Ironwood Residential (TTM No. 37001)

NOISE IMPACT ANALYSIS
CITY OF MORENO VALLEY

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LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
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
INCE	Institute of Noise Control Engineering
Leq	Equivalent continuous (average) sound level
Lmax	Maximum level measured over the time interval
Lmin	Minimum level measured over the time interval
mph	Miles per hour
NR	Noise Reduction
PPV	Peak particle velocity
Project	Ironwood Residential (TTM No. 37001)
RCNM	Roadway Construction Noise Model
REMEL	Reference Energy Mean Emission Level
RMS	Root-mean-square
SR-60	State Route 60
STC	Sound Transmission Class
VdB	Vibration Decibels

EXECUTIVE SUMMARY

Urban Crossroads, Inc. has prepared this noise study to determine the noise exposure and the necessary noise mitigation measures for the proposed Ironwood Residential (TTM No. 37001) development ("Project"). The Project site is located north of Ironwood Avenue and between Nason Street and Oliver Street in the City of Moreno Valley. The Project is proposed to include the development of up to 181 single-family detached residential dwelling units. The purpose of this noise analysis is to ensure that the proposed development is compatible with the existing and future noise environment. This study has been prepared to satisfy the City of Moreno Valley noise standards for residential land uses.

OFF-SITE TRAFFIC NOISE ANALYSIS

Traffic generated by the proposed Project will influence the traffic noise levels in surrounding off-site areas. To quantify the off-site traffic noise increases on the surrounding off-site areas, the changes in traffic noise levels on nine roadway segments surrounding the Project site were estimated based on the change in the average daily traffic (ADT) volumes. The traffic noise levels provided in this analysis are based on the traffic forecasts found in the *Ironwood Residential (TTM No. 37001) Traffic Impact Analysis* prepared by Urban Crossroads, Inc. (1) To assess the off-site noise level impacts associated with the proposed Project, noise contour boundaries were developed for Existing, Year 2020, and Year 2035 traffic conditions. The off-site traffic noise analysis indicates that the Project's contributions to roadway noise levels at adjacent sensitive land uses will be *less than significant* for Existing, Year 2020, and Year 2035 conditions.

ON-SITE NOISE ANALYSIS

The results of this analysis indicate that future vehicle noise from Ironwood Avenue is the principal source of community noise that will impact the Project site. The Project will also experience some background traffic noise impacts from Nason Street, Oliver Street, and the Project's internal roads, however due to the distance, topography and low traffic volume/speeds, traffic noise from these roads will not make a significant contribution to the noise environment. The following on-site noise mitigation measures recommended in this noise analysis have been designed to reduce the exterior and interior noise levels to satisfy the City of Moreno Valley transportation related CNEL noise criteria for residential development. With the recommended noise mitigation measures shown on Exhibit ES-A, the on-site noise impacts will be *less than significant*.

EXTERIOR NOISE MITIGATION

To satisfy the City of Moreno Valley 65 dBA CNEL exterior noise level standards for residential land use, the construction of 4-foot high noise barriers for the outdoor living areas (backyards) of lots 26 to 30 is required. With the recommended noise barriers shown on Exhibit ES-A, the mitigated future exterior noise levels will range from 61.5 to 63.3 dBA CNEL. This noise analysis shows that the recommended noise barriers will satisfy the City of Moreno Valley 65 dBA CNEL

exterior noise level standards. The recommendations identify the minimum required noise barrier height to satisfy the City of Moreno Valley exterior noise level standards.

The recommended noise control barriers shall be constructed so that the top of each wall extends to the recommended height above the pad elevation of the lot it is shielding. When the road is elevated above the pad elevation, the barrier shall extend to the recommended height above the highest point between the residential home and the road. The barriers shall provide a weight of at least 4 pounds per square foot of face area with no decorative cutouts or line-of-sight openings between shielded areas and the roadways. The noise barrier shall be constructed using one of the following materials:

- Masonry block
- Stucco veneer over wood framing (or foam core), or 1 inch thick tongue and groove wood of sufficient weight per square foot
- Glass (1/4 inch thick), or other transparent material with sufficient weight per square foot
- Earthen berm
- Any combination of these construction materials

The barrier must present a solid face from top to bottom. Unnecessary openings or decorative cutouts shall not be made. All gaps (except for weep holes) should be filled with grout or caulking.

INTERIOR NOISE MITIGATION

To satisfy the City of Moreno Valley 45 dBA CNEL interior noise level criteria, a Noise Reduction (NR) of up to 21.4 dBA and a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning) are required for lots adjacent to Ironwood Avenue. In order to meet the City of Moreno Valley 45 dBA CNEL interior noise standards the Project shall provide the following or equivalent noise mitigation measures:

- Windows: All windows and sliding glass doors shall be well fitted, well weather-stripped assemblies and shall have a minimum STC rating of 27.
- Doors: All exterior doors shall be well weather-stripped solid core assemblies at least one and three-fourths-inch thick.
- Roof: Roof sheathing of wood construction shall be well fitted or caulked plywood of at least one-half inch thick. Ceilings shall be well fitted, well-sealed gypsum board of at least one-half inch thick.
- Attic: Attic vents should be oriented away from Ironwood Avenue. If such an orientation cannot be avoided, then an acoustical baffle shall be placed in the attic space behind the vents. Insulation with at least a rating of R-19 shall be used in the attic space.
- Ventilation: When any habitable room is in use, arrangements shall be such that circulated air is received when any exterior door(s) or window(s) are closed. 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.

With the interior noise mitigation measures provided in this study, the proposed Ironwood Residential (TTM No. 37001) Project is expected to meet the City of Moreno Valley 45 dBA CNEL interior noise level standards.

CONSTRUCTION NOISE AND VIBRATION ANALYSIS

Construction noise represents a short-term impact on the ambient noise levels. Based on the four phases of Project construction, the construction-related noise impacts are expected to create temporary and intermittent high-level noise conditions at receivers surrounding the Project site when certain activities occur at the center of construction activity.

The peak construction noise levels are expected to range from 46.2 to 56.6 dBA Leq with the attenuation provided by the recommended temporary construction noise barriers and noise mitigation measures provided below. With the temporary noise control barriers providing a minimum attenuation of 10 dBA, the construction noise levels will satisfy the 60 dBA Leq construction noise level threshold at the nearby sensitive receivers. Therefore, the construction of the Project will result in a *less than significant* noise impact.

Construction activity can result in varying degrees of ground-borne vibration, depending on the equipment and methods used, distance to the affected structures and soil type. It is expected that ground-borne vibration from Project construction activities would cause only intermittent, localized intrusion. This analysis shows the construction vibration levels are expected to approach 64.6 VdB at the nine receiver locations. Based on the FTA vibration standard of 80 VdB, the proposed Project site will not include or require equipment, facilities, or activities that would result in a barely perceptible human response (annoyance), and therefore, impacts due to vibration are considered *less than significant*.

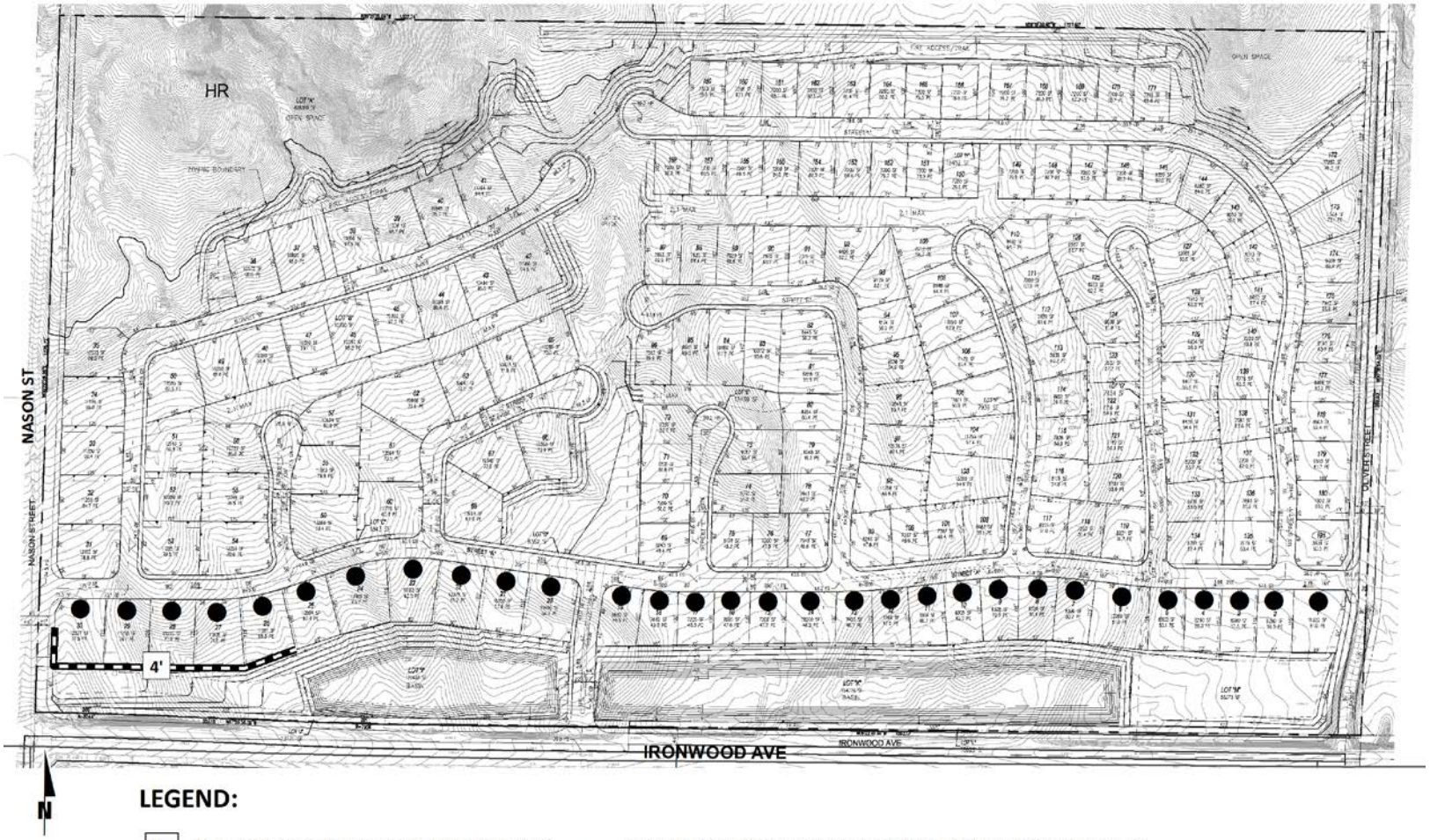
CONSTRUCTION NOISE AND VIBRATION ABATEMENT MEASURES

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

- Prior to approval of grading plans and/or issuance of building permits, plans shall include a note indicating that noise-generating Project construction activities shall only occur between the hours of 7:00 a.m. and 8:00 p.m. on any day. The Project construction supervisor shall ensure compliance with the note and the City shall conduct periodic inspection at its discretion.
- Install temporary noise control barriers that provide a minimum noise level attenuation of 10 dBA when Project construction occurs near existing noise-sensitive structures. The noise control barrier must present a solid face from top to bottom. The noise control barrier must be high enough and long enough to block the view of the noise source. Unnecessary openings shall not be made.
    - The noise barrier may be constructed using an acoustical blanket (e.g. vinyl acoustic curtains or quilted blankets) attached to the construction site perimeter fence or equivalent temporary fence posts.

  - The noise barriers must be maintained and any damage promptly repaired. Gaps, holes, or weaknesses in the barrier or openings between the barrier and the ground shall be promptly repaired.
  - The noise control barriers and associated elements shall be completely removed and the site appropriately restored upon the conclusion of the construction activity.
- During all Project site construction, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards. The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from the noise sensitive receptors nearest the Project site.
- The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receivers nearest the Project site (i.e., to the north) during all Project construction.
- The construction contractor shall limit haul truck deliveries to the same hours specified for construction equipment (between the hours of 7:00 a.m. and 8:00 p.m. on any day). The contractor shall design delivery routes to minimize the exposure of sensitive land uses or residential dwellings to delivery truck-related noise.

EXHIBIT ES-A: SUMMARY OF RECOMMENDATIONS



LEGEND:

6' Recommended Noise Barrier Height (in feet)

Recommended Noise Barrier Location

Lots requiring standard windows with a minimum STC rating of 27 and a means of mechanical ventilation (e.g. air conditioning).

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1 INTRODUCTION

This noise analysis has been completed to determine the noise impacts associated with the development of the proposed Ironwood Residential (TTM No. 37001) ("Project"). This noise study briefly describes the proposed Project, provides information regarding noise fundamentals, describes the local regulatory setting, provides the study methods and procedures for traffic noise analysis, and evaluates the future exterior noise environment. In addition, this study includes an analysis of the potential Project-related short-term construction noise impacts.

1.1 SITE LOCATION

The proposed Ironwood Residential (TTM No. 37001) site is located north of Ironwood Avenue and between Nason Street and Oliver Street in the City of Moreno Valley, as shown on Exhibit 1-A. The Project site is currently vacant. Existing single-family residential homes are located to the west, east, and south of the Project site. The State Route 60 (SR-60) Freeway is located approximately one half mile south of the Project site.

1.2 PROJECT DESCRIPTION

The Project is proposed to include the development of up to 181 single-family detached residential dwelling units, as shown on Exhibit 1-B.

EXHIBIT 1-A: LOCATION MAP

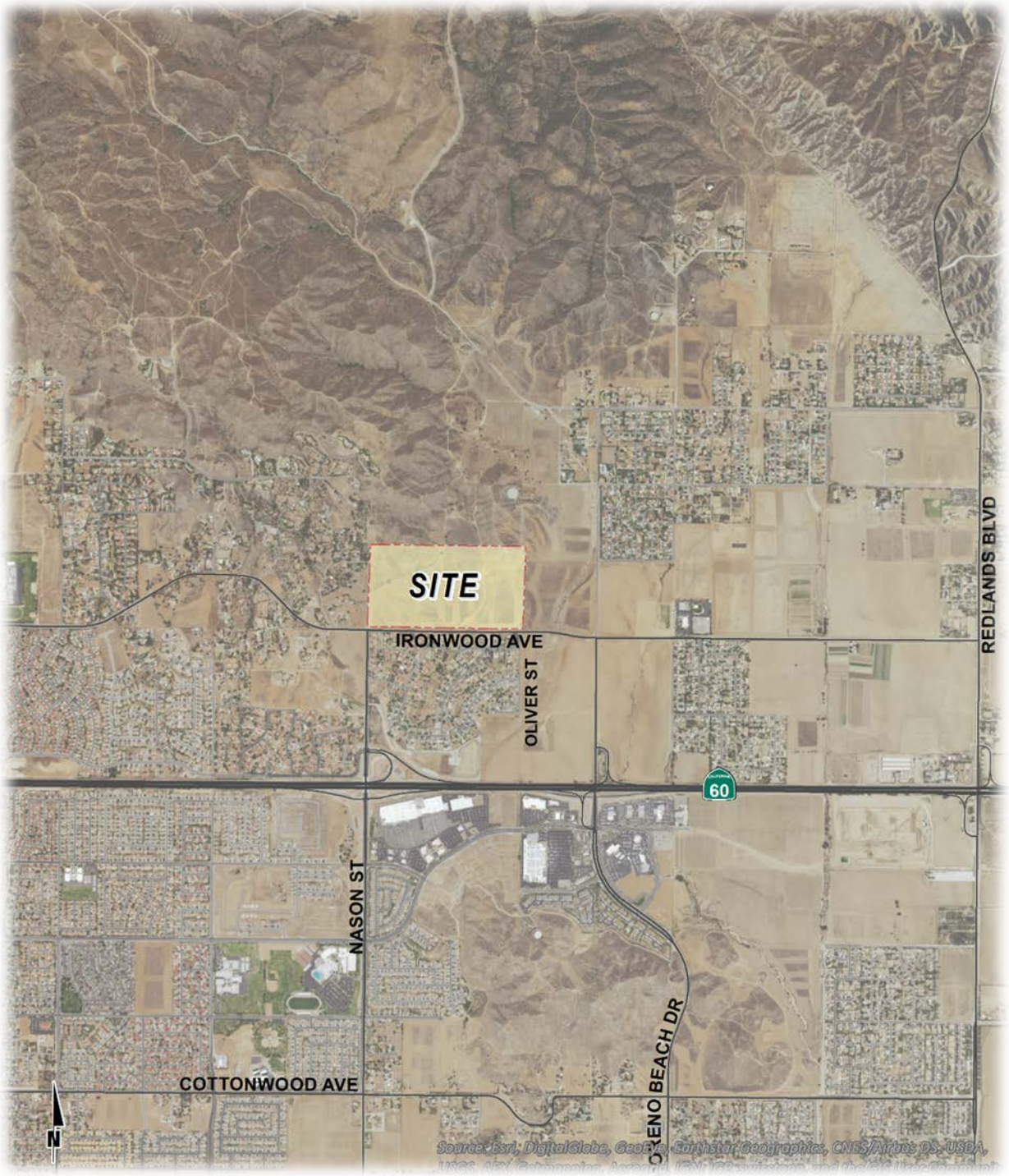
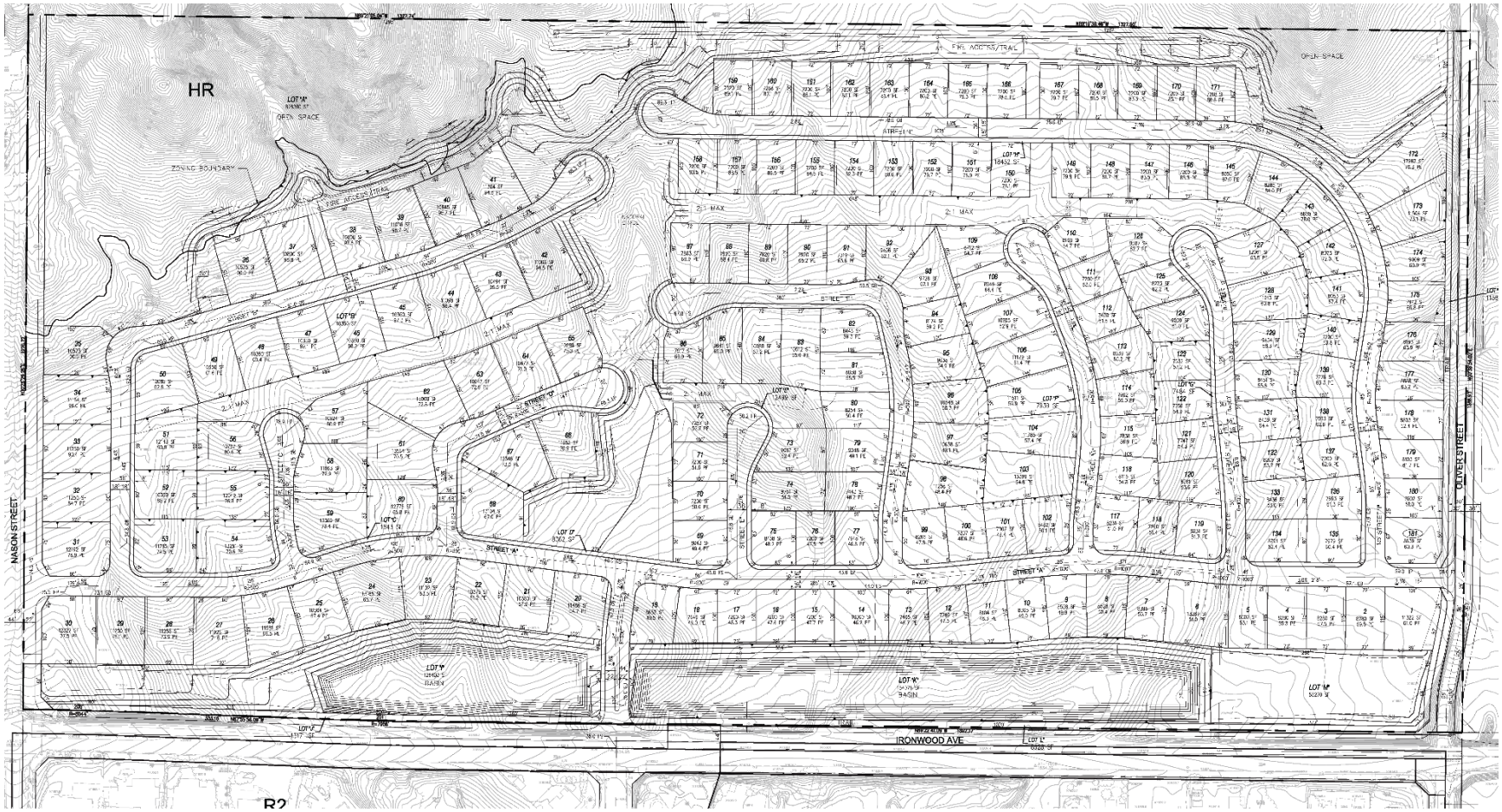


EXHIBIT 1-B: SITE PLAN



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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	
QUIET URBAN NIGHTTIME	THEATER, LARGE CONFERENCE ROOM (BACKGROUND)	40		SLEEP DISTURBANCE
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. (2) 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. (3) Another important aspect of noise is the duration of the sound and the way it is described and distributed in time.

2.2 NOISE DESCRIPTORS

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

Peak hour or average noise levels, while useful, do not completely describe a given noise environment. Noise levels lower than the 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 twenty-four 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 Leq sound levels in the evening from 7:00 p.m. to 10:00 p.m., and the addition of 10 decibels to dBA Leq 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 particular time, but rather represents the total sound exposure. The City of Moreno Valley 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 manner in which noise reduces with distance depends on the following factors.

2.3.1 GEOMETRIC SPREADING

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

2.3.2 GROUND ABSORPTION

The propagation path of noise from a highway to a receptor is usually very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually

sufficiently accurate for distances of less than 200 ft. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receptor, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receptor such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance from a line source.

2.3.3 ATMOSPHERIC EFFECTS

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

2.3.4 SHIELDING

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

2.4 TRAFFIC NOISE PREDICTION

Vehicle noise is a combination of the noise produced by the engine, exhaust, and tires on the roadway. According to the *Highway Traffic Noise Analysis and Abatement Policy and Guidance,* provided by the Federal Highway Administration (FHWA), the level of traffic noise depends on three primary factors: the volume of the traffic, the speed of the traffic, and the vehicle mix within the flow of traffic. Generally, the loudness of traffic noise is increased by heavier traffic volumes, higher speeds, and a greater number of trucks. (4) A doubling of the traffic volume, assuming that the speed and vehicle mix do not change, results in a noise level increase of 3 dBA. The vehicle mix on a given roadway may also have an effect on community noise levels. As the number of medium and heavy trucks increases and becomes a larger percentage of the vehicle mix, adjacent noise level impacts will increase.

2.5 NOISE CONTROL

Noise control is the process of obtaining an acceptable noise environment for a particular 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 any and all of these three elements.

2.6 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. (4)

2.7 LAND USE COMPATIBILITY WITH NOISE

Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches and residences are more sensitive to noise intrusion than are commercial or industrial developments and related activities. As ambient noise levels affect the perceived amenity or livability of a development, so too can the mismanagement of noise impacts impair the economic health and growth potential of a community by reducing the area's desirability as a place to live, shop and work. For this reason, land use compatibility with the noise environment is an important consideration in the planning and design process. The FHWA encourages State and Local government to regulate land development in such a way that noise-sensitive land uses are either prohibited from being located adjacent to a highway, or that the developments are planned, designed, and constructed in such a way that noise impacts are minimized. (5)

2.8 COMMUNITY RESPONSE TO NOISE

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

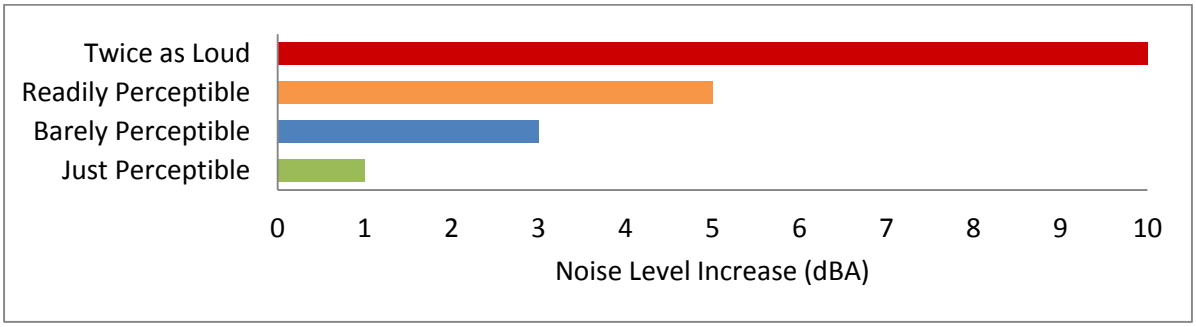
- Fear associated with noise producing activities;
- Socio-economic status and educational level;
- Perception that those affected are being unfairly treated;
- Attitudes regarding the usefulness of the noise-producing activity;
- Belief that the noise source can be controlled.

Approximately ten percent of the population has a very low tolerance for noise and will object to any noise not of their making. Consequently, even in the quietest environment, some complaints will occur. Another twenty-five percent of the population will not complain even in very severe noise environments. Thus, a variety of reactions can be expected from people exposed to any given noise environment. (6) Surveys have shown that about ten percent of the people exposed to traffic noise of 60 dBA will report being highly annoyed with the noise, and each increase of

one dBA is associated with approximately two percent more people being highly annoyed. When traffic noise exceeds 60 dBA or aircraft noise exceeds 55 dBA, people may begin to complain. (6)

Despite this variability in behavior on an individual level, the population as a whole can be expected to exhibit the following responses to changes in noise levels as shown on Exhibit 2-B. An increase or decrease of 1 dBA cannot be perceived except in carefully controlled laboratory experiments, a change of 3 dBA are considered *barely perceptible*, and changes of 5 dBA are considered *readily perceptible*. (4)

EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION



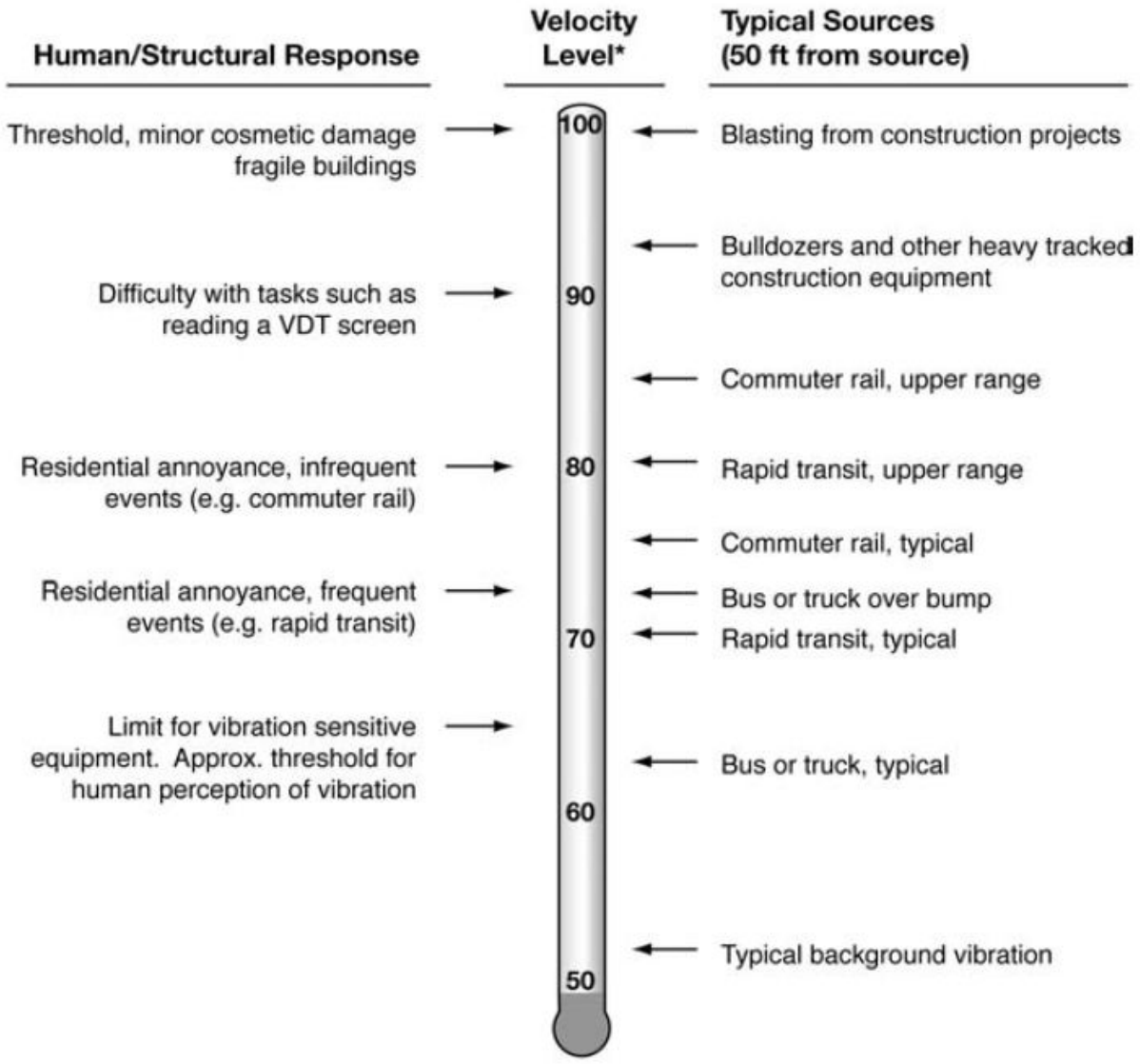
2.9 VIBRATION

According to the Federal Transit Administration (FTA) *Transit Noise Impact and Vibration Assessment* (7), vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structure-borne noise. Sources of ground-borne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as factory machinery, or transient, such as explosions. As is the case with airborne sound, ground-borne vibrations may be described by amplitude and frequency.

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

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

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



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

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

3 REGULATORY SETTING

To limit population exposure to physically and/or psychologically damaging as well as intrusive noise levels, the federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. In most areas, automobile and truck traffic is the major source of environmental noise. Traffic activity generally produces an average sound level that remains fairly 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. (8) The purpose of the Noise Element is to *limit the exposure of the community to excessive noise levels*. In addition, the California Environmental Quality Act (CEQA) requires that all known environmental effects of a project be analyzed, including environmental noise impacts.

3.2 STATE OF CALIFORNIA BUILDING CODE

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

3.3 CITY OF MORENO VALLEY GENERAL PLAN SAFETY ELEMENT

The City of Moreno Valley General Plan does not include a noise element or specific transportation-related noise standards. Rather, noise is considered in Section 6.4 of the Environmental Safety section of the General Plan Safety Element. (9) While the General Plan provides background and noise fundamentals, it does not identify criteria to assess the impacts associated with off-site transportation-related noise impacts. Instead, the General Plan includes policies associated with each element in Chapter 9, *Goals and Objectives*. The objectives identified in Chapter 9 of the City of Moreno Valley General Plan to address potential noise impacts are listed below:

Objective 6.3 *Provide noise compatible land use relationships by establishing noise standards utilized for design and siting purposes.*

Objective 6.4 *Review noise issues during the planning process and require noise attenuation measures to minimize acoustic impacts to existing and future surrounding land uses.*

Objective 6.5 *Minimize noise impacts from significant noise generators such as, but not limited to, motor vehicles, trains, aircraft, commercial, industrial, construction, and other activities.*

The City of Moreno Valley General Policies (pg. 9-31, 9-32) act to ensure that when exterior noise levels exceed 65 dBA CNEL at sensitive land uses (Policy 6.3.1), mitigation is provided to ensure that interior noise levels of 45 dBA CNEL are maintained. General Plan Policies in this regard are consistent with, and support, the California Building Code interior noise standards previously discussed in Section 3.2.

3.4 CITY OF MORENO VALLEY MUNICIPAL CODE NOISE STANDARDS

The most effective method to control community noise impacts from non-transportation noise sources (such as playgrounds, trash compactors, air-conditioning units, etc.) is through the application of a noise control ordinance. For the purpose of this analysis, the potential non-transportation noise impacts include Project-related short-term construction activities during the permitted hours of construction established in the Municipal Code. The City of Moreno Valley Municipal Code is included in Appendix 3.1.

As a subset of its stationary-source noise regulations, the City of Moreno Valley Municipal Code establishes restrictions on construction-source noise. More specifically, Municipal Code Section 11.80.030(D)(7), *Construction and Demolition*, provides the following:

> *No person shall operate or cause operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between the hours of eight p.m. and seven a.m. the following day such that the sound there from creates a noise disturbance, except for emergency work by public service utilities or for other work approved by the city manager or designee.*

The City of Moreno Valley defines a *noise disturbance* as any sound which:

> *Disturbs a reasonable person of normal sensitivities; exceeds the sound level limits set forth in this chapter* [Section 11.80.030(C)]*; or is plainly audible as defined in this section. Where no specific distance is set forth for the determination of audibility, references to noise disturbance shall be deemed to mean plainly audible at a distance of two (200) feet from the real property line of the source of the sound, if the sound occurs on privately owned property, or from the source of the sound, if the sound occurs on public right of way, public space or other publicly owned property.*

Therefore, Project construction shall be limited to the hours of 7:00 a.m. to 8:00 p.m. on any day and may not generate a noise level at 200 feet from the property line which exceeds the noise standards provided in the Noise Ordinance, Section 11.80.030(C), *Non-impulsive Sound Decibel Limits*, which states the following:

> *No person shall maintain, create, operate or cause to be operated on private property any source of sound in such a manner as to create any non-impulsive sound which exceeds the limits set forth for the source land use category in Table 11.80.030-2 when measured at a distance of two hundred (200) feet or more from the real property line of the source of the sound, if the sound occurs on privately owned property, or from the source of the sound, if the sound occurs on public right-of-way, public space or other publicly owned property. Any source of sound in violation of this subsection shall be deemed prima facie to be a noise disturbance*. (10)

Even though the City of Moreno Valley Municipal Code does not identify specific construction noise limits; it does provide noise level limits for the source land use category when measured at a distance of 200 feet. For the purpose of this analysis, the Ironwood Residential (TTM No. 37001) Project is considered *Residential* land use since it is *land primarily for dwelling units*, as defined by the City of Moreno Valley Municipal Code. For residential land uses, the City of Moreno Valley 60 dBA Leq noise level standard at a distance of 200 feet is used as the limit for this analysis to assess the construction noise level impacts at sensitive receivers in the Project study area. Therefore, to conform to the applicable provisions of the Municipal Code, the maximum allowable noise generated by on-site construction activities when measured at 200 feet from any property line, shall not exceed 60 dBA Leq. The City of Moreno Valley construction noise standards are shown on Table 3-1 and included in Appendix 3.1.

TABLE 3-1: CONSTRUCTION NOISE STANDARDS

Jurisdiction	Permitted Hours of Construction Activity	Construction Noise Level Standard
City of Moreno Valley[1]	Between 7:00 a.m. and 8:00 p.m. on any day	60 dBA Leq @ 200'

[1] Source: City of Moreno Valley Municipal Code, Section 11.80.030(D)(7) (Appendix 3.1).

3.5 CONSTRUCTION VIBRATION STANDARDS

To analyze the vibration impacts originating from the construction of the Project, vibration from construction activities are typically evaluated against standards established under a City's Municipal Code. The City of Moreno Valley Municipal Code, however, does not identify specific vibration standards for construction. Therefore, the construction-related vibration standards provided by the United States Department of Transportation Federal Transit Administration (FTA) are used in this analysis to assess the potential vibration impacts due to Project construction.

3.6.1 FTA VIBRATION STANDARDS

The FTA identifies guidelines for maximum-acceptable vibration criteria for different types of land uses. (7) These guidelines allow 80 VdB for residential uses and buildings where people normally sleep. Construction activity can result in varying degrees of ground-borne vibration, depending on the equipment and methods used, distance to the affected structures and soil type. Construction vibration is generally associated with pile driving and rock blasting. Other construction equipment such as air compressors, light trucks, hydraulic loaders, etc., generates little or no ground vibration. Occasionally large bulldozers and loaded trucks can cause perceptible vibration levels at close proximity. While not enforceable regulations within the City of Moreno Valley, the FTA guidelines of 80 VdB for sensitive land uses provide the basis for determining the relative significance of potential Project-related vibration impacts.

3.6.2 HUMAN PERCEPTION OF VIBRATION

Typically, the human response at the perception threshold for vibration includes annoyance in residential areas when vibration levels, expressed in vibration decibels (VdB), approach 75 VdB as previously shown on Exhibit 2-C. As discussed in Section 2.9, ground-borne vibration is normally perceptible to humans at approximately 65 VdB and, for most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels. For this analysis, the FTA-provided 80 VdB vibration standard represents residential annoyance as perceived by the nearby sensitive receivers in the Project study area.

4 SIGNIFICANCE CRITERIA

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

A. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

B. Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.

C. A substantial permanent increase in ambient noise levels in the Project vicinity above existing levels without the proposed Project; or

D. A substantial temporary or periodic increase in ambient noise levels in the Project vicinity above noise levels existing without the proposed Project.

While the CEQA Guidelines and the City of Moreno Valley General Plan Guidelines provide direction on noise compatibility and establish noise standards by land use type that are sufficient to assess the significance of noise impacts under the first threshold, they do not define the levels at which increases are considered substantial for use under the second, third and fourth threshold. Under CEQA, consideration must be given to the magnitude of the increase, the existing ambient noise levels and the location of noise-sensitive receivers in order to determine if a noise increase represents a significant adverse environmental impact. This approach recognizes *that there is no single noise increase that renders the noise impact significant.* (11)

Unfortunately, there is no completely satisfactory way to measure the subjective effects of noise or of the corresponding human reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance and differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment to which one has adapted—the so-called *ambient* environment.

In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will typically be judged. With this in mind, the Federal Interagency Committee on Noise (FICON) developed guidance to be used for the assessment of project-generated increases in noise levels that take into account the ambient noise level. (12) The FICON recommendations are based on studies that relate aircraft noise levels to the percentage of persons highly annoyed by aircraft noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, these recommendations are often used in environmental noise impact assessments involving the use of cumulative noise exposure metrics, such as the average-daily noise level (i.e., CNEL).

For example, if the ambient noise environment is quiet (<60 dBA) and the new noise source greatly increases the noise levels, an impact may occur even though the noise criteria might not be exceeded. Therefore, for the purpose of this analysis, FICON identifies a *readily perceptible* 5 dBA or greater project related noise level increase is considered a significant impact when nearby

noise-sensitive receivers are affected. According to the FICON, in areas where the without project noise levels range from 60 to 65 dBA, a 3 dBA *barely perceptible* noise level increase appears to be appropriate for most people. When the without project noise levels already exceed 65 dBA, any increase in community noise louder than 1.5 dBA or greater is considered a significant impact if noise-sensitive receivers are affected, since it likely contributes to an existing noise exposure exceedance. Table 4-1 below provides a summary of the potential noise impact significance criteria, based on guidance from FICON.

TABLE 4-1: SIGNIFICANCE OF NOISE IMPACTS

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

Federal Interagency Committee on Noise (FICON), 1992.

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

OFF-SITE TRAFFIC NOISE

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

ON-SITE TRAFFIC NOISE

- If the on-site exterior noise levels exceed 65 dBA CNEL at the residential land uses within the Project site. Interior noise levels shall not exceed 45 dBA CNEL for residential land uses (City of Moreno Valley General Noise Element, Policy 6.3.1).

CONSTRUCTION NOISE AND VIBRATION

- If Project-related construction activities:
    - occur anytime other than between the permitted hours of 7:00 a.m. to 8:00 p.m. on any day (City of Moreno Valley Municipal Code Section 11.80.030(D)(7)); or
    - create noise levels at sensitive residential receivers in the City of Moreno Valley which exceed the short-term construction noise level limit of 60 dBA Leq at 200 feet from the Project site (City of Moreno Valley Municipal Code, Section 11.80.030(D)(7)).

- If short-term Project generated construction vibration levels exceed the FTA maximum acceptable vibration standard of 80 VdB at sensitive receiver locations (FTA Transit Noise and Vibration Impact Assessment, May 2006).

TABLE 4-2: SIGNIFICANCE CRITERIA SUMMARY

Analysis	Condition(s)	Significance Criteria	
		Daytime	Nighttime
Off-Site[1]	if ambient is < 60 dBA CNEL	≥ 5 dBA CNEL Project increase	
	if ambient is 60 - 65 dBA CNEL	≥ 3 dBA CNEL Project increase	
	if ambient is > 65 dBA CNEL	≥ 1.5 dBA CNEL Project increase	
On-Site[2]	Exterior residential land use	65 dBA CNEL	
	Interior residential land use	45 dBA CNEL	
Construction[3]	Permitted hours of 7:00 a.m. to 8:00 p.m. on any day.		
	Noise Level Threshold	60 dBA Leq @ 200'	n/a
	Vibration Level Threshold[4]	80 VdB	n/a

[1] Source: FICON, 1992.
[2] Source: City of Moreno Valley General Noise Element, Policy 6.3.1.
[3] Source: City of Moreno Valley Municipal Code Section 11.80.030(D)(7) (Appendix 3.1).
[4] Source: FTA Transit Noise and Vibration Impact Assessment, May 2006.
"Daytime" = 8:00 a.m. to 10:00 p.m.; "Nighttime" = 10:01 p.m. to 7:59 a.m.; "n/a" = No nighttime construction activity is permitted and therefore, no nighttime construction noise and vibration thresholds are identified.

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5 EXISTING NOISE LEVEL MEASUREMENTS

To assess the existing noise level environment, five 24-hour noise level measurements were taken at sensitive receiver locations in the Project study area. The receiver locations were selected to describe and document the existing noise environment within the Project study area. Exhibit 5-A provides the boundaries of the Project study area and the noise level measurement locations. To fully describe the existing noise conditions, noise level measurements were collected by Urban Crossroads, Inc. on Wednesday, January 28th, 2015. Appendix 5.1 includes study area photos.

5.1 MEASUREMENT PROCEDURE AND CRITERIA

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

5.2 NOISE MEASUREMENT LOCATIONS

The long-term noise level measurements were positioned at the nearest sensitive receiver locations to assess the existing ambient hourly noise levels surrounding the Project site. To describe the existing noise environment, 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. 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 cumulative noise impacts.

5.3 NOISE MEASUREMENT RESULTS

The noise measurements presented below focus on the average or equivalent sound levels (Leq). The equivalent sound level (Leq) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. Table 5-1 identifies the hourly daytime (8:00 a.m. to 10:00 p.m.) and nighttime (10:01 p.m. to 7:59 a.m.) noise levels at each noise level measurement location. Appendix 5.2 provides a summary of the existing hourly ambient noise levels described below:

EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS

N

LEGEND:

▲ Noise Measurement Locations

- Location L1 represents the noise levels at the northeastern corner of Ironwood Avenue and Nason Street near existing residential homes across Ironwood Avenue. The noise level measurements collected show an overall 24-hour exterior noise level of 63.6 dBA CNEL. The hourly noise levels measured at location L1 ranged from 55.5 to 61.9 dBA Leq during the daytime hours and from 45.3 to 62.8 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 60.1 dBA Leq with an average nighttime noise level of 57.1 dBA Leq.
- Location L2 represents the noise levels in the northwestern portion of the Project site, east of existing residential homes across Nason Street. The noise level measurements collected show an overall 24-hour exterior noise level of 55.4 dBA CNEL. The hourly noise levels measured at location L2 ranged from 45.4 to 50.2 dBA Leq during the daytime hours and from 44.2 to 52.8 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 48.7 dBA Leq with an average nighttime noise level of 49.0 dBA Leq.
- Location L3 represents the noise levels at the southwestern corner of Ironwood Avenue and Oliver Street adjacent to an existing residential home. The 24-hour CNEL indicates that the overall exterior noise level is 63.0 dBA CNEL. At location L3 the background ambient noise levels ranged from 56.2 to 61.9 dBA Leq during the daytime hours to levels of 46.8 to 61.0 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 59.7 dBA Leq with an average nighttime noise level of 56.1 dBA Leq.
- Located on the eastern Project site boundary, location L4 represents the noise levels north of Ironwood Avenue at the Project site. The noise level measurements collected show an overall 24-hour exterior noise level of 55.5 dBA CNEL. The hourly noise levels measured at location L4 ranged from 46.7 to 51.2 dBA Leq during the daytime hours and from 43.6 to 53.2 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 49.7 dBA Leq with an average nighttime noise level of 49.1 dBA Leq.
- Location L5 represents the noise levels south of the Project site across Ironwood Avenue adjacent to existing residential homes. The 24-hour CNEL indicates that the overall exterior noise level is 73.2 dBA CNEL. At location L5 the background ambient noise levels ranged from 66.7 to 71.6 dBA Leq during the daytime hours to levels of 58.2 to 72.2 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 69.9 dBA Leq with an average nighttime noise level of 66.8 dBA Leq.

Table 5-1 provides the (energy average) noise levels used to describe the daytime and nighttime ambient conditions. These daytime and nighttime energy average noise levels represent the average of all hourly noise levels observed during these time periods expressed as a single number. Appendix 5.2 provides a summary 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. This includes the auto and heavy truck activities near the noise level measurement locations. The 24-hour existing noise level measurements shown on Table 5-1 present the worst-case existing unmitigated ambient noise conditions.

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

Location[1]	Distance from Project Site (Feet)	Description	Hourly Noise Level (dBA Leq)[2]		CNEL
			Daytime	Nighttime	
L1	0'	Located at the northeastern corner of Ironwood Avenue and Nason Street near existing residential homes across Ironwood Avenue.	60.1	57.1	63.6
L2	0'	Located in the northwestern portion of the Project site, east of existing residential homes across Nason Street.	48.7	49.0	55.4
L3	96'	Located at the southwestern corner of Ironwood Avenue and Oliver Street adjacent to an existing residential home.	59.7	56.1	63.0
L4	0'	Located north of Ironwood Avenue on the eastern Project site boundary.	49.7	49.1	55.5
L5	81'	Located south of the Project site across Ironwood Avenue adjacent to existing residential homes.	69.9	66.8	73.2

[1] See Exhibit 5-A for the location of the noise level measurement locations.
[2] Energy (logarithmic) average hourly levels. The long-term 24-hour measurement printouts are included in Appendix 5.2.
"Daytime" = 8:00 a.m. to 10:00 p.m.; "Nighttime" = 10:01 p.m. to 7:59 a.m.

6 METHODS AND PROCEDURES

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

6.1 FHWA TRAFFIC NOISE PREDICTION MODEL

The estimated roadway noise impacts from vehicular traffic were calculated using a computer program that replicates the Federal Highway Administration (FHWA) Traffic Noise Prediction Model- FHWA-RD-77-108. (14) 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. (15) Adjustments are then made to the REMEL to account for: the roadway classification (e.g., collector, secondary, major or arterial), the roadway active width (i.e., the distance between the center of the outermost travel lanes on each side of the roadway), the total average daily traffic (ADT), the travel speed, the percentages of automobiles, medium trucks, and heavy trucks in the traffic volume, the roadway grade, the angle of view (e.g., whether the roadway view is blocked), the site conditions ("hard" or "soft" relates to the absorption of the ground, pavement, or landscaping), and the percentage of total ADT which flows each hour throughout a 24-hour period.

6.2 OFF-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

Table 6-1 presents the roadway parameters used to assess the Project's off-site transportation noise impacts. Table 6-1 identifies the nine study area roadway segments, the distance from the centerline to adjacent land use based on the functional roadway classifications according to the City of Moreno Valley General Plan Environmental Impact Report (EIR) Traffic/Circulation section, and the vehicle speeds. The ADT volumes used for this study, presented in Table 6-2, were obtained from the *Ironwood Residential (TTM No. 37001) Traffic Impact Analysis,* prepared by Urban Crossroads, Inc. (1) Table 6-3 presents the time of day vehicle splits and Table 6-4 presents the traffic flow distributions (vehicle mix) used for this analysis. The vehicle mix provides the hourly distribution percentages of automobile, medium trucks and heavy trucks for input into the FHWA noise prediction model.

TABLE 6-1: OFF-SITE ROADWAY PARAMETERS

ID	Roadway	Segment	Adjacent Planned Land Use[1]	Distance from Centerline to Nearest Adjacent Land Use (feet)[2]	Vehicle Speed (mph)
1	Nason St.	s/o Ironwood Av.	Residential	44'	45
2	Nason St.	n/o SR-60 WB Ramps	Residential	44'	45
3	Nason St.	n/o SR-60 WB Fwy	Open Space	44'	45
4	Nason St.	s/o SR-60 EB Ramps	Commercial	44'	45
5	Ironwood Av.	w/o Nason St.	Residential	44'	45
6	Ironwood Av.	e/o Nason St.	Residential	44'	55
7	Ironwood Av.	e/o Lantz Ln.	Residential	44'	55
8	Ironwood Av.	e/o Oliver St.	Residential	44'	55

[1] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[2] Distance to adjacent land use is based upon the right-of-way distances for each functional roadway classification provided in the City of Moreno Valley General Plan Environmental Impact Report (EIR) Traffic/Circulation section.

TABLE 6-2: AVERAGE DAILY TRAFFIC VOLUMES

ID	Roadway	Segment	Average Daily Traffic (1,000's)[1]					
			Existing		Year 2020		Year 2035	
			Without Project	With Project	Without Project	With Project	Without Project	With Project
1	Nason St.	s/o Ironwood Av.	4.3	5.3	9.0	9.9	9.9	10.8
2	Nason St.	n/o SR-60 WB Ramps	4.8	5.7	9.5	10.4	10.4	11.4
3	Nason St.	n/o SR-60 WB Fwy	12.7	13.3	18.7	19.4	20.6	21.3
4	Nason St.	s/o SR-60 EB Ramps	17.8	18.2	24.9	25.2	27.4	27.7
5	Ironwood Av.	w/o Nason St.	6.8	7.1	12.2	12.5	13.4	13.7
6	Ironwood Av.	e/o Nason St.	4.6	5.3	7.8	8.6	8.6	9.4
7	Ironwood Av.	e/o Lantz Ln.	4.3	4.5	7.4	7.7	8.1	8.4
8	Ironwood Av.	e/o Oliver St.	4.3	4.8	7.4	7.8	8.1	8.5

[1] Source: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis, Urban Crossroads, Inc. August 2015.

TABLE 6-3: 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: County of Riverside Office of Industrial Hygiene.

TABLE 6-4: DISTRIBUTION OF TRAFFIC FLOW BY VEHICLE TYPE (VEHICLE MIX)

Roadway	Total % Traffic Flow			Total
	Autos	Medium Trucks	Heavy Trucks	
All Segments[1]	97.42%	1.84%	0.74%	100.00%

[1] Source: County of Riverside Office of Industrial Hygiene.

6.3 ON-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

The on-site roadway parameters including the ADT volumes used for this analysis are presented on Table 6-5. Based on the City of Moreno Valley General Plan EIR Traffic/Circulation section, Figure 5.2-1, Ironwood Avenue is classified as a 4-lane Minor Arterial. (16) To predict the future on-site noise environment at the Project site, the City of Moreno Valley General Plan EIR Traffic/Circulation section, Table 5.2-5, future design capacity traffic volumes were used. The traffic volumes shown on Table 6-5 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.

TABLE 6-5: ON-SITE ROADWAY PARAMETERS

Roadway	Lanes	Classification[1]	Design Capacity Volume[2]	Posted Speed Limit (mph)[3]	Site Conditions
Ironwood Av.	4	Minor Arterial	30,000	55	Soft

[1] Road classifications based upon the City of Moreno Valley General Plan Environmental Impact Report (EIR), Figure 5.2-1.
[2] Source: City of Moreno Valley General Plan EIR, Table 5.2-5.
[3] Source: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis, Urban Crossroads, Inc., August 2015.

Table 6-3 presents the time of day vehicle splits by vehicle type, and Table 6-4 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. To predict the future noise environment at lots within the Project site, coordinate information was collected to identify the noise transmission path between the noise source and receiver. The coordinate information is based on the Project site plan showing the plotting of each lot in relationship to Ironwood Avenue, as shown in Appendix 6.1.

The site plan is used to identify the relationship between the roadway centerline elevation, the pad elevation and the centerline distance to the noise barrier, and the building façade. The exterior noise level impacts at the outdoor living area receivers (backyards) were placed five feet above the pad elevation and ten feet from the proposed barrier location or at the proposed building façade, whichever is greater. First floor receivers were located five feet above the

proposed finished floor elevation and second floor receivers were located fourteen feet above the proposed finished floor elevation.

6.4 VIBRATION ASSESSMENT

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

However, while vehicular traffic is rarely perceptible, construction has the potential to result in varying degrees of temporary ground vibration, depending on the specific construction activities and equipment used. Ground vibration levels associated with various types of construction equipment are summarized on Table 6-6. Based on the representative vibration levels presented for various construction equipment types, it is possible to estimate the human response (annoyance) using the following vibration assessment methods defined by the FTA. To describe the human response (annoyance) associated with vibration impacts the FTA provides the following equation (7): $L_{VdB}(D) = L_{VdB}(25\text{ ft}) - 30\log(D/25)$

TABLE 6-6: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	Vibration Decibels (VdB) at 25 feet
Small bulldozer	58
Jackhammer	79
Loaded Trucks	86
Large bulldozer	87

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

7 OFF-SITE TRAFFIC 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 the *Ironwood Residential (TTM No. 37001) Traffic Impact Analysis*. (1) 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 Without / With Project: This scenario refers to the existing present-day noise conditions, without the Project, and with the construction of the Project.
- Year 2020 Without / With Project: This scenario refers to the background noise conditions at future Year 2020 with and without the proposed Project. The with Project scenario corresponds to Year 2020 conditions and includes all cumulative projects identified in the Traffic Impact Analysis.
- Year 2035 Without / With Project: This scenario refers to the background noise conditions at future Year 2035 with and without the proposed Project. The with Project scenario corresponds to Year 2035 conditions and includes all cumulative projects identified in the Traffic Impact Analysis.

7.1 TRAFFIC NOISE CONTOURS

To quantify the Project's traffic noise impacts on the surrounding areas, the changes in traffic noise levels on nine roadway segments surrounding the Project were calculated based on the changes in the average daily traffic volumes. The noise contours were used to assess the Project's incremental traffic-related noise impacts at land uses adjacent to roadways conveying Project traffic. Based on the noise impact significance criteria described in Section 4, a significant off-site traffic noise level impact occurs if the without Project noise levels at nearby noise-sensitive receivers:

- are less than 60 dBA and the Project creates a *readily perceptible* 5 dBA or greater Project related noise level increase, or:
- range from 60 to 65 dBA and the Project creates a *barely perceptible* 3 dBA or greater Project noise level increase, or;
- already exceed 65 dBA, and the Project creates a community noise level impact of greater than 1.5 dBA.

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 take into account the effect of any existing noise barriers or topography that may affect ambient noise levels. In addition, since the noise contours reflect modeling of vehicular noise on area roadways, they appropriately do not reflect noise contributions from any nearby stationary noise sources within the Project study area. Tables 7-1 to 7-6 present a summary of the unmitigated exterior traffic noise levels for the nine study area roadway segments analyzed from the without Project to the with Project conditions in each of the three timeframes: Existing, Year 2020, and

Year 2035 conditions. Appendix 7.1 includes a summary of the traffic noise level contours for each of the six traffic scenarios.

TABLE 7-1: EXISTING WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Nason St.	s/o Ironwood Av.	Residential	64.9	RW	RW	93
2	Nason St.	n/o SR-60 WB Ramps	Residential	65.3	RW	46	100
3	Nason St.	n/o SR-60 WB Fwy	Open Space	69.6	RW	89	191
4	Nason St.	s/o SR-60 EB Ramps	Commercial	71.0	52	111	239
5	Ironwood Av.	w/o Nason St.	Residential	66.8	RW	58	126
6	Ironwood Av.	e/o Nason St.	Residential	67.4	RW	63	136
7	Ironwood Av.	e/o Lantz Ln.	Residential	67.1	RW	60	130
8	Ironwood Av.	e/o Oliver St.	Residential	67.1	RW	60	130

[1] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-2: EXISTING WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Nason St.	s/o Ironwood Av.	Residential	65.8	RW	49	107
2	Nason St.	n/o SR-60 WB Ramps	Residential	66.1	RW	52	112
3	Nason St.	n/o SR-60 WB Fwy	Open Space	69.8	RW	91	197
4	Nason St.	s/o SR-60 EB Ramps	Commercial	71.1	52	113	243
5	Ironwood Av.	w/o Nason St.	Residential	67.0	RW	60	130
6	Ironwood Av.	e/o Nason St.	Residential	68.0	RW	69	149
7	Ironwood Av.	e/o Lantz Ln.	Residential	67.3	RW	62	134
8	Ironwood Av.	e/o Oliver St.	Residential	67.5	RW	65	140

[1] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-3: YEAR 2020 WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Nason St.	s/o Ironwood Av.	Residential	68.1	RW	70	152
2	Nason St.	n/o SR-60 WB Ramps	Residential	68.3	RW	73	157
3	Nason St.	n/o SR-60 WB Fwy	Open Space	71.2	53	115	247
4	Nason St.	s/o SR-60 EB Ramps	Commercial	72.5	64	139	299
5	Ironwood Av.	w/o Nason St.	Residential	69.4	RW	86	186
6	Ironwood Av.	e/o Nason St.	Residential	69.6	RW	90	193
7	Ironwood Av.	e/o Lantz Ln.	Residential	69.4	RW	87	187
8	Ironwood Av.	e/o Oliver St.	Residential	69.4	RW	87	187

[1] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-4: YEAR 2020 WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Nason St.	s/o Ironwood Av.	Residential	68.5	RW	75	162
2	Nason St.	n/o SR-60 WB Ramps	Residential	68.7	RW	78	167
3	Nason St.	n/o SR-60 WB Fwy	Open Space	71.4	55	118	253
4	Nason St.	s/o SR-60 EB Ramps	Commercial	72.5	65	140	302
5	Ironwood Av.	w/o Nason St.	Residential	69.5	RW	88	189
6	Ironwood Av.	e/o Nason St.	Residential	70.1	44	96	206
7	Ironwood Av.	e/o Lantz Ln.	Residential	69.6	RW	89	192
8	Ironwood Av.	e/o Oliver St.	Residential	69.6	RW	90	193

[1] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-5: YEAR 2035 WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Nason St.	s/o Ironwood Av.	Residential	68.5	RW	75	162
2	Nason St.	n/o SR-60 WB Ramps	Residential	68.7	RW	78	167
3	Nason St.	n/o SR-60 WB Fwy	Open Space	71.7	57	122	264
4	Nason St.	s/o SR-60 EB Ramps	Commercial	72.9	69	148	319
5	Ironwood Av.	w/o Nason St.	Residential	69.8	RW	92	198
6	Ironwood Av.	e/o Nason St.	Residential	70.1	44	96	206
7	Ironwood Av.	e/o Lantz Ln.	Residential	69.8	RW	92	198
8	Ironwood Av.	e/o Oliver St.	Residential	69.8	RW	92	198

[1] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-6: YEAR 2035 WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Nason St.	s/o Ironwood Av.	Residential	68.9	RW	80	171
2	Nason St.	n/o SR-60 WB Ramps	Residential	69.1	RW	82	178
3	Nason St.	n/o SR-60 WB Fwy	Open Space	71.8	58	125	270
4	Nason St.	s/o SR-60 EB Ramps	Commercial	72.9	69	149	321
5	Ironwood Av.	w/o Nason St.	Residential	69.9	RW	93	201
6	Ironwood Av.	e/o Nason St.	Residential	70.5	47	102	219
7	Ironwood Av.	e/o Lantz Ln.	Residential	70.0	44	94	203
8	Ironwood Av.	e/o Oliver St.	Residential	70.0	44	95	205

[1] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

7.2 EXISTING CONDITION PROJECT TRAFFIC NOISE LEVEL CONTRIBUTIONS

Table 7-7 presents a comparison of the Existing without and with Project conditions CNEL noise levels. Table 7-1 shows that the exterior noise levels are expected to range from 64.9 to 71.0 dBA CNEL for Existing without Project conditions. Table 7-2 presents the Existing with Project conditions noise level contours that are expected to range from 65.8 to 71.1 dBA CNEL. As shown on Table 7-7 the Project is expected to generate an exterior noise level increase of up to 0.9 dBA CNEL. Based on the significance criteria in Section 4, the Project-related off-site traffic noise level increases are considered *less than significant* impacts for all roadway segments under Existing conditions.

TABLE 7-7: EXISTING PROJECT-RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Adjacent Land Use (dBA)			Potential Significant Impact?[2]
				Without Project	With Project	Project Addition	
1	Nason St.	s/o Ironwood Av.	Residential	64.9	65.8	0.9	No
2	Nason St.	n/o SR-60 WB Ramps	Residential	65.3	66.1	0.8	No
3	Nason St.	n/o SR-60 WB Fwy	Open Space	69.6	69.8	0.2	No
4	Nason St.	s/o SR-60 EB Ramps	Commercial	71.0	71.1	0.1	No
5	Ironwood Av.	w/o Nason St.	Residential	66.8	67.0	0.2	No
6	Ironwood Av.	e/o Nason St.	Residential	67.4	68.0	0.6	No
7	Ironwood Av.	e/o Lantz Ln.	Residential	67.1	67.3	0.2	No
8	Ironwood Av.	e/o Oliver St.	Residential	67.1	67.5	0.4	No

[1] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[2] Significance Criteria (Section 4, Table 4-1).

7.3 YEAR 2020 PROJECT TRAFFIC NOISE LEVEL CONTRIBUTIONS

Table 7-8 presents a comparison of the Year 2020 without and with Project conditions CNEL noise levels. Table 7-3 shows that the exterior noise levels are expected to range from 68.1 to 72.5 dBA CNEL for Year 2020 without Project conditions. Table 7-4 presents the Year 2020 with Project conditions noise level contours that are expected to range from 68.5 to 72.5 dBA CNEL. As shown on Table 7-8 the Project is expected to generate an exterior noise level increase of up to 0.5 dBA CNEL. Based on the significance criteria in Section 4, the Project-related off-site traffic noise level increases are considered *less than significant* impacts for all roadway segments under Year 2020 conditions.

TABLE 7-8: YEAR 2020 PROJECT-RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Adjacent Land Use (dBA)			Potential Significant Impact?[2]
				Without Project	With Project	Project Addition	
1	Nason St.	s/o Ironwood Av.	Residential	68.1	68.5	0.4	No
2	Nason St.	n/o SR-60 WB Ramps	Residential	68.3	68.7	0.4	No
3	Nason St.	n/o SR-60 WB Fwy	Open Space	71.2	71.4	0.2	No
4	Nason St.	s/o SR-60 EB Ramps	Commercial	72.5	72.5	0.0	No
5	Ironwood Av.	w/o Nason St.	Residential	69.4	69.5	0.1	No
6	Ironwood Av.	e/o Nason St.	Residential	69.6	70.1	0.5	No
7	Ironwood Av.	e/o Lantz Ln.	Residential	69.4	69.6	0.2	No
8	Ironwood Av.	e/o Oliver St.	Residential	69.4	69.6	0.2	No

[1] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[2] Significance Criteria (Section 4, Table 4-1).

7.4 YEAR 2035 PROJECT TRAFFIC NOISE LEVELS

Table 7-9 presents a comparison of the Year 2035 without and with Project conditions CNEL noise levels. Table 7-5 shows that the exterior noise levels are expected to range from 68.5 to 72.9 dBA CNEL for Year 2035 without Project conditions. Table 7-6 presents the Year 2035 with Project conditions noise level contours that are expected to range from 68.9 to 72.9 dBA CNEL. As shown on Table 7-9 the Project is expected to generate an exterior noise level increase of up to 0.4 dBA CNEL. Based on the significance criteria in Section 4, the Project-related off-site traffic noise level increases are considered *less than significant* impacts for all roadway segments under Year 2035 conditions.

TABLE 7-9: YEAR 2035 PROJECT-RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Adjacent Land Use (dBA)			Potential Significant Impact?[2]
				Without Project	With Project	Project Addition	
1	Nason St.	s/o Ironwood Av.	Residential	68.5	68.9	0.4	No
2	Nason St.	n/o SR-60 WB Ramps	Residential	68.7	69.1	0.4	No
3	Nason St.	n/o SR-60 WB Fwy	Open Space	71.7	71.8	0.1	No
4	Nason St.	s/o SR-60 EB Ramps	Commercial	72.9	72.9	0.0	No
5	Ironwood Av.	w/o Nason St.	Residential	69.8	69.9	0.1	No
6	Ironwood Av.	e/o Nason St.	Residential	70.1	70.5	0.4	No
7	Ironwood Av.	e/o Lantz Ln.	Residential	69.8	70.0	0.2	No
8	Ironwood Av.	e/o Oliver St.	Residential	69.8	70.0	0.2	No

[1] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[2] Significance Criteria (Section 4, Table 4-1).

7.5 PROJECT TRAFFIC NOISE CONTRIBUTIONS

The off-site traffic noise analysis shows that the greatest Project-related noise level contribution of 0.9 dBA CNEL under Existing conditions will decrease to 0.4 dBA CNEL under Year 2035 conditions. This shows that the Project's incremental traffic-related noise level increases at land uses adjacent to roadways conveying Project traffic will diminish over time. This occurs as the background traffic on the study area roadway segments increases and the Project represents a smaller percentage of the overall traffic volume. The off-site traffic noise analysis indicates that the Project's contributions to roadway noise levels will be *less than significant*.

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8 ON-SITE TRAFFIC NOISE IMPACTS

An on-site exterior noise impact analysis has been completed to determine the traffic noise exposure and to identify potential necessary noise abatement measures for the proposed Ironwood Residential (TTM No. 37001) Project. It is expected that the primary source of noise impacts to the Project site will be traffic noise from Ironwood Avenue. The Project will also experience some background traffic noise impacts from Nason Street, Oliver Street, and the Project's internal streets, however, due to the distance, topography and low traffic volume/speed, traffic noise from these roads will not make a significant contribution to the noise environment.

8.1 ON-SITE EXTERIOR NOISE ANALYSIS

Using the FHWA traffic noise prediction model and the parameters outlined in Tables 6-3 to 6-5, the expected future exterior noise levels for individual lots were calculated. Table 8-1 presents a summary of future exterior noise level impacts in the outdoor living areas (backyards) for the lots within the Project site. The on-site traffic noise level impacts indicate that the lots adjacent to Ironwood Avenue will experience unmitigated exterior noise levels ranging from 63.3 to 67.0 dBA CNEL. The on-site traffic noise analysis calculations are provided in Appendix 8.1.

To satisfy the City of Moreno Valley 65 dBA CNEL exterior noise level standards for residential land use, the construction of 4-foot high noise barriers for the outdoor living areas (backyards) of lots 26 to 30 is required. With the recommended noise barriers shown on Exhibit ES-A, the mitigated future exterior noise levels will range from 61.5 to 63.3 dBA CNEL. This noise analysis shows that the recommended noise barriers will satisfy the City of Moreno Valley 65 dBA CNEL exterior noise level standards. The recommendations identify the minimum required noise barrier height to satisfy the City of Moreno Valley exterior noise level standards.

TABLE 8-1: EXTERIOR NOISE LEVELS (CNEL)

Lot Number	Roadway	Unmitigated Noise Level (dBA CNEL)	Mitigated Noise Level (dBA CNEL)	Recommended Barrier Height (Feet)	Top of Barrier Elevation (Feet)
1	Ironwood Av.	64.5	–[1]	–[1]	–[1]
5	Ironwood Av.	64.4	–[1]	–[1]	–[1]
12	Ironwood Av.	64.4	–[1]	–[1]	–[1]
19	Ironwood Av.	64.4	–[1]	–[1]	–[1]
20	Ironwood Av.	64.3	–[1]	–[1]	–[1]
23	Ironwood Av.	63.3	–[1]	–[1]	–[1]
25	Ironwood Av.	64.6	–[1]	–[1]	–[1]
27	Ironwood Av.	66.6	61.5	4'	1876'
30	Ironwood Av.	67.0	61.6	4'	1882'

[1] No exterior noise mitigation required to meet the City of Moreno Valley exterior noise standards.

8.2 ON-SITE INTERIOR NOISE ANALYSIS

To ensure that the interior noise levels comply with the City of Moreno Valley 45 dBA CNEL interior noise standards, future noise levels were calculated at the first and second floor building façades.

8.2.1 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 building construction will provide a Noise Reduction (NR) of approximately 12 dBA with "windows open" and a minimum 25 dBA NR with "windows closed." However, sound leaks, cracks and openings within the window assembly can greatly diminish its effectiveness in reducing noise. Several methods are used to improve interior NR, 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.

8.2.2 INTERIOR NOISE LEVEL ASSESSMENT

To satisfy the City of Moreno Valley 45 dBA CNEL interior noise level criteria, a Noise Reduction (NR) of up to 21.4 dBA and a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning) are required for lots adjacent to Ironwood Avenue. Table 8-2 shows that the future unmitigated noise levels at the first floor building façade are expected to range from 60.1 to 64.3 dBA CNEL. The first floor interior noise level analysis shows that the City of Moreno Valley 45 dBA CNEL interior noise level standards for residential land use can be satisfied using standard windows with a minimum STC rating of 27 for all lots adjacent to Ironwood Avenue. Table 8-3 shows that the future unmitigated noise levels at the second floor building façade are expected to range from 63.0 to 66.4 dBA CNEL. The second floor interior noise level analysis shows that the City of Moreno Valley 45 dBA CNEL interior noise level standards for residential land use can be satisfied using standard windows with a minimum STC rating of 27 for all lots adjacent to Ironwood Avenue. The interior noise analysis shows that with the recommended interior noise mitigation measures described in the Executive Summary, the Project will satisfy the City of Moreno Valley 45 dBA CNEL interior noise level standards for residential development.

TABLE 8-2: FIRST FLOOR INTERIOR NOISE IMPACTS (CNEL)

Lot Number	Noise Level at Façade[1]	Required Interior Noise Reduction[2]	Estimated Interior Noise Reduction[3]	Upgraded Windows[4]	Interior Noise Level[5]
1	64.1	19.1	25.0	No	39.1
5	64.1	19.1	25.0	No	39.1
12	64.1	19.1	25.0	No	39.1
19	64.1	19.1	25.0	No	39.1
20	64.0	19.0	25.0	No	39.0
23	63.0	18.0	25.0	No	38.0
25	64.3	19.3	25.0	No	39.3
27	60.2	15.2	25.0	No	35.2
30	60.1	15.1	25.0	No	35.1

[1] Exterior noise level at the facade with a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning).
[2] Noise reduction required to satisfy the 45 dBA CNEL interior noise standards.
[3] A minimum 25 dBA noise reduction is assumed with standard building construction.
[4] Does the required interior noise reduction trigger upgraded with a minimum STC rating of greater than 27?
[5] Estimated interior noise level with minimum STC rating for all windows.

TABLE 8-3: SECOND FLOOR INTERIOR NOISE IMPACTS (CNEL)

Lot Number	Noise Level at Façade[1]	Required Interior Noise Reduction[2]	Estimated Interior Noise Reduction[3]	Upgraded Windows[4]	Interior Noise Level[5]
1	64.1	19.1	25.0	No	39.1
5	64.1	19.1	25.0	No	39.1
12	64.1	19.1	25.0	No	39.1
19	64.1	19.1	25.0	No	39.1
20	64.0	19.0	25.0	No	39.0
23	63.0	18.0	25.0	No	38.0
25	64.3	19.3	25.0	No	39.3
27	66.2	21.2	25.0	No	41.2
30	66.4	21.4	25.0	No	41.4

[1] Exterior noise level at the facade with a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning).
[2] Noise reduction required to satisfy the 45 dBA CNEL interior noise standards.
[3] A minimum 25 dBA noise reduction is assumed with standard building construction.
[4] Does the required interior noise reduction trigger upgraded with a minimum STC rating of greater than 27?
[5] Estimated interior noise level with minimum STC rating for all windows.

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9 RECEIVER LOCATIONS

To assess the potential for short-term construction noise impacts, the following nine receiver locations, as shown on Exhibit 9-A, were identified as representative locations for analysis. Sensitive receivers are generally defined as locations where people reside or where the presence of unwanted sound could otherwise adversely affect the use of the land. Noise-sensitive land uses are generally considered to include: schools, hospitals, single-family dwellings, mobile home parks, churches, libraries, and recreation areas. Moderately noise-sensitive land uses typically include: multi-family dwellings, hotels, motels, dormitories, out-patient clinics, cemeteries, golf courses, country clubs, athletic/tennis clubs, and equestrian clubs. Land uses that are considered relatively insensitive to noise include business, commercial, and professional developments. Land uses that are typically not affected by noise include: industrial, manufacturing, utilities, agriculture, natural open space, undeveloped land, parking lots, warehousing, liquid and solid waste facilities, salvage yards, and transit terminals.

Representative sensitive receivers in the vicinity of the Project site include existing residential homes represented by receiver locations R1 to R9. The closest sensitive receiver is represented by location R1 where an existing residential home is located approximately 40 feet west of the Project site.

R1: Located approximately 40 feet west of the Project site, R1 represents existing residential homes at the northwest corner of Nason Street and Sandi Lane.

R2: Location R2 represents the existing single-family residential home located approximately 86 feet west of the Project site across Nason Street.

R3: Location R3 represents the existing residential homes situated west of the Project site across Nason Street at a distance of roughly 208 feet.

R4: Location R4 represents the existing residential home situated approximately 168 feet south of the Project site across Ironwood Avenue.

R5: At a distance of approximately 141 feet, location R5 represents single-family residential homes south of the Project site across Ironwood Avenue.

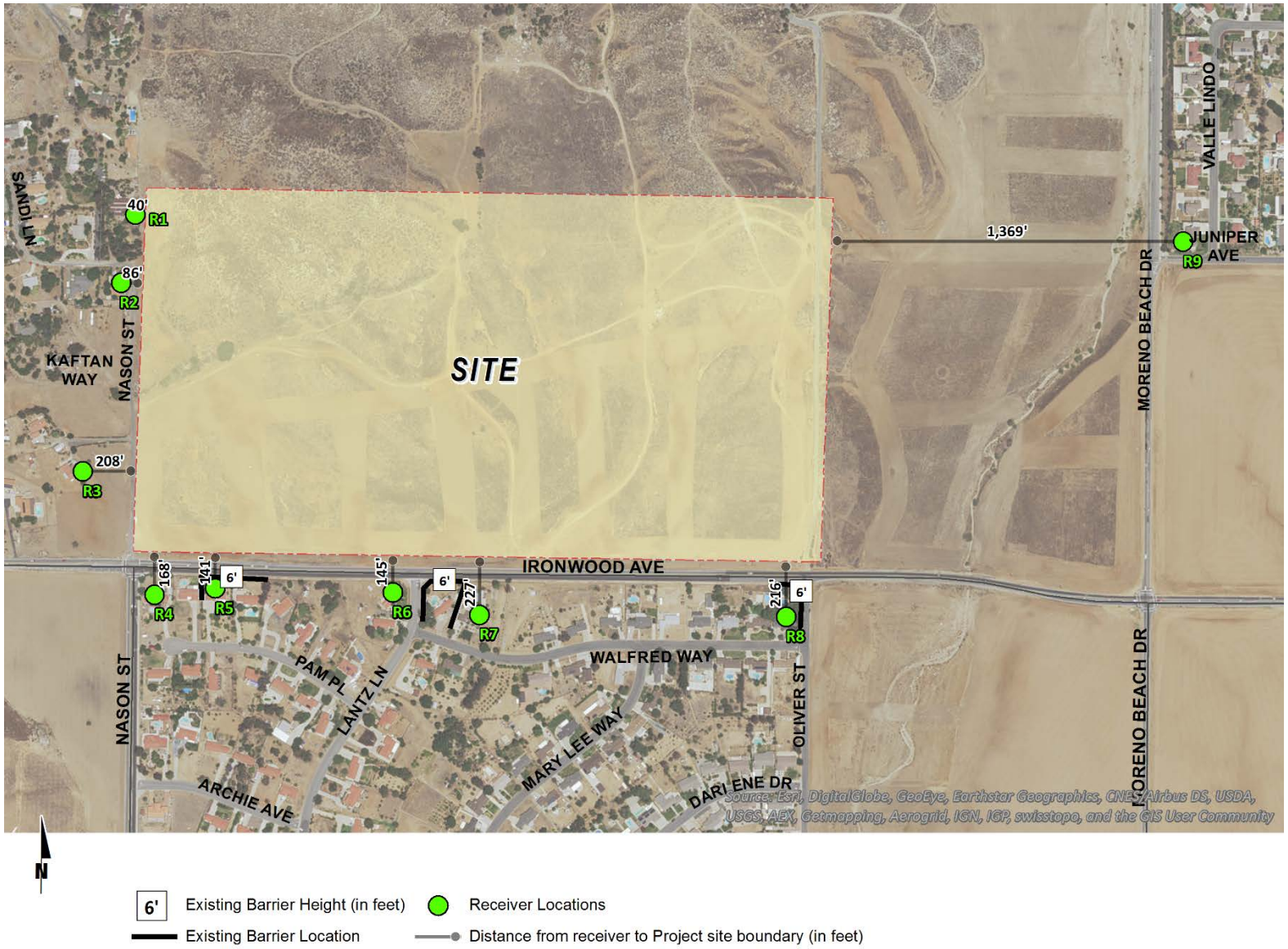
R6: At a distance of 145 feet south of the Project site, R6 describes the residential homes located at the southwest corner of Ironwood Avenue and Lantz Lane.

R7: Location R7 represents existing single-family residential homes located south of the Project site at a distance of approximately 227 feet on Walfred Way.

R8: Location R8 represents the existing residential home situated approximately 216 feet south of the Project site at the northwest corner of Walfred Way and Oliver Street.

R9: Location R9 represents the existing residential community located approximately 1,369 feet east of the Project site.

EXHIBIT 9-A: RECEIVER LOCATIONS



10 CONSTRUCTION IMPACTS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project.

10.1 CONSTRUCTION NOISE STANDARDS

Project construction shall be limited to the hours of 7:00 a.m. to 8:00 p.m. on any day and may not generate a noise level at 200 feet from the property line which exceeds the noise standards provided in the Noise Ordinance, Section 11.80.030(C), *Non-impulsive Sound Decibel Limits*, which states the following:

> *No person shall maintain, create, operate or cause to be operated on private property any source of sound in such a manner as to create any non-impulsive sound which exceeds the limits set forth for the source land use category in Table 11.80.030-2 when measured at a distance of two hundred (200) feet or more from the real property line of the source of the sound, if the sound occurs on privately owned property, or from the source of the sound, if the sound occurs on public right-of-way, public space or other publicly owned property. Any source of sound in violation of this subsection shall be deemed prima facie to be a noise disturbance*. (10)

Even though the City of Moreno Valley Municipal Code does not identify specific construction noise limits; it does provide noise level limits for the source land use category when measured at a distance of 200 feet. For the purpose of this analysis, the Ironwood Residential (TTM No. 37001) Project is considered *Residential* land use since it is *land primarily for dwelling units*, as defined by the City of Moreno Valley Municipal Code. For residential land uses, the City of Moreno Valley 60 dBA Leq noise level standard at a distance of 200 feet is used as the limit for this analysis to assess the construction noise level impacts at sensitive receivers in the Project study area. Therefore, to conform to the applicable provisions of the Municipal Code, the maximum allowable noise generated by on-site construction activities when measured at 200 feet from any property line, shall not exceed 60 dBA Leq.

10.2 CONSTRUCTION NOISE LEVELS

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

- Grading
- Paving
- Building Construction
- Architectural Coating

This construction noise analysis was prepared using the Federal Highway Administration (FHWA) published Roadway Construction Noise Model (RCNM) that includes a national database of construction equipment reference noise emission levels. (17) The RCNM equipment database,

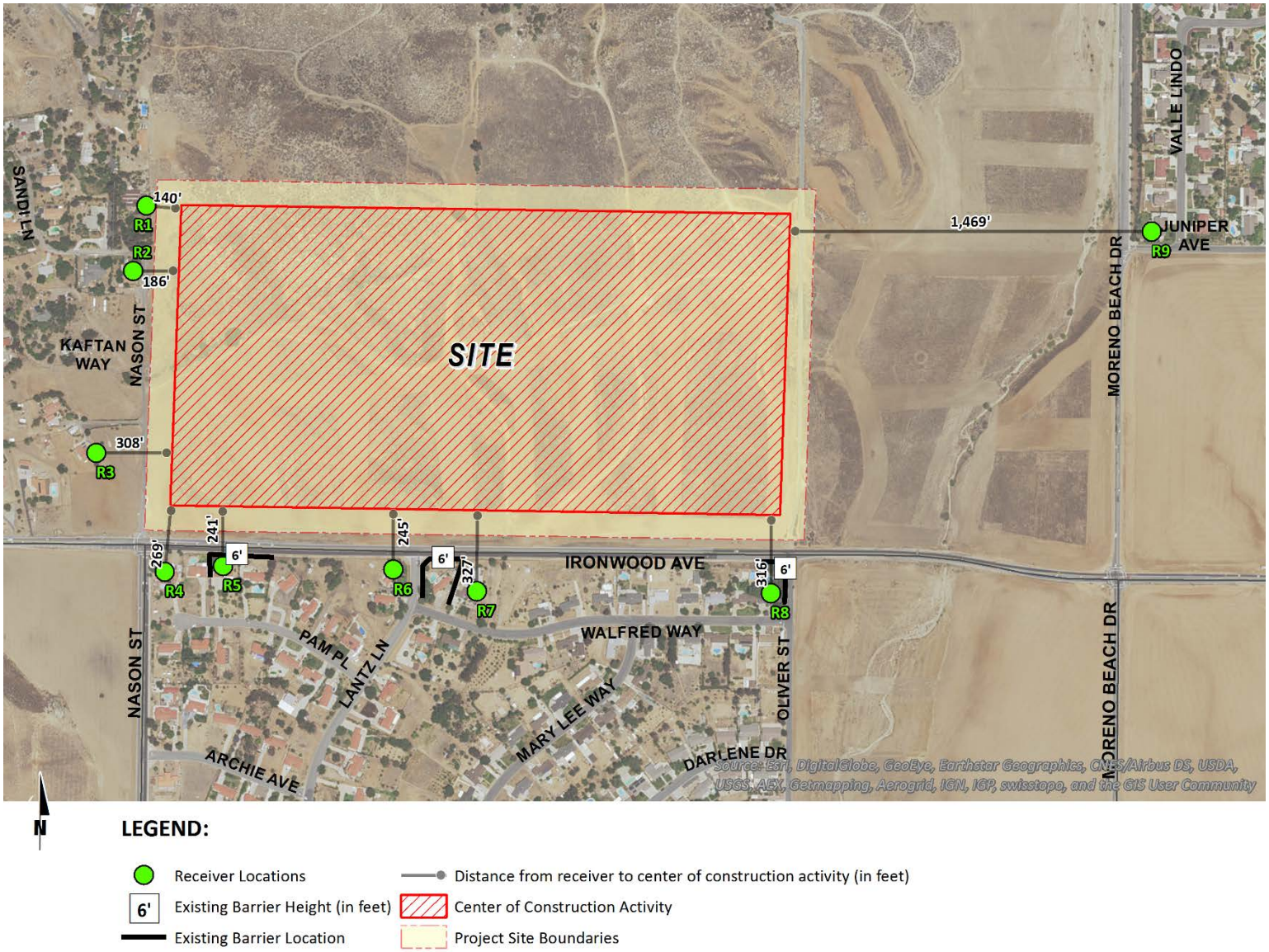
as shown in Appendix 10.1, provides a comprehensive list of the noise generating characteristics for specific types of construction equipment. In addition, the database provides an acoustical usage factor to estimate the fraction of time each piece of construction equipment is operating at full power (i.e., its loudest condition) during a construction operation.

Noise levels generated by heavy construction equipment can range from approximately 62 dBA to 76 dBA when measured at 200 feet. However, these noise levels diminish with distance from the construction site at a rate of 6 dBA per doubling of distance. For example, a noise level of 76 dBA measured at 200 feet from the noise source to the receiver would be reduced to 70 dBA at 400 feet from the source to the receiver, and would be further reduced to 64 dBA at 800 feet from the source to the receiver. The construction noise levels including the number and mix of construction equipment by construction phase are consistent with the data used to support the construction emissions in the *Ironwood Residential (TTM No. 37001) Air Quality Impact Analysis* prepared by Urban Crossroads Inc. (18)

10.3 CONSTRUCTION NOISE ANALYSIS

Using the stationary-source RCNM noise prediction model, calculations of the Project construction noise level impacts at the nine sensitive receiver locations were completed. Tables 10-1 to 10-4 present the short-term construction noise levels at a distance of 200 feet from the center of construction activity for each stage of construction. Table 10-5 provides a summary of the construction noise levels by phase at the nine noise receiver locations. Based on the four stages of construction, the noise impacts associated with the proposed Project are expected to create temporary high noise levels at the nearby receiver locations. To assess the construction noise levels at each receiver location, this analysis shows the construction noise levels by phase when all heavy equipment is operating simultaneously at a distance of roughly 100 feet from the Project site boundary. Exhibit 10-A shows the receiver locations and construction activity location used in this analysis.

EXHIBIT 10-A: CONSTRUCTION ACTIVITY AND RECEIVER LOCATIONS



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LEGEND:

- Receiver Locations
- 6' Existing Barrier Height (in feet)
- Existing Barrier Location
- Distance from receiver to center of construction activity (in feet)
- Center of Construction Activity
- Project Site Boundaries

TABLE 10-1: GRADING EQUIPMENT NOISE LEVELS

Equipment Type[1]	Quantity	Usage Factor[2]	Hours Of Operation[3]	Reference Noise Level @ 50 Feet (dBA Lmax)	Combined Level @ 200 Feet (dBA Leq)
Excavators	2	40%	3.2	81.0	68.0
Graders	1	40%	3.2	85.0	69.0
Water Trucks	1	40%	3.2	76.0	60.0
Rubber Tired Dozers	1	40%	3.2	82.0	66.0
Scrapers	2	40%	3.2	84.0	71.0
Tractor/Loader/Backhoes	2	40%	3.2	79.0	66.0
Combined Hourly Noise Levels 200 Feet (dBA Leq)					75.5
Distance to 65 dBA Leq Contour (Feet)					672'

Construction Noise Reference Distance	Distance To Construction Activity (Feet)[4]	Distance Attenuation (dBA Leq)[5]	Estimated Existing Barrier Attenuation (dBA Leq)[6]	Construction Noise Level (dBA Leq)
R1	140'	-8.9	0.0	66.6
R2	186'	-11.4	0.0	64.1
R3	308'	-15.8	0.0	59.7
R4	269'	-14.6	0.0	60.9
R5	241'	-13.7	-5.0	56.9
R6	245'	-13.8	0.0	61.7
R7	327'	-16.3	0.0	59.2
R8	316'	-16.0	-5.0	54.5
R9	1,469'	-29.4	0.0	46.2

[1] Source: FHWA's Roadway Construction Noise Model, January 2006.
[2] Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.
[3] Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.
[4] Distance from the nearest point of construction activity to the nearest receiver.
[5] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[6] Estimated barrier attenuation provided by the existing barriers in the Project study area.

TABLE 10-2: PAVING EQUIPMENT NOISE LEVELS

Equipment Type[1]	Quantity	Usage Factor[2]	Hours Of Operation[3]	Reference Noise Level @ 50 Feet (dBA Lmax)	Combined Level @ 200 Feet (dBA Leq)
Pavers	2	50%	4.0	77.0	65.0
Paving Equipment	2	40%	3.2	76.0	63.0
Rollers	2	20%	1.6	80.0	64.0
Combined Hourly Noise Levels 200 Feet (dBA Leq)					68.8
Distance to 65 dBA Leq Contour (Feet)					311'

Construction Noise Reference Distance	Distance To Construction Activity (Feet)[4]	Distance Attenuation (dBA Leq)[5]	Estimated Existing Barrier Attenuation (dBA Leq)[6]	Construction Noise Level (dBA Leq)
R1	140'	-8.9	0.0	59.9
R2	186'	-11.4	0.0	57.4
R3	308'	-15.8	0.0	53.0
R4	269'	-14.6	0.0	54.2
R5	241'	-13.7	-5.0	50.2
R6	245'	-13.8	0.0	55.0
R7	327'	-16.3	0.0	52.5
R8	316'	-16.0	-5.0	47.8
R9	1,469'	-29.4	0.0	39.5

[1] Source: FHWA's Roadway Construction Noise Model, January 2006.
[2] Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.
[3] Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.
[4] Distance from the nearest point of construction activity to the nearest receiver.
[5] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[6] Estimated barrier attenuation provided by the existing barriers in the Project study area.

TABLE 10-3: BUILDING CONSTRUCTION EQUIPMENT NOISE LEVELS

Equipment Type[1]	Quantity	Usage Factor[2]	Hours Of Operation[3]	Reference Noise Level @ 50 Feet (dBA Lmax)	Combined Level @ 200 Feet (dBA Leq)
Cranes	1	16%	1.3	81.0	61.0
Forklifts	3	20%	1.6	75.0	60.7
Generator Sets	1	50%	4.0	81.0	65.9
Tractor/Loader/Backhoes	3	40%	3.2	79.0	67.8
Welders	1	40%	3.2	74.0	58.0
Combined Hourly Noise Levels 200 Feet (dBA Leq)					71.1
Distance to 65 dBA Leq Contour (Feet)					405'

Construction Noise Reference Distance	Distance To Construction Activity (Feet)[4]	Distance Attenuation (dBA Leq)[5]	Estimated Existing Barrier Attenuation (dBA Leq)[6]	Construction Noise Level (dBA Leq)
R1	140'	-8.9	0.0	62.2
R2	186'	-11.4	0.0	59.7
R3	308'	-15.8	0.0	55.3
R4	269'	-14.6	0.0	56.5
R5	241'	-13.7	-5.0	52.5
R6	245'	-13.8	0.0	57.3
R7	327'	-16.3	0.0	54.8
R8	316'	-16.0	-5.0	50.1
R9	1,469'	-29.4	0.0	41.8

[1] Source: FHWA's Roadway Construction Noise Model, January 2006.
[2] Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.
[3] Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.
[4] Distance from the nearest point of construction activity to the nearest receiver.
[5] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[6] Estimated barrier attenuation provided by the existing barriers in the Project study area.

TABLE 10-4: ARCHITECTURAL COATING EQUIPMENT NOISE LEVELS

Equipment Type[1]	Quantity	Usage Factor[2]	Hours Of Operation[3]	Reference Noise Level @ 50 Feet (dBA Lmax)	Combined Level @ 200 Feet (dBA Leq)
Air Compressors	1	40%	3.2	78.0	62.0
Combined Hourly Noise Levels 200 Feet (dBA Leq)					62.0
Distance to 65 dBA Leq Contour (Feet)					141'

Construction Noise Reference Distance	Distance To Construction Activity (Feet)[4]	Distance Attenuation (dBA Leq)[5]	Estimated Existing Barrier Attenuation (dBA Leq)[6]	Construction Noise Level (dBA Leq)
R1	140'	-8.9	0.0	53.0
R2	186'	-11.4	0.0	50.6
R3	308'	-15.8	0.0	46.2
R4	269'	-14.6	0.0	47.4
R5	241'	-13.7	-5.0	43.3
R6	245'	-13.8	0.0	48.2
R7	327'	-16.3	0.0	45.7
R8	316'	-16.0	-5.0	41.0
R9	1,469'	-29.4	0.0	32.6

[1] Source: FHWA's Roadway Construction Noise Model, January 2006.
[2] Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.
[3] Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.
[4] Distance from the nearest point of construction activity to the nearest receiver.
[5] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[6] Estimated barrier attenuation provided by the existing barriers in the Project study area.

10.4 CONSTRUCTION NOISE THRESHOLDS OF SIGNIFICANCE

The construction noise analysis shows that the highest construction noise levels will occur during grading activities within the Project site. As shown on Table 10-5, the unmitigated peak construction noise levels are expected to range from 46.2 to 66.6 dBA Leq. Construction activities are estimated to occur during the permitted hours of 7:00 a.m. to 8:00 p.m. on any day, based on the City of Moreno Valley Municipal Code. (10)

TABLE 10-5: UNMITIGATED CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Noise Receiver[1]	Distance To Construction Activity (Feet)	Construction Phase Hourly Noise Level (dBA Leq)					Potential Significant Impact?[3]
		Grading	Paving	Building Const.	Arch. Coating	Peak[2]	
R1	140'	66.6	59.9	62.2	53.0	66.6	Yes
R2	186'	64.1	57.4	59.7	50.6	64.1	Yes
R3	308'	59.7	53.0	55.3	46.2	59.7	No
R4	269'	60.9	54.2	56.5	47.4	60.9	Yes
R5	241'	56.9	50.2	52.5	43.3	56.9	No
R6	245'	61.7	55.0	57.3	48.2	61.7	Yes
R7	327'	59.2	52.5	54.8	45.7	59.2	No
R8	316'	54.5	47.8	50.1	41.0	54.5	No
R9	1,469'	46.2	39.5	41.8	32.6	46.2	No

[1] Noise receiver locations are shown on Exhibit 10-A.
[2] Estimated construction noise levels during peak operating conditions.
[3] Do the peak construction noise levels exceed the City of Moreno Valley 60 dBA Leq threshold?

Based on the construction noise standards described in Section 3.4, the potential short-term unmitigated construction noise level impacts are expected to exceed the acceptable construction noise level threshold of 60 dBA Leq at nearby sensitive receiver locations R1, R2, R4, and R6 during the permitted hours of construction activity. Therefore, temporary noise abatement would be needed to reduce the potential construction noise impacts. With the installation of temporary exterior noise control barriers providing a minimum attenuation of 10 dBA, construction noise levels at the nearby residential receivers would be reduced, but not eliminated.

This analysis does not evaluate the feasibility of temporary noise barrier installation. If it is not feasible to install temporary barriers, construction noise levels would not be reduced, because no other measures exist to reasonably reduce construction noise levels. The noise attenuation provided through temporary noise barriers depends on many factors including cost, wind loading, the location of the receiver, and the ability to place barriers such that the line-of-sight of the receiver is blocked to the noise source, among others. This analysis assumes a temporary noise barrier capable of 10 dBA of attenuation and constructed using frame-mounted materials such as vinyl acoustic curtains or quilted blankets.

While noise attenuation of greater than 10 dBA may be possible to achieve with the use of temporary barriers, the noise barrier costs are expected to increase exponentially in relation to additional attenuation provided above 10 dBA. This suggests a point of diminishing return of noise attenuation for temporary noise barriers beyond 10 dBA. While a 10 dBA reduction in sound level is considered *attainable*, a reduction of 15 dBA is *very difficult* and a 20 dBA reduction is *nearly impossible*. (4) Further noise attenuation strategies include the installation of temporary barriers or window inserts and treatments at each receiver location to reduce the noise levels and block the line of sight to the source. However, the ability to install such measures at the

approval of nearby homeowners may not be feasible and will vary depending on each homeowner's willingness to allow for installation. Further, noise abatement at the receiver is usually only cost-effective if fewer residences are involved as each home may require different materials based on each home's specifications. (19) Therefore, an *attainable* attenuation of 10 dBA through the use of temporary construction noise barriers is recommended to reduce construction noise levels at the nearby residential receivers.

Table 10-6 shows the peak construction noise levels are expected to range from 46.2 to 56.6 dBA Leq with the attenuation provided by the temporary construction noise barriers. With the temporary noise control barrier providing a minimum attenuation of 10 dBA, the construction noise levels will satisfy the 60 dBA Leq construction noise level threshold. Therefore, the construction of the Project will result in a *less than significant* noise impact with mitigation at nearby receiver locations during peak construction activity.

TABLE 10-6: MITIGATED CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Noise Receiver[1]	Distance To Const. Activity (Feet)	Without Temporary Noise Barriers			With Temporary Noise Barriers		
		Const. Noise Level (dBA Leq)[2]	Threshold (dBA Leq)[3]	Compliance[4]	Attenuation	Const. Noise Levels With Attenuation[5]	Compliance With Attenuation[4]
R1	140'	66.6	60	No	-10.0	56.6	Yes
R2	186'	64.1	60	No	-10.0	54.1	Yes
R3	308'	59.7	60	Yes	n/a	n/a	n/a
R4	269'	60.9	60	No	-10.0	50.9	Yes
R5	241'	56.9	60	Yes	-10.0	46.9	Yes
R6	245'	61.7	60	No	-10.0	51.7	Yes
R7	327'	59.2	60	Yes	n/a	n/a	n/a
R8	316'	54.5	60	Yes	n/a	n/a	n/a
R9	1,469'	46.2	60	Yes	n/a	n/a	n/a

[1] Noise receiver locations are shown on Exhibit 10-A.
[2] Estimated construction noise levels during peak operating conditions, as shown on Table 10-5.
[3] Source: City of Moreno Valley Municipal Code, Section 11.80.030 (D) (7) (Appendix 3.1)
[4] Do the estimated Project construction noise levels meet the threshold of 60 dBA Leq?
[5] Peak construction noise levels with the recommended minimum temporary noise barrier attenuation of 10 dBA when operating near sensitive receiver locations.

10.5 CONSTRUCTION NOISE MITIGATION MEASURES

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

- Prior to approval of grading plans and/or issuance of building permits, plans shall include a note indicating that noise-generating Project construction activities shall only occur between the hours of 7:00 a.m. and 8:00 p.m. on any day. The Project construction supervisor shall ensure compliance with the note and the City shall conduct periodic inspection at its discretion.

- Install temporary noise control barriers that provide a minimum noise level attenuation of 10 dBA when Project construction occurs near existing noise-sensitive structures. The noise control barrier must present a solid face from top to bottom. The noise control barrier must be high enough and long enough to block the view of the noise source. Unnecessary openings shall not be made.
    - The noise barrier may be constructed using an acoustical blanket (e.g. vinyl acoustic curtains or quilted blankets) attached to the construction site perimeter fence or equivalent temporary fence posts.
    - The noise barriers must be maintained and any damage promptly repaired. Gaps, holes, or weaknesses in the barrier or openings between the barrier and the ground shall be promptly repaired.
    - The noise control barriers and associated elements shall be completely removed and the site appropriately restored upon the conclusion of the construction activity.
- During all Project site construction, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards. The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from the noise sensitive receptors nearest the Project site.
- The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receivers nearest the Project site (i.e., to the northern center) during all Project construction.
- The construction contractor shall limit haul truck deliveries to the same hours specified for construction equipment (between the hours of 7:00 a.m. and 8:00 p.m. on any day). The contractor shall design delivery routes to minimize the exposure of sensitive land uses or residential dwellings to delivery truck-related noise.

10.6 CONSTRUCTION VIBRATION IMPACTS

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

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

Ground-borne vibration levels resulting from construction activities occurring within the Project site were estimated by data published by the Federal Transit Administration. Construction activities that would have the potential to generate low levels of ground-borne vibration within

the Project site include grading. Using the vibration source level of construction equipment provided on Table 6-6 and the construction vibration assessment methodology published by the FTA, it is possible to estimate the Project vibration impacts. Table 10-7 presents the expected Project related vibration levels at each of the nine sensitive receiver locations.

TABLE 10-7: CONSTRUCTION EQUIPMENT VIBRATION LEVELS

Noise Receiver[1]	Distance To Construction Activity (Feet)	Receiver Vibration Levels (VdB)[2]					Potential Significant Impact?[3]
		Small Bulldozer	Jackhammer	Loaded Trucks	Large Bulldozer	Peak Vibration	
R1	140'	35.6	56.6	63.6	64.6	64.6	No
R2	186'	31.9	52.9	59.9	60.9	60.9	No
R3	308'	25.3	46.3	53.3	54.3	54.3	No
R4	269'	27.0	48.0	55.0	56.0	56.0	No
R5	241'	28.5	49.5	56.5	57.5	57.5	No
R6	245'	28.3	49.3	56.3	57.3	57.3	No
R7	327'	24.5	45.5	52.5	53.5	53.5	No
R8	316'	24.9	45.9	52.9	53.9	53.9	No
R9	1,469'	4.9	25.9	32.9	33.9	33.9	No

[1] Noise receiver locations are shown on Exhibit 10-A.
[2] Based on the Vibration Source Levels of Construction Equipment included on Table 6-6.
[3] Does the Peak Vibration exceed the FTA maximum acceptable vibration standard of 80 (VdB)?

Based on the reference vibration levels provided by the FTA, a large bulldozer represents the peak source of vibration with a reference velocity of 87 VdB at a distance of 25 feet. At distances ranging from 140 to 1,469 feet from the Project site, construction vibration velocity levels are expected to approach 64.6 VdB, as shown on Table 10-7. Based on the FTA vibration standards, the proposed Project site will not include or require equipment, facilities, or activities that would result in a *barely perceptible* human response (annoyance) for infrequent events.

Further, vibration levels at the site of the closest sensitive receiver are unlikely to be sustained during the entire construction period, but will occur rather only during the times that heavy construction equipment is operating simultaneously at a distance of 100 feet from the Project site perimeter. Moreover, construction at the Project site will be restricted to daytime hours consistent with City requirements thereby eliminating potential vibration impacts during the sensitive nighttime hours. The results of this analysis indicate that the vibration impacts due to Project construction will be *less than significant*.

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11 REFERENCES

1. **Urban Crossroads, Inc.** *Ironwood Residential (TTM No. 37001) Traffic Impact Analysis.* August 2015.
2. **California Department of Transportation Environmental Program.** *Technical Noise Supplement - A Technical Supplement to the Traffic Noise Analysis Protocol.* Sacramento, CA : s.n., September 2013.
3. **Environmental Protection Agency Office of Noise Abatement and Control.** *Information on Levels of Environmental Noise Requiste to Protect Public Health and Welfare with an Adequate Margin of Safety.* March, 1974. EPA/ONAC 550/9/74-004.
4. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning, Noise and Air Quality Branch.** *Highway Traffic Noise Analysis and Abatement Policy and Guidance.* June, 1995.
5. **U.S. Department of Transportation, Federal Highway Administration.** *Highway Traffic Noise in the United States, Problem and Response.* April 2000. p. 3.
6. **U.S. Environmental Protection Agency Office of Noise Abatement and Control.** *Noise Effects Handbook-A Desk Reference to Health and Welfare Effects of Noise.* October 1979 (revised July 1981). EPA 550/9/82/106.
7. **U.S. Department of Transportation, Federal Transit Administration.** *Transit Noise and Vibration Impact Assessment.* May 2006. FTA-VA-90-1003-06.
8. **Office of Planning and Research.** *State of California General Plan Guidlines 2003.* October 2003.
9. **City of Moreno Valley.** *General Plan Safety Element (Noise).* July 2006.
10. —. *Municipal Code, Chapter 11.80 Noise Regulation.*
11. **California Court of Appeal.** *Gray v. County of Madera, F053661.* 167 Cal.App.4th 1099; - Cal.Rptr.3d, October 2008.
12. **Federal Interagency Committee on Noise.** *Federal Agency Review of Selected Airport Noise Analysis Issues.* August 1992.
13. **American National Standards Institute (ANSI).** *Specification for Sound Level Meters ANSI S1.4-2014/IEC 61672-1:2013.*
14. **U.S. Department of Transportation, Federal Highway Administration.** *FHWA Highway Traffic Noise Prediction Model.* December 1978. FHWA-RD-77-108.
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16. **City of Moreno Valley.** *General Plan Environmental Impact Report, Traffic/Circulation.* July 2006.
17. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning.** *FHWA Roadway Construction Noise Model.* January 2006.
18. **Urban Crossroads, Inc.** *Ironwood Residential (TTM No. 37001) Air Quality Impact Analysis.* September 2015.
19. **California Department of Transportation.** *Transportation and Construction Vibration Guidance Manual.* September 2013.

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12 CERTIFICATION

The contents of this noise study report represent an accurate depiction of the noise environment and impacts associated with the proposed Ironwood Residential (TTM No. 37001) Project. The information contained in this noise study report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 660-1994 ext. 203.

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EDUCATION

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

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

PROFESSIONAL REGISTRATIONS

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

PROFESSIONAL AFFILIATIONS

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

PROFESSIONAL CERTIFICATIONS

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

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APPENDIX 3.1:

CITY OF MORENO VALLEY MUNICIPAL CODE

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Chapter 11.80 NOISE REGULATION

11.80.010 Legislative findings.

It is found and declared that:

A. Excessive sound within the limits of the city is a condition which has existed for some time, and the amount and intensity of such sound is increasing.

B. Such excessive sound is a detriment to the public health, safety, and welfare and quality of life of the residents of the city.

C. The necessity in the public interest for the provisions and prohibitions hereinafter contained and enacted is declared as a matter of legislative determination and public policy, and it is further declared that the provisions and prohibitions hereinafter contained and enacted are in pursuance of and for the purpose of securing and promoting the public health, safety, welfare and quality of life of the city and its inhabitants. (Ord. 740 § 1.2, 2007)

11.80.020 Definitions.

For purposes of this chapter, certain words and phrases used herein are defined as follows:

“A-weighted sound level” means the sound pressure level in decibels as measured with a sound level meter using the A-weighting network. The unit of measurement is the dB(A).

“Commercial” means all uses of land not otherwise classified as residential, as defined in this section.

“Construction” means any site preparation, and/or any assembly, erection, repair, or alteration, excluding demolition, of any structure, or improvements to real property.

“Continuous airborne sound” means sound that is measured by the slow-response setting of a meter manufactured to the specifications of ANSI Section 1.4-1983 (R2006) “Specification for Sound Level Meters,” or its successor.

“Daytime” means eight a.m. to ten p.m. the same day.

“Decibel” (dB) means a unit for measuring the amplitude of sound, equal to twenty (20) times the logarithm to the base ten (10) of the ratio of the pressure of the sound measured to the reference pressure, which is twenty (20) microPascals (twenty (20) microNewtons per square meter.)

“Demolition” means any dismantling, intentional destruction or removal of structures or other improvements to real property.

“Disturb” means to interrupt, interfere with, or hinder the enjoyment of peace or quiet or the normal listening activities or the sleep, rest or mental concentration of the hearer.

“Emergency” means any occurrence or set of circumstances involving actual or imminent physical trauma or significant property damage which necessitates immediate action. Economic loss alone shall not constitute an emergency. It shall be the burden of an alleged violator to prove an “emergency.”

“Emergency work” means any work made necessary to restore property to a safe condition following an emergency, or to protect persons or property threatened by an imminent emergency, to the extent such work is, in fact, necessary to protect persons or property from exposure to imminent danger or damage.

“Frequency” means the number of complete oscillation cycles per unit of time.

“Impulsive sound” means sound of short duration, usually less than one second, with an abrupt onset and rapid

decay. Examples of sources of impulsive sound include explosions, drop forge impacts, and discharge of firearms.

"Nighttime" means 10:01 p.m. to 7:59 a.m. the following day.

"Noise disturbance" means any sound which:

1. Disturbs a reasonable person of normal sensitivities;

2. Exceeds the sound level limits set forth in this chapter; or

3. Is plainly audible as defined in this section. Where no specific distance is set forth for the determination of audibility, references to noise disturbance shall be deemed to mean plainly audible at a distance of two hundred (200) feet from the real property line of the source of the sound, if the sound occurs on privately owned property, or from the source of the sound, if the sound occurs on public right of way, public space or other publicly owned property.

"Person" means any person, person's firm, association, copartnership, joint venture, corporation, or any entity public or private in nature.

"Plainly audible" means that the sound or noise produced or reproduced by any particular source, can be clearly distinguished from ambient noise by a person using his/her normal hearing faculties.

"Public right-of-way" means any street, avenue, boulevard, sidewalk, bike path or alley, or similar place normally accessible to the public which is owned or controlled by a governmental entity.

"Public space" means any park, recreational or community facility, or lot which contains at least one building that is open to the general public during its hours of operation.

"Residential" means all uses of land primarily for dwelling units, as well as hospitals, schools, colleges and universities, and places of religious assembly.

"Sound" means an oscillation in pressure, particle displacement, particle velocity or other physical parameter, in a medium with internal forces that causes compression and rarefaction of that medium capable of producing an auditory impression. The description of sound may include any characteristic of such sound, including duration, intensity and frequency.

"Sound level" means the weighted sound pressure level as measured in dB(A) by a sound level meter and as specified in American National Standards Institute (ANSI) specifications for sound-level meters (ANSI Section 1.4-1971 (R1976)). If the frequency weighting employed is not indicated, the A-weighting shall apply.

"Sound level meter" means an instrument, demonstrably capable of accurately measuring sound levels as defined above.

All technical definitions not defined above shall be in accordance with applicable publications and standards of the American National Standards Institute (ANSI). (Ord. 740 § 1.2, 2007)

11.80.030 Prohibited acts.

A. General Prohibition. It is unlawful and a violation of this chapter to maintain, make, cause, or allow the making of any sound that causes a noise disturbance, as defined in Section 11.80.020.

B. Sound causing permanent hearing loss.

1. Sound level limits. Based on statistics from the Center for Disease Control and Prevention and the National Institute for Occupational Safety and Health, Table 1 and Table 1-A specify sound level limits which, if exceeded, will have a high probability of producing permanent hearing loss in anyone in the area where the sound levels are being exceeded. No sound shall be permitted within the city which exceeds the parameters set forth in Tables 11.80.030-1 and 11.80.030-1-A of this chapter:

Table 11.80.030-1

MAXIMUM CONTINUOUS SOUND LEVELS*

Duration per Day Continuous Hours	Sound level [db(A)]
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25	115

* When the daily sound exposure is composed of two or more periods of sound exposure at different levels, the combined effect of all such periods shall constitute a violation of this section if the sum of the percent of allowed period of sound exposure at each level exceeds 100 percent

Table 11.80.030-1A

MAXIMUM IMPULSIVE SOUND LEVELS

Number of Repetitions per 24-Hour Period	Sound level [dB(A)]
1	145
10	135
100	125

2. Exemptions. No violation shall exist if the only persons exposed to sound levels in excess of those listed in Tables 11.80.030-1 and 11.80.030-1A are exposed as a result of:

a. Trespass;

b. Invitation upon private property by the person causing or permitting the sound; or

c. Employment by the person or a contractor of the person causing or permitting the sound.

C. Nonimpulsive Sound Decibel Limits. No person shall maintain, create, operate or cause to be operated on private property any source of sound in such a manner as to create any nonimplusive sound which exceeds the limits set forth for the source land use category (as defined in Section 11.80.020) in Table 11.80.030-2 when measured at a distance of two hundred (200) feet or more from the real property line of the source of the sound, if the sound occurs on privately owned property, or from the source of the sound, if the sound occurs on public right-of-way, public space or other publicly owned property. Any source of sound in violation of this subsection shall be deemed prima facie to be a noise disturbance.

Table 11.80.030-2

MAXIMUM SOUND LEVELS (IN dB(A)) FOR SOURCE LAND USES

Residential		Commercial	
Daytime	**Nighttime**	**Daytime**	**Nighttime**
60	55	65	60

D. Specific Prohibitions. In addition to the general prohibitions set out in subsection A of this section, and unless otherwise exempted by this chapter, the following specific acts, or the causing or permitting thereof, are regulated as follows:

1. Motor Vehicles. No person shall operate or cause to be operated a public or private motor vehicle, or combination of vehicles towed by a motor vehicle, that creates a sound exceeding the sound level limits in Table 11.80.030-2 when the vehicle(s) are not otherwise subject to noise regulations provided for by the California Vehicle Code.

2. Radios, Televisions, Electronic Audio Equipment, Musical Instruments or Similar Devices from a Stationary Source. No person shall operate, play or permit the operation or playing of any radio, tape player, television, electronic audio equipment, musical instrument, sound amplifier or other mechanical or electronic sound making device that produces, reproduces or amplifies sound in such a manner as to create a noise disturbance. However, this subsection shall not apply to any use or activity exempted in subsection E of this section and any use or activity for which a special permit has been issued pursuant to Section 11.80.040.

3. Radios, Electronic Audio Equipment, or Similar Devices from a Mobile Source Such as a Motor Vehicle. Sound amplification or reproduction equipment on or in a motor vehicle is subject to regulation in accordance with the California Vehicle Code when upon the public right-of-way. When upon public space or publicly owned property other than the public right-of-way or upon private property open to the public, sound amplification or reproduction equipment shall not be operated in such a manner that it is plainly audible at a distance of fifty (50) feet in any direction from the vehicle.

4. Portable, Hand-Held Music or Sound Amplification or Reproduction Equipment. Such equipment shall not be operated on a public right-of-way, public space or other publicly owned property in such a manner as to be plainly audible at a distance of fifty (50) feet in any direction from the operator.

5. Loudspeakers and Public Address Systems.

a. Except as permitted by Section 11.80.040, no person shall operate, or permit the operation of, any loudspeaker, public address system or similar device, for any commercial purpose:

1. Which produces, reproduces or amplifies sound in such a manner as to create a noise disturbance; or

2. During nighttime hours on a public right-of-way, public space or other publicly owned property.

b. No person shall operate, or permit the operation of, any loudspeaker, public address system or similar device, for any noncommercial purpose, during nighttime hours in such a manner as to create a noise disturbance.

6. Animals. No person shall own, possess or harbor an animal or bird that howls, barks, meows, squawks, or makes other sounds that:

a. Create a noise disturbance;

b. Are of frequent or continued duration for ten (10) or more consecutive minutes and are plainly audible at a distance of fifty (50) feet from the real property line of the source of the sound; or

c. Are intermittent for a period of thirty (30) or more minutes and are plainly audible at a distance of fifty (50) feet from the real property line of the source of the sound.

7. Construction and Demolition. No person shall operate or cause the operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between the hours of eight p.m. and seven a.m. the following day such that the sound there from creates a noise disturbance, except for emergency work by

public service utilities or for other work approved by the city manager or designee. This section shall not apply to the use of power tools as provided in subsection (D)(9) of this section.

8. Emergency Signaling Devices. No person shall intentionally sound or permit the sounding outdoors of any fire, burglar or civil defense alarm, siren or whistle, or similar stationary emergency signaling device, except for emergency purposes or for testing as follows:

a. Testing of a stationary emergency signaling device shall not occur between seven p.m. and seven a.m. the following day;

b. Testing of a stationary emergency signaling device shall use only the minimum cycle test time, in no case to exceed sixty (60) seconds;

c. Testing of a 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. Such testing shall only occur only on weekdays between seven a.m. and seven p.m. and shall be exempt from the time limit specified in subsection (D)(8)(2) of this section.

9. Power Tools. No person shall operate or permit the operation of any mechanically, electrically or gasoline motor-driven tool during nighttime hours so as to cause a noise disturbance across a residential real property boundary.

10. Pumps, Air Conditioners, Air-Handling Equipment and Other Continuously Operating Equipment. Notwithstanding the general prohibitions of subsection a of this section, no person shall operate or permit the operation of any pump, air conditioning, air-handling or other continuously operating motorized equipment in a state of disrepair or in a manner which otherwise creates a noise disturbance distinguishable from normal operating sounds.

E. Exemptions. The following uses and activities shall be exempt from the sound level regulations except the maximum sound levels provided in Tables 11.80.030-1 and 11.80.030-1A:

1. Sounds resulting from any authorized emergency vehicle when responding to an emergency call or acting in time of an emergency.

2. Sounds resulting from emergency work as defined in Section 11.80.020

3. Any aircraft operated in conformity with, or pursuant to, federal law, federal air regulations and air traffic control instruction used pursuant to and within the duly adopted federal air regulations; and any aircraft operating under technical difficulties in any kind of distress, under emergency orders of air traffic control, or being operated pursuant to and subsequent to the declaration of an emergency under federal air regulations.

4. All sounds coming from the normal operations of interstate motor and rail carriers, to the extent that local regulation of sound levels of such vehicles has been preempted by the Noise Control Act of 1972 (42 U.S.C. § 4901 et seq.) or other applicable federal laws or regulations

5. Sounds from the operation of motor vehicles, to the extent they are regulated by the California Vehicle Code.

6. Any constitutionally protected noncommercial speech or expression conducted within or upon a any public right-of-way, public space or other publicly owned property constituting an open or a designated public forum in compliance with any applicable reasonable time, place and manner restrictions on such speech or expression or otherwise pursuant to legal authority.

7. Sounds produced at otherwise lawful and permitted city-sponsored events, organized sporting events, school assemblies, school playground activities, by permitted fireworks, and by permitted parades on public right-of-way, public space or other publicly owned property.

8. An event for which a temporary use permit or special event permit has been issued under other provisions of this code, where the provisions of Section 11.80.040 are met, the permit granted expressly grants an exemption from specific standards contained in this chapter, and the permittee and all persons under the permittee's reasonable control actually comply with all conditions of such permit. Violation of any condition of

such a permit related to sound or sound equipment shall be a violation of this chapter and punishable as such.

F. Nothing in this chapter shall be construed to limit, modify or repeal any other regulation elsewhere in this code relating to the regulation of noise sources, nor shall any such other regulation be read to permit the emission of noise in violation of any provision of this chapter. (Ord. 740 § 1.2, 2007)

11.80.040 Special provisions for temporary use and special event permits.

The exemption by permit set forth in Section 11.80.030(E)(8) shall be subject to the following requirements and conditions:

A. The permit application shall include the name, address and telephone number of the permit applicant; the date, hours and location for which the permit is requested; and the nature of the event or activity. It shall also specify the types of sounds and/or sound equipment to be permitted, the proposed duration of such sound, the specific standards from which the sound is to be exempted, and the reasons for each requested exemption.

B. The permit shall be issued provided the proposed activity meets the requirements of this section and the issuing official determines that the sound to be emitted at the event as proposed would not be detrimental to the public health, safety or welfare, that the event cannot reasonably achieve its legitimate aims and purposes without the exemption and that the sound levels proposed will not unreasonably damage the peace and quiet enjoyment of the lawful users of surrounding properties, nor constitute a public nuisance.

C. The official issuing the permit may prescribe any reasonable conditions or requirements he/she deems necessary to minimize noise disturbances upon the community or the surrounding neighborhood, and/or to protect the health, safety or welfare of the public, including participants in the permitted event, including use of mufflers, screens or other sound-attenuating devices.

D. Any permit granted must be in writing and shall contain all conditions upon which the permit shall be effective.

E. No more than six events requiring a sound limit exemption may be held at any particular location upon privately owned or controlled property per calendar year, provided further that the number of events shall not exceed the number permitted under the regulations for the type of permit issued. For purposes of this subsection, “location” means a legal parcel of real property or a complete shopping or commercial center or mall sharing common parking and access even if comprised of multiple legal parcels.

F. The exemption from sound limits under such permit shall not exceed maximum period of four hours in one twenty-four (24) hour day.

G. The permit will only be granted for hours between nine a.m. and ten p.m. on all days other than Friday and Saturday; and, on Friday and Saturday, between the hours of nine a.m. and one a.m. of the following day, except in the following circumstances:

1. A permit may be granted for hours between nine a.m. on New Year’s Eve and one a.m. the following day (New Year’s Day).

2. A permit may be granted for hours between nine a.m. and two a.m. the following day if there are no residences, hospitals, or nursing homes within a 0.5 mile radius of the property where the function is taking place.

H. Functions for which the permits are issued shall be limited to a continuous airborne sound level not to exceed seventy (70) dB(A), as measured two hundred (200) feet from the real property boundary of the source property if on private property, or from the source if on public right of way, public space or other publicly owned property. (Ord. 740 § 1.2, 2007)

11.80.050 Measurement or assessment of sound.

A. Measurement With Sound Meter.

1. The measurement of sound shall be made with a sound level meter meeting the standards prescribed by ANSI Section 1.4-1983 (R2006). The instruments shall be maintained in calibration and good working order. A calibration check shall be made of the system at the time of any sound level measurement. Measurements recorded shall be taken so as to provide a proper representation of the source of the sound. The microphone during measurement shall be positioned so as not to create any unnatural enhancement or diminution of the measured sound. A windscreen for the microphone shall be used at all times. However, a violation of this chapter may occur without the occasion of the measurements being made as otherwise provided.

2. The slow meter response of the sound level meter shall be used in order to best determine the average amplitude.

3. The measurement shall be made at any point on the property into which the sound is being transmitted and shall be made at least three feet away from any ground, wall, floor, ceiling, roof and other plane surface.

4. In case of multiple occupancy of a property, the measurement may be made at any point inside the premises to which any complainant has right of legal private occupancy; provided that the measurement shall not be made within three feet of any ground, wall, floor, ceiling, roof or other plane surface.

5. All measurements of sound provided for in this chapter will be made by qualified officials of the city who are designated by the city manger or designee to operate the apparatus used to make the measurements.

B. Assessment Without Sound Level Meter. Any police officer, code enforcement officer, or other official designated by the city manager or designee who hears a noise or sound that is plainly audible, as defined in Section 11.80.020, in violation of this chapter, may enforce this chapter and shall assess the noise or sound according to the following standards:

1. The primary means of detection shall be by means of the official's normal hearing faculties, not artificially enhanced.

2. The official shall first attempt to have a direct line of sight and hearing to the vehicle or real property from which the sound or noise emanates so that the official can readily identify the offending source of the sound or noise and the distance involved. If the official is unable to have a direct line of sight and hearing to the vehicle or real property from which the sound or noise emanates, then the official shall confirm the source of the sound or noise by approaching the suspected vehicle or real property until the official is able to obtain a direct line of sight and hearing, and confirm the source of the sound or noise that was heard at the place of the original assessment of the sound or noise.

3. The official need not be required to identify song titles, artists, or lyrics in order to establish a violation. (Ord. 740 § 1.2, 2007)

11.80.060 Violation.

A. Violation of Sound Level Limits. Any person violating any of the provisions of this chapter shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punishable by a fine not to exceed one thousand dollars ($1,000.00) and/or six months in the county jail, or both. Notwithstanding the foregoing, any violation of the provisions of this chapter may, in the discretion of the citing officer or the city attorney, be cited and/or prosecuted as an infraction or be subject to civil citation pursuant to Chapter 1.10.

B. Joint and Several Responsibility. In addition to the person causing the offending sound, the owner, tenant or lessee of property, or a manager, overseer or agent, or any other person lawfully entitled to possess the property from which the offending sound is emitted at the time the offending sound is emitted, shall be responsible for compliance with this chapter if the additionally responsible party knows or should have known of the offending noise disturbance. It shall not be a lawful defense to assert that some other person caused the sound. The lawful possessor or operator of the premises shall be responsible for operating or maintaining the premises in compliance with this chapter and may be cited regardless of whether or not the person actually causing the sound is also cited.

C. Violation May be Declared a Public Nuisance. The operation or maintenance of any device, equipment, instrument, vehicle or machinery in violation of any provisions of this chapter which endangers the public health, safety and quality of life of residents in the area is declared to be a public nuisance, and may be subject to abatement summarily or by a restraining order or injunction issued

by a court of competent jurisdiction. (Ord. 824 § 1.2, 2011; Ord. 740 § 1.2, 2007)

View the mobile version.

APPENDIX 5.1:

STUDY AREA PHOTOS

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L1
33, 56' 48.508300", 117, 11' 28.760300"

L1_E
33, 56' 48.508300", 117, 11' 28.760300"

L1_N
33, 56' 48.508300", 117, 11' 28.760300"

L1_NE
33, 56' 48.508300", 117, 11' 28.760300"

L1_S
33, 56' 48.508300", 117, 11' 28.760300"

L1_SW
33, 56' 48.508300", 117, 11' 28.760300"

L1_W
33, 56' 48.508300", 117, 11' 28.760300"

L2
33, 56' 58.821700", 117, 11' 29.062500"

L2_E
33, 56' 58.821700", 117, 11' 29.062500"

L2_N
33, 56' 58.821700", 117, 11' 29.062500"

L2_NE
33, 56' 58.821700", 117, 11' 29.062500"

L2_NW
33, 56' 58.821700", 117, 11' 29.062500"

L2_S
33, 56' 58.821700", 117, 11' 29.062500"

L2_SE
33, 56' 58.821700", 117, 11' 29.062500"

L3
33, 56' 47.189900", 117, 10' 58.547900"

L3_N
33, 56' 47.189900", 117, 10' 58.547900"

L3_NE
33, 56' 47.189900", 117, 10' 58.547900"

L3_NW
33, 56' 47.189900", 117, 10' 58.547900"

L4
33, 56' 52.078800", 117, 10' 58.108500"

L4_E
33, 56' 49.854100", 117, 10' 58.108500"

L4_E-2
33, 56' 52.078800", 117, 10' 58.108500"

L4_N
33, 56' 49.854100", 117, 10' 58.108500"

L4_N-2
33, 56' 52.078800", 117, 10' 58.108500"

L4_NE
33, 56' 49.854100", 117, 10' 58.108500"

L4_NE-2
33, 56' 49.854100", 117, 10' 58.108500"

L4_NW
33, 56' 49.854100", 117, 10' 58.108500"

L4_S
33, 56' 52.078800", 117, 10' 58.108500"

L4_SE
33, 56' 52.078800", 117, 10' 58.108500"

L4_W
33, 56' 49.854100", 117, 10' 58.108500"

L4_W-2
33, 56' 52.078800", 117, 10' 58.108500"

L5
33, 56' 47.546900", 117, 11' 13.242100"

L5_E
33, 56' 47.546900", 117, 11' 13.242100"

L5_N
33, 56' 47.546900", 117, 11' 13.242100"

L5_NE
33, 56' 47.546900", 117, 11' 13.242100"

L5_NW
33, 56' 47.546900", 117, 11' 13.242100"

L5_S
33, 56' 47.546900", 117, 11' 13.242100"

L5_W
33, 56' 47.546900", 117, 11' 13.242100"

S_Site_E
33, 56' 45.761700", 117, 11' 28.403300"

S_Site_E-2
33, 56' 48.659300", 117, 11' 27.112400"

S_Site_N
33, 56' 45.761700", 117, 11' 28.403300"

S_Site_NE
33, 56' 45.761700", 117, 11' 28.403300"

S_Site_NE-2
33, 56' 48.659300", 117, 11' 27.112400"

S_Site_S
33, 56' 45.761700", 117, 11' 28.403300"

S_Site_SE
33, 56' 45.761700", 117, 11' 28.403300"

S_Site_SW
33, 56' 45.761700", 117, 11' 28.403300"

SE_Site_E
33, 56' 48.164900", 117, 10' 58.300700"

SE_Site_N
33, 56' 48.164900", 117, 10' 58.300700"

SE_Site_N-2
33, 56' 48.164900", 117, 10' 58.300700"

SE_Site_S
33, 56' 48.164900", 117, 10' 58.300700"

SE_Site_SW
33, 56' 48.164900", 117, 10' 58.300700"

SE_Site_W
33, 56' 48.164900", 117, 10' 58.300700"

SW_Site_E
33, 56' 49.497000", 117, 11' 29.282200"

SW_Site_Ironwood Av_E
33, 56' 48.576900", 117, 11' 29.199800"

SW_Site_Ironwood Av_Nason St_S
33, 56' 48.576900", 117, 11' 29.199800"

SW_Site_Ironwood Av_W
33, 56' 48.576900", 117, 11' 29.199800"

SW_Site_N
33, 56' 49.497000", 117, 11' 29.282200"

SW_Site_NE
33, 56' 49.497000", 117, 11' 29.282200"

SW_Site_S
33, 56' 49.497000", 117, 11' 29.282200"

SW_Site_SE
33, 56' 49.497000", 117, 11' 29.282200"

SW_Site_SW
33, 56' 49.497000", 117, 11' 29.282200"

SW_Site_W
33, 56' 49.497000", 117, 11' 29.282200"

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APPENDIX 5.2:

NOISE LEVEL MEASUREMENT WORKSHEETS

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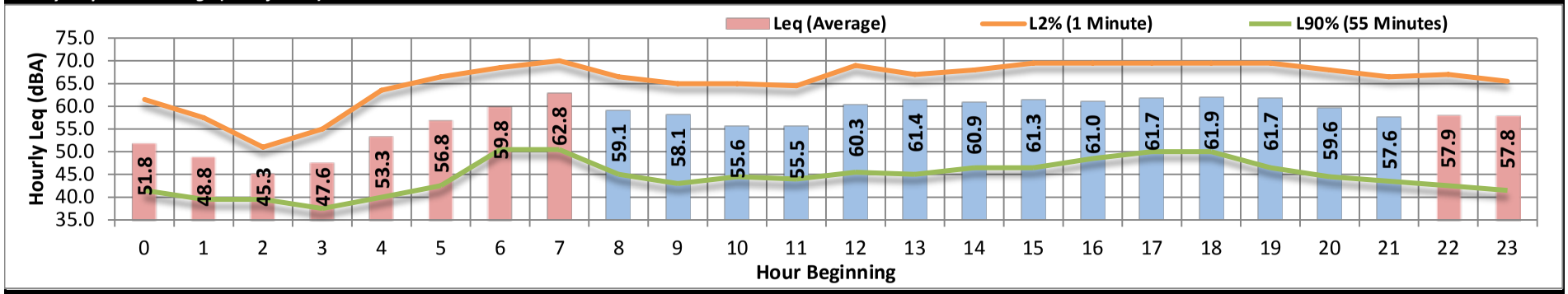
24-Hour Noise Level Measurement Summary

Project Name:	Ironwood Residential	*JN:*	9385	*Energy Average Leq*		*24-Hour*
Location:	L1 - Located at the northeastern corner of Ironwood Avenue and Nason Street near existing residential homes across Ironwood Avenue.	*Analyst:*	A. Wolfe	*Day*	*Night*	*CNEL*
		Date:	1/28/2015	60.1	57.1	63.6

Hourly Leq dBA Readings (unadjusted)



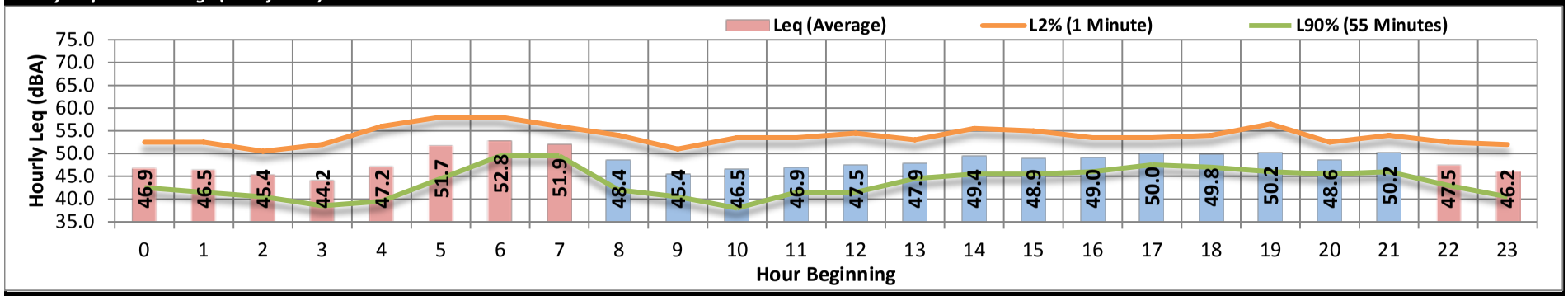
Time Period	*Hour*	*Leq*	*Lmax*	*Lmin*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	55.5	70.9	40.5	66.0	64.5	62.0	60.5	53.0	47.0	43.0	42.5	41.5
	Max	61.9	87.8	46.2	72.5	69.5	67.5	66.0	61.0	56.0	50.0	48.5	47.0
Energy Average		60.1	83.5	42.6	70.4	68.0	65.3	63.6	57.7	52.2	46.5	45.3	43.8
Night	Min	45.3	69.7	37.6	53.0	51.0	48.0	45.0	41.5	40.5	37.5	37.5	37.5
	Max	62.8	89.6	46.8	72.5	70.0	67.0	65.5	60.5	55.5	50.5	49.5	48.5
Energy Average		57.1	81.8	41.6	68.1	65.4	61.5	59.3	53.5	49.5	45.1	44.1	43.0
Hourly Summary													
Night	0	51.8	72.1	39.4	64.5	61.5	55.5	53.0	47.0	44.5	41.5	41.0	40.0
	1	48.8	70.2	37.6	62.5	57.5	50.0	47.5	44.0	41.5	39.5	39.0	37.5
	2	45.3	69.7	37.6	53.0	51.0	48.0	47.0	44.0	42.0	39.5	39.0	38.0
	3	47.6	71.3	37.6	60.5	55.0	48.0	45.0	41.5	40.5	37.5	37.5	37.5
	4	53.3	78.8	37.7	67.0	63.5	56.0	52.5	45.0	42.0	40.0	39.5	39.0
	5	56.8	78.5	39.0	68.5	66.5	61.5	59.0	54.0	51.0	42.5	41.0	39.5
	6	59.8	79.4	46.8	71.0	68.5	66.0	63.5	56.5	53.5	50.5	49.5	48.5
	7	62.8	89.6	46.4	72.5	70.0	67.0	65.5	60.5	55.5	50.5	49.5	48.0
Day	8	59.1	83.9	43.0	68.5	66.5	64.5	63.0	56.5	51.0	45.0	44.5	43.5
	9	58.1	84.5	41.6	67.5	65.0	62.5	60.5	53.0	47.0	43.0	42.5	41.5
	10	55.6	70.9	42.4	66.0	65.0	62.5	60.5	53.5	48.5	44.5	43.5	43.0
	11	55.5	72.9	41.5	66.0	64.5	62.0	60.5	53.5	48.0	44.0	43.0	42.0
	12	60.3	84.4	42.3	71.5	69.0	65.5	63.5	58.5	53.0	45.5	44.5	43.0
	13	61.4	87.1	41.6	70.0	67.0	64.5	63.0	57.0	50.5	45.0	44.0	43.0
	14	60.9	81.6	42.5	71.5	68.0	65.5	64.0	58.0	52.5	46.5	45.0	43.5
	15	61.3	85.4	42.4	72.5	69.5	66.0	64.5	58.5	52.5	46.5	45.5	44.0
	16	61.0	83.7	42.9	72.0	69.5	66.5	65.0	59.5	54.0	48.5	47.0	45.0
	17	61.7	82.6	44.0	71.0	69.5	67.0	66.0	61.0	56.0	50.0	48.5	46.0
	18	61.9	80.0	46.2	71.5	69.5	67.5	66.0	61.0	56.0	50.0	48.5	47.0
	19	61.7	87.8	41.7	71.5	69.5	66.5	64.5	57.5	52.0	46.5	45.5	43.5
	20	59.6	80.4	40.5	70.5	68.0	65.0	63.0	56.0	50.0	44.5	43.5	42.0
	21	57.6	79.4	40.6	69.0	66.5	64.0	61.6	53.5	48.0	43.5	42.5	41.5
Night	22	57.9	81.9	39.3	69.5	67.0	62.5	60.0	51.5	47.0	42.5	41.5	40.5
	23	57.8	82.0	37.7	69.0	65.5	60.5	56.5	50.5	47.0	41.5	40.5	39.5

URBAN CROSSROADS

24-Hour Noise Level Measurement Summary

Project Name:	Ironwood Residential	*JN:* 9385	*Energy Average Leq*		*24-Hour*
Location:	L2 - Located in the northwestern portion of the Project site, east of existing residential homes across Nason Street.	*Analyst:* A. Wolfe	*Day*	*Night*	*CNEL*
		Date: 1/28/2015	48.7	49.0	55.4

Hourly Leq dBA Readings (unadjusted)



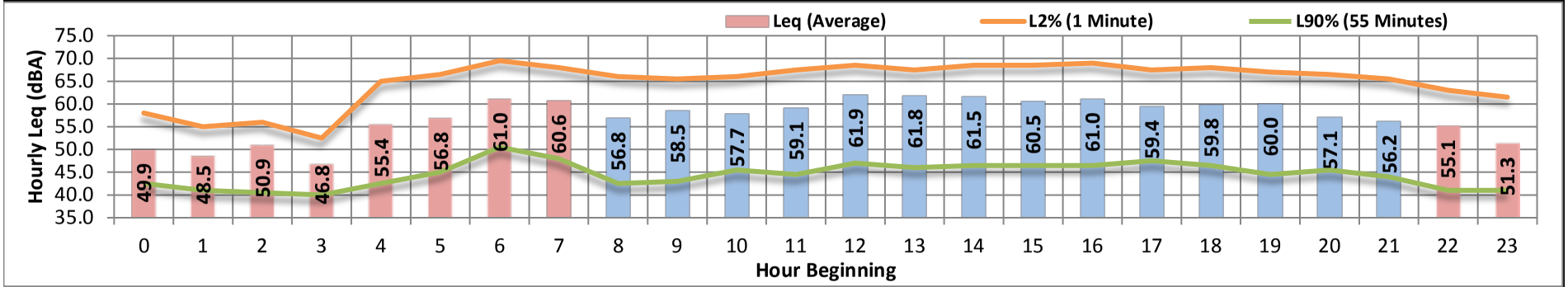
Time Period	*Hour*	*Leq*	*Lmax*	*Lmin*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	45.4	56.8	36.0	52.5	51.0	49.0	48.0	46.0	43.5	38.0	37.5	37.5
	Max	50.2	67.9	44.9	59.0	56.5	53.5	52.0	50.5	49.5	47.5	47.0	45.5
Energy Average		48.7	63.2	42.2	55.8	54.0	52.0	51.0	48.7	47.1	44.8	44.3	43.3
Night	Min	44.2	57.7	37.3	52.0	50.5	49.0	47.0	43.5	41.0	38.5	38.0	37.5
	Max	52.8	65.5	47.3	59.5	58.0	56.5	55.0	53.0	51.5	49.5	49.0	48.5
Energy Average		49.0	62.0	42.1	56.2	54.8	52.8	51.7	49.2	47.4	44.7	44.1	43.3
Hourly Summary													
Night	0	46.9	58.5	40.3	54.0	52.5	50.5	49.5	47.0	45.5	42.5	42.0	41.0
	1	46.5	57.7	38.7	53.5	52.5	50.5	49.5	47.0	45.0	41.5	40.5	39.0
	2	45.4	58.8	37.7	52.0	50.5	49.0	48.0	46.0	43.5	40.5	39.5	38.5
	3	44.2	58.8	37.3	54.5	52.0	49.0	47.0	43.5	41.0	38.5	38.0	37.5
	4	47.2	65.3	37.8	58.0	56.0	52.5	51.0	45.0	42.5	39.5	39.0	38.5
	5	51.7	61.5	40.7	59.5	58.0	56.5	55.0	52.0	50.0	44.5	43.5	42.5
	6	52.8	63.4	46.5	59.0	58.0	56.0	55.0	53.0	51.5	49.5	49.0	48.5
	7	51.9	65.5	47.3	57.0	56.0	54.5	53.5	52.5	51.0	49.5	49.0	48.0
Day	8	48.4	62.1	38.9	55.0	54.0	52.5	52.0	49.5	46.0	42.0	41.0	39.5
	9	45.4	56.8	38.8	52.5	51.0	49.0	48.0	46.0	43.5	40.5	40.0	39.0
	10	46.5	60.4	36.0	55.0	53.5	52.0	50.5	46.5	43.5	38.0	37.5	37.5
	11	46.9	63.2	39.8	57.0	53.5	50.5	49.5	46.0	44.0	41.5	41.0	40.0
	12	47.5	63.1	38.3	56.0	54.5	53.0	51.5	47.0	44.5	41.5	40.5	39.5
	13	47.9	61.2	41.9	54.5	53.0	50.5	50.0	48.0	46.5	44.5	44.0	43.5
	14	49.4	65.9	43.0	57.5	55.5	52.5	51.0	48.5	47.5	45.5	45.0	44.0
	15	48.9	61.0	43.2	57.0	55.0	52.0	51.0	48.5	47.5	45.5	45.0	44.5
	16	49.0	60.8	44.0	55.0	53.5	52.0	51.0	49.5	48.0	46.0	45.5	44.5
	17	50.0	59.5	44.2	54.5	53.5	52.5	51.5	50.5	49.5	47.5	47.0	45.5
	18	49.8	59.5	44.9	55.0	54.0	52.5	52.0	50.0	49.0	47.0	46.5	45.5
	19	50.2	67.9	42.9	59.0	56.5	53.5	52.0	49.5	48.0	46.0	45.5	44.5
	20	48.6	60.7	42.4	53.5	52.5	51.5	50.5	49.0	47.5	45.5	45.0	44.0
	21	50.2	67.0	43.6	55.5	54.0	52.5	52.0	50.0	49.0	46.0	45.5	44.5
Night	22	47.5	60.8	40.3	54.0	52.5	51.0	50.5	48.0	46.0	43.0	42.5	41.5
	23	46.2	60.6	37.6	53.0	52.0	50.5	50.0	46.5	44.0	40.5	40.0	38.5

URBAN CROSSROADS

24-Hour Noise Level Measurement Summary

Project Name:	Ironwood Residential	*JN:* 9385	*Energy Average Leq*		*24-Hour*
Location:	L3 - Located at the southwestern corner of Ironwood Avenue and Oliver Street adjacent to an existing residential home.	*Analyst:* A. Wolfe	*Day*	*Night*	*CNEL*
		Date: 1/28/2015	59.7	56.1	63.0

Hourly Leq dBA Readings (unadjusted)



Time Period	*Hour*	*Leq*	*Lmax*	*Lmin*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	56.2	73.5	39.9	67.0	65.5	62.5	59.5	50.5	46.5	42.5	41.5	41.0
	Max	61.9	90.6	44.7	71.5	69.0	66.5	65.5	60.0	53.0	47.5	46.5	45.5
Energy Average		59.7	84.8	42.7	69.4	67.4	65.1	63.6	57.3	50.8	45.7	44.7	43.6
Night	Min	46.8	67.8	38.2	58.0	52.5	47.5	46.0	43.5	42.0	40.0	39.5	38.0
	Max	61.0	81.1	48.1	71.0	69.5	67.5	66.0	61.0	54.0	50.5	50.0	49.0
Energy Average		56.1	77.3	41.9	66.8	64.4	61.4	59.7	54.0	48.7	44.8	44.1	43.0
Hourly Summary													
Night	0	49.9	69.1	41.1	62.0	58.0	53.0	51.0	47.5	45.5	42.5	42.0	41.0
	1	48.5	70.0	38.5	61.0	55.0	49.5	48.0	45.5	43.5	41.0	40.0	40.0
	2	50.9	75.9	39.0	62.0	56.0	49.0	47.1	44.5	43.0	40.5	40.0	40.0
	3	46.8	67.8	38.2	58.0	52.5	47.5	46.0	43.5	42.0	40.0	39.5	38.0
	4	55.4	79.0	39.9	68.0	65.0	57.0	52.0	47.0	45.0	42.5	42.0	41.0
	5	56.8	77.5	41.2	68.5	66.5	63.0	59.6	52.0	49.5	45.0	44.0	42.0
	6	61.0	81.1	48.1	71.0	69.5	67.5	66.0	59.0	53.5	50.5	50.0	49.0
	7	60.6	79.0	42.9	69.5	68.0	66.5	65.5	61.0	54.0	48.0	47.0	45.0
Day	8	56.8	74.1	39.9	67.0	66.0	64.0	62.5	54.0	46.5	42.5	41.5	41.0
	9	58.5	86.9	40.0	67.0	65.5	63.5	61.5	52.5	47.5	43.0	42.0	41.0
	10	57.7	75.6	40.6	67.5	66.0	64.0	62.5	57.0	52.0	45.5	43.5	41.0
	11	59.1	80.6	40.8	69.5	67.5	65.0	63.5	57.0	50.5	44.5	43.5	41.5
	12	61.9	90.6	42.7	71.0	68.5	65.5	64.0	58.5	53.0	47.0	45.5	44.0
	13	61.8	89.2	43.6	69.5	67.5	65.5	64.0	57.5	51.5	46.0	45.5	44.5
	14	61.5	86.1	43.9	70.5	68.5	66.5	65.0	59.5	52.0	46.5	45.5	44.5
	15	60.5	78.4	44.1	70.0	68.5	66.5	65.5	60.0	52.5	46.5	45.5	44.5
	16	61.0	83.7	44.0	71.5	69.0	66.5	65.5	59.5	52.0	46.5	46.0	45.0
	17	59.4	73.5	44.7	68.5	67.5	66.0	64.5	59.5	52.5	47.5	46.5	45.5
	18	59.8	83.4	43.5	70.0	68.0	65.5	64.5	57.5	50.0	46.5	45.5	44.5
	19	60.0	86.8	42.5	69.5	67.0	64.0	62.5	54.0	48.5	44.5	44.0	43.0
	20	57.1	77.2	42.9	68.0	66.5	63.5	62.0	53.5	48.5	45.5	45.0	44.0
	21	56.2	78.4	40.0	68.5	65.5	62.5	59.5	50.5	47.5	44.0	43.0	42.0
Night	22	55.1	80.7	38.2	66.5	63.0	58.0	53.6	46.5	44.0	41.0	40.5	40.0
	23	51.3	70.8	38.2	65.0	61.5	54.0	51.0	47.0	44.5	41.0	40.0	39.5

URBAN CROSSROADS

24-Hour Noise Level Measurement Summary

Project Name: Ironwood Residential

Location: L4 - Located north of Ironwood Avenue along the eastern Project site boundary.

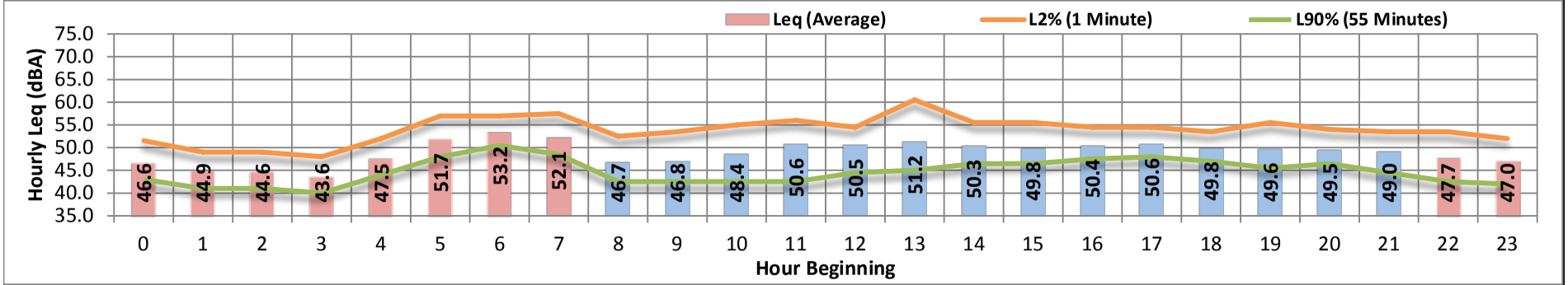
JN: 9385

Analyst: A. Wolfe

Date: 1/28/2015

Energy Average Leq		*24-Hour*
Day	*Night*	*CNEL*
49.7	49.1	55.5

Hourly Leq dBA Readings (unadjusted)



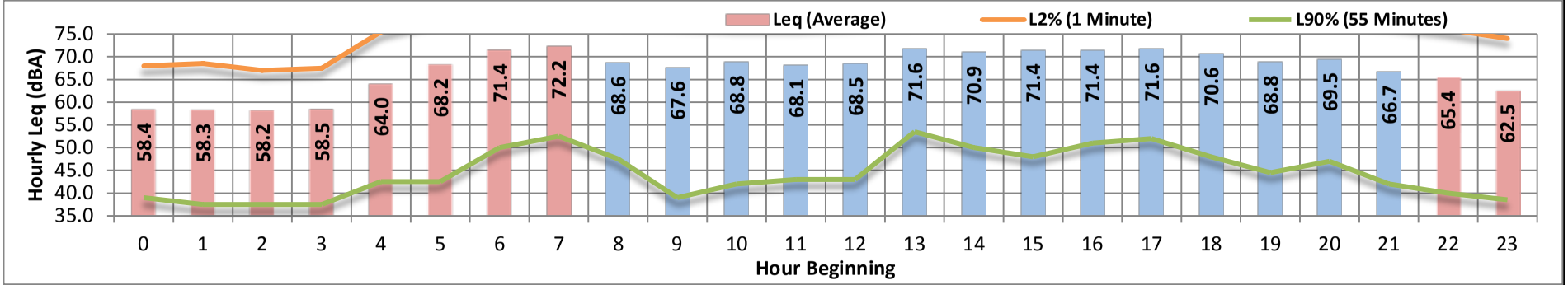
Time Period	*Hour*	*Leq*	*Lmax*	*Lmin*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	46.7	57.5	39.9	54.0	52.5	50.0	49.0	46.5	45.0	42.5	42.0	41.0
	Max	51.2	78.7	45.9	62.0	60.5	57.0	54.0	51.0	49.5	48.0	47.5	46.5
Energy Average		49.7	71.4	43.2	57.0	55.4	52.9	51.6	49.3	47.8	45.5	44.9	44.1
Night	Min	43.6	54.2	38.8	49.5	48.0	46.5	45.5	44.0	43.0	40.0	40.0	39.0
	Max	53.2	67.0	48.5	59.5	57.5	55.5	55.0	53.5	52.5	50.5	50.5	49.5
Energy Average		49.1	63.0	42.9	55.5	53.9	52.1	51.3	49.3	48.0	45.6	45.2	44.0
Hourly Summary													
Night	0	46.6	57.7	40.6	53.0	51.5	50.0	49.0	47.0	45.5	43.0	42.5	41.5
	1	44.9	54.5	38.8	50.0	49.0	48.0	47.5	45.5	44.0	41.0	40.5	39.5
	2	44.6	59.3	38.8	50.5	49.0	48.0	47.0	45.0	43.5	41.0	40.0	40.0
	3	43.6	54.2	38.8	49.5	48.0	46.5	45.5	44.0	43.0	40.0	40.0	39.0
	4	47.5	65.1	41.9	54.0	52.0	50.5	50.0	47.5	46.0	44.0	43.5	42.5
	5	51.7	65.5	45.6	58.0	57.0	55.0	54.0	52.0	50.5	48.0	47.5	46.5
	6	53.2	62.6	48.5	58.5	57.0	55.5	55.0	53.5	52.5	50.5	50.5	49.5
	7	52.1	64.5	43.4	59.5	57.5	55.0	54.0	52.0	51.0	48.5	48.0	45.5
Day	8	46.7	61.4	40.3	54.0	52.5	50.0	49.0	46.5	45.0	42.5	42.5	41.5
	9	46.8	61.8	40.7	54.5	53.5	50.0	49.0	47.0	45.0	42.5	42.0	41.0
	10	48.4	62.6	39.9	56.5	55.0	53.0	51.5	48.5	46.0	42.5	42.0	41.0
	11	50.6	78.2	40.1	58.0	56.0	52.0	50.5	47.5	45.5	42.5	42.0	41.0
	12	50.5	78.7	40.9	55.5	54.5	52.5	51.0	48.5	47.0	44.5	44.0	43.0
	13	51.2	67.0	41.8	62.0	60.5	57.0	54.0	49.0	47.5	45.0	44.0	43.5
	14	50.3	75.0	44.2	57.5	55.5	53.0	52.0	49.5	48.5	46.5	46.0	45.5
	15	49.8	61.7	44.8	57.0	55.5	53.0	52.0	50.0	48.5	46.5	46.0	45.5
	16	50.4	60.8	45.2	56.0	54.5	53.0	52.5	50.5	49.5	47.5	46.5	46.0
	17	50.6	63.1	45.9	55.0	54.5	53.0	52.5	51.0	49.5	48.0	47.5	46.5
	18	49.8	57.5	44.8	54.5	53.5	52.0	51.5	50.5	49.0	47.0	46.5	45.5
	19	49.6	63.9	43.4	58.0	55.5	53.5	52.0	49.5	47.5	45.5	45.0	44.5
	20	49.5	63.6	44.3	56.0	54.0	52.0	51.0	49.5	48.5	46.5	46.0	45.0
	21	49.0	58.2	41.0	55.0	53.5	52.5	51.5	49.5	48.0	44.5	43.5	42.0
Night	22	47.7	67.0	40.1	55.5	53.5	51.0	50.0	47.5	45.5	42.5	42.0	41.0
	23	47.0	62.4	38.8	53.5	52.0	51.0	50.0	47.5	45.5	42.0	41.5	40.5

URBAN CROSSROADS

24-Hour Noise Level Measurement Summary

Project Name:	Ironwood Residential	*JN:*	9385	*Energy Average Leq*		*24-Hour*
Location:	L5 - Located south of the Project site across Ironwood Avenue adjacent to existing residential homes.	*Analyst:*	A. Wolfe	*Day*	*Night*	*CNEL*
		Date:	1/28/2015	69.9	66.8	73.2

Hourly Leq dBA Readings (unadjusted)



Time Period	*Hour*	*Leq*	*Lmax*	*Lmin*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	66.7	81.6	37.6	78.0	77.0	74.5	71.5	60.5	50.5	39.0	37.5	37.5
	Max	71.6	99.7	45.3	80.5	79.5	78.0	77.0	72.0	64.5	53.5	51.0	47.5
Energy Average		69.9	91.2	41.6	79.4	78.3	76.6	75.3	69.0	60.3	48.3	46.1	43.1
Night	Min	58.2	80.8	34.8	72.5	67.0	57.0	52.5	41.0	39.0	37.5	35.5	35.0
	Max	72.2	89.1	47.0	81.0	80.0	78.5	77.5	72.5	64.5	52.5	50.5	48.0
Energy Average		66.8	85.4	40.8	77.8	75.8	73.1	71.4	65.1	56.9	45.5	43.6	41.8
Hourly Summary													
Night	0	58.4	82.3	37.5	73.0	68.0	58.0	53.5	43.5	41.5	39.0	37.5	37.5
	1	58.3	80.9	34.8	73.0	68.5	58.5	54.0	44.0	41.5	37.5	37.5	35.0
	2	58.2	82.5	34.8	72.5	67.0	58.5	53.5	41.0	39.0	37.5	37.0	35.0
	3	58.5	80.8	34.8	73.0	67.5	57.0	52.5	43.5	40.0	37.5	35.5	35.0
	4	64.0	85.5	38.7	78.0	75.5	70.0	65.5	52.0	47.0	42.5	40.5	39.5
	5	68.2	87.3	39.5	80.0	78.5	76.0	73.5	62.5	52.5	42.5	41.5	40.5
	6	71.4	85.8	44.4	80.5	79.5	78.0	77.0	71.0	62.5	50.0	47.5	46.0
	7	72.2	87.7	47.0	81.0	80.0	78.5	77.5	72.5	64.5	52.5	50.5	48.0
Day	8	68.6	86.3	40.7	79.0	78.0	76.0	74.5	66.5	57.5	47.5	45.5	42.5
	9	67.6	87.3	37.6	78.5	77.5	75.0	73.5	64.0	54.0	39.0	37.5	37.5
	10	68.8	94.2	37.7	78.0	77.0	75.5	74.0	66.5	55.0	42.0	40.5	38.5
	11	68.1	81.6	37.7	78.0	77.0	75.5	74.0	67.0	56.5	43.0	40.5	38.0
	12	68.5	86.0	37.7	78.5	77.5	75.5	74.0	66.0	55.0	43.0	41.0	39.5
	13	71.6	99.7	45.3	79.5	78.0	76.5	75.5	70.0	61.5	53.5	51.0	47.5
	14	70.9	90.9	42.8	80.0	79.0	77.5	76.5	71.0	62.0	50.0	48.0	44.5
	15	71.4	86.3	42.5	80.0	79.0	78.0	77.0	72.0	63.5	48.0	46.0	44.0
	16	71.4	88.5	43.1	80.5	79.0	78.0	77.0	72.0	64.0	51.0	48.0	45.0
	17	71.6	87.2	44.7	80.5	79.5	78.0	77.0	72.0	64.5	52.0	50.0	46.0
	18	70.6	86.4	41.8	80.0	79.0	77.5	76.5	70.0	61.0	48.0	46.0	43.5
	19	68.8	90.4	40.7	79.5	78.0	76.0	74.5	65.0	56.0	44.5	43.0	41.5
	20	69.5	84.4	41.5	79.5	78.5	76.5	75.5	68.0	59.5	47.0	44.5	42.5
	21	66.7	83.7	37.7	79.0	77.5	74.5	71.5	60.5	50.5	42.0	40.5	38.5
Night	22	65.4	89.1	37.7	78.5	76.0	70.5	66.5	52.0	44.0	40.0	39.5	38.5
	23	62.5	83.8	37.4	77.0	74.0	67.0	61.5	47.0	42.0	38.5	37.5	37.5

URBAN CROSSROADS

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APPENDIX 6.1:

SITE PLAN

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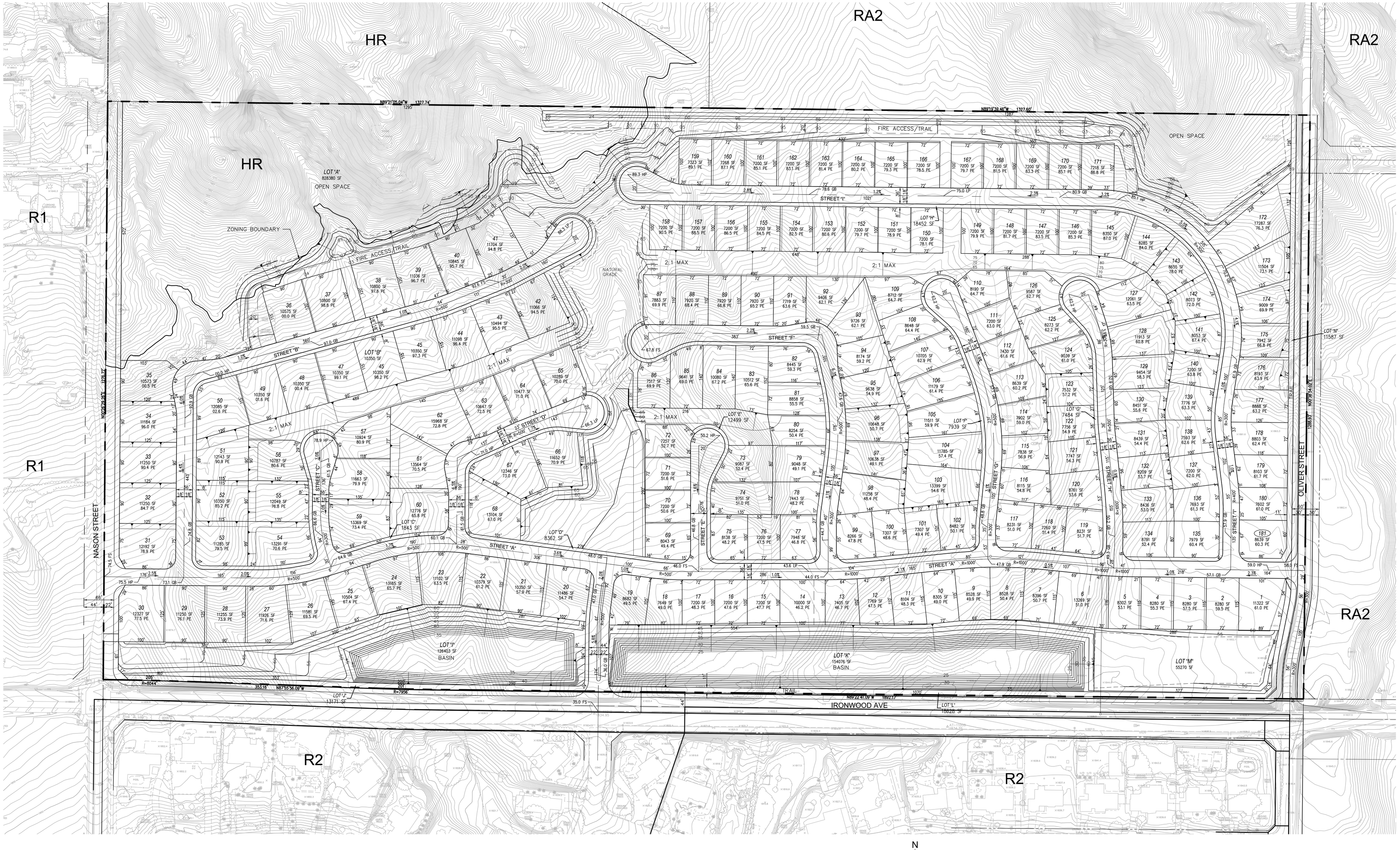
CITY OF MORENO VALLEY, STATE OF CALIFORNIA

TENTATIVE TRACT MAP NO. 37001

AUGUST, 2015



N

80' 0' 40' 80' 160' 240'

GRAPHIC SCALE
1 INCH = 80' FT

ANDERSON CONSULTING ENGINEERS, INC.
12526 HIGH BLUFF DR., SUITE 300
SAN DIEGO, CA 92130
(858) 925-7918

TENTATIVE TRACT MAP NO. 37001
CITY OF MORENO VALLEY, STATE OF CALIFORNIA

SITE PLAN

SUBMITTALS:	
DESIGNED BY: JAA	
DRAWN BY: IMC	
CHECKED BY: JAA	
SHEET 2 OF 2	

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APPENDIX 7.1:

OFF-SITE TRAFFIC NOISE CONTOURS

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Nason St.
Road Segment: s/o Ironwood Av.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,300	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	430	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-5.62	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-22.85	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-26.81	1.98	-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:	63.6	61.7	59.9	53.9	62.5	63.1
Medium Trucks:	57.4	55.9	49.5	48.0	56.4	56.7
Heavy Trucks:	58.2	56.8	47.8	49.0	57.4	57.5
Vehicle Noise:	65.4	63.7	60.5	55.9	64.4	64.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	19	40	86	186
CNEL:	20	43	93	200

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Nason St.
Road Segment: n/o SR-60 WB Ramps
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,800	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	480	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-5.14	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-22.38	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-26.33	1.98	-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:	64.1	62.2	60.4	54.3	63.0	63.6
Medium Trucks:	57.9	56.3	50.0	48.4	56.9	57.1
Heavy Trucks:	58.7	57.3	48.2	49.5	57.8	58.0
Vehicle Noise:	65.9	64.2	61.0	56.3	64.9	65.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	20	43	93	201
CNEL:	22	46	100	215

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Nason St.
Road Segment: n/o SR-60 WB Fwy
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	12,700	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,270	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.91	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-18.15	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.11	1.98	-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:	68.3	66.4	64.6	58.6	67.2	67.8
Medium Trucks:	62.1	60.6	54.2	52.7	61.1	61.4
Heavy Trucks:	62.9	61.5	52.5	53.7	62.1	62.2
Vehicle Noise:	70.1	68.4	65.2	60.6	69.1	69.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	38	83	178	384
CNEL:	41	89	191	411

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Nason St.
Road Segment: s/o SR-60 EB Ramps
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,800	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,780	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.55	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.69	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.64	1.98	-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:	69.8	67.9	66.1	60.0	68.7	69.3
Medium Trucks:	63.5	62.0	55.7	54.1	62.6	62.8
Heavy Trucks:	64.4	63.0	53.9	55.2	63.5	63.7
Vehicle Noise:	71.6	69.9	66.7	62.0	70.6	71.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	48	103	223	480
CNEL:	52	111	239	515

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Ironwood Av.
Road Segment: w/o Nason St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,800	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	680	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.63	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.86	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.82	1.98	-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:	65.6	63.7	61.9	55.9	64.5	65.1
Medium Trucks:	59.4	57.9	51.5	50.0	58.4	58.6
Heavy Trucks:	60.2	58.8	49.8	51.0	59.4	59.5
Vehicle Noise:	67.4	65.7	62.5	57.9	66.4	66.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	25	54	117	253
CNEL:	27	58	126	271

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Ironwood Av.
Road Segment: e/o Nason St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,600	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	460	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-6.19	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-23.43	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-27.39	1.98	-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:	66.3	64.4	62.7	56.6	65.2	65.8
Medium Trucks:	59.8	58.2	51.9	50.3	58.8	59.0
Heavy Trucks:	59.8	58.4	49.3	50.6	58.9	59.1
Vehicle Noise:	67.9	66.2	63.2	58.3	66.9	67.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	27	59	126	272
CNEL:	29	63	136	293

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Ironwood Av.
Road Segment: e/o Lantz Ln.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,300	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	430	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-6.49	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-23.73	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-27.68	1.98	-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:	66.0	64.1	62.4	56.3	64.9	65.5
Medium Trucks:	59.5	58.0	51.6	50.0	58.5	58.7
Heavy Trucks:	59.5	58.1	49.0	50.3	58.6	58.8
Vehicle Noise:	67.6	65.9	62.9	58.0	66.6	67.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	26	56	121	260
CNEL:	28	60	130	280

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Ironwood Av.
Road Segment: e/o Oliver St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,300	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	430	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-6.49	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-23.73	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-27.68	1.98	-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:	66.0	64.1	62.4	56.3	64.9	65.5
Medium Trucks:	59.5	58.0	51.6	50.0	58.5	58.7
Heavy Trucks:	59.5	58.1	49.0	50.3	58.6	58.8
Vehicle Noise:	67.6	65.9	62.9	58.0	66.6	67.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	26	56	121	260
CNEL:	28	60	130	280

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project
Road Name: Nason St.
Road Segment: s/o Ironwood Av.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,300	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	530	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.71	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.95	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.90	1.98	-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:	64.5	62.6	60.8	54.8	63.4	64.0
Medium Trucks:	58.3	56.8	50.4	48.9	57.3	57.6
Heavy Trucks:	59.1	57.7	48.7	49.9	58.3	58.4
Vehicle Noise:	66.3	64.6	61.4	56.8	65.3	65.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	21	46	99	214
CNEL:	23	49	107	230

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project
Road Name: Nason St.
Road Segment: n/o SR-60 WB Ramps
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,700	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	570	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.39	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.63	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.59	1.98	-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:	64.8	62.9	61.1	55.1	63.7	64.3
Medium Trucks:	58.6	57.1	50.7	49.2	57.6	57.9
Heavy Trucks:	59.4	58.0	49.0	50.2	58.6	58.7
Vehicle Noise:	66.7	64.9	61.8	57.1	65.6	66.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	22	48	104	225
CNEL:	24	52	112	241

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project
Road Name: Nason St.
Road Segment: n/o SR-60 WB Fwy
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	13,300	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,330	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.71	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.95	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.91	1.98	-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:	68.5	66.6	64.8	58.8	67.4	68.0
Medium Trucks:	62.3	60.8	54.4	52.9	61.3	61.6
Heavy Trucks:	63.1	61.7	52.7	53.9	62.3	62.4
Vehicle Noise:	70.3	68.6	65.4	60.8	69.3	69.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	40	85	184	396
CNEL:	42	91	197	424

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project
Road Name: Nason St.
Road Segment: s/o SR-60 EB Ramps
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,200	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,820	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.65	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.59	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.54	1.98	-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:	69.8	67.9	66.2	60.1	68.8	69.4
Medium Trucks:	63.6	62.1	55.8	54.2	62.7	62.9
Heavy Trucks:	64.5	63.1	54.0	55.3	63.6	63.8
Vehicle Noise:	71.7	70.0	66.8	62.1	70.7	71.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	49	105	226	488
CNEL:	52	113	243	523

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project
Road Name: Ironwood Av.
Road Segment: w/o Nason St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,100	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	710	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.44	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.68	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.63	1.98	-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:	65.8	63.9	62.1	56.0	64.7	65.3
Medium Trucks:	59.6	58.0	51.7	50.1	58.6	58.8
Heavy Trucks:	60.4	59.0	49.9	51.2	59.5	59.7
Vehicle Noise:	67.6	65.9	62.7	58.0	66.6	67.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	26	56	121	260
CNEL:	28	60	130	279

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project
Road Name: Ironwood Av.
Road Segment: e/o Nason St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,300	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	530	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-5.58	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-22.82	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-26.77	1.98	-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:	66.9	65.0	63.3	57.2	65.8	66.4
Medium Trucks:	60.4	58.9	52.5	51.0	59.4	59.6
Heavy Trucks:	60.4	59.0	49.9	51.2	59.5	59.7
Vehicle Noise:	68.5	66.8	63.8	58.9	67.5	68.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	30	65	139	299
CNEL:	32	69	149	322

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project
Road Name: Ironwood Av.
Road Segment: e/o Lantz Ln.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,500	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	450	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-6.29	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-23.53	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-27.48	1.98	-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:	66.2	64.3	62.6	56.5	65.1	65.7
Medium Trucks:	59.7	58.1	51.8	50.2	58.7	58.9
Heavy Trucks:	59.7	58.3	49.2	50.5	58.8	59.0
Vehicle Noise:	67.8	66.1	63.1	58.2	66.8	67.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	27	58	125	268
CNEL:	29	62	134	289

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project
Road Name: Ironwood Av.
Road Segment: e/o Oliver St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,800	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	480	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-6.01	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-23.25	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-27.20	1.98	-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:	66.5	64.6	62.8	56.8	65.4	66.0
Medium Trucks:	59.9	58.4	52.1	50.5	59.0	59.2
Heavy Trucks:	60.0	58.5	49.5	50.8	59.1	59.2
Vehicle Noise:	68.1	66.3	63.4	58.5	67.1	67.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	28	60	130	280
CNEL:	30	65	140	301

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Nason St.
Road Segment: s/o Ironwood Av.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	900	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.41	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.65	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.60	1.98	-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:	66.8	64.9	63.1	57.1	65.7	66.3
Medium Trucks:	60.6	59.1	52.7	51.2	59.6	59.9
Heavy Trucks:	61.4	60.0	51.0	52.2	60.6	60.7
Vehicle Noise:	68.6	66.9	63.7	59.1	67.6	68.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	30	66	142	305
CNEL:	33	70	152	327

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Nason St.
Road Segment: n/o SR-60 WB Ramps
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,500	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	950	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.17	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.41	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.37	1.98	-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:	67.0	65.1	63.4	57.3	65.9	66.5
Medium Trucks:	60.8	59.3	52.9	51.4	59.9	60.1
Heavy Trucks:	61.7	60.2	51.2	52.5	60.8	60.9
Vehicle Noise:	68.9	67.1	64.0	59.3	67.8	68.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	32	68	147	316
CNEL:	34	73	157	339

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Nason St.
Road Segment: n/o SR-60 WB Fwy
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,700	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,870	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.77	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.47	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.43	1.98	-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	66.3	60.2	68.9	69.5
Medium Trucks:	63.8	62.3	55.9	54.3	62.8	63.0
Heavy Trucks:	64.6	63.2	54.1	55.4	63.7	63.9
Vehicle Noise:	71.8	70.1	66.9	62.2	70.8	71.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	50	107	230	496
CNEL:	53	115	247	532

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Nason St.
Road Segment: s/o SR-60 EB Ramps
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	24,900	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,490	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.01	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-15.23	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.18	1.98	-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:	71.2	69.3	67.5	61.5	70.1	70.7
Medium Trucks:	65.0	63.5	57.1	55.6	64.0	64.3
Heavy Trucks:	65.8	64.4	55.4	56.6	65.0	65.1
Vehicle Noise:	73.1	71.3	68.2	63.5	72.0	72.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	60	129	279	601
CNEL:	64	139	299	644

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Ironwood Av.
Road Segment: w/o Nason St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	12,200	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,220	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.09	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-18.33	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.28	1.98	-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:	68.1	66.2	64.4	58.4	67.0	67.6
Medium Trucks:	61.9	60.4	54.0	52.5	61.0	61.2
Heavy Trucks:	62.7	61.3	52.3	53.5	61.9	62.0
Vehicle Noise:	70.0	68.2	65.1	60.4	68.9	69.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	37	80	173	373
CNEL:	40	86	186	401

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Ironwood Av.
Road Segment: e/o Nason St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,800	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	780	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-3.90	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-21.14	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-25.10	1.98	-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:	68.6	66.7	65.0	58.9	67.5	68.1
Medium Trucks:	62.0	60.5	54.2	52.6	61.1	61.3
Heavy Trucks:	62.1	60.7	51.6	52.9	61.2	61.4
Vehicle Noise:	70.2	68.4	65.5	60.6	69.2	69.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	39	83	180	387
CNEL:	42	90	193	417

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Ironwood Av.
Road Segment: e/o Lantz Ln.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,400	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	740	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-4.13	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-21.37	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-25.32	1.98	-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:	68.4	66.5	64.7	58.7	67.3	67.9
Medium Trucks:	61.8	60.3	53.9	52.4	60.9	61.1
Heavy Trucks:	61.8	60.4	51.4	52.6	61.0	61.1
Vehicle Noise:	70.0	68.2	65.3	60.4	68.9	69.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	37	81	174	374
CNEL:	40	87	187	402

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Ironwood Av.
Road Segment: e/o Oliver St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,400	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	740	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-4.13	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-21.37	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-25.32	1.98	-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:	68.4	66.5	64.7	58.7	67.3	67.9
Medium Trucks:	61.8	60.3	53.9	52.4	60.9	61.1
Heavy Trucks:	61.8	60.4	51.4	52.6	61.0	61.1
Vehicle Noise:	70.0	68.2	65.3	60.4	68.9	69.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	37	81	174	374
CNEL:	40	87	187	402

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 With Project
Road Name: Nason St.
Road Segment: s/o Ironwood Av.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,900	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	990	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.99	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.23	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.19	1.98	-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:	67.2	65.3	63.5	57.5	66.1	66.7
Medium Trucks:	61.0	59.5	53.1	51.6	60.0	60.3
Heavy Trucks:	61.8	60.4	51.4	52.6	61.0	61.1
Vehicle Noise:	69.1	67.3	64.2	59.5	68.0	68.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	32	70	151	325
CNEL:	35	75	162	348

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 With Project
Road Name: Nason St.
Road Segment: n/o SR-60 WB Ramps
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,400	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,040	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.78	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.02	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.97	1.98	-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:	67.4	65.5	63.8	57.7	66.3	66.9
Medium Trucks:	61.2	59.7	53.3	51.8	60.3	60.5
Heavy Trucks:	62.1	60.6	51.6	52.8	61.2	61.3
Vehicle Noise:	69.3	67.5	64.4	59.7	68.2	68.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	34	72	156	336
CNEL:	36	78	167	360

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 With Project
Road Name: Nason St.
Road Segment: n/o SR-60 WB Fwy
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,400	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,940	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.93	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.31	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.27	1.98	-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:	70.1	68.2	66.5	60.4	69.0	69.6
Medium Trucks:	63.9	62.4	56.0	54.5	63.0	63.2
Heavy Trucks:	64.8	63.3	54.3	55.6	63.9	64.0
Vehicle Noise:	72.0	70.2	67.1	62.4	70.9	71.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	51	110	236	509
CNEL:	55	118	253	546

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 With Project
Road Name: Nason St.
Road Segment: s/o SR-60 EB Ramps
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,200	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,520	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.06	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-15.18	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.13	1.98	-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:	71.3	69.4	67.6	61.5	70.2	70.8
Medium Trucks:	65.1	63.5	57.2	55.6	64.1	64.3
Heavy Trucks:	65.9	64.5	55.4	56.7	65.0	65.2
Vehicle Noise:	73.1	71.4	68.2	63.5	72.1	72.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	61	130	281	606
CNEL:	65	140	302	650

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 With Project
Road Name: Ironwood Av.
Road Segment: w/o Nason St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	12,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,250 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.98	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-18.22	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.18	1.98	-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:	68.2	66.3	64.6	58.5	67.1	67.7
Medium Trucks:	62.0	60.5	54.1	52.6	61.1	61.3
Heavy Trucks:	62.9	61.4	52.4	53.6	62.0	62.1
Vehicle Noise:	70.1	68.3	65.2	60.5	69.0	69.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	38	82	176	380
CNEL:	41	88	189	407

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 With Project
Road Name: Ironwood Av.
Road Segment: e/o Nason St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	860 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-3.48	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-20.72	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-24.67	1.98	-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:	69.0	67.1	65.4	59.3	67.9	68.5
Medium Trucks:	62.5	61.0	54.6	53.1	61.5	61.7
Heavy Trucks:	62.5	61.1	52.0	53.3	61.6	61.8
Vehicle Noise:	70.6	68.9	65.9	61.0	69.6	70.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	41	89	192	413
CNEL:	44	96	206	445

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 With Project
Road Name: Ironwood Av.
Road Segment: e/o Lantz Ln.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	770 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-3.96	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-21.20	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-25.15	1.98	-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:	68.6	66.7	64.9	58.8	67.5	68.1
Medium Trucks:	62.0	60.5	54.1	52.6	61.0	61.3
Heavy Trucks:	62.0	60.6	51.6	52.8	61.2	61.3
Vehicle Noise:	70.2	68.4	65.4	60.6	69.1	69.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	38	83	178	384
CNEL:	41	89	192	413

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 With Project
Road Name: Ironwood Av.
Road Segment: e/o Oliver St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	780 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-3.90	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-21.14	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-25.10	1.98	-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:	68.6	66.7	65.0	58.9	67.5	68.1
Medium Trucks:	62.0	60.5	54.2	52.6	61.1	61.3
Heavy Trucks:	62.1	60.7	51.6	52.9	61.2	61.4
Vehicle Noise:	70.2	68.4	65.5	60.6	69.2	69.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	39	83	180	387
CNEL:	42	90	193	417

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Nason St.
Road Segment: s/o Ironwood Av.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,900	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	990	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.99	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.23	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.19	1.98	-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:	67.2	65.3	63.5	57.5	66.1	66.7
Medium Trucks:	61.0	59.5	53.1	51.6	60.0	60.3
Heavy Trucks:	61.8	60.4	51.4	52.6	61.0	61.1
Vehicle Noise:	69.1	67.3	64.2	59.5	68.0	68.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	32	70	151	325
CNEL:	35	75	162	348

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Nason St.
Road Segment: n/o SR-60 WB Ramps
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,400	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,040	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.78	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.02	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.97	1.98	-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:	67.4	65.5	63.8	57.7	66.3	66.9
Medium Trucks:	61.2	59.7	53.3	51.8	60.3	60.5
Heavy Trucks:	62.1	60.6	51.6	52.8	61.2	61.3
Vehicle Noise:	69.3	67.5	64.4	59.7	68.2	68.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	34	72	156	336
CNEL:	36	78	167	360

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Nason St.
Road Segment: n/o SR-60 WB Fwy
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,600	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,060	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.19	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.05	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.01	1.98	-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:	70.4	68.5	66.7	60.7	69.3	69.9
Medium Trucks:	64.2	62.7	56.3	54.8	63.2	63.5
Heavy Trucks:	65.0	63.6	54.6	55.8	64.2	64.3
Vehicle Noise:	72.2	70.5	67.3	62.7	71.2	71.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	53	114	246	530
CNEL:	57	122	264	568

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Nason St.
Road Segment: s/o SR-60 EB Ramps
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,400	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,740	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.43	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-14.81	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.77	1.98	-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:	71.6	69.7	68.0	61.9	70.5	71.1
Medium Trucks:	65.4	63.9	57.5	56.0	64.5	64.7
Heavy Trucks:	66.3	64.8	55.8	57.1	65.4	65.5
Vehicle Noise:	73.5	71.7	68.6	63.9	72.4	72.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	64	138	297	640
CNEL:	69	148	319	687

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Ironwood Av.
Road Segment: w/o Nason St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	13,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,340 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.68	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.92	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.87	1.98	-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:	68.5	66.6	64.9	58.8	67.4	68.0
Medium Trucks:	62.3	60.8	54.4	52.9	61.4	61.6
Heavy Trucks:	63.2	61.7	52.7	53.9	62.3	62.4
Vehicle Noise:	70.4	68.6	65.5	60.8	69.3	69.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	40	86	185	398
CNEL:	43	92	198	426

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Ironwood Av.
Road Segment: e/o Nason St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	860 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-3.48	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-20.72	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-24.67	1.98	-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:	69.0	67.1	65.4	59.3	67.9	68.5
Medium Trucks:	62.5	61.0	54.6	53.1	61.5	61.7
Heavy Trucks:	62.5	61.1	52.0	53.3	61.6	61.8
Vehicle Noise:	70.6	68.9	65.9	61.0	69.6	70.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	41	89	192	413
CNEL:	44	96	206	445

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Ironwood Av.
Road Segment: e/o Lantz Ln.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	810 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-3.74	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-20.98	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-24.93	1.98	-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:	68.8	66.9	65.1	59.1	67.7	68.3
Medium Trucks:	62.2	60.7	54.3	52.8	61.3	61.5
Heavy Trucks:	62.2	60.8	51.8	53.0	61.4	61.5
Vehicle Noise:	70.4	68.6	65.6	60.8	69.3	69.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	40	86	184	397
CNEL:	43	92	198	427

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Ironwood Av.
Road Segment: e/o Oliver St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	810 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-3.74	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-20.98	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-24.93	1.98	-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:	68.8	66.9	65.1	59.1	67.7	68.3
Medium Trucks:	62.2	60.7	54.3	52.8	61.3	61.5
Heavy Trucks:	62.2	60.8	51.8	53.0	61.4	61.5
Vehicle Noise:	70.4	68.6	65.6	60.8	69.3	69.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	40	86	184	397
CNEL:	43	92	198	427

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Nason St.
Road Segment: s/o Ironwood Av.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,800	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,080	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.62	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-18.86	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.81	1.98	-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:	67.6	65.7	63.9	57.9	66.5	67.1
Medium Trucks:	61.4	59.9	53.5	52.0	60.4	60.7
Heavy Trucks:	62.2	60.8	51.8	53.0	61.4	61.5
Vehicle Noise:	69.4	67.7	64.5	59.9	68.4	68.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	34	74	160	344
CNEL:	37	80	171	369

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Nason St.
Road Segment: n/o SR-60 WB Ramps
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	11,400	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,140	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.38	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-18.62	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.58	1.98	-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:	67.8	65.9	64.2	58.1	66.7	67.3
Medium Trucks:	61.6	60.1	53.7	52.2	60.7	60.9
Heavy Trucks:	62.5	61.0	52.0	53.2	61.6	61.7
Vehicle Noise:	69.7	67.9	64.8	60.1	68.6	69.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	36	77	166	357
CNEL:	38	82	178	383

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Nason St.
Road Segment: n/o SR-60 WB Fwy
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,300	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,130	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.33	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-15.91	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.86	1.98	-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:	70.5	68.6	66.9	60.8	69.4	70.0
Medium Trucks:	64.3	62.8	56.5	54.9	63.4	63.6
Heavy Trucks:	65.2	63.7	54.7	56.0	64.3	64.4
Vehicle Noise:	72.4	70.6	67.5	62.8	71.4	71.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	54	117	251	541
CNEL:	58	125	270	581

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Nason St.
Road Segment: s/o SR-60 EB Ramps
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,700	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,770	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.47	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-14.76	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.72	1.98	-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:	71.7	69.8	68.0	62.0	70.6	71.2
Medium Trucks:	65.5	64.0	57.6	56.1	64.5	64.7
Heavy Trucks:	66.3	64.9	55.9	57.1	65.5	65.6
Vehicle Noise:	73.5	71.8	68.6	64.0	72.5	72.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	65	139	299	645
CNEL:	69	149	321	692

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Ironwood Av.
Road Segment: w/o Nason St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	13,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,370 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.58	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.82	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.78	1.98	-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:	68.6	66.7	64.9	58.9	67.5	68.1
Medium Trucks:	62.4	60.9	54.5	53.0	61.5	61.7
Heavy Trucks:	63.3	61.8	52.8	54.0	62.4	62.5
Vehicle Noise:	70.5	68.7	65.6	60.9	69.4	69.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	40	87	187	403
CNEL:	43	93	201	433

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Ironwood Av.
Road Segment: e/o Nason St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	940 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-3.09	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-20.33	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-24.29	1.98	-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:	69.4	67.5	65.8	59.7	68.3	68.9
Medium Trucks:	62.9	61.3	55.0	53.4	61.9	62.1
Heavy Trucks:	62.9	61.5	52.4	53.7	62.0	62.2
Vehicle Noise:	71.0	69.3	66.3	61.4	70.0	70.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	44	95	204	439
CNEL:	47	102	219	472

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Ironwood Av.
Road Segment: e/o Lantz Ln.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	840 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-3.58	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-20.82	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-24.77	1.98	-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:	68.9	67.0	65.3	59.2	67.8	68.4
Medium Trucks:	62.4	60.9	54.5	53.0	61.4	61.6
Heavy Trucks:	62.4	61.0	51.9	53.2	61.5	61.7
Vehicle Noise:	70.5	68.8	65.8	60.9	69.5	70.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	41	88	189	407
CNEL:	44	94	203	438

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Ironwood Av.
Road Segment: e/o Oliver St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	850 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-3.53	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-20.77	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-24.72	1.98	-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:	69.0	67.1	65.3	59.3	67.9	68.5
Medium Trucks:	62.4	60.9	54.5	53.0	61.5	61.7
Heavy Trucks:	62.5	61.0	52.0	53.2	61.6	61.7
Vehicle Noise:	70.6	68.8	65.9	61.0	69.5	70.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	41	88	190	410
CNEL:	44	95	205	441

Monday, August 31, 2015

APPENDIX 8.1:

ON-SITE TRAFFIC NOISE CALCULATIONS

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Backyard No Wall
Road Name: Ironwood Av.
Lot No: 1

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	194.0 feet
Centerline Dist. to Observer:	204.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,861.0 feet
Road Elevation:	1,839.0 feet
Barrier Elevation:	1,861.0 feet
Road Grade:	0.0%

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,839.000		
Medium Trucks:	1,841.297		
Heavy Trucks:	1,847.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	204.255
Medium Trucks:	203.964
Heavy Trucks:	203.351

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.27	-1.20	-0.63	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.26	-1.20	-0.67	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.24	-1.20	-0.78	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:	64.2	62.3	60.5	54.5	63.1	63.7
Medium Trucks:	54.1	52.6	46.2	44.7	53.1	53.4
Heavy Trucks:	54.1	52.7	43.7	44.9	53.3	53.4
Vehicle Noise:	65.0	63.2	60.8	55.3	63.9	64.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.2	62.3	60.5	54.5	63.1	63.7
Medium Trucks:	54.1	52.6	46.2	44.7	53.1	53.4
Heavy Trucks:	54.1	52.7	43.7	44.9	53.3	53.4
Vehicle Noise:	65.0	63.2	60.8	55.3	63.9	64.5

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Backyard No Wall
Road Name: Ironwood Av.
Lot No: 5

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	196.0 feet
Centerline Dist. to Observer:	206.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,853.1 feet
Road Elevation:	1,838.5 feet
Barrier Elevation:	1,853.1 feet
Road Grade:	0.0%

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,838.500		
Medium Trucks:	1,840.797		
Heavy Trucks:	1,846.506	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	205.415
Medium Trucks:	205.208
Heavy Trucks:	204.806

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.31	-1.20	-0.78	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.30	-1.20	-0.82	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.29	-1.20	-0.94	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.2	62.3	60.5	54.4	63.1	63.7
Medium Trucks:	54.1	52.6	46.2	44.6	53.1	53.3
Heavy Trucks:	54.1	52.7	43.6	44.9	53.2	53.4
Vehicle Noise:	64.9	63.1	60.7	55.3	63.9	64.4

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.2	62.3	60.5	54.4	63.1	63.7
Medium Trucks:	54.1	52.6	46.2	44.6	53.1	53.3
Heavy Trucks:	54.1	52.7	43.6	44.9	53.2	53.4
Vehicle Noise:	64.9	63.1	60.7	55.3	63.9	64.4

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Backyard No Wall
Road Name: Ironwood Av.
Lot No: 12

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	196.0 feet
Centerline Dist. to Observer:	206.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,847.5 feet
Road Elevation:	1,834.4 feet
Barrier Elevation:	1,847.5 feet
Road Grade:	0.0%

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,834.400		
Medium Trucks:	1,836.697		
Heavy Trucks:	1,842.406	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	205.277
Medium Trucks:	205.087
Heavy Trucks:	204.726

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.30	-1.20	-0.81	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.30	-1.20	-0.85	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.29	-1.20	-0.98	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:	64.2	62.3	60.5	54.5	63.1	63.7
Medium Trucks:	54.1	52.6	46.2	44.7	53.1	53.3
Heavy Trucks:	54.1	52.7	43.6	44.9	53.2	53.4
Vehicle Noise:	64.9	63.1	60.7	55.3	63.9	64.4

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.2	62.3	60.5	54.5	63.1	63.7
Medium Trucks:	54.1	52.6	46.2	44.7	53.1	53.3
Heavy Trucks:	54.1	52.7	43.6	44.9	53.2	53.4
Vehicle Noise:	64.9	63.1	60.7	55.3	63.9	64.4

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Backyard No Wall
Road Name: Ironwood Av.
Lot No: 19

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	195.0 feet
Centerline Dist. to Observer:	205.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,849.5 feet
Road Elevation:	1,835.0 feet
Barrier Elevation:	1,849.5 feet
Road Grade:	0.0%

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,835.000		
Medium Trucks:	1,837.297		
Heavy Trucks:	1,843.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	204.402
Medium Trucks:	204.196
Heavy Trucks:	203.794

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.28	-1.20	-0.78	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.27	-1.20	-0.82	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.26	-1.20	-0.95	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:	64.2	62.3	60.5	54.5	63.1	63.7
Medium Trucks:	54.1	52.6	46.2	44.7	53.1	53.4
Heavy Trucks:	54.1	52.7	43.7	44.9	53.3	53.4
Vehicle Noise:	65.0	63.2	60.8	55.3	63.9	64.4

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.2	62.3	60.5	54.5	63.1	63.7
Medium Trucks:	54.1	52.6	46.2	44.7	53.1	53.4
Heavy Trucks:	54.1	52.7	43.7	44.9	53.3	53.4
Vehicle Noise:	65.0	63.2	60.8	55.3	63.9	64.4

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Backyard No Wall
Road Name: Ironwood Av.
Lot No: 20

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt): 30,000 vehicles
Peak Hour Percentage: 10%
Peak Hour Volume: 3,000 vehicles
Vehicle Speed: 55 mph
Near/Far Lane Distance: 50 feet

Site Data

Barrier Height: **0.0 feet**
Barrier Type (0-Wall, 1-Berm): 0.0
Centerline Dist. to Barrier: 199.0 feet
Centerline Dist. to Observer: 209.0 feet
Barrier Distance to Observer: 10.0 feet
Observer Height (Above Pad): 5.0 feet
Pad Elevation: 1,854.7 feet
Road Elevation: 1,835.0 feet
Barrier Elevation: 1,854.7 feet
Road Grade: 0.0%

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos: 1,835.000
Medium Trucks: 1,837.297
Heavy Trucks: 1,843.006 *Grade Adjustment:* 0.0

Lane Equivalent Distance (in feet)

Autos: 208.964
Medium Trucks: 208.705
Heavy Trucks: 208.170

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.42	-1.20	-0.68	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.41	-1.20	-0.73	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.40	-1.20	-0.84	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:	64.1	62.2	60.4	54.3	63.0	63.6
Medium Trucks:	54.0	52.4	46.1	44.5	53.0	53.2
Heavy Trucks:	54.0	52.6	43.5	44.8	53.1	53.2
Vehicle Noise:	64.8	63.0	60.6	55.2	63.8	64.3

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.1	62.2	60.4	54.3	63.0	63.6
Medium Trucks:	54.0	52.4	46.1	44.5	53.0	53.2
Heavy Trucks:	54.0	52.6	43.5	44.8	53.1	53.2
Vehicle Noise:	64.8	63.0	60.6	55.2	63.8	64.3

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Backyard No Wall
Road Name: Ironwood Av.
Lot No: 23

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt): 30,000 vehicles
Peak Hour Percentage: 10%
Peak Hour Volume: 3,000 vehicles
Vehicle Speed: 55 mph
Near/Far Lane Distance: 50 feet

Site Data

Barrier Height: **0.0 feet**
Barrier Type (0-Wall, 1-Berm): 0.0
Centerline Dist. to Barrier: 233.0 feet
Centerline Dist. to Observer: 243.0 feet
Barrier Distance to Observer: 10.0 feet
Observer Height (Above Pad): 5.0 feet
Pad Elevation: 1,863.5 feet
Road Elevation: 1,839.5 feet
Barrier Elevation: 1,863.5 feet
Road Grade: 0.0%

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos: 1,839.500
Medium Trucks: 1,841.797
Heavy Trucks: 1,847.506 *Grade Adjustment:* 0.0

Lane Equivalent Distance (in feet)

Autos: 243.444
Medium Trucks: 243.181
Heavy Trucks: 242.621

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-10.41	-1.20	-0.67	0.000	0.000
Medium Trucks:	79.85	-15.29	-10.41	-1.20	-0.71	0.000	0.000
Heavy Trucks:	83.81	-19.25	-10.39	-1.20	-0.81	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:	63.1	61.2	59.4	53.3	62.0	62.6
Medium Trucks:	53.0	51.4	45.1	43.5	52.0	52.2
Heavy Trucks:	53.0	51.6	42.5	43.8	52.1	52.3
Vehicle Noise:	63.8	62.0	59.6	54.2	62.8	63.3

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.1	61.2	59.4	53.3	62.0	62.6
Medium Trucks:	53.0	51.4	45.1	43.5	52.0	52.2
Heavy Trucks:	53.0	51.6	42.5	43.8	52.1	52.3
Vehicle Noise:	63.8	62.0	59.6	54.2	62.8	63.3

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Backyard No Wall
Road Name: Ironwood Av.
Lot No: 25

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt): 30,000 vehicles
Peak Hour Percentage: 10%
Peak Hour Volume: 3,000 vehicles
Vehicle Speed: 55 mph
Near/Far Lane Distance: 50 feet

Site Data

Barrier Height: **0.0 feet**
Barrier Type (0-Wall, 1-Berm): 0.0
Centerline Dist. to Barrier: 188.0 feet
Centerline Dist. to Observer: 198.0 feet
Barrier Distance to Observer: 10.0 feet
Observer Height (Above Pad): 5.0 feet
Pad Elevation: 1,867.4 feet
Road Elevation: 1,845.0 feet
Barrier Elevation: 1,867.4 feet
Road Grade: 0.0%

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos: 1,845.000
Medium Trucks: 1,847.297
Heavy Trucks: 1,853.006 *Grade Adjustment:* 0.0

Lane Equivalent Distance (in feet)

Autos: 198.317
Medium Trucks: 198.013
Heavy Trucks: 197.371

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.08	-1.20	-0.61	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.07	-1.20	-0.65	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.05	-1.20	-0.77	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:	64.4	62.5	60.7	54.7	63.3	63.9
Medium Trucks:	54.3	52.8	46.4	44.9	53.3	53.6
Heavy Trucks:	54.3	52.9	43.9	45.1	53.5	53.6
Vehicle Noise:	65.2	63.3	61.0	55.5	64.1	64.6

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.4	62.5	60.7	54.7	63.3	63.9
Medium Trucks:	54.3	52.8	46.4	44.9	53.3	53.6
Heavy Trucks:	54.3	52.9	43.9	45.1	53.5	53.6
Vehicle Noise:	65.2	63.3	61.0	55.5	64.1	64.6

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Backyard With Wall
Road Name: Ironwood Av.
Lot No: 27

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt): 30,000 vehicles
Peak Hour Percentage: 10%
Peak Hour Volume: 3,000 vehicles
Vehicle Speed: 55 mph
Near/Far Lane Distance: 50 feet

Site Data

Barrier Height: **4.0 feet**
Barrier Type (0-Wall, 1-Berm): 0.0
Centerline Dist. to Barrier: 136.0 feet
Centerline Dist. to Observer: 146.0 feet
Barrier Distance to Observer: 10.0 feet
Observer Height (Above Pad): 5.0 feet
Pad Elevation: 1,871.6 feet
Road Elevation: 1,852.8 feet
Barrier Elevation: 1,871.6 feet
Road Grade: 0.0%

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos: 1,852.800
Medium Trucks: 1,855.097
Heavy Trucks: 1,860.806 *Grade Adjustment:* 0.0

Lane Equivalent Distance (in feet)

Autos: 145.663
Medium Trucks: 145.295
Heavy Trucks: 144.548

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-7.07	-1.20	0.02	-5.200	-8.200
Medium Trucks:	79.85	-15.29	-7.05	-1.20	0.01	-5.100	-8.100
Heavy Trucks:	83.81	-19.25	-7.02	-1.20	0.00	-4.900	-7.900

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.4	64.5	62.7	56.7	65.3	65.9
Medium Trucks:	56.3	54.8	48.4	46.9	55.4	55.6
Heavy Trucks:	56.4	54.9	45.9	47.1	55.5	55.6
Vehicle Noise:	67.2	65.4	63.0	57.5	66.1	66.7

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	61.2	59.3	57.5	51.5	60.1	60.7
Medium Trucks:	51.2	49.7	43.3	41.8	50.3	50.5
Heavy Trucks:	51.5	50.0	41.0	42.2	50.6	50.7
Vehicle Noise:	62.0	60.2	57.8	52.4	61.0	61.5

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Backyard With Wall
Road Name: Ironwood Av.
Lot No: 30

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**4.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	129.0 feet
Centerline Dist. to Observer:	139.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,877.5 feet
Road Elevation:	1,856.6 feet
Barrier Elevation:	1,877.5 feet
Road Grade:	0.0%

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,856.600		
Medium Trucks:	1,858.897		
Heavy Trucks:	1,864.606	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	139.031
Medium Trucks:	138.607
Heavy Trucks:	137.727

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-6.77	-1.20	*0.04*	-5.400	-8.400
Medium Trucks:	79.85	-15.29	-6.75	-1.20	*0.02*	-5.200	-8.200
Heavy Trucks:	83.81	-19.25	-6.70	-1.20	*0.00*	-4.900	-7.900

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.7	64.8	63.0	57.0	65.6	66.2
Medium Trucks:	56.6	55.1	48.7	47.2	55.7	55.9
Heavy Trucks:	56.7	55.2	46.2	47.5	55.8	55.9
Vehicle Noise:	67.5	65.7	63.3	57.8	66.4	67.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	61.3	59.4	57.6	51.6	60.2	60.8
Medium Trucks:	51.4	49.9	43.5	42.0	50.5	50.7
Heavy Trucks:	51.8	50.3	41.3	42.6	50.9	51.0
Vehicle Noise:	62.2	60.3	57.9	52.5	61.1	61.6

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: First Floor With Wall
Road Name: Ironwood Av.
Lot No: 1

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	194.0 feet
Centerline Dist. to Observer:	214.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,861.0 feet
Road Elevation:	1,839.0 feet
Barrier Elevation:	1,861.0 feet
Road Grade:	0.0%

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,839.000		
Medium Trucks:	1,841.297		
Heavy Trucks:	1,847.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	214.243
Medium Trucks:	213.966
Heavy Trucks:	213.382

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.58	-1.20	*-0.16*	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.57	-1.20	*-0.19*	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.56	-1.20	*-0.27*	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:	63.9	62.0	60.2	54.2	62.8	63.4
Medium Trucks:	53.8	52.3	45.9	44.4	52.8	53.1
Heavy Trucks:	53.8	52.4	43.4	44.6	53.0	53.1
Vehicle Noise:	64.7	62.8	60.5	55.0	63.6	64.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.2	62.8	63.4
Medium Trucks:	53.8	52.3	45.9	44.4	52.8	53.1
Heavy Trucks:	53.8	52.4	43.4	44.6	53.0	53.1
Vehicle Noise:	64.7	62.8	60.5	55.0	63.6	64.1

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: First Floor With Wall
Road Name: Ironwood Av.
Lot No: 5

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	196.0 feet
Centerline Dist. to Observer:	216.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,853.1 feet
Road Elevation:	1,838.5 feet
Barrier Elevation:	1,853.1 feet
Road Grade:	0.0%

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,838.500		
Medium Trucks:	1,840.797		
Heavy Trucks:	1,846.506	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	215.442
Medium Trucks:	215.245
Heavy Trucks:	214.861

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.62	-1.20	*-0.27*	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.61	-1.20	*-0.30*	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.60	-1.20	*-0.41*	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:	63.9	62.0	60.2	54.1	62.8	63.4
Medium Trucks:	53.8	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.8	52.3	43.3	44.6	52.9	53.0
Vehicle Noise:	64.6	62.8	60.4	55.0	63.6	64.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.1	62.8	63.4
Medium Trucks:	53.8	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.8	52.3	43.3	44.6	52.9	53.0
Vehicle Noise:	64.6	62.8	60.4	55.0	63.6	64.1

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: First Floor With Wall
Road Name: Ironwood Av.
Lot No: 12

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	196.0 feet
Centerline Dist. to Observer:	216.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,847.5 feet
Road Elevation:	1,834.4 feet
Barrier Elevation:	1,847.5 feet
Road Grade:	0.0%

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,834.400		
Medium Trucks:	1,836.697		
Heavy Trucks:	1,842.406	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	215.310
Medium Trucks:	215.130
Heavy Trucks:	214.786

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.61	-1.20	*-0.29*	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.61	-1.20	*-0.33*	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.60	-1.20	*-0.44*	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:	63.9	62.0	60.2	54.1	62.8	63.4
Medium Trucks:	53.8	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.8	52.3	43.3	44.6	52.9	53.0
Vehicle Noise:	64.6	62.8	60.4	55.0	63.6	64.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.1	62.8	63.4
Medium Trucks:	53.8	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.8	52.3	43.3	44.6	52.9	53.0
Vehicle Noise:	64.6	62.8	60.4	55.0	63.6	64.1

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: First Floor With Wall
Road Name: Ironwood Av.
Lot No: 19

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	195.0 feet
Centerline Dist. to Observer:	215.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,849.5 feet
Road Elevation:	1,835.0 feet
Barrier Elevation:	1,849.5 feet
Road Grade:	0.0%

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,835.000		
Medium Trucks:	1,837.297		
Heavy Trucks:	1,843.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	214.430
Medium Trucks:	214.233
Heavy Trucks:	213.851

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.59	-1.20	-0.27	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.58	-1.20	-0.30	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.57	-1.20	-0.41	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:	63.9	62.0	60.2	54.2	62.8	63.4
Medium Trucks:	53.8	52.3	45.9	44.4	52.8	53.1
Heavy Trucks:	53.8	52.4	43.3	44.6	52.9	53.1
Vehicle Noise:	64.7	62.8	60.5	55.0	63.6	64.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.2	62.8	63.4
Medium Trucks:	53.8	52.3	45.9	44.4	52.8	53.1
Heavy Trucks:	53.8	52.4	43.3	44.6	52.9	53.1
Vehicle Noise:	64.7	62.8	60.5	55.0	63.6	64.1

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: First Floor With Wall
Road Name: Ironwood Av.
Lot No: 20

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	199.0 feet
Centerline Dist. to Observer:	219.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,854.7 feet
Road Elevation:	1,835.0 feet
Barrier Elevation:	1,854.7 feet
Road Grade:	0.0%

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,835.000		
Medium Trucks:	1,837.297		
Heavy Trucks:	1,843.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	218.966
Medium Trucks:	218.719
Heavy Trucks:	218.208

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.72	-1.20	-0.20	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.72	-1.20	-0.23	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.70	-1.20	-0.32	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:	63.8	61.9	60.1	54.0	62.7	63.3
Medium Trucks:	53.6	52.1	45.8	44.2	52.7	52.9
Heavy Trucks:	53.7	52.2	43.2	44.5	52.8	52.9
Vehicle Noise:	64.5	62.7	60.3	54.9	63.5	64.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.8	61.9	60.1	54.0	62.7	63.3
Medium Trucks:	53.6	52.1	45.8	44.2	52.7	52.9
Heavy Trucks:	53.7	52.2	43.2	44.5	52.8	52.9
Vehicle Noise:	64.5	62.7	60.3	54.9	63.5	64.0

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: First Floor With Wall
Road Name: Ironwood Av.
Lot No: 23

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	233.0 feet
Centerline Dist. to Observer:	253.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,863.5 feet
Road Elevation:	1,839.5 feet
Barrier Elevation:	1,863.5 feet
Road Grade:	0.0%

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,839.500		
Medium Trucks:	1,841.797		
Heavy Trucks:	1,847.506	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	253.427
Medium Trucks:	253.174
Heavy Trucks:	252.636

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-10.68	-1.20	-0.19	0.000	0.000
Medium Trucks:	79.85	-15.29	-10.67	-1.20	-0.21	0.000	0.000
Heavy Trucks:	83.81	-19.25	-10.66	-1.20	-0.29	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:	62.8	60.9	59.1	53.1	61.7	62.3
Medium Trucks:	52.7	51.2	44.8	43.3	51.7	52.0
Heavy Trucks:	52.7	51.3	42.3	43.5	51.9	52.0
Vehicle Noise:	63.6	61.7	59.4	53.9	62.5	63.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.8	60.9	59.1	53.1	61.7	62.3
Medium Trucks:	52.7	51.2	44.8	43.3	51.7	52.0
Heavy Trucks:	52.7	51.3	42.3	43.5	51.9	52.0
Vehicle Noise:	63.6	61.7	59.4	53.9	62.5	63.0

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: First Floor With Wall
Road Name: Ironwood Av.
Lot No: 25

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	188.0 feet
Centerline Dist. to Observer:	208.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,867.4 feet
Road Elevation:	1,845.0 feet
Barrier Elevation:	1,867.4 feet
Road Grade:	0.0%

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,845.000		
Medium Trucks:	1,847.297		
Heavy Trucks:	1,853.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	208.302
Medium Trucks:	208.012
Heavy Trucks:	207.401

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.40	-1.20	-0.15	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.39	-1.20	-0.17	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.37	-1.20	-0.26	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:	64.1	62.2	60.4	54.4	63.0	63.6
Medium Trucks:	54.0	52.5	46.1	44.6	53.0	53.3
Heavy Trucks:	54.0	52.6	43.5	44.8	53.1	53.3
Vehicle Noise:	64.9	63.0	60.7	55.2	63.8	64.3

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.1	62.2	60.4	54.4	63.0	63.6
Medium Trucks:	54.0	52.5	46.1	44.6	53.0	53.3
Heavy Trucks:	54.0	52.6	43.5	44.8	53.1	53.3
Vehicle Noise:	64.9	63.0	60.7	55.2	63.8	64.3

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: First Floor With Wall
Road Name: Ironwood Av.
Lot No: 27

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**4.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	136.0 feet
Centerline Dist. to Observer:	156.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,871.6 feet
Road Elevation:	1,852.8 feet
Barrier Elevation:	1,871.6 feet
Road Grade:	0.0%

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,852.800		
Medium Trucks:	1,855.097		
Heavy Trucks:	1,860.806	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	155.638
Medium Trucks:	155.271
Heavy Trucks:	154.524

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	72.73	1.95	-7.50	-1.20	*0.12*	-6.160	-9.160
Medium Trucks:	79.85	-15.29	-7.49	-1.20	*0.08*	-5.800	-8.800
Heavy Trucks:	83.81	-19.25	-7.45	-1.20	*0.03*	-5.300	-8.300

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	66.0	64.1	62.3	56.3	64.9	65.5
Medium Trucks:	55.9	54.4	48.0	46.5	54.9	55.2
Heavy Trucks:	55.9	54.5	45.5	46.7	55.1	55.2
Vehicle Noise:	66.8	64.9	62.6	57.1	65.7	66.2

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	59.8	57.9	56.1	50.1	58.7	59.3
Medium Trucks:	50.1	48.6	42.2	40.7	49.1	49.4
Heavy Trucks:	50.6	49.2	40.2	41.4	49.8	49.9
Vehicle Noise:	60.7	58.9	56.4	51.1	59.6	60.2

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: First Floor With Wall
Road Name: Ironwood Av.
Lot No: 30

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**4.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	129.0 feet
Centerline Dist. to Observer:	149.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,877.5 feet
Road Elevation:	1,856.6 feet
Barrier Elevation:	1,877.5 feet
Road Grade:	0.0%

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,856.600		
Medium Trucks:	1,858.897		
Heavy Trucks:	1,864.606	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	149.006
Medium Trucks:	148.582
Heavy Trucks:	147.702

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	72.73	1.95	-7.22	-1.20	*0.17*	-6.560	-9.560
Medium Trucks:	79.85	-15.29	-7.20	-1.20	*0.13*	-6.240	-9.240
Heavy Trucks:	83.81	-19.25	-7.16	-1.20	*0.05*	-5.500	-8.500

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	66.3	64.4	62.6	56.5	65.2	65.8
Medium Trucks:	56.2	54.7	48.3	46.8	55.2	55.4
Heavy Trucks:	56.2	54.8	45.8	47.0	55.4	55.5
Vehicle Noise:	67.0	65.2	62.8	57.4	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:	59.7	57.8	56.0	50.0	58.6	59.2
Medium Trucks:	49.9	48.4	42.1	40.5	49.0	49.2
Heavy Trucks:	50.7	49.3	40.3	41.5	49.9	50.0
Vehicle Noise:	60.6	58.8	56.3	51.0	59.5	60.1

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Second Floor With Wall
Road Name: Ironwood Av.
Lot No: 1

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	194.0 feet
Centerline Dist. to Observer:	214.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	1,861.0 feet
Road Elevation:	1,839.0 feet
Barrier Elevation:	1,861.0 feet
Road Grade:	0.0%

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,839.000		
Medium Trucks:	1,841.297		
Heavy Trucks:	1,847.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	215.562
Medium Trucks:	215.190
Heavy Trucks:	214.370

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	72.73	1.95	-9.62	-1.20	*-2.59*	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.61	-1.20	*-2.71*	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.59	-1.20	*-3.03*	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:	63.9	62.0	60.2	54.1	62.8	63.4
Medium Trucks:	53.8	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.8	52.4	43.3	44.6	52.9	53.1
Vehicle Noise:	64.6	62.8	60.4	55.0	63.6	64.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	63.9	62.0	60.2	54.1	62.8	63.4
Medium Trucks:	53.8	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.8	52.4	43.3	44.6	52.9	53.1
Vehicle Noise:	64.6	62.8	60.4	55.0	63.6	64.1

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Second Floor With Wall
Road Name: Ironwood Av.
Lot No: 5

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	196.0 feet
Centerline Dist. to Observer:	216.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	1,853.1 feet
Road Elevation:	1,838.5 feet
Barrier Elevation:	1,853.1 feet
Road Grade:	0.0%

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,838.500		
Medium Trucks:	1,840.797		
Heavy Trucks:	1,846.506	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	216.446
Medium Trucks:	216.155
Heavy Trucks:	215.534

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	72.73	1.95	-9.65	-1.20	*-3.00*	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.64	-1.20	*-3.13*	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.62	-1.20	*-3.47*	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:	63.8	61.9	60.2	54.1	62.7	63.3
Medium Trucks:	53.7	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.7	52.3	43.3	44.5	52.9	53.0
Vehicle Noise:	64.6	62.8	60.4	55.0	63.5	64.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	63.8	61.9	60.2	54.1	62.7	63.3
Medium Trucks:	53.7	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.7	52.3	43.3	44.5	52.9	53.0
Vehicle Noise:	64.6	62.8	60.4	55.0	63.5	64.1

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Second Floor With Wall
Road Name: Ironwood Av.
Lot No: 12

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,000	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	196.0	feet
Centerline Dist. to Observer:	216.0	feet
Barrier Distance to Observer:	20.0	feet
Observer Height (Above Pad):	14.0	feet
Pad Elevation:	1,847.5	feet
Road Elevation:	1,834.4	feet
Barrier Elevation:	1,847.5	feet
Road Grade:	0.0%	

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,834.400		
Medium Trucks:	1,836.697		
Heavy Trucks:	1,842.406	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	216.253
Medium Trucks:	215.977
Heavy Trucks:	215.396

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	72.73	1.95	-9.64	-1.20	*-3.09*	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.63	-1.20	*-3.22*	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.62	-1.20	*-3.56*	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:	63.8	61.9	60.2	54.1	62.7	63.3
Medium Trucks:	53.7	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.8	52.3	43.3	44.5	52.9	53.0
Vehicle Noise:	64.6	62.8	60.4	55.0	63.5	64.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	63.8	61.9	60.2	54.1	62.7	63.3
Medium Trucks:	53.7	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.8	52.3	43.3	44.5	52.9	53.0
Vehicle Noise:	64.6	62.8	60.4	55.0	63.5	64.1

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Second Floor With Wall
Road Name: Ironwood Av.
Lot No: 19

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,000	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	195.0	feet
Centerline Dist. to Observer:	215.0	feet
Barrier Distance to Observer:	20.0	feet
Observer Height (Above Pad):	14.0	feet
Pad Elevation:	1,849.5	feet
Road Elevation:	1,835.0	feet
Barrier Elevation:	1,849.5	feet
Road Grade:	0.0%	

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,835.000		
Medium Trucks:	1,837.297		
Heavy Trucks:	1,843.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	215.435
Medium Trucks:	215.143
Heavy Trucks:	214.523

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	72.73	1.95	-9.62	-1.20	*-3.00*	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.61	-1.20	*-3.13*	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.59	-1.20	*-3.47*	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:	63.9	62.0	60.2	54.1	62.8	63.4
Medium Trucks:	53.8	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.8	52.4	43.3	44.6	52.9	53.1
Vehicle Noise:	64.6	62.8	60.4	55.0	63.6	64.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	63.9	62.0	60.2	54.1	62.8	63.4
Medium Trucks:	53.8	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.8	52.4	43.3	44.6	52.9	53.1
Vehicle Noise:	64.6	62.8	60.4	55.0	63.6	64.1

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Second Floor With Wall
Road Name: Ironwood Av.
Lot No: 20

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,000	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	199.0	feet
Centerline Dist. to Observer:	219.0	feet
Barrier Distance to Observer:	20.0	feet
Observer Height (Above Pad):	14.0	feet
Pad Elevation:	1,854.7	feet
Road Elevation:	1,835.0	feet
Barrier Elevation:	1,854.7	feet
Road Grade:	0.0%	

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,835.000		
Medium Trucks:	1,837.297		
Heavy Trucks:	1,843.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	220.163
Medium Trucks:	219.823
Heavy Trucks:	219.080

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	72.73	1.95	-9.76	-1.20	*-2.75*	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.75	-1.20	*-2.87*	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.73	-1.20	*-3.18*	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:	63.7	61.8	60.0	54.0	62.6	63.2
Medium Trucks:	53.6	52.1	45.7	44.2	52.7	52.9
Heavy Trucks:	53.6	52.2	43.2	44.4	52.8	52.9
Vehicle Noise:	64.5	62.7	60.3	54.8	63.4	64.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	63.7	61.8	60.0	54.0	62.6	63.2
Medium Trucks:	53.6	52.1	45.7	44.2	52.7	52.9
Heavy Trucks:	53.6	52.2	43.2	44.4	52.8	52.9
Vehicle Noise:	64.5	62.7	60.3	54.8	63.4	64.0

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Second Floor With Wall
Road Name: Ironwood Av.
Lot No: 23

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,000	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	233.0	feet
Centerline Dist. to Observer:	253.0	feet
Barrier Distance to Observer:	20.0	feet
Observer Height (Above Pad):	14.0	feet
Pad Elevation:	1,863.5	feet
Road Elevation:	1,839.5	feet
Barrier Elevation:	1,863.5	feet
Road Grade:	0.0%	

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,839.500		
Medium Trucks:	1,841.797		
Heavy Trucks:	1,847.506	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	254.613
Medium Trucks:	254.281
Heavy Trucks:	253.542

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	72.73	1.95	-10.71	-1.20	*-2.75*	0.000	0.000
Medium Trucks:	79.85	-15.29	-10.70	-1.20	*-2.85*	0.000	0.000
Heavy Trucks:	83.81	-19.25	-10.68	-1.20	*-3.12*	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:	62.8	60.9	59.1	53.0	61.7	62.3
Medium Trucks:	52.7	51.2	44.8	43.3	51.7	51.9
Heavy Trucks:	52.7	51.3	42.2	43.5	51.8	52.0
Vehicle Noise:	63.5	61.7	59.3	53.9	62.5	63.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	62.8	60.9	59.1	53.0	61.7	62.3
Medium Trucks:	52.7	51.2	44.8	43.3	51.7	51.9
Heavy Trucks:	52.7	51.3	42.2	43.5	51.8	52.0
Vehicle Noise:	63.5	61.7	59.3	53.9	62.5	63.0

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Second Floor With Wall
Road Name: Ironwood Av.
Lot No: 25

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,000	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	188.0	feet
Centerline Dist. to Observer:	208.0	feet
Barrier Distance to Observer:	20.0	feet
Observer Height (Above Pad):	14.0	feet
Pad Elevation:	1,867.4	feet
Road Elevation:	1,845.0	feet
Barrier Elevation:	1,867.4	feet
Road Grade:	0.0%	

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,845.000		
Medium Trucks:	1,847.297		
Heavy Trucks:	1,853.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	209.676
Medium Trucks:	209.289
Heavy Trucks:	208.435

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	72.73	1.95	-9.44	-1.20	*-2.53*	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.43	-1.20	*-2.65*	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.40	-1.20	*-2.97*	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:	64.0	62.1	60.4	54.3	62.9	63.5
Medium Trucks:	53.9	52.4	46.1	44.5	53.0	53.2
Heavy Trucks:	54.0	52.5	43.5	44.8	53.1	53.2
Vehicle Noise:	64.8	63.0	60.6	55.2	63.7	64.3

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	64.0	62.1	60.4	54.3	62.9	63.5
Medium Trucks:	53.9	52.4	46.1	44.5	53.0	53.2
Heavy Trucks:	54.0	52.5	43.5	44.8	53.1	53.2
Vehicle Noise:	64.8	63.0	60.6	55.2	63.7	64.3

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Second Floor With Wall
Road Name: Ironwood Av.
Lot No: 27

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,000	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**4.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	136.0	feet
Centerline Dist. to Observer:	156.0	feet
Barrier Distance to Observer:	20.0	feet
Observer Height (Above Pad):	14.0	feet
Pad Elevation:	1,871.6	feet
Road Elevation:	1,852.8	feet
Barrier Elevation:	1,871.6	feet
Road Grade:	0.0%	

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,852.800		
Medium Trucks:	1,855.097		
Heavy Trucks:	1,860.806	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	157.438
Medium Trucks:	156.976
Heavy Trucks:	155.967

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	72.73	1.95	-7.58	-1.20	*-0.83*	0.000	0.000
Medium Trucks:	79.85	-15.29	-7.56	-1.20	*-0.92*	0.000	0.000
Heavy Trucks:	83.81	-19.25	-7.51	-1.20	*-1.18*	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:	65.9	64.0	62.2	56.2	64.8	65.4
Medium Trucks:	55.8	54.3	47.9	46.4	54.9	55.1
Heavy Trucks:	55.9	54.4	45.4	46.6	55.0	55.1
Vehicle Noise:	66.7	64.9	62.5	57.0	65.6	66.2

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	65.9	64.0	62.2	56.2	64.8	65.4
Medium Trucks:	55.8	54.3	47.9	46.4	54.9	55.1
Heavy Trucks:	55.9	54.4	45.4	46.6	55.0	55.1
Vehicle Noise:	66.7	64.9	62.5	57.0	65.6	66.2

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Second Floor With Wall
Road Name: Ironwood Av.
Lot No: 30

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,000	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**4.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	129.0	feet
Centerline Dist. to Observer:	149.0	feet
Barrier Distance to Observer:	20.0	feet
Observer Height (Above Pad):	14.0	feet
Pad Elevation:	1,877.5	feet
Road Elevation:	1,856.6	feet
Barrier Elevation:	1,877.5	feet
Road Grade:	0.0%	

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%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,856.600		
Medium Trucks:	1,858.897		
Heavy Trucks:	1,864.606	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	150.977
Medium Trucks:	150.462
Heavy Trucks:	149.329

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	72.73	1.95	-7.30	-1.20	*-0.69*	0.000	0.000
Medium Trucks:	79.85	-15.29	-7.28	-1.20	*-0.78*	0.000	0.000
Heavy Trucks:	83.81	-19.25	-7.23	-1.20	*-1.03*	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:	66.2	64.3	62.5	56.5	65.1	65.7
Medium Trucks:	56.1	54.6	48.2	46.7	55.1	55.4
Heavy Trucks:	56.1	54.7	45.7	46.9	55.3	55.4
Vehicle Noise:	67.0	65.1	62.8	57.3	65.9	66.4

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	66.2	64.3	62.5	56.5	65.1	65.7
Medium Trucks:	56.1	54.6	48.2	46.7	55.1	55.4
Heavy Trucks:	56.1	54.7	45.7	46.9	55.3	55.4
Vehicle Noise:	67.0	65.1	62.8	57.3	65.9	66.4

Thursday, August 27, 2015

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APPENDIX 10.1:

RCNM EQUIPMENT DATABASE

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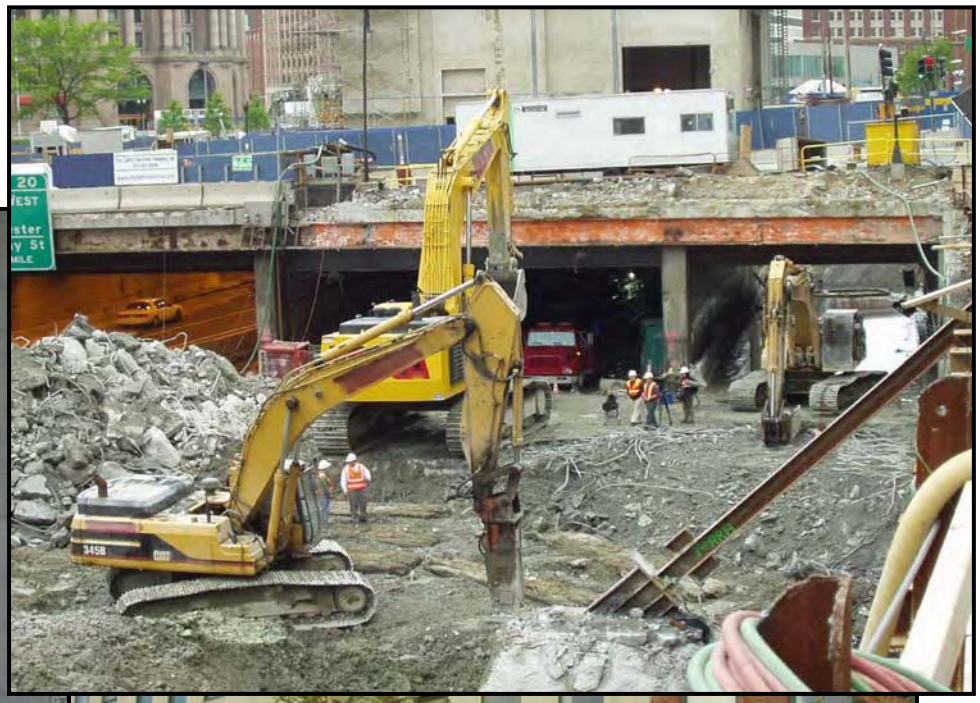
U.S. Department
of Transportation

**Federal Highway
Administration**

FHWA
Roadway Construction Noise Model
User's Guide

FHWA-HEP-05-054
DOT-VNTSC-FHWA-05-01

Final Report
January 2006



Prepared for
U.S. Department of Transportation
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Office of Natural and Human Environment
Washington, DC 20590

Prepared by
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Table 1. CA/T equipment noise emissions and acoustical usage factors database.

CA/T Noise Emission Reference Levels and Usage Factors					
filename: EQUIPLST.xls					
revised: 7/26/05		Acoustical	Spec 721.560	Actual Measured	No. of Actual
	Impact	Use Factor	Lmax @ 50ft	Lmax @ 50ft	Data Samples
Equipment Description	Device ?	(%)	(dBA, slow)	(dBA, slow)	(Count)
				(samples averaged)	
All Other Equipment > 5 HP	No	50	85	-- N/A --	0
Auger Drill Rig	No	20	85	84	36
Backhoe	No	40	80	78	372
Bar Bender	No	20	80	-- N/A --	0
Blasting	Yes	-- N/A --	94	-- N/A --	0
Boring Jack Power Unit	No	50	80	83	1
Chain Saw	No	20	85	84	46
Clam Shovel (dropping)	Yes	20	93	87	4
Compactor (ground)	No	20	80	83	57
Compressor (air)	No	40	80	78	18
Concrete Batch Plant	No	15	83	-- N/A --	0
Concrete Mixer Truck	No	40	85	79	40
Concrete Pump Truck	No	20	82	81	30
Concrete Saw	No	20	90	90	55
Crane	No	16	85	81	405
Dozer	No	40	85	82	55
Drill Rig Truck	No	20	84	79	22
Drum Mixer	No	50	80	80	1
Dump Truck	No	40	84	76	31
Excavator	No	40	85	81	170
Flat Bed Truck	No	40	84	74	4
Front End Loader	No	40	80	79	96
Generator	No	50	82	81	19
Generator (<25KVA, VMS signs)	No	50	70	73	74
Gradall	No	40	85	83	70
Grader	No	40	85	-- N/A --	0
Grapple (on backhoe)	No	40	85	87	1
Horizontal Boring Hydr. Jack	No	25	80	82	6
Hydra Break Ram	Yes	10	90	-- N/A --	0
Impact Pile Driver	Yes	20	95	101	11
Jackhammer	Yes	20	85	89	133
Man Lift	No	20	85	75	23
Mounted Impact Hammer (hoe ram)	Yes	20	90	90	212
Pavement Scarafier	No	20	85	90	2
Paver	No	50	85	77	9
Pickup Truck	No	40	55	75	1
Pneumatic Tools	No	50	85	85	90
Pumps	No	50	77	81	17
Refrigerator Unit	No	100	82	73	3
Rivit Buster/chipping gun	Yes	20	85	79	19
Rock Drill	No	20	85	81	3
Roller	No	20	85	80	16
Sand Blasting (Single Nozzle)	No	20	85	96	9
Scraper	No	40	85	84	12
Shears (on backhoe)	No	40	85	96	5
Slurry Plant	No	100	78	78	1
Slurry Trenching Machine	No	50	82	80	75
Soil Mix Drill Rig	No	50	80	-- N/A --	0
Tractor	No	40	84	-- N/A --	0
Vacuum Excavator (Vac-truck)	No	40	85	85	149
Vacuum Street Sweeper	No	10	80	82	19
Ventilation Fan	No	100	85	79	13
Vibrating Hopper	No	50	85	87	1
Vibratory Concrete Mixer	No	20	80	80	1
Vibratory Pile Driver	No	20	95	101	44
Warning Horn	No	5	85	83	12
Welder / Torch	No	40	73	74	5