

NOISE ASSESSMENT TECHNICAL REPORT
for the
Desert Valley Hospital Emergency Department Project
City of Victorville, California

Prepared for:

Desert Valley Hospital
16850 Bear Valley Road
Victorville, California 92395

Prepared by:

DUDEK

605 Third Street
Encinitas, California 92024
Contact: Jonathan Leech, INCE

JUNE 2024

PAGE INTENTIONALLY BLANK

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

TABLE OF CONTENTS

<u>Section</u>	<u>Page No.</u>
1.0 INTRODUCTION.....	1
1.1 Purpose.....	1
2.0 PROJECT LOCATION AND DESCRIPTION.....	1
2.1 Location	1
2.2 Project Description	1
Overview	1
Building and Site Design	1
3.0 NOISE BACKGROUND AND TERMINOLOGY	9
3.1 Fundamentals of Environmental Noise	9
Exterior Noise Distance Attenuation	10
Structural Noise Attenuation	11
Health Effects of Noise	11
3.2 Fundamentals of Vibration	12
4.0 NOISE REGULATION AND MANAGEMENT.....	12
4.1 Federal.....	12
Federal Transit Administration.....	12
Federal Interagency Committee on Noise	12
4.2 State.....	13
California Noise Control Act of 1973.....	13
California Noise Insulation Standards (CCR Title 24).....	13
California General Plan Guidelines	13
California Department of Transportation (Caltrans) Standards	13
4.3 City of Victorville	14
City of Victorville General Plan	14
Municipal and Development Codes.....	15
5.0 EXISTING NOISE CONDITIONS	15
6.0 SIGNIFICANCE CRITERIA.....	19
6.1 Significance Thresholds.....	19
7.0 IMPACTS AND MITIGATION	21
7.1 Transportation Noise Exposure.....	21
7.1.1 Impact Analysis	21
7.1.2 Mitigation Measures	22

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

TABLE OF CONTENTS (CONTINUED)

<u>Section</u>	<u>Page No.</u>
7.2 Operations Noise Generation	22
7.2.1 Impact Analysis	22
7.2.2 Mitigation Measures	25
7.3 Construction Noise.....	27
7.3.1 On-Site Construction Impact Analysis.....	22
7.3.1 Off-site Construction Traffic Impact Analysis	30
7.3.3 Mitigation Measures	30
7.4 Ground-borne Vibration	30
7.4.1 Impact Analysis	30
7.4.2 Mitigation Measures	32
8.0 REFERENCES.....	33

FIGURES

FIGURE 1	REGIONAL LOCATION	7
FIGURE 2	SITE PLAN	9
FIGURE 3	NOISE MEASUREMENT LOCATIONS.....	10
FIGURE 4	OPERATIONAL NOISE LEVELS AT MODELED SENSITIVE RECEIVERS.....	21

APPENDICES

A	Ambient Noise Measurement Data
B	Traffic Noise Worksheets
C	Stationary Noise Source Operational Modeling Data
D	Roadway Noise Construction Model - Input and Results Data Sheets
E	Construction Vibration Analysis

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Meaning
ADT	Average Daily Trips
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNEL	Community Noise Equivalent Level
CUP	Conditional Use Permit
DA	Development Agreement
dB	Decibel
dBA	A-Weighted Decibel
d _{ref}	The Reference Distance that Helps Define Leq (Activity)
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HVAC	Heating, Ventilation and Air Conditioning
ISO	International Organization of Standardization
L _{dn}	Day-Night Sound Level
L _{eq}	Equivalent Sound Level
L _{max}	Maximum Sound Level
L _{min}	Minimum Sound Level
L _v	Vibration Level
L _{xx}	Percentile-Exceeded Sound Levels
PPV	Peak Particle Velocity
RCNM	Roadway Construction Noise Model
USEPA	United States Environmental Protection Agency
VdB	Vibration Decibel

**Noise Assessment Technical Report for the
Desert Valley Hospital Emergency Department Project, Victorville CA**

INTENTIONALLY LEFT BLANK

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

1.0 INTRODUCTION

1.1 Purpose

This technical noise report evaluates noise effects of the project including noise generation potential associated with construction and operation of the proposed hospital expansion. Noise generation sources from future implementation of the project include traffic, parking lot vehicle activities, mechanical equipment, intermittent helicopter activities, and short-term construction operations.

2.0 PROJECT LOCATION AND DESCRIPTION

2.1 Location

The approximately 1.85-acre proposed Project site is located in the southeastern part of the City of Victorville, which is situated in the Victor Valley region in western San Bernardino County (Figure 1, Project Location). The proposed Project site is located at 16850 Bear Valley Road, within the grounds of the existing Desert Valley Hospital, located north of Bear Valley Road, west of 1st Avenue and existing development, south of vacant land and Jasmine Street, and east of 2nd Avenue (Figure 2, Project Site).

2.2 Project Description

Overview

The proposed project consists of the construction of a new 2-story building addition to the existing Desert Valley Hospital. The building addition will include a new Emergency Department on the first floor and a new Medical - Surgery Department on the second floor. As part of the project a new service yard will be provided on site to accommodate utilities for the building addition. On-site and off-site improvements are planned as part of the project to accommodate additional on-site parking spaces and efficient traffic flow into/out of the project site. The purpose of this project is to provide a new Emergency Department for the facility that will address the needs for the hospital and community. Specifically, the building addition provides an opportunity to create capacity for current and future demand, and to resolve the challenges and deficiencies in the existing departments.

Building and Site Design

Emergency Department and Medical-Surgical Department

The proposed building addition to the existing Desert Valley Hospital would be located east of the existing Medical Office Building and would occupy the southeast corner of the Desert Valley Hospital campus. The approximately 83,369 square foot building addition would be two stories (refer to *Figure 2, Site Plan*, for building addition location). The first floor of the Building Addition would include 39,036 square feet for a new Emergency Department (ED). The new ED would connect to the existing Hospital on the first floor

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

through an existing corridor that will be widened. The new ED would provide 68 treatment bays. The second floor of the Building Addition would include 38,269 square feet for a Medical-Surgical Department (Med Surg Unit). The Med Surg Unit would provide 71 beds. One bed in an existing Med Surg Unit will be eliminated to accommodate access from the existing Hospital to the new building addition. The Med Surg Unit would connect to the existing Hospital through a new bridge over the existing Hospital's low roof. The vertical transportation system is planned to be traction type elevators with hospital size cabs. Two (2) Patient/Staff/Service Elevators would be provided. Upon the project completion, the Desert Valley Hospital would have 218 licensed beds in total. The building addition would add approximately 150 new employees to the Hospital.

Helipad area

Desert Valley Hospital has an existing ground-based helipad on site which is located east of the existing Medical Office Building with access to the helipad through a driveway along Bear Valley Road. The existing ground-based helipad and associated gurney ramp would be demolished as part of the site to make ready for the proposed building addition, surface parking areas, and new driveway location. A new helipad is proposed for the Hospital and would be located on the roof level of the proposed building addition. The new helipad would accommodate a regional EMS helicopter. The surface of the helideck would be at an elevation of approximately 45 feet above grade. Effectively, the helipad location would shift approximately 170 to the west under the proposed project. The distance between the helipad and the closest residences west of the project would decrease from approximately 2,230 feet to 1,960 feet.

Service Yard

The project would include a new service yard on the northeast portion of the project site to accommodate utilities for the building addition (refer to *Figure 2, Site Plan*). The service yard would include a pump house, a cooling tower, a chiller room, a normal power electrical room, and an emergency power electrical room. The portions of the service yard housing the pump house and the cooling tower would be open to the sky. East of the service yard would be a new bulk oxygen storage yard. North of the service yard (in the existing employee parking lot) would be two new emergency water storage tanks that will be located underground.

Vehicular and Pedestrian Access

The primary patient vehicular access to the site would be from the relocated driveway along Bear Valley Road. Walk-In Emergency Department patients could be dropped off at the Emergency Department canopy located at the south end of the building addition or park in the proposed parking spaces to the east of the building addition and walk along the provided sidewalks and crosswalks to the walk-in entry. There would also be a second driveway entrance constructed at Bear Valley Road and an additional one located at 1st Avenue. The project would provide additional parking for ED walk-in patients and physicians east of the proposed building addition. A total of 162 new parking stalls would be provided, for a total of 943 parking stalls onsite. Of these new parking stalls, 19 would be accessible (for a total of 54 accessible stalls onsite,

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

and 3 would be van accessible stalls (for a total of 9 van accessible stalls). Additionally, 9 stalls would be Clean Air Stalls, and 29 would be future EV charging only stalls.

Emergency Vehicle access

The north end of the building addition would include an ambulance canopy for ambulance patient drop-off. Emergency vehicles would access the site from either Second Ave or Bear Valley Road. There would be 4 ambulance parking spaces provided at the Ambulance Canopy. An additional 4 parking spaces for emergency vehicles are located on the opposite side of this driveway for ambulance overflow parking and other emergency vehicles. Refer to *Figure 2, Site Plan*.

Landscaping

All landscaping for the proposed facility would be consistent with Section 16-3.10.020 (e) of the City of Victorville Municipal Code development standards for commercial districts and Water Conservation Ordinance 2114, which requires the use of native and low water demand plants for the development of the landscaping palette. The project would require the removal of 26 trees. Chapter 13.33 of the City of Victorville Municipal Code prohibits the removal of Joshua trees without the consent of the Director of Parks and Recreation. All tree removal will be compliant with Chapter 13.33 of the City of Victorville Municipal Code.

Lighting

Lighting for the emergency department would be consistent with current lighting usage and would be illuminated from 6:00pm to 6:00am. All lighting for the proposed facility would be consistent with Section 16-3.10.020 (e) of the City of Victorville Municipal Code development standards for commercial districts.

Sustainable Design Features

The design of the Building Addition includes several sustainable design features related to energy efficiency and drainage. The glazing system of the Building Addition is designed to maximize energy efficiency, incorporating a combination of storefront-type windows and fixed windows, all equipped with low-E insulated glass, which minimizes energy consumption. Additionally, The roofing system of the Building Addition would have reflective white surface to mitigate heat absorption and would include tapered rigid foam sheets are adhered to the flat concrete roof slab providing insulation and enabling efficient water drainage.

Offsite Improvements

Offsite improvements for the project would include the relocation of two existing electrical poles, and improvements at Bear Valley Rd and 1st Ave. Improvements along Bear Valley Road include the installation of a median and sidewalk. Offsite improvements along 1st Avenue would consist of sidewalk improvements and the continuation of 1st Ave to Bear Valley Road.

**Noise Assessment Technical Report for the
Desert Valley Hospital Emergency Department Project, Victorville CA**

INTENTIONALLY LEFT BLANK

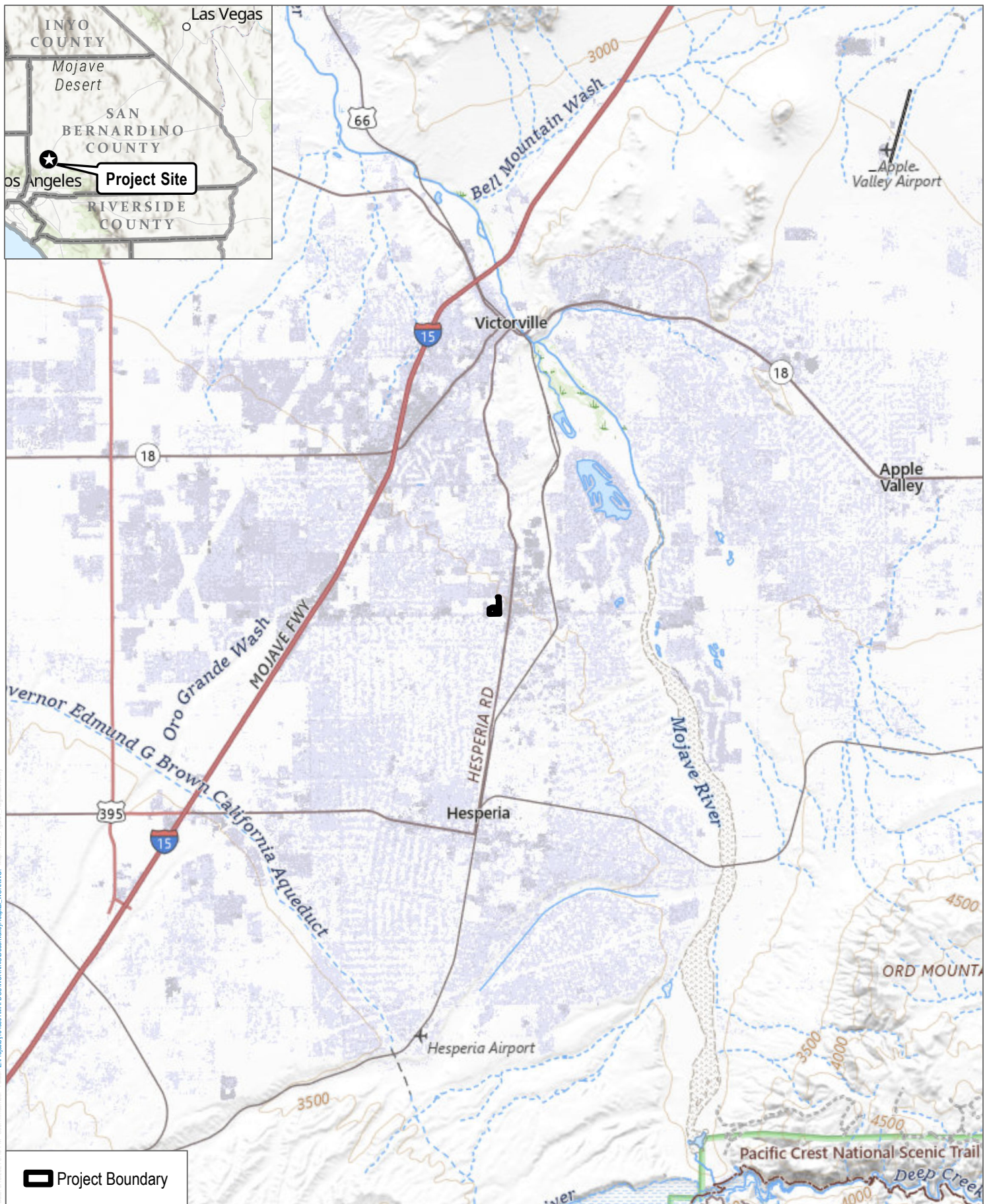


FIGURE 1

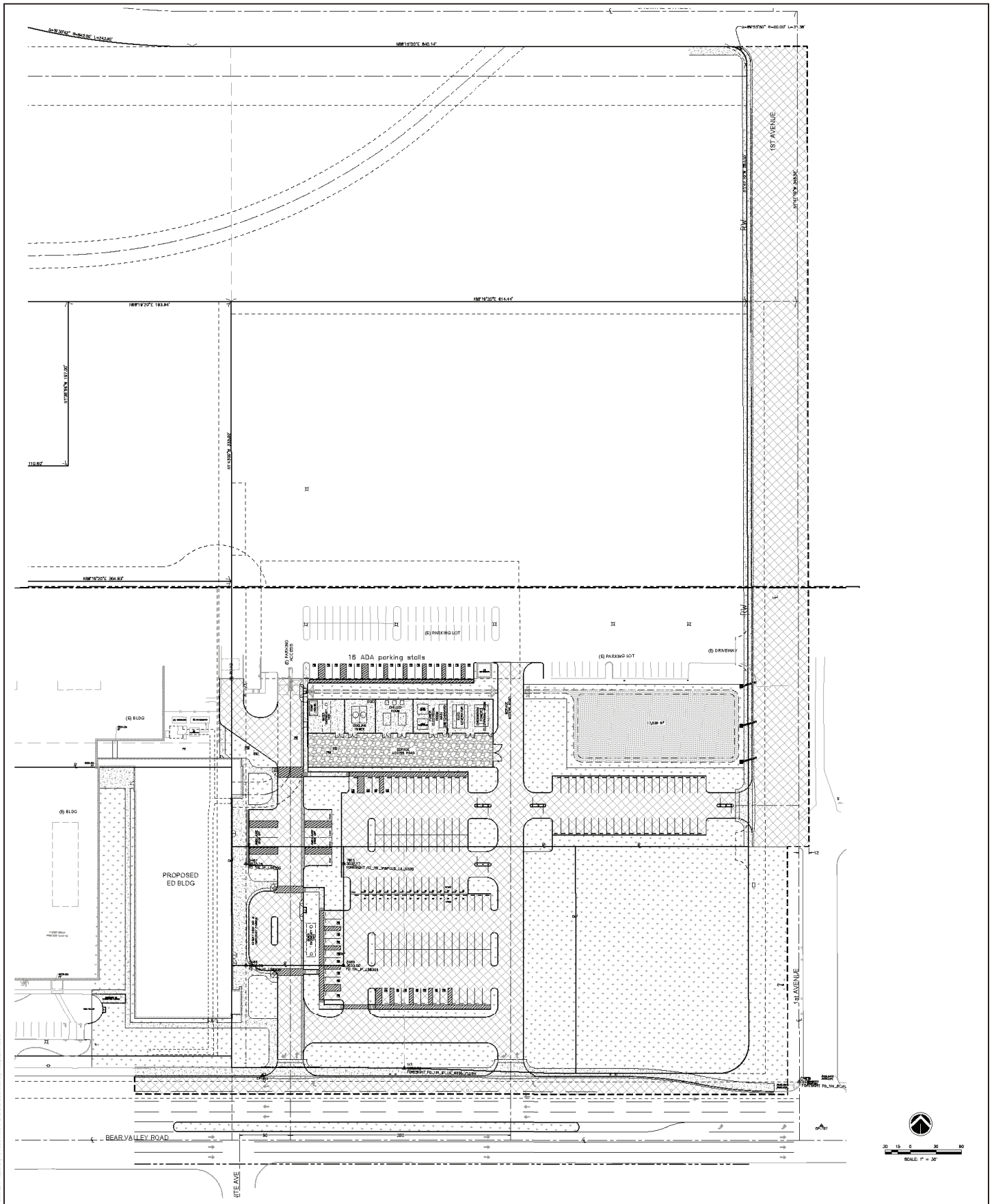
Project Site

Desert Valley Hospital Project



**Noise Assessment Technical Report for the
Desert Valley Hospital Emergency Department Project, Victorville CA**

INTENTIONALLY LEFT BLANK



SOURCE: IMEG 2024

FIGURE 2

Site Plan

Desert Valley Hospital Project

**Noise Assessment Technical Report for the
Desert Valley Hospital Emergency Department Project, Victorville CA**

INTENTIONALLY LEFT BLANK

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

3.0 NOISE BACKGROUND AND TERMINOLOGY

3.1 Fundamentals of Environmental Noise

Vibrations, traveling as waves through air from a source, exert a force perceived by the human ear as sound. Sound pressure level (referred to as sound level) is measured on a logarithmic scale in decibels (dB) that represent the fluctuation of air pressure above and below atmospheric pressure. Frequency, or pitch, is a physical characteristic of sound and is expressed in units of cycles per second or hertz (Hz). The normal frequency range of hearing for most people extends from about 20 to 20,000 Hz. The human ear is more sensitive to middle and high frequencies, especially when the noise levels are quieter. As noise levels get louder, the human ear starts to hear the frequency spectrum more evenly. To accommodate for this phenomenon, a weighting system to evaluate how loud a noise level is to a human was developed. The frequency weighting called “A” weighting is typically used for quieter noise levels which de-emphasizes the low frequency components of the sound in a manner similar to the response of a human ear. This A-weighted sound level is called the “noise level” and is referenced in units of dBA.

Since sound is measured on a logarithmic scale, a doubling of sound energy results in a 3 dBA increase in the noise level. Changes in a community noise level of less than 3 dBA are not typically noticed by the human ear (Caltrans 1998). Changes from 3 to 5 dBA may be noticed by some individuals who are extremely sensitive to changes in noise. A 5 dBA increase is readily noticeable (EPA 1973). The human ear perceives a 10 dBA increase in sound level as a doubling of the sound level (i.e., 65 dBA sounds twice as loud as 55 dBA to a human ear).

An individual’s noise exposure occurs over a period of time; however, noise level is a measure of noise at a given instant in time. Community noise sources vary continuously, being the product of many noise sources at various distances, all of which constitute a relatively stable background or ambient noise environment. The background, or ambient, noise level gradually changes throughout a typical day, corresponding to distant noise sources, such as traffic volume, as well as changes in atmospheric conditions.

Noise levels are generally higher during the daytime and early evening when traffic (including airplanes), commercial, and industrial activity is the greatest. However, noise sources experienced during nighttime hours when background levels are generally lower can be potentially more conspicuous and irritating to the receiver. In order to evaluate noise in a way that considers periodic fluctuations experienced throughout the day and night, a concept termed “community noise equivalent level” (CNEL) was developed, wherein noise measurements are weighted, added, and averaged over a 24-hour period to reflect magnitude, duration, frequency, and time of occurrence. A complete definition of CNEL is provided below.

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

Different types of measurements are used to characterize the time-varying nature of sound. These measurements include the equivalent sound level (L_{EQ}), the minimum and maximum sound levels (L_{MIN} and L_{MAX}), percentile-exceeded sound levels (L_{XX}), the day-night sound level (L_{DN}), and the CNEL. Below are brief definitions of these measurements and other terminology used in this report.

- *Decibel (dB)* is a unitless measure of sound on a logarithmic scale which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micropascals.
- *A-weighted decibel (dBA)* is an overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- *Equivalent sound level (L_{EQ})* is the constant level that, over a given time period, transmits the same amount of acoustic energy as the actual time-varying sound. Equivalent sound levels are the basis for both the day-night average sound levels (L_{DN}) and community noise equivalent level (CNEL) scales.
- *Maximum sound level (L_{MAX})* is the maximum sound level measured during the measurement period.
- *Minimum sound level (L_{MIN})* is the minimum sound level measured during the measurement period.
- *Percentile-exceeded sound level (L_{XX})* is the sound level exceeded x percent of a specific time period. L_{10} is the sound level exceeded 10% of the time.
- *Day-night average sound level (L_{DN})*. The L_{DN} is a 24-hour average A-weighted sound level with a 10 dB penalty added to the nighttime hours from 10:00 p.m. to 7:00 a.m. The 10 dB penalty is applied to account for increased noise sensitivity during the nighttime hours. This metric is similar to CNEL (see definition below); resulting values from application of L_{DN} versus CNEL rarely differ by more than 1 dB, and therefore these two methods of describing average noise levels are often considered interchangeable.
- *Community noise equivalent level (CNEL)*. The CNEL is the average equivalent A-weighted sound level during a 24-hour day. CNEL accounts for the increased noise sensitivity during the evening hours (7 p.m. to 10 p.m.) and nighttime hours (10 p.m. to 7 a.m.) by adding 5 dB to the sound levels in the evening and 10 dB to the sound levels at night. CNEL and L_{DN} are often considered equivalent descriptors.

Exterior Noise Distance Attenuation

Noise sources are classified in two forms: (1) point sources, such as stationary equipment or a group of construction vehicles and equipment working within a spatially limited area at a given time, and (2) line sources, such as a roadway with a large number of pass-by sources (motor vehicles). Sound generated by a point source typically diminishes (attenuates) at a rate of 6.0 dBA for each doubling of distance from the

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

source to the receptor at acoustically “hard” sites and at a rate of 7.5 dBA for each doubling of distance from source to receptor at acoustically “soft” sites. Sound generated by a line source (i.e., a roadway) typically attenuates at a rate of 3 dBA and 4.5 dBA per doubling distance, for hard and soft sites, respectively. Sound levels can also be attenuated by man-made or natural barriers.

For the purpose of sound attenuation discussion, a “hard” or reflective site does not provide any excess ground-effect attenuation and is characteristic of asphalt or concrete ground surfaces, as well as very hard-packed soils. An acoustically “soft” or absorptive site is characteristic of unpaved loose soil or vegetated ground.

Structural Noise Attenuation

Sound levels can also be attenuated by man-made or natural barriers. Solid walls or slopes associated with elevation differences typically reduce noise levels by 5 to 10 dBA (Caltrans 1998). Structures can also provide noise reduction by insulating interior spaces from outdoor noise. The outside-to-inside noise attenuation provided by typical structures in California ranges between 17 to 30 dBA with open and closed windows, respectively, as shown in *Table 1*.

Table 1. Outside-to-Inside Noise Attenuation (dBA)

Building Type	Open Windows	Closed Windows ^a
Residences	17	25
Schools	17	25
Churches	20	30
Hospitals/Offices/Hotels	17	25
Theaters	17	25

Source: Caltrans 1998.

^a As shown, structures with closed windows can attenuate exterior noise by a minimum of 25 to 30 dBA.

Health Effects of Noise

Noise is known to have a number of different adverse effects on humans. Based upon these recognized adverse effects of noise, criteria have been established to help protect the public health and safety and prevent disruption of certain human activities. These criteria are based on effects of noise on people such as hearing loss (not generally associated with community noise), communication interference, sleep interference, physiological responses, and annoyance.

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

3.2 Fundamentals of Vibration

Vibration is an oscillatory motion that can be described in terms of displacement, velocity, or acceleration. The response of humans to vibration is very complex. However, it is generally accepted that human response is best approximated by the vibration velocity level associated with the vibration occurrence.

Heavy equipment operation, including stationary equipment that produces substantial oscillation or construction equipment that causes percussive action against the ground surface, may be perceived by building occupants as perceptible vibration. It is also common for ground-borne vibration to cause windows, pictures on walls, or items on shelves to rattle. Although the perceived vibration from such equipment operation can be intrusive to building occupants, the vibration is seldom of sufficient magnitude to cause even minor cosmetic damage to buildings.

Peak particle velocity (PPV) that describes particle movement over time (in terms of physical displacement of mass, expressed as inches/second or in/sec) is generally employed for the discussion of vibration impacts on people and structures. Groundborne vibration generated by construction projects is usually highest during pile driving, rock blasting, soil compacting, jack hammering, and demolition-related activities. Next to pile driving and soil compacting, grading activity has the greatest potential for vibration impacts when earthwork involves large bulldozers, large trucks, or other heavy equipment.

4.0 NOISE REGULATION AND MANAGEMENT

4.1 Federal

Federal Transit Administration

Although no federal regulations are applicable to this Project, guidance and methodologies from the Federal Transit Administration's (FTA's) Transit Noise and Vibration Impact Assessment Manual (FTA 2018) pertaining to construction noise and vibration are used in this analysis. For example, in its Transit Noise and Vibration Impact Assessment guidance manual (FTA 2018), the Federal Transit Administration (FTA) offers guidance on the estimation of construction noise levels from a construction Project site. It also provides suggested thresholds that include no more than 80 dBA L_{eq} (over an 8-hour daytime period) as received at a residential land use. Since the City does not provide a quantified construction noise limit, this analysis adopts the 80 dBA L_{eq} 8-hr FTA guidance for quantitative construction noise impact assessment.

Federal Interagency Committee on Noise

In 1992 the Federal Interagency Committee on Noise (FICON) assessed the annoyance effects of changes in ambient noise levels resulting from aircraft operations. Although the FICON recommendations were developed to address aircraft noise impacts, they are used in this analysis to define a substantial increase in community noise levels related to roadway traffic, as detailed in Section 6.1, Thresholds of Significance.

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

4.2 State

California Noise Control Act of 1973

Sections 46000 through 46080 of the California Health and Safety Code, known as the California Noise Control Act of 1973, declares that excessive noise is a serious hazard to the public health and welfare and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. It also identifies a continuous and increasing bombardment of noise in the urban, suburban, and rural areas. The California Noise Control Act declares that the State of California has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the State to provide an environment for all Californians free from noise that jeopardizes their health or welfare.

California Noise Insulation Standards (CCR Title 24)

In 1974, the California Commission on Housing and Community Development adopted noise insulation standards for hotels, motels, dormitories, and multi-family residential buildings (CCR Title 24, Part 2). Title 24 establishes standards for interior room noise (attributable to outside noise sources). The City of Santa Clarita applies the interior noise criterion of CNEL 45 dBA for single family residences, in addition to multi-family residential structures.

California General Plan Guidelines

The California General Plan Guidelines, published by the Governor's Office of Planning and Research (OPR), provides guidance for the acceptability of specific land use types within areas of specific noise exposure. The guidelines also present adjustment factors that may be used to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution. OPR guidelines are advisory in nature. Local jurisdictions, including the City of Victorville, have the responsibility to set specific noise standards based on local conditions.

California Department of Transportation (Caltrans) Standards

Although the Caltrans standards are intended for application to transportation construction projects sponsored by Caltrans, the impact assessment procedures and criteria included in the Transportation-Related Earthborne Vibrations and Construction Vibration Guidance Manual (September 2020) are routinely used for evaluation of various types of construction projects proposed or reviewed by local jurisdictions. The Caltrans damage threshold for commercial buildings with concrete and steel construction is 0.5 in/sec PPV; for residential buildings, the damage threshold is 0.25 in/sec PPV. With respect to vibration impacts to persons, Caltrans uses a threshold of 0.2 in/sec PPV for long-term, continuous vibration sources (such as traffic), and a slightly higher annoyance threshold of 0.24 in/sec PPV for transient sources, such as construction.

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

4.3 City of Victorville

City of Victorville General Plan

The Noise Element of the 2030 City of Victorville General Plan provides guidance and policies for minimizing community noise impacts, which include Land Use Compatibility Standards appearing in Exhibit A.

Exhibit A – City of Victorville Land Use Compatibility Standards

Land Use Categories	Community Noise Exposure L_{dn} or CNEL, dB						
	55	60	65	70	75	80+	--
Residential- Low Density, Single Family, Duplex, Multi-family, Mobile Home	1	1	2	2	3	4	4
Transient Lodging – Motels, Hotels	1	1	2	2	3	3	4
Schools, Libraries, Churches, Hospitals, Nursing Homes	1	1	2	3	3	4	4
Auditoriums, Concert Halls, Amphitheaters	2	2	3	3	4	4	4
Sports Arena, Outdoor Spectator Sports	2	2	2	2	3	3	3
Playgrounds, Neighborhood Parks	1	1	1	2	3	3	3
Gold Courses, Riding Stables, Water Recreation, Cemeteries	1	1	1	2	2	4	4
Office Buildings, Business Commercial, Retail Commercial and Professional	1	1	1	2	2	3	3
Industrial, Manufacturing, Utilities	1	1	1	1	2	2	2
Agriculture	1	1	1	1	1	1	1
Notes: 1. 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. 2. CONDITIONALLY ACCEPTABLE: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and Schools, Libraries, Churches, Hospitals, Nursing Homes 1 needed noise insulation features included in the design. Conventional construction, with closed windows and fresh air supply systems or air conditioning will normally suffice. 3. 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. 4. CLEARLY UNACCEPTABLE: New construction or development should generally not be undertaken.							

Source: City of Victorville 2022

Relevant Noise Element implementation measures include the following:

- Implementation Measure 1.1.1.1: Continue to assess projects through the subdivision, site plan, conditional use permit, and other development review processes and incorporate conditions of approval which ensure noise compatibility where appropriate.

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

- Implementation Measure 2.1.1.2: Monitor noise complaints and enforce provisions of the City noise ordinance.
- Implementation Measure 2.1.1.5: Continue to restrict noise and require mitigation measures for any noise-emitting construction equipment or activity.

Municipal and Development Codes

Noise generation in Victorville is regulated by Municipal Code Title 13, Chapter 13.01 Noise Control, and under Title 16 (Development Code) Article 12, Chapter 6 Code Enforcement.

Section 16-6.12.040 (Base ambient noise levels) from the City's Development Code indicates that the default ambient noise level limits for all residential zones would be 65 dBA during daytime hours (10:00 a.m. to 7:00 p.m.) and 55 dBA during nighttime hours (10:00 p.m. to 7:00 a.m.). The default ambient noise level limits for commercial zones is 70 dBA during any time of the day or night. These outdoor ambient noise level limits may be superseded by actual ambient sound levels that are greater. When assessing compliance with these limits, temporal adjustments ranging between 5 and 20 dB may be made per Section 16-6.12.050 depending on the cumulative time exceeded over an indicated portion of any hour. Construction activity noise would be exempt from the City's regulations per Section 16-6.12.060 (9).

As stated in Section 13.01.060 (Noise Source Exemptions) Subsection 9 of the City's Municipal Code, construction activities carried out on private property that are determined by the director of building and safety to be essential to the completion of a project are exempt from the provisions of the Municipal Code.

5.0 EXISTING NOISE CONDITIONS

Ambient noise measurements were conducted in the vicinity of the Project site to characterize the existing noise environment. The measurements were conducted on November 1, 2023, using a Rion NL-52 Integrating Sound Level Meter equipped with a 0.5-inch, pre-polarized condenser microphone with pre-amplifier. The Rion NL-52 meets the current American National Standards Institute (ANSI) standard for a Type 1 (Precision) sound level meter. The calibration of the sound level meter was verified before and after the measurements, and the measurements were conducted with the measurement microphone covered with a windscreen and positioned approximately five feet above the ground.

Five noise measurement locations were selected (ST1–ST5), representing existing noise-sensitive receptors in the Project vicinity. The measurement locations are shown in *Figure 3*, Noise Measurement Locations, and a summary of the measured average noise levels and measurement location descriptions are provided in Table 3. Noise measurement data is also included in Appendix A. As shown in Table 2, measured ambient noise levels ranged from approximately 54 dBA L_{eq} at ST5 to 68 dBA L_{eq} at ST1. The primary noise source at the measurement locations consisted of traffic along the adjacent roadways. Secondary noise sources included distant traffic, distant conversations, and distant industrial noise.

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

Table 2. Measured Noise Levels

Site	Description	Date/Time	L _{EQ} ¹	L _{MAX}	L _{MIN}
ST1	Southeast corner of Bear Valley Road and Bornite Avenue	11/1/2023 11:10 a.m. to 11:25 a.m.	67.6	75.7	49.6
ST2	Northwest of project site, southwest side of Jasmine Street and 2 nd Avenue	11/1/2023 12:01 p.m. to 12:16 p.m.	64.6	85.2	42.7
ST3	North side of Jasmine Street in front of High Desert Vilas	11/1/2023 12:19 p.m. to 12:34 p.m.	63.6	79.6	36.6
ST4	Northeast corner of Jasmine Street and 1 st Avenue	11/1/2023 12:41 p.m. to 12:56 p.m.	66.3	80	39.9
ST5	About 100 feet from the east side of the hospital	11/1/2023 11:40 a.m. to 11:55 a.m.	54.1	71.9	48.8

Table Notes: ¹ Equivalent Continuous Sound Level (Time-Average Sound Level)

² Maximum sound level recorded over the measurement duration

³ Minimum sound level recorded over the measurement duration

General Notes: Temperature 78 degrees, sunny, calm wind.

Source: Dudek (Appendix A)



SOURCE: Esri World Imagery Basemap; San Bernadino County 2024

DUDEK



0 150 300 Feet

FIGURE 3
Noise Measurement Locations
Desert Valley Hospital Project

**Noise Assessment Technical Report for the
Desert Valley Hospital Emergency Department Project, Victorville CA**

INTENTIONALLY LEFT BLANK

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

6.0 SIGNIFICANCE CRITERIA

6.1 Significance Thresholds

The following significance criteria, included in Appendix G of the California Environmental Quality Act (CEQA) Guidelines (14 CCR 15000 et seq.), will be employed to determine the significance of a noise impact. Impacts related to noise would be significant if the proposed Project would result in:

- 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 groundborne vibration or groundborne 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, the exposure of people residing or working in the project area to excessive noise levels.

In accordance with the generalized parameters above, quantitative thresholds of significance have been established for the purposes of this analysis based on the local policies and regulations described in Section 4.3 as well as those of federal and State agencies and are listed below.

- **Construction Vibration:** Groundborne vibration from construction and operation of the Project would be considered significant if the Project resulted in vibration levels exceeding the Caltrans recommendations (i.e., 0.2 ips PPV for annoyance, during construction and operation).
- **Construction Noise:** During construction activities, an exceedance of the FTA's 80 dBA L_{eq} 8-hr threshold is considered a significant noise impact.
- **Project-Related Stationary Noise:** A noise impact would be considered significant if predicted noise from typical operation of heating, ventilation and air conditioning (HVAC) and other electro-mechanical systems exceeds the applicable standards of Section 16-6.12.040 (Base ambient noise levels) from the City's Development Code as detailed in Section 1.4.
- **Traffic Noise:** Guidance regarding the determination of a substantial permanent increase in transportation noise levels in the project vicinity above existing levels is provided by the 1992 findings of FICON, which assessed the annoyance effects of changes in ambient noise levels resulting from aircraft operations. The FICON recommendations are based upon studies that relate aircraft noise levels to the percentage of persons highly annoyed by the noise. Annoyance is a qualitative measure of the adverse reaction of people to noise that generates speech interference, sleep disturbance, or interference with the desire for a tranquil environment. The rationale for the FICON recommendations is that it is possible to consistently describe the annoyance of people exposed to transportation noise in terms of L_{dn} (and, by extension, CNEL¹).

¹ As discussed in Section 3.1, the L_{dn} and CNEL noise metrics are very similar and often used interchangeably.

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

The changes in noise exposure that are shown in Table 3 are expected to result in equal changes in annoyance at sensitive land uses. Although the FICON recommendations were developed to address aircraft noise impacts, they are used in this analysis to define a substantial increase in community noise levels related to all transportation noise sources.²

Table 3. Measures of Substantial Increase for Transportation Noise Sources

Ambient Noise Level Without Project (L_{dn}/CNEL)	Significant Impact Assumed to Occur if the Project Increases Ambient Noise Levels by:
<60 dB	+ 5 dB or more
60–65 dB	+ 3 dB or more
>65 dB	+ 1.5 dB or more

Source: FICON 1992.

² Traffic noise and other transportation noise sources are similar to aircraft/airport noise in that all of these noise sources can and do operate throughout the daytime and nighttime hours. The FICON recommendations use a weighted 24-hour noise metric, in which noise occurring during nighttime hours has a penalty applied to account for the increased sensitivity of persons to noise at night. Additionally, the graduated levels of the FICON guidance for substantial increase account for the diminishing tolerance of the typical person to noise increases as ambient noise levels are increased. Such is the case whether the dominant noise source is aircraft, or some other transportation source.

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

7.0 IMPACTS AND MITIGATION

7.1 Transportation Noise Exposure

7.1.1 Impact Analysis

Roadway Noise

The primary noise-related effect that most commercial projects produce is a potential for off-site increases in traffic, which is the main source of noise in most urban areas. To determine the potential for roadway traffic noise level increases from project implementation, acoustical calculations were performed for the following scenarios evaluated in the project traffic impact assessment: opening day [Year 2027] and opening day plus project, and future [Year 2037] and future plus project traffic levels)

Acoustical calculations were performed for roadway segments identified in the traffic impact assessment (STC Traffic, Inc. 2024) as those which could be affected by implementation of the project and along which noise-sensitive uses (i.e., residences) are located, using standard noise modeling equations adapted from the FHWA noise prediction model. The modeling calculations take into account the posted vehicle speed, average daily traffic volume, and the estimated vehicle mix. The model assumed standard exterior attenuation rates for “hard sites” (i.e., areas of pavement or compacted dirt adjacent to the roadway). Table 4, *Existing and Future Roadway Traffic Noise Levels (CNEL)*, presents the noise level results for each scenario. Complete worksheets from traffic noise are included in Appendix B.

With regard to Table 4, noise levels are indicated at the approximate distance from each roadway segment centerline to the closest existing residences adjacent to each evaluated roadway segment. For 1st Avenue, 2nd Avenue, and Jasmine Street this distance is 50 feet from the roadway centerline; for Bear Valley this distance is 155 feet from the roadway centerline. Noise levels at greater distances than these from the centerline would be lower due to attenuation provided by increased distance from the noise source. Generally, noise from heavily traveled roadways would experience a decrease of approximately 3 dBA for every doubling of distance from the roadway where hard site conditions exist adjacent to the roadway. The noise model does not take into account the sound-attenuating effect of intervening structures, barriers, vegetation, or topography. Therefore, the noise levels predicted by the model are conservative.

The proposed project, along with future regional growth and other projects to be developed within the project vicinity, would result in the addition of vehicle trips that would increase traffic noise. Baseline traffic noise levels for the modeled segments under the Year 2027 (opening year) scenario would range from 58.7 to 70.8 dBA CNEL. For those roadway segments where the baseline noise level is already greater than 65 dBA CNEL, a potentially significant project impact would occur where an increase of 1.5 dB CNEL or more is predicted (FICON). For segments with baseline traffic noise level between 60 and 65 dBA CNEL, the significance threshold would be a 3 DB CNEL or greater increase. As illustrated in Table 4, the proposed project would result in traffic noise increases of well below 1 dB CNEL on each of the examined roadway

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

segments, when comparing Year 2027 to Year 2027 plus project noise levels. As such, the project would result in less than significant project-specific traffic noise impacts.

Table 4. Modeled Traffic Noise Levels for Selected Roadway Segments

(dBA CNEL)						
Street Segment	2027	2027 + Project	Difference	2037	2037 + Project	Difference
2nd Avenue North of Bear Valley	65.3	65.6	0.3	68.3	68.5	0.2
Bear Valley East of Bornite	70.8	70.8	0	71.8	71.9	0.1
1st Avenue North of Jasmine	58.7	58.7	0	59.5	59.5	0
Jasmine Street East of 2nd	63.7	63.8	0.1	66.3	66.4	0.1

Sources: Desert Valley Hospital Emergency Department Expansion Traffic Study (STC 2024) and FHWA TNM 2.5.

Cumulative Roadway Noise

The STC traffic study (STC 2024) included the evaluation of project traffic in addition to anticipated or predicted traffic contributions from all projects in the area through Year 2037 (the cumulative traffic scenario). As indicated in Table 4, because the project's individual contribution to traffic noise would in all cases be less than 1dB LDN as compared to the "without project" traffic noise levels under the cumulative traffic scenario (Year 2037), the project would not contribute substantially to any cumulatively significant traffic noise impacts. Refer to Appendix B for the traffic noise worksheets.

7.1.2 Mitigation Measures

The Project would not result in a significant traffic noise impact; therefore, no mitigation is required.

Significance After Mitigation

Mitigation is not required because impacts would be less than significant.

7.2 Operations Noise Generation

7.2.1 Impact Analysis

The implementation of the project would also result in changes to existing noise levels on the project site by developing new stationary sources of noise, including introduction of HVAC equipment, new surface parking lot, and emergency electrical generators. These sources may affect noise-sensitive vicinity land uses off the project site. The following analysis evaluates noise from exterior mechanical equipment and activities associated with the new surface parking lot. As identified in Section 3.1 (Significance Criteria), project operations that would exceed 60 dBA L_{eq} at the property line for any existing residential properties in the project vicinity would constitute a significant impact.

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

Regarding the proposed helipad relocation portion of the project, the frequency of helicopter flights using the helipad is not anticipated to change with the proposed relocation. Hence, noise levels generated by this component would not be altered under the proposal. The helipad would be shifted approximately 170 feet westward with the project; this shift would decrease the distance from the helipad to the closest residences west of the project from approximately 2,230 feet to 1,960 feet. Based on standard outdoor attenuation rates, this reduction in the separation distance from the helipad to the closest residences west of the project would result in an increase of approximately 1 dBA, which would not be discernible to the human ear in the outdoor environment. Therefore, the shift in helipad location is not included in the analysis below of new noise sources at the project site.

7.2.1.1 *Parking Lot Activity*

An hourly average noise level generated by parking lot movements may be estimated with the following expression:

$$\text{Hourly } L_{eq} = 70 + 10 \cdot \text{LOG}(N) - 35.6$$

where 70 dBA is the mean Sound Exposure Level (SEL) at 50 feet for an automobile parking lot arrival or departure, N is the number of parking lot operations in a given hour, and 35.6 is ten times the logarithm of the number of seconds in an hour (BAC 2020). With this L_{eq} value serving as a reference input, noise exposure levels at the Project site can then be estimated after application of distance propagation and other natural attenuation factors such as air absorption and ground absorption consistent with ISO 9613-2 algorithms and reference data. Using the PM peak hour trip rate from the traffic study (STC 2024) peak hourly parking lot activity is assumed to be 66 trips per hour. Therefore, a parking lot noise source level used in this analysis is calculated to be 53 $L_{eq} \text{ } 1 \text{ Hr}$ at 50 feet. As a conservative analysis, this parking lot noise level is assumed to occur every hour of the night and day.

7.2.1.2 *Roof-Top HVAC Equipment*

The proposed buildings would require installation and use of HVAC equipment. For independent zone control, it is assumed that the new building would each include four package HVAC units, with all equipment mounted on the roof of the building addition. Based on the floor area, it is anticipated that four (4) 10-ton capacity units would be required to provide climate control for the building addition. This report uses the sound rating for a Daikin AGZ-E 30-ton capacity HVAC package unit as the sound level reference.

Noise level data provided by the manufacturer were used to determine the noise levels which would be generated by each of the HVAC package units. The Daikin AGZ-E 30-ton package HVAC unit has a sound power rating (L_w) of 75 dBA. It is assumed a minimum 3.5-foot high parapet would extend along the perimeter of the roof, but acoustical calculations do not include sound level reductions associated with the noise barrier effect of the parapet.

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

7.2.1.3 *Emergency Backup Generator*

The hospital expansion would also be served by a new 1,250 kW diesel generator for back-up emergency power needs. Kohler provides the noise level in L_{eq} for a KD1250-F generator, installed in a factory-available sound attenuating and weather-proof enclosure; at a reference distance of 1 meter (3.28 feet) the KD1250-F generator in the factory-provided enclosure produces a sound level of 85 dBA L_{eq} with a noise source height of 10 feet.

7.2.1.4 *Sound Levels From Combined On-Site Noise Sources*

Prediction of project on-site operation noise (i.e., HVAC units, parking lots, and emergency generator) at neighboring receiver properties involved creation of a sound propagation model using a commercial 3-Dimensional noise prediction model, CadnaA. The sound emission reference levels described above for HVAC units, parking lot activities, and the emergency generator were all entered into the CadnaA model. The outdoor noise propagation formulas in CadnaA follow the International Organization of Standardization (ISO) Standard 9613-2, "Attenuation of Sound During Propagation Outdoors, Part 2: General Method of Calculation" (ISO 1996).

None of the stationary noise sources described above would be expected to have continuous operation over an entire hour. In practice, at any given time, some of the equipment would be in operation mode, while other equipment would be in rest mode, and vehicle arrival and departure would be intermittent. Nonetheless, the model was constructed to address a worst-case scenario where all the equipment is in continuous operation for a full hour, including vehicle arrivals and departures reflecting peak transportation hours. Four receiver points, representing the closest noise-sensitive receivers on all sides of the project site, were also entered into the CadnaA model space. The four receiver locations correspond to the same numbered short-term measurement locations, for easy comparison between ambient noise levels and project operational noise levels. Figure 4 indicates the location of these receiver points (designated ST1 – ST4), while Table 5 lists the relationship between modeled receivers and short-term ambient measurement locations.

Calculation parameters that establish how the NoisePro model predicts combined noise level from these above-listed Project sources include as follows:

- Sound propagation per International Organization of Standardization (ISO) 9613-2 (ISO 1996);
- Default ground acoustical absorption coefficient = 0.5 (on a scale of 0 = reflective, 1 = absorptive); and.
- Zero order of reflection.

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

The results of the mechanical equipment and parking structure operations noise analysis indicate that the proposed project would comply with the City of Victorville municipal code noise limits (Chapter 11.44.040). Table 5 presents the results of the modeling of on-site stationary noise sources at the closest residential receiver on each side of the project site. As shown in Table 5, Project operational noise levels would remain well below even the nighttime limit for residential exterior noise exposure of 55 dBA L_{eq} . As also shown in Table 5, Project operational noise levels at each modeled receiver would be at least 20 dBA L_{eq} lower than measured ambient levels. Therefore, Project operational noise levels would not result in an increase in ambient noise levels at the closest residences to the Project site.

CadnaA predicts noise levels not only at discrete receiver points, but also across a continuous grid around the Project site. Noise contours representing the predicted Project operational noise levels are illustrated in *Figure 4, Project Operational Noise Levels at Modeled Receivers*. As illustrated in Figure 4, Project operational noise levels exceeding 50 dBA L_{eq} would be contained within the Project site. Hence, **Project operational noise levels would be less than significant** and no operational noise mitigation measures are needed.

Noise modeling data for stationary source operational noise is included in Appendix C.

Table 5 Summary of Results for Mechanical and Parking Lot Operations Noise Analysis		
	Modeled Operational Noise Levels at Closest Residences (dBA L_{eq})	
Receiver	Project Stationary Sources Operational Noise Levels	Existing Ambient
R1 / ST1	46.7	67.6
R2 / ST2	27.4	64.6
R3 / ST3	36.5	63.6
R4 / ST4	35.3	66.3

Sources: Refer to Appendix C.

7.2.2 Mitigation Measures

The Project would not result in a significant operational noise impact; therefore, no mitigation is required.

Significance After Mitigation

Mitigation is not required because impacts would be less than significant.



SOURCES: Google 2022; Mission Clean Energy 2024; Dudek 2024

DUDEK



0 160 320 Feet

FIGURE 4

Predicted Project Operation Noise Emission Levels

Desert Valley Hospital (Dudek No. 15498)

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

7.3 Construction Noise

7.3.1 On-site Construction Equipment and Activity

Construction of the project would occur over an approximate 30-month period. Construction would occur in phases, including demolition, grading, building construction, architectural coatings, and paving. The types of construction equipment that would be used to construct the proposed project include standard equipment that would be employed for any routine construction project of this scale, such as graders, tractors, loaders, cranes, rubber-tired bulldozers, generators, and paving equipment. Rock blasting, onsite rock crushing and pile driving would not take place as part of this project.

Construction noise is difficult to quantify because of the many variables involved, including the specific equipment types, size of equipment used, percentage of time each piece is in operation, condition of each piece of equipment, and number of pieces that would operate on the site. The range of maximum noise levels for various types of construction equipment at 50 feet is shown in Table 6. The noise values represent maximum noise generation, or full- power operation of the equipment. As an example, a loader and two dozers, all operating at full power and relatively close together, would generate a maximum sound level of approximately 90 dBA at 50 feet from their operations..

Table 6. Typical Construction Equipment Noise Emission Levels

Equipment	Typical Sound Level (dBA) 50 Feet from Source
Air compressor	81
Backhoe	80
Compactor	82
Concrete mixer	85
Concrete pump	82
Concrete vibrator	76
Crane, mobile	83
Dozer	85
Generator	81
Grader	85
Impact wrench	85
Jackhammer	88
Loader	85
Paver	89
Pneumatic tool	85
Pump	76
Roller	74
Saw	76
Truck	88

Source: FTA 2018.

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

As one increases the distance between equipment or separation of areas with simultaneous construction activity, dispersion and distance attenuation reduce the effects of separate noise sources added together. In addition, typical operating cycles may involve 2 minutes of full-power operation, followed by 3 or 4 minutes at lower levels. The average noise level during construction activities is generally lower (typical levels of approximately 88 dBA L_{eq} at a distance of 50 feet), since maximum noise generation may only occur up to 50% of the time. Noise levels from construction operations decrease at a rate of approximately 6 dBA per doubling of distance from the source.

The nearest noise-sensitive receiver is a single-family residence south of the project site. Single-family and multi-family residences also exist further to the north and northwest. Project construction would take place both near and far from these existing land uses. For example, construction would take place for relatively short periods of time as near as approximately 240 feet from the nearest residence, but (because of the Project's size) construction work would also take place as far as 700 feet from the same residential use, depending upon project phase. The nearest residence is located approximately 500 feet away from the center of construction activity. Similarly, the construction noise estimates for the residences to the north were calculated for both the nearest construction activity/receiver distances (which would occur for a relatively short period of time) and for typical construction activity/receiver distances (based on the center of the construction site).

Using specific construction equipment assumptions similar to those as used for the air quality analysis for this Project, a noise analysis was performed using a model emulating the Roadway Construction Noise Model (RCNM) that was developed by the Federal Highway Administration (FHWA 2008). Input variables for the RCNM consist of the receiver/land use types, the equipment type (i.e., backhoe, crane, truck, etc.), the number of equipment pieces, the duty cycle for each piece of equipment (i.e., percentage of each time period the equipment typically is in operation and operating at full load or power level), and the distance between the construction noise source and the sensitive receiver. The Roadway Construction Noise Model has default duty-cycle values for the various pieces of equipment, which were derived from an extensive study of typical construction activity patterns. Those default duty-cycle values were adopted for this noise analysis.

Table 7 provides a summary of the predicted construction noise exposure levels by each phase at the nearest noise-sensitive receptor locations. The input and output data are provided in Appendix D. Noise-sensitive land uses in the vicinity of the project site include existing residences to the south and north of the Project site. Consequently, project construction noise exposure levels at other receivers further away from the site would be less, due primarily to natural distance-dependent attenuation factors such as geometric divergence, air absorption, ground surface absorption, and potential path-occluding structures and topography.

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

Table 7. Construction Noise Model Results Summary

Construction Phase	Construction Noise at Nearest Receiver Distances ($L_{eq\ 8-hr}$ [dBA])			
	Nearest Residential Use to the South		Nearest Residential Use to the North	
	Nearest Source/Receiver Distance (Approximately 240 feet)	Typical Source/Receiver Distance (Approximately 500 feet)	Nearest Source/Receiver Distance (Approximately 950 feet)	Typical Source/Receiver Distance (Approximately 1,100 feet)
Demolition	66	62	55	54
Grading	65	60	54	53
Building Construction	59	58	50	50
Paving	62	58	52	51
Architectural Coating	51	48	41	40

Source: Appendix D

Notes: $L_{eq\ 8-hr}$ = 8-hour equivalent continuous sound level; dBA = A-weighted decibel.

Typical construction noise levels are calculated based on the acoustic center distances between the nearest sensitive receptors and the construction phase.

As shown in Table 7, typical construction noise levels at the nearest noise-sensitive land use (a single-family residence to the south) are estimated to range from approximately 48 dBA $L_{eq\ 8-hr}$ during the architectural coating phase to approximately 62 dBA $L_{eq\ 8-hr}$ during the demolition phase. As detailed on the worksheets in Appendix D, this 15 dB range of predicted construction noise levels is due to the intensity of construction activity, expected quantities and types of involved construction equipment, and distance. Table 7 and Appendix D worksheets also show construction noise level predictions at distances between the noise-sensitive receptor position and the anticipated nearest boundary associated with a construction phase, which are thus shorter than those with respect to the construction site center for the same phase; however, the "center site" scenario assumes that equipment would be operating at a range of distances (because not all equipment for a phase would be operating at the same distance simultaneously) and result in levels that would range from approximately 51 dBA $L_{eq\ 8-hr}$ during the architectural coating phase to approximately 66 dBA $L_{eq\ 8-hr}$ during the site preparation phase. These noise levels would not exceed the 80 dBA $L_{eq\ 8-hr}$ suggested FTA threshold for construction noise.

The next-nearest noise-sensitive receivers (the single-family and multi-family residences located to the north) are located further from the Project site. Thus, estimated construction noise levels would be lower, ranging from approximately 40 dBA $L_{eq\ 8-hr}$ during the architectural coating phase to approximately 54 dBA $L_{eq\ 8-hr}$ during the demolition phases under typical conditions. During the relatively brief periods of time when construction would be focused near the northern Project boundary, noise from construction activities is estimated to range from approximately 41 to 55 dBA $L_{eq\ 8-hr}$. These noise levels also would not exceed the 80 dBA $L_{eq\ 8-hr}$ suggested FTA threshold for construction noise.

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

As discussed previously, the City's municipal code exempts noise from construction activities carried out on private property that are determined by the director of building and safety to be essential to the completion of a project. The proposed project would not conduct noisy construction activities during nighttime hours or on Sundays. Therefore, noise from Project construction would be **less than significant**.

Although the predicted impact due to construction noise is less than significant, good construction practice (or as required by City regulations, policies, or expectations) would include providing nearby off-site residences advance notice of expected construction periods.

7.3.2 Off-Site Construction Traffic Noise

Similar to traffic noise from trips associated with operation of the project, noise would also result from construction-related traffic. Construction traffic levels would vary by construction phase, with a peak of 244 combined daily roundtrips for construction workers, vendors, and haul trucks during the demolition phase (the phase with the highest construction traffic). This compares with a predicted 862 average daily trips from project operation (once fully constructed). As indicated in Table 4, the addition of 862 project trips to are roadways would not result in an increase greater than 0.3 dBA CNEL. Consequently, the addition of no more than 244 daily trips during construction would result in traffic noise level increases less than 0.3 dBA CNEL. Construction traffic noise is therefore deemed **a less than significant impact**.

7.3.3 Mitigation Measures

The Project would not result in a significant construction noise impact; therefore, no mitigation is required.

Significance After Mitigation

Mitigation is not required because construction noise impacts would be less than significant.

7.4 Ground-borne Vibration

7.4.1 Impact Analysis

Construction Vibration

The main concern associated with ground-borne vibration is annoyance; however, in extreme cases, vibration can cause damage to buildings, particularly those that are old or otherwise fragile. Some common sources of ground-borne vibration are trains, and construction activities such as blasting, pile-driving, and heavy earth-moving equipment. The primary source of ground-borne vibration occurring as part of the project is construction activity.

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

During land clearing and construction activities for the proposed project ground-borne vibration would be produced by the heavy duty construction equipment. The most important equipment relative to generation of vibration, and the vibration levels produced by such equipment, is illustrated in Table 8.

Table 8 Vibration Velocities for Typical Construction Equipment	
Equipment	PPV at 25 Feet (Inches Per Second)
Large Bulldozer	0.089
Loaded Trucks	0.076
Drill Rig / Auger	0.089
Jackhammer	0.035
Small Bulldozer	0.003

Source: Caltrans 2020.

Dudek evaluated vibration generated by site preparation and construction activities using data and methods recommended by Caltrans (Caltrans 2020). The assessment involves use of the vibration generation levels in Table 8 (as reported at 25 feet from the equipment), and use of an appropriate equation (Caltrans 2020) to calculate the vibration level at the distance of the closest sensitive receivers to the operating construction equipment. The equation used for determining attenuation of vibration with distance (Caltrans 2020) is:

$$PPV_{\text{Equipment}} = PPV_{\text{Ref}} (25/D)^n \text{ (in/sec)}$$

Where:

PPV_{Ref} = reference PPV at 25 ft.

D = distance from equipment to the receiver in ft.

n = 1.1 (the value related to the attenuation rate through ground)

The nearest building to the construction site would be the existing hospital building, 45 feet from the western construction boundary. This building is considered to be recent age commercial construction for which Caltrans identifies a building damage vibration standard of 0.5 PPV inches per second (IPS). The closest off-site building is an existing single-family residence approximately 285 feet from the closest future project construction boundary. Because of the unknown date of construction for this residence, it is assigned a damage standard of 0.25 PPV IPS.

Using the distance and building categories described immediately above and employing the vibration attenuation distance equation (Caltrans 2020) vibration from construction activity was calculated at each of the adjacent existing buildings. Results are presented below in Table 9.

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

As shown in Table 9, construction-related vibration levels at the adjacent hospital building would be no greater than 0.037 PPV IPS. As also illustrated in Table 9, vibration levels at the closest off-site residence would be no greater than 0.002 PPV IPS. Thus, Project construction-related vibration levels at the closest existing structures to the construction zone would remain well below even the more restrictive threshold of 0.25 PPV IPS for older residential structures. Construction-related vibration impacts are therefore considered to be **less than significant**.

Table 9. Calculated Construction Vibration Levels at Closest Existing Structures

Receiver Location	Equipment	Distance to Construction (feet)	Calculated Vibration Level, PPV	Building Damage Standard (PPV)	Less Than Building Damage Standard (PPV) ?
Hospital	Drill Rig / Auger	45	0.001	0.5	Y
	Loaded Trucks		0.014		Y
	Jack Hammer		0.031		Y
	Small Dozer		0.037		Y
Residence	Drill Rig / Auger	285	0.00	0.25	Y
	Loaded Trucks		0.001		Y
	Jack Hammer		0.002		Y
	Small Dozer		0.002		Y

Source: Dudek 2024. Appendix E

Operations Vibration

Long-term sources of vibration include trains, heavy equipment involving rotating components (i.e., industrial compressors, etc.), and equipment involving percussion or impacts between components (i.e., die presses, etc.). While the proposed project does include HVAC equipment with air compressor components, such components are limited in scale and would not be expected to produce substantial vibration. This equipment is proposed to be installed on the roof-top of structures and would typically be designed with vibration-isolation mounting systems (i.e., employing dampeners or springs). The magnitude of vibration which would be produced by project components is such that vibration would not reach existing habitable portions of existing on-site structures, and would have no potential to affect off-site structures or residents. Long term vibration impacts are therefore considered less than significant.

7.4.2 Mitigation Measures

The project would not result in a significant ground-borne vibration impact; therefore, no mitigation is required.

Significance After Mitigation

Mitigation is not required because impacts would be less than significant.

Noise Assessment Technical Report for the Desert Valley Hospital Emergency Department Project, Victorville CA

8.0 REFERENCES

- Bollard Acoustical Consultants (BAC). 2020. Environmental Noise Assessment – Peabody Apartments. BAC Job No. 2020-116. December 17.
- California Office of Planning and Research, General Plan Guidelines 2003, Appendix C.
- Caltrans . 1987. *California Vehicle Noise Emission Levels*. Report No. FHWA/CA/TL-87/03. January 1987. <http://www.dot.ca.gov/hq/env/noise/pub/CA%20Vehicle%20Noise%20Emission%20Levels.pdf>.
- Caltrans. 1998. *Technical Noise Supplement – A Technical Supplement to the Traffic Noise Analysis Protocol*. California Department of Transportation; Environmental Program; Environmental Engineering; Noise, Air Quality, and Hazardous Waste Management Office. October 1998. <http://www.dot.ca.gov/hq/env/noise/pub/Technical%20Noise%20Supplement.pdf>.
- Caltrans. 2020. *Transportation and Construction Vibration Guidance Manual*. Report No. CT-HWANP-RT-20-365.01.01. California Department of Transportation; Environmental Program; Environmental Engineering; Noise, Air Quality, and Hazardous Waste Management Office. April 2020.
- City of Victorville. 2008. *General Plan Noise Element*. Adopted October 21st, 2008.
- City of Victorville. 2024. Municipal Code Title 13, Chapter 13.01 Noise Control, and Title 16 (Development Code) Article 12, Chapter 6 Code Enforcement.
- EPA (Environmental Protection Agency). 1971. *Noise from Construction Equipment and Operations, Building Equipment and Home Appliances*. Prepared by Bolt, Beranek & Newman, Boston, Massachusetts. Washington, D.C.: EPA.
- FHWA (Federal Highway Administration). 2006. Transportation Noise Model (TNM 2.5)
- FHWA, Roadway Construction Noise Model (RCNM) (2008).
- STC Traffic, Inc. 2024. *Traffic Study Report for Desert Valley Hospital Emergency Department Expansion Victorville, CA*. May 2024.

**Noise Assessment Technical Report for the
Desert Valley Hospital Emergency Department Project, Victorville CA**

APPENDIX A

AMBIENT NOISE MEASUREMENT DATA

Field Noise Measurement Data

Record: 1758

Project Name	Desert Valley Hospital
Observer(s)	
Date	2023-11-01

Meteorological Conditions

Temp (F)	65
Humidity % (R.H.)	13
Wind	Light
Wind Speed (MPH)	5
Wind Direction	South
Sky	Clear

Instrument and Calibrator Information

Instrument Name List	(ENC) Rion NL-52
Instrument Name	(ENC) Rion NL-52
Instrument Name Lookup Key	(ENC) Rion NL-52
Manufacturer	Rion
Model	NL-52
Serial Number	553896
Calibrator Name	(ENC) LD CAL150

FORMS FIELD DATA REPORT

Calibrator Name	(ENC) LD CAL150
Calibrator Name Lookup Key	(ENC) LD CAL150
Calibrator Manufacturer	Larson Davis
Calibrator Model	LD CAL150
Calibrator Serial #	5152
Pre-Test (dBA SPL)	94
Post-Test (dBA SPL)	94
Weighting?	A-WTD
Slow/Fast?	Slow

Monitoring

Record #	1
Site ID	ST1
Site Location Lat/Long	34.470549, -117.296901
Begin (Time)	11:10:00
End (Time)	11:25:00
Leq	66.6
Lmax	75.7
Lmin	49.6
Other Lx?	L90, L50, L10
L90	58
L50	65
L10	70

FORMS FIELD DATA REPORT

Other Lx (Specify Metric)	L
Primary Noise Source	Traffic
Other Noise Sources (Background)	Birds, Distant Traffic
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as previously noted?	Yes

Source Info and Traffic Counts	
Number of Lanes	6
Lane Width (feet)	10
Roadway Width (feet)	60
Roadway Width (m)	18.3
Distance to Roadway (feet)	30
Distance to Roadway (m)	9.2
Distance Measured to Centerline or Edge of Pavement?	Edge of Pavement
Estimated Vehicle Speed (MPH)	0

Traffic Counts	
Vehicle Count Summary	A 510, MT 7, HT 10, B 0, MC 0
Select Method for Recording Count Duration	Enter Manually
Counting Both Directions?	Yes
Count Duration (minutes)	0
Vehicle Count Tally	

Select Method for Vehicle Counts	Enter Manually
Number of Vehicles - Autos	510
Number of Vehicles - Medium Trucks	7
Number of Vehicles - Heavy Trucks	10
Number of Vehicles - Buses	0
Number of Vehicles - Motorcycles	0

Description / Photos

Site Photos

Photo

F DUDEK FORMS FIELD DATA REPORT	
Comments / Description	Facing east

Site Photos	
Photo	
Comments / Description	Facing north

Site Photos

Photo



Comments / Description

Facing west

Monitoring

Record #

2

Site ID

ST5

Site Location Lat/Long

34.471933, -117.297158

FORMS FIELD DATA REPORT

Begin (Time)	11:40:00
End (Time)	11:55:00
Leq	54.1
Lmax	71.9
Lmin	48.8
Other Lx?	L90, L50, L10
L90	50.3
L50	52.1
L10	55.5
Other Lx (Specify Metric)	L
Primary Noise Source	Traffic
Other Noise Sources (Background)	Distant Conversations / Yelling, Distant Industrial
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as previously noted?	Yes

Description / Photos

Site Photos

Photo	
Comments / Description	Facing east

Site Photos	

Photo	
Comments / Description	Facing west

Site Photos	

Photo



Comments / Description

Facing north

Monitoring

Record #

3

Site ID

ST2

Site Location Lat/Long

34.474723, -117.299387

FORMS FIELD DATA REPORT

Begin (Time)	12:01:00
End (Time)	12:16:00
Leq	64.6
Lmax	85.2
Lmin	42.7
Other Lx?	L90, L50, L10
L90	49.4
L50	58.8
L10	67.2
Other Lx (Specify Metric)	L
Primary Noise Source	Traffic
Other Noise Sources (Background)	Distant Conversations / Yelling, Distant Traffic
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as previously noted?	Yes

Source Info and Traffic Counts	
Number of Lanes	3
Lane Width (feet)	10
Roadway Width (feet)	30
Roadway Width (m)	9.2
Distance to Roadway (feet)	5
Distance to Roadway (m)	1.5

Distance Measured to Centerline or Edge of Pavement?	Edge of Pavement
Estimated Vehicle Speed (MPH)	0

Traffic Counts	
Vehicle Count Summary	A 53, MT 0, HT 0, B 0, MC 0
Select Method for Recording Count Duration	Enter Manually
Counting Both Directions?	Yes
Count Duration (minutes)	0
Vehicle Count Tally	
Select Method for Vehicle Counts	Enter Manually
Number of Vehicles - Autos	53
Number of Vehicles - Medium Trucks	0
Number of Vehicles - Heavy Trucks	0
Number of Vehicles - Buses	0
Number of Vehicles - Motorcycles	0

Description / Photos

Site Photos

Photo	
Comments / Description	Facing north

Site Photos	

Photo



Comments / Description

Facing south

Monitoring

Record #

4

Site ID

ST3

Site Location Lat/Long

34.474900, -117.296709

FORMS FIELD DATA REPORT

Begin (Time)	12:19:00
End (Time)	12:34:00
Leq	63.6
Lmax	79.6
Lmin	36.6
Other Lx?	L90, L50, L10
L90	
L10	67.5
Other Lx (Specify Metric)	L
Primary Noise Source	Traffic
Other Noise Sources (Background)	Distant Conversations / Yelling
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as previously noted?	Yes

Source Info and Traffic Counts	
Number of Lanes	4
Lane Width (feet)	10
Roadway Width (feet)	40
Roadway Width (m)	12.2
Distance to Roadway (feet)	5
Distance to Roadway (m)	1.5
Distance Measured to Centerline or Edge of Pavement?	Edge of Pavement

Estimated Vehicle Speed (MPH)	0
-------------------------------	---

Traffic Counts	
Vehicle Count Summary	A 37, MT 0, HT 0, B 0, MC 0
Select Method for Recording Count Duration	Enter Manually
Counting Both Directions?	Yes
Count Duration (minutes)	0
Vehicle Count Tally	
Select Method for Vehicle Counts	Enter Manually
Number of Vehicles - Autos	37
Number of Vehicles - Medium Trucks	0
Number of Vehicles - Heavy Trucks	0
Number of Vehicles - Buses	0
Number of Vehicles - Motorcycles	0

Description / Photos

Site Photos

Photo	
Comments / Description	Facing west

Site Photos	

Photo



Comments / Description

Facing east

Monitoring

Record #

5

Site ID

ST4

Site Location Lat/Long

34.474949, -117.294853

FORMS FIELD DATA REPORT

Begin (Time)	12:41:00
End (Time)	12:56:00
Leq	66.3
Lmax	80
Lmin	39.9
Other Lx?	L90, L50, L10
L90	45.8
L50	58.3
L10	70.5
Other Lx (Specify Metric)	L
Primary Noise Source	Traffic
Other Noise Sources (Background)	Distant Conversations / Yelling
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as previously noted?	Yes

Source Info and Traffic Counts	
Number of Lanes	4
Lane Width (feet)	10
Roadway Width (feet)	40
Roadway Width (m)	12.2
Distance to Roadway (feet)	6
Distance to Roadway (m)	1.8

Distance Measured to Centerline or Edge of Pavement?	Edge of Pavement
Estimated Vehicle Speed (MPH)	0

Traffic Counts	
Vehicle Count Summary	A 53, MT 0, HT 0, B 1, MC 0
Select Method for Recording Count Duration	Enter Manually
Counting Both Directions?	Yes
Count Duration (minutes)	0
Vehicle Count Tally	
Select Method for Vehicle Counts	Enter Manually
Number of Vehicles - Autos	53
Number of Vehicles - Medium Trucks	0
Number of Vehicles - Heavy Trucks	0
Number of Vehicles - Buses	1
Number of Vehicles - Motorcycles	0

Description / Photos

Site Photos

Photo	
Comments / Description	Facing east

Site Photos	

Photo



Comments / Description

Facing west

**Noise Assessment Technical Report for the
Desert Valley Hospital Emergency Department Project, Victorville CA**

APPENDIX B

TRAFFIC NOISE MODELING DATA

Appendix B

Traffic Noise Modeling Calculations - Summary

Project:	15498 Desert Valley Hospital
-----------------	-------------------------------------

[illegible]

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

Traffic Noise Model Calculations

Traffic K-Factor: 10

2027 w/o Project Conditions

1	2nd Avenue	Bear Valley Road	Jasmine Street
2	Bear Valley	Bornite Avenue	1st Avenue
3	1st Avenue	Jasmine Street	Silica Drive
4	Jasmine Street	2nd Avenue	1st Avenue

Distance to Directional Centerline, (feet)₄

Ldn, (dBA) _{5,6,7}	Distance to Contour, (feet) ₃			
	70 dBA	65 dBA	60 dBA	55 dBA
65	1,000	1,000	1,000	1,000
70	1,000	1,000	1,000	1,000
75	1,000	1,000	1,000	1,000
80	1,000	1,000	1,000	1,000
85	1,000	1,000	1,000	1,000
90	1,000	1,000	1,000	1,000
95	1,000	1,000	1,000	1,000
100	1,000	1,000	1,000	1,000
105	1,000	1,000	1,000	1,000
110	1,000	1,000	1,000	1,000
115	1,000	1,000	1,000	1,000
120	1,000	1,000	1,000	1,000
125	1,000	1,000	1,000	1,000
130	1,000	1,000	1,000	1,000
135	1,000	1,000	1,000	1,000
140	1,000	1,000	1,000	1,000
145	1,000	1,000	1,000	1,000
150	1,000	1,000	1,000	1,000
155	1,000	1,000	1,000	1,000
160	1,000	1,000	1,000	1,000
165	1,000	1,000	1,000	1,000
170	1,000	1,000	1,000	1,000
175	1,000	1,000	1,000	1,000
180	1,000	1,000	1,000	1,000
185	1,000	1,000	1,000	1,000
190	1,000	1,000	1,000	1,000
195	1,000	1,000	1,000	1,000
200	1,000	1,000	1,000	1,000
205	1,000	1,000	1,000	1,000
210	1,000	1,000	1,000	1,000
215	1,000	1,000	1,000	1,000
220	1,000	1,000	1,000	1,000
225	1,000	1,000	1,000	1,000
230	1,000	1,000	1,000	1,000
235	1,000	1,000	1,000	1,000
240	1,000	1,000	1,000	1,000
245	1,000	1,000	1,000	1,000
250	1,000	1,000	1,000	1,000
255	1,000	1,000	1,000	1,000
260	1,000	1,000	1,000	1,000
265	1,000	1,000	1,000	1,000
270	1,000	1,000	1,000	1,000
275	1,000	1,000	1,000	1,000
280	1,000	1,000	1,000	1,000
285	1,000	1,000	1,000	1,000
290	1,000	1,000	1,000	1,000
295	1,000	1,000	1,000	1,000
300	1,000	1,000	1,000	1,000
305	1,000	1,000	1,000	1,000
310	1,000	1,000	1,000	1,000
315	1,000	1,000	1,000	1,000
320	1,000	1,000	1,000	1,000
325	1,000	1,000	1,000	1,000
330	1,000	1,000	1,000	1,000
335	1,000	1,000	1,000	1,000
340	1,000	1,000	1,000	1,000
345	1,000	1,000	1,000	1,000
350	1,000	1,000	1,000	1,000
355	1,000	1,000	1,000	1,000
360	1,000	1,000	1,000	1,000
365	1,000	1,000	1,000	1,000
370	1,000	1,000	1,000	1,000
375	1,000	1,000	1,000	1,000
380	1,000	1,000	1,000	1,000
385	1,000	1,000	1,000	1,000
390	1,000	1,000	1,000	1,000
395	1,000			

65.3	17	55	175	553
70.8	187	593	1874	5926
58.7	4	11	36	114
63.7	12	38	119	377

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

Traffic Noise Model Calculations

Traffic K-Factor: 10

2027 With Project Conditions

Ldn, (dBA) _{5,6,7}	Distance to Contour, (feet) ₃			
	70 dBA	65 dBA	60 dBA	55 dBA

65.6	19	60	189	599
70.8	189	599	1893	5986
58.7	4	11	36	114
63.8	12	39	122	386

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

Traffic Noise Model Calculations

Noise Level Descriptor:	Ldn
Site Conditions:	Hard
Traffic Input:	Peak
Traffic K-Factor:	10

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

**Noise Assessment Technical Report for the
Desert Valley Hospital Emergency Department Project, Victorville CA**

APPENDIX C

ON-SITE OPERATIONAL NOISE MODELING DATA

ACCs (air-cooled chillers on rooftops):

Building Interior Comfort (non-office)

percent of GSF reserved for "cold room":	25
percent of remaining GSF reserved for "office space":	4.52
actual percent of GSF occupied:	75

with or without sound insulation? (enter Y/N): Y

	tons	LWA	unweighted PWL (dB) per OCBF (Hz) at full load (100%)							
			63	125	250	500	1000	2000	4000	8000
Bryant BH16-018 (no sound blanket)	1.5	67	66.2	66.2	63.9	63.8	62.3	58.4	56.4	50.3
Bryant BH16-024 (no sound blanket)	2	71	65	65	63.7	63.4	68.5	64.7	58.7	52.8
Bryant BH16-036 (no sound blanket)	3	71	68.2	68.2	66.4	67.5	68.4	59.6	58.2	52.4
Bryant BH16-048 (no sound blanket)	4	71	68.4	68.4	67.7	69.7	67.6	59.4	56.4	50
Bryant BH16-060 (no sound blanket)	5	69	63.7	63.7	65.4	67.3	64.9	58.3	56.2	51.9
Daikin AGZ-E 30 (w/out sound insulation)	30	85	84	84	83	84	77	75	74	70
Daikin AGZ-E 40 (w/out sound insulation)	40	85	84	84	83	84	77	75	74	70
Daikin AGZ-E 50 (w/out sound insulation)	50	87	85	85	85	86	80	77	75	70
Daikin AGZ-E 60 (w/out sound insulation)	60	87	85	85	85	86	80	77	75	70
Daikin AGZ-E 70 (w/out sound insulation)	70	87	85	85	85	86	80	77	75	70
Daikin AGZ-E 80 (w/out sound insulation)	80	88	88	85	87	86	81	81	77	71
Daikin AGZ-E 90 (w/out sound insulation)	90	88	88	87	87	86	83	80	77	71
Daikin AGZ-E 120 (w/out sound insulation)	120	89	91	85	88	86	82	81	79	72
Daikin AGZ-E 240 (w/out sound insulation)	241	94	94	88	91	90	91	84	82	75

Phase	Building Tag	GSF	Avail. SF	comparable facility function	Avg. GSF per ton* tons of refrig.	Approx. Qty. of ACCs	tons per ACC	Approx. Total PWL (dBA)	unweighted PWL (dB) per OCBF (Hz) at full load (100%)							
									63	125	250	500	1000	2000	4000	8000
NB	North Bldg (Bldg. 3)	83,369	44775	Theatre (i.e., room volume is tall and large)	400	111.9	4	75	70	70	71	73	71	64	62	58
*based upon "lo" value per Loren Cook's "Engineering Cookbook", 1999 edition, pp. 59-60									A-weighting adjustments							
									26	13	9	3	0	-1	-1	1

AHUs (plenum-
Building Minimum Ventilation (no cold room)

percent GSF reserved for "cold room": 25

A-weighting adjustments

	26	13	9	3	0	-1	-1	1
--	----	----	---	---	---	----	----	---

average of values for the two fan diameter ranges, per Guyer (Table 12)

average of values for the two fan diameter ranges, per Guyer (Table 12)

per Guyer (Table 12, presumed based on Bies & Hansen ENC)

plug	40	40	38	34	29	23	19	16
tube	47	44	46	47	44	45	38	35
prop	46	48	55	53	52	48	43	38

Tag	Building	GSF	Avail. SF	Height (ft)	Avg. minutes to change air*	Volume (ft3)	CFM	m ² function	comparable facility	Pressure (lwa)	Pressure (Pa)	Q (m ³ /s)	fantype = plug, tube, or prop	A-weighted PWL (for CadnaA inputs)									OA dB
return air fans in building rooftop AHUs														63	125	250	500	1000	2000	4000	8000		
NB	North Bldg (Bldg. 3)	83,369	62526.75	30	8	1875803	234475.313	5812	office	2	500	111	plug	68	80	81	82	79	72	66	61		87

*from 2-10 minute range, per Loren Cook's "Engineering Cookbook", 1999 edition, p. 41

fan or AHU cabinet liner/interior attenuation (excludes inlet/outlet PWL, already in calcs above:

2	3	4	5	6	8	10	10
---	---	---	---	---	---	----	----

**Noise Assessment Technical Report for the
Desert Valley Hospital Emergency Department Project, Victorville CA**

APPENDIX D

CONSTRUCTION NOISE MODELING DATA

To User: bordered cells are inputs, unbordered cells have formulae

noise level limit for construction phase at residential land use, per FTA guidance =80

allowable hours over which Leq is to be averaged =8

= temporary barrier (TB) of input height inserted between source and receptor

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Temporary Barrier Insertion Loss (dB)	Additional Noise Reduction	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq	Source Elevation (ft)	Receiver Elevation (ft)	Barrier Height (ft)	Source to Barr. ("A") Horiz. (ft)	Rcvr. to Barr. ("B") Horiz. (ft)	Source to Rcvr. ("C") Horiz. (ft)	"A" (ft)	"B" (ft)	"C" (ft)	Path Length Diff. "P" (ft)	Abarr (dB)	Heff (with barrier)	Heff (wout barrier)	G (with barrier)	G (without barrier)	ILbarr (dB)
Demolition	excavator	1	40	81		950			49.9	8	480	46	5	5	0	945	5	950	945.0	7.1	950.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	dozer	1	40	82		970			50.7	8	480	47	5	5	0	970	5	975	970.0	7.1	975.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	concrete saw	1	20	90		990			58.5	8	480	51	5	5	0	946	5	951	946.0	7.1	951.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	excavator	1	40	81		1010			49.3	8	480	45	5	5	0	971	5	976	971.0	7.1	976.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	dozer	1	40	82		1030			50.1	8	480	46	5	5	0	947	5	952	947.0	7.1	952.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	excavator	1	40	81		1050			48.9	8	480	45	5	5	0	972	5	977	972.0	7.1	977.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total for Demolition Phase:										55.2																		
Grading	tractor	1	40	84		950			52.9	8	480	49	5	5	0	945	5	950	945.0	7.1	950.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	excavator	1	40	81		970			49.7	8	480	46	5	5	0	970	5	975	970.0	7.1	975.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	grader	1	40	85		990			53.5	8	480	49	5	5	0	995	5	1000	995.0	7.1	1000.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	backhoe	1	40	78		1010			46.3	8	480	42	5	5	0	1020	5	1025	1020.0	7.1	1025.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	front end loader	1	40	79		1030			47.1	8	480	43	5	5	0	1045	5	1050	1045.0	7.1	1050.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total for Grading Phase:										53.8																		
Building Construction	man lift	1	20	75		1050			42.9	8	480	36	5	5	0	1045	5	1050	1045.0	7.1	1050.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	tractor	1	40	84		1070			51.7	7	420	47	5	5	0	1070	5	1075	1070.0	7.1	1075.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	crane	1	16	81		1090			48.5	7	420	40	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	man lift	1	20	75		1110			42.3	8	480	35	5	5	0	1120	5	1125	1120.0	7.1	1125.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	backhoe	1	40	78		1130			45.1	7	420	41	5	5	0	1145	5	1150	1145.0	7.1	1150.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	generator	1	50	72		1150			39.0	8	480	36	5	5	0	1170	5	1175	1170.0	7.1	1175.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	front end loader	1	40	79		1170			45.8	7	420	41	5	5	0	1195	5	1200	1195.0	7.1	1200.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	man lift	1	20	75		1190			41.6	8	480	35	5	5	0	1220	5	1225	1220.0	7.1	1225.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	welder / torch	1	40	73		1210			39.5	8	480	35	5	5	0	1245	5	1250	1245.0	7.1	1250.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	Total for Building Construction Phase:										50.2																	
Paving	paver	1	50	77		950			45.9	8	480	43	5	5	0	945	5	950	945.0	7.1	950.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	pavement scarafier	1	20	85		970			53.7	8	480	47	5	5	0	970	5	975	970.0	7.1	975.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	roller	1	20	80		990			48.5	8	480	41	5	5	0	995	5	1000	995.0	7.1	1000.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	paver	1	50	77		1010			45.3	8	480	42	5	5	0	1020	5	1025	1020.0	7.1	1025.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	pavement scarafier	1	20	85		1030			53.1	8	480	46	5	5	0	1045	5	1050	1045.0	7.1	1050.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	roller	1	20	80		1050			47.9	8	480	41	5	5	0	1070	5	1075	1070.0	7.1	1075.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total for Paving Phase:										51.7																		

To User: bordered cells are inputs, unbordered cells have formulae

noise level limit for construction phase at residential land use, per FTA guidance =80

allowable hours over which Leq is to be averaged =8

= temporary barrier (TB) of input height inserted between source and receptor

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Temporary Barrier Insertion Loss (dB)	Additional Noise Reduction	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq	Source Elevation (ft)	Receiver Elevation (ft)	Barrier Height (ft)	Source to Barr. ("A") Horiz. (ft)	Rcvr. to Barr. ("B") Horiz. (ft)	Source to Rcvr. ("C") Horiz. (ft)	"A" (ft)	"B" (ft)	"C" (ft)	Path Length Diff. "P" (ft)	Abarr (dB)	Heff (with barrier)	Heff (wout barrier)	G (with barrier)	G (without barrier)	ILbarr (dB)
Demolition	excavator	1	40	81		1100			48.4	8	480	44	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	dozer	1	40	82		1100			49.4	8	480	45	5	5	0	1985	5	1100	1985.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	concrete saw	1	20	90		1100			57.4	8	480	50	5	5	0	2875	5	1100	2875.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	excavator	1	40	81		1100			48.4	8	480	44	5	5	0	3765	5	1100	3765.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	dozer	1	40	82		1100			49.4	8	480	45	5	5	0	4655	5	1100	4655.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	excavator	1	40	81		1100			48.4	8	480	44	5	5	0	5545	5	1100	5545.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total for Demolition Phase:													54.2															
Grading	tractor	1	40	84		1100			51.4	8	480	47	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	excavator	1	40	81		1100			48.4	8	480	44	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	grader	1	40	85		1100			52.4	8	480	48	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	backhoe	1	40	78		1100			45.4	8	480	41	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	front end loader	1	40	79		1100			46.4	8	480	42	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total for Grading Phase:													52.7															
Building Construction	man lift	1	20	75		1100			42.4	8	480	35	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	tractor	1	40	84		1100			51.4	7	420	47	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	crane	1	16	81		1100			48.4	7	420	40	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	man lift	1	20	75		1100			42.4	8	480	35	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	backhoe	1	40	78		1100			45.4	7	420	41	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	generator	1	50	72		1100			39.4	8	480	36	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	front end loader	1	40	79		1100			46.4	7	420	42	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	man lift	1	20	75		1100			42.4	8	480	35	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	welder / torch	1	40	73		1100			40.4	8	480	36	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	Total for Building Construction Phase:													50.2														
Paving	paver	1	50	77		1100			44.4	8	480	41	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	pavement scarafier	1	20	85		1100			52.4	8	480	45	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	roller	1	20	80		1100			47.4	8	480	40	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	paver	1	50	77		1100			44.4	8	480	41	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	pavement scarafier	1	20	85		1100			52.4	8	480	45	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	roller	1	20	80		1100			47.4	8	480	40	5	5	0	1095	5	1100	1095.0	7.1	1100.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total for Paving Phase:													50.8															

To User: bordered cells are inputs, unbordered cells have formulae

noise level limit for construction phase at residential land use, per FTA guidance =80

allowable hours over which Leq is to be averaged =8

= temporary barrier (TB) of input height inserted between source and receptor

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Temporary Barrier Insertion Loss (dB)	Additional Noise Reduction	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq	Source Elevation (ft)	Receiver Elevation (ft)	Barrier Height (ft)	Source to Barr. ("A") Horiz. (ft)	Rcvr. to Barr. ("B") Horiz. (ft)	Source to Rcvr. ("C") Horiz. (ft)	"A" (ft)	"B" (ft)	"C" (ft)	Path Length Diff. "P" (ft)	Abarr (dB)	Heff (with barrier)	Heff (wout barrier)	G (with barrier)	G (without barrier)	ILbarr (dB)			
Demolition	excavator	1	40	81		240			63.2	8	480	59	5	5	0	285	5	290	285.0	7.1	290.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	dozer	1	40	82		300			62.0	8	480	58	5	5	0	310	5	315	310.0	7.1	315.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	concrete saw	1	20	90		350			68.5	8	480	62	5	5	0	335	5	340	335.0	7.1	340.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	excavator	1	40	81		400			58.2	8	480	54	5	5	0	360	5	365	360.0	7.1	365.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	dozer	1	40	82		450			58.1	8	480	54	5	5	0	385	5	390	385.0	7.1	390.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	excavator	1	40	81		500			56.1	8	480	52	5	5	0	410	5	415	410.0	7.1	415.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
Total for Demolition Phase:													65.5																		
Grading	tractor	1	40	84		240			66.2	8	480	62	5	5	0	285	5	290	285.0	7.1	290.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	excavator	1	40	81		300			61.0	8	480	57	5	5	0	310	5	315	310.0	7.1	315.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	grader	1	40	85		350			63.5	8	480	60	5	5	0	335	5	340	335.0	7.1	340.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	backhoe	1	40	78		400			55.2	8	480	51	5	5	0	360	5	365	360.0	7.1	365.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	front end loader	1	40	79		450			55.1	8	480	51	5	5	0	385	5	390	385.0	7.1	390.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
Total for Grading Phase:													65.2																		
Building Construction	man lift	1	20	75		350			53.5	8	480	47	5	5	0	345	5	350	345.0	7.1	350.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	tractor	1	40	84		400			61.2	7	420	57	5	5	0	405	5	410	405.0	7.1	410.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	crane	1	16	81		450			57.1	7	420	49	5	5	0	465	5	470	465.0	7.1	470.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	man lift	1	20	75		500			50.1	8	480	43	5	5	0	525	5	530	525.0	7.1	530.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	backhoe	1	40	78		550			52.2	7	420	48	5	5	0	585	5	590	585.0	7.1	590.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	generator	1	50	72		600			45.3	8	480	42	5	5	0	645	5	650	645.0	7.1	650.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	front end loader	1	40	79		650			51.6	7	420	47	5	5	0	705	5	710	705.0	7.1	710.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	man lift	1	20	75		450			51.1	8	480	44	5	5	0	765	5	770	765.0	7.1	770.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	welder / torch	1	40	73		500			48.1	8	480	44	5	5	0	825	5	830	825.0	7.1	830.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	Total for Building Construction Phase:													58.9																	
Paving	paver	1	50	77		240			59.2	8	480	56	5	5	0	285	5	290	285.0	7.1	290.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	pavement scarafier	1	20	85		300			65.0	8	480	58	5	5	0	310	5	315	310.0	7.1	315.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	roller	1	20	80		350			58.5	8	480	52	5	5	0	335	5	340	335.0	7.1	340.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	paver	1	50	77		360			55.2	8	480	52	5	5	0	360	5	365	360.0	7.1	365.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	pavement scarafier	1	20	85		420			61.8	8	480	55	5	5	0	385	5	390	385.0	7.1	390.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
	roller	1	20	80		470			55.7	8	480	49	5	5	0	410	5	415	410.0	7.1	415.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1			
Total for Paving Phase:													62.4																		

To User: bordered cells are inputs, unbordered cells have formulae

noise level limit for construction phase at residential land use, per FTA guidance =	80
allowable hours over which Leq is to be averaged =	8

= temporary barrier (TB) of input height inserted between source and receptor

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Temporary Barrier Insertion Loss (dB)	Additional Noise Reduction	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq	Source Elevation (ft)	Receiver Elevation (ft)	Barrier Height (ft)	Source to Barr. ("A") Horiz. (ft)	Rcvr. to Barr. ("B") Horiz. (ft)	Source to Rcvr. ("C") Horiz. (ft)	"A" (ft)	"B" (ft)	"C" (ft)	Path Length Diff. "P" (ft)	Abarr (dB)	Heff (with barrier)	Heff (wout barrier)	G (with barrier)	G (without barrier)	ILBarr (dB)
Demolition	excavator	1	40	81		500			56.1	8	480	52	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	dozer	1	40	82		500			57.1	8	480	53	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	concrete saw	1	20	90		500			65.1	8	480	58	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	excavator	1	40	81		500			56.1	8	480	52	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	dozer	1	40	82		500			57.1	8	480	53	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	excavator	1	40	81		500			56.1	8	480	52	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total for Demolition Phase:												61.9																
Grading	tractor	1	40	84		500			59.1	8	480	55	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	excavator	1	40	81		500			56.1	8	480	52	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	grader	1	40	85		500			60.1	8	480	56	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	backhoe	1	40	78		500			53.1	8	480	49	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	front end loader	1	40	79		500			54.1	8	480	50	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total for Grading Phase:												60.3																
Building Construction	man lift	1	20	75		500			50.1	8	480	43	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	tractor	1	40	84		500			59.1	7	420	55	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	crane	1	16	81		500			56.1	7	420	48	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	man lift	1	20	75		500			50.1	8	480	43	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	backhoe	1	40	78		500			53.1	7	420	49	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	generator	1	50	72		500			47.1	8	480	44	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	front end loader	1	40	79		500			54.1	7	420	50	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	man lift	1	20	75		500			50.1	8	480	43	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	welder / torch	1	40	73		500			48.1	8	480	44	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total for Building Construction Phase:												57.9																
Paving	paver	1	50	77		500			52.1	8	480	49	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	pavement scarafier	1	20	85		500			60.1	8	480	53	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	roller	1	20	80		500			55.1	8	480	48	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	paver	1	50	77		500			52.1	8	480	49	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	pavement scarafier	1	20	85		500			60.1	8	480	53	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	roller	1	20	80		500			55.1	8	480	48	5	5	0	435	5	440	435.0	7.1	440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total for Paving Phase:												58.4																

**Noise Assessment Technical Report for the
Desert Valley Hospital Emergency Department Project, Victorville CA**

APPENDIX E

CONSTRUCTION VIBRATION MODELING DATA

BOLD values exceed significance threshold

Distance to Closest Off-site Structure (feet) 285
 Direction / Building: South / Bear Valley Street residence
 Significance Threshold for Structure: (PPV ips) 0.25

Vibration in PPV			
$PPV(D) = PPV_{25} \times (25/D)^{1.5}$			
Where PPV(D) is vibration level at distance D And PPV ₂₅ is reported vibration level at 25 feet from selected equipment			
	PPV ₂₅	Distance (D)	PPV @ D
Small Dozer	0.003	285	0.000
Jackhammer	0.035	285	0.001
Loaded Truck	0.076	285	0.002
Drill Rig/Auger	0.089	285	0.002

BOLD values exceed significance threshold

Distance to Closest Off-site Structure (feet) 45
 Direction / Building: W / Hospital
 Significance Threshold for Structure: (PPV ips) 0.5

Vibration in PPV			
$PPV(D) = PPV_{25} \times (25/D)^{1.5}$			
Where PPV(D) is vibration level at distance D And PPV ₂₅ is reported vibration level at 25 feet from selected equipment			
	PPV ₂₅	Distance (D)	PPV @ D
Small Dozer	0.003	45	0.001
Jackhammer	0.035	45	0.014
Loaded Truck	0.076	45	0.031
Drill Rig/Auger	0.089	45	0.037

BOLD values exceed significance threshold