VA Medical Clinic

NOISE AND VIBRATION ANALYSIS

CITY OF BAKERSFIELD

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LIST OF ABBREVIATED TERMS

(1)	Reference
ANSI	American National Standards Institute
Calveno	California Vehicle Noise
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dBA	A-weighted decibels
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
INCE	Institute of Noise Control Engineering
L_{eq}	Equivalent continuous (average) sound level
L_{max}	Maximum level measured over the time interval
mph	Miles per hour
NOP	Notice of Preparation
PPV	Peak Particle Velocity
Project	VA Medical Clinic
REMEL	Reference Energy Mean Emission Level
RMS	Root-mean-square
VdB	Vibration Decibels

EXECUTIVE SUMMARY

Urban Crossroads, Inc. has prepared this noise study to determine the noise exposure and the necessary noise mitigation measures for the proposed VA Medical Clinic development ("Project"). The Project site is located east of Knudsen Street, west of Landco Drive, north of Hageman Road and south of Olive Drive in City of Bakersfield. The project applicant proposes to develop a 39,648 square foot (s.f.) medical outpatient facility to serve as a Department of Veterans Affairs (VA) Community-Based Outpatient Medical Clinic. This noise study has been prepared to satisfy applicable City of Bakersfield noise standards and significance criteria based on Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1)

The results of this Noise and Vibration Analysis are summarized below based on the significance criteria in Section 4 of this report consistent with Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1) 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*	-
Operational Noise	9	*Less Than Significant*	-
Construction Noise	10	*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 VA Medical Clinic ("Project"). This noise study briefly describes the proposed Project, provides information regarding noise fundamentals, sets out the local regulatory setting, presents the study methods and procedures for transportation related CNEL traffic noise analysis, and evaluates the future exterior noise environment. In addition, this study includes an analysis of the potential Project-related long-term stationary-source operational noise and short-term construction noise and vibration impacts.

1.1 SITE LOCATION

The proposed Project is located east of Knudsen Street, west of Landco Drive, north of Hageman Road and south of Olive Drive in City of Bakersfield, as shown on Exhibit 1-A. The Project Site is currently vacant.

1.2 PROJECT DESCRIPTION

The VA Medical Clinic involves the proposed development of a 39,648 square foot (s.f.) medical outpatient facility to serve as a Department of Veterans Affairs (VA) Community-Based Outpatient Medical Clinic, with associated parking and other site improvements as shown on Exhibit 1-B.

The on-site Project-related noise sources are expected to include: outdoor loading dock activity, roof-top air conditioning units, emergency generator, trash enclosure activity, parking lot vehicle movements, and truck movements. This noise analysis is intended to describe the noise level impacts associated with the expected typical operational activities at the Project site.

EXHIBIT 1-A: LOCATION MAP

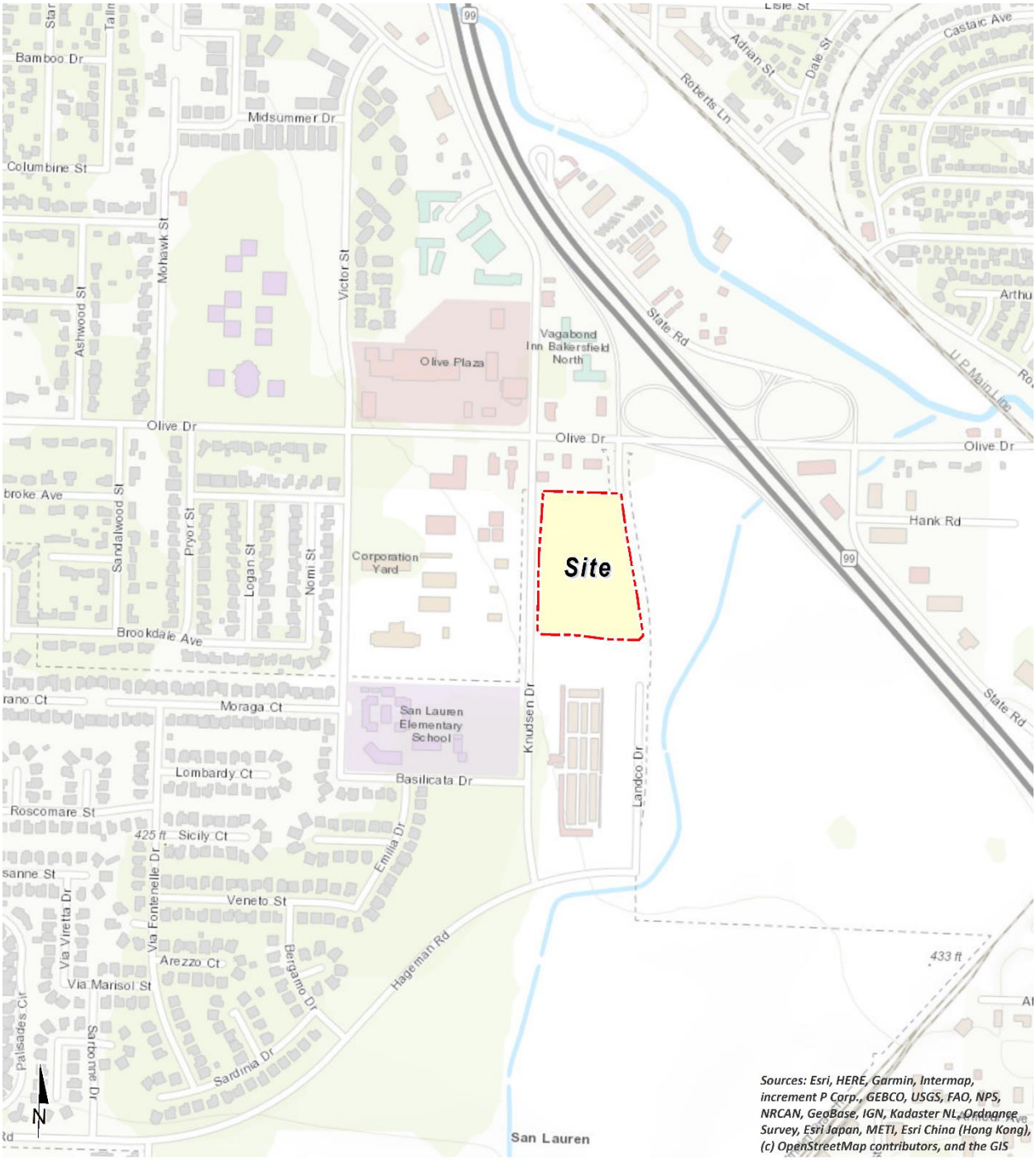
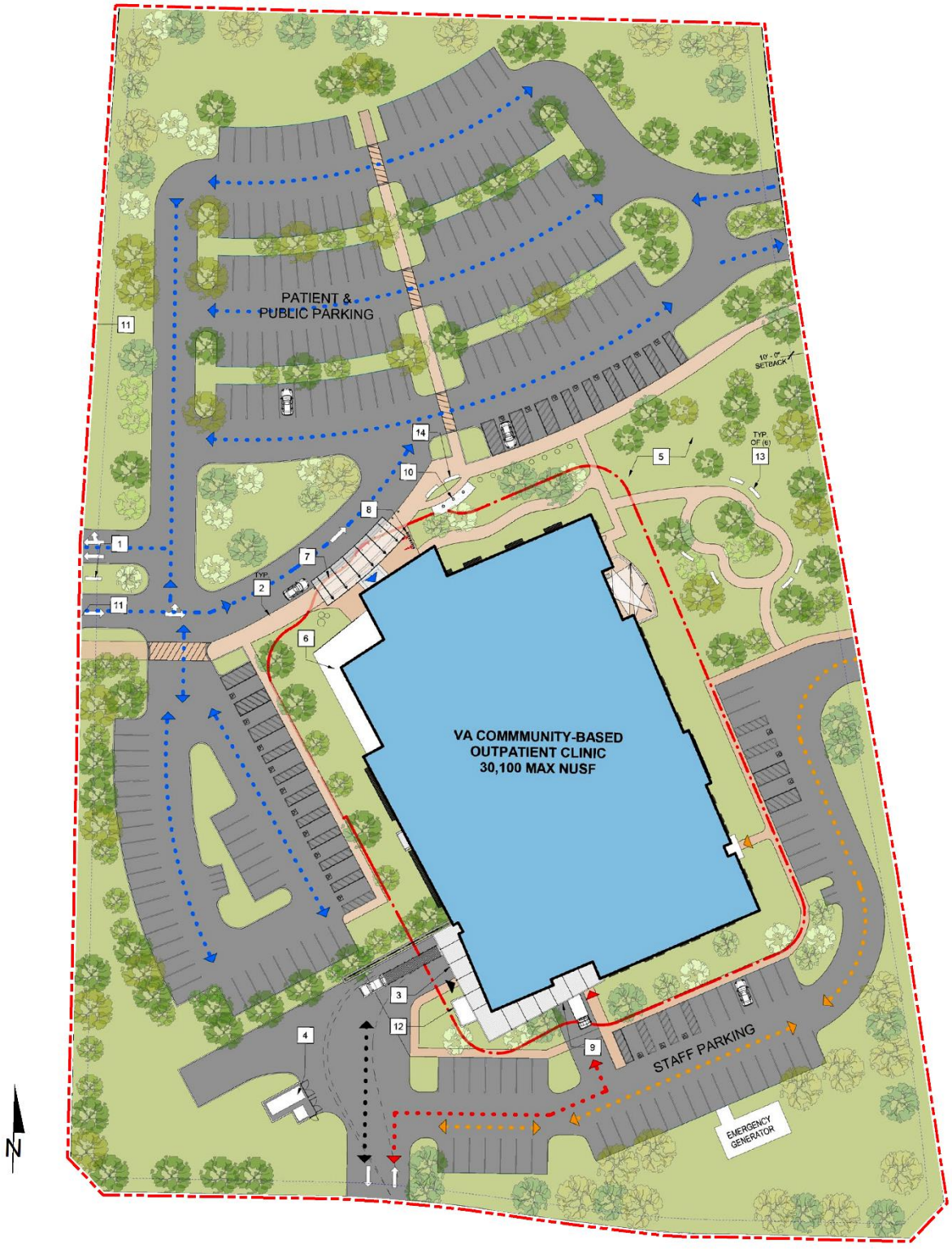


EXHIBIT 1-B: SITE PLAN



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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 1,000 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 metric is the equivalent level (L_{eq}). Equivalent sound levels are not measured directly but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period and is commonly used to describe the "average" noise levels within the environment.

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 noise can become more intrusive. CNEL does not represent the actual sound level heard at any time, but rather represents the total sound exposure. The City of Bakersfield 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. (5)

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 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 block the line-of-sight path of sound from the noise source.

2.6 LAND USE COMPATIBILITY WITH NOISE

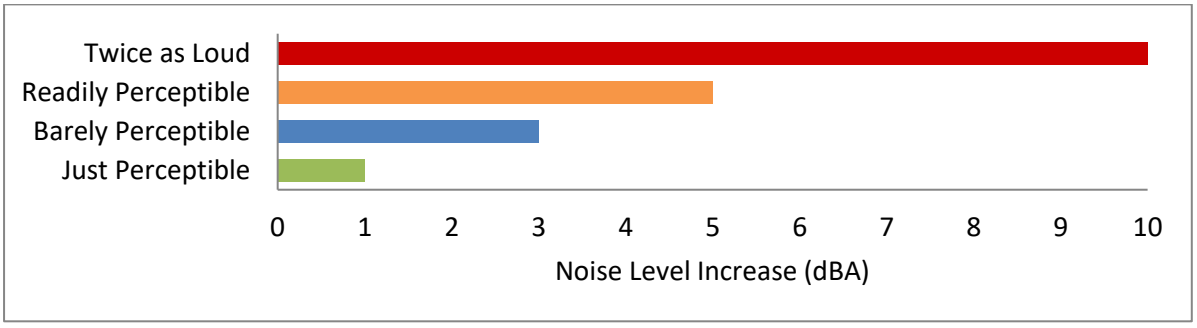
Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches, and residences are more sensitive to noise intrusion than are commercial or industrial developments and related activities. As ambient noise levels affect the perceived amenity or livability of a development, 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. (6)

2.7 COMMUNITY RESPONSE TO NOISE

Approximately sixteen 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 may occur. Twenty to thirty percent of the population will not complain even in very severe noise environments. (7 pp. 8-6) Thus, a variety of reactions can be expected from people exposed to any given noise environment.

Surveys have shown that community response to noise varies from no reaction to vigorous action for newly introduced noises averaging from 10 dB below existing to 25 dB above existing. (8) According to research originally published in the Noise Effects Handbook (7), the percentage of high annoyance ranges from approximately 0 percent at 45 dB or less, 10 percent are highly annoyed around 60 dB, and increases rapidly to approximately 70 percent being highly annoyed at approximately 85 dB or greater. 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 is considered barely perceptible, and changes of 5 dBA are considered readily perceptible. (4)

EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION



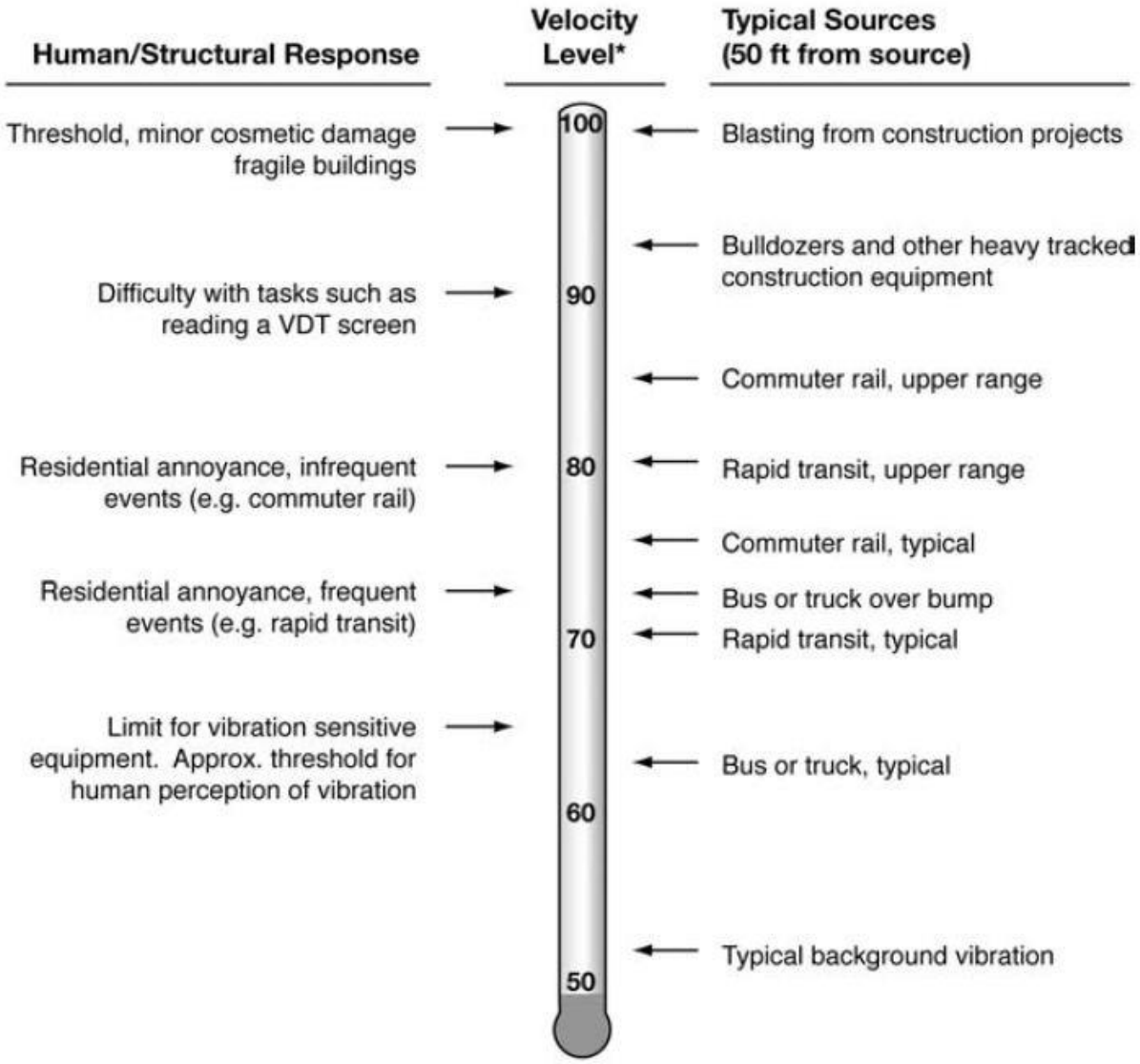
2.8 VIBRATION

Per the Federal Transit Administration (FTA) *Transit Noise Impact and Vibration Impact Assessment Manual* (8) , 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



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

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

3 REGULATORY SETTING

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 (OPR). (9) The purpose of the Noise Element is to *limit the exposure of the community to excessive noise levels*. In addition, the California Environmental Quality Act (CEQA) requires that all known environmental effects of a project be analyzed, including environmental noise impacts.

3.2 CITY OF BAKERSFIELD GENERAL PLAN NOISE ELEMENT

The City of Bakersfield has adopted a Noise Element of the General Plan to protect local citizens from the harmful effect of excessive noise exposure. (10) The Noise Element identifies the following two goals.

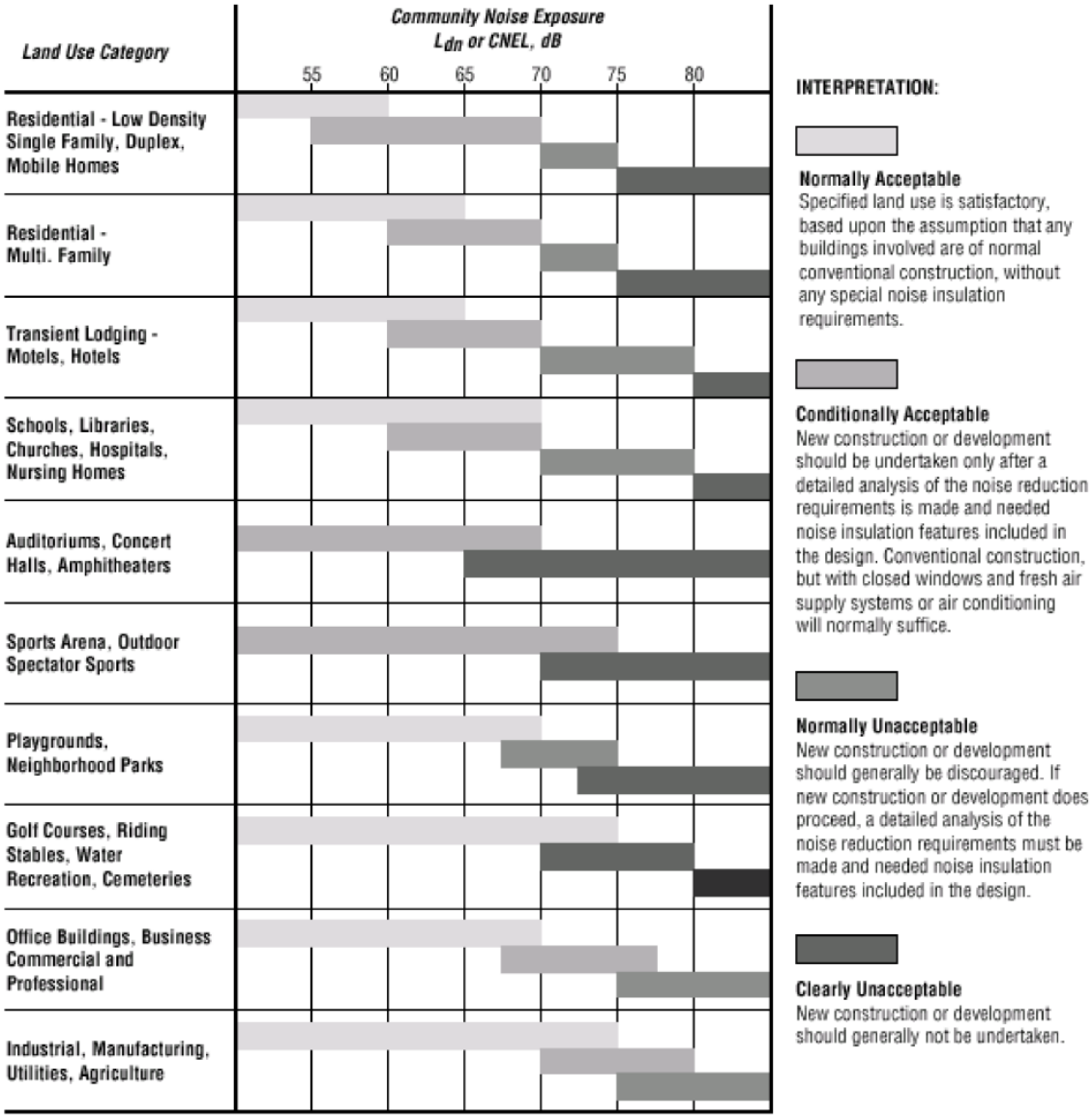
1. Ensure that residents of the Bakersfield Metropolitan Area are protected from excessive noise and existing moderate levels of noise are maintained.
2. Protect citizens of the planning area from the harmful effects of exposure to excessive noise and protect the economic base of the area by preventing the encroachment of incompatible land uses near known noise-producing roadways, industries, railroads, airports, and other sources.

The policies and implementation measures specified in the City of Bakersfield Noise Element are designed to satisfy these goals. For example, Policy 3 involves review of discretionary industrial, commercial, or other noise-generating land use project for compatibility with nearby noise-sensitive land use. Additional implementation measures include requiring proposed commercial and industrial uses to be designed or arranged so that they will not subject residential or noise sensitive land use to exterior noise levels in excess of the noise level performance standards in Table VII-2 (Table 3-1).

3.2.1 LAND USE COMPATIBILITY GUIDELINES

To ensure that residents are protected from excessive noise, the City of Bakersfield General Plan Noise Element provides guidelines to evaluate the *Land Use Compatibility for Community Noise Environments* (Figure VII-1). These guidelines presented on Exhibit 3-A are based on the Governor's Office of Planning and Research (9) and are used to describe land use categories of compatibility and not specific noise standards. According to the *Land Use Compatibility for Community Noise Environment* guidelines, noise sensitive land uses such as single-family residences are *normally acceptable* with exterior noise levels below 60 dBA CNEL and *conditionally acceptable* with noise levels below 70 dBA CNEL. The City of Bakersfield General Plan Noise Element is included in Appendix 3.1.

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



Source: OPR General Plan Guidelines, Appendix D: Noise Element Guidelines, Figure 2.

3.3.2 NOISE LEVEL PERFORMANCE STANDARDS

The City of Bakersfield General Plan Table VII-2 establishes the exterior noise level standards for stationary noise sources. Since the Project's land use could potentially impact nearby noise-sensitive uses in the Project study area, this noise study relies on the noise-sensitive residential stationary noise level standards given in the General Plan to describe Project related operational noise impacts. For residential properties, the exterior noise level shall not exceed 55 dBA L_{eq} during the daytime hours (7:00 a.m. to 10:00 p.m.) and 50 dBA L_{eq} during the nighttime hours (10:00 p.m. to 7:00 a.m.).

The exterior noise level standards apply for a cumulative period of 30 minutes in any hour, as well as the standard plus 5 dBA cannot be exceeded for a cumulative period of more than 15 minutes in any hour, or the standard plus 10 dBA for a cumulative period of more than 5 minutes in any hour, or the standard plus 15 dBA for a cumulative period of more than 1 minute in any hour, or the standard plus 20 dBA for any period of time. The City of Bakersfield stationary source noise level standards are shown on Table 3-1 and included in Appendix 3.2.

TABLE 3-1: NOISE LEVEL PERFORMANCE STANDARDS

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} (Anytime)
Daytime (7:00 a.m. to 10:00 p.m.)	55	60	65	70	75
Nighttime (10:00 p.m. to 7:00 a.m.)	50	55	60	65	70

[1] City of Bakersfield General Plan Noise Element Table VII-2 Noise Level Performance Standards (Appendix 3.1). 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.

The percentile noise descriptors are provided to ensure that the duration of the noise source is fully considered. However, because the Project's operational activities are assumed to be relatively constant in intensity and do not involve loud bursts of single-event noise, the L_{50} or average L_{eq} noise level metrics best describe the outdoor loading dock activity, roof-top air conditioning units, emergency generator, trash enclosure activity, parking lot vehicle movements, and truck movements. In addition, 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 operational noise levels.

3.3 CITY OF BAKERSFIELD MUNICIPAL CODE

Chapter 9.22, Noise of the City of Bakersfield Municipal Code included in Appendix 3.2 finds that excessive, unnecessary, and annoying noise levels are detrimental to the public health, welfare and safety and contrary to the public interest.

3.3.1 NOISE GENERALLY

In addition to the noise level performance standards outlined in Table VII-2 of the General Plan Noise Element, the Municipal Code identifies the following provisions to protect persons from excessive levels of noise.

- Section 9.22.030[A]: It is unlawful for any person to willfully make or continue, or allow to be made or continued, any loud, unnecessary noise which disturbs the peace or quiet of any neighborhood or which causes discomfort or annoyance to persons residing within one thousand feet of the noise source.
- Section 9.22.030[C]: Refrigerator trucks shall be permitted to operate in any commercial or manufacturing zone at all hours; provided, however, that such use does not emit noise or vibration detrimentally impacting neighboring residential properties and the occupants thereof between ten p.m. and seven a.m.

3.3.2 NOISE DURING CONSTRUCTION

To control noise impacts associated with construction, which would include construction of the proposed Project, Section 9.22.050 of the Municipal Code has established limits to the hours of construction activities. Section 9.22.050[A] states that it is unlawful for any person, firm or corporation to erect, demolish, alter or repair any building, or to grade or excavate land, streets or highways, other than between the hours of six a.m. and nine p.m. on weekdays, and between eight a.m. and nine p.m. on weekends. According to Section 9.22.050[C], limits to the hours of construction shall not apply to any work of construction performed one thousand feet or more from the nearest residential dwelling.

3.4 CONSTRUCTION NOISE STANDARDS

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. (8 p. 179)

3.5 CONSTRUCTION VIBRATION STANDARDS

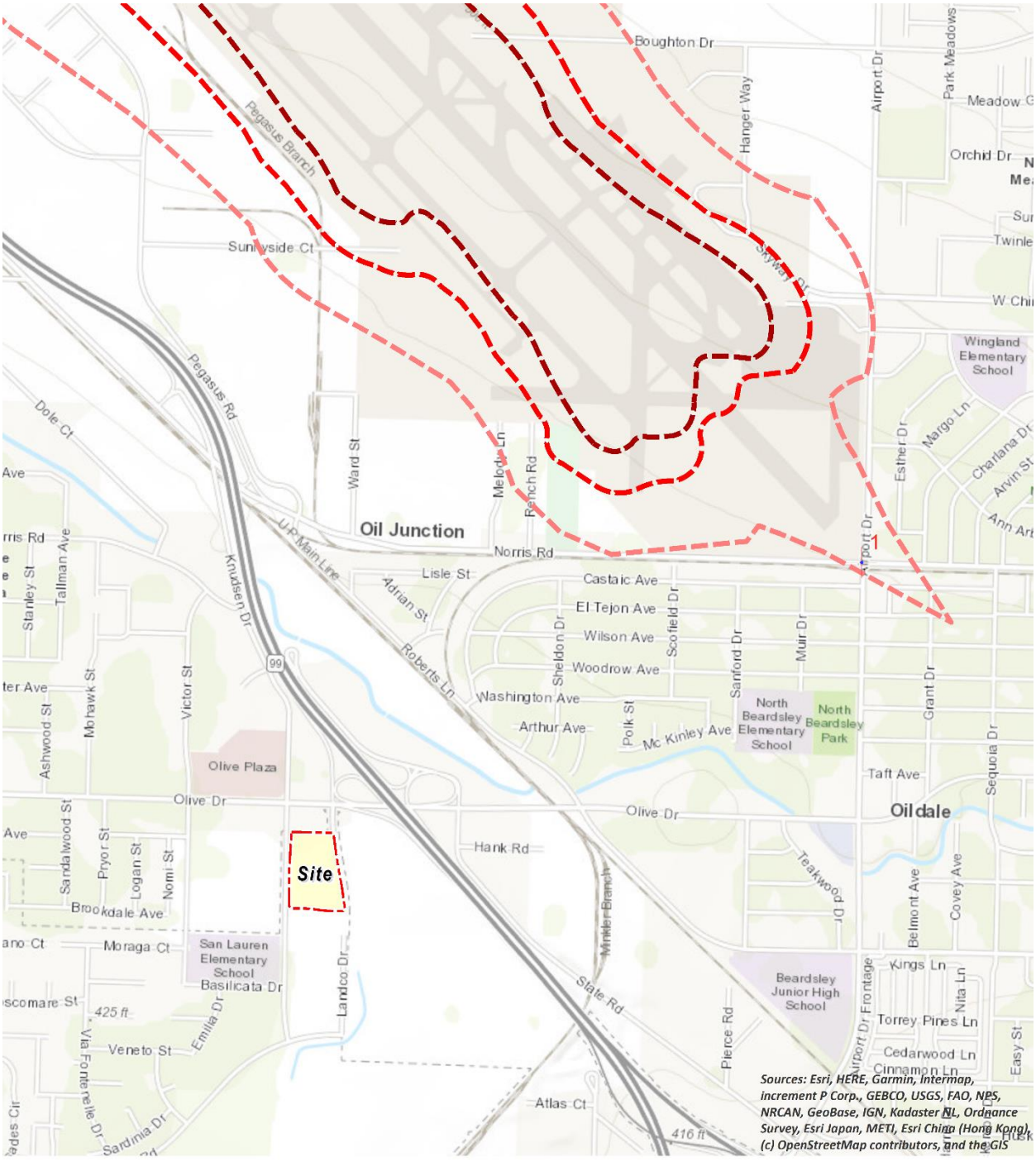
Construction activity can result in varying degrees of ground-borne vibration, depending on the equipment and methods used, distance to the affected structures and soil type. Construction vibration is generally associated with pile driving and rock blasting. Other construction equipment such as air compressors, light trucks, hydraulic loaders, etc., generates little or no ground vibration. (8) To analyze vibration impacts originating from the operation and construction of the VA Medical Clinic, vibration-generating activities are appropriately evaluated against standards established under a City's Municipal Code, if such standards exist. However,

the City of Bakersfield does not identify specific vibration level limits. Therefore, for analysis purposes, the Caltrans *Transportation and Construction Vibration Guidance Manual*, (11 p. 38) Table 19, vibration damage are used in this noise study to assess potential temporary construction-related impacts at adjacent building locations. The nearest noise sensitive buildings adjacent to the Project site can best be described as "older residential structures" with a maximum acceptable continuous vibration threshold of 0.3 PPV (in/sec).

3.6 MEADOWS FIELD AIRPORT

The Project site is located approximately one mile southwest to Runway 12R-30L of the Meadows Field Airport (BFL). This places the Project site within the Airport Influence Area (AIA) according to the County of Kern Airport Land Use Compatibility Plan (ALUCP) as shown on Exhibit 3-B. (12) The purpose of the ALUCP is to establish procedures and criteria by which the County of Kern and the affected incorporated cities can address compatibility issues when making planning decisions regarding airports and the land uses around them. In addition, the ALUCP requires that the supporting compatibility criteria consider the future Community Noise Equivalent Level (CNEL) contours. Exhibit 3-B shows that the Project site is located well outside the 60 dBA CNEL noise level contour boundary of the Meadows Field Airport. According to the ALUCP noise compatibility criteria shown on Exhibit 3-C, the Project medical outpatient commercial land use is considered *normally acceptable* with exterior noise levels of 55-60 dBA CNEL.

EXHIBIT 3-B: MEADOWS FIELD AIRPORT NOISE CONTOURS



Source: County of Kern Airport Land Use Compatibility Plan (ALUCP)

EXHIBIT 3-C: ALUCP NOISE COMPATIBILITY CRITERIA

LAND USE CATEGORY	CNEL, dBA 50-55	55-60	60-65	65-70	70-75
Residential					
single family, mobile homes	++	+	o	— —	— —
multi-family, apartments, condominiums	++	+	o	— —	— —
Public					
schools, libraries, hospitals	+	o	—	— —	— —
churches, auditoriums, concert halls	+	o	o	—	— —
transportation, parking, cemeteries	++	++	++	+	o
Commercial and Industrial					
offices, retail trade	++	+	o	o	—
service commercial, wholesale trade, warehousing, light industrial	++	++	+	o	o
general manufacturing, utilities, extractive industry	++	++	++	+	+
nursing homes	++	++	+	—	—
Agricultural and Recreational					
cropland	++	++	++	++	+
livestock breeding	++	+	o	o	—
parks, playgrounds, zoos	++	+	+	o	—
golf courses, riding stables, water recreation	++	++	+	o	o
outdoor spectator sports	++	+	+	o	—
amphitheaters	+	o	—	— —	— —

LAND USE AVAILABILITY		INTERPRETATION/COMMENTS
++	Clearly Acceptable	The activities associated with the specified land use can be carried out with essentially no interference from the noise exposure.
+	Normally Acceptable	Noise is a factor to be considered in that slight interference with outdoor activities may occur. Conventional construction methods will eliminate most noise intrusions upon indoor activities.
o	Marginally Acceptable	The indicated noise exposure will cause moderate interference with outdoor activities and with indoor activities when windows are open. The land use is acceptable on the conditions that outdoor activities are minimal and construction features which provide sufficient noise attenuation are used (e.g., installation of air conditioning so that windows can be kept closed). Under other circumstances, the land use should be discouraged.
—	Normally Unacceptable	Noise will create substantial interference with both outdoor and indoor activities. Noise intrusion upon indoor activities can be mitigated by requiring special noise insulation construction. Land uses which have conventionally constructed structures and/or involve outdoor activities which would be disrupted by noise should generally be avoided.
— —	Clearly Unacceptable	Unacceptable noise intrusion upon land use activities will occur. Adequate structural noise insulation is not practical under most circumstances. The indicated land use should be avoided unless strong overriding factors prevail and it should be prohibited if outdoor activities are involved.

Source: Hodges & Shutt (1993)

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4 SIGNIFICANCE CRITERIA

The following significance criteria are based on currently adopted guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (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?

4.1 NOISE LEVEL INCREASES (THRESHOLD A)

Noise level increases resulting from the Project are evaluated based on the Appendix G CEQA Guidelines described above at the closest sensitive receiver locations. Under CEQA, consideration must be given to the magnitude of the increase, the existing baseline ambient noise levels, and the location of noise-sensitive receivers to determine if a noise increase represents a significant adverse environmental impact. This approach recognizes *that there is no single noise increase that renders a noise impact significant.* (12) 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 level exceeds the previously existing ambient noise level, the less acceptable the new noise level will typically be judged.

The Federal Interagency Committee on Noise (FICON) (13) developed guidance to be used for the assessment of project-generated increases in noise levels that consider the ambient noise level. The FICON recommendations are based on studies that relate aircraft noise levels to the percentage of persons highly annoyed by aircraft noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, these recommendations are often used in environmental noise impact assessments involving the use of cumulative noise exposure metrics, such as the average-daily noise level (CNEL) and equivalent continuous noise level (L_{eq}).

As previously stated, the approach used in this noise study recognizes *that there is no single noise increase that renders a noise impact significant*, based on a 2008 California Court of Appeal ruling on Gray v. County of Madera. (12) For example, if the ambient noise environment is quiet (<60 dBA) and the new noise source greatly increases the noise levels, an impact may occur if the noise criteria may be exceeded. Therefore, for this analysis, a *readily perceptible* 5 dBA or greater project-related noise level increase is considered a significant impact when the without project noise levels are below 60 dBA. Per the FICON, in areas where the without project noise levels range from 60 to 65 dBA, a 3 dBA *barely perceptible* noise level increase appears to be appropriate for most people. When the without project noise levels already exceed 65 dBA, any

increase in community noise louder than 1.5 dBA or greater is considered a significant impact if the noise criteria for a given land use is exceeded, since it likely contributes to an existing noise exposure exceedance. The FICON guidance provides an established source of criteria to assess the impacts of substantial temporary or permanent increase in baseline ambient noise levels. Based on the FICON criteria, the amount to which a given noise level increase is considered acceptable is reduced when the without Project (baseline) noise levels are already shown to exceed certain land-use specific exterior noise level criteria. The specific levels are based on typical responses to noise level increases of 5 dBA or *readily perceptible*, 3 dBA or *barely perceptible*, and 1.5 dBA depending on the underlying without Project noise levels for noise-sensitive uses.

According to the General Plan Noise Element *Standards for Project Noise Impacts for Mobile Sources* (10 p. VII_13)*,* the off-site traffic noise level increase criteria is limited to existing noise-sensitive land uses. In addition, these levels of increases and their perceived acceptance are consistent with the guidance provided by both the Federal Highway Administration (4 p. 9) and Caltrans (14 p. 2_48).

4.2 VIBRATION (THRESHOLD B)

As described in Section 3.5, the vibration impacts originating from the construction of VA Medical Clinic, vibration-generating activities are appropriately evaluated using the Caltrans vibration damage thresholds to assess potential temporary construction-related impacts at adjacent building locations. The nearest noise sensitive buildings adjacent to the Project site can best be described as "older residential structures" with a maximum acceptable continuous vibration threshold of 0.3 PPV (in/sec).

4.3 CEQA GUIDELINES NOT FURTHER ANALYZED (THRESHOLD C)

The closest airport which would require additional noise analysis under CEQA Significance Criteria C is the Meadows Field Airport which is located approximately one mile northeast of the Project site. As previously indicated in Section 3.6, the noise contour boundaries of Meadows Field Airport are presented on Exhibit 3-B of this report shows that the Project's medical outpatient commercial land use is located well outside the 60 dBA CNEL noise level contour boundary. According to the ALUCP noise compatibility criteria shown on Exhibit 3-C, the Project medical outpatient commercial land use is considered *normally acceptable* with exterior noise levels of 55-60 dBA CNEL. Therefore, the Project impacts are considered *less than significant,* and no further noise analysis is provided under CEQA Significance Criteria C.

4.4 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 < 60 dBA CNEL	≥ 5 dBA CNEL Project increase	
	If ambient is 60 - 65 dBA CNEL	≥ 3 dBA CNEL Project increase	
	If ambient is > 65 dBA CNEL	≥ 1.5 dBA CNEL Project increase	
Operational	Exterior Noise Level Standards[2]	55 dBA L_{eq}	50 dBA L_{eq}
	If ambient is < 60 dBA Leq[1]	≥ 5 dBA L_{eq} Project increase	
	If ambient is 60 - 65 dBA Leq[1]	≥ 3 dBA L_{eq} Project increase	
	If ambient is > 65 dBA Leq[1]	≥ 1.5 dBA L_{eq} Project increase	
Construction	Construction activities are restricted within 1,000 feet of residential dwellings other than between the hours of six a.m. and nine p.m. on weekdays, and between eight a.m. and nine p.m. on weekends[3]		
	Noise Level Threshold[4]	80 dBA L_{eq}	n/a
	Vibration Level Threshold[5]	0.3 PPV (in/sec)	

[1] FICON, 1992 and the City of Bakersfield Noise Element Standards for Project Noise Impacts for Mobile Sources. Consistent with the General Plan Noise Element (VII-13), off-site traffic noise level increase criteria are limited to existing noise-sensitive land uses.
[2] Metropolitan Bakersfield Noise Element Table VII-2 Noise Level Performance Standards.
[3] City of Bakersfield Municipal Code Section 9.22.050[A].
[4] Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual.
[5] Caltrans Transportation and Construction Vibration Manual, April 2020 Table 19.
"Daytime" = 7:00 a.m. to 7:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

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5 EXISTING NOISE LEVEL MEASUREMENTS

To assess the existing noise level environment, 24-hour noise level measurements were taken at five locations in the Project study area. The receiver locations were selected to describe and document the existing noise environment within the Project study area. Exhibit 5-A provides the boundaries of the Project study area and the noise level measurement locations. To fully describe the existing noise conditions, noise level measurements were collected by Urban Crossroads, Inc. on Wednesday, December 14, 2022. 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 equivalent daytime and nighttime hourly noise levels. 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. (15)

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*. (8)

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

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

EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS

5.3 NOISE MEASUREMENT RESULTS

The noise measurements presented below focus on the equivalent or the hourly energy average 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.

TABLE 5-1: AMBIENT NOISE LEVEL MEASUREMENTS

Location[1]	Description	Energy Average Noise Level (dBA L_{eq})[2]	
		Daytime	Nighttime
L1	Located North of the site near the hotel located at 6100 Knudsen Dr.	63.3	61.6
L2	Located Southwest of the site near the commercial site located at 5151 Knudsen Dr.	66.9	60.6
L3	Located Southwest of the site near the school located at 5210 Victor St.	58.1	55.4
L4	Located West of the site near the residence located at 5704 Nomi St.	65.2	61.3
L5	Located West of the site near the apartments located at 5948 Victor St.	66.3	60.3

[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 equivalent 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

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6 TRAFFIC NOISE METHODS AND PROCEDURES

The following section outlines the methods and procedures used to estimate and analyze the future traffic noise environment. Consistent with City of Bakersfield *Land Use Compatibility for Community Noise Environments* Guidelines for Land Use Planning (see Exhibit 3-A), all transportation related noise levels are presented in terms of the 24-hour CNEL's.

6.1 FHWA TRAFFIC NOISE PREDICTION MODEL

The expected roadway noise level increases from vehicular traffic were calculated by Urban Crossroads, Inc. using a computer program that replicates the Federal Highway Administration (FHWA) Traffic Noise Prediction Model- FHWA-RD-77-108. (16) This methodology is commonly used to describe the off-site traffic noise levels throughout California and is consistent with the City of Bakersfield General Plan Noise Element.

The FHWA Model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). In California the national REMELs are substituted with the California Vehicle Noise (Calveno) Emission Levels. (17) Adjustments are then made to the REMEL to account for: the roadway classification (e.g., collector, secondary, major or arterial), the roadway active width (i.e., the distance between the center of the outermost travel lanes on each side of the roadway), the total average daily traffic (ADT), the travel speed, the percentages of automobiles, medium trucks, and heavy trucks in the traffic volume, the roadway grade, the angle of view (e.g., whether the roadway view is blocked), the site conditions ("hard" or "soft" relates to the absorption of the ground, pavement, or landscaping), and the percentage of total ADT which flows each hour throughout a 24-hour period. Research conducted by Caltrans has shown that the use of soft site conditions is appropriate for the application of the FHWA traffic noise prediction model used in this analysis. (18)

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 seven off-site study area roadway segments, the distance from the centerline to adjacent land use based on the functional roadway classifications per the Metropolitan Bakersfield General Plan Circulation Element, and the vehicle speeds. The ADT volumes used in this study area presented on Table 6-2 are based on the VA Community-Based Outpatient Clinic Traffic Study prepared by Ruettgers & Schuler Civil Engineers ("Traffic Study") for the following traffic scenarios. (20)

1. Existing
2. Existing with Project
3. Year 2042 without Project
4. Year 2042 with Project

The ADT volumes vary for each roadway segment based on the existing traffic volumes and the combination of project traffic distributions. This analysis relies on a comparative evaluation of the off-site traffic noise impacts at the boundary of the right-of-way of the receiving adjacent land use, without and with project ADT traffic volumes from the Project traffic study. Table 6-3 provides the time of day (daytime, evening, and nighttime) vehicle splits. Table 6-4 shows the typical traffic flow by vehicle type (vehicle mix). The vehicle mix provides the hourly distribution percentages of automobile, medium trucks, and heavy trucks for input into the FHWA noise prediction model.

TABLE 6-1: OFF-SITE ROADWAY PARAMETERS

ID	Roadway	Segment	Classification[1]	Distance from Centerline to Receiving Land Use (Feet)	Vehicle Speed (mph)
1	Knudsen Dr.	n/o Olive Dr.	Collector	37'	40
2	Knudsen Dr.	s/o Olive Dr.	Collector	37'	40
3	Knudsen Dr.	s/o Hageman Rd.	Collector	37'	40
4	Olive Dr.	w/o Knudsen Dr.	Arterial	55'	45
5	Olive Dr.	e/o Knudsen Dr.	Arterial	55'	45
6	Hageman Rd.	w/o Knudsen Dr.	Arterial	55'	45
7	Hageman Rd.	e/o Knudsen Dr.	Arterial	55'	45

[1] Metropolitan Bakersfield General Plan Circulation Element

TABLE 6-2: AVERAGE DAILY TRAFFIC VOLUMES

ID	Roadway	Segment	Average Daily Traffic Volumes[1]			
			Existing		Year 2042	
			Without Project	With Project	Without Project	With Project
1	Knudsen Dr.	n/o Olive Dr.	9,820	9,910	11,060	11,150
2	Knudsen Dr.	s/o Olive Dr.	15,660	16,270	11,270	11,720
3	Knudsen Dr.	s/o Hageman Rd.	-	-	6,150	6,150
4	Olive Dr.	w/o Knudsen Dr.	20,840	21,090	13,920	14,150
5	Olive Dr.	e/o Knudsen Dr.	37,820	38,090	23,310	23,440
6	Hageman Rd.	w/o Knudsen Dr.	16,680	17,300	17,600	18,080
7	Hageman Rd.	e/o Knudsen Dr.	-	-	20,050	20,320

[1] VA Community-Based Outpatient Clinic Traffic Study prepared by Ruettgers & Schuler Civil Engineers.

TABLE 6-3: TIME OF DAY VEHICLE SPLITS

Vehicle Type	Time of Day Splits			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%

"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: TYPICAL VEHICLE MIX

Classification	Total % Traffic Flow			Total
	Autos	Medium Trucks	Heavy Trucks	
All Segments	97.42%	1.84%	0.74%	100.00%

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7 OFF-SITE TRAFFIC NOISE ANALYSIS

To assess the off-site transportation CNEL noise level impacts associated with development of the proposed Project, noise contours were developed based on the VA Community-Based Outpatient Clinic Traffic Study prepared by Ruettgers & Schuler Civil Engineers. (20) Noise contour boundaries represent the equal levels of noise exposure and are measured in CNEL from the center of the roadway.

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 to 7-4 present a summary of the exterior traffic noise levels for each traffic condition. Appendix 7.1 includes the traffic noise level contours worksheets.

TABLE 7-1: EXISTING WITHOUT PROJECT CONTOURS

ID	Road	Segment	CNEL at Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
				70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Knudsen Dr.	n/o Olive Dr.	67.9	RW	58	124
2	Knudsen Dr.	s/o Olive Dr.	69.9	37	79	170
3	Knudsen Dr.	s/o Hageman Rd.	-	-	-	-
4	Olive Dr.	w/o Knudsen Dr.	69.8	RW	116	249
5	Olive Dr.	e/o Knudsen Dr.	72.4	80	172	370
6	Hageman Rd.	w/o Knudsen Dr.	68.9	RW	100	215
7	Hageman Rd.	e/o Knudsen Dr.	-	-	-	-

[1] The CNEL is calculated at the boundary of the receiving 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 CONTOURS

ID	Road	Segment	CNEL at Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
				70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Knudsen Dr.	n/o Olive Dr.	67.9	RW	58	125
2	Knudsen Dr.	s/o Olive Dr.	70.1	38	81	174
3	Knudsen Dr.	s/o Hageman Rd.	-	-	-	-
4	Olive Dr.	w/o Knudsen Dr.	69.9	RW	116	251
5	Olive Dr.	e/o Knudsen Dr.	72.5	80	173	372
6	Hageman Rd.	w/o Knudsen Dr.	69.0	RW	102	220
7	Hageman Rd.	e/o Knudsen Dr.	-	-	-	-

[1] The CNEL is calculated at the boundary of the receiving adjacent land use.
RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-3: YEAR 2042 WITHOUT PROJECT CONTOURS

ID	Road	Segment	CNEL at Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
				70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Knudsen Dr.	n/o Olive Dr.	68.4	RW	63	135
2	Knudsen Dr.	s/o Olive Dr.	68.5	RW	63	136
3	Knudsen Dr.	s/o Hageman Rd.	65.9	RW	42	91
4	Olive Dr.	w/o Knudsen Dr.	68.1	RW	88	190
5	Olive Dr.	e/o Knudsen Dr.	70.3	58	124	268
6	Hageman Rd.	w/o Knudsen Dr.	69.1	RW	103	222
7	Hageman Rd.	e/o Knudsen Dr.	69.7	RW	113	243

[1] The CNEL is calculated at the boundary of the receiving adjacent land use.
RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-4: YEAR 2042 WITH PROJECT CONTOURS

ID	Road	Segment	CNEL at Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
				70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Knudsen Dr.	n/o Olive Dr.	68.5	RW	63	135
2	Knudsen Dr.	s/o Olive Dr.	68.7	RW	65	140
3	Knudsen Dr.	s/o Hageman Rd.	65.9	RW	42	91
4	Olive Dr.	w/o Knudsen Dr.	68.2	RW	89	192
5	Olive Dr.	e/o Knudsen Dr.	70.3	58	125	269
6	Hageman Rd.	w/o Knudsen Dr.	69.2	RW	105	226
7	Hageman Rd.	e/o Knudsen Dr.	69.7	RW	114	245

[1] The CNEL is calculated at the boundary of the receiving adjacent land use.
RW" = Location of the respective noise contour falls within the right-of-way of the road.

7.2 EXISTING PROJECT TRAFFIC NOISE LEVEL INCREASES

An analysis of existing traffic noise levels plus traffic noise generated by the proposed Project has been included in this report for informational purposes and to fully analyze all the existing traffic scenarios identified in the Traffic Study. Table 7-1 shows the Existing without Project conditions CNEL noise levels. The Existing without Project exterior noise levels range from 67.9 to 72.4 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-2 shows the Existing with Project conditions ranging from 67.9 to 72.5 dBA CNEL. Table 7-5 shows that the Project off-site traffic noise level increases range from 0.0 to 0.2 dBA CNEL on the study area roadway segments. Based on the significance criteria for off-site traffic noise presented in Section 4.1, existing noise sensitive land uses adjacent to the study area roadway segments would experience *less than significant* noise level impacts due to the unmitigated Project-related traffic noise levels.

7.3 2042 TRAFFIC NOISE LEVEL INCREASES

Table 7-3 presents the 2042 without Project conditions CNEL noise levels. The 2042 without Project exterior noise levels range from 65.9 to 70.3 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-4 shows that the 2042 with Project conditions will range from 65.9 to 70.3 dBA CNEL. Table 7-6 shows that the Project off-site traffic noise level increases range from 0.0 to 0.2 dBA CNEL. Based on the significance criteria for off-site traffic noise presented in Section 4.1, land use adjacent to the study area roadway segments would experience *less than significant* noise level impacts due to the unmitigated Project-related traffic noise levels.

TABLE 7-5: EXISTING WITH PROJECT TRAFFIC NOISE LEVEL INCREASES

ID	Road	Segment	CNEL at Receiving Land Use (dBA)[1]			Incremental Noise Level Increase Threshold[2]	
			No Project	With Project	Project Addition	Limit	Exceeded?
1	Knudsen Dr.	n/o Olive Dr.	67.9	67.9	0.0	1.5	No
2	Knudsen Dr.	s/o Olive Dr.	69.9	70.1	0.2	1.5	No
3	Knudsen Dr.	s/o Hageman Rd.	-	-	-	-	-
4	Olive Dr.	w/o Knudsen Dr.	69.8	69.9	0.1	1.5	No
5	Olive Dr.	e/o Knudsen Dr.	72.4	72.5	0.0	1.5	No
6	Hageman Rd.	w/o Knudsen Dr.	68.9	69.0	0.2	1.5	No
7	Hageman Rd.	e/o Knudsen Dr.	-	-	-	-	-

[1] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the receiving land use.
[2] Does the Project create an incremental noise level increase exceeding the significance criteria in Section 4.1?
[3] Off-site traffic noise level increase threshold is limited to existing noise-sensitive land uses (General Plan Noise Element Standards for Project Noise Impacts for Mobile Sources (VII_13).

TABLE 7-6: 2042 WITH PROJECT TRAFFIC NOISE LEVEL INCREASES

ID	Road	Segment	CNEL at Receiving Land Use (dBA)[1]			Incremental Noise Level Increase Threshold[2]	
			No Project	With Project	Project Addition	Limit	Exceeded?
1	Knudsen Dr.	n/o Olive Dr.	68.4	68.5	0.0	1.5	No
2	Knudsen Dr.	s/o Olive Dr.	68.5	68.7	0.2	1.5	No
3	Knudsen Dr.	s/o Hageman Rd.	65.9	65.9	0.0	1.5	No
4	Olive Dr.	w/o Knudsen Dr.	68.1	68.2	0.1	1.5	No
5	Olive Dr.	e/o Knudsen Dr.	70.3	70.3	0.0	1.5	No
6	Hageman Rd.	w/o Knudsen Dr.	69.1	69.2	0.1	1.5	No
7	Hageman Rd.	e/o Knudsen Dr.	69.7	69.7	0.1	1.5	No

[1] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the receiving land use.
[2] Does the Project create an incremental noise level increase exceeding the significance criteria in Section 4.1?
[3] Off-site traffic noise level increase threshold is limited to existing noise-sensitive land uses (General Plan Noise Element Standards for Project Noise Impacts for Mobile Sources (VII_13).

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

To describe the potential off-site Project noise levels, five sensitive receiver locations in the vicinity of the Project site were identified. The selection of receiver locations is based on FHWA guidelines and is consistent with additional guidance provided by Caltrans and the FTA, as previously described in Section 5.2. 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. Distance is measured in a straight line from the project boundary to each receiver location.

R1: Location R1 represents the Vagabond Inn hotel located at 6100 Knudsen Drive, approximately 611 feet north of the Project site. Since there are no private outdoor living areas (backyards) facing the Project site, receiver R1 is placed at the building façade. A 24-hour noise measurement was taken near this location, L1, to describe the existing ambient noise environment.

R2: Location R2 represents the Kern River Transitional Care Center at 5151 Knudsen Drive, approximately 1,010 feet southwest of the Project site. Since there are no private outdoor living areas (backyards) facing the Project site, receiver R2 is placed at the building façade. A 24-hour noise measurement was taken near this location, L2, to describe the existing ambient noise environment.

R3: Location R3 represents the San Lauren Elementary at 5210 Victor Street, approximately 557 feet southwest of the Project site. R3 is placed in the outdoor play area facing the Project site. A 24-hour noise measurement was taken near this location, L3, to describe the existing ambient noise environment.

R4: Location R4 represents the nearest existing noise sensitive residence located at 5704 Nomi Street, approximately 1,093 feet west of the Project site. R4 is placed in the private outdoor living areas (backyard) facing the Project site. A 24-hour noise measurement was taken near this location, L4, to describe the existing ambient noise environment.

R5: Location R5 represents the Valley Baptist Church at 5500 Olive Drive, approximately 1,307 feet northwest of the Project site. R5 is placed in the outdoor areas facing the Project

site. A 24-hour noise measurement was taken near this location, L5, to describe the existing ambient noise environment.

EXHIBIT 8-A: RECEIVER LOCATIONS

9 OPERATIONAL NOISE IMPACTS

This section analyzes the potential stationary-source operational noise impacts at the nearest receiver locations, identified in Section 8, resulting from the operation of the proposed VA Medical Clinic Project. Exhibit 9-A identifies the noise source locations used to assess the operational noise levels.

9.1 OPERATIONAL NOISE SOURCES

This operational noise analysis is intended to describe noise level impacts associated with the expected typical of daytime and nighttime activities at the Project site. The on-site Project-related noise sources are expected to include: outdoor loading dock activity, roof-top air conditioning units, emergency generator, trash enclosure activity, parking lot vehicle movements, and truck movements.

9.2 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 detailed description of the reference noise level measurements shown on Table 9-1 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 the outdoor loading dock activity, roof-top air conditioning units, emergency generator, trash enclosure activity, parking lot vehicle movements, and truck movements all operating at the same time. These sources of noise activity will likely vary throughout the day.

9.2.1 MEASUREMENT PROCEDURES

The reference noise level measurements presented in this section were collected 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. (15)

EXHIBIT 9-A: OPERATIONAL NOISE SOURCE LOCATIONS

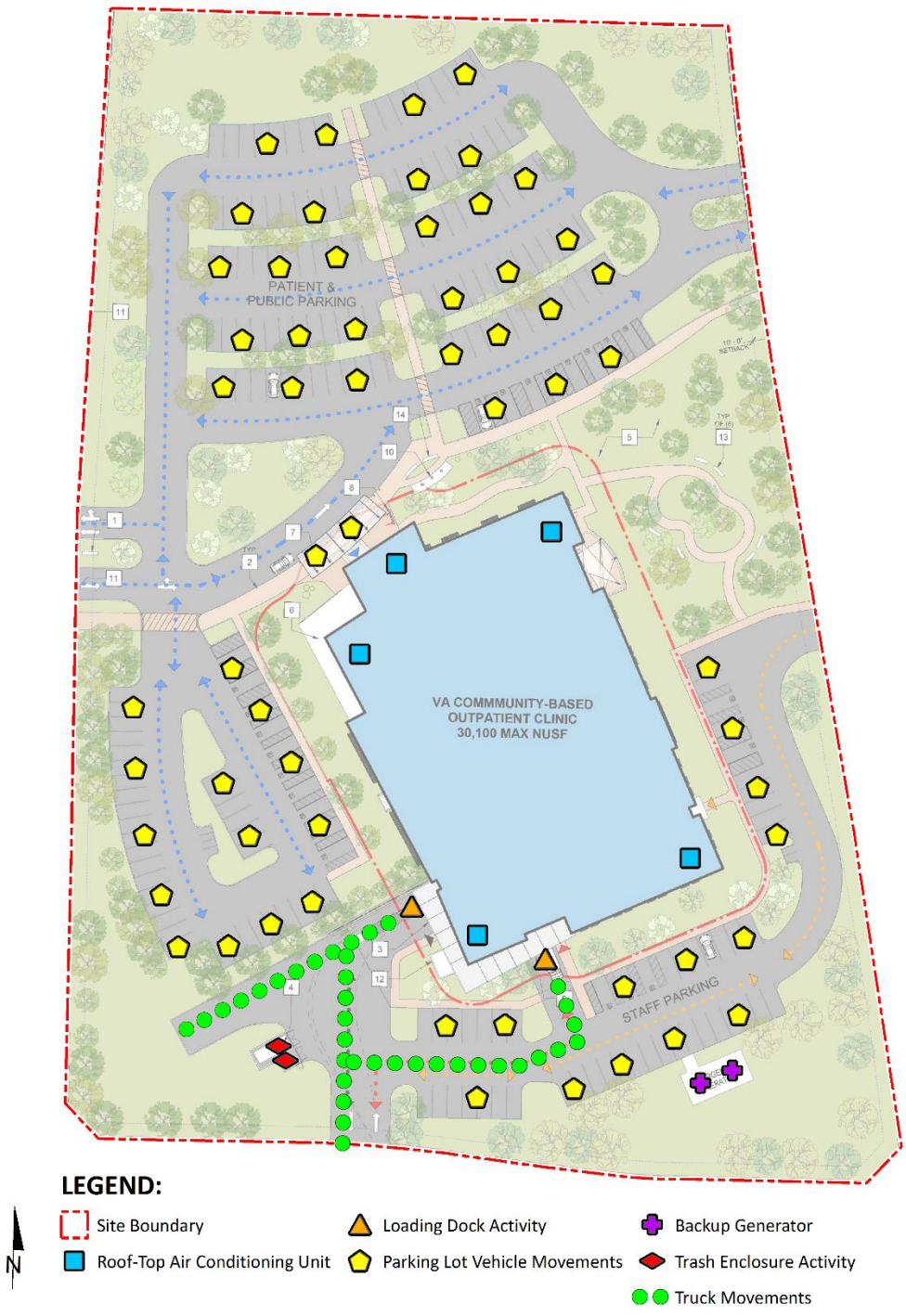

TABLE 9-1: REFERENCE NOISE LEVEL MEASUREMENTS

Noise Source[1]	Noise Source Height (Feet)	Min./ Hour[2]		Reference Noise Level (dBA L_{eq}) @ 50 Feet	Sound Power Level (dBA)[3]
		Day	Night		
Loading Dock Activity	8'	60	60	62.8	103.4
Roof-Top Air Conditioning Units	5'	39	28	57.2	88.9
Backup Generator	6'	60	60	64.9	110.3
Trash Enclosure Activity	5'	60	30	57.3	89.0
Parking Lot Vehicle Movements	5'	60	60	52.6	81.1
Truck Movements	8'	60	60	59.8	93.2

[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 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.

9.2.2 LOADING DOCK ACTIVITY

The reference loading dock activities are intended to describe the typical operational noise source levels associated with the Project. This includes truck idling, deliveries, backup alarms, unloading/loading, docking including a combination of tractor trailer semi-trucks, two-axle delivery trucks, and background forklift operations. At a uniform reference distance of 50 feet, Urban Crossroads collected a reference noise level of 62.8 dBA L_{eq}. The loading dock activity noise level measurement was taken over a fifteen-minute period and represents multiple noise sources taken from the center of activity. The reference noise level measurement includes employees unloading a docked truck container included the squeaking of the truck's shocks when weight was removed from the truck, employees playing music over a radio, as well as a forklift horn and backup alarm. In addition, during the noise level measurement a truck entered the loading dock area and proceeded to reverse and dock in a nearby loading bay, adding truck engine, idling, air brakes noise, in addition to on-going idling of an already docked truck. Loading dock activity is estimated during all the daytime, evening, and nighttime hours.

9.2.3 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 5 feet from the roof-top air conditioning unit, the exterior noise levels were measured at 77.2 dBA L_{eq}. At the uniform reference distance of 50 feet, the reference noise levels are 57.2 dBA L_{eq}. Based on the typical operating conditions observed over a four-day measurement period, the roof-top air conditioning units are estimated to operate for and average 39 minutes per hour during the daytime hours, and 28 minutes per hour during the nighttime hours. These operating conditions reflect peak summer cooling requirements with measured temperatures approaching 96 degrees Fahrenheit (°F) with average daytime temperatures of 82°F. For this noise analysis, the air conditioning units are expected to be

located on the roof of the Project buildings. This reference noise level describes the expected roof-top air conditioning units located 5 feet above the roof for the planned air conditioning units at the Project site.

9.2.4 BACKUP GENERATOR

To describe the noise levels associated with the planned backup generator at the Project site, Urban Crossroads collected a reference noise level measurement of a 336-kilowatt (kW) diesel generator. The measured reference noise level at the uniform 50-foot reference distance is 64.9 dBA L_{eq}. This analysis assumes the generator would operate for 60 minutes per hour, when in reality, the backup generator would only be used in emergencies or when being tested for maintenance.

9.2.5 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, and 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 the Project's proposed building.

9.2.5 PARKING LOT VEHICLE MOVEMENTS

To describe the on-site parking lot activity, a long-term 29-hour reference noise level measurement was collected in the center of activity within the staff parking lot of an Amazon warehouse distribution center. At 50 feet from the center of activity, the parking lot produced a reference noise level of 52.6 dBA L_{eq}. Parking activities are expected to take place during the full hour (60 minutes) throughout the daytime and evening hours. The parking lot noise levels are mainly due cars pulling in and out of parking spaces in combination with car doors opening and closing.

9.2.6 TRUCK MOVEMENTS

The truck movements reference noise level measurement was collected over a period of 1 hour and 28 minutes and represents multiple heavy trucks entering and exiting the outdoor loading dock area producing a reference noise level of 59.8 dBA L_{eq} at 50 feet. The noise sources included at this measurement location account for trucks entering and existing the Project driveways and maneuvering in and out of the outdoor loading dock activity area.

9.3 CADNAA NOISE PREDICTION MODEL

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

Using the ISO 9613-2 protocol, 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 9613-2 protocol, the CadnaA noise prediction model relies on the reference sound power level (L_w) to describe individual noise sources. While sound pressure levels (e.g., L_{eq}) quantify in decibels the intensity of given sound sources at a reference distance, sound power levels (L_w) are connected to the sound source and are independent of distance. Sound pressure levels vary substantially with distance from the source and diminish because of intervening obstacles and barriers, air absorption, wind, and other factors. Sound power is the acoustical energy emitted by the sound source and is an absolute value that is not affected by the environment.

The operational noise level calculations provided in this noise study account for the distance attenuation provided due to geometric spreading, when sound from a localized stationary source (i.e., a point source) propagates uniformly outward in a spherical pattern. A default ground attenuation factor of 0.5 was used in the CadnaA noise analysis to account for mixed ground representing a combination of hard and soft surfaces. Appendix 9.1 includes the detailed noise model inputs used to estimate the Project operational noise levels presented in this section.

9.4 PROJECT OPERATIONAL NOISE LEVELS

Using the reference noise levels to represent the proposed Project operations that include outdoor loading dock activity, roof-top air conditioning units, emergency generator, trash enclosure activity, parking lot vehicle movements, and truck 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. Table 9-2 shows the Project operational noise levels during the daytime hours of 7:00 a.m. to 10:00 p.m. The daytime hourly

TABLE 9-2: DAYTIME PROJECT OPERATIONAL NOISE LEVELS

Noise Source[1]	Operational Noise Levels by Receiver Location (dBA Leq)				
	R1	R2	R3	R4	R5
Loading Dock Activity	21.8	42.7	46.0	36.9	29.4
Roof-Top Air Conditioning Units	29.2	28.7	31.4	27.7	23.1
Drive-Through Speakerphone Activity	30.7	39.6	46.1	35.6	26.2
Trash Enclosure Activity	24.0	28.5	32.6	20.3	15.9
Parking Lot Vehicle Movements	34.2	31.9	36.0	28.6	22.3
Truck Movements	23.7	33.3	37.0	26.1	21.5
Total (All Noise Sources)	**37.0**	**44.9**	**49.4**	**40.0**	**32.3**

[1] See Exhibit 9-A for the noise source locations. CadnaA noise model calculations are included in Appendix 9.1.

Tables 9-3 shows the Project operational noise levels during the nighttime hours of 10:00 p.m. to 7:00 a.m. The nighttime hourly noise levels at the off-site receiver locations are expected to range from 32.0 to 49.3 dBA L_{eq}. The differences between the daytime and nighttime noise levels are largely related to the estimated duration of noise activity as outlined in Table 9-1 and Appendix 9.1.

TABLE 9-3: NIGHTTIME PROJECT OPERATIONAL NOISE LEVELS

Noise Source[1]	Operational Noise Levels by Receiver Location (dBA Leq)				
	R1	R2	R3	R4	R5
Outdoor Loading Dock Activity	21.8	42.7	46.0	36.9	29.4
Roof-Top Air Conditioning Units	26.8	26.3	29.0	25.3	20.7
Drive-Through Speakerphone Activity	30.7	39.6	46.1	35.6	26.2
Trash Enclosure Activity	20.1	24.5	28.6	16.3	12.0
Parking Lot Vehicle Movements	34.2	31.9	36.0	28.6	22.3
Truck Movements	23.7	33.3	37.0	26.1	21.5
Total (All Noise Sources)	**36.6**	**44.8**	**49.3**	**39.8**	**32.0**

[1] See Exhibit 9-A for the noise source locations. CadnaA noise model calculations are included in Appendix 9.1.

9.5 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 Bakersfield exterior noise level standards at nearby noise-sensitive receiver locations. Table 9-4 shows the operational noise levels associated with VA Medical Clinic Project will satisfy the City of Bakersfield daytime and nighttime exterior noise level standards. Therefore, the operational noise impacts are considered *less than significant* at the nearby noise-sensitive receiver locations.

TABLE 9-4: OPERATIONAL NOISE LEVEL COMPLIANCE

Receiver Location[1]	Project Operational Noise Levels (dBA Leq)[2]		Noise Level Standards (dBA Leq)[3]		Noise Level Standards Exceeded?[4]	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
R1	37.0	36.6	55	50	No	No
R2	44.9	44.8	55	50	No	No
R3	49.4	49.3	55	50	No	No
R4	40.0	39.8	55	50	No	No
R5	32.3	32.0	55	50	No	No

[1] See Exhibit 8-A for the receiver locations.
[2] Proposed Project operational noise levels as shown on Tables 9-2 and 9-3.
[3] City of Bakersfield Noise Element Table VII-2 Noise Level Performance Standards (Table 3-1).
[4] Do the estimated Project operational noise source activities exceed the noise level standards?
"Daytime" = 7:00 a.m. - 10:00 p.m.; "Nighttime" = 10:00 p.m. - 7:00 a.m.

9.5 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 describes the Project noise level increases to the existing ambient noise environment. Noise levels that would be experienced at receiver locations when Project-source noise is added to the daytime and nighttime ambient conditions are presented on Tables 9-5 and 9-6, respectively.

As indicated on Table 9-5, the Project will generate a daytime operational noise level increases ranging from 0.0 to 0.6 dBA L_{eq} at the nearest receiver locations. Table 9-6 shows that the Project will generate a nighttime operational noise level increases ranging from 0.0 to 1.0 dBA L_{eq} at the nearest receiver locations. Project-related operational noise level increases will not exceed the operational noise level increase significance criteria presented in Table 4-1. Therefore, the increases at the sensitive receiver locations will be *less than significant.*

TABLE 9-5: 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]	Increase Criteria[7]	Increase Criteria Exceeded?
R1	37.0	L1	63.3	63.3	0.0	3.0	No
R2	44.9	L2	66.9	66.9	0.0	1.5	No
R3	49.4	L3	58.1	58.7	0.6	5.0	No
R4	40.0	L4	65.2	65.2	0.0	1.5	No
R5	32.3	L5	66.3	66.3	0.0	1.5	No

[1] See Exhibit 8-A for the receiver locations.
[2] Total Project daytime operational noise levels as shown on Table 9-2.
[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 9-6: 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]	Increase Criteria[7]	Increase Criteria Exceeded?
R1	36.6	L1	61.6	61.6	0.0	3.0	No
R2	44.8	L2	60.6	60.7	0.1	3.0	No
R3	49.3	L3	55.4	56.4	1.0	5.0	No
R4	39.8	L4	61.3	61.3	0.0	3.0	No
R5	32.0	L5	60.3	60.3	0.0	3.0	No

[1] See Exhibit 8-A for the receiver locations.
[2] Total Project nighttime operational noise levels as shown on Table 9-2.
[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.

10 CONSTRUCTION IMPACTS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project. Exhibit 10-A shows the construction noise source locations in relation to the nearby sensitive receiver locations previously described in Section 8. The limits of construction include the off-site roadway and utility improvements needed to support the Project development. According to Section 9.22.050[A] of the City of Bakersfield Municipal Code, it is unlawful for any person, firm or corporation to erect, demolish, alter or repair any building, or to grade or excavate land, streets or highways, other than between the hours of six a.m. and nine p.m. on weekdays, and between eight a.m. and nine p.m. on weekends within one thousand feet of a residential dwelling. Section 9.22.050[C], limits to hours of construction shall not apply to any work of construction performed one thousand feet or more from the nearest residential dwelling.

Neither the 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. (8 p. 179)

10.1 CONSTRUCTION NOISE LEVELS

The FTA *Transit Noise and Vibration Impact Assessment Manual* recognizes that construction projects are accomplished in several different stages and outlines the procedures for assessing noise impacts during construction. Each stage has a specific equipment mix, depending on the work to be completed during that stage. As a result of the equipment mix, each stage has its own noise characteristics; some stages have higher continuous noise levels than others, and some have higher impact noise levels than others. The Project construction activities are expected to occur in the following stages:

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

10.2 CONSTRUCTION REFERENCE NOISE LEVELS

To describe construction noise activities, this construction noise analysis was prepared using reference construction equipment noise levels from the Federal Highway Administration (FHWA) published the Roadway Construction Noise Model (RCNM), which includes a national database of construction equipment reference noise emission levels. (25) The RCNM equipment database, provides a comprehensive list of the noise generating characteristics for specific types of construction equipment. In addition, the database provides an acoustical usage factor to

estimate the fraction of time each piece of construction equipment is operating at full power (i.e., its loudest condition) during a construction operation.

EXHIBIT 10-A: CONSTRUCTION NOISE SOURCE LOCATIONS

10.3 CONSTRUCTION NOISE ANALYSIS

Using the reference construction equipment noise levels and the CadnaA noise prediction model, calculations of the Project construction noise level impacts at the nearby sensitive receiver locations were completed. Consistent with FTA guidance for general construction noise assessment, Table 10-1 presents the combined construction reference noise levels for the loudest construction equipment, assuming they operate at the same time. As shown on Table 10-2, the construction noise levels are expected to range from 42.0 to 60.7 dBA L_{eq} at the nearby receiver locations. Appendix 10.1 includes the detailed CadnaA construction noise model inputs.

TABLE 10-1: CONSTRUCTION REFERENCE NOISE LEVELS

Construction Stage	Reference Construction Activity	Reference Noise Level @ 50 Feet (dBA L_{eq})[1]	Combined Noise Level (dBA L_{eq})[2]	Combined Sound Power Level (PWL)[3]
Site Preparation	Crawler Tractors	78	80	112
	Hauling Trucks	72		
	Rubber Tired Dozers	75		
Grading	Graders	81	83	115
	Excavators	77		
	Compactors	76		
Building Construction	Cranes	73	81	113
	Tractors	80		
	Welders	70		
Paving	Pavers	74	83	115
	Paving Equipment	82		
	Rollers	73		
Architectural Coating	Cranes	73	77	109
	Air Compressors	74		
	Generator Sets	70		

[1] FHWA Roadway Construction Noise Model (RCNM).
[2] Represents the combined noise level for all equipment assuming they operate at the same time consistent with FTA Transit Noise and Vibration Impact Assessment guidance.
[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 calibrated using the CadnaA noise model at the reference distance to the noise source.

TABLE 10-2: CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Receiver Location[1]	Construction Noise Levels (dBA L_{eq})					
	Site Preparation	Grading	Building Construction	Paving	Architectural Coating	Highest Levels[2]
R1	55.4	58.4	56.4	58.4	52.4	58.4
R2	54.0	57.0	55.0	57.0	51.0	57.0
R3	57.7	60.7	58.7	60.7	54.7	60.7
R4	50.9	53.9	51.9	53.9	47.9	53.9
R5	45.0	48.0	46.0	48.0	42.0	48.0

[1] Construction noise source and receiver locations are shown on Exhibit 10-A.
[2] Construction noise level calculations based on distance from the construction activity, which is measured from the Project site boundary to the nearest receiver locations. CadnaA construction noise model inputs are included in Appendix 10.1.

10.4 CONSTRUCTION NOISE LEVEL COMPLIANCE

To evaluate whether the Project will generate potentially significant short-term noise levels at nearest receiver locations, a construction-related daytime noise level threshold of 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 receiver locations will not exceed the reasonable daytime 80 dBA L_{eq} significance threshold during Project construction activities as shown on Table 10-3. Therefore, the noise impacts due to Project construction noise are considered *less than significant* at all receiver locations.

TABLE 10-3: CONSTRUCTION NOISE LEVEL COMPLIANCE

Receiver Location[1]	Construction Noise Levels (dBA L_{eq})		
	Highest Construction Noise Levels[2]	Threshold[3]	Threshold Exceeded?[4]
R1	58.4	80	No
R2	57.0	80	No
R3	60.7	80	No
R4	53.9	80	No
R5	48.0	80	No

[1] Construction noise source and receiver locations are shown on Exhibit 10-A.
[2] Highest construction noise level calculations based on distance from the construction noise source activity to the nearest receiver locations as shown on Table 10-2.
[3] Construction noise level thresholds as shown on Table 4-1.
[4] Do the estimated Project construction noise levels exceed the construction noise level threshold?

10.6 CONSTRUCTION VIBRATION ANALYSIS

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods employed. Operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Ground vibration levels associated with various types of construction equipment are summarized on Table 10-4. Based on the representative vibration levels presented for various construction

equipment types, it is possible to estimate the potential for human response (annoyance) and building damage using the following vibration assessment methods defined by the FTA. To describe the vibration impacts the FTA provides the following equation: $PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$

TABLE 10-4: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	PPV (in/sec) at 25 feet
Small bulldozer	0.003
Jackhammer	0.035
Loaded Trucks	0.076
Large bulldozer	0.089
Vibratory Roller	0.210

Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual

Table 10-5 presents the expected Project related vibration levels at the nearby receiver locations. At distances ranging from 557 to 1,307 feet from Project construction activities, construction vibration velocity levels are estimated to range from 0.001 to 0.002 in/sec PPV. Based on maximum acceptable continuous vibration threshold of 0.3 PPV (in/sec), the typical Project construction vibration levels will fall below the building damage thresholds at all the noise sensitive receiver locations. Therefore, the Project-related vibration impacts are considered *less than significant* during typical construction activities at the Project site.

TABLE 10-5: PROJECT CONSTRUCTION VIBRATION LEVELS

Location[1]	Distance to Const. Activity (Feet)[2]	Typical Construction Vibration Levels PPV (in/sec)[3]						Thresholds PPV (in/sec)[4]	Thresholds Exceeded?[5]
		Small bulldozer	Jackhammer	Loaded Trucks	Large bulldozer	Vibratory Roller	Highest Vibration Level		
R1	611'	0.000	0.000	0.001	0.001	0.002	0.002	0.3	No
R2	1,010'	0.000	0.000	0.000	0.000	0.001	0.001	0.3	No
R3	557'	0.000	0.000	0.001	0.001	0.002	0.002	0.3	No
R4	1,093'	0.000	0.000	0.000	0.000	0.001	0.001	0.3	No
R5	1,307'	0.000	0.000	0.000	0.000	0.001	0.001	0.3	No

[1] Construction noise source and receiver locations are shown on Exhibit 10-A.
[2] Distance from receiver building facade to Project construction boundary (Project site boundary).
[3] Based on the Vibration Source Levels of Construction Equipment (Table 10-4).
[4] Caltrans Transportation and Construction Vibration Guidance Manual, April 2020, Table 19, p. 38.
[5] Does the peak vibration exceed the acceptable vibration thresholds?
"PPV" = Peak Particle Velocity

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11 REFERENCES

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21. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning.** *FHWA Roadway Construction Noise Model.* January, 2006.

12 CERTIFICATION

The contents of this noise study report represent an accurate depiction of the noise environment and impacts associated with the proposed VA Medical Clinic 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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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 San Diego • March, 2018
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 BAKERSFIELD GENERAL PLAN NOISE ELEMENT

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CHAPTER VII - NOISE ELEMENT

STATUTORY REQUIREMENTS

The contents of a Noise Element have been determined by the requirements of Section 65302(f) of the California Government Code and by "Guidelines for the Preparation and Content of Noise Elements of the General Plan" published by the California Office of Noise Control (ONC) in 1976. The Government Code and ONC Guidelines require that certain major noise sources and areas containing noise sensitive land uses be identified and quantified by preparing generalized noise exposure contours for current and projected levels of activity within the community.

Pursuant to the Government Code and ONC Guidelines, the following major noise sources were considered in the preparation of the Noise Element:

- Highways and freeways
- Primary arterials and major local streets
- Railroad operations
- Aircraft and airport operations
- Local industrial facilities
- Other stationary sources

Due to the size and scale of the noise contour maps (1"=400'), they are not reproduced in this document, but can be referenced in the City of Bakersfield Planning Department or the Kern County Department of Planning and Development Services.

Also considered in the preparation of the Noise Element are areas containing the following noise sensitive land uses:

- Schools
- Hospitals
- Rest homes
- Long-term medical or mental care facilities
- Other uses deemed noise sensitive by the local jurisdiction

The purpose of this Noise Element is to provide a means for protecting local citizens from the harmful effects of excessive exposure to noise.

OVERVIEW OF EXISTING CONDITIONS

MAJOR NOISE SOURCES

Based on discussions with government officials and the results of field studies by Brown-Buntin Associates (BBA), it was determined that there are four major sources of community noise within the study area. These sources are traffic on state highways and major local streets, railroad operations, airport operations and local industrial activities. Specific noise sources selected for study are listed.

STATE HIGHWAYS

- State Route 58
- State Route 99
- State Route 119
- State Route 178
- State Route 184
- State Route 204

MAJOR LOCAL STREETS
RAILROAD OPERATIONS

- Burlington Northern Santa Fe Railway (B.N.S.E.)
-Southern Pacific Transportation Company (SPTCo.)

AIRPORT OPERATIONS

- Kern County Airport (Meadows Field)
- Bakersfield Airpark

INDUSTRIAL FACILITIES AND OTHER MAJOR STATIONARY NOISE SOURCES

- Lake Ming Boat Races
- Mesa Marin Raceway
- Burlington Northern Santa Fe Classification Yard
- Southern Pacific Classification Yard
- Kern Rock Company
- Calcrete
- Coors Recycling Center
- United States Cold Storage

A combination of noise monitoring and analytical noise modeling techniques were used to develop generalized noise exposure contours around the major noise sources identified above for existing (1985 or 1986) and future (2010) conditions.

The analytical methods used in this report closely follow recommendations made by ONC, and were supplemented where appropriate by field-measured noise level data to account for local conditions. It should be noted that the noise exposure contours presented in this report are based upon annual average or in some cases maximum noise level conditions, and are not intended to be site-specific where local topography, vegetation or intervening structures may significantly affect noise exposure at a particular location.

1. Highways and Major Local Streets

The Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA-RD-77-108) was used to develop Community Noise Equivalent Level (CNEL) contours for state highways and major local streets within the study area.

The FHWA Model was developed to predict hourly L_{eq} values for free-flowing traffic conditions, and is generally considered to be accurate within plus or minus 1.5 dB. To predict CNEL values, it is necessary to determine the hourly distribution of traffic for a typical 24-hour day and adjust the traffic volume input data to yield an equivalent hourly traffic volume.

Traffic volumes and truck percentages for existing (1985-86) and future (2010) conditions on the state highways in the study area were obtained from Caltrans. Future projections of annual average daily traffic volumes on state highways are based upon a yearly growth factor of 3.6 percent which is the five-year average for 1979-1984 as published by Caltrans. Traffic volumes for existing and future conditions on major local streets were obtained from the City of Bakersfield and County of Kern Roads Departments.

Using existing traffic data and the FHWA methodology, traffic noise levels as defined by CNEL were calculated for existing (1985-86) and projected future (2010) traffic volumes on the state highways and the major local streets identified for study.

The approximate locations of the 60 and 65 dB CNEL contours for these roadways have been plotted on 400 scale maps. Only those contours which are located at distances of greater than 75 feet from the center of the roadway are shown on the 400 scale maps. It should be noted that since the methodology used to develop generalized contours did not take into consideration shielding which may be caused by buildings or topography in some areas, the distances on the 400 scale maps should be considered as worst-case estimates of traffic noise exposure in the community.

2. Railroad Operations

Two rail companies provide service in the Bakersfield area. Noise measurements of Burlington Northern Santa Fe and Southern Pacific Transportation Co. trains were conducted in Bakersfield in May 1986 to document noise levels generated by individual rail movements in the community. Noise level measurements of branch line operations conducted.

Noise exposure levels as defined by CNEL for railroad operations in the study area were calculated using the Simplified Procedure for Assessment of Noise Emitted by On-Line Railroad Operations, prepared by Wyle Laboratories (Report No. 59197-1) in March 1974 and railroad operational data. The Wyle Methodology is an analytical method used to predict railway noise which is based upon reference energy emission levels for diesel locomotives and freight/passenger cars with consideration given to numbers of locomotives and cars, speed, track conditions, and distance to the receiver. The approximate locations of the 65 and 60 CNEL contours for 1986 conditions are shown on the 400 scale maps.

As in the case of traffic noise contours, railroad noise contours should be considered as estimates of worst-case exposure since no adjustments have been made for shielding provided by intervening topography or buildings. CNEL contours for the McKittrick and Oildale branch lines have not been illustrated on the 400 scale maps.

Although noise levels from individual train movements on these branch lines produce short term noise impacts when they occur, such impacts do not occur frequently enough to produce a significant noise exposure as defined by CNEL.

TABLE VII-1

Distance (Feet) from Center of Track to CNEL Contour Values for Existing (1986) Railroad Operations

Railroad	Segment	CNEL 65 dB	CNEL 60 dB
Southern Pacific Transportation Co.	SPTCo. Mainline Yard to the northwest within 1,000' of grade crossings)	342 (631)	730 (1,360)
Southern Pacific Transportation Co. and Burlington Northern Santa Fe	SPTCo. Mainline Combined Operations Yard to Edison (within 1,000' of grade crossings)	464 (858)	1,000 (1,848)
Burlington Northern Santa Fe	AT&SF Mainline Yard to the northwest (within 1,000' of grade crossings)	342 (631)	730 (1,360)
Burlington Northern Santa Fe	SPTCo. Arvin Branchline (within 1,000' of grade crossings)	369 (681)	794 (1,468)
Southern Pacific Transportation Co.	SPTCo. McKittrick Branchline (within 1,000' of grade crossings)	25 (46)	54 (100)
Burlington Northern	SPTCo. Oildale Branchline (within 1,000' of grade crossings)	25 (46)	54 (100)

Source: Brown-Buntin Associates.

3. Airport Operations

Two airports are located within the planning area. Meadows Field is owned and operated by Kern County. Bakersfield Municipal Airport is owned and operated by the City of Bakersfield.

In 1996, the City and County adopted the Airport Land Use Compatibility Plan (ALUCP). This document was prepared using the materials entitled "Kern County Airport Land Use Compatibility Plan" dated June 1994. It includes material, including noise contours, prepared by Hodges and Shutt, an aviation consulting firm under contract to the Kern Council of Governments (Kern COG).

The noise contours contained in the ALUCP are calculated based on aircraft activity forecasts which are set forth in an airport master plan or which are considered by the local agency to be plausible.

The locations of CNEL contours are one of the factors used to define compatibility zone boundaries and criteria. It is intended that noise compatibility criteria be applied at the general plan level. Because of the inherent variability of flight paths and other factors that influence noise emissions, the depicted contour boundaries are not absolute determinants of the compatibility of a given land use.

4. Industrial Facilities and Other Stationary Noise Sources

a. Calcrete

The Calcrete plant is located near the intersection of Pacheco and Wible Roads. The most significant sources of noise associated with this operation are vibrators located in the sand and cement bins to keep materials moving through the system.

Maximum noise levels during the operation of the cement bin vibrator were 60-65 dB(A) at approximately 500 feet northwest of the plant. Based upon the above-described noise level data and operational data, a generalized 60 dB CNEL contour was prepared depicting a worst case condition with a 12-hour work shift beginning at 7 a.m.

b. Lake Ming Boat Races

Lake Ming, located about nine miles northeast of central Bakersfield, is operated by the Kern County Parks and Recreation Department as a recreational lake for both power and sail boats. Several times each year, boat racing consisting of circle boat or drag boat racing, is permitted on the lake. On April 19, 1986, Brown-Buntin Associates monitored noise levels from drag racing events at four different locations around the lake in order to determine maximum noise levels (L_{max}).

The noise levels recorded by Brown-Buntin Associates and Kern County indicate that drag boat racing activity on Lake Ming can conflict with noise-sensitive land uses in the area. A generalized 75 dB(A) maximum noise level contour for boat racing activities at Lake Ming is shown on the 400 scale 1986 and 2010 noise exposure contour maps. 75 dB(A) represents the maximum exterior daytime noise level currently allowed by the City of Bakersfield Noise Element for residential properties. CNEL contours for boat racing on Lake Ming were not prepared since such activities occur only a few times per year.

c. Mesa Marin Raceway

Mesa Marin Raceway is located near the intersection of State Routes 178 and 184 about 8 miles east of central Bakersfield. Classes of modified stock cars racing at the track include Street Stocks, Super Modified Stocks, and Open Competition Stocks

Noise level measurements near Mesa Marin Raceway were conducted by Brown-Buntin Associates during the evening of April 19, 1986. Typical median (L_{50}) noise levels recorded ranged from 61 to 70 dB(A) with typical maximum levels reaching 87 dB(A). At El Dorado Estates, about 2 miles from Mesa Marin maximum noise levels of 48-52 dB(A) were recorded. At a site 0.9 miles west of the raceway, maximum noise levels ranged from 58-62 dB(A).

In the parking lot of the raceway, maximum noise levels of 60-67 dB(A) were recorded. It should be noted that at this location the earthen berm which borders the southern portion of the oval track considerably reduces noise levels. Based upon the above-described topographical factors and noise level data, the worst case 70 and 75 dB(A) maximum noise level contours were plotted on 400 scale maps. CNEL contours were not prepared for this facility due to the relatively infrequent use of the track.

d. Kern Rock Company

The Kern Rock Company sand and gravel operation is located approximately 1,500 feet west of the intersection of Wible and Pacheco Roads. Noise generating activities include truck traffic (hauling sand and gravel to the stockpile area, picking up loads of bulk cement and hauling concrete ready-mix), and the operation of the plant itself. Based upon noise levels and plant operational data, the location of the 60 dB CNEL contour was estimated to be 300 feet from the plant.

e. Burlington Northern Santa Fe: Railroad Classification Yard

The Burlington Northern Santa Fe railroad yard is located east of Oak Street between 16th Street and California Avenue. Generalized CNEL contours for this facility were prepared using operational data obtained from the railroad for existing conditions. These are shown on the 400 scale noise exposure maps for 1986 and 2010. Operational data obtained from the railroad were intended to be representative of annual average conditions, although it was recognized that activity varies considerably with seasonal demands and economic conditions

f. Southern Pacific Transportation Company: Railroad Classification Yard

The SPTCo. railroad classification yard is located east of Beale Avenue between Sumner and Kentucky Streets in Bakersfield. The Wyle methodology was used to develop generalized CNEL contours around the facility for existing levels of yard operations, which are shown on the large scale map.

Operational data were obtained from the railroad to represent annual average conditions, although it was recognized that activity varies considerably throughout the year due to seasonal demands and economic conditions.

g. Jack Frost Ice Co.

The Jack Frost Ice Co. facility is located at the southwest intersection of Stine Road and District Boulevard. Noise sources associated with the plant include two compressors located on the roof of the building and truck traffic entering and leaving the loading dock area.

Noise measurements with both compressors operating at a distance of 140 feet from the approximate center of the plant resulted in a noise level of 64.1 dB(A) L_{eq}. The approximate location of the 60 dB CNEL contour based upon the above-described noise level and operational data are shown on the large scale map.

h. Joey Recycling Center

This facility is located on the south side of White Lane between Hughes Lane and South H Street. Noise generating activities consist of the unloading and crushing of aluminum cans using a hydraulic press. Noise measurements 400 feet from the facility were conducted on the morning of May 14, 1986, while the crusher was in operation. The measured Leq at this location was 64.7 dB(A). Based upon the above-described noise level and operational data, a generalized 60 dB CNEL contour was prepared and is shown on the 400 scale maps.

NOISE SENSITIVE AREAS

The following noise sensitive land uses have been identified in the study area:

- Residential areas
- Schools
- Convalescent and acute care hospitals
- Parks and recreational areas

As suggested by the Office of Noise Control Guidelines, a community noise survey was conducted in March 1986 to document existing noise exposure in areas of the community containing noise sensitive land uses. The purpose of the community noise survey was to define the existing noise environment in areas of the community outside the Ldn 60 dB contour where noise sensitive land uses are located; to provide a numerical check of noise levels determined by mathematical modeling techniques and to serve as a basis for establishing quantitative land use compatibility criteria and noise performance standards consistent with existing noise levels in the community. Since the geographic scope of the study area is over 400 square miles, including both developed and undeveloped lands, noise measurements were conducted only in urbanized areas.

The results of the community noise survey indicate that the mean noise level as defined by CNEL in areas of the community where noise sensitive land uses are located is approximately 57 dB, ranging from 44 to 64 dB. Such levels are typical of suburban residential neighborhoods and are considered normally acceptable for all noise sensitive land uses according to criteria suggested by the Office of Noise Control Guidelines (Figure VII-1).

The median noise level (L_{50}) is the criterion commonly used in noise ordinances or in other types of performance standards to assess the acceptability of noise sensitive land uses located in proximity to commercial or industrial noise sources. During the survey, median (L_{50}) noise levels at the sites monitored continuously for 24 hours or more ranged from 38 to 49 dB(A) during the daytime hours (7 a.m. to 10 p.m.). During the nighttime hours (10 p.m. to 7 a.m.), L_{50} levels ranged from 24 to 48 dB(A).

Maintenance of desirable noise exposures for sensitive areas are addressed through consideration of sporadic noise normally associated with stationary land uses. Table VII-2 provides a method of determining land use compatibility for sensitive uses through the assignment of noise exceedence levels and time restrictions.

TABLE VII-2

NOISE LEVEL PERFORMANCE STANDARDS*
Exterior Noise Level Standards

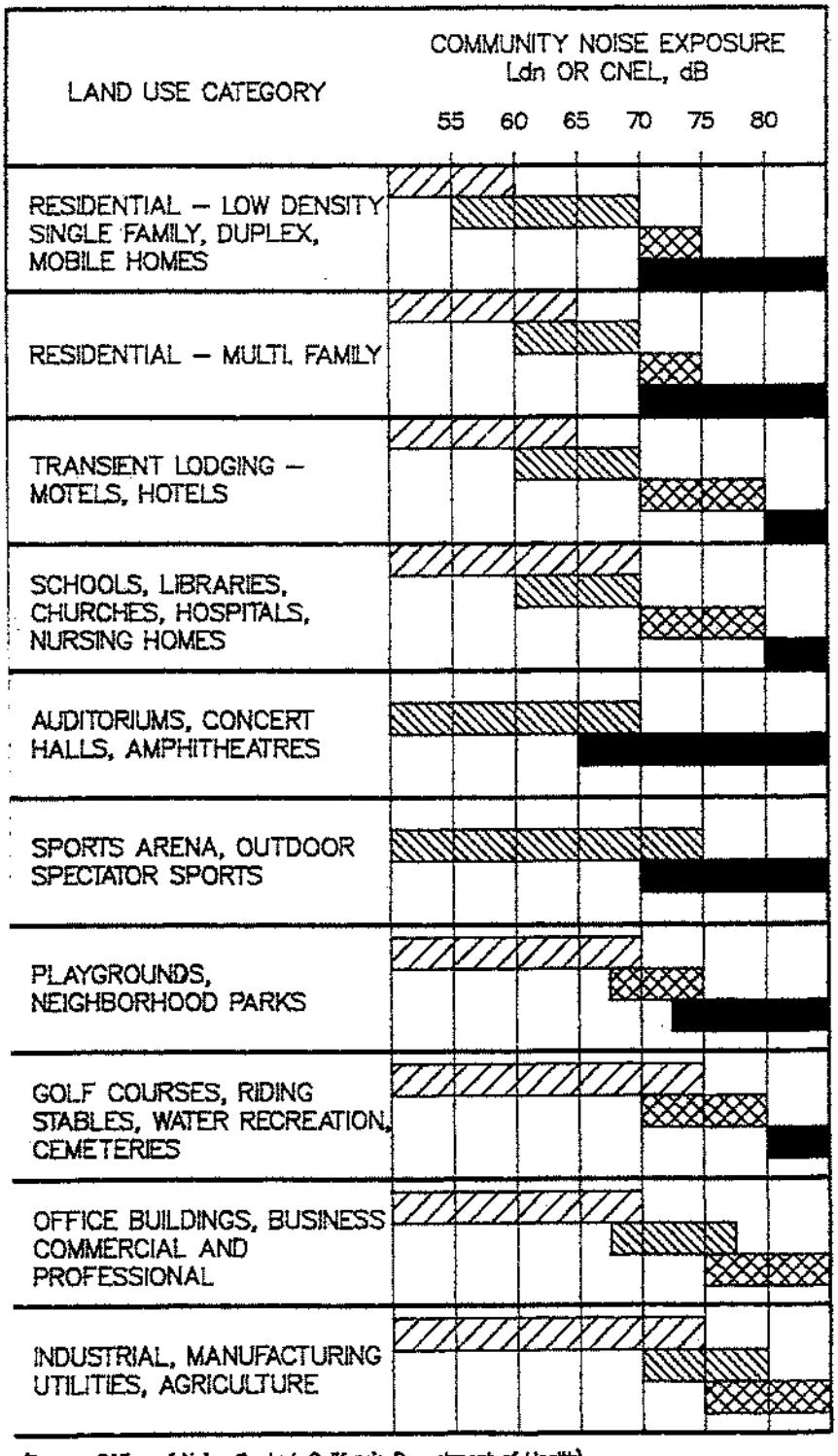
Category	Cumulative Number of minutes in any one-hour time period	Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.
1	30	55	50
2	15	60	55
3	5	65	60
4	1	70	65
5	0	75	70

* Each of the noise level standards specified in this table shall be reduced by five (5) dB(A) for pure tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises. These noise level standards should be applied at a residential or other noise-sensitive land use and not on the property of a noise-generating land use.

SUMMARY

Existing and projected future traffic volumes, as well as noise sources from industry, trains, aircraft and recreational activities have the potential to increase noise to unacceptable levels in residential and other noise-sensitive areas of the plan area. Similarly, the expansion of residential uses near industry and airports may displace these activities if improper land use planning with regard to noise occurs. A series of policies and implementation measures have been prepared to address these issues.

LAND USE COMPATABLILTY FOR COMMUNITY NOISE ENVIRONMENTS



INTERPRETATION

NORMALLY ACCEPTABLE
Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

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

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

CLEARLY UNACCEPTABLE
New construction or development should generally not be undertaken.

(Source: Office of Noise Control, California Department of Health)

FIGURE VII–1

NOISE ISSUES

The following issues have been identified regarding noise:

- Noise exposure from conflicting land uses and transportation corridors.
- Maintenance of acceptable noise levels.

GOALS AND POLICIES

The following presents the goals and policies for noise in the planning area. Implementing programs are contained in the following subsection.

At the end of each policy is listed in parenthesis a code beginning with the letter "I" followed by a number. This code refers to the pertinent implementing program.

GOALS

1. Ensure that residents of the Bakersfield Metropolitan Area are protected from excessive noise and existing moderate levels of noise are maintained.

2. Protect the citizens of the planning area from the harmful effects of exposure to excessive noise, and protect the economic base of the area by preventing the encroachment of incompatible land uses near known noise-producing roadways, industries, railroads, airports and other sources.

POLICIES

Goals will be achieved through the following policies which set more specific directions and guide actions.

1. Identify noise-impact areas exposed to existing or projected noise levels exceeding 65 dB CNEL (exterior) or the performance standards described in Table VII-2. The noise exposure contour maps on file at the City of Bakersfield and County of Kern indicate areas where existing and projected noise exposures exceed 65 dB CNEL (exterior) for the major noise sources identified (I-1).

2. Prohibit new noise-sensitive land uses in noise-impacted areas unless effective mitigation measures are incorporated into project design to reduce noise to acceptable levels. (I-2, I-3, I-6, I-7).

3. Review discretionary industrial, commercial or other noise-generating land use projects for compatibility with nearby noise-sensitive land uses.

Additionally, the development of new noise-generating land uses which are not preempted from local noise regulation will be reviewed if resulting noise levels will exceed the performance standards contained within Table VII-2 in areas containing residential or other noise-sensitive land uses (I-3, I-6, I-7).

4. Require noise level criteria applied to land uses other than residential or other n noise-sensitive uses to be consistent with the recommendations of the California Office of Noise Control (see Figure VII-1 (I-4)).

5. Encourage vegetation and landscaping along roadways and adjacent to other noise sources in order to increase absorption of noise (I-7).

6. Encourage interjurisdictional coordination and cooperation with regard to noise impact issues (I-8).

7. Establish threshold standards for the determination of the existence of project and cumulative noise impacts for mobile noise generating land uses that are significant, and will therefore require mitigation to achieve acceptable noise standards that do not exceed the standards contained in this element (I-9, 1-10)

IMPLEMENTATION

The following are programs to be carried out by the City of Bakersfield and County of Kern to implement the goals and policies of the Noise Element. This listing is not to limit the scope of implementation of this plan. State law requires that planning agencies recommend various methods of implementation of the general plan as part of their on-going duties.

1. Maintain noise contour maps which enable planning agencies, developers and the public to identify noise impacted areas on the land use map.

2. Review discretionary development plans, programs and proposals, including those initiated by both the public and private sectors, to ascertain and ensure their conformance to the policy framework outlined in this element.

3. Require development of proposed residential or other noise sensitive land uses in noise-impacted area to comply with the noise standards of 65 dB CNEL or less in outdoor activity areas and 45 dB CNEL or less within interior living spaces and the performance standards within Table VII-2.

4. Require proposed commercial and industrial uses or operations to be designed or arranged so that they will not subject residential or other noise sensitive land uses to exterior noise levels in excess of 65 dB CNEL and interior noise levels in excess of 45 dB CNEL and so that

impacts on noise sensitive uses shall not exceed the performance standards in Table VII-2.

At time of any discretionary approval, such as a request for zone change or subdivision, the developer may be required to submit an acoustical report indicating the means by which the developer proposes to comply with the noise standards. The acoustical report shall:

a) Be the responsibility of the applicant.

b) Be prepared by a qualified acoustical consultant experienced in the fields of environmental noise assessment and architectural acoustics.

c) Include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions.

d) Include estimated noise levels in terms of CNEL and the standards of Table VII-2 (if applicable) for existing and projected future (10-20 years hence) conditions, with a comparison made to the adopted policies of the Noise Element.

e) Include recommendations for appropriate mitigation to achieve compliance with the adopted policies and standards of the Noise Element.

f) Include estimates of noise exposure after the prescribed mitigation measures have been implemented. If compliance with the adopted standards and policies of the Noise Element will not be achieved, a rationale for acceptance of the project must be provided.

5. Develop implementation procedures to ensure that requirements imposed pursuant to the findings of an acoustical analysis are conducted as part of the project permitting process.

6. Enforce the State Noise Insulation Standards (California Administrative Code, Title 24) and Chapter 35 of the Uniform Building Code concerning the construction of new multiple-occupancy dwellings such as hotels, apartments, and condominiums.

7. Investigate development and adoption of a community noise control ordinance to address noise complaints, and to provide local industry with performance standards for future development and equipment modifications. The noise exposure information developed during the community noise survey should be used as a guide in preparation of the ordinance. The ordinance should be consistent with the "Model Community Noise Control Ordinance" prepared by the California Office of

Noise Control in 1977 with modifications made to reflect local concerns and conditions. Periodically review and update the City of Bakersfield's noise ordinance under Chapter 9.22 of the Municipal Code.

8. Amend the city and county zoning ordinances as necessary to reflect the policies and programs of the Noise Element.

9. Cooperate and discuss with all appropriate government agencies the planning documents governing noise-impact issues for consistency and coordination.

10. STANDARDS FOR PROJECT NOISE IMPACTS FOR MOBILE SOURCES

A significant increase of existing ambient noise levels affecting existing noise-sensitive land uses (receptors), and requiring the adoption of practical and feasible mitigation measures, is deemed to occur where a project will cause:

- An increase of the existing ambient noise level by 5 dB or more, where the existing ambient level is less than 60 dB CNEL
- An increase of the existing ambient noise level by 3 dB or more, where the existing ambient level is 60 to 65 dB CNEL;
- An increase of the existing ambient noise level by 1.5 dB or more, where the existing ambient level is greater than 65 dB CNEL.

STANDARDS FOR CUMULATIVE NOISE IMPACTS FOR MOBILE SOURCES

A project's contribution to noise increase would normally be considered cumulatively considerable and considered significant when ambient noise levels affect noise sensitive land uses (receptors) and when the following occurs.

- A project increases the ambient (cumulative without project) noise level by 1 dB or more;

and

- The cumulative with project noise levels cause the following:
    - An increase of the existing ambient noise level by 5 dB or more, where the existing ambient level is less than 60 dB CNEL;
    - An increase of the existing ambient noise level by 3 dB or more, where the existing ambient level is 60 to 65 DB CNEL;
    - An increase on the existing ambient noise level by 1.5 dB or more, where the existing ambient level is greater than 65 dB CNEL.

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APPENDIX 3.2:

CITY OF BAKERSFIELD MUNICIPAL CODE

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Chapter 9.22
NOISE

Sections:

I. General Provisions

9.22.010 Purpose.

A. The city council declares and finds that excessive, unnecessary and annoying noise levels are detrimental to the public health, welfare and safety and contrary to the public interest as follows:

1. By interfering with the comfortable enjoyment of life, the full use and enjoyment of property, and with the conduct and operation of business and industry;

2. By contributing to hearing impairment and a wide range of adverse physiological and psychological stress conditions; and

3. By adversely affecting the value of real property.

B. It is the intent of this chapter to protect persons from excessive levels of noise and the following regulations are enacted for this purpose. (Ord. 3924 § 3, 1999)

9.22.020 Definitions.

The following words, phrases and terms as used in this chapter shall have the following meanings specified in this section:

“Amplified sound” means sound created by the use of sound-amplifying equipment.

“Central traffic district’ means that portion of the city defined as such by Chapter 10.08 or any other ordinance hereafter adopted by the city.

“Construction” means any site preparation, assembly, erection, substantial repair, alteration, demolition or similar action, for or of private or public rights-of-way, structures, utilities or similar property and includes the transportation or delivery of any materials, tools, equipment or personnel to or from the site of any construction project for the loading or unloading or use of such materials, tools, equipment or personnel.

“Emergency work” means work made necessary to restore property to a safe condition following a public calamity, work required to protect persons or property from exposure to danger, or work by private or public utilities when restoring utility services.

“Person” means any individual, partnership, corporation, organization, or association of any nature whatsoever.

“Public place” means any area open to the public within the jurisdiction and control of the city of Bakersfield.

“Public right-of-way” means any street, avenue, boulevard, highway, sidewalk, alley, easement or the like dedicated to and accepted by the city of Bakersfield.

“Sound equipment” means and includes any loudspeaker, public address system, sound amplifier, radio or phonograph equipped with a loudspeaker or sound amplifier, or any machine or device for the amplification or reproduction of the human voice, music or any other sound, when operated or maintained in such a manner as to cause any such sound to be audible to a person of average hearing faculties or capacity in, on or over any public right-of-way, public building, park or other public place or any private premises or vehicle other than that in or upon which any such machine or device is being operated or maintained. It does not include the operation of any public address system, loudspeaker or other machine or device for the necessary amplification or reproduction of sound in connection with any program, entertainment, contest, public celebration, performance, show, exhibit or similar event, with a volume no louder than necessary for the convenient hearing of those within the building, enclosure or space in which such program, entertainment, contest, public celebration, performance, show, exhibition or similar event is staged or conducted; the operation of any radio receiving set, musical instrument,

phonograph or other machine or device for the producing or reproducing of sound with a volume no louder than necessary for the convenient hearing of the person or persons who are within the room, building, vehicle, chamber, space or location in which such machine or device is operated and are voluntary listeners thereto; or warning device on authorized emergency vehicles or horns or other authorized emergency vehicles or horns or other authorized warning devices on any vehicle used for traffic safety purposes.

"Sound truck" means any vehicle having mounted thereon, or attached thereto, any sound equipment defined in the definition of "sound equipment" of this section. (Ord. 3924 § 3, 1999)

9.22.030 Noise generally.

A. It is unlawful for any person to willfully make or continue, or allow to be made or continued, any loud, unnecessary noise which disturbs the peace or quiet of any neighborhood or which causes discomfort or annoyance to persons residing within one thousand feet of the noise source.

B. The standards which may be considered in determining whether a violation of the provisions of this section exists may include, but are not limited to the following:

1. The level of the noise;
2. The level and intensity of any background noise;
3. The proximity of the noise to residential sleeping facilities;
4. The nature and zoning of the area within which the noise occurs;
5. The density of habitation of the area within which the noise occurs;
6. The time of the day or night the noise occurs;
7. The duration of the noise;
8. Whether the noise is recurrent, intermittent or constant.

C. Refrigerator trucks shall be permitted to operate in any commercial or manufacturing zone at all hours; provided, however, that such use does not emit noise or vibration detrimentally impacting neighboring residential properties and the occupants thereof between ten p.m. and seven a.m. (Ord. 3924 § 3, 1999)

9.22.040 Exemptions.

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

A. The emission of sound for the purpose of alerting persons to the existence of an emergency or the emission of sound in the performance of emergency works for as long a period of time as is necessary to constitute adequate alerting of persons to the existence of the emergency or the emergency work;

B. Warning devices for the protection of the public safety, as for example, police, fire, ambulance, commercial, residential and vehicle alarm devices, and train horns;

C. All mechanical devices, apparatus or equipment which are utilized for the protection or salvage of agricultural crops during periods of potential or actual frost damage or other adverse weather conditions. (Ord. 3924 § 3, 1999)

9.22.050 Noise during construction.

A. Except as provided herein or in subsection B, C or D of this section, it is unlawful for any person, firm or corporation to erect, demolish, alter or repair any building, or to grade or excavate land, streets or highways, other than between the hours of six a.m. and nine p.m. on weekdays, and between eight a.m. and nine p.m. on weekends; provided, however, that city crews and those of the city's contractors performing street work between nine p.m. and six a.m. are exempt herefrom if the city engineer has directed that work be performed between such hours to alleviate potential traffic congestion.

B. Notwithstanding any other provisions of this chapter, if the city manager determines that the public health and safety will not be impaired by the erection, demolition, alteration or repair of any building or the excavating and grading of land, streets or highways between the hours of nine p.m. and six a.m., and if he or she further determines that loss or inconvenience would result to any party in interest by virtue of the requirements provided in subsection A of this section, he or she may grant a permit for such work to be done between the hours of nine p.m. and six a.m., upon application being made at the time the permit for the work is awarded or during the progress of the work. Such permit may be granted for a period not to exceed three days, and may be extended by the city manager for a period not to exceed three days.

C. The provisions of this section shall not apply to any work of construction performed one thousand feet or more from the nearest residential dwelling.

D. The provisions of this section shall not apply to performance of emergency work as defined in this chapter. (Ord. 3924 § 3, 1999)

9.22.060 Assessment of service fee.

In addition to the penalty provided for in Chapter 1.40 of this code, a property owner shall be assessed a service fee pursuant to Chapter 3.70 if Bakersfield enforcement personnel respond more than one time in a thirty-day period for violation(s) of this chapter. (Ord. 3924 § 3, 1999)

9.22.070 Other remedies.

No provision of this chapter shall be construed to impair any common law or statutory cause of action, or legal remedy therefrom, of any person for injury or damages arising from any violation of this chapter. (Ord. 3924 § 3, 1999)

II. Amplified sound

9.22.080 Purpose.

The city council enacts this article for the sole purpose of securing and promoting the public health, comfort, safety and welfare of its citizenry. While recognizing that the use of sound-amplifying equipment is protected by the constitutional rights of freedom of speech and assembly, the council nevertheless feels obligated to reasonably regulate the use of sound-amplifying equipment in order to protect the constitutional rights of the citizens of this community to privacy and freedom from public nuisance of loud and unnecessary amplified sound. (Ord. 3924 § 3, 1999)

9.22.090 Registration and permit required.

No person, other than personnel of law enforcement or governmental agencies, shall operate, maintain, or cause, allow or permit to be operated or maintained any sound equipment in the city before filing a registration statement in writing with the city finance director or his or her designee and procuring a valid permit. The registration statement shall be made on forms to be furnished by the city, shall be submitted no less than two working days prior to the event, shall be filed in duplicate and shall contain the following information:

A. Name, address and telephone number of:

1. The registrant,
2. The owner of the sound equipment,
3. The person in direct charge of the sound equipment, and
4. All persons who will use or operate the sound equipment;

B. A general description of the sound equipment which is to be used;

C. The location where such sound equipment is to be used; if on a sound truck, the name and address of the registered owner and the license number of same, and a general statement of the area or areas of the city in which such sound truck is to be operated;

D. A general statement of the purpose for which such sound equipment is to be used;

E. The proposed hours of operation of such sound equipment;

F. The dates of proposed operation of such sound equipment;

G. The maximum sound producing power of the sound equipment to be used. State the following:

1. The wattage to be used,

2. The volume in decibels of the sound which will be produced,

3. The approximate maximum distance sound will be transmitted from the sound equipment;

H. The applicant shall pay a fee not to exceed the cost of processing any such application as set forth in Chapter 3.70. (Ord. 3924 § 3, 1999)

9.22.100 Registration statement amendment.

All persons operating or maintaining, or causing, allowing or permitting to be operated or maintained any sound equipment shall amend any registration statement filed pursuant to this section within two working days after any change in the information therein furnished. (Ord. 3924 § 3, 1999)

9.22.110 Issuance and display of permit.

A. If the information on the registration statement demonstrates that the proposed operation will be consistent with the regulations in this chapter, the city finance director or his or her designee shall return to each registrant, one copy of such registration statement duly certified as a correct copy of such permit.

B. Such permit shall be in the possession of any person operating the sound equipment at all times, and such permit shall be displayed promptly to any enforcement personnel upon request. (Ord. 3924 § 3, 1999)

9.22.120 Regulations for use.

The operation or maintenance of sound equipment shall be subject to the following regulations:

A. Only music and human speech are permitted.

B. Operations are permitted only between the hours of nine a.m. and six p.m., of each day; except, that sound equipment operating from a fixed location on private premises included in a commercial or industrial zone by the provisions of Title 17 may be operated between the hours of nine a.m. and ten p.m. of any day. The hours of operation and location for use, including within the central traffic district, may be modified by special permit issued by the city manager as otherwise permitted by provisions of this municipal code.

C. Sound equipment shall not be operated within one hundred yards of:

1. Any hospital;

2. Any school, except after school hours and on days when school is not in session and when such school is not being used for the purpose of a public meeting;

3. Any church, except when the same is not being used for religious services or classes;

4. The City Hall or Kern County courthouses, except after five p.m. on weekdays or on weekends or legal holidays;

5. Any mortuary or cemetery, when services are in progress.

D. No sound truck or sound equipment shall be operated or maintained within the central traffic district where the volume of sound is audible for a distance in excess of fifty feet from the sound truck or the exterior boundaries of the premises upon which such sound equipment is located, except that the city council may issue a permit for the installation and operation of a stationary sound equipment affixed to a building for the reproduction or amplification of music or bell tones to be reproduced at regular stated intervals and for a stated period each time, during the day between nine a.m. and ten p.m., upon compliance with all other provisions of this chapter and amendments thereto; and, provided further, that the volume of sound shall be controlled so that it will not be audible for a distance of more than six hundred feet from the point of location of such sound equipment; and, provided further, that such permit may be revoked at any time by the city council, upon satisfactory evidence that such use of such equipment is a nuisance to the surrounding neighborhood, and disturbs and interferes with the reasonable and comfortable enjoyment of life or property of persons residing or working in the neighborhood of such equipment.

E. Except as otherwise stated in this section or by special permit referred to in subsection B of this section, the volume of sound shall be controlled so that it will not be audible for a distance in excess of one hundred fifty feet from the exterior boundaries of the premises upon which such sound equipment is located, and so that such volume is not unreasonably loud, raucous, jarring, disturbing or a nuisance.

F. When any loudspeaker, public address system, sound amplifier, radio or phonograph equipped with loudspeaker, jukebox or any other machine or device for the amplification or reproduction of the human voice, music or any other sound is so arranged, operated or equipped that it can be heard both inside and outside of the building or premises where the same is maintained, and such machine or device is operated at times other than those in which the operation of sound equipment is permitted under the provisions of this chapter, then such machine or device shall be equipped with a control switch located inside such building or premises, in such a manner that all speakers located outside such building or premises can be turned off at times when the operation of sound equipment is prohibited by this chapter. (Ord. 3924 § 3, 1999)

9.22.130 Amplification from aircraft prohibited.

No person shall operate, or cause, allow or permit to be operated any aircraft for any purpose in or over the city from which any sound equipment is being operated with volume sufficiently loud to be audible to a person of average hearing faculties or capacity in or on any private premises in such city. (Ord. 3924 § 3, 1999)

9.22.140 Amplified sound from vehicles.

Except as otherwise allowed under this chapter, no person shall use or operate or permit to be used or operated a radio, tape player, tape recorder, compact disc player, or any similar device in or attached to a vehicle whether moving, stopped or parked, occupied or unoccupied, which is audible to a person of normal hearing sensitivity more than fifty feet from such vehicle or, as to any vehicle not located on a public street, so audible more than fifty feet from the property line of the property on which such vehicle is located. This section shall not apply to acts proscribed by Vehicle Code Section 27007 after the effective date of such section, to any sound system being operated to request assistance or to warn of a hazardous situation, to any authorized emergency vehicle or vehicles operated by gas, electric, communications or water utilities. (Ord. 3924 § 3, 1999)

9.22.150 Revocation.

Any permit issued pursuant to this chapter may be immediately revoked by the city finance director or his or her designee whenever he or she finds:

A. That false or misleading statement(s) were made on the application; or

B. That the applicant has done any act related to the application involving dishonesty, fraud or deceit with the intent to substantially benefit himself or another, or substantially injure another; or

C. That the permit holder has violated any provision of this chapter or any other applicable law; or

D. That any of the terms or conditions of such permit have been violated. (Ord. 3924 § 3, 1999)

9.22.160 Appeal.

A. 1. The decision of the city finance director on any registration statement filed under this chapter may be appealed to the city manager or his or her designee.

2. The applicant must file the appeal with the office of the city manager within five days of the mailing or delivery of such decision.

3. The city manager or his or her designee shall hold a hearing within three days of the filing of such appeal at the office of the city manager, at which hearing the applicant may present any evidence, testimony and information relevant to the registration statement.

4. The city manager or his or her designee may, within twenty-four hours after the conclusion thereof, issue a decision either affirming the denial of the application or directing the city finance director to issue a permit as applied for or upon such conditions as are reasonable under all the circumstances, in accordance with this chapter. The city manager or his or her designee shall specify the grounds for denial or the imposition of conditions.

B. 1. Should any applicant be dissatisfied with the decision of the city manager not to grant a permit or for the revocation of a permit, then such applicant may, no later than ten days after notice of such hearing is deposited in the United States mail, addressed to the applicant or permittee at the address provided on the application, make written objection to the city council setting forth the grounds for dissatisfaction, whereupon the council shall hear such objections at a regular meeting no later than three weeks following the filing of the objection with the city clerk. The applicant shall be given written notice no less than three days prior to such hearing. The council may, upon such hearing, sustain, suspend or overrule the decision of the city manager, which decision shall be final and conclusive.

2. Pending the hearing before the council, the decision of the city manager shall remain in full force and effect and any reversal thereof by the city council shall not be retroactive but shall take effect as of the date of the council's decision. (Ord. 3924 § 3, 1999)

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APPENDIX 5.1:

STUDY AREA PHOTOS

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JN:15239

15239_L1_A 1.North
35, 24' 47.160000"119, 3' 28.960000"

15239_L1_A 2.South
35, 24' 47.150000"119, 3' 28.930000"

15239_L1_A 3.East
35, 24' 47.330000"119, 3' 28.630000"

15239_L1_A 4.West
35, 24' 47.260000"119, 3' 28.690000"

JN:15239

15239_L2_B 1.North
35, 24' 25.210000"119, 3' 32.640000"

15239_L2_B 2.South
35, 24' 24.930000"119, 3' 32.860000"

15239_L2_B 3.East
35, 24' 24.830000"119, 3' 32.830000"

15239_L2_B 4.West
35, 24' 24.830000"119, 3' 32.890000"

JN:15239

15239_L3_C 1.North
35, 24' 30.680000"119, 3' 36.160000"

15239_L3_C 2.South
35, 24' 30.730000"119, 3' 36.160000"

15239_L3_C 3.East
35, 24' 30.820000"119, 3' 36.050000"

15239_L3_C 4.West
35, 24' 30.750000"119, 3' 36.130000"

JN:15239

15239_L4_D 1.North
35, 24' 38.060000"119, 3' 43.570000"

15239_L4_D 2.South
35, 24' 37.950000"119, 3' 43.540000"

15239_L4_D 3.East
35, 24' 37.890000"119, 3' 43.650000"

15239_L4_D 4.West
35, 24' 37.910000"119, 3' 43.680000"

JN:15239

15239_L5_L 1.North
35, 24' 49.030000"119, 3' 44.890000"

15239_L5_L 2.South
35, 24' 48.980000"119, 3' 44.780000"

15239_L5_L 3.East
35, 24' 48.960000"119, 3' 44.750000"

15239_L5_L 4.West
35, 24' 48.890000"119, 3' 44.730000"

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APPENDIX 5.2:

NOISE LEVEL MEASUREMENT WORKSHEETS

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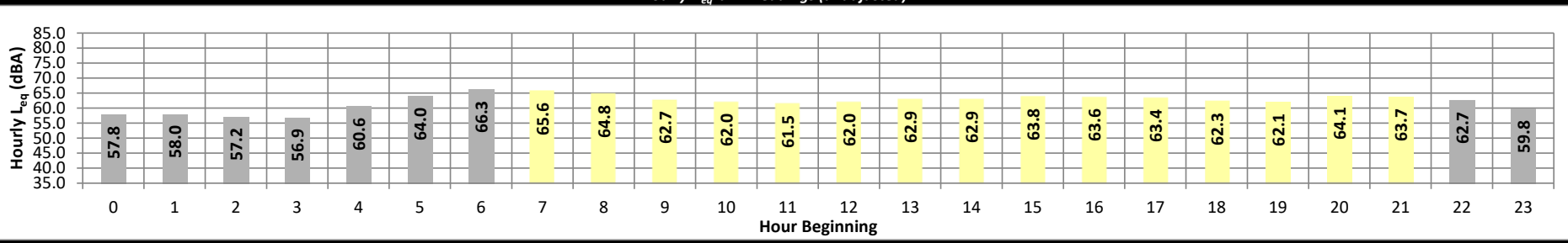
24-Hour Noise Level Measurement Summary

Date: Wednesday, December 14, 2022 *Location:* L1 - Located North of the site near the hotel located at 6100 *Meter:* Piccolo II *JN:* 15239

Project: VA Medical *Source:* Knudsen Dr. *Analyst:* Z. Ibrahim

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	57.8	64.1	53.0	63.6	63.1	61.9	60.8	58.4	56.7	54.2	53.7	53.1	57.8	10.0	67.8
	1	58.0	67.1	49.6	66.6	66.0	64.3	62.8	57.7	54.4	51.1	50.5	49.8	58.0	10.0	68.0
	2	57.2	64.9	50.8	64.4	63.9	62.3	61.0	57.4	55.5	52.4	51.8	51.0	57.2	10.0	67.2
	3	56.9	62.3	51.6	61.9	61.5	60.6	59.9	57.6	56.0	53.2	52.4	51.8	56.9	10.0	66.9
	4	60.6	67.9	55.2	67.6	67.3	65.8	64.2	60.6	59.0	56.6	56.0	55.3	60.6	10.0	70.6
	5	64.0	70.0	60.2	69.7	69.3	68.1	66.9	64.4	63.0	61.1	60.7	60.3	64.0	10.0	74.0
	6	66.3	71.4	63.4	71.1	70.7	69.3	68.5	66.7	65.6	64.2	63.9	63.5	66.3	10.0	76.3
Day	7	65.6	69.9	63.0	69.6	69.2	68.2	67.7	66.1	65.2	63.8	63.5	63.1	65.6	0.0	65.6
	8	64.8	72.0	61.1	71.3	70.7	69.4	68.1	64.8	63.4	61.9	61.5	61.1	64.8	0.0	64.8
	9	62.7	68.4	59.3	68.0	67.5	66.3	65.2	63.0	61.9	60.3	59.9	59.4	62.7	0.0	62.7
	10	62.0	67.7	58.2	67.3	66.9	65.7	64.9	62.5	61.1	59.2	58.8	58.3	62.0	0.0	62.0
	11	61.5	67.5	57.6	67.0	66.5	65.4	64.4	61.9	60.5	58.6	58.2	57.8	61.5	0.0	61.5
	12	62.0	68.6	58.1	68.2	67.8	66.2	65.0	62.2	60.9	59.0	58.6	58.2	62.0	0.0	62.0
	13	62.9	70.2	58.4	69.8	69.3	67.1	66.1	63.2	61.5	59.4	58.9	58.5	62.9	0.0	62.9
	14	62.9	68.7	59.4	68.2	67.6	66.5	65.6	63.4	62.0	60.3	59.9	59.5	62.9	0.0	62.9
	15	63.8	70.6	60.1	70.1	69.4	67.6	66.5	64.2	62.7	60.9	60.6	60.3	63.8	0.0	63.8
	16	63.6	71.0	59.4	70.6	70.1	68.0	66.4	63.8	62.2	60.3	59.9	59.5	63.6	0.0	63.6
	17	63.4	71.1	59.3	70.7	70.0	68.3	66.4	63.4	61.9	60.2	59.8	59.5	63.4	0.0	63.4
	18	62.3	68.7	58.2	68.3	67.8	66.6	65.7	62.6	61.1	59.1	58.7	58.3	62.3	0.0	62.3
	19	62.1	69.8	57.2	69.3	68.6	67.0	65.7	62.2	60.4	58.2	57.8	57.3	62.1	5.0	67.1
	20	64.1	74.9	57.9	74.1	73.2	70.9	67.6	62.7	61.0	58.8	58.4	58.0	64.1	5.0	69.1
	21	63.7	71.0	58.0	70.6	70.3	69.2	68.2	64.2	61.1	59.1	58.6	58.2	63.7	5.0	68.7
Night	22	62.7	71.4	57.7	70.9	70.3	68.1	66.2	62.3	60.5	58.6	58.2	57.8	62.7	10.0	72.7
	23	59.8	66.7	55.3	66.3	65.7	64.2	63.2	60.1	58.5	56.4	55.9	55.4	59.8	10.0	69.8

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	61.5	67.5	57.2	67.0	66.5	65.4	64.4	61.9	60.4	58.2	57.8	57.3
	Max	65.6	74.9	63.0	74.1	73.2	70.9	68.2	66.1	65.2	63.8	63.5	63.1
Energy Average		63.3	Average:		69.5	69.0	67.5	66.2	63.4	61.8	59.9	59.5	59.1
Night	Min	56.9	62.3	49.6	61.9	61.5	60.6	59.9	57.4	54.4	51.1	50.5	49.8
	Max	66.3	71.4	63.4	71.1	70.7	69.3	68.5	66.7	65.6	64.2	63.9	63.5
Energy Average		61.6	Average:		66.9	66.4	65.0	63.7	60.6	58.8	56.4	55.9	55.3

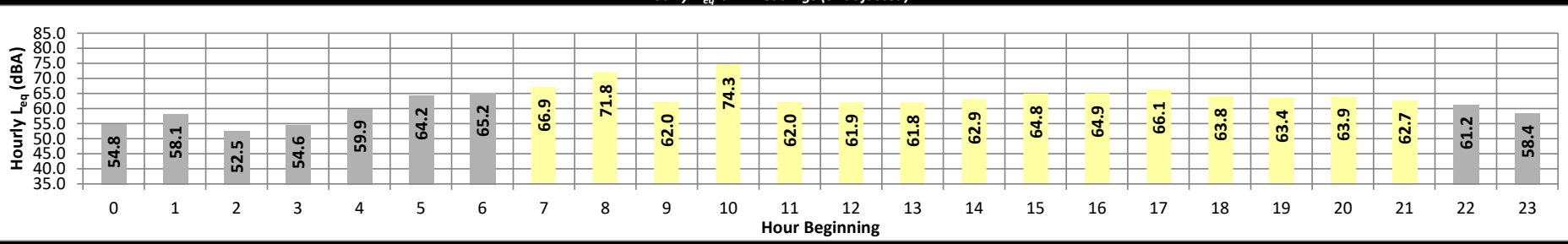
24-Hour CNEL	Leq (dBA) Daytime (7am-10pm)	Leq (dBA) Nighttime (10pm-7am)
68.7	**63.3**	**61.6**

24-Hour Noise Level Measurement Summary

Date: Wednesday, December 14, 2022 *Location:* L2 - Located Southwest of the site near the commercial site *Meter:* Piccolo II *JN:* 15239

Project: VA Medical *Source:* located at 5151 Knudsen Dr. *Analyst:* Z. Ibrahim

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	54.8	64.9	44.1	64.7	64.3	62.3	60.1	54.0	49.3	44.9	44.5	44.2	54.8	10.0	64.8
	1	58.1	68.6	40.6	68.4	68.0	67.0	65.3	52.9	46.8	41.4	41.0	40.7	58.1	10.0	68.1
	2	52.5	64.1	43.4	63.8	63.0	60.3	57.3	49.1	45.8	43.9	43.7	43.5	52.5	10.0	62.5
	3	54.6	65.0	46.8	64.7	64.1	61.6	59.5	53.1	49.5	47.5	47.2	47.0	54.6	10.0	64.6
	4	59.9	69.5	49.5	69.2	68.6	66.8	65.3	59.9	54.8	50.3	50.0	49.6	59.9	10.0	69.9
	5	64.2	73.1	55.4	72.8	72.4	70.5	69.1	64.4	60.9	56.4	55.9	55.5	64.2	10.0	74.2
	6	65.2	72.4	57.7	72.1	71.7	70.5	69.3	66.0	63.0	59.0	58.3	57.8	65.2	10.0	75.2
Day	7	66.9	75.8	59.0	75.3	74.7	72.7	71.0	67.1	64.6	60.5	59.8	59.2	66.9	0.0	66.9
	8	71.8	84.5	57.4	84.1	83.3	79.6	75.8	66.8	63.6	59.4	58.4	57.6	71.8	0.0	71.8
	9	62.0	69.4	51.4	69.0	68.5	67.1	66.2	63.4	59.8	53.8	52.8	51.6	62.0	0.0	62.0
	10	74.3	86.1	51.8	85.4	84.4	83.6	82.4	65.7	59.3	53.8	52.9	52.0	74.3	0.0	74.3
	11	62.0	69.8	54.0	69.4	68.9	67.4	66.2	62.8	59.9	55.5	54.8	54.2	62.0	0.0	62.0
	12	61.9	69.7	52.1	69.1	68.5	66.9	65.9	63.2	59.9	54.1	53.1	52.3	61.9	0.0	61.9
	13	61.8	69.2	51.2	68.9	68.4	67.2	66.1	63.0	59.8	53.7	52.5	51.5	61.8	0.0	61.8
	14	62.9	70.1	52.9	69.9	69.5	68.2	67.1	64.0	61.0	54.8	53.9	53.1	62.9	0.0	62.9
	15	64.8	73.4	54.8	73.0	72.7	70.8	68.9	65.3	62.6	56.9	55.9	54.9	64.8	0.0	64.8
	16	64.9	71.8	55.8	71.5	71.2	70.0	68.9	66.1	63.2	57.7	56.8	56.0	64.9	0.0	64.9
	17	66.1	74.9	56.6	74.5	74.0	72.8	71.4	66.0	63.2	58.6	57.5	56.7	66.1	0.0	66.1
	18	63.8	72.1	55.3	71.7	71.1	69.0	67.7	64.7	61.6	56.8	55.9	55.4	63.8	0.0	63.8
	19	63.4	70.4	56.9	70.1	69.6	68.2	67.1	64.3	61.6	58.0	57.5	57.0	63.4	5.0	68.4
	20	63.9	71.5	57.6	71.3	70.9	69.3	67.9	64.3	61.6	58.6	58.2	57.7	63.9	5.0	68.9
	21	62.7	70.0	57.1	69.7	69.3	67.8	66.7	63.2	60.7	57.9	57.5	57.1	62.7	5.0	67.7
Night	22	61.2	69.6	55.1	69.2	68.7	67.1	65.5	61.1	58.3	55.9	55.5	55.2	61.2	10.0	71.2
	23	58.4	67.4	50.7	67.2	66.8	64.9	63.5	58.1	54.4	51.4	51.1	50.8	58.4	10.0	68.4

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	61.8	69.2	51.2	68.9	68.4	66.9	65.9	62.8	59.3	53.7	52.5	51.5
	Max	74.3	86.1	59.0	85.4	84.4	83.6	82.4	67.1	64.6	60.5	59.8	59.2
Energy Average		66.9	Average:		72.9	72.3	70.7	69.3	64.7	61.5	56.7	55.8	55.1
Night	Min	52.5	64.1	40.6	63.8	63.0	60.3	57.3	49.1	45.8	41.4	41.0	40.7
	Max	65.2	73.1	57.7	72.8	72.4	70.5	69.3	66.0	63.0	59.0	58.3	57.8
Energy Average		60.6	Average:		68.0	67.5	65.7	63.9	57.6	53.6	50.1	49.7	49.4

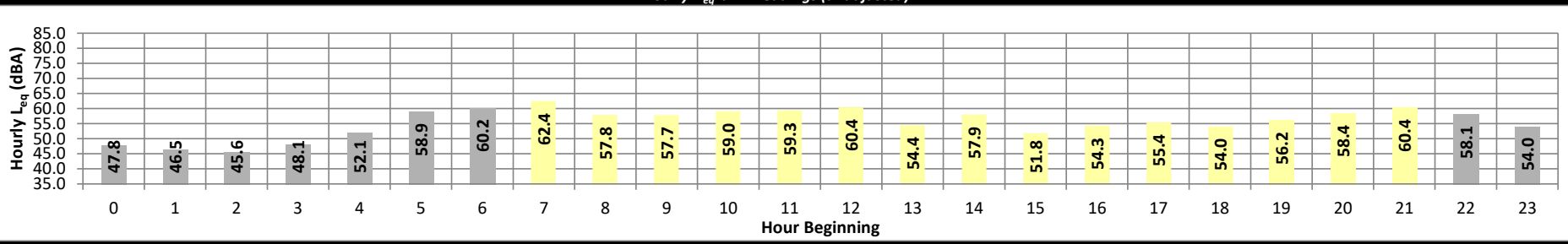
24-Hour CNEL	*Leq (dBA) Daytime (7am-10pm)*	*Leq (dBA) Nighttime (10pm-7am)*
69.0	**66.9**	**60.6**

24-Hour Noise Level Measurement Summary

Date: Wednesday, December 14, 2022 *Location:* L3 - Located Southwest of the site near the school located at *Meter:* Piccolo II *JN:* 15239

Project: VA Medical *Source:* 5210 Victor St. *Analyst:* Z. Ibrahim

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	47.8	52.2	45.6	51.7	51.3	50.3	49.5	48.2	47.3	46.1	45.9	45.7	47.8	10.0	57.8
	1	46.5	55.0	38.8	54.3	54.0	53.2	52.2	45.7	41.2	39.4	39.2	38.9	46.5	10.0	56.5
	2	45.6	51.3	43.0	50.7	50.3	49.1	48.1	45.9	44.7	43.6	43.3	43.1	45.6	10.0	55.6
	3	48.1	50.9	46.5	50.6	50.3	49.8	49.4	48.5	47.8	46.9	46.8	46.5	48.1	10.0	58.1
	4	52.1	56.3	50.0	56.0	55.6	54.8	54.2	52.5	51.6	50.5	50.3	50.1	52.1	10.0	62.1
	5	58.9	63.5	56.5	63.1	62.7	62.0	61.3	59.3	58.2	57.1	56.9	56.6	58.9	10.0	68.9
	6	60.2	63.9	58.4	63.6	63.2	62.3	61.8	60.6	59.8	58.9	58.7	58.5	60.2	10.0	70.2
Day	7	62.4	72.4	58.7	71.9	71.0	67.4	64.8	61.2	60.4	59.3	59.1	58.8	62.4	0.0	62.4
	8	57.8	61.9	55.8	61.6	61.0	60.1	59.5	58.2	57.3	56.3	56.1	55.9	57.8	0.0	57.8
	9	57.7	64.2	52.9	63.4	62.7	61.4	60.7	58.5	56.7	54.4	53.9	53.2	57.7	0.0	57.7
	10	59.0	68.0	51.3	67.0	66.3	64.7	63.5	59.2	56.2	52.8	52.3	51.6	59.0	0.0	59.0
	11	59.3	66.2	53.6	65.3	64.6	63.4	62.5	60.1	58.0	55.1	54.5	53.9	59.3	0.0	59.3
	12	60.4	68.6	54.4	67.6	66.7	64.9	63.8	60.8	59.0	56.2	55.5	54.7	60.4	0.0	60.4
	13	54.4	63.0	48.4	62.7	62.2	60.3	58.6	54.1	51.6	49.4	49.0	48.6	54.4	0.0	54.4
	14	57.9	69.6	50.6	69.2	68.5	65.1	61.7	55.0	53.4	51.4	51.1	50.7	57.9	0.0	57.9
	15	51.8	57.1	47.9	56.7	56.2	55.2	54.4	52.6	51.0	48.8	48.5	48.0	51.8	0.0	51.8
	16	54.3	60.9	49.3	60.2	59.3	58.0	57.2	55.0	53.3	50.6	50.1	49.5	54.3	0.0	54.3
	17	55.4	62.7	49.6	62.3	62.1	61.1	59.7	56.1	52.4	50.3	50.0	49.7	55.4	0.0	55.4
	18	54.0	57.4	51.9	57.1	56.7	56.0	55.6	54.5	53.7	52.4	52.3	52.0	54.0	0.0	54.0
	19	56.2	59.8	54.1	59.5	59.2	58.3	57.7	56.6	55.9	54.7	54.4	54.2	56.2	5.0	61.2
	20	58.4	61.9	56.3	61.6	61.4	60.6	59.9	58.9	58.2	56.9	56.7	56.4	58.4	5.0	63.4
	21	60.4	65.3	57.3	65.0	64.6	63.4	62.7	61.1	59.7	57.8	57.6	57.4	60.4	5.0	65.4
Night	22	58.1	62.8	55.7	62.4	62.0	61.0	60.3	58.5	57.5	56.3	56.1	55.8	58.1	10.0	68.1
	23	54.0	57.8	51.6	57.5	57.1	56.3	55.8	54.5	53.6	52.3	52.0	51.7	54.0	10.0	64.0

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	51.8	57.1	47.9	56.7	56.2	55.2	54.4	52.6	51.0	48.8	48.5	48.0
	Max	62.4	72.4	58.7	71.9	71.0	67.4	64.8	61.2	60.4	59.3	59.1	58.8
Energy Average		58.1	Average:		63.4	62.8	61.3	60.2	57.5	55.8	53.8	53.4	53.0
Night	Min	45.6	50.9	38.8	50.6	50.3	49.1	48.1	45.7	41.2	39.4	39.2	38.9
	Max	60.2	63.9	58.4	63.6	63.2	62.3	61.8	60.6	59.8	58.9	58.7	58.5
Energy Average		55.4	Average:		56.7	56.3	55.4	54.7	52.6	51.3	50.1	49.9	49.7

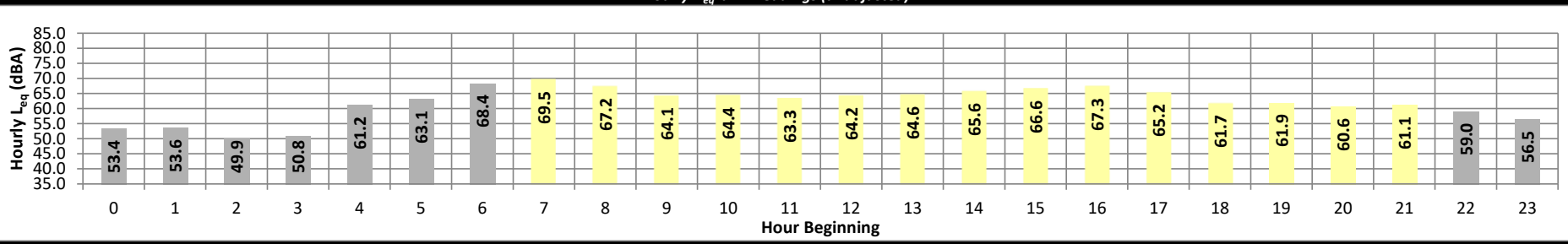
24-Hour CNEL	Leq (dBA) Daytime (7am-10pm)	Leq (dBA) Nighttime (10pm-7am)
62.8	**58.1**	**55.4**

24-Hour Noise Level Measurement Summary

Date: Wednesday, December 14, 2022 *Location:* L4 - Located West of the site near the residence located at *Meter:* Piccolo II *JN:* 15239

Project: VA Medical *Source:* 5704 Nomi St. *Analyst:* Z. Ibrahim

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	53.4	64.3	40.5	64.0	63.6	61.8	59.2	50.2	44.4	41.2	40.9	40.6	53.4	10.0	63.4
	1	53.6	66.4	37.3	66.2	65.6	62.3	58.4	46.6	40.1	37.8	37.6	37.4	53.6	10.0	63.6
	2	49.9	61.1	40.6	60.8	60.7	58.4	55.5	44.7	42.3	41.1	41.0	40.7	49.9	10.0	59.9
	3	50.8	62.3	43.1	62.1	61.5	58.8	56.1	46.0	44.4	43.6	43.4	43.2	50.8	10.0	60.8
	4	61.2	71.6	47.6	71.4	71.0	68.8	67.3	60.0	51.5	48.2	48.0	47.7	61.2	10.0	71.2
	5	63.1	73.9	54.2	73.6	73.1	70.6	68.5	60.9	57.0	54.9	54.6	54.3	63.1	10.0	73.1
	6	68.4	78.6	57.5	78.3	77.9	75.9	74.2	67.2	62.0	58.3	58.0	57.6	68.4	10.0	78.4
Day	7	69.5	77.2	57.7	77.0	76.6	75.2	74.4	70.8	66.4	58.8	58.2	57.8	69.5	0.0	69.5
	8	67.2	76.3	54.1	76.0	75.5	73.5	72.3	67.9	62.5	55.6	54.9	54.2	67.2	0.0	67.2
	9	64.1	73.4	48.9	73.1	72.7	70.9	69.5	64.3	60.1	50.6	49.8	49.0	64.1	0.0	64.1
	10	64.4	73.3	53.8	73.0	72.6	70.9	69.6	64.5	59.7	55.1	54.6	54.0	64.4	0.0	64.4
	11	63.3	72.9	48.4	72.6	72.3	70.4	69.1	63.5	56.1	49.8	49.2	48.5	63.3	0.0	63.3
	12	64.2	74.5	50.2	74.3	73.8	71.8	69.8	63.5	57.2	51.3	50.7	50.3	64.2	0.0	64.2
	13	64.6	74.3	49.3	74.0	73.4	71.3	70.0	64.9	58.5	50.6	50.0	49.5	64.6	0.0	64.6
	14	65.6	74.1	50.3	73.9	73.5	72.1	71.0	66.6	61.0	52.6	51.6	50.5	65.6	0.0	65.6
	15	66.6	76.4	51.1	76.1	75.5	73.2	71.4	67.0	61.5	53.6	52.1	51.2	66.6	0.0	66.6
	16	67.3	76.4	53.1	76.0	75.5	73.5	72.4	67.8	63.4	55.3	54.2	53.5	67.3	0.0	67.3
	17	65.2	74.3	50.8	74.0	73.6	71.9	70.6	65.8	60.1	52.2	51.5	50.9	65.2	0.0	65.2
	18	61.7	71.7	50.2	71.4	71.0	69.0	67.3	60.9	54.6	50.9	50.6	50.3	61.7	0.0	61.7
	19	61.9	72.4	51.4	72.1	71.7	69.4	67.5	60.4	55.1	52.2	51.8	51.5	61.9	5.0	66.9
	20	60.6	70.5	54.0	70.2	69.8	67.7	65.6	58.7	56.3	54.7	54.4	54.1	60.6	5.0	65.6
	21	61.1	70.2	54.9	69.8	69.3	67.0	65.5	60.7	58.5	55.5	55.2	55.0	61.1	5.0	66.1
Night	22	59.0	67.9	53.6	67.6	67.3	65.3	63.4	58.2	56.0	54.3	54.0	53.7	59.0	10.0	69.0
	23	56.5	65.8	50.0	65.5	65.2	63.1	61.1	55.4	53.2	50.8	50.5	50.1	56.5	10.0	66.5

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	60.6	70.2	48.4	69.8	69.3	67.0	65.5	58.7	54.6	49.8	49.2	48.5
	Max	69.5	77.2	57.7	77.0	76.6	75.2	74.4	70.8	66.4	58.8	58.2	57.8
Energy Average		65.2	Average:		73.6	73.1	71.2	69.7	64.5	59.4	53.3	52.6	52.0
Night	Min	49.9	61.1	37.3	60.8	60.7	58.4	55.5	44.7	40.1	37.8	37.6	37.4
	Max	68.4	78.6	57.5	78.3	77.9	75.9	74.2	67.2	62.0	58.3	58.0	57.6
Energy Average		61.3	Average:		67.7	67.3	65.0	62.6	54.4	50.1	47.8	47.5	47.3

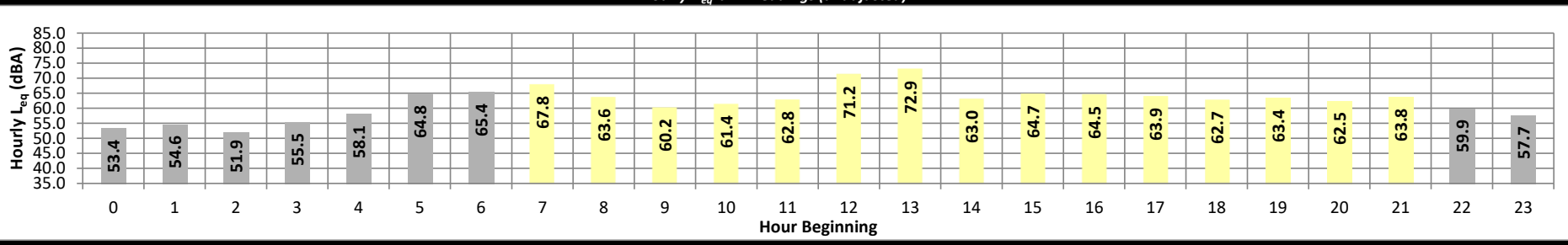
24-Hour CNEL	Leq (dBA) Daytime (7am-10pm)	Leq (dBA) Nighttime (10pm-7am)
68.7	**65.2**	**61.3**

24-Hour Noise Level Measurement Summary

Date: Wednesday, December 14, 2022 *Location:* L5 - Located West of the site near the apartments located at *Meter:* Piccolo II *JN:* 15239

Project: VA Medical *Source:* 5948 Victor St. *Analyst:* Z. Ibrahim

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	53.4	63.6	44.6	63.3	62.8	60.6	58.4	52.2	48.2	45.4	45.0	44.7	53.4	10.0	63.4
	1	54.6	66.2	41.6	65.9	65.2	62.6	60.0	51.1	45.7	42.3	42.0	41.7	54.6	10.0	64.6
	2	51.9	62.1	45.6	61.5	60.7	58.5	56.7	50.7	48.2	46.2	46.0	45.7	51.9	10.0	61.9
	3	55.5	63.9	48.9	63.6	63.2	61.4	59.9	55.6	53.0	49.6	49.4	49.0	55.5	10.0	65.5
	4	58.1	69.0	49.7	68.6	68.0	65.5	63.2	55.8	52.5	50.3	50.0	49.8	58.1	10.0	68.1
	5	64.8	75.8	54.9	75.1	74.4	72.6	70.5	62.3	58.8	55.8	55.4	55.0	64.8	10.0	74.8
	6	65.4	75.5	56.8	75.0	74.3	72.1	70.9	64.5	60.8	57.7	57.3	56.9	65.4	10.0	75.4
Day	7	67.8	79.2	56.9	78.8	77.9	74.7	71.9	66.8	62.7	58.1	57.5	57.0	67.8	0.0	67.8
	8	63.6	71.9	53.6	71.7	71.2	69.8	68.7	64.3	60.0	54.7	54.2	53.7	63.6	0.0	63.6
	9	60.2	69.8	49.7	69.5	68.9	67.0	65.4	59.9	55.8	50.8	50.3	49.8	60.2	0.0	60.2
	10	61.4	71.5	49.8	71.2	70.6	68.6	67.0	60.6	55.9	51.2	50.5	49.9	61.4	0.0	61.4
	11	62.8	70.6	54.2	70.3	69.8	68.2	67.2	63.8	60.3	55.5	55.0	54.4	62.8	0.0	62.8
	12	71.2	82.1	56.7	81.7	81.0	78.3	76.3	69.8	65.3	59.1	58.0	57.0	71.2	0.0	71.2
	13	72.9	84.6	51.4	83.9	83.5	81.6	78.6	68.0	58.5	52.7	52.0	51.5	72.9	0.0	72.9
	14	63.0	72.1	51.3	71.8	71.3	69.3	67.9	63.6	59.0	52.9	52.0	51.4	63.0	0.0	63.0
	15	64.7	74.0	53.7	73.7	73.1	71.0	69.7	65.1	60.7	55.4	54.6	53.9	64.7	0.0	64.7
	16	64.5	73.2	53.6	72.9	72.3	70.4	69.2	65.3	61.2	55.0	54.2	53.7	64.5	0.0	64.5
	17	63.9	71.7	54.8	71.4	70.9	69.3	68.3	64.9	61.3	56.1	55.4	54.9	63.9	0.0	63.9
	18	62.7	70.8	55.2	70.5	70.1	68.3	67.2	63.4	60.0	56.1	55.6	55.3	62.7	0.0	62.7
	19	63.4	71.6	57.0	71.3	70.9	69.3	67.6	63.5	60.6	57.9	57.5	57.1	63.4	5.0	68.4
	20	62.5	70.2	57.0	69.9	69.4	67.8	66.6	62.8	59.9	57.9	57.5	57.1	62.5	5.0	67.5
	21	63.8	74.4	56.7	74.0	73.7	70.4	67.7	62.1	59.9	57.6	57.3	56.9	63.8	5.0	68.8
Night	22	59.9	68.8	54.0	68.5	67.9	65.8	64.2	59.5	56.9	54.7	54.4	54.1	59.9	10.0	69.9
	23	57.7	67.5	50.2	67.3	66.8	64.6	62.7	56.8	53.2	50.9	50.6	50.3	57.7	10.0	67.7

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	60.2	69.8	49.7	69.5	68.9	67.0	65.4	59.9	55.8	50.8	50.3	49.8
	Max	72.9	84.6	57.0	83.9	83.5	81.6	78.6	69.8	65.3	59.1	58.0	57.1
Energy Average		66.3	Average:		73.5	73.0	70.9	69.3	64.3	60.1	55.4	54.8	54.2
Night	Min	51.9	62.1	41.6	61.5	60.7	58.5	56.7	50.7	45.7	42.3	42.0	41.7
	Max	65.4	75.8	56.8	75.1	74.4	72.6	70.9	64.5	60.8	57.7	57.3	56.9
Energy Average		60.3	Average:		67.6	67.0	64.9	62.9	56.5	53.0	50.3	50.0	49.7

24-Hour CNEL	*Leq (dBA) Daytime (7am-10pm)*	*Leq (dBA) Nighttime (10pm-7am)*
68.6	**66.3**	**60.3**

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APPENDIX 7.1:

OFF-SITE TRAFFIC NOISE LEVEL CALCULATIONS

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E
Road Name: Knudsen Dr.
Road Segment: n/o Olive Dr.
Project Name: VA Clinic
Job Number: 15239

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,820 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	982 vehicles
Vehicle Speed:	40 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:	37.0 feet
Centerline Dist. to Observer:	37.0 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:	32.711
Medium Trucks:	32.439
Heavy Trucks:	32.466

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-1.52	2.66	-1.20	-4.56	0.000	0.000
Medium Trucks:	77.72	-18.76	2.72	-1.20	-4.87	0.000	0.000
Heavy Trucks:	82.99	-22.71	2.71	-1.20	-5.61	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.5	64.6	62.8	56.7	65.4	66.0
Medium Trucks:	60.5	59.0	52.6	51.1	59.5	59.8
Heavy Trucks:	61.8	60.4	51.3	52.6	60.9	61.1
Vehicle Noise:	68.5	66.8	63.5	58.9	67.5	67.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	25	54	116	250
CNEL:	27	58	124	268

Sunday, December 18, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E
Road Name: Knudsen Dr.
Road Segment: s/o Olive Dr.
Project Name: VA Clinic
Job Number: 15239

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,660 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	1,566 vehicles
Vehicle Speed:	40 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:	37.0 feet
Centerline Dist. to Observer:	37.0 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:	32.711
Medium Trucks:	32.439
Heavy Trucks:	32.466

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	0.51	2.66	-1.20	-4.56	0.000	0.000
Medium Trucks:	77.72	-16.73	2.72	-1.20	-4.87	0.000	0.000
Heavy Trucks:	82.99	-20.69	2.71	-1.20	-5.61	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:	62.5	61.0	54.6	53.1	61.5	61.8
Heavy Trucks:	63.8	62.4	53.4	54.6	63.0	63.1
Vehicle Noise:	70.5	68.8	65.5	60.9	69.5	69.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	34	74	159	342
CNEL:	37	79	170	366

Sunday, December 18, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E
Road Name: Olive Dr.
Road Segment: w/o Knudsen Dr.
Project Name: VA Clinic
Job Number: 15239

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,840 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	2,084 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	52 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:	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:	48.724
Medium Trucks:	48.542
Heavy Trucks:	48.560

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.24	0.07	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-16.00	0.09	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.96	0.09	-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	66.7	64.9	58.8	67.5	68.1
Medium Trucks:	62.3	60.8	54.5	52.9	61.4	61.6
Heavy Trucks:	63.2	61.8	52.7	54.0	62.3	62.5
Vehicle Noise:	70.4	68.7	65.5	60.8	69.4	69.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	50	108	232	500
CNEL:	54	116	249	536

Sunday, December 18, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E
Road Name: Olive Dr.
Road Segment: e/o Knudsen Dr.
Project Name: VA Clinic
Job Number: 15239

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,820 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	3,782 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	52 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:	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:	48.724
Medium Trucks:	48.542
Heavy Trucks:	48.560

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	3.83	0.07	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-13.41	0.09	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-17.37	0.09	-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:	71.2	69.3	67.5	61.4	70.1	70.7
Medium Trucks:	64.9	63.4	57.1	55.5	64.0	64.2
Heavy Trucks:	65.8	64.3	55.3	56.6	64.9	65.0
Vehicle Noise:	73.0	71.3	68.1	63.4	72.0	72.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	74	160	345	744
CNEL:	80	172	370	798

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E
Road Name: Hageman Rd.
Road Segment: w/o Knudsen Dr.
Project Name: VA Clinic
Job Number: 15239

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,680 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	1,668 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	52 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:	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:	48.724
Medium Trucks:	48.542
Heavy Trucks:	48.560

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.27	0.07	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-16.97	0.09	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.92	0.09	-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:	67.6	65.7	63.9	57.9	66.5	67.1
Medium Trucks:	61.4	59.9	53.5	52.0	60.4	60.7
Heavy Trucks:	62.2	60.8	51.8	53.0	61.4	61.5
Vehicle Noise:	69.4	67.7	64.5	59.9	68.4	68.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	43	93	200	431
CNEL:	46	100	215	462

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EP
Road Name: Knudsen Dr.
Road Segment: n/o Olive Dr.
Project Name: VA Clinic
Job Number: 15239

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,910 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	991 vehicles
Vehicle Speed:	40 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:	37.0 feet
Centerline Dist. to Observer:	37.0 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:	32.711
Medium Trucks:	32.439
Heavy Trucks:	32.466

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-1.48	2.66	-1.20	-4.56	0.000	0.000
Medium Trucks:	77.72	-18.72	2.72	-1.20	-4.87	0.000	0.000
Heavy Trucks:	82.99	-22.67	2.71	-1.20	-5.61	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.5	64.6	62.8	56.8	65.4	66.0
Medium Trucks:	60.5	59.0	52.6	51.1	59.6	59.8
Heavy Trucks:	61.8	60.4	51.4	52.6	61.0	61.1
Vehicle Noise:	68.5	66.8	63.5	59.0	67.5	67.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	25	54	117	252
CNEL:	27	58	125	270

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EP
Road Name: Knudsen Dr.
Road Segment: s/o Olive Dr.
Project Name: VA Clinic
Job Number: 15239

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,270 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	1,627 vehicles
Vehicle Speed:	40 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:	37.0 feet
Centerline Dist. to Observer:	37.0 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:	32.711
Medium Trucks:	32.439
Heavy Trucks:	32.466

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	0.67	2.66	-1.20	-4.56	0.000	0.000
Medium Trucks:	77.72	-16.56	2.72	-1.20	-4.87	0.000	0.000
Heavy Trucks:	82.99	-20.52	2.71	-1.20	-5.61	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.6	66.7	65.0	58.9	67.5	68.2
Medium Trucks:	62.7	61.2	54.8	53.3	61.7	61.9
Heavy Trucks:	64.0	62.6	53.5	54.8	63.1	63.3
Vehicle Noise:	70.7	68.9	65.7	61.1	69.7	70.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	35	76	163	351
CNEL:	38	81	174	375

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EP
Road Name: Olive Dr.
Road Segment: w/o Knudsen Dr.
Project Name: VA Clinic
Job Number: 15239

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,090 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	2,109 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	52 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:	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:	48.724
Medium Trucks:	48.542
Heavy Trucks:	48.560

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.29	0.07	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-15.95	0.09	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.90	0.09	-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	66.7	65.0	58.9	67.5	68.1
Medium Trucks:	62.4	60.9	54.5	53.0	61.4	61.7
Heavy Trucks:	63.2	61.8	52.8	54.0	62.4	62.5
Vehicle Noise:	70.5	68.7	65.6	60.9	69.4	69.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	50	109	234	504
CNEL:	54	116	251	541

Sunday, December 18, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EP
Road Name: Olive Dr.
Road Segment: e/o Knudsen Dr.
Project Name: VA Clinic
Job Number: 15239

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	38,090 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	3,809 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	52 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:	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:	48.724
Medium Trucks:	48.542
Heavy Trucks:	48.560

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	3.86	0.07	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	79.45	-13.38	0.09	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-17.34	0.09	-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:	71.2	69.3	67.5	61.5	70.1	70.7
Medium Trucks:	65.0	63.4	57.1	55.5	64.0	64.2
Heavy Trucks:	65.8	64.4	55.3	56.6	64.9	65.1
Vehicle Noise:	73.0	71.3	68.1	63.5	72.0	72.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	75	161	347	747
CNEL:	80	173	372	802

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EP
Road Name: Hageman Rd.
Road Segment: w/o Knudsen Dr.
Project Name: VA Clinic
Job Number: 15239

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,300 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	1,730 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	52 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:	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:	48.724
Medium Trucks:	48.542
Heavy Trucks:	48.560

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	0.43	0.07	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	79.45	-16.81	0.09	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-20.76	0.09	-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	65.9	64.1	58.0	66.7	67.3
Medium Trucks:	61.5	60.0	53.7	52.1	60.6	60.8
Heavy Trucks:	62.4	61.0	51.9	53.2	61.5	61.6
Vehicle Noise:	69.6	67.9	64.7	60.0	68.6	69.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	44	95	205	442
CNEL:	47	102	220	474

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2042
Road Name: Knudsen Dr.
Road Segment: n/o Olive Dr.
Project Name: VA Clinic
Job Number: 15239

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	11,060 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	1,106 vehicles
Vehicle Speed:	40 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:	37.0 feet
Centerline Dist. to Observer:	37.0 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:	32.711
Medium Trucks:	32.439
Heavy Trucks:	32.466

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	66.51	-1.00	2.66	-1.20	*-4.56*	0.000	0.000
Medium Trucks:	77.72	-18.24	2.72	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	82.99	-22.20	2.71	-1.20	*-5.61*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	67.0	65.1	63.3	57.3	65.9	66.5
Medium Trucks:	61.0	59.5	53.1	51.6	60.0	60.3
Heavy Trucks:	62.3	60.9	51.9	53.1	61.5	61.6
Vehicle Noise:	69.0	67.3	64.0	59.4	68.0	68.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	27	58	126	271
CNEL:	29	63	135	290

Sunday, December 18, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2042
Road Name: Knudsen Dr.
Road Segment: s/o Olive Dr.
Project Name: VA Clinic
Job Number: 15239

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	11,270 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	1,127 vehicles
Vehicle Speed:	40 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:	37.0 feet
Centerline Dist. to Observer:	37.0 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:	32.711
Medium Trucks:	32.439
Heavy Trucks:	32.466

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	66.51	-0.92	2.66	-1.20	*-4.56*	0.000	0.000
Medium Trucks:	77.72	-18.16	2.72	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	82.99	-22.11	2.71	-1.20	*-5.61*	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:	67.1	65.2	63.4	57.3	66.0	66.6
Medium Trucks:	61.1	59.6	53.2	51.7	60.1	60.4
Heavy Trucks:	62.4	61.0	51.9	53.2	61.5	61.7
Vehicle Noise:	69.1	67.3	64.1	59.5	68.1	68.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	27	59	127	275
CNEL:	29	63	136	294

Sunday, December 18, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2042 | Project Name: VA Clinic
Road Name: Knudsen Dr. | Job Number: 15239
Road Segment: s/o Hageman Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,150 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	615 vehicles
Vehicle Speed:	40 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:	37.0 feet
Centerline Dist. to Observer:	37.0 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:	32.711
Medium Trucks:	32.439
Heavy Trucks:	32.466

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-3.55	2.66	-1.20	-4.56	0.000	0.000
Medium Trucks:	77.72	-20.79	2.72	-1.20	-4.87	0.000	0.000
Heavy Trucks:	82.99	-24.74	2.71	-1.20	-5.61	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.4	62.5	60.8	54.7	63.3	63.9
Medium Trucks:	58.4	56.9	50.6	49.0	57.5	57.7
Heavy Trucks:	59.8	58.3	49.3	50.6	58.9	59.0
Vehicle Noise:	66.4	64.7	61.4	56.9	65.4	65.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	18	39	85	183
CNEL:	20	42	91	196

Sunday, December 18, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2042 | Project Name: VA Clinic
Road Name: Olive Dr. | Job Number: 15239
Road Segment: w/o Knudsen Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	13,920 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	1,392 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	52 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:	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:	48.724
Medium Trucks:	48.542
Heavy Trucks:	48.560

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.51	0.07	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-17.75	0.09	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.71	0.09	-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:	66.8	64.9	63.1	57.1	65.7	66.3
Medium Trucks:	60.6	59.1	52.7	51.2	59.6	59.9
Heavy Trucks:	61.4	60.0	51.0	52.2	60.6	60.7
Vehicle Noise:	68.7	66.9	63.8	59.1	67.6	68.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	38	82	177	382
CNEL:	41	88	190	410

Sunday, December 18, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2042 | Project Name: VA Clinic
Road Name: Olive Dr. | Job Number: 15239
Road Segment: e/o Knudsen Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,310 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	2,331 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	52 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:	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:	48.724
Medium Trucks:	48.542
Heavy Trucks:	48.560

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.72	0.07	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-15.51	0.09	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.47	0.09	-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:	69.1	67.2	65.4	59.3	68.0	68.6
Medium Trucks:	62.8	61.3	55.0	53.4	61.9	62.1
Heavy Trucks:	63.7	62.2	53.2	54.5	62.8	62.9
Vehicle Noise:	70.9	69.1	66.0	61.3	69.9	70.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	54	116	250	539
CNEL:	58	124	268	578

Sunday, December 18, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2042 | Project Name: VA Clinic
Road Name: Hageman Rd. | Job Number: 15239
Road Segment: w/o Knudsen Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,600 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	1,760 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	52 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:	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:	48.724
Medium Trucks:	48.542
Heavy Trucks:	48.560

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.50	0.07	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-16.73	0.09	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.69	0.09	-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	65.9	64.2	58.1	66.7	67.3
Medium Trucks:	61.6	60.1	53.7	52.2	60.7	60.9
Heavy Trucks:	62.4	61.0	52.0	53.2	61.6	61.7
Vehicle Noise:	69.7	67.9	64.8	60.1	68.6	69.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	45	96	207	447
CNEL:	48	103	222	479

Sunday, December 18, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2042 | Project Name: VA Clinic
Road Name: Hageman Rd. | Job Number: 15239
Road Segment: e/o Knudsen Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,050 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	2,005 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	52 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:	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:	48.724
Medium Trucks:	48.542
Heavy Trucks:	48.560

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.07	0.07	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-16.17	0.09	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.12	0.09	-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	66.5	64.7	58.7	67.3	67.9
Medium Trucks:	62.2	60.7	54.3	52.8	61.2	61.4
Heavy Trucks:	63.0	61.6	52.6	53.8	62.2	62.3
Vehicle Noise:	70.2	68.5	65.3	60.7	69.2	69.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	49	105	226	487
CNEL:	52	113	243	523

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2042P | Project Name: VA Clinic
Road Name: Knudsen Dr. | Job Number: 15239
Road Segment: n/o Olive Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	11,150 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	1,115 vehicles
Vehicle Speed:	40 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:	37.0 feet
Centerline Dist. to Observer:	37.0 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:	32.711
Medium Trucks:	32.439
Heavy Trucks:	32.466

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-0.97	2.66	-1.20	-4.56	0.000	0.000
Medium Trucks:	77.72	-18.21	2.72	-1.20	-4.87	0.000	0.000
Heavy Trucks:	82.99	-22.16	2.71	-1.20	-5.61	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	67.0	65.1	63.3	57.3	65.9	66.5
Medium Trucks:	61.0	59.5	53.2	51.6	60.1	60.3
Heavy Trucks:	62.3	60.9	51.9	53.1	61.5	61.6
Vehicle Noise:	69.0	67.3	64.0	59.5	68.0	68.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	27	59	127	273
CNEL:	29	63	135	292

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2042P | Project Name: VA Clinic
Road Name: Knudsen Dr. | Job Number: 15239
Road Segment: s/o Olive Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	11,720 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	1,172 vehicles
Vehicle Speed:	40 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:	37.0 feet
Centerline Dist. to Observer:	37.0 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:	32.711
Medium Trucks:	32.439
Heavy Trucks:	32.466

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-0.75	2.66	-1.20	-4.56	0.000	0.000
Medium Trucks:	77.72	-17.99	2.72	-1.20	-4.87	0.000	0.000
Heavy Trucks:	82.99	-21.94	2.71	-1.20	-5.61	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	67.2	65.3	63.6	57.5	66.1	66.7
Medium Trucks:	61.2	59.7	53.4	51.8	60.3	60.5
Heavy Trucks:	62.6	61.1	52.1	53.4	61.7	61.8
Vehicle Noise:	69.2	67.5	64.2	59.7	68.2	68.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	28	61	131	282
CNEL:	30	65	140	302

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2042P | Project Name: VA Clinic
Road Name: Knudsen Dr. | Job Number: 15239
Road Segment: s/o Hageman Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,150 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	615 vehicles
Vehicle Speed:	40 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:	37.0 feet
Centerline Dist. to Observer:	37.0 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:	32.711
Medium Trucks:	32.439
Heavy Trucks:	32.466

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-3.55	2.66	-1.20	-4.56	0.000	0.000
Medium Trucks:	77.72	-20.79	2.72	-1.20	-4.87	0.000	0.000
Heavy Trucks:	82.99	-24.74	2.71	-1.20	-5.61	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.4	62.5	60.8	54.7	63.3	63.9
Medium Trucks:	58.4	56.9	50.6	49.0	57.5	57.7
Heavy Trucks:	59.8	58.3	49.3	50.6	58.9	59.0
Vehicle Noise:	66.4	64.7	61.4	56.9	65.4	65.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	18	39	85	183
CNEL:	20	42	91	196

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2042P | Project Name: VA Clinic
Road Name: Olive Dr. | Job Number: 15239
Road Segment: w/o Knudsen Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,150 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	1,415 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	52 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:	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:	48.724
Medium Trucks:	48.542
Heavy Trucks:	48.560

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.44	0.07	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-17.68	0.09	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.64	0.09	-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:	66.9	65.0	63.2	57.2	65.8	66.4
Medium Trucks:	60.7	59.1	52.8	51.2	59.7	59.9
Heavy Trucks:	61.5	60.1	51.0	52.3	60.6	60.8
Vehicle Noise:	68.7	67.0	63.8	59.2	67.7	68.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	39	83	179	386
CNEL:	41	89	192	414

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2042P | Project Name: VA Clinic
Road Name: Olive Dr. | Job Number: 15239
Road Segment: e/o Knudsen Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,440 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	2,344 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	52 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:	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:	48.724
Medium Trucks:	48.542
Heavy Trucks:	48.560

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.75	0.07	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-15.49	0.09	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.45	0.09	-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:	69.1	67.2	65.4	59.4	68.0	68.6
Medium Trucks:	62.8	61.3	55.0	53.4	61.9	62.1
Heavy Trucks:	63.7	62.3	53.2	54.5	62.8	63.0
Vehicle Noise:	70.9	69.2	66.0	61.3	69.9	70.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	54	116	251	541
CNEL:	58	125	269	580

Sunday, December 18, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2042P | Project Name: VA Clinic
Road Name: Hageman Rd. | Job Number: 15239
Road Segment: w/o Knudsen Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,080 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	1,808 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	52 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:	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:	48.724
Medium Trucks:	48.542
Heavy Trucks:	48.560

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.62	0.07	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-16.62	0.09	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.57	0.09	-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:	67.9	66.0	64.3	58.2	66.8	67.5
Medium Trucks:	61.7	60.2	53.9	52.3	60.8	61.0
Heavy Trucks:	62.6	61.1	52.1	53.4	61.7	61.8
Vehicle Noise:	69.8	68.0	64.9	60.2	68.8	69.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	45	98	211	455
CNEL:	49	105	226	488

Sunday, December 18, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2042P | Project Name: VA Clinic
Road Name: Hageman Rd. | Job Number: 15239
Road Segment: e/o Knudsen Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,320 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	2,032 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	52 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:	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:	48.724
Medium Trucks:	48.542
Heavy Trucks:	48.560

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.13	0.07	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-16.11	0.09	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.07	0.09	-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	66.6	64.8	58.7	67.4	68.0
Medium Trucks:	62.2	60.7	54.4	52.8	61.3	61.5
Heavy Trucks:	63.1	61.7	52.6	53.9	62.2	62.3
Vehicle Noise:	70.3	68.6	65.4	60.7	69.3	69.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	49	106	228	492
CNEL:	53	114	245	527

Sunday, December 18, 2022

APPENDIX 9.1:

CADNAA OPERATIONAL NOISE MODEL INPUTS

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15239 - VA Clinic

CadnaA Noise Prediction Model: 15239-02.cna
Date: 18.12.22
Analyst: B. Lawson

Calculation Configuration

Configuration	
Parameter	**Value**
General	
Max. Error (dB)	**0.00**
Max. Search Radius (#(Unit,LEN))	**2000.01**
Min. Dist Src to Rcvr	**0.00**
Partition	
Raster Factor	**0.50**
Max. Length of Section (#(Unit,LEN))	**999.99**
Min. Length of Section (#(Unit,LEN))	**1.01**
Min. Length of Section (%)	**0.00**
Proj. Line Sources	**On**
Proj. Area Sources	**On**
Ref. Time	
Reference Time Day (min)	**960.00**
Reference Time Night (min)	**480.00**
Daytime Penalty (dB)	**0.00**
Recr. Time Penalty (dB)	**5.00**
Night-time Penalty (dB)	**10.00**
DTM	
Standard Height (m)	**0.00**
Model of Terrain	**Triangulation**
Reflection	
max. Order of Reflection	**2**
Search Radius Src	**100.00**
Search Radius Rcvr	**100.00**
Max. Distance Source - Rcvr	**1000.00 1000.00**
Min. Distance Rvcr - Reflector	**1.00 1.00**
Min. Distance Source - Reflector	**0.10**
Industrial (ISO 9613)	
Lateral Diffraction	**some Obj**
Obst. within Area Src do not shield	**On**
Screening	**Incl. Ground Att. over Barrier**
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	**3.0 20.0 0.0**
Temperature (#(Unit,TEMP))	**10**
rel. Humidity (%)	**70**
Ground Absorption G	**0.50**
Wind Speed for Dir. (#(Unit,SPEED))	**3.0**
Roads (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)
RECEIVERS		R1	37.2	36.8	43.5	55.0	50.0	0.0				5.00	a	5724498.22	2833269.62	5.00
RECEIVERS		R2	45.2	45.1	51.8	55.0	50.0	0.0				5.00	a	5723954.09	2830931.68	5.00
RECEIVERS		R3	49.7	49.6	56.3	55.0	50.0	0.0				5.00	a	5723848.20	2831558.36	5.00
RECEIVERS		R4	40.2	40.0	46.7	55.0	50.0	0.0				5.00	a	5723208.17	2832429.98	5.00
RECEIVERS		R5	32.7	32.4	39.1	55.0	50.0	0.0				5.00	a	5723179.73	2833305.79	5.00
RECEIVERS		R6	52.5	52.4	59.1	55.0	50.0	0.0				5.00	a	5724717.13	2832629.03	5.00

Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night			X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(ft)		(ft)	(ft)	(ft)
POINTSOURCE		AC01	88.9	88.9	88.9	Lw	88.9		585.00	0.00	252.00	5.00	g	5724573.42	2832018.56	40.00
POINTSOURCE		AC02	88.9	88.9	88.9	Lw	88.9		585.00	0.00	252.00	5.00	g	5724721.22	2832072.11	40.00
POINTSOURCE		AC03	88.9	88.9	88.9	Lw	88.9		585.00	0.00	252.00	5.00	g	5724624.83	2832299.15	40.00
POINTSOURCE		AC04	88.9	88.9	88.9	Lw	88.9		585.00	0.00	252.00	5.00	g	5724491.32	2832214.19	40.00
POINTSOURCE		AC05	88.9	88.9	88.9	Lw	88.9		585.00	0.00	252.00	5.00	g	5724517.02	2832277.02	40.00
POINTSOURCE		CAR01	81.8	81.8	81.8	Lw	81.8					5.00	a	5724485.62	2832302.40	5.00
POINTSOURCE		CAR02	81.8	81.8	81.8	Lw	81.8					5.00	a	5724461.31	2832282.95	5.00
POINTSOURCE		CAR03	81.8	81.8	81.8	Lw	81.8					5.00	a	5724430.06	2832026.70	5.00
POINTSOURCE		CAR04	81.8	81.8	81.8	Lw	81.8					5.00	a	5724400.20	2832011.42	5.00
POINTSOURCE		CAR05	81.8	81.8	81.8	Lw	81.8					5.00	a	5724365.48	2832010.73	5.00
POINTSOURCE		CAR06	81.8	81.8	81.8	Lw	81.8					5.00	a	5724353.68	2832046.84	5.00
POINTSOURCE		CAR07	81.8	81.8	81.8	Lw	81.8					5.00	a	5724341.87	2832088.51	5.00

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night			X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(ft)		(ft)	(ft)	(ft)
POINTSOURCE		CAR08	81.8	81.8	81.8	Lw	81.8					5.00	a	5724335.62	2832135.03	5.00
POINTSOURCE		CAR09	81.8	81.8	81.8	Lw	81.8					5.00	a	5724334.23	2832177.40	5.00
POINTSOURCE		CAR10	81.8	81.8	81.8	Lw	81.8					5.00	a	5724402.98	2832204.48	5.00
POINTSOURCE		CAR11	81.8	81.8	81.8	Lw	81.8					5.00	a	5724422.43	2832175.31	5.00
POINTSOURCE		CAR12	81.8	81.8	81.8	Lw	81.8					5.00	a	5724396.73	2832124.62	5.00
POINTSOURCE		CAR13	81.8	81.8	81.8	Lw	81.8					5.00	a	5724443.95	2832139.20	5.00
POINTSOURCE		CAR14	81.8	81.8	81.8	Lw	81.8					5.00	a	5724414.79	2832087.81	5.00
POINTSOURCE		CAR15	81.8	81.8	81.8	Lw	81.8					5.00	a	5724463.40	2832095.45	5.00
POINTSOURCE		CAR16	81.8	81.8	81.8	Lw	81.8					5.00	a	5724458.54	2832041.98	5.00
POINTSOURCE		CAR17	81.8	81.8	81.8	Lw	81.8					5.00	a	5724551.59	2831955.87	5.00
POINTSOURCE		CAR18	81.8	81.8	81.8	Lw	81.8					5.00	a	5724573.12	2831905.87	5.00
POINTSOURCE		CAR19	81.8	81.8	81.8	Lw	81.8					5.00	a	5724592.56	2831956.56	5.00
POINTSOURCE		CAR20	81.8	81.8	81.8	Lw	81.8					5.00	a	5724640.48	2831912.12	5.00
POINTSOURCE		CAR21	81.8	81.8	81.8	Lw	81.8					5.00	a	5724673.81	2831928.96	5.00
POINTSOURCE		CAR22	81.8	81.8	81.8	Lw	81.8					5.00	a	5724675.38	2831983.12	5.00
POINTSOURCE		CAR23	81.8	81.8	81.8	Lw	81.8					5.00	a	5724710.27	2831947.19	5.00
POINTSOURCE		CAR24	81.8	81.8	81.8	Lw	81.8					5.00	a	5724718.61	2832001.87	5.00
POINTSOURCE		CAR25	81.8	81.8	81.8	Lw	81.8					5.00	a	5724755.06	2831963.33	5.00
POINTSOURCE		CAR26	81.8	81.8	81.8	Lw	81.8					5.00	a	5724758.71	2832016.98	5.00
POINTSOURCE		CAR27	81.8	81.8	81.8	Lw	81.8					5.00	a	5724781.63	2832088.85	5.00
POINTSOURCE		CAR28	81.8	81.8	81.8	Lw	81.8					5.00	a	5724768.09	2832121.67	5.00
POINTSOURCE		CAR29	81.8	81.8	81.8	Lw	81.8					5.00	a	5724750.90	2832162.81	5.00
POINTSOURCE		CAR30	81.8	81.8	81.8	Lw	81.8					5.00	a	5724733.71	2832205.00	5.00
POINTSOURCE		CAR31	81.8	81.8	81.8	Lw	81.8					5.00	a	5724396.90	2832400.31	5.00
POINTSOURCE		CAR32	81.8	81.8	81.8	Lw	81.8					5.00	a	5724444.65	2832399.88	5.00
POINTSOURCE		CAR33	81.8	81.8	81.8	Lw	81.8					5.00	a	5724489.79	2832405.09	5.00
POINTSOURCE		CAR34	81.8	81.8	81.8	Lw	81.8					5.00	a	5724555.32	2832423.32	5.00
POINTSOURCE		CAR35	81.8	81.8	81.8	Lw	81.8					5.00	a	5724585.71	2832385.55	5.00
POINTSOURCE		CAR36	81.8	81.8	81.8	Lw	81.8					5.00	a	5724587.88	2832436.77	5.00
POINTSOURCE		CAR37	81.8	81.8	81.8	Lw	81.8					5.00	a	5724628.24	2832402.05	5.00
POINTSOURCE		CAR38	81.8	81.8	81.8	Lw	81.8					5.00	a	5724624.34	2832454.57	5.00
POINTSOURCE		CAR39	81.8	81.8	81.8	Lw	81.8					5.00	a	5724666.00	2832421.15	5.00
POINTSOURCE		CAR40	81.8	81.8	81.8	Lw	81.8					5.00	a	5724660.79	2832479.30	5.00
POINTSOURCE		CAR41	81.8	81.8	81.8	Lw	81.8					5.00	a	5724636.05	2832503.18	5.00
POINTSOURCE		CAR42	81.8	81.8	81.8	Lw	81.8					5.00	a	5724606.97	2832545.28	5.00
POINTSOURCE		CAR43	81.8	81.8	81.8	Lw	81.8					5.00	a	5724575.72	2832527.92	5.00
POINTSOURCE		CAR44	81.8	81.8	81.8	Lw	81.8					5.00	a	5724594.82	2832480.61	5.00
POINTSOURCE		CAR45	81.8	81.8	81.8	Lw	81.8					5.00	a	5724556.19	2832461.94	5.00
POINTSOURCE		CAR46	81.8	81.8	81.8	Lw	81.8					5.00	a	5724538.40	2832511.86	5.00
POINTSOURCE		CAR47	81.8	81.8	81.8	Lw	81.8					5.00	a	5724488.48	2832440.68	5.00
POINTSOURCE		CAR48	81.8	81.8	81.8	Lw	81.8					5.00	a	5724475.46	2832490.59	5.00
POINTSOURCE		CAR49	81.8	81.8	81.8	Lw	81.8					5.00	a	5724449.42	2832435.90	5.00
POINTSOURCE		CAR50	81.8	81.8	81.8	Lw	81.8					5.00	a	5724435.97	2832483.65	5.00
POINTSOURCE		CAR51	81.8	81.8	81.8	Lw	81.8					5.00	a	5724409.93	2832432.86	5.00
POINTSOURCE		CAR52	81.8	81.8	81.8	Lw	81.8					5.00	a	5724394.30	2832483.65	5.00
POINTSOURCE		CAR53	81.8	81.8	81.8	Lw	81.8					5.00	a	5724409.93	2832520.97	5.00
POINTSOURCE		CAR54	81.8	81.8	81.8	Lw	81.8					5.00	a	5724427.29	2832569.58	5.00
POINTSOURCE		CAR55	81.8	81.8	81.8	Lw	81.8					5.00	a	5724459.84	2832521.84	5.00
POINTSOURCE		CAR56	81.8	81.8	81.8	Lw	81.8					5.00	a	5724468.52	2832575.66	5.00
POINTSOURCE		CAR57	81.8	81.8	81.8	Lw	81.8					5.00	a	5724532.32	2832544.84	5.00
POINTSOURCE		CAR58	81.8	81.8	81.8	Lw	81.8					5.00	a	5724529.28	2832596.49	5.00
POINTSOURCE		CAR59	81.8	81.8	81.8	Lw	81.8					5.00	a	5724568.35	2832560.90	5.00
POINTSOURCE		CAR60	81.8	81.8	81.8	Lw	81.8					5.00	a	5724564.87	2832618.19	5.00
POINTSOURCE		DOCK01	103.4	103.4	103.4	Lw	103.4					8.00	a	5724527.73	2832038.55	8.00
POINTSOURCE		DOCK03	103.4	103.4	103.4	Lw	103.4					8.00	a	5724620.54	2832002.14	8.00
POINTSOURCE		GEN01	110.3	110.3	110.3	Lw	110.3					6.00	a	5724728.36	2831915.75	6.00
POINTSOURCE		GEN02	110.3	110.3	110.3	Lw	110.3					6.00	a	5724750.49	2831924.31	6.00
POINTSOURCE		TRASH01	89.0	89.0	89.0	Lw	89		900.00	0.00	270.00	5.00	a	5724434.91	2831941.45	5.00
POINTSOURCE		TRASH02	89.0	89.0	89.0	Lw	89		900.00	0.00	270.00	5.00	a	5724439.91	2831931.45	5.00

Line Source(s)

Name	M.	ID	Result. PWL			Result. PWL'			Lw / Li			Operating Time			Moving Pt. Src				Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	Number			Speed		
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	Day	Evening	Night	(mph)	(ft)	
LINESOURCE		TRUCK01	91.6	91.6	91.6	74.7	74.7	74.7	Lw	91.6									8	a
LINESOURCE		TRUCK02	91.6	91.6	91.6	75.4	75.4	75.4	Lw	91.6									8	a
LINESOURCE		TRUCK03	91.6	91.6	91.6	73.4	73.4	73.4	Lw	91.6									8	a

Name	ID	Height				Coordinates			
		Begin		End		x	y	z	Ground
		(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
LINESOURCE	TRUCK01	8.00	a			5724512.01	2832027.40	8.00	0.00
						5724371.04	2831953.09	8.00	0.00
LINESOURCE	TRUCK02	8.00	a			5724479.26	2831873.46	8.00	0.00
						5724481.96	2832011.56	8.00	0.00
LINESOURCE	TRUCK03	8.00	a			5724626.59	2831989.20	8.00	0.00

Name	ID	Height		Coordinates			
		Begin	End	x	y	z	Ground
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
				5724645.34	2831945.45	8.00	0.00
				5724600.90	2831927.40	8.00	0.00
				5724480.37	2831930.19	8.00	0.00

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	

Name	ID	Height		Coordinates			
		Begin	End	x	y	z	Ground
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)

Barrier(s)

Name	Sel.	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	a		5724748.21	2831935.01	8.00	0.00
												5724707.50	2831915.41	8.00	0.00
												5724718.96	2831897.92	8.00	0.00
												5724764.49	2831917.82	8.00	0.00
												5724750.62	2831935.31	8.00	0.00

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APPENDIX 10.1:

CADNAA CONSTRUCTION NOISE MODEL INPUTS

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15239 - VA Clinic

CadnaA Noise Prediction Model: 15239-02_Construction.cna
Date: 19.12.22
Analyst: B. Lawson

Calculation Configuration

Configuration	
Parameter	**Value**
General	
Max. Error (dB)	**0.00**
Max. Search Radius (#(Unit,LEN))	**2000.01**
Min. Dist Src to Rcvr	**0.00**
Partition	
Raster Factor	**0.50**
Max. Length of Section (#(Unit,LEN))	**999.99**
Min. Length of Section (#(Unit,LEN))	**1.01**
Min. Length of Section (%)	**0.00**
Proj. Line Sources	**On**
Proj. Area Sources	**On**
Ref. Time	
Reference Time Day (min)	**960.00**
Reference Time Night (min)	**480.00**
Daytime Penalty (dB)	**0.00**
Recr. Time Penalty (dB)	**5.00**
Night-time Penalty (dB)	**10.00**
DTM	
Standard Height (m)	**0.00**
Model of Terrain	**Triangulation**
Reflection	
max. Order of Reflection	**2**
Search Radius Src	**100.00**
Search Radius Rcvr	**100.00**
Max. Distance Source - Rcvr	**1000.00 1000.00**
Min. Distance Rvcr - Reflector	**1.00 1.00**
Min. Distance Source - Reflector	**0.10**
Industrial (ISO 9613)	
Lateral Diffraction	**some Obj**
Obst. within Area Src do not shield	**On**
Screening	**Incl. Ground Att. over Barrier**
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	**3.0 20.0 0.0**
Temperature (#(Unit,TEMP))	**10**
rel. Humidity (%)	**70**
Ground Absorption G	**0.50**
Wind Speed for Dir. (#(Unit,SPEED))	**3.0**
Roads (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)
RECEIVERS		R1	58.4	-48.6	55.4	55.0	50.0	0.0				5.00	a	5724498.22	2833269.62	5.00
RECEIVERS		R2	57.0	-49.9	54.0	55.0	50.0	0.0				5.00	a	5723954.09	2830931.68	5.00
RECEIVERS		R3	60.7	-46.3	57.7	55.0	50.0	0.0				5.00	a	5723848.20	2831558.36	5.00
RECEIVERS		R4	53.9	-53.1	50.8	55.0	50.0	0.0				5.00	a	5723208.17	2832429.98	5.00
RECEIVERS		R5	48.0	-59.0	45.0	55.0	50.0	0.0				5.00	a	5723179.73	2833305.79	5.00

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL"			Lw / Li			Operating Time			Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)	
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)		
SITEBOUNDARY		CONSTRUCTION	122.0	15.0	15.0	76.2	-30.7	-30.7	PWL-Pt	115					8	a

Name	ID	Height				Coordinates			
		Begin		End		x	y	z	Ground
		(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
SITEBOUNDARY	CONSTRUCTION	8.00	a			5724318.28	2832663.68	8.00	0.00
						5724747.53	2832651.12	8.00	0.00
						5724756.32	2832569.94	8.00	0.00
						5724766.93	2832488.97	8.00	0.00
						5724779.36	2832408.27	8.00	0.00
						5724793.61	2832327.86	8.00	0.00
						5724835.21	2832089.54	8.00	0.00
						5724868.15	2831871.44	8.00	0.00

Name	ID	Height		Coordinates			
		Begin	End	x	y	z	Ground
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
				5724843.84	2831846.09	8.00	0.00
				5724722.66	2831848.87	8.00	0.00
				5724701.13	2831848.87	8.00	0.00
				5724678.56	2831850.26	8.00	0.00
				5724620.58	2831857.20	8.00	0.00
				5724551.13	2831866.92	8.00	0.00
				5724523.01	2831870.05	8.00	0.00
				5724495.93	2831872.48	8.00	0.00
				5724466.41	2831874.22	8.00	0.00
				5724309.81	2831876.99	8.00	0.00
				5724286.55	2831901.65	8.00	0.00
				5724290.72	2832072.48	8.00	0.00
				5724294.88	2832308.94	8.00	0.00