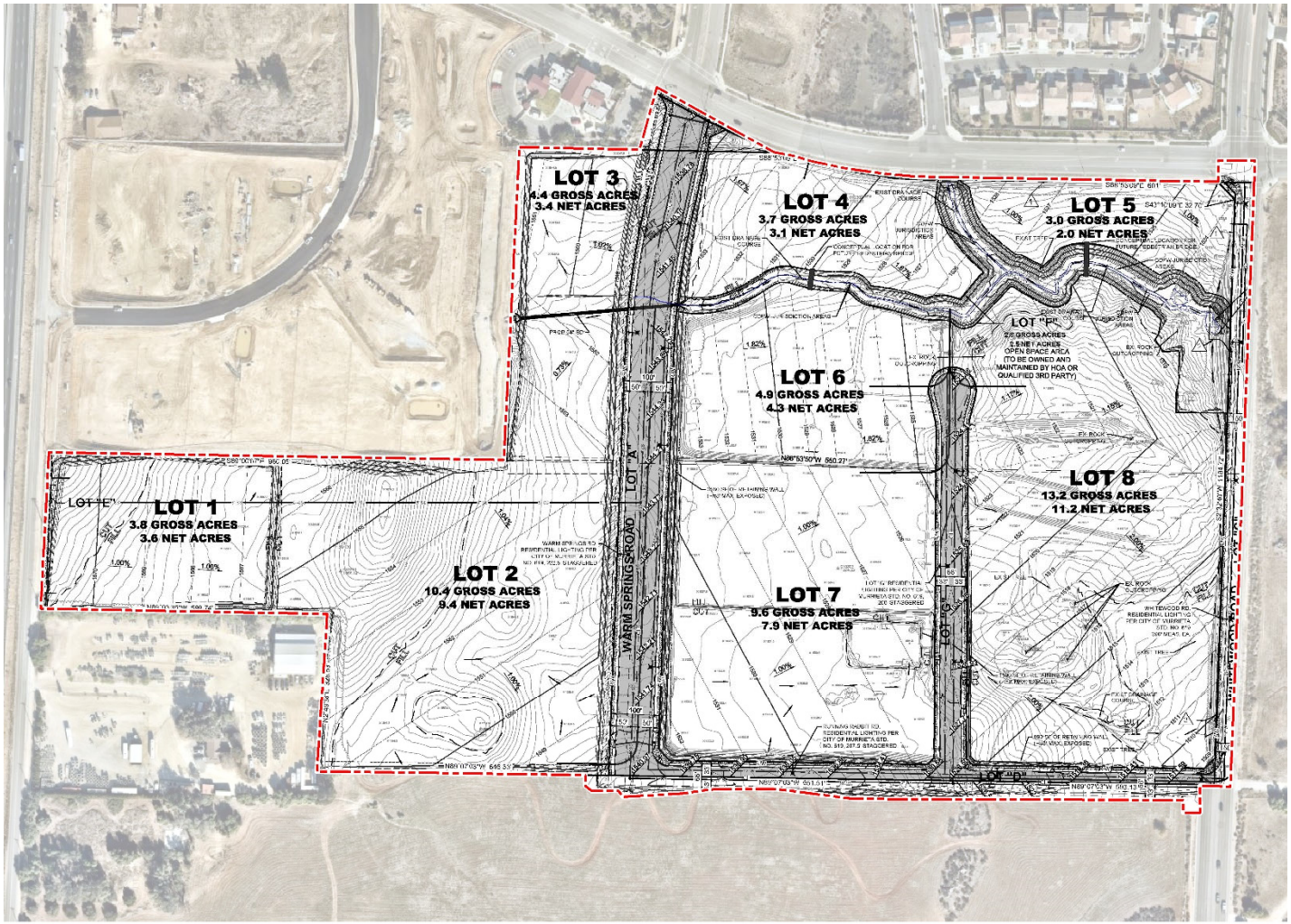


EXHIBIT 1-B: TENTATIVE TRACT MAP



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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		SPEECH INTERFERENCE
NOISY URBAN AREA, DAYTIME	VACUUM CLEANER AT 3m (10 ft)	70	LOUD	
HEAVY TRAFFIC AT 90m (300 ft)	NORMAL SPEECH AT 1m (3 ft)	60		
QUIET URBAN DAYTIME	LARGE BUSINESS OFFICE	50	MODERATE	SLEEP DISTURBANCE
QUIET URBAN NIGHTTIME	THEATER, LARGE CONFERENCE ROOM (BACKGROUND)	40		
QUIET SUBURBAN NIGHTTIME	LIBRARY	30	FAINT	NO EFFECT
QUIET RURAL NIGHTTIME	BEDROOM AT NIGHT, CONCERT HALL (BACKGROUND)	20		
	BROADCAST/RECORDING STUDIO	10	VERY FAINT	
LOWEST THRESHOLD OF HUMAN HEARING	LOWEST THRESHOLD OF HUMAN HEARING	0		

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

2.1 RANGE OF NOISE

Since the range of intensities that the human ear can detect is so large, the scale frequently used to measure intensity is a scale based on multiples of 10, the logarithmic scale. The scale for measuring intensity is the decibel scale. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud. (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 (L_{eq}). Equivalent sound levels are not measured directly but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period and is commonly used to describe the "average" noise levels within the environment.

To describe the time-varying character of environmental noise, the statistical or percentile noise descriptors L_{50}, L_{25}, L_8 and L_2, are commonly used. The percentile noise descriptors are the noise levels equaled or exceeded during 50 percent, 25 percent, 8 percent, and 2 percent of a stated time. Sound levels associated with the L_2 and L_8 typically describe transient or short-term events, while levels associated with the L_{50} describe the steady state (or median) noise conditions. While the L_{50} describes the median noise levels occurring 50 percent of the time, the L_{eq} accounts for the total energy (average) observed for the entire hour. Therefore, the L_{eq} noise descriptor is generally 1-2 dBA higher than the L_{50} noise level.

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

2.3 SOUND PROPAGATION

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

2.3.1 GEOMETRIC SPREADING

Sound from a localized source (i.e., a stationary point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source. (4)

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. (6)

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 have significant effects. (4)

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. (6)

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 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 VIBRATION

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

Additionally, in contrast to airborne noise, ground-borne vibration outdoors is not a common environmental problem and annoyance from ground-borne vibration is almost exclusively an indoor phenomenon (8). Therefore, the effects of vibrations should only be evaluated at a structure and the effects of the building structure on the vibration should be considered. Wood-frame buildings, such as typical residential structures, are more easily excited by ground vibration than heavier buildings. In contrast, large masonry buildings with spread footings have a low response to ground vibration (8). In general, the heavier a building is, the lower the response will

be to the incident vibration energy. However, all structurers reduce vibration levels due to the coupling of the building to the soil.

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 (8). 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 (8). However, the RMS amplitude and PPV are related mathematically, and the RMS amplitude of equipment is typically calculated from the PPV reference level. The RMS amplitude is approximately 70% of the PPV (9). Thus, either can be used on the description of vibration impacts.

While not universally accepted, vibration decibel notation (VdB) is another vibration notation developed and used by the FTA in their guidance manual to describe vibration levels and provide a background of common vibration levels and set vibration limits (10). Decibel notation (VdB) serves to reduce the range of numbers used to describe vibration levels and is used in this report to describe vibration levels.

As stated in the FTA guidance manual, 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.

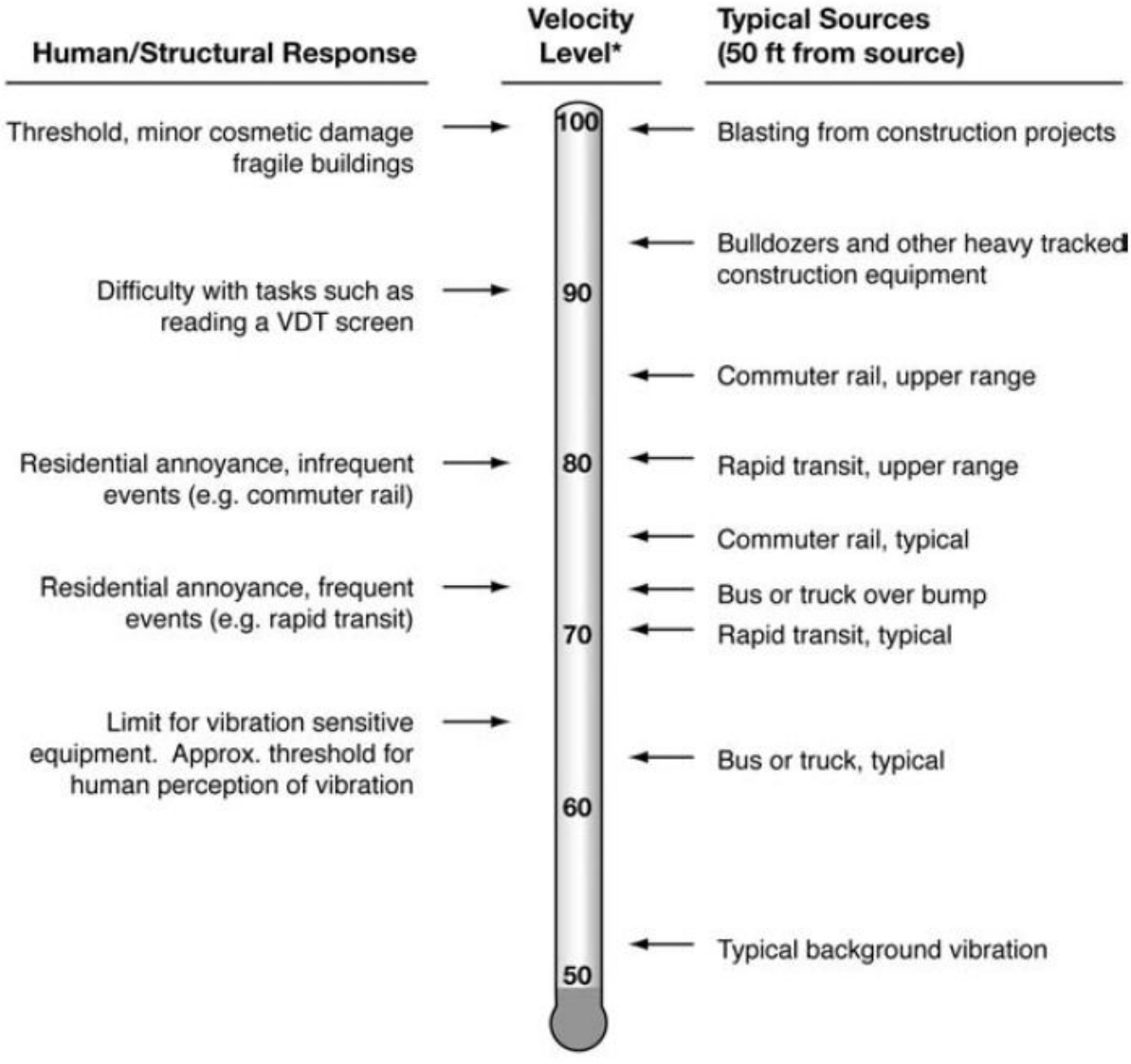
2.8 BLASTING

The intensity of the noise and vibration impacts associated with rock blasting depends on location, size, material, shape of the rock, and the methods used to crack it. While a blasting contractor can design the blasts to stay below a given vibration level that could cause damage to nearby structures, it is difficult to design blasts that produce noise levels which are not perceptible to receivers near the blast site. (9) The noise produced by blasting activities is referred to as air overpressure, or an “airblast,” which is generated when explosive energy in the form of gases escape from the detonating blast holes. Much like a point source, airblasts radiate outward in a spherical pattern and attenuate with each doubling of distance from the blast location, depending on the design of the blast and amount of containment.

Blasting activities generally include: the pre-drilling of holes in the hard rock area; preparation and placement of the charges in the drilled holes; a pre-blast horn signal; additional pre-blast

horn signals immediately prior to the blast; and the blast itself. An additional horn signal is sounded to indicate the "all clear" after the blast and the blasting contractor has inspected the blasting area. The noise from the blast itself starts with a cracking sound from the detonator, located at a distance from the charges, and ends with the low crackling sound from each charge as they are subsequently set off. Blasts typically occur for only a few seconds, depending on their design. It is important to note that no other construction equipment will be operating during each blast in the blast area but will commence operation once the blasting contractor indicates it is safe to do so. The following equations are provided in this report is based on the 18th Edition of the *International Society of Explosives Engineer's (ISEE's) Blasters' Handbook*.

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



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

2.9.1 BLASTING NOISE LEVELS

Air overpressure, or "airblast," levels generated by blasting can travel up to 1,100 feet per second, depending on the size of the blast, distance from the blast, and amount of charge confinement. (11) To determine potential airblast levels (dB) from a blast, the cubed-root scaled distance (SD_3) is used based on the planned maximum charge weight of the blast, and distance to the receiver location being analyzed. The following equation is provided in the Blasters' Handbook to calculate the cubed root scaled distance:

$$SD_3 = R / W^{1/3}$$

Where "R" is equal to the distance to the receiver location (e.g., residential homes), and "W" is equal to the maximum charge weight detonated within any 8-millisecond period per Blasters' Handbook guidelines. With known cubed root scaled distances for each blast, the anticipated airblast levels can be calculated at the receiver location. The following equation is provided in the Blaster's Handbook for calculating airblast levels in "P," which represents air pressure in pounds per inch squared (lbs/in^2):

$$P = A \times (SD_3)^{-B}$$

Where "A" is equal to the intercept of a reference line with the calculated SD_3 value. The "A" values are based on the Blasters' Handbook for a given reference industry blast (e.g., construction, mining, etc.), and vary depending on the amount of confinement of each blast. "B" is equal to the slope of the line per Blasters' Handbook reference data. It is important to note that airblast levels are calculated in terms of pressure in the air, and do not represent perceptible noise levels typically described using A-weighted decibels (dBA). Alternatively, airblast pressure levels can be converted to linear decibels (dB) using the following equation per the Blasters' Handbook:

$$P_s = 20 \times \log(P / P_0)$$

Where "P" equals the measured or calculated overpressure, and P_0 represents the reference ambient air pressure (2.9×10^{-9} pounds/inch^2) per the Blasters' Handbook.

2.9.2 BLASTING VIBRATION LEVELS

Vibration levels generated by a blast can travel up to 20,000 feet per second, depending on the size of the blast, travel pathways (e.g., ground discontinuities), and site characteristics. (11) To determine potential vibration levels (PPV) from a blast, the square-root scaled distance (SD_2) is used based on the planned maximum charge weight of the blast, and distance to the receiver location being analyzed. The following equation is provided in the Blasters' Handbook to calculate the square-root scaled distance:

$$SD_2 = R / W^{1/2}$$

Where "R" is equal to the distance to the receiver location (e.g., residential homes), and "W" is equal to the maximum charge weight detonated within any 8-millisecond period per Blasters' Handbook guidelines. With known square-root scaled distances for each blast, the anticipated

PPV levels can be calculated at the receiver location. The following equation is provided in the Blaster's Handbook for calculating vibration levels:

$$PPV = A \times (SD_2)^{-B}$$

Where "A" is equal to the intercept of a reference line with the calculated SD_2 value. The "A" values are based on the lower, best fit, or upper bound lines (provided in the Blasters' Handbook) for a given reference industry blast (e.g., construction, mining, etc.), and "B" is equal to the slope of the line.

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 according to guidelines adopted by the Governor's Office of Planning and Research. (12) The purpose of the Noise Element is to *limit the exposure of the community to excessive noise levels*. In addition, the California Environmental Quality Act (CEQA) requires that all known environmental effects of a project be analyzed, including environmental noise impacts.

3.2 STATE OF CALIFORNIA BUILDING CODE

The State of California regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise standards, and provides guidance for local land use compatibility. State law requires that each county and city adopt a General Plan that includes a Noise Element which is to be prepared per guidelines adopted by the Governor's Office of Planning and Research (OPR). (13) The purpose of the Noise Element is to *limit the exposure of the community to excessive noise levels*. In addition, the California Environmental Quality Act (CEQA) requires that all known environmental effects of a project be analyzed, including environmental noise impacts.

3.2.1 RESIDENTIAL CONSTRUCTION

The State of California's noise insulation standards for all residential units are codified in the California Code of Regulations (CCR), Title 24, Building Standards Administrative Code, Chapter 12, Section 1206. These noise standards are applied to new construction that contains dwelling units or sleeping units, such as residential and hotel or motel uses, in California for controlling interior noise levels resulting from exterior noise sources. For new buildings, the acceptable interior noise limit is 45 dBA CNEL in habitable rooms (14).

3.2.2 NON-RESIDENTIAL CONSTRUCTION

The State of California's Green Building Standards Code contains mandatory measures for non-residential building construction in Section 5.507 on Environmental Comfort. (15) 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 non-residential structures are developed in areas where the exterior noise levels exceed 65 dBA CNEL, such as within a noise contour of an airport, freeway, railroad, and other noise source. If the development falls within an airport or freeway 65 dBA CNEL noise contour, buildings shall be construction to provide an interior noise level environment attributable to exterior sources that does not exceed an hourly equivalent level of 50 dBA L_{eq} in occupied areas during any hour of operation.

3.3 CITY OF MURRIETA GENERAL PLAN NOISE ELEMENT

The City of Murrieta has adopted a Noise Element of the General Plan to control and abate environmental noise, and to protect the citizens of the City of Murrieta from excessive exposure to noise. (2) The Noise Element specifies the exterior noise levels allowable for new developments impacted by transportation noise sources such as arterial roads, freeways, airports and railroads. In addition, the Noise Element identifies noise polices designed to protect, create, and maintain an environment free from noise that may jeopardize the health or welfare of sensitive receivers, or degrade quality of life. To protect City of Murrieta residents from excessive noise, the Noise Element contains the following three goals related to the Project:

N-1 Noise sensitive land uses are properly and effectively protected from excessive noise generators.

N-2 A comprehensive and effective land use planning and development review process that ensures noise impacts are adequately addressed.

N-3 Noise from mobile noise sources is minimized.

The noise policies specified in the City of Murrieta Noise Element provide the guidelines necessary to satisfy these three goals. To protect new land uses from excessive noise generators (N-1), Table 11-2 of the City of Murrieta General Plan Noise Element, shown on Exhibit 3-A, identifies a 60 dBA CNEL as a *normally acceptable* noise level for single-family and 65 dBA CNEL for multiple-family residential land uses impacted by transportation noise sources. Similarly, Exhibit 3-A identifies a noise level of up to 70 dBA CNEL as a normally compatible level for Office Buildings and Business Commercial and Professional developments impacted by transportation noise sources such as arterial roads, freeways, airports and railroads. According to the General Plan, noise levels in excess of *normally acceptable* levels requires that *a detailed analysis of the noise reduction requirements must be made and needed noise-insulation features must be included in the design*.

The Noise Element also provides several policies to reduce noise impacts to new developments (N-2) that include integrating noise considerations into planning decisions, noise mitigation measures as development requirements, and compliance with the standards of the Noise Element and Noise Ordinance. To ensure noise from mobile sources is minimized (N-3), noise

mitigation measures must be considered in the design of all future streets and highways such as the construction and maintenance of noise barriers located along the I-15 and I-215 Freeways.

The policies included in the General Plan Noise Element consider land use compatibility and identify exterior noise level compatibility standards for transportation related noise. The *Land Use Compatibility for Community Noise Environments* matrix shown on Exhibit 3-A provides the City of Murrieta with a planning tool to gauge the compatibility of land uses relative to existing and future exterior noise levels.

EXHIBIT 3-A: LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENTS

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

CNEL = community noise equivalent level; NA = not applicable

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

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

3.4 OPERATIONAL NOISE STANDARDS

To analyze noise impacts originating from the operation of the Project, noise from operational activities are typically limited to the hours of operation established under the Municipal Code. The Municipal Code noise standards for operational sources are described below for the City of Murrieta to determine the potential noise impacts at the nearby sensitive receiver locations. The operational-related noise standards are summarized in Exhibit 3-B.

The City of Murrieta has established maximum exterior and interior noise levels for Project operational noise sources. Section 16.30.090 of the Municipal Code identifies limits on noise levels from operational activities as shown on Exhibits 3-B for exterior and interior. The nearest noise-sensitive receivers to the Project site consist of existing multi- and single-family residential homes. For multi-family residential development, operational exterior noise levels may not exceed 50 dBA during the daytime hours (7:00 a.m. to 10:00 p.m.) and may not exceed 45 dBA

during the nighttime hours (10:00 p.m. to 7:00 a.m.). (16) The City of Murrieta Municipal Code is included in Appendix 3.1.

EXHIBIT 3-B: CITY OF MURRIETA EXTERIOR AND INTERIOR NOISE LIMITS

Noise Zone	Land Use (Receptor Property)	Time Period	Allowed Exterior Noise Level (dBA)
Exterior Noise Limits			
I	Noise-sensitive area	Anytime	45
II	Residential properties	10:00 PM to 7:00 AM	45
		7:00 AM to 10:00 PM	50
	Residential properties within 500 feet of a kennel(s)	7:00 AM to 10:00 PM	70
III	Commercial properties	10:00 PM to 7:00 AM	55
		7:00 AM to 10:00 PM	60
IV	Industrial properties	Anytime	70
Interior Noise Limits			
All noise zones	Multi-family residential	10:00 PM to 7:00 AM	40
		7:00 AM to 10:00 PM	45
Source: City of Murrieta, *City of Murrieta Development Code Section 16.30.090.*			

3.5 CONSTRUCTION NOISE STANDARDS

To analyze noise impacts originating from the construction of the Discovery Village Project, noise from construction activities are typically limited to the hours of operation established under the Municipal Code. The Municipal Code noise standards for construction are described below for the City of Murrieta to determine the potential noise impacts at the nearby sensitive receiver locations. The construction-related noise standards are summarized in Exhibit 3-C.

The City of Murrieta has established maximum noise levels for mobile and stationary construction equipment based on receiving land use. Section 16.30.130 of the Municipal Code identifies noise levels limits from construction activities as shown on Exhibit 3-C for mobile and stationary equipment. In addition, the Municipal Code identifies hours during which mobile and stationary equipment may operate, between 7:00 a.m. to 8:00 p.m. daily, with no activity allowed on Sundays or holidays (City of Murrieta Municipal Code, Section 16.30.130(A)(2)(a)(1)). The City of Murrieta Municipal Code is included in Appendix 3.1.

EXHIBIT 3-C: CITY OF MURRIETA CONSTRUCTION NOISE STANDARDS

Equipment Type	Single-Family Residential	Multi-Family Residential	Commercial
Mobile Equipment			
Daily, except Sundays and holidays, 7:00 AM to 8:00 PM	75 dBA	80 dBA	85 dBA
Daily, except Sundays and holidays, 8:00 PM to 7:00 AM	60 dBA	64 dBA	70 dBA
Stationary Equipment			
Daily, except Sundays and holidays, 7:00 AM to 8:00 PM	60 dBA	65 dBA	70 dBA
Daily, except Sundays and holidays, 8:00 PM to 7:00 AM	50 dBA	55 dBA	60 dBA
Source: City of Murrieta, *City of Murrieta Development Code Section 16.30.130.*			

3.6 CONSTRUCTION VIBRATION STANDARDS

The City of Murrieta Municipal Code, Section 16.30.130 (K), states that *operating or permitting the operation of any device that creates a vibration that is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at one hundred fifty feet from the source if on public space or public right-of-way* is prohibited. The Municipal Code defines the vibration perception threshold to be a motion velocity of 0.01 RMS in/sec (in/sec) over the range of one to 100 Hz. (16) An RMS of 0.01 in/sec is equivalent to 0.04 PPV in/sec. Table 3-1 shows the City of Murrieta Municipal Code vibration level standards.

TABLE 3-1: CONSTRUCTION VIBRATION STANDARDS

Jurisdiction	Root-Mean-Square Velocity Standard (in/sec)
City of Murrieta[1]	0.01

[1] Source: City of Murrieta Municipal Code, Section 16.30.130 (K) (Appendix 3.1).

3.7 BLASTING STANDARDS

The blasting contractor is required to obtain blasting permit(s) from the City Fire Department Chief, and to notify City of Murrieta Police Department within 24 hours of planned blasting events. While any equipment, such as loaders or rock drills are subject to the City of Murrieta construction noise level limits, however, a blast does not involve mobile or stationary equipment, thus the City of Murrieta construction noise level limits are not applicable to a blast. Similarly, the vibration generated by a blast is very short and the perception threshold is higher than longer-term sources, such as construction. However, air overpressure regulations are identified by the U.S. Bureau of Mines 30 CFR Ch. VII, §816.67(b)(1)(i) of U.S. Bureau of Mines publication

RI8485 and vibration limits are identified in 30 CFR Ch. VII, §816.67(d)(2)(i) of U.S. Bureau of Mines publication RI8508. (11)

3.7.1 BLASTING NOISE LIMITS

Based on Table 26.17 *Typical Air Overpressure Damage Criteria* of the Blasters' Handbook, an air overpressure of 133 dB is identified as a perception-based criteria level for blasting. As such, to present a conservative approach, the Project blasting-related noise and airblast levels are based on the 133 dB criteria for airblasts identified by the ISEE and U.S. Bureau of Mines. This is the same blasting noise limit outlined in the sample blasting specifications on page D-5 of the Caltrans *Transportation and Construction Vibration Guidance Manual.* (9)

3.7.2 BLASTING VIBRATION LIMITS

To analyze vibration impacts originating from the blasting, vibration-generating rock blasting activities are appropriately evaluated against standards established under a jurisdiction's County Code, if such standards exist. However, the City of Murrieta does not identify specific blasting vibration level limits. Therefore, for analysis purposes, the Caltrans *Transportation and Construction Vibration Guidance Manual*, (9 p. 38) Table 19, vibration criteria are used in this noise study to assess construction-related blasting impacts at the closest sensitive receiver locations. Caltrans guidance identifies a maximum acceptable transient peak-particle-velocity (PPV) vibration threshold of 0.5 inches per second (in/sec). Therefore, the 0.5 PPV (in/sec) vibration threshold is used to evaluate the potential blasting-related vibration levels experienced at the closest residences.

4 SIGNIFICANCE CRITERIA

The following significance criteria are based on currently adopted guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (17) For the purposes of this report, impacts would be potentially significant if the Project results in or causes:

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

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

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

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

4.1 ON-SITE TRAFFIC NOISE

- If the on-site noise levels:
    1. exceed the exterior land use compatibility criteria of the City of Murrieta General Plan Noise Element at an exterior use area, Table 11-2, for Project land uses; and
    2. exceed an interior noise level of 45 dBA CNEL for residential uses within the Project site (California Code of Regulations, Title 24, Building Standards Administrative Code, Part 2 as discussed in Section 3.2).

4.2 OFF-SITE TRAFFIC NOISE

- If the off-site traffic noise levels:
    1. are less than 60 dBA CNEL and the Project creates a *readily perceptible* 5 dBA CNEL or greater Project-related noise level increase; or
    2. range from 60 to 65 dBA CNEL and the Project creates a *barely perceptible* 3 dBA CNEL or greater Project-related noise level increase; or
    3. already exceed 65 dBA CNEL, and the Project creates a community noise level increase of greater than 1.5 dBA CNEL (FICON, 1992).

4.3 OPERATIONAL NOISE

- If the Project operational noise levels
    1. exceed the exterior noise standards of the City of Murrieta Municipal Code 16.30.090, Exhibit 3-C, for adjacent land uses; and

4.4 CONSTRUCTION NOISE AND VIBRATION

- If Project-related construction activities:
    1. occur anytime other than between the permitted hours of 7:00 a.m. to 8:00 p.m. daily, with no activity allowed on Sundays or holidays (City of Murrieta Municipal Code, Section 16.30.130(A)(2)(a)(1)); or
    2. create noise levels which exceed the mobile or stationary equipment noise level limits at an affected land use (City of Murrieta Municipal Code, Section 16.30.130 (A)).
- If short-term Project generated construction vibration levels could exceed the City of Murrieta maximum acceptable vibration standard of 0.01 RMS in/sec (0.04 in/sec PPV) at sensitive receiver locations (City of Murrieta Municipal Code, Section 16.30.130 (K)). For clarity this report uses the PPV threshold to be consistent with the reference levels.

4.5 BLASTING NOISE AND VIBRATION

- If Project-related blasting:
    1. occur anytime other than between the permitted hours of 7:00 a.m. to 8:00 p.m. daily, with no blasting allowed on Sundays or holidays (City of Murrieta Municipal Code, Section 16.30.130(A)(2)(a)(1)); or
    2. create noise or vibration levels which exceed the U.S. Bureau of Mines noise and vibration level limits at an affected land use (30 CFR Ch. VII, §816.67(b)(1)(i) and 30 CFR Ch. VII, §816.67(d)(2)(i) of U.S. Bureau of Mines publication RI8508, respectively).

4.6 SIGNIFICANCE CRITERIA SUMMARY

Noise impacts shall be considered significant if any of the following occur as a direct result of the proposed development. Table 4-1 shows the significance criteria summary matrix that includes the allowable criteria used to identify potentially significant incremental noise level increases.

TABLE 4-1: SIGNIFICANCE CRITERIA SUMMARY

Analysis	Land Use	Condition(s)	Significance Criteria	
			Daytime[9]	Nighttime[9]
On-Site Traffic Noise	All Land Uses	Exterior Noise Level Criteria[1]	See Exhibit 3-A	
	Residential[2]	Interior Noise Level Standard	45 dBA CNEL	
	Non-Residential[3]		50 dBA L_{eq}	
Off-Site	Noise-Sensitive	< 60 dBA	5 dBA or more	
		60 – 65 dBA	3 dBA or more	
		> 65 dBA	1.5 dBA or more	
	Non-Noise-Sensitive	=< 70 dBA	5 dBA or more	
		> 70 dBA	3 dBA or more	
Operational	All Land Uses	Daytime[4]	See Exhibit 3-B	
		Nighttime[4]		
Construction Noise & Vibration	All Land Uses	Mobile Construction[5]	See Exhibit 3-C	
		Stationary Construction[5]		
		Vibration Level Threshold[6]	0.04 PPV in/sec	
Blasting Noise & Vibration	All Land Uses	Noise Level Threshold[7]	133 dB	
		Vibration Level Threshold[8]	0.5 PPV In/sec	

[1] City of Murrieta General Plan Noise Element, Table 11-2.
[2] California Code of Regulations, Title 24, Building Standards Administrative Code, Part 2.
[3] California Code of Regulations, Title 24, Building Standards Administrative Code, Part 11.
[4] City of Murrieta Municipal Code, Section 16.30.130 (Appendix 3.1).
[5] City of Murrieta Municipal Code, Section 16.30.090 (Appendix 3.1).
[6] City of Murrieta Municipal Code, Section 16.30.090 (Appendix 3.1).
[7] U.S. Bureau of Mines 30 CFR Ch. VII, §816.67(b)(1)(i)
[8] U.S. Bureau of Mines 30 CFR Ch. VII, §816.67(b)(2)(i)
[9] Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

5 EXISTING NOISE LEVEL MEASUREMENTS

To assess the existing noise level environment, seven 24-hour noise level measurements were taken at sensitive receiver locations in the Project study area. The receiver locations were selected to describe and document the existing noise environment within the Project study area. Exhibit 5-A provides the boundaries of the Project study area and the noise level measurement locations. To fully describe the existing noise conditions, noise level measurements were collected by Urban Crossroads, Inc. on Tuesday, August 17, 2021.

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. (18)

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, t*hat it is not necessary nor recommended that existing noise exposure be determined by measuring at every noise-sensitive location in the project area. Rather, the recommended approach is to characterize the noise environment for clusters of sites based on measurements or estimates at representative locations in the community*. (19)

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. (19) In other words, the area represented by the receiver shares similar shielding, terrain, and geometric relationship to the reference noise source. Receivers represent a location of noise sensitive areas and are used to estimate the future noise level impacts. Collecting reference ambient noise level measurements at the nearby sensitive receiver locations allows for a comparison of the before and after Project noise levels

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

5.3 NOISE MEASUREMENT RESULTS

The noise measurements presented below focus on the average or equivalent sound levels (L_{eq}). The L_{eq} represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. Table 5-1 identifies the hourly daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) noise levels at each noise level measurement location. Appendix 5.1 provides a summary of the existing hourly ambient noise levels described below:

L1: Location L1 represents Murrieta Fire Station No. 4 at 28155 Baxter Road, approximately 60 feet north of the Project site. The noise level measurements collected show an overall 24-hour exterior noise level of 49.2 dBA L_{eq}. The energy (logarithmic) average daytime noise level was calculated at 50.4 dBA L_{eq} with an average nighttime noise level of 45.8 dBA L_{eq}.

L2: Location L2 represents an existing residence at 28411 Cottage Way, approximately 115 feet north of the Project site. Receiver R2 is placed at the private outdoor use area. The noise level measurements collected show an overall 24-hour exterior noise level of 57.8 dBA L_{eq}. The energy (logarithmic) average daytime noise level was calculated at 59.3 dBA L_{eq} with an average nighttime noise level of 53.0 dBA L_{eq}.

L3: Location L3 represents an existing residence at 28555 Running Rabbit Road, approximately 358 feet southeast of the Project site. Receiver R3 is placed at the private outdoor living area (backyard). The noise level measurements collected show an overall 24-hour exterior noise level of 48.5 dBA L_{eq}. The energy (logarithmic) average daytime noise level was calculated at 49.8 dBA L_{eq} with an average nighttime noise level of 44.5 dBA L_{eq}.

L4: Location L4 represents the existing residence at 28393 Somers Road, approximately 633 feet south of the Project site. Receiver R4 is placed at the private outdoor living area (backyard). The noise level measurements collected show an overall 24-hour exterior noise level of 49.5 dBA L_{eq}. The energy (logarithmic) average daytime noise level was calculated at 50.8 dBA L_{eq} with an average nighttime noise level of 45.5 dBA L_{eq}.

L5: Location L5 represents an existing residence at 35256 McElwain Road, approximately 451 feet west-southwest of the Project site and west of I-215. Receiver R5 is placed at the private outdoor living area (backyard). The noise level measurements collected show an overall 24-hour exterior noise level of 66.0 dBA L_{eq}. The energy (logarithmic) average daytime noise level was calculated at 67.0 dBA L_{eq} with an average nighttime noise level of 63.7 dBA L_{eq}.

L6: Location L6 represents an existing residence at 34970 Antelope Road, approximately 808 feet west-northwest of the Project site. Receiver R5 is placed at the private outdoor living area (backyard). The noise level measurements collected show an overall 24-hour exterior noise level of 67.8 dBA L_{eq}. The energy (logarithmic) average daytime noise level was calculated at 68.7 dBA L_{eq} with an average nighttime noise level of 65.7 dBA L_{eq}.

L7: Location L7 represents the Loma Linda University Health facility, at 28062 Baxter Road, approximately 864 feet northwest of the Project site. Receiver R5 is placed at nearest

location someone may stand for up to one hour. The noise level measurements collected show an overall 24-hour exterior noise level of 60.8 dBA L_{eq}. The energy (logarithmic) average daytime noise level was calculated at 61.3 dBA L_{eq} with an average nighttime noise level of 59.8 dBA L_{eq}.

Table 5-1 provides the (energy average) noise levels used to describe the daytime and nighttime ambient conditions. These daytime and nighttime energy average noise levels represent the average of all hourly noise levels observed during these time periods expressed as a single number. Appendix 5.1 provides summary worksheets of the noise levels for each hour as well as the minimum, maximum, L_1, L_2, L_5, L_8, L_{25}, L_{50}, L_{90}, L_{95}, and L_{99} percentile noise levels observed during the daytime and nighttime periods.

The background ambient noise levels in the Project study area are dominated by the transportation-related noise associated with the arterial roadway network, including I-215. The 24-hour existing noise level measurements shown on Table 5-1 present the existing ambient noise conditions.

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

Location[1]	Description	Energy Average Noise Level (dBA L_{eq})[2]		24-Hour L_{eq}
		Daytime	Nighttime	
L1	Location L1 represents Murrieta Fire Station No. 4 at 28155 Baxter Road, approximately 60 feet north of the Project site.	50.4	45.8	49.2
L2	Location L2 represents an existing residence at 28411 Cottage Way, approximately 115 feet north of the Project site.	59.3	53.0	57.8
L3	Location L3 represents an existing residence at 28555 Running Rabbit Road, approximately 358 feet southeast of the Project site.	49.8	44.5	48.5
L4	Location L4 represents the existing residence at 28393 Somers Road, approximately 633 feet south of the Project site.	50.8	45.5	49.5
L5	Location L5 represents an existing residence at 35256 McElwain Road, approximately 451 feet west of the Project site.	67.0	63.7	66.0
L6	Location L6 represents an existing residence at 34970 Antelope Road, approximately 808 feet northwest of the Project site.	68.7	65.7	67.8
L7	Location L7 represents the Loma Linda University Health facility, at 28062 Baxter Road, approximately 864 feet northwest of the Project site.	61.3	59.8	60.8

[1] See Exhibit 5-A for the noise level measurement locations.
[2] Energy (logarithmic) average levels. The long-term 24-hour measurement worksheets are included in Appendix 5.".
"Dayt"me" = 7:00 a.m. to 10:00 p.m"; "Nightt"me" = 10:00 p.m. to 7:00 a.m.

EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS

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6 TRAFFIC NOISE METHODS AND PROCEDURES

A noise impact analysis has been completed to determine the noise exposure levels that would result from off-site traffic noise sources, and to identify potential noise mitigation measures that would achieve acceptable Project exterior and interior noise levels. The primary source of traffic noise affecting the Project site is anticipated to be from Baxter Road, Whitewood Road, Warm Springs Road, and I-215. The Project would also be exposed to nominal traffic noise from the Project's internal local streets. However, due to low traffic volumes/speeds, traffic noise from these roads will not make a substantive contribution to ambient noise conditions. This section outlines the methods and procedures used to model and analyze the future on-site noise environment, analyzes on-site exterior, and interior noise levels at the Project buildings.

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. (20) 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. (21) 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 condition ("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 ADT volumes used for this analysis are presented on Table 6-1. Based on the City of Murrieta General Plan Circulation Element, Exhibit 5-10, Baxter Road, Whitewood Road, and Warm Spring Road are classified as Major Roadways. (22) To predict the future on-site noise environment at the Project site, the City of Murrieta General Plan Circulation Element Table 5-2 *Daily Roadway Capacity Values* were used. The traffic volumes shown on Table 6-1 reflect future long-range traffic conditions needed to assess the future on-site traffic noise environment and to identify potential mitigation measures (if any) that address the worst-case future conditions. For the purposes of this analysis, soft site conditions were used to analyze the on-site traffic noise impacts for the Project study area. Soft site conditions account for the sound propagation loss over natural surfaces such as normal earth and ground vegetation. Research conducted by Caltrans has shown that the use of soft site conditions is appropriate for the application of the FHWA traffic noise prediction model used in this analysis. (23)

TABLE 6-1: ON-SITE ROADWAY PARAMETERS

Roadway	Lanes	Classification[1]	Daily Roadway Capacity Volume[2]	Posted Speed Limit (mph)[3]	Site Conditions
Baxter Road	6	Urban Arterial	43,100	40	Soft
Whitewood Road	4	Major	27,300	45	Soft
I-215	6	Freeway	200,000	65	Soft
Antelope Rd	2	Industrial Collector	10,400	50	Soft
Warm Springs Rd	4	Urban Arterial	27,300	40	Soft

[1] Source: City of Murrieta General Plan Circulation Element, Exhibit 5-10.
[2] Roadway traffic volumes were obtained from the City of Murrieta General Plan Circulation Element, Table 5-2.
[3] Posted speed limit on Whitewood Road.

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%

Source: Typical Southern California vehicle mix.

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%

Source: Typical Southern California vehicle mix.

To predict the future noise environment at potential building locations 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 Tentative Map, see Exhibit 1-B, showing the plotting of the lots in relationship to Baxter Road, Whitewood Road, and I-215.

The exterior noise level impacts at the first-floor buildilade were placed five feet above the pad elevation. For modeling purposes, all buildings were assumed to be 3-stories high. All second-

floor receivers were located 14 feet above the proposed finished floor elevation. All third-floor receivers were located 23 feet above the proposed finished floor elevation.

6.3 OFF-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

Table 6-4 identifies the three off-site study area roadway segments, the distance from the centerline to adjacent land use based on the functional roadway classifications per the City of Murrieta General Plan Connected City Element, and the posted vehicle speeds. Consistent with the Traffic Analysis prepared by Urban Crossroads, Inc. (24) the off-site traffic noise analysis includes the following traffic scenarios.

- Existing
- Existing Plus Project (E+P)
- Cumulative Year 2040 (CY)
- Cumulative Year 2040 Plus Project (CY+P)

The average daily traffic (ADT) volumes used for this study are presented on Table 6-5. Table 6-2 and Table 6-3 provides the time of day (daytime, evening, and nighttime) vehicle splits used for calculating CNEL values.

TABLE 6-4: OFF-SITE ROADWAY PARAMETERS

ID	Roadway	Segment	Receiving Land Use[1]	Classification[2]	Centerline Distance to Receiving Land Use (Feet)[3]	Vehicle Speed (mph)
1	Baxter Rd	w/o Whitewood Rd	Sensitive	Major	94’	40
2	Baxter Rd.	e/o Whitewood Rd	Sensitive	Major	94’	40
3	Whitewood Rd	n/o Baxter Rd	Sensitive	Major	100’	45
4	Whitewood Rd	s/o Baxter Rd	Sensitive	Major	100’	45
5	Whitewood Rd	s/o Running Rabbit Rd	Sensitive	Major	100’	45
6	Whitewood Rd	s/o Keller	Sensitive	Major	89’	45
7	Whitewood Rd	n/o Keller	Sensitive	Major	89’	45
8	Whitewood Rd	s/o Scott Rd	Sensitive	Major	90’	45
9	Scott Rd	w/o Whitewood Rd	Sensitive	Major	91’	45
10	Antelope Road	s/o Scott Rd	Sensitive	Collector	92’	50

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] City of Murrieta General Plan Circulation Element.
[3] Based upon the right-of-way distances for each roadway classification provided in the General Plan Circulation Element.

TABLE 6-5: AVERAGE DAILY TRAFFIC VOLUMES

ID	Roadway	Segment	Average Daily Traffic Volumes[1]			
			Existing		Cumulative (2040)	
			Without Project	With Project	Without Project	With Project
1	Baxter Rd	w/o Whitewood Rd	3,279	5,138	18,328	20,187
2	Baxter Rd.	e/o Whitewood Rd	1,176	1,667	1,834	1,834
3	Whitewood Rd	n/o Baxter Rd	16,371	18,145	24,539	26,313
4	Whitewood Rd	s/o Baxter Rd	19,539	20,340	29,219	30,020
5	Whitewood Rd	s/o Running Rabbit Rd	26,563	27,364	29,218	30,020
6	Whitewood Rd	s/o Keller	11,372	13,144	18,765	20,537
7	Whitewood Rd	n/o Keller	10,506	11,926	16,823	18,343
8	Whitewood Rd	s/o Scott Rd	11,434	12,856	16,861	18,283
9	Scott Rd	w/o Whitewood Rd	28,114	28,824	35,101	35,811
10	Antelope Road	s/o Scott Rd	12,906	13,262	15,988	16,344

[1] Discovery Village Traffic Analysis, Urban Crossroads, Inc.

7 ON-SITE NOISE ANALYSIS

7.1 EXTERIOR NOISE ANALYSIS

Using the FHWA traffic noise prediction model, and the parameters outlined in Section 6.2, the expected future exterior noise levels at the anticipated location of building façades were calculated. Table 7-1 presents a summary of future exterior noise level impacts at the first-, second-, and third-floor receiver locations. While the actual design of on-site buildings has not been completed, this analysis assesses all lots with 3-story structures. The on-site transportation noise level impacts indicate that the unmitigated exterior noise levels will range from 55.0 to 80.5 dBA CNEL. The on-site traffic noise analysis calculations are provided in Appendix 7.1.

TABLE 7-1: UNMITIGATED EXTERIOR TRAFFIC NOISE LEVELS

On-Site Receiver Location	Roadway	Unmitigated Exterior Noise Level (dBA CNEL)[1]		
		1st Floor	2nd Floor	3rd Floor
Lot 1	I-215	80.3	80.5	80.4
Lot 2-e	Warm Springs Rd	72.9	72.7	72.0
Lot 2-w	I-215	66.1	66.1	66.1
Lot 3-e	Warm Springs Rd	72.9	72.7	72.0
Lot 3-w	Baxter Road	60.6	60.6	60.6
Lot 4-n	Baxter Road	71.8	72.1	71.5
Lot 4-w	Warm Springs Rd	72.9	72.7	72.0
Lot 5-e	Whitewood Road	71.3	71.5	71.0
Lot 5-n	Baxter Road	71.8	72.1	71.5
Lot 6	Warm Springs Rd	72.9	72.7	72.0
Lot 7	Warm Springs Rd	72.9	72.7	72.0
Lot 8	Whitewood Road	71.3	71.5	71.0

[1] Exterior noise calculations at the building façade are shown in Appendix 7.1.

Lots 1-3 are non-residential and are exposed to noise levels ranging from 60.6 to 80.5 dBA CNEL. Noise levels less than 70 CNEL are considered normally acceptable, noise levels up to 77.5 are conditionally acceptable, and noise levels up to 85 are normally unacceptable for business commercial and professional land uses. Residential lots 4, 5, 6, 7, and 8 are exposed to the *normally unacceptable* noise levels between 70 and 75 dBA CNEL. Based on the noise levels interior noise analyses are necessary for all lots to determine necessary insulation and building components are included in the project design.

Due to the noise levels at building facades along Baxter Road and Whitewood Road, additional interior noise analysis is required to satisfy the General Plan Noise Element residential land use requirements within the Project site (2).

7.2 INTERIOR NOISE ANALYSIS

To ensure that the Project provides an acceptable interior noise environment, this analysis relies on the City of Murrieta 45 dBA CNEL interior noise limit for new residential construction and 50 dBA L_{eq} for occupied spaces of non-residential land uses.

7.2.1 NOISE REDUCTION METHODOLOGY

The interior noise level is the difference between the predicted exterior noise level at the building façade and the noise reduction of the structure. Typical residential 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.” (25) (26) Similarly, typical commercial building construction will provide a NR of approximately 12 dBA with “windows open” and a minimum 30 dBA noise reduction with "window” closed." However, sound leaks, cracks and openings within the window assembly can greatly diminish its effectiveness in reducing noise through structures. 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 assembles free of cut outs or openings.

7.2.2 INTERIOR NOISE LEVEL ASSESSMENT

Tables 7-2 to 7-4 show that all residential units will require a windows-closed condition and a means of mechanical ventilation (e.g., air conditioning). Interior noise levels are provided for each floor.

Table 7-2 shows that the future noise levels at the potential first-floor residential building façades are estimated to range from 71.3 to 72.9 dBA CNEL. Based on 25 dBA CNEL reduction, the interior noise levels would range from 46.3 to 47.9 dBA CNEL.

Table 7-2 shows that the future noise levels at the potential first-floor commercial building façades are estimated to range from 60.6 to 80.3 dBA CNEL. Based on 30 dBA CNEL reduction, the interior noise levels would range from 30.6 to 50.3 dBA CNEL.

The first-floor interior noise level analysis shows that residential buildings on Lots 4 through 8, facing Baxter Road, Warm Springs Road, and Whitewood Road, would require window or dwelling unit entry door to have STC 28 to comply with the City of Murrieta 45 dBA CNEL interior noise standard.

The following measure (Noise-1) is recommend to comply with the City of Murrieta 45 dBA CNEL interior noise standard:

Noise-1: All residential windows or entry doors facing Baxter Road, Warm Spring Road, and Whitewood Road shall have the following minimum Sound Transmission Class (STC) rating of 28.

The first-floor interior noise level analysis shows that non-residential buildings on Lot 1 facing I-215, would require window and entry door to have STC 31 to comply with the State 50 dBA L_{eq}

interior noise standard. All other lots can satisfy the 50 dBA L_{eq} interior noise standards with standard windows and dwelling unit entry doors and mechanical ventilation.

The following measure (Noise-2) is recommend to comply with the State 50 dBA L_{eq} interior noise standards for occupied spaced in non-residential buildings:

Noise-2: All commercial windows or entry doors on Lot 1 facing I-215 shall have a minimum Sound Transmission Class (STC) rating of 31.

Table 7-3 shows the future noise levels at the second-floor building façade are estimated to range from 60.6 to 80.5 dBA CNEL with interior noise levels ranging from 30.6 to 50.5 dBA CNEL. Table 7-4 shows the future noise levels at the third-floor building façades are estimated to range from 60.6 to 80.4 dBA CNEL with interior noise levels ranging from 30.6 to 50.4 dBA CNEL.

The second-floor and third-floor interior noise level analysis shows that second-floor residential locations, would also require windows and dwelling unit entry doors to have STC 28 to comply with the 45 dBA CNEL interior noise standard and non-residential buildings on Lot 1 may require windows and entry doors to have an STC of 31 to comply with the States 50 dBA L_{eq} standard for occupied spaces of non-residential buildings.

TABLE 7-2: FIRST FLOOR INTERIOR TRAFFIC NOISE LEVELS

Receiver Location	Noise Level at Façade[1]	Required Interior NR[2]	Minimum Calculated Interior NR[3]	Interior Noise Level[4]	Threshold	Threshold Exceeded?
Lot 1	80.3	30.3	30.0	50.3	50	Yes
Lot 2-e	72.9	22.9	30.0	42.9	50	No
Lot 2-w	66.1	16.1	30.0	36.1	50	No
Lot 3-e	72.9	27.9	30.0	42.9	45	No
Lot 3-w	60.6	15.6	30.0	30.6	45	No
Lot 4-n	71.8	26.8	25.0	46.8	45	Yes
Lot 4-w	72.9	27.9	25.0	47.9	45	Yes
Lot 5-e	71.3	26.3	25.0	46.3	45	Yes
Lot 5-n	71.8	26.8	25.0	46.8	45	Yes
Lot 6	72.9	27.9	25.0	47.9	45	Yes
Lot 7	72.9	27.9	25.0	47.9	45	Yes
Lot 8	71.3	26.3	25.0	46.3	45	Yes

[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 City of Murrieta General Plan 45 dBA CNEL interior noise standard for residential uses.
[3] Minimum calculated interior noise reduction from all rooms for each unit plan as shown on Table 7-1.
[4] Does the required interior noise reduction trigger upgraded windows with a minimum STC rating of greater than 27?
[5] Estimated interior noise level with minimum STC rating for all windows.
"NR" = Noise Reduction

TABLE 7-3: SECOND FLOOR INTERIOR TRAFFIC NOISE LEVELS

Receiver Location	Noise Level at Façade[1]	Required Interior NR[2]	Minimum Calculated Interior NR[3]	Interior Noise Level[4]	Threshold	Threshold Exceeded?
Lot 1	80.5	30.5	30.0	50.5	50	Yes
Lot 2-e	72.7	22.7	30.0	42.7	50	No
Lot 2-w	66.1	16.1	30.0	36.1	50	No
Lot 3-e	72.7	27.7	30.0	42.7	45	No
Lot 3-w	60.6	15.6	30.0	30.6	45	No
Lot 4-n	72.1	27.1	25.0	47.1	45	Yes
Lot 4-w	72.7	27.7	25.0	47.7	45	Yes
Lot 5-e	71.5	26.5	25.0	46.5	45	Yes
Lot 5-n	72.1	27.1	25.0	47.1	45	Yes
Lot 6	72.7	27.7	25.0	47.7	45	Yes
Lot 7	72.7	27.7	25.0	47.7	45	Yes
Lot 8	71.5	26.5	25.0	46.5	45	Yes

[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 City of Murrieta General Plan 45 dBA CNEL interior noise standard for residential uses.
[3] Minimum calculated interior noise reduction from all rooms for each unit plan as shown on Table 7-1.
[4] Does the required interior noise reduction trigger upgraded windows with a minimum STC rating of greater than 27?
[5] Estimated interior noise level with minimum STC rating for all windows.
"NR" = Noise Reduction

TABLE 7-4: THIRD FLOOR INTERIOR TRAFFIC NOISE LEVELS

Receiver Location	Noise Level at Façade[1]	Required Interior NR[2]	Minimum Calculated Interior NR[3]	Interior Noise Level[4]	Threshold	Threshold Exceeded?
Lot 1	80.4	30.4	30.0	50.4	50	Yes
Lot 2-e	72.0	22.0	30.0	42.0	50	No
Lot 2-w	66.1	16.1	30.0	36.1	50	No
Lot 3-e	72.0	22.0	30.0	42.0	50	No
Lot 3-w	60.6	10.6	30.0	30.6	50	No
Lot 4-n	71.5	26.5	25.0	46.5	45	Yes
Lot 4-w	72.0	27.0	25.0	47.0	45	Yes
Lot 5-e	71.0	26.0	25.0	46.0	45	Yes
Lot 5-n	71.5	26.5	25.0	46.5	45	Yes
Lot 6	72.0	27.0	25.0	47.0	45	Yes
Lot 7	72.0	27.0	25.0	47.0	45	Yes
Lot 8	71.0	26.0	25.0	46.0	45	Yes

[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 City of Murrieta General Plan 45 dBA CNEL interior noise standard for residential uses.
[3] Minimum calculated interior noise reduction from all rooms for each unit plan as shown on Table 7-1.
4 Estimated interior noise level with minimum STC rating for all windows.
"NR" = Noise Reduction

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8 OFF-SITE TRANSPORTATION NOISE IMPACTS

To assess the off-site transportation CNEL noise level impacts associated with development of the proposed Project, noise contours were developed based on *Discovery Village Traffic Impact Analysis*. (27) Noise contour boundaries represent the equal levels of noise exposure and are measured in CNEL from the center of the roadway. Noise contours were developed for the following traffic scenarios:

- Existing Conditions Without Project: This scenario refers to the existing present-day noise conditions without the proposed Project.
    1. Existing With Project: This scenario refers to the existing present-day noise conditions with the proposed Project.
- Cumulative Year 2040 Without the Project: This scenario refers to Year 2040 cumulative noise conditions without the proposed Project.
    1. Cumulative Year 2040 Year With Project: This scenario includes all cumulative projects identified in the *Traffic Impact Analysis*.

8.1 TRAFFIC NOISE CONTOURS

Noise contours were'used to assess the Project's incremental traffic-related noise impacts at land uses adjacent to roadways conveying Project traffic. The noise contours represent the distance to noise levels of a constant value and are measured from the center of the roadway for the 70, 65, and 60 dBA noise levels. The noise contours do not consider the effect of any existing noise barriers or topography that may attenuate ambient noise levels. In addition, because the noise contours reflect modeling of vehicular noise on area roadways, they appropriately do not reflect noise contributions from the surrounding stationary noise sources within the Project study area. Tables 8-1 and 8-4 present a summary of the exterior traffic noise levels, without barrier attenuation, for the seven study area roadway segments analyzed from the without Project to the With Project conditions for Existing and Cumulative Year 2040 conditions. Appendix 8.1 includes a summary of the traffic noise level contours for each of the traffic scenarios.

TABLE 8-1: EXISTING WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Baxter Rd	w/o Whitewood Rd	Sensitive	63.1	17	37	81
2	Baxter Rd	e/o Whitewood Rd	Sensitive	58.7	9	19	41
3	Whitewood Rd	n/o Baxter Rd	Sensitive	71.4	62	133	286
4	Whitewood Rd	s/o Baxter Rd	Sensitive	72.1	69	149	322
5	Whitewood Rd	s/o Running Rabbit Rd	Sensitive	73.5	85	183	395
6	Whitewood Rd	s/o Keller	Sensitive	69.8	48	104	224
7	Whitewood Rd	n/o Keller	Sensitive	69.4	46	99	213
8	Whitewood Rd	s/o Scott Rd	Sensitive	69.8	48	104	225
9	Scott Rd	w/o Whitewood Rd	Sensitive	73.7	88	190	410
10	Antelope Rd	s/o Scott Rd	Sensitive	72.3	47	102	220

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 8-2: EXISTING WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Baxter Rd	w/o Whitewood Rd	Sensitive	65.1	RW	RW	RW
2	Baxter Rd	e/o Whitewood Rd	Sensitive	60.2	RW	RW	RW
3	Whitewood Rd	n/o Baxter Rd	Sensitive	71.8	RW	142	306
4	Whitewood Rd	s/o Baxter Rd	Sensitive	72.3	RW	153	330
5	Whitewood Rd	s/o Running Rabbit Rd	Sensitive	73.6	RW	187	403
6	Whitewood Rd	s/o Keller	Sensitive	70.4	RW	115	247
7	Whitewood Rd	n/o Keller	Sensitive	70.0	RW	107	231
8	Whitewood Rd	s/o Scott Rd	Sensitive	70.3	RW	113	243
9	Scott Rd	w/o Whitewood Rd	Sensitive	73.8	RW	193	417
10	Antelope Rd	s/o Scott Rd	Sensitive	72.5	RW	104	224

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 8-3: CUMULATIVE YEAR 2040 WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Baxter Rd	w/o Whitewood Rd	Sensitive	70.6	RW	RW	254
2	Baxter Rd	e/o Whitewood Rd	Sensitive	60.6	RW	RW	RW
3	Whitewood Rd	n/o Baxter Rd	Sensitive	73.1	RW	174	374
4	Whitewood Rd	s/o Baxter Rd	Sensitive	73.9	RW	195	421
5	Whitewood Rd	s/o Running Rabbit Rd	Sensitive	73.9	RW	195	421
6	Whitewood Rd	s/o Keller	Sensitive	72.0	RW	145	313
7	Whitewood Rd	n/o Keller	Sensitive	71.5	RW	135	291
8	Whitewood Rd	s/o Scott Rd	Sensitive	71.5	RW	135	292
9	Scott Rd	w/o Whitewood Rd	Sensitive	74.7	102	221	475
10	Antelope Rd	s/o Scott Rd	Sensitive	73.3	RW	118	253

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 8-4: CUMULATIVE YEAR 2040 WITH PROJECT CONDITIONS NOISE

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Baxter Rd	w/o Whitewood Rd	Sensitive	71.0	RW	RW	271
2	Baxter Rd	e/o Whitewood Rd	Sensitive	60.6	RW	RW	RW
3	Whitewood Rd	n/o Baxter Rd	Sensitive	73.4	RW	182	392
4	Whitewood Rd	s/o Baxter Rd	Sensitive	74.0	RW	199	428
5	Whitewood Rd	s/o Running Rabbit Rd	Sensitive	74.0	RW	199	428
6	Whitewood Rd	s/o Keller	Sensitive	72.3	RW	154	333
7	Whitewood Rd	n/o Keller	Sensitive	71.9	RW	143	308
8	Whitewood Rd	s/o Scott Rd	Sensitive	71.8	RW	143	308
9	Scott Rd	w/o Whitewood Rd	Sensitive	74.8	104	224	482
10	Antelope Rd	s/o Scott Rd	Sensitive	73.4	RW	119	257

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

8.2 EXISTING PROJECT TRAFFIC NOISE LEVEL CONTRIBUTIONS

An analysis of Existing traffic noise levels plus traffic noise generated by the proposed Project has been included in this report. However, the analysis of existing traffic noise levels plus traffic noise generated by the proposed Project scenario will not actually occur since the Project would not be fully constructed and operational until Year 2040 cumulative conditions.

Table 8-1 shows the Existing without Project conditions CNEL noise levels. The Existing without Project exterior noise levels are expected to range from 58.7 to 73.7 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 8-2 shows the Existing with Project conditions range from 60.2 to 73.8 dBA CNEL. Table 8-5 shows that the Project off-site traffic noise level increases range from 0.1 to 2.0 dBA CNEL on the study area roadway segments.

8.3 YEAR 2040 CUMULATIVE PROJECT TRAFFIC NOISE LEVEL CONTRIBUTIONS

Table 8-3 presents the Year 2040 Cumulative without Project conditions CNEL noise levels. The Year 2040 Cumulative without Project exterior noise levels are expected to range from 60.6 to 74.7 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography.

Table 8-4 shows the Year 2040 Cumulative with Project conditions range from 60.6 to 74.8 dBA CNEL. Table 8-6 shows that the Project off-site traffic noise level increases range from 0.0 to 0.4 dBA CNEL. Based on the significance criteria for off-site traffic noise, land uses adjacent to the study area roadway segments would experience *less than significant* noise level impacts due to unmitigated Project-related traffic noise levels.

TABLE 8-5: EXISTING WITH PROJECT TRAFFIC NOISE LEVEL INCREASES

ID	Road	Segment	Receiving Land Use[1]	CNEL at Receiving Land Use (dBA)[2]			Incremental Noise Level Increase Threshold[3]	
				No Project	With Project	Project Addition	Limit	Exceeded?
1	Baxter Rd	w/o Whitewood Rd	Sensitive	63.1	65.1	2.0	3.0	No
2	Baxter Rd	e/o Whitewood Rd	Sensitive	58.7	60.2	1.5	5.0	No
3	Whitewood Rd	n/o Baxter Rd	Sensitive	71.4	71.8	0.4	1.5	No
4	Whitewood Rd	s/o Baxter Rd	Sensitive	72.1	72.3	0.2	1.5	No
5	Whitewood Rd	s/o Running Rabbit Rd	Sensitive	73.5	73.6	0.1	1.5	No
6	Whitewood Rd	s/o Keller	Sensitive	69.8	70.4	0.6	1.5	No
7	Whitewood Rd	n/o Keller	Sensitive	69.4	70.0	0.6	1.5	No
8	Whitewood Rd	s/o Scott Rd	Sensitive	69.8	70.3	0.5	1.5	No
9	Scott Rd	w/o Whitewood Rd	Sensitive	73.7	73.8	0.1	1.5	No
10	Antelope Rd	s/o Scott Rd	Sensitive	72.3	72.5	0.1	1.5	No

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.

[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the receiving land use.

[3] Does the Project create an incremental noise level increase exceeding the significance criteria (Table 4-1)?

TABLE 8-6: CUMULATIVE YEAR 2025 WITH PROJECT TRAFFIC NOISE LEVEL INCREASES

ID	Road	Segment	Receiving Land Use[1]	CNEL at Receiving Land Use (dBA)[2]			Incremental Noise Level Increase Threshold[3]	
				No Project	With Project	Project Addition	Limit	Exceeded?
1	Baxter Rd	w/o Whitewood Rd	Sensitive	70.6	71.0	0.4	1.5	No
2	Baxter Rd	e/o Whitewood Rd	Sensitive	60.6	60.6	0.0	3.0	No
3	Whitewood Rd	n/o Baxter Rd	Sensitive	73.1	73.4	0.3	1.5	No
4	Whitewood Rd	s/o Baxter Rd	Sensitive	73.9	74.0	0.1	1.5	No
5	Whitewood Rd	s/o Running Rabbit Rd	Sensitive	73.9	74.0	0.1	1.5	No
6	Whitewood Rd	s/o Keller	Sensitive	72.0	72.3	0.3	1.5	No
7	Whitewood Rd	n/o Keller	Sensitive	71.5	71.9	0.4	1.5	No
8	Whitewood Rd	s/o Scott Rd	Sensitive	71.5	71.8	0.3	1.5	No
9	Scott Rd	w/o Whitewood Rd	Sensitive	74.7	74.8	0.1	1.5	No
10	Antelope Rd	s/o Scott Rd	Sensitive	73.3	73.4	0.1	1.5	No

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the receiving land use.
[3] Does the Project create an incremental noise level increase exceeding the significance criteria (Table 4-1)?

9 SENSITIVE RECEIVER LOCATIONS

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

Sensitive receivers near the Project site include existing fire station north of the Project site, single-family residences north, across Baxter Road. 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: Location R1 represents Murrieta Fire Station No. 4 at 28155 Baxter Road, approximately 60 feet north of the Project site. Receiver R1 is placed at nearest location someone may stand for up to one hour. For analysis purposes this receiver is considered a multifamily residential land use. A 24-hour noise level measurement was taken near this location, L1, to describe the existing ambient noise environment.

R2: Location R2 represents an existing residence at 28411 Cottage Way, approximately 91 feet north of the Project site. Receiver R2 is placed at the private outdoor use area. This receiver is a single-family residential land use. A 24-hour noise level measurement was taken near this location, L2, to describe the existing ambient noise environment.

R3: Location R3 represents an existing residence at 28555 Running Rabbit Road, approximately 265 feet southeast of the Project site. Receiver R3 is placed at the private outdoor living area (backyard). This receiver is a single-family residential land use. A 24-hour noise level measurement was taken near this location, L3, to describe the existing ambient noise environment.

R4: Location R4 represents the existing residence at 28393 Somers Road, approximately 561 feet south of the Project site. Receiver R4 is placed at the private outdoor living area (backyard). This receiver is a single-family residential land use. A 24-hour noise level measurement was taken near this location, L4, to describe the existing ambient noise environment.

R5: Location R5 represents an existing residence at 35256 McElwain Road, approximately 451 feet west of the Project site. Receiver R5 is placed at the private outdoor living area (backyard). This receiver is a single-family residential land use. A 24-hour noise level

measurement was taken near this location, L5, to describe the existing ambient noise environment.

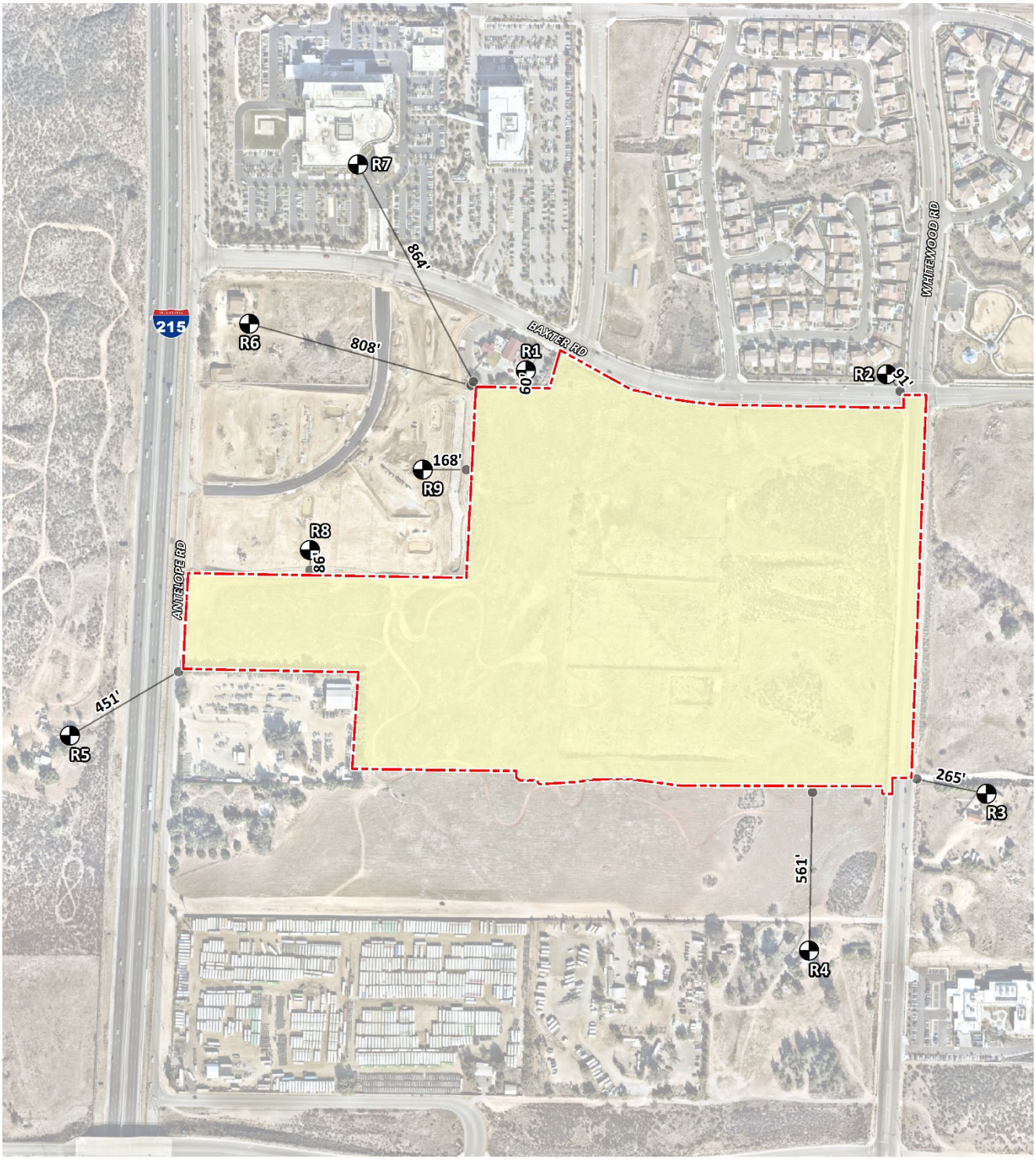
R6: Location R6 represents an existing residence at 34970 Antelope Road, approximately 808 feet northwest of the Project site. Receiver R5 is placed at the private outdoor living area (backyard). This receiver is a single-family residential land use. A 24-hour noise level measurement was taken near this location, L6, to describe the existing ambient noise environment.

R7: Location R7 represents the Loma Linda University Health facility, at 28062 Baxter Road, approximately 864 feet northwest of the Project site. Receiver R5 is placed at nearest location someone may stand for up to one hour. This receiver is a commercial land use. A 24-hour noise level measurement was taken near this location, L7, to describe the existing ambient noise environment.

R8 Location R8 represents a future proposed medical office building within the Makena Hills Development, at the southeast corner of Baxter Road, approximately 86 feet north of the Project site. Receiver R8 is placed at nearest location someone may stand for up to one hour. This receiver is a commercial land use.

R9 Location R9 represents a future proposed medical office building within the Makena Hills Development, approximately 168 feet east the Project site. Receiver R9 is placed at nearest location someone may stand for up to one hour. This receiver is a commercial land use.

EXHIBIT 9-A: RECEIVER LOCATIONS



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10 OPERATIONAL NOISE

This section analyzes the potential stationary-source operational noise impacts at the nearest receiver locations, identified in Section 9, resulting from the operation of the proposed Discovery Village Project.

10.1 OPERATIONAL NOISE SOURCES

RESIDENTIAL

The residential portion of the Project has not been designed at this stage of project development. The Discovery Village residential development on Lots 4 through 8 is not expected to include any specific type of operational noise levels beyond the typical noise sources associated with similar residential land uses in the Project study area, such as people and children, garage doors, small air conditioners, and trash collection, and is considered a noise-sensitive receiving land use. Therefore, potential operational noise impacts for the residential land use are not further analyzed in the noise study.

NON-RESIDENTIAL

Similar to the residential portion of the Project, the proposed innovation portion of the Project on Lot 1-3 has not been designed and building or lot layouts are not available. Unlike the residential portion of the Project, the innovation portion is anticipated to include potential noise sources that may impact the residential uses proposed on Lot 4 through 8 as well as surrounding land uses, as described below.

Mechanical HVAC Equipment

Heating, Ventilation, and Air Conditioning (HVAC) equipment could be a primary noise source associated with commercial or industrial uses. HVAC equipment is often mounted on rooftops, located on the ground, or located within mechanical rooms. The noise sources could take the form of fans, pumps, air compressors, chillers, or cooling towers.

Noise levels from HVAC equipment vary substantially depending on unit efficiency, size, and location, but generally range from 45 to 70 dBA Leq at a distance of 50 feet (28). Accounting for typical attenuation rates of 6 dB per doubling of distance, noise levels attributed to unshielded HVAC mechanical systems could exceed the City property line noise limit (50 dBA L_{eq}) within 475 feet of the source. In addition, sources located within 800 feet of a noise sensitive land use property line could exceed the City noise limit for nighttime stationary-source noise. As a result, the impact of noise from HVAC equipment under the Project would be *potentially significant*.

Loading Dock and Delivery Activity

Noise sources associated with loading dock and delivery activities can include trucks idling, on-site truck circulation, trailer-mounted refrigeration units, pallets dropping, and the operation of forklifts. Typical hourly noise levels for loading dock operations range from 55 to 60 dBA L_{eq} and from 80 to 84 dBA L_{max} (maximum noise level) at a distance of 50 feet. Based on these measured

noise levels, the City's daytime stationary noise criterion would be exceeded approximately 125 feet from the acoustic center of the loading dock and the nighttime stationary noise criterion would be exceeded approximately 200 feet from the acoustic center of the loading dock.

It is possible that the distance between loading docks and residential land uses could be less than 200 feet. Therefore, noise generated from loading dock and delivery activities is considered a potentially significant impact.

Therefore, measure Noise-3 would require best engineering practices to be used in the placement of noise generating equipment when developing site plans for commercial land uses containing HVAC units and loading docks such that noise levels at the property line comply with City standards. Development plans shall be accompanied by an acoustical analysis demonstrating compliance with City standards for approval prior to issuance of building permits.

Noise-3: Prior to the issuance of a building permit for non-residential development on Lots 1 through 3, the Property Owner/Developer shall prepare an acoustical study(ies) of proposed plans, which shall identify all noise-generating areas and associated equipment, predict noise levels at property lines from all identified areas, and recommended noise attenuation features to be implemented (e.g., enclosures, barriers, site orientation, reduction of parking stalls), as necessary, to comply with the City Municipal Code Section 16.030.090.

11 CONSTRUCTION IMPACTS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project. Exhibit 11-A shows the construction noise source locations in relation to the nearby sensitive receiver locations previously described in Section 9.

11.1 CADNAA NOISE PREDICTION MODEL

To fully describe the construction noise levels from the Project, Urban Crossroads, Inc. developed a noise prediction model using the CadnaA (Computer Aided Noise Abatement) computer program. CadnaA can analyze multiple types of noise sources using the spatially accurate Project site plan, georeferenced Nearmap aerial imagery, topography, buildings, and barriers in its calculations to predict outdoor noise levels. This includes the additional noise attenuation provided by the existing intervening building structures located on-site and would block the line-of-sight between the Project noise sources and the nearest existing off-site receiver locations.

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

The noise level calculations provided in this noise study account for the distance attenuation provided due to geometric spreading, when sound from a localized stationary source (i.e., a point source) propagates uniformly outward in a spherical pattern. A default ground attenuation factor of 0.5 was used in the noise analysis to account for the mixed hard and soft surfaces during construction activities.

11.2 TYPICAL CONSTRUCTION NOISE AND VIBRATION

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

- Site Preparation
- Grading
- Blasting
- Rock Crushing

EXHIBIT 11-A: TYPICAL CONSTRUCTION NOISE SOURCE LOCATIONS

- Building Construction
- Paving
- Architectural Coating

11.2.1 CONSTRUCTION REFERENCE NOISE LEVELS

To describe peak construction noise activities, this construction noise analysis was prepared using reference noise level measurements published in the Update of Noise Database for Prediction of Noise on Construction and Open Sites by the Department for Environment, Food and Rural Affairs (DEFRA). (29). The DEFRA database provides the most recent and comprehensive source of reference construction noise levels. Table 11-1 provides a summary of the DEFRA construction reference noise level measurements expressed in hourly average dBA L_{eq} using the estimated FHWA Roadway Construction Noise Model (RCNM) usage factors (30) to describe the typical construction activities for each stage of Project construction.

TABLE 11-1: TYPICAL CONSTRUCTION REFERENCE NOISE LEVELS

Construction Stage	Reference Construction Equipmnet[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})	Composite Reference Noise Level (dBA L_{eq})	Reference Power Level (dBA L_w)
Site Preparation	Tractor	80.0	82.9	114.5
	Front End Loader	75.0		
	Dozer	78.0		
Grading	Tractor	80.0	82.8	114.4
	Excavator	77.0		
	Compactor (ground)	76.0		
Building Construction	Crane	73.0	82.1	113.7
	Generator	78.0		
	Gradall	79.0		
Paving	Paver	74.0	77.8	109.5
	Dump Truck	72.0		
	Roller	73.0		
Architectural Coating	Man Lift	68.0	76.2	107.8
	Compressor (air)	74.0		
	Generator (<25kVA)	70.0		

[1] FHWA Road Construction Noise Model.

11.2.2 TYPICAL CONSTRUCTION NOISE ANALYSIS

Using the reference construction equipment noise levels and the CadnaA noise prediction model, calculations of the Project construction noise level impacts at the nearby sensitive receiver locations were completed. To assess the worst-case construction noise levels, the Project construction noise analysis relies on the highest noise level impacts when the equipment with the highest reference noise level is operating at the closest point from the edge of primary construction activity (Project site boundary) to each receiver location. As shown on Table 11-2,

the highest construction noise levels are expected to range from 52.6 to 62.3 dBA L_{eq} at the nearest receiver locations. Appendix 10.1 includes the detailed CadnaA construction noise model inputs.

TABLE 11-2: TYPICAL CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Receiver Location[1]	Construction Noise Levels (dBA L_{eq})					
	Site Preparation	Grading	Building Construction	Paving	Architectural Coating	Highest Levels[2]
R1	62.3	62.2	61.5	57.3	55.6	62.3
R2	60.1	60.0	59.3	55.1	53.4	60.1
R3	56.7	56.6	55.9	51.7	50.0	56.7
R4	55.4	55.3	54.6	50.4	48.7	55.4
R5	53.3	53.2	52.5	48.3	46.6	53.3
R6	53.9	53.8	53.1	48.9	47.2	53.9
R7	52.6	52.5	51.8	47.6	45.9	52.6
R8	61.1	61.0	60.3	56.1	54.4	61.1
R9	60.3	60.2	59.5	55.3	53.6	60.3

[1] Construction noise source and receiver locations are shown on Exhibit 11-A.
[2] Construction noise level calculations based on distance from the project site boundaries (construction activity area) to nearby receiver locations. CadnaA construction noise model inputs are included in Appendix 11.1.

The construction noise analysis presents a conservative approach with the highest noise-level-producing equipment for each stage of Project construction operating at the closest point from primary 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.

11.2.3 TYPICAL CONSTRUCTION NOISE LEVEL COMPLIANCE

To evaluate whether the Project will generate potentially significant short-term noise levels at nearest receiver locations, a construction-related daytime noise level threshold of 75 dBA L_{eq} is used as a reasonable threshold to assess the daytime construction noise level impacts. The construction noise analysis shows that the nearest receiver locations will satisfy the reasonable significance threshold during the daytime of 75 dBA L_{eq} at single family land uses (R2 through R6), 80 dBA L_{eq} at multi-family residential land uses (R1), and 85 dBA L_{eq} at commercial land uses (R7 through R9) during Project construction activities as shown on Table 11-3. Therefore, the noise impacts due to Project construction noise are considered *less than significant* at all receiver locations.

TABLE 11-3: TYPICAL CONSTRUCTION NOISE LEVEL COMPLIANCE

Receiver Location[1]	Construction Noise Levels (dBA L_{eq})		
	Highest Construction Noise Levels[2]	Threshold[3]	Threshold Exceeded?[4]
R1	62.3	80	No
R2	60.1	75	No
R3	56.7	75	No
R4	55.4	75	No
R5	53.3	75	No
R6	53.9	75	No
R7	52.6	85	No
R8	61.1	85	No
R9	60.3	85	No

[1] Noise receiver locations are shown on Exhibit 11-A.
[2] Highest construction noise level operating at the Project site boundary to nearby receiver locations (Table 10-2).
[3] City of Murrieta Noise Element, Table 11-3.
[4] Do the estimated Project construction noise levels exceed the construction noise level threshold?

11.2.4 TYPICAL 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. Ground-borne vibration levels resulting from typical construction activities occurring within the Project site were estimated by data published by the Federal Transit Administration (FTA). (31) 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 11-4. Based on the representative vibration levels presented for various construction equipment types, it is possible to estimate the potential Project construction vibration levels using the following vibration assessment methods defined by the FTA. To describe the human response (annoyance) associated with vibration impacts the FTA provides the following equation: $PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$

TABLE 11-4: TYPICAL VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	PPV (in/sec) at 25 feet
Small bulldozer	0.003
Crane	0.008
Hoe-Ram	0.089
Jackhammer	0.035
Loaded Trucks	0.076
Large bulldozer	0.089

Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual

Using the vibration source level of construction equipment provided on Table 11-4 and the construction vibration assessment methodology published by the FTA, it is possible to estimate the Project vibration impacts. Table 11-5 presents the expected typical construction vibration levels at the nearby receiver locations. At distances ranging from 60 to 864 feet from typical Project construction activities, construction vibration velocity levels are estimated to range from less than 0.00 to 0.02 PPV in/sec. Based on maximum acceptable continuous vibration threshold of 0.04 PPV in/sec, the typical Project construction vibration levels will satisfy the City of Murrieta thresholds at all receiver locations. Therefore, the Project-related vibration impacts are considered less than significant during the construction activities at the Project site.

In addition, the typical construction vibration levels at the nearest sensitive receiver locations are unlikely to be sustained during the entire construction period but will occur rather only during the times that heavy construction equipment is operating adjacent to the Project site boundaries.

11.3 ROCK CRUSHING NOISE AND VIBRATION

Rock crushing may be used during grading to reuse on-site excavated material. There are various phases in rock crushing also known as stations. These various stages exist because passing material through one stage alone may not be enough to crush the rock down to a desired shape and size.

TABLE 11-5: PROJECT CONSTRUCTION VIBRATION LEVELS

Receiver Location[1]	Distance to Const. Activity (Feet)[2]	Typical Construction Vibration Levels PPV (in/sec)[3]					Thresholds PPV (in/sec)[4]	Thresholds Exceeded?[5]
		Small bulldozer	Jack-hammer	Loaded Trucks	Large Bulldozer	Highest Vibration Level		
R1	60'	0.00	0.01	0.02	0.02	0.02	0.04	No
R2	91'	0.00	0.01	0.01	0.01	0.01	0.04	No
R3	265'	0.00	0.00	0.00	0.00	0.00	0.04	No
R4	561'	0.00	0.00	0.00	0.00	0.00	0.04	No
R5	451'	0.00	0.00	0.00	0.00	0.00	0.04	No
R6	808'	0.00	0.00	0.00	0.00	0.00	0.04	No
R7	864'	0.00	0.00	0.00	0.00	0.00	0.04	No
R8	86'	0.00	0.01	0.01	0.01	0.01	0.04	No
R9	168'	0.00	0.00	0.00	0.01	0.01	0.04	No

[1] Construction receiver locations are shown on Exhibit 11-A.
[2] Distance from receiver location to Project construction boundary.
[3] Based on the Vibration Source Levels of Construction Equipment (Table 11-4).
[4] City of Murrieta Municipal Code, Section 16.30.130 (K) (Appendix 3.1)
[5] Does the peak vibration exceed the acceptable vibration thresholds?
"PPV" = Peak Particle Velocity

It is common to use multiple crusher types within a project and set them up as stations in a circuit format to perform the necessary material reduction work. In many cases, primary, secondary, and tertiary, and quaternary stations are installed to reduce the rock to the desired size, shape, and consistency. Unlike typical construction activity, the rock crushing activity is assessed using the stationary source construction noise level limit.

11.3.1 ROCK CRUSHING CONSTRUCTION REFERENCE NOISE LEVELS

This analysis was completed to assess potential noise level impacts due to rock crushing activities. Exhibit 11-B shows the anticipated location of the crushing activity area in relation to the nearest receiver locations. The crushing construction noise analysis was prepared using reference construction equipment noise levels from the Federal Highway Administration (FHWA) published in the Roadway Construction Noise Model (RCNM), which includes a national database of construction equipment reference noise emission levels (32). Table 11-6 provides a summary of the reference average L_{eq} noise levels used to describe concrete crushing construction activities. The reference noise level summary describes construction activity noise levels with

multiple pieces of construction equipment operating simultaneously and includes source noise levels for a hoe ram or breaker representing a percussion hammer fitted to an excavator for breaking rock and a rock crushing activity including jaw crushers, a cone crusher, screens, and a conveyor system (33). A default ground attenuation factor of 0.5 was used in the CadnaA noise prediction model to account for mixed ground representing a combination of hard and soft surfaces.

TABLE 11-6: ROCK CRUSHING CONSTRUCTION REFERENCE NOISE LEVELS

Construction Stage	Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})	Combined Noise Level (dBA L_{eq})[2]	Sound Power Leve (dBA L_w)
Rock Crushing	Rock Crusher	89[1]	90	121.6
	Front End Loader	75[2]		
	Hoe Ram	83[2]		

[1] University District Rock Crusher Conditional Use Permit, 2011.
[2] FHWA's Roadway Construction Noise Model, January 2006.
[3] Represents the combined noise level for all equipment assuming they operate at the same time consistent with FTA Transit Noise and Vibration Impact Assessment guidance for general construction noise assessment.

11.3.2 ROCK CRUSHING CONSTRUCTION NOISE ANALYSIS AND COMPLIANCE

Using the reference crushing construction equipment noise levels and the CadnaA noise prediction model, calculations of the Project construction noise level impacts at nearest sensitive receiver locations were completed. To assess the worst-case construction noise levels, the Project construction noise analysis relies on the highest noise level impacts when multiple pieces of equipment with the highest reference noise level are operating at the closest point from the edge of primary construction activity (as shown on Exhibit 11-B) to each receiver location.

As shown on Table 11-7, the rock crushing construction noise levels are estimated to range from 53.2 to 68.7 dBA L_{eq} at the nearest receiver locations. The rock crushing construction noise analysis shows that the nearest receiver locations will satisfy the reasonable significance threshold during the daytime of 60 dBA L_{eq} at single family land uses (R2 through R6), 65 dBA L_{eq} at multi-family residential land uses (R1), and 70 dBA L_{eq} at commercial land uses (R7 through R9). Therefore, the noise impacts due to the Project rock crushing noise is considered *less than significant* at all receiver locations. Appendix 11.2 includes the detailed CadnaA rock crushing construction equipment noise model inputs.

EXHIBIT 11-B: ROCK CRUSHING ACTIVITIES AND RECEIVER LOCATIONS

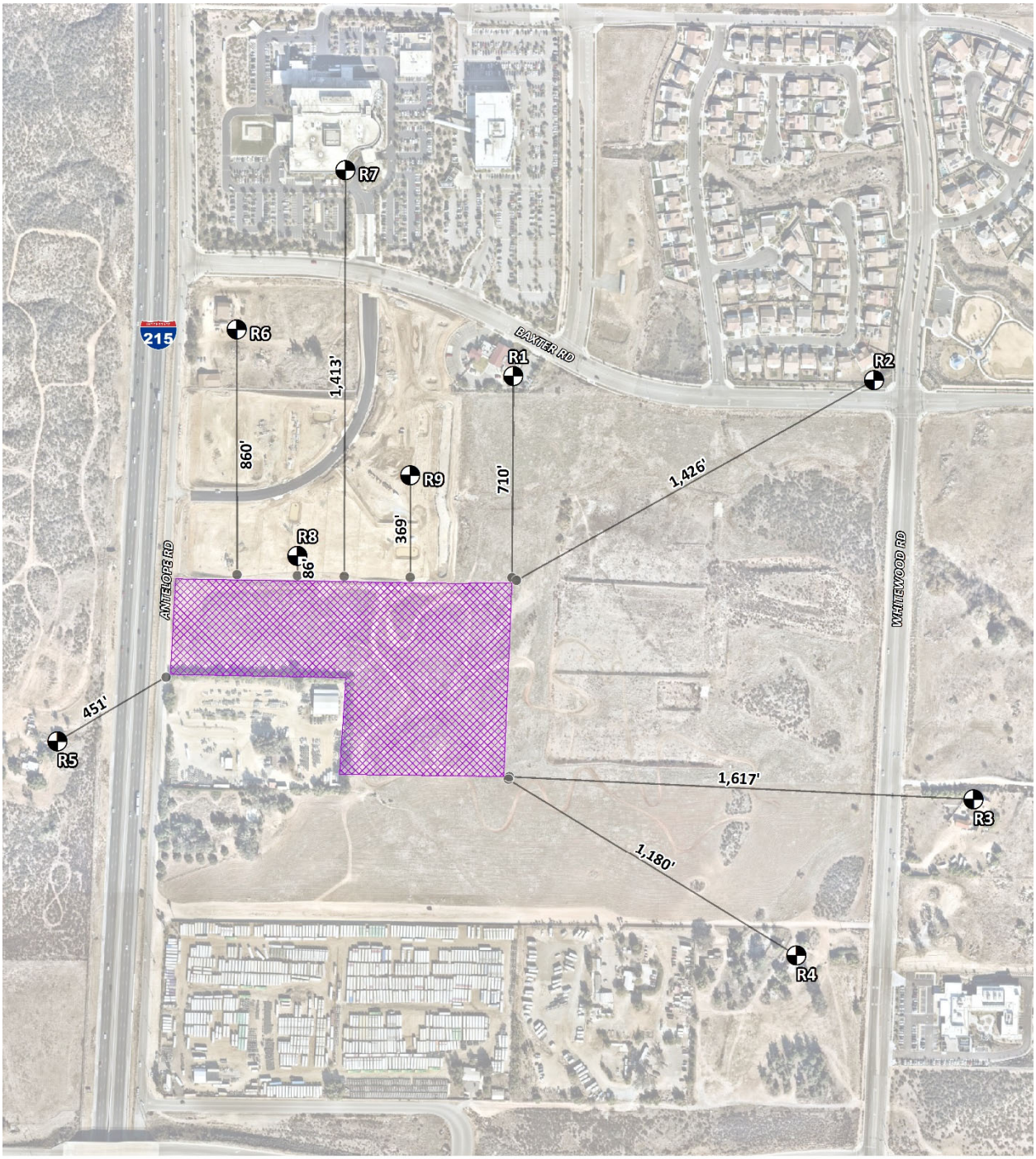

TABLE 11-7: ROCK CRUSHING CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Receiver Location[1]	Construction Noise Levels (dBA L_{eq})		
	Concrete Crushing[2]	Daytime Threshold[3]	Threshold Exceeded?[4]
R1	59.1	65	No
R2	53.8	60	No
R3	53.2	60	No
R4	54.9	60	No
R5	59.9	60	No
R6	58.2	60	No
R7	55.1	70	No
R8	68.7	70	No
R9	63.3	70	No

[1] Noise receiver locations are shown on Exhibit 11-B.
[2] Concrete crushing noise level calculations provided in Appendix 11.2
[3]City of Murrieta Noise Element Table 11-3
[4] Do the estimated Project construction noise levels exceed the daytime construction noise level threshold?

11.3.3 ROCK CRUSHING CONSTRUCTION VIBRATION ANALYSIS AND COMPLIANCE

Using the vibration source level of construction equipment list provided on Table 11-6 that includes source levels for a hoe ram or breaker representing a percussion hammer fitted to an excavator for breaking rock and the construction vibration assessment methodology published by the FTA, it is possible to estimate the Project rock crushing construction vibration impacts. Table 11-8 presents the expected rock crushing construction equipment vibration levels when the equipment with the highest reference vibration activity operating at the closest point from the edge of rock crushing activity to each receiver location.

At distances ranging from 95 feet to 1,617 feet from the rock crushing activities as shown on Exhibit 10-B, construction vibration levels are estimated to range from 0.00 to 0.01 PPV (in/sec) and will remain below the City of Murrieta 0.04 in/sec PPV threshold for vibration at all receiver locations. Therefore, the Project-related vibration impacts are considered *less than significant* during Project rock crushing construction activities at the Project site.

TABLE 11-8: ROCK CRUSHING EQUIPMENT VIBRATION LEVELS

Receiver Location[1]	Distance to Const. Activity (Feet)[2]	Typical Construction Vibration Levels PPV (in/sec)[3]					Thresholds PPV (in/sec)[4]	Thresholds Exceeded?[5]
		Small bulldozer	Jack-hammer	Loaded Trucks	Large Bulldozer	Highest Vibration Level		
R1	710'	0.00	0.00	0.00	0.00	0.00	0.04	No
R2	1,426'	0.00	0.00	0.00	0.00	0.00	0.04	No
R3	1,617'	0.00	0.00	0.00	0.00	0.00	0.04	No
R4	1,180'	0.00	0.00	0.00	0.00	0.00	0.04	No
R5	451'	0.00	0.00	0.00	0.00	0.00	0.04	No
R6	860'	0.00	0.00	0.00	0.00	0.00	0.04	No
R7	1,413'	0.00	0.00	0.00	0.00	0.00	0.04	No
R8	95'	0.00	0.00	0.01	0.01	0.01	0.04	No
R9	362'	0.00	0.00	0.00	0.00	0.00	0.04	No

[1] Construction receiver locations are shown on Exhibit 11-A.
[2] Distance from receiver location to Project construction boundary.
[3] Based on the Vibration Source Levels of Construction Equipment (Table 11-4).
[4] City of Murrieta Municipal Code, Section 16.30.130 (K) (Appendix 3.1)
[5] Does the peak vibration exceed the acceptable vibration thresholds?
"PPV" = Peak Particle Velocity

11.4 BLASTING NOISE AND VIBRATION IMPACTS

If blasting is determined to be required during excavation and grading, the blasting contractor is required to obtain blasting permit(s) from the City, and to notify City of Murrieta Police/Fire Department within 24 hours of planned blasting events. As outlined in Section 3.6, air overpressure regulations are identified by the U.S. Bureau of Mines and the ISEE's Blasters' Handbook. (11)

A blasting contractor would be required to complete all blasting-related activities in compliance with applicable regulations of the Riverside County Sheriff's Department, the U.S. Bureau of Mines, the California Division of Occupational Safety and Health (Cal-OHSA), the Department of Homeland Security, and the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF). As required by law a licensed blasting contractor would be responsible for performing and supervising all blasting activities, including the following:

1) Drill pattern design;
2) Pre-blast inspection;
3) Loading of explosives;
4) Pre-blast notifications and warning signaling;
5) Blasting safety procedures;
6) Blasting site security;
7) Post-blast inspections and re-entry procedures; and
8) Blast log and history.

Explosives used for blasting usually consist of a primer, secondary explosive, and an initiator. The blasting contractor would most likely use a high explosive Ammonia Gelatin as a primer for each shot and ammonium nitrate mixed with fuel oil (ANFO) as the primary blasting agent. Non-electric blasting caps are typically used to initiate the blasting agent. The charges are time delayed by at least 8-milliseconds. Delays between charges are used to decouple changes and reduce vibration.

Pattern blasting is a common technique used in blasting for construction. This method is used when rock materials occur over a wide area. Pattern blasting involves drilling holes in a pre-designed pattern. The depth and spacing of holes is controlled to provide the maximum fracture with the minimum amount of ground shaking.

Blasting patterns typically consist of drill holes between two and five inches in diameter. Depth of the drill holes would be determined by the blasting contractor and is specific to each application. Blasting patterns on construction sites typically range from three feet by three feet to 12 feet by 12 feet.

The Blasting Engineer would control blasting-induced vibration and noise. General control measures include:

1) Stemming shall be of uniform size in order to ensure consistency between individual shots;
2) The weight of explosives used per delay shall be determined by adherence to the Scaled Distance Equation;
3) Independent delays shall be used for each blast hole to control vibration; and
4) Blasting shall not take place when wind velocity equals or exceeds 15 miles per hour. A licensed blasting contractor will determine wind speed through the use of a recording anemometer located a minimum of ten feet above ground level.

In addition, ground vibrations and air overpressure shall be monitored during each blast for compliance with the limits by the U.S. Bureau of Mines. Following each blast, seismographs shall be checked to ensure that the blasting has not exceeded relevant standards. The relevant standards are as follows:

1) Pursuant to 30 CFR Ch. VII, §816.67(b)(1)(i) of U.S. Bureau of Mines publication RI8485, airblasts shall not exceed 133 dB at the location of any dwelling, public building, school, church, or community or institutional building outside the permit area.
2) Pursuant to 30 CFR Ch. VII, §816.67(d)(2)(i) of U.S. Bureau of Mines publication RI8508, the maximum ground vibration shall not exceed the limits in said section at the location of any dwelling, public building, school, church, or community or institutional building outside the permit area.

While there are specific blasting regulations and standards that have been designed to ensure that adverse impacts would not result from blasting operations, as there is no specific information on where or how much blasting would occur, the project's compliance with such federal and state regulations cannot be verified in this analysis. Therefore, if blasting is required, the Project should implement Noise-4 to demonstrate any required blasting activities comply with the thresholds in this analysis:

Noise-4: Where blasting is required, the following measures should be employed:

1) Blasting will be conducted only between the hours of 9:00 a.m. to 5:00 p.m. on weekdays only. Explosives will not be detonated on weekends or the following holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day.
2) All blasting will be done by a licensed blaster.
3) Pursuant to 30 CFR Ch. VII, §816.67(b)(1)(i) of U.S. Bureau of Mines publication RI8485, airblasts shall not exceed 133 dB at the location of any dwelling, public building, school, church, or community or institutional building.
4) Pursuant to 30 CFR Ch. VII, §816.67(d)(2)(i) of U.S. Bureau of Mines publication RI8508, the maximum ground vibration shall not exceed the limits in said section at the location of any dwelling, public building, school, church, or community or institutional building outside the permit area.
5) Blasting Notification
   a) All owners of non-vacant property within ¼ mile of the blast location will be notified at least 24 hours prior to blasting.
   b) Notify the City Of Murrieta Police Department at least 24 hours prior to blasting.
6) A record of notifications will be maintained and will be available for inspection by the City of Murietta.
7) All persons who conduct blasting operations will comply with all applicable State and federal laws governing the use and storage of explosives.
8) Blasting will be conducted in a manner that prevents injury to persons and damage to public or private property outside the project area.
9) A record of each blast will be made and provided to the City of Murietta within one week of the blast. The record is to be completed by the end of the work day during which the blast occurred, including the seismograph reading, if available, and will contain the following:
   a) Name of operator conducting the blast.
   b) The location, date and time of the blast.
   c) Name, signature and license number of the licensed blaster.
   d) Type of material blasted.
   e) Number of holes, burden and spacing.
   f) Diameter and depth of holes.
   g) Type of explosives used.
   h) Total weight of explosives used.
   i) Weight of explosives per hole.
   j) Maximum weight of explosives detonated within any eight (8) millisecond period.
   k) Maximum number of holes or decks detonated within any eight (8) millisecond period.
   l) Initiation system, including number of circuits and the time interval, if sequential timer is used.
   m) Type and length of stemming (deck and top).
   n) Type and detonator and delay periods used, in milliseconds.
   o) Distance and scaled distance to the closest protected structure.
   p) Maximum peak particle velocity will not exceed limits as set by U.S. Bureau of Mines 8507 Report at the location of any dwelling, public building, school, church or community or institutional building outside the blast area.
10) All blasting will be done with small charges and with the following protective best management practices, whenever feasible:
11) Two to four feet of rippable material will be left over the solid material to be blasted to serve as a cover to prevent excessive fly rock. Blasting mats may be used if overburden is not available. The blasting mats must be of suitable size and material to dampen noise and contain blasted materials.

12) The size of the shot will be limited by sound and vibration control levels and amount of area that can be blasted with good results.
13) Small diameter drilling with high-speed equipment will be used to reduce the amount of explosives used in each hole.
14) The use of delay blasting techniques will be used to reduce vibrations associated with the blast.
15) Material stockpiles will be placed, if available to help block blasting and material processing noise transmission off-site.
16) Blasting shots will be designed to minimize ground vibration and air blast.
17) Blasting will not occur during adverse weather conditions, such as high winds, unless a loaded charge must be detonated before the end of the day for safety reasons.

With the implementation of Noise-4, impacts related to vibration from blasting would result in a *less-than-significant impact*.

12 REFERENCES

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13 CERTIFICATION

The contents of this noise study report represent an accurate depiction of the noise environment and impacts associated with the proposed Discovery Village 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 (619) 788-1971.

William Maddux
Senior Associate
URBAN CROSSROADS, INC.
(619) 788-1971
bmaddux@urbanxroads.com

EDUCATION

Bachelor of Science in Urban and Regional Planning
California Polytechnic State University, Pomona • June 2000

PROFESSIONAL AFFILIATIONS

ASA – Acoustical Society of America
AEP – Association of Environmental Planners
AWMA – Air and Waste Management Association
INCE – Institute of Noise Control Engineers

PROFESSIONAL CERTIFICATIONS

Approved Acoustical Consultant • County of San Diego
FHWA Traffic Noise Model of Training • November 2004
CadnaA Basic and Advanced Training Certificate • October 2008.

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APPENDIX 3.1:

CITY OF MURRIETA MUNICIPAL CODE

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16.30 Noise

Sections:

16.30.010 Purpose.

16.30.020 Declaration of Policy.

16.30.030 Definitions.

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16.30.060 Activities Exempt from Regulations.

16.30.070 Decibel Measurement.

16.30.080 Noise Zones Designated.

16.30.090 Exterior Noise Standards.

16.30.100 Interior Noise Standards for Multi-family Residential.

16.30.110 Correction for Certain Types of Sounds.

16.30.120 Measurement Methods.

16.30.130 Acts Deemed Violations of Chapter.

16.30.140 Modification of Standards.

16.30.010 Purpose.

The purpose of this chapter is to establish standards to protect the health, safety, and welfare of those living and working in the city and to implement policies of the general plan noise element.

(Ord. 182 § 2 (part), 1997)

16.30.020 Declaration of Policy.

Excessive noise levels are detrimental to the health and safety of individuals. Noise is considered a public nuisance and the city discourages unnecessary, excessive or annoying noises from all sources. Creating, maintaining, causing or allowing to be created. caused or maintained any noise or vibration in a manner prohibited by the provisions of this chapter is a public nuisance and shall be punishable as a misdemeanor.

(Ord. 182 § 2 (part), 1997)

16.30.030 Definitions.

The following words. terms and phrases. when used in this chapter, shall have the meanings ascribed to them in this chapter, except where the context clearly indicates a different meaning:

A-Weighted Sound Level. The sound level in decibels as measured on a sound level meter using the A-weighting network. The level so read is designated dB(A) or dBA.

Ambient Noise Histogram. The composite of all noise from sources near and far, excluding the alleged intrusive noise source. In this context, the ambient noise histogram shall constitute the normal or existing level of environmental noise at a given location.

Cumulative Period. An additive period of time composed of individual time segments which may be continuous or interrupted.

Decibel. A unit for measuring the amplitude of a sound, equal to twenty (20) times the logarithm to the base of ten of the ratio of the pressure of the sound measured to the reference pressure, which is twenty (20) micropascals.

Emergency Machinery, Vehicle or Alarm. Any machinery, vehicle or alarm used, employed, performed or operated in an effort to protect, provide or restore safe conditions in the community, or work by private or public utilities when restoring utility service.

Emergency Work. Work performed for the purpose of preventing or alleviating the physical trauma or property damage threatened or caused by an emergency.

Fixed Noise Source. A stationary device which creates sounds while fixed or motionless, including, but not limited to, residential, agricultural, industrial and commercial machinery and equipment, pumps, fans, compressors, air conditioners and refrigeration equipment.

Impulsive Noise. A sound of short duration, usually less than one second and of high intensity, with an abrupt onset and rapid decay.

Intrusive Noise. The alleged offensive noise that intrudes over and above the existing ambient noise at the receptor property.

Mobile Noise Source. A noise source other than a fixed noise source.

Noise Disturbance. An alleged intrusive noise that violates an applicable noise standard of this chapter. Noise Histogram. A graphical representation of the distribution of frequency of occurrence of all noise levels near and far measured over a given period of time.

Noise Level (L_N). The noise level expressed in decibels that exceeds the specified (L,) value a percentage of total time measured. For example, an L25 noise level means that noise level that is exceeded twenty-five (25) percent of the time measured.

Noise-Sensitive Area. An area designated for the purpose of ensuring exceptional quiet (e.g.. around hospitals, nursing homes, libraries, and similar uses).

NoiseZone. A defined area of a generally consistent land use.

Pure Tone Noise. A sound that can be judged as audible as a single pitch or a set of single pitches by the code enforcement officer. For the purposes of this chapter, a pure tone shall exist if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the sound-pressure levels of the two contiguous one-third octave bands by five dB for center frequencies of five hundred (500) Hertz and above, and by eight dB for center frequencies between one hundred sixty (160) and four hundred (400) Hertz, and by fifteen (15) dB for center frequencies less than or equal to one hundred twenty-five (125) Hertz.

Sound Level Meter. An instrument, including a microphone, an amplifier, an output meter and frequency weighting network, for the measurement of sound levels, that satisfies the requirements pertinent for Type S2A meters in American National Standards Institute specifications for sound level meters.

Vibration. The minimum ground or structure-borne vibrational motion necessary to cause a normal person to be aware of the vibration including, but not limited to, sensation by touch or visual

observations of moving objects. The perception threshold shall be presumed to be a motion velocity of 0.01 in/sec over the range of one to one hundred (100) Hertz.

Weekday. Any day. Monday through Friday, that is not a legal holiday.

(Ord. 182 § 2 (part), 1997)

16.30.040 Enforcement of Regulations.

The code enforcement officer shall have primary responsibility for the enforcement of the noise regulations contained in this chapter. The code enforcement officer shall make all noise-level measurements required for the enforcement of this chapter.

(Ord. 182 § 2 (part), 1997)

16.30.050 Initial Violations.

In the event of an initial violation of the provisions of this chapter, a written notice of violation shall be given the alleged violator. specifying the time by which the condition shall be corrected or an application for a permit or variance shall be filed. No further action shall be taken if the cause of the violation has been removed, the condition abated, or fully corrected within the time period specified in the written notice.

(Ord. 182 § 2 (part), 1997)

16.30.060 Activities Exempt from Regulations.

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

A. Emergency Exemption. The emission of sound for the purpose of alerting persons to the existence of an emergency, or the emission of sound in the performance of emergency work.

B. Warning Device. Warning devices necessary for the protection of public safety, (e.g., police, tire and ambulance sirens, and train horns).

C. Outdoor Activities. Activities conducted on public playgrounds and public or private school grounds. including, but not limited to, school athletic and school entertainment events.

D. Motion Picture Production and Related Activities. Activities in connection to production of motion pictures.

E. Railroad Activities. All locomotives and rail cars operated by any railroad which is regulated by the state Public Utilities Commission.

F. Federal or State Pre-Exempted Activities. Any activity, to the extent regulation thereof has been pre-empted by state or federal law,

G. Public Health and Safety Activities. All transportation, flood control, and utility company maintenance and construction operations at any time on public right-of-way, and those situations that may occur on private real property deemed necessary to serve the best interest of the public and to protect the public's health and well being, including, but not limited to, street sweeping, debris and limb removal, removal of downed wires, restoring electrical service, repairing traffic signals, unplugging sewers, house moving, vacuuming catchbasins, removal of damaged poles and vehicles, repair of water hydrants and mains, gas lines, oil lines, sewers, etc.

H. Motor, Vehicles on Public Right-of-Way and Private Property. Except as provided in this chapter, all vehicles operating in a legal manner in compliance with local, state, and federal vehicle noise regulations within the public right-of-way or on private property.

1. Minor Maintenance to Residential Real Property. Noise sources associated with the minor maintenance of residential real property, provided the activities take place between the hours of seven a.m. and eight p.m. on any day except Sunday, or between the hours of nine a.m. and eight p.m. on Sunday.

(Ord. 182 § 2 (part), 1997)

16.30.070 Decibel Measurement.

Decibel measurements made in compliance with the provisions of this chapter shall be based on a reference sound-pressure of twenty (20) micropascals, as measured with a sound level meter using the A-weighted network (scale) at slow response, or at the fast response when measuring impulsive sound levels and vibrations.

(Ord. 182 § 2 (part). 1997)

16.30.080 Noise Zones Designated.

Receptor properties described in this chapter are hereby assigned to the following noise zones:

A. Noise zone I, noise-sensitive area:

B. Noise zone II, residential properties;

C. Noise zone III, commercial properties: and

D. Noise zone IV, industrial properties.

(Ord. 182 § 2 (part), 1997)

16.30.090 Exterior Noise Standards.

A. Standards for Noise Zones. Unless otherwise provided in this chapter, the following exterior noise levels shall apply to all receptor properties within a designated noise zone:

TABLE 3-6

EXTERIOR NOISE STANDARDS

Noise Zone	Designated Noise Zone Land Use (Receptor Property)	Time Interval	Allowed Exterior Noise Level (dB)
I	Noise-sensitive area	Anytime	45
II	Residential properties Residential properties within five hundred (500) feet of a kennel(s)	10:00 p.m. to 7:00 a.m. (nighttime) 7:00 a.m. to 10:00 p.m. (daytime) 7:00 a.m. to 10:00 p.m.	45 50 70
III	Commercial properties	10:00 p.m. to 7:00 a.m. (nighttime) 7:00 a.m. to 10:00 p.m. (daytime)	55 60
IV	Industrial properties	Anytime	70

B. Noise Standards. No person shall operate or cause to be operated. any source of sound at any location within the city or allow the creation of any noise on property owned, leased, occupied or

otherwise controlled by a person that causes the noise level, when measured on any other property to exceed the following exterior noise standards:

1. **Standard No.1**. Standard No. 1 shall be the exterior noise level which shall not be exceeded for a cumulative period of more than thirty (30) minutes in any hour. Standard No. 1 may be the applicable noise level from Table 3-6 above.

2. **Standard No. 2.** Standard No. 2 shall be the exterior noise level which shall not be exceeded for a cumulative period of more than fifteen (15) minutes in any hour. Standard No. 2 shall be the applicable noise level from Table 3-6 above, plus five dB.

3. **Standard No.3.** Standard No. 3 shall be the exterior noise level which shall not be exceeded for a cumulative period of more than five minutes in any hour. Standard No. 3 shall be the applicable noise level from Table 3-6 above plus ten dB.

4. **Standard No.4.** Standard No. 4 shall be the exterior noise level which shall not be exceeded for a cumulative period of more than one minute in any hour. Standard No. 4 shall be the applicable noise level from Table 3-6 above plus fifteen (15) dB.

5. **Standard No. 5.** Standard No. 5 shall be the exterior noise level which shall not be exceeded for any period of time. Standard No. 5 shall be the applicable noise level from Table 3-6 above plus twenty (20) dB.

C. **Noise at Zone Boundaries.** If the measurement location is on a boundary property between two different zoning districts, the exterior noise level utilized in subsection B of this chapter to determine the exterior standard shall be the arithmetic mean of the exterior noise levels. as specified in Table 3-6, of the subject zones.

D. **Measurement of Ambient Noise Histogram.** The ambient noise histogram shall be measured at the same location along the property line utilized in subsection B. above, with the alleged intruding noise source inoperative. If the alleged intruding noise source cannot be turned off, the ambient noise histogram shall be estimated by performing a measurement in the same general area of the alleged intruding noise source but at a sufficient distance so that the noise from the alleged intruding noise source is at least ten dB below the ambient noise histogram.

E. **Abatement Notice in Lieu of Citation.** If the intrusive noise exceeds the exterior noise standards provided in subsections A and B above, at a specific receptor property and the code enforcement officer has reason to believe that this violation was unanticipated and due to abnormal conditions, the code enforcement officer shall issue an abatement notice in lieu of a citation. lithe specific violation is abated, no citation shall be is-sued. If the specific violation is not abated, the code enforcement officer shall issue a citation.

(Ord. 182 § 2 (part), 1997)

16.30.100 Interior Noise Standards for Multi-Family Residential.

A. **Noise Standards for Residential Units.** No person shall operate or cause to be operated within a residential unit. any source of sound, or allow the creation of any noise, that causes the noise level when measured inside a neighboring receiving residential unit to exceed the following standards:

1. **Standard No.1.** The applicable interior noise level for cumulative period of more than five minutes in any hour;

2. **Standard No.2**. The applicable interior noise level plus five dB for a cumulative period of more than one minute in any hour; or

3. **Standard No.3.** The applicable interior noise level plus ten dB for any period of time.

B. Interior Noise Levels for Multi-Family Residential. The following interior noise levels shall apply within multi-family dwellings with windows in their normal seasonal configuration.

Noise Zone	Designated Land Use	Time Interval	Allowable Interior Noise Level(dBl
All	Multi-family Residential	10:00 p.m.—7:00 a.m. 7:00 a.m.—10:00 p.m.	40 45

If the measured ambient noise level reflected by the L_{50} exceeds that permissible within the interior noise standards in subsection A above. the allowable interior noise level shall be increased in five dB increments to reflect the ambient noise level (L5„).

(Ord. 182 § 2 (part), 1997)

16.30.110 Correction for Certain Types of Sounds.

For any source of sound that emits a pure tone or impulsive noise, the allowed noise levels provided in Sections 1 6.30.090 (Exterior Noise Standards) and 16.30.100 (Interior Noise Standards for Multi-family Residential) shall be reduced by five decibels.

(Ord. 182 § 2 (part). 1997)

16.30.120 Measurement Methods.

A. A-weighting Scale. The noise level shall be measured at a position(s) at any point on the receiver's property utilizing the A-weighting scale of the sound-level meter and the slow meter response (use fast response for impulsive type sounds). Calibration of the measurement equipment, utilizing an acoustic calibrator, shall be performed immediately prior to recording any noise data.

B. Microphone Location. The microphone shall be located four to five feet above the ground and ten feet or more from the nearest reflective surface except in those cases where another elevation is deemed appropriate.

C. Interior Noise. Interior noise measurements shall be made within the affected residential unit. The measurements shall be made at a point at least four feet from the wall, ceiling or floor nearest the noise source, with windows in the normal seasonal configuration.

(Ord. 182 § 2 (part), 1997)

16.30.130 Acts Deemed Violations of Chapter.

The following acts are a violation of this chapter.

A. Construction Noise.

1. Operating or causing the operation of tools or equipment used in construction, drilling, repair, alteration, or demolition work between weekday hours of eight p.m. and seven a.m., or at any time on Sundays or holidays so that the sound creates a noise disturbance across a residential or commercial property line, except for emergency work of public service utilities.

2. Construction activities shall be conducted in a manner that the maximum noise levels at the affected structures will not exceed those listed in the following schedule:

a. Residential Structures:

1) Mobile Equipment. Maximum noise levels for nonscheduled, intermittent, short-term operation (less than ten days) of mobile equipment:

	Single-family Residential	Multi-family Residential	Commercial
Daily, except Sundays and legal holidays, 7:00 a.m. to 8:00 p.m.	75 dBA	80 dBA	85 dBA
Daily, 8:00 p.m. to 7:00 a.m. and all day Sunday and legal holidays	60 dBA	64 dBA	70 dBA

2) Stationary Equipment. Maximum noise level for repetitively scheduled and relatively long-term operation periods (three days or more) of stationary equipment:

	Single-family Residential	Multi-family Residential	Commercial
Daily, except Sundays and legal holidays, 7:00 a.m. to 8:00 p.m.	60 dBA	65 dBA	70 dBA
Daily, 8:00 p.m. to 7:00 a.m. and all day Sunday and legal holidays	50 dBA	55 dBA	60 dBA

b. Business Structures. Maximum noise levels for nonscheduled, intermittent, short-term operation of mobile equipment: daily. including Sundays and legal holidays, all hours: maximum of eighty-five (85) dBA.

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

B. Loading and Unloading Operations. Loading, unloading, opening, closing or other handling of boxes. crates, containers, building materials, garbage cans or similar objects between the hours of ten p.m. and six am. in a manner to cause a noise disturbance is prohibited.

C. Noise Disturbances in Noise-Sensitive Zones. Creating or causing the creation of a noise disturbance within a noise-sensitive zone is prohibited, provided that conspicuous signs are displayed indicating the presence of the zone. Noise-sensitive zones shall be indicated by the display of conspicuous signs in at least three separate locations within five hundred (500) feet of the institution or facility (e.g., health care facility)

D. Places of Public Entertainment. Operating, playing, or permitting the operation or playing of a radio, television. phonograph, drum, musical instrument, sound amplifier or similar device that produces, reproduces, or amplifies sound in a place of public entertainment at a sound level greater than ninety-five (95) dBA, (read by the slow response on a sound level meter) at any point that is normally occupied by a customer is prohibited, unless conspicuous signs are located near each public entrance stating, "Warning: Sound Levels Within May Cause Hearing Impairment."

E. Emergency Signaling Devices.

1. The intentional sounding or permitting the sounding outdoors of an emergency signaling device, including fire, burglar or civil defense alarm, siren, whistle, or similar stationary emergency signaling device, except for emergency purposes or for testing is prohibited.

2. Testing of a stationary emergency signaling device shall not occur before seven a.m. or after seven p.m. Testing shall use only the minimum cycle test time. Test time shall not exceed sixty (60) seconds. Testing of the complete emergency signaling system, including the functioning of the signaling device, and the personnel response to the signaling device, shall not occur more than once in each calendar month. Testing shall not occur before seven a.m. or after ten p.m.

3. Sounding or permitting the sounding of an exterior burglar or fire alarm, or motor vehicle burglar alarm

is prohibited, unless the alarm is terminated within fifteen (15) minutes of activation.

F. Stationary Nonemergency Signaling Devices. Sounding or permitting the sounding of an electronically amplified signal from a stationary bell, chime, siren. whistle, or similar device intended primarily for nonemergency purposes, from any place, for more than ten consecutive seconds in any hourly period is prohibited.

G. Refuse Collection Vehicles.

1. Operating or permitting the operation of the compacting mechanism of any motor vehicle that compacts refuse and that creates, during the compacting cycle, a sound level in excess of eighty-six (86) dBA when measured at fifty (50) feet from any point of the vehicle is prohibited.

2. Collecting refuse, or operating or permitting the operation of the compacting mechanism of any motor vehicle that compacts refuse between the hours often p.m. and six a.m. the following day in a residential area or noise-sensitive zone is prohibited.

H. Sweepers and Associated Equipment. Operating or permitting the operation of sweepers or associated sweeping equipment (i.e., blowers) between the hours often p.m. and six a.m. the following day in, or adjacent to, a residential area or noise-sensitive area is prohibited.

I. Residential Air Conditioning·or Refrigeration Equipment. Operating or permitting the operation of air conditioning or refrigeration equipment in a manner that exceeds the following sound levels is prohibited:

Measurement Location	Maximum Noise level
Any point on neighboring property line, five feet above grade level, no closer than three feet from any wall.	55
Center of neighboring patio, five feet above grade level, no closer than three feet from any wall.	50
Outside the neighboring living area window nearest the equipment location, not more than three feet from the window opening, but at least three feet from any other surface.	50

J. Vehicle or Motorboat Repairs and Testing. Repairing, rebuilding, modifying or testing any motor vehicle, motorcycle or motorboat in a manner as to cause a noise disturbance across property lines or within a noise-sensitive zone is prohibited.

K. Vibration. Operating or permitting the operation of any device that creates vibration that is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property, or at one hundred fifty (150) feet from the source if on a public space or public right-of-way is prohibited. The perception threshold shall be a motion velocity of 0.01 in/sec over the range of 1 to 100 Hertz.

(Ord. 544 § 3, 2019; Ord. 182 §2 (part), 1997)

16.30.140 Modification of Standards.

Modifications to the requirements of this chapter may be granted by the director for a period of up to two years, subject to any terms, conditions, or requirements to minimize adverse effects on the surrounding neighborhood reasonable. Modifications may be granted only if one of the following findings can be made:

A. Additional time is necessary for the applicant to alter or modify the activity, operation, or noise source to comply with this chapter: or

B. The activity, operation, or noise source cannot feasibly be done in a manner that would comply with the provisions of this chapter. and no other reasonable alternative is available to the applicant.

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APPENDIX 5.1:

NOISE LEVEL MEASUREMENT PHOTOS

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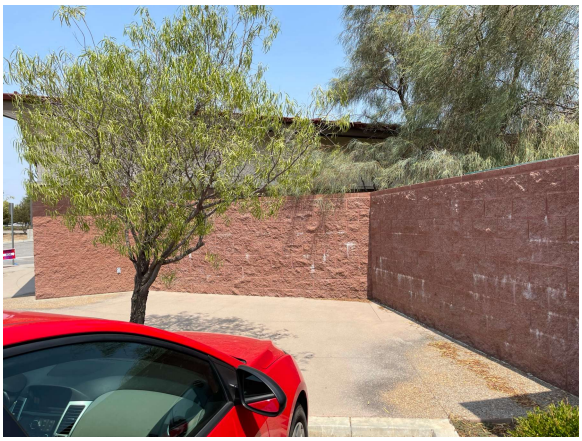
JN: 14073 Study Area Photos

L1_E
33, 36' 45.240000"117, 10' 3.370000"



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L1_W
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L2_E
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L2_N
33, 36' 44.640000"117, 9' 47.770000"

JN: 14073 Study Area Photos

L2_S
33, 36' 44.600000"117, 9' 47.740000"

L2_W
33, 36' 44.600000"117, 9' 47.710000"

L3_E
33, 36' 31.210000"117, 9' 42.140000"

L3_N
33, 36' 31.130000"117, 9' 42.190000"

L3_S
33, 36' 31.170000"117, 9' 42.190000"

L3_W
33, 36' 31.200000"117, 9' 42.170000"

JN: 14073 Study Area Photos

L4_E
33, 36' 25.840000"117, 9' 49.310000"

L4_N
33, 36' 25.870000"117, 9' 49.330000"

L4_S
33, 36' 25.810000"117, 9' 49.310000"

L4_W
33, 36' 25.840000"117, 9' 49.310000"

L5_E
33, 36' 34.830000"117, 10' 15.120000"

L5_N
33, 36' 34.850000"117, 10' 15.150000"

JN: 14073 Study Area Photos

L5_S
33, 36' 34.830000"117, 10' 15.120000"

L5_W
33, 36' 34.820000"117, 10' 15.150000"

L6_E
33, 36' 44.210000"117, 10' 14.520000"

L6_N
33, 36' 44.210000"117, 10' 14.550000"

L6_S
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L6_W
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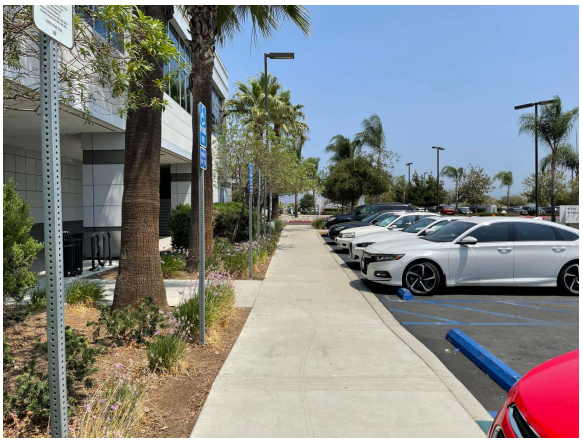
JN: 14073 Study Area Photos



L7_E
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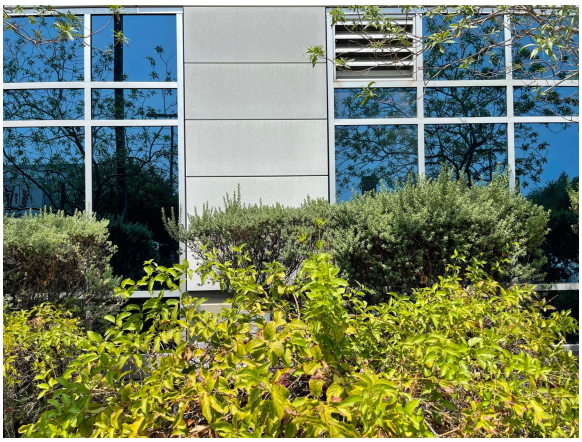

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L7_S
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L7_W
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APPENDIX 5.2:

NOISE LEVEL MEASUREMENT WORKSHEETS

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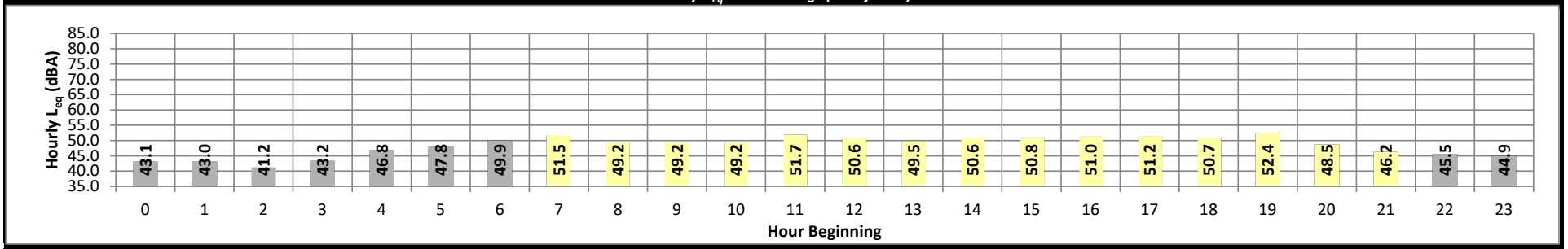
24-Hour Noise Level Measurement Summary

Date: Tuesday, August 17, 2021 *Location:* L1 - Located north of the Project site near Murrieta Fire *Meter:* Piccolo II *JN:* 14073

Project: Discovery Village *Source:* Station No. 4 at 28155 Baxter Road. *Analyst:* A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	43.1	49.0	39.2	48.3	47.6	46.6	46.0	43.5	42.1	40.2	39.9	39.4	43.1	10.0	53.1
	1	43.0	49.9	38.3	49.2	48.6	47.3	46.4	43.6	41.8	39.3	38.9	38.4	43.0	10.0	53.0
	2	41.2	46.8	37.5	46.3	45.8	44.9	44.0	41.7	40.4	38.3	38.0	37.6	41.2	10.0	51.2
	3	43.2	49.2	39.1	48.8	48.5	47.2	46.3	43.9	41.9	39.8	39.5	39.2	43.2	10.0	53.2
	4	46.8	53.4	42.8	52.9	52.4	50.9	49.8	47.2	45.5	43.5	43.3	42.9	46.8	10.0	56.8
	5	47.8	52.9	44.5	52.5	52.1	51.2	50.6	48.3	46.9	45.2	44.9	44.6	47.8	10.0	57.8
	6	49.9	57.0	45.6	56.6	55.9	54.1	52.8	50.3	48.4	46.4	46.1	45.7	49.9	10.0	59.9
Day	7	51.5	63.3	46.4	62.6	61.6	58.3	55.7	51.7	49.7	47.1	46.8	46.5	51.5	0.0	51.5
	8	49.2	57.0	44.6	56.5	55.8	54.0	52.6	49.2	47.6	45.4	45.1	44.8	49.2	0.0	49.2
	9	49.2	56.1	45.0	55.5	54.8	53.2	52.2	49.8	48.0	45.9	45.5	45.1	49.2	0.0	49.2
	10	49.2	69.9	45.4	68.0	65.8	60.2	57.9	50.7	48.4	46.1	45.8	45.5	49.2	0.0	49.2
	11	51.7	63.3	48.3	62.9	62.6	61.1	60.1	56.3	51.0	48.9	48.7	48.4	51.7	0.0	51.7
	12	50.6	62.7	46.6	62.1	61.4	59.9	58.9	55.1	49.4	47.4	47.0	46.7	50.6	0.0	50.6
	13	49.5	56.4	46.0	55.3	54.3	52.8	52.1	49.9	48.6	46.7	46.5	46.1	49.5	0.0	49.5
	14	50.6	56.5	47.2	55.7	55.0	53.9	53.3	51.1	49.8	48.0	47.7	47.3	50.6	0.0	50.6
	15	50.8	59.0	46.7	58.2	57.1	55.8	53.8	50.9	49.2	47.4	47.1	46.8	50.8	0.0	50.8
	16	51.0	59.4	46.5	58.9	58.1	56.2	55.2	50.6	49.1	47.3	47.0	46.6	51.0	0.0	51.0
	17	51.2	59.1	47.2	58.7	57.8	56.3	55.2	50.8	49.5	47.9	47.6	47.3	51.2	0.0	51.2
	18	50.7	58.0	46.7	57.4	56.5	54.8	53.9	50.9	49.3	47.4	47.1	46.8	50.7	0.0	50.7
	19	52.4	63.6	46.6	63.2	62.4	60.8	59.5	55.9	49.7	47.6	47.2	46.7	52.4	5.0	57.4
	20	48.5	63.6	44.2	63.3	63.1	62.4	61.9	58.5	54.4	48.2	45.0	44.6	48.5	5.0	53.5
	21	46.2	71.4	47.1	71.1	70.5	69.2	68.6	66.2	62.6	48.5	48.3	47.6	46.2	5.0	51.2
Night	22	45.5	66.0	42.0	65.7	65.6	64.0	62.8	57.1	45.5	43.0	42.7	42.2	45.5	10.0	55.5
	23	44.9	51.5	40.8	50.9	50.2	48.9	48.0	45.4	43.7	41.7	41.4	41.0	44.9	10.0	54.9

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	46.2	56.1	44.2	55.3	54.3	52.8	52.1	49.2	47.6	45.4	45.0	44.6
	Max	52.4	71.4	48.3	71.1	70.5	69.2	68.6	66.2	62.6	48.9	48.7	48.4
Energy Average		50.4	Average:		60.6	59.8	57.9	56.7	53.2	50.4	47.3	46.8	46.5
Night	Min	41.2	46.8	37.5	46.3	45.8	44.9	44.0	41.7	40.4	38.3	38.0	37.6
	Max	49.9	66.0	45.6	65.7	65.6	64.0	62.8	57.1	48.4	46.4	46.1	45.7
Energy Average		45.8	Average:		52.4	51.9	50.6	49.6	46.8	44.0	42.0	41.6	41.2

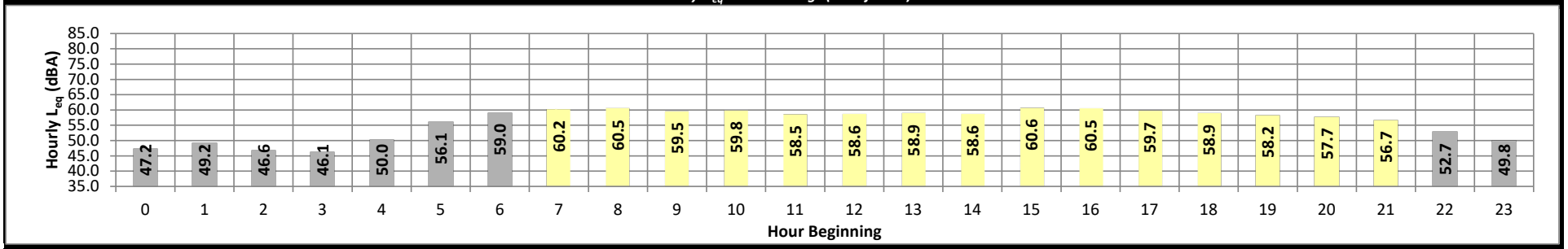
L_{eq} (dBA)		
24-Hour	Daytime (7am-10pm)	Nighttime (10pm-7am)
49.2	**50.4**	**45.8**

24-Hour Noise Level Measurement Summary

Date: Tuesday, August 17, 2021 *Location:* L2 - Located north of the Project site near single-family *Meter:* Piccolo II *JN:* 14073

Project: Discovery Village *Source:* residence at 28411 Cottage Way. *Analyst:* A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	47.2	57.4	37.7	57.1	56.6	54.4	52.3	46.0	42.2	38.7	38.3	37.8	47.2	10.0	57.2
	1	49.2	61.2	37.2	60.7	60.1	57.0	53.9	46.1	42.1	38.3	37.9	37.4	49.2	10.0	59.2
	2	46.6	57.7	37.1	57.4	56.8	54.2	51.5	44.2	40.8	37.9	37.6	37.2	46.6	10.0	56.6
	3	46.1	57.1	37.0	56.6	55.8	53.1	50.4	45.0	41.4	37.9	37.6	37.1	46.1	10.0	56.1
	4	50.0	66.5	41.8	66.0	64.8	61.0	56.8	49.4	46.2	42.9	42.4	41.9	50.0	10.0	60.0
	5	56.1	70.2	44.2	69.8	69.0	66.0	62.7	53.0	49.5	45.4	44.9	44.4	56.1	10.0	66.1
	6	59.0	70.3	48.0	69.7	69.0	66.2	63.6	57.8	53.8	49.5	48.9	48.2	59.0	10.0	69.0
Day	7	60.2	75.3	50.4	74.6	73.5	69.8	66.2	58.9	55.4	51.8	51.2	50.5	60.2	0.0	60.2
	8	60.5	75.2	49.8	74.7	73.5	69.7	65.9	59.6	56.1	51.6	50.7	49.9	60.5	0.0	60.5
	9	59.5	71.8	49.7	71.5	70.9	68.3	65.7	59.5	55.9	51.6	50.8	49.9	59.5	0.0	59.5
	10	59.8	73.6	48.7	73.3	72.5	69.4	66.0	58.8	54.7	50.4	49.6	48.9	59.8	0.0	59.8
	11	58.5	80.6	48.3	80.0	78.8	76.7	73.4	60.3	54.9	49.6	49.0	48.4	58.5	0.0	58.5
	12	58.6	80.7	49.1	80.3	79.5	74.9	69.5	58.2	54.3	50.4	49.8	49.3	58.6	0.0	58.6
	13	58.9	73.7	48.6	73.1	72.1	68.6	65.4	58.6	54.5	50.2	49.5	48.8	58.9	0.0	58.9
	14	58.6	72.4	49.0	71.8	70.5	66.8	64.1	58.2	54.7	50.3	49.7	49.1	58.6	0.0	58.6
	15	60.6	74.1	49.9	73.6	72.8	69.5	66.5	59.7	55.7	51.6	50.9	50.1	60.6	0.0	60.6
	16	60.5	72.1	50.2	71.4	70.7	67.9	65.8	59.4	55.8	51.7	51.1	50.4	60.5	0.0	60.5
	17	59.7	70.8	50.9	70.4	69.9	67.7	65.4	59.4	56.1	52.4	51.7	51.1	59.7	0.0	59.7
	18	58.9	70.7	49.4	70.2	69.2	66.4	64.1	58.4	55.1	50.9	50.2	49.6	58.9	0.0	58.9
	19	58.2	67.9	48.6	67.6	67.0	65.0	62.9	57.7	54.5	50.2	49.3	48.7	58.2	5.0	63.2
	20	57.7	72.8	45.9	72.3	71.4	68.5	65.7	56.0	52.3	47.5	46.7	46.1	57.7	5.0	62.7
	21	56.7	69.7	44.0	69.2	68.3	65.8	64.2	59.8	53.4	45.6	44.9	44.2	56.7	5.0	61.7
Night	22	52.7	70.6	41.3	69.9	69.1	65.9	62.1	52.0	47.1	42.6	42.0	41.4	52.7	10.0	62.7
	23	49.8	65.6	39.9	65.3	64.6	61.5	57.4	49.8	45.7	41.2	40.6	40.0	49.8	10.0	59.8

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	56.7	67.9	44.0	67.6	67.0	65.0	62.9	56.0	52.3	45.6	44.9	44.2
	Max	60.6	80.7	50.9	80.3	79.5	76.7	73.4	60.3	56.1	52.4	51.7	51.1
Energy Average		59.3	Average:		72.9	72.0	69.0	66.1	58.8	54.9	50.4	49.7	49.0
Night	Min	46.1	57.1	37.0	56.6	55.8	53.1	50.4	44.2	40.8	37.9	37.6	37.1
	Max	59.0	70.6	48.0	69.9	69.1	66.2	63.6	57.8	53.8	49.5	48.9	48.2
Energy Average		53.0	Average:		63.6	62.9	59.9	56.8	49.3	45.4	41.6	41.1	40.6

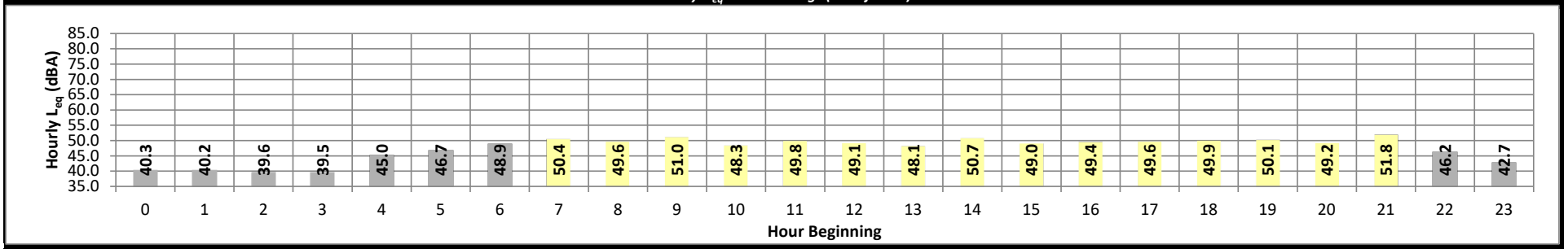
L_{eq} (dBA)		
24-Hour	Daytime (7am-10pm)	Nighttime (10pm-7am)
57.8	**59.3**	**53.0**

24-Hour Noise Level Measurement Summary

Date: Tuesday, August 17, 2021 *Location:* L3 - Located southeast of the Project site near single-family *Meter:* Piccolo II *JN:* 14073

Project: Discovery Village *Source:* residence at 28555 Running Rabbit Road. *Analyst:* A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	40.3	47.7	35.2	47.5	47.1	45.8	44.8	40.1	37.9	35.9	35.6	35.3	40.3	10.0	50.3
	1	40.2	47.5	34.7	47.0	46.5	45.2	44.2	40.8	38.3	35.5	35.2	34.8	40.2	10.0	50.2
	2	39.6	48.3	33.6	48.0	47.5	45.9	44.0	39.1	36.7	34.4	34.0	33.7	39.6	10.0	49.6
	3	39.5	45.9	34.7	45.5	45.1	44.1	43.5	40.3	37.8	35.4	35.1	34.7	39.5	10.0	49.5
	4	45.0	51.9	38.6	51.6	51.2	50.2	49.3	45.7	43.0	39.7	39.2	38.7	45.0	10.0	55.0
	5	46.7	54.8	40.1	54.5	54.0	52.6	51.2	46.7	44.2	41.1	40.7	40.2	46.7	10.0	56.7
	6	48.9	56.3	41.4	56.0	55.6	54.2	53.2	49.6	46.5	42.6	42.1	41.6	48.9	10.0	58.9
Day	7	50.4	56.7	43.7	56.4	56.0	55.1	54.1	51.3	49.1	45.1	44.4	43.8	50.4	0.0	50.4
	8	49.6	55.7	42.3	55.4	55.1	54.1	53.4	50.7	48.2	44.0	43.2	42.5	49.6	0.0	49.6
	9	51.0	60.0	42.8	59.3	58.9	56.8	55.3	51.2	48.1	44.3	43.7	43.0	51.0	0.0	51.0
	10	48.3	56.0	41.0	55.6	55.1	53.7	52.3	48.9	46.5	42.5	41.8	41.2	48.3	0.0	48.3
	11	49.8	58.9	42.3	58.5	57.7	55.7	54.7	49.4	46.9	43.6	43.0	42.5	49.8	0.0	49.8
	12	49.1	57.2	42.2	56.9	56.2	54.0	53.3	49.7	46.9	43.4	42.9	42.4	49.1	0.0	49.1
	13	48.1	56.6	41.4	56.3	55.7	54.0	52.3	48.2	45.8	42.5	42.0	41.6	48.1	0.0	48.1
	14	50.7	57.7	44.5	57.3	56.9	55.5	54.3	51.5	49.0	45.7	45.1	44.6	50.7	0.0	50.7
	15	49.0	57.5	42.2	57.1	56.6	54.8	53.2	49.1	46.5	43.2	42.8	42.4	49.0	0.0	49.0
	16	49.4	59.4	42.4	58.8	57.7	55.5	53.5	48.9	46.6	43.4	43.0	42.6	49.4	0.0	49.4
	17	49.6	58.4	43.8	57.5	56.8	54.4	53.2	49.7	47.7	44.9	44.4	44.0	49.6	0.0	49.6
	18	49.9	60.0	43.4	59.4	58.6	56.1	53.8	49.2	46.9	44.4	44.0	43.6	49.9	0.0	49.9
	19	50.1	57.6	44.1	57.3	56.8	55.5	54.5	50.4	47.8	45.0	44.6	44.2	50.1	5.0	55.1
	20	49.2	57.3	42.0	56.9	56.3	55.2	53.5	49.5	46.6	43.2	42.8	42.2	49.2	5.0	54.2
	21	51.8	58.9	40.7	58.5	58.2	56.9	56.3	53.6	48.3	43.3	41.4	40.9	51.8	5.0	56.8
Night	22	46.2	54.2	38.7	53.6	53.0	52.1	51.4	46.9	42.2	39.4	39.1	38.8	46.2	10.0	56.2
	23	42.7	50.4	36.8	50.1	49.8	48.5	47.2	42.8	40.1	37.6	37.2	36.9	42.7	10.0	52.7

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	48.1	55.7	40.7	55.4	55.1	53.7	52.3	48.2	45.8	42.5	41.4	40.9
	Max	51.8	60.0	44.5	59.4	58.9	56.9	56.3	53.6	49.1	45.7	45.1	44.6
Energy Average		49.8	Average:		57.4	56.8	55.1	53.9	50.1	47.4	43.9	43.3	42.8
Night	Min	39.5	45.9	33.6	45.5	45.1	44.1	43.5	39.1	36.7	34.4	34.0	33.7
	Max	48.9	56.3	41.4	56.0	55.6	54.2	53.2	49.6	46.5	42.6	42.1	41.6
Energy Average		44.5	Average:		50.4	50.0	48.7	47.6	43.6	40.8	37.9	37.6	37.2

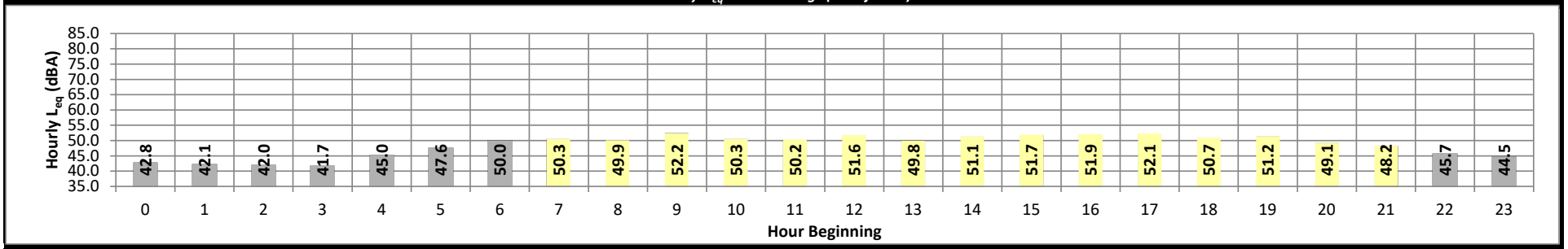
L_{eq} (dBA)		
24-Hour	Daytime (7am-10pm)	Nighttime (10pm-7am)
48.5	**49.8**	**44.5**

24-Hour Noise Level Measurement Summary

Date: Tuesday, August 17, 2021 *Location:* L4 - Located south of the Project site near single-family *Meter:* Piccolo II *JN:* 14073

Project: Discovery Village *Source:* residence at 28393 Somers Road. *Analyst:* A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	42.8	48.4	39.5	48.1	47.7	46.9	46.4	42.9	41.4	40.1	39.9	39.6	42.8	10.0	52.8
	1	42.1	47.5	38.8	47.0	46.6	45.9	45.1	42.6	41.0	39.5	39.2	38.9	42.1	10.0	52.1
	2	42.0	47.7	38.9	47.5	47.2	46.2	45.4	42.0	40.7	39.5	39.3	39.1	42.0	10.0	52.0
	3	41.7	46.3	38.8	45.9	45.5	44.6	44.1	42.2	41.0	39.4	39.2	39.0	41.7	10.0	51.7
	4	45.0	51.8	40.5	51.6	51.3	50.1	49.3	44.8	42.9	41.3	41.0	40.6	45.0	10.0	55.0
	5	47.6	55.0	42.1	54.7	54.5	53.5	52.6	47.3	44.8	42.8	42.5	42.2	47.6	10.0	57.6
	6	50.0	57.0	44.4	56.7	56.4	55.5	54.6	50.2	47.7	45.4	45.0	44.6	50.0	10.0	60.0
Day	7	50.3	57.3	45.3	57.1	56.8	55.7	54.9	50.1	48.2	46.1	45.8	45.4	50.3	0.0	50.3
	8	49.9	56.0	45.2	55.7	55.3	54.4	53.6	50.6	48.4	46.0	45.6	45.3	49.9	0.0	49.9
	9	52.2	59.6	46.4	59.2	58.6	57.3	56.3	52.7	50.1	47.6	47.0	46.5	52.2	0.0	52.2
	10	50.3	57.7	44.9	57.4	56.9	55.3	54.5	51.0	48.1	45.7	45.3	45.0	50.3	0.0	50.3
	11	50.2	60.3	45.4	59.9	59.6	57.9	57.1	51.0	48.3	46.2	45.8	45.5	50.2	0.0	50.2
	12	51.6	60.7	45.9	60.3	59.4	56.8	55.6	51.2	49.0	46.7	46.4	46.0	51.6	0.0	51.6
	13	49.8	58.7	45.4	58.4	58.0	56.8	54.9	49.8	48.1	46.1	45.8	45.5	49.8	0.0	49.8
	14	51.1	58.4	46.2	57.8	57.2	56.0	54.8	51.4	49.2	47.0	46.7	46.3	51.1	0.0	51.1
	15	51.7	57.8	46.7	57.5	57.2	56.3	55.4	52.5	50.1	47.6	47.3	46.9	51.7	0.0	51.7
	16	51.9	59.0	46.6	58.7	58.3	57.1	56.1	52.2	49.9	47.5	47.1	46.8	51.9	0.0	51.9
	17	52.1	58.4	47.2	58.0	57.5	56.5	55.8	52.7	50.6	48.1	47.7	47.3	52.1	0.0	52.1
	18	50.7	56.6	46.7	56.2	55.8	55.0	54.4	51.7	49.9	47.6	47.2	46.8	50.7	0.0	50.7
	19	51.2	59.2	46.5	58.6	58.0	56.5	55.5	52.0	49.8	47.4	47.0	46.6	51.2	5.0	56.2
	20	49.1	55.9	44.7	55.6	55.2	54.4	53.6	50.2	48.0	45.5	45.1	44.8	49.1	5.0	54.1
	21	48.2	58.4	43.2	58.0	57.5	56.3	55.6	52.2	48.0	44.2	43.7	43.3	48.2	5.0	53.2
Night	22	45.7	51.9	41.6	51.7	51.3	50.4	49.7	46.4	43.8	42.2	42.0	41.7	45.7	10.0	55.7
	23	44.5	51.2	40.5	50.8	50.4	49.3	48.3	44.4	42.9	41.2	41.0	40.7	44.5	10.0	54.5

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	48.2	55.9	43.2	55.6	55.2	54.4	53.6	49.8	48.0	44.2	43.7	43.3
	Max	52.2	60.7	47.2	60.3	59.6	57.9	57.1	52.7	50.6	48.1	47.7	47.3
Energy Average		50.8	Average:		57.9	57.4	56.1	55.2	51.4	49.0	46.6	46.2	45.9
Night	Min	41.7	46.3	38.8	45.9	45.5	44.6	44.1	42.0	40.7	39.4	39.2	38.9
	Max	50.0	57.0	44.4	56.7	56.4	55.5	54.6	50.2	47.7	45.4	45.0	44.6
Energy Average		45.5	Average:		50.4	50.1	49.2	48.4	44.7	42.9	41.3	41.0	40.7

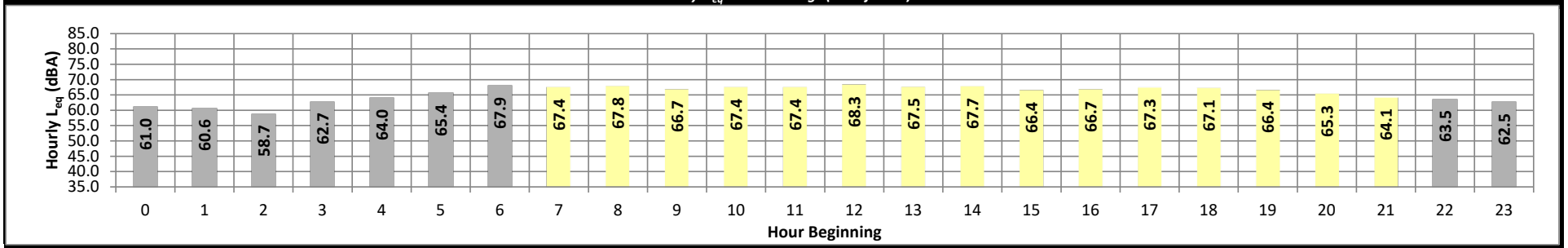
L_{eq} (dBA)		
24-Hour	Daytime (7am-10pm)	Nighttime (10pm-7am)
49.5	**50.8**	**45.5**

24-Hour Noise Level Measurement Summary

Date: Tuesday, August 17, 2021 | *Location:* L5 - Located west of the Project site near single-family | *Meter:* Piccolo II | *JN:* 14073

Project: Discovery Village | *Source:* residence at 35256 McElwain Road. | *Analyst:* A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	61.0	70.7	46.0	70.3	69.8	68.0	66.4	60.8	56.5	48.6	47.3	46.2	61.0	10.0	71.0
	1	60.6	70.0	45.6	69.7	69.1	67.4	65.8	60.7	55.9	47.8	46.7	45.7	60.6	10.0	70.6
	2	58.7	68.1	44.0	67.8	67.3	65.7	64.1	58.5	54.2	46.6	45.4	44.2	58.7	10.0	68.7
	3	62.7	74.5	48.2	74.2	73.2	70.0	67.3	61.0	56.5	50.6	49.3	48.3	62.7	10.0	72.7
	4	64.0	72.8	54.3	72.6	72.2	70.2	68.5	64.1	61.0	56.2	55.2	54.5	64.0	10.0	74.0
	5	65.4	73.4	57.5	73.1	72.7	71.1	69.7	65.8	63.1	59.4	58.5	57.7	65.4	10.0	75.4
	6	67.9	77.4	60.0	76.9	76.3	74.0	71.7	67.8	65.4	61.7	61.0	60.2	67.9	10.0	77.9
Day	7	67.4	74.8	60.3	74.5	73.9	72.3	71.1	68.1	65.7	62.0	61.3	60.4	67.4	0.0	67.4
	8	67.8	76.1	59.5	75.8	75.1	72.7	71.3	68.4	65.9	61.6	60.7	59.7	67.8	0.0	67.8
	9	66.7	74.3	58.6	73.9	73.4	71.7	70.5	67.5	64.9	60.8	59.8	58.8	66.7	0.0	66.7
	10	67.4	75.9	58.8	75.5	74.8	72.5	71.2	67.9	65.1	61.0	60.1	59.0	67.4	0.0	67.4
	11	67.4	74.7	59.8	74.3	73.7	72.2	71.1	68.3	65.6	61.7	60.9	60.0	67.4	0.0	67.4
	12	68.3	79.2	59.6	78.5	77.1	73.6	71.6	68.1	65.3	61.5	60.6	59.8	68.3	0.0	68.3
	13	67.5	75.6	59.4	75.3	74.6	72.6	71.5	68.0	65.4	61.4	60.5	59.6	67.5	0.0	67.5
	14	67.7	74.8	61.1	74.4	73.9	72.3	71.2	68.4	66.2	62.9	62.2	61.3	67.7	0.0	67.7
	15	66.4	73.3	59.5	72.9	72.4	71.0	69.9	67.2	65.1	61.3	60.5	59.6	66.4	0.0	66.4
	16	66.7	73.7	60.3	73.4	73.0	71.5	70.2	67.3	65.1	61.9	61.2	60.4	66.7	0.0	66.7
	17	67.3	76.1	60.6	75.2	74.2	72.0	70.9	67.6	65.4	62.3	61.6	60.8	67.3	0.0	67.3
	18	67.1	75.3	59.7	75.0	74.4	72.1	70.6	67.6	65.2	61.7	60.8	59.9	67.1	0.0	67.1
	19	66.4	75.2	58.4	74.7	74.0	71.8	70.2	66.7	64.2	60.4	59.5	58.6	66.4	5.0	71.4
	20	65.3	74.1	56.2	73.7	73.0	70.8	69.2	65.6	63.0	58.7	57.6	56.4	65.3	5.0	70.3
	21	64.1	72.7	53.8	72.4	71.8	69.8	68.3	64.3	61.6	56.5	55.2	54.0	64.1	5.0	69.1
Night	22	63.5	72.1	52.2	71.7	71.2	69.4	67.9	64.2	60.7	54.8	53.5	52.4	63.5	10.0	73.5
	23	62.5	72.0	49.5	71.8	71.3	69.2	67.3	62.5	58.8	52.6	51.0	49.7	62.5	10.0	72.5

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	64.1	72.7	53.8	72.4	71.8	69.8	68.3	64.3	61.6	56.5	55.2	54.0
	Max	68.3	79.2	61.1	78.5	77.1	73.6	71.6	68.4	66.2	62.9	62.2	61.3
Energy Average		67.0	Average:		74.6	74.0	71.9	70.6	67.4	64.9	61.0	60.2	59.2
Night	Min	58.7	68.1	44.0	67.8	67.3	65.7	64.1	58.5	54.2	46.6	45.4	44.2
	Max	67.9	77.4	60.0	76.9	76.3	74.0	71.7	67.8	65.4	61.7	61.0	60.2
Energy Average		63.7	Average:		72.0	71.5	69.4	67.6	62.8	59.1	53.1	52.0	51.0

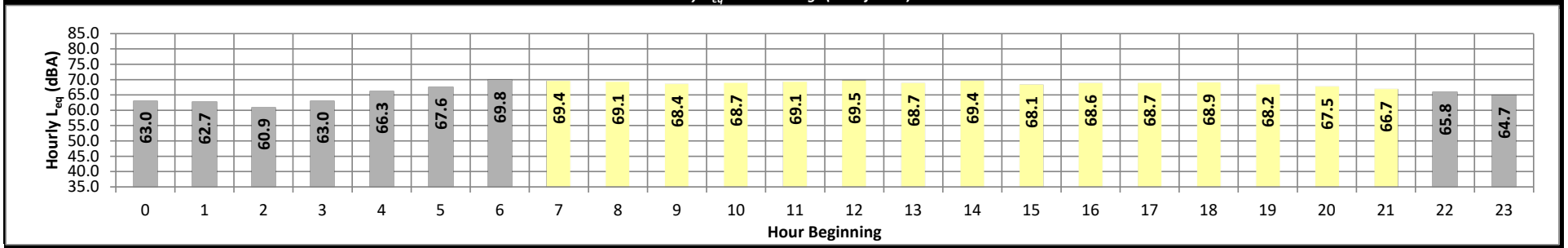
L_{eq} (dBA)		
24-Hour	Daytime (7am-10pm)	Nighttime (10pm-7am)
66.0	**67.0**	**63.7**

24-Hour Noise Level Measurement Summary

Date: Tuesday, August 17, 2021 *Location:* L6 - Located west of the Project site near single-family *Meter:* Piccolo II *JN:* 14073

Project: Discovery Village *Source:* residence at 34970 Antelope Road. *Analyst:* A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	63.0	72.0	49.8	71.7	71.3	69.7	68.1	63.0	59.2	52.4	51.1	50.0	63.0	10.0	73.0
	1	62.7	72.2	47.9	71.9	71.4	69.6	67.9	62.8	58.2	50.8	49.3	48.3	62.7	10.0	72.7
	2	60.9	69.6	46.6	69.4	69.0	67.5	66.2	61.1	57.1	49.3	47.8	46.8	60.9	10.0	70.9
	3	63.0	72.1	50.1	71.8	71.5	70.1	68.4	62.7	58.8	52.5	51.1	50.3	63.0	10.0	73.0
	4	66.3	74.8	57.2	74.5	74.0	72.3	70.8	66.5	63.5	59.1	58.3	57.4	66.3	10.0	76.3
	5	67.6	75.7	60.1	75.2	74.6	72.5	71.2	68.2	65.7	61.9	61.1	60.3	67.6	10.0	77.6
	6	69.8	79.1	62.1	78.8	78.3	75.7	73.4	69.5	67.3	64.0	63.1	62.3	69.8	10.0	79.8
Day	7	69.4	76.9	62.7	76.6	76.2	74.3	72.9	69.8	67.7	64.4	63.6	62.9	69.4	0.0	69.4
	8	69.1	76.9	61.7	76.5	75.9	73.9	72.5	69.6	67.6	63.7	62.8	61.9	69.1	0.0	69.1
	9	68.4	75.1	61.5	74.9	74.5	73.0	71.9	69.1	67.0	63.3	62.6	61.6	68.4	0.0	68.4
	10	68.7	76.3	61.3	76.0	75.6	74.0	72.6	69.4	66.8	63.3	62.4	61.5	68.7	0.0	68.7
	11	69.1	75.8	62.0	75.5	75.2	73.6	72.7	69.8	67.6	63.9	63.1	62.2	69.1	0.0	69.1
	12	69.5	78.8	61.8	78.4	77.4	74.5	72.8	69.9	67.3	63.7	62.9	62.0	69.5	0.0	69.5
	13	68.7	75.7	61.7	75.4	74.9	73.4	72.3	69.4	67.2	63.4	62.6	61.8	68.7	0.0	68.7
	14	69.4	76.0	63.3	75.7	75.2	73.8	72.8	70.1	68.2	65.0	64.3	63.5	69.4	0.0	69.4
	15	68.1	75.0	62.1	74.7	74.3	72.6	71.6	68.8	66.7	63.8	63.0	62.2	68.1	0.0	68.1
	16	68.6	76.2	62.9	75.9	75.3	73.3	72.0	69.1	67.0	64.3	63.7	63.0	68.6	0.0	68.6
	17	68.7	75.8	62.9	75.5	75.1	73.5	72.3	69.2	67.2	64.4	63.8	63.0	68.7	0.0	68.7
	18	68.9	77.0	62.4	76.7	76.2	74.0	72.4	69.1	67.1	64.0	63.3	62.6	68.9	0.0	68.9
	19	68.2	75.9	61.0	75.7	75.2	73.4	72.0	68.7	66.4	63.0	62.0	61.2	68.2	5.0	73.2
	20	67.5	75.1	59.6	74.8	74.3	72.9	71.6	68.1	65.5	61.6	60.6	59.8	67.5	5.0	72.5
	21	66.7	74.4	56.1	74.1	73.7	72.2	70.9	67.7	64.0	58.9	57.5	56.3	66.7	5.0	71.7
Night	22	65.8	74.0	55.1	73.7	73.3	71.8	70.3	66.1	63.1	57.8	56.4	55.3	65.8	10.0	75.8
	23	64.7	73.6	51.8	73.3	72.9	71.1	69.4	64.9	61.5	55.2	53.4	52.0	64.7	10.0	74.7

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	66.7	74.4	56.1	74.1	73.7	72.2	70.9	67.7	64.0	58.9	57.5	56.3
	Max	69.5	78.8	63.3	78.4	77.4	74.5	72.9	70.1	68.2	65.0	64.3	63.5
Energy Average		68.7	Average:		75.8	75.3	73.5	72.2	69.2	66.9	63.4	62.5	61.7
Night	Min	60.9	69.6	46.6	69.4	69.0	67.5	66.2	61.1	57.1	49.3	47.8	46.8
	Max	69.8	79.1	62.1	78.8	78.3	75.7	73.4	69.5	67.3	64.0	63.1	62.3
Energy Average		65.7	Average:		73.4	72.9	71.1	69.5	65.0	61.6	55.9	54.6	53.6

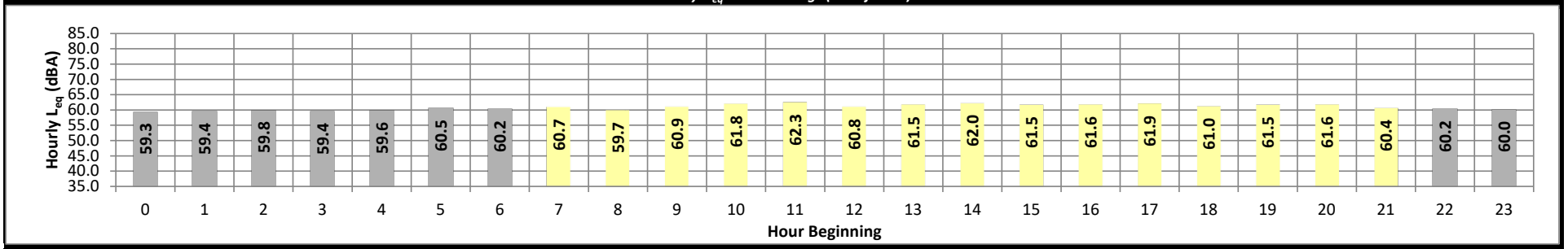
L_{eq} (dBA)		
24-Hour	Daytime (7am-10pm)	Nighttime (10pm-7am)
67.8	**68.7**	**65.7**

24-Hour Noise Level Measurement Summary

Date: Tuesday, August 17, 2021 | *Location:* L7 - Located northwest of the project site near Loma Linda | *Meter:* Piccolo II | *JN:* 14073

Project: Discovery Village | *Source:* University Health - Murrieta at 28062 Baxter Road. | *Analyst:* A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	59.3	61.0	58.4	60.8	60.6	60.4	60.2	59.6	59.2	58.7	58.6	58.5	59.3	10.0	69.3
	1	59.4	61.4	58.3	61.2	61.0	60.6	60.3	59.6	59.2	58.6	58.5	58.4	59.4	10.0	69.4
	2	59.8	61.1	59.0	60.9	60.8	60.6	60.4	60.1	59.7	59.3	59.2	59.0	59.8	10.0	69.8
	3	59.4	60.8	58.4	60.6	60.5	60.3	60.1	59.7	59.2	58.8	58.7	58.5	59.4	10.0	69.4
	4	59.6	61.3	58.7	61.1	60.9	60.6	60.4	59.9	59.6	59.0	58.8	58.7	59.6	10.0	69.6
	5	60.5	62.1	59.5	61.9	61.7	61.4	61.2	60.7	60.3	59.8	59.7	59.6	60.5	10.0	70.5
	6	60.2	63.3	59.0	63.0	62.6	61.8	61.4	60.3	59.9	59.3	59.2	59.1	60.2	10.0	70.2
Day	7	60.7	65.6	59.4	65.0	64.2	62.6	61.9	60.9	60.3	59.7	59.6	59.5	60.7	0.0	60.7
	8	59.7	61.7	58.8	61.3	61.1	60.7	60.5	59.9	59.6	59.1	59.0	58.8	59.7	0.0	59.7
	9	60.9	63.5	59.7	63.1	62.6	61.9	61.7	61.1	60.7	60.1	60.0	59.8	60.9	0.0	60.9
	10	61.8	65.5	60.1	64.9	64.3	63.6	63.2	62.1	61.5	60.6	60.4	60.2	61.8	0.0	61.8
	11	62.3	68.2	60.7	67.1	66.1	64.5	63.9	62.3	61.7	61.1	61.0	60.8	62.3	0.0	62.3
	12	60.8	63.5	59.5	63.2	62.9	62.4	61.9	61.1	60.6	59.9	59.7	59.6	60.8	0.0	60.8
	13	61.5	63.8	60.2	63.6	63.4	63.0	62.6	61.8	61.3	60.6	60.5	60.3	61.5	0.0	61.5
	14	62.0	66.4	60.4	65.9	65.6	64.4	63.7	62.0	61.5	60.8	60.7	60.5	62.0	0.0	62.0
	15	61.5	64.1	60.1	63.8	63.4	62.8	62.5	61.8	61.3	60.5	60.4	60.1	61.5	0.0	61.5
	16	61.6	63.7	60.3	63.5	63.2	62.7	62.5	61.9	61.5	60.7	60.5	60.4	61.6	0.0	61.6
	17	61.9	64.3	60.6	64.0	63.7	63.2	62.9	62.1	61.6	61.1	60.9	60.7	61.9	0.0	61.9
	18	61.0	63.6	59.5	63.4	63.1	62.6	62.3	61.3	60.7	59.9	59.8	59.6	61.0	0.0	61.0
	19	61.5	64.2	60.2	63.9	63.7	63.2	62.8	61.7	61.2	60.5	60.4	60.3	61.5	5.0	66.5
	20	61.6	66.5	59.1	66.3	66.1	65.5	64.7	61.6	60.5	59.6	59.4	59.2	61.6	5.0	66.6
	21	60.4	73.0	60.5	72.8	72.6	72.3	71.9	70.2	66.3	62.2	61.4	60.6	60.4	5.0	65.4
Night	22	60.2	66.8	58.7	66.4	66.0	65.1	64.5	61.4	60.0	59.1	58.9	58.8	60.2	10.0	70.2
	23	60.0	62.1	59.0	61.9	61.8	61.3	60.9	60.2	59.8	59.2	59.1	59.0	60.0	10.0	70.0

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	59.7	61.7	58.8	61.3	61.1	60.7	60.5	59.9	59.6	59.1	59.0	58.8
	Max	62.3	73.0	60.7	72.8	72.6	72.3	71.9	70.2	66.3	62.2	61.4	60.8
Energy Average		61.3	Average:		64.8	64.4	63.7	63.3	62.1	61.4	60.4	60.2	60.0
Night	Min	59.3	60.8	58.3	60.6	60.5	60.3	60.1	59.6	59.2	58.6	58.5	58.4
	Max	60.5	66.8	59.5	66.4	66.0	65.1	64.5	61.4	60.3	59.8	59.7	59.6
Energy Average		59.8	Average:		62.0	61.8	61.3	61.0	60.2	59.7	59.1	59.0	58.8

L_{eq} (dBA)		
24-Hour	Daytime (7am-10pm)	Nighttime (10pm-7am)
60.8	**61.3**	**59.8**

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APPENDIX 7.1:

ON-SITE TRAFFIC NOISE LEVEL CALCULATIONS

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Backyard No Wall
Road Name: I-215
Lot No: Lot 1

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	200,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	20,000	vehicles
Vehicle Speed:	65	mph
Near/Far Lane Distance:	90	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	0.0	feet
Centerline Dist. to Observer:	135.0	feet
Barrier Distance to Observer:	135.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Barrier Elevation:	0.0	feet
Road Grade:	1.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	78.102
Medium Trucks:	137.390
Heavy Trucks:	143.099

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	75.54	9.46	-3.01	-1.20	*-88.01*	0.000	0.000
Medium Trucks:	81.71	-7.78	-6.69	-1.20	*88.16*	-19.400	-22.400
Heavy Trucks:	85.21	-11.73	-6.95	-1.20	*88.79*	-19.400	-22.400

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	80.8	78.9	77.1	71.1	79.7	80.3
Medium Trucks:	66.0	64.5	58.2	56.6	65.1	65.3
Heavy Trucks:	65.3	63.9	54.9	46.1	61.5	61.8
Vehicle Noise:	81.1	79.2	77.2	71.2	79.9	80.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	80.8	78.9	77.1	71.1	79.7	80.3
Medium Trucks:	46.6	45.1	38.8	37.2	45.7	45.9
Heavy Trucks:	45.9	44.5	35.5	26.7	42.1	42.4
Vehicle Noise:	80.8	78.9	77.1	71.1	79.7	80.3

Friday, December 10, 2021

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Backyard No Wall
Road Name: I-215
Lot No: Lot 2

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	200,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	20,000	vehicles
Vehicle Speed:	65	mph
Near/Far Lane Distance:	90	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	0.0	feet
Centerline Dist. to Observer:	735.0	feet
Barrier Distance to Observer:	735.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Barrier Elevation:	0.0	feet
Road Grade:	1.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	688.549
Medium Trucks:	737.314
Heavy Trucks:	743.023

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	75.54	9.46	-17.19	-1.20	*-88.06*	0.000	0.000
Medium Trucks:	81.71	-7.78	-17.63	-1.20	*88.13*	-19.400	-22.400
Heavy Trucks:	85.21	-11.73	-17.68	-1.20	*88.76*	-19.400	-22.400

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	66.6	64.7	63.0	56.9	65.5	66.1
Medium Trucks:	55.1	53.6	47.2	45.7	54.1	54.4
Heavy Trucks:	54.6	53.2	44.1	35.4	50.8	51.0
Vehicle Noise:	67.2	65.3	63.1	57.2	66.0	66.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	66.6	64.7	63.0	56.9	65.5	66.1
Medium Trucks:	35.7	34.2	27.8	26.3	34.7	35.0
Heavy Trucks:	35.2	33.8	24.7	16.0	31.4	31.6
Vehicle Noise:	66.6	64.7	63.0	56.9	65.5	66.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Backyard No Wall
Road Name: Baxter Road
Lot No: Lot 3

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,790 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	247.0 feet
Barrier Distance to Observer:	247.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	226.173
Medium Trucks:	249.348
Heavy Trucks:	255.057

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	67.36	3.02	-9.94	-1.20	*-39.13*	0.000	0.000
Medium Trucks:	76.31	-14.22	-10.57	-1.20	*39.30*	-18.986	-21.986
Heavy Trucks:	81.16	-18.18	-10.72	-1.20	*40.68*	-19.014	-22.014

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	59.2	57.3	55.6	49.5	58.1	58.7
Medium Trucks:	50.3	48.8	42.5	40.9	49.4	49.6
Heavy Trucks:	51.1	49.6	40.6	31.9	47.3	47.5
Vehicle Noise:	60.3	58.5	55.9	50.1	59.0	59.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	59.2	57.3	55.6	49.5	58.1	58.7
Medium Trucks:	31.3	29.8	23.5	21.9	30.4	30.6
Heavy Trucks:	32.0	30.6	21.6	12.8	28.2	28.5
Vehicle Noise:	59.3	57.4	55.6	49.5	58.2	58.8

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Backyard No Wall
Road Name: Baxter Road
Lot No: Lot 4

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,790 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	52.0 feet
Barrier Distance to Observer:	52.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	25.475
Medium Trucks:	54.537
Heavy Trucks:	60.246

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	67.36	3.02	4.29	-1.20	*-38.99*	0.000	0.000
Medium Trucks:	76.31	-14.22	-0.67	-1.20	*39.39*	-18.988	-21.988
Heavy Trucks:	81.16	-18.18	-1.32	-1.20	*40.74*	-19.015	-22.015

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.5	71.6	69.8	63.7	72.4	73.0
Medium Trucks:	60.2	58.7	52.4	50.8	59.3	59.5
Heavy Trucks:	60.5	59.0	50.0	41.3	56.7	56.9
Vehicle Noise:	73.9	72.0	69.9	64.0	72.7	73.3

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.5	71.6	69.8	63.7	72.4	73.0
Medium Trucks:	41.2	39.7	33.4	31.8	40.3	40.5
Heavy Trucks:	41.4	40.0	31.0	22.2	37.6	37.9
Vehicle Noise:	73.5	71.6	69.8	63.7	72.4	73.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Backyard No Wall
Road Name: Baxter Road
Lot No: Lot 5

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,790 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	52.0 feet
Barrier Distance to Observer:	52.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	25.475
Medium Trucks:	54.537
Heavy Trucks:	60.246

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	67.36	3.02	4.29	-1.20	*-38.99*	0.000	0.000
Medium Trucks:	76.31	-14.22	-0.67	-1.20	*39.39*	-18.988	-21.988
Heavy Trucks:	81.16	-18.18	-1.32	-1.20	*40.74*	-19.015	-22.015

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.5	71.6	69.8	63.7	72.4	73.0
Medium Trucks:	60.2	58.7	52.4	50.8	59.3	59.5
Heavy Trucks:	60.5	59.0	50.0	41.3	56.7	56.9
Vehicle Noise:	73.9	72.0	69.9	64.0	72.7	73.3

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.5	71.6	69.8	63.7	72.4	73.0
Medium Trucks:	41.2	39.7	33.4	31.8	40.3	40.5
Heavy Trucks:	41.4	40.0	31.0	22.2	37.6	37.9
Vehicle Noise:	73.5	71.6	69.8	63.7	72.4	73.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Backyard No Wall
Road Name: Baxter Road
Lot No: Lot 6

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,790 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	305.0 feet
Barrier Distance to Observer:	305.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	284.341
Medium Trucks:	307.338
Heavy Trucks:	313.047

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	67.36	3.02	-11.43	-1.20	*-39.13*	0.000	0.000
Medium Trucks:	76.31	-14.22	-11.93	-1.20	*39.29*	-18.986	-21.986
Heavy Trucks:	81.16	-18.18	-12.05	-1.20	*40.67*	-19.013	-22.013

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	57.8	55.9	54.1	48.0	56.7	57.3
Medium Trucks:	49.0	47.5	41.1	39.5	48.0	48.2
Heavy Trucks:	49.7	48.3	39.3	30.5	45.9	46.2
Vehicle Noise:	58.9	57.1	54.4	48.7	57.5	58.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	57.8	55.9	54.1	48.0	56.7	57.3
Medium Trucks:	30.0	28.5	22.1	20.6	29.0	29.3
Heavy Trucks:	30.7	29.3	20.3	11.5	26.9	27.2
Vehicle Noise:	57.8	55.9	54.1	48.0	56.7	57.3

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Backyard No Wall
Road Name: Whitewood Road
Lot No: Lot 7

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,580 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	618.0 feet
Barrier Distance to Observer:	618.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	597.686
Medium Trucks:	620.317
Heavy Trucks:	626.026

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	69.34	3.59	-16.27	-1.20	*-39.14*	0.000	0.000
Medium Trucks:	77.62	-13.65	-16.51	-1.20	*39.28*	-18.986	-21.986
Heavy Trucks:	82.14	-17.61	-16.57	-1.20	*40.66*	-19.013	-22.013

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	55.5	53.6	51.8	45.7	54.4	55.0
Medium Trucks:	46.3	44.8	38.4	36.8	45.3	45.5
Heavy Trucks:	46.8	45.3	36.3	27.6	43.0	43.2
Vehicle Noise:	56.5	54.6	52.1	46.3	55.1	55.7

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	55.5	53.6	51.8	45.7	54.4	55.0
Medium Trucks:	27.3	25.8	19.4	17.9	26.3	26.6
Heavy Trucks:	27.8	26.3	17.3	8.5	24.0	24.2
Vehicle Noise:	55.5	53.6	51.8	45.8	54.4	55.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Backyard No Wall
Road Name: Whitewood Road
Lot No: Lot 8 (N)

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,580 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	65.0 feet
Barrier Distance to Observer:	65.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	40.620
Medium Trucks:	67.489
Heavy Trucks:	73.198

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	69.34	3.59	1.25	-1.20	*-39.05*	0.000	0.000
Medium Trucks:	77.62	-13.65	-2.06	-1.20	*39.37*	-18.987	-21.987
Heavy Trucks:	82.14	-17.61	-2.59	-1.20	*40.74*	-19.015	-22.015

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.0	71.1	69.3	63.3	71.9	72.5
Medium Trucks:	60.7	59.2	52.8	51.3	59.8	60.0
Heavy Trucks:	60.7	59.3	50.3	41.5	56.9	57.2
Vehicle Noise:	73.5	71.6	69.5	63.6	72.3	72.8

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.0	71.1	69.3	63.3	71.9	72.5
Medium Trucks:	41.7	40.2	33.9	32.3	40.8	41.0
Heavy Trucks:	41.7	40.3	31.3	22.5	37.9	38.2
Vehicle Noise:	73.0	71.1	69.3	63.3	71.9	72.5

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Backyard No Wall
Road Name: Whitewood Road
Lot No: Lot8 (S)

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,580 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	65.0 feet
Barrier Distance to Observer:	65.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	40.620
Medium Trucks:	67.489
Heavy Trucks:	73.198

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	69.34	3.59	1.25	-1.20	*-39.05*	0.000	0.000
Medium Trucks:	77.62	-13.65	-2.06	-1.20	*39.37*	-18.987	-21.987
Heavy Trucks:	82.14	-17.61	-2.59	-1.20	*40.74*	-19.015	-22.015

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.0	71.1	69.3	63.3	71.9	72.5
Medium Trucks:	60.7	59.2	52.8	51.3	59.8	60.0
Heavy Trucks:	60.7	59.3	50.3	41.5	56.9	57.2
Vehicle Noise:	73.5	71.6	69.5	63.6	72.3	72.8

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.0	71.1	69.3	63.3	71.9	72.5
Medium Trucks:	41.7	40.2	33.9	32.3	40.8	41.0
Heavy Trucks:	41.7	40.3	31.3	22.5	37.9	38.2
Vehicle Noise:	73.0	71.1	69.3	63.3	71.9	72.5

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: First Floor With Wall
Road Name: I-215
Lot No: Lot 1

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	200,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	20,000	vehicles
Vehicle Speed:	65	mph
Near/Far Lane Distance:	90	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	0.0	feet
Centerline Dist. to Observer:	135.0	feet
Barrier Distance to Observer:	135.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Barrier Elevation:	0.0	feet
Road Grade:	1.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	78.102
Medium Trucks:	137.390
Heavy Trucks:	143.099

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	75.54	9.46	-3.01	-1.20	*-88.01*	0.000	0.000
Medium Trucks:	81.71	-7.78	-6.69	-1.20	*88.16*	-19.400	-22.400
Heavy Trucks:	85.21	-11.73	-6.95	-1.20	*88.79*	-19.400	-22.400

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	80.8	78.9	77.1	71.1	79.7	80.3
Medium Trucks:	66.0	64.5	58.2	56.6	65.1	65.3
Heavy Trucks:	65.3	63.9	54.9	46.1	61.5	61.8
Vehicle Noise:	81.1	79.2	77.2	71.2	79.9	80.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	80.8	78.9	77.1	71.1	79.7	80.3
Medium Trucks:	46.6	45.1	38.8	37.2	45.7	45.9
Heavy Trucks:	45.9	44.5	35.5	26.7	42.1	42.4
Vehicle Noise:	80.8	78.9	77.1	71.1	79.7	80.3

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: First Floor With Wall
Road Name: I-215
Lot No: Lot 2

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	200,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	20,000 vehicles
Vehicle Speed:	65 mph
Near/Far Lane Distance:	90 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	735.0 feet
Barrier Distance to Observer:	735.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	688.549
Medium Trucks:	737.314
Heavy Trucks:	743.023

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	75.54	9.46	-17.19	-1.20	*-88.06*	0.000	0.000
Medium Trucks:	81.71	-7.78	-17.63	-1.20	*88.13*	-19.400	-22.400
Heavy Trucks:	85.21	-11.73	-17.68	-1.20	*88.76*	-19.400	-22.400

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	66.6	64.7	63.0	56.9	65.5	66.1
Medium Trucks:	55.1	53.6	47.2	45.7	54.1	54.4
Heavy Trucks:	54.6	53.2	44.1	35.4	50.8	51.0
Vehicle Noise:	67.2	65.3	63.1	57.2	66.0	66.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	66.6	64.7	63.0	56.9	65.5	66.1
Medium Trucks:	35.7	34.2	27.8	26.3	34.7	35.0
Heavy Trucks:	35.2	33.8	24.7	16.0	31.4	31.6
Vehicle Noise:	66.6	64.7	63.0	56.9	65.5	66.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: First Floor With Wall
Road Name: Baxter Road
Lot No: Lot 3

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,790 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	247.0 feet
Barrier Distance to Observer:	247.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	226.173
Medium Trucks:	249.348
Heavy Trucks:	255.057

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	67.36	3.02	-9.94	-1.20	*-39.13*	0.000	0.000
Medium Trucks:	76.31	-14.22	-10.57	-1.20	*39.30*	-18.986	-21.986
Heavy Trucks:	81.16	-18.18	-10.72	-1.20	*40.68*	-19.014	-22.014

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	59.2	57.3	55.6	49.5	58.1	58.7
Medium Trucks:	50.3	48.8	42.5	40.9	49.4	49.6
Heavy Trucks:	51.1	49.6	40.6	31.9	47.3	47.5
Vehicle Noise:	60.3	58.5	55.9	50.1	59.0	59.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	59.2	57.3	55.6	49.5	58.1	58.7
Medium Trucks:	31.3	29.8	23.5	21.9	30.4	30.6
Heavy Trucks:	32.0	30.6	21.6	12.8	28.2	28.5
Vehicle Noise:	59.3	57.4	55.6	49.5	58.2	58.8

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: First Floor With Wall
Road Name: Baxter Road
Lot No: Lot 4

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,790 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	52.0 feet
Barrier Distance to Observer:	52.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	25.475
Medium Trucks:	54.537
Heavy Trucks:	60.246

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	67.36	3.02	4.29	-1.20	*-38.99*	0.000	0.000
Medium Trucks:	76.31	-14.22	-0.67	-1.20	*39.39*	-18.988	-21.988
Heavy Trucks:	81.16	-18.18	-1.32	-1.20	*40.74*	-19.015	-22.015

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.5	71.6	69.8	63.7	72.4	73.0
Medium Trucks:	60.2	58.7	52.4	50.8	59.3	59.5
Heavy Trucks:	60.5	59.0	50.0	41.3	56.7	56.9
Vehicle Noise:	73.9	72.0	69.9	64.0	72.7	73.3

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.5	71.6	69.8	63.7	72.4	73.0
Medium Trucks:	41.2	39.7	33.4	31.8	40.3	40.5
Heavy Trucks:	41.4	40.0	31.0	22.2	37.6	37.9
Vehicle Noise:	73.5	71.6	69.8	63.7	72.4	73.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: First Floor With Wall
Road Name: Baxter Road
Lot No: Lot 5

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,790 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	52.0 feet
Barrier Distance to Observer:	52.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	25.475
Medium Trucks:	54.537
Heavy Trucks:	60.246

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	67.36	3.02	4.29	-1.20	*-38.99*	0.000	0.000
Medium Trucks:	76.31	-14.22	-0.67	-1.20	*39.39*	-18.988	-21.988
Heavy Trucks:	81.16	-18.18	-1.32	-1.20	*40.74*	-19.015	-22.015

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.5	71.6	69.8	63.7	72.4	73.0
Medium Trucks:	60.2	58.7	52.4	50.8	59.3	59.5
Heavy Trucks:	60.5	59.0	50.0	41.3	56.7	56.9
Vehicle Noise:	73.9	72.0	69.9	64.0	72.7	73.3

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.5	71.6	69.8	63.7	72.4	73.0
Medium Trucks:	41.2	39.7	33.4	31.8	40.3	40.5
Heavy Trucks:	41.4	40.0	31.0	22.2	37.6	37.9
Vehicle Noise:	73.5	71.6	69.8	63.7	72.4	73.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: First Floor With Wall
Road Name: Baxter Road
Lot No: Lot 6

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,790 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	305.0 feet
Barrier Distance to Observer:	305.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	284.341
Medium Trucks:	307.338
Heavy Trucks:	313.047

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	67.36	3.02	-11.43	-1.20	*-39.13*	0.000	0.000
Medium Trucks:	76.31	-14.22	-11.93	-1.20	*39.29*	-18.986	-21.986
Heavy Trucks:	81.16	-18.18	-12.05	-1.20	*40.67*	-19.013	-22.013

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	57.8	55.9	54.1	48.0	56.7	57.3
Medium Trucks:	49.0	47.5	41.1	39.5	48.0	48.2
Heavy Trucks:	49.7	48.3	39.3	30.5	45.9	46.2
Vehicle Noise:	58.9	57.1	54.4	48.7	57.5	58.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	57.8	55.9	54.1	48.0	56.7	57.3
Medium Trucks:	30.0	28.5	22.1	20.6	29.0	29.3
Heavy Trucks:	30.7	29.3	20.3	11.5	26.9	27.2
Vehicle Noise:	57.8	55.9	54.1	48.0	56.7	57.3

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: First Floor With Wall
Road Name: Whitewood Road
Lot No: Lot 7

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,580 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	618.0 feet
Barrier Distance to Observer:	618.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	597.686
Medium Trucks:	620.317
Heavy Trucks:	626.026

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	69.34	3.59	-16.27	-1.20	*-39.14*	0.000	0.000
Medium Trucks:	77.62	-13.65	-16.51	-1.20	*39.28*	-18.986	-21.986
Heavy Trucks:	82.14	-17.61	-16.57	-1.20	*40.66*	-19.013	-22.013

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	55.5	53.6	51.8	45.7	54.4	55.0
Medium Trucks:	46.3	44.8	38.4	36.8	45.3	45.5
Heavy Trucks:	46.8	45.3	36.3	27.6	43.0	43.2
Vehicle Noise:	56.5	54.6	52.1	46.3	55.1	55.7

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	55.5	53.6	51.8	45.7	54.4	55.0
Medium Trucks:	27.3	25.8	19.4	17.9	26.3	26.6
Heavy Trucks:	27.8	26.3	17.3	8.5	24.0	24.2
Vehicle Noise:	55.5	53.6	51.8	45.8	54.4	55.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: First Floor With Wall
Road Name: Whitewood Road
Lot No: Lot 8 (N)

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,580 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	65.0 feet
Barrier Distance to Observer:	65.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	40.620
Medium Trucks:	67.489
Heavy Trucks:	73.198

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	69.34	3.59	1.25	-1.20	*-39.05*	0.000	0.000
Medium Trucks:	77.62	-13.65	-2.06	-1.20	*39.37*	-18.987	-21.987
Heavy Trucks:	82.14	-17.61	-2.59	-1.20	*40.74*	-19.015	-22.015

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.0	71.1	69.3	63.3	71.9	72.5
Medium Trucks:	60.7	59.2	52.8	51.3	59.8	60.0
Heavy Trucks:	60.7	59.3	50.3	41.5	56.9	57.2
Vehicle Noise:	73.5	71.6	69.5	63.6	72.3	72.8

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.0	71.1	69.3	63.3	71.9	72.5
Medium Trucks:	41.7	40.2	33.9	32.3	40.8	41.0
Heavy Trucks:	41.7	40.3	31.3	22.5	37.9	38.2
Vehicle Noise:	73.0	71.1	69.3	63.3	71.9	72.5

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: First Floor With Wall
Road Name: Whitewood Road
Lot No: Lot8 (S)

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,580 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	65.0 feet
Barrier Distance to Observer:	65.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	40.620
Medium Trucks:	67.489
Heavy Trucks:	73.198

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	69.34	3.59	1.25	-1.20	*-39.05*	0.000	0.000
Medium Trucks:	77.62	-13.65	-2.06	-1.20	*39.37*	-18.987	-21.987
Heavy Trucks:	82.14	-17.61	-2.59	-1.20	*40.74*	-19.015	-22.015

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.0	71.1	69.3	63.3	71.9	72.5
Medium Trucks:	60.7	59.2	52.8	51.3	59.8	60.0
Heavy Trucks:	60.7	59.3	50.3	41.5	56.9	57.2
Vehicle Noise:	73.5	71.6	69.5	63.6	72.3	72.8

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.0	71.1	69.3	63.3	71.9	72.5
Medium Trucks:	41.7	40.2	33.9	32.3	40.8	41.0
Heavy Trucks:	41.7	40.3	31.3	22.5	37.9	38.2
Vehicle Noise:	73.0	71.1	69.3	63.3	71.9	72.5

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Second Floor With Wall
Road Name: I-215
Lot No: Lot 1

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	200,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	20,000 vehicles
Vehicle Speed:	65 mph
Near/Far Lane Distance:	90 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	135.0 feet
Barrier Distance to Observer:	135.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	79.190
Medium Trucks:	78.816
Heavy Trucks:	143.730

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	75.54	9.46	-3.10	-1.20	*-87.71*	0.000	0.000
Medium Trucks:	81.71	-7.78	-3.07	-1.20	*-88.08*	0.000	0.000
Heavy Trucks:	85.21	-11.73	-6.98	-1.20	*89.26*	-19.400	-22.400

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	80.7	78.8	77.0	71.0	79.6	80.2
Medium Trucks:	69.7	68.2	61.8	60.3	68.7	68.9
Heavy Trucks:	65.3	63.9	54.8	46.1	61.5	61.7
Vehicle Noise:	81.1	79.3	77.2	71.3	80.0	80.6

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	80.7	78.8	77.0	71.0	79.6	80.2
Medium Trucks:	69.7	68.2	61.8	60.3	68.7	68.9
Heavy Trucks:	45.9	44.5	35.4	26.7	42.1	42.3
Vehicle Noise:	81.0	79.2	77.2	71.3	79.9	80.5

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Second Floor With Wall
Road Name: I-215
Lot No: Lot 2

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	200,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	20,000 vehicles
Vehicle Speed:	65 mph
Near/Far Lane Distance:	90 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	735.0 feet
Barrier Distance to Observer:	735.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	688.673
Medium Trucks:	737.430
Heavy Trucks:	743.139

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	75.54	9.46	-17.19	-1.20	*-88.05*	0.000	0.000
Medium Trucks:	81.71	-7.78	-17.63	-1.20	*88.15*	-19.400	-22.400
Heavy Trucks:	85.21	-11.73	-17.68	-1.20	*88.85*	-19.400	-22.400

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	66.6	64.7	62.9	56.9	65.5	66.1
Medium Trucks:	55.1	53.6	47.2	45.7	54.1	54.4
Heavy Trucks:	54.6	53.2	44.1	35.4	50.8	51.0
Vehicle Noise:	67.2	65.3	63.1	57.2	66.0	66.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	66.6	64.7	62.9	56.9	65.5	66.1
Medium Trucks:	35.7	34.2	27.8	26.3	34.7	35.0
Heavy Trucks:	35.2	33.8	24.7	16.0	31.4	31.6
Vehicle Noise:	66.6	64.7	63.0	56.9	65.5	66.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Second Floor With Wall
Road Name: Baxter Road
Lot No: Lot 3

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,790 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	247.0 feet
Barrier Distance to Observer:	247.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	226.550
Medium Trucks:	249.693
Heavy Trucks:	255.402

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	67.36	3.02	-9.95	-1.20	*-39.10*	0.000	0.000
Medium Trucks:	76.31	-14.22	-10.58	-1.20	*39.36*	-18.987	-21.987
Heavy Trucks:	81.16	-18.18	-10.73	-1.20	*40.96*	-19.019	-22.019

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	59.2	57.3	55.6	49.5	58.1	58.7
Medium Trucks:	50.3	48.8	42.4	40.9	49.4	49.6
Heavy Trucks:	51.1	49.6	40.6	31.8	47.3	47.5
Vehicle Noise:	60.3	58.5	55.9	50.1	59.0	59.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	59.2	57.3	55.6	49.5	58.1	58.7
Medium Trucks:	31.3	29.8	23.5	21.9	30.4	30.6
Heavy Trucks:	32.0	30.6	21.6	12.8	28.2	28.5
Vehicle Noise:	59.2	57.3	55.6	49.5	58.1	58.7

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Second Floor With Wall
Road Name: Baxter Road
Lot No: Lot 4

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,790 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	52.0 feet
Barrier Distance to Observer:	52.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	28.636
Medium Trucks:	27.586
Heavy Trucks:	61.858

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	67.36	3.02	3.53	-1.20	*-38.08*	0.000	0.000
Medium Trucks:	76.31	-14.22	3.77	-1.20	*-39.05*	0.000	0.000
Heavy Trucks:	81.16	-18.18	-1.49	-1.20	*41.91*	-19.038	-22.038

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.7	70.8	69.0	63.0	71.6	72.2
Medium Trucks:	64.7	63.2	56.8	55.2	63.7	63.9
Heavy Trucks:	60.3	58.9	49.8	41.1	56.5	56.7
Vehicle Noise:	73.5	71.7	69.3	63.7	72.4	72.9

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.7	70.8	69.0	63.0	71.6	72.2
Medium Trucks:	64.7	63.2	56.8	55.2	63.7	63.9
Heavy Trucks:	41.3	39.8	30.8	22.0	37.5	37.7
Vehicle Noise:	73.3	71.5	69.3	63.7	72.3	72.8

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Second Floor With Wall
Road Name: Baxter Road
Lot No: Lot 5

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,790 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	52.0 feet
Barrier Distance to Observer:	52.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	28.636
Medium Trucks:	27.586
Heavy Trucks:	61.858

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	67.36	3.02	3.53	-1.20	*-38.08*	0.000	0.000
Medium Trucks:	76.31	-14.22	3.77	-1.20	*-39.05*	0.000	0.000
Heavy Trucks:	81.16	-18.18	-1.49	-1.20	*41.91*	-19.038	-22.038

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.7	70.8	69.0	63.0	71.6	72.2
Medium Trucks:	64.7	63.2	56.8	55.2	63.7	63.9
Heavy Trucks:	60.3	58.9	49.8	41.1	56.5	56.7
Vehicle Noise:	73.5	71.7	69.3	63.7	72.4	72.9

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.7	70.8	69.0	63.0	71.6	72.2
Medium Trucks:	64.7	63.2	56.8	55.2	63.7	63.9
Heavy Trucks:	41.3	39.8	30.8	22.0	37.5	37.7
Vehicle Noise:	73.3	71.5	69.3	63.7	72.3	72.8

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Second Floor With Wall
Road Name: Baxter Road
Lot No: Lot 6

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,790 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	305.0 feet
Barrier Distance to Observer:	305.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	284.642
Medium Trucks:	307.618
Heavy Trucks:	313.327

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	67.36	3.02	-11.43	-1.20	*-39.11*	0.000	0.000
Medium Trucks:	76.31	-14.22	-11.94	-1.20	*39.34*	-18.987	-21.987
Heavy Trucks:	81.16	-18.18	-12.06	-1.20	*40.90*	-19.018	-22.018

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	57.7	55.8	54.1	48.0	56.6	57.3
Medium Trucks:	49.0	47.4	41.1	39.5	48.0	48.2
Heavy Trucks:	49.7	48.3	39.3	30.5	45.9	46.2
Vehicle Noise:	58.8	57.1	54.4	48.7	57.5	58.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	57.7	55.8	54.1	48.0	56.6	57.3
Medium Trucks:	30.0	28.5	22.1	20.6	29.0	29.2
Heavy Trucks:	30.7	29.3	20.2	11.5	26.9	27.1
Vehicle Noise:	57.8	55.9	54.1	48.0	56.7	57.3

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Second Floor With Wall
Road Name: Whitewood Road
Lot No: Lot 7

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,580 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	618.0 feet
Barrier Distance to Observer:	618.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	597.829
Medium Trucks:	620.456
Heavy Trucks:	626.165

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	69.34	3.59	-16.27	-1.20	*-39.13*	0.000	0.000
Medium Trucks:	77.62	-13.65	-16.51	-1.20	*39.31*	-18.986	-21.986
Heavy Trucks:	82.14	-17.61	-16.57	-1.20	*40.77*	-19.015	-22.015

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	55.5	53.6	51.8	45.7	54.4	55.0
Medium Trucks:	46.3	44.8	38.4	36.8	45.3	45.5
Heavy Trucks:	46.8	45.3	36.3	27.6	43.0	43.2
Vehicle Noise:	56.5	54.6	52.1	46.3	55.1	55.7

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	55.5	53.6	51.8	45.7	54.4	55.0
Medium Trucks:	27.3	25.8	19.4	17.9	26.3	26.6
Heavy Trucks:	27.8	26.3	17.3	8.5	23.9	24.2
Vehicle Noise:	55.5	53.6	51.8	45.8	54.4	55.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Second Floor With Wall
Road Name: Whitewood Road
Lot No: Lot 8 (N)

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,580 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	65.0 feet
Barrier Distance to Observer:	65.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	42.673
Medium Trucks:	41.976
Heavy Trucks:	74.497

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	69.34	3.59	0.93	-1.20	*-38.51*	0.000	0.000
Medium Trucks:	77.62	-13.65	1.04	-1.20	*-39.26*	0.000	0.000
Heavy Trucks:	82.14	-17.61	-2.70	-1.20	*41.72*	-19.034	-22.034

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.7	70.8	69.0	62.9	71.6	72.2
Medium Trucks:	63.8	62.3	55.9	54.4	62.9	63.1
Heavy Trucks:	60.6	59.2	50.2	41.4	56.8	57.1
Vehicle Noise:	73.4	71.6	69.3	63.5	72.2	72.8

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.7	70.8	69.0	62.9	71.6	72.2
Medium Trucks:	63.8	62.3	55.9	54.4	62.9	63.1
Heavy Trucks:	41.6	40.2	31.1	22.4	37.8	38.0
Vehicle Noise:	73.2	71.3	69.2	63.5	72.1	72.7

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Second Floor With Wall
Road Name: Whitewood Road
Lot No: Lot8 (S)

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,580 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	65.0 feet
Barrier Distance to Observer:	65.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	42.673
Medium Trucks:	41.976
Heavy Trucks:	74.497

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	69.34	3.59	0.93	-1.20	*-38.51*	0.000	0.000
Medium Trucks:	77.62	-13.65	1.04	-1.20	*-39.26*	0.000	0.000
Heavy Trucks:	82.14	-17.61	-2.70	-1.20	*41.72*	-19.034	-22.034

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.7	70.8	69.0	62.9	71.6	72.2
Medium Trucks:	63.8	62.3	55.9	54.4	62.9	63.1
Heavy Trucks:	60.6	59.2	50.2	41.4	56.8	57.1
Vehicle Noise:	73.4	71.6	69.3	63.5	72.2	72.8

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.7	70.8	69.0	62.9	71.6	72.2
Medium Trucks:	63.8	62.3	55.9	54.4	62.9	63.1
Heavy Trucks:	41.6	40.2	31.1	22.4	37.8	38.0
Vehicle Noise:	73.2	71.3	69.2	63.5	72.1	72.7

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Third Floor With Wall
Road Name: I-215
Lot No: Lot 1

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	200,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	20,000 vehicles
Vehicle Speed:	65 mph
Near/Far Lane Distance:	90 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	135.0 feet
Barrier Distance to Observer:	135.0 feet
Observer Height (Above Pad):	23.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	81.265
Medium Trucks:	80.645
Heavy Trucks:	144.951

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	75.54	9.46	-3.27	-1.20	*-87.13*	0.000	0.000
Medium Trucks:	81.71	-7.78	-3.22	-1.20	*-87.72*	0.000	0.000
Heavy Trucks:	85.21	-11.73	-7.04	-1.20	*89.44*	-19.400	-22.400

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	80.5	78.6	76.9	70.8	79.4	80.0
Medium Trucks:	69.5	68.0	61.6	60.1	68.6	68.8
Heavy Trucks:	65.2	63.8	54.8	46.0	61.4	61.7
Vehicle Noise:	81.0	79.1	77.0	71.2	79.8	80.4

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	80.5	78.6	76.9	70.8	79.4	80.0
Medium Trucks:	69.5	68.0	61.6	60.1	68.6	68.8
Heavy Trucks:	45.8	44.4	35.4	26.6	42.0	42.3
Vehicle Noise:	80.9	79.0	77.0	71.2	79.8	80.4

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Third Floor With Wall
Road Name: I-215
Lot No: Lot 2

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	200,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	20,000	vehicles
Vehicle Speed:	65	mph
Near/Far Lane Distance:	90	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	0.0	feet
Centerline Dist. to Observer:	735.0	feet
Barrier Distance to Observer:	735.0	feet
Observer Height (Above Pad):	23.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Barrier Elevation:	0.0	feet
Road Grade:	1.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	688.915
Medium Trucks:	737.657
Heavy Trucks:	743.366

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	75.54	9.46	-17.19	-1.20	*-88.03*	0.000	0.000
Medium Trucks:	81.71	-7.78	-17.64	-1.20	*88.16*	-19.400	-22.400
Heavy Trucks:	85.21	-11.73	-17.69	-1.20	*88.94*	-19.400	-22.400

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	66.6	64.7	62.9	56.9	65.5	66.1
Medium Trucks:	55.1	53.6	47.2	45.7	54.1	54.4
Heavy Trucks:	54.6	53.2	44.1	35.4	50.8	51.0
Vehicle Noise:	67.2	65.3	63.1	57.2	66.0	66.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	66.6	64.7	62.9	56.9	65.5	66.1
Medium Trucks:	35.7	34.2	27.8	26.3	34.7	35.0
Heavy Trucks:	35.2	33.8	24.7	16.0	31.4	31.6
Vehicle Noise:	66.6	64.7	62.9	56.9	65.5	66.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Third Floor With Wall
Road Name: Baxter Road
Lot No: Lot 3

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,790 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	247.0 feet
Barrier Distance to Observer:	247.0 feet
Observer Height (Above Pad):	23.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	227.284
Medium Trucks:	250.366
Heavy Trucks:	256.075

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	67.36	3.02	-9.97	-1.20	*-39.04*	0.000	0.000
Medium Trucks:	76.31	-14.22	-10.60	-1.20	*39.39*	-18.988	-21.988
Heavy Trucks:	81.16	-18.18	-10.74	-1.20	*41.21*	-19.024	-22.024

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	59.2	57.3	55.5	49.5	58.1	58.7
Medium Trucks:	50.3	48.8	42.4	40.9	49.3	49.6
Heavy Trucks:	51.0	49.6	40.6	31.8	47.2	47.5
Vehicle Noise:	60.3	58.5	55.9	50.1	59.0	59.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	59.2	57.3	55.5	49.5	58.1	58.7
Medium Trucks:	31.3	29.8	23.4	21.9	30.4	30.6
Heavy Trucks:	32.0	30.6	21.6	12.8	28.2	28.5
Vehicle Noise:	59.2	57.3	55.5	49.5	58.1	58.7

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Third Floor With Wall
Road Name: Baxter Road
Lot No: Lot 4

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,790 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	52.0 feet
Barrier Distance to Observer:	52.0 feet
Observer Height (Above Pad):	23.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	33.956
Medium Trucks:	32.444
Heavy Trucks:	29.135

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	67.36	3.02	2.42	-1.20	*-36.64*	0.000	0.000
Medium Trucks:	76.31	-14.22	2.71	-1.20	*-38.04*	0.000	0.000
Heavy Trucks:	81.16	-18.18	3.42	-1.20	*-42.13*	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:	71.6	69.7	67.9	61.9	70.5	71.1
Medium Trucks:	63.6	62.1	55.7	54.2	62.7	62.9
Heavy Trucks:	65.2	63.8	54.7	46.0	61.4	61.6
Vehicle Noise:	73.0	71.2	68.4	62.7	71.6	72.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	71.6	69.7	67.9	61.9	70.5	71.1
Medium Trucks:	63.6	62.1	55.7	54.2	62.7	62.9
Heavy Trucks:	65.2	63.8	54.7	46.0	61.4	61.6
Vehicle Noise:	73.0	71.2	68.4	62.7	71.6	72.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Third Floor With Wall
Road Name: Baxter Road
Lot No: Lot 5

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,790 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	52.0 feet
Barrier Distance to Observer:	52.0 feet
Observer Height (Above Pad):	23.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	33.956
Medium Trucks:	32.444
Heavy Trucks:	29.135

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	67.36	3.02	2.42	-1.20	*-36.64*	0.000	0.000
Medium Trucks:	76.31	-14.22	2.71	-1.20	*-38.04*	0.000	0.000
Heavy Trucks:	81.16	-18.18	3.42	-1.20	*-42.13*	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:	71.6	69.7	67.9	61.9	70.5	71.1
Medium Trucks:	63.6	62.1	55.7	54.2	62.7	62.9
Heavy Trucks:	65.2	63.8	54.7	46.0	61.4	61.6
Vehicle Noise:	73.0	71.2	68.4	62.7	71.6	72.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	71.6	69.7	67.9	61.9	70.5	71.1
Medium Trucks:	63.6	62.1	55.7	54.2	62.7	62.9
Heavy Trucks:	65.2	63.8	54.7	46.0	61.4	61.6
Vehicle Noise:	73.0	71.2	68.4	62.7	71.6	72.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Third Floor With Wall
Road Name: Baxter Road
Lot No: Lot 6

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,790 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	305.0 feet
Barrier Distance to Observer:	305.0 feet
Observer Height (Above Pad):	23.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	285.226
Medium Trucks:	308.163
Heavy Trucks:	313.872

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	67.36	3.02	-11.45	-1.20	*-39.08*	0.000	0.000
Medium Trucks:	76.31	-14.22	-11.95	-1.20	*39.38*	-18.988	-21.988
Heavy Trucks:	81.16	-18.18	-12.07	-1.20	*41.11*	-19.022	-22.022

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	57.7	55.8	54.1	48.0	56.6	57.2
Medium Trucks:	48.9	47.4	41.1	39.5	48.0	48.2
Heavy Trucks:	49.7	48.3	39.3	30.5	45.9	46.2
Vehicle Noise:	58.8	57.0	54.4	48.7	57.5	58.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	57.7	55.8	54.1	48.0	56.6	57.2
Medium Trucks:	30.0	28.4	22.1	20.5	29.0	29.2
Heavy Trucks:	30.7	29.3	20.2	11.5	26.9	27.1
Vehicle Noise:	57.7	55.8	54.1	48.0	56.6	57.2

Friday, December 10, 2021

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Third Floor With Wall
Road Name: Whitewood Road
Lot No: Lot 7

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,580 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	618.0 feet
Barrier Distance to Observer:	618.0 feet
Observer Height (Above Pad):	23.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	598.108
Medium Trucks:	620.725
Heavy Trucks:	626.434

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	69.34	3.59	-16.27	-1.20	*-39.12*	0.000	0.000
Medium Trucks:	77.62	-13.65	-16.51	-1.20	*39.33*	-18.987	-21.987
Heavy Trucks:	82.14	-17.61	-16.57	-1.20	*40.88*	-19.018	-22.018

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	55.5	53.6	51.8	45.7	54.4	55.0
Medium Trucks:	46.3	44.8	38.4	36.8	45.3	45.5
Heavy Trucks:	46.8	45.3	36.3	27.6	43.0	43.2
Vehicle Noise:	56.4	54.6	52.1	46.3	55.1	55.7

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	55.5	53.6	51.8	45.7	54.4	55.0
Medium Trucks:	27.3	25.8	19.4	17.9	26.3	26.6
Heavy Trucks:	27.7	26.3	17.3	8.5	23.9	24.2
Vehicle Noise:	55.5	53.6	51.8	45.8	54.4	55.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Third Floor With Wall
Road Name: Whitewood Road
Lot No: Lot 8 (N)

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,580 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	65.0 feet
Barrier Distance to Observer:	65.0 feet
Observer Height (Above Pad):	23.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	46.411
Medium Trucks:	45.317
Heavy Trucks:	76.955

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	69.34	3.59	0.38	-1.20	*-37.58*	0.000	0.000
Medium Trucks:	77.62	-13.65	0.54	-1.20	*-38.69*	0.000	0.000
Heavy Trucks:	82.14	-17.61	-2.91	-1.20	*42.13*	-19.043	-22.043

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.1	70.2	68.4	62.4	71.0	71.6
Medium Trucks:	63.3	61.8	55.4	53.9	62.4	62.6
Heavy Trucks:	60.4	59.0	50.0	41.2	56.6	56.9
Vehicle Noise:	72.9	71.1	68.7	63.0	71.7	72.3

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.1	70.2	68.4	62.4	71.0	71.6
Medium Trucks:	63.3	61.8	55.4	53.9	62.4	62.6
Heavy Trucks:	41.4	40.0	30.9	22.2	37.6	37.8
Vehicle Noise:	72.7	70.8	68.7	63.0	71.6	72.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v10/31/19

Scenario: Third Floor With Wall
Road Name: Whitewood Road
Lot No: Lot8 (S)

Project Name: Discovery Village
Job Number: 14073
Analyst: B Maddux

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,580 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	40 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	0.0 feet
Centerline Dist. to Observer:	65.0 feet
Barrier Distance to Observer:	65.0 feet
Observer Height (Above Pad):	23.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Barrier Elevation:	0.0 feet
Road Grade:	1.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	1.1%	0.74%

Noise Source Elevations (in feet)

Autos:	0.00		
Medium Trucks:	2.30		
Heavy Trucks:	8.01	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	46.411
Medium Trucks:	45.317
Heavy Trucks:	76.955

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	69.34	3.59	0.38	-1.20	*-37.58*	0.000	0.000
Medium Trucks:	77.62	-13.65	0.54	-1.20	*-38.69*	0.000	0.000
Heavy Trucks:	82.14	-17.61	-2.91	-1.20	*42.13*	-19.043	-22.043

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.1	70.2	68.4	62.4	71.0	71.6
Medium Trucks:	63.3	61.8	55.4	53.9	62.4	62.6
Heavy Trucks:	60.4	59.0	50.0	41.2	56.6	56.9
Vehicle Noise:	72.9	71.1	68.7	63.0	71.7	72.3

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.1	70.2	68.4	62.4	71.0	71.6
Medium Trucks:	63.3	61.8	55.4	53.9	62.4	62.6
Heavy Trucks:	41.4	40.0	30.9	22.2	37.6	37.8
Vehicle Noise:	72.7	70.8	68.7	63.0	71.6	72.1

APPENDIX 8.1:

OFF-SITE TRAFFIC NOISE LEVEL CALCULATIONS

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Baxter Rd
Road Segment: w/o Whitewood

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,036 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	404 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	64 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	30.610
Medium Trucks:	30.320
Heavy Trucks:	30.349

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	66.51	-5.38	3.09	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	77.72	-22.62	3.16	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	82.99	-26.57	3.15	-1.20	*-5.50*	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:	63.0	61.1	59.4	53.3	61.9	62.5
Medium Trucks:	57.1	55.5	49.2	47.6	56.1	56.3
Heavy Trucks:	58.4	56.9	47.9	49.2	57.5	57.6
Vehicle Noise:	65.1	63.3	60.0	55.5	64.0	64.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	18	38	82	176
CNEL:	19	41	87	188

Friday, December 10, 2021

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Baxter Rd.
Road Segment: e/o Whitewood

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,667 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	167 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	64 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	30.610
Medium Trucks:	30.320
Heavy Trucks:	30.349

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	66.51	-9.22	3.09	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	77.72	-26.46	3.16	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	82.99	-30.41	3.15	-1.20	*-5.50*	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:	59.2	57.3	55.5	49.5	58.1	58.7
Medium Trucks:	53.2	51.7	45.3	43.8	52.3	52.5
Heavy Trucks:	54.5	53.1	44.1	45.3	53.7	53.8
Vehicle Noise:	61.2	59.5	56.2	51.7	60.2	60.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	10	21	45	98
CNEL:	10	23	49	105

Friday, December 10, 2021

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Whitewood Rd
Road Segment: n/o Baxter

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,308 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	2,231 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	76 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	32.879
Medium Trucks:	32.608
Heavy Trucks:	32.635

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	1.53	2.63	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-15.70	2.68	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-19.66	2.68	-1.20	*-5.43*	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:	71.4	69.5	67.8	61.7	70.3	70.9
Medium Trucks:	65.2	63.7	57.4	55.8	64.3	64.5
Heavy Trucks:	66.1	64.6	55.6	56.9	65.2	65.3
Vehicle Noise:	73.3	71.5	68.4	63.7	72.2	72.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	71	152	328	706
CNEL:	76	163	351	757

Friday, December 10, 2021

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Whitewood Rd
Road Segment: s/o Baxter

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	26,563 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	2,656 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	76 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	32.879
Medium Trucks:	32.608
Heavy Trucks:	32.635

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	2.29	2.63	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-14.95	2.68	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-18.90	2.68	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.2	70.3	68.5	62.5	71.1	71.7
Medium Trucks:	66.0	64.5	58.1	56.6	65.0	65.3
Heavy Trucks:	66.8	65.4	56.4	57.6	66.0	66.1
Vehicle Noise:	74.0	72.3	69.1	64.5	73.0	73.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	79	171	368	793
CNEL:	85	183	395	850

Friday, December 10, 2021

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Whitewood Rd
Road Segment: s/o Running Rabbit Rd

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	26,563 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	2,656 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	76 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	32.879
Medium Trucks:	32.608
Heavy Trucks:	32.635

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	2.29	2.63	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-14.95	2.68	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-18.90	2.68	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.2	70.3	68.5	62.5	71.1	71.7
Medium Trucks:	66.0	64.5	58.1	56.6	65.0	65.3
Heavy Trucks:	66.8	65.4	56.4	57.6	66.0	66.1
Vehicle Noise:	74.0	72.3	69.1	64.5	73.0	73.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	79	171	368	793
CNEL:	85	183	395	850

Friday, December 10, 2021

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Antelope Road
Road Segment: n/o Baxter

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,535 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	1,454 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	56 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	39.0 feet
Centerline Dist. to Observer:	39.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	27.604
Medium Trucks:	27.282
Heavy Trucks:	27.314

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	-0.78	3.77	-1.20	*-4.58*	0.000	0.000
Medium Trucks:	81.00	-18.02	3.84	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-21.98	3.84	-1.20	*-5.57*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.0	70.1	68.3	62.3	70.9	71.5
Medium Trucks:	65.6	64.1	57.8	56.2	64.7	64.9
Heavy Trucks:	66.0	64.6	55.6	56.8	65.2	65.3
Vehicle Noise:	73.7	72.0	68.9	64.1	72.7	73.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	59	127	273	588
CNEL:	63	136	293	631

Friday, December 10, 2021

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Antelope Road
Road Segment: s/o Baxter

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,545 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	1,755 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	56 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	39.0 feet
Centerline Dist. to Observer:	39.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	27.604
Medium Trucks:	27.282
Heavy Trucks:	27.314

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	0.03	3.77	-1.20	*-4.58*	0.000	0.000
Medium Trucks:	81.00	-17.21	3.84	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-21.16	3.84	-1.20	*-5.57*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.8	70.9	69.1	63.1	71.7	72.3
Medium Trucks:	66.4	64.9	58.6	57.0	65.5	65.7
Heavy Trucks:	66.9	65.4	56.4	57.6	66.0	66.1
Vehicle Noise:	74.5	72.8	69.7	64.9	73.5	74.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	67	144	309	666
CNEL:	72	154	332	716

Friday, December 10, 2021

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E + P
Road Name: Baxter Rd
Road Segment: w/o Whitewood

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,895 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	590 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	64 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	30.610
Medium Trucks:	30.320
Heavy Trucks:	30.349

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	66.51	-3.73	3.09	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	77.72	-20.97	3.16	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	82.99	-24.93	3.15	-1.20	*-5.50*	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:	64.7	62.8	61.0	55.0	63.6	64.2
Medium Trucks:	58.7	57.2	50.8	49.3	57.7	58.0
Heavy Trucks:	60.0	58.6	49.6	50.8	59.2	59.3
Vehicle Noise:	66.7	65.0	61.7	57.1	65.7	66.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	23	49	105	227
CNEL:	24	52	113	243

Friday, December 10, 2021

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E + P
Road Name: Baxter Rd.
Road Segment: e/o Whitewood

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,667 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	167 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	64 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	30.610
Medium Trucks:	30.320
Heavy Trucks:	30.349

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	66.51	-9.22	3.09	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	77.72	-26.46	3.16	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	82.99	-30.41	3.15	-1.20	*-5.50*	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:	59.2	57.3	55.5	49.5	58.1	58.7
Medium Trucks:	53.2	51.7	45.3	43.8	52.3	52.5
Heavy Trucks:	54.5	53.1	44.1	45.3	53.7	53.8
Vehicle Noise:	61.2	59.5	56.2	51.7	60.2	60.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	10	21	45	98
CNEL:	10	23	49	105

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E + P
Road Name: Whitewood Rd
Road Segment: n/o Baxter

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	24,082 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	2,408 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	76 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	32.879
Medium Trucks:	32.608
Heavy Trucks:	32.635

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	1.87	2.63	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-15.37	2.68	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-19.33	2.68	-1.20	*-5.43*	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:	71.8	69.9	68.1	62.0	70.7	71.3
Medium Trucks:	65.6	64.1	57.7	56.1	64.6	64.8
Heavy Trucks:	66.4	65.0	55.9	57.2	65.5	65.7
Vehicle Noise:	73.6	71.9	68.7	64.0	72.6	73.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	74	160	345	743
CNEL:	80	172	370	797

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E + P
Road Name: Whitewood Rd
Road Segment: s/o Baxter

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,364 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	2,736 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	76 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	32.879
Medium Trucks:	32.608
Heavy Trucks:	32.635

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	2.42	2.63	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-14.82	2.68	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-18.77	2.68	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.3	70.4	68.6	62.6	71.2	71.8
Medium Trucks:	66.1	64.6	58.2	56.7	65.2	65.4
Heavy Trucks:	67.0	65.5	56.5	57.7	66.1	66.2
Vehicle Noise:	74.2	72.4	69.3	64.6	73.1	73.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	81	174	375	809
CNEL:	87	187	403	867

Friday, December 10, 2021

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E + P
Road Name: Whitewood Rd
Road Segment: s/o Running Rabbit Rd

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,364 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	2,736 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	76 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	32.879
Medium Trucks:	32.608
Heavy Trucks:	32.635

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	2.42	2.63	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-14.82	2.68	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-18.77	2.68	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.3	70.4	68.6	62.6	71.2	71.8
Medium Trucks:	66.1	64.6	58.2	56.7	65.2	65.4
Heavy Trucks:	67.0	65.5	56.5	57.7	66.1	66.2
Vehicle Noise:	74.2	72.4	69.3	64.6	73.1	73.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	81	174	375	809
CNEL:	87	187	403	867

Friday, December 10, 2021

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E + P
Road Name: Antelope Road
Road Segment: n/o Baxter

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,891 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	1,489 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	56 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	39.0 feet
Centerline Dist. to Observer:	39.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	27.604
Medium Trucks:	27.282
Heavy Trucks:	27.314

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	-0.68	3.77	-1.20	*-4.58*	0.000	0.000
Medium Trucks:	81.00	-17.92	3.84	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-21.87	3.84	-1.20	*-5.57*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.1	70.2	68.4	62.4	71.0	71.6
Medium Trucks:	65.7	64.2	57.9	56.3	64.8	65.0
Heavy Trucks:	66.1	64.7	55.7	56.9	65.3	65.4
Vehicle Noise:	73.8	72.1	69.0	64.2	72.8	73.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	60	129	277	597
CNEL:	64	138	298	642

Friday, December 10, 2021

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E + P
Road Name: Antelope Road
Road Segment: s/o Baxter

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,545 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	1,755 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	56 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	39.0 feet
Centerline Dist. to Observer:	39.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	27.604
Medium Trucks:	27.282
Heavy Trucks:	27.314

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	0.03	3.77	-1.20	*-4.58*	0.000	0.000
Medium Trucks:	81.00	-17.21	3.84	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-21.16	3.84	-1.20	*-5.57*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.8	70.9	69.1	63.1	71.7	72.3
Medium Trucks:	66.4	64.9	58.6	57.0	65.5	65.7
Heavy Trucks:	66.9	65.4	56.4	57.6	66.0	66.1
Vehicle Noise:	74.5	72.8	69.7	64.9	73.5	74.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	67	144	309	666
CNEL:	72	154	332	716

Friday, December 10, 2021

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035
Road Name: Baxter Rd
Road Segment: w/o Whitewood

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,328 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	1,833 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	64 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	30.610
Medium Trucks:	30.320
Heavy Trucks:	30.349

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	66.51	1.19	3.09	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	77.72	-16.05	3.16	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	82.99	-20.00	3.15	-1.20	*-5.50*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	69.6	67.7	65.9	59.9	68.5	69.1
Medium Trucks:	63.6	62.1	55.8	54.2	62.7	62.9
Heavy Trucks:	64.9	63.5	54.5	55.7	64.1	64.2
Vehicle Noise:	71.6	69.9	66.6	62.1	70.6	71.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	48	104	224	483
CNEL:	52	111	240	517

Friday, December 10, 2021

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035
Road Name: Baxter Rd.
Road Segment: e/o Whitewood

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,834 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	183 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	64 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	30.610
Medium Trucks:	30.320
Heavy Trucks:	30.349

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	66.51	-8.81	3.09	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	77.72	-26.04	3.16	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	82.99	-30.00	3.15	-1.20	*-5.50*	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:	59.6	57.7	55.9	49.9	58.5	59.1
Medium Trucks:	53.6	52.1	45.8	44.2	52.7	52.9
Heavy Trucks:	54.9	53.5	44.5	45.7	54.1	54.2
Vehicle Noise:	61.6	59.9	56.6	52.1	60.6	61.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	10	22	48	104
CNEL:	11	24	52	111

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035
Road Name: Whitewood Rd
Road Segment: n/o Baxter

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	24,539 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	2,454 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	76 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	32.879
Medium Trucks:	32.608
Heavy Trucks:	32.635

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	1.95	2.63	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-15.29	2.68	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-19.25	2.68	-1.20	*-5.43*	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:	71.8	69.9	68.2	62.1	70.7	71.3
Medium Trucks:	65.6	64.1	57.8	56.2	64.7	64.9
Heavy Trucks:	66.5	65.1	56.0	57.3	65.6	65.8
Vehicle Noise:	73.7	71.9	68.8	64.1	72.7	73.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	75	162	349	752
CNEL:	81	174	374	807

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035
Road Name: Whitewood Rd
Road Segment: s/o Baxter

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	29,219 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	2,922 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	76 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	32.879
Medium Trucks:	32.608
Heavy Trucks:	32.635

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	2.71	2.63	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-14.53	2.68	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-18.49	2.68	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.6	70.7	68.9	62.9	71.5	72.1
Medium Trucks:	66.4	64.9	58.5	57.0	65.4	65.7
Heavy Trucks:	67.2	65.8	56.8	58.0	66.4	66.5
Vehicle Noise:	74.4	72.7	69.5	64.9	73.4	73.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	84	182	392	845
CNEL:	91	195	421	906

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035
Road Name: Whitewood Rd
Road Segment: s/o Running Rabbit Rd

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	29,218 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	2,922 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	76 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	32.879
Medium Trucks:	32.608
Heavy Trucks:	32.635

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	2.71	2.63	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-14.53	2.68	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-18.49	2.68	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.6	70.7	68.9	62.9	71.5	72.1
Medium Trucks:	66.4	64.9	58.5	57.0	65.4	65.7
Heavy Trucks:	67.2	65.8	56.8	58.0	66.4	66.5
Vehicle Noise:	74.4	72.7	69.5	64.9	73.4	73.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	84	182	392	845
CNEL:	91	195	421	906

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035
Road Name: Antelope Road
Road Segment: n/o Baxter

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,988	vehicles
Peak Hour Percentage:	10.00%	
Peak Hour Volume:	1,599	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	56	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	39.0	feet
Centerline Dist. to Observer:	39.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	27.604
Medium Trucks:	27.282
Heavy Trucks:	27.314

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	-0.37	3.77	-1.20	*-4.58*	0.000	0.000
Medium Trucks:	81.00	-17.61	3.84	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-21.56	3.84	-1.20	*-5.57*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.4	70.5	68.7	62.7	71.3	71.9
Medium Trucks:	66.0	64.5	58.2	56.6	65.1	65.3
Heavy Trucks:	66.4	65.0	56.0	57.2	65.6	65.7
Vehicle Noise:	74.1	72.4	69.3	64.5	73.1	73.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	63	135	291	626
CNEL:	67	145	312	673

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035
Road Name: Antelope Road
Road Segment: s/o Baxter

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,299 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	1,930 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	56 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	39.0 feet
Centerline Dist. to Observer:	39.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	27.604
Medium Trucks:	27.282
Heavy Trucks:	27.314

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	0.45	3.77	-1.20	*-4.58*	0.000	0.000
Medium Trucks:	81.00	-16.79	3.84	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-20.75	3.84	-1.20	*-5.57*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.2	71.3	69.6	63.5	72.1	72.7
Medium Trucks:	66.9	65.3	59.0	57.4	65.9	66.1
Heavy Trucks:	67.3	65.8	56.8	58.1	66.4	66.5
Vehicle Noise:	74.9	73.2	70.1	65.4	73.9	74.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	71	153	330	710
CNEL:	76	164	354	763

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035+P
Road Name: Baxter Rd
Road Segment: w/o Whitewood

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,187 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	2,019 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	64 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	30.610
Medium Trucks:	30.320
Heavy Trucks:	30.349

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	66.51	1.61	3.09	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	77.72	-15.63	3.16	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	82.99	-19.58	3.15	-1.20	*-5.50*	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	66.4	60.3	68.9	69.5
Medium Trucks:	64.0	62.5	56.2	54.6	63.1	63.3
Heavy Trucks:	65.4	63.9	54.9	56.2	64.5	64.6
Vehicle Noise:	72.0	70.3	67.0	62.5	71.0	71.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	51	111	239	515
CNEL:	55	119	256	551

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035+P
Road Name: Baxter Rd.
Road Segment: e/o Whitewood

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,834 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	183 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	64 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	30.610
Medium Trucks:	30.320
Heavy Trucks:	30.349

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	66.51	-8.81	3.09	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	77.72	-26.04	3.16	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	82.99	-30.00	3.15	-1.20	*-5.50*	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:	59.6	57.7	55.9	49.9	58.5	59.1
Medium Trucks:	53.6	52.1	45.8	44.2	52.7	52.9
Heavy Trucks:	54.9	53.5	44.5	45.7	54.1	54.2
Vehicle Noise:	61.6	59.9	56.6	52.1	60.6	61.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	10	22	48	104
CNEL:	11	24	52	111

Friday, December 10, 2021

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035+P
Road Name: Whitewood Rd
Road Segment: n/o Baxter

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	26,313 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	2,631 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	76 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	32.879
Medium Trucks:	32.608
Heavy Trucks:	32.635

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	2.25	2.63	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-14.99	2.68	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-18.94	2.68	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.1	70.2	68.5	62.4	71.0	71.6
Medium Trucks:	65.9	64.4	58.1	56.5	65.0	65.2
Heavy Trucks:	66.8	65.4	56.3	57.6	65.9	66.1
Vehicle Noise:	74.0	72.2	69.1	64.4	73.0	73.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	79	170	366	788
CNEL:	85	182	392	845

Friday, December 10, 2021

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035+P
Road Name: Whitewood Rd
Road Segment: s/o Baxter

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,020 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	3,002 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	76 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	32.879
Medium Trucks:	32.608
Heavy Trucks:	32.635

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	2.82	2.63	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-14.42	2.68	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-18.37	2.68	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.7	70.8	69.0	63.0	71.6	72.2
Medium Trucks:	66.5	65.0	58.6	57.1	65.6	65.8
Heavy Trucks:	67.4	65.9	56.9	58.1	66.5	66.6
Vehicle Noise:	74.6	72.8	69.7	65.0	73.5	74.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	86	185	399	860
CNEL:	92	199	428	923

Friday, December 10, 2021

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035+P
Road Name: Whitewood Rd
Road Segment: s/o Running Rabbit Rd

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,020 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	3,002 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	76 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	32.879
Medium Trucks:	32.608
Heavy Trucks:	32.635

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	2.82	2.63	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-14.42	2.68	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-18.37	2.68	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.7	70.8	69.0	63.0	71.6	72.2
Medium Trucks:	66.5	65.0	58.6	57.1	65.6	65.8
Heavy Trucks:	67.4	65.9	56.9	58.1	66.5	66.6
Vehicle Noise:	74.6	72.8	69.7	65.0	73.5	74.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	86	185	399	860
CNEL:	92	199	428	923

Friday, December 10, 2021

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035+P
Road Name: Antelope Road
Road Segment: n/o Baxter

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,344 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	1,634 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	56 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	39.0 feet
Centerline Dist. to Observer:	39.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	27.604
Medium Trucks:	27.282
Heavy Trucks:	27.314

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	-0.28	3.77	-1.20	*-4.58*	0.000	0.000
Medium Trucks:	81.00	-17.51	3.84	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-21.47	3.84	-1.20	*-5.57*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.5	70.6	68.8	62.8	71.4	72.0
Medium Trucks:	66.1	64.6	58.3	56.7	65.2	65.4
Heavy Trucks:	66.5	65.1	56.1	57.3	65.7	65.8
Vehicle Noise:	74.2	72.5	69.4	64.6	73.2	73.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	64	137	295	635
CNEL:	68	147	317	683

Friday, December 10, 2021

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035+P
Road Name: Antelope Road
Road Segment: s/o Baxter

Project Name: Discovery Village
Job Number: 14073

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,299 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	1,930 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	56 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	39.0 feet
Centerline Dist. to Observer:	39.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

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

Noise Source Elevations (in feet)

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

Lane Equivalent Distance (in feet)

Autos:	27.604
Medium Trucks:	27.282
Heavy Trucks:	27.314

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	0.45	3.77	-1.20	*-4.58*	0.000	0.000
Medium Trucks:	81.00	-16.79	3.84	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-20.75	3.84	-1.20	*-5.57*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.2	71.3	69.6	63.5	72.1	72.7
Medium Trucks:	66.9	65.3	59.0	57.4	65.9	66.1
Heavy Trucks:	67.3	65.8	56.8	58.1	66.4	66.5
Vehicle Noise:	74.9	73.2	70.1	65.4	73.9	74.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	71	153	330	710
CNEL:	76	164	354	763

Friday, December 10, 2021

APPENDIX 11.1:

CONSTRUCTION NOISE LEVEL CALCULATIONS

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14073 Discover Village Construction

CadnaA Noise Prediction Model: 14073-02_Construction.cna
Date: 27.04.22
Analyst: B. Maddux

Calculation Configuration

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

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
R1		R1	62.3	62.3	69.0	0.0	0.0	0.0		x	Total	5.00	r	6282474.37	2167703.48	5.00
R2		R2	60.1	60.1	66.7	0.0	0.0	0.0		x	Total	5.00	r	6283713.48	2167689.73	5.00
R3		R3	56.7	56.7	63.4	0.0	0.0	0.0		x	Total	5.00	r	6284055.57	2166250.14	5.00
R4		R4	55.4	55.4	62.1	0.0	0.0	0.0		x	Total	5.00	r	6283446.74	2165711.67	5.00
R5		R5	53.3	53.3	60.0	0.0	0.0	0.0		x	Total	5.00	r	6280908.42	2166449.71	5.00
R6		R6	53.9	53.9	60.5	0.0	0.0	0.0		x	Total	5.00	r	6281524.30	2167863.62	5.00
R7		R7	52.6	52.6	59.3	0.0	0.0	0.0		x	Total	5.00	r	6281897.57	2168410.43	5.00
R8		R8	61.1	61.1	67.8	0.0	0.0	0.0		x	Total	5.00	r	6281732.77	2167086.42	5.00
R9		R9	60.3	60.3	66.9	0.0	0.0	0.0		x	Total	5.00	r	6282120.35	2167362.46	5.00

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	
SITEBOUNDARY		SITEBOUNDARY00001	119.3	119.3	119.3	65.6	65.6	65.6	PWL-Pt	114.5					8

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
SITEBOUNDARY	8.00	a			6282302.28	2167646.59	8.00	0.00
					6282554.75	2167641.59	8.00	0.00

Name	Height		Coordinates			
	Begin	End	x	y	z	Ground
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
			6282591.28	2167772.27	8.00	0.00
			6282837.79	2167635.99	8.00	0.00
			6282873.57	2167629.72	8.00	0.00
			6282921.49	2167616.18	8.00	0.00
			6282983.47	2167603.16	8.00	0.00
			6283056.39	2167592.74	8.00	0.00
			6283135.55	2167584.93	8.00	0.00
			6283692.96	2167575.50	8.00	0.00
			6283770.97	2167574.36	8.00	0.00
			6283770.97	2167618.63	8.00	0.00
			6283848.23	2167618.63	8.00	0.00
			6283796.50	2166304.25	8.00	0.00
			6283732.27	2166305.30	8.00	0.00
			6283732.90	2166249.38	8.00	0.00
			6283697.84	2166249.95	8.00	0.00
			6283696.79	2166275.77	8.00	0.00
			6283003.74	2166278.55	8.00	0.00
			6282841.92	2166299.06	8.00	0.00
			6282779.63	2166299.70	8.00	0.00
			6282703.39	2166298.08	8.00	0.00
			6282645.68	2166289.80	8.00	0.00
			6282520.23	2166282.45	8.00	0.00
			6282509.81	2166295.91	8.00	0.00
			6282453.82	2166295.47	8.00	0.00
			6282441.24	2166305.02	8.00	0.00
			6282440.83	2166328.49	8.00	0.00
			6281876.69	2166336.28	8.00	0.00
			6281898.69	2166667.84	8.00	0.00
			6281296.30	2166679.53	8.00	0.00
			6281313.48	2167006.94	8.00	0.00
			6282269.39	2166991.09	8.00	0.00

APPENDIX 11.2:

ROCK CRUSHING NOISE LEVEL CALCULATIONS

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14073 Discover Village Rock Crushing

CadnaA Noise Prediction Model: 14073-02_Crushing.cna
Date: 27.04.22
Analyst: B. Maddux

Calculation Configuration

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

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
R1		R1	59.1	59.1	65.7	0.0	0.0	0.0		x	Total	5.00	r	6282474.37	2167703.48	5.00
R2		R2	53.8	53.8	60.4	0.0	0.0	0.0		x	Total	5.00	r	6283713.48	2167689.73	5.00
R3		R3	53.2	53.2	59.9	0.0	0.0	0.0		x	Total	5.00	r	6284055.57	2166250.14	5.00
R4		R4	54.9	54.9	61.6	0.0	0.0	0.0		x	Total	5.00	r	6283446.74	2165711.67	5.00
R5		R5	59.9	59.9	66.5	0.0	0.0	0.0		x	Total	5.00	r	6280908.42	2166449.71	5.00
R6		R6	58.2	58.2	64.9	0.0	0.0	0.0		x	Total	5.00	r	6281524.30	2167863.62	5.00
R7		R7	55.1	55.1	61.8	0.0	0.0	0.0		x	Total	5.00	r	6281897.57	2168410.43	5.00
R8		R8	68.7	68.7	75.4	0.0	0.0	0.0		x	Total	5.00	r	6281732.77	2167086.42	5.00
R9		R9	63.3	63.3	70.0	0.0	0.0	0.0		x	Total	5.00	r	6282120.35	2167362.46	5.00

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	
AREASOURCE		AREASOURCE00001	121.6	121.6	121.6	74.4	74.4	74.4	Lw	121.6					8

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
AREASOURCE	8.00	a			6281876.69	2166336.28	8.00	0.00
					6281898.69	2166667.84	8.00	0.00

Name	Height		Coordinates			
	Begin	End	x	y	z	Ground
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
			6281296.30	2166679.53	8.00	0.00
			6281313.48	2167006.94	8.00	0.00
			6282269.39	2166991.09	8.00	0.00
			6282469.34	2166993.20	8.00	0.00
			6282440.83	2166328.49	8.00	0.00