Appendix G

Noise and Vibration Technical Report for the
Los Robles Comprehensive Cancer Center Project

Noise and Vibration Technical Report

Los Robles Comprehensive Cancer Center / 355 W Janss Road Land Use Change Project, City of Thousand Oaks, California

DECEMBER 2023

Prepared for:

CITY OF THOUSAND OAKS
2100 Thousand Oaks Boulevard
Thousand Oaks, California 91362

Prepared by:

DUDEK
621 Chapala Street
Santa Barbara, California 93101
Contacts: Mike Greene, INCE Bd. Cert.
Mark Storm, INCE Bd. Cert.

Printed on 30% post-consumer recycled material.

Table of Contents

TABLES

FIGURES

APPENDICES

Acronyms and Abbreviations

Acronym/Abbreviation	Definition
AHU	Air handling unit
ANSI	American National Standards Institute
APN	Assessor's Parcel Number
Caltrans	California Department of Transportation
Cancer Center	Los Robles Comprehensive Cancer Center
CEQA	California Environmental Quality Act
City	City of Thousand Oaks, California
CNEL	community noise equivalent level
C-O	Commercial Office
CZW	Construction zone width
dB	decibel
dBA	A-weighted decibels
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HVAC	heating, ventilation and air conditioning
Hz	hertz
ips	inches per second
Janss Road	355 W Janss Road General Plan Amendment and Zone Change
kHz	kilohertz
Ldn	day-night level
Leq	equivalent sound level
Lmax	maximum sound level during measurement interval
Lxx	Percentile-exceeded sound level
mPA	micro-Pascals
OPR	California Governor's Office of Planning and Research
OSHPD	Office of Statewide Health Planning and Development
OS-PR	Open Space, Protected Ridgeline Overlay
PD	Perpendicular distance
PL	Public, Quasi-Public, and Institutional Lands and Facilities Zone
PPV	peak particle velocity
RCNM	Roadway Construction Noise Model
R-3	Multi-Family Residential Zone
R-E-1AC	Rural-Exclusive
R-O-3AC	Single-Family Estate Zone – 3 AC Min. Lot Size
RPD-4.5U	Residential Planned Development, up to 4.5 dwelling units per acre
SB 330	Housing Crisis Act of 2019, or Senate Bill 330
SF	square foot/feet
SPL	sound pressure level
ST	short-term noise measurement location

Acronym/Abbreviation	Definition
TNM	Traffic Noise Model
V1	Traffic volume with project
V2	Traffic volume without project

INTENTIONALLY LEFT BLANK

1 Executive Summary

The purpose of this technical report is to assess the potential noise and vibration impacts associated with implementation of the proposed Los Robles Comprehensive Cancer Center (Cancer Center) and the 355 W Janss Road General Plan Amendment and Zone Change (Janss Road) Project (collectively the "Project"). This assessment utilizes the significance thresholds in Appendix G of the California Environmental Quality Act Guidelines (14 CCR 15000 et seq.).

1.1 Project Summary

The Project consists of two components: (1) redevelopment of the 4.92-gross acre site off Rolling Oaks Drive as a comprehensive cancer center medical building (Cancer Center); and (2) a concurrent request for a General Plan Amendment and zone change at 355 W Janss Road Site to ensure no net loss of residential zoning capacity from approval of the comprehensive cancer center (Janss Road). Both project components are described further in Section 2.

1.2 Summary of Findings

The results of this report are summarized below based on the significance criteria in Section 6 consistent with Appendix G of the CEQA Guidelines.

Table 1. Summary of Impact Determinations

Analysis	Report Section	Significance Determinations	
		Unmitigated	Mitigated
Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards during construction	7.1.1	Less-than-Significant with Mitigation	Less-than-Significant
	7.1.2	*Cancer Center:* Less-than-Significant *Janss Road:* Less-than-Significant with Mitigation	*Cancer Center:* Not Applicable *Janss Road:* Less-than-Significant
Generation of excessive groundborne vibration or groundborne noise levels during construction	7.2.1	Less-than-Significant	Not Applicable
	7.2.2	Less-than-Significant	Not Applicable
Exposure of people residing or working in the project area to excessive noise levels from a private airstrip or an airport	7.3	No Impact	Not Applicable

2 Project Background

2.1 Project Location

Cancer Center Site

The approximately 4.92-gross acre site is in the southern portion of the City of Thousand Oaks (City), which is in Ventura County. The site is bordered to the north by Rolling Oaks Drive and medical office development, to the west by Los Padres Drive and residential development, to the east by undeveloped land and residential development, and to the south by undeveloped land designated as Los Padres Open Space. The Cancer Center site consists of Assessor's Parcel Number (APN) 681-0180-265 and 681-0180-275. Specifically, the Cancer Center site is in Section 16, Township 1 North, Range 19 West, as depicted on the U.S. Geological Survey Thousand Oaks, California 7.5-minute topographic quadrangle map. Surrounding uses include the following:

- North: Existing surgical medical, PL (Public, Quasi-Public, and Institutional Lands and Facilities Zone)
- South: Vacant, OS-PR (Open Space, Protected Ridgeline Overlay)
- East: Vacant land and single-family residences in unincorporated Ventura County, R-O-3AC (Single-Family Estate Zone – 3 AC Min. Lot Size)
- West: Existing multifamily residential development, R-3 (Multi-Family Residential Zone)

The project location is shown in Figure 1. Regional access to the Cancer Center site is provided via U.S. Route 101, which is located 0.2 miles north of the site. Local access is provided via Rolling Oaks Drive and Los Padres Drive.

Janss Road Site

The 2.15- acre site is located at 355 W Janss Road in Thousand Oaks and approximately 2.3 miles northwest of the Cancer Center Site. The site is bordered to the north by a medical office development, to the west by Lynn Road and Arroyo Conejo Open Space, to the east by an internal access road and parking lot, and to the south by W Janss Road and residential development. The Janss Road Site consists of APN 522-0270-135. Specifically, the Site is in Section 00, Township 1 North, Range 18 West, as depicted on the U.S. Geological Survey Thousand Oaks, California 7.5-minute topographic quadrangle map.

Regional access to the Janss Road Site is provided via U.S. Route 101, located 1.55 miles south of the site. Local access is provided via Lynn Road and Janss Road.

2.2 Project Description

Cancer Center

Approval of the Cancer Center would require a General Plan Amendment to modify the Cancer Center Site's General Plan Land Use designation from Very Low Density Rural Residential to Commercial, and a Zone Change to modify the Cancer Center Site's zoning designation from Rural-Exclusive (R-E-1AC) to Commercial Office (C-O).

The Cancer Center would result in construction of a 58,412 square foot (SF) medical office that accommodates various cancer medical and patient services, having a split level amongst two stories with a mechanical rooftop screened with mansard roofing. The building height would range between 27 feet and 42 feet at its highest point. An Office of Statewide Health Planning and Development (OSHPD) 3 building is proposed, requiring state review and approval of building permits applied to clinics that are licensed pursuant to Health and Safety Code Section 1200. The medical building would accommodate patient rooms, treatment services, an office area for staff and physicians, conference/consultation rooms, a lounge, and general storage and utility areas.

The proposed Cancer Center consists of a new medical office building with primary access off Rolling Oaks Drive and secondary access off Los Padres Drive. Street-level parking would be provided on-site, including a drop-off area for patients. The Cancer Center would include 233 surface parking spaces, in accordance with the City Municipal Code requirements, including 26 electric vehicle charging spaces and 28 clean air stalls per CalGreen standards. In addition, and as shown in Figure 2, the Cancer Center would include pedestrian and bicycle facilities that provide safe, continuous accessibility to the facility, including pedestrian pathways, crosswalks, and bicycle parking spots (short-term and long-term).

Janss Road

The Housing Crisis Act of 2019, or Senate Bill 330 (SB 330), was passed in October 2019 to address California's housing shortage by expediting the approval process for housing development projects. The Housing Crisis Act prohibits some local discretionary land use controls and generally requires cities to approve housing developments that comply with the objective standards in local zoning codes and general plans. It generally requires that a housing development project only be subject to the ordinances, policies, and standards adopted and in effect when a preliminary application is submitted. The Act included amendments to the HAA, Planning and Zoning Law, and Permit Streamlining Act, setting new provisions statewide for housing development projects. Effective January 1, 2022, SB 330 is now extended until January 1, 2030, with the passage of SB 8.

The Cancer Center Project component would result in a General Plan Amendment to modify the Project site's General Plan Land Use designation from Very Low Density Rural Residential to Commercial, and a Zone Change to modify the Cancer Center Site's zoning designation from Rural-Exclusive (R-E-1AC) to Commercial Office (C-O). With this amendment and rezone, the potential for buildout of up to 9 residential units would not occur at the Cancer Center Site. To ensure compliance with the Housing Crisis Act and to allow the City to make the required findings pursuant to California's "No Net Loss" statute (California Government Code Section 65863), a General Plan Amendment from Institutional to Low Residential and Zone Change from Public, Quasi-public and institutional Lands and Facilities (PL) to Residential Planned Development, maximum 4.5 dwelling units per acre (RPD-4.5U) is proposed at the 2.15-acre site located at 355 W Janss Road in Thousand Oaks (APN 522-0270-135) (Janss Road Site). The Janss Road Site is currently used for surface parking for the existing surgical center and supporting medical services.

The Project would involve a General Plan Amendment to modify the Janss Road Site's General Plan Land Use designation from Institutional to Low Density Residential, and a Zone Change to modify the site's zoning designation from Public, Quasi-public and Institutional Lands and Facilities (PL) to Residential Planned Development, maximum 4.5 dwelling units per acre (RPD-4.5U).

3 Fundamentals of Noise and Vibration

3.1 Sound, Noise, and Acoustics

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a hearing organ, such as a human ear. Noise is defined as loud, unexpected, or annoying sound. In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receptor, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receptor determine the sound level and characteristics of the noise perceived by the receptor. The field of acoustics deals primarily with the propagation and control of sound.

Frequency

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low-frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or Hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz (kHz), or thousands of Hertz. The audible frequency range for humans is generally between 20 Hz and 20,000 Hz.

Sound Pressure Levels and Decibels

The amplitude of pressure waves generated by a sound source determines the loudness of that source. Sound pressure amplitude is measured in micro-Pascals (mPa). One mPa is approximately one hundred billionth (0.00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 to 100,000,000 mPa. Because of this huge range of values, sound is rarely expressed in terms of mPa. Instead, a logarithmic scale is used to describe sound pressure level (SPL) in terms of decibels (dB). The threshold of hearing for young people is about 0 dB, which corresponds to 20 mPa.

Addition of Decibels

Because decibels are logarithmic units, SPL cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3 dB increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a receptor equidistant to each sound source would be 3 dB higher than one source under the same conditions. For example, if one automobile produces an SPL of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB—rather, they would combine to produce 73 dB. Under the decibel scale, three sources of equal loudness together produce a sound level 5 dB louder than one source.

A-Weighted Decibels

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. 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 in the range of audible frequencies as well as in the way it perceives the SPL in that range. In general, people are most sensitive to the frequency range of 1,000–8,000 Hz and perceive sounds within that range better than sounds of the same amplitude in higher or lower frequencies. To approximate the response of the human ear, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies. Then, an “A-weighted” sound level (expressed in units of dBA) can be computed based on this information.

The A-weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments of 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 problems (e.g., B-, C-, D-, and G-scales), but these scales are rarely used in conjunction with highway traffic noise. Noise levels for traffic noise reports are typically reported in terms of A-weighted decibels (dBA). Table 2 provides typical outdoor and indoor noise sources against a decreasing linear scale of A-weighted sound levels.

Table 2. Typical A-Weighted Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	— 110 —	Rock band
Jet fly-over at 1000 feet		
	— 100 —	
Gas lawn mower at 3 feet		
	— 90 —	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	— 80 —	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	— 70 —	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	— 60 —	
		Large business office
Quiet urban daytime	— 50 —	Dishwasher next room
Quiet urban nighttime	— 40 —	Theater, large conference room (background)
Quiet suburban nighttime		
	— 30 —	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	— 20 —	
		Broadcast/recording studio
	— 10 —	
Lowest threshold of human hearing	— 0 —	Lowest threshold of human hearing

Source: Caltrans 2013.

Human Response to Changes in Noise Levels

As discussed above, doubling sound energy results in a 3 dB increase in sound. However, given a sound level change measured with precise instrumentation, the subjective human perception of a doubling of loudness will usually be different than what is measured.

Under controlled conditions in an acoustical laboratory, the trained, healthy human ear is able to discern 1 dB changes in sound levels, when exposed to steady, single-frequency ("pure-tone") signals in the mid-frequency (1,000 Hz–8,000 Hz) range (Caltrans 2013). In typical noisy environments, changes in noise of 1 to 2 dB are generally not perceptible. However, it is widely accepted that people can begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5 dB increase is generally perceived as a distinctly noticeable increase, and a 10 dB increase is generally perceived as a doubling of loudness. Therefore, a doubling of sound energy (e.g., doubling the volume of traffic on a highway) that would result in a 3 dB increase in sound would generally be perceived as barely detectable.

Noise Descriptors

Noise in our daily environment fluctuates over time at varying rates. Various noise descriptors have been developed to describe time-varying noise levels. The following are the noise descriptors are utilized in this analysis.

- **Equivalent Sound Level (L_{eq}):** L_{eq} represents an energy average of the sound level occurring over a specified period. The 1-hour A-weighted equivalent sound level (L_{eq}[h]) is the energy average of A-weighted sound levels occurring during a one-hour period and is the basis for noise abatement criteria used by the California Department of Transportation (Caltrans) and the Federal Highway Administration (FHWA). Note that L_{eq} is not an arithmetic average of varying dB levels over a period of time, it accounts for greater sound energy represented by higher decibel contributions.
- **Percentile-Exceeded Sound Level (L_{xx}):** L_{xx} represents the sound level exceeded for a given percentage of a specified period (e.g., L_{10} is the sound level exceeded 10% of the time, and L_{90} is the sound level exceeded 90% of the time).
- **Maximum Sound Level (L_{max}):** L_{max} is the highest instantaneous sound level measured during a specified period.
- **Day-Night Level (L_{dn}):** L_{dn} is the energy average of A-weighted sound levels occurring over a 24-hour period, with a 10 dB penalty applied to A-weighted sound levels occurring during nighttime hours between 10 p.m. and 7 a.m.
- **Community Noise Equivalent Level (CNEL):** Similar to L_{dn}, CNEL is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10 dB penalty applied to A-weighted sound levels occurring during the nighttime hours between 10 p.m. and 7 a.m., and a 5 dB penalty applied to the A-weighted sound levels occurring during evening hours between 7 p.m. and 10 p.m.

Sound Propagation

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

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

- **Ground Absorption –** The propagation path of noise from a sound emission source to a receptor is usually horizontal and proximate to the ground. Under these conditions, noise attenuation from ground absorption and reflective-wave canceling can add to the attenuation associated with geometric spreading. For acoustically "hard" paths over which sound may traverse (i.e., sites with a reflective surface between the source and the receptor, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or "soft" sites (i.e., those sites with an absorptive ground surface between the source and the receptor, such as fresh-fallen snow, soft dirt, or dense vegetative ground cover), an additional ground-attenuation value of +1.5 dB per doubling of distance is normally assumed. When added to cylindrical spreading for line source sound propagation, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance.
- **Atmospheric Absorption –** In addition to aforementioned geometric spreading, the fluid medium (i.e., the air) through which sound travels yields frequency-dependent attenuation that increases in magnitude with increasing frequency. The effect is influenced by temperature and relative humidity, and typically negligible over short source-to-receptor distances (e.g., less than 500 feet); but it helps explain why lower-frequency sound such as a thunderclap appears to "travel farther" over great distances.
- **Meteorological Effects –** Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound pressure levels can also be increased at large distances (e.g., more than 500 feet) due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects when distances between a source and receptor are large.
- **Shielding by Natural or Human-Made Features –** A large object or barrier in the direct path between a noise source and a receptor can substantially attenuate noise levels at the receptor. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and ridgelines) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receptor specifically to reduce noise. A barrier that breaks the line of sight between a source and a receptor will typically result in at least 5 dB of noise reduction. Taller barriers provide increased noise reduction. While a line of trees may visually occlude the direct line between a source and a receptor, its actual noise-reducing effect is usually negligible because it does not create an acoustically solid barrier. Deep expanses of dense wooded areas, on the other hand, can offer noise reduction under the right conditions.

3.2 Vibration

Vibration is oscillatory movement of mass (typically a solid) over time. It is described in terms of frequency and amplitude and, unlike sound, can be expressed as displacement, velocity, or acceleration. For environmental studies, vibration is often studied as a velocity that, akin to the discussion of sound pressure levels, can also be expressed in dB as a way to cast a large range of quantities into a more convenient scale. Vibration impacts to buildings are generally discussed in terms of inches per second (ips) peak particle velocity (PPV), which will be used herein to discuss vibration levels for ease of reading and comparison with relevant standards. Vibration can also be annoying and thereby impact occupants of structures, and vibration of sufficient amplitude can disrupt sensitive equipment and processes (Caltrans 2020), such as those involving the use of electron microscopes and lithography equipment. Common sources of vibration within communities include construction activities and railroads. Groundborne vibration generated by construction projects is usually highest during pile driving, rock blasting, soil compacting, jack hammering, and demolition-related activities where sudden releases of subterranean energy or powerful impacts of tools on hard materials occur. Depending on their distances to a sensitive receptor, operation of large bulldozers, graders, loaded dump trucks, or other heavy construction equipment and vehicles on a construction site also have the potential to cause high vibration amplitudes. The maximum vibration level standard used by Caltrans for the prevention of structural damage to typical residential buildings is 0.3 ips PPV (Caltrans 2020). For human annoyance, Caltrans guidance indicates that a more stringent threshold of 0.2 ips PPV due to continuous vibration (e.g., nearby roadway traffic) would be “annoying.” Vibration velocity limits for transient or single events tend to be less stringent than those for continuous or “steady-state” vibration sources.

INTENTIONALLY LEFT BLANK

4 Existing Noise Environment

4.1 Cancer Center Site

Ambient noise measurements were conducted in the vicinity of the site to characterize the existing noise environment. The measurements were conducted on March 9, 2023 using a Piccolo II Integrating Sound Level Meter equipped with a 0.5-inch, pre-polarized condenser microphone with pre-amplifier. The sound level meter meets the current American National Standards Institute (ANSI) standard for a Type 2 (General Use) sound level meter. The calibration of the sound level meter was verified before and after the measurements, and the measurements were conducted with the measurement microphone covered with a windscreen and positioned approximately five feet above the ground.

Three noise measurement locations were selected (ST1–ST3), representing existing noise-sensitive receptors in the project vicinity. The measurement locations are shown in Figure 3, Baseline Sound Measurement and Traffic Noise Assessment Locations – Cancer Center,[1] and the measured average noise levels and measurement locations are provided in Table 3. Noise measurement data is also included in Appendix A. As shown in Table 3, measured ambient noise levels ranged from approximately 50 dBA L_{eq} at ST2 to 56 dBA L_{eq} at ST3. The primary noise source at the measurement locations consisted of distant traffic from the 101 freeway to the north and local traffic along the adjacent roadways. Secondary noise sources included distant aircraft noise, distant conversations, and birdsong.

Table 3. Measured Existing Outdoor Ambient Sound Levels – Cancer Center Site

Receptors	Location/Address	Date	Time	L_{eq} (dBA)	L_{max} (dBA)
ST1	West of Project site, adjacent to multi-family residences at 300 Rolling Oaks Drive (Bldg. #6)	March 9, 2023	12:00 p.m. – 12:15 p.m.	52.0	67.4
ST2	West of Project site, adjacent to multi-family residences at 300 Rolling Oaks Drive (Bldg. #9)	March 9, 2023	10:24 a.m. – 10:38 a.m.	50.4	65.0
ST3	East of Project site, adjacent to single-family residence at 243 Rimrock Road	March 9, 2023	10:55 a.m. – 11:10 a.m.	55.7	75.0

Source: Appendix A
Notes: L_{eq} = equivalent continuous sound level (time-averaged sound level); L_{max} = maximum sound level during the measurement interval.

[1] The purpose of the modeled (M1) receptor shown in Figure 3 is for the assessment of offsite operational noise (i.e., traffic noise; see Section 7.1.2).

4.2 Janss Road Site

Ambient noise measurements were conducted in the vicinity of the Janss Road site to characterize the existing noise environment. The measurements were conducted on July 20, 2023 using a Rion NL-52 Sound Level Meter equipped with a 0.5-inch, pre-polarized condenser microphone with pre-amplifier. The sound level meter meets the current American National Standards Institute (ANSI) standard for a Type 1 (General Use) sound level meter. The calibration of the sound level meter was verified before and after the measurements, and the measurements were conducted with the measurement microphone covered with a windscreen and positioned approximately five feet above the ground.

Two noise measurement locations were selected (ST4–ST5), representing existing noise-sensitive receptors in the vicinity. The measurement locations are shown in Figure 4. Noise measurement data is also included in Appendix A. As shown in Table 4, measured ambient noise levels ranged from approximately 61 dBA L_{eq} at ST4 to 67 dBA L_{eq} at ST5. The primary noise source at the measurement locations consisted of traffic from Janss Road and Lynn Road. Secondary noise sources included distant aircraft noise, leaves rustling, and birdsong.

Table 4. Measured Existing Outdoor Ambient Sound Levels – Janss Road Site

Receptors	Location/Address	Date	Time	L_{eq} (dBA)	L_{max} (dBA)
ST4	Adjacent to residences south of site	July 20, 2023	12:53 p.m. – 1:08 p.m.	60.6	72.7
ST5	Adjacent to residences southwest of site	July 20, 2023	1:16 p.m. – 1:31 p.m.	67.4	85.7

Source: Appendix A
Notes: L_{eq} = equivalent continuous sound level (time-averaged sound level); L_{max} = maximum sound level during the measurement interval.

5 Regulatory Setting

5.1 Federal

There are no federal noise regulations applicable to the Project. However, various federal agencies have established rules and guidelines addressing noise and vibration. For example, in its Transit Noise and Vibration Impact Assessment guidance manual (FTA 2018), the Federal Transit Administration (FTA) offers guidance on the estimation of construction noise levels from a construction Project site. It also provides suggested thresholds that include no more than 80 dBA L_{eq} (over an 8-hour daytime period) as received at a residential land use. Since the City does not provide a quantified construction noise limit, this analysis adopts the 80 dBA L_{eq8h} FTA guidance for quantitative construction noise impact assessment.

5.2 State

State

Government Code Section 65302(g)

California Government Code Section 65302(g) requires the preparation of a Noise Element in a community general plan, which shall identify and appraise the noise problems for the community. The Noise Element shall recognize the guidelines adopted by the Office of Noise Control in the State Department of Health Services and shall quantify, to the extent practicable, current and projected noise levels for major noise sources such as highways and freeways, primary arterials and major local streets, rail lines, airports and industrial plants.

California General Plan Guidelines

The California General Plan Guidelines, published by the Governor's Office of Planning and Research (OPR), provides guidance for the acceptability of specific land use types within areas of specific noise exposure. OPR guidelines are advisory in nature. Local jurisdictions, including the City, have the responsibility to set specific noise standards based on local conditions (OPR 2017).

California Department of Transportation

In its Transportation and Construction Vibration Guidance Manual, Caltrans recommends a vibration velocity threshold of 0.2 ips PPV (Caltrans 2020) for assessing annoying vibration impacts to occupants of residential structures. Although this Caltrans guidance is not a regulation, it can serve as a quantified standard in the absence of such limits at the local jurisdictional level. Similarly, thresholds to assess building damage risk due to construction vibration vary with the type of structure and its fragility but tend to range between 0.2 ips and 0.3 ips PPV for typical residential structures (Caltrans 2020).

5.3 Local

City of Thousand Oaks General Plan Noise Element

The Project site is located within the City of Thousand Oaks, as are the existing residences and other noise-sensitive land uses in the surrounding area. The noise criteria identified in the Noise Element of the Thousand Oaks General Plan are guidelines to evaluate the land use compatibility of outdoor environmental noise levels. The land use compatibility guidelines indicate that low-density and multifamily residential land uses are considered normally acceptable with noise levels below 60 dBA CNEL and conditionally acceptable with noise levels below 65 dBA CNEL (City of Thousand Oaks 2000).

Furthermore, the Noise Element of the Thousand Oaks General Plan, Chapter 4.6, Noise Considerations in Environmental Impact Reports and Negative Declarations, Section 4.6.1, identifies standards for operational noise in which a significant impact would occur at receiving sensitive land uses (i.e., residences to the west and east of the Project site) (City of Thousand Oaks 2000):

- Project-related increase of greater than 1.0 dBA at residences in areas where annual average noise level at General Plan build-out would be between 55 and 60 dBA CNEL.
- Project-related increase of greater than 0.5 dBA at residences in areas where the annual average noise level at General Plan build-out would be greater than 60 dBA CNEL.

For purposes of this noise assessment, and consistent with the "all sources" phrasing in Table 9 of Section 4.6.1 of the Noise Element, the Project-attributed increase to the outdoor ambient sound environment (expressed as CNEL) encompasses both changes to local surface transportation noise (roadway noise) and on-site operation of stationary sources (e.g., rooftop heating, ventilation, air conditioning systems, standby generators etc.).

City of Thousand Oaks Municipal Code

The Noise Ordinance presented in Title 5, Chapter 21, Noise, does not provide quantitative standards for noise regulation. However, Section 8-11.01 of the City's Municipal Code currently limits construction activity to between the hours of 7:00 a.m. and 7:00 p.m., Monday through Saturday, unless permission is specifically granted by the Public Works Department for work outside these hours (i.e., 7:00 p.m. to 7:00 a.m. Monday through Saturday and anytime on Sundays).

6 Significance Criteria

6.1 Significance Thresholds

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

a. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
b. Generation of excessive groundborne vibration or groundborne noise levels.
c. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, the exposure of people residing or working in the project area to excessive noise levels.

Quantitative thresholds of significance have been established for the purposes of this analysis based on the local polices and regulations described in Section 5.3 as well as those of federal and State agencies and are listed below.

- **Construction Noise:** During construction activities, an exceedance of the FTA's 80 dBA $L_{eq\ 8\text{-}hr}$ threshold is considered a significant noise impact.

  Additionally, consistent with other recent project noise impact assessments under City jurisdiction, when a relative increase attributed to project construction noise would be greater than 10 dB compared with pre-construction daytime outdoor ambient sound levels, the corresponding temporary impact to potentially affected nearest offsite receptors would be considered significant.
- **Traffic Noise and Project-Related Stationary Noise:** Consistent with the City's Noise Element, project-related increases in either traffic noise or on-site stationary source noise at noise-sensitive land uses (residences) would be considered significant if the following were to occur:
  - Project-related increase of greater than 1.0 dBA at residences in areas where annual average noise level at General Plan build-out would be between 55 and 60 dBA CNEL.
  - Project-related increase of greater than 0.5 dBA at residences in areas where the annual average noise level at General Plan build-out would be greater than 60 dBA CNEL.
  - Additionally, for the emergency generator, City of Thousand Oaks planning staff have established a noise limit of 60 dBA at the project's property boundary.
- **Construction Vibration:** Groundborne vibration from construction and operation of the Project would be considered significant if the Project resulted in vibration levels exceeding the Caltrans recommendations (i.e., 0.2 ips PPV for annoyance, during construction and operation).

INTENTIONALLY LEFT BLANK

7 Impact Analysis

7.1 Significance Threshold 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?

7.1.1 Construction

Cancer Center

Project construction is proposed to begin in February 2024 and occur over approximately 18 months with project completion in August 2025. For purposes of this environmental analysis, project construction is assumed to occur in the following sequence:

- Demolition: approximately 29 days.
- Grading: approximately 90 days.
- Building construction: approximately 428 days duration.
- Architectural coating: approximately 120 days duration.
- Paving and landscaping: approximately 113 days.

The types of construction equipment that would be used to construct the proposed Project include standard equipment that would be employed for any routine construction project of this scale, such as graders, tractors, loaders, cranes, rubber-tired bulldozers, generators, and paving equipment. No blasting, on-site rock crushing or pile driving would be necessary.

Construction noise is difficult to quantify because of the many variables involved, including the specific equipment types, size of equipment used, percentage of time each piece is in operation, condition of each piece of equipment, and number of pieces that would operate on the site. The range of maximum noise levels for various types of common construction equipment at a distance of 50 feet is shown in Table 5. The noise values represent maximum noise generation, or full- power operation of the equipment. As an example, a loader and two dozers, all operating at full power and relatively close together, would generate a maximum sound level of approximately 90 dBA at 50 feet from their operations. As one increases the distance between equipment or separation of areas with simultaneous construction activity, dispersion and distance attenuation reduce the effects of separate noise sources added together. In addition, typical operating cycles may involve 2 minutes of full-power operation, followed by 3 or 4 minutes at lower levels. The average noise level during construction activities is generally lower (typical levels of approximately 88 dBA L_{eq} at a distance of 50 feet) since maximum noise generation may only occur up to 50% of the time. Noise levels from construction operations decrease at a rate of approximately 6 dBA per doubling of distance from the source.

Table 5. Typical Construction Equipment Noise Emission Levels

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

Source: FTA 2018.

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

Table 6 provides a summary of the predicted construction noise exposure levels by each phase at the three nearest noise-sensitive receptor locations—associated with the three short-term baseline sound level survey positions listed in Table 3 and appearing in Figure 3. The input and output data are provided in Appendix B. Project construction noise exposure levels at other receivers further away from the site would be less, due primarily to natural distance-dependent attenuation factors such as geometric divergence, air absorption, ground surface absorption.

Table 6. Construction Noise Model Results Summary – Cancer Center Site

Construction Phase	Construction Noise Exposure at Nearest Offsite Sensitive Receptors ($L_{eq\ 8\text{-}hr}$ [dBA])		
	ST1 (approximately 70' from project construction boundary)	ST2 (approximately 70' from project construction boundary)	ST3 (approximately 255' from project construction boundary)
Demolition	76	76	62
Grading	78	78	65
Building Construction	66	66	60
Paving	75	75	61
Architectural Coating	58	58	52

Source: Appendix B.
Notes: L_{eq} = equivalent continuous sound level; dBA = A-weighted decibel.

As shown in Table 6, predicted typical construction noise exposure levels at the nearest noise-sensitive land uses (multi-family residences to the west, 70 feet away from nearest operating onsite equipment) are estimated to range from approximately 58 dBA $L_{eq\ 8\text{-}hr}$ during the architectural coating phase to approximately 78 dBA $L_{eq\ 8\text{-}hr}$ during the grading phase. This 20 dB range of predicted construction noise levels is due to the intensity of construction activity, expected quantities and types of involved construction equipment, and equipment-to-receptor distances that may vary with the indicated construction phase. Because the existing samples of daytime outdoor ambient sound level at locations ST1 and ST2 that represent the nearest offsite receptors west of the project range from 50 to 52 dBA L_{eq}, the relative increase expected at these locations attributed to typical project construction noise would range from 8 to 28 dB.

The next-nearest noise-sensitive receiver (the single-family residences located to the east, represented by ST3) are located further from the project site. Thus, estimated typical construction noise levels would be lower, ranging from approximately 52 dBA $L_{eq\ 8\text{-}hr}$ during the architectural coating phase to approximately 65 dBA $L_{eq\ 8\text{-}hr}$ during the site grading phase under typical conditions. Per this estimation method, the anticipated relative increase to the existing sampled daytime outdoor ambient sound level at ST3 would be up to 9 dBA, on the basis of the sample measured outdoor ambient sound level of 56 dBA.

As discussed previously, City Municipal Code Section 8-11.01 does not permit construction noise that would create a noise disturbance between the hours of 7:00 p.m. and 7:00 a.m. Since the proposed project would not conduct noisy construction activities between these hours of 7:00 p.m. and 7:00 a.m., then the predicted construction noise levels expressed as 8-hour L_{eq} values as appearing in Table 6 would not exceed the FTA's advisory noise standard of 80 dBA $L_{eq\ 8\text{-}hr}$ for either typical or nearest noise estimation techniques for both the eastern and western nearest offsite receptors. Therefore, on this basis, proposed project construction noise exposure at these nearest eastern and western offsite noise-sensitive receptors would be compatible with oft-used federal guidance for purposes of construction noise assessment.

However, and while the effect would be temporary and would cease upon conclusion of project construction, the aforementioned relative increases to the existing outdoor ambient sound environment would be audible and likely perceived as more than a doubling of noise level when the change is 10 dB or greater. For the purposes of this noise assessment, and consistent with other recent project noise impact assessments under City jurisdiction, when such a relative increase attributed to project construction noise would be greater than 10 dB over pre-construction daytime outdoor ambient sound levels, the corresponding temporary impact to potentially affected nearest offsite receptors would be considered significant. Predicted conditions where this may occur include the western offsite receptors exposed to noise from all five studied phases. For the eastern offsite receptors, this would occur during the demolition, grading, and paving construction phases.

At ST3, representing the nearest offsite noise-sensitive receptors to the east of the Project, predicted construction noise levels appearing in Table 6 are not expected to cause an increase of the baseline sound environment by more than 9 dB; hence, construction noise exposures would not require mitigation and would be a less than significant impact.

For ST1 and ST2, implementation of **MM-NOI-1** requires properly designed and implemented administrative or engineering controls and field installation of temporary noise barriers for needed construction phases that shall result in construction noise exposures that do not cause more than a 10 dB increase over pre-construction daytime outdoor ambient sound levels. The resulting mitigated construction noise levels and estimated increases to the existing outdoor ambient sound levels that would be compliant with this 10 dB allowable increment appear in Table 7. On this basis, the construction noise impact at ST1 and ST2 would be less than significant level with mitigation incorporated.

Table 7. Mitigated Construction Noise Level Estimates – Cancer Center Site

Nearest Offsite Receptor (Existing Outdoor Ambient Sound Level* [dBA])	Contrast of Non-mitigated and Mitigated Construction Noise Levels							
	ST1 (52.0 dBA L_{eq})				ST2 (50.4 dBA L_{eq})			
	Non-mitigated		Mitigated		Non-mitigated		Mitigated	
Construction Phase	8-hr L_{eq} (dBA)	Increase over Exiting Ambient (dB)	8-hr L_{eq} (dBA)	Increase over Exiting Ambient (dB)	8-hr L_{eq} (dBA)	Increase over Exiting Ambient (dB)	8-hr L_{eq} (dBA)	Increase over Exiting Ambient (dB)
Demolition	76	24	60	8	76	26	60	10
Grading	78	26	60	8	78	28	60	10
Building Construction	66	14	52	< 1	66	16	52	2
Paving	75	23	60	8	75	25	60	10
Architectural Coating	58	6	no mitigation need		58	8	no mitigation need	

Source: Appendix B.
Notes: L_{eq} = equivalent continuous sound level; dBA = A-weighted decibel.
*from Table 3

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

While parts of the same proposed Project studied herein, the Cancer Center and Janss Road components (the latter of which is discussed in the next subsection) are on different parcels greater than two miles apart and in proximity to different offsite noise-sensitive receptors relative to those Project component locations. Because construction noise attenuates geometrically with increasing distance and other effects (e.g., path-occluding natural topography and existing infrastructure), it is not appropriate to attempt to combine their effects into an overall construction noise impact assessment and explains why they are studied separately herein.

Janss Road

No specific residential development project has been proposed for the Janss Road Site. However, the proposed modification in land use designation and rezone of the site would allow for future residential uses onsite. As such, reasonably foreseeable development would consist of residences developed at the maximum allowable intensity of 9 units on the 2.15-acre site. No specific development plan is proposed at this time; as such, it would be speculative to assume the type of housing, mix and size of units, building footprint and/or overall design that would be developed at Janss Road as part of this EIR. However, in the interest of fully and conservatively disclosing the potential for noise and vibration construction impacts related to the future construction of a 9 unit, single-family residential development project, CalEEMod default assumptions have been applied to reasonably anticipate onsite construction activities associated with a future residential development that would include demolition of existing parking lot, excavation, and relocation of soil on the site, backfilling and compaction of soils, construction of infrastructure improvements (water supply, wastewater, drainage facilities, electrical and natural gas, retaining walls, roadway, parking, and driveway improvements), and construction of residential units and associated improvements to the site.

For purposes of estimating project emissions, and based on information provided by the project applicant, it is assumed that construction of the project would commence in February 2027 and would last approximately 13 months, ending in February 2028. Consistent with Section 8-11.01 of the City's Municipal Code, construction activity would be limited between the hours of 7:00 a.m. and 7:00 p.m., Monday through Saturday. The analysis contained herein is based on the following conservative assumptions (duration of phases is approximate):

- Demolition (1 month);
- Site Preparation (1 week);
- Grading (2 weeks);
- Building construction (11 months);
- Paving (2 weeks); and
- Architectural coating (2 weeks).

It is assumed that existing onsite trees along the Janns Road Site boundaries would remain in place and that trees and landscaping located between existing parking rows would be removed. Depending on the type and mix of housing ultimately proposed, landscape coverage, private and common open space, and setbacks would be provided consistent with City requirements. A future residential development would require demolition and removal of the existing parking lot asphalt and associated development (i.e., lighting poles, etc.). As there is no development plan for the Janss Site, no cut or fill was assumed.

Similar to the Cancer Center site, noise generated by construction equipment for the Janss Road site would include a combination of heavy equipment that, when combined, can reach relatively high levels. A construction noise analysis for the Janss Road site was conducted in a similar manner to the Cancer Center site, except that only the construction noise from the project centroid was calculated because a site-specific plan has not yet been developed for the Janss Road site.

Table 8 provides a summary of the predicted construction noise exposure levels by each phase at the nearest noise-sensitive receptor locations. The input and output data are provided in Appendix B. Noise-sensitive land uses in the vicinity of the project site include existing residences to the west and southwest.

Table 8. Construction Noise Model Results Summary - Janss Road Site

Construction Phase	Construction Noise at Nearest Receiver Distances (8-hr L_{eq} [dBA])	
	Residences to the South (represented by ST4)	*Residences to the Southwest (represented by ST5)*
	Typical Source/Receiver Distance (Approximately 100 feet)	*Typical Source/Receiver Distance (Approximately 250 feet)*
Demolition	77	68
Site Preparation	75	66
Grading	75	66
Building Construction	68	61
Paving	73	63
Architectural Coating	59	53

Source: Appendix B.
Notes: L_{eq} = equivalent continuous sound level; dBA = A-weighted decibel.

As shown in Table 8, predicted typical construction noise exposure levels at the nearest noise-sensitive land uses (single-family residences to the south) are estimated to range from approximately 59 dBA $L_{eq\ 8\text{-}hr}$ during the architectural coating phase to approximately 77 dBA $L_{eq\ 8\text{-}hr}$ during the demolition phase. Because the existing sample of daytime outdoor ambient sound level at location ST4 that represents the nearest offsite receptors south of the project was approximately 61 dBA L_{eq}, the highest relative increase expected at the receivers to the south attributed to typical project construction noise would be approximately 16 dB.

The next-nearest noise-sensitive receivers (the single-family residences located to the southwest) are located further from the project site. Thus, estimated typical construction noise levels would be lower, ranging from approximately 53 dBA $L_{eq\ 8\text{-}hr}$ during the architectural coating phase to approximately 68 dBA $L_{eq\ 8\text{-}hr}$ during the demolition phase under typical conditions. Per this estimation method, the anticipated relative increase to the existing sampled daytime outdoor ambient sound level at ST5 (representing these residences to the southwest) of 67 dBA as shown in Table 4 would be no more than 1 dBA.

As discussed previously, City Municipal Code Section 8-11.01 does not permit construction noise that would create a noise disturbance between the hours of 7:00 p.m. and 7:00 a.m. Since the proposed project would not conduct noisy construction activities between these hours, the predicted construction noise levels expressed as 8-hour L_{eq} values as appearing in Table 8 would be below the FTA's advisory noise standard of 80 dBA $L_{eq\ 8\text{-}hr}$ for both the southern and southwestern nearest offsite receptors. Therefore, on this basis, proposed project construction noise exposure at these nearest eastern and western offsite noise-sensitive receptors would be compatible with oft-used federal guidance for purposes of construction noise assessment.

However, and while the effect would be temporary and would cease upon conclusion of project construction, the aforementioned relative increases to the existing outdoor ambient sound environment at ST4 would be audible and likely perceived as more than a doubling of noise level when the change is 10 dB or greater. For the purposes of this noise assessment, and in light of the existing outdoor sound level at the nearest residential receivers to the south (represented by ST4) of approximately 61 dBA L_{eq}, when such a relative increase attributed to project construction noise would be 10 dB or more over these pre-construction daytime outdoor ambient sound levels, the corresponding temporary impact to potentially affected nearest offsite receptors is considered significant. Predicted conditions where this may occur include the nearby residences to the south exposed to noise from the demolition, site preparation, grading, and paving phases. During the two other phases of construction and at residences to the south, building construction and architectural coatings, the relative increase from construction would be less than 10 dB and thus not a significant impact.

At ST5, representing the nearest offsite noise-sensitive receptors to southwest, predicted construction noise levels appearing in Table 9 are not expected to cause an increase of the baseline sound environment by more than 3 dB; hence, construction noise exposures would not require mitigation and would be a less than significant impact.

For ST4, implementation of **MM-NOI-2** requires intelligently designed and implemented field installation of temporary noise barriers for needed construction phases that shall result in construction noise exposures that do not cause more than a 10 dB increase over pre-construction daytime outdoor ambient sound levels. The resulting mitigated construction noise levels and estimated increases to the existing outdoor ambient sound levels that would be compliant with this 10 dB allowable increment appear in Table 9. On this basis, the construction noise impact at ST4 would be less than significant level with mitigation incorporated.

Table 9. Mitigated Construction Noise Level Estimates – Cancer Center Site

Nearest Offsite Receptor (Existing Outdoor Ambient Sound Level* [dBA])	Contrast of Non-mitigated and Mitigated Construction Noise Levels							
	ST4 (60.6 dBA L_{eq})				ST5 (67.4 dBA L_{eq})			
	Non-mitigated		Mitigated		Non-mitigated		Mitigated	
Construction Phase	8-hr L_{eq} (dBA)	Increase over Exiting Ambient (dB)	8-hr L_{eq} (dBA)	Increase over Exiting Ambient (dB)	8-hr L_{eq} (dBA)	Increase over Exiting Ambient (dB)	8-hr L_{eq} (dBA)	Increase over Exiting Ambient (dB)
Demolition	77	16	65	4	68	< 3	no mitigation need	
Site Preparation	75	15	63	2	66	< 3	no mitigation need	
Grading	75	15	63	2	66	< 3	no mitigation need	
Building Construction	68	7	no mitigation need		61	< 1	no mitigation need	
Paving	73	12	61	< 1	63	< 1	no mitigation need	

Table 9. Mitigated Construction Noise Level Estimates – Cancer Center Site

Nearest Offsite Receptor (Existing Outdoor Ambient Sound Level* [dBA])	Contrast of Non-mitigated and Mitigated Construction Noise Levels					
	ST4 (60.6 dBA L_{eq})			ST5 (67.4 dBA L_{eq})		
Architectural Coating	59	< 1	no mitigation need	53	< 1	no mitigation need

Source: Appendix B.
Notes: L_{eq} = equivalent continuous sound level; dBA = A-weighted decibel.
*from Table 4

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

7.1.2 Operation

7.1.2.1 Project-Generated Off-Site Traffic Noise

Cancer Center

The proposed project would generate additional traffic trips along several existing roads in the area including Rolling Oaks Drive and Haaland Drive. Of these, only Rolling Oaks Drive has adjacent noise-sensitive (residential) land uses. Based upon information provided in the project's Traffic and Parking Study report (ATE 2022), the proposed project would result in a net increase of 2,103 vehicle trips on a daily basis; 181 during the AM peak hour and 235 during the PM peak hour.

Potential noise effects from vehicular traffic were assessed using the FHWA's Traffic Noise Model (TNM) version 2.5 (FHWA 2004). Information used in the model included the site geometry, existing, existing plus project, cumulative without project, and cumulative with project traffic volumes and posted traffic speeds. Noise levels were modeled at location M1, representative of noise-sensitive receivers (residences) adjacent to Rolling Oaks Drive as shown in Figure 3. The receiver was modeled to be 5 feet above the local ground elevation. The noise model results are summarized in Table 10. Detailed traffic noise modeling input and output is provided in Appendix C.

Table 10 shows that the maximum noise level increase at M1, which represents a worst-case sensitive receptor location (based upon its perpendicular distance from the studied roadway centerline) would be 0.9 dB, comparing existing traffic noise levels to existing plus project traffic noise levels. Comparing cumulative scenario traffic noise levels to cumulative plus project traffic noise levels, an increase of 0.9 dB would also occur. An increase of 1 dB or less would typically not be a perceptible change in the context of community noise. Consistent with the City's General Plan Noise Element and as summarized in Section 5.3, the proposed project would not result in an increase in noise levels of 1.0 dB or more in locations with an ambient noise level of less than 60 dBA CNEL; nor would the proposed project result in an increase of 0.5 dB or more in locations with an ambient noise level greater than 60 dBA CNEL. Although the Janss Road site development is part of the proposed project and discussed in the following subsection, it is located over two miles north-northwest of the proposed Cancer Center site and would thus affect local roadway traffic segments that are different from those proximate to the Cancer Center site. Based upon these results and considerations, off-site traffic noise impacts would be less than significant. No mitigation measures are required..

Table 10. Off-Site Traffic Noise Modeling Results

Modeled Receptor	Existing Noise Level (dBA CNEL)	Existing Plus Project Noise Level (dBA CNEL)	Noise Level Increase (dB)	Cumulative Noise Level (dBA CNEL)	Cumulative Plus Project Noise Level (dBA CNEL)	Noise Level Increase (dB)
M1	58.4	59.3	0.9	58.5	59.4	0.9

Source: Appendix C

Janss Road

Based upon the project's transportation analysis, the Janss Road component is estimated to generate 85 average daily trips, 6 AM peak hour trips and 8 PM peak hour trips. Compared to traffic count data provided by the City of Thousand Oaks Public Works Department, the average weekday PM peak hour traffic volume on Janss Road east of Lynn Road is 781, and the average weekday PM peak hour traffic volume on Lynn Road south of Janss Road is 2,174. The 8 additional PM peak hour trips would represent an approximate increase in traffic on Janss Road of 1 percent, and an approximate increase in traffic on Lynn Road of 0.4 percent. Such a slight increase in traffic volumes would yield a 0.0002 dB increase in noise per the following expression:

Change in traffic noise (dB) = 10*LOG(V2/V1), where V1 = without-project volume, and V2 = with-project volume.

This component of the proposed project would therefore not result in an increase in noise levels of 1.0 dB or more in locations with an ambient noise level of less than 60 dBA CNEL; nor would the proposed project result in an increase of 0.5 dB or more in locations with an ambient noise level greater than 60 dBA CNEL and thus be consistent with the City's general plan as summarized in Section 4.9.2. Based upon these results, off-site traffic noise impacts would be less than significant. No mitigation measures are required.

7.1.2.2 Project-Generated On-Site Operation Noise

Cancer Center

Stationary Sources

The implementation of the Cancer Center would also result in changes to existing outdoor ambient noise levels in the project vicinity by introducing new stationary sources of noise emission primarily associated with operating electro-mechanical equipment exposed to the outdoor environment. Aggregate sound emission from proposed Project stationary noise-producing sources was predicted with Datakustik CadnaA, a commercially available sound propagation modeling software program based on International Organization of Standardization 9613-2 standard algorithms and reference data. Using applicant-provided information on anticipated cooling load for the Project, the anticipated major noise-producing Project mechanical systems (e.g., heating, ventilation, air conditioning units and standby generator) were modeled as point-type sources as follows:

- Based upon information provided in the project plans and the building's square footage of 58,412 square feet, 4 air handling units (AHUs) would be located on the building's mansard roof, each with sound power levels of 87.8 dBA.
- One standby generator (typically used only during power outages and tested periodically for limited time periods), emitting up to 95.7 dBA sound power level with enclosure.

Key modeling features, parameters, and assumptions utilized by the CadnaA software include the following:

- Ground effect acoustical absorption coefficient equal to 0.5, which intends to represent a blend of pavements (acoustically reflective, and thus near zero) and vegetative ground surfaces (acoustically porous, and hence near a value of 1) on and around the Project site
- Reflection order of 1, which allows for a single reflection of sound paths on encountered structural surfaces such as the modeled facades of the proposed Project
- Off-site residential structures and nearby existing commercial buildings have not been rendered in the prediction model
- Calm meteorological conditions (i.e., no wind) with 68°F and 70% relative humidity

As shown in Table 11, the predicted aggregate noise exposure at modeled receptors ST1 through ST3 (representing adjacent residential receivers) assuming operation of all on-site HVAC units ranged from 30 to 34 dBA L_{eq}. During periods of time in which the standby generator would be operational as well as HVAC equipment, the noise exposure at receptors ST1 through ST3 ranged from 35 dBA L_{eq} (at ST3, representing residences to the east) to 48 dBA L_{eq} at receptors ST1 and ST2 (residences to the west). Expressed in terms of the 24-hour weighted average CNEL noise metric, the noise levels from HVAC operation would range from 36 to 40 dBA CNEL, and the noise level from HVAC plus generator noise would range from 41 to 54 dBA CNEL. These levels are below the City of Thousand Oaks General Plan Noise Element's normally acceptable land use compatibility guideline for residential uses of 60 dBA CNEL. Furthermore, it should be noted that the estimation of noise levels on a CNEL basis is highly conservative as it assumes that the stationary equipment would operate 24 hours a day on a continuous basis, which is unlikely to occur because the proposed facility would typically operate during regular business hours (8 a.m. to 5 p.m. Monday through Friday).

Table 11. Cancer Center Operational Stationary Noise Model Results Summary

Modeled Receiver Number	HVAC Noise Level (L_{eq} dBA)	HVAC plus Standby Generator Noise (L_{eq} dBA)
ST1	33.5	48.4
ST2	33.0	48.1
ST3	30.2	34.7

Source: Appendix D.
Notes: Noise level modeling conservatively assumes continuous operation of all HVAC equipment as well as standby generators.

Parking Activities

A comprehensive study of noise levels associated with surface parking lots was published in the Journal of Environmental Engineering and Landscape Management (Baltrënas et al. 2004). The study found that average noise levels during the peak period of use of the parking lot (generally in the morning with arrival of commuters, and in the evening with the departure of commuters), was 47 dBA L_{eq} at 1 meter (3.28 feet) from the outside boundary of the parking lot. During off-peak time periods, especially during nighttime hours (10 p.m. to 7 a.m.), noise levels from parking lot activities would be substantially lower. The parking lots would function as an area source for noise, which means that noise would attenuate at a rate of 3 dBA with each doubling of distance. The nearest parking lot to existing noise-sensitive receivers (receivers ST1 and ST2, the multi-family residence to the west) is located approximately 120 or more feet from the nearest parking area. At a distance of 120 feet, parking lot noise levels would be approximately 31 dBA L_{eq}. At the noise-sensitive receivers to the east, the estimated parking lot noise would be approximately 28 dBA L_{eq}. Conservatively assuming that parking lot noise could extend into the evening hours (7 p.m. to 10 p.m.), on a 24-hour CNEL basis the resulting noise level would be approximately 31 dBA CNEL at residences to the west and 28 dBA CNEL at residences to the east, which would be well below the City's residential noise compatibility standard of 60 dBA CNEL.

Increase Over Ambient

The logarithmic combination of the predicted noise exposures due to anticipated Project stationary sources and parking activities is 36 to 48 dBA L_{eq} at adjacent residential receivers (ST1 through ST3). As shown in Table 12, the combined on-site noise levels at all receivers are estimated to be less than the measured existing daytime noise levels, ranging from -20 dBA to -2 dBA less than existing noise levels. Therefore, the on-site noise levels would be compliant with the City's allowable outdoor ambient increase standard of up to 1.0 dBA. As such, this would be considered a less-than-significant noise impact to the community.

Table 12. Operational Stationary plus Parking Area Noise Results Summary

Modeled Receiver Number	Stationary Noise Level (Daytime) (L_{eq} dBA)	Parking Area Noise Level (L_{eq} dBA)	Combined Stationary Noise plus Parking Area Noise Level (L_{eq} dBA)	Measured Noise Level (L_{eq} dBA)	Difference (Estimated On-Site Noise - Measured Noise Level) (dBA)
ST1	48.4	31.4	48.4	52	-3.6
ST2	48.1	31.4	48.2	50.4	-2.2
ST3	34.7	28.2	35.6	55.7	-20.1

Source: Appendix D

Janss Road

Stationary Sources

Because the Janss Road site is assumed to consist of 9 single-family residential units, the primary source of onsite operational noise would be HVAC equipment. HVAC equipment located on the ground or on the rooftop of the buildings would have the potential to generate high noise levels. The specific details (location, size, manufacturer, and model) of the equipment have not yet been determined. Because HVAC noise may exceed the City's Noise Element's compatibility guidelines for residential uses of 60 dBA CNEL at nearby existing residential uses to the south and southwest, this impact is considered potentially significant. With implementation of mitigation measure

MM-NOI-3, noise impacts from HVAC equipment would be reduced to less than significant with mitigation incorporated.

7.2 Significance Threshold B

Would the project result in generation of excessive groundborne vibration or groundborne noise levels?

7.2.1 Construction

The main concern associated with groundborne vibration is annoyance; however, in extreme cases, vibration can cause damage to buildings, particularly those that are old or otherwise fragile. Common sources of groundborne vibration are trains and construction activities such as blasting, pile-driving, and heavy earth-moving equipment. No blasting or pile driving is anticipated as part of the proposed Project; thus, the primary source of groundborne vibration from the proposed project is heavy earth-moving equipment during construction activity.

Based on published vibration data, the anticipated heavy construction equipment would generate a vibration level of approximately 0.089 inches per second peak particle velocity (PPV) at a distance of 25 feet from the source; lighter construction equipment, such as a small bulldozer, would generate a substantially lower vibration level of approximately 0.003 inches per second PPV at a distance of 25 feet from the source. Although heavy equipment would operate throughout both project sites at various construction phases, it is anticipated that heavy equipment would occasionally operate as close as approximately 120 feet from existing residences at both the Cancer Center site and the Janss Road site. At the distance from the nearest vibration-sensitive receivers (residences located to the west for the Cancer Center site, and residence located to the south for the Janss Road site) to where construction activity would be occurring on the Project site, the peak particle velocity vibration level would be approximately 0.008 inches per second. As such, vibration levels would be less than the Caltrans threshold of 0.20 inches per second for human annoyance or the standard used by Caltrans for the prevention of structural damage to typical residential buildings of 0.3 ips PPV (Caltrans 2020). Because groundborne vibration from Project construction would not exceed recognized standards, and due to the temporary and intermittent occurrence of vibration levels, vibration impacts would be less than significant. No mitigation measures are required.

7.2.2 Operation

During operation, no major sources of groundborne vibration are anticipated. Therefore, less than significant impacts related to groundborne vibration would occur from operation of the project. No mitigation measures are required.

7.3 Significance Threshold 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?

No private airstrips exist in the project vicinity. The project components are not located within 2 miles of any public airport or within the boundaries of any airport land use plans. Therefore, the proposed Project components would not expose or result in excessive noise for people residing or working in the area, and no impact would occur.

INTENTIONALLY LEFT BLANK

8 Mitigation Measures

Threshold 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 Impacts

Cancer Center Site

With regard to potential temporary and relative increases in daytime outdoor ambient noise at nearby offsite noise-sensitive receptors west of the Cancer Center for all five studied sequential phases of proposed construction, the project would result in impacts that are less-than-significant with application of MM NOI-1 detailed as follows:

MM-NOI-1 Construction Noise Reduction—Cancer Center Site. The following measures shall be implemented by the construction contractor to reduce project construction noise exposures as predicted in this EIR and as received by nearest existing offsite residential receptors west and east of the project site to levels less than 10 dBA over the pre-project outdoor daytime ambient sound environment.

i. The project contractor shall schedule construction phases to avoid concurrent operation of construction equipment from multiple phases at nearest horizontal distances to an offsite noise-sensitive receiver.

ii. All construction equipment, fixed or mobile, shall be equipped with properly operating and maintained engine exhaust mufflers.

iii. Based on feasibility and/or practicality, contractor shall apply the following onsite equipment noise control and sound abatement methods:

a. shutting off idling engines of vehicles and stationary engine-driven equipment when not in use;

b. orient operating stationary equipment so that audibly or measurably louder cabinet surfaces or penetrations (e.g., air intake or discharge vents) are facing away from nearest offsite noise-sensitive receptors; and

c. apply factory-approved enclosures, vent shrouds, and other equipment-mounted features to attenuate (via dissipative acoustical absorption, south path occlusion or redirection, etc.) noise emission.

iv. During the site demolition, grading, building construction, and paving phases of the project, the contractor shall install a minimum 12-foot tall temporary noise barrier (e.g., vertical installation of adjoining plywood sheeting, a frame-suspended outdoor acoustical blanket, or other materials/assembly that demonstrates a minimum of sound transmission class [STC] 25) along an extent of the project boundary between the construction activity of concern and the offsite noise-sensitive receptor of interest. The barrier shall feature the following:

a. No open gaps between the ground surface and the barrier bottom edge;

b. No gaps or cracks between adjoining vertical barrier element edges (e.g., overlap plywood sheeting or acoustical blanket flaps);

c. As depicted in Exhibit MM-NOI-1-A, the horizontal extent of an installed linear barrier, with a midpoint at a perpendicular distance (PD) from the midpoint of the construction zone width (CZW), should be equal to the width of the construction zone plus four times the perpendicular distance between the noise source and barrier plane (i.e., linear barrier extent = CZW+4PD). As illustrated in Exhibit MM-NOI-1-B, one or both ends of the barrier may instead be turned inward up to ninety degrees towards the construction zone or noise source, creating an "L" or "C"-shaped barrier layout with less total length than CZW+4PD, so long as angle "alpha" between the ray connecting the vertical edge position with the construction zone centroid and the plane of the barrier parallel to the construction zone is held constant. Either barrier layout per this guidance should thus minimize flanking around the vertical edges and help preserve noise reduction performance.

Exhibit MM-NOI-1-A Temporary Construction Barrier Layout Guidance – Linear Barrier

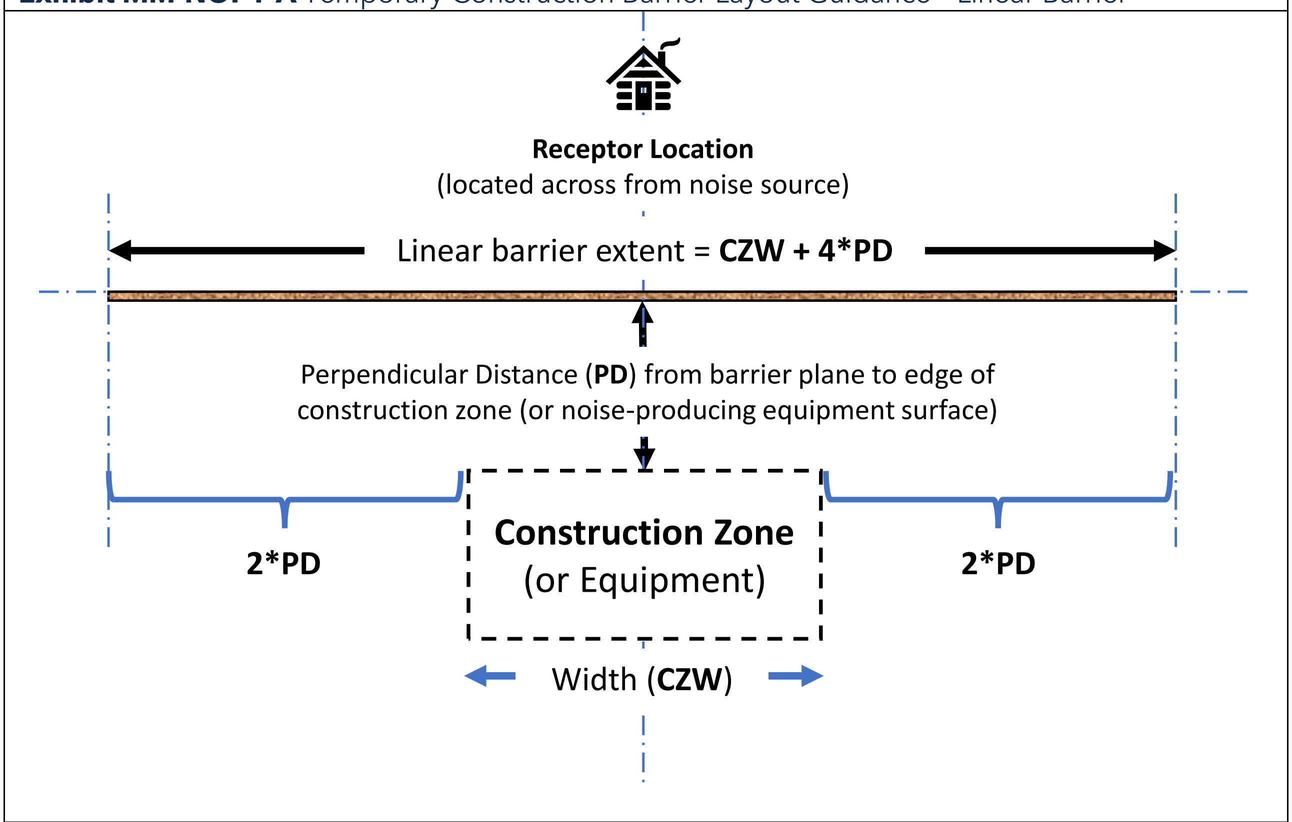
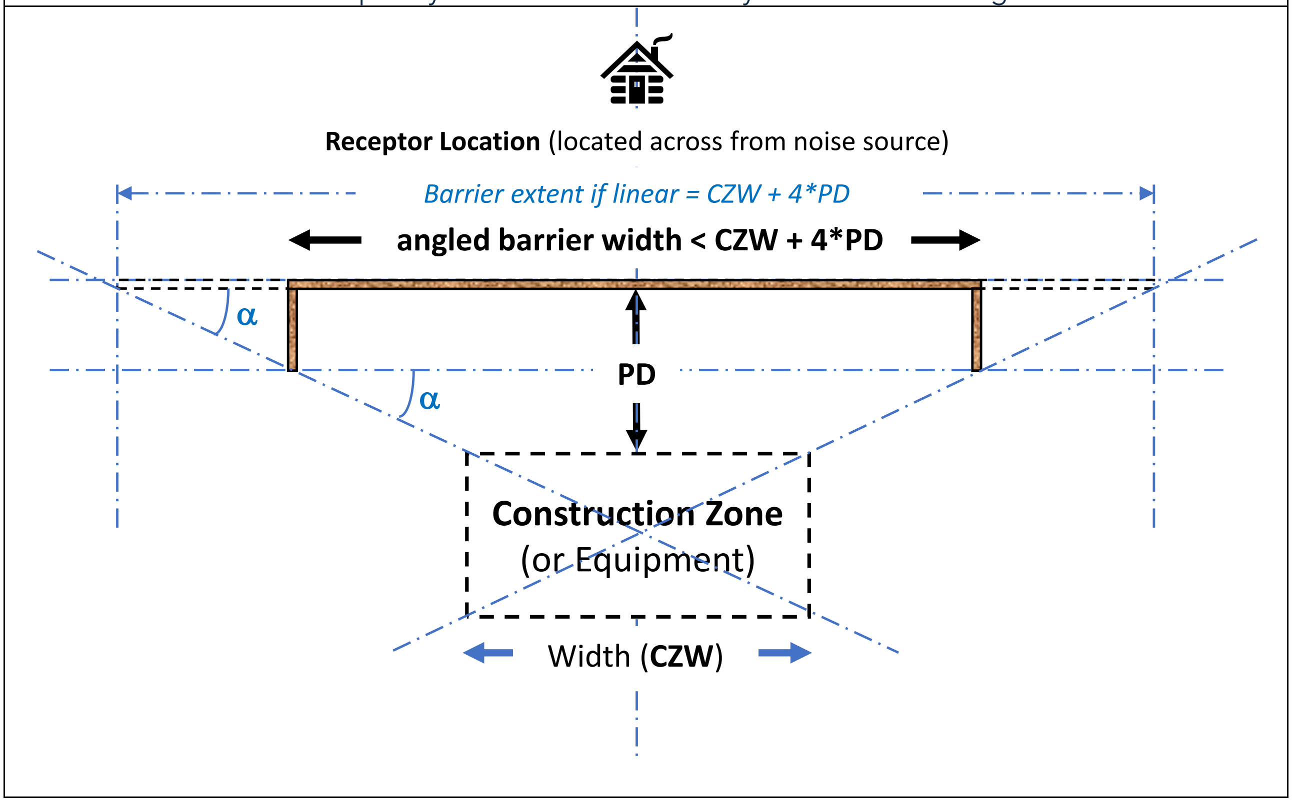


Exhibit MM-NOI-1-B Temporary Construction Barrier Layout Guidance – Angled Barrier



v. In combination with application of a temporary barrier per MM-NOI-1-iv, the cumulative hours onsite within a typical 8-hour daytime construction period during which an operating piece of construction equipment may operate at the indicated closest distance to an offsite noise-sensitive receptor shall be limited as follows for each of the four construction phases:

a. Demolition – no more than 5 hours each for the excavator and dozer, operating as close as 75 feet to the nearest offsite noise-sensitive receptor.

b. Grading – no more than 6 hours each for the excavator, front-end loader, and backhoe, operating as close as 125 feet to the nearest offsite noise-sensitive receptor; no more than 2 hours each for the dozer and tractor, operating as close as 75 feet to the nearest offsite noise-sensitive receptor.

c. Building Construction – no limitation on equipment operating hours at the closest distance of 180 feet to the nearest offsite noise-sensitive receptor.

d. Paving – no more than 6 hours each for the concrete mixer truck and roller, operating as close as 75 feet to the nearest offsite noise-sensitive receptor; no more than 4 hours for the paver operating as close as 75 feet to the nearest offsite noise-sensitive receptor; no more than 7 hours for the front-end loader operating as close as 75 feet to the nearest offsite noise-sensitive receptor.

For the remaining hours of an 8-hour daytime construction work shift, the above-listed equipment may operate onsite but at least three times the indicated distance.

vi. At the representative first-day of each project construction phase, or under similar conditions that are indicative of normal onsite construction activity for that phase, a noise level monitor shall be deployed on the receiver side of an installed project onsite temporary noise barrier to measure and document that offsite noise exposure levels attributed to project construction activity of concern at a sample western and eastern offsite sensitive receptor is in conformance with the 10 dBA increase-over-ambient noise level threshold when compared to a sample measured baseline condition without project construction activity occurring.

The construction noise model prediction worksheets presented within Appendix B include predictive sound propagation calculations for both non-mitigated and mitigation scenarios associated with offsite receptors ST1 and ST2 and present by phase what would be expected to reduce aggregate construction noise level (as an 8-hour L_{eq}) to no more than 10 dB greater than the measured samples of outdoor baseline or pre-project sound environment for the western offsite receptors represented by ST1 and ST2 as studied herein. These predictions include incorporation of mitigation measures as described in MM-NOI-1 above.

Janss Road Site

With regard to potential temporary and relative increases in daytime outdoor ambient noise at nearby offsite noise-sensitive receptors west of the Janss Road site during the demolition phase of future development of the site, the project would result in impacts that are less-than-significant with application of MM-NOI-2 detailed as follows:

MM-NOI-2 Construction Noise Reduction—Janss Road Site. The following measures shall be implemented by the construction contractor to reduce project construction noise exposures as predicted in this EIR and as received by nearest existing offsite residential receptors west and east of the project site to levels less than 10 dBA over the pre-project outdoor daytime ambient sound environment.

i. The project contractor shall schedule construction phases to avoid concurrent operation of construction equipment from multiple phases at nearest horizontal distances to an offsite noise-sensitive receiver.

ii. All construction equipment, fixed or mobile, shall be equipped with properly operating and maintained engine exhaust mufflers.

iii. Based on feasibility and/or practicality, contractor shall apply the following onsite equipment noise control and sound abatement methods:

a. shutting off idling engines of vehicles and stationary engine-driven equipment when not in use;

b. orient operating stationary equipment so that audibly or measurably louder cabinet surfaces or penetrations (e.g., air intake or discharge vents) are facing away from nearest offsite noise-sensitive receptors; and

c. apply factory-approved enclosures, vent shrouds, and other equipment-mounted features to attenuate (via dissipative acoustical absorption, south path occlusion or redirection, etc.) noise emission.

iv. During the site demolition, grading, building construction, and paving phases of the Project, the contractor shall install a minimum 8-foot tall temporary noise barrier (e.g., vertical installation of adjoining plywood sheeting, a frame-suspended outdoor acoustical blanket, or other materials/assembly that demonstrates a minimum of sound transmission class [STC] 20) along an extent of the Project boundary between the construction activity of concern and the offsite noise-sensitive receptor of interest. The barrier shall feature the following:

a. No open gaps between the ground surface and the barrier bottom edge;

b. No gaps or cracks between adjoining vertical barrier element edges (e.g., overlap plywood sheeting or acoustical blanket flaps);

c. As depicted in Exhibit MM-NOI-1-A, the horizontal extent of an installed linear barrier, with a midpoint at a perpendicular distance (PD) from the midpoint of the construction zone width (CZW), should be equal to the width of the construction zone plus four times the perpendicular distance between the noise source and barrier plane (i.e., linear barrier extent = CZW+4PD). As illustrated in Exhibit MM-NOI-1-B, one or both ends of the barrier may instead be turned inward up to ninety degrees towards the construction zone or noise source, creating an “L” or “C”-shaped barrier layout with less total length than CZW+4PD, so long as angle “alpha” between the ray connecting the vertical edge position with the construction zone centroid and the plane of the barrier parallel to the construction zone is held constant. Either barrier layout per this guidance should thus minimize flanking around the vertical edges and help preserve noise reduction performance.

v. At the representative first-day of each project construction phase, or under similar conditions that are indicative of normal onsite construction activity for that phase, a noise level monitor shall be deployed on the receiver side of an installed project onsite temporary noise barrier to measure and document that offsite noise exposure levels attributed to project construction activity of concern at a sample western and eastern offsite sensitive receptor is in conformance with the 10 dBA increase-over-ambient noise level threshold when compared to a sample measured baseline condition without project construction activity occurring.

The construction noise model prediction worksheets presented within Appendix B include predictive sound propagation calculations for both non-mitigated and mitigation scenarios associated with offsite receptor ST4 and present by phase what would be expected to reduce aggregate construction noise level (as an 8-hour L_{eq}) to no more than 10 dB greater than the measured samples of outdoor baseline or pre-project sound environment for the offsite receptor represented by ST4 south of Janss Road as studied herein. These predictions include incorporation of mitigation measures as described in MM-NOI-1 above.

Long-Term Operational Impacts

Project-Generated Off-Site Traffic Noise

Both the Cancer Center and Janss Road components of the project would result in a less than significant impact related to project-generated off-site traffic noise. No mitigation measures are required.

Project-Generated On-Site Operation Noise

The Cancer Center component would result in a less than significant impact related to stationary noise-producing sources from on-site operations; hence, no mitigation measures are required.

As discussed in Section 7.1.2.2, implementation of **MM-NOI-3** would be necessary to reduce noise impacts from HVAC equipment to a less than significant level.

MM-NOI-3 Because heating, ventilation, and air conditioning (HVAC) equipment can generate noise that could affect surrounding sensitive receptors and because the details, specifications, and locations of this equipment is not yet known, the project applicant shall retain an acoustical specialist to review project construction-level plans prior to final approval to ensure that the equipment specifications and plans for HVAC and other outdoor mechanical equipment incorporate measures, such as the specification of quieter equipment or provision of acoustical enclosures, that will not exceed relevant noise standards at nearby noise-sensitive land uses (e.g., residential). Prior to the commencement of construction, the acoustical specialist shall certify in writing to the City that the equipment specifications and plans incorporate measures that will achieve the relevant noise limits.

Threshold B: Would the Project result in generation of excessive groundborne vibration or groundborne noise levels?

The Project would result in less-than-significant impacts with regard to groundborne vibration and groundborne noise levels. No mitigation is required.

Threshold 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 Project would result in no impact with regard to excessive airport noise levels. No mitigation is required.

INTENTIONALLY LEFT BLANK

9 References Cited

14 CCR 15000–15387 and Appendices A–L. Guidelines for Implementation of the California Environmental Quality Act

(ATE) Associated Transportation Engineers). 2022. Los Robles Medical Center, Thousand Oaks, California, Traffic and Parking Study. October 2022

Baltrënas, Pranus et.al. (Pranas Baltrënas, Dainius Kazlauskas & Egidijus Petraitis). 2004. Testing on noise level prevailing at motor vehicle parking lots and numeral simulation of its dispersion, Journal of Environmental Engineering and Landscape Management, 12:2, 63-70

Caltrans (California Department of Transportation). 2013. *Technical Noise Supplement to the Caltrans Traffic Noise Analysis Protocol*. Division of Environmental Analysis, Environmental Engineering, Hazardous Waste, Air, Noise, Paleontology Office. September 2013.

Caltrans. 2020. Transportation and Construction Vibration Guidance Manual. Division of Environmental Analysis, Environmental Engineering, Hazardous Waste, Air, Noise, Paleontology Office. April 2020.

City of Thousand Oaks. 2000. Noise Element, Thousand Oaks General Plan. Accessed September 2021. https://www.toaks.org/home/showpublisheddocument?id=340

FHWA (Federal Highway Administration). 2004. FHWA Traffic Noise Model, Version 2.5. Office of Environment and Planning. Washington, DC. February 2004

FHWA (Federal Highway Administration). 2008. *Roadway Construction Noise Model (RCNM), Software Version 1.1.* Washington, DC: U.S. Department of Transportation, Research and Innovative Technology Administration, John A. Volpe National Transportation Systems Center, Environmental Measurement and Modeling Division.

FTA (U.S. Department of Transportation, Federal Transit Administration). 2018. Transit Noise and Vibration Impact Assessment Manual. September 2018.

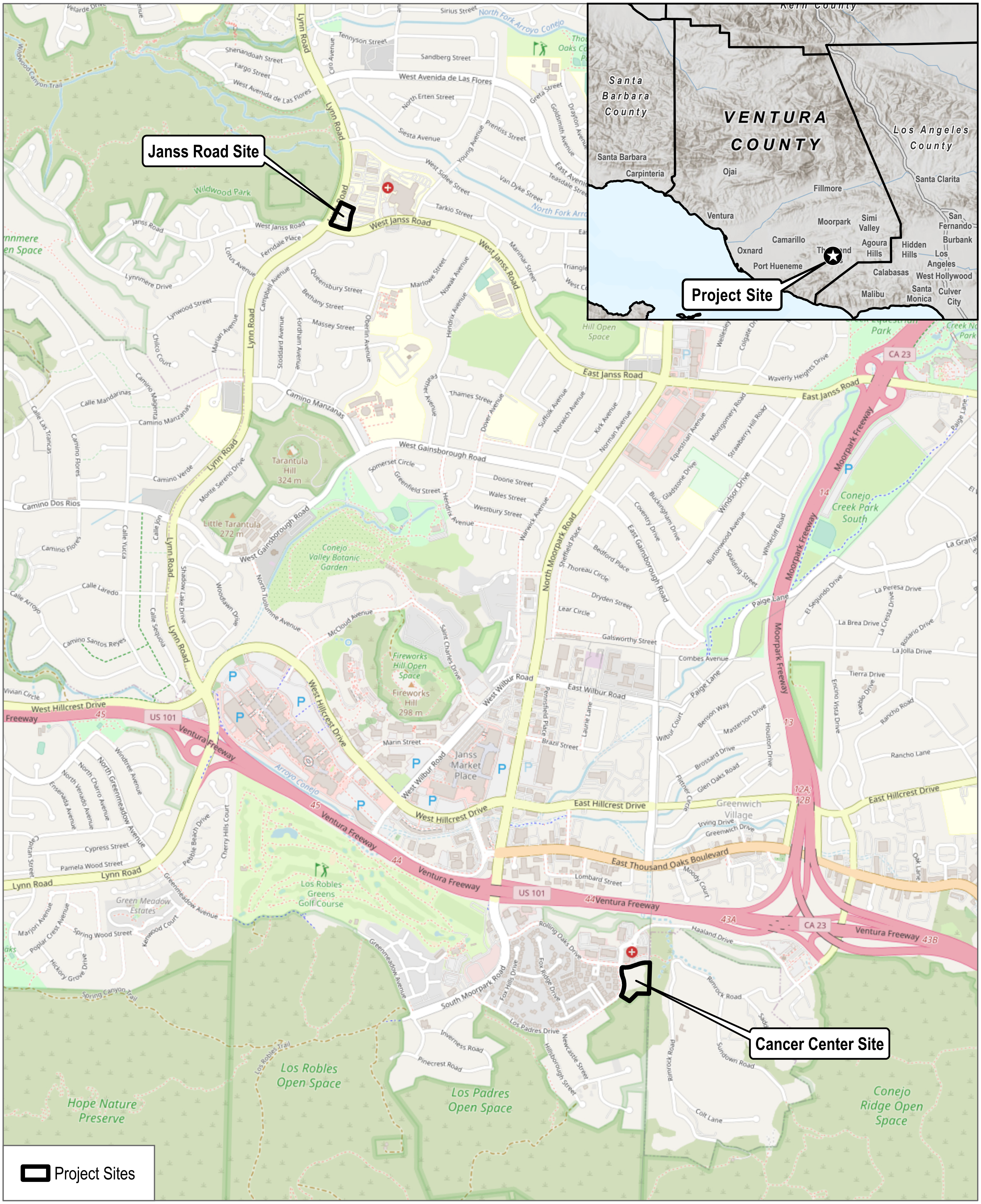
OPR (Governor's Office of Planning and Research). 2017. State of California General Plan Guidelines 2017: Appendix D, Noise Element Guidelines: Guidelines for the Preparation and Content of the Noise Element of the General Plan. OPR. 2018. Technical Advisory on Evaluating Transportation Impacts in CEQA. December 2018. Accessed March 2021. https://www.opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf

INTENTIONALLY LEFT BLANK

10 List of Preparers

Mark Storm, Acoustic Services Manager
Mike Greene, Senior Noise Specialist
Carson Wong, Noise Specialist

INTENTIONALLY LEFT BLANK



SOURCE: Open Street Map 2023

DUDEK

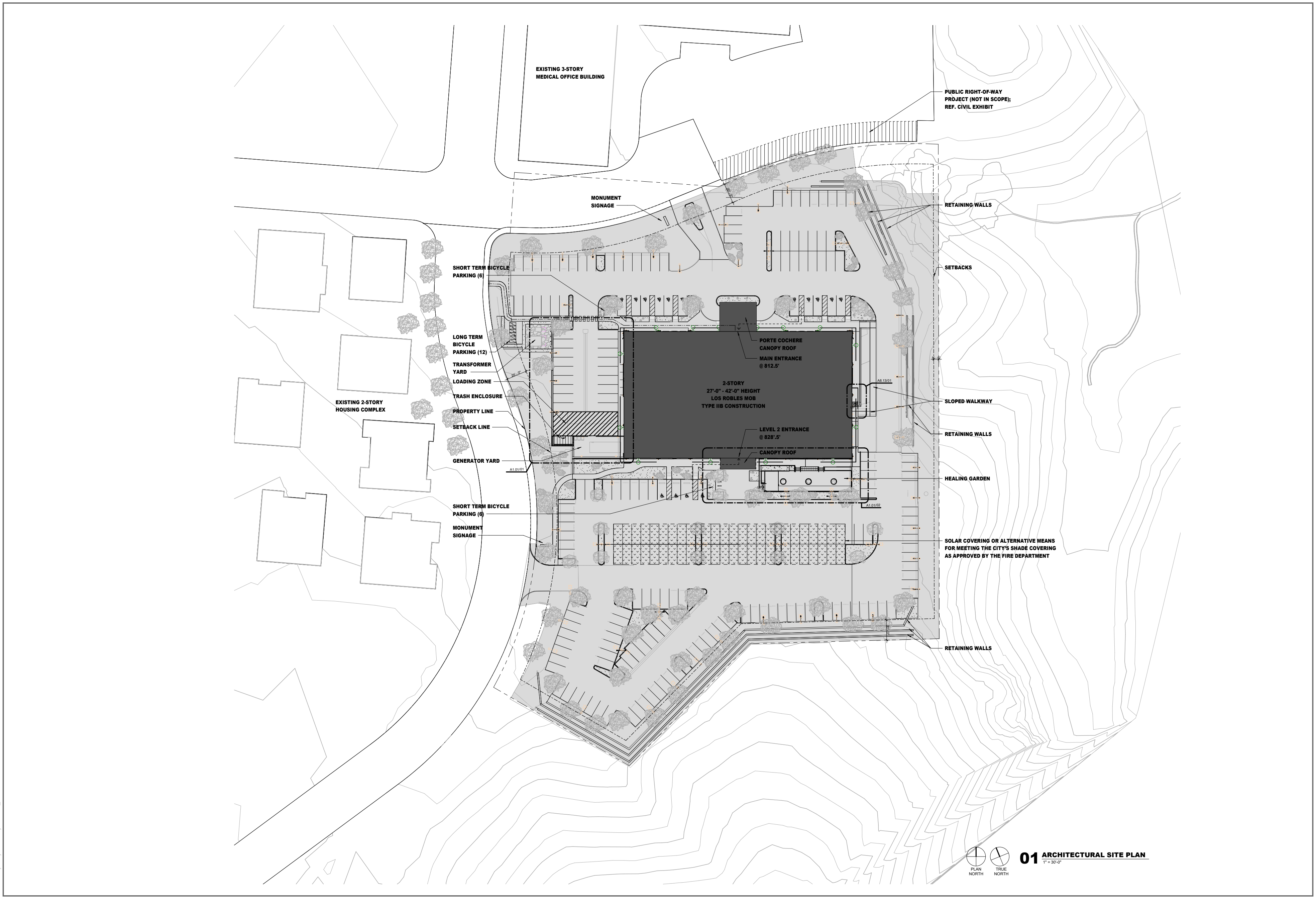
0 500 1,000 Feet

FIGURE 1

Project Location

EIR for Los Robles Comprehensive Cancer Center - 355 W Janss Road Land Use Change Project

INTENTIONALLY LEFT BLANK



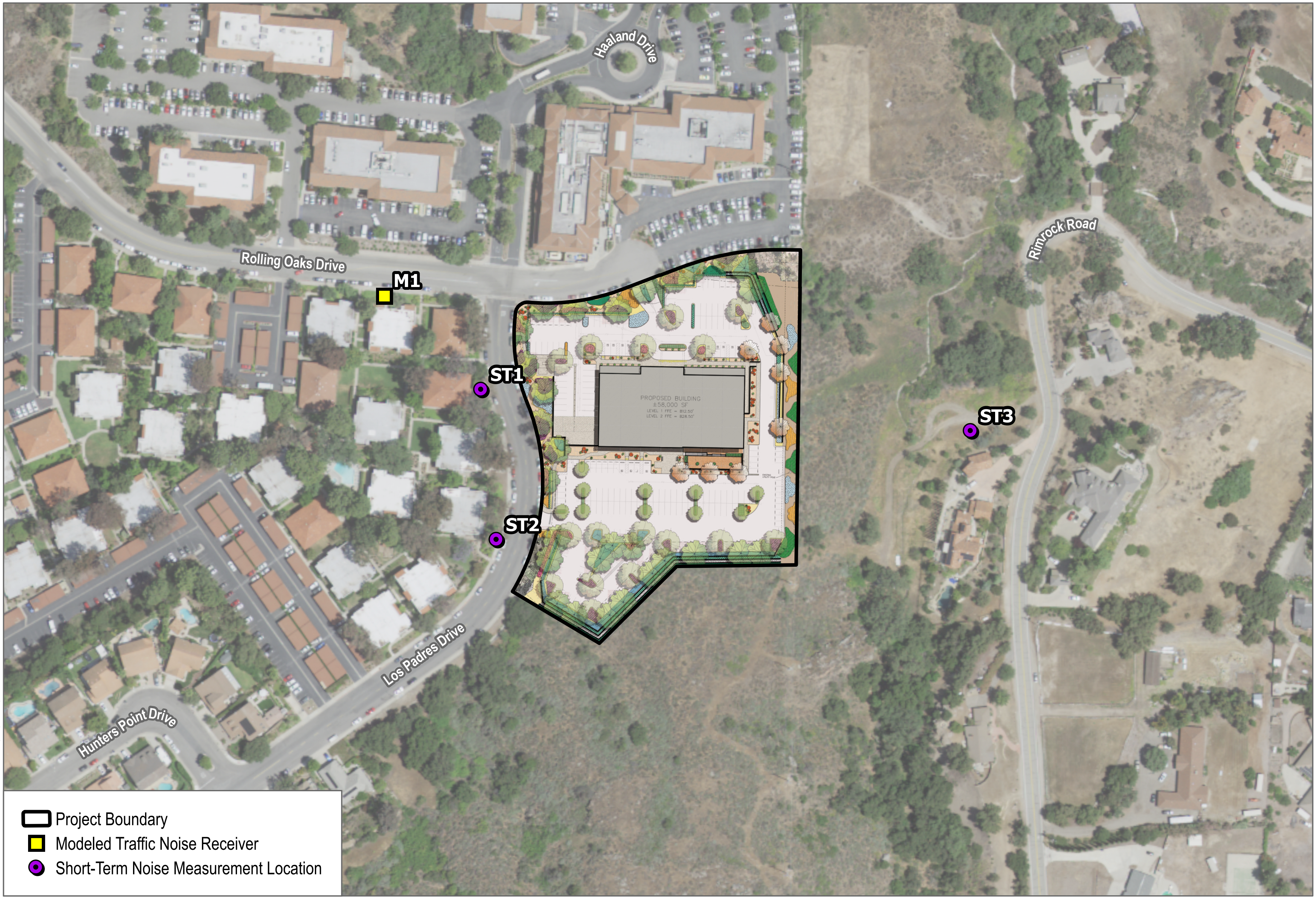
SOURCE: HKS Architects, INC., October 2023

DUDEK

FIGURE 2

Proposed Cancer Center Site Plan

INTENTIONALLY LEFT BLANK



SOURCE: NAIP 2020; HKS Architect 2023

DUDEK

FIGURE 3

Baseline Sound Measurement and Traffic Noise Assessment Locations – Cancer Center

EIR for Los Robles Comprehensive Cancer Center - 355 W Janss Road Land Use Change Project

INTENTIONALLY LEFT BLANK

SOURCE: NAIP 2020

DUDEK

0 100 200 Feet

FIGURE 4

Baseline Sound Measurement Locations – Janss Road

EIR for Los Robles Comprehensive Cancer Center - 355 W Janss Road Land Use Change Project

INTENTIONALLY LEFT BLANK

Appendix A
Field Noise Measurement Data Sheets

FIELD NOISE MEASUREMENT DATA

DUDEK

PROJECT: LOS ROBLES MOB
PROJECT #: 12902.03
SITE ID:
SITE ADDRESS:
OBSERVER(S): PETE VITAN
START DATE: 3/9/23 END DATE: 3/9/23
START TIME: END TIME:

METEOROLOGICAL CONDITIONS
TEMP: 62 F HUMIDITY: 48 % R.H. WIND: CALM LIGHT (MODERATE)
WINDSPD: 9 MPH DIR. N NE S SE S SW W NW VARIABLE STEADY GUSTY
SKY: SUNNY CLEAR OVRCAST (PRTLY CLDY) FOG RAIN

ACOUSTIC MEASUREMENTS
MEAS. INSTRUMENT: PICCOLO SLM-P3 TYPE 1 2 SERIAL #: 130927046
CALIBRATOR: REED R8090 SERIAL #:
CALIBRATION CHECK: PRE-TEST ____ dBA SPL POST-TEST ____ dBA SPL WINDSCRN: YES

SETTINGS: (A-WTD) (SLOW) FAST FRONTAL RANDOM ANSI OTHER:

	REC. #	BEGIN	END	Leq	Lmax	Lmin	L90	L50	L10	OTHER (SPECIFY METRIC)
ST1	250-265	12:00	12:15							

COMMENTS: (BUILDING #6)
READING TAKEN ALONG LOS PADRES DRIVE, ON EAST END OF RESIDENTIAL COMPLEX AT 300 ROLLING OAKS DR; PRIMARY NOISE SOURCE IS TRAFFIC ON ROLLING OAKS DR & ON LOS PADRES RD; AUDIBLE TRAFFIC NOISE FROM 101 FWY TO THE NORTH;
(*) TRAFFIC COUNT IS FOR LOS PADRES ROAD

SOURCE INFO AND TRAFFIC COUNTS
PRIMARY NOISE SOURCE: (TRAFFIC) AIRCRAFT RAIL INDUSTRIAL OTHER:
ROADWAY TYPE: ASPHALT DIST. TO RDWY (C/L) OR EOP: APX 30' TO C/L ON LOS PADRES DR
TRAFFIC COUNT DURATION: 15 MIN SPEED

COUNT 1 (OR RDWY 1)

DIRECTION	NB/EB	SB/WB	SPEED NB/EB	SPEED SB/WB
AUTOS	12			
MED TRKS	0			
HVY TRKS	0			
BUSES	0			
MOTRCLS	0			

IF COUNTING BOTH DIRECTIONS AS ONE, CHECK HERE: ✓

COUNT 2 (OR RDWY 2): ____ MIN

DIRECTION	NB/EB	SB/WB	SPEED NB/EB	SPEED SB/WB
AUTOS				
MED TRKS				
HVY TRKS				
BUSES				
MOTRCLS				

SPEEDS ESTIMATED BY: RADAR / DRIVING THE PACE
POSTED SPEED LIMIT SIGNS SAY:

OTHER NOISE SOURCES (BACKGROUND): DIST. AIRCRAFT RUSTLING LEAVES DIST. BARKING DOGS (BIRDS) DIST. INDUSTRIAL DIST. KIDS PLAYING (DIST. CONVERSTNS / YELLING) (DIST. TRAFFIC (LIST RDWYS BELOW)) DIST. GARDENERS/LANDSCAPING NOISE
OTHER: DISTANT TRAFFIC NOISE FROM 101 FWY TO THE NORTH; SOME SHORT CONVERSATIONS ON SIDEWALK / IN BUILDING WALKWAYS; PROP. PLANE FLYOVER AT 12:10PM;

DESCRIPTION / SKETCH
TERRAIN: HARD SOFT (MIXED) FLAT OTHER:
PHOTOS: 6598; 6599; 6600; 6601
OTHER COMMENTS / SKETCH:

DUDEK

FIELD NOISE MEASUREMENT DATA

PROJECT: LOS ROBLES MOB.
PROJECT #: 12902.03
SITE ID:
SITE ADDRESS:
OBSERVER(S): PETE VITAR
START DATE: 3/9/23 END DATE: 3/8/23
START TIME: END TIME:

METEOROLOGICAL CONDITIONS
TEMP: 62 F HUMIDITY: 48 % R.H. WIND: CALM LIGHT **(MODERATE)**
WINDSPD: 4 MPH DIR. N NE S SE S SW W NW VARIABLE STEADY GUSTY
SKY: SUNNY CLEAR OVRCAST **(PRTLY CLDY)** FOG RAIN

ACOUSTIC MEASUREMENTS
MEAS. INSTRUMENT: PICCOLO SLM P-3 TYPE 1 2 SERIAL #: 130927046
CALIBRATOR: REED R 8090 SERIAL #:
CALIBRATION CHECK: PRE-TEST ___ dBA SPL POST-TEST ___ dBA SPL WINDSCRN: YES

SETTINGS: **(A-WTD)** **(SLOW)** FAST FRONTAL RANDOM ANSI OTHER:

	REC. #	BEGIN	END	Leq	Lmax	Lmin	L90	L50	L10	OTHER (SPECIFY METRIC)
(ST2)	266-281									

COMMENTS
READING TAKEN ALONG LOS PADRES DR, ON EAST END OF RESIDENTIAL COMPLEX AT 300 ROLLING OAKS DR (BUILDING #9); PRIMARY NOISE SOURCE IS TRAFFIC ON LOS PADRES DR; AUDIBLE TRAFFIC NOISE FROM TRAFFIC ON 101 FWY TO THE NORTH;

SOURCE INFO AND TRAFFIC COUNTS
PRIMARY NOISE SOURCE: **(TRAFFIC)** AIRCRAFT RAIL INDUSTRIAL OTHER:
ROADWAY TYPE: ASPHALT DIST. TO RDWY C/L OR EOP: APX 30'-70 C/L ON LOS PADRES DR.

TRAFFIC COUNT DURATION: 15 MIN

COUNT 1 (OR RDWY 1) DIRECTION	NB/EB	SB/WB	SPEED NB/EB	SPEED SB/WB
AUTOS	17			
MED TRKS	0			
HVY TRKS	0			
BUSES	0			
MOTRCLS	0			

IF COUNTING BOTH DIRECTIONS AS ONE, CHECK HERE: ✓

COUNT 2 (OR RDWY 2) DIRECTION	NB/EB	SB/WB	SPEED NB/EB	SPEED SB/WB
AUTOS				
MED TRKS				
HVY TRKS				
BUSES				
MOTRCLS				

SPEEDS ESTIMATED BY: RADAR / DRIVING THE PACE
POSTED SPEED LIMIT SIGNS SAY:

OTHER NOISE SOURCES (BACKGROUND): DIST. AIRCRAFT RUSTLING LEAVES DIST. BARKING DOGS **(BIRDS)** DIST. INDUSTRIAL DIST. KIDS PLAYING **(DIST. CONVERSTNS / YELLING)** **(DIST. TRAFFIC (LIST RDWYS BELOW))** DIST. GARDENERS/LANDSCAPING NOISE
OTHER: DISTANT TRAFFIC NOISE FROM 101 FWY TO THE NORTH; SOME SHORT CONVERSATIONS ALONG SIDEWALK IN DISTANCE; HELICOPTER FLYOVER AT 12:26PM;

DESCRIPTION / SKETCH
TERRAIN: HARD SOFT **(MIXED)** FLAT OTHER:
PHOTOS: 6603; 6604; 6605; 6606
OTHER COMMENTS / SKETCH

DUDEK

FIELD NOISE MEASUREMENT DATA

PROJECT: LOS RUSLES MOB   PROJECT #: 12902.03
SITE ID:
SITE ADDRESS: OBSERVER(S): PETE VITAN
START DATE: 3/9/23   END DATE: 3/9/23
START TIME: END TIME:

METEOROLOGICAL CONDITIONS

TEMP: 60 F   HUMIDITY: 50 % R.H.   WIND: CALM LIGHT (MODERATE)
WINDSPD: 4 MPH   DIR. N NE S SE S SW W NW   VARIABLE STEADY GUSTY
SKY: SUNNY CLEAR OVRCAST (PRTLY CLDY) FOG RAIN

ACOUSTIC MEASUREMENTS

MEAS. INSTRUMENT: PICCOLO SLM P-3   TYPE 1 2   SERIAL # 130927046
CALIBRATOR: REED R8090   SERIAL #
CALIBRATION CHECK: PRE-TEST ____ dBA SPL   POST-TEST ____ dBA SPL   WINDSCRN: YES

SETTINGS: (A-WTD) (SLOW) FAST FRONTAL RANDOM ANSI OTHER:

	REC. #	BEGIN	END	Leq	Lmax	Lmin	L90	L50	L10	OTHER (SPECIFY METRIC)
ST3	234-249	10:55	11:10							

COMMENTS:
READING TAKEN AT NE CORNER OF PROPERTY AT 243 RIMROCK RD (RESIDENTIAL); PRIMARY NOISE SOURCE IS TRAFFIC ON I-01 FWY TO THE NORTH; METER LOCATION IS DIRECTLY ACROSS STREET FROM DRIVEWAY ENTRANCE TO 224 RIMROCK RD (RESIDENCE);

SOURCE INFO AND TRAFFIC COUNTS

PRIMARY NOISE SOURCE: (TRAFFIC) AIRCRAFT RAIL INDUSTRIAL OTHER:
ROADWAY TYPE: ASPHALT   DIST. TO RDWY (C/L) OR EOP: APX 25' TO C/L ON RIMROCK RD; APX 1,030' FROM C/L ON 101 FWY
TRAFFIC COUNT DURATION: 15 MIN   SPEED   MIN   SPEED

COUNT 1 (OR RDWY 1) DIRECTION	NB/EB	SB/WB	NB/EB	SB/WB
AUTOS	6			
MED TRKS	0			
HVY TRKS	0			
BUSES	0			
MOTRCLS	0			

IF COUNTING BOTH DIRECTIONS AS ONE, CHECK HERE: ✓

COUNT 2 (OR RDWY 2) DIRECTION	NB/EB	SB/WB	NB/EB	SB/WB
AUTOS				
MED TRKS				
HVY TRKS				
BUSES				
MOTRCLS				

SPEEDS ESTIMATED BY: RADAR / DRIVING THE PACE
POSTED SPEED LIMIT SIGNS SAY:

OTHER NOISE SOURCES (BACKGROUND): DIST. AIRCRAFT RUSTLING LEAVES DIST. BARKING DOGS (BIRDS) DIST. INDUSTRIAL
DIST. KIDS PLAYING DIST. CONVRSTNS / YELLING (DIST. TRAFFIC (LIST RDWYS BELOW)) DISTD GARDENERS/LANDSCAPING NOISE
OTHER: LOUD MOTORIZED CART PASSING METER AT 11:09;

DESCRIPTION / SKETCH

TERRAIN: HARD SOFT (MIXED) FLAT OTHER:
PHOTOS: 6588; 6589; 6590; 6591; 6592; 6593
OTHER COMMENTS / SKETCH

N

From: no-reply-dudek-forms@iformbuilder.com
Sent: Thursday, July 20, 2023 9:50 PM
To: Carson Wong
Subject: New Record - Field Noise Measurement Data

FORMS DUDEK FIELD DATA REPORT

Field Noise Measurement Data

ID	1670
Project Name	Thousand oaks
Observer(s)	
Date	2023-07-20

Meteorological Conditions

ID	S1670
Temp (F)	89
Humidity % (R.H.)	39
Wind	Calm
Wind Speed (MPH)	8
Wind Direction	East
Sky	Clear

Instrument and Calibrator Information

ID	S1670
Instrument Name List	(ENC) Rion NL-52

Instrument and Calibrator Information

ID	S1670
Instrument Name	(ENC) Rion NL-52
Instrument Name Lookup Key	(ENC) Rion NL-52
Manufacturer	Rion
Model	NL-52
Serial Number	553896
Calibrator Name	(ENC) LD CAL150
Calibrator Name	(ENC) LD CAL150
Calibrator Name Lookup Key	(ENC) LD CAL150
Calibrator Manufacturer	Larson Davis
Calibrator Model	LD CAL150
Calibrator Serial #	5152
Pre-Test (dBA SPL)	93.8
Windscreen	Yes
Weighting?	A-WTD
Slow/Fast?	Slow

Monitoring

ID	S1670
Record #	6

Monitoring

ID	S1670
Site ID	0961
Site Location Lat/Long	34.206054, -118.886626
Begin (Time)	13:16:00
End (Time)	13:31:00
Leq	67.4
Lmax	85.7
Lmin	45.8
Other Lx?	L90, L50, L10
L90	52.8
L50	61.6
L10	71
Other Lx (Specify Metric)	L
Primary Noise Source	Traffic
Other Noise Sources (Background)	Rustling Leaves
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as previously noted?	Yes

Source Info and Traffic Counts

ID	S6770
Number of Lanes	4
Lane Width (feet)	10
Roadway Width (feet)	40
Roadway Width (m)	12.2
Distance to Roadway (feet)	10
Distance to Roadway (m)	3
Distance Measured to Centerline or Edge of Pavement?	Edge of Pavement
Estimated Vehicle Speed (MPH)	0

Traffic Counts

ID	S1613
Vehicle Count Summary	A 197, MT 0, HT 0, B 0, MC 1
Select Method for Recording Count Duration	Enter Manually
Counting Both Directions?	Yes
Count Duration (minutes)	0
Vehicle Count Tally	
Select Method for Vehicle Counts	Enter Manually
Number of Vehicles - Autos	197
Number of Vehicles - Medium Trucks	0

Traffic Counts

ID	S1613
Number of Vehicles - Heavy Trucks	0
Number of Vehicles - Buses	0
Number of Vehicles - Motorcyles	1

Description / Photos

ID	S6770

Site Photos

ID	S5099
Photo	
Comments / Description	Facing north

ID	S5099
Photo	
Comments / Description	Facing southeast

ID	S5099
Photo	
Comments / Description	Facing south

Monitoring

ID	S1670
Record #	5
Site ID	
Site Location Lat/Long	34.205796, -118.885847
Begin (Time)	12:53:00
End (Time)	13:08:00
Leq	60.6
Lmax	72.7
Lmin	45.8
Other Lx?	L90, L50, L10
L90	50.4
L50	57.7
L10	64.8
Other Lx (Specify Metric)	L
Primary Noise Source	Traffic
Other Noise Sources (Background)	Birds, Rustling Leaves
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as previously noted?	Yes

Description / Photos

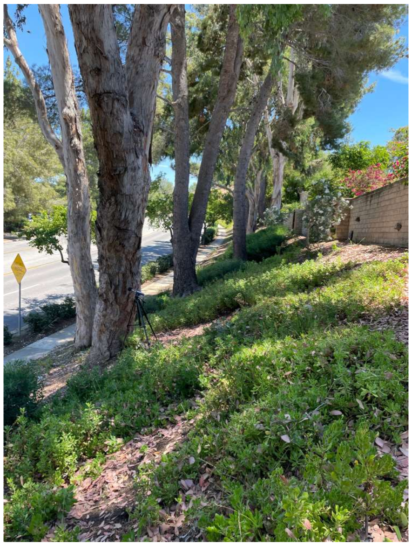
ID	**S6767**

Site Photos

ID	**S5096**
Photo	
Comments / Description	Facing south

ID	**S5096**
Photo	

ID	S5096
Comments / Description	Facing north

ID	S5096
Photo	
Comments / Description	Facing east

ID	S5096
Photo	
Comments / Description	Facing west

Appendix B
Construction Noise Model Input / 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? 1
grnd abs? 1

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	Demolition	Excavator	1	40	81	75	0		76.6	8	480	73	5	5	0	5	70	75	7.1	70.2	75.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Dozer	1	40	82	75	0		77.6	8	480	74	5	5	0	5	70	75	7.1	70.2	75.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Demolition Phase	**76.1**																
2	Grading	Excavator	1	40	81	125	0		70.0	8	480	66	5	5	0	5	120	125	7.1	120.1	125.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Dozer	1	40	82	75	0		77.6	8	480	74	5	5	0	5	70	75	7.1	70.2	75.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Tractor	1	40	84	75	0		79.6	8	480	76	5	5	0	5	70	75	7.1	70.2	75.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Front End Loader	1	40	79	125	0		68.0	8	480	64	5	5	0	5	120	125	7.1	120.1	125.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Backhoe	1	40	78	125	0		67.0	8	480	63	5	5	0	5	120	125	7.1	120.1	125.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Grading Phase	**78.3**																
3	Building Construction	Crane	1	16	81	185	0		65.8	7	420	57	5	5	0	5	180	185	7.1	180.1	185.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Man Lift	1	20	75	185	0		59.8	8	480	53	5	5	0	5	180	185	7.1	180.1	185.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		welder / torch	1	40	73	185	0		57.8	8	480	54	5	5	0	5	180	185	7.1	180.1	185.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Tractor	1	40	84	185	0		68.8	7	420	64	5	5	0	5	180	185	7.1	180.1	185.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Man Lift	1	20	75	185	0		59.8	8	480	53	5	5	0	5	180	185	7.1	180.1	185.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		welder / torch	1	40	73	185	0		57.8	8	480	54	5	5	0	5	180	185	7.1	180.1	185.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Building Construction Phase	**66.1**																
4	Paving	Concrete Mixer Truck	1	40	79	75	0		74.6	6	360	69	5	5	0	5	70	75	7.1	70.2	75.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Paver	1	50	77	75	0		72.6	4	240	67	5	5	0	5	70	75	7.1	70.2	75.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Front End Loader	1	40	79	75	0		74.6	8	480	71	5	5	0	5	70	75	7.1	70.2	75.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		Roller	1	20	80	75	0		75.6	6	360	67	5	5	0	5	70	75	7.1	70.2	75.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Paving Phase	**74.8**																
5	Architectural Coating	compressor (air)	1	40	78	185	0		62.8	6	360	58	5	5	0	5	180	185	7.1	180.1	185.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Architectural Coating Phase	**57.6**																

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? 1
grnd abs? 1

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	Demolition	Excavator	1	40	81	75	15		62.0	5	300	56	5	5	12	5	70	75	8.6	70.3	75.0	3.95	15.0	17.0	5.0	0.4	0.7	14.6
		Dozer	1	40	82	75	15		63.0	5	300	57	5	5	12	5	70	75	8.6	70.3	75.0	3.95	15.0	17.0	5.0	0.4	0.7	14.6
		Excavator	1	40	81	225	9		55.2	3	180	47	5	5	12	155	70	225	155.2	70.3	225.0	0.51	10.1	17.0	5.0	0.4	0.7	8.7
		Dozer	1	40	82	225	9		56.2	3	180	48	5	5	12	155	70	225	155.2	70.3	225.0	0.51	10.1	17.0	5.0	0.4	0.7	8.7
											Total Aggregate Noise Exposure from Demolition Phase	**60.0**																
2	Grading	Excavator	1	40	81	125	14		56.0	6	360	51	5	5	12	5	120	125	8.6	120.2	125.0	3.81	15.0	17.0	5.0	0.4	0.7	14.2
		Dozer	1	40	82	75	15		63.0	2	120	53	5	5	12	5	70	75	8.6	70.3	75.0	3.95	15.0	17.0	5.0	0.4	0.7	14.6
		Tractor	1	40	84	75	15		65.0	2	120	55	5	5	12	5	70	75	8.6	70.3	75.0	3.95	15.0	17.0	5.0	0.4	0.7	14.6
		Front End Loader	1	40	79	125	14		54.0	6	360	49	5	5	12	5	120	125	8.6	120.2	125.0	3.81	15.0	17.0	5.0	0.4	0.7	14.2
		Backhoe	1	40	78	125	14		53.0	6	360	48	5	5	12	5	120	125	8.6	120.2	125.0	3.81	15.0	17.0	5.0	0.4	0.7	14.2
		Excavator	1	40	81	375	6		52.8	2	120	43	5	5	12	255	120	375	255.1	120.2	375.0	0.30	7.9	17.0	5.0	0.4	0.7	6.0
		Dozer	1	40	82	225	9		56.2	6	360	51	5	5	12	155	70	225	155.2	70.3	225.0	0.51	10.1	17.0	5.0	0.4	0.7	8.7
		Tractor	1	40	84	225	9		58.2	6	360	53	5	5	12	155	70	225	155.2	70.3	225.0	0.51	10.1	17.0	5.0	0.4	0.7	8.7
		Front End Loader	1	40	79	375	6		50.8	2	120	41	5	5	12	255	120	375	255.1	120.2	375.0	0.30	7.9	17.0	5.0	0.4	0.7	6.0
		Backhoe	1	40	78	375	6		49.8	2	120	40	5	5	12	255	120	375	255.1	120.2	375.0	0.30	7.9	17.0	5.0	0.4	0.7	6.0
											Total Aggregate Noise Exposure from Grading Phase	**60.5**																
3	Building Construction	Crane	1	16	81	185	14		52.1	7	420	44	5	5	12	5	180	185	8.6	180.1	185.0	3.74	15.0	17.0	5.0	0.4	0.7	13.8
		Man Lift	1	20	75	185	14		46.1	8	480	39	5	5	12	5	180	185	8.6	180.1	185.0	3.74	15.0	17.0	5.0	0.4	0.7	13.8
		welder / torch	1	40	73	185	14		44.1	8	480	40	5	5	12	5	180	185	8.6	180.1	185.0	3.74	15.0	17.0	5.0	0.4	0.7	13.8
		Tractor	1	40	84	185	14		55.1	7	420	51	5	5	12	5	180	185	8.6	180.1	185.0	3.74	15.0	17.0	5.0	0.4	0.7	13.8
		Man Lift	1	20	75	185	14		46.1	8	480	39	5	5	12	5	180	185	8.6	180.1	185.0	3.74	15.0	17.0	5.0	0.4	0.7	13.8
		welder / torch	1	40	73	185	14		44.1	8	480	40	5	5	12	5	180	185	8.6	180.1	185.0	3.74	15.0	17.0	5.0	0.4	0.7	13.8
											Total Aggregate Noise Exposure from Building Construction Phase	**52.3**																
4	Paving	Concrete Mixer Truck	1	40	79	75	15		60.0	6	360	55	5	5	12	5	70	75	8.6	70.3	75.0	3.95	15.0	17.0	5.0	0.4	0.7	14.6
		Paver	1	50	77	75	15		58.0	4	240	52	5	5	12	5	70	75	8.6	70.3	75.0	3.95	15.0	17.0	5.0	0.4	0.7	14.6
		Front End Loader	1	40	79	75	15		60.0	7	420	55	5	5	12	5	70	75	8.6	70.3	75.0	3.95	15.0	17.0	5.0	0.4	0.7	14.6
		Roller	1	20	80	75	15		61.0	6	360	53	5	5	12	5	70	75	8.6	70.3	75.0	3.95	15.0	17.0	5.0	0.4	0.7	14.6
		Concrete Mixer Truck	1	40	79	225	9		53.2	2	120	43	5	5	12	155	70	225	155.2	70.3	225.0	0.51	10.1	17.0	5.0	0.4	0.7	8.7
		Paver	1	50	77	225	9		51.2	4	240	45	5	5	12	155	70	225	155.2	70.3	225.0	0.51	10.1	17.0	5.0	0.4	0.7	8.7
		Front End Loader	1	40	79	225	9		53.2	1	60	40	5	5	12	155	70	225	155.2	70.3	225.0	0.51	10.1	17.0	5.0	0.4	0.7	8.7
		Roller	1	20	80	225	9		54.2	2	120	41	5	5	12	155	70	225	155.2	70.3	225.0	0.51	10.1	17.0	5.0	0.4	0.7	8.7
											Total Aggregate Noise Exposure from Paving Phase	**60.3**																
5	Architectural Coating	compressor (air)	1	40	78	185	0		62.8	6	360	58	5	5	0	5	180	185	7.1	180.1	185.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
											Total Aggregate Noise Exposure from Architectural Coating Phase	**57.6**																

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? 1
grnd abs? 1

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
1	Demolition	Excavator	1	40	81	75	0		76.6	8	480	73
		Dozer	1	40	82	75	0		77.6	8	480	74
											Total Aggregate Noise Exposure from Demolition Phase	**76.1**
2	Grading	Excavator	1	40	81	125	0		70.0	8	480	66
		Dozer	1	40	82	75	0		77.6	8	480	74
		Tractor	1	40	84	75	0		79.6	8	480	76
		Front End Loader	1	40	79	125	0		68.0	8	480	64
		Backhoe	1	40	78	125	0		67.0	8	480	63
											Total Aggregate Noise Exposure from Grading Phase	**78.3**
3	Building Construction	Crane	1	16	81	185	0		65.8	7	420	57
		Man Lift	1	20	75	185	0		59.8	8	480	53
		welder / torch	1	40	73	185	0		57.8	8	480	54
		Tractor	1	40	84	185	0		68.8	7	420	64
		Man Lift	1	20	75	185	0		59.8	8	480	53
		welder / torch	1	40	73	185	0		57.8	8	480	54
											Total Aggregate Noise Exposure from Building Construction Phase	**66.1**
4	Paving	Concrete Mixer Truck	1	40	79	75	0		74.6	6	360	69
		Paver	1	50	77	75	0		72.6	4	240	67
		Front End Loader	1	40	79	75	0		74.6	8	480	71
		Roller	1	20	80	75	0		75.6	6	360	67
											Total Aggregate Noise Exposure from Paving Phase	**74.8**
5	Architectural Coating	compressor (air)	1	40	78	185	0		62.8	6	360	58
											Total Aggregate Noise Exposure from Architectural Coating Phase	**57.6**

Project Phase No.	Comparable FHWA RCNM Construction Equipment Type	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	Excavator	5	5	0	5	70	75	7.1	70.2	75.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
1	Dozer	5	5	0	5	70	75	7.1	70.2	75.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
2	Excavator	5	5	0	5	120	125	7.1	120.1	125.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
2	Dozer	5	5	0	5	70	75	7.1	70.2	75.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
2	Tractor	5	5	0	5	70	75	7.1	70.2	75.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
2	Front End Loader	5	5	0	5	120	125	7.1	120.1	125.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
2	Backhoe	5	5	0	5	120	125	7.1	120.1	125.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
3	Crane	5	5	0	5	180	185	7.1	180.1	185.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
3	Man Lift	5	5	0	5	180	185	7.1	180.1	185.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
3	welder / torch	5	5	0	5	180	185	7.1	180.1	185.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
3	Tractor	5	5	0	5	180	185	7.1	180.1	185.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
3	Man Lift	5	5	0	5	180	185	7.1	180.1	185.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
3	welder / torch	5	5	0	5	180	185	7.1	180.1	185.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
4	Concrete Mixer Truck	5	5	0	5	70	75	7.1	70.2	75.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
4	Paver	5	5	0	5	70	75	7.1	70.2	75.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
4	Front End Loader	5	5	0	5	70	75	7.1	70.2	75.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
4	Roller	5	5	0	5	70	75	7.1	70.2	75.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
5	compressor (air)	5	5	0	5	180	185	7.1	180.1	185.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1

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? 1
grnd abs? 1

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	Demolition	Excavator	1	40	81	75	15		62.0	5	300	56	5	5	12	5	70	75	8.6	70.3	75.0	3.95	15.0	17.0	5.0	0.4	0.7	14.6
		Dozer	1	40	82	75	15		63.0	5	300	57	5	5	12	5	70	75	8.6	70.3	75.0	3.95	15.0	17.0	5.0	0.4	0.7	14.6
		Excavator	1	40	81	225	9		55.2	3	180	47	5	5	12	155	70	225	155.2	70.3	225.0	0.51	10.1	17.0	5.0	0.4	0.7	8.7
		Dozer	1	40	82	225	9		56.2	3	180	48	5	5	12	155	70	225	155.2	70.3	225.0	0.51	10.1	17.0	5.0	0.4	0.7	8.7
									Total Aggregate Noise Exposure from Demolition Phase			**60.0**																
2	Grading	Excavator	1	40	81	125	14		56.0	6	360	51	5	5	12	5	120	125	8.6	120.2	125.0	3.81	15.0	17.0	5.0	0.4	0.7	14.2
		Dozer	1	40	82	75	15		63.0	2	120	53	5	5	12	5	70	75	8.6	70.3	75.0	3.95	15.0	17.0	5.0	0.4	0.7	14.6
		Tractor	1	40	84	75	15		65.0	2	120	55	5	5	12	5	70	75	8.6	70.3	75.0	3.95	15.0	17.0	5.0	0.4	0.7	14.6
		Front End Loader	1	40	79	125	14		54.0	6	360	49	5	5	12	5	120	125	8.6	120.2	125.0	3.81	15.0	17.0	5.0	0.4	0.7	14.2
		Backhoe	1	40	78	125	14		53.0	6	360	48	5	5	12	5	120	125	8.6	120.2	125.0	3.81	15.0	17.0	5.0	0.4	0.7	14.2
		Excavator	1	40	81	375	6		52.8	2	120	43	5	5	12	255	120	375	255.1	120.2	375.0	0.30	7.9	17.0	5.0	0.4	0.7	6.0
		Dozer	1	40	82	225	9		56.2	6	360	51	5	5	12	155	70	225	155.2	70.3	225.0	0.51	10.1	17.0	5.0	0.4	0.7	8.7
		Tractor	1	40	84	225	9		58.2	6	360	53	5	5	12	155	70	225	155.2	70.3	225.0	0.51	10.1	17.0	5.0	0.4	0.7	8.7
		Front End Loader	1	40	79	375	6		50.8	2	120	41	5	5	12	255	120	375	255.1	120.2	375.0	0.30	7.9	17.0	5.0	0.4	0.7	6.0
		Backhoe	1	40	78	375	6		49.8	2	120	40	5	5	12	255	120	375	255.1	120.2	375.0	0.30	7.9	17.0	5.0	0.4	0.7	6.0
									Total Aggregate Noise Exposure from Grading Phase			**60.5**																
3	Building Construction	Crane	1	16	81	185	14		52.1	7	420	44	5	5	12	5	180	185	8.6	180.1	185.0	3.74	15.0	17.0	5.0	0.4	0.7	13.8
		Man Lift	1	20	75	185	14		46.1	8	480	39	5	5	12	5	180	185	8.6	180.1	185.0	3.74	15.0	17.0	5.0	0.4	0.7	13.8
		welder / torch	1	40	73	185	14		44.1	8	480	40	5	5	12	5	180	185	8.6	180.1	185.0	3.74	15.0	17.0	5.0	0.4	0.7	13.8
		Tractor	1	40	84	185	14		55.1	7	420	51	5	5	12	5	180	185	8.6	180.1	185.0	3.74	15.0	17.0	5.0	0.4	0.7	13.8
		Man Lift	1	20	75	185	14		46.1	8	480	39	5	5	12	5	180	185	8.6	180.1	185.0	3.74	15.0	17.0	5.0	0.4	0.7	13.8
		welder / torch	1	40	73	185	14		44.1	8	480	40	5	5	12	5	180	185	8.6	180.1	185.0	3.74	15.0	17.0	5.0	0.4	0.7	13.8
									Total Aggregate Noise Exposure from Building Construction Phase			**52.3**																
4	Paving	Concrete Mixer Truck	1	40	79	75	15		60.0	6	360	55	5	5	12	5	70	75	8.6	70.3	75.0	3.95	15.0	17.0	5.0	0.4	0.7	14.6
		Paver	1	50	77	75	15		58.0	4	240	52	5	5	12	5	70	75	8.6	70.3	75.0	3.95	15.0	17.0	5.0	0.4	0.7	14.6
		Front End Loader	1	40	79	75	15		60.0	7	420	55	5	5	12	5	70	75	8.6	70.3	75.0	3.95	15.0	17.0	5.0	0.4	0.7	14.6
		Roller	1	20	80	75	15		61.0	6	360	53	5	5	12	5	70	75	8.6	70.3	75.0	3.95	15.0	17.0	5.0	0.4	0.7	14.6
		Concrete Mixer Truck	1	40	79	225	9		53.2	2	120	43	5	5	12	155	70	225	155.2	70.3	225.0	0.51	10.1	17.0	5.0	0.4	0.7	8.7
		Paver	1	50	77	225	9		51.2	4	240	45	5	5	12	155	70	225	155.2	70.3	225.0	0.51	10.1	17.0	5.0	0.4	0.7	8.7
		Front End Loader	1	40	79	225	9		53.2	1	60	40	5	5	12	155	70	225	155.2	70.3	225.0	0.51	10.1	17.0	5.0	0.4	0.7	8.7
		Roller	1	20	80	225	9		54.2	2	120	41	5	5	12	155	70	225	155.2	70.3	225.0	0.51	10.1	17.0	5.0	0.4	0.7	8.7
									Total Aggregate Noise Exposure from Paving Phase			**60.3**																
5	Architectural Coating	compressor (air)	1	40	78	185	0		62.8	6	360	58	5	5	0	5	180	185	7.1	180.1	185.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
									Total Aggregate Noise Exposure from Architectural Coating Phase			**57.6**																

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? 1
grnd abs? 1

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
1	Demolition	Excavator	1	40	81	260	0		62.4	8	480	58
		Dozer	1	40	82	260	0		63.4	8	480	59
											Total Aggregate Noise Exposure from Demolition Phase	**61.9**
2	Grading	Excavator	1	40	81	310	0		60.6	8	480	57
		Dozer	1	40	82	260	0		63.4	8	480	59
		Tractor	1	40	84	260	0		65.4	8	480	61
		Front End Loader	1	40	79	310	0		58.6	8	480	55
		Backhoe	1	40	78	310	0		57.6	8	480	54
											Total Aggregate Noise Exposure from Grading Phase	**65.1**
3	Building Construction	Crane	1	16	81	335	0		59.9	7	420	51
		Man Lift	1	20	75	335	0		53.9	8	480	47
		welder / torch	1	40	73	335	0		51.9	8	480	48
		Tractor	1	40	84	335	0		62.9	7	420	58
		Man Lift	1	20	75	335	0		53.9	8	480	47
		welder / torch	1	40	73	335	0		51.9	8	480	48
											Total Aggregate Noise Exposure from Building Construction Phase	**60.2**
4	Paving	Concrete Mixer Truck	1	40	79	260	0		60.4	6	360	55
		Paver	1	50	77	260	0		58.4	4	240	52
		Front End Loader	1	40	79	260	0		60.4	8	480	56
		Roller	1	20	80	260	0		61.4	6	360	53
											Total Aggregate Noise Exposure from Paving Phase	**60.6**
5	Architectural Coating	compressor (air)	1	40	78	335	0		56.9	6	360	52
											Total Aggregate Noise Exposure from Architectural Coating Phase	**51.6**

Project Phase No.	Comparable FHWA RCNM Construction Equipment Type	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	Excavator	5	5	0	5	255	260	7.1	255.0	260.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	Dozer	5	5	0	5	255	260	7.1	255.0	260.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
2	Excavator	5	5	0	5	305	310	7.1	305.0	310.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	Dozer	5	5	0	5	255	260	7.1	255.0	260.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	Tractor	5	5	0	5	255	260	7.1	255.0	260.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	Front End Loader	5	5	0	5	305	310	7.1	305.0	310.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	Backhoe	5	5	0	5	305	310	7.1	305.0	310.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
3	Crane	5	5	0	5	330	335	7.1	330.0	335.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	Man Lift	5	5	0	5	330	335	7.1	330.0	335.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	welder / torch	5	5	0	5	330	335	7.1	330.0	335.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	Tractor	5	5	0	5	330	335	7.1	330.0	335.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	Man Lift	5	5	0	5	330	335	7.1	330.0	335.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	welder / torch	5	5	0	5	330	335	7.1	330.0	335.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
4	Concrete Mixer Truck	5	5	0	5	255	260	7.1	255.0	260.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	Paver	5	5	0	5	255	260	7.1	255.0	260.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	Front End Loader	5	5	0	5	255	260	7.1	255.0	260.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	Roller	5	5	0	5	255	260	7.1	255.0	260.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
5	compressor (air)	5	5	0	5	330	335	7.1	330.0	335.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1

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? 1
grnd abs? 1

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
1	Demolition	Concrete Saw	1	20	90	105	0		81.1	8	480	74
		Tractor	1	40	84	105	0		75.1	8	480	71
		Front End Loader	1	40	79	105	0		70.1	8	480	66
		Backhoe	1	40	78	105	0		69.1	8	480	65
		Dozer	1	40	82	105	0		73.1	8	480	69
											Total Aggregate Noise Exposure from Demolition Phase	**77.3**
2	Site Preparation	Grader	1	40	85	155	0		71.7	8	480	68
		Scraper	1	40	84	105	0		75.1	8	480	71
		Tractor	1	40	84	105	0		75.1	7	420	71
											Total Aggregate Noise Exposure from Site Preparation Phase	**74.8**
3	Grading	Dozer	1	40	82	155	0		68.7	8	480	65
		Grader	1	40	85	105	0		76.1	8	480	72
		Tractor	1	40	84	105	0		75.1	7	420	71
		Front End Loader	1	40	79	155	0		65.7	8	480	62
											Total Aggregate Noise Exposure from Grading Phase	**75.1**
4	Building Construction	Crane	1	16	81	155	0		67.7	7	420	59
		Man Lift	2	20	75	155	0		61.7	7	420	57
		Generator	1	50	72	155	0		58.7	8	480	56
		Tractor	1	40	84	155	0		70.7	6	360	65
		welder / torch	3	40	73	155	0		59.7	8	480	60
											Total Aggregate Noise Exposure from Building Construction Phase	**68.0**
5	Paving	Concrete Mixer Truck	1	40	79	105	0		70.1	8	480	66
		Paver	1	50	77	105	0		68.1	8	480	65
		Front End Loader	1	40	79	105	0		70.1	8	480	66
		Roller	2	20	80	105	0		71.1	8	480	67
		Concrete Pump Truck	1	20	81	105	0		72.1	8	480	65
											Total Aggregate Noise Exposure from Paving Phase	**73.0**
5	Architectural Coating	compressor (air)	1	40	78	155	0		64.7	6	360	59
											Total Aggregate Noise Exposure from Architectural Coating Phase	**59.4**

Equipment Type	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)
Concrete Saw	5	5	0	5	100	105	7.1	100.1	105.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Tractor	5	5	0	5	100	105	7.1	100.1	105.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Front End Loader	5	5	0	5	100	105	7.1	100.1	105.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Backhoe	5	5	0	5	100	105	7.1	100.1	105.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Dozer	5	5	0	5	100	105	7.1	100.1	105.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Grader	5	5	0	5	150	155	7.1	150.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Scraper	5	5	0	5	100	105	7.1	100.1	105.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Tractor	5	5	0	5	100	105	7.1	100.1	105.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Dozer	5	5	0	5	150	155	7.1	150.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Grader	5	5	0	5	100	105	7.1	100.1	105.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Tractor	5	5	0	5	100	105	7.1	100.1	105.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Front End Loader	5	5	0	5	150	155	7.1	150.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Crane	5	5	0	5	150	155	7.1	150.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Man Lift	5	5	0	5	150	155	7.1	150.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Generator	5	5	0	5	150	155	7.1	150.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Tractor	5	5	0	5	150	155	7.1	150.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
welder / torch	5	5	0	5	150	155	7.1	150.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Concrete Mixer Truck	5	5	0	5	100	105	7.1	100.1	105.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Paver	5	5	0	5	100	105	7.1	100.1	105.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Front End Loader	5	5	0	5	100	105	7.1	100.1	105.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Roller	5	5	0	5	100	105	7.1	100.1	105.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Concrete Pump Truck	5	5	0	5	100	105	7.1	100.1	105.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
compressor (air)	5	5	0	5	150	155	7.1	150.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1

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? 1
grnd abs? 1

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 cell] = 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
1	Demolition	Concrete Saw	1	20	90	105	12		69.2	8	480	62
		Tractor	1	40	84	105	12		63.2	8	480	59
		Front End Loader	1	40	79	105	12		58.2	8	480	54
		Backhoe	1	40	78	105	12		57.2	8	480	53
		Dozer	1	40	82	105	12		61.2	8	480	57
											Total Aggregate Noise Exposure from Demolition Phase	**65.4**
2	Site Preparation	Grader	1	40	85	155	12		60.1	8	480	56
		Scraper	1	40	84	105	12		63.2	8	480	59
		Tractor	1	40	84	105	12		63.2	7	420	59
											Total Aggregate Noise Exposure from Site Preparation Phase	**63.0**
3	Grading	Dozer	1	40	82	155	12		57.1	8	480	53
		Grader	1	40	85	105	12		64.2	8	480	60
		Tractor	1	40	84	105	12		63.2	7	420	59
		Front End Loader	1	40	79	155	12		54.1	8	480	50
											Total Aggregate Noise Exposure from Grading Phase	**63.2**
4	Building Construction	Crane	1	16	81	155	12		56.1	7	420	48
		Man Lift	2	20	75	155	12		50.1	7	420	46
		Generator	1	50	72	155	12		47.1	8	480	44
		Tractor	1	40	84	155	12		59.1	6	360	54
		welder / torch	3	40	73	155	12		48.1	8	480	49
											Total Aggregate Noise Exposure from Building Construction Phase	**56.4**
5	Paving	Concrete Mixer Truck	1	40	79	105	12		58.2	8	480	54
		Paver	1	50	77	105	12		56.2	8	480	53
		Front End Loader	1	40	79	105	12		58.2	8	480	54
		Roller	2	20	80	105	12		59.2	8	480	55
		Concrete Pump Truck	1	20	81	105	12		60.2	8	480	53
											Total Aggregate Noise Exposure from Paving Phase	**61.1**
5	Architectural Coating	compressor (air)	1	40	78	155	0		64.7	6	360	59
											Total Aggregate Noise Exposure from Architectural Coating Phase	**59.4**

Project Phase No.	Comparable FHWA RCNM Construction Equipment Type	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	Concrete Saw	5	5	8	5	100	105	5.8	100.0	105.0	0.88	12.4	13.0	5.0	0.5	0.7	12.0
	Tractor	5	5	8	5	100	105	5.8	100.0	105.0	0.88	12.4	13.0	5.0	0.5	0.7	12.0
	Front End Loader	5	5	8	5	100	105	5.8	100.0	105.0	0.88	12.4	13.0	5.0	0.5	0.7	12.0
	Backhoe	5	5	8	5	100	105	5.8	100.0	105.0	0.88	12.4	13.0	5.0	0.5	0.7	12.0
	Dozer	5	5	8	5	100	105	5.8	100.0	105.0	0.88	12.4	13.0	5.0	0.5	0.7	12.0
2	Grader	5	5	8	5	150	155	5.8	150.0	155.0	0.86	12.3	13.0	5.0	0.5	0.7	11.6
	Scraper	5	5	8	5	100	105	5.8	100.0	105.0	0.88	12.4	13.0	5.0	0.5	0.7	12.0
	Tractor	5	5	8	5	100	105	5.8	100.0	105.0	0.88	12.4	13.0	5.0	0.5	0.7	12.0
3	Dozer	5	5	8	5	150	155	5.8	150.0	155.0	0.86	12.3	13.0	5.0	0.5	0.7	11.6
	Grader	5	5	8	5	100	105	5.8	100.0	105.0	0.88	12.4	13.0	5.0	0.5	0.7	12.0
	Tractor	5	5	8	5	100	105	5.8	100.0	105.0	0.88	12.4	13.0	5.0	0.5	0.7	12.0
	Front End Loader	5	5	8	5	150	155	5.8	150.0	155.0	0.86	12.3	13.0	5.0	0.5	0.7	11.6
4	Crane	5	5	8	5	150	155	5.8	150.0	155.0	0.86	12.3	13.0	5.0	0.5	0.7	11.6
	Man Lift	5	5	8	5	150	155	5.8	150.0	155.0	0.86	12.3	13.0	5.0	0.5	0.7	11.6
	Generator	5	5	8	5	150	155	5.8	150.0	155.0	0.86	12.3	13.0	5.0	0.5	0.7	11.6
	Tractor	5	5	8	5	150	155	5.8	150.0	155.0	0.86	12.3	13.0	5.0	0.5	0.7	11.6
	welder / torch	5	5	8	5	150	155	5.8	150.0	155.0	0.86	12.3	13.0	5.0	0.5	0.7	11.6
5	Concrete Mixer Truck	5	5	8	5	100	105	5.8	100.0	105.0	0.88	12.4	13.0	5.0	0.5	0.7	12.0
	Paver	5	5	8	5	100	105	5.8	100.0	105.0	0.88	12.4	13.0	5.0	0.5	0.7	12.0
	Front End Loader	5	5	8	5	100	105	5.8	100.0	105.0	0.88	12.4	13.0	5.0	0.5	0.7	12.0
	Roller	5	5	8	5	100	105	5.8	100.0	105.0	0.88	12.4	13.0	5.0	0.5	0.7	12.0
	Concrete Pump Truck	5	5	8	5	100	105	5.8	100.0	105.0	0.88	12.4	13.0	5.0	0.5	0.7	12.0
5	compressor (air)	5	5	0	5	150	155	7.1	150.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1

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? 1
grnd abs? 1

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
1	Demolition	Concrete Saw	1	20	90	255	0		71.5	8	480	65
		Tractor	1	40	84	255	0		65.5	8	480	62
		Front End Loader	1	40	79	255	0		60.5	8	480	57
		Backhoe	1	40	78	255	0		59.5	8	480	56
		Dozer	1	40	82	255	0		63.5	8	480	60
											Total Aggregate Noise Exposure from Demolition Phase	**67.8**
2	Site Preparation	Grader	1	40	85	305	0		64.8	8	480	61
		Scraper	1	40	84	255	0		65.5	8	480	62
		Tractor	1	40	84	255	0		65.5	7	420	61
											Total Aggregate Noise Exposure from Site Preparation Phase	**65.9**
3	Grading	Dozer	1	40	82	305	0		61.8	8	480	58
		Grader	1	40	85	255	0		66.5	8	480	63
		Tractor	1	40	84	255	0		65.5	7	420	61
		Front End Loader	1	40	79	305	0		58.8	8	480	55
											Total Aggregate Noise Exposure from Grading Phase	**66.0**
4	Building Construction	Crane	1	16	81	305	0		60.8	7	420	52
		Man Lift	2	20	75	305	0		54.8	7	420	50
		Generator	1	50	72	305	0		51.8	8	480	49
		Tractor	1	40	84	305	0		63.8	6	360	59
		welder / torch	3	40	73	305	0		52.8	8	480	54
											Total Aggregate Noise Exposure from Building Construction Phase	**61.1**
5	Paving	Concrete Mixer Truck	1	40	79	255	0		60.5	8	480	57
		Paver	1	50	77	255	0		58.5	8	480	56
		Front End Loader	1	40	79	255	0		60.5	8	480	57
		Roller	2	20	80	255	0		61.5	8	480	58
		Concrete Pump Truck	1	20	81	255	0		62.5	8	480	56
											Total Aggregate Noise Exposure from Paving Phase	**63.4**
5	Architectural Coating	compressor (air)	1	40	78	305	0		57.8	6	360	53
											Total Aggregate Noise Exposure from Architectural Coating Phase	**52.6**

Comparable FHWA RCNM Construction Equipment Type	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)
Concrete Saw	5	5	0	5	250	255	7.1	250.0	255.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Tractor	5	5	0	5	250	255	7.1	250.0	255.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Front End Loader	5	5	0	5	250	255	7.1	250.0	255.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Backhoe	5	5	0	5	250	255	7.1	250.0	255.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Dozer	5	5	0	5	250	255	7.1	250.0	255.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Grader	5	5	0	5	300	305	7.1	300.0	305.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Scraper	5	5	0	5	250	255	7.1	250.0	255.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Tractor	5	5	0	5	250	255	7.1	250.0	255.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Dozer	5	5	0	5	300	305	7.1	300.0	305.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Grader	5	5	0	5	250	255	7.1	250.0	255.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Tractor	5	5	0	5	250	255	7.1	250.0	255.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Front End Loader	5	5	0	5	300	305	7.1	300.0	305.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Crane	5	5	0	5	300	305	7.1	300.0	305.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Man Lift	5	5	0	5	300	305	7.1	300.0	305.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Generator	5	5	0	5	300	305	7.1	300.0	305.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Tractor	5	5	0	5	300	305	7.1	300.0	305.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
welder / torch	5	5	0	5	300	305	7.1	300.0	305.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Concrete Mixer Truck	5	5	0	5	250	255	7.1	250.0	255.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Paver	5	5	0	5	250	255	7.1	250.0	255.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Front End Loader	5	5	0	5	250	255	7.1	250.0	255.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Roller	5	5	0	5	250	255	7.1	250.0	255.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Concrete Pump Truck	5	5	0	5	250	255	7.1	250.0	255.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
compressor (air)	5	5	0	5	300	305	7.1	300.0	305.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1

Appendix C
Traffic Noise Model Input / Output

Dudek					**22 May 2023**						
MG					**TNM 2.5**						
INPUT: ROADWAYS							**Average pavement type shall be used unless**				
PROJECT/CONTRACT:	**12902.03**						**a State highway agency substantiates the use**				
RUN:	**Los Robles MOB Project - Existing**						**of a different type with the approval of FHWA**				
Roadway		**Points**									
Name	**Width**	**Name**	**No.**	**Coordinates (pavement)**			**Flow Control**			**Segment**	
				X	**Y**	**Z**	**Control Device**	**Speed Constraint**	**Percent Vehicles Affected**	**Pvmt Type**	**On Struct?**
	ft			ft	ft	ft		mph	%		
Rolling Oaks Drive	45.0	point1	1	50.0	100.0	0.00				Average	
		point2	2	500.0	100.0	0.00					

Dudek 22 May 2023
MG TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Percentages

PROJECT/CONTRACT: 12902.03
RUN: Los Robles MOB Project - Existing

Roadway	Points													
Name	Name	No.	Segment											
			Total	Autos		MTrucks		HTrucks		Buses		Motorcycles	
			Volume	P	S	P	S	P	S	P	S	P	S
			veh/hr	%	mph	%	mph	%	mph	%	mph	%	mph
Rolling Oaks Drive	point1	1	461	97	35	2	35	1	30	0	0	0	0
	point2	2											

Dudek						**22 May 2023**						
MG						**TNM 2.5**						
INPUT: RECEIVERS												
PROJECT/CONTRACT:	**12902.03**											
RUN:	**Los Robles MOB Project - Existing**											
Receiver												
Name	**No.**	**#DUs**	**Coordinates (ground)**			**Height**	**Input Sound Levels and Criteria**				**Active**
			X	**Y**	**Z**	**above**	**Existing**	**Impact Criteria**		**NR**	**in**
						Ground	**LAeq1h**	**LAeq1h**	**Sub'l**	**Goal**	**Calc.**
			ft	ft	ft	ft	dBA	dBA	dB	dB	
M1	1	1	249.2	26.8	0.00	5.00	0.00	66	10.0	8.0	Y

Dudek							**22 May 2023**					
MG							**TNM 2.5**					
							Calculated with TNM 2.5					
RESULTS: SOUND LEVELS												
PROJECT/CONTRACT:		**12902.03**										
RUN:		**Los Robles MOB Project - Existing**										
BARRIER DESIGN:		**INPUT HEIGHTS**						**Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.**				
ATMOSPHERICS:		**68 deg F, 50% RH**										
Receiver Name	**No.**	**#DUs**	**Existing LAeq1h**	**No Barrier LAeq1h Calculated**	**Crit'n**	**Increase over existing Calculated**	**Crit'n Sub'l Inc**	**Type Impact**	**With Barrier Calculated LAeq1h**	**Noise Reduction Calculated**	**Goal**	**Calculated minus Goal**
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
M1	1	1	0.0	58.4	66	58.4	10	----	58.4	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction Min**	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	1	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Dudek					**22 May 2023**							
MG					**TNM 2.5**							
INPUT: ROADWAYS							**Average pavement type shall be used unless**					
PROJECT/CONTRACT:	**12902.03**						**a State highway agency substantiates the use**					
RUN:	**Los Robles MOB Project - Exist w Proj**						**of a different type with the approval of FHWA**					
Roadway Name	**Width**	**Points Name**	**No.**	**Coordinates (pavement) X**	**Y**	**Z**	**Flow Control Control Device**	**Speed Constraint**	**Percent Vehicles Affected**	**Segment Pvmt Type**	**On Struct?**
	ft			ft	ft	ft		mph	%		
Rolling Oaks Drive	45.0	point1	1	50.0	100.0	0.00				Average	
		point2	2	500.0	100.0	0.00					

Dudek
MG

22 May 2023
TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Percentages

PROJECT/CONTRACT: 12902.03
RUN: Los Robles MOB Project - Exist w Proj

Roadway	Points													
Name	Name	No.	Segment											
			Total	Autos		MTrucks		HTrucks		Buses		Motorcycles	
			Volume	P	S	P	S	P	S	P	S	P	S
			veh/hr	%	mph	%	mph	%	mph	%	mph	%	mph
Rolling Oaks Drive	point1	1	566	97	35	2	35	1	30	0	0	0	0
	point2	2											

Dudek						**22 May 2023**						
MG						**TNM 2.5**						
INPUT: RECEIVERS												
PROJECT/CONTRACT:	**12902.03**											
RUN:	**Los Robles MOB Project - Exist w Proj**											
Receiver												
Name	**No.**	**#DUs**	**Coordinates (ground)**			**Height**	**Input Sound Levels and Criteria**					**Active**
			X	**Y**	**Z**	**above**	**Existing**	**Impact Criteria**			**NR**	**in**
						Ground	**LAeq1h**	**LAeq1h**	**Sub'l**		**Goal**	**Calc.**
			ft	ft	ft	ft	dBA	dBA	dB		dB	
M1	1	1	249.2	26.8	0.00	5.00	0.00	66	10.0		8.0	Y

Dudek			22 May 2023		
MG			TNM 2.5		
			Calculated with TNM 2.5		
RESULTS: SOUND LEVELS					
PROJECT/CONTRACT:	12902.03				
RUN:	Los Robles MOB Project - Exist w Proj				
BARRIER DESIGN:	INPUT HEIGHTS		Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.		
ATMOSPHERICS:	68 deg F, 50% RH				

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	No Barrier Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
M1	1	1	0.0	59.3	66	59.3	10	----	59.3	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	1	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Dudek					**22 May 2023**							
MG					**TNM 2.5**							
INPUT: ROADWAYS							**Average pavement type shall be used unless**					
PROJECT/CONTRACT:	**12902.03**						**a State highway agency substantiates the use**					
RUN:	**Los Robles MOB Project - Cumulative**						**of a different type with the approval of FHWA**					
Roadway Name	**Width**	**Points Name**	**No.**	**Coordinates (pavement) X**	**Y**	**Z**	**Flow Control Control Device**	**Speed Constraint**	**Percent Vehicles Affected**	**Segment Pvmt Type**	**On Struct?**	
	ft			ft	ft	ft		mph	%			
Rolling Oaks Drive	45.0	point1	1	50.0	100.0	0.00				Average		
		point2	2	500.0	100.0	0.00						

Dudek							**22 May 2023**						
MG							**TNM 2.5**						
INPUT: TRAFFIC FOR LAeq1h Percentages													
PROJECT/CONTRACT:	**12902.03**												
RUN:	**Los Robles MOB Project - Cumulative**												
Roadway	**Points**												
Name	**Name**	**No.**	**Segment**										
			Total	**Autos**		**MTrucks**		**HTrucks**		**Buses**		**Motorcycles**	
			Volume	**P**	**S**	**P**	**S**	**P**	**S**	**P**	**S**	**P**	**S**
			veh/hr	%	mph	%	mph	%	mph	%	mph	%	mph
Rolling Oaks Drive	point1	1	469	97	35	2	35	1	30	0	0	0	0
	point2	2											

Dudek						**22 May 2023**						
MG						**TNM 2.5**						
INPUT: RECEIVERS												
PROJECT/CONTRACT:	**12902.03**											
RUN:	**Los Robles MOB Project - Cumulative**											
Receiver												
Name	**No.**	**#DUs**	**Coordinates (ground)**			**Height**	**Input Sound Levels and Criteria**				**Active**
			X	**Y**	**Z**	**above**	**Existing**	**Impact Criteria**		**NR**	**in**
						Ground	**LAeq1h**	**LAeq1h**	**Sub'l**	**Goal**	**Calc.**
			ft	ft	ft	ft	dBA	dBA	dB	dB	
M1	1	1	249.2	26.8	0.00	5.00	0.00	66	10.0	8.0	Y

Dudek							**22 May 2023**						
MG							**TNM 2.5**						
							Calculated with TNM 2.5						
RESULTS: SOUND LEVELS													
PROJECT/CONTRACT:		**12902.03**											
RUN:		**Los Robles MOB Project - Cumulative**											
BARRIER DESIGN:		**INPUT HEIGHTS**						**Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.**					
ATMOSPHERICS:		**68 deg F, 50% RH**											
Receiver Name	**No.**	**#DUs**	**Existing LAeq1h**	**No Barrier LAeq1h Calculated**	**Crit'n**	**Increase over existing Calculated**	**Crit'n Sub'l Inc**	**Type Impact**	**With Barrier Calculated LAeq1h**	**Noise Reduction Calculated**	**Goal**	**Calculated minus Goal**
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
M1	1	1	0.0	58.5	66	58.5	10	----	58.5	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction Min**	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	1	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Dudek					**22 May 2023**						
MG					**TNM 2.5**						
INPUT: ROADWAYS							**Average pavement type shall be used unless**				
PROJECT/CONTRACT:	**12902.03**						**a State highway agency substantiates the use**				
RUN:	**Los Robles MOB Project - Cumltv w Proj**						**of a different type with the approval of FHWA**				
Roadway Name	**Width**	**Points Name**	**No.**	**Coordinates (pavement) X**	**Y**	**Z**	**Flow Control Control Device**	**Speed Constraint**	**Percent Vehicles Affected**	**Segment Pvmt Type**	**On Struct?**
	ft			ft	ft	ft		mph	%		
Rolling Oaks Drive	45.0	point1	1	50.0	100.0	0.00				Average	
		point2	2	500.0	100.0	0.00					

Dudek **22 May 2023**
MG **TNM 2.5**

INPUT: TRAFFIC FOR LAeq1h Percentages

PROJECT/CONTRACT: **12902.03**
RUN: **Los Robles MOB Project - Cumltv w Proj**

Roadway	Points													
Name	**Name**	**No.**	**Segment**											
			Total	**Autos**		**MTrucks**		**HTrucks**		**Buses**		**Motorcycles**		
			Volume	**P**	**S**	**P**	**S**	**P**	**S**	**P**	**S**	**P**	**S**	
			veh/hr	%	mph	%	mph	%	mph	%	mph	%	mph	
Rolling Oaks Drive	point1	1	574	97	35	2	35	1	30	0	0	0	0	
	point2	2												

Dudek						**22 May 2023**						
MG						**TNM 2.5**						
INPUT: RECEIVERS												
PROJECT/CONTRACT:	**12902.03**											
RUN:	**Los Robles MOB Project - Cumltv w Proj**											
Receiver												
Name	**No.**	**#DUs**	**Coordinates (ground)**			**Height**	**Input Sound Levels and Criteria**					**Active**
			X	**Y**	**Z**	**above**	**Existing**	**Impact Criteria**			**NR**	**in**
						Ground	**LAeq1h**	**LAeq1h**	**Sub'l**		**Goal**	**Calc.**
			ft	ft	ft	ft	dBA	dBA	dB		dB	
M1	1	1	249.2	26.8	0.00	5.00	0.00	66	10.0		8.0	Y

Dudek						22 May 2023				
MG						TNM 2.5				
						Calculated with TNM 2.5				
RESULTS: SOUND LEVELS										
PROJECT/CONTRACT:	12902.03									
RUN:	Los Robles MOB Project - Cumltv w Proj									
BARRIER DESIGN:	INPUT HEIGHTS						Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.			
ATMOSPHERICS:	68 deg F, 50% RH									

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
M1	1	1	0.0	59.4	66	59.4	10	----	59.4	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	1	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Appendix D
Exterior Noise Calculations

Bericht (Exist w Project HVAC.cna)

Gruppentabelle Tag und Nacht

Name	Expression	Partial Sum Level					
		ST1		ST2		ST3	
		Day	Night	Day	Night	Day	Night

Source			Partial Level					
Name	M.	ID	ST1		ST2		ST3	
			Day	Night	Day	Night	Day	Night
HVAC			27.1	27.1	26.6	26.6	23.6	23.6
HVAC			27.8	27.8	27.1	27.1	24.6	24.6
HVAC			27.3	27.3	27.2	27.2	24.1	24.1
HVAC			27.6	27.6	27.2	27.2	24.5	24.5

Schallquellen

Punktquellen

Name	M.	ID	Result. PWL			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0
			Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night	
			(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)	(min)	(min)	(dB)
HVAC			87.8	87.8	87.8	Lw	87.8		0.0	0.0	0.0							0.0
HVAC			87.8	87.8	87.8	Lw	87.8		0.0	0.0	0.0							0.0
HVAC			87.8	87.8	87.8	Lw	87.8		0.0	0.0	0.0							0.0
HVAC			87.8	87.8	87.8	Lw	87.8		0.0	0.0	0.0							0.0

Linienquellen

Name	M.	ID	Result. PWL			Result. PWL'			Lw / Li			Correction			Sound Reduction		Attenuation	Ope
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)

Flächenquellen

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Correction			Sound Reduction		Attenuation	Ope
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)

Flächenquellen vertikal

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Correction			Sound Reduction		Attenuation	Ope
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)

Schienen

Name	M.	ID	Lm,E		Train Class	Add.Level				Vmax
			Day	Night		Dfb	Dbr	Dbü	Dra	
			(dBA)	(dBA)		(dB)	(dB)	(dB)	(dB)	(km/h)

Zugklassen

Name	M.	ID	Lm,E		Train Class											Add.Level				Vmax
			Day	Night	Type	p	Number of Trains			v	l	Dfz	Dae	Lm,E,i (dB)		Dfb	Dbr	Dbü	Dra	
			(dBA)	(dBA)		(%)	Day	Evening	Night	(km/h)	(m)	(dB)	(dB)	Day	Night	(dB)	(dB)	(dB)	(dB)	(km/h)

Name	Lm,E		Train Class										
	Day	Night	Type	p	Number of Trains			v	l	Dfz	Dae	Lm,E,i (dB)	
	(dBA)	(dBA)		(%)	Day	Evening	Night	(km/h)	(m)	(dB)	(dB)	Day	Night

Parkplätze

Name	M.	ID	Type	Lwa			Event Data						Penalty Type		Penalty Surface	
				Day	Special	Night	Ref. Quantity	Number B	No. Spaces/RefQ	Events/h/RefQ			Kpa	Type	Kstro	Surface
				(dBA)	(dBA)	(dBA)				Day	Special	Night	(dB)		(dB)	

Strassen

Name	M.	ID	Lme			Count Data		exact Count Data						Speed Limit		SCS	Surface		Grac
			Day	Evening	Night	DTV	Str.class.	M			p (%)			Auto	Truck	Dist.	Dstro	Type	
			(dBA)	(dBA)	(dBA)			Day	Evening	Night	Day	Evening	Night	(km/h)	(km/h)		(dB)		(%

Ampeln

Name	M.	ID	Active			Height	Coordinates		
			Day	Evening	Night	Begin	X	Y	Z
						(m)	(m)	(m)	(m)

Immissionspunkte

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(m)		(m)	(m)	(m)
ST1			33.5	33.5	0.0	0.0		x	Total	7.50	r	327.64	496.57	7.50
ST2			33.0	33.0	0.0	0.0		x	Total	7.50	r	336.00	434.69	7.50
ST3			30.2	30.2	0.0	0.0		x	Total	2.50	r	565.19	473.22	2.50

Gebietsausweisungen

Name	M.	ID	Type	Persons
				(1/km²)

Hindernisse

Schirme

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height			
			left	right		horz.	vert.	Begin		End	
					(m)	(m)	(m)	(m)		(m)	
Mansard Roof Parapet								12.19	r	12.19	r

Häuser

Name	M.	ID	RB	Residents	Absorption	Height
						Begin
						(m)

Bewuchs

Name	M.	ID	Height
			(m)

Bebauung

Name	M.	ID	Type	Attenuation	B	m	Height
				dB/100m	%	1/m	(m)

Geometriedaten

Geometrie Linienquellen

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(m)		(m)		(m)	(m)	(m)	(m)

Geometrie Flächenquellen

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(m)		(m)		(m)	(m)	(m)	(m)

Geometrie Parkplätze

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(m)		(m)		(m)	(m)	(m)	(m)

Geometrie Straßen

Name	Height				Coordinates				Dist	LSlope
	Begin		End		x	y	z	Ground	(m)	(%)
	(m)		(m)		(m)	(m)	(m)	(m)		

Geometrie Schienen

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(m)		(m)		(m)	(m)	(m)	(m)

Geometrie Schirme

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height				Coordinates			
			left	right		horz.	vert.	Begin		End		x	y	z	Ground
					(m)	(m)	(m)	(m)		(m)		(m)	(m)	(m)	(m)
Mansard Roof Parapet								12.19	r	12.19	r	395.70	504.35	12.19	0.00
												457.50	504.15	12.19	0.00
												457.57	474.95	12.19	0.00
												395.76	474.75	12.19	0.00
												395.72	504.38	12.19	0.00

Geometrie Häuser

Name	M.	ID	RB	Residents	Absorption	Height	Coordinates			
						Begin	x	y	z	Ground
						(m)	(m)	(m)	(m)	(m)

Geometrie Höhenlinien

Name	M.	ID	OnlyPts	Height		Coordinates		
				Begin	End	x	y	z
				(m)	(m)	(m)	(m)	(m)

Geometrie Bruchkanten

Name	M.	ID	Coordinates	
			x	y
			(m)	(m)

Bericht (Exist w Project HVACn w Standby Generator.cna)

Gruppentabelle Tag und Nacht

Name	Expression	Partial Sum Level					
		ST1		ST2		ST3	
		Day	Night	Day	Night	Day	Night

Source			Partial Level					
Name	M.	ID	ST1		ST2		ST3	
			Day	Night	Day	Night	Day	Night
HVAC			27.1	27.1	26.6	26.6	23.6	23.6
HVAC			27.8	27.8	27.1	27.1	24.6	24.6
HVAC			27.3	27.3	27.2	27.2	24.1	24.1
HVAC			27.6	27.6	27.2	27.2	24.5	24.5
Standby Generator			48.3	48.3	47.9	47.9	32.7	32.7

Schallquellen

Punktquellen

Name	M.	ID	Result. PWL			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Tim		
			Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	N
			(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m^2)		(min)	(min)	(
HVAC			87.8	87.8	87.8	Lw	87.8		0.0	0.0	0.0						
HVAC			87.8	87.8	87.8	Lw	87.8		0.0	0.0	0.0						
HVAC			87.8	87.8	87.8	Lw	87.8		0.0	0.0	0.0						
HVAC			87.8	87.8	87.8	Lw	87.8		0.0	0.0	0.0						
Standby Generator			95.7	95.7	95.7	Lw	95.7		0.0	0.0	0.0						

Linienquellen

Name	M.	ID	Result. PWL			Result. PWL'			Lw / Li			Correction			Sound Reduction		Attenuation	Ope
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m^2)		(min)

Flächenquellen

Name	M.	ID	Result. PWL			Result. PWL"			Lw / Li			Correction			Sound Reduction		Attenuation	Ope
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m^2)		(min)

Flächenquellen vertikal

Name	M.	ID	Result. PWL			Result. PWL"			Lw / Li			Correction			Sound Reduction		Attenuation	Ope
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m^2)		(min)

Schienen

Name	M.	ID	Lm,E		Train Class	Add.Level				Vmax
			Day	Night		Dfb	Dbr	Dbü	Dra	
			(dBA)	(dBA)		(dB)	(dB)	(dB)	(dB)	(km/h)

Zugklassen

Name	M.	ID	Lm,E		Train Class									Lm,E,i (dB)		Add.Level				Vmax
			Day	Night	Type	p	Number of Trains			v	l	Dfz	Dae	Lm,E,i (dB)		Dfb	Dbr	Dbü	Dra	
			(dBA)	(dBA)		(%)	Day	Evening	Night	(km/h)	(m)	(dB)	(dB)	Day	Night	(dB)	(dB)	(dB)	(dB)	(km/h)

Name	Lm,E		Train Class										
	Day	Night	Type	p	Number of Trains			v	l	Dfz	Dae	Lm,E,i (dB)	
	(dBA)	(dBA)		(%)	Day	Evening	Night	(km/h)	(m)	(dB)	(dB)	Day	Night

Parkplätze

Name	M.	ID	Type	Lwa			Event Data						Penalty Type		Penalty Surface	
				Day	Special	Night	Ref. Quantity	Number B	No. Spaces/RefQ	Events/h/RefQ			Kpa	Type	Kstro	Surface
				(dBA)	(dBA)	(dBA)				Day	Special	Night	(dB)		(dB)	

Strassen

Name	M.	ID	Lme			Count Data		exact Count Data						Speed Limit		SCS	Surface		Grac
			Day	Evening	Night	DTV	Str.class.	M			p (%)			Auto	Truck	Dist.	Dstro	Type	
			(dBA)	(dBA)	(dBA)			Day	Evening	Night	Day	Evening	Night	(km/h)	(km/h)		(dB)		(%

Ampeln

Name	M.	ID	Active			Height	Coordinates		
			Day	Evening	Night	Begin	X	Y	Z
						(m)	(m)	(m)	(m)

Immissionspunkte

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(m)		(m)	(m)	(m)
ST1			48.4	48.4	0.0	0.0		x	Total	7.50	r	327.64	496.57	7.50
ST2			48.1	48.1	0.0	0.0		x	Total	7.50	r	336.00	434.69	7.50
ST3			34.7	34.7	0.0	0.0		x	Total	2.50	r	565.19	473.22	2.50

Gebietsausweisungen

Name	M.	ID	Type	Persons
				(1/km²)

Hindernisse

Schirme

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height			
			left	right		horz.	vert.	Begin		End	
					(m)	(m)	(m)	(m)		(m)	
Mansard Roof Parapet								12.19	r	12.19	r

Häuser

Name	M.	ID	RB	Residents	Absorption	Height
						Begin
						(m)

Bewuchs

Name	M.	ID	Height
			(m)

Bebauung

Name	M.	ID	Type	Attenuation	B	m	Height
				dB/100m	%	1/m	(m)

Geometriedaten

Geometrie Linienquellen

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(m)		(m)		(m)	(m)	(m)	(m)

Geometrie Flächenquellen

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(m)		(m)		(m)	(m)	(m)	(m)

Geometrie Parkplätze

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(m)		(m)		(m)	(m)	(m)	(m)

Geometrie Straßen

Name	Height				Coordinates				Dist	LSlope
	Begin		End		x	y	z	Ground	(m)	(%)
	(m)		(m)		(m)	(m)	(m)	(m)		

Geometrie Schienen

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(m)		(m)		(m)	(m)	(m)	(m)

Geometrie Schirme

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height				Coordinates			
			left	right		horz.	vert.	Begin		End		x	y	z	Ground
					(m)	(m)	(m)	(m)		(m)		(m)	(m)	(m)	(m)
Mansard Roof Parapet								12.19	r	12.19	r	395.70	504.35	12.19	0.00
												457.50	504.15	12.19	0.00
												457.57	474.95	12.19	0.00
												395.76	474.75	12.19	0.00
												395.72	504.38	12.19	0.00

Geometrie Häuser

Name	M.	ID	RB	Residents	Absorption	Height	Coordinates			
						Begin	x	y	z	Ground
						(m)	(m)	(m)	(m)	(m)

Geometrie Höhenlinien

Name	M.	ID	OnlyPts	Height		Coordinates		
				Begin	End	x	y	z
				(m)	(m)	(m)	(m)	(m)

Geometrie Bruchkanten

Name	M.	ID	Coordinates	
			x	y
			(m)	(m)