Appendix H
Noise Technical Report

Noise Technical Report

Olive Park Apartments Project City of Oceanside, California

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Prepared for:

CAPSTONE EQUITIES
5600 West Jefferson Boulevard
Los Angeles, California 90016
Contact: Brian Mikail

Prepared by:

DUDEK

605 Third Street
Encinitas, California 92024
Contact: Cole Martin, INCE
Jim Cowan, INCE Bd. Cert.

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Table of Contents

SECTION **PAGE NO.**

TABLES

FIGURES

APPENDICES

Acronyms and Abbreviations

Acronym/Abbreviation	Definition
ACC	Air-cooled condensers
ADT	Average Daily Traffic
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
City	City of Oceanside
CNEL	Community Noise Equivalent Level
County	San Diego County
dB	decibel
dBA	A-weighted decibel
DOT	Department of Transportation
FICON	Federal Interagency Committee on Noise
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HVAC	Heating, ventilation, and air conditioning
ips	inches per second
ISO	International Organization of Standardization
L_{dn}	day–night average noise level
L_{eq}	equivalent noise level
L_{max}	maximum sound level
L_{min}	minimum sound level
LT	Long-term
OBCF	Octave-band center frequency
OPR	Governor's Office of Planning and Research
Olive Park Apartments Project	proposed project
PPV	peak particle velocity
PWL	Sound power level
RCNM	Roadway Construction Noise Model
SLM	Sound level meter
SPL	Sound pressure level
ST	Short-term
VdB	Velocity Decibel

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1 Introduction

1.1 Report Purpose and Scope

The purpose of this technical report is to assess the potential noise impacts associated with construction and operation of the Olive Park Apartments project (project). This analysis uses the significance thresholds in Appendix G of the California Environmental Quality Act (CEQA) Guidelines (14 CCR 15000 et seq.). The City of Oceanside (City) is the lead agency responsible for compliance with the California Environmental Quality Act (CEQA) for the project.

1.2 Regional and Local Setting

The overall property is generally located south of Oceanside Boulevard and west of College Boulevard; more specifically, west of the terminus of Olive Drive and south of the North County Transit District (NCTD) rail line and College Boulevard Station. The project falls on Sections 21 and 22, Township 11 South, Range 4 West of the 7.5-minute San Luis Rey USGS Geological Survey Quadrangle map (Figure 1). The project proposes development of parcel (APN 162-111-04) that covers approximately 43.50 acres (Site Plan) (Figure 2). Development of the project will disturb an on-site area of approximately 10.87 acres (On-Site Impact Area). The final pad on which the project will sit will be approximately 6.11 acres (Net Developable Pad). Project development will disturb approximately 0.88 acres outside the Parcel Area (Off-Site Impact Area) for a Total Impact Area of 11.75 acres.

1.3 Project Description

The project proposes to r develop a maximum of 260 multi-family residential units under Option A with an option to build 282 dwelling units under Option B with a different unit mix. All the dwelling units would be affordable to low, very-low, and extremely low income households with one to three bedroom/two bath units. Access to the site would be provided via Olive Drive, at the eastern side of the Parcel Area. An emergency access only entry/exit to the project would be provided adjacent to the NCTD rail line. The development would provide at least the minimum parking for a 100% affordable project. The proposed project will voluntarily provide approximately 336 parking spaces regardless of whether Option A or Option B is developed. The project development would include two separate residential buildings that may be developed in one or two phases. The proposed project would also include an open space area that will be maintained and managed by the project that will include an all-weather accessible pedestrian/bicycle connection for the project and neighboring residents to the adjacent Sprinter station.

Project Design Features

The proposed project would implement the following construction-related project design feature (PDF) that would have the effect of reducing construction noise emissions at the nearest sensitive receptors. PDF-NOI-1 would be identified on construction permit plans, required of all construction contractors, and required as City-imposed Conditions of Approval and/or incorporated into the project's MMRP to ensure implementation during construction of the proposed project:

PDF-NOI-1 Construction Noise Reduction Features

- All construction equipment must have appropriate sound muffling devices, which shall be properly maintained and used at all times such equipment is in operation.
- The project contractor shall place stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.
- The construction contractor shall locate on-site equipment staging areas so as to maximize the distance between construction-related noise sources and noise-sensitive receptors nearest the project site during the construction period.
- All noise producing construction activities, including warming-up or servicing equipment and any preparation for construction, shall be limited to the hours between 7:00 a.m. and 6:00 p.m.
- An eight (8) foot tall, temporary noise barrier shall be erected along the applicable portion of the eastern portion of the property line where the property line is adjacent to the nearest noise-sensitive receptor during the site preparation phase when site preparation activity occurs within 45 feet of the property line, the grading phase when grading activity occurs within 50 feet of the property line, and the paving - east phase when paving activity occurs within 55 feet of the property line. Exhibit I shows the extent of the temporary eight-foot-tall noise barrier.
- The temporary solid noise barriers shall be constructed of 3/4-inch Medium Density Overlay (MDO) plywood sheeting, or other material of equivalent utility and appearance having a surface weight of 2 pounds per square foot or greater. There shall be no gaps in the barrier, and the barrier shall block the line of sight between the construction equipment and the noise sensitive receptor.

Exhibit I: 8-Foot-Tall Temporary Noise Barrier Location

(Note: Noise barrier is represented by the red line)

1.4 Fundamentals of Noise and Vibration

The following is a brief discussion of fundamental noise concepts and terminology.

1.4.1 Sound, Noise, and Acoustics

Sound is actually a process that consists of three components: the sound source, sound path, and sound receptor. All three components must be present for sound to exist. Without a source to produce sound, there is no sound. Similarly, without a medium to transmit sound pressure waves, there is no sound. Finally, sound must be received; a hearing organ, sensor, or object must be present to perceive, register, or be affected by sound or noise. In most situations, there are many different sound sources, paths, and receptors rather than just one of each. Acoustics is the field of science that deals with the production, propagation, reception, effects, and control of sound. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired.

1.4.2 Sound Pressure Levels and Decibels

The amplitude of a sound wave determines its loudness. Loudness of sound increases with increasing amplitude. Sound pressure amplitude is measured in units of micronewtons per square meter, also called micropascals. One micropascal is approximately one-hundred billionth (0.00000000001) of normal atmospheric pressure. The pressure of a very loud sound may be 200 million micropascals, or 10 million times the pressure of the weakest audible sound. Because expressing sound levels in terms of micropascals would be very cumbersome and the sensitivity of human hearing to changes in micropascals is rather coarse (e.g., a doubling of micropascals is just audible to most people), sound pressure level in logarithmic units is used instead to describe the ratio of actual sound pressure to a reference pressure squared. These units are called Bels. To provide a finer resolution, a Bel is subdivided into 10 decibels (dB). When analyzing the noise level generated by multiple noise sources, the principals of noise propagation require a logarithmic measurement. Decibel levels differences of 10 or less are logarithmically summed whereas differences of greater than 10 create a noise level equal to the decibel level of the highest noise source.

Addition of Sound Pressure Levels

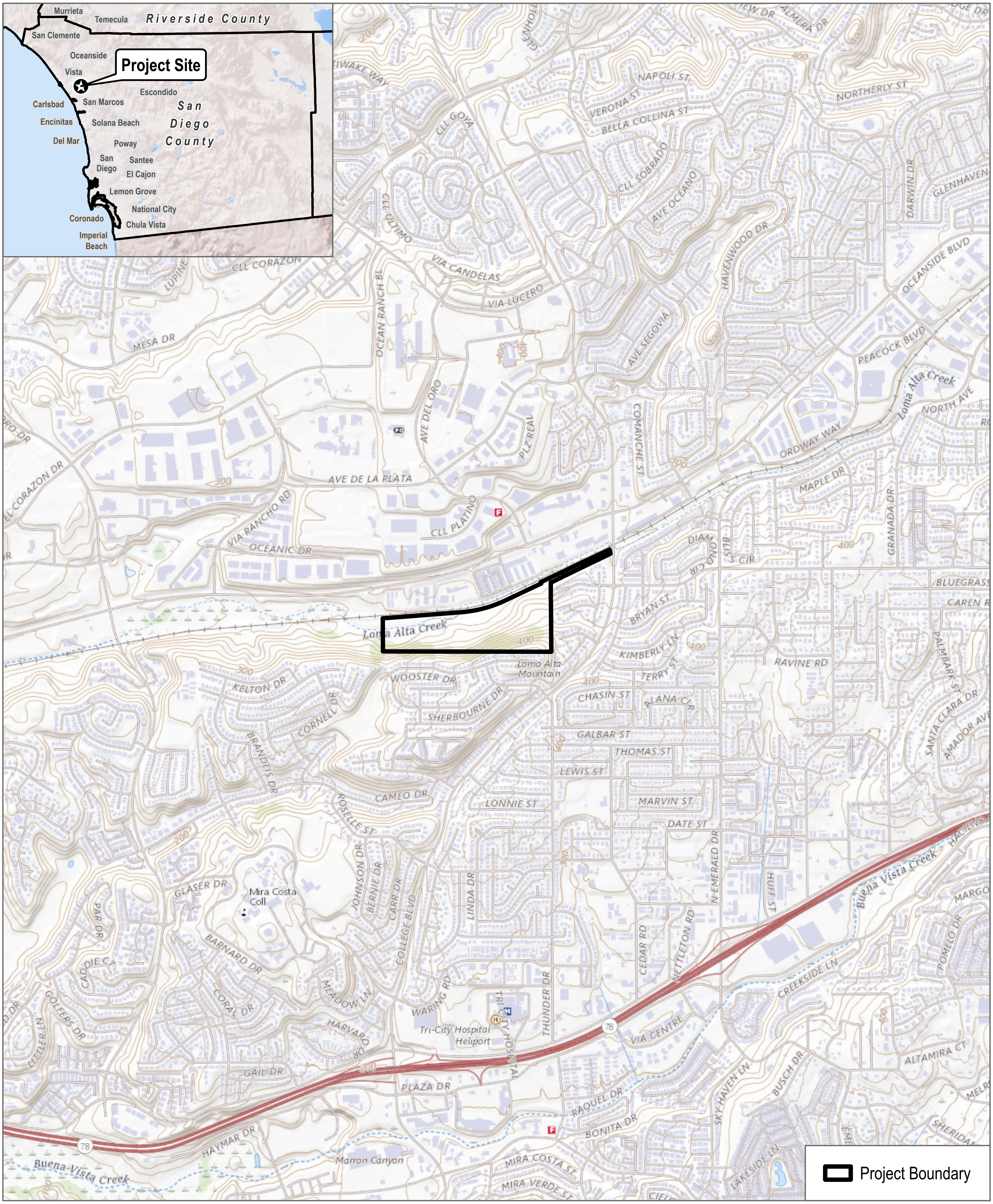
Decibels cannot simply be added using arithmetic equations. Decibels use logarithmic units and must be added logarithmically. For example, a rail line with two trains at 60 dBA each and both passing a measurement point at the same time would not produce 120 dBA. The logarithmic sum of the two trains would be 63 dBA. The following equation can be used to logarithmically sum multiple noise sources (Caltrans 2013):

SPLTotal = 10log10[10SPL1 /10 + 10SPL2 /10 + … 10SPLn /10], where n is the total number of SPLs to be added.

The exhibit below provides a simple approximation when combining two sound levels:

When Two Decibel Values Differ by:	Add This Amount to the Higher Value:	Example:
0 or 1 dB	3 dB	70 + 69 = 73 dB
2 or 3 dB	2 dB	74 + 71 = 76 dB
4 to 9 dB	1 dB	66 + 60 = 67 dB
10 dB or more	0 dB	65 + 55 = 65 dB

~~To provide a finer resolution, a Bel is subdivided into 10 decibels (dB).~~



SOURCE: USGS National Map 2024

San Luis Rey Quadrangle - Township 11S Range 4W Section 21, 22

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0 500 1,000 Feet

FIGURE 1

Project Location

Olive Park Apartments

LEGEND

- DIEGAN COASTAL SAGE SCRUB
- DISTURBED DIEGAN COASTAL SAGE SCRUB
- EUCALYPTUS WOODLAND
- FRESHWATER MARSH
- NON-NATIVE GRASSLAND
- SOUTHERN MIXED CHAPARRAL
- DISTURBED SOUTHERN MIXED CHAPARRAL
- DISTURBED SOUTHERN WILLOW SCRUB
- DISTURBED HABITAT
- URBAN/DEVELOPED

SOURCE: DUDEK RECEIVED JANUARY 16, 2024

PREPARED BY
HUNSAKER & ASSOCIATES SAN DIEGO, INC.
PLANNING ENGINEERING SURVEYING
9707 Waples Street
San Diego, Ca 92121
PH(858)558-4500 · FX(858)558-1414

DUDEK BIO MAPPING
TPM / DEVELOPMENT PLAN
OLIVE PARK APARTMENTS
CITY OF OCEANSIDE, CALIFORNIA

SHEET 2 OF 2

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1.4.3 A-Weighted Sound Level

Sound pressure level alone is not a reliable indicator of loudness. The frequency, or pitch, of a sound also has a substantial effect on how humans will respond. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness, or human response, is determined by the characteristics of the human ear.

Human hearing is limited not only in the range of audible frequencies, but also in the way it perceives the sound in that range. In general, the healthy human ear is most sensitive to sounds between 1,000 and 5,000 hertz, and it perceives a sound within that range as more intense than a sound of higher or lower frequency with the same magnitude. To approximate the frequency response of the human ear, a series of sound level adjustments is usually applied to the sound measured by a sound level meter. The adjustments (referred to as a weighting network) are frequency-dependent.

The A-scale weighting network approximates the frequency response of the average young ear when listening to ordinary sounds. When people make judgments about the relative loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Other weighting networks have been devised to address high noise levels or other special situations (e.g., B-scale, C-scale, and D-scale), but these scales are rarely used in conjunction with most environmental noise evaluations. Noise levels are typically reported in terms of A-weighted sound levels. All sound levels discussed in this report are A-weighted decibels (dBA). Examples of typical noise levels for common indoor and outdoor activities are depicted in Table 1.

Table 1. Typical Sound Levels in the Environment and Industry

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
—	110	Rock band
Jet fly over at 300 meters (1,000 feet)	100	—
Gas lawn mower at 1 meter (3 feet)	90	—
Diesel truck at 15 meters (50 feet), at 80 kilometers per hour (50 miles per hour)	80	Food blender at 1 meter (3 feet); garbage disposal at 1 meter (3 feet)
Noisy urban area, daytime; gas lawn mower at 30 meters (100 feet)	70	Vacuum cleaner at 3 meters (10 feet)
Commercial area; heavy traffic at 90 meters (300 feet)	60	Normal speech at 1 meter (3 feet)
Quiet urban, daytime	50	Large business office; dishwasher next room
Quiet urban, nighttime	40	Theater; large conference room (background)
Quiet suburban, nighttime	30	Library
Quiet rural, nighttime	20	Bedroom at night; concert hall (background)
—	10	Broadcast/Recording studio
Lowest threshold of human hearing	0	Lowest threshold of human hearing

Source: Caltrans 2020.

1.4.4 Human Response to Changes in Noise Levels

Under controlled conditions in an acoustics laboratory, the trained, healthy human ear is able to discern changes in sound pressure levels of 1 dBA when exposed to steady, single-frequency signals in the mid-frequency range. Outside such controlled conditions, the trained ear can detect changes of 2 dBA in normal environmental noise. It is widely accepted that the average healthy ear, however, can barely perceive noise level changes of 3 dBA. A change of 5 dBA is readily perceptible, and a change of 10 dBA is perceived as twice (if a gain) or half (if a loss) as loud. A doubling of sound energy results in a 3 dBA increase in sound, which means that a doubling of sound energy (e.g., doubling the volume of traffic on a road) would result in a barely perceptible change in sound level.

1.4.5 Noise Descriptors

Additional units of measure have been developed to evaluate the long-term characteristics of sound. The energy-equivalent sound level (L_{eq}) is also referred to as the time-average sound level. It is the equivalent steady-state or constant sound level that in a stated period of time would contain the same acoustical energy as the time-varying sound level during the same time period. For instance, the 1-hour A-weighted equivalent sound level, $L_{eq(h)}$, is the energy average of the A-weighted sound levels occurring during a 1-hour period, and is the basis for most of the City Noise Ordinance standards.

People are generally more sensitive to and thus potentially more annoyed by noise occurring during the evening and nighttime hours. Hence, another noise descriptor used in community noise assessments—the community noise equivalent level (CNEL)—represents a time-weighted, 24-hour average noise level based on the A-weighted sound level. However, unlike an unmodified 24-hour L_{eq} value, the CNEL descriptor accounts for increased noise sensitivity during the evening (7 p.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.) by adding 5 dBA and 10 dBA, respectively, to the average sound levels occurring during these defined hours within a 24-hour period. .

1.4.6 Sound Propagation

Sound propagation (i.e., the traverse of sound from a noise emission source position to a receptor location) is influenced by multiple factors that include geometric spreading, ground absorption, atmospheric effects, and occlusion by natural terrain and/or features of the built environment.

Sound levels attenuate (or diminish) geometrically at a rate of approximately 6 dBA per doubling of distance from an outdoor stationary point-type source due to the spherical spreading of sound energy with increasing distance travelled. The effects of atmospheric conditions such as humidity, temperature, and wind gradients are typically distance-dependent and can also temporarily either increase or decrease sound levels measured or perceived at a receptor location. In general, the greater the distance the receptor is from the source of sound emission, the greater the potential for variation in sound levels at the receptor due to these atmospheric effects. Additional attenuation can result from sound path occlusion and diffraction due to intervention of natural (ridgelines, dense forests, etc.) and built features (such as solid walls, buildings, and other structures).

1.4.7 Ground-borne Vibration Fundamentals

Ground-borne vibration is fluctuating or oscillatory motion transmitted through the ground mass (i.e., soils, clays, and rock strata). The strength of ground-borne vibration attenuates rapidly over distance. Some soil types transmit vibration quite efficiently; other types (primarily sandy soils) do not. Several basic measurement units are commonly used to describe the intensity of ground vibration. The descriptors used by the Federal Transit Administration (FTA) are peak particle velocity (PPV), in units of inches per second (ips), and velocity decibel (VdB) that is based on a root-mean square (RMS) of the vibration signal magnitude. Per the California Department of Transportation (Caltrans) Transportation and Construction Vibration Guidance Manual (Caltrans 2020), the calculation to determine PPV at a given vibration source to receptor distance is as follows:

$$PPV_{distance} = PPV_{ref} * (25/D)^{1.1}$$

Where:

$PPV_{distance}$ = the peak particle velocity in inches per second of the equipment adjusted for distance

PPV_{ref} = the reference vibration level in inches per second at 25 feet

D = the distance from the equipment to the receptor

2 Regulatory Setting

2.1 Federal

2.1.1 Federal Transit Administration

In its Transit Noise and Vibration Impact Assessment guidance manual, the FTA recommends a daytime construction noise level threshold of 80 dBA L_{eq} over an 8-hour period (FTA 2018) when detailed construction noise assessments are performed to evaluate potential impacts to community residences surrounding a project. Although this FTA guidance is not a regulation, it can serve as a quantified standard in the absence of such noise limits at the state and local jurisdictional levels.

2.2 State

2.2.1 California Code of Regulations, Title 24

Title 24 of the California Code of Regulations sets standards that new developments in California must meet. According to Title 24, interior noise levels are not to exceed 45 dBA CNEL in any habitable room (ICC 2019).

2.2.2 California Department of Health Services Guidelines

The California Department of Health Services has developed guidelines of community noise acceptability for use by local agencies (OPR 2017). Selected relevant levels are listed here:

- Below 60 dBA CNEL: normally acceptable for low-density residential use
- 50 to 70 dBA CNEL: conditionally acceptable for low-density residential use
- Below 65 dBA CNEL: normally acceptable for high-density residential use and transient lodging
- 60 to 70 dBA CNEL: conditionally acceptable for high-density residential, transient lodging, churches, educational, and medical facilities

The normally acceptable exterior noise level for high-density residential use is up to 65 dBA CNEL. Additionally, this exterior noise level limit is consistent with the City of Oceanside General Plan Noise Element, which considers multi-family units to be noise-sensitive land uses.

2.2.3 California Department of Transportation

In its Transportation and Construction Vibration Guidance Manual (Caltrans 2020), Caltrans recommends 0.5 ips PPV as a threshold for the avoidance of structural damage to typical newer residential buildings exposed to continuous or frequent intermittent sources of ground-borne vibration. For transient vibration events, such as blasting, the damage risk threshold would be 1.0 ips PPV (Caltrans 2020) at the same type of newer residential structures. For older structures, these guidance thresholds would be more stringent: 0.3 ips PPV for continuous/intermittent vibration sources, and 0.5 ips PPV for transient vibration events. With respect to human annoyance, Caltrans guidance (Caltrans 2020) indicates that building occupants exposed to continuous ground-borne vibration at a level of 0.2 ips PPV would find it “annoying” and thus a likely significant impact. Although these Caltrans guidance thresholds are not regulations, they can serve as quantified standards in the absence of such limits at the local jurisdictional level.

2.3 Local

2.3.1 City of Oceanside Noise Control Ordinance

The City of Oceanside Noise Ordinance (Oceanside Municipal Code Chapter 38) (City of Oceanside 2022) contains regulations restricting land use related noise-generating activities and operations, so as to avoid noise nuisance in the community. Section 38.12 of the Municipal Code establishes the maximum allowable exterior noise limits, based upon the classification of the source land use. These standards typically apply to stationary sources such as noise from mechanical equipment (including mechanical ventilation and air conditioning noise, pool pump noise, etc.) or event noise, as opposed to traffic noise. For instance, a school, commercial enterprise, or industrial operation must not generate noise that exceeds a certain specified noise level at any property boundary. The property-line noise standards are presented in Table 2.

Table 2. City of Oceanside General Sound Level Limits (in dBA)

Base District Zone	7:00 a.m. to 9:59 p.m.	10:00 p.m. to 6:59 a.m.
RE (Residential Estate)	50	45
RS (Single-Family)	50	45
RM (Medium Density)	50	45
RH (High Density)	55	50
RT (Residential Tourist)	55	50
C (Commercial)	65	60
I (Industrial)	70	65
D (Downtown)	65	55
A (Agricultural)	50	45
OS (Open Space)	50	45

Source: City of Oceanside, 2022

Additionally, Section 38.12(c) establishes the limits for joint boundaries where land uses differ between adjacent properties. The Municipal Code states: “when property lines form the joint boundary of two base district zones, the sound level limit shall be the arithmetic mean of the limit applicable to each of the two zones.” The project land use is designated as residential, and would therefore be limited to 50 dBA between the hours of 7:00 a.m. to 9:59 p.m. and 45 dBA between the hours of 10:00 p.m. to 6:59 a.m. The adjacent residential area is limited to 50 dBA between the hours of 7:00 a.m. to 9:59 p.m. and 45 dBA between the hours of 10:00 p.m. to 6:59 a.m.

Construction activities are subject to Section 38.17 of the Noise Ordinance, which specifically prohibits the operation of any pneumatic or air hammer, pile driver, steam shovel, derrick, steam, or electric hoist, parking lot cleaning equipment, or other appliance, the use of which is attended by loud or unusual noise, between the hours of 10:00 p.m. and 7:00 a.m.

Section 38.16 prohibits nuisance noise as recommended in the City's General Plan Noise Element. It is unlawful for any person to make, continue, or cause to be made or continued within the limits of the City any disturbing, excessive, or offensive noise that causes discomfort or annoyance to reasonable persons of normal sensitivity.

2.3.2 The City of Oceanside General Plan Noise Element

The City of Oceanside General Plan Noise Element establishes guidelines for construction noise generated by projects within the City limits. The Noise Element states that:

1) It should be unlawful for any person within any residential zone or 500 feet therefrom to operate any pile driver, power shovel, pneumatic, power hoist, or other construction equipment between 8:00 p.m. and 7:00 a.m. generating an ambient noise level of 50 dBA at any property line, unless an emergency exists.

2) It should be unlawful for any person to operate any construction equipment at a level in excess of 85 dBA at 100 feet from the source.

3) It should be unlawful for any person to engage in construction activities between 6:00 p.m. and 7:00 a.m. when such activities exceed the ambient noise level by 5 dBA. A special permit may be granted by the Director of Public Works if extenuation circumstances exist.

In addition, the Noise Element addresses nuisance noise and states that it should be unlawful for any person to make or continue any loud, unnecessary noise that causes annoyance to any reasonable person of normal sensitivity.

The Oceanside Noise Element outlines general goals, objectives, and noise policies as follows:

Goal: To minimize the effects of excessive noise in the City of Oceanside.

Objective: To protect the residents and visitors to Oceanside from noise pollution. To improve the quality of Oceanside's environment.

Policies:

- Noise levels shall not be so loud as to cause danger to public health in all zones except manufacturing zones where noise levels may be greater.
- Noise shall be controlled at the source where possible.
- Noise shall be intercepted by barriers or dissipated by space where the source cannot be controlled.
- Noise levels shall be considered in any change to the Land Use and Circulation Elements of the City's General Plan.
- Noise levels of City vehicles, construction equipment, and garbage trucks shall be reduced to acceptable levels.

In a manner similar to the state's land use planning guidelines, the City's Noise Element establishes an implementation recommendation (#5) that puts attention to the careful planning of future residents in areas subjected to noise levels of 65 dBA CNEL or higher.

For interior noise, the Noise Element refers to the aforementioned California Title 24 noise insulation standard: 45 dBA CNEL as the maximum acceptable level for inhabited rooms when exterior noise levels are 60 dBA CNEL or more. If windows and doors are required to be closed to meet this standard, then mechanical ventilation (i.e., air conditioning) shall be included in the project design.

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3 Existing Conditions

3.1 Noise Measurement Survey

A sound pressure level (SPL) measurement survey was conducted at five (5) representative positions in the vicinity of the project site on February 21, 2024 to characterize the existing outdoor ambient noise levels. The noise measurement locations are shown in Figure 3.

Table 3 provides a summary of the noise measurement results as well as the location and time that an individual noise level measurement was performed. As shown in Table 3, the short-term (15-minute duration) measured L_{eq} noise levels ranged from 44.5 dBA at ST3 to 53.0 dBA at ST2.

The short-term measurements were conducted by an attending Dudek investigator with a Rion NL-62 model sound level meter (SLM) equipped with a windscreen-protected, 0.5-inch diameter pre-polarized condenser microphone with pre-amplifier. The SLM meets the current American National Standards Institute (ANSI) standard for a Type 1 (Precision) SLM.

The long-term measurement was conducted by a Dudek investigator with a SoftdB "Piccolo" model SLM equipped with a windscreen-protected, 0.5-inch diameter pre-polarized condenser microphone with pre-amplifier. The SLM meets the current American National Standards Institute (ANSI) standard for a Type 2 (General Use) SLM.

The accuracy of both sound level meters was verified using a field calibrator before and after the measurements, and the measurements were conducted with the microphone positioned approximately five feet above the ground. Appendix A provides sample digital photographs of the field noise level survey locations, followed by Dudek investigator field notes and a chart of the LT measurement data.

Table 3. Measured Baseline Outdoor Ambient Noise Levels

Site	Location (and investigator observed/perceived sounds)	Time	L_{eq} (dBA)	L_{max} (dBA)	L_{min} (dBA)
ST1	South of the rail line, northwest of the Olive Drive cul-de-sac (traffic, rail [including horns and train stop speakers], birds, distant landscaping, distant industrial)	9:17 a.m. to 9:32 a.m.	48.0	50.6	44.5
ST2	At the end of the Olive Drive cul-de-sac (traffic, birds, distant aircraft, dogs barking, distant industrial, distant rail [including horns])	9:35 a.m. to 9:50 a.m.	53.0	65.5	41.1
ST3	South of the residences on the north side of Crystal Street (traffic, birds, distant aircraft, rustling leaves, delivery vehicles, distant rail horn)	9:55 a.m. to 10:10 a.m.	44.5	50.5	41.2
ST4	Near the end of the Wooster Drive cul-de-sac (traffic, birds, distant and nearby landscaping, rustling leaves)	10:17 a.m. to 10:32 a.m.	50.1	55.4	44.2
LT1	South of the rail line, northwest of the Olive Drive cul-de-sac (traffic, rail [including horns and train stop speakers], birds, distant landscaping, distant industrial)	9:09 a.m. to 9:09 a.m.[1]	62.4	102.5	32.8

Source: Appendix A.

Notes: L_{eq} = equivalent continuous sound level (time-averaged sound level); dBA = A-weighted decibels; L_{max} = maximum sound level during the measurement interval; L_{min} = minimum sound level during the measurement interval. ST = short-term measurement location. LT = long-term measurement location. See Figure 3 for measurement locations.

[1] Long-term measurement was conducted for a 24 hour period on February 21 and February 22, 2024

Following FTA guidance found in Table 4-17 of the Transit Noise and Vibration Impact Assessment Manual, the estimated nighttime ambient noise level would be approximately 10 dBA less than the measured daytime noise level and the estimated evening ambient noise level would be approximately 5 dBA less than the measured daytime noise level. Therefore, the calculated CNEL is approximately equal in magnitude to the measured daytime noise level (L_{eq}) at each measurement location.

SOURCE: Google 2024; Dudek 2024

DUDEK

FIGURE 3

Noise Measurement Locations

Olive Park Apartments Project

3.2 Sensitive Receptors

Noise- and vibration-sensitive land uses are typically locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Residences, schools, hospitals, guest lodging, libraries, and some passive recreation or open space areas would be considered noise and vibration sensitive and may warrant unique measures for protection from intruding noise. Existing sensitive receptors in the vicinity of the project site consist of residential uses located to the east and south of the project site, on-site residents following occupancy of phase 1 while phase 2 is under construction, and the MSCP-covered wildlife species directly to the north, south, and west of the project site.

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4 Thresholds of Significance

The following significance criteria are based on Appendix G of the California Environmental Quality Act Guidelines (14 CCR 15000 et seq.) and will be used to determine the significance of potential noise and vibration impacts. Impacts associated with noise and vibration would be significant if the proposed project would result in:

- 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.
- Generation of excessive ground-borne vibration or ground-borne noise levels.
- 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 2 miles of a public airport or public use airport, exposing people residing or working in the project area to excessive noise levels. .

In light of these above significance criteria, this analysis uses the following standards to evaluate potential noise and vibration impacts.

- Construction noise – The City's General Plan allows noise from construction equipment operation to be as high as 85 dBA at 100 feet from the source. Applying the principles of sound propagation for a point-type source, this level means 91 dBA at 50 feet, which is greater than the maximum sound levels of most operating construction equipment and would thus imply all but the loudest construction activities (e.g., pile driving, not used on this project) could be compliant with this standard. The General Plan also provides that it "should be unlawful for any person to engage in construction activities between 6:00 p.m. and 7:00 a.m. when such activities exceed the ambient noise level by 5 dBA. A special permit may be granted by the Director of Public Works if extenuating circumstances exist. The apparent proximity of existing residential receptors to the east of the proposed project site suggests that source-to-receptor distances could be as short as 15 feet. Additionally, most construction equipment and vehicles on a project site do not operate continuously. Therefore, consistent with the Federal Transit Administration guidance mentioned in Section 2.1.1, this analysis will use 80 dBA L_{eq} over an eight-hour period as the construction noise impact criterion during daytime hours (7:00 a.m. to 6:00 p.m.). If construction work were to occur outside these hours, the impact threshold would align with the City's General Plan requirement during such hours: no more than a five dBA increase over existing ambient noise levels. For special status wildlife species, a 60 dBA hourly L_{eq} threshold is adopted per the City's Biology Guidelines.
- Transportation noise – For purposes of this analysis, a noise impact due to transportation noise would be considered significant if predicted traffic noise levels exceed the City's 65 dBA CNEL standard for exterior levels at single-family homes and, if existing noise levels exceed the threshold without the addition of project traffic then significance would occur if the project causes the existing levels to increase by more than 3 dB (a barely perceptible change in audibility).
- Stationary operations noise – For purposes of this analysis, a noise impact would be considered significant if noise from typical operation of the project including heating, ventilation, and air conditioning (HVAC), and other electro-mechanical systems associated with the proposed project exceeded 45 dBA L_{eq} (the strictest noise threshold) at the property line of the nearby single-family homes during nighttime hours (10:00 p.m.

to 6:59 a.m.). For special status wildlife species, a 60 dBA hourly L_{eq} threshold is adopted per the City's Biology Guidelines.

- Construction vibration – Guidance from Caltrans indicates that a vibration velocity level of 0.2 ips PPV received at a structure would be considered annoying by occupants within (Caltrans 2020). As for the receiving structure itself, aforementioned Caltrans guidance from Section 2.2.3 recommends that a vibration level of 0.3 ips PPV would represent the threshold for building damage risk.

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5 Impact Discussion

Potential noise and vibration impacts attributed to project construction and operation are studied in the following subsections that are categorized by the CEQA Guidelines Appendix G significance for noise.

a) ***Would the project result in 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?***

Short-Term Construction

Less Than Significant. Construction noise and vibration are temporary phenomena, with emission levels varying from hour to hour and day to day, depending on the equipment in use, the operations performed, and the distance between the source and receptor. Equipment that would be in use during construction would include, in part, graders, backhoes, rubber-tired dozers, loaders, cranes, forklifts, pavers, rollers, and air compressors. The typical maximum noise levels at a distance of 50 feet from various pieces of construction equipment and activities anticipated for use on the proposed project site are presented in Table 4. Note that the equipment noise levels presented in Table 4 are maximum noise levels. Usually, construction equipment operates in alternating cycles of full power and low power, producing average noise levels over time that are less than the maximum noise level. The average sound level of construction activity also depends on the amount of time that the equipment operates and the intensity of construction activities during that time.

Table 4. Typical Construction Equipment Maximum Noise Levels

Equipment Type	Typical Noise Level (L_{max}, dBA at 50 Feet)
All Other Equipment > 5 HP	85
Backhoe	78
Compressor (air)	78
Concrete Saw	90
Crane	81
Dozer	82
Excavator	81
Flat Bed Truck	74
Front End Loader	79
Generator	72
Grader	85
Man Lift	75
Paver	77
Roller	80
Scraper	84
Welder / Torch	73

Source: DOT 2006.
Note: L_{max} = maximum sound level; dBA = A-weighted decibels.

Aggregate noise emission from proposed project construction activities, broken down by sequential phase, was predicted at the nearest existing noise-sensitive receptor boundary (single-family homes to the east of the project site) to the nearest position of the on-site construction boundary.

For purposes of this study, and in a manner resembling the "general assessment" methodology per FTA guidance, this analysis assumes that among what may be a quantity of mobile heavy construction equipment active onsite, only one of the loudest type of equipment per phase would be located at the nearest possible distance to the property line of a sensitive receptor (as close as 5 feet to the east, but dependent on the distance from the phase work to the receptor at any one time) for some portion or the entirety of the 8-hour evaluation period. The remainder of active equipment would be operating, on a time-average basis over the course of the same 8-hour evaluation period, at a distance approximating the centroid position of the work phase area.

A Microsoft Excel–based noise prediction model emulating and using reference data from the Federal Highway Administration Roadway Construction Noise Model (RCNM) (FHWA 2008) was used to estimate construction noise levels at the nearest occupied noise-sensitive land use. Although the RCNM was funded and promulgated by the Federal Highway Administration, it is often used for non-roadway projects, because the same types of construction equipment used for roadway projects are often used for other types of construction. Input variables for the predictive modeling consist of the equipment type and number of each (e.g., a grader, two excavators two front end loaders, two scrapers, and a dozer), and the duty cycle for each piece of equipment (e.g., percentage of time within a specific time period, such as an hour, when the equipment is expected to operate at full power or capacity and thus make noise at a level comparable to what is presented in Table 4). The predictive model also considers how many hours that equipment may be on-site and operating (or idling) within an established work shift. Conservatively, no topographical or structural shielding was assumed in the modeling. The RCNM 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 used for this noise analysis. Appendix B contains the details for construction noise analysis by phase activity.

As the project includes implementation of PDF-NOI-1 imposing construction design features applicable during the site preparation, grading and paving activities on the east side of the On-Site Impact Area the maximum noise level generated by project construction relative to neighboring sensitive residential receptors would be below the FTA guidance of 80 dBA L_{eq} over an 8-hour period (see Table 5, below). Therefore, project impacts would be **less than significant.**

Table 5. Predicted Construction Phase Noise Levels with PDF

Construction Phase	Predicted Noise Level 5 Feet from Property Line with PDF (dBA, 8-hour L_{eq})
Site Preparation	78
Grading	79
Paving - East	80

Source: Appendix B.

Off-Site Construction Noise

While construction operations will occur off-site in the locations show on Figure 2, the receptors exposed to off-site construction are at locations equal to or further from the off-site construction boundary than the nearest existing noise-sensitive receptor to on-site construction operations as described above.

Residentially zoned properties south of the proposed emergency access road would be directly adjacent to construction activity but separated by a topographical break between the road and the receptors as the residences are approximately 10 to 25 feet above the construction area and separated by fencing. This topographical break functions the same as a barrier and is treated as such by the RCNM analysis. As shown Appendix B, the “with barrier option” noise levels for all phases are predicted to be equal to or less than the FTA 80 dBA L_{eq} over an 8-hour period threshold. Residentially zoned properties along Olive Drive near the project boundary would be directly adjacent to the proposed off-site right of way and utility connection improvements within the Olive Drive right of way. However, these improvements will not utilize heavy construction equipment and their noise contributions will not exceed the applicable threshold of significance. Therefore, the construction noise impacts for noise sensitive receptors potentially exposed to off-site construction activity would be considered less than significant.

Therefore, temporary construction-related noise impacts at nearby residential receptors would be considered **less than significant.** No mitigation measures are required.

Off-Site Construction Traffic Noise

The project would result in local, short-term increases in roadway noise as a result of construction traffic. Based on information developed as part of the project’s air quality analysis, project-related traffic would include workers commuting to and from the project site as well as vendor and haul trucks bringing or removing materials. The highest number of average daily construction related trips to and from the project site for all of construction phases would be 16 worker trips, 2 vendor trips, and 188 haul truck trips (for a total of 206 trips) occurring during the grading of phase 1.

Based upon traffic counts conducted for the project (Counts Unlimited 2024), the existing (2024) Average Daily Traffic (ADT) volume on Olive Drive west of Bradley Street is 233 vehicles per day. Comparing the maximum number of daily construction-related trips (a total of 206 trips, and an adjusted Passenger Car Equivalent (PCE) total of 430 trips (based on one haul truck generating the equivalent noise of two passenger vehicles) to the average daily traffic volume of 233 PCE trips, the additional vehicle trips would amount to a worst-case number of trips due to project construction. As shown in Table 5, the predicted existing (2024) traffic noise level on Olive Drive from the project boundary to Bradley Street is 45 dBA CNEL. Based on the total number of project construction trips at its highest being 430 trips per day, the predicted existing (2024) plus project construction trip noise level is approximately ~~54~~ 50 dBA CNEL, which is less than the City’s 65 dBA exterior threshold for single-family homes.

Therefore, impacts from project-related construction traffic noise would be **less than significant.** No mitigation measures are required.

On-Site Sensitive Receptor Construction Noise Analysis

Noise generated by the construction of portions of the Phase 2 area have the potential to impact sensitive receptors occupying the Phase 1 building as Phase 1 will be occupied before construction of Phase 2 is completed.

Architectural coating will occur on the Phase 2 building approximately 40 feet away from the eastern façade of the occupied Phase 1 building. Using the same workbook as described above, the calculated noise level due to the architectural coating work is predicted to be approximately 76 dBA over an 8-hour period, which is lower than the FTA threshold of 80 dBA over an 8-hour period. Appendix B contains the details for the on-site sensitive receptor construction noise analysis.

Therefore, impacts to on-site Phase 1 sensitive receptors due to project-related construction noise in the Phase 2 area would be **less than significant.** No mitigation measures are required.

Special Status Wildlife Species Construction Noise Analysis

Construction-related noise could occur from equipment used during vegetation clearing and construction of the residences and associated infrastructure. Noise impacts can have a variety of indirect impacts on wildlife species, including increased stress, weakened immune systems, altered foraging behavior, displacement due to startle, degraded communication with conspecifics (e.g., masking), damaged hearing from extremely loud noises, and increased vulnerability to predators (Lovich and Ennen 2011; Brattstrom and Bondello 1983, as cited in Lovich and Ennen 2011). Suitable native habitat is present west of the on-site impact area, which would provide refuge for wildlife, including preservation of the ability to move temporarily to avoid loud construction noises. Additionally, the study area is already subject to a baseline level of noise from the nearby trains, roads, and human disturbance. Potential noise impacts to nesting birds would be avoided and minimized through implementation of MM-BIO-3 (Nesting Bird Surveys), appropriate disturbance avoidance buffers would be implemented for any active nests, and monitoring would ensure avoidance and minimization of impacts through implementation of MM-BIO-4 (Biological Monitoring). Therefore, short-term indirect impacts due to noise would be less than significant.

MM-BIO-3 Nesting Bird Surveys. Construction-related ground-disturbing activities (e.g., clearing/grubbing, grading, and other intensive activities) that occur during the avian breeding season (typically February 1 through September 15) shall require a one-time biological survey for nesting bird species to be conducted within the limits of grading and a 500-foot buffer (where feasible) within 72 hours prior to construction. This survey is necessary to ensure avoidance of impacts to nesting raptors and other birds protected by the federal Migratory Bird Treaty Act and California Fish and Game Code Sections 3503 and 3513. If any active nests are detected, the area shall be flagged and mapped on the construction plans or a biological resources figure, and the information provided to the construction supervisor and any personnel working near the nest buffer. Active nests shall have avoidance buffers established around them (e.g., 250 feet for passerines to 500 feet for raptors) by the project biologist in the field with brightly colored flagging tape, conspicuous fencing, or other appropriate barriers or signage. The project biologist shall serve as a construction monitor during those periods when construction activities occur near active nest areas to avoid inadvertent impacts to these nests. The project biologist may adjust the 250-foot or 500-foot buffer at their discretion depending on the species and the location of the nest (e.g., if the nest is well protected in an area buffered by dense vegetation). However, if needed, additional qualified monitor(s) shall be provided to monitor active nest(s) or other project activities in order to ensure all of the project biologist's duties are completed. Once the nest is determined by a qualified monitor to be no longer occupied for the season, construction may proceed in the buffer areas.

If construction activities, particularly clearing/grubbing, grading, and other intensive activities, stop for more than 3 days, an additional nesting bird survey shall be conducted within the proposed work area and a 500-foot buffer, where feasible.

If coastal California gnatcatchers occur in the study area; pending results of focused surveys: Prior to the initiation of vegetation clearing activities outside of the nesting season, a coastal California gnatcatcher permitted biologist shall perform a minimum of three focused surveys, on separate days, to determine the presence of coastal California gnatcatcher nest-building activities, egg incubation activities, or brood rearing activities. The surveys shall begin a maximum of 7 days prior to project work activities, and one survey shall be conducted the day immediately prior to the initiation of work. The applicant shall notify the U.S. Fish and Wildlife Service (USFWS) at least 7 days prior to the initiation of surveys and within 24 hours of locating any coastal California gnatcatchers.

To the maximum extent practicable, project construction within 500 feet of avoided gnatcatcher habitat shall occur from September 1 through February 14 to avoid the gnatcatcher breeding season. If project construction within 500 feet of avoided gnatcatcher habitat must occur during the gnatcatcher breeding season, a minimum of three focused surveys, on separate days, shall be conducted to determine the presence of gnatcatcher nests, and one survey shall be conducted the day immediately prior to the initiation of work. The applicant shall notify USFWS at least 7 days prior to the initiation of surveys and within 24 hours of locating any gnatcatcher nest. Survey results shall be provided to USFWS.

If a California gnatcatcher nest is found in or within 500 feet of project construction areas, the biologist shall postpone work within 500 feet of the nest and contact USFWS to discuss (1) the best approach to avoid/minimize impacts to nesting birds (e.g., sound walls) and (2) a nest monitoring program acceptable to USFWS. If sound walls are proposed, an analysis showing that noise generated by construction activities would not exceed 60 dBA hourly average at the edge of occupied habitat must be completed by a qualified acoustician possessing a current noise engineer license or registration with noise monitoring experience with listed animal species. Subsequent to these discussions, work may be initiated subject to implementation of the agreed-upon avoidance/minimization approach and nest monitoring program. Nest success or failure shall be established by regular and frequent trips to the site, as determined by the biologist, and through a schedule approved by USFWS. The biologist shall determine whether bird activity is being disrupted. If the biologist determines that bird activity is being disrupted, the applicant shall stop work and coordinate with USFWS to review the avoidance/minimization approach. Coordination between the applicant and USFWS to review the avoidance/minimization approach shall occur within 48 hours. Upon agreement as to the necessary revisions to the avoidance/minimization approach, work may resume subject to the revisions and continued nest monitoring. Nest monitoring shall continue until fledglings have dispersed or the nest has been determined to be a failure, as approved by USFWS.

DOCUMENTATION: The applicant shall provide a letter of agreement with this condition to the City of Oceanside. **TIMING:** Prior to pre-construction conference and prior to any clearing, grubbing, trenching, grading, or any land disturbances and throughout the duration of the grading, compliance with this condition is mandatory unless the requirement is waived by the City of Oceanside upon receipt of concurrence from the Wildlife Agencies. **MONITORING:** The City of Oceanside shall review the concurrence letter.

MM-BIO-4 Biological Monitoring. To prevent inadvertent disturbance to areas outside the limits of grading, all grading of native habitat shall be monitored by a biologist. The biological monitor(s) shall be contracted to perform biological monitoring during all clearing and grubbing activities and periodic monitoring during and after grading when recommended by a Qualified Biologist. The project biologist(s) also shall do the following:

a. Attend the pre-construction meeting with the contractor and other key construction personnel prior to clearing and grubbing to reduce conflict between the timing and location of construction activities with other mitigation requirements (e.g., seasonal surveys for nesting birds).

b. The Qualified Biologist shall conduct a training session for all project personnel prior to any grading/construction activities. At a minimum the training shall include a description of the target species of concern, its habitats, the general provisions of the Endangered Species Act (Act) and the MHCP, the need to adhere to the provision of the Act and the MHCP, the penalties associated with violating the provisions of the Act, the general measures that are being implemented to conserve the target species of concern as they relate to the project, and the access routes to and project site boundaries within which the project activities must be accomplished. Prior to clearing and grubbing, the project biologist shall conduct meetings with the contractor and other key construction personnel each morning prior to construction activities to go over the proposed activities for the day, and for the monitor(s) to describe the importance of restricting work to designated areas and of minimizing harm to or harassment of wildlife.

c. Review and/or designate the construction area in the field with the contractor in accordance with the final grading plan prior to clearing and grubbing.

d. Supervise and monitor construction activities weekly to ensure against direct and indirect impacts to biological resources that are intended to be protected and preserved and to document that protective fencing is intact.

e. Flush wildlife species (e.g., reptiles, mammals, avian, and other mobile species) from occupied habitat areas immediately prior to brush-clearing activities. This does not include disturbance to nesting birds (see MM-BIO-3) or “flushing” of federally listed species (i.e., coastal California gnatcatcher).

f. Periodically monitor the construction site to verify that the project is implementing the following stormwater pollution prevention plan best management practices: dust control, silt fencing, removal of construction debris and a clean work area, covered trash receptacles that are animal-proof and weather-proof, prohibition of pets on the construction site, and a speed limit of 15 miles per hour.

g. Periodically monitor the construction site after grading is completed and during the construction phase to see that artificial security light fixtures are directed away from open space and are shielded, and to document that no unauthorized impacts have occurred.

h. If dead or injured federally and/or state-listed species are found onsite, the City, CDFW, and/or USFWS will be notified in compliance with applicable laws and regulations.

~~h.~~i. Keep monitoring notes for the duration of project construction for submittal in a final report to substantiate the biological supervision of the vegetation clearing and grading activities and the protection of biological resources.

~~i.~~j. Prepare a monitoring report after construction activities are completed that describes the biological monitoring activities, including a monitoring log; photos of the site before, during, and after the grading and clearing activities; and a list of special-status species observed.

~~j.~~k. Halt work, if necessary, and confer with the City of Oceanside to ensure the proper implementation of special-status species and sensitive resource protection measures.

~~f.~~l. Submit a final report to the City of Oceanside within 60 days of project completion that includes as-built construction drawings with an overlay of habitat that was impacted and avoided, photographs of habitat areas that were to be avoided, and other relevant summary information documenting that authorized impacts were not exceeded and that compliance with all measures was achieved.

DOCUMENTATION: The applicant shall provide a letter of agreement with this condition to the City of Oceanside. **TIMING:** Prior to final grading release. **MONITORING:** The City of Oceanside shall review the concurrence letter.

With proper implementation of Mitigation Measure MM-BIO-3 and MM-BIO-4, construction noise impacts to MSCP special status wildlife species would be **less than significant**.

Long-Term Operational

Off-Site Traffic Noise Exposure

The project is expected to generate a subtotal of 1,378 average daily trips to the roadway system, as shown in the data provided by the project transportation engineer at LOS Engineering, Inc (LOS Engineering 2024). Utilizing this information as well as additional traffic data provided in Appendix C of this technical report, the FHWA's Highway Traffic Noise Prediction Model RD-77-108 was used to estimate potential noise impacts at noise-sensitive uses adjacent to roadway segments expected to experience added traffic volumes attributed to the proposed project. Information used in the model included ADT volumes (from Counts Unlimited for existing year 2024 volumes and LOS Engineering for buildout year 2050 volumes), posted traffic speeds, truck mix percentage, and day/evening/night mix percentage. Consistent with Caltrans guidance (Caltrans 2013), 80% of the ADT occurs during daytime hours (7:00 a.m. to 7:00 p.m.), 5% during the evening (7:00 p.m. to 10:00 p.m.), and 15% during the nighttime (10:00 p.m. to 7:00 a.m.).

The future modeled traffic speed was conducted using 45 miles per hour (mph) for College Boulevard, 35 mph for Olive Drive east of College Boulevard, and 25 mph for Olive Drive west of College Boulevard. The truck percentages used in the noise model for the modeled scenarios were 2.0% medium trucks and 1.0% heavy trucks. This truck mix is based on vehicle surveys conducted for a number of similar roads in San Diego County that allow truck traffic.

The change in roadway noise levels was determined for six conditions: year 2024, year 2024 plus project, year 2026, year 2026 plus project year 2050, and year 2050 plus project. Traffic noise levels were calculated for the following roadway segments bounded by intersections within the project vicinity as follows:

- College Boulevard – North of Olive Drive to Olive Drive;
- College Boulevard – Olive Drive to South of Olive Drive;
- Olive Drive – West of Bradley Street to Bradley Street;
- Olive Drive – Bradley Street to College Boulevard; and;

- Olive Drive – College Boulevard to Joann Drive.

Table 6 presents the year 2024, year 2024 plus project, year 2026, year 2026 plus project, year 2050, and year 2050 predicted traffic noise levels.

Table 6. Predicted Traffic Noise Levels

Modeled Roadway Segment	Year 2024 Noise Level (dBA CNEL) – 50 Feet from Centerline	Year 2024 Plus Project Noise Level (dBA CNEL) – 50 Feet from Centerline	Year 2024 Project-Related Noise Level Increase (dBA)	Year 2026 Noise Level (dBA CNEL) – 50 Feet from Centerline	Year 2026 Plus Project Noise Level (dBA CNEL) – 50 Feet from Centerline	Year 2026 Project-Related Noise Level Increase (dBA)	Year 2050 Noise Level (dBA CNEL) – 50 Feet from Centerline	Year 2050 Plus Project Noise Level (dBA CNEL) – 50 Feet from Centerline	Year 2050 Project-Related Noise Level Increase (dBA)
1. College Boulevard – North of Olive Drive to Olive Drive	74.9	74.9	0.0	75.0	75.1	0.0	76.5	76.6	0.1
2. College Boulevard – Olive Drive to South of Olive Drive	73.1	73.2	0.1	73.2	73.3	0.1	75.2	75.2	0.0
3. Olive Drive – West of Bradley Street to Bradley Street	45.3	53.7	8.4	45.3	53.7	8.4	47.3	54.0	6.7
4. Olive Drive – Bradley Street to College Boulevard	49.3	54.5	5.3	49.3	54.5	5.3	51.3	55.2	3.9
5. Olive Drive – College Boulevard to Joann Drive	68.3	68.4	0.1	68.4	68.5	0.1	69.0	69.1	0.1

Source: Appendix C.

As shown in Table 6, traffic noise levels for sensitive receptors adjacent to Olive Drive from West of Bradley Street to College Boulevard (Segment No.3 and No.4) were predicted to be as high as 55.2 dBA CNEL., While the project would contribute to an audible increase in noise (maximum increase of 6.7 dB), noise levels would still be which is lower than the 65 dBA CNEL City exterior threshold for single-family homes. Traffic noise levels for sensitive receptors adjacent to College Boulevard and Olive Park from College Boulevard to Joann Drive (Segment No.1, No.2, and No.5) in the existing without project and the future conditions without project exceed the 65 dBA CNEL City exterior threshold for single-family homes. The Noise analysis demonstrates that the noise levels with the project in those areas would result in a maximum increase of 0.1 dB above the without project levels. An increase of 0.1 dB is less than significant as it would be well below the 3dB increase required for perceptibility as explained in Section 1.4.4. As that level of noise increases is well below the level of perceptibility., Therefore, project-generated changes to future traffic noise would be **less than significant.**

Project Sound Sources

On-site Outdoor Mechanical Equipment

The completion of the project buildings will add a variety of noise-producing mechanical equipment that include those presented and discussed in the following paragraphs. Most of the noise-producing equipment or sound sources would be considered stationary or limited in mobility to a defined area.

Rooftop HVAC

The proposed project buildings would be served by roof-mounted air-conditioning equipment that includes outdoor-exposed packaged air-handling units and air-cooled condensers (ACC) that provide the expected cooling demand (expressed as refrigeration "tonnage") for a building. The following are descriptions of modeled sound sources, with Table 7 exhibiting modeled sound power level (PWL) data at octave-band center frequency (OBCF) resolution. Detailed information supporting these summary descriptions and quantities appear in Appendix D.

Table 7. Modeled Sound Power Levels (PWL) for Stationary Roof-Mounted Sources (HVAC)

Building	Sound Source	Overall L_{eq} (dBA)	A-Weighted dB at Octave Band Center Frequency (OBCF, Hz)								
			32.5	63	125	250	500	1000	2000	4000	8000
1	Air Handling	91	72	72	84	85	86	83	76	70	65
	Air Conditioning	94	67	67	80	83	90	86	85	84	78
2	Air Handling	88	69	69	81	82	83	80	73	67	62
	Air Conditioning	78	47	47	60	65	73	74	68	66	60

Source: Appendix D

The HVAC reference sound levels were calculated from a combination of inputs that include square footage values for the proposed project's proposed spaces, project applicant response to data requests, and manufacturer sound power level data. For the analysis of noise from HVAC equipment operation, eight air conditioning units were modeled on the roofs of each building.

Other Stationary Noise Sources

The proposed project buildings may feature other noise emitters, but their contributions would tend to be sporadic or otherwise occur infrequently and thus be expected to have no greater acoustic contribution to an hourly L_{eq} than the continuous-type HVAC noise studied herein. Other stationary sources included in the model consisted of groups of people speaking at tables, working out, or playing in play areas. Table 8 contains a list of other modeled stationary noise sources and the associated PWL.

Table 8. Modeled Sound Power Levels (PWL) for Other Stationary Noise Sources

Source	Source Description	Sound Power Level (dBA)
Table	4 people (+6 dB) "raised normal speaking" at 1m (60 dBA), half of the time (-3 dB), +8 dB hemispherical PWL conversion	71
Seating Area	4 people (+6 dB) "raised normal speaking" at 1m (60 dBA), half of the time (-3 dB), +8 dB hemispherical PWL conversion	71
Play Area	4 children (+6 dB) "very loud speaking" at 1m (78 dBA), half of the time (-3dB), +8 hemispherical PWL conversion	89
Fitness Area	4 people (+6 dB) "relaxed normal speaking" at 1m (54 dBA), a quarter of the time (-6 dB), +8 dB hemispherical PWL conversion	62

Source: Hayne 2006

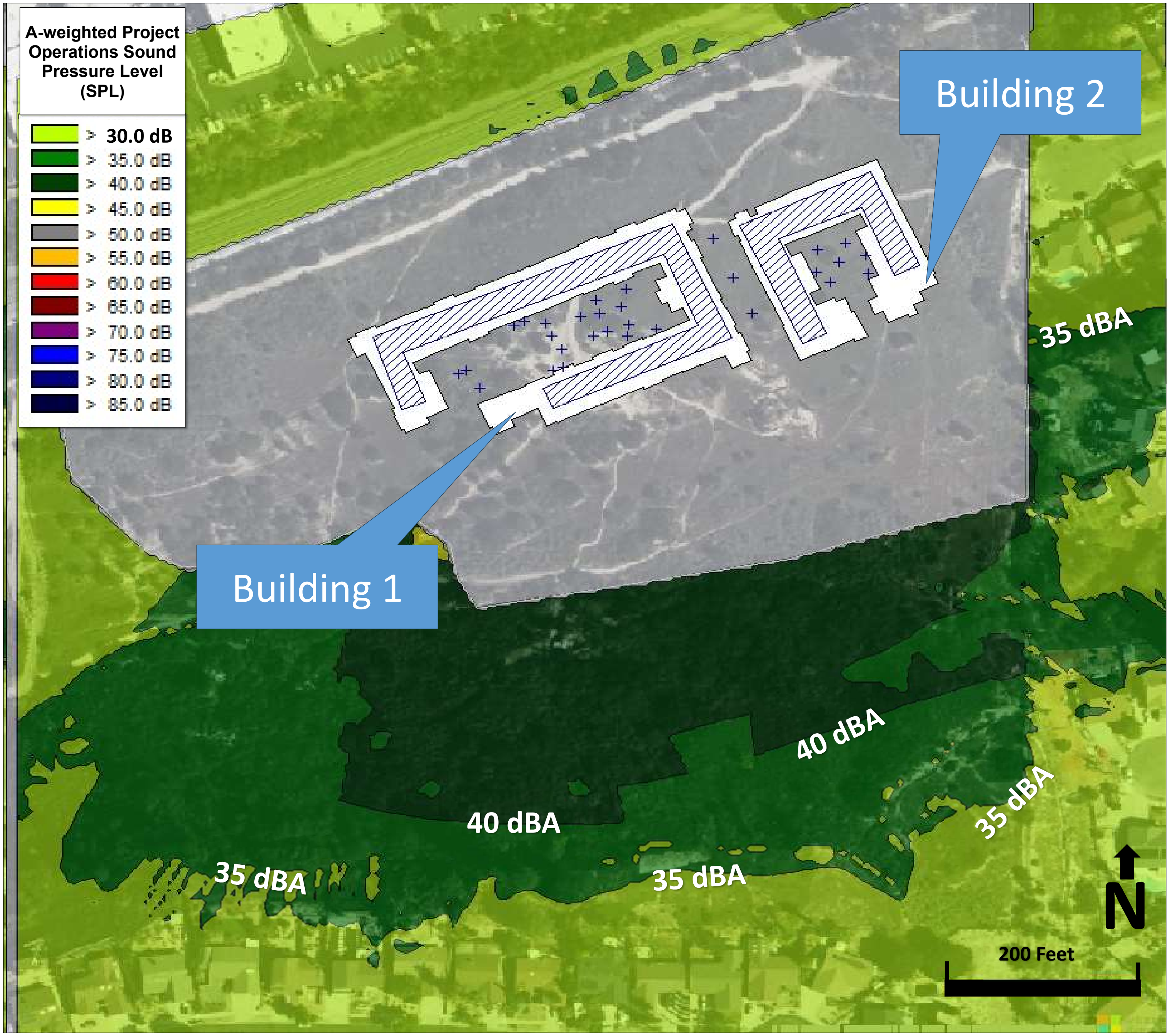
Prediction Methodology and Parameters

The aggregate noise emission from these outdoor-exposed sound sources has been predicted with the Datakustik CadnaA sound propagation program. CadnaA is a commercially available software program for the calculation, presentation, assessment, and prediction of environmental noise based on algorithms and reference data per International Organization of Standardization (ISO) Standard 9613-2, "Attenuation of Sound During Propagation Outdoors, Part 2: General Method of Calculation" (ISO 1996). The CadnaA computer software allows one to position sources of sound emission in a simulated three-dimensional (3-D) space having heights and footprints consistent with project architectural plans and elevations. In addition to the above-mentioned sound source inputs and building-block structures that define the three-dimensional sound propagation model space, the following assumptions and parameters are included in this CadnaA-supported stationary noise source assessment:

- Ground effect acoustical absorption coefficient equal to 0.7, which intends to represent an average or blending of ground covers that are characterized by a mix of soft, natural materials and hard, reflective pavements along with existing building surfaces across the project site and the surroundings;
- Reflection order of 1, which allows for a single reflection of sound paths on encountered structural surfaces such as the modeled building masses;
- Off-site residential structures and buildings have not been included in the model as there were no existing structures between the source and the nearest sensitive receptors;
- Calm meteorological conditions (i.e., no wind) with 68 degrees Fahrenheit and 50% relative humidity; and
- All of the modeled noise sources are operating concurrently and continuously for a minimum period of 1 hour.

Off-Site Sensitive Receptor Operation Impact Analysis

An operational scenario of the proposed project was modeled that assumes all the HVAC equipment and other stationary sources as listed above (such as occupied tables, play areas, and fitness equipment) are operating simultaneously for a typical period of one hour.



SOURCE: Microsoft 2024; Datakustik 2024; Dudek 2024

DUDEK

FIGURE 4

Off-Site Operational Noise Level Prediction

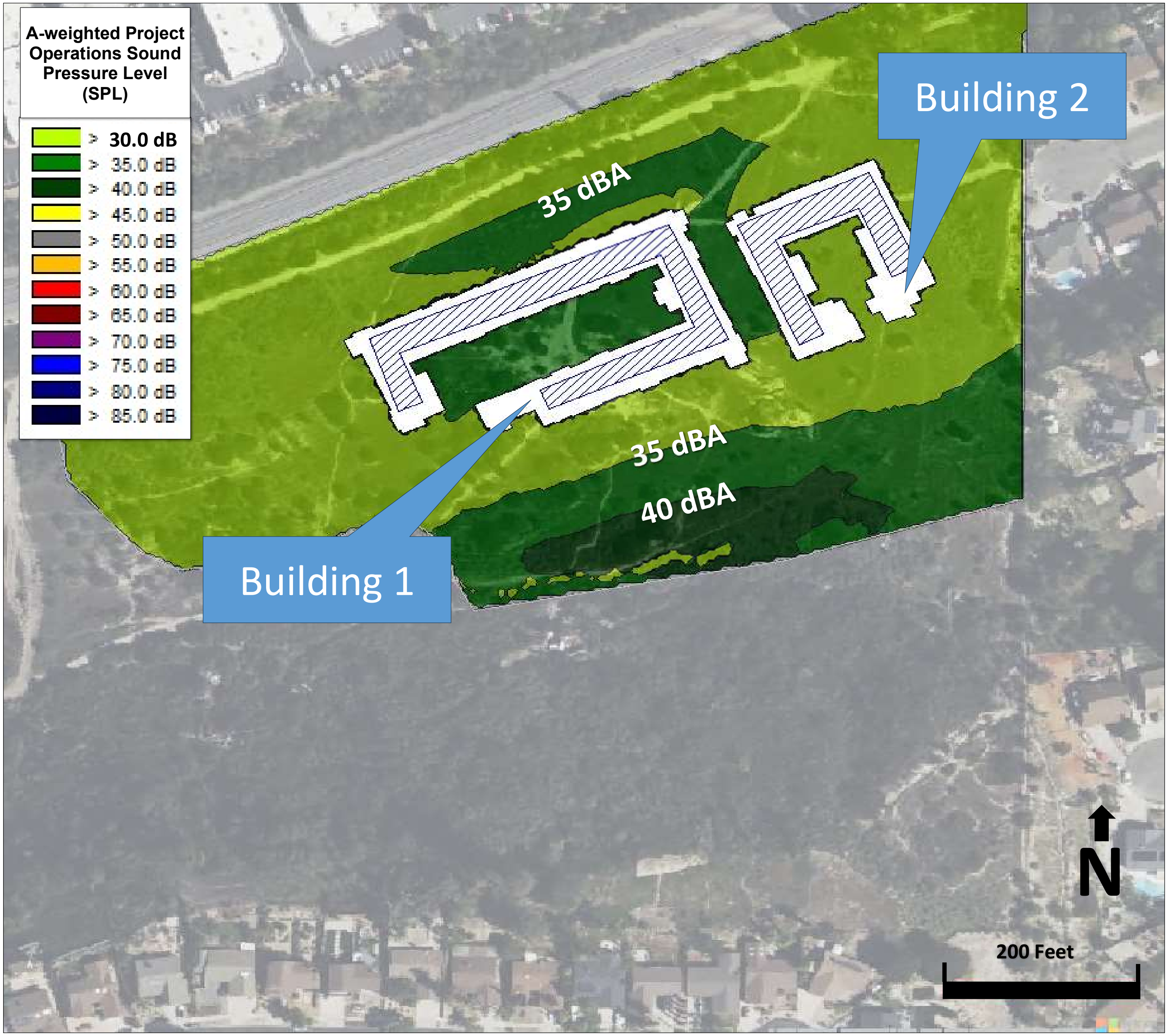
Olive Park Apartments Project

Figure 4 illustrates predicted aggregate SPL propagation solely from operation of the proposed project sound sources as described above. The color-coded annular bands of SPL are calculated across a field parallel with and five (5) feet above local grade.

Based on the noise level contours appearing in Figure 4, the proposed project is predicted to be up to 42 dBA L_{eq} at the single-family homes to the east of the project and up to 37 dBA L_{eq} at the single-family homes to the south of the project and is therefore would be lower than and thus comply with the City's 50 dBA L_{eq} daytime threshold and 45 dBA L_{eq} nighttime threshold for residential land uses. Additionally, the predicted levels due to stationary operations also comply with the City's 60 dBA threshold for special status wildlife species.

On-Site Sensitive Receptor Operations Impact Analysis

On-site HVAC operations have the potential to impact exterior use areas provided by the project. An analysis was conducted to display the HVAC-only noise level contours generated by the project. Figure 5 illustrates predicted aggregate SPL propagation solely from operation of the proposed project HVAC as described above. The color-coded annular bands of SPL are calculated across a field parallel with and five (5) feet above local grade.



SOURCE: Microsoft 2024; Datakustik 2024; Dudek 2024

DUDEK

FIGURE 5
On-Site Operational Noise Level Prediction

Olive Park Apartments Project

As displayed in Figure 5, HVAC-only operational noise levels are predicted to be as high 40 dBA at potentially sensitive project exterior areas which is less than the City's 50 dBA nighttime exterior threshold for high density multi-family land uses.

Therefore, impacts associated with the project's stationary operations noise would not result in 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; therefore, project impacts would be **less than significant.**

b) Would the project result in generation of excessive ground-borne vibration or ground-borne noise levels?

Less Than Significant Impact. Construction activities may expose persons to excessive ground-borne vibration or ground-borne noise, causing a potentially significant impact. Caltrans has collected ground-borne vibration information related to construction activities (Caltrans 2020). For context, heavier pieces of construction equipment, such as a bulldozer (or comparable equipment with respect to mass and power) that may be expected on the project site, have peak particle velocities of approximately 0.089 ips or less at a reference distance of 25 feet (FTA 2018).

Ground-borne vibration attenuates rapidly, even over short distances. The attenuation of ground-borne vibration as it propagates from source to receptor through intervening soils and rock strata can be estimated with expressions found in FTA and Caltrans guidance. By way of example, for a tractor operating on-site and as close as the eastern project boundary (i.e., ~10 feet from the nearest property) during the paving phase, the estimated vibration velocity would be 0.24 ips PPV per the equation as follows (Caltrans 2020):

$PPV_{rcvr} = PPV_{ref} * (25/D)^{1.1} = 0.24 = 0.089 * (25/10)^{1.1}$

In the above equation, PPV_{rcvr} is the predicted vibration velocity at the receptor position, PPV_{ref} is the reference value at 25 feet from the vibration source (the bulldozer), and D is the actual horizontal distance to the receptor. Because this predicted 0.24 ips PPV ground-borne vibration exposure level at the façade of the nearest receiving residential building façade is less than the 0.3 ips PPV threshold for building damage risk per Caltrans guidance for older residential structures, the impact would be less than significant.

For a vibratory roller during the paving phase, with a nearest receptor distance of 30 feet, the calculation is similar but uses the FTA-based reference PPV level of 0.21 ips at 25 feet and yields an exposure level of 0.17 ips PPV:

$PPV_{rcvr} = PPV_{ref} * (25/D)^{1.1} = 0.17 = 0.21 * (25/30)^{1.1}$

This vibration exposure level is also less than the 0.3 ips PPV threshold, and therefore would result in a less than significant impact with respect ground borne vibration or ground borne noise levels.

Within these nearest existing offsite residential structures, the occupants would be exposed to a vibration level that includes a "coupling loss" (i.e., the energy loss at the interface of the building mass and foundation with the surrounding soil/strata through which the ground-borne vibration has traversed) that FTA guidance indicates as a -5 dB adjustment for wood-framed homes (FTA 2018). When applied to the aforementioned PPV calculations for the tractor and roller, the calculated interior vibration levels are 0.14 ips PPV and 0.10 ips PPV, respectively. As these are both less than the 0.2 ips PPV Caltrans guidance-based standard for annoyance, this impact would be considered less than significant

Once operational, the proposed project would not be expected to feature major producers of ground-borne vibration. Anticipated mechanical systems like heating, ventilation, and air-conditioning units are designed and manufactured to feature rotating (fans, motors) and reciprocating (compressors) components that are well-balanced with isolated vibration within or external to the equipment casings. On this basis, the project would not result in generation of excessive ground-borne vibration and project impacts would be **less than significant.**

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

The closest airport to the proposed project site is the Oceanside Municipal Airport approximately 3.15 miles northwest of the project boundary. Therefore, the project would not expose people residing or working in the project area to excessive noise levels and project impacts would be **less than significant.**

6 Exterior Rail Noise Analysis

Utilizing schedule information for the nearby rail station at College Boulevard, the Federal Railroad Administration (FRA) CREATE Railroad Noise Model was used to predict the existing noise level due to rail operations at adjacent project exterior areas, the closest of which is approximately 200 feet from the centerline of the rail line. Appendix E provides the input and output data from the CREATE model.

As shown in Appendix E, the predicted daytime (7:00 a.m. to 10:00 p.m.) railroad noise level was 52 dBA and the predicted nighttime (10:00 p.m. to 7:00 a.m.) railroad noise level was 52 dBA for a calculated L_{dn} of 59 dBA, which is lower than the City's 65 dBA CNEL/L_{dn} exterior noise threshold for high density multi-family land uses.

7 Summary of Findings

The project includes implementation of PDF-1. The results of the noise and vibration technical analysis indicate that potential impacts during construction would **be less than significant.** Offsite exterior noise impacts due to operation of the proposed project would be **less than significant.** Offsite exterior noise impacts due to traffic noise would be **less than significant.**

8 References Cited

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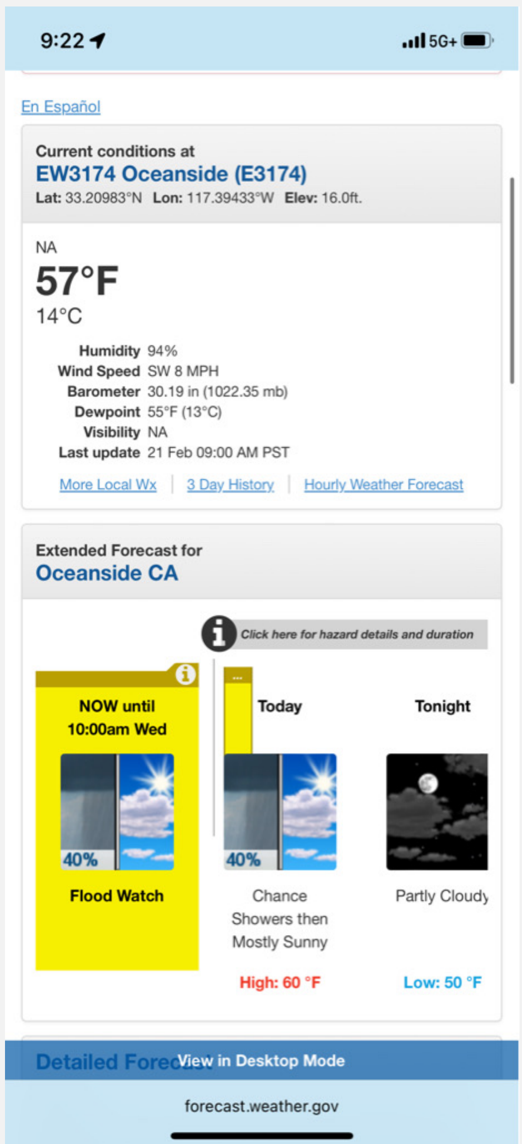
Appendix A

Baseline Noise Measurement Field Data

FORMS FIELD DATA REPORT

Field Noise Measurement Data

Record: 1848	
Project Name	*Trolley Place Oceanside*
Project #	*15953*
Date	*2024-02-21*

Meteorological Conditions	
Upload NOAA Forecast	

Temp (F)	*57*
Humidity % (R.H.)	*94*
Wind	*Light*
Wind Speed (MPH)	*8*
Wind Direction	*South West*
Sky	*Partly Cloudy*

Instrument and Calibrator Information	
Instrument Name List	*(SAC) NL-62*
Instrument Name	*(SAC) NL-62*
Instrument Name Lookup Key	*(SAC) NL-62*
Manufacturer	*Rion*
Model	*NL-62*
Serial Number	*350815*
Calibration Date	*7/16/2018*
Calibrator Name	*(SAC) Rion NC-74*
Calibrator Name	*(SAC) Rion NC-74*
Calibrator Name Lookup Key	*(SAC) Rion NC-74*
Calibrator Manufacturer	*Rion*
Calibrator Model	*NC-74*
Calibrator Serial #	*34167529*
Pre-Test (dBA SPL)	*93.9*
Post-Test (dBA SPL)	*94*

Windscreen	*Yes*
Weighting?	*A-WTD*
Slow/Fast?	*Slow*
ANSI?	*Yes*

Monitoring	
Record #	*1*
Site ID	*ST1/LT1*
Site Location Lat/Long	*33.204011, -117.288850*
Begin (Time)	*09:17:00*
End (Time)	*09:32:00*
Leq	*48*
Lmax	*50.6*
Lmin	*44.5*
Other Lx?	*L90, L50, L10*
L90	*45.5*
L50	*47.8*
L10	*50.1*
Other Lx (Specify Metric)	*L*
Primary Noise Source	*Rail*
Other Noise Sources (Background)	*Birds, Distant Gardener / Landscape Noise, Distant Industrial*
Other Noise Sources Additional Description	*Intermittent Amtrak rail noise (including horns), train stop speakers, distant low frequency rumbling of industrial equipment*

FORMS DUDEK FIELD DATA REPORT

Is the same instrument and calibrator being used as previously noted?	*Yes*
Are the meteorological conditions the same as previously noted?	*Yes*

Description / Photos	
Terrain	*Soft*

Site Photos	
Photo	

Comments / Description	*Facing N (LT1 in background)*

Site Photos

Photo	
Comments / Description	*Facing E (LT1 in background)*

Site Photos	
Photo	
Comments / Description	*Facing S*

Site Photos

Photo	
Comments / Description	*Facing W*

Monitoring	
Record #	*2*
Site ID	*ST2*
Site Location Lat/Long	*33.203651, -117.288186*

Begin (Time)	*09:35:00*
End (Time)	*09:50:00*
Leq	*53*
Lmax	*65.5*
Lmin	*41.1*
Other Lx?	*L90, L50, L10*
L90	*41.6*
L50	*45*
L10	*53.4*
Other Lx (Specify Metric)	*L*
Primary Noise Source	*Traffic*
Other Noise Sources (Background)	*Birds, Distant Aircraft, Distant Dog Barking, Distant Industrial, Distant Traffic*
Other Noise Sources Additional Description	*Distant intermittent Amtrak rail and horn noise, occasional street traffic*
Is the same instrument and calibrator being used as previously noted?	*Yes*
Are the meteorological conditions the same as previously noted?	*Yes*

Description / Photos	
Terrain	*Mixed*

Site Photos

Photo	
Comments / Description	*Facing N*

Site Photos

FORMS DUDEK FIELD DATA REPORT

Photo	
Comments / Description	*Facing E*

Site Photos

Photo	
Comments / Description	*Facing S*

Site Photos

Photo	
Comments / Description	*Facing W*

Monitoring	
Record #	*3*
Site ID	*ST3*
Site Location Lat/Long	*33.203193, -117.286449*

Begin (Time)	*09:55:00*
End (Time)	*10:10:00*
Leq	*44.5*
Lmax	*50.5*
Lmin	*41.2*
Other Lx?	*L90, L50, L10*
L90	*41.5*
L50	*44*
L10	*47.2*
Other Lx (Specify Metric)	*L*
Primary Noise Source	*Traffic*
Other Noise Sources (Background)	*Birds, Distant Aircraft, Distant Traffic, Rustling Leaves*
Other Noise Sources Additional Description	*UPS and USPS vehicle drive by's, distant Amtrak horn*
Is the same instrument and calibrator being used as previously noted?	*Yes*
Are the meteorological conditions the same as previously noted?	*Yes*

Description / Photos	
Terrain	*Hard*

Site Photos

Photo	
Comments / Description	*Facing N*

Site Photos

Photo	
Comments / Description	*Facing E*

Site Photos

Photo	
Comments / Description	*Facing S*

Site Photos

FORMS DUDEK FIELD DATA REPORT

Photo	
Comments / Description	*Facing W (UPS and USPS vehicles in background)*

Monitoring	
Record #	*4*
Site ID	*ST4*
Site Location Lat/Long	*33.200793, -117.289215*

Begin (Time)	*10:17:00*
End (Time)	*10:32:00*
Leq	*50.1*
Lmax	*55.4*
Lmin	*44.2*
Other Lx?	*L90, L50, L10*
L90	*45*
L50	*48.3*
L10	*54.1*
Other Lx (Specify Metric)	*L*
Primary Noise Source	*Traffic*
Other Noise Sources (Background)	*Birds, Distant Gardener / Landscape Noise, Distant Traffic, Rustling Leaves*
Other Noise Sources Additional Description	*Nearby landscaper*
Is the same instrument and calibrator being used as previously noted?	*Yes*
Are the meteorological conditions the same as previously noted?	*Yes*

Description / Photos	
Terrain	*Hard*

FORMS DUDEK FIELD DATA REPORT

Site Photos	
Photo	
Comments / Description	*Facing N*

Site Photos

Photo	
Comments / Description	*Facing E*

Site Photos

Photo	
Comments / Description	*Facing S*

Site Photos

Photo	
Comments / Description	*Facing W*

Description / Photos

Site Photos

Photo	
Comments / Description	*LT1 facing N*

Site Photos

Photo	
Comments / Description	*LT1 facing E*

Site Photos

Photo	
Comments / Description	*LT1 facing S*

Site Photos

FIELD DATA REPORT

Photo	
Comments / Description	*LT1 facing W*

Appendix B

Construction Noise Modeling Input and Output

To User: bordered cells are inputs, unbordered cells have formulae
enter "0" to turn off air or grnd absorption terms, "1" to turn on

air abs? 0
grnd abs? 0

magnitude of threshold (dBA) = 80
allowable hours over which Leq is to be averaged = 8

Source, receptor, and barrier all share same reference grade elevation; unless otherwise noted)
= Barrier of input height inserted between source and receptor

Project Phase No.	Project Phase Description	Comparable FHWA RCNM Construction Equipment Type	Quantity	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	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)
1	Site Preparation (Phase 1)	Auger Drill Rig	0	20	84	10	0		97.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Auger Drill Rig	0	20	84	500	0		63.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Tractor	1	40	84	10	0		97.9	8	480	94	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Tractor	0	40	84	500	0		63.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Front End Loader	0	40	79	10	0		92.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Front End Loader	0	40	79	500	0		58.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Backhoe	0	40	78	10	0		91.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Backhoe	0	40	78	500	0		57.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Site Preparation (Phase 1) Phase	**93.9**																
1	Grading (Phase 1)	Grader	1	40	85	10	0		98.9	8	480	95	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Grader	0	40	85	500	0		64.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Scraper	0	40	84	10	0		97.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Scraper	0	40	84	500	0		63.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Tractor	0	40	84	10	0		97.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Tractor	0	40	84	500	0		63.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Backhoe	0	40	78	10	0		91.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Backhoe	0	40	78	500	0		57.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Grading (Phase 1) Phase	**94.9**																
1	Building Construction (Phase 1)	Man Lift	1	20	75	290	0		59.7	8	480	53	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
		Tractor	1	40	84	290	0		68.7	8	480	65	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
		Backhoe	1	40	78	290	0		62.7	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
											Total Aggregate Noise Exposure from Building Construction (Phase 1) Phase	**65.9**																
1	Paving - West (Phase 1)	Paver	0	50	77	10	0		90.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Paver	0	50	77	500	0		56.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		All Other Equipment > 5 HP	1	50	85	795	0		60.9	8	480	58	5	5	0	790	5	795	790.0	7.1	795.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		All Other Equipment > 5 HP	0	50	85	500	0		64.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Roller	0	20	80	10	0		93.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Roller	0	20	80	500	0		59.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Paving - West (Phase 1) Phase	**57.9**																
1	Architectural Coating (Phase 1)	Compressor (air)	1	40	78	290	0		62.7	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
											Total Aggregate Noise Exposure from Architectural Coating (Phase 1) Phase	**58.7**																
1	Paving - East (Phase 1)	Paver	0	50	77	10	0		90.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Paver	0	50	77	500	0		56.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		All Other Equipment > 5 HP	1	50	85	10	0		98.9	8	480	96	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		All Other Equipment > 5 HP	0	50	85	500	0		64.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Roller	0	20	80	10	0		93.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Roller	0	20	80	500	0		59.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Paving - East (Phase 1) Phase	**95.9**																
2	Building Construction (Phase 2)	Man Lift	1	20	75	90	0		69.8	8	480	63	5	5	0	85	5	90	85.1	7.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Tractor	1	40	84	90	0		78.8	8	480	75	5	5	0	85	5	90	85.1	7.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Backhoe	1	40	78	90	0		72.8	8	480	69	5	5	0	85	5	90	85.1	7.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Building Construction (Phase 2) Phase	**76.0**																
2	Architectual Coating (Phase 2)	Compressor (air)	1	40	78	90	0		72.8	8	480	69	5	5	0	85	5	90	85.1	7.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Architectual Coating (Phase 2) Phase	**68.9**																

To User: bordered cells are inputs, unbordered cells have formulae
enter "0" to turn off air or grnd absorption terms, "1" to turn on

air abs? 0
grnd abs? 0

magnitude of threshold (dBA) = 80
allowable hours over which Leq is to be averaged = 8

Source, receptor, and barrier all share same reference grade elevation; unless otherwise noted)
= Barrier of input height inserted between source and receptor

Project Phase No.	Project Phase Description	Comparable FHWA RCNM Construction Equipment Type	Quantity	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	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)
1	Site Preparation (Phase 1)	Auger Drill Rig	0	20	84	10	0		97.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Auger Drill Rig	0	20	84	500	0		63.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Tractor	1	40	84	50	0		83.9	8	480	80	5	5	0	45	5	50	45.3	7.1	50.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Tractor	0	40	84	500	0		63.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Front End Loader	0	40	79	10	0		92.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Front End Loader	0	40	79	500	0		58.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Backhoe	0	40	78	10	0		91.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Backhoe	0	40	78	500	0		57.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Site Preparation (Phase 1) Phase	**80.0**																
1	Grading (Phase 1)	Grader	1	40	85	55	0		84.1	8	480	80	5	5	0	50	5	55	50.2	7.1	55.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Grader	0	40	85	500	0		64.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Scraper	0	40	84	10	0		97.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Scraper	0	40	84	500	0		63.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Tractor	0	40	84	10	0		97.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Tractor	0	40	84	500	0		63.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Backhoe	0	40	78	10	0		91.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Backhoe	0	40	78	500	0		57.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Grading (Phase 1) Phase	**80.1**																
1	Building Construction (Phase 1)	Man Lift	1	20	75	290	0		59.7	8	480	53	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
		Tractor	1	40	84	290	0		68.7	8	480	65	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
		Backhoe	1	40	78	290	0		62.7	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
											Total Aggregate Noise Exposure from Building Construction (Phase 1) Phase	**65.9**																
1	Paving - West (Phase 1)	Paver	0	50	77	10	0		90.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Paver	0	50	77	500	0		56.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		All Other Equipment > 5 HP	1	50	85	795	0		60.9	8	480	58	5	5	0	790	5	795	790.0	7.1	795.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		All Other Equipment > 5 HP	0	50	85	500	0		64.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Roller	0	20	80	10	0		93.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Roller	0	20	80	500	0		59.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Paving - West (Phase 1) Phase	**57.9**																
1	Architectural Coating (Phase 1)	Compressor (air)	1	40	78	290	0		62.7	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
											Total Aggregate Noise Exposure from Architectural Coating (Phase 1) Phase	**58.7**																
1	Paving - East (Phase 1)	Paver	0	50	77	10	0		90.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Paver	0	50	77	500	0		56.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		All Other Equipment > 5 HP	1	50	85	60	0		83.4	8	480	80	5	5	0	55	5	60	55.2	7.1	60.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		All Other Equipment > 5 HP	0	50	85	500	0		64.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Roller	0	20	80	10	0		93.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Roller	0	20	80	500	0		59.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Paving - East (Phase 1) Phase	**80.3**																
2	Building Construction (Phase 2)	Man Lift	1	20	75	90	0		69.8	8	480	63	5	5	0	85	5	90	85.1	7.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Tractor	1	40	84	90	0		78.8	8	480	75	5	5	0	85	5	90	85.1	7.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Backhoe	1	40	78	90	0		72.8	8	480	69	5	5	0	85	5	90	85.1	7.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Building Construction (Phase 2) Phase	**76.0**																
2	Architectual Coating (Phase 2)	Compressor (air)	1	40	78	90	0		72.8	8	480	69	5	5	0	85	5	90	85.1	7.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Architectual Coating (Phase 2) Phase	**68.9**																

To User: bordered cells are inputs, unbordered cells have formulae
enter "0" to turn off air or grnd absorption terms, "1" to turn on

air abs? 0
grnd abs? 0

magnitude of threshold (dBA) = 80
allowable hours over which Leq is to be averaged = 8

Source, receptor, and barrier all share same reference grade elevation; unless otherwise noted)
[orange] = Barrier of input height inserted between source and receptor

Project Phase No.	Project Phase Description	Comparable FHWA RCNM Construction Equipment Type	Quantity	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	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)
1	Site Preparation (Phase 1)	Auger Drill Rig	0	20	84	10	0		97.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Auger Drill Rig	0	20	84	500	0		63.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Tractor	1	40	84	10	16		82.0	8	480	78	5	5	8	5	5	10	5.8	5.8	10.0	1.66	15.0	13.0	5.0	0.5	0.7	16.0
		Tractor	0	40	84	500	0		63.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Front End Loader	0	40	79	10	0		92.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Front End Loader	0	40	79	500	0		58.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Backhoe	0	40	78	10	0		91.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Backhoe	0	40	78	500	0		57.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Site Preparation (Phase 1) Phase	**78.0**																
1	Grading (Phase 1)	Grader	1	40	85	10	16		83.0	8	480	79	5	5	8	5	5	10	5.8	5.8	10.0	1.66	15.0	13.0	5.0	0.5	0.7	16.0
		Grader	0	40	85	500	0		64.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Scraper	0	40	84	10	0		97.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Scraper	0	40	84	500	0		63.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Tractor	0	40	84	10	0		97.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Tractor	0	40	84	500	0		63.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Backhoe	0	40	78	10	0		91.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Backhoe	0	40	78	500	0		57.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Grading (Phase 1) Phase	**79.0**																
1	Building Construction (Phase 1)	Man Lift	1	20	75	290	0		59.7	8	480	53	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
		Tractor	1	40	84	290	0		68.7	8	480	65	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
		Backhoe	1	40	78	290	0		62.7	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
											Total Aggregate Noise Exposure from Building Construction (Phase 1) Phase	**65.9**																
1	Paving - West (Phase 1)	Paver	0	50	77	10	0		90.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Paver	0	50	77	500	0		56.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		All Other Equipment > 5 HP	1	50	85	795	11		50.5	8	480	47	5	5	8	790	5	795	790.0	5.8	795.0	0.84	12.2	13.0	5.0	0.5	0.7	10.5
		All Other Equipment > 5 HP	0	50	85	500	0		64.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Roller	0	20	80	10	0		93.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Roller	0	20	80	500	0		59.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Paving - West (Phase 1) Phase	**47.4**																
1	Architectural Coating (Phase 1)	Compressor (air)	1	40	78	290	0		62.7	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
											Total Aggregate Noise Exposure from Architectural Coating (Phase 1) Phase	**58.7**																
1	Paving - East (Phase 1)	Paver	0	50	77	10	0		90.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Paver	0	50	77	500	0		56.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		All Other Equipment > 5 HP	1	50	85	10	16		83.0	8	480	80	5	5	8	5	5	10	5.8	5.8	10.0	1.66	15.0	13.0	5.0	0.5	0.7	16.0
		All Other Equipment > 5 HP	0	50	85	500	0		64.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Roller	0	20	80	10	0		93.9	8	480	0	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Roller	0	20	80	500	0		59.9	0.01	0.6	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Paving - East (Phase 1) Phase	**80.0**																
2	Building Construction (Phase 2)	Man Lift	1	20	75	90	0		69.8	8	480	63	5	5	0	85	5	90	85.1	7.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Tractor	1	40	84	90	0		78.8	8	480	75	5	5	0	85	5	90	85.1	7.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Backhoe	1	40	78	90	0		72.8	8	480	69	5	5	0	85	5	90	85.1	7.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Building Construction (Phase 2) Phase	**76.0**																
2	Architectual Coating (Phase 2)	Compressor (air)	1	40	78	90	0		72.8	8	480	69	5	5	0	85	5	90	85.1	7.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Architectual Coating (Phase 2) Phase	**68.9**																

To User: bordered cells are inputs, unbordered cells have formulae
enter "0" to turn off air or grnd absorption terms, "1" to turn on

air abs? 0
grnd abs? 0

magnitude of threshold (dBA) = 80
allowable hours over which Leq is to be averaged = 8

Source, receptor, and barrier all share same reference grade elevation; unless otherwise noted)
= Barrier of input height inserted between source and receptor

Project Phase No.	Project Phase Description	Comparable FHWA RCNM Construction Equipment Type	Quantity	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	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)
1	Site Preparation (Phase 1)	Auger Drill Rig	0	20	84	25	0		90.0	1	60	0	5	5	0	20	5	25	20.6	7.1	25.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Auger Drill Rig	0	20	84	500	0		63.9	7	420	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Tractor	1	40	84	25	0		90.0	1	60	77	5	5	0	20	5	25	20.6	7.1	25.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Tractor	1	40	84	500	0		63.9	7	420	59	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Front End Loader	0	40	79	25	0		85.0	1	60	0	5	5	0	20	5	25	20.6	7.1	25.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Front End Loader	0	40	79	500	0		58.9	7	420	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Backhoe	0	40	78	25	0		84.0	1	60	0	5	5	0	20	5	25	20.6	7.1	25.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Backhoe	0	40	78	500	0		57.9	7	420	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Site Preparation (Phase 1) Phase	**77.0**																
1	Grading (Phase 1)	Grader	1	40	85	25	0		91.0	1.5	90	80	5	5	0	20	5	25	20.6	7.1	25.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Grader	1	40	85	500	0		64.9	6.5	390	60	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Scraper	0	40	84	25	0		90.0	1	60	0	5	5	0	20	5	25	20.6	7.1	25.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Scraper	0	40	84	500	0		63.9	7	420	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Tractor	0	40	84	25	0		90.0	1	60	0	5	5	0	20	5	25	20.6	7.1	25.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Tractor	0	40	84	500	0		63.9	7	420	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Backhoe	0	40	78	25	0		84.0	1	60	0	5	5	0	20	5	25	20.6	7.1	25.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Backhoe	0	40	78	500	0		57.9	7	420	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Grading (Phase 1) Phase	**79.8**																
1	Building Construction (Phase 1)	Man Lift	1	20	75	290	0		59.7	8	480	53	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
		Tractor	1	40	84	290	0		68.7	8	480	65	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
		Backhoe	1	40	78	290	0		62.7	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
											Total Aggregate Noise Exposure from Building Construction (Phase 1) Phase	**65.9**																
1	Paving (Phase 1)	Paver		50			0		#NUM!	1	60	0	5	5	0	10	5	15	11.2	7.1	15.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Paver	0	50	77	500	0		56.9	7	420	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		All Other Equipment > 5 HP	1	50	85	15	0		95.4	0.25	15	77	5	5	0	10	5	15	11.2	7.1	15.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		All Other Equipment > 5 HP	1	50	85	500	0		64.9	7.75	465	62	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Roller	0	20	80	15	0		90.4	1	60	0	5	5	0	10	5	15	11.2	7.1	15.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Roller	0	20	80	500	0		59.9	7	420	0	5	5	0	495	5	500	495.0	7.1	500.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Paving (Phase 1) Phase	**77.5**																
1	Architectural Coating (Phase 1)	Compressor (air)	1	40	78	290	0		62.7	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
											Total Aggregate Noise Exposure from Architectural Coating (Phase 1) Phase	**58.7**																
2	Building Construction (Phase 2)	Man Lift	1	20	75	90	0		69.8	8	480	63	5	5	0	85	5	90	85.1	7.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Tractor	1	40	84	90	0		78.8	8	480	75	5	5	0	85	5	90	85.1	7.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Backhoe	1	40	78	95	0		72.4	8	480	68	5	5	0	90	5	95	90.1	7.1	95.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Building Construction (Phase 2) Phase	**76.0**																
2	Architectural Coating (Phase 2)	Compressor (air)	1	40	78	40	0		79.9	8	480	76	5	5	0	35	5	40	35.4	7.1	40.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Architectural Coating (Phase 2) Phase	**75.9**																

Appendix C

Traffic Noise Modeling Input and Output

Appendix C

Traffic Noise Modeling Calculations - Summary

Project: 15953 Olive Park Apartments

Number	Segment Description and Location Name	From	To	Existing Year 2024	Existing Year 2024 + Project	Δ Existing Year 2024 – Existing Year 2024 + Project	Near-Term 2026	Near-Term 2026 + Project	Δ Near-Term 2026 – Near-Term 2026 + Project
Summary of Net Changes									
1	College Boulevard	North of Olive Drive	Olive Drive	74.9	74.9	0.0	75.0	75.1	0.0
2	College Boulevard	Olive Drive	South of Olive Drive	73.1	73.2	0.1	73.2	73.3	0.1
3	Olive Drive	West of Bradley Street	Bradley Street	45.3	53.7	8.4	45.3	53.7	8.4
4	Olive Drive	Bradley Street	College Boulevard	49.3	54.5	5.3	49.3	54.5	5.3
5	Olive Drive	College Boulevard	Joann Drive	68.3	68.4	0.1	68.4	68.5	0.1

*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.

Appendix C

Traffic Noise Modeling Calculations - Summary

Project: 15953 Olive Park Apartments

Number	Name	Segment Description and Location From	To	Buildout 2050	Buildout 2050 + Project	Δ Buildout 2050 – Buildout 2050 + Project
Summary of Net Changes						
1	College Boulevard	North of Olive Drive	Olive Drive	76.5	76.6	0.0
2	College Boulevard	Olive Drive	South of Olive Drive	75.2	75.2	0.0
3	Olive Drive	West of Bradley Street	Bradley Street	47.3	54.0	6.7
4	Olive Drive	Bradley Street	College Boulevard	51.3	55.2	3.9
5	Olive Drive	College Boulevard	Joann Drive	69.0	69.1	0.1

*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.

Appendix C - 1
Traffic Noise Model Calculations

Project: 15953 Olive Park Apartments

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor: 10

	Segment Description and Location			Input										Output				
						Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics							Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Med	% Hvy	% Day	% Eve	% Night	CNEL, (dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
Existing Year 2024 Conditions																		
1	College Boulevard	North of Olive Drive	Olive Drive	49,791	45	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	74.9	106	229	493	1062
2	College Boulevard	Olive Drive	South of Olive Drive	32,727	45	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	73.1	80	173	373	803
3	Olive Drive	West of Bradley Street	Bradley Street	233	25	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	45.3	1	2	5	11
4	Olive Drive	Bradley Street	College Boulevard	586	25	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	49.3	2	4	10	21
5	Olive Drive	College Boulevard	Joann Drive	22,100	35	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	68.3	39	83	180	388

*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.

Appendix C - 2

Traffic Noise Model Calculations

Project: 15953 Olive Park Apartments

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor: 10

	Segment Description and Location			Input											Output				
						Distance to Directional Centerline, (feet)4		Traffic Distribution Characteristics							CNEL,	Distance to Contour, (feet)3			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Med	% Hvy	% Day	% Eve	% Night		(dBA)5,6,7	70 dBA	65 dBA	60 dBA	55 dBA
Existing Year 2024 + Project Conditions																			
1	College Boulevard	North of Olive Drive	Olive Drive	50,273	45	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%		74.9	107	230	496	1069
2	College Boulevard	Olive Drive	South of Olive Drive	33,278	45	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%		73.2	81	175	377	812
3	Olive Drive	West of Bradley Street	Bradley Street	1,611	25	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%		53.7	4	9	19	41
4	Olive Drive	Bradley Street	College Boulevard	1,964	25	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%		54.5	5	10	22	46
5	Olive Drive	College Boulevard	Joann Drive	22,444	35	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%		68.4	39	84	182	392

*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.

Appendix C - 1
Traffic Noise Model Calculations

Project: 15953 Olive Park Apartments

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor: 10

	Segment Description and Location			Input										Output				
						Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics						CNEL,	Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Med	% Hvy	% Day	% Eve	% Night	(dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
Near-Term 2026 Conditions																		
1	College Boulevard	North of Olive Drive	Olive Drive	51,124	45	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	75.0	108	233	502	1081
2	College Boulevard	Olive Drive	South of Olive Drive	33,711	45	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	73.2	82	176	380	819
3	Olive Drive	West of Bradley Street	Bradley Street	233	25	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	45.3	1	2	5	11
4	Olive Drive	Bradley Street	College Boulevard	586	25	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	49.3	2	4	10	21
5	Olive Drive	College Boulevard	Joann Drive	22,515	35	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	68.4	39	85	182	392

*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.

Appendix C - 2

Traffic Noise Model Calculations

Project: 15953 Olive Park Apartments

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor: 10

Segment Description and Location				Input											Output				
						Distance to Directional Centerline, (feet)4		Traffic Distribution Characteristics							CNEL,	Distance to Contour, (feet)3			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Med	% Hvy	% Day	% Eve	% Night		(dBA)5,6,7	70 dBA	65 dBA	60 dBA	55 dBA
Near-Term 2026 + Project Conditions																			
1	College Boulevard	North of Olive Drive	Olive Drive	51,606	45	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%		75.1	109	234	505	1087
2	College Boulevard	Olive Drive	South of Olive Drive	34,262	45	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%		73.3	83	178	384	828
3	Olive Drive	West of Bradley Street	Bradley Street	1,611	25	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%		53.7	4	9	19	41
4	Olive Drive	Bradley Street	College Boulevard	1,964	25	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%		54.5	5	10	22	46
5	Olive Drive	College Boulevard	Joann Drive	22,859	35	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%		68.5	40	85	184	396

*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.

Appendix C - 3

Traffic Noise Model Calculations

Project: 15953 Olive Park Apartments

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor: 10

Segment Description and Location				Input										Output				
						Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics						CNEL,	Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Med	% Hvy	% Day	% Eve	% Night	(dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
Buildout 2050																		
1	College Boulevard	North of Olive Drive	Olive Drive	72,596	45	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	76.5	137	294	634	1365
2	College Boulevard	Olive Drive	South of Olive Drive	52,961	45	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	75.2	111	238	514	1106
3	Olive Drive	West of Bradley Street	Bradley Street	373	25	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	47.3	2	3	7	15
4	Olive Drive	Bradley Street	College Boulevard	938	25	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	51.3	3	6	13	28
5	Olive Drive	College Boulevard	Joann Drive	25,787	35	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	69.0	43	93	199	429

*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.

Appendix C - 4

Traffic Noise Model Calculations

Project: 15953 Olive Park Apartments

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor: 10

Segment Description and Location				Input											Output				
						Distance to Directional Centerline, (feet)4		Traffic Distribution Characteristics								Distance to Contour, (feet)3			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Med	% Hvy	% Day	% Eve	% Night	CNEL, (dBA)5,6,7	70 dBA	65 dBA	60 dBA	55 dBA
Buildout 2050 + Project																		
1	College Boulevard	North of Olive Drive	Olive Drive	73,078	45	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	76.6	137	295	637	1371
2	College Boulevard	Olive Drive	South of Olive Drive	53,512	45	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	75.2	111	240	517	1114
3	Olive Drive	West of Bradley Street	Bradley Street	1,751	25	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	54.0	4	9	20	43
4	Olive Drive	Bradley Street	College Boulevard	2,316	25	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	55.2	5	11	24	52
5	Olive Drive	College Boulevard	Joann Drive	26,131	35	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	69.1	43	93	201	433

*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.

Appendix C - Construction Traffic

Traffic Noise Modeling Calculations - Summary

Project: 15953 Olive Park Apartments

Number	Name	Segment Description and Location From	To	Existing Year 2024	Existing Year 2024 + Construction Traffic	Δ Existing Year 2024 – Existing Year 2024 + Construction Traffic
Summary of Net Changes						
1	College Boulevard	North of Olive Drive	Olive Drive	74.9	74.9	0.0
2	College Boulevard	Olive Drive	South of Olive Drive	73.1	73.1	0.1
3	Olive Drive	West of Bradley Street	Bradley Street	45.3	49.8	4.5
4	Olive Drive	Bradley Street	College Boulevard	49.3	51.7	2.4
5	Olive Drive	College Boulevard	Joann Drive	68.3	68.5	0.1

*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.

Appendix C - Construction Traffic - 1

Traffic Noise Model Calculations

Project: 15953 Olive Park Apartments

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor: 10

Segment Description and Location				Input										Output				
						Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics						CNEL,	Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Med	% Hvy	% Day	% Eve	% Night	(dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
Existing Year 2024 Conditions																		
1	College Boulevard	North of Olive Drive	Olive Drive	49,791	45	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	74.9	106	229	493	1062
2	College Boulevard	Olive Drive	South of Olive Drive	32,727	45	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	73.1	80	173	373	803
3	Olive Drive	West of Bradley Street	Bradley Street	233	25	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	45.3	1	2	5	11
4	Olive Drive	Bradley Street	College Boulevard	586	25	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	49.3	2	4	10	21
5	Olive Drive	College Boulevard	Joann Drive	22,100	35	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	68.3	39	83	180	388

*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.

Appendix C - Construction Traffic - 2

Traffic Noise Model Calculations

Project: 15953 Olive Park Apartments

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor: 10

Segment Description and Location				Input										Output				
						Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics						CNEL,	Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Med	% Hvy	% Day	% Eve	% Night	(dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
Existing Year 2024 + Construction Traffic Conditions																		
1	College Boulevard	North of Olive Drive	Olive Drive	50,221	45	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	74.9	107	230	496	1068
2	College Boulevard	Olive Drive	South of Olive Drive	33,157	45	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	73.1	81	174	376	810
3	Olive Drive	West of Bradley Street	Bradley Street	663	25	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	49.8	2	5	10	23
4	Olive Drive	Bradley Street	College Boulevard	1,016	25	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	51.7	3	6	14	30
5	Olive Drive	College Boulevard	Joann Drive	22,874	35	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	68.5	40	85	184	397

*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.

Appendix C1

Remodel for Construction Traffic Noise

Appendix C - Construction Traffic

Traffic Noise Modeling Calculations - Summary

Project: 15953 Olive Park Apartments

Number	Name	From	To	Existing Year 2024	Existing Year 2024 + Construction Traffic	Δ Existing Year 2024 – Existing Year 2024 + Construction Traffic
	Segment Description and Location					
Summary of Net Changes						
1	College Boulevard	North of Olive Drive	Olive Drive	74.9	75.0	0.1
2	College Boulevard	Olive Drive	South of Olive Drive	73.1	73.2	0.1
3	Olive Drive	West of Bradley Street	Bradley Street	45.3	51.9	6.7
4	Olive Drive	Bradley Street	College Boulevard	49.3	53.2	3.9
5	Olive Drive	College Boulevard	Joann Drive	68.3	68.5	0.2

*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.

Appendix C - Construction Traffic - 1

Traffic Noise Model Calculations

Project: 15953 Olive Park Apartments

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor: 10

Segment Description and Location				Input										Output				
						Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics						CNEL,	Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Med	% Hvy	% Day	% Eve	% Night	(dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
Existing Year 2024 Conditions																		
1	College Boulevard	North of Olive Drive	Olive Drive	49,791	45	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	74.9	106	229	493	1062
2	College Boulevard	Olive Drive	South of Olive Drive	32,727	45	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	73.1	80	173	373	803
3	Olive Drive	West of Bradley Street	Bradley Street	233	25	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	45.3	1	2	5	11
4	Olive Drive	Bradley Street	College Boulevard	586	25	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	49.3	2	4	10	21
5	Olive Drive	College Boulevard	Joann Drive	22,100	35	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	68.3	39	83	180	388

*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.

Appendix C - Construction Traffic - 2

Traffic Noise Model Calculations

Project: 15953 Olive Park Apartments

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor: 10

Segment Description and Location				Input										Output				
						Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics						CNEL,	Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Med	% Hvy	% Day	% Eve	% Night	(dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
Existing Year 2024 + Construction Traffic Conditions																		
1	College Boulevard	North of Olive Drive	Olive Drive	50,639	45	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	75.0	107	231	498	1074
2	College Boulevard	Olive Drive	South of Olive Drive	33,575	45	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	73.2	82	176	379	817
3	Olive Drive	West of Bradley Street	Bradley Street	1,081	25	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	51.9	3	7	14	31
4	Olive Drive	Bradley Street	College Boulevard	1,434	25	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	53.2	4	8	17	38
5	Olive Drive	College Boulevard	Joann Drive	22,948	35	50	50	97.0%	2.0%	1.0%	80.0%	5.0%	15.0%	68.5	40	86	184	397

*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.

Appendix D

Project Sound Source Calculation Data

AHUs (plenum-type return fan only, no condenser units [see separate worksheet]):

Building Minimum Ventilation

		63	125	250	500	1000	2000	4000	8000
	A-weighting adjustments	26	13	9	3	0	-1	-1	1
average of values for the two fan diameter ranges, per Guyer (Table 12)	plug	40	40	38	34	29	23	19	16
average of values for the two fan diameter ranges, per Guyer (Table 12)	tube	47	44	46	47	44	45	38	35
per Guyer (Table 12, presumed based on Bies & Hansen ENC)	prop	46	48	55	53	52	48	43	38

percent GSF actually occupied (and need ventilation): 95

														A-weighted PWL (for CadnaA inputs)								
Tag	Building	GSF	Avail. SF	Height (ft)	Avg. minutes to change air*	Volume (ft3)	CFM	m^2	comparable facility function	Pressure (iwg)	Pressure (Pa)	Q (m^3/s)	fantype = plug, tube, or prop	63	125	250	500	1000	2000	4000	8000	OA dB
return air fans in building rooftop AHUs:																						
Bldg1	Residential	79820	75829	57	5	1696795	339359	7048	residential	2.5	625	160	plug	72	84	85	86	83	76	70	65	**91**
Bldg2	Residential	102730	97594	51	5	942049	188409.7	9071	residential	2.5	625	89	plug	69	81	82	83	80	73	67	62	**88**

	63	125	250	500	1000	2000	4000	8000
fan or AHU cabinet liner/interior attenuation (excludes inlet/outlet PWL split, already in calcs above:	2	3	4	5	6	8	10	10

*from Loren Cook's "Engineering Cookbook", 1999 edition, p. 42

ACCs (air-cooled chillers on rooftops):

Building Interior Comfort

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

unweighted PWL (dB) per OCBF (Hz) at full load (100%)

	tons	LWA	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

actual percent of GSF occupied: 95

unweighted PWL (dB) per OCBF (Hz) at full load (100%)

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)	63	125	250	500	1000	2000	4000	8000
Bldg1	residential	79820	160075	residential - large	490	326.7	8	41	**94**	93	93	92	93	86	84	83	79
Bldg2	residential	102730	88873	residential - large	490	181.4	8	23	**78**	73	73	74	76	74	67	65	61

*based upon "lo" value per Loren Cook's "Engineering Cookbook", 1999 edition, pp. 59-60

Appendix E

CREATE Rail Operations Noise Model Worksheet

Noise Model Based on Federal Transit Adminstration General Transit Noise Assessment
Developed for Chicago Create Project

Case: Olive Park Apartments - Sprinter

RESULTS			
Noise Source	**Ldn (dB)**	**Leq - daytime (dB)**	**Leq - nighttime (dB)**
All Sources	59	52	52
Source 1	59	52	52
Source 2	0	0	0
Source 3	0	0	0
Source 4	0	0	0
Source 5	0	0	0
Source 6	0	0	0
Source 7	0	0	0
Source 8	0	0	0

Enter noise receiver land use category below.

LAND USE CATEGORY	
Noise receiver land use category (1, 2 or 3)	2

Enter data for up to 8 noise sources below - see reference list for source numbers.

NOISE SOURCE PARAMETERS								
Parameter	**Source 1**		**Source 2**		**Source 3**		**Source 4**	
Source Num.	Commuter Diesel Locomotive	2						
Distance (source to receiver)	distance (ft)	200						
Daytime Hours	speed (mph)	5						
(7 AM - 10 PM)	trains/hour	4						
	locos/train	1						
Nighttime Hours	speed (mph)	5						
(10 PM - 7 AM)	trains/hour	4						
	locos/train	1						
Wheel Flats?		0.00%						
Jointed Track?	Y/N	N						
Embedded Track?	Y/N	N						
Aerial Structure?	Y/N	N						
Barrier Present?	Y/N	Y						
Intervening Rows of of Buildings	number of rows	0						

SOURCE REFERENCE LIST	
Source	**Number**
Commuter Electric Locomotive	1
Commuter Diesel Locomotive	2
Commuter Rail Cars	3
RRT/LRT	4
AGT, Steel Wheel	5
AGT, Rubber Tire	6
Monorail	7
Maglev	8
Freight Locomotive	9
Freight Cars	10
Hopper Cars (empty)	11
Hopper Cars (full)	12
Crossover	13
Automobiles	14
City Buses	15
Commuter Buses	16
Rail Yard or Shop	17
Layover Tracks	18
Bus Storage Yard	19
Bus Op. Facility	20
Bus Transit Center	21
Parking Garage	22
Park & Ride Lot	23