Crestview Apartments

Draft Environmental Impact Report (DEIR)

Appendix H – Noise Impact Analysis

Crestview Apartments

NOISE IMPACT ANALYSIS

CITY OF RIVERSIDE

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LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
ANSI	American National Standards Institute
Calveno	California Vehicle Noise
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dBA	A-weighted decibels
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
I-215	Interstate 215
INCE	Institute of Noise Control Engineering
L_{eq}	Equivalent continuous (average) sound level
L_{min}	Minimum level measured over the time interval
mph	Miles per hour
PPV	Peak Particle Velocity
Project	Crestview Apartments
REMEL	Reference Energy Mean Emission Level
RMS	Root-mean-square
TNM	Traffic Noise Model
CA-60	California Route 60
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 Crestview Apartments development ("Project"). The Project site is located at the northwest corner of Sycamore Canyon Boulevard and Central Avenue in the City of Riverside. The total development is proposed to consist of up to 237 multifamily residential dwelling units. This study has been prepared to satisfy applicable City of Riverside standards and thresholds of significance based on guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1)

The results of this Crestview Apartments Noise Impact Analysis are summarized below based on the significance criteria in Section 4 of this report. Table ES-1 shows the findings of significance for each potential noise and/or vibration impact under CEQA before and after any required mitigation measures.

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS

Analysis	Report Section	Significance Findings	
		Unmitigated	Mitigated
Off-Site Traffic Noise	7	*Less Than Significant*	-
On-Site Traffic Noise	8	*Less Than Significant*	-
Operational Noise	10	*Less Than Significant*	-
Construction Noise	11	*Less Than Significant*	-
Construction Vibration		*Less Than Significant*	-

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1 INTRODUCTION

This noise analysis has been completed to determine the noise impacts associated with the development of the proposed Crestview Apartments ("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 transportation noise analysis, and evaluates the future exterior noise environment. In addition, this study includes an analysis of the potential Project-related long-term operational noise and short-term construction noise and vibration impacts.

1.1 SITE LOCATION

The proposed Crestview Apartments Project is located at the northwest corner of Sycamore Canyon Boulevard and Central Avenue in the City of Riverside, as shown on Exhibit 1-A. The proposed Project is located approximately 237 feet southwest of I-215 / CA-60 just east of the Quail Run open space area. The closest airport to the Project site is March Air Reserve Base (MARB) which is located approximately 4.7 miles southeast of the Project site. The Project site is currently vacant. The closest existing single-family residential uses are located west and south of the Project site.

1.2 PROJECT DESCRIPTION

The total development is proposed to consist of up to 237 multifamily residential dwelling units, as shown on Exhibit 1-B. The proposed residential development is considered a noise-sensitive receiving land use and is not expected to include any specific type of operational noise levels beyond the typical noise sources associated with residential land use in the Project study area. However, to present a conservative approach, on-site Project-only operational noise sources are analyzed in this noise study and are expected to include: roof-top air conditioning units, trash enclosure activity, dog park activity, pool/spa activity and parking lot vehicle movements.

EXHIBIT 1-A: LOCATION MAP

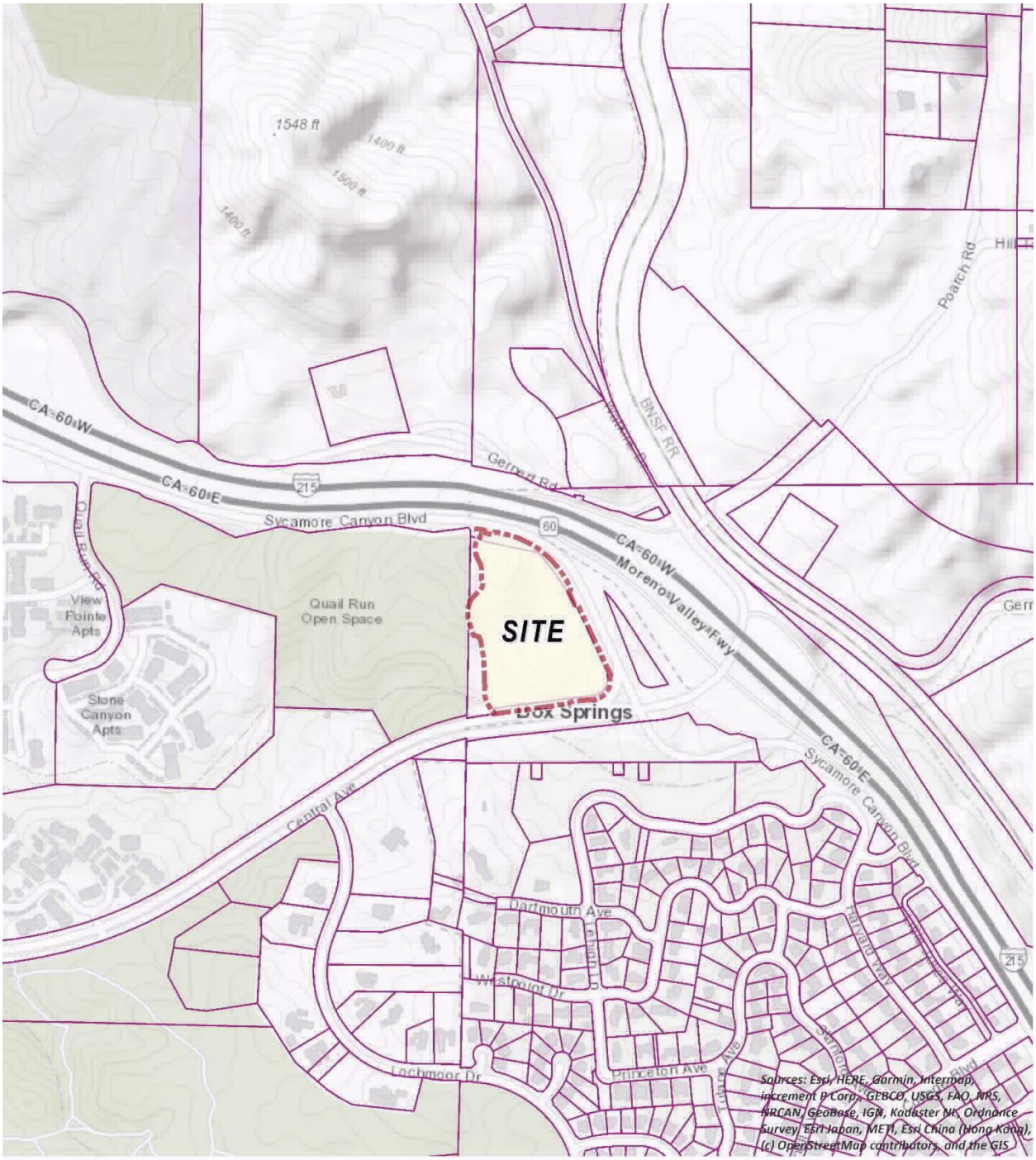
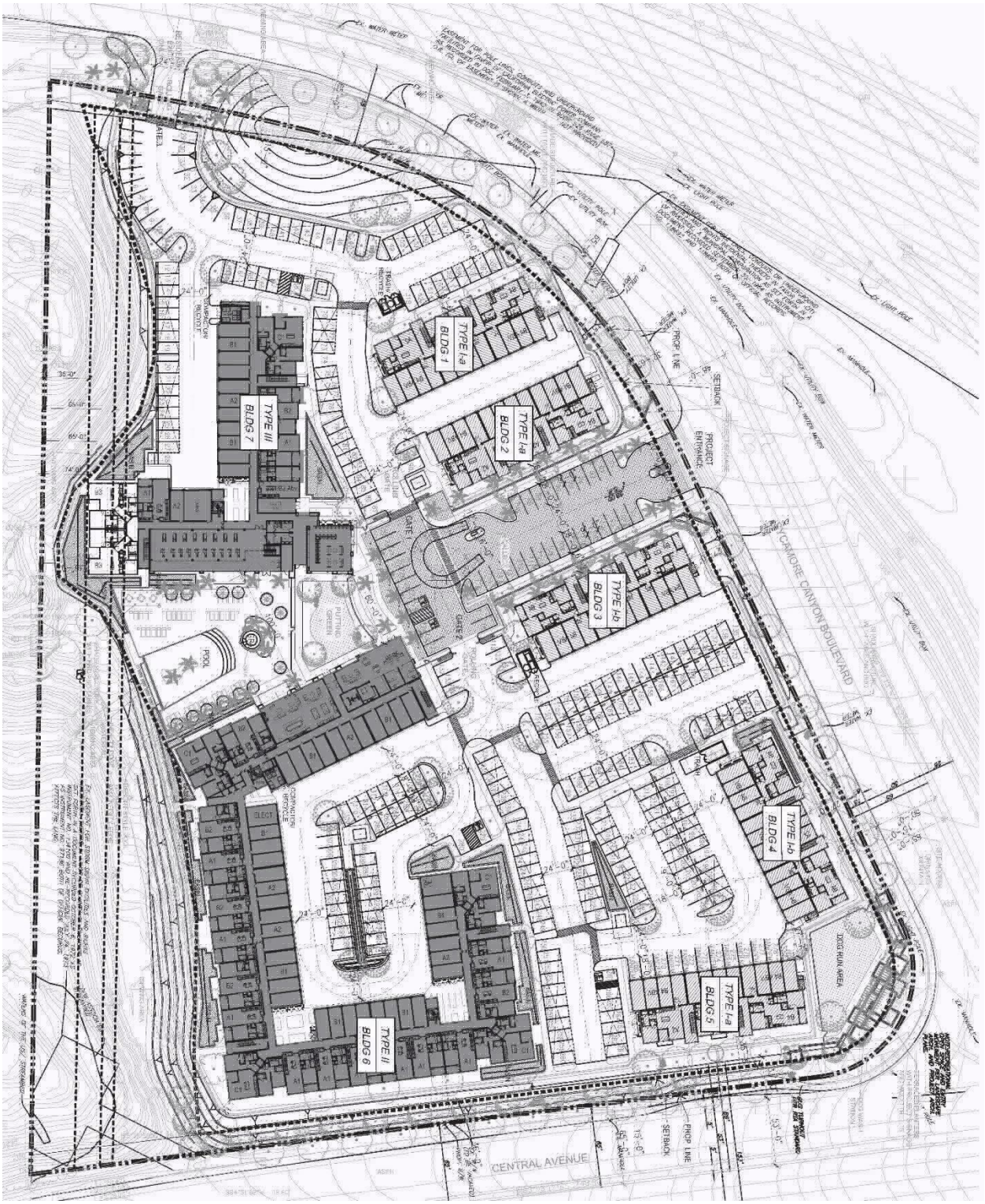


EXHIBIT 1-B: SITE PLAN



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2 FUNDAMENTALS

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

EXHIBIT 2-A: TYPICAL NOISE LEVELS

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

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

2.1 RANGE OF NOISE

Since the range of intensities that the human ear can detect is so large, the scale frequently used to measure intensity is a scale based on multiples of 10, the logarithmic scale. The scale for measuring intensity is the decibel scale. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud. (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 used figure is the equivalent level (L_{eq}). Equivalent sound levels are not measured directly but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period (typically one hour) and is commonly used to describe the "average" noise levels within the environment. To describe the time-varying character of environmental noise, the statistical or percentile noise descriptors L_{50}, L_{25}, L_8 and L_2, are commonly used. The percentile noise descriptors are the noise levels equaled or exceeded during 50 percent, 25 percent, 8 percent and 2 percent of a stated time. Sound levels associated with the L_2 and L_8 typically describe transient or short-term events, while levels associated with the L_{50} describe the steady state (or median) noise conditions. The relies on the percentile noise levels to describe the stationary source noise level limits. While the L_{50} describes the noise levels occurring 50 percent of the time, the L_{eq} accounts for the total energy (average) observed for the entire hour.

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

2.3 SOUND PROPAGATION

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

2.3.1 GEOMETRIC SPREADING

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

as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source. (2)

2.3.2 GROUND ABSORPTION

The propagation path of noise from a highway to a receiver 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 receiver, 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 receiver 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. (4)

2.3.3 ATMOSPHERIC EFFECTS

Receivers 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)

2.3.4 SHIELDING

A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. 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 residents. 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 Federal Highway Administration (FHWA) does not consider the planting of vegetation to be a noise abatement measure (4).

2.4 NOISE CONTROL

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

2.5 NOISE BARRIER ATTENUATION

Effective noise barriers can reduce noise levels by up to 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 receiver. 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).

2.6 LAND USE COMPATIBILITY WITH NOISE

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

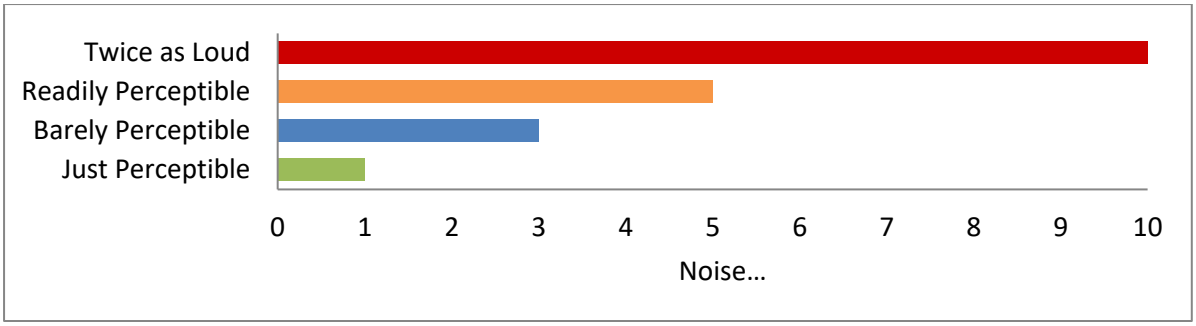
2.7 COMMUNITY RESPONSE TO NOISE

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

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

Approximately ten percent of the population has a very low tolerance for noise and will object to any noise not of their making. Consequently, even in the quietest environment, some complaints will occur. 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 can be expected to exhibit the following responses to changes in noise levels as shown on Exhibit 2-B. 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



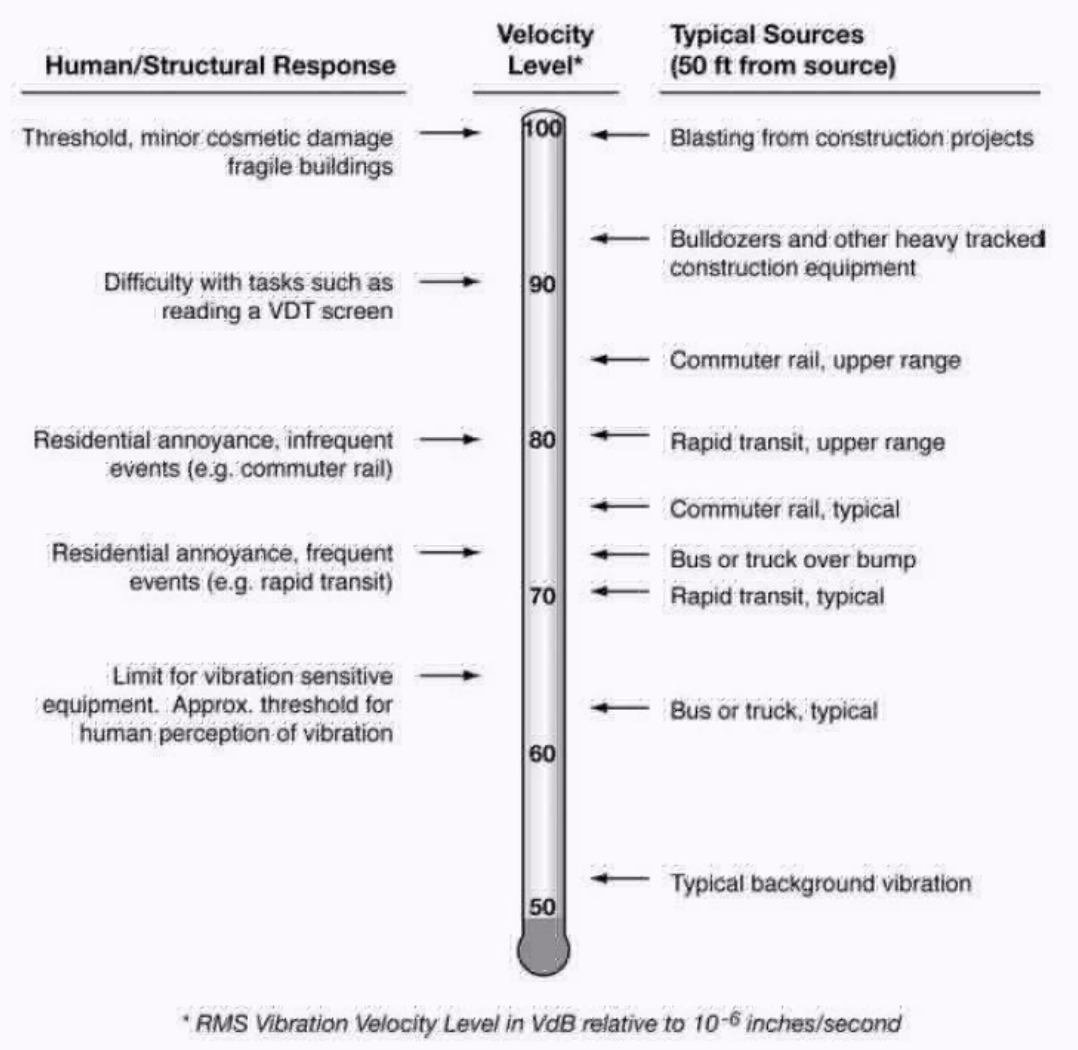
2.8 VIBRATION

Per the Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual* (7), vibration is the periodic oscillation of a medium or object. 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 and/or activities

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



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

2.9 BLASTING

The intensity of the noise and vibration impacts associated with rock blasting depends on location, size, material, shape of the rock, and the methods used to crack it. While a blasting contractor can design the blasts to stay below a given vibration level that could cause damage to nearby structures, it is difficult to design blasts that produce noise levels which are not perceptible to receivers near the blast site. (8) The noise produced by blasting activities is referred to as air overpressure, or an "airblast," which is generated when explosive energy in the form of gases escape from the detonating blast holes. Much like a point source, airblasts radiate outward in a spherical pattern and attenuate with each doubling of distance from the blast location, depending on the design of the blast and amount of containment.

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

2.9.1 BLASTING NOISE LEVELS

Air overpressure, or "airblast," levels generated by blasting can travel up to 1,100 feet per second, depending on the size of the blast, distance from the blast, and amount of charge confinement. (9) To determine potential airblast levels (dB) from a blast, the cubed-root scaled distance (SD_3) is used based on the planned maximum charge weight of the blast, and distance to the receiver location being analyzed. The following equation is provided in the Blasters' Handbook to calculate the cubed root scaled distance:

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

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

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

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

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

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

2.9.2 BLASTING VIBRATION LEVELS

Vibration levels generated by a blast can travel up to 20,000 feet per second, depending on the size of the blast, travel pathways (e.g., ground discontinuities), and site characteristics. (9) To determine potential vibration levels (PPV) from a blast, the square-root scaled distance (SD_2) is used based on the planned maximum charge weight of the blast, and distance to the receiver location being analyzed. The following equation is provided in the Blasters' Handbook to calculate the square-root scaled distance:

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

Where "R" is equal to the distance to the receiver location (e.g., residential homes), and "W" is equal to the maximum charge weight detonated within any 8-millisecond period per Blasters' Handbook guidelines. With known square-root scaled distances for each blast, the anticipated PPV levels can be calculated at the receiver location. The following equation is provided in the Blaster's Handbook for calculating vibration levels:

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

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

3 REGULATORY SETTING

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

3.1 STATE OF CALIFORNIA NOISE REQUIREMENTS

The State of California regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise standards, and provides guidance for local land use compatibility. State law requires that each county and city adopt a General Plan that includes a Noise Element which is to be prepared per guidelines adopted by the Governor's Office of Planning and Research. (10) 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 RIVERSIDE GENERAL PLAN

The City of Riverside has adopted a Noise Element of the General Plan to control and abate environmental noise, and to protect the citizens of the City of Riverside from excessive exposure to noise. In addition, the Noise Element identifies several polices to minimize the impacts of excessive noise levels throughout the community and establishes noise level compatibility criteria for different land uses.

LAND USE COMPATIBILITY

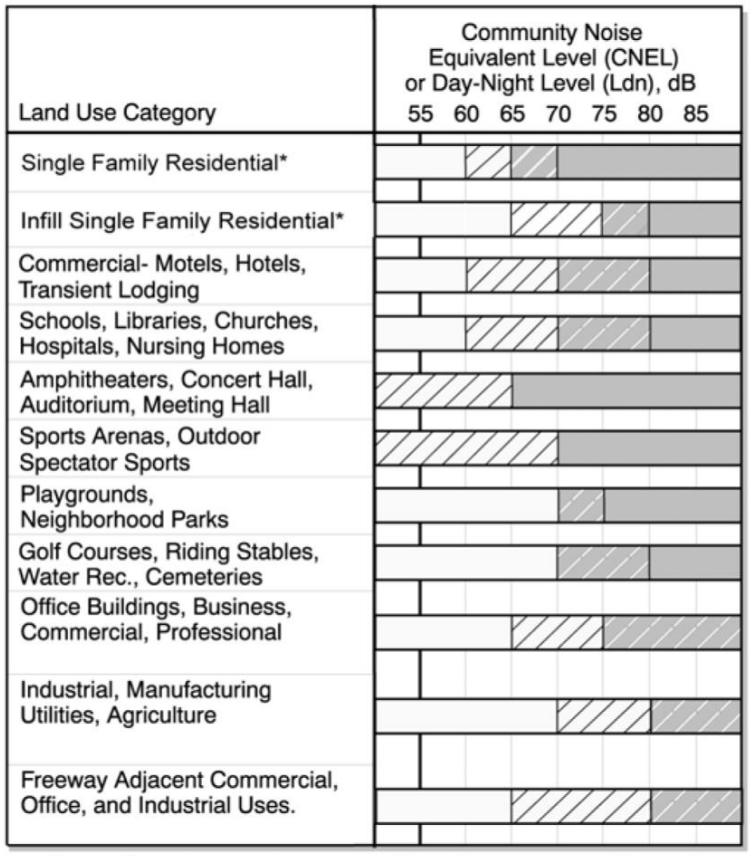
The *Noise/Land Use Noise Compatibility Criteria* (Figure N-10) in the City of Riverside General Plan Noise Element provides guidelines to evaluate the land use compatibility as shown on Exhibit 3-A. Figure N-10 provides the City with a planning tool to gauge the compatibility of land uses relative to existing and future exterior noise levels. The *Noise/Land Use Noise Compatibility Criteria* describes categories of compatibility and not specific noise standards. Based on feedback from the City of Riverside, to conservatively estimate the compatibility of the residential use, the Crestview Apartments is considered as infill single-family residential land use. According to the noise/land use categories of compatibility, infill single-family residential uses are considered *normally acceptable* with unmitigated exterior noise levels below 65 dBA CNEL, *conditionally acceptable* with noise levels below 75 dBA CNEL, *normally unacceptable* with noise levels below 75 dBA CNEL, and *conditionally unacceptable* with noise levels above 80 dBA CNEL.

3.4 CITY OF RIVERSIDE SOUND LEVEL LIMITS

To control unnecessary, excessive and/or annoying noise, the City of Riverside has adopted exterior and interior sound level limits in the Noise Control section (Title 7) of the Municipal Code. Title 7 outlines exterior and interior noise level standards for affected land uses. Title 7 relies on the use of percentile noise descriptors to ensure that the duration of the noise source is fully considered. However, due to the relatively constant intensity of the Project noise activities, the L_{50} or average L_{eq} noise level metrics best describe the Project related operational noise source activities.

The L_{eq} noise level metric accounts for noise fluctuations over time by averaging the louder and quieter events and giving more weight to the louder events. In addition, due to the mathematical relationship between the median (L_{50}) and the mean (L_{eq}), the L_{eq} will always be larger than or equal to the $L_{50.}$ The more variable the noise becomes, the larger the L_{eq} becomes in comparison to the L_{50}. Therefore, this noise study conservatively relies on the average L_{eq} sound level limits to describe the Project noise levels.

EXHIBIT 3-A: NOISE/LAND USE NOISE COMPATIBILITY CRITERIA



Nature of the noise environment where the CNEL or Ldn level is:

Below 55 dB
Relatively quiet suburban or urban areas, no arterial streets within 1 block, no freeways within 1/4 mile.

55-65 dB
Most somewhat noisy urban areas, near but not directly adjacent to high volumes of traffic.

65-75 dB
Very noisy urban areas near arterials, freeways or airports.

75+ dB
Extremely noisy urban areas adjacent to freeways or under airport traffic patterns. Hearing damage with constant exposure outdoors.

Normally Acceptable

Specific land use is satifactory, based on the assumption that any building is of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable

New construction or development should be undertaken only after a detailed analysis of noise reduction requirements is made and needed noise insulation features included in design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.

Normally Unacceptable

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

Conditionally Unacceptable

New construction or development should generally not be undertaken, unless it can be demonstrated that noise reduction requirements can be employed to reduce noise impacts to an acceptable level. If new construction or development does proceed, a detailed analysis of noise reduction requirements must be made and needed noise insulation features included in the design.

The Community Noise Equivalent Level (CNEL) and Day-Night Noise Level (Ldn) are measures of the 24-hour noise environment. They represent the constant A-weighted noise level that would be measured if all the sound energy received over the day were averaged. In order to account for the greater sensitivity of people to noise at night, the CNEL weighting includes a 5-decibel penalty on noise between 7:00 p.m. and 10:00 p.m. and a 10-decibel penalty on noise between 10:00 p.m. and 7:00 a.m. of the next day. The Ldn includes only the 10-decibel weighting for late-night noise events. For practical purposes, the two measures are equivalent for typical urban noise environments.

* For properties located within airport influence areas, acceptable noise limits for single family residential uses are established by the Riverside County Airport Land Use Compatibility Plan.

SOURCE: STATE DEPARTMENT OF HEALTH, AS MODIFIED BY THE CITY OF RIVERSIDE

3.4.1 EXTERIOR NOISE STANDARDS

For noise-sensitive residential properties, Table 7.25.010A identifies exterior noise standards for the daytime (7:00 a.m. to 10:00 p.m.) hours of 55 dBA L_{50} and 45 dBA L_{50} during the nighttime (10:00 p.m. to 7:00 a.m.) hours as shown on Table 3-1.

TABLE 3-1: EXTERIOR NOISE STANDARDS

Land Use	Time Period	Exterior Noise Level Standards (dBA)[1]				
		L_{50} (30 mins)	L_{25} (15 mins)	L_8 (5 mins)	L_2 (1 min)	L_{max} (0 min)
Residential	Daytime	55	60	65	70	75
	Nighttime	45	50	55	60	65

[1] The percent noise level is the level exceeded "n" percent of the time during the measurement period. L_{50} is the noise level exceeded 50% of the time.
[2] City of Riverside Municipal Code, Title 7 Noise Control, Section 7.25.010 (A) (Appendix 3.1).
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

Section 7.25.010 (A) indicates that it is unlawful for any person to cause or allow the creation of any noise which exceeds the following:

1. The exterior noise standard of the applicable land use category up to 5 dBA for a cumulative period of 30 minutes in any hour (L_{50}); or
2. The exterior noise standard of the applicable land use category, plus 5 dBA, for a cumulative period of more than 15 minutes in any hour (L_{25}); or
3. The exterior noise standard of the applicable land use category, plus 10 dBA, for a cumulative period of more than 5 minutes in any hour (L_8); or
4. The exterior noise standard of the applicable land use category, plus 15 dBA, for a cumulative period of more than 1 minute in any hour (L_2).
5. The exterior noise standard for the applicable land use category, plus twenty decibels or the maximum measured ambient noise level, for any period of time (L_{max}).

In addition, Section 7.25.010 (B) indicates that if the existing ambient noise level already exceeds any of the exterior noise level limit categories, then the standard shall be increased in five decibel increments in each category as appropriate to encompass the ambient noise level.

According to Section 7.25.010 (C), if possible, the ambient noise level shall be measured at the same location along the property line with the alleged offending noise source inoperative. If for any reason the alleged offending noise source cannot be shut down, then the ambient noise must be estimated by performing a measurement in the same general area of the source but at a sufficient distance that the offending noise is inaudible. If the measurement location is on the boundary between two different districts, the noise shall be the arithmetic mean of the two districts. The City of Riverside Municipal Code Title 7 Noise Control section is included in Appendix 3.1.

3.4.2 INTERIOR NOISE STANDARD

To assess the interior noise levels for noise sensitive residential properties, Table 7.30.015 identifies interior noise standards for the daytime (7:00 a.m. to 10:00 p.m.) hours of 45 dBA L_8 and 35 dBA L_8 during the nighttime (10:00 p.m. to 7:00 a.m.) hours as shown on Table 3-2.

TABLE 3-2: INTERIOR SOUND LEVEL LIMITS

Land Use	Time Period	Interior NoiseStandard (dBA)[1]		
		L_8 (5 mins)	L_2 (1 min)	L_{max} (0 min)
Residential	Daytime	45	50	55
	Nighttime	35	40	45

[1] The percent noise level is the level exceeded "n" percent of the time during the measurement period. L_{50} is the noise level exceeded 50% of the time.
[2] City of Riverside Municipal Code, Title 7 Noise Control, Section 7.30.015 (A) (Appendix 3.1). "Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

Section 7.30.015 (A) indicates that no person shall operate or cause to be operated, any source of sound indoors which causes the noise level, when measured inside another dwelling unit, school or hospital, to exceed:

1. The interior noise standard for the applicable land category area, up to five decibels, for a cumulative period of more than five minutes in any (L_8); or
2. The interior noise standard for the applicable land use category, plus five decibels, for a cumulative period of more than one minute in any hour; (L_2); or
3. The interior noise standard for the applicable land use category, plus ten decibels or the maximum measured ambient noise level, for any period of time (L_{max}).

In addition, Section 7.25.015 (B) indicates that if the measured interior ambient noise level exceeds that permissible within the first two noise limit categories in this section, the allowable noise exposure standard shall be increased in five decibel increments in each category as appropriate to reflect the interior ambient noise level. In the event the interior ambient noise level exceeds the third noise limit category, the maximum allowable interior noise level under said category shall be increased to reflect the maximum interior ambient noise level.

According to Section 7.25.010 (C), the interior noise standard for various land use districts shall apply, unless otherwise specifically indicated, within structures located in designated zones with windows opened or closed as is typical of the season.

3.5 CONSTRUCTION NOISE STANDARDS

To control noise impacts associated with the construction of the proposed Project, the City of Riverside has established limits to the hours of operation. Section 7.35.020 (G) of the General Noise Regulations indicates that *noise sources associated with construction, repair, remodeling, or grading of any real property; provided a permit has been obtained from the City as required; and provided said activities do not take place between the hours of 7:00 p.m. and 7:00 a.m. on weekdays, between the hours of 5:00 p.m. and 8:00 a.m. on Saturdays, or at any time on Sunday or a federal holiday.* Therefore, Project construction noise levels are considered exempt from municipal regulation if activities occur within the hours specified Section 7.35.020 (G); provided a permit has been obtained from the City as required.

However, neither the City of Riverside General Plan nor Municipal Code establish numeric maximum acceptable construction source noise levels at potentially affected receivers. Therefore, a numerical construction threshold based on Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual* is used for analysis of daytime construction impacts. According to the FTA, local noise ordinances are typically not very useful in evaluating construction noise. They usually relate to nuisance and hours of allowed activity, and sometimes specify limits in terms of maximum levels, but are generally not practical for assessing the impact of a construction project. Project construction noise criteria should account for the existing noise environment, the absolute noise levels during construction activities, the duration of the construction, and the adjacent land use. Due to the lack of standardized construction noise thresholds, the FTA provides guidelines that can be considered reasonable criteria for construction noise assessment. The FTA considers a daytime exterior construction noise level of 80 dBA L_{eq} as a reasonable threshold for noise sensitive residential land use. (7 p. 179)

3.6 CONSTRUCTION VIBRATION STANDARDS

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. (7) The City of Riverside does not identify specific vibration level limits and instead will rely on the Federal Transit Administration (FTA) methodology for the purpose of analyzing vibration impacts from the proposed project. The FTA *Transit Noise and Vibration Impact Assessment Manual* general vibration assessment methodology provides guidelines for the maximum-acceptable infrequent event vibration criteria for different types of land uses. These guidelines allow for 80 VdB for daytime residential uses in buildings where people normally sleep. (7)

3.7 BLASTING STANDARDS

The blasting contractor is required to obtain blasting permit(s) from the State, and to notify Riverside County Sheriff's Department within 24 hours of planned blasting events. Air overpressure regulations are identified by the U.S. Bureau of Mines and the ISEE's Blasters' Handbook. (9)

3.7.1 BLASTING NOISE LIMITS

Based on Table 26.17 *Typical Air Overpressure Damage Criteria* of the Blasters' Handbook, an air overpressure of 133 dB is identified as a perception-based criteria level for blasting. As such, to present a conservative approach, the Project blasting-related vibration and airblast levels are based on the 133 dB criteria for airblasts identified by the ISEE and U.S. Bureau of Mines.

3.7.2 BLASTING VIBRATION LIMITS

Construction vibration is generally associated with pile driving and rock blasting. To analyze vibration impacts originating from the construction of the Crestview Apartments, vibration-generating rock blasting activities are appropriately evaluated against standards established under a City's Municipal Code, if such standards exist. However, the City of Riverside does not identify specific vibration level limits. Therefore, for analysis purposes, the Caltrans *Transportation and Construction Vibration Guidance Manual*, (8 p. 38) Table 19, vibration criteria is used in this noise study to assess potential temporary construction-related impacts at adjacent receiver locations. Since most of the buildings near the Project site can described as residential buildings, Caltrans guidance identifies a maximum acceptable transient peak-particle-velocity (PPV) vibration threshold of 0.5 inches per second (in/sec). Therefore, the 0.5 PPV (in/sec) vibration threshold is used to evaluate the potential blasting-related vibration levels experienced at the nearby residential homes.

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4 SIGNIFICANCE CRITERIA

The following significance criteria are based on guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1) For the purposes of this report, impacts would be potentially significant if the Project results in or causes:

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

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

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

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

4.1 CEQA GUIDELINES NOT FURTHER ANALYZED

The Project site is located within Airport Compatibility Zone E of the MARB/Inland Port AIA, however, the Riverside County Airport Land Use Commission (ALUC) determined that the proposed Project is consistent with 2014 March ALUCP. The ALUC determination is included in Appendix 4.1. As such, the Project site would not be exposed to excessive noise levels from airport operations, and therefore, impacts are considered *less than significant,* and no further noise analysis is conducted in relation to Guideline C.

4.2 NOISE-SENSITIVE RECEIVERS

Noise level increases resulting from the Project are evaluated based on the Appendix G CEQA Guidelines described above at the nearest sensitive receiver locations. Under CEQA, consideration must be given to the magnitude of the increase, the existing ambient noise levels, and the location of noise-sensitive receivers to determine if a noise level increase represents a significant adverse environmental impact. 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. Since neither the City of Riverside General Plan Noise Element or Municipal Code identify any noise level increase thresholds, the substantial noise level increase criteria are derived from the Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual.* To describe the amount to which a given noise

level increase is considered acceptable, the FTA criteria is used to evaluate the incremental noise level increase and establishes a method for comparing future project noise with existing ambient conditions under CEQA Significance Threshold A. The amount to which a given noise level increase is considered acceptable is reduced based on existing ambient noise conditions.

4.2 SIGNIFICANCE CRITERIA SUMMARY

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

TABLE 4-1: SIGNIFICANCE CRITERIA SUMMARY

Analysis	Condition(s)	Significance Criteria	
		Daytime	Nighttime
Off-Site Traffic[1]	If ambient is < 55 dBA CNEL	≥ 5 dBA CNEL Project increase	
	If ambient is 55 - 60 dBA CNEL	≥ 3 dBA CNEL Project increase	
	If ambient is 60 - 65 dBA CNEL	≥ 2 dBA CNEL Project increase	
	If ambient is > 65 dBA CNEL	≥ 1 dBA CNEL Project increase	
On-Site	Exterior Noise Compatibility[2]	See Exhibit 3-A	
	Exterior Noise Level Standards[3]	55 dBA L_{eq}	45 dBA L_{eq}
	Interior Noise Level Standard[4]	45 dBA L_{eq}	35 dBA L_{eq}
	Interior Noise Level Standard[5]	45 dBA CNEL	
Operational[1]	Exterior Noise Level Standards[3]	55 dBA L_{eq}	45 dBA L_{eq}
	If ambient is < 55 dBA L_{eq}	≥ 5 dBA L_{eq} Project increase	
	If ambient is 55 - 60 dBA L_{eq}	≥ 3 dBA L_{eq} Project increase	
	If ambient is 60 - 65 dBA L_{eq}	≥ 2 dBA L_{eq} Project increase	
	If ambient is < 65 dBA L_{eq}	≥ 1 dBA L_{eq} Project increase	
Construction	Exempt from the exterior noise level standards between the hours of 7:00 p.m. and 7:00 a.m. on weekdays, between the hours of 5:00 p.m. and 8:00 a.m. on Saturdays, or at any time on Sunday or a federal holiday.[6]		
	Noise Level Threshold[1]	80 dBA L_{eq}	n/a
	Vibration Level Threshold[1]	80 VdB	n/a
Blasting	Airblast Threshold[7]	133 dBA L_{eq}	n/a
	Vibration Level Threshold[8]	0.5 PPV (in/sec)	n/a

[1] Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual.
[2] City of Riverside General Plan Noise Element, Figure N-10
[3] City of Riverside Municipal Code, Title 7 Noise Control, Section 7.25.010 (A) (Appendix 3.1).
[4] City of Riverside Municipal Code, Title 7 Noise Control, Section 7.30.015 (A) (Appendix 3.1).
[5] State of California Building Code standards (Section 3.2)
[6] City of Riverside Municipal Code Section 7.35.020 (G)
[7] ISEE's Blasters' Handbook, Table 26.17 Typical Air Overpressure Damage Criteria, and U.S. Bureau of Mines standards.
[8] Caltrans Transportation and Construction Vibration Manual, April 2020 Table 19.
"Daytime" = 7:00 a.m. - 10:00 p.m.; "Nighttime" = 10:00 p.m. - 7:00 a.m.; "PPV" = Peak Particle Velocity

5 EXISTING NOISE LEVEL MEASUREMENTS

To assess the existing noise level environment, 24-hour noise level measurements were taken at eight 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 Thursday, August 8th, 2019 and on Wednesday, July 9th, 2020. Appendix 5.1 includes study area photos.

5.1 MEASUREMENT PROCEDURE AND CRITERIA

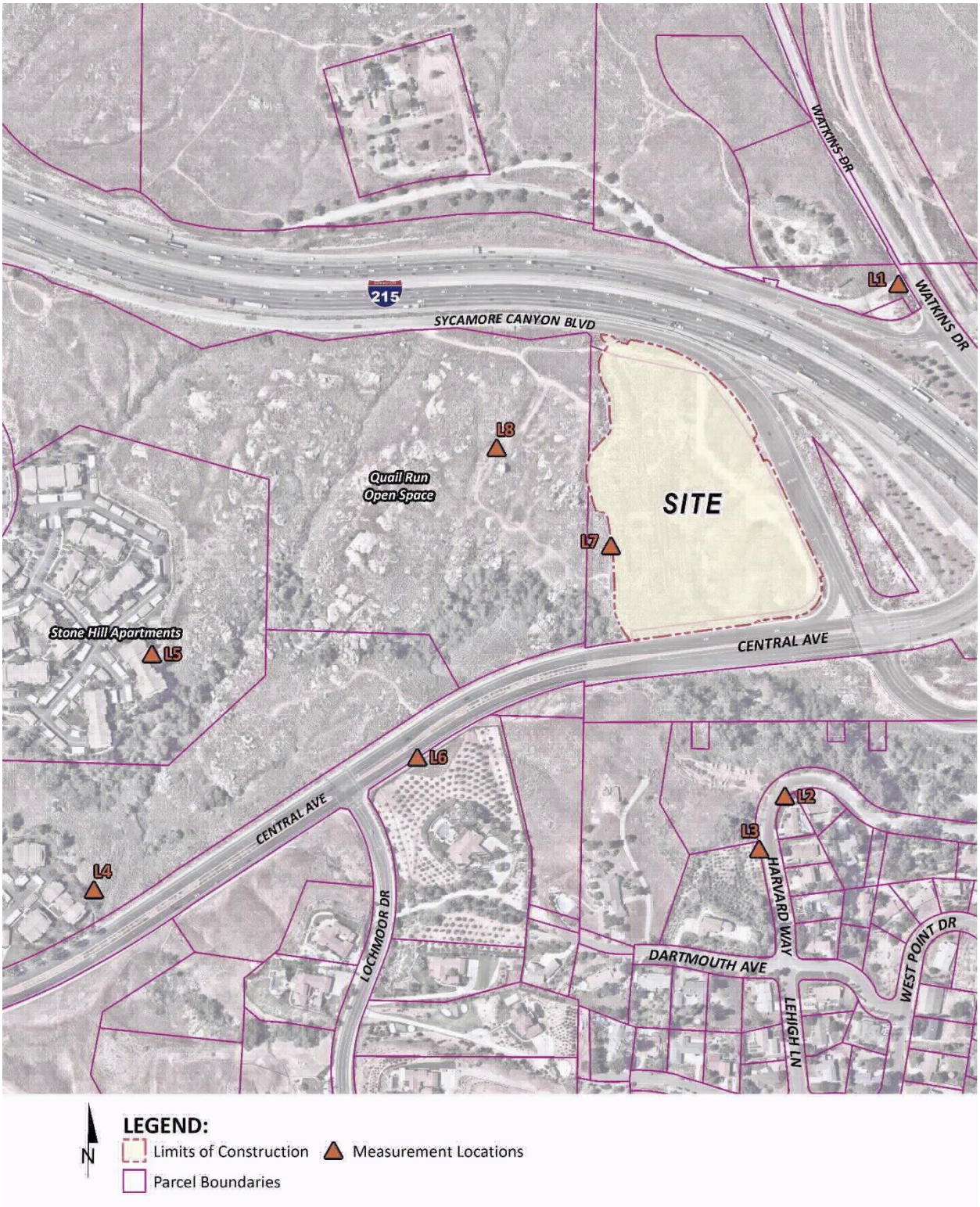
To describe the existing noise environment, the hourly noise levels were measured during typical weekday conditions over a 24-hour period. By collecting individual hourly noise level measurements, it is possible to describe the daytime and nighttime hourly noise levels and calculate the 24-hour CNEL. 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. (12)

5.2 NOISE MEASUREMENT LOCATIONS

The long-term noise level measurements were positioned as close to the nearest sensitive receiver locations as possible to assess the existing ambient hourly noise levels surrounding the Project site. Both Caltrans and the FTA recognize that it is not reasonable to collect noise level measurements that can fully represent every part of a private yard, patio, deck, or balcony normally used for human activity when estimating impacts for new development projects. This is demonstrated in the Caltrans general site location guidelines which indicate that, *sites must be free of noise contamination by sources other than sources of interest. Avoid sites located near sources such as barking dogs, lawnmowers, pool pumps, and air conditioners unless it is the express intent of the analyst to measure these sources*. (2) Further, FTA guidance states, t*hat it is not necessary nor recommended that existing noise exposure be determined by measuring at every noise-sensitive location in the project area. Rather, the recommended approach is to characterize the noise environment for clusters of sites based on measurements or estimates at representative locations in the community*. (7)

Based on recommendations of Caltrans and the FTA, it is not necessary to collect measurements at each individual building or residence, because each receiver measurement represents a group of buildings that share acoustical equivalence. (7) Collecting reference ambient noise level measurements at the nearby sensitive receiver locations allows for a comparison of the before and after Project noise levels and is necessary to assess potential noise impacts due to the Project's contribution to the ambient noise levels.

EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS



5.3 NOISE MEASUREMENT RESULTS

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

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

Location[1]	Description	Energy Average Noise Level (dBA L_{eq})[2]		CNEL
		Daytime	Nighttime	
L1	Located northeast of the Project site on Watkins Drive Road outside the entry gate Gernert Road.	62.8	64.8	71.2
L2	Located south of Project site near the existing single-family residential home at 20098 Harvard Way.	50.1	50.1	56.9
L3	Located south of Project site across the street from the single-family residential home at 20088 Harvard Way.	51.9	52.1	58.8
L4	Located southwest of the Project site north of Central Avenue near existing multi-family residential homes at 375 Central Avenue.	57.0	59.4	65.8
L5	Located west of the Project site near the Stone Canyon Apartments at 5100 Quail Run Road.	47.3	49.9	56.0
L6	Located southwest of the Project site on Central Avenue north of existing single-family residential home at 5240 Lochmoor Drive.	70.8	63.7	72.6
L7	Located near the southwestern boundary of the Project site adjacent to the Quail Run open space.	51.5	50.1	57.1
L8	Located west of the Project site in the middle of the Quail Run open space.	51.3	51.1	58.0

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

Table 5-1 provides the (energy average) noise levels used to describe the daytime and nighttime ambient conditions. These daytime and nighttime energy average noise levels represent the average of all hourly noise levels observed during these time periods expressed as a single number. Appendix 5.2 provides summary worksheets of the noise levels for each hour as well as the minimum, maximum, 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 surface streets and I-215 Freeway.

6 METHODS AND PROCEDURES

The following section outlines the methods and procedures used to model and analyze the future traffic noise environment on the six study area roadway segments shown on Exhibit 6-A.

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. (13) 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. (14) 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.

6.1.1 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 six study area roadway segments, the distance from the centerline to adjacent land use based on the functional roadway classifications per the City of Riverside General Plan Circulation Element, and the posted vehicle speeds. For this analysis, soft site conditions are used to analyze the traffic noise impacts within the Project study area. Soft site conditions account for the sound propagation loss over natural surfaces such as normal earth and ground vegetation. Caltrans' research has shown that the use of soft site conditions is appropriate for the application of the FHWA traffic noise prediction model as used in this off-site traffic noise analysis. (15)

The Existing, Opening Year 2022, and Horizon Year 2040 average daily traffic volumes used for this study are presented on Table 6-2 and are provided by the Crestview Apartments *Focused Traffic Analysis* prepared by Urban Crossroads, Inc. (16) 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.

EXHIBIT 6-A: OFF-SITE STUDY AREA ROADWAY SEGMENTS

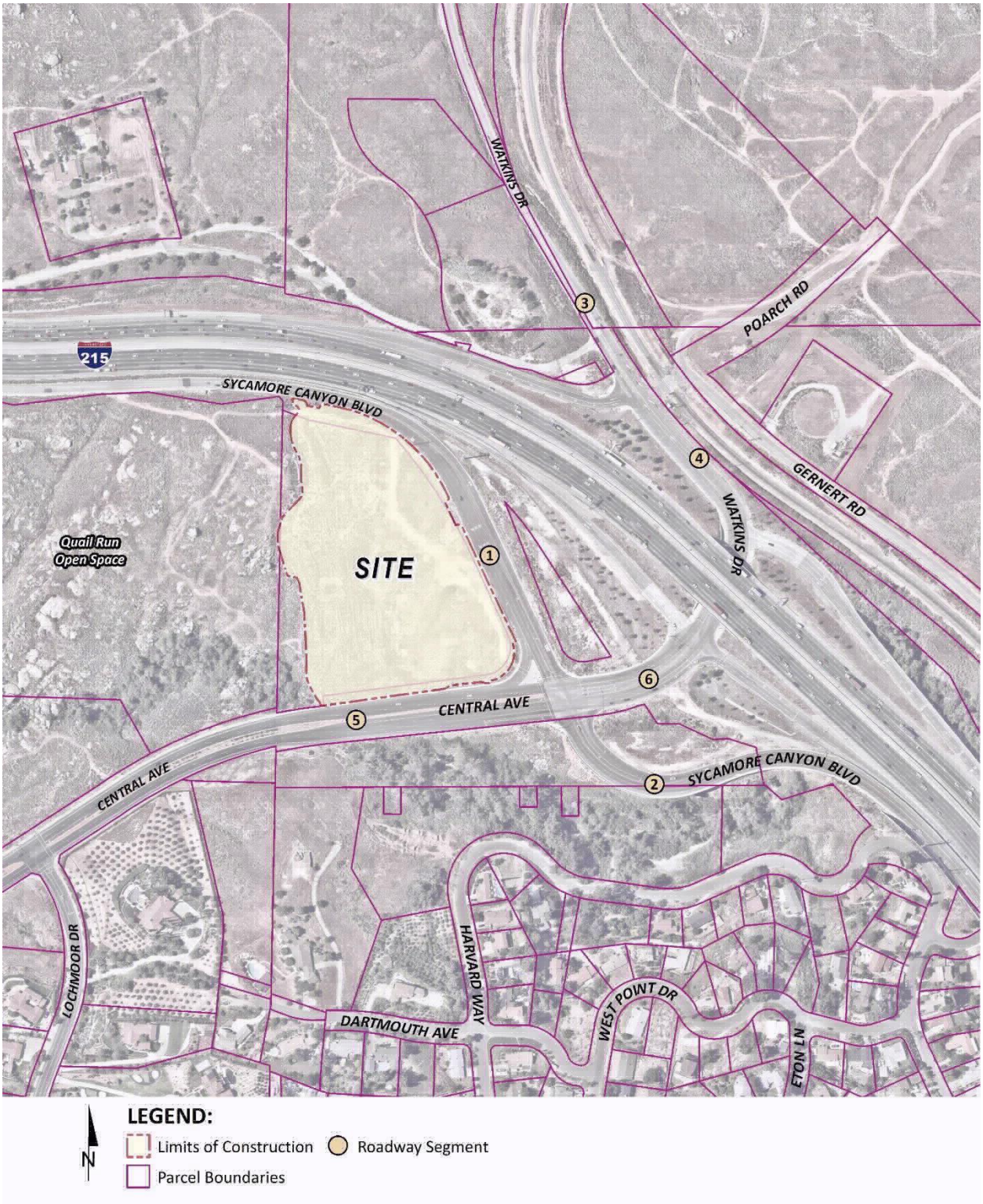


TABLE 6-1: OFF-SITE ROADWAY PARAMETERS

ID	Roadway	Segment	Adjacent Land Use[1]	Distance From Centerline To Nearest Adjacent Land Use (Feet)[2]	Vehicle Speed (mph)[3]
1	Sycamore Canyon Bl.	n/o Central Av.	Commercial	33'	45
2	Sycamore Canyon Bl.	s/o Central Av.	Conservation	55'	45
3	Watkins Dr.	n/o SR-60 WB On-Ramp	Hillside Residential	55'	45
4	Watkins Dr.	s/o SR-60 WB On-Ramp	Hillside Residential	55'	35
5	Central Av.	w/o Sycamore Canyon Bl.	Hillside Residential	44'	50
6	Central Av.	e/o Sycamore Canyon Bl.	Conservation	44'	50

[1] Sources: Google Earth aerial imagery and the City of Riverside General Plan Land Use/Urban Design Element, Figure LU-10 and County of Riverside Highgrove Area Plan Land Use Plan, Figure 3.
[2] Distance to adjacent land use is based upon the right-of-way distances for each functional roadway classification provided in the City of Riverside General Plan Circulation Element.
[3] Crestview Apartments Focused Analysis.

TABLE 6-2: AVERAGE DAILY TRAFFIC VOLUMES

ID	Roadway	Segment	Average Daily Traffic (1,000's)[1]					
			Existing		Opening Year		Horizon Year 2040	
			Without Project	With Project	Without Project	With Project	Without Project	With Project
1	Sycamore Canyon Bl.	n/o Central Av.	6.7	7.4	9.9	10.6	10.7	11.3
2	Sycamore Canyon Bl.	s/o Central Av.	21.5	21.6	23.1	23.2	25.4	25.5
3	Watkins Dr.	n/o SR-60 WB On-Ramp	17.5	17.6	18.7	18.8	20.6	20.7
4	Watkins Dr.	s/o SR-60 WB On-Ramp	19.9	20.2	21.6	21.9	23.8	24.0
5	Central Av.	w/o Sycamore Canyon Bl.	18.5	18.7	20.5	20.6	33.0	33.1
6	Central Av.	e/o Sycamore Canyon Bl.	18.7	19.2	21.4	21.8	33.9	34.3

[1]Crestview Apartments Focused Traffic Analysis.

TABLE 6-3: TIME OF DAY VEHICLE SPLITS

Vehicle Type	Time of Day Splits[1]			Total of Time of Day Splits
	Daytime	Evening	Nighttime	
Autos	77.50%	12.90%	9.60%	100.00%
Medium Trucks	84.80%	4.90%	10.30%	100.00%
Heavy Trucks	86.50%	2.70%	10.80%	100.00%

[1] Source: Typical Southern California vehicle mix.
"Daytime" = 7:00 a.m. to 7:00 p.m.; "Evening" = 7:00 p.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

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

Roadway	Total % Traffic Flow			Total
	Autos	Medium Trucks	Heavy Trucks	
I-215/CA-60 Freeway[1]	87.00%	7.19%	5.81%	100.00%
Expressway, Arterial, Major[2]	92.00%	3.00%	5.00%	100.00%
Secondary, Collector[3]	97.42%	1.84%	0.74%	100.00%

[1] Caltrans Traffic Data Branch Annual Average Daily Truck Traffic on the California Highways System, 2018
[2] County of Riverside Office of Industrial Hygiene, 2017.

6.1.2 ON-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

The on-site roadway parameters including the average daily traffic (ADT) volumes used for this study are presented on Table 6-5. The average daily traffic volumes for I-215/CA-60 Freeway are based on a 10-percent increase in existing volumes published in the Caltrans Traffic Data Branch Annual Average Daily Truck Traffic on the California Highways System data. Future traffic volumes on Sycamore Canyon Boulevard and Central Avenue are based on the *Crestview Apartments Focused Traffic Analysis* prepared by Urban Crossroads, Inc. (16). As previously described, 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 Traffic Noise Model (TNM) noise protocol in CadnaA noise prediction model.

TABLE 6-5: TRAFFIC NOISE MODEL PARAMETERS

Roadway Segment	Classification[1]	Future ADT Volume[2]	Vehicle Speed (mph)[3]
I-215/CA-60 Fwy.	Freeway	199,100	70
Sycamore Cyn. Blvd.	Collector	11,300	45
Central Ave.	Arterial	33,100	50

[1] Roadway classification provided in the City of Riverside General Plan Circulation Element (Figure CCM-4).
[2] Freeway Average Daily Traffic (ADT) volumes are based on a 10-percent increase in existing volumes obtained from the Caltrans Traffic Data Branch Annual Average Daily Truck Traffic on the California Highways System. Roadway capacity volumes are based on the Crestview Apartments Focused Traffic Analysis.
[3] Freeway speeds are based on a conservative 5 mph above the posted speed limit of 65 mph, and the posted speed limit for roadways.

The site plan is used to identify the relationship between the roadway centerline elevation, the pad elevation and the centerline distance to any intervening noise barriers, and the building façade. The exterior noise level impacts were placed five feet above the pad elevation at the proposed building façade for first-floor level analysis. All second-floor receivers were located 14 feet above the proposed finished floor elevation; third floor receivers were located at 23 feet, and fourth floor receivers were located at 32 feet.

6.2 CADNAA NOISE PREDICTION MODEL

To fully describe the exterior noise levels at the Project site, Urban Crossroads, Inc. developed a noise prediction model using the CadnaA (Computer Aided Noise Abatement) computer program. CadnaA can analyze multiple types of noise sources using the spatially accurate Project site plan, topography, buildings, and barriers in its calculations to predict exterior noise levels.

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

The noise level calculations provided in this noise study account for the distance attenuation provided due to geometric spreading. A default ground attenuation factor of 0.0 was used in the CadnaA noise analysis to account for hard site conditions.

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7 OFF-SITE TRANSPORTATION NOISE IMPACTS

To assess the off-site transportation CNEL noise level impacts associated with development of the proposed Project, noise contours were developed based on Crestview Apartments *Focused Traffic Analysis*. (16) Noise contour boundaries represent the equal levels of noise exposure and are measured in CNEL from the center of the roadway. Noise contours were developed for the following traffic scenarios:

- Existing Conditions Without / With Project: This scenario refers to the existing present-day noise conditions without and with the proposed Project.
- Opening Year 2022 Without / With Buildout of the Project: This scenario refers to Year 2022 noise conditions without and with Buildout of the proposed Project. This scenario includes all cumulative projects identified in the Traffic Analysis.
- Horizon Year 2040 Without / With Project: This scenario refers to the background noise conditions at future Year 2040 without and with the proposed Project. This scenario corresponds to 2040 conditions, and includes all cumulative projects identified in the Traffic Analysis.

7.1 TRAFFIC NOISE CONTOURS

Noise contours were used to assess the Project's incremental traffic-related noise impacts at land uses adjacent to roadways conveying Project traffic. The noise contours represent the distance to noise levels of a constant value and are measured from the center of the roadway for the 70, 65, and 60 dBA noise levels. The noise contours do not consider the effect of any existing noise barriers or topography that may attenuate ambient noise levels. In addition, because the noise contours reflect modeling of vehicular noise on area roadways, they appropriately do not reflect noise contributions from the surrounding stationary noise sources within the Project study area. Tables 7-1 and 7-6 present a summary of the exterior traffic noise levels, without barrier attenuation, for the study area roadway segments analyzed from the without Project to the with Project conditions under Existing, Opening Year 2022, and Horizon Year 2040 conditions. Appendix 7.1 includes a summary of the traffic noise level contours for each of the 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)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Sycamore Canyon Bl.	n/o Central Av.	Commercial	67.5	RW	RW	104
2	Sycamore Canyon Bl.	s/o Central Av.	Conservation	71.9	RW	159	342
3	Watkins Dr.	n/o SR-60 WB On-Ramp	Hillside Residential	71.0	RW	138	298
4	Watkins Dr.	s/o SR-60 WB On-Ramp	Hillside Residential	69.1	RW	RW	223
5	Central Av.	w/o Sycamore Canyon Bl.	Conservation	71.7	RW	123	264
6	Central Av.	e/o Sycamore Canyon Bl.	Conservation	71.7	RW	124	266

[1] Sources: Google Earth aerial imagery and the City of Riverside General Plan Land Use/Urban Design Element, Figure LU-10 and County of Riverside Highgrove Area Plan Land Use Plan, Figure 3.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
"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)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Sycamore Canyon Bl.	n/o Central Av.	Commercial	67.9	RW	RW	111
2	Sycamore Canyon Bl.	s/o Central Av.	Conservation	71.9	RW	159	343
3	Watkins Dr.	n/o SR-60 WB On-Ramp	Hillside Residential	71.0	RW	139	299
4	Watkins Dr.	s/o SR-60 WB On-Ramp	Hillside Residential	69.2	RW	RW	225
5	Central Av.	w/o Sycamore Canyon Bl.	Conservation	71.7	RW	124	266
6	Central Av.	e/o Sycamore Canyon Bl.	Conservation	71.8	RW	126	271

[1] Sources: Google Earth aerial imagery and the City of Riverside General Plan Land Use/Urban Design Element, Figure LU-10 and County of Riverside Highgrove Area Plan Land Use Plan, Figure 3.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-3: OPENING YEAR 2022 WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Sycamore Canyon Bl.	n/o Central Av.	Commercial	69.2	RW	RW	135
2	Sycamore Canyon Bl.	s/o Central Av.	Conservation	72.2	RW	167	359
3	Watkins Dr.	n/o SR-60 WB On-Ramp	Hillside Residential	71.3	RW	145	312
4	Watkins Dr.	s/o SR-60 WB On-Ramp	Hillside Residential	69.5	RW	RW	235
5	Central Av.	w/o Sycamore Canyon Bl.	Conservation	72.1	RW	131	283
6	Central Av.	e/o Sycamore Canyon Bl.	Conservation	72.3	RW	135	291

[1] Sources: Google Earth aerial imagery and the City of Riverside General Plan Land Use/Urban Design Element, Figure LU-10 and County of Riverside Highgrove Area Plan Land Use Plan, Figure 3.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-4: OPENING YEAR 2022 WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Sycamore Canyon Bl.	n/o Central Av.	Commercial	69.5	RW	66	141
2	Sycamore Canyon Bl.	s/o Central Av.	Conservation	72.2	RW	167	360
3	Watkins Dr.	n/o SR-60 WB On-Ramp	Hillside Residential	71.3	RW	145	313
4	Watkins Dr.	s/o SR-60 WB On-Ramp	Hillside Residential	69.5	RW	110	238
5	Central Av.	w/o Sycamore Canyon Bl.	Conservation	72.1	RW	132	284
6	Central Av.	e/o Sycamore Canyon Bl.	Conservation	72.4	RW	137	295

[1] Sources: Google Earth aerial imagery and the City of Riverside General Plan Land Use/Urban Design Element, Figure LU-10 and County of Riverside Highgrove Area Plan Land Use Plan, Figure 3.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-5: HORIZON YEAR 2040 WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Sycamore Canyon Bl.	n/o Central Av.	Commercial	69.5	RW	66	142
2	Sycamore Canyon Bl.	s/o Central Av.	Conservation	72.6	RW	177	382
3	Watkins Dr.	n/o SR-60 WB On-Ramp	Hillside Residential	71.7	RW	154	332
4	Watkins Dr.	s/o SR-60 WB On-Ramp	Hillside Residential	69.9	RW	117	251
5	Central Av.	w/o Sycamore Canyon Bl.	Conservation	74.2	RW	180	389
6	Central Av.	e/o Sycamore Canyon Bl.	Conservation	74.3	RW	184	396

[1] Sources: Google Earth aerial imagery and the City of Riverside General Plan Land Use/Urban Design Element, Figure LU-10 and County of Riverside Highgrove Area Plan Land Use Plan, Figure 3.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-6: HORIZON YEAR 2040 WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Sycamore Canyon Bl.	n/o Central Av.	Commercial	69.8	RW	68	148
2	Sycamore Canyon Bl.	s/o Central Av.	Conservation	72.6	RW	178	383
3	Watkins Dr.	n/o SR-60 WB On-Ramp	Hillside Residential	71.7	RW	155	333
4	Watkins Dr.	s/o SR-60 WB On-Ramp	Hillside Residential	69.9	RW	117	253
5	Central Av.	w/o Sycamore Canyon Bl.	Conservation	74.2	RW	181	390
6	Central Av.	e/o Sycamore Canyon Bl.	Conservation	74.4	RW	185	399

[1] Sources: Google Earth aerial imagery and the City of Riverside General Plan Land Use/Urban Design Element, Figure LU-10 and County of Riverside Highgrove Area Plan Land Use Plan, Figure 3.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

7.2 EXISTING CONDITION PROJECT TRAFFIC NOISE LEVEL INCREASES

Table 7-1 presents the Existing without Project conditions CNEL noise levels. The without Project exterior noise levels are expected to range from 67.5 to 71.9 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-2 shows the Existing with Project conditions will range from 67.9 to 71.9 dBA CNEL. As shown on Table 7-7 the Project will generate a noise level increase of up to 0.4 dBA CNEL on the study area roadway segments. Based on the significance criteria in Section 4, the Project-related noise level increases are considered *less than significant* under Existing with Project conditions at the land uses adjacent to roadways conveying Project traffic.

7.3 OPENING YEAR 2022 PROJECT TRAFFIC NOISE LEVEL INCREASES

Table 7-3 presents the Opening Year 2022 without Project conditions CNEL noise levels which are expected to range from 69.2 to 72.3 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-4 shows the Opening Year 2022 with Project conditions will range from 69.5 to 72.4 dBA CNEL. As shown on Table 7-8 the Project will generate a noise level increase of up to 0.3 dBA CNEL on the study area roadway segments. Based on the significance criteria in Section 4, the Project-related noise level increases are considered *less than significant* under Opening Year 2022 with Project conditions at the land uses adjacent to roadways conveying Project traffic.

7.4 HORIZON YEAR 2040 PROJECT TRAFFIC NOISE LEVEL INCREASES

Table 7-5 presents the Horizon Year 2040 without Project conditions CNEL noise levels are expected to range from 69.5 to 74.3 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-6 shows the Horizon Year 2040 with Project conditions will range from 69.8 to 74.4 dBA CNEL. As shown on Table 7-9 the Project will generate a noise level increase of up to 0.2 dBA CNEL on the study area roadway segments. Based on the significance criteria in Section 4, the Project-related noise level increases are considered *less than significant* under Horizon Year 2040 with Project conditions at the land uses adjacent to roadways conveying Project traffic.

TABLE 7-7: EXISTING CONDITION OFF-SITE PROJECT-RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Adjacent Land Use (dBA)[2]			Incremental Noise Level Increase Threshold[3]	
				No Project	With Project	Project Addition	Limit	Exceeded?
1	Sycamore Canyon Bl.	n/o Central Av.	Commercial	67.5	67.9	0.4	1	No
2	Sycamore Canyon Bl.	s/o Central Av.	Conservation	71.9	71.9	0.0	1	No
3	Watkins Dr.	n/o SR-60 WB On-Ramp	Hillside Residential	71.0	71.0	0.0	1	No
4	Watkins Dr.	s/o SR-60 WB On-Ramp	Hillside Residential	69.1	69.2	0.1	1	No
5	Central Av.	w/o Sycamore Canyon Bl.	Conservation	71.7	71.7	0.0	1	No
6	Central Av.	e/o Sycamore Canyon Bl.	Conservation	71.7	71.8	0.1	1	No

[1] Sources: Google Earth aerial imagery and the City of Riverside General Plan Land Use/Urban Design Element, Figure LU-10 and County of Riverside Highgrove Area Plan Land Use Plan, Figure 3.

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

TABLE 7-8: OPENING YEAR 2022 OFF-SITE PROJECT-RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Adjacent Land Use (dBA)[2]			Incremental Noise Level Increase Threshold[3]	
				No Project	With Project	Project Addition	Limit	Exceeded?
1	Sycamore Canyon Bl.	n/o Central Av.	Commercial	69.2	69.5	0.3	1	No
2	Sycamore Canyon Bl.	s/o Central Av.	Conservation	72.2	72.2	0.0	1	No
3	Watkins Dr.	n/o SR-60 WB On-Ramp	Hillside Residential	71.3	71.3	0.0	1	No
4	Watkins Dr.	s/o SR-60 WB On-Ramp	Hillside Residential	69.5	69.5	0.1	1	No
5	Central Av.	w/o Sycamore Canyon Bl.	Conservation	72.1	72.1	0.0	1	No
6	Central Av.	e/o Sycamore Canyon Bl.	Conservation	72.3	72.4	0.1	1	No

[1] Sources: Google Earth aerial imagery and the City of Riverside General Plan Land Use/Urban Design Element, Figure LU-10 and County of Riverside Highgrove Area Plan Land Use Plan, Figure 3.

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

TABLE 7-9: HORIZON YEAR 2040 OFF-SITE PROJECT-RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Adjacent Land Use (dBA)[2]			Incremental Noise Level Increase Threshold[3]	
				No Project	With Project	Project Addition	Limit	Exceeded?
1	Sycamore Canyon Bl.	n/o Central Av.	Commercial	69.5	69.8	0.2	1	No
2	Sycamore Canyon Bl.	s/o Central Av.	Conservation	72.6	72.6	0.0	1	No
3	Watkins Dr.	n/o SR-60 WB On-Ramp	Hillside Residential	71.7	71.7	0.0	1	No
4	Watkins Dr.	s/o SR-60 WB On-Ramp	Hillside Residential	69.9	69.9	0.0	1	No
5	Central Av.	w/o Sycamore Canyon Bl.	Conservation	74.2	74.2	0.0	1	No
6	Central Av.	e/o Sycamore Canyon Bl.	Conservation	74.3	74.4	0.1	1	No

[1] Sources: Google Earth aerial imagery and the City of Riverside General Plan Land Use/Urban Design Element, Figure LU-10 and County of Riverside Highgrove Area Plan Land Use Plan, Figure 3.

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

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8 ON-SITE NOISE IMPACTS

An on-site noise impact analysis has been completed to determine the noise exposure impacting the Project site, and to identify potential noise mitigation measures that would achieve acceptable on-site exterior and interior noise levels. The primary source of noise affecting the Project site is anticipated to be from Interstate 215 (I-215)/CA-60 Freeway, Sycamore Canyon Boulevard, Central Avenue, and exterior noise source activities from the approved Sycamore at Canyon commercial center as shown on Exhibit 8-A.

8.2 REFERENCE EXTERIOR NOISE SOURCE ACTIVITY

The approved Sycamore at Canyon commercial center will be located approximately 140 feet east of the Crestview Apartments and will include a combination of noise source activities. A review of the entitled commercial center site plan to be constructed suggests that the primary noise source activity will consist of roof-top air conditioning units, car wash tunnel, car wash vacuums, gas station activity, drive-thru speaker activity and trash enclosure activity Table 8-1 presents a summary of the expected noise source activity from the Sycamore at Canyon commercial center.

TABLE 8-1: EXTERIOR NOISE SOURCES IMPACTING THE PROJECT

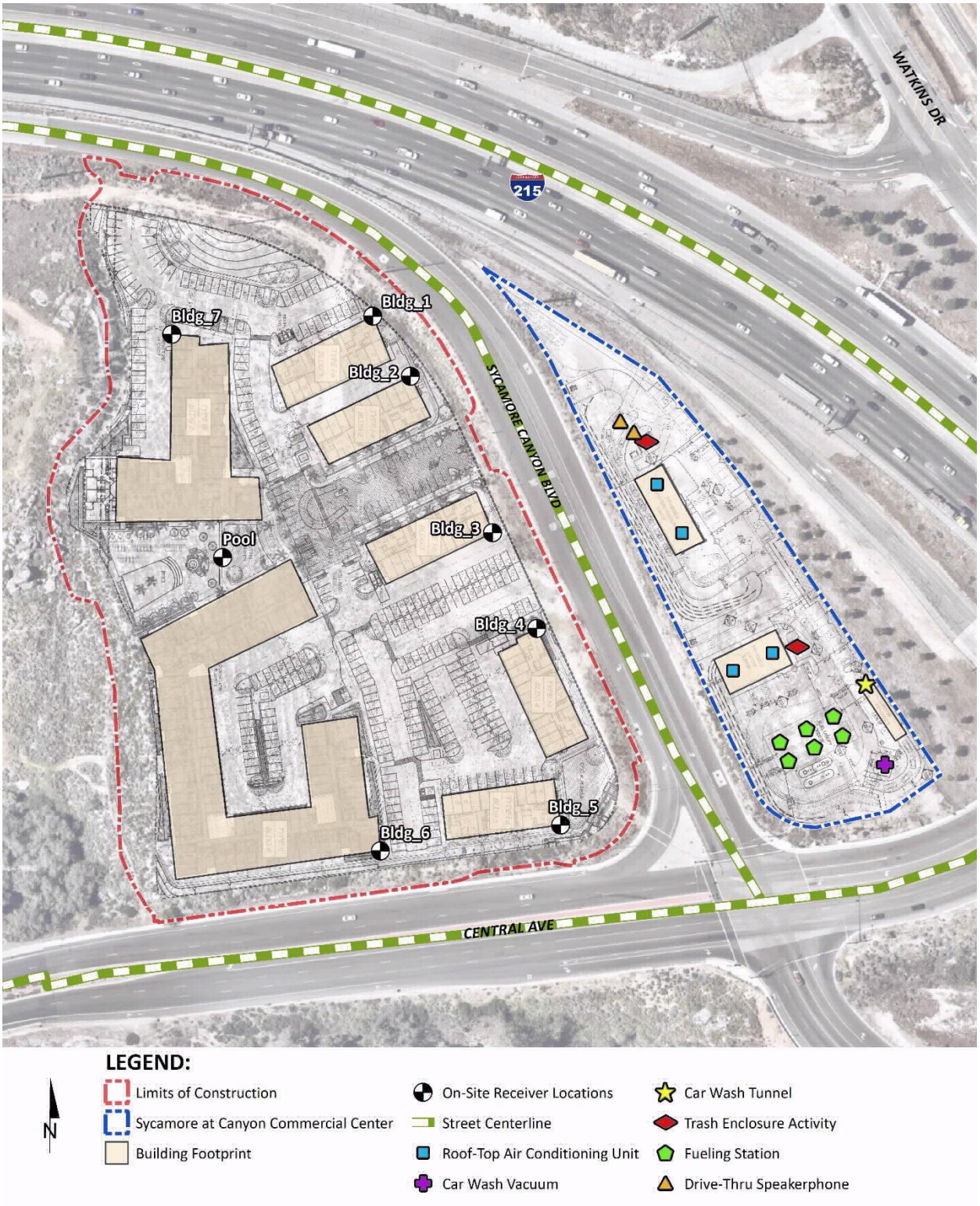
Noise Source[1]	Noise Source Height (Feet)	Min./Hour[2]		Reference Noise Level @50 feet (dBA L_{eq})	Sound Power Level (dBA)[3]
		Day	Night		
Roof-Top Air Conditioning Units	5'	60	60	57.2	88.9
Car Wash Tunnel	8'	60	0	74.3	106.0
Car Wash Vacuum	3'	60	0	54.6	86.3
Gas Station Activity	5'	60	60	48.2	79.9
Drive-Thru Activity	3'	60	60	51.5	83.2
Trash Enclosure Activity	5'	10	10	57.3	89.0

[1] As measured by Urban Crossroads, Inc.
[2] Anticipated duration (minutes within the hour) of noise activity during typical hourly conditions expected at the Project site. "Daytime" = 7:00 a.m. - 10:00 p.m.; "Nighttime" = 10:00 p.m. - 7:00 a.m.
[3] Sound power level (Lw) represents the total amount of acoustical energy (noise level) produced by a sound source independent of distance or surroundings.

8.1.1 ROOF-TOP AIR CONDITIONING UNITS

To assess the noise levels created by the roof-top air conditioning units, reference noise level measurements were collected from a Lennox SCA120 series 10-ton model packaged air conditioning unit. At the uniform reference distance of 50 feet, the reference noise levels are 57.2 dBA L_{eq}. For this noise analysis, the air conditioning units are expected to be located 5 feet above the roof of each proposed building.

EXHIBIT 8-A: OFF-SITE NOISE SOURCE ACTIVITY



8.1.2 CAR WASH TUNNEL

A reference noise level measurement was taken by Urban Crossroads at the Audi Mission Viejo dealership to describe the air blowers used in a car wash tunnel. A reference noise level of 74.3 dBA L_{eq} was measured at the uniform distance of 50 feet. The reference noise level measurement includes an exposed five-unit air blower system with background pressure washer noise and is used to represent the proposed Project facilities. It is anticipated that the air dryers within the proposed car wash will operate continuously during the peak operating conditions. Further, this noise analysis does not include any additional attenuation or directional influence provided by locating the car wash air blower and dryer equipment inside the tunnel itself, but rather, models the tunnel exit activities as occurring at the building façade. As such, the analysis may conservatively overstate actual noise levels produced by the car wash tunnel air blower and dryer equipment.

8.1.3 CAR WASH VACUUM

To represent the self-serve vacuums within the Project site, a reference noise level measurement was collected at an express car wash located at 1195 Baker Street in the City of Costa Mesa. The reference noise level measurement represents up to four vacuums operating simultaneously at the Costa Mesa express car wash. At a uniform reference distance of 50 feet, the vacuum reference noise level is 54.6 dBA L_{eq}. This reference car wash vacuum activity noise level is anticipated to conservatively overstate those of the Project, since this reference noise level includes more vacuums operating simultaneously (4 vacuums) than what will be possible at the Project site (2 vacuums).

8.1.4 GAS STATION ACTIVITY

To describe the potential noise level impacts created by the gas station of the Project, a reference noise level measurement was collected at an ARCO gas station located at 6501 Quail Hill Parkway in the City of Irvine. The reference noise level measurement includes six cars fueling at once, car doors closing, engines starting, fuel pump TV sounds and background car pass-by events within a 3-minute period. At 50 feet from the gas station, a reference noise level of 48.2 dBA L_{eq} was measured.

8.1.5 DRIVE-THRU SPEAKER ACTIVITY

To describe the potential noise level impacts associated with potential drive-thru speaker and vehicle activities, a reference noise level measurement was collected at a Panera Bread restaurant located at 423 South Associated Road in the City of Brea. The reference noise levels collected at the Panera Bread restaurant are expected to reflect potential drive-thru speaker noise level activities at the Project site, since the reference measurement includes both drive-thru speaker and vehicle activity noise. The noise sources included in the reference noise level measurement consist of voices of the Panera Bread employees over the drive-thru speaker, customers' voices ordering food, car engines idling, car radios playing music, and cars queuing in the drive-thru lane. At 50 feet from the drive-thru speaker, a reference noise level of 51.5 dBA L_{eq} was measured. This reference noise level measurement overstates the actual average noise

levels since it represents the average of 28 speakerphone menu board ordering events observed over a two-hour period. In other words, the Panera Bread drive-thru speaker menu board reference noise level describes continuous drive-thru operations and does not include any periods of inactivity.

8.1.6 TRASH ENCLOSURE ACTIVITY

To describe the noise levels associated with a trash enclosure activity, Urban Crossroads collected a reference noise level measurement at an existing trash enclosure containing two dumpster bins. The trash enclosure noise levels describe metal gates opening and closing, metal scraping against concrete floor sounds, dumpster movement on metal wheels, trash dropping into the metal dumpster. The reference noise levels describe trash enclosure noise activities when trash is dropped into an empty metal dumpster, as would occur at the Project site. The measured reference noise level at the uniform 50-foot reference distance is 57.3 dBA L_{eq} for the trash enclosure activity. The reference noise level describes the expected noise source activities associated with the trash enclosures for each of the Project buildings. Typical trash enclosure activities are estimated to occur for 10 minutes per hour.

8.2 EXTERIOR NOISE ANALYSIS

Using future traffic noise levels from the Interstate 215 (I-215)/CA-60 Freeway, Sycamore Canyon Boulevard, Central Avenue, and exterior noise source activities from the planned Sycamore at Canyon commercial center, Urban Crossroads, Inc. developed an on-site CadnaA noise prediction model. The on-site CadnaA noise prediction model was used to calculate the exterior noise levels at each of the Project building locations and at the outdoor common areas (pool and adjacent recreational spaces). Tables 8-2 and 8-3 presents the daytime and nighttime dBA L_{eq} exterior noise levels and Table 8-4 presents the 24-hour dBA CNEL noise levels.

Table 8-2 shows that the daytime exterior noise levels will range from 62.3 to 74.0 dBA L_{eq}. Table 8-3 shows that the nighttime exterior noise levels will range from 53.8 to 65.5 dBA L_{eq}. Table 8-4 shows that the 24-hour exterior noise levels will range from 62.7 to 74.4 dBA CNEL. The detailed CadnaA noise prediction model inputs and the exterior noise level calculations are included in Appendix 8.1.

TABLE 8-2: DAYTIME EXTERIOR NOISE LEVELS

Noise Source[1]	Daytime Exterior Levels by Receiver Location (dBA L_{eq})							
	Bldg_1	Bldg_2	Bldg_3	Bldg_4	Bldg_5	Bldg_6	Bldg_7	Pool
I-215/CA-60 Fwy.	72.0	73.6	71.8	69.5	65.0	61.4	61.8	63.0
Sycamore Cyn. Blvd.	63.0	63.2	63.3	64.2	58.8	48.5	52.3	48.6
Central Ave.	23.7	39.7	40.2	53.4	68.0	66.8	40.0	21.1
Roof-Top AC	39.7	45.3	48.6	50.2	45.9	24.7	20.8	27.2
Car Wash Tunnel	45.7	48.5	49.8	49.6	57.2	32.1	31.8	29.3
Car Wash Vacuum	22.2	26.9	26.4	37.9	38.8	29.5	7.2	13.8
Gas Station Activity	23.6	26.8	30.1	38.8	40.3	24.0	8.4	14.2
Drive-Thru Activity	31.9	38.3	40.4	38.3	22.8	29.9	11.5	33.9
Trash Enclosure Activity	29.7	35.9	38.1	36.5	20.9	13.7	10.9	31.3
Total (All Noise Sources)	**72.5**	**74.0**	**72.4**	**70.8**	**70.3**	**68.0**	**62.3**	**63.2**

[1] See Exhibit 8-A for the noise source locations. On-site exterior CadnaA noise model calculations are included in Appendix 8.1.

TABLE 8-3: NIGHTTIME EXTERIOR NOISE LEVELS

Noise Source[1]	Nighttime Exterior Levels by Receiver Location (dBA L_{eq})							
	Bldg_1	Bldg_2	Bldg_3	Bldg_4	Bldg_5	Bldg_6	Bldg_7	Pool
I-215/CA-60 Fwy.	63.4	65.0	63.2	60.9	56.4	52.8	53.2	54.4
Sycamore Cyn. Blvd.	54.9	55.1	55.2	56.0	50.6	40.4	44.2	40.4
Central Ave.	16.4	32.3	32.9	46.1	60.7	59.5	32.6	13.8
Roof-Top AC	38.7	44.4	47.7	49.3	44.9	23.7	19.8	26.2
Car Wash Tunnel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Car Wash Vacuum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gas Station Activity	23.6	26.8	30.1	38.8	40.3	24.0	8.4	14.2
Drive-Thru Activity	31.0	37.3	39.4	37.4	21.9	28.9	10.5	32.9
Trash Enclosure Activity	28.8	34.9	37.1	35.5	19.9	12.7	10.0	30.3
Total (All Noise Sources)	**64.0**	**65.5**	**64.0**	**62.5**	**62.5**	**60.4**	**53.8**	**54.6**

[1] See Exhibit 8-A for the noise source locations. On-site exterior CadnaA noise model calculations are included in Appendix 8.1.

TABLE 8-4: 24-HOUR CNEL EXTERIOR NOISE LEVELS

Noise Source[1]	24-Hour Exterior Levels by On-Site Receiver Location (dBA CNEL)							
	Bldg_1	Bldg_2	Bldg_3	Bldg_4	Bldg_5	Bldg_6	Bldg_7	Pool
I-215/CA-60 Fwy.	72.4	74.0	72.2	69.9	65.4	61.7	62.2	63.4
Sycamore Cyn. Blvd.	63.6	63.8	63.9	64.8	59.4	49.1	52.9	49.2
Central Ave.	24.7	40.7	41.3	54.4	69.0	67.8	41.0	22.2
Roof-Top AC	45.1	50.8	54.1	55.7	51.4	30.1	26.2	32.6
Car Wash Tunnel	42.7	45.5	46.8	46.6	54.2	29.1	28.8	26.3
Car Wash Vacuum	19.2	23.9	23.4	34.9	35.8	26.5	4.2	10.8
Gas Station Activity	30.3	33.4	36.8	45.5	46.9	30.6	15.1	20.9
Drive-Thru Activity	37.4	43.7	45.8	43.8	28.3	35.3	16.9	39.3
Trash Enclosure Activity	35.2	41.3	43.5	41.9	26.3	19.1	16.4	36.7
Total (All Noise Sources)	**73.0**	**74.4**	**72.9**	**71.3**	**71.1**	**68.8**	**62.7**	**63.6**

[1] See Exhibit 8-A for the noise source locations. On-site exterior CadnaA noise model calculations are included in Appendix 8.1.

8.3 EXTERIOR NOISE/LAND USE COMPATIBILITY

The *Noise/Land Use Noise Compatibility Criteria* (Figure N-10) in the City of Riverside General Plan Noise Element provides guidelines to evaluate the land use compatibility as shown on Exhibit 3-A. Based on feedback from the City of Riverside, to conservatively estimate the compatibility of the residential use, the Crestview Apartments is considered as infill single-family residential land use. A summary of exterior noise/land use compatibility shown on Table 8-5 shows that the unmitigated exterior noise levels will range from 62.7 to 74.4 dBA CNEL.

TABLE 8-5: EXTERIOR NOISE/LAND USE COMPATIBILITY

On-Site Location[1]	24-Hr Exterior Noise Levels (dBA CNEL)[2]	Land Use Compatibility[3]
Bldg_1	73.0	Conditionally Acceptable
Bldg_2	74.4	Conditionally Acceptable
Bldg_3	72.9	Conditionally Acceptable
Bldg_4	71.3	Conditionally Acceptable
Bldg_5	71.1	Conditionally Acceptable
Bldg_6	68.8	Conditionally Acceptable
Bldg_7	62.7	Normally Acceptable
Pool	63.6	Normally Acceptable

[1] See Exhibit 8-A for the on-site receiver locations.
[2] Calculated 24-Hour CNEL Exterior Noise Levels as shown on Table 8-4.
[3] Figure N-10 of the City of Riverside General Plan Noise Element (Infill Single Family Residential).

According to *Noise/Land Use Noise Compatibility Criteria* for infill single-family residential land use, the Crestview Apartments will experience unmitigated exterior noise levels that are considered *conditionally acceptable* at buildings 1 to 7. For *conditionally acceptable* noise/land use compatibility, Figure N-10 indicates that *new construction or development should be undertaken only after a detailed analysis of noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.*

As shown in Table 8-5, building 7 and the outdoor common area will experience unmitigated exterior noise levels that are considered *normally acceptable.* For *normally acceptable* noise/land use compatibility, Figure N-10 indicates that *specific land use is satisfactory, based on the assumption that any building is of normal construction without any special noise insulation requirements.* Based on the future unmitigated exterior noise levels at the Project site, additional interior noise analysis is required to satisfy the General Plan Noise Element Figure N-10 noise/land use compatibility requirements for the infill single-family residential use (buildings 1 to 7) of the Project site. (17)

8.4 INTERIOR NOISE ANALYSIS

Using the on-site CadnaA noise prediction model, the expected future exterior noise levels at the first to fourth floor building façades were calculated. The interior noise level is the difference between the predicted exterior noise level at the building facade and the Noise Reduction (NR) of the structure. Typical building construction will provide a NR of approximately 12 dBA with "windows open" and a minimum 25 dBA noise reduction with "windows closed." (18) However, sound leaks, cracks and openings within the window assembly can greatly diminish its effectiveness in reducing noise. Several methods are used to improve interior noise reduction, including: (1) weather-stripped solid core exterior doors; (2) upgraded dual glazed windows; (3) mechanical ventilation/air conditioning; and (4) exterior wall/roof assembles free of cut outs or openings.

To demonstrate compliance with the City of Riverside noise criteria, the interior noise levels are evaluated against the City of Riverside 45 dBA L_{eq} daytime and 35 dBA L_{eq} nighttime interior sound level limits in the Noise Control section (Title 7) of the Municipal Code, as well as the 45 dBA CNEL California Building Code requirements. The on-site CadnaA noise prediction model calculations are provided in Appendix 8.1.

8.4.1 DAYTIME INTERIOR NOISE LEVELS

Table 8-6 shows the future unmitigated daytime exterior noise levels at the building façades are expected to range from 62.4 to 74.9 dBA L_{eq} requiring an interior noise level reduction ranging from 17.4 to 29.9 dBA L_{eq}. Therefore, a windows-closed condition requiring a means of mechanical ventilation (e.g. air conditioning), upgraded windows and glass doors with a minimum sound transmission class (STC) rating of 34 are required for all units. Table 8-6 shows that with the upgraded windows, the daytime interior noise levels will range from 30.4 to 42.9 dBA L_{eq}. The daytime interior noise level assessment demonstrates that the Project will satisfy the 45 dBA L_{eq} City of Riverside Municipal Code Title 7 noise criteria.

TABLE 8-6: DAYTIME INTERIOR NOISE LEVELS (LEQ)

Receiver Location	Floor	Noise Level at Façade[1]	Required Interior NR[2]	Estimated Interior NR[3]	Upgraded Windows[4]	Interior Noise Level[5]	Threshold[6]	Threshold Exceeded?
Bldg. 1	1	72.6	27.6	32.0	Yes	40.6	45	No
	2	74.0	29.0	32.0	Yes	42.0	45	No
	3	74.7	29.7	32.0	Yes	42.7	45	No
Bldg. 2	1	74.1	29.1	32.0	Yes	42.1	45	No
	2	74.9	29.9	32.0	Yes	42.9	45	No
	3	74.2	29.2	32.0	Yes	42.2	45	No
Bldg. 3	1	72.5	27.5	32.0	Yes	40.5	45	No
	2	73.1	28.1	32.0	Yes	41.1	45	No
	3	74.2	29.2	32.0	Yes	42.2	45	No
Bldg. 4	1	70.8	25.8	32.0	Yes	38.8	45	No
	2	71.5	26.5	32.0	Yes	39.5	45	No
	3	73.8	28.8	32.0	Yes	41.8	45	No
Bldg. 5	1	70.4	25.4	32.0	Yes	38.4	45	No
	2	70.8	25.8	32.0	Yes	38.8	45	No
	3	71.1	26.1	32.0	Yes	39.1	45	No
Bldg. 6	1	68.0	23.0	32.0	Yes	36.0	45	No
	2	68.5	23.5	32.0	Yes	36.5	45	No
	3	68.3	23.3	32.0	Yes	36.3	45	No
	4	68.3	23.3	32.0	Yes	36.3	45	No
Bldg. 7	1	62.4	17.4	32.0	Yes	30.4	45	No
	2	67.0	22.0	32.0	Yes	35.0	45	No
	3	68.4	23.4	32.0	Yes	36.4	45	No
	4	69.4	24.4	32.0	Yes	37.4	45	No

[1] Exterior noise level at the facade with a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning).
[2] Noise reduction required to satisfy the City of Riverside Municipal Code, Title 7 Noise Control, Section 7.30.015 (A) interior noise standard.
[3] Minimum noise reduction based on approximately 2 dBA less than the upgraded STC rating for all windows/glass doors..
[4] Does the required interior noise reduction trigger upgraded windows with a minimum STC rating of greater than 27?
[5] Estimated interior noise level with minimum STC rating for all windows.
[6] City of Riverside Municipal Code, Title 7 Noise Control, Section 7.30.015 (A) interior noise standard.
"NR" = Noise Reduction

8.4.2 NIGHTTIME INTERIOR NOISE LEVELS

Table 8-7 shows the future unmitigated nighttime exterior noise levels at the building façades are expected to range from 53.8 to 66.3 dBA L_{eq} requiring an interior noise level reduction ranging from 18.8 to 31.3 dBA L_{eq}. Therefore, a windows-closed condition requiring a means of mechanical ventilation (e.g. air conditioning), upgraded windows and glass doors with a minimum sound transmission class (STC) rating of 34 are required for all units. Table 8-7 shows that with the upgraded windows, the nighttime interior noise levels will range from 21.8 to 34.3 dBA L_{eq}.

The nighttime interior noise level assessment demonstrates that the Project will satisfy the 35 dBA L_{eq} City of Riverside Municipal Code Title 7 noise criteria.

TABLE 8-7: NIGHTTIME INTERIOR NOISE LEVELS (LEQ)

Receiver Location	Floor	Noise Level at Façade[1]	Required Interior NR[2]	Estimated Interior NR[3]	Upgraded Windows[4]	Interior Noise Level[5]	Threshold[6]	Threshold Exceeded?
Bldg. 1	1	64.1	29.1	32.0	Yes	32.1	35	No
	2	65.4	30.4	32.0	Yes	33.4	35	No
	3	66.1	31.1	32.0	Yes	34.1	35	No
Bldg. 2	1	65.5	30.5	32.0	Yes	33.5	35	No
	2	66.3	31.3	32.0	Yes	34.3	35	No
	3	65.7	30.7	32.0	Yes	33.7	35	No
Bldg. 3	1	64.0	29.0	32.0	Yes	32.0	35	No
	2	64.6	29.6	32.0	Yes	32.6	35	No
	3	65.7	30.7	32.0	Yes	33.7	35	No
Bldg. 4	1	62.5	27.5	32.0	Yes	30.5	35	No
	2	63.2	28.2	32.0	Yes	31.2	35	No
	3	65.4	30.4	32.0	Yes	33.4	35	No
Bldg. 5	1	62.5	27.5	32.0	Yes	30.5	35	No
	2	62.9	27.9	32.0	Yes	30.9	35	No
	3	63.2	28.2	32.0	Yes	31.2	35	No
Bldg. 6	1	60.4	25.4	32.0	Yes	28.4	35	No
	2	60.9	25.9	32.0	Yes	28.9	35	No
	3	60.7	25.7	32.0	Yes	28.7	35	No
	4	60.7	25.7	32.0	Yes	28.7	35	No
Bldg. 7	1	53.8	18.8	32.0	Yes	21.8	35	No
	2	58.5	23.5	32.0	Yes	26.5	35	No
	3	59.8	24.8	32.0	Yes	27.8	35	No
	4	60.8	25.8	32.0	Yes	28.8	35	No

[1] Exterior noise level at the facade with a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning).
[2] Noise reduction required to satisfy the City of Riverside Municipal Code, Title 7 Noise Control, Section 7.30.015 (A) interior noise standard.
[3] Minimum noise reduction based on approximately 2 dBA less than the upgraded STC rating for all windows/glass doors..
[4] Does the required interior noise reduction trigger upgraded windows with a minimum STC rating of greater than 27?
[5] Estimated interior noise level with minimum STC rating for all windows.
[6] City of Riverside Municipal Code, Title 7 Noise Control, Section 7.30.015 (A) interior noise standard.
"NR" = Noise Reduction

8.4.3 24-HOUR INTERIOR NOISE LEVELS

Table 8-8 shows the future unmitigated nighttime exterior noise levels at the building façades are expected to range from 62.8 to 75.3 dBA CNEL requiring an interior noise level reduction ranging from 17.8 to 30.3 dBA CNEL. Therefore, a windows-closed condition requiring a means of mechanical ventilation (e.g. air conditioning), upgraded windows and glass doors with a minimum sound transmission class (STC) rating of 34 are required for all units. Table 8-8 shows that with the upgraded windows, the nighttime interior noise levels will range from 30.8 to 43.3 dBA CNEL. The nighttime interior noise level assessment demonstrates that the Project will satisfy the 45 dBA CNEL noise criteria in the California Code of Regulations, Title 24, Building Standards Administrative Code, Part 2, and the California Building Code.

8.4.4 INTERIOR NOISE ABATEMENT MEASURES

To meet the City of Riverside interior noise standards the following on-site noise abatement measures are required:

- Windows & Glass Doors (All Units): All windows and glass doors with well-fitted, well-weather-stripped assemblies and shall have minimum STC rating of 34 consistent with standard building construction.
- Exterior (Non-Glass) Doors: All exterior doors shall be well weather-stripped and have minimum STC ratings of 27. Well-sealed perimeter gaps around the doors are essential to achieve the optimal STC rating. (19)
- Exterior Walls: At any penetrations of exterior walls by pipes, ducts, or conduits, the space between the wall and pipes, ducts, or conduits shall be caulked or filled with mortar to form an airtight seal.
- Roof: Roof sheathing of wood construction shall be per manufacturer's specification or caulked plywood of at least one-half inch thick. Ceilings shall be per manufacturer's specification or well-sealed gypsum board of at least one-half inch thick. Insulation with at least a rating of R-19 shall be used in the attic space. Gable vents or vents that penetrate the roof surface that are fitted with transfer ducts at least six feet in length that are insulating flexible ducting or metal ducts containing internal one-inch thick coated fiberglass sound-absorbing duct liner. Each duct shall have a lined ninety-degree bend in the duct so that there is no direct line-of-sight from the exterior through the duct into the attic; or
- Ventilation: Arrangements for any habitable room shall be such that any exterior door or window can be kept closed when the room is in use and still receive circulated air. A forced air circulation system (e.g. air conditioning) or active ventilation system (e.g. fresh air supply) shall be provided which satisfies the requirements of the Uniform Building Code.

9 SENSITIVE RECEIVER LOCATIONS

To assess the potential for long-term operational and short-term construction noise impacts, the following sensitive 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, undeveloped land, parking lots, warehousing, liquid and solid waste facilities, salvage yards, and transit terminals.

To describe the potential off-site Project noise levels, four noise sensitive residential receiver locations in the vicinity of the Project site were identified. In addition, receiver locations BIO-1 and BIO-2 represent the existing Quail Run open space areas and potential sensitive receiver locations for further consideration in the Biology report for the Project. All distances are measured in a straight line from the Project limits of construction to the parcel boundary or property line of the nearest receiver locations. Other sensitive land uses in the Project study area that are located at greater distances than those identified in this noise study will experience lower noise levels than those presented in this report due to the additional attenuation from distance and the shielding of intervening structures.

R1: Location R1 represents the existing noise sensitive residence north of Gernet Road, approximately 623 feet northwest of the Project site. A 24-hour noise measurement was taken near this location, L1, to describe the existing ambient noise environment.

R2: Location R2 represents the existing noise sensitive residence at 20098 Harvard Way, approximately 519 feet south of the Project site. A 24-hour noise measurement was taken near this location, L2, to describe the existing ambient noise environment.

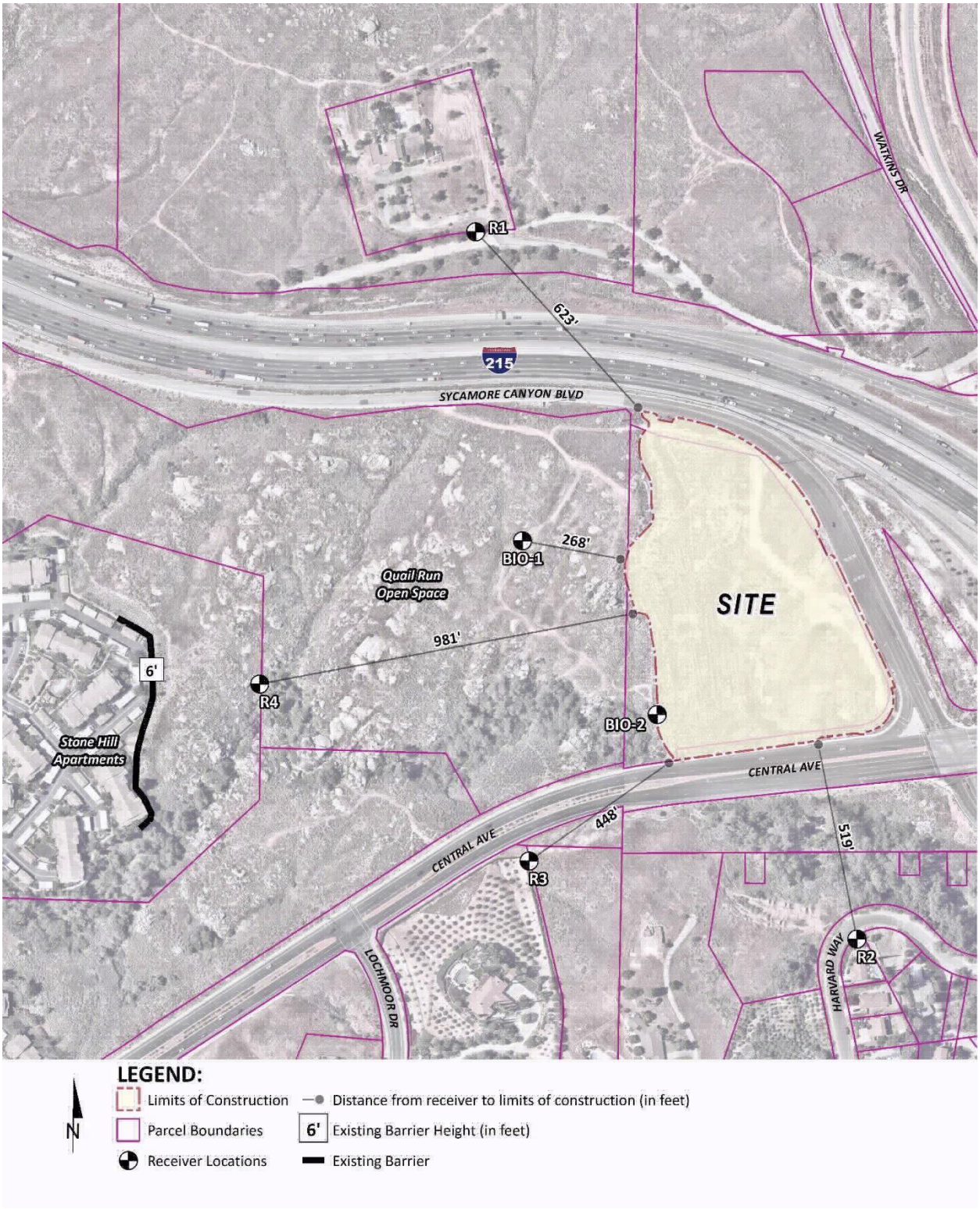
R3: Location R3 represents the existing noise sensitive residence at 5240 Lochmoor Drive, approximately 448 feet southwest of the Project site. A 24-hour noise measurement near this location, L6, is used to describe the existing ambient noise environment.

R4: Location R4 represents the Stone Hill Apartments at 5100 Quail Run Road, approximately 981 feet west of the Project site. A 24-hour noise measurement near this location, L5, is used to describe the existing ambient noise environment.

BIO-1: Location BIO-1 represents the middle of the existing Quail Run Open Space, approximately 268 feet west of the Project site. A 24-hour noise measurement near this location, L8, is used to describe the existing ambient noise environment.

BIO-2: Location BIO-2 represents the limits of construction in the southwest corner of the site. A 24-hour noise measurement near this location, L7, is used to describe the existing ambient noise environment.

EXHIBIT 9-A: RECEIVER LOCATIONS



10 OPERATIONAL IMPACTS

The proposed residential development is considered a noise-sensitive receiving land use and is not expected to include any specific type of operational noise levels beyond those typically associated with residential land use in the Project study area. However, this section analyzes the potential operational noise impacts at the nearby receiver locations, identified in Section 9, resulting from the typical operations of the Crestview Apartments Project. Exhibit 10-A identifies the representative noise source locations used to assess the operational noise levels.

10.1 OPERATIONAL NOISE SOURCES

This operational noise analysis is intended to describe noise level impacts associated with the expected typical of daytime and nighttime residential activities at the Project site. To analyze noise impacts originating from the Crestview Apartments, the operational noise that may include roof-top air conditioning units, trash enclosure activity, dog park activity, pool/spa activity and parking lot vehicle movements are evaluated against standards established in the City of Riverside Municipal Code, Title 7 Noise Control.

10.2 REFERENCE NOISE LEVELS

To estimate the Project operational noise impacts, reference noise level measurements were collected from similar types of activities to represent the noise levels expected with the development of the proposed Project. This section provides a description of the reference noise level measurements shown on Table 10-1 used to estimate the Project operational noise impacts. It is important to note that the following projected noise levels assume the worst-case noise environment with all noise sources operating continuously. These sources of noise activity will likely vary throughout the day.

10.2.1 ROOF-TOP AIR CONDITIONING UNITS

To assess the noise levels created by the roof-top air conditioning units, reference noise levels were taken from the Carrier model 24ACC4 product data sheet. The product data sheet for Carrier model 24ACC4 planned for the Project will produce a maximum sound power level of 75 dBA. For this noise analysis, the air conditioning units are expected operate continuously for 60 minutes per hour and will be located four feet above the roof elevation of the Project buildings.

10.2.2 TRASH ENCLOSURE ACTIVITY

To describe the noise levels associated with a trash enclosure activity, Urban Crossroads collected a reference noise level measurement at an existing trash enclosure containing two dumpster bins. The trash enclosure noise levels describe metal gates opening and closing, metal scraping against concrete floor sounds, dumpster movement on metal wheels, trash dropping into the metal dumpster. The reference noise levels describe trash enclosure noise activities when trash is dropped into an empty metal dumpster, as would occur at the Project site. The measured reference noise level at the uniform 50-foot reference distance is 57.3 dBA L_{eq} for the trash enclosure activity. The reference noise level describes the expected noise source activities

associated with the trash enclosures for each of the Project buildings. Typical trash enclosure activities are estimated to occur for 10 minutes per hour.

EXHIBIT 10-A: OPERATIONAL NOISE SOURCE AND RECEIVER LOCATIONS

TABLE 10-1: REFERENCE NOISE LEVEL MEASUREMENTS

Noise Source[1]	Noise Source Height (Feet)	Min./Hour[2]		Reference Noise Level @ 50 Feet (dBA L_{eq})	Sound Power Level (PWL)[3]
		Daytime	Nighttime		
Roof-Top Air Conditioning Units	4'	60'	60'	43.3	75.0
Trash Enclosure Activity	5'	10'	10'	57.3	89.0
Dog Park Activity	4'	60'	60'	42.8	79.1
Pool/Spa Activity	4'	60'	60'	54.7	94.6
Parking Lot Vehicle Movements	5'	60'	60'	40.8	88.6

[1] As measured by Urban Crossroads, Inc.

[2] Anticipated duration (minutes within the hour) of noise activity during typical hourly conditions expected at the Project site. "Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

[3] Sound power level represents the total amount of acoustical energy (noise level) produced by a sound source independent of distance or surroundings. Sound power levels calculated using the CadnaA noise model at the reference distance to the noise source. Numbers may vary due to size differences between point and area noise sources.

10.2.3 DOG PARK

To describe the potential noise level impacts associated with the Project's dog park, Urban Crossroads, Inc. collected a reference noise level measurement at La Paws Dog Park in the City of Mission Viejo. The reference noise level measurement describes large and small dogs with people talking, dogs running, playing fetch, chasing each other, growling, barking, and owners talking on cell phones. At 50 feet from the noise source, a reference noise level of 42.8 dBA L_{eq} is used.

10.2.4 POOL/SPA ACTIVITY

To represent the noise levels associated with pool activities, Urban Crossroads collected a reference noise level measurement at the Covenant Hill Clubhouse Pool in the unincorporated community of Ladera Ranch in the County of Orange. The reference noise level at 50 feet is 54.7 dBA L_{eq} for pool activity. The pool activity noise levels include kids playing, running, screaming, splashing, playing with a ball, and parents talking.

10.2.5 PARKING LOT VEHICLE MOVEMENTS

To determine the noise levels associated with a residential apartment community parking lot, Urban Crossroads collected reference noise level measurements at the Windemere Apartment community in the City of Riverside. At 50 feet, the parking lot vehicle movements produced a reference noise level of 40.8 dBA L_{eq}. The residential parking lot noise levels are mainly due to cars pulling in and out of spaces and residents going to and from their apartment homes, and includes horns honking in the parking lot. Noise associated with parking lot vehicle movements is expected during the typical daytime, and nighttime conditions for the entire hour (60 minutes).

10.4 PROJECT OPERATIONAL NOISE LEVELS

Using the reference noise levels to represent the proposed Project operations that include roof-top air conditioning units, trash enclosure activity, dog park activity, pool/spa activity and parking

lot vehicle movements, Urban Crossroads, Inc. calculated the operational source noise levels that are expected to be generated at the Project site and the Project-related noise level increases that would be experienced at each of the sensitive receiver locations. Tables 10-2 shows the Project operational noise levels at the off-site receiver locations are expected to range from 25.2 to 41.7 dBA L_{eq}.

TABLE 10-2: PROJECT OPERATIONAL NOISE LEVELS

Noise Source[1]	Operational Noise Levels by Receiver Location (dBA L_{eq})					
	R1	R2	R3	R4	BIO-1	BIO-2
Roof-Top Air Conditioning Units	24.1	30.3	26.8	16.0	29.7	27.3
Trash Enclosure Activity	13.6	24.2	10.2	6.8	12.6	12.0
Dog Park Activity	1.9	27.9	6.8	1.9	1.9	4.8
Pool/Spa Activity	1.9	16.4	35.2	24.4	39.9	41.4
Parking Lot Vehicle Movements	20.6	29.3	21.5	9.1	22.8	24.6
Total (All Noise Sources)	**26.0**	**34.5**	**36.0**	**25.2**	**40.4**	**41.7**

[1] See Exhibit 9-A for the noise source locations. CadnaA noise model calculations are included in Appendix 10.1.

10.5 PROJECT OPERATIONAL NOISE LEVEL COMPLIANCE

To demonstrate compliance with local noise regulations, the Project-only operational noise levels are evaluated against exterior noise level thresholds based on the City of Riverside exterior noise level standards at nearby noise-sensitive receiver locations. Table 10-3 shows the operational noise levels associated with Crestview Apartments Project will satisfy the City of Riverside 55 dBA L_{eq} daytime and 45 dBA L_{eq} nighttime exterior noise level standards at all nearby noise sensitive residential receiver locations. Therefore, the operational noise impacts are considered *less than significant* at the nearby noise-sensitive residential receiver locations.

TABLE 10-3: OPERATIONAL NOISE LEVEL COMPLIANCE

Receiver Location[1]	Measurement Location	Project Noise Levels (dBA Leq)[2]	Noise Level Standards (dBA Leq)[3]		Noise Level Standards Exceeded?[4]	
			Daytime	Nighttime	Daytime	Nighttime
R1	L1	26.0	55.0	45.0	No	No
R2	L2	34.5	55.0	45.0	No	No
R3	L6	36.0	55.0	45.0	No	No
R4	L5	25.2	55.0	45.0	No	No
BIO-1	L8	40.4	-[5]	-[5]	-[5]	-[5]
BIO-2	L7	41.7	-[5]	-[5]	-[5]	-[5]

[1] See Exhibit 9-A for the receiver locations.
[2] Proposed Project operational noise levels as shown on Table 10-2.
[3] City of Riverside Municipal Code, Title 7 Noise Control, Section 7.25.010 (A) (Appendix 3.1).
[4] Do the estimated Project operational noise source activities exceed the noise level standards?
[5] Receiver location and Project operational noise levels provided for informational purposes. Potential impacts analyzed in the Bio report for the Project.
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

10.6 PROJECT OPERATIONAL NOISE LEVEL INCREASES

To describe the Project operational noise level increases, the Project operational noise levels are combined with the existing ambient noise levels measurements for the nearby receiver locations potentially impacted by Project operational noise sources. Since the units used to measure noise, decibels (dB), are logarithmic units, the Project-operational and existing ambient noise levels cannot be combined using standard arithmetic equations. (2) Instead, they must be logarithmically added using the following base equation:

$$SPL_{Total} = 10\log_{10}[10^{SPL1/10} + 10^{SPL2/10} + \ldots 10^{SPLn/10}]$$

Where "SPL1," "SPL2," etc. are equal to the sound pressure levels being combined, or in this case, the Project-operational and existing ambient noise levels. The difference between the combined Project and ambient noise levels describe the Project noise level increases to the existing ambient noise environment. As indicated on Tables 10-4 and 10-5, the Project will generate a daytime operational noise level increases ranging from 0.0 to 0.1 dBA L_{eq} at the nearby receiver locations. Project-related operational noise level increases will satisfy the operational noise level increase significance criteria presented on Table 4-1. Therefore, the incremental Project operational noise level increase is considered *less than significant* at all receiver locations.

TABLE 10-4: DAYTIME PROJECT OPERATIONAL NOISE LEVEL INCREASES

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Increase[6]	Noise Sensitive Land Use?	Increase Criteria[7]	Increase Criteria Exceeded?[7]
R1	26.0	L1	62.8	62.8	0.0	Yes	2	No
R2	34.5	L2	50.1	50.2	0.1	Yes	5	No
R3	36.0	L6	70.8	70.8	0.0	Yes	1	No
R4	25.2	L5	47.3	47.3	0.0	Yes	5	No

[1] See Exhibit 9-A for the receiver locations.
[2] Total Project operational noise levels as shown on Table 10-2.
[3] Reference noise level measurement locations as shown on Exhibit 5-A.
[4] Observed daytime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] Significance increase criteria as shown on Table 4-1.

TABLE 10-5: NIGHTTIME OPERATIONAL NOISE LEVEL INCREASES

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Increase[6]	Noise Sensitive Land Use?	Increase Criteria[7]	Increase Criteria Exceeded?[7]
R1	26.0	L1	64.8	64.8	0.0	Yes	2	No
R2	34.5	L2	50.1	50.2	0.1	Yes	5	No
R3	36.0	L6	63.7	63.7	0.0	Yes	2	No
R4	25.2	L5	49.9	49.9	0.0	Yes	5	No

[1] See Exhibit 9-A for the receiver locations.
[2] Total Project operational noise levels as shown on Table 10-2.
[3] Reference noise level measurement locations as shown on Exhibit 5-A.
[4] Observed nighttime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] Significance increase criteria as shown on Table 4-1.

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11 CONSTRUCTION IMPACTS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project. Exhibit 11-A shows the construction noise source locations in relation to the nearest sensitive receiver locations previously described in Section 8. According the City of Riverside Municipal Code Section 7.35.020 (G), Project construction noise levels are considered exempt from municipal regulation if noise levels activity associated with construction, repair, remodeling, or grading of any real property; provided a permit has been obtained from the City as required; do not take place between the hours of 7:00 p.m. and 7:00 a.m. on weekdays, between the hours of 5:00 p.m. and 8:00 a.m. on Saturdays, or at any time on Sunday or a federal holiday.

In addition, neither the City of Riverside General Plan or Municipal Code establish numeric maximum acceptable construction source noise levels at potentially affected receivers for CEQA analysis purposes. Therefore, a numerical construction threshold based on Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual* is used for analysis of daytime construction impacts. The FTA considers a daytime exterior construction noise level of 80 dBA L_{eq} as a reasonable threshold for noise sensitive residential land use. (7 p. 179)

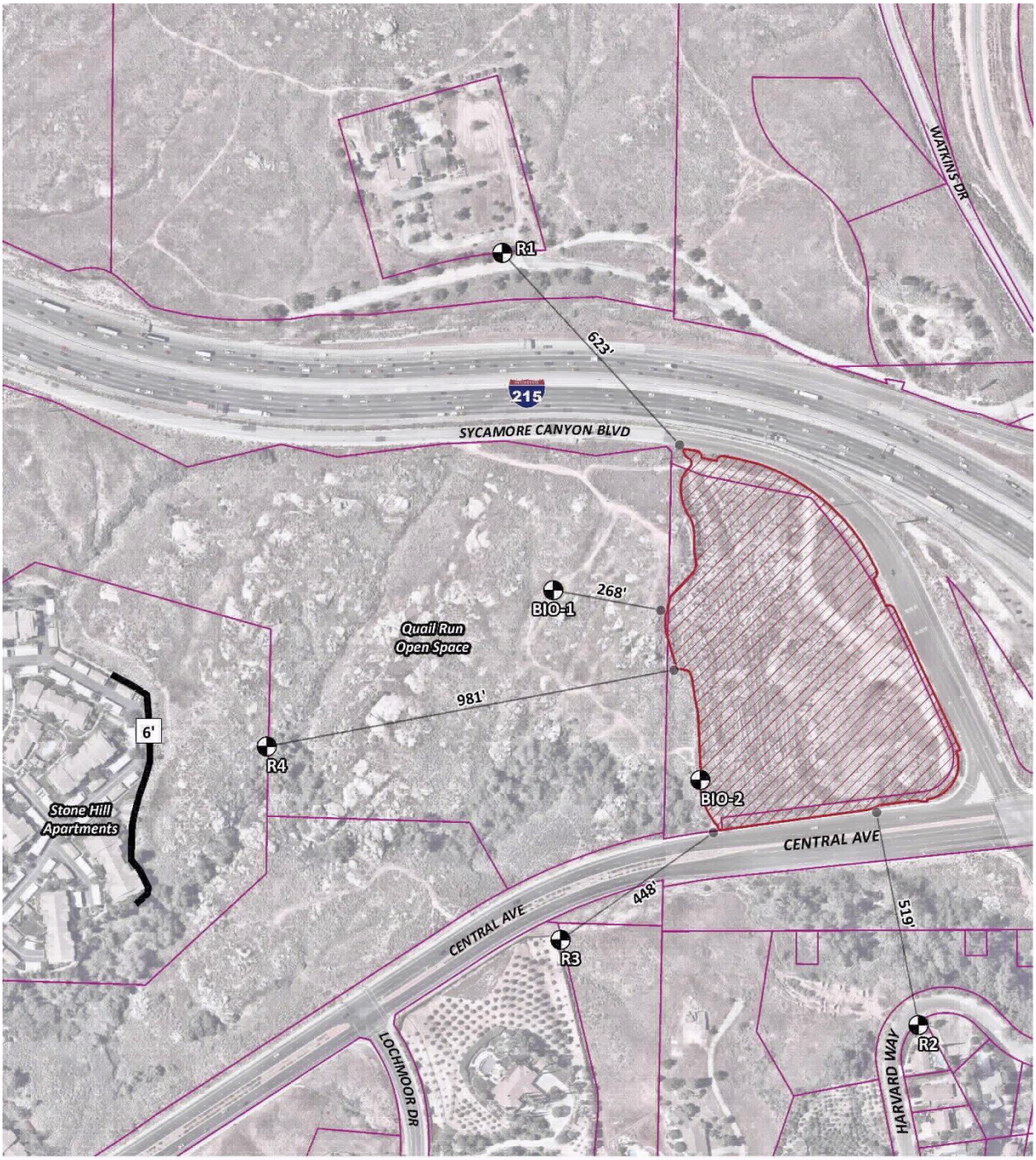
11.1 CONSTRUCTION NOISE LEVELS

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

- Site Preparation
- Grading
- Building Construction
- Paving
- Architectural Coating

This construction noise analysis was prepared using reference noise level measurements taken by Urban Crossroads, Inc. to describe the typical construction activity noise levels for each stage of Project construction. The construction reference noise level measurements represent a list of typical construction activity noise levels. Noise levels generated by heavy construction equipment can range from approximately 68 dBA to more than 80 dBA when measured at 50 feet. However, these noise levels diminish with distance from the construction site at a rate of 6 dBA per doubling of distance. For example, a noise level of 80 dBA measured at 50 feet from the noise source to the receiver would be reduced to 74 dBA at 100 feet from the source to the receiver, and would be further reduced to 68 dBA at 200 feet from the source to the receiver.

EXHIBIT 11-A: TYPICAL CONSTRUCTION NOISE SOURCE LOCATIONS



11.2 TYPICAL CONSTRUCTION REFERENCE NOISE LEVELS

To describe the Project typical construction noise levels, measurements were collected for similar activities at several construction sites. Table 11-1 provides a summary of the construction reference noise level measurements. Since the reference noise levels were collected at varying distances of 30 feet and 50 feet, all construction noise level measurements presented on Table 11-1 have been adjusted for consistency to describe a uniform reference distance of 50 feet. Construction noise generated from concrete crushing activities and nighttime concrete pours are addressed separately, below.

TABLE 11-1: TYPICAL CONSTRUCTION REFERENCE NOISE LEVELS

Construction Stage	Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})	Highest Reference Noise Level (dBA L_{eq})
Site Preparation	Scraper, Water Truck, & Dozer Activity	75.3	75.3
	Backhoe	64.2	
	Water Truck Pass-By & Backup Alarm	71.9	
Grading	Rough Grading Activities	73.5	73.5
	Water Truck Pass-By & Backup Alarm	71.9	
	Construction Vehicle Maintenance Activities	67.5	
Building Construction	Foundation Trenching	68.2	71.6
	Framing	62.3	
	Concrete Mixer Backup Alarms & Air Brakes	71.6	
Paving	Concrete Mixer Truck Movements	71.2	71.2
	Concrete Paver Activities	65.6	
	Concrete Mixer Pour & Paving Activities	65.9	
Architectural Coating	Air Compressors	65.2	65.2
	Generator	64.9	
	Crane	62.3	

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

11.3 TYPICAL CONSTRUCTION NOISE ANALYSIS

Using the reference construction equipment noise levels and the CadnaA noise prediction model, calculations of the Project construction noise level impacts with multiple pieces of equipment operating simultaneously at the nearest sensitive receiver locations were completed. This includes the additional noise attenuation provided by the existing intervening building structures and noise barriers located between the Project site and the nearest receiver locations. To assess the worst-case construction noise levels, the Project construction noise analysis relies on the highest noise level impacts when the equipment with the highest reference noise level is operating at the closest point from the edge of primary construction activity (Project site boundary) to each receiver location. As shown on Table 11-2, the construction noise levels are

expected to range from 43.9 to 77.9 dBA L_{eq}, and the highest construction levels are expected to range from 47.7 to 77.9 dBA L_{eq} at the nearby receiver locations. Appendix 11.1 includes the detailed CadnaA construction noise model inputs.

TABLE 11-2: TYPICAL CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Receiver Location[1]	Distance to Construction Activity (Feet)	Construction Noise Levels (dBA L_{eq})					
		Site Preparation	Grading	Building Construction	Paving	Architectural Coating	Highest Levels[2]
R1	623'	54.4	52.6	50.7	50.3	50.3	54.4
R2	519'	65.7	63.9	62.0	61.6	61.6	65.7
R3	448'	59.2	57.4	55.5	55.1	55.1	59.2
R4	981'	47.7	45.9	44.0	43.6	43.6	47.7
BIO-1	268'	63.4	61.6	59.7	59.3	59.3	63.4
BIO-2	0'	77.9	76.1	74.2	73.8	73.8	77.9

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

11.4 TYPICAL CONSTRUCTION NOISE LEVEL COMPLIANCE

To evaluate whether the Project will generate potentially significant short-term noise levels at nearest receiver locations, the FTA construction-related daytime noise level threshold of 80 dBA L_{eq} is used as a reasonable threshold to assess the daytime construction noise level impacts. The construction noise analysis shows that the nearest noise sensitive residential receiver locations will satisfy the reasonable daytime 80 dBA L_{eq} significance threshold during Project construction activities as shown on Table 10-3.

TABLE 11-3: TYPICAL CONSTRUCTION NOISE LEVEL COMPLIANCE

Receiver Location[1]	Construction Noise Levels (dBA L_{eq})		
	Highest Construction Noise Levels[2]	Threshold[3]	Threshold Exceeded?[4]
R1	54.4	80	No
R2	65.7	80	No
R3	59.2	80	No
R4	47.7	80	No
BIO-1	63.4	-[5]	-[5]
BIO-2	77.9	-[5]	-[5]

[1] Noise receiver locations are shown on Exhibit 11-A.
[2] Highest construction noise level calculations based on distance from the construction noise source activity to nearby receiver locations as shown on Table 11-2.
[3] Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual.
[4] Do the estimated Project construction noise levels exceed the construction noise level threshold?
[5] Receiver location and Project construction noise levels provided for informational purposes. Potential impacts analyzed in the Biology report for the Project.

Therefore, the noise impacts due to Project construction noise is considered *less than significant* at all the noise sensitive residential receiver locations. Potential construction noise level impacts associated receiver locations BIO-1 and BIO-2 are analyzed in the Biology report for the Project.

11.5 CONSTRUCTION VIBRATION ANALYSIS

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods used, distance to the affected structures and soil type. Ground vibration levels associated with various types of construction equipment are summarized on Table 11-4. The vibration source levels describe a variety of equipment including several methods of pile driving. This includes impact pile driving and non-impact alternatives. Since the actual equipment used to support the Project construction may include deep dynamic compaction or rapid impact compaction, this analysis conservatively relies on the highest worst-case impact pile driving reference vibration source levels to describe the Project vibration levels. Based on the representative vibration levels presented for various construction equipment types, it is possible to estimate the potential Project construction vibration levels using the following vibration assessment methods defined by the FTA. To describe the human response (annoyance) associated with vibration impacts the FTA provides the following equation: $L_{VdB}(D) = L_{VdB}(25\text{ ft}) - 30\log(D/25)$

TABLE 11-4: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	Vibration Decibels (VdB) at 25 feet
Small bulldozer	58
Jackhammer	79
Loaded Trucks	86
Large bulldozer	87
Pile Driver (Impact)	104
Pile Driver (Sonic)	93
Caisson Drill	87

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

Table 11-5 presents the potential construction equipment vibration levels. However, it is expected that the project will rely on methods with substantially lower vibration impacts. Construction vibration levels are expected to range from 56.2 to 66.4 VdB at the nearby residential receiver locations. Using the construction vibration assessment methods provided by the FTA, Project construction vibration levels would not exceed the FTA 80 VdB threshold at all sensitive residential receiver locations, and therefore, is considered a *less than significant* impact. 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 at the Project site perimeter.

11.6 BLASTING IMPACTS

The blasting contractor is required to obtain blasting permit(s) from the State, and to notify Riverside County Sheriff's Department within 24 hours of planned blasting events. The Project blasting-related vibration and airblast levels are based on the 133 dB criteria for airblasts identified by the ISEE and U.S. Bureau of Mines. The blasting impacts described below represent the worst-case (closest) blast locations describing the potential impacts when measured from the edge of the nearest blast area to the nearest receiver location. When measured at greater distances, the blasts will result in lower airblast noise and vibration levels. The blasting calculations are included in Appendix 11.2.

11.6.1 AIRBLAST NOISE LEVELS

The following equations are used to calculate the airblast levels from Project blasts based on the ISEE's Blasters' Handbook equation for partially and substantially confined construction blasts, determined based on the anticipated depth of hard rock in each location. This analysis describes partially confined airblast levels since they are calculated using the Blasters' Handbook equation for general construction blasting activities. Table 11-6 shows that the calculated airblast levels from the worst-case (closest) Project blasting activities are expected to range from 106 to 116 dB. The Project airblast levels are shown to satisfy the 133 dB airblast threshold at the nearest noise sensitive residential receiver locations. Therefore, the Project-related airblast noise level impacts are considered *less than significant* during typical construction activities at the Project site.

TABLE 11-5: TYPICAL CONSTRUCTION EQUIPMENT VIBRATION LEVELS

Receiver Location[1]	Distance to Construction Activity (Feet)	Receiver Vibration Levels (VdB)[2]								Threshold VdB[3]	Threshold Exceeded?[4]
		Small Bulldozer	Jack-hammer	Loaded Trucks	Large Bulldozer	Pile Driver (Impact)	Pile Driver (Sonic)	Caisson Drill	Highest Vibration Levels		
R1	623'	16.1	37.1	44.1	45.1	62.1	51.1	45.1	62.1	80	No
R2	519'	18.5	39.5	46.5	47.5	64.5	53.5	47.5	64.5	80	No
R3	448'	20.4	41.4	48.4	49.4	66.4	55.4	49.4	66.4	80	No
R4	981'	10.2	31.2	38.2	39.2	56.2	45.2	39.2	56.2	80	No

[1] Noise receiver locations are shown on Exhibit 11-A.

[2] Based on the Vibration Source Levels of Construction Equipment included on Table 11-4.

[3] FTA Transit Noise and Vibration Impact Assessment Manual maximum acceptable vibration criteria as shown on Table 4-1.

[4] Does the vibration level exceed the maximum acceptable vibration threshold?

[5] Receiver location and Project construction noise levels provided for informational purposes. Potential impacts analyzed in the Bio report for the Project.

TABLE 11-6: PROJECT BLASTING AND COMPLIANCE SUMMARY

Receiver Location[1]	Distance to Construction Activity (Feet)	Blasting Levels[2]		Threshold[3]		Threshold Exceeded?[4]	
		Airblast (dB)	Vibration (PPV)	Airblast (dB)	Vibration (PPV)	Airblast (dB)	Vibration (PPV)
R1	623'	114	0.07	133	0.5	No	No
R2	519'	115	0.10	133	0.5	No	No
R3	448'	117	0.12	133	0.5	No	No
R4	981'	109	0.03	133	0.5	No	No

[1] Noise receiver locations are shown on Exhibit 11-A.
[2] Based on input data provided by California Drilling & Blasting. Calculations are provided in Appendix A for each blast location.
[3] Sources: Vibration threshold obtained from the Caltrans Transportation and Construction Vibration Manual, April 2020 Table 19. Airblast threshold is based on ISEE's Blasters' Handbook, Table 26.17 Typical Air Overpressure Damage Criteria, and U.S. Bureau of Mines standards.
[4] Do the blast-related airblast and vibration levels exceed the thresholds?

11.6.2 BLASTING VIBRATION

The following equation is used to calculate all PPV levels from Project blasts based on the ISEE's Blasters' Handbook equation for typical construction blasting vibration levels:

$$PPV = 160 \times (SD_2)^{-1.6}$$

Table 11-6 shows the calculated vibration levels for the worst-case (closest) blast locations near the adjacent residential homes north and west of the Project site. The vibration levels of Project blasts are expected to range from 0.02 to 0.10 in/sec PPV based on the distances to nearby residential noise sensitive receiver locations. Table 11-6 shows that the Project blasting vibration levels will remain below the maximum acceptable transient peak-particle-velocity (PPV) vibration threshold 0.5 PPV (in/sec) all the nearby noise sensitive residential receiver locations, and therefore, represent a *less than significant* impact.

12 REFERENCES

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3. **Environmental Protection Agency Office of Noise Abatement and Control.** *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* March 1974. EPA/ONAC 550/9/74-004.
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.* December 2011.
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 Manual.* September 2018.
8. **California Department of Transportation.** *Transportation and Construction Vibration Guidance Manual.* April 2020.
9. **International Society of Explosives Engineer's.** *Blasters' Handbook, 18th Edition.* 2014.
10. **Office of Planning and Research.** *State of California General Plan Guidelines.* 2017.
11. **California Court of Appeal.** *King and Gardiner Farms, LLC v. County of Kern (2020) .* 45 Cal.App.5th 814, 893,
12. **American National Standards Institute (ANSI).** *Specification for Sound Level Meters ANSI S1.4-2014/IEC 61672-1:2013.*
13. **U.S. Department of Transportation, Federal Highway Administration.** *FHWA Highway Traffic Noise Prediction Model.* December 1978. FHWA-RD-77-108.
14. **California Department of Transportation Environmental Program, Office of Environmental Engineering.** *Use of California Vehicle Noise Reference Energy Mean Emission Levels (Calveno REMELs) in FHWA Highway Traffic Noise Prediction.* September 1995. TAN 95-03.
15. **California Department of Transportation.** *Traffic Noise Attenuation as a Function of Ground and Vegetation Final Report.* June 1995. FHWA/CA/TL-95/23.
16. **Urban Crossroads, Inc.** *Crestview Apartments Focused Traffic Impact Analysis.* July 2020.
17. **City of Riverside.** *General Plan Noise Element.*
18. **California Department of Transportation.** *Traffic Noise Analysis Protocol.* May 2011.
19. **Harris, Cyril M.** *Noise Control in Buildings.* s.l. : McGraw-Hill, Inc., 1994.

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13 CERTIFICATION

The contents of this noise study report represent an accurate depiction of the noise environment and impacts associated with the proposed Crestview Apartments 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) 584-3148.

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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 RIVERSIDE MUNICIPAL CODE

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Title 7

NOISE CONTROL

Chapters:

7.05	POLICY AND INTENT
7.10	DEFINITIONS
7.15	ADMINISTRATION AND ENFORCEMENT
7.20	SOUND LEVEL MEASUREMENT
7.23	AMBIENT NOISE LEVELS
7.25	NUISANCE EXTERIOR SOUND LEVEL LIMITS
7.30	NUISANCE INTERIOR SOUND LEVEL LIMITS
7.35	GENERAL NOISE REGULATIONS
7.40	VARIANCE PROCEDURE
7.45	SEVERABILITY

Chapter 7.05

POLICY AND INTENT

Sections:

7.05.010 Policy and intent.

Section 7.05.010 Policy and intent.

It is determined that certain noise levels are detrimental to the public health, safety and welfare and are contrary to the public interest. Therefore, the City Council declares that creating, maintaining, causing or allowing to create, maintain or cause any noise in a manner not in conformity with the provisions of this chapter, is a public nuisance and shall be punishable as such.

In order to control unnecessary, excessive and/or annoying noise in the City, it is declared to be the policy of the City to prohibit such noise generated by the sources specified in this chapter. It shall be the goal of the City to minimize noise levels and mitigate the effects of noise to provide a safe and healthy living environment. (Ord. 6273 § 1 (part), 1996)

Chapter 7.10

DEFINITIONS

Sections:

7.10.010 Definitions generally.
7.10.015 A-weighted sound level.
7.10.020 Agricultural property.
7.10.025 Ambient noise level.
7.10.030 Commercial purpose.
7.10.035 Construction.
7.10.040 Community support land use category.
7.10.045 Cumulative period.
7.10.050 Decibel (dB).
7.10.055 Demolition.
7.10.060 Emergency.
7.10.065 Emergency work.
7.10.070 Fixed noise source.
7.10.075 Grading.
7.10.080 Impulsive sound.
7.10.085 Industrial land use category.
7.10.090 Intrusive noise.
7.10.095 Minor maintenance.
7.10.100 Mobile noise source.
7.10.105 Motor vehicle.
7.10.110 Muffler or sound dissapative device.
7.10.115 Noise.
7.10.120 Noise Control Officer.
7.10.125 Noise disturbance.
7.10.130 Noise source.
7.10.135 Noise zone.
7.10.140 Nonurban land use category.
7.10.145 Office/commercial land use category.
7.10.150 Person.
7.10.155 Powered model vehicle.
7.10.160 Public recreation facility land use category.
7.10.165 Public right-of-way.
7.10.170 Public space.
7.10.175 Residential land use category.
7.10.180 Sound.
7.10.185 Sound amplifying equipment.
7.10.190 Sound level.
7.10.195 Sound level meter.
7.10.200 Sound pressure.
7.10.205 Sound pressure level.
7.10.210 Supplementary definitions of technical terms.

Section 7.10.010 Definitions generally.

For the purposes of this title, the words and phrases defined in this chapter shall have the meanings respectively ascribed to them by this chapter. (Ord. 6273 § 1 (part), 1996)

Section 7.10.015 A-weighted sound level.

"A-weighted sound level" means the sound pressure level in decibels as measured on a sound level meter using the A-weighing network. The level is designated dB(A) or dBA. (Ord. 6273 § 1 (part), 1996)

Section 7.10.020 Agricultural property.

"Agricultural property" means a parcel of real property which is developed for agricultural and incidental residential purposes which is located within any permitted zone. (Ord. 6273 § 1 (part), 1996)

Section 7.10.025 Ambient noise level.

"Ambient noise level" means the all-encompassing noise level associated with a given environment, being a composite of sounds from all sources, excluding an alleged offensive noise, at the location and approximate time at which the comparison with the offensive noise is to be made. The ambient noise level constitutes the normal or existing level of environmental noise at a given location. (Ord. 6273 § 1 (part), 1996)

Section 7.10.030 Commercial purpose.

"Commercial purpose" means the use, operation or maintenance of any sound amplification equipment for the purpose of advertising any business, goods or services, or for the purposes of attracting the attention of the public, or soliciting patronage of customers to any performance, show, entertainment, exhibition or event, or for the purpose of demonstrating such sound equipment. (Ord. 6273 § 1 (part), 1996)

Section 7.10.035 Construction.

"Construction" means any site preparation including grading, building, fabricating, assembly, substantial repair, alteration, or similar action. (Ord. 6273 § 1 (part), 1996)

Section 7.10.040 Community support land use category.

"Community support land use category" means areas developed with schools, libraries, fire stations, hospitals and similar uses in any zone. (Ord. 6273 § 1 (part), 1996)

Section 7.10.045 Cumulative period.

"Cumulative period" means a total period of time composed of time segments which may be continuous or discontinuous. (Ord. 6273 § 1 (part), 1996)

Section 7.10.050 Decibel (dB).

"Decibel (dB)" means a unit for measuring amplitude of a sound, equal to twenty times the logarithm to the base ten of the ratio of the pressure of the sound measured to the reference pressure, which is twenty micropascals (twenty micronewtons per square meter). (Ord. 6273 § 1 (part), 1996)

Section 7.10.055 Demolition.

"Demolition" means any dismantling, intentional destruction or removal of structures, site improvements, landscaping or utilities. (Ord. 6273 § 1 (part), 1996)

Section 7.10.060 Emergency.

"Emergency" means any occurrence or set of circumstances involving actual or imminent physical trauma or property damage which demands immediate action. (Ord. 6273 § 1 (part), 1996)

Section 7.10.065 Emergency work.

"Emergency work" means work made necessary to restore property to a safe condition following a physical trauma or property damage caused by an emergency or work necessary to prevent or minimize damage from a potential emergency. (Ord. 6273 § 1 (part), 1996)

Section 7.10.070 Fixed noise source.

"Fixed noise source" means a stationary device which creates sounds from a fixed location, including residential, agricultural, industrial and commercial machinery and equipment, pumps fans, compressors, air conditioners and refrigeration devices. (Ord. 6273 § 1 (part), 1996)

Section 7.10.075 Grading.

"Grading" means any excavating and/or filling of earth material to prepare a site for construction or the placement of improvements. (Ord. 6273 § 1 (part), 1996)

Section 7.10.080 Impulsive sound.

"Impulsive sound" means sound of short duration, usually less than one second, with an abrupt onset and rapid decay. Examples include explosions, drum beats, drop-forge impacts, fire crackers, discharge of firearms and one object striking another. (Ord. 6273 § 1 (part), 1996)

Section 7.10.085 Industrial land use category.

"Industrial land use category" means any area occupied by land uses whose primary operation involves warehousing, manufacturing, assembling, distributing, packaging or processing goods in the BMP, I, and AIR zones. (Ord. 6967 § 2, 2007; (Ord. 6273 § 1 (part), 1996)

Section 7.10.090 Intrusive noise.

"Intrusive noise" means a noise which intrudes over and above the existing ambient noise. The relative intrusiveness of the sound depends upon its amplitude, duration, frequency and time of occurrence, tonal or informational content as well as its relationship to the prevailing ambient noise level. (Ord. 6273 § 1 (part), 1996)

Section 7.10.095 Minor maintenance.

"Minor maintenance" means work required to keep property used for residential purposes in an existing state. (Ord. 6273 § 1 (part), 1996)

Section 7.10.100 Mobile noise source.

"Mobile noise source" means any noise source other than a fixed noise source. (Ord. 6273 § 1 (part), 1996)

Section 7.10.105 Motor vehicle.

"Motor vehicle" means any self-propelled vehicle as defined in the California Vehicle Code, including all on-highway types of motor vehicles subject to registration under said code, and all off-highway type motor vehicles subject to identification under said code. (Ord. 6273 § 1 (part), 1996)

Section 7.10.110 Muffler or sound dissapative device.

"Muffler or sound dissapative device" means a device for abating the sound of escaping gases from an internal combustion engine. (Ord. 6273 § 1 (part), 1996)

Section 7.10.115 Noise.

"Noise" means any sound which exceeds the appropriate actual or presumed ambient noise level or which annoys or tends to disturb humans or which causes or tends to cause an adverse psychological or physiological effect on humans. (Ord. 6273 § 1 (part), 1996)

Section 7.10.120 Noise Control Officer.

"Noise Control Officer" means the City official(s) or duly authorized representative(s) with the responsibility to enforce the noise ordinance. (Ord. 6273 § 1 (part), 1996)

Section 7.10.125 Noise disturbance.

"Noise disturbance" means any sound which endangers or injures the safety or health of humans or animals, or annoys or disturbs a reasonable person of normal sensitivities or endangers or injures personal or real property. (Ord. 6273 § 1 (part), 1996)

Section 7.10.130 Noise source.

"Noise source" means a disturbance causing operation which originates from noise generating mechanism. An example of a noise source is the combination of a motor, pump and compressor. (Ord. 6273 § 1 (part), 1996)

Section 7.10.135 Noise zone.

"Noise zone" means defined areas of generally consistent land use where the ambient noise levels are generally similar within a range of five decibels. (Ord. 6273 § 1 (part), 1996)

Section 7.10.140 Nonurban land use category.

"Nonurban land use category" means vacant land or land primarily for agricultural production containing ten acres or more. (Ord. 6273 § 1 (part), 1996)

Section 7.10.145 Office/commercial land use category.

"Office/commercial land use category" means areas developed with office and/or commercial uses in the O, CRC, CR-NC, CR, and CG zones. (Ord. 6967 § 2, 2007; Ord. 6273 § 1 (part), 1996)

Section 7.10.150 Person.

"Person" means any individual, association, partnership or corporation and includes any officer, employee, department, agency or instrumentality of a State or any political subdivision of a State. (Ord. 6273 § 1 (part), 1996)

Section 7.10.155 Powered model vehicle.

"Powered model vehicle" means airborne, waterborne or land-borne vehicles such as model airplanes, model boats, and model vehicles of any type or size which are not designed for carrying persons or property and which can be propelled in any form other than manpower or wind power. (Ord. 6273 § 1 (part), 1996)

Section 7.10.160 Public recreation facility land use category.

"Public recreation facility land use category" means areas developed with public parks and other public recreational facilities. (Ord. 6273 § 1 (part), 1996)

Section 7.10.165 Public right-of-way.

"Public right-of-way" means any street, avenue, boulevard, highway, sidewalk or alley or similar place which is owned or controlled by a government entity. (Ord. 6273 § 1 (part), 1996)

Section 7.10.170 Public space.

"Public space" means any real property or structures which are owned or controlled by a government entity. (Ord. 6273 § 1 (part), 1996)

Section 7.10.175 Residential land use category.

"Residential land use category" means areas primarily used for residential purposes in the RE, RA-5, RR, RC, R-1-1-1/2 acre, R-1-13000, R-1-10500, R-1-8500, R-1-7000, R-3-2500, R-3-4000, R-3-3000, R-3-2000, R-3-1500, and R-4 zones. (Ord. 6967 § 2, 2007; Ord. 6273 § 1 (part), 1996)

Section 7.10.180 Sound.

"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. The description of sound may include any characteristic of such sound, including duration, intensity and frequency. (Ord. 6273 § 1 (part), 1996)

Section 7.10.185 Sound amplifying equipment.

"Sound amplifying equipment" means any device for the amplification of the human voice, or music, or any other sound, excluding devices in motor vehicles when heard only by the occupants of the vehicle, excluding warning devices on authorized emergency vehicles or horns or other warning devices on any vehicle used only for traffic safety purposes. (Ord. 6273 § 1 (part), 1996)

Section 7.10.190 Sound level.

"Sound level" means the weighted sound pressure level obtained by the use of a sound level meter and frequency weighing network, such as A, B or C, as specified in American National Standards Institute specifications for sound level meter ANSI S1.4-1971 or the latest approved revision thereof. If the frequency weighing method used is not stated, the A-weighing shall apply. (Ord. 6273 § 1 (part), 1996)

Section 7.10.195 Sound level meter.

"Sound level meter" means an instrument, including a microphone, an amplifier, an output meter, and frequency weighing networks for the measurement of sound levels which satisfies the requirements for S2A meters in American National Standards Institute specifications for

sound level meters, S1.4-1971, or the most recent revision thereof. (Ord. 6273 § 1 (part), 1996)

Section 7.10.200 Sound pressure.

"Sound pressure" means the instantaneous difference between the actual pressure and the average or barometric pressure at a given point in space, as produced by sound energy. (Ord. 6273 § 1 (part), 1996)

Section 7.10.205 Sound pressure level.

"Sound pressure level" in decibels means twenty times the logarithm to the base ten of the ratio of the pressure of this sound to the reference pressure, which reference pressure shall be explicitly stated. (Ord. 6273 § 1 (part), 1996)

Section 7.10.210 Supplementary definitions of technical terms.

Definitions of technical terms not defined herein shall be obtained from the American National Standard, "Acoustical Terminology" S1.1-1961 (R-1971) or the latest revision thereof. (Ord. 6273 § 1 (part), 1996)

Chapter 7.15

ADMINISTRATION AND ENFORCEMENT

Section:

7.15.005 Administration and enforcement.

Section 7.15.005 Administration and enforcement.

A. The noise regulation shall be enforced by the Code Enforcement Division of the Community & Economic Development Department and/or the Riverside Police Department.

B. It shall be the responsibility of the Code Enforcement Division and/or the Riverside Police Department to enforce the provisions of this Title and to perform all other functions required by this Title. Such duties shall include, but not be limited to investigating potential violations, issuing warning notices and citations, and providing evidence to the City Attorney for legal action.

C. A violation of these regulations may be prosecuted as a misdemeanor or as an infraction. Each day a violation occurs shall constitute a separate offense and shall be punishable as such. However, nothing in these regulations shall prevent any code compliance officer or his duly authorized representatives from efforts to obtain voluntary compliance by way of warning, notice or education. (Ord. 7341 § 6, 2016; Ord. 6959 § 1, 2007; Ord. 6844 § 15, 2006; Ord. 6273 § 1 (part), 1996)

Chapter 7.20

SOUND LEVEL MEASUREMENT

Section:

7.20.010 Sound level measurement.

Section 7.20.010 Sound level measurement.

Except as provided by Chapter 17.35, General Noise Regulations, any sound or noise level measurement made to enforce this title shall be measured with a sound level meter using the A-weighing scale at slow response. The exterior noise level shall be measured at the position or positions along the complainant's property line closest to the noise source or where the noise level is highest. If the complaint concerns an interior source, noise measurements shall be made at a point at least four feet from the wall, ceiling or floor nearest the noise source with windows opened or closed as would be normal for the season. (Ord. 6273 § 1 (part), 1996)

Chapter 7.23

AMBIENT NOISE LEVELS

Sections:

7.23.010 Ambient Sound Levels.
7.23.020 Mixed Use Development.
7.23.030 Infill Single-Family Residential Development.

Section 7.23.010 Ambient Sound Levels.

Title 7 - Noise Control of the Riverside Municipal Code shall be consistent with Title 24 of the Health and Safety Code of the State of California as may be amended from time to time. (Ord. 6967 § 3, 2007)

Section 7.23.020 Mixed Use Development.

Where a new development proposal includes a mix of residential and nonresidential uses within the same project, the interior ambient noise standard for the residential component of the project may be increased by 5 decibels. (Ord. 6967 § 3, 2007)

Section 7.23.030 Infill Single-Family Residential Development.

Where a new development proposal includes an infill single-family residential use, the interior ambient noise standard for the proposal may be increased by 5 decibels. (Ord. 6967 § 3, 2007)

Chapter 7.25

NUISANCE EXTERIOR SOUND LEVEL LIMITS

Section:

7.25.010 Exterior sound level limits.

Section 7.25.010 Exterior sound level limits.

A. Unless a variance has been granted as provided in this chapter, it shall be unlawful for any person to cause or allow the creation of any noise which exceeds the following:

1. The exterior noise standard of the applicable land use category, up to five decibels, for a cumulative period of more than thirty minutes in any hour; or
2. The exterior noise standard of the applicable land use category, plus five decibels, for a cumulative period of more than fifteen minutes in any hour; or
3. The exterior noise standard of the applicable land use category, plus ten decibels, for a cumulative period of more than five minutes in any hour; or
4. The exterior noise standard of the applicable land use category, plus fifteen decibels, for the cumulative period of more than one minute in any hour; or
5. The exterior noise standard for the applicable land use category, plus twenty decibels or the maximum measured ambient noise level, for any period of time.

B. If the measured ambient noise level exceeds that permissible within any of the first four noise limit categories, the allowable noise exposure standard shall be increased in five decibel increments in each category as appropriate to encompass the ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.

C. If possible, the ambient noise level shall be measured at the same location along the property line with the alleged offending noise source inoperative. If for any reason the alleged offending noise source cannot be shut down, then the ambient noise must be estimated by performing a measurement in the same general area of the source but at a sufficient distance that the offending noise is inaudible. If the measurement location is on the boundary between two different districts, the noise shall be the arithmetic mean of the two districts.

D. Where the intruding noise source is an air-conditioning unit or refrigeration system which was installed prior to the effective date of this chapter, the exterior noise level when measured at the property line shall not exceed sixty dBA for units installed before 1-1-80 and fifty-five dBA for units installed after 1-1-80.

Table 7.25.010A

Exterior Noise Standards		
Land Use Category	**Time Period**	**Noise Level**
Residential	Night (10 p.m. to 7 a.m.) Day (7 a.m. to 10 p.m.)	45 dBA 55 dBA
Office/commercial	Any time	65 dBA
Industrial	Any time	70 dBA
Community support	Any time	60 dBA
Public recreation facility	Any time	65 dBA
Nonurban	Any time	70 dBA

Table 7.25.010B

Land Use Category/Zoning Matrix	
Land Use Category	**Underlying Zone**
Residential	RE, RA-5, RR, RC, R-1-1/2 acre, R-1-13000, R-1-10500, R-1-8500, R-1-7000, R-3-2500, R-3-4000, R-3-3000, R-3-2000, R-3-1500, R-4
Office/commercial	O, CRC, CR-NC, CR, CG
Industrial	BMP, I, AIR
Community support	Any permitted zone
Nonurban	Any permitted zone

(Ord. 6967 § 5, 2007; Ord. 6273 § 1 (part), 1996)

Chapter 7.30

NUISANCE INTERIOR SOUND LEVEL LIMITS

Section:
7.30.015 Interior sound level limits.

Section 7.30.015 Interior sound level limits.

A. No person shall operate or cause to be operated, any source of sound indoors which causes the noise level, when measured inside another dwelling unit, school or hospital, to exceed:

1. The interior noise standard for the applicable land category area, up to five decibels, for a cumulative period of more than five minutes in any hour;

2. The interior noise standard for the applicable land use category, plus five decibels, for a cumulative period of more than one minute in any hour;

3. The interior noise standard for the applicable land use category, plus ten decibels or the maximum measured ambient noise level, for any period of time.

B. If the measured interior ambient noise level exceeds that permissible within the first two noise limit categories in this section, the allowable noise exposure standard shall be increased in five decibel increments in each category as appropriate to reflect the interior ambient noise level. In the event the interior ambient noise level exceeds the third noise limit category, the maximum allowable interior noise level under said category shall be increased to reflect the maximum interior ambient noise level.

C. The interior noise standard for various land use districts shall apply, unless otherwise specifically indicated, within structures located in designated zones with windows opened or closed as is typical of the season.

Table 7.30.015

Interior Noise Standard		
Land Use Category	**Time Period**	**Noise Level**
Residential	Night (10 p.m. C 7 a.m.) Day (7 a.m. C 10 p.m.)	35 dBA 45 dBA
School	7 a.m. C 10 p.m. (while school is in session)	45 dBA
Hospital	Any time	45 dBA

(Ord. 6273 § 1 (part), 1996)

Chapter 7.35

GENERAL NOISE REGULATIONS

Sections:

7.35.010 General noise regulations.
7.35.020 Exemptions.

Section 7.35.010 General noise regulations.

A. Notwithstanding the sound level meter standards described in this ordinance, it is nonetheless unlawful for any person to make, continue, or cause to be made or continued any disturbing, excessive or offensive noise which causes discomfort or annoyance to reasonable persons of normal sensitivity. The factors which should be considered in determining whether a violation of this section exists, include the following:

1. The sound level of the objectionable noise.
2. The sound level of the ambient noise.
3. The proximity of the noise to residential sleeping facilities.
4. The zoning of the area.
5. The population density of the area.
6. The time of day or night.
7. The duration of the noise.
8. Whether the noise is recurrent, intermittent, or constant.
9. Whether the noise is produced by a commercial or noncommercial activity.
10. Whether the nature of the noise is usual or unusual.
11. Whether the noise is natural or unnatural.

B. It is unlawful for any person to make, continue, or cause to be made or continued any disturbing, excessive or offensive noise which causes discomfort or annoyance to reasonable persons of normal sensitivity. The following acts, among others, are declared to be disturbing, excessive and offensive noises in violation of this section:

1. Radios, Television Sets, Musical Instruments and similar stationary or mobile devices: Operating, playing or permitting the operation or playing of any radio, television set, audio equipment, drum, musical instrument, or similar device which produces or reproduces sound in such a manner as to disturb the peace, quiet and comfort of neighboring residents or persons of normal sensitivity. The operation of any such set, instrument, audio equipment, television set, machine or similar device between the hours of 10:00 p.m. and 7:00 a.m. in such a manner as to be plainly audible at a distance of 50 feet from the building, structure or vehicle in which it is located, shall be prima facie evidence of a violation of this section.
2. Loud Speakers (Amplified Sound): Using, or operating, or permitting to be used or operated, for any purpose, any loud speaker, loudspeaker system, or similar device between the hours of 10:00 p.m. and 7:00 a.m. such that the sound therefrom creates a noise disturbance across a residential property line, or at any time exceeds the maximum permitted noise level for the underlying land use category, except for any non-commercial public speaking, public assembly or other activity for which a variance has been issued.
3. Animals and Birds: Owning, possessing, or permitting to be harbored any animal or bird which frequently or for a continued duration howls, barks, meows, squawks, or makes other sounds which create a noise disturbance across a residential or commercial property line.

4. Loading and Unloading: Loading, unloading, opening, closing or other handling of boxes, crates, containers, building materials, garbage cans, or similar objects, or permitting these activities between the hours of 10:00 p.m. and 7:00 a.m. in such a manner as to cause a noise disturbance across a residential property line or at any time exceeds the maximum permitted noise level for the underlying land use category.

5. Construction: Operating or causing the operation of any tools or equipment used in construction, drilling, repair, alteration, grading or demolition work between the hours of 7:00 p.m. and 7:00 a.m. on week days and between 5:00 p.m. and 8:00 a.m. on Saturdays or at any time on Sunday or federal holidays.

6. Domestic Power Tools: Operating or permitting the operation of any mechanically powered saw, sander, drill grinder, lawn or garden tool, or similar tool between 10:00 p.m. and 7:00 a.m. so as to create a noise disturbance across a residential or commercial property line. Any motor, machinery, pump, compressor, generator etc., shall be sufficiently muffled and maintained so as not to create a noise disturbance.

7. Powered Model Vehicles: Operating or permitting the operation of powered model vehicles between the hours of 10:00 p.m. and 7:00 a.m. so as to create a noise disturbance across a residential or commercial property line or at any time exceeds the maximum permitted noise level for the underlying land use category.

8. Stationary Non-emergency Signaling Devices: Sounding, or permitting the sounding of any signal from any stationary bell, chime, siren, whistle, or similar device intended primarily for non-emergency purposes, from any place, for more than 10 seconds in any hourly period. Houses of worship and the Mission Inn carillons shall be exempt from the operation of this provision. Sound sources covered by this provision and not exempted under this subsection may be exempted by a variance.

9. Emergency Signaling Devices: The intentional sounding or permitting the sounding outdoors of any fire, burglar or civil defense alarm, siren, whistle or similar stationary emergency signaling device, except for emergency purposes or for testing. Testing of a stationary emergency signaling device shall not occur before 7:00 a.m. or after 7:00 p.m. Any such testing shall only use the minimum cycle test time. In no case shall the test time exceed 10 seconds or occur more than once each calendar month.

10. Vehicle, Motorcycle, Motorboat or Aircraft Repair and Testing: Repairing, rebuilding, modifying or testing any motor vehicle, motorboat or aircraft, or permitting any these activities, in such a manner as to create a noise disturbance across a residential property line, or at any time exceeds the maximum permitted noise level for the underlying land use category shall not be permitted except where said activities are directly related to officially sanctioned events. underlying land use category.

11. For other than noise sources identified in 1-10 above, the following noise disturbance shall be prohibited:

a. Plainly audible across property boundaries;

b. Plainly audible through partitions common to two residences within a building;

c. Plainly audible at a distance of 50 feet in any direction from the source of music or sound between the hours of 7:00 a.m. and 10:00 p.m.; or

d. Plainly audible at a distance of 25 feet in any direction from the source of music or sound between the hours of 10:00 p.m. and 7:00 a.m. (Ord. 7341 §6, 2016; Ord. 6959 §2, 2007; Ord. 6328 § 1, 1996; Ord. 6273 § 1 (part), 1996)

Section 7.35.020 Exemptions.

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

A. Emergency Work. The provisions of this Title shall not apply to the emission of

sound for the purpose of alerting persons to the existence of an emergency or in the performance of emergency work.

B. Entertainment Events. The provisions of this Title shall not apply to those reasonable sounds emanating from authorized school bands, school athletic and school entertainment events and occasional public and private outdoor or indoor gatherings, public dances, shows, bands, sporting and entertainment events conducted between the hours of 7:00 a.m. and 10:00 p.m.

C. Federal or State Preempted Activities. The provisions of this Chapter shall not apply to any other activity the noise level of which is regulated by state or federal law.

D. Minor Maintenance to Residential Property. The provisions of this Title shall not apply to noise sources associated with minor maintenance to property used for residential purposes, provided the activities take place between the hours of 7:00 a.m. and 10:00 p.m.

E. Right-Of-Way Construction. The provisions of this Title shall not apply to any work performed in the City right-of-ways when, in the opinion of the Public Works Director or his designee, such work will create traffic congestion and/or hazardous or unsafe conditions.

F. Public Health, Welfare and Safety Activities. The provisions of this Title shall not apply to construction maintenance and repair operations conducted by public agencies and/or utility companies or their contractors which are deemed necessary to serve the best interests of the public and to protect the public health, welfare and safety, including but not limited to, trash collection, street sweeping, debris and limb removal, removal of downed wires, restoring electrical service, repairing traffic signals, unplugging sewers, vacuuming catch basins, repairing of damaged poles, removal of abandoned vehicles, repairing of water hydrants and mains, gas lines, oil lines, sewers, storm drains, roads, sidewalks, etc.

G. Noise sources associated with construction, repair, remodeling, or grading of any real property; provided a permit has been obtained from the City as required; and provided said activities do not take place between the hours of 7:00 p.m. and 7:00 a.m. on weekdays, between the hours of 5:00 p.m. and 8:00 a.m. on Saturdays, or at any time on Sunday or a federal holiday. (Ord. 7341 § 6, 2016; Ord. 6917 § 1, 2006; Ord. 6328 § 2, 1996; Ord. 6273 § 1 (part), 1996)

Chapter 7.40

VARIANCE PROCEDURE

Sections:

7.40.010 Variance procedure.
7.40.020 Appeals.

Section 7.40.010 Variance procedure.

A. The Zoning Administrator is authorized to grant variances for exemption from any provision of this title, and may limit area of applicability, noise levels, time limits, and other terms and conditions determined appropriate to protect the public health, safety, and welfare. The provisions of this section shall in no way affect the duty to obtain any permit or license required by law for such activities.

B. Any person seeking a variance pursuant to this section shall file an application with the Zoning Administrator. The application shall be signed by the property owner or owner's representative using forms supplied by the Community & Economic Development Department - Planning Division. The application shall contain information which demonstrates that bringing the source of the sound or activity into compliance with this title would constitute an unreasonable hardship to the applicant, the community, or other persons. The Zoning Administrator may require additional information if it is necessary to make a determination regarding the variance request. The application shall be accompanied by a fee established by resolution of the City Council.

C. A separate application shall be filed for each noise source; provided, however, several mobile sources under common ownership or several fixed sources on a single property may be combined into one application. Any person who claims to be adversely affected by the allowance of the variance may file a statement with the Zoning Administrator containing any information to support his claim. If the Zoning Administrator determines that a sufficient controversy exists regarding a variance application, the variance may be set for public hearing before the Planning Commission.

D. Public notice of the consideration of a proposed variance from the standards of this chapter shall be provided by the Zoning Administrator by mailing such notice to property owners within three hundred feet of the exterior boundaries of the property under consideration. The notice shall invite interested persons to notify the Planning Division of any concerns or comments within ten days of the date of the notice.

E. In determining whether to grant or deny the application, the Zoning Administrator or the Planning Commission shall consider comments received from property owners within three hundred feet, hardship on the applicant, the community, or other persons affected and property affected and any other adverse impacts. The requested variance may be granted in whole or in part and upon such terms and conditions as it deems necessary if, from the facts presented on the application, the Zoning Administrator or the Planning Commission finds that:

1. The strict application of the provisions of this title would result in practical difficulties or unnecessary hardships inconsistent with the general purpose of this title;

2. There are exceptional circumstances or conditions applicable to the property involved or to the intended use or development of the property that do not apply generally to other property in the same zone or neighborhood;

3. The granting of such variance will not be materially detrimental to the public welfare or injurious to the property or improvements in the zone or neighborhood in which the property is located;

4. The granting of such variance will not be contrary to the objectives of any part of the adopted General Plan.

F. A variance shall be granted by a notice to the applicant containing all the necessary conditions, including any time limits on the permitted activity. The variance shall not become effective until all the conditions are agreed to by the applicant. Noncompliance with any condition of the variance shall terminate the variance and subject the person holding it to those provisions of this chapter for which the variance was granted.

G. A variance shall be valid for a period not exceeding one year after the date on which it was granted. Applications for extensions of the time limits specified in variances or for the modification of other substantial conditions shall be treated like applications for initial variances.

H. In the event the Zoning Administrator does not approve an application for a variance within ten days after the application is filed it shall be placed on the agenda of the next regularly scheduled Planning Commission, unless the Commission refers the matter to the City Council. (Ord. 7341 § 6, 2016; Ord. 6967 § 7, 2007; Ord. 6462 § 8-10, 1999; Ord. 6273 § 1 (part), 1996)

Section 7.40.020 Appeals.

Any person aggrieved by the approval or disapproval of a variance, may appeal the decision of the Zoning Administrator or Planning Commission to the City Council within ten days after the date of such approval or disapproval. The City Council shall hold a hearing thereon, upon notice to the applicant, considering the same criteria presented to the Zoning Administrator. (Ord. 6462 § 11, 1999; Ord. 6273 § 1 (part), 1996)

Chapter 7.45

SEVERABILITY

Section:
7.45.010 Severability

Section 7.45.010 Severability

If any section, subsection, sentence, clause or phrase in this title is for any reason held to be invalid or unconstitutional by decision of any court of competent jurisdiction, such decision shall not affect the validity of the remaining portions of this title. The City Council hereby declares that it would have passed this title and each section, subsection, clause or phrase thereof irrespective of the fact that any one or more other sections, subsections, clauses or phrases may be declared invalid or unconstitutional. (Ord. 6328 § 3, 1996)

APPENDIX 4.1:

AIRPORT LAND USE COMMISSION (ALUC) DETERMINATION

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AIRPORT LAND USE COMMISSION
RIVERSIDE COUNTY

RECEIVED

MAY – 6 2020

Community & Economic Development Department

April 30, 2020

Ms. Candice Assadzadeh, Senior Planner
City of Riverside Community and Economic Department – Planning Division
3900 Main Street, 3rd Floor
Riverside CA 92522

County Administrative Center
4080 Lemon St., 14th Floor.
Riverside, CA 92501
(951) 955-5132

www.rcaluc.org

RE: AIRPORT LAND USE COMMISSION (ALUC) DEVELOPMENT REVIEW – DIRECTOR'S DETERMINATION

File No.:	ZAP1414MA20– Letter 1 of 2
Related File Nos.:	P19-0775 (General Plan Amendment), P19-0776 (Rezone)
APN:	256-050-012
Airport Zone:	Compatibility Zone E

Dear Ms. Assadzadeh:

Under the delegation of the Riverside County Airport Land Use Commission (ALUC) pursuant to ALUC Resolution No.15-01 (as adopted on August 13, 2015), staff reviewed City of Riverside Case Nos. P19-0775 (General Plan Amendment), P19-0776 (Rezone), a proposal to amend the City's General Plan land use designation of a 9.77 acre parcel located on the northwest corner of Central Avenue and Sycamore Canyon Boulevard from Commercial to Very High Density Residential, and change the zoning of the site from Commercial General to R-4 Multiple-Family Residential.

The site is located within Airport Compatibility Zone E of the March Air Reserve Base/Inland Port Airport Influence Area (AIA). Within Compatibility Zone E of the March Air Reserve Base/Inland Port Airport Land Use Compatibility Plan, residential density are not restricted.

As ALUC Director, I hereby find the above-referenced project **CONSISTENT** with the 2014 March Air Reserve Base/Inland Port Airport Land Use Compatibility Plan ("March ALUCP").

This finding of consistency relates to airport compatibility issues and does not necessarily constitute an endorsement of this general plan amendment and change of zone. Both the existing and proposed General Plan designation and zoning are consistent, as the site is located within Airport Compatibility Zone E, where non-residential intensity and residential density are not restricted.

If you have any questions, please contact Paul Rull, ALUC Principal Planner, at (951) 955-6893.

Sincerely,
RIVERSIDE COUNTY AIRPORT LAND USE COMMISSION

Simon A. Housman, ALUC Director

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APPENDIX 5.1:

STUDY AREA PHOTOS

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JN:12586 Noise Level Measurement Photos

L1_E
33, 57' 33.480000"117, 18' 58.460000"

L1_N
33, 57' 33.480000"117, 18' 58.460000"

L1_S
33, 57' 33.480000"117, 18' 58.460000"

L1_W
33, 57' 33.480000"117, 18' 58.460000"

L2_L3_E
33, 57' 24.050000"117, 18' 42.860000"

L2_L3_N
33, 57' 23.930000"117, 18' 42.720000"

JN:12586 Noise Level Measurement Photos

L2_L3_S
33, 57' 24.040000"117, 18' 42.780000"

L2_L3_W
33, 57' 24.040000"117, 18' 42.910000"

L4_E
33, 57' 21.340000"117, 19' 6.590000"

L4_N
33, 57' 21.280000"117, 19' 6.340000"

L4_S
33, 57' 21.330000"117, 19' 6.590000"

L4_W
33, 57' 21.330000"117, 19' 6.620000"

JN:12586 Noise Level Measurement Photos

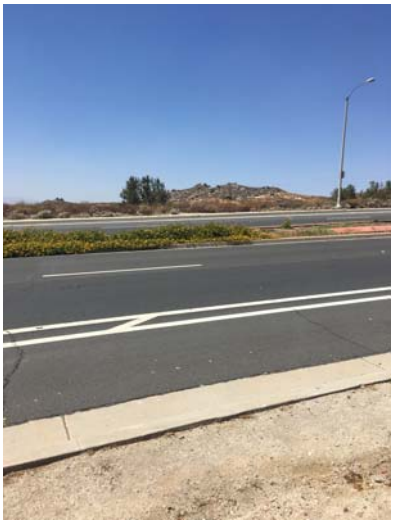
L5_E
33, 57' 27.840000"117, 19' 4.720000"

L5_N
33, 57' 27.840000"117, 19' 4.720000"

L5_S
33, 57' 28.100000"117, 19' 4.580000"

L5_W
33, 57' 28.070000"117, 19' 4.530000"

L6_E
33, 57' 25.180000"117, 18' 55.240000"



L6_N
33, 57' 25.230000"117, 18' 55.190000"

JN:12586 Noise Level Measurement Photos

L6_S
33, 57' 25.260000"117, 18' 55.130000"

L6_W
33, 57' 25.290000"117, 18' 55.130000"

L7_E
33, 57' 31.260000"117, 18' 48.630000"

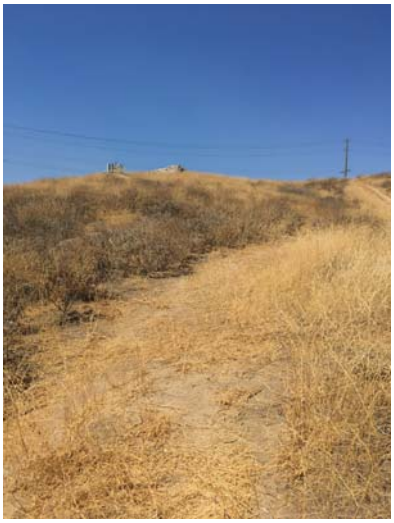
L7_N
33, 57' 22.950000"117, 19' 3.130000"

L7_S
33, 57' 31.260000"117, 18' 48.650000"

L7_W
33, 57' 31.250000"117, 18' 48.650000"

JN:12586 Noise Level Measurement Photos

L8_E
33, 57' 34.100000"117, 18' 52.580000"



L8_N
33, 57' 34.140000"117, 18' 52.580000"

L8_S
33, 57' 34.090000"117, 18' 52.610000"

L8_W
33, 57' 34.130000"117, 18' 52.640000"

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APPENDIX 5.2:

NOISE LEVEL MEASUREMENT WORKSHEETS

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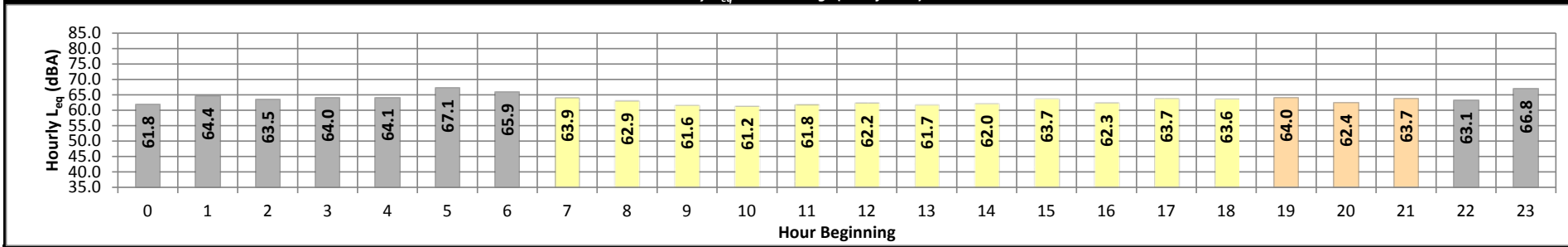
24-Hour Noise Level Measurement Summary

Date: Thursday, August 08, 2019 *Location:* L1 - Northeast of location site. Located on Watkins Dr and Gernet Rd outside of gates leading west into Gernet Rd *Meter:* Piccolo II *JN:* 12586

Project: Crestview Apartments *Source:* *Analyst:* P. Mara

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	61.8	68.4	54.5	67.7	66.2	65.0	60.5	56.0	55.0	0.0	0.0	0.0	61.8	10.0	71.8
	1	64.4	76.9	54.2	76.5	66.6	65.3	61.1	55.7	54.8	0.0	0.0	0.0	64.4	10.0	74.4
	2	63.5	71.4	56.3	70.4	68.5	67.1	61.6	57.8	56.8	0.0	0.0	0.0	63.5	10.0	73.5
	3	64.0	70.2	58.1	69.3	67.4	66.5	63.2	59.7	58.7	0.0	0.0	0.0	64.0	10.0	74.0
	4	64.1	69.3	59.7	68.3	66.9	66.1	63.6	61.0	60.2	0.0	0.0	0.0	64.1	10.0	74.1
	5	67.1	80.3	61.5	79.4	69.3	67.6	64.5	62.4	61.9	0.0	0.0	0.0	67.1	10.0	77.1
	6	65.9	78.2	58.9	76.8	70.1	68.0	63.6	60.1	59.4	0.0	0.0	0.0	65.9	10.0	75.9
Day	7	63.9	74.5	56.6	73.3	67.8	66.5	62.1	58.0	57.1	0.0	0.0	0.0	63.9	0.0	63.9
	8	62.9	72.4	56.3	71.1	67.7	65.6	61.0	57.5	56.8	0.0	0.0	0.0	62.9	0.0	62.9
	9	61.6	71.7	55.5	70.3	65.8	63.7	59.7	56.6	56.0	0.0	0.0	0.0	61.6	0.0	61.6
	10	61.2	68.1	56.1	67.1	64.7	63.4	60.3	57.3	56.6	0.0	0.0	0.0	61.2	0.0	61.2
	11	61.8	72.1	56.3	70.8	65.4	64.1	60.4	57.5	56.8	0.0	0.0	0.0	61.8	0.0	61.8
	12	62.2	71.8	55.8	70.6	67.1	65.3	60.1	57.0	56.3	0.0	0.0	0.0	62.2	0.0	62.2
	13	61.7	70.0	56.4	68.8	65.6	64.0	60.5	57.5	56.9	0.0	0.0	0.0	61.7	0.0	61.7
	14	62.0	71.4	55.6	70.2	66.6	64.6	60.2	56.9	56.1	0.0	0.0	0.0	62.0	0.0	62.0
	15	63.7	75.9	56.7	74.2	68.4	65.5	61.0	57.9	57.2	0.0	0.0	0.0	63.7	0.0	63.7
	16	62.3	70.1	57.2	68.4	65.8	64.5	61.3	58.4	57.7	0.0	0.0	0.0	62.3	0.0	62.3
	17	63.7	73.3	58.0	71.9	67.1	65.6	62.5	59.4	58.6	0.0	0.0	0.0	63.7	0.0	63.7
	18	63.6	71.3	57.9	70.1	67.6	65.8	62.5	59.3	58.5	0.0	0.0	0.0	63.6	0.0	63.6
Evening	19	64.0	73.0	57.4	72.0	68.1	66.8	62.4	58.6	57.8	0.0	0.0	0.0	64.0	5.0	69.0
	20	62.4	69.7	56.3	68.6	66.1	64.9	61.4	57.7	56.9	0.0	0.0	0.0	62.4	5.0	67.4
	21	63.7	71.9	56.7	70.4	67.5	66.2	62.5	58.4	57.4	0.0	0.0	0.0	63.7	5.0	68.7
Night	22	63.1	70.2	56.1	69.1	66.9	65.9	62.1	57.6	56.6	0.0	0.0	0.0	63.1	10.0	73.1
	23	66.8	81.1	54.8	80.1	70.1	68.8	61.7	56.6	55.4	0.0	0.0	0.0	66.8	10.0	76.8

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	61.2	68.1	55.5	67.1	64.7	63.4	59.7	56.6	56.0	0.0	0.0	0.0
	Max	63.9	75.9	58.0	74.2	68.4	66.5	62.5	59.4	58.6	0.0	0.0	0.0
Energy Average		62.6	Average:		70.6	66.6	64.9	61.0	57.8	57.0	0.0	0.0	0.0
Evening	Min	62.4	69.7	56.3	68.6	66.1	64.9	61.4	57.7	56.9	0.0	0.0	0.0
	Max	64.0	73.0	57.4	72.0	68.1	66.8	62.5	58.6	57.8	0.0	0.0	0.0
Energy Average		63.4	Average:		70.3	67.2	66.0	62.1	58.3	57.4	0.0	0.0	0.0
Night	Min	61.8	68.4	54.2	67.7	66.2	65.0	60.5	55.7	54.8	0.0	0.0	0.0
	Max	67.1	81.1	61.5	80.1	70.1	68.8	64.5	62.4	61.9	0.0	0.0	0.0
Energy Average		64.8	Average:		73.1	68.0	66.7	62.4	58.5	57.7	0.0	0.0	0.0

L_{eq} (dBA)

24-Hour	Daytime	Nighttime
63.7	**62.8**	**64.8**

24-Hour CNEL (dBA)

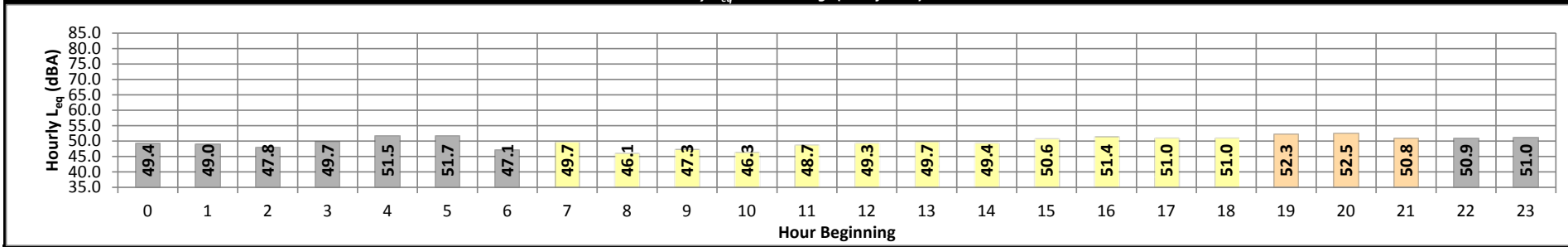
71.2

24-Hour Noise Level Measurement Summary

Date: Thursday, August 08, 2019 *Location:* L2 - Located south of project site along Harvard Way just south of central ave along a bend. *Meter:* Piccolo II *JN:* 12586

Project: Crestview Apartments *Source:* *Analyst:* P. Mara

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	*Hour*	*L_{eq}*	*L_{max}*	*L_{min}*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*	*L_{eq}*	*Adj.*	*Adj. L_{eq}*
Night	0	49.4	56.3	44.8	54.9	53.2	52.0	48.3	45.8	45.3	0.0	0.0	0.0	49.4	10.0	59.4
	1	49.0	56.8	45.0	55.6	52.7	50.7	48.1	46.0	45.5	0.0	0.0	0.0	49.0	10.0	59.0
	2	47.8	55.9	43.3	54.4	52.2	50.6	46.4	44.3	43.8	0.0	0.0	0.0	47.8	10.0	57.8
	3	49.7	58.8	46.3	56.9	52.3	51.4	48.8	47.1	46.7	0.0	0.0	0.0	49.7	10.0	59.7
	4	51.5	57.2	48.4	56.3	54.1	53.2	51.0	49.3	48.8	0.0	0.0	0.0	51.5	10.0	61.5
	5	51.7	56.8	48.5	55.9	54.2	53.5	51.2	49.4	48.9	0.0	0.0	0.0	51.7	10.0	61.7
	6	47.1	54.1	43.7	53.1	50.4	49.1	46.3	44.5	44.1	0.0	0.0	0.0	47.1	10.0	57.1
Day	7	49.7	61.8	43.8	59.6	55.8	52.7	46.3	44.6	44.2	0.0	0.0	0.0	49.7	0.0	49.7
	8	46.1	56.6	42.2	53.3	49.1	47.9	45.0	43.0	42.6	0.0	0.0	0.0	46.1	0.0	46.1
	9	47.3	54.4	44.8	52.9	49.6	48.6	46.6	45.4	45.1	0.0	0.0	0.0	47.3	0.0	47.3
	10	46.3	55.0	41.6	53.5	50.1	48.6	44.9	42.6	42.1	0.0	0.0	0.0	46.3	0.0	46.3
	11	48.7	58.4	43.9	56.4	52.5	51.0	47.4	45.1	44.5	0.0	0.0	0.0	48.7	0.0	48.7
	12	49.3	58.2	44.3	56.9	53.1	51.3	48.1	45.6	45.0	0.0	0.0	0.0	49.3	0.0	49.3
	13	49.7	61.9	43.6	59.8	54.2	52.4	47.3	44.8	44.2	0.0	0.0	0.0	49.7	0.0	49.7
	14	49.4	57.7	44.7	56.0	52.9	51.6	48.3	45.9	45.2	0.0	0.0	0.0	49.4	0.0	49.4
	15	50.6	61.7	45.3	58.7	54.5	52.8	49.1	46.5	45.9	0.0	0.0	0.0	50.6	0.0	50.6
	16	51.4	61.4	46.4	60.1	54.4	53.1	50.0	47.5	47.0	0.0	0.0	0.0	51.4	0.0	51.4
	17	51.0	61.2	46.0	59.9	55.1	52.9	49.5	47.1	46.6	0.0	0.0	0.0	51.0	0.0	51.0
	18	51.0	59.8	46.2	58.4	54.9	53.2	49.8	47.3	46.7	0.0	0.0	0.0	51.0	0.0	51.0
Evening	19	52.3	60.9	47.3	59.8	57.0	55.3	50.5	48.4	47.9	0.0	0.0	0.0	52.3	5.0	57.3
	20	52.5	61.1	48.9	59.8	55.6	53.9	51.6	49.8	49.4	0.0	0.0	0.0	52.5	5.0	57.5
	21	50.8	57.4	46.3	56.3	54.2	53.1	49.9	47.5	46.8	0.0	0.0	0.0	50.8	5.0	55.8
Night	22	50.9	58.7	46.1	57.5	55.1	53.4	49.6	47.1	46.6	0.0	0.0	0.0	50.9	10.0	60.9
	23	51.0	59.3	46.2	57.7	54.9	53.2	50.0	47.3	46.7	0.0	0.0	0.0	51.0	10.0	61.0

Timeframe	*Hour*	*L_{eq}*	*L_{max}*	*L_{min}*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	46.1	54.4	41.6	52.9	49.1	47.9	44.9	42.6	42.1	0.0	0.0	0.0
	Max	51.4	61.9	46.4	60.1	55.8	53.2	50.0	47.5	47.0	0.0	0.0	0.0
Energy Average		49.5	Average:		57.1	53.0	51.3	47.7	45.4	44.9	0.0	0.0	0.0
Evening	Min	50.8	57.4	46.3	56.3	54.2	53.1	49.9	47.5	46.8	0.0	0.0	0.0
	Max	52.5	61.1	48.9	59.8	57.0	55.3	51.6	49.8	49.4	0.0	0.0	0.0
Energy Average		51.9	Average:		58.6	55.6	54.1	50.7	48.5	48.0	0.0	0.0	0.0
Night	Min	47.1	54.1	43.3	53.1	50.4	49.1	46.3	44.3	43.8	0.0	0.0	0.0
	Max	51.7	59.3	48.5	57.7	55.1	53.5	51.2	49.4	48.9	0.0	0.0	0.0
Energy Average		50.1	Average:		55.8	53.3	51.9	48.9	46.8	46.3	0.0	0.0	0.0

L_{eq} (dBA)

24-Hour	*Daytime*	*Nighttime*
50.1	**50.1**	**50.1**

24-Hour CNEL (dBA)

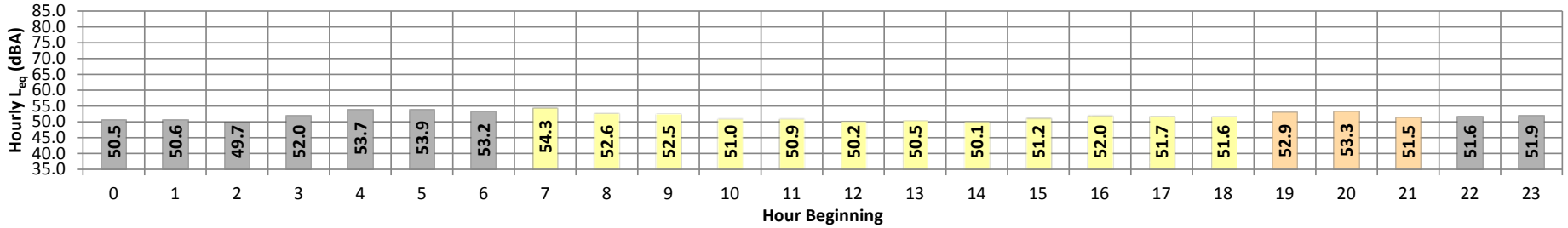
56.9

24-Hour Noise Level Measurement Summary

Date: Thursday, August 08, 2019 *Location:* L3 - Located south of project site along Harvard Way just south of central ave along a bend. *Meter:* Piccolo II *JN:* 12586

Project: Crestview Apartments *Source:* *Analyst:* P. Mara

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	50.5	57.5	45.9	55.9	54.2	53.2	49.4	47.0	46.4	0.0	0.0	0.0	50.5	10.0	60.5
	1	50.6	57.9	46.6	56.9	54.2	52.2	49.7	47.6	47.1	0.0	0.0	0.0	50.6	10.0	60.6
	2	49.7	57.9	45.2	55.9	54.0	52.5	48.4	46.2	45.7	0.0	0.0	0.0	49.7	10.0	59.7
	3	52.0	61.0	48.5	59.2	54.6	53.6	51.1	49.4	48.9	0.0	0.0	0.0	52.0	10.0	62.0
	4	53.7	59.5	50.5	58.4	56.2	55.3	53.1	51.3	50.9	0.0	0.0	0.0	53.7	10.0	63.7
	5	53.9	59.0	50.5	58.1	56.5	55.8	53.4	51.5	51.0	0.0	0.0	0.0	53.9	10.0	63.9
	6	53.2	60.2	49.1	59.0	56.7	55.1	52.3	50.2	49.6	0.0	0.0	0.0	53.2	10.0	63.2
Day	7	54.3	64.2	49.2	62.3	59.1	56.9	52.5	50.5	49.9	0.0	0.0	0.0	54.3	0.0	54.3
	8	52.6	60.9	47.5	59.0	56.1	55.0	51.3	48.9	48.2	0.0	0.0	0.0	52.6	0.0	52.6
	9	52.5	59.9	49.1	58.6	55.5	54.4	51.6	50.0	49.5	0.0	0.0	0.0	52.5	0.0	52.5
	10	51.0	59.2	45.2	57.9	55.0	53.6	49.5	46.5	45.9	0.0	0.0	0.0	51.0	0.0	51.0
	11	50.9	60.7	45.6	59.0	55.0	53.5	49.4	47.0	46.3	0.0	0.0	0.0	50.9	0.0	50.9
	12	50.2	59.1	45.1	57.9	54.0	52.1	49.0	46.4	45.7	0.0	0.0	0.0	50.2	0.0	50.2
	13	50.5	62.5	44.3	60.7	55.1	52.8	48.0	45.5	44.9	0.0	0.0	0.0	50.5	0.0	50.5
	14	50.1	58.3	45.3	56.8	53.5	52.2	49.0	46.6	46.0	0.0	0.0	0.0	50.1	0.0	50.1
	15	51.2	61.5	45.9	58.5	55.0	53.4	49.9	47.3	46.5	0.0	0.0	0.0	51.2	0.0	51.2
	16	52.0	61.9	47.1	60.9	55.1	53.8	50.7	48.2	47.6	0.0	0.0	0.0	52.0	0.0	52.0
	17	51.7	61.9	46.7	60.7	55.9	53.4	50.1	47.8	47.2	0.0	0.0	0.0	51.7	0.0	51.7
	18	51.6	60.3	46.9	58.8	55.6	53.9	50.4	48.0	47.4	0.0	0.0	0.0	51.6	0.0	51.6
Evening	19	52.9	61.4	48.0	60.3	57.5	56.0	51.2	49.1	48.5	0.0	0.0	0.0	52.9	5.0	57.9
	20	53.3	61.4	49.7	60.3	56.5	54.7	52.3	50.6	50.1	0.0	0.0	0.0	53.3	5.0	58.3
	21	51.5	58.1	47.0	57.0	54.8	53.8	50.6	48.1	47.5	0.0	0.0	0.0	51.5	5.0	56.5
Night	22	51.6	59.6	46.7	58.4	55.8	53.9	50.3	47.9	47.2	0.0	0.0	0.0	51.6	10.0	61.6
	23	51.9	59.9	47.1	58.5	55.7	54.0	50.8	48.2	47.6	0.0	0.0	0.0	51.9	10.0	61.9

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	50.1	58.3	44.3	56.8	53.5	52.1	48.0	45.5	44.9	0.0	0.0	0.0
	Max	54.3	64.2	49.2	62.3	59.1	56.9	52.5	50.5	49.9	0.0	0.0	0.0
Energy Average		51.7	Average:		59.3	55.4	53.8	50.1	47.7	47.1	0.0	0.0	0.0
Evening	Min	51.5	58.1	47.0	57.0	54.8	53.8	50.6	48.1	47.5	0.0	0.0	0.0
	Max	53.3	61.4	49.7	60.3	57.5	56.0	52.3	50.6	50.1	0.0	0.0	0.0
Energy Average		52.6	Average:		59.2	56.2	54.8	51.4	49.2	48.7	0.0	0.0	0.0
Night	Min	49.7	57.5	45.2	55.9	54.0	52.2	48.4	46.2	45.7	0.0	0.0	0.0
	Max	53.9	61.0	50.5	59.2	56.7	55.8	53.4	51.5	51.0	0.0	0.0	0.0
Energy Average		52.1	Average:		57.8	55.3	54.0	51.0	48.8	48.3	0.0	0.0	0.0

L_{eq} (dBA)

24-Hour	*Daytime*	*Nighttime*
52.0	**51.9**	**52.1**

24-Hour CNEL (dBA)

58.8

24-Hour Noise Level Measurement Summary

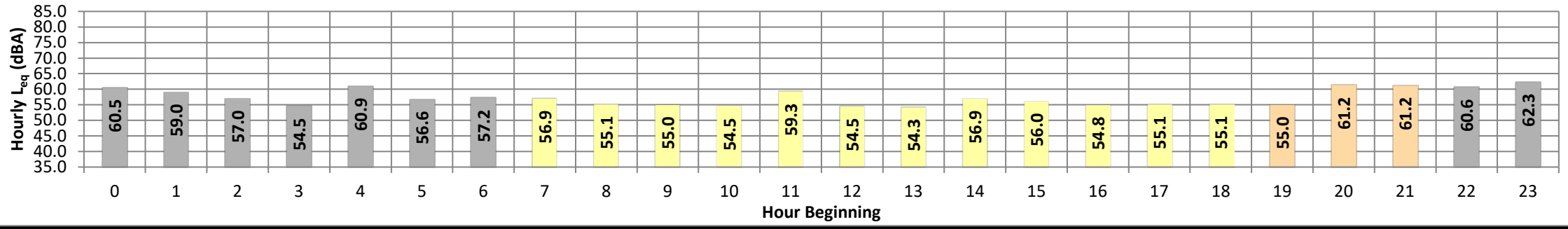
Date: Wednesday, July 08, 2020
Project: Crestview Apartments

Location: L4 - Located southwest of the Project site north of Central Avenue near existing multi-family residential homes at 375 Central Avenue.

Meter: Piccolo II

JN: 12586
Analyst: P. Mara

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	60.5	66.1	59.8	66.0	65.9	65.5	65.2	64.3	63.8	62.7	62.1	60.2	60.5	10.0	70.5
	1	59.0	61.2	55.9	61.1	61.0	60.8	60.5	59.5	59.0	57.6	57.0	56.1	59.0	10.0	69.0
	2	57.0	60.6	52.7	60.4	60.2	59.6	59.1	57.5	56.9	54.5	53.7	52.8	57.0	10.0	67.0
	3	54.5	59.4	51.2	59.2	59.0	58.3	57.5	54.9	53.6	51.9	51.6	51.3	54.5	10.0	64.5
	4	60.9	63.5	57.1	63.4	63.3	62.9	62.6	61.4	60.9	59.1	58.3	57.4	60.9	10.0	70.9
	5	56.6	63.3	51.5	63.2	62.9	61.6	60.7	57.3	54.6	52.1	51.8	51.6	56.6	10.0	66.6
	6	57.2	64.4	47.4	64.2	63.9	62.8	61.8	58.4	54.7	48.8	48.2	47.5	57.2	10.0	67.2
Day	7	56.9	64.5	45.9	64.2	64.0	63.2	61.9	57.6	53.7	47.3	46.6	46.0	56.9	0.0	56.9
	8	55.1	62.1	45.2	61.8	61.5	60.4	59.5	56.4	52.8	46.8	46.0	45.3	55.1	0.0	55.1
	9	55.0	62.0	46.9	61.7	61.4	60.2	59.3	56.1	52.6	48.1	47.4	47.0	55.0	0.0	55.0
	10	54.5	62.3	45.2	62.0	61.5	60.4	59.2	55.4	52.0	46.6	45.8	45.3	54.5	0.0	54.5
	11	59.3	65.0	48.7	64.8	64.6	63.7	63.2	61.1	57.9	51.2	49.9	48.9	59.3	0.0	59.3
	12	54.5	62.8	45.8	62.4	61.8	59.8	58.3	55.3	52.4	47.6	46.7	46.0	54.5	0.0	54.5
	13	54.3	62.6	44.6	62.0	61.4	59.7	58.5	55.2	51.7	46.1	45.4	44.7	54.3	0.0	54.3
	14	56.9	63.9	48.3	63.5	63.1	62.2	61.5	58.5	53.7	49.6	48.9	48.5	56.9	0.0	56.9
	15	56.0	64.4	48.5	64.0	63.4	61.4	59.9	56.4	53.7	49.6	49.1	48.7	56.0	0.0	56.0
	16	54.8	61.0	47.5	60.8	60.5	59.5	58.8	56.1	53.2	49.1	48.3	47.6	54.8	0.0	54.8
	17	55.1	61.9	48.4	61.6	61.3	60.0	59.1	56.1	53.4	49.6	49.0	48.5	55.1	0.0	55.1
	18	55.1	63.1	48.9	62.6	62.1	60.2	58.7	55.8	53.1	49.9	49.5	49.0	55.1	0.0	55.1
Evening	19	55.0	61.2	49.2	61.0	60.7	59.6	58.7	56.0	53.4	50.2	49.7	49.4	55.0	5.0	60.0
	20	61.2	64.9	57.2	64.7	64.4	63.6	62.9	61.8	61.0	59.6	58.9	57.6	61.2	5.0	66.2
	21	61.2	64.6	57.8	64.2	64.0	63.3	62.8	61.8	60.8	59.4	58.9	58.1	61.2	5.0	66.2
Night	22	60.6	64.1	57.4	63.9	63.6	62.9	62.2	61.1	60.4	59.0	58.4	57.6	60.6	10.0	70.6
	23	62.3	65.2	57.0	65.1	64.9	64.3	63.9	63.0	62.3	60.1	58.7	57.3	62.3	10.0	72.3

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	54.3	61.0	44.6	60.8	60.5	59.5	58.3	55.2	51.7	46.1	45.4	44.7
	Max	59.3	65.0	48.9	64.8	64.6	63.7	63.2	61.1	57.9	51.2	49.9	49.0
Energy Average		55.9	Average:		62.6	62.2	60.9	59.8	56.7	53.4	48.5	47.7	47.1
Evening	Min	55.0	61.2	49.2	61.0	60.7	59.6	58.7	56.0	53.4	50.2	49.7	49.4
	Max	61.2	64.9	57.8	64.7	64.4	63.6	62.9	61.8	61.0	59.6	58.9	58.1
Energy Average		59.9	Average:		63.3	63.0	62.2	61.5	59.8	58.4	56.4	55.8	55.0
Night	Min	54.5	59.4	47.4	59.2	59.0	58.3	57.5	54.9	53.6	48.8	48.2	47.5
	Max	62.3	66.1	59.8	66.0	65.9	65.5	65.2	64.3	63.8	62.7	62.1	60.2
Energy Average		59.4	Average:		62.9	62.7	62.1	61.5	59.7	58.5	56.2	55.5	54.7

L_{eq} (dBA)

24-Hour	*Daytime*	*Nighttime*
58.1	**57.0**	**59.4**

24-Hour CNEL (dBA)

65.8

URBAN CROSSROADS

24-Hour Noise Level Measurement Summary

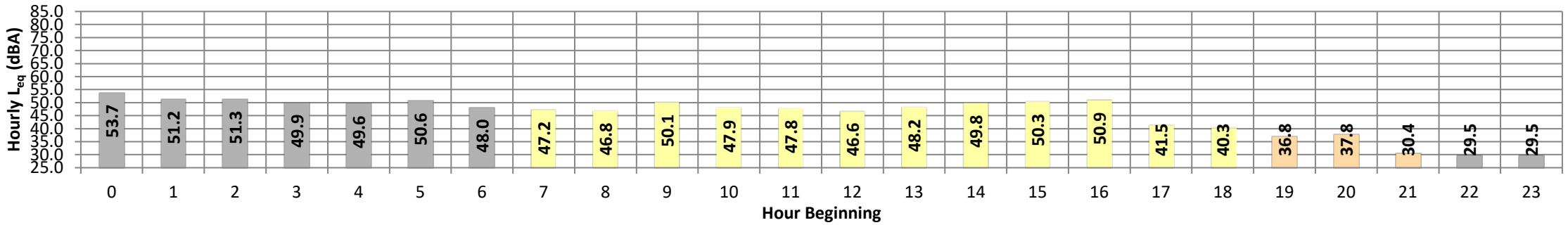
Date: Thursday, July 09, 2020
Project: Crestview Apartments

Location: L5 - Located west of the Project site near the Stone Canyon Apartments at 5100 Quail Run Road.

Meter: Piccolo II

JN: 12586
Analyst: P. Mara

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	53.7	55.1	52.9	54.9	54.7	54.5	54.3	53.9	53.7	53.2	53.1	53.0	53.7	10.0	63.7
	1	51.2	52.6	50.4	52.4	52.3	52.0	51.8	51.6	51.1	50.6	50.6	50.5	51.2	10.0	61.2
	2	51.3	53.9	50.0	53.7	53.5	52.9	52.5	51.6	51.1	50.3	50.2	50.1	51.3	10.0	61.3
	3	49.9	51.2	48.7	51.1	51.0	50.8	50.7	50.3	49.8	49.0	48.9	48.8	49.9	10.0	59.9
	4	49.6	52.1	48.1	51.9	51.5	51.1	50.5	50.0	49.4	48.5	48.3	48.2	49.6	10.0	59.6
	5	50.6	54.3	48.4	54.1	53.8	53.4	52.7	51.2	50.2	48.9	48.7	48.6	50.6	10.0	60.6
	6	48.0	52.4	46.2	51.8	51.3	50.3	49.8	48.4	47.6	46.6	46.5	46.3	48.0	10.0	58.0
Day	7	47.2	50.9	44.4	50.6	50.3	49.9	49.5	48.4	46.6	44.8	44.7	44.5	47.2	0.0	47.2
	8	46.8	50.4	44.5	50.1	49.8	49.3	48.8	47.4	46.2	44.9	44.7	44.6	46.8	0.0	46.8
	9	50.1	55.6	47.5	55.4	55.1	54.3	53.8	49.8	48.7	47.8	47.7	47.6	50.1	0.0	50.1
	10	47.9	54.1	45.4	53.5	52.6	51.1	50.3	48.3	47.0	45.8	45.6	45.5	47.9	0.0	47.9
	11	47.8	53.1	45.3	52.5	52.1	50.6	50.0	48.2	47.2	45.6	45.5	45.3	47.8	0.0	47.8
	12	46.6	49.3	45.0	49.0	48.7	48.2	47.9	47.1	46.5	45.4	45.3	45.1	46.6	0.0	46.6
	13	48.2	56.3	45.3	55.3	54.6	53.0	51.4	47.8	46.7	45.7	45.6	45.4	48.2	0.0	48.2
	14	49.8	57.7	46.9	56.9	55.7	53.7	52.7	50.0	48.2	47.4	47.3	47.0	49.8	0.0	49.8
	15	50.3	53.9	48.6	53.5	53.1	52.3	51.9	50.7	49.9	49.0	48.9	48.7	50.3	0.0	50.3
	16	50.9	56.0	48.8	55.5	55.1	54.1	53.4	51.0	50.1	49.1	49.0	48.8	50.9	0.0	50.9
	17	41.5	44.3	39.7	43.9	43.5	42.8	42.6	42.0	41.4	40.2	40.1	39.9	41.5	0.0	41.5
	18	40.3	41.9	39.3	41.7	41.6	41.4	41.3	40.6	40.2	39.7	39.5	39.4	40.3	0.0	40.3
Evening	19	36.8	41.0	34.7	40.4	39.9	38.7	38.3	37.4	36.4	35.2	35.0	34.8	36.8	5.0	41.8
	20	37.8	49.1	34.2	47.8	46.0	41.6	38.7	37.0	36.3	34.7	34.6	34.4	37.8	5.0	42.8
	21	30.4	32.3	29.8	32.1	32.0	31.5	31.2	30.4	30.1	29.9	29.9	29.8	30.4	5.0	35.4
Night	22	29.5	31.7	29.1	31.4	31.1	30.6	30.2	29.5	29.3	29.2	29.2	29.2	29.5	10.0	39.5
	23	29.5	31.9	29.1	31.6	31.4	30.7	30.2	29.5	29.3	29.2	29.1	29.1	29.5	10.0	39.5

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	40.3	41.9	39.3	41.7	41.6	41.4	41.3	40.6	40.2	39.7	39.5	39.4
	Max	50.9	57.7	48.8	56.9	55.7	54.3	53.8	51.0	50.1	49.1	49.0	48.8
Energy Average		48.2	Average:		51.5	51.0	50.1	49.5	47.6	46.6	45.4	45.3	45.1
Evening	Min	30.4	32.3	29.8	32.1	32.0	31.5	31.2	30.4	30.1	29.9	29.9	29.8
	Max	37.8	49.1	34.7	47.8	46.0	41.6	38.7	37.4	36.4	35.2	35.0	34.8
Energy Average		36.0	Average:		40.1	39.3	37.2	36.1	34.9	34.3	33.3	33.2	33.0
Night	Min	29.5	31.7	29.1	31.4	31.1	30.6	30.2	29.5	29.3	29.2	29.1	29.1
	Max	53.7	55.1	52.9	54.9	54.7	54.5	54.3	53.9	53.7	53.2	53.1	53.0
Energy Average		49.9	Average:		48.1	47.9	47.3	47.0	46.2	45.7	45.1	45.0	44.9

L_{eq} (dBA)		
24-Hour	Daytime	Nighttime
48.4	47.3	49.9

24-Hour CNEL (dBA)
56.0

URBAN CROSSROADS

24-Hour Noise Level Measurement Summary

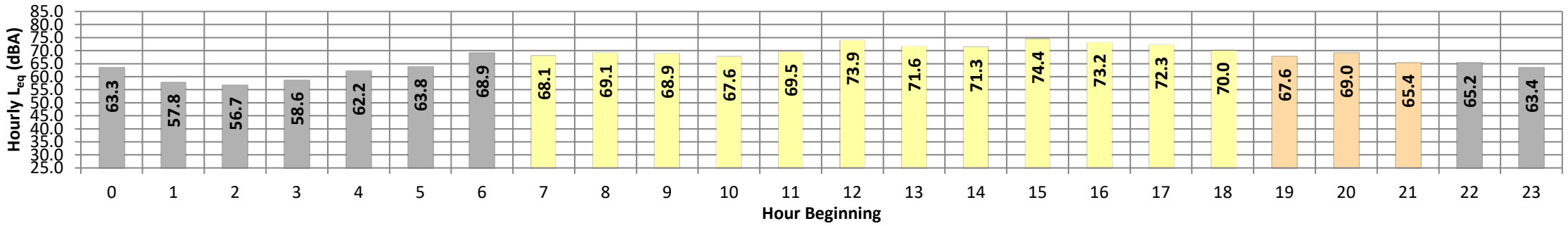
Date: Wednesday, July 08, 2020
Project: Crestview Apartments

Location: L6 - Located southwest of the Project site on Central Avenue north of existing single-family residential home at 5240 Lochmoor Drive.

Meter: Piccolo II

JN: 12586
Analyst: P. Mara

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	63.3	77.6	44.5	77.1	75.7	70.9	66.6	55.2	48.5	45.2	45.0	44.6	63.3	10.0	73.3
	1	57.8	70.5	45.7	69.9	68.6	65.5	62.9	53.7	48.5	46.4	46.1	45.8	57.8	10.0	67.8
	2	56.7	69.5	45.7	69.1	68.0	64.0	60.9	53.0	48.0	46.2	46.0	45.8	56.7	10.0	66.7
	3	58.6	71.6	47.0	71.1	70.0	66.2	63.2	53.2	49.4	47.6	47.4	47.1	58.6	10.0	68.6
	4	62.2	74.2	50.0	73.7	72.7	69.7	67.2	59.8	54.2	50.8	50.4	50.1	62.2	10.0	72.2
	5	63.8	75.6	51.2	75.0	73.7	70.8	69.0	62.7	56.7	52.0	51.6	51.3	63.8	10.0	73.8
	6	68.9	81.4	49.0	80.9	79.9	76.4	74.0	66.5	59.7	50.7	49.9	49.2	68.9	10.0	78.9
Day	7	68.1	78.8	47.3	78.4	77.6	75.3	73.4	67.9	61.5	49.7	48.3	47.5	68.1	0.0	68.1
	8	69.1	80.6	47.3	80.1	79.2	76.2	74.2	68.4	62.4	50.1	48.6	47.5	69.1	0.0	69.1
	9	68.9	80.0	47.1	79.5	78.7	76.1	74.1	68.5	61.6	50.0	48.3	47.3	68.9	0.0	68.9
	10	67.6	78.4	46.9	77.7	76.7	74.4	72.7	67.8	61.9	50.1	48.1	47.1	67.6	0.0	67.6
	11	69.5	80.1	48.6	79.6	78.7	76.2	74.3	69.5	64.7	53.2	50.4	48.9	69.5	0.0	69.5
	12	73.9	87.8	50.5	86.5	84.9	80.2	76.7	72.2	68.4	57.2	54.5	51.7	73.9	0.0	73.9
	13	71.6	84.1	49.9	83.5	82.2	77.9	75.2	70.6	66.0	54.8	52.4	50.3	71.6	0.0	71.6
	14	71.3	84.2	49.6	83.4	81.9	77.7	75.0	70.3	65.4	53.6	51.5	49.8	71.3	0.0	71.3
	15	74.4	87.3	52.9	86.4	85.4	82.3	79.2	71.8	66.6	56.5	54.7	53.2	74.4	0.0	74.4
	16	73.2	86.0	53.4	85.5	84.2	79.8	76.9	71.2	67.1	56.7	55.0	53.6	73.2	0.0	73.2
	17	72.3	84.4	53.1	83.6	82.2	78.4	76.0	71.8	68.0	57.3	55.3	53.4	72.3	0.0	72.3
	18	70.0	82.3	50.6	81.7	80.7	76.6	74.0	69.1	63.7	53.3	51.8	50.8	70.0	0.0	70.0
Evening	19	67.6	79.2	49.6	78.5	77.5	74.2	72.3	67.3	61.4	51.4	50.5	49.8	67.6	5.0	72.6
	20	69.0	81.9	50.0	81.2	80.0	76.1	73.3	66.6	61.4	51.5	50.7	50.1	69.0	5.0	74.0
	21	65.4	76.9	48.8	76.4	75.5	72.6	70.4	64.5	58.2	49.9	49.4	48.9	65.4	5.0	70.4
Night	22	65.2	78.2	47.3	77.6	76.5	72.6	69.8	62.0	54.9	48.0	47.7	47.4	65.2	10.0	75.2
	23	63.4	76.3	46.4	75.8	74.8	71.0	68.1	59.6	51.2	47.0	46.8	46.5	63.4	10.0	73.4

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	67.6	78.4	46.9	77.7	76.7	74.4	72.7	67.8	61.5	49.7	48.1	47.1
	Max	74.4	87.8	53.4	86.5	85.4	82.3	79.2	72.2	68.4	57.3	55.3	53.6
Energy Average		71.4	Average:		82.2	81.0	77.6	75.1	69.9	64.8	53.5	51.6	50.1
Evening	Min	65.4	76.9	48.8	76.4	75.5	72.6	70.4	64.5	58.2	49.9	49.4	48.9
	Max	69.0	81.9	50.0	81.2	80.0	76.1	73.3	67.3	61.4	51.5	50.7	50.1
Energy Average		67.6	Average:		78.7	77.6	74.3	72.0	66.1	60.3	50.9	50.2	49.6
Night	Min	56.7	69.5	44.5	69.1	68.0	64.0	60.9	53.0	48.0	45.2	45.0	44.6
	Max	68.9	81.4	51.2	80.9	79.9	76.4	74.0	66.5	59.7	52.0	51.6	51.3
Energy Average		63.7	Average:		74.5	73.3	69.7	66.9	58.4	52.3	48.2	47.9	47.5

L_{eq} (dBA)		
24-Hour	Daytime	Nighttime
69.3	70.8	63.7

24-Hour CNEL (dBA)

72.6

URBAN CROSSROADS

24-Hour Noise Level Measurement Summary

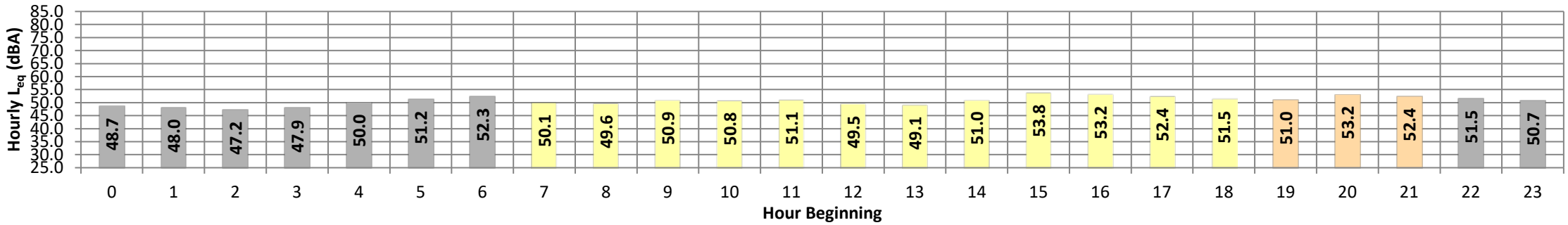
Date: Wednesday, July 08, 2020
Project: Crestview Apartments

Location: L7 - Located near the southwestern boundary of the Project site adjacent to vacant wilderness.

Meter: Piccolo II

JN: 12586
Analyst: P. Mara

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	48.7	53.1	44.1	52.8	52.5	51.8	51.3	49.5	48.1	45.6	44.9	44.2	48.7	10.0	58.7
	1	48.0	51.2	45.0	51.0	50.8	50.3	50.0	48.7	47.7	46.0	45.5	45.1	48.0	10.0	58.0
	2	47.2	52.4	43.9	51.7	51.1	50.0	49.4	47.6	46.7	45.1	44.5	44.0	47.2	10.0	57.2
	3	47.9	52.5	45.2	52.0	51.6	50.8	50.3	48.5	47.3	45.8	45.6	45.3	47.9	10.0	57.9
	4	50.0	53.9	47.1	53.7	53.4	52.8	52.4	50.8	49.4	47.8	47.5	47.2	50.0	10.0	60.0
	5	51.2	55.0	48.2	54.8	54.6	53.9	53.4	51.9	50.7	49.0	48.7	48.3	51.2	10.0	61.2
	6	52.3	59.1	47.6	58.7	58.1	56.6	55.5	52.7	50.9	48.7	48.2	47.8	52.3	10.0	62.3
Day	7	50.1	56.5	45.6	56.0	55.6	54.5	53.4	50.6	49.0	46.6	46.1	45.8	50.1	0.0	50.1
	8	49.6	55.4	45.0	55.1	54.8	53.8	52.9	50.4	48.5	45.9	45.5	45.2	49.6	0.0	49.6
	9	50.9	57.3	44.0	57.0	56.6	55.6	55.0	52.5	48.7	45.1	44.7	44.2	50.9	0.0	50.9
	10	50.8	57.6	43.6	57.3	56.9	56.0	55.2	51.9	48.0	44.6	44.1	43.7	50.8	0.0	50.8
	11	51.1	57.1	43.5	56.8	56.6	55.9	55.2	52.6	49.2	44.7	44.2	43.7	51.1	0.0	51.1
	12	49.5	56.9	43.2	56.6	56.1	54.8	53.4	50.0	47.4	44.2	43.8	43.3	49.5	0.0	49.5
	13	49.1	56.1	43.1	55.8	55.4	53.8	52.6	49.9	47.6	44.1	43.6	43.2	49.1	0.0	49.1
	14	51.0	58.8	43.6	58.3	58.0	56.7	55.5	52.1	47.9	44.6	44.1	43.7	51.0	0.0	51.0
	15	53.8	62.9	46.1	62.5	61.7	59.6	58.1	54.0	51.1	47.2	46.7	46.2	53.8	0.0	53.8
	16	53.2	60.7	46.9	60.5	60.0	58.6	57.2	53.3	51.2	48.1	47.5	47.0	53.2	0.0	53.2
	17	52.4	57.9	47.7	57.5	57.2	55.9	55.1	53.2	51.7	48.8	48.3	47.8	52.4	0.0	52.4
	18	51.5	56.8	47.2	56.5	56.1	55.1	54.3	52.1	50.6	48.2	47.8	47.3	51.5	0.0	51.5
Evening	19	51.0	56.8	47.2	56.2	55.5	54.4	53.7	51.7	50.2	48.1	47.7	47.3	51.0	5.0	56.0
	20	53.2	61.5	48.6	60.5	59.5	58.0	56.7	53.4	51.3	49.4	49.0	48.7	53.2	5.0	58.2
	21	52.4	57.1	49.3	56.9	56.7	55.7	54.9	52.8	51.7	50.1	49.8	49.5	52.4	5.0	57.4
Night	22	51.5	55.7	47.9	55.4	55.0	54.3	53.7	52.4	51.1	49.0	48.6	48.1	51.5	10.0	61.5
	23	50.7	56.1	47.3	55.8	55.5	54.1	53.0	51.0	49.9	48.3	47.9	47.4	50.7	10.0	60.7

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	49.1	55.4	43.1	55.1	54.8	53.8	52.6	49.9	47.4	44.1	43.6	43.2
	Max	53.8	62.9	47.7	62.5	61.7	59.6	58.1	54.0	51.7	48.8	48.3	47.8
Energy Average		51.3	Average:		57.5	57.1	55.9	54.8	51.9	49.2	46.0	45.5	45.1
Evening	Min	51.0	56.8	47.2	56.2	55.5	54.4	53.7	51.7	50.2	48.1	47.7	47.3
	Max	53.2	61.5	49.3	60.5	59.5	58.0	56.7	53.4	51.7	50.1	49.8	49.5
Energy Average		52.3	Average:		57.9	57.2	56.0	55.1	52.6	51.0	49.2	48.8	48.5
Night	Min	47.2	51.2	43.9	51.0	50.8	50.0	49.4	47.6	46.7	45.1	44.5	44.0
	Max	52.3	59.1	48.2	58.7	58.1	56.6	55.5	52.7	51.1	49.0	48.7	48.3
Energy Average		50.1	Average:		54.0	53.6	52.8	52.1	50.3	49.1	47.2	46.8	46.4

L_{eq} (dBA)		
24-Hour	Daytime	Nighttime
51.0	51.5	50.1

24-Hour CNEL (dBA)
57.1

URBAN CROSSROADS

24-Hour Noise Level Measurement Summary

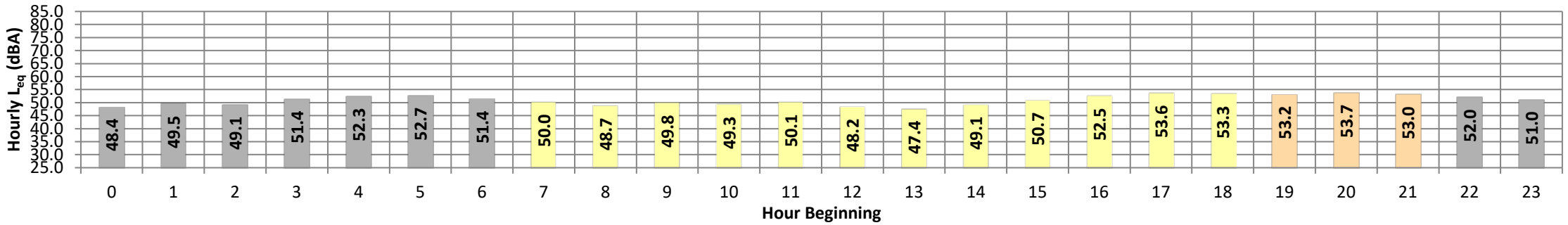
Date: Wednesday, July 08, 2020
Project: Crestview Apartments

Location: L8 - Located west of the Project site near existing vacant wilderness.

Meter: Piccolo II

JN: 12586
Analyst: P. Mara

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	48.4	53.3	45.2	53.0	52.7	51.6	50.9	49.1	47.6	45.9	45.7	45.3	48.4	10.0	58.4
	1	49.5	53.5	47.0	53.2	53.0	52.1	51.5	50.0	49.1	47.7	47.4	47.1	49.5	10.0	59.5
	2	49.1	53.9	46.9	53.0	52.3	51.1	50.6	49.5	48.7	47.5	47.2	47.0	49.1	10.0	59.1
	3	51.4	55.1	49.4	54.6	54.1	53.3	52.9	51.9	51.1	49.9	49.7	49.5	51.4	10.0	61.4
	4	52.3	55.9	50.6	55.6	55.2	54.6	54.1	52.7	51.9	51.1	50.9	50.7	52.3	10.0	62.3
	5	52.7	56.3	50.8	56.0	55.7	54.9	54.4	53.0	52.2	51.2	51.1	50.9	52.7	10.0	62.7
	6	51.4	54.8	49.4	54.6	54.3	53.6	53.2	51.8	51.0	49.9	49.8	49.5	51.4	10.0	61.4
Day	7	50.0	53.5	47.9	53.2	52.9	52.1	51.7	50.6	49.7	48.5	48.2	48.0	50.0	0.0	50.0
	8	48.7	52.1	46.7	51.9	51.6	50.9	50.5	49.2	48.3	47.3	47.1	46.8	48.7	0.0	48.7
	9	49.8	54.0	46.7	53.7	53.3	52.6	52.4	51.2	48.6	47.2	47.0	46.8	49.8	0.0	49.8
	10	49.3	54.4	45.8	54.0	53.5	52.7	52.3	50.2	47.8	46.5	46.2	46.0	49.3	0.0	49.3
	11	50.1	55.6	45.4	55.2	54.8	54.0	53.5	51.2	48.5	46.1	45.8	45.5	50.1	0.0	50.1
	12	48.2	53.6	44.8	53.2	52.6	51.9	51.4	49.0	46.9	45.4	45.2	44.9	48.2	0.0	48.2
	13	47.4	51.3	45.1	51.0	50.6	49.8	49.3	48.0	47.0	45.6	45.4	45.2	47.4	0.0	47.4
	14	49.1	55.4	45.2	55.0	54.3	53.2	52.7	50.0	47.3	45.8	45.6	45.3	49.1	0.0	49.1
	15	50.7	55.6	47.2	55.2	54.8	53.8	53.2	51.5	49.9	48.0	47.7	47.3	50.7	0.0	50.7
	16	52.5	59.5	48.6	59.0	58.6	57.1	56.2	52.6	51.0	49.4	49.1	48.7	52.5	0.0	52.5
	17	53.6	57.6	50.7	57.3	56.9	56.1	55.5	54.2	53.1	51.5	51.2	50.8	53.6	0.0	53.6
	18	53.3	58.2	50.2	57.8	57.3	56.4	55.6	53.9	52.7	51.1	50.7	50.3	53.3	0.0	53.3
Evening	19	53.2	57.2	50.6	57.0	56.6	55.8	55.3	53.8	52.8	51.2	51.0	50.7	53.2	5.0	58.2
	20	53.7	60.2	50.7	59.6	59.1	57.1	56.0	53.9	52.9	51.4	51.1	50.8	53.7	5.0	58.7
	21	53.0	56.8	50.6	56.6	56.2	55.5	55.0	53.5	52.5	51.3	51.0	50.7	53.0	5.0	58.0
Night	22	52.0	56.2	49.2	55.9	55.5	54.8	54.3	52.6	51.3	49.9	49.6	49.3	52.0	10.0	62.0
	23	51.0	54.9	48.8	54.6	54.3	53.4	52.9	51.6	50.5	49.3	49.1	48.9	51.0	10.0	61.0

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	47.4	51.3	44.8	51.0	50.6	49.8	49.3	48.0	46.9	45.4	45.2	44.9
	Max	53.6	59.5	50.7	59.0	58.6	57.1	56.2	54.2	53.1	51.5	51.2	50.8
Energy Average		50.7	Average:		54.7	54.3	53.4	52.9	51.0	49.2	47.7	47.4	47.1
Evening	Min	53.0	56.8	50.6	56.6	56.2	55.5	55.0	53.5	52.5	51.2	51.0	50.7
	Max	53.7	60.2	50.7	59.6	59.1	57.1	56.0	53.9	52.9	51.4	51.1	50.8
Energy Average		53.3	Average:		57.7	57.3	56.1	55.4	53.7	52.7	51.3	51.0	50.7
Night	Min	48.4	53.3	45.2	53.0	52.3	51.1	50.6	49.1	47.6	45.9	45.7	45.3
	Max	52.7	56.3	50.8	56.0	55.7	54.9	54.4	53.0	52.2	51.2	51.1	50.9
Energy Average		51.1	Average:		54.5	54.1	53.2	52.7	51.4	50.4	49.2	48.9	48.7

L_{eq} (dBA)		
24-Hour	Daytime	Nighttime
51.3	51.3	51.1

24-Hour CNEL (dBA)
58.0

APPENDIX 7.1:

OFF-SITE TRAFFIC NOISE LEVEL CONTOURS

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Sycamore Canyon Bl.
Road Segment: n/o Central Av.

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	670 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-3.69	2.64	-1.20	*-4.52*	0.000	0.000
Medium Trucks:	79.45	-20.93	2.69	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	84.25	-24.88	2.69	-1.20	*-5.69*	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:	60.0	58.5	52.1	50.6	59.1	59.3
Heavy Trucks:	60.9	59.4	50.4	51.6	60.0	60.1
Vehicle Noise:	68.1	66.3	63.2	58.5	67.0	67.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	21	45	97	209
CNEL:	22	48	104	224

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Sycamore Canyon Bl.
Road Segment: s/o Central Av.

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,150 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:	55.0 feet
Centerline Dist. to Observer:	55.0 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:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	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:	49.244
Medium Trucks:	49.064
Heavy Trucks:	49.082

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	1.37	0.00	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	79.45	-15.86	0.02	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-19.82	0.02	-1.20	*-5.38*	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	66.6	65.3	59.3	67.7	68.3
Medium Trucks:	62.4	58.5	51.0	59.8	65.9	66.0
Heavy Trucks:	63.2	59.2	55.8	60.5	66.7	66.8
Vehicle Noise:	70.5	67.9	65.9	64.6	71.6	71.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	70	151	326	703
CNEL:	74	159	342	737

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Watkins Dr.
Road Segment: n/o SR-60 WB On-Ramp

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,750 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:	55.0 feet
Centerline Dist. to Observer:	55.0 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:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	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:	49.244
Medium Trucks:	49.064
Heavy Trucks:	49.082

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	0.48	0.00	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	79.45	-16.76	0.02	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-20.71	0.02	-1.20	*-5.38*	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:	67.7	65.7	64.4	58.4	66.8	67.4
Medium Trucks:	61.5	57.6	50.1	58.9	65.0	65.1
Heavy Trucks:	62.4	58.3	54.9	59.6	65.8	65.9
Vehicle Noise:	69.6	67.0	65.0	63.7	70.7	71.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	61	132	284	613
CNEL:	64	138	298	642

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Watkins Dr.
Road Segment: s/o SR-60 WB On-Ramp

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,990 vehicles
Vehicle Speed:	35 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:	55.0 feet
Centerline Dist. to Observer:	55.0 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:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	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:	49.244
Medium Trucks:	49.064
Heavy Trucks:	49.082

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	2.13	0.00	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	75.75	-15.11	0.02	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	81.57	-19.07	0.02	-1.20	*-5.38*	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:	65.2	63.2	61.9	55.9	64.3	64.9
Medium Trucks:	59.5	55.6	48.1	56.8	63.0	63.0
Heavy Trucks:	61.3	57.3	53.9	58.5	64.7	64.8
Vehicle Noise:	67.5	64.8	62.7	62.0	68.8	69.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	46	99	214	460
CNEL:	48	103	223	480

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Central Av.
Road Segment: w/o Sycamore Canyon Bl.

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,850 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 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:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	0.26	1.28	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	81.00	-16.98	1.31	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-20.93	1.31	-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	70.1
Medium Trucks:	64.1	62.6	56.3	54.7	63.2	63.4
Heavy Trucks:	64.6	63.1	54.1	55.3	63.7	63.8
Vehicle Noise:	72.2	70.5	67.4	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	123	264	570

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Central Av.
Road Segment: e/o Sycamore Canyon Bl.

Project Name: Crestview
Job Number: 12586

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:	50 mph
Near/Far Lane Distance:	36 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:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	0.31	1.28	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	81.00	-16.93	1.31	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-20.88	1.31	-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:	70.6	68.7	66.9	60.9	69.5	70.1
Medium Trucks:	64.2	62.7	56.3	54.8	63.2	63.5
Heavy Trucks:	64.6	63.2	54.1	55.4	63.7	63.9
Vehicle Noise:	72.3	70.5	67.5	62.7	71.3	71.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	53	115	248	534
CNEL:	57	124	266	574

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project
Road Name: Sycamore Canyon Bl.
Road Segment: n/o Central Av.

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	740 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-3.26	2.64	-1.20	*-4.52*	0.000	0.000
Medium Trucks:	79.45	-20.50	2.69	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	84.25	-24.45	2.69	-1.20	*-5.69*	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:	66.6	64.7	63.0	56.9	65.5	66.1
Medium Trucks:	60.4	58.9	52.6	51.0	59.5	59.7
Heavy Trucks:	61.3	59.9	50.8	52.1	60.4	60.6
Vehicle Noise:	68.5	66.7	63.6	58.9	67.5	67.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	22	48	104	224
CNEL:	24	52	111	240

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project
Road Name: Sycamore Canyon Bl.
Road Segment: s/o Central Av.

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,160 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:	55.0 feet
Centerline Dist. to Observer:	55.0 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:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	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:	49.244
Medium Trucks:	49.064
Heavy Trucks:	49.082

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	1.39	0.00	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	79.45	-15.84	0.02	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-19.80	0.02	-1.20	*-5.38*	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:	68.7	66.6	65.3	59.3	67.7	68.4
Medium Trucks:	62.4	58.5	51.0	59.8	65.9	66.0
Heavy Trucks:	63.3	59.2	55.8	60.5	66.7	66.8
Vehicle Noise:	70.5	67.9	65.9	64.7	71.6	71.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	71	152	327	705
CNEL:	74	159	343	739

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project
Road Name: Watkins Dr.
Road Segment: n/o SR-60 WB On-Ramp

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,760 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:	55.0 feet
Centerline Dist. to Observer:	55.0 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:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	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:	49.244
Medium Trucks:	49.064
Heavy Trucks:	49.082

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	0.50	0.00	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	79.45	-16.73	0.02	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-20.69	0.02	-1.20	*-5.38*	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	65.8	64.4	58.4	66.8	67.5
Medium Trucks:	61.5	57.6	50.1	58.9	65.1	65.1
Heavy Trucks:	62.4	58.3	54.9	59.6	65.8	65.9
Vehicle Noise:	69.6	67.0	65.0	63.8	70.7	71.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	62	133	286	615
CNEL:	64	139	299	645

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project
Road Name: Watkins Dr.
Road Segment: s/o SR-60 WB On-Ramp

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,020 vehicles
Vehicle Speed:	35 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:	55.0 feet
Centerline Dist. to Observer:	55.0 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:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	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:	49.244
Medium Trucks:	49.064
Heavy Trucks:	49.082

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	2.19	0.00	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	75.75	-15.04	0.02	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	81.57	-19.00	0.02	-1.20	*-5.38*	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:	65.3	63.3	62.0	56.0	64.4	65.0
Medium Trucks:	59.5	55.6	48.1	56.9	63.0	63.1
Heavy Trucks:	61.4	57.3	53.9	58.6	64.8	64.9
Vehicle Noise:	67.5	64.8	62.8	62.1	68.9	69.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	46	100	216	465
CNEL:	48	104	225	485

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project
Road Name: Central Av.
Road Segment: w/o Sycamore Canyon Bl.

Project Name: Crestview
Job Number: 12586

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:	50 mph
Near/Far Lane Distance:	36 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:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	0.31	1.28	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	81.00	-16.93	1.31	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-20.88	1.31	-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:	70.6	68.7	66.9	60.9	69.5	70.1
Medium Trucks:	64.2	62.7	56.3	54.8	63.2	63.5
Heavy Trucks:	64.6	63.2	54.1	55.4	63.7	63.9
Vehicle Noise:	72.3	70.5	67.5	62.7	71.3	71.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	53	115	248	534
CNEL:	57	124	266	574

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project
Road Name: Central Av.
Road Segment: e/o Sycamore Canyon Bl.

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,920 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 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:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	0.42	1.28	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	81.00	-16.81	1.31	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-20.77	1.31	-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:	70.7	68.8	67.0	61.0	69.6	70.2
Medium Trucks:	64.3	62.8	56.4	54.9	63.3	63.6
Heavy Trucks:	64.7	63.3	54.3	55.5	63.9	64.0
Vehicle Noise:	72.4	70.7	67.6	62.8	71.4	71.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	54	117	252	543
CNEL:	58	126	271	584

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY Without Project
Road Name: Sycamore Canyon Bl.
Road Segment: n/o Central Av.

Project Name: Crestview
Job Number: 12586

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:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-1.99	2.64	-1.20	*-4.52*	0.000	0.000
Medium Trucks:	79.45	-19.23	2.69	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	84.25	-23.19	2.69	-1.20	*-5.69*	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:	67.9	66.0	64.2	58.2	66.8	67.4
Medium Trucks:	61.7	60.2	53.8	52.3	60.8	61.0
Heavy Trucks:	62.5	61.1	52.1	53.3	61.7	61.8
Vehicle Noise:	69.8	68.0	64.9	60.2	68.7	69.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	27	58	126	271
CNEL:	29	63	135	291

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY Without Project
Road Name: Sycamore Canyon Bl.
Road Segment: s/o Central Av.

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,310 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:	55.0 feet
Centerline Dist. to Observer:	55.0 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:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	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:	49.244
Medium Trucks:	49.064
Heavy Trucks:	49.082

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	1.69	0.00	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	79.45	-15.55	0.02	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-19.51	0.02	-1.20	*-5.38*	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	66.9	65.6	59.6	68.0	68.7
Medium Trucks:	62.7	58.8	51.3	60.1	66.2	66.3
Heavy Trucks:	63.6	59.5	56.1	60.8	67.0	67.1
Vehicle Noise:	70.8	68.2	66.2	64.9	71.9	72.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	74	159	342	738
CNEL:	77	167	359	773

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY Without Project
Road Name: Watkins Dr.
Road Segment: n/o SR-60 WB On-Ramp

Project Name: Crestview
Job Number: 12586

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:	55.0 feet
Centerline Dist. to Observer:	55.0 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:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	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:	49.244
Medium Trucks:	49.064
Heavy Trucks:	49.082

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	0.77	0.00	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	79.45	-16.47	0.02	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-20.43	0.02	-1.20	*-5.38*	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:	68.0	66.0	64.7	58.7	67.1	67.7
Medium Trucks:	61.8	57.9	50.4	59.1	65.3	65.4
Heavy Trucks:	62.6	58.6	55.2	59.8	66.0	66.1
Vehicle Noise:	69.9	67.3	65.3	64.0	71.0	71.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	64	138	297	641
CNEL:	67	145	312	671

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY Without Project
Road Name: Watkins Dr.
Road Segment: s/o SR-60 WB On-Ramp

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,160 vehicles
Vehicle Speed:	35 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:	55.0 feet
Centerline Dist. to Observer:	55.0 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:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	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:	49.244
Medium Trucks:	49.064
Heavy Trucks:	49.082

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	2.48	0.00	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	75.75	-14.75	0.02	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	81.57	-18.71	0.02	-1.20	*-5.38*	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	63.6	62.3	56.2	64.7	65.3
Medium Trucks:	59.8	55.9	48.4	57.2	63.3	63.4
Heavy Trucks:	61.7	57.6	54.2	58.9	65.1	65.2
Vehicle Noise:	67.8	65.1	63.0	62.3	69.2	69.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	49	105	226	486
CNEL:	51	109	235	507

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY Without Project
Road Name: Central Av.
Road Segment: w/o Sycamore Canyon Bl.

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,050 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 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:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	0.71	1.28	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	81.00	-16.53	1.31	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-20.49	1.31	-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:	71.0	69.1	67.3	61.3	69.9	70.5
Medium Trucks:	64.6	63.1	56.7	55.2	63.6	63.9
Heavy Trucks:	65.0	63.6	54.5	55.8	64.1	64.3
Vehicle Noise:	72.7	70.9	67.9	63.1	71.7	72.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	57	122	264	568
CNEL:	61	131	283	610

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY Without Project
Road Name: Central Av.
Road Segment: e/o Sycamore Canyon Bl.

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,140 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 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:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	0.90	1.28	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	81.00	-16.34	1.31	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-20.30	1.31	-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:	64.8	63.3	56.9	55.4	63.8	64.0
Heavy Trucks:	65.2	63.8	54.7	56.0	64.3	64.5
Vehicle Noise:	72.9	71.1	68.1	63.3	71.8	72.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	58	126	271	584
CNEL:	63	135	291	628

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY With Project
Road Name: Sycamore Canyon Bl.
Road Segment: n/o Central Av.

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,060 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-1.70	2.64	-1.20	*-4.52*	0.000	0.000
Medium Trucks:	79.45	-18.94	2.69	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	84.25	-22.89	2.69	-1.20	*-5.69*	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	64.5	58.5	67.1	67.7
Medium Trucks:	62.0	60.5	54.1	52.6	61.1	61.3
Heavy Trucks:	62.8	61.4	52.4	53.6	62.0	62.1
Vehicle Noise:	70.1	68.3	65.1	60.5	69.0	69.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	28	61	132	284
CNEL:	30	66	141	305

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY With Project
Road Name: Sycamore Canyon Bl.
Road Segment: s/o Central Av.

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,320 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:	55.0 feet
Centerline Dist. to Observer:	55.0 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:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	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:	49.244
Medium Trucks:	49.064
Heavy Trucks:	49.082

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	1.70	0.00	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	79.45	-15.53	0.02	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-19.49	0.02	-1.20	*-5.38*	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	67.0	65.6	59.6	68.0	68.7
Medium Trucks:	62.7	58.8	51.3	60.1	66.3	66.3
Heavy Trucks:	63.6	59.5	56.1	60.8	67.0	67.1
Vehicle Noise:	70.8	68.2	66.2	65.0	71.9	72.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	74	159	343	740
CNEL:	78	167	360	775

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY With Project
Road Name: Watkins Dr.
Road Segment: n/o SR-60 WB On-Ramp

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,880 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:	55.0 feet
Centerline Dist. to Observer:	55.0 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:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	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:	49.244
Medium Trucks:	49.064
Heavy Trucks:	49.082

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	0.79	0.00	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	79.45	-16.45	0.02	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-20.40	0.02	-1.20	*-5.38*	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:	68.0	66.0	64.7	58.7	67.1	67.8
Medium Trucks:	61.8	57.9	50.4	59.2	65.3	65.4
Heavy Trucks:	62.7	58.6	55.2	59.9	66.1	66.2
Vehicle Noise:	69.9	67.3	65.3	64.1	71.0	71.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	64	139	298	643
CNEL:	67	145	313	674

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY With Project
Road Name: Watkins Dr.
Road Segment: s/o SR-60 WB On-Ramp

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,190 vehicles
Vehicle Speed:	35 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:	55.0 feet
Centerline Dist. to Observer:	55.0 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:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	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:	49.244
Medium Trucks:	49.064
Heavy Trucks:	49.082

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	2.54	0.00	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	75.75	-14.69	0.02	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	81.57	-18.65	0.02	-1.20	*-5.38*	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	63.6	62.3	56.3	64.7	65.4
Medium Trucks:	59.9	56.0	48.5	57.2	63.4	63.4
Heavy Trucks:	61.7	57.7	54.3	58.9	65.1	65.2
Vehicle Noise:	67.9	65.2	63.1	62.4	69.3	69.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	49	106	228	491
CNEL:	51	110	238	512

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY With Project
Road Name: Central Av.
Road Segment: w/o Sycamore Canyon Bl.

Project Name: Crestview
Job Number: 12586

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:	50 mph
Near/Far Lane Distance:	36 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:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	0.73	1.28	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	81.00	-16.51	1.31	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-20.46	1.31	-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:	71.0	69.1	67.3	61.3	69.9	70.5
Medium Trucks:	64.6	63.1	56.7	55.2	63.7	63.9
Heavy Trucks:	65.0	63.6	54.6	55.8	64.2	64.3
Vehicle Noise:	72.7	71.0	67.9	63.1	71.7	72.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	57	123	264	570
CNEL:	61	132	284	612

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY With Project
Road Name: Central Av.
Road Segment: e/o Sycamore Canyon Bl.

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,180 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 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:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	0.98	1.28	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	81.00	-16.26	1.31	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-20.22	1.31	-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:	64.8	63.3	57.0	55.4	63.9	64.1
Heavy Trucks:	65.3	63.8	54.8	56.1	64.4	64.5
Vehicle Noise:	73.0	71.2	68.2	63.4	71.9	72.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	59	127	275	592
CNEL:	64	137	295	635

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 Without Project
Road Name: Sycamore Canyon Bl.
Road Segment: n/o Central Av.

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,070 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-1.66	2.64	-1.20	*-4.52*	0.000	0.000
Medium Trucks:	79.45	-18.90	2.69	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	84.25	-22.85	2.69	-1.20	*-5.69*	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	54.2	52.6	61.1	61.3
Heavy Trucks:	62.9	61.5	52.4	53.7	62.0	62.2
Vehicle Noise:	70.1	68.3	65.2	60.5	69.1	69.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	29	62	133	286
CNEL:	31	66	142	307

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 Without Project
Road Name: Sycamore Canyon Bl.
Road Segment: s/o Central Av.

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,540 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:	55.0 feet
Centerline Dist. to Observer:	55.0 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:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	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:	49.244
Medium Trucks:	49.064
Heavy Trucks:	49.082

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	2.10	0.00	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	79.45	-15.14	0.02	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-19.10	0.02	-1.20	*-5.38*	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	67.3	66.0	60.0	68.4	69.1
Medium Trucks:	63.1	59.2	51.7	60.5	66.7	66.7
Heavy Trucks:	64.0	59.9	56.5	61.2	67.4	67.5
Vehicle Noise:	71.2	68.6	66.6	65.4	72.3	72.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	79	169	365	786
CNEL:	82	177	382	823

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 Without Project
Road Name: Watkins Dr.
Road Segment: n/o SR-60 WB On-Ramp

Project Name: Crestview
Job Number: 12586

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:	55.0 feet
Centerline Dist. to Observer:	55.0 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:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	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:	49.244
Medium Trucks:	49.064
Heavy Trucks:	49.082

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	1.19	0.00	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	79.45	-16.05	0.02	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-20.01	0.02	-1.20	*-5.38*	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	66.4	65.1	59.1	67.5	68.2
Medium Trucks:	62.2	58.3	50.8	59.6	65.7	65.8
Heavy Trucks:	63.1	59.0	55.6	60.3	66.5	66.6
Vehicle Noise:	70.3	67.7	65.7	64.4	71.4	71.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	68	147	317	683
CNEL:	72	154	332	716

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 Without Project
Road Name: Watkins Dr.
Road Segment: s/o SR-60 WB On-Ramp

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,380 vehicles
Vehicle Speed:	35 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:	55.0 feet
Centerline Dist. to Observer:	55.0 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:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	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:	49.244
Medium Trucks:	49.064
Heavy Trucks:	49.082

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	2.91	0.00	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	75.75	-14.33	0.02	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	81.57	-18.29	0.02	-1.20	*-5.38*	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	64.0	62.7	56.7	65.1	65.7
Medium Trucks:	60.2	56.3	48.8	57.6	63.8	63.8
Heavy Trucks:	62.1	58.1	54.7	59.3	65.5	65.6
Vehicle Noise:	68.2	65.5	63.5	62.8	69.6	69.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	52	112	241	519
CNEL:	54	117	251	541

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 Without Project
Road Name: Central Av.
Road Segment: w/o Sycamore Canyon Bl.

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,300 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 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:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	2.78	1.28	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	81.00	-14.46	1.31	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-18.42	1.31	-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:	73.1	71.2	69.4	63.3	72.0	72.6
Medium Trucks:	66.6	65.1	58.8	57.2	65.7	65.9
Heavy Trucks:	67.1	65.6	56.6	57.9	66.2	66.3
Vehicle Noise:	74.8	73.0	70.0	65.2	73.7	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	78	168	362	780
CNEL:	84	180	389	838

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 Without Project
Road Name: Central Av.
Road Segment: e/o Sycamore Canyon Bl.

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,390 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 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:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	2.89	1.28	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	81.00	-14.34	1.31	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-18.30	1.31	-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:	73.2	71.3	69.5	63.5	72.1	72.7
Medium Trucks:	66.8	65.3	58.9	57.4	65.8	66.0
Heavy Trucks:	67.2	65.8	56.7	58.0	66.3	66.5
Vehicle Noise:	74.9	73.1	70.1	65.3	73.8	74.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	79	171	369	794
CNEL:	85	184	396	853

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 With Project
Road Name: Sycamore Canyon Bl.
Road Segment: n/o Central Av.

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	11,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,130 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-1.42	2.64	-1.20	*-4.52*	0.000	0.000
Medium Trucks:	79.45	-18.66	2.69	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	84.25	-22.61	2.69	-1.20	*-5.69*	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:	30	64	138	296
CNEL:	32	68	148	318

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 With Project
Road Name: Sycamore Canyon Bl.
Road Segment: s/o Central Av.

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,550 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:	55.0 feet
Centerline Dist. to Observer:	55.0 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:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	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:	49.244
Medium Trucks:	49.064
Heavy Trucks:	49.082

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	2.11	0.00	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	79.45	-15.12	0.02	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-19.08	0.02	-1.20	*-5.38*	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	67.4	66.0	60.0	68.5	69.1
Medium Trucks:	63.1	59.2	51.7	60.5	66.7	66.7
Heavy Trucks:	64.0	59.9	56.6	61.2	67.4	67.5
Vehicle Noise:	71.2	68.6	66.7	65.4	72.3	72.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	79	170	366	788
CNEL:	83	178	383	826

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 With Project
Road Name: Watkins Dr.
Road Segment: n/o SR-60 WB On-Ramp

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,070 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:	55.0 feet
Centerline Dist. to Observer:	55.0 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:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	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:	49.244
Medium Trucks:	49.064
Heavy Trucks:	49.082

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	1.21	0.00	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	79.45	-16.03	0.02	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-19.99	0.02	-1.20	*-5.38*	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	66.5	65.1	59.1	67.6	68.2
Medium Trucks:	62.2	58.3	50.8	59.6	65.8	65.8
Heavy Trucks:	63.1	59.0	55.6	60.3	66.5	66.6
Vehicle Noise:	70.3	67.7	65.7	64.5	71.4	71.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	69	148	318	686
CNEL:	72	155	333	718

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 With Project
Road Name: Watkins Dr.
Road Segment: s/o SR-60 WB On-Ramp

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	24,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,400 vehicles
Vehicle Speed:	35 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:	55.0 feet
Centerline Dist. to Observer:	55.0 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:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	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:	49.244
Medium Trucks:	49.064
Heavy Trucks:	49.082

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	2.94	0.00	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	75.75	-14.30	0.02	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	81.57	-18.25	0.02	-1.20	*-5.38*	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	64.0	62.7	56.7	65.1	65.8
Medium Trucks:	60.3	56.4	48.9	57.6	63.8	63.8
Heavy Trucks:	62.1	58.1	54.7	59.3	65.5	65.6
Vehicle Noise:	68.3	65.6	63.5	62.8	69.7	69.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	52	112	242	521
CNEL:	54	117	253	544

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 With Project
Road Name: Central Av.
Road Segment: w/o Sycamore Canyon Bl.

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,310 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 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:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	2.79	1.28	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	81.00	-14.45	1.31	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-18.40	1.31	-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:	73.1	71.2	69.4	63.3	72.0	72.6
Medium Trucks:	66.7	65.2	58.8	57.2	65.7	65.9
Heavy Trucks:	67.1	65.7	56.6	57.9	66.2	66.4
Vehicle Noise:	74.8	73.0	70.0	65.2	73.7	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	78	168	363	781
CNEL:	84	181	390	839

Wednesday, August 28, 2019

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: HY 2040 With Project
Road Name: Central Av.
Road Segment: e/o Sycamore Canyon Bl.

Project Name: Crestview
Job Number: 12586

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	34,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,430 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 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:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	2.94	1.28	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	81.00	-14.29	1.31	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-18.25	1.31	-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:	73.2	71.3	69.6	63.5	72.1	72.7
Medium Trucks:	66.8	65.3	58.9	57.4	65.9	66.1
Heavy Trucks:	67.2	65.8	56.8	58.0	66.4	66.5
Vehicle Noise:	74.9	73.2	70.1	65.3	73.9	74.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	80	172	371	800
CNEL:	86	185	399	860

Wednesday, August 28, 2019

APPENDIX 8.1:

ON-SITE NOISE LEVEL CALCULATIONS

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12586 - Crestview Apartments

CadnaA Noise Prediction Model: 12586-10_1ST_wall.cna
Date: 15.10.20
Analyst: B. Lawson

Calculation Configuration

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (#(Unit,LEN))	2000.01
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (#(Unit,LEN))	999.99
Min. Length of Section (#(Unit,LEN))	1.01
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	5.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	2
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Incl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (#(Unit,TEMP))	10
rel. Humidity (%)	70
Ground Absorption G	0.00
Wind Speed for Dir. (#(Unit,SPEED))	3.0
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
BLDG_01		BLDG_01	72.6	64.0	73.0	55.0	45.0	45.0				5.00	r	6239469.48	2294547.51	1355.00
BLDG_02		BLDG_02	74.0	65.5	74.4	55.0	45.0	45.0				5.00	r	6239513.32	2294477.63	1364.37
BLDG_03		BLDG_03	72.4	64.0	72.9	55.0	45.0	45.0				5.00	r	6239608.80	2294295.77	1360.39
BLDG_04		BLDG_04	70.8	62.5	71.3	55.0	45.0	45.0				5.00	r	6239660.06	2294184.59	1363.18
BLDG_05		BLDG_05	70.3	62.5	71.0	55.0	45.0	45.0				5.00	r	6239687.88	2293955.92	1355.00
BLDG_06		BLDG_06	67.9	60.4	68.8	55.0	45.0	45.0				5.00	r	6239478.35	2293925.79	1355.68
BLDG_07		BLDG_07	62.3	53.8	62.7	55.0	45.0	45.0				5.00	r	6239235.54	2294526.24	1361.60
POOL		POOL	63.1	54.6	63.6	55.0	45.0	45.0				5.00	r	6239294.81	2294266.96	1355.00
DOGPARK		DOGPARK	69.1	60.8	69.6	55.0	45.0	45.0				5.00	r	6239713.13	2294008.13	1355.00

Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			K0	Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night				X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(dB)	(ft)		(ft)	(ft)	(ft)
POINTSOURCE		AC01	88.9	88.9	88.9	Lw	88.9		900.00	0.00	540.00	0.0	5.00	g	6239799.80	2294351.83	1384.16
POINTSOURCE		AC02	88.9	88.9	88.9	Lw	88.9		900.00	0.00	540.00	0.0	5.00	g	6239828.87	2294295.43	1384.16
POINTSOURCE		AC03	88.9	88.9	88.9	Lw	88.9		900.00	0.00	540.00	0.0	5.00	g	6239888.18	2294135.53	1380.40
POINTSOURCE		AC04	88.9	88.9	88.9	Lw	88.9		900.00	0.00	540.00	0.0	5.00	g	6239934.12	2294155.88	1380.40
POINTSOURCE		DT01	83.2	83.2	83.2	Lw	83.2		450.00	0.00	270.00	0.0	3.00	r	6239757.35	2294425.09	1367.50
POINTSOURCE		DT02	83.2	83.2	83.2	Lw	83.2		450.00	0.00	270.00	0.0	3.00	r	6239773.05	2294412.30	1368.54
POINTSOURCE		GAS01	79.9	79.9	79.9	Lw	79.9					0.0	5.00	r	6240005.06	2294082.61	1367.09
POINTSOURCE		GAS02	79.9	79.9	79.9	Lw	79.9					0.0	5.00	r	6240015.52	2294059.94	1366.75

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			K0	Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night				X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(dB)	(ft)		(ft)	(ft)	(ft)
POINTSOURCE		GAS03	79.9	79.9	79.9	Lw	79.9					0.0	5.00	r	6239982.96	2294046.56	1364.20
POINTSOURCE		GAS04	79.9	79.9	79.9	Lw	79.9					0.0	5.00	r	6239973.66	2294068.08	1364.44
POINTSOURCE		GAS05	79.9	79.9	79.9	Lw	79.9					0.0	5.00	r	6239942.84	2294052.38	1361.23
POINTSOURCE		GAS06	79.9	79.9	79.9	Lw	79.9					0.0	5.00	r	6239952.73	2294030.86	1360.83
POINTSOURCE		TRASH01	89.0	89.0	89.0	Lw	89		150.00	0.00	90.00	0.0	5.00	r	6239787.59	2294401.25	1371.25
POINTSOURCE		TRASH02	89.0	89.0	89.0	Lw	89		150.00	0.00	90.00	0.0	5.00	r	6239963.19	2294162.85	1369.06
POINTSOURCE		TUNNEL01	106.0	106.0	106.0	Lw	106		900.00	0.00	0.00	0.0	8.00	r	6240042.85	2294119.83	1373.85
POINTSOURCE		VACUUM01	86.3	86.3	86.3	Lw	86.3		900.00	0.00	0.00	0.0	3.00	r	6240064.95	2294026.21	1365.50

Barrier(s)

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height				Coordinates			
			left	right		horz.	vert.	Begin		End		x	y	z	Ground
					(ft)	(ft)	(ft)	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
								8.00	r			6238817.46	2294815.33	1345.97	1337.97
												6238932.23	2294812.46	1353.46	1345.46
												6239037.24	2294804.43	1362.99	1354.99
												6239183.58	2294783.19	1367.31	1359.31
												6239293.18	2294760.81	1372.34	1364.34
												6239447.55	2294716.63	1387.70	1379.70
												6239600.77	2294658.67	1372.28	1364.28

Building(s)

Name	M.	ID	RB	Residents	Absorption	Height		Coordinates			
						Begin		x	y	z	Ground
						(ft)		(ft)	(ft)	(ft)	(ft)
BLDG_01		BLDG_01	x	0		39.00	r	6239351.42	2294489.35	1389.00	1350.00
								6239469.48	2294547.51	1389.00	1350.00
								6239490.31	2294495.86	1389.00	1352.90
								6239369.65	2294439.87	1389.00	1355.21
BLDG_02		BLDG_02	x	0		39.00	r	6239513.32	2294477.63	1398.37	1359.37
								6239536.75	2294430.32	1398.37	1357.13
								6239418.26	2294375.20	1398.37	1355.46
								6239393.09	2294419.47	1398.37	1355.84
BLDG_03		BLDG_03	x	0		39.00	r	6239460.80	2294282.31	1390.76	1351.76
								6239589.71	2294342.64	1390.76	1352.71
								6239608.80	2294295.77	1390.76	1355.39
								6239485.10	2294235.87	1390.76	1354.57
BLDG_04		BLDG_04	x	0		39.00	r	6239614.75	2294156.21	1396.85	1357.85
								6239637.41	2294167.15	1396.85	1357.89
								6239635.84	2294172.61	1396.85	1358.16
								6239660.06	2294184.59	1396.85	1358.18
								6239664.23	2294175.74	1396.85	1357.71
								6239719.96	2294056.47	1396.85	1351.36
								6239671.00	2294034.07	1396.85	1351.40
BLDG_05		BLDG_05	x	0		39.00	r	6239549.34	2293989.94	1391.00	1352.00
								6239679.89	2294009.39	1391.00	1350.14
								6239687.88	2293955.92	1391.00	1350.00
								6239554.89	2293938.56	1391.00	1350.00
BLDG_06		BLDG_06	x	0		50.00	r	6239373.75	2294264.76	1400.06	1350.06
								6239405.00	2294198.79	1400.06	1353.96
								6239278.26	2294138.03	1400.06	1351.55
								6239299.10	2293964.85	1400.06	1350.00
								6239397.62	2293977.00	1400.06	1350.47
								6239386.34	2294072.49	1400.06	1352.19
								6239451.01	2294082.04	1400.06	1353.51
								6239464.90	2293964.42	1400.06	1351.40
								6239474.88	2293966.59	1400.06	1351.61
								6239478.35	2293925.79	1400.06	1350.68
								6239240.07	2293892.37	1400.06	1350.00
								6239215.33	2294135.86	1400.06	1350.17
								6239199.27	2294171.88	1400.06	1350.00
BLDG_07		BLDG_07	x	0		50.00	r	6239235.54	2294526.24	1406.60	1356.60
								6239268.09	2294523.63	1406.60	1361.39
								6239267.66	2294513.65	1406.60	1359.61
								6239301.51	2294515.82	1406.60	1355.62
								6239304.55	2294360.87	1406.60	1353.56
								6239336.67	2294360.01	1406.60	1354.41
								6239340.57	2294310.53	1406.60	1350.27
								6239170.43	2294307.92	1406.60	1350.08
								6239171.74	2294383.88	1406.60	1350.04
								6239233.80	2294379.97	1406.60	1351.68
CARWASH		CARWASH	x	0		15.00	r	6240037.51	2294112.99	1380.26	1365.26
								6240050.49	2294121.28	1380.26	1366.39
								6240090.17	2294062.13	1380.26	1365.57
								6240077.19	2294053.83	1380.26	1364.50

Name	M.	ID	RB	Residents	Absorption	Height		Coordinates			
						Begin		x	y	z	Ground
						(ft)		(ft)	(ft)	(ft)	(ft)
QSR		QSR	x	0		15.00	r	6239773.48	2294357.18	1379.16	1364.16
								6239805.58	2294374.49	1379.16	1366.69
								6239854.63	2294286.12	1379.16	1367.62
								6239821.09	2294269.53	1379.16	1365.46
STORE		STORE	x	0		15.00	r	6239866.18	2294147.97	1375.40	1360.40
								6239937.59	2294182.60	1375.40	1364.40
								6239952.46	2294152.05	1375.40	1362.92
								6239957.07	2294142.56	1375.40	1362.62
								6239949.58	2294138.95	1375.40	1362.05
								6239912.97	2294121.28	1375.40	1360.00
								6239884.57	2294107.57	1375.40	1358.09
								6239869.88	2294139.85	1375.40	1360.00

Roads

Name	M.	ID	Lme			Count Data		exact Count Data						Speed Limit		SCS	Surface		Gradient	Mult. Reflection		
			Day	Evening	Night	DTV	Str.class.	M			p (%)			Auto	Truck	Dist.	Dstro	Type		Drefl	Hbuild	Dist.
			(dBA)	(dBA)	(dBA)			Day	Evening	Night	Day	Evening	Night	(mph)	(mph)		(dB)		(%)	(dB)	(ft)	(ft)
SYCAMORE		SYCAMORE	63.0	55.6	54.9			846.0	155.0	130.0	1.8	1.8	1.8	45		8	0.0	1	0.0	0.0		
CENTRAL		CENTRAL	69.2	61.7	61.9			2428.0	432.0	450.0	3.0	3.0	3.0	50	50	20	0.0	1	0.0	0.0		
I-215		I-215	81.7	74.4	73.1			13087.0	2429.0	1807.0	7.2	7.2	7.2	70	70	43.2	0.0	1	0.0	0.0		

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APPENDIX 10.1:

OPERATIONAL NOISE MODEL INPUTS

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12586 - Crestview Apartments

CadnaA Noise Prediction Model: 12586-06.cna
Date: 14.09.20
Analyst: B. Lawson

Calculation Configuration

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (#(Unit,LEN))	2000.01
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (#(Unit,LEN))	999.99
Min. Length of Section (#(Unit,LEN))	1.01
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	5.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	2
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Incl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (#(Unit,TEMP))	10
rel. Humidity (%)	70
Ground Absorption G	0.00
Wind Speed for Dir. (#(Unit,SPEED))	3.0
Roads (RLS-90)	
Strictly acc. to RLS-90	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
RECEIVERS		R1	26.8	25.0	55.0	45.0				5.00	r	6238712.12	2295190.56	1337.31
RECEIVERS		R2	34.5	32.4	55.0	45.0				5.00	r	6239683.80	2293387.36	1360.97
RECEIVERS		R3	35.9	27.0	55.0	45.0				5.00	r	6238848.06	2293586.59	1326.44
RECEIVERS		R4	25.2	16.3	55.0	45.0				5.00	r	6238161.51	2294037.78	1227.51
RECEIVERS		BIO-1	40.4	29.6	0.0	0.0		x	Total	5.00	r	6238831.21	2294402.91	1345.60
RECEIVERS		BIO-2	41.7	28.3	0.0	0.0		x	Total	5.00	r	6239174.59	2293959.83	1344.35

Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			K0	Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night				X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(dB)	(ft)		(ft)	(ft)	(ft)
POINTSOURCE		TRASH01	89.0	89.0	89.0	Lw	89		150.00	0.00	90.00	0.0	5.00	r	6239367.03	2294526.06	1355.59
POINTSOURCE		TRASH02	89.0	89.0	89.0	Lw	89		150.00	0.00	90.00	0.0	5.00	r	6239471.97	2294239.91	1359.01
POINTSOURCE		TRASH03	89.0	89.0	89.0	Lw	89		150.00	0.00	90.00	0.0	5.00	r	6239612.60	2294168.73	1363.07
POINTSOURCE		AC01	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239259.35	2294070.31	1404.06
POINTSOURCE		AC02	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239265.08	2294023.43	1404.06
POINTSOURCE		AC03	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239269.77	2293980.72	1404.06
POINTSOURCE		AC04	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239324.45	2293942.18	1404.06
POINTSOURCE		AC05	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239357.27	2293946.87	1404.06
POINTSOURCE		AC06	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239390.60	2293951.04	1404.06
POINTSOURCE		AC07	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239424.45	2294005.20	1404.06

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			K0	Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night				X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(dB)	(ft)		(ft)	(ft)	(ft)
POINTSOURCE		AC08	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239421.33	2294032.81	1404.06
POINTSOURCE		AC09	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239419.77	2294055.20	1404.06
POINTSOURCE		AC10	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239305.70	2294184.37	1404.06
POINTSOURCE		AC11	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239353.62	2294209.89	1404.06
POINTSOURCE		AC12	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239204.83	2294347.82	1410.60
POINTSOURCE		AC13	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239236.61	2294348.87	1410.60
POINTSOURCE		AC14	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239266.81	2294434.28	1410.60
POINTSOURCE		AC15	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239265.25	2294480.64	1410.60
POINTSOURCE		AC16	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239395.46	2294487.41	1384.00
POINTSOURCE		AC17	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239436.61	2294508.24	1384.00
POINTSOURCE		AC18	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239446.50	2294405.64	1393.37
POINTSOURCE		AC19	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239486.08	2294423.35	1393.37
POINTSOURCE		AC20	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239513.69	2294286.89	1385.76
POINTSOURCE		AC21	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239554.31	2294304.60	1385.76
POINTSOURCE		AC22	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239596.07	2293960.50	1386.00
POINTSOURCE		AC23	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239637.30	2293965.27	1386.00
POINTSOURCE		AC24	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239683.74	2294092.88	1391.85
POINTSOURCE		AC25	75.0	75.0	75.0	Lw	75		900.00	0.00	540.00	0.0	4.00	g	6239666.38	2294131.50	1391.85

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	
AREASOURCE		POOL	94.6	94.6	94.6	64.5	64.5	64.5	Lw	94.6		900.00	0.00	0.00	4
AREASOURCE		PARKING	88.6	88.6	88.6	47.3	47.3	47.3	Lw	88.6		900.00	0.00	540.00	5
AREASOURCE		DOG	79.1	79.1	79.1	54.4	54.4	54.4	Lw	79.1		900.00	0.00	0.00	4

Name	Height			Coordinates			
	Begin		End	x	y	z	Ground
	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)
AREASOURCE	4.00	r		6239256.09	2294299.49	1356.35	1352.35
				6239293.07	2294221.37	1354.00	1350.00
				6239199.32	2294175.02	1354.00	1350.00
				6239153.49	2294300.54	1354.00	1350.00
AREASOURCE	5.00	r		6239157.89	2294671.28	1355.00	1350.00
				6239223.16	2294660.17	1355.00	1350.00
				6239224.55	2294626.14	1355.00	1350.00
				6239243.65	2294605.30	1355.00	1350.00
				6239369.00	2294581.35	1380.13	1375.13
				6239404.41	2294597.67	1382.26	1377.26
				6239426.98	2294585.17	1373.33	1368.33
				6239462.05	2294558.08	1356.02	1351.02
				6239463.79	2294547.67	1355.00	1350.00
				6239348.86	2294494.54	1355.00	1350.00
				6239366.91	2294436.90	1360.14	1355.14
				6239503.37	2294502.18	1356.79	1351.79
				6239513.79	2294479.96	1363.72	1358.72
				6239366.57	2294410.51	1360.15	1355.15
				6239391.57	2294350.10	1358.26	1353.26
				6239403.02	2294342.11	1356.51	1351.51
				6239561.01	2294421.62	1359.60	1354.60
				6239598.16	2294348.71	1357.67	1352.67
				6239588.09	2294347.32	1357.45	1352.45
				6239451.29	2294275.44	1356.80	1351.80
				6239471.43	2294223.01	1359.76	1354.76
				6239474.90	2294224.40	1359.80	1354.80
				6239619.00	2294297.67	1360.59	1355.59
				6239663.79	2294204.61	1363.97	1358.97
				6239598.86	2294174.05	1362.93	1357.93
				6239638.79	2294100.44	1359.96	1354.96
				6239673.86	2294011.90	1355.37	1350.37
				6239547.12	2293992.46	1357.15	1352.15
				6239555.11	2293923.01	1355.00	1350.00
				6239490.18	2293913.29	1355.00	1350.00
				6239472.82	2294029.61	1357.84	1352.84
				6239454.76	2294102.53	1358.98	1353.98
				6239442.61	2294117.80	1359.08	1354.08
				6239377.68	2294089.68	1357.38	1352.38
				6239389.48	2293981.35	1355.42	1350.42
				6239303.02	2293968.85	1355.00	1350.00
				6239279.76	2294133.43	1356.55	1351.55
				6239405.11	2294195.58	1359.11	1354.11
				6239406.15	2294205.65	1358.68	1353.68
				6239382.19	2294265.03	1355.29	1350.29
				6239341.91	2294357.39	1359.55	1354.55
				6239321.43	2294403.57	1358.97	1353.97

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
					6239309.62	2294433.78	1358.63	1353.63
					6239306.84	2294457.04	1358.62	1353.62
					6239303.37	2294523.01	1363.57	1358.57
					6239236.01	2294528.22	1361.67	1356.67
					6239233.23	2294397.32	1356.65	1351.65
					6239186.70	2294398.36	1355.42	1350.42
					6239183.58	2294560.86	1355.00	1350.00
					6239171.08	2294587.60	1355.00	1350.00
					6239157.19	2294628.22	1355.00	1350.00
AREASOURCE	4.00	r			6239689.22	2294029.14	1354.81	1350.81
					6239730.01	2294049.76	1354.86	1350.86
					6239744.55	2294019.38	1354.00	1350.00
					6239710.05	2293954.49	1354.00	1350.00
					6239697.25	2293954.93	1354.00	1350.00

Barrier(s)

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height			Coordinates			
			left	right		horz.	vert.	Begin		End	x	y	z	Ground
					(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)
BARRIERS		BARRIERS00001						6.00	r		6237798.51	2294206.29	1237.30	1231.29
											6237851.29	2294177.81	1240.51	1234.51
											6237881.15	2294158.37	1243.07	1237.07
											6237886.01	2294096.56	1239.90	1233.90
											6237888.79	2294004.20	1235.66	1229.66
											6237876.99	2293962.54	1229.11	1223.11
											6237863.10	2293922.26	1220.93	1214.93
											6237851.99	2293880.59	1214.66	1208.66
											6237847.13	2293854.90	1210.65	1204.65
											6237845.74	2293823.65	1206.00	1200.00
											6237844.35	2293772.95	1200.75	1194.75
											6237865.18	2293747.95	1195.81	1189.81
											6237884.63	2293708.37	1190.34	1184.34
											6237882.54	2293693.79	1189.30	1183.30
											6237855.46	2293669.48	1190.11	1184.11

Building(s)

Name	M.	ID	RB	Residents	Absorption	Height		Coordinates			
						Begin		x	y	z	Ground
						(ft)		(ft)	(ft)	(ft)	(ft)
BUILDING		BUILDING00001	x	0		50.00	r	6239373.75	2294264.76	1400.06	1350.06
								6239405.00	2294198.79	1400.06	1353.96
								6239278.26	2294138.03	1400.06	1351.55
								6239299.10	2293964.85	1400.06	1350.00
								6239397.62	2293977.00	1400.06	1350.47
								6239386.34	2294072.49	1400.06	1352.19
								6239451.01	2294082.04	1400.06	1353.51
								6239464.90	2293964.42	1400.06	1351.40
								6239474.88	2293966.59	1400.06	1351.61
								6239478.35	2293925.79	1400.06	1350.68
								6239240.07	2293892.37	1400.06	1350.00
								6239215.33	2294135.86	1400.06	1350.17
								6239199.27	2294171.88	1400.06	1350.00
BUILDING		BUILDING00002	x	0		50.00	r	6239235.54	2294526.24	1406.60	1356.60
								6239268.09	2294523.63	1406.60	1361.39
								6239267.66	2294513.65	1406.60	1359.61
								6239301.51	2294515.82	1406.60	1355.62
								6239304.55	2294360.87	1406.60	1353.56
								6239336.67	2294360.01	1406.60	1354.41
								6239340.57	2294310.53	1406.60	1350.27
								6239170.43	2294307.92	1406.60	1350.08
								6239171.74	2294383.88	1406.60	1350.04
								6239233.80	2294379.97	1406.60	1351.68
BUILDING		BUILDING00003	x	0		30.00	r	6239351.42	2294489.35	1380.00	1350.00
								6239469.48	2294547.51	1380.00	1350.00
								6239490.31	2294495.86	1380.00	1352.90
								6239369.65	2294439.87	1380.00	1355.21
BUILDING		BUILDING00004	x	0		30.00	r	6239513.32	2294477.63	1389.37	1359.37
								6239536.75	2294430.32	1389.37	1357.13
								6239418.26	2294375.20	1389.37	1355.46
								6239393.09	2294419.47	1389.37	1355.84
BUILDING		BUILDING00005	x	0		30.00	r	6239460.80	2294282.31	1381.76	1351.76
								6239589.71	2294342.64	1381.76	1352.71
								6239608.80	2294295.77	1381.76	1355.39
								6239485.10	2294235.87	1381.76	1354.57
BUILDING		BUILDING00006	x	0		30.00	r	6239614.75	2294156.21	1387.85	1357.85

Name	M.	ID	RB	Residents	Absorption	Height		Coordinates			
						Begin		x	y	z	Ground
						(ft)		(ft)	(ft)	(ft)	(ft)
								6239637.41	2294167.15	1387.85	1357.89
								6239635.84	2294172.61	1387.85	1358.16
								6239660.06	2294184.59	1387.85	1358.18
								6239664.23	2294175.74	1387.85	1357.71
								6239719.96	2294056.47	1387.85	1351.36
								6239671.00	2294034.07	1387.85	1351.40
BUILDING		BUILDING00007	x	0		30.00	r	6239549.34	2293989.94	1382.00	1352.00
								6239679.89	2294009.39	1382.00	1350.14
								6239687.88	2293955.92	1382.00	1350.00
								6239554.89	2293938.56	1382.00	1350.00

APPENDIX 11.1:

CONSTRUCTION NOISE MODEL INPUTS

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12586 - Crestview Apartments

CadnaA Noise Prediction Model: 12586-06_Construction.cna
Date: 14.09.20
Analyst: B. Lawson

Calculation Configuration

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (#(Unit,LEN))	2000.01
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (#(Unit,LEN))	999.99
Min. Length of Section (#(Unit,LEN))	1.01
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	5.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	2
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Incl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (#(Unit,TEMP))	10
rel. Humidity (%)	70
Ground Absorption G	0.00
Wind Speed for Dir. (#(Unit,SPEED))	3.0
Roads (RLS-90)	
Strictly acc. to RLS-90	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
RECEIVERS		R1	54.3	54.3	55.0	45.0				5.00	r	6238712.12	2295190.56	1337.31
RECEIVERS		R2	65.6	65.6	55.0	45.0				5.00	r	6239683.80	2293387.36	1360.97
RECEIVERS		R3	59.1	59.1	55.0	45.0				5.00	r	6238848.06	2293586.59	1326.44
RECEIVERS		R4	47.6	47.6	55.0	45.0				5.00	r	6238161.51	2294037.78	1227.51
RECEIVERS		BIO-1	63.3	63.3	0.0	0.0		x	Total	5.00	r	6238831.21	2294402.91	1345.60
RECEIVERS		BIO-2	77.9	77.9	0.0	0.0		x	Total	5.00	r	6239174.59	2293959.83	1344.35

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL"			Lw / Li			Operating Time			Height
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	
LIMITSOFCONSTRUCTION		SITEPREPARATION	121.3	121.3	121.3	75.3	75.3	75.3	Lw"	75.3					8

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
LIMITSOFCONSTRUCTION	8.00	r			6239460.68	2294614.20	1370.14	1362.14
					6239485.12	2294592.35	1362.21	1354.21
					6239507.95	2294568.82	1361.00	1353.00
					6239529.04	2294543.72	1360.85	1352.85
					6239548.30	2294517.19	1364.78	1356.78

Name	Height		Coordinates			
	Begin	End	x	y	z	Ground
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
			6239567.84	2294484.39	1369.44	1361.44
			6239585.45	2294450.52	1360.02	1352.02
			6239586.37	2294448.28	1360.01	1352.01
			6239586.92	2294445.93	1359.97	1351.97
			6239587.08	2294443.52	1359.90	1351.90
			6239586.85	2294441.11	1359.81	1351.81
			6239586.24	2294438.77	1359.69	1351.69
			6239585.27	2294436.56	1359.54	1351.54
			6239583.95	2294434.54	1359.38	1351.38
			6239582.32	2294432.75	1359.20	1351.20
			6239580.42	2294431.25	1359.02	1351.02
			6239578.31	2294430.07	1358.83	1350.83
			6239607.40	2294366.40	1359.80	1351.80
			6239609.84	2294367.23	1359.72	1351.72
			6239612.39	2294367.64	1359.93	1351.93
			6239614.97	2294367.60	1360.13	1352.13
			6239617.51	2294367.13	1360.33	1352.33
			6239619.92	2294366.22	1360.50	1352.50
			6239622.15	2294364.91	1360.66	1352.66
			6239624.12	2294363.24	1360.79	1352.79
			6239625.77	2294361.26	1360.89	1352.89
			6239627.06	2294359.03	1360.95	1352.95
			6239781.07	2294030.26	1358.50	1350.50
			6239771.76	2294026.78	1358.30	1350.30
			6239775.48	2294013.60	1357.03	1349.03
			6239776.99	2293999.98	1355.75	1347.75
			6239776.25	2293986.31	1355.94	1347.94
			6239773.29	2293972.93	1355.31	1347.31
			6239768.19	2293960.22	1355.57	1347.57
			6239761.07	2293948.52	1354.49	1346.49
			6239752.14	2293938.13	1353.15	1345.15
			6239741.62	2293929.35	1352.44	1344.44
			6239729.82	2293922.40	1352.88	1344.87
			6239717.03	2293917.48	1351.03	1343.03
			6239703.62	2293914.71	1347.95	1339.95
			6239703.67	2293908.63	1347.39	1339.39
			6239692.43	2293909.50	1346.79	1338.79
			6239681.44	2293912.04	1345.52	1337.52
			6239592.03	2293901.12	1333.96	1325.96
			6239582.60	2293896.20	1332.53	1324.53
			6239572.66	2293892.41	1331.10	1323.10
			6239562.35	2293889.79	1329.69	1321.69
			6239394.61	2293866.64	1352.06	1344.06
			6239308.56	2293854.76	1351.95	1343.95
			6239220.30	2293842.58	1349.66	1341.66
			6239220.16	2293844.41	1350.18	1342.18
			6239219.87	2293844.38	1350.14	1342.14
			6239216.56	2293844.12	1349.75	1341.75
			6239215.02	2293844.05	1349.59	1341.59
			6239214.42	2293852.88	1352.11	1344.11
			6239207.04	2293859.78	1352.12	1344.12
			6239194.75	2293879.32	1352.87	1344.87
			6239184.40	2293899.95	1352.50	1344.50
			6239176.09	2293921.48	1350.01	1342.01
			6239174.28	2293948.94	1347.23	1339.23
			6239175.06	2293976.45	1347.32	1339.32
			6239169.32	2294094.41	1347.18	1339.18
			6239169.50	2294109.67	1336.33	1328.33
			6239161.60	2294151.57	1329.22	1321.22
			6239154.46	2294197.40	1347.64	1339.64
			6239147.23	2294214.04	1352.20	1344.20
			6239133.86	2294217.68	1350.24	1342.24
			6239120.29	2294220.42	1348.11	1340.11
			6239113.33	2294238.89	1349.64	1341.64
			6239093.90	2294303.39	1364.38	1356.38
			6239092.03	2294321.31	1366.26	1358.26
			6239092.54	2294347.72	1361.09	1353.09
			6239105.46	2294389.65	1372.46	1364.46
			6239154.60	2294441.50	1368.07	1360.07
			6239158.03	2294445.67	1367.79	1359.79
			6239160.77	2294450.32	1367.84	1359.84
			6239162.76	2294455.34	1368.10	1360.10
			6239163.95	2294460.60	1368.82	1360.82
			6239164.32	2294465.99	1369.51	1361.51
			6239163.85	2294471.36	1370.59	1362.59
			6239162.56	2294476.60	1372.13	1364.13
			6239160.57	2294486.73	1398.47	1390.47

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
					6239159.62	2294497.00	1386.67	1378.67
					6239159.72	2294536.29	1372.24	1364.24
					6239158.20	2294548.57	1370.46	1362.46
					6239154.91	2294560.50	1368.34	1360.34
					6239149.92	2294571.83	1368.02	1360.02
					6239143.35	2294582.31	1370.90	1362.90
					6239136.13	2294597.83	1378.97	1370.97
					6239131.17	2294614.22	1390.97	1382.97
					6239128.57	2294631.14	1377.99	1369.99
					6239128.04	2294647.68	1369.10	1361.10
					6239129.38	2294656.93	1364.40	1356.40
					6239132.11	2294665.88	1359.94	1351.94
					6239136.18	2294674.29	1358.00	1350.00
					6239141.49	2294681.99	1358.86	1350.86
					6239147.91	2294688.79	1382.02	1374.02
					6239149.63	2294690.26	1387.92	1379.92
					6239151.08	2294692.00	1387.58	1379.58
					6239152.20	2294693.96	1387.11	1379.11
					6239152.98	2294696.09	1386.59	1378.59
					6239153.38	2294698.32	1386.04	1378.04
					6239153.39	2294700.58	1385.48	1377.48
					6239153.02	2294702.82	1384.92	1376.92
					6239152.27	2294704.95	1384.39	1376.39
					6239151.17	2294706.93	1383.89	1375.89
					6239149.75	2294708.69	1383.45	1375.45
					6239148.04	2294710.19	1383.07	1375.07
					6239144.88	2294711.79	1382.65	1374.65
					6239142.01	2294713.87	1382.11	1374.11
					6239139.51	2294716.39	1381.47	1373.47
					6239137.45	2294719.27	1380.75	1372.74
					6239135.88	2294722.45	1379.95	1371.95
					6239134.83	2294725.83	1379.10	1371.10
					6239134.34	2294729.35	1378.23	1370.23
					6239134.41	2294732.89	1377.36	1369.36
					6239165.09	2294728.24	1378.72	1370.72
					6239167.25	2294727.73	1378.86	1370.86
					6239169.30	2294726.88	1379.09	1371.09
					6239171.19	2294725.71	1379.39	1371.39
					6239172.86	2294724.26	1379.76	1371.76
					6239174.28	2294722.55	1380.19	1372.19
					6239175.41	2294720.64	1380.67	1372.67
					6239176.21	2294718.57	1381.19	1373.19
					6239176.68	2294716.40	1381.73	1373.73
					6239176.78	2294714.18	1382.28	1374.28
					6239176.53	2294711.97	1382.82	1374.82
					6239211.86	2294705.01	1384.79	1376.79
					6239212.41	2294707.17	1384.26	1376.26
					6239213.31	2294709.22	1383.76	1375.76
					6239214.52	2294711.10	1383.31	1375.31
					6239216.01	2294712.77	1382.91	1374.91
					6239217.75	2294714.17	1382.58	1374.58
					6239219.69	2294715.28	1382.34	1374.34
					6239221.78	2294716.07	1382.18	1374.18
					6239223.97	2294716.51	1382.09	1374.09
					6239226.20	2294716.61	1382.10	1374.10
					6239228.42	2294716.34	1382.18	1374.18
					6239269.19	2294707.63	1384.68	1376.68
					6239309.69	2294697.71	1385.87	1377.87
					6239336.77	2294687.89	1386.89	1378.89
					6239363.18	2294676.39	1387.18	1379.18
					6239388.82	2294663.26	1386.62	1378.62
					6239413.59	2294648.56	1383.95	1375.95
					6239437.39	2294632.33	1377.19	1369.19

Barrier(s)

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height			Coordinates			
			left	right		horz.	vert.	Begin		End	x	y	z	Ground
					(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)
BARRIERS		BARRIERS00001						6.00	r		6237798.51	2294206.29	1237.30	1231.29
											6237851.29	2294177.81	1240.51	1234.51
											6237881.15	2294158.37	1243.07	1237.07
											6237886.01	2294096.56	1239.90	1233.90
											6237888.79	2294004.20	1235.66	1229.66
											6237876.99	2293962.54	1229.11	1223.11
											6237863.10	2293922.26	1220.93	1214.93
											6237851.99	2293880.59	1214.66	1208.66

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height			Coordinates			
			left	right		horz.	vert.	Begin		End	x	y	z	Ground
					(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)
											6237847.13	2293854.90	1210.65	1204.65
											6237845.74	2293823.65	1206.00	1200.00
											6237844.35	2293772.95	1200.75	1194.75
											6237865.18	2293747.95	1195.81	1189.81
											6237884.63	2293708.37	1190.34	1184.34
											6237882.54	2293693.79	1189.30	1183.30
											6237855.46	2293669.48	1190.11	1184.11

APPENDIX 11.2:

BLASTING CALCULATIONS

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BLASTING INPUTS & CALCULATIONS

Scaled Distance

Source: ISEE's Blaster's Handbook, 2018 Edition.

Square Root Scaled Distance

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

R =	623	feet	Distance from blast to a point of intereste (meters or feet)
W =	25	lbs	Maximum charge-weigh detonated within any 8-millisecond period (kilograms or pounds)

SD_2 = 124.60 ft/lbs$^{1/2}$

Peak Particle Velocity

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

A =	160	**"Best Fit" 160 per blasting contractor guidance based on site conditions.**
SD_2 =	124.60	*All blasts will be designed on-site by the blasting contractor to remain below 0.5 in/sec PPV*
B =	1.6	Slope of the line (note that the slope is **negative** in the equation)

PPV = 0.07 in/sec

Vibration Amplitude Equations For Various Blasting Industries

Industry	Metric Equations mm/sec.	U.S. Equations in./sec.	Confidence level	Source
General	$PPV = 1{,}140(SD_2)^{-1.6}$	$PPV = 160(SD_2)^{-1.6}$	Best Fit	DuPont
Construction	$PPV = 173(SD_2)^{-1.6}$	$PPV = 24.2(SD_2)^{-1.6}$	Lower Bound	Oriard
Construction	$PPV = 1{,}730(SD_2)^{-1.6}$	$PPV = 242(SD_2)^{-1.6}$	Upper Bound	Oriard (2005)
Construction	$PPV = 4{,}320(SD_2)^{-1.6}$	$PPV = 605(SD_2)^{-1.6}$	Upper Bound - High Confinement	Oriard (2005)
Construction	$PPV = 53(SD_2)^{-1.09}$	$PPV = 5(SD_2)^{-1.09}$	Best Fit	USBM RI 8507
Quarries	$PPV = 1{,}090(SD_2)^{-1.82}$	$PPV = 182(SD_2)^{-1.82}$	Best Fit	USBM Bulletin 656
Coal Mines	$PPV = 905(SD_2)^{-1.52}$	$PPV = 119(SD_2)^{-1.52}$	Best Fit	USBM RI 8507
Coal Mines	$PPV = 3{,}330(SD_2)^{-1.52}$	$PPV = 438(SD_2)^{-1.52}$	Upper bound	USBM RI 8507
Coal - Low Frequency sites	$PPV = 1{,}252(SD_2)^{-1.31}$	$PPV = 138(SD_2)^{-1.31}$	Best Fit	USBM RI 9226

Air Overpressure/Airblast

Cubed Root Scaled Distance

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

R =	623	feet	Distance from blast to a point of intereste (meters or feet)
W =	25	lbs	Maximum charge-weigh detonated within any 8-millisecond period (kilograms or pounds)

SD_3 = 213.06 ft/lbs$^{1/3}$

Air Overpressure Prediction

$P = A * SD_3^{-B}$

URBAN CROSSROADS

R1

A =	0.5	Partially confined.
SD_3 =	213.06	
B =	1.1	Slope of the line (note that the slope is negative)

P = 0.0014 psi

Air Overpressure Prediction Equations

Blasting	Metric Equations mb	U.S. Equations psi	Statistical Type	Source
Open air (no confinement)	$P = 3589 \times SD_3^{-1.38}$	$P = 187 \times SD_3^{-1.38}$	Best Fit	Perkins
Coal mines (parting)	$P = 2596 \times SD_3^{-1.62}$	$P = 169 \times SD_3^{-1.62}$	Best Fit	USBM RI 8485
Coal mines (highwall)	$P = 5.37 \times SD_3^{-0.79}$	$P = 0.162 \times SD_3^{-0.79}$	Best Fit	USBM RI 8485
Quarry face	$P = 37.1 \times SD_3^{-0.97}$	$P = 1.32 \times SD_3^{-0.97}$	Best Fit	USBM RI 8485
Metal Mine	$P = 14.3 \times SD_3^{-0.71}$	$P = 0.401 \times SD_3^{-0.71}$	Best Fit	USBM RI 8485
Construction (average)	$P = 24.8 \times SD_3^{-1.1}$	$P = 1 \times SD_3^{-1.1}$	Best Fit	Oriard (2005)
Construction (highly confined)	$P = 2.48 \times SD_3^{-1.1}$	$P = 0.1 \times SD_3^{-1.1}$	Best Fit	Oriard (2005)
Buried (total confinement)	$P = 1.73 \times SD_3^{-0.96}$	$P = 0.061 \times SD_3^{-0.96}$	Best Fit	USBM RI 8485

Decibels (Linear)

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

P =	0.0014 psi	
P_0 =	2.9E-09 pascals	Reference value: $2.9 * 10^{-9}$ lbs/inch^2

P_s = 113.50 dB

BLASTING INPUTS & CALCULATIONS

Scaled Distance

Source: ISEE's Blaster's Handbook, 2018 Edition.

Square Root Scaled Distance

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

R =	519	feet	Distance from blast to a point of intereste (meters or feet)
W =	25	lbs	Maximum charge-weigh detonated within any 8-millisecond period (kilograms or pounds)

SD_2 = 103.80 ft/lbs$^{1/2}$

Peak Particle Velocity

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

A =	160	**"Best Fit" 160 per blasting contractor guidance based on site conditions.**
SD_2 =	103.80	*All blasts will be designed on-site by the blasting contractor to remain below 0.5 in/sec PPV*
B =	1.6	Slope of the line (note that the slope is **negative** in the equation)

PPV = 0.10 in/sec

Vibration Amplitude Equations For Various Blasting Industries

Industry	Metric Equations mm/sec.	U.S. Equations in./sec.	Confidence level	Source
General	$PPV = 1{,}140(SD_2)^{-1.6}$	$PPV = 160(SD_2)^{-1.6}$	Best Fit	DuPont
Construction	$PPV = 173(SD_2)^{-1.6}$	$PPV = 24.2(SD_2)^{-1.6}$	Lower Bound	Oriard
Construction	$PPV = 1{,}730(SD_2)^{-1.6}$	$PPV = 242(SD_2)^{-1.6}$	Upper Bound	Oriard (2005)
Construction	$PPV = 4{,}320(SD_2)^{-1.6}$	$PPV = 605(SD_2)^{-1.6}$	Upper Bound - High Confinement	Oriard (2005)
Construction	$PPV = 53(SD_2)^{-1.09}$	$PPV = 5(SD_2)^{-1.09}$	Best Fit	USBM RI 8507
Quarries	$PPV = 1{,}090(SD_2)^{-1.82}$	$PPV = 182(SD_2)^{-1.82}$	Best Fit	USBM Bulletin 656
Coal Mines	$PPV = 905(SD_2)^{-1.52}$	$PPV = 119(SD_2)^{-1.52}$	Best Fit	USBM RI 8507
Coal Mines	$PPV = 3{,}330(SD_2)^{-1.52}$	$PPV = 438(SD_2)^{-1.52}$	Upper bound	USBM RI 8507
Coal - Low Frequency sites	$PPV = 1{,}252(SD_2)^{-1.31}$	$PPV = 138(SD_2)^{-1.31}$	Best Fit	USBM RI 9226

Air Overpressure/Airblast

Cubed Root Scaled Distance

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

R =	519	feet	Distance from blast to a point of intereste (meters or feet)
W =	25	lbs	Maximum charge-weigh detonated within any 8-millisecond period (kilograms or pounds)

SD_3 = 177.50 ft/lbs$^{1/3}$

Air Overpressure Prediction

$P = A * SD_3^{-B}$

URBAN CROSSROADS

R2

A =	0.5	Partially confined.
SD_3 =	177.50	
B =	1.1	Slope of the line (note that the slope is negative)

P = 0.0017 psi

Air Overpressure Prediction Equations

Blasting	Metric Equations mb	U.S. Equations psi	Statistical Type	Source
Open air (no confinement)	$P = 3589 \times SD_3^{-1.38}$	$P = 187 \times SD_3^{-1.38}$	Best Fit	Perkins
Coal mines (parting)	$P = 2596 \times SD_3^{-1.62}$	$P = 169 \times SD_3^{-1.62}$	Best Fit	USBM RI 8485
Coal mines (highwall)	$P = 5.37 \times SD_3^{-0.79}$	$P = 0.162 \times SD_3^{-0.79}$	Best Fit	USBM RI 8485
Quarry face	$P = 37.1 \times SD_3^{-0.97}$	$P = 1.32 \times SD_3^{-0.97}$	Best Fit	USBM RI 8485
Metal Mine	$P = 14.3 \times SD_3^{-0.71}$	$P = 0.401 \times SD_3^{-0.71}$	Best Fit	USBM RI 8485
Construction (average)	$P = 24.8 \times SD_3^{-1.1}$	$P = 1 \times SD_3^{-1.1}$	Best Fit	Oriard (2005)
Construction (highly confined)	$P = 2.48 \times SD_3^{-1.1}$	$P = 0.1 \times SD_3^{-1.1}$	Best Fit	Oriard (2005)
Buried (total confinement)	$P = 1.73 \times SD_3^{-0.96}$	$P = 0.061 \times SD_3^{-0.96}$	Best Fit	USBM RI 8485

Decibels (Linear)

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

P =	0.0017 psi	
P_0 =	2.9E-09 pascals	Reference value: $2.9 * 10^{-9}$ lbs/inch^2

P_s = 115.25 dB

URBAN CROSSROADS

BLASTING INPUTS & CALCULATIONS

Scaled Distance

Source: ISEE's Blaster's Handbook, 2018 Edition.

Square Root Scaled Distance

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

R =	448	feet	Distance from blast to a point of intereste (meters or feet)
W =	25	lbs	Maximum charge-weigh detonated within any 8-millisecond period (kilograms or pounds)

SD_2 = 89.60 ft/lbs$^{1/2}$

Peak Particle Velocity

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

A =	160	**"Best Fit" 160 per blasting contractor guidance based on site conditions.**
SD_2 =	89.60	*All blasts will be designed on-site by the blasting contractor to remain below 0.5 in/sec PPV*
B =	1.6	Slope of the line (note that the slope is **negative** in the equation)

PPV = 0.12 in/sec

Vibration Amplitude Equations For Various Blasting Industries

Industry	Metric Equations mm/sec.	U.S. Equations in./sec.	Confidence level	Source
General	$PPV = 1{,}140(SD_2)^{-1.6}$	$PPV = 160(SD_2)^{-1.6}$	Best Fit	DuPont
Construction	$PPV = 173(SD_2)^{-1.6}$	$PPV = 24.2(SD_2)^{-1.6}$	Lower Bound	Oriard
Construction	$PPV = 1{,}730(SD_2)^{-1.6}$	$PPV = 242(SD_2)^{-1.6}$	Upper Bound	Oriard (2005)
Construction	$PPV = 4{,}320(SD_2)^{-1.6}$	$PPV = 605(SD_2)^{-1.6}$	Upper Bound - High Confinement	Oriard (2005)
Construction	$PPV = 53(SD_2)^{-1.09}$	$PPV = 5(SD_2)^{-1.09}$	Best Fit	USBM RI 8507
Quarries	$PPV = 1{,}090(SD_2)^{-1.82}$	$PPV = 182(SD_2)^{-1.82}$	Best Fit	USBM Bulletin 656
Coal Mines	$PPV = 905(SD_2)^{-1.52}$	$PPV = 119(SD_2)^{-1.52}$	Best Fit	USBM RI 8507
Coal Mines	$PPV = 3{,}330(SD_2)^{-1.52}$	$PPV = 438(SD_2)^{-1.52}$	Upper bound	USBM RI 8507
Coal - Low Frequency sites	$PPV = 1{,}252(SD_2)^{-1.31}$	$PPV = 138(SD_2)^{-1.31}$	Best Fit	USBM RI 9226

Air Overpressure/Airblast

Cubed Root Scaled Distance

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

R =	448	feet	Distance from blast to a point of intereste (meters or feet)
W =	25	lbs	Maximum charge-weigh detonated within any 8-millisecond period (kilograms or pounds)

SD_3 = 153.21 ft/lbs$^{1/3}$

Air Overpressure Prediction

$P = A * SD_3^{-B}$

URBAN CROSSROADS

R3

A =	0.5	Partially confined.
SD_3 =	153.21	
B =	1.1	Slope of the line (note that the slope is negative)

P = 0.0020 psi

Air Overpressure Prediction Equations

Blasting	Metric Equations mb	U.S. Equations psi	Statistical Type	Source
Open air (no confinement)	$P = 3589 \times SD_3^{-1.38}$	$P = 187 \times SD_3^{-1.38}$	Best Fit	Perkins
Coal mines (parting)	$P = 2596 \times SD_3^{-1.62}$	$P = 169 \times SD_3^{-1.62}$	Best Fit	USBM RI 8485
Coal mines (highwall)	$P = 5.37 \times SD_3^{-0.79}$	$P = 0.162 \times SD_3^{-0.79}$	Best Fit	USBM RI 8485
Quarry face	$P = 37.1 \times SD_3^{-0.97}$	$P = 1.32 \times SD_3^{-0.97}$	Best Fit	USBM RI 8485
Metal Mine	$P = 14.3 \times SD_3^{-0.71}$	$P = 0.401 \times SD_3^{-0.71}$	Best Fit	USBM RI 8485
Construction (average)	$P = 24.8 \times SD_3^{-1.1}$	$P = 1 \times SD_3^{-1.1}$	Best Fit	Oriard (2005)
Construction (highly confined)	$P = 2.48 \times SD_3^{-1.1}$	$P = 0.1 \times SD_3^{-1.1}$	Best Fit	Oriard (2005)
Buried (total confinement)	$P = 1.73 \times SD_3^{-0.96}$	$P = 0.061 \times SD_3^{-0.96}$	Best Fit	USBM RI 8485

Decibels (Linear)

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

P =	0.0020 psi	
P_0 =	2.9E-09 pascals	Reference value: $2.9 * 10^{-9}$ lbs/inch^2

P_s = 116.65 dB

URBAN CROSSROADS

BLASTING INPUTS & CALCULATIONS

Scaled Distance

Source: ISEE's Blaster's Handbook, 2018 Edition.

Square Root Scaled Distance

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

R =	981	feet	Distance from blast to a point of intereste (meters or feet)
W =	25	lbs	Maximum charge-weigh detonated within any 8-millisecond period (kilograms or pounds)

SD_2 = 196.20 ft/lbs$^{1/2}$

Peak Particle Velocity

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

A =	160	**"Best Fit" 160 per blasting contractor guidance based on site conditions.**
SD_2 =	196.20	*All blasts will be designed on-site by the blasting contractor to remain below 0.5 in/sec PPV*
B =	1.6	Slope of the line (note that the slope is **negative** in the equation)

PPV = 0.03 in/sec

Vibration Amplitude Equations For Various Blasting Industries

Industry	Metric Equations mm/sec.	U.S. Equations in./sec.	Confidence level	Source
General	$PPV = 1{,}140(SD_2)^{-1.6}$	$PPV = 160(SD_2)^{-1.6}$	Best Fit	DuPont
Construction	$PPV = 173(SD_2)^{-1.6}$	$PPV = 24.2(SD_2)^{-1.6}$	Lower Bound	Oriard
Construction	$PPV = 1{,}730(SD_2)^{-1.6}$	$PPV = 242(SD_2)^{-1.6}$	Upper Bound	Oriard (2005)
Construction	$PPV = 4{,}320(SD_2)^{-1.6}$	$PPV = 605(SD_2)^{-1.6}$	Upper Bound - High Confinement	Oriard (2005)
Construction	$PPV = 53(SD_2)^{-1.09}$	$PPV = 5(SD_2)^{-1.09}$	Best Fit	USBM RI 8507
Quarries	$PPV = 1{,}090(SD_2)^{-1.82}$	$PPV = 182(SD_2)^{-1.82}$	Best Fit	USBM Bulletin 656
Coal Mines	$PPV = 905(SD_2)^{-1.52}$	$PPV = 119(SD_2)^{-1.52}$	Best Fit	USBM RI 8507
Coal Mines	$PPV = 3{,}330(SD_2)^{-1.52}$	$PPV = 438(SD_2)^{-1.52}$	Upper bound	USBM RI 8507
Coal - Low Frequency sites	$PPV = 1{,}252(SD_2)^{-1.31}$	$PPV = 138(SD_2)^{-1.31}$	Best Fit	USBM RI 9226

Air Overpressure/Airblast

Cubed Root Scaled Distance

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

R =	981	feet	Distance from blast to a point of intereste (meters or feet)
W =	25	lbs	Maximum charge-weigh detonated within any 8-millisecond period (kilograms or pounds)

SD_3 = 335.50 ft/lbs$^{1/3}$

Air Overpressure Prediction

$P = A * SD_3^{-B}$

URBAN CROSSROADS

R4

A =	0.5	Partially confined.
SD_3 =	335.50	
B =	1.1	Slope of the line (note that the slope is negative)

P = 0.0008 psi

Air Overpressure Prediction Equations

Blasting	Metric Equations mb	U.S. Equations psi	Statistical Type	Source
Open air (no confinement)	$P = 3589 \times SD_3^{-1.38}$	$P = 187 \times SD_3^{-1.38}$	Best Fit	Perkins
Coal mines (parting)	$P = 2596 \times SD_3^{-1.62}$	$P = 169 \times SD_3^{-1.62}$	Best Fit	USBM RI 8485
Coal mines (highwall)	$P = 5.37 \times SD_3^{-0.79}$	$P = 0.162 \times SD_3^{-0.79}$	Best Fit	USBM RI 8485
Quarry face	$P = 37.1 \times SD_3^{-0.97}$	$P = 1.32 \times SD_3^{-0.97}$	Best Fit	USBM RI 8485
Metal Mine	$P = 14.3 \times SD_3^{-0.71}$	$P = 0.401 \times SD_3^{-0.71}$	Best Fit	USBM RI 8485
Construction (average)	$P = 24.8 \times SD_3^{-1.1}$	$P = 1 \times SD_3^{-1.1}$	Best Fit	Oriard (2005)
Construction (highly confined)	$P = 2.48 \times SD_3^{-1.1}$	$P = 0.1 \times SD_3^{-1.1}$	Best Fit	Oriard (2005)
Buried (total confinement)	$P = 1.73 \times SD_3^{-0.96}$	$P = 0.061 \times SD_3^{-0.96}$	Best Fit	USBM RI 8485

Decibels (Linear)

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

P =	0.0008 psi	
P_0 =	2.9E-09 pascals	Reference value: $2.9 * 10^{-9}$ lbs/inch^2

P_s = 109.17 dB

URBAN CROSSROADS