Appendix H

Environmental Noise Assessment

College Park Environmental Noise Assessment

City of Rocklin, California
May 14, 2021

jcb Project # 2019-140

Prepared for:

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ROCKLIN CALIFORNIA

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This section provides a general description of the existing noise sources in the project vicinity, a discussion of the regulatory setting, and identifies potential noise impacts associated with the proposed project. Project impacts are evaluated relative to applicable noise level criteria and to the existing ambient noise environment. Mitigation measures have been identified for significant noise-related impacts.

3.11.1 ENVIRONMENTAL SETTING

KEY TERMS

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given area consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of noise.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, defined as ten times the logarithm of the ratio of the sound pressure squared over the reference pressure squared.
CNEL	Community noise equivalent level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic acoustic signal, expressed in cycles per second or Hertz.
Impulsive	Sound of short duration, usually less than one second, with an abrupt onset and rapid decay.
L_{dn}	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
L_{eq}	Equivalent or energy-averaged sound level.
L_{max}	The highest root-mean-square (RMS) sound level measured over a given period of time.
$L_{(n)}$	The sound level exceeded a described percentile over a measurement period. For instance, an hourly L_{50} is the sound level exceeded 50 percent of the time during the one hour period.
Loudness	A subjective term for the sensation of the magnitude of sound.
Noise	Unwanted sound.
SEL	Sound exposure levels. A rating, in decibels, of a discrete event, such as an aircraft flyover or train passby, that compresses the total sound energy into a one-second event.

FUNDAMENTALS OF ACOUSTICS

Acoustics is the science of sound. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to human (or animal) ears. If the pressure variations occur frequently enough (at least 20 times per second), then they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second or Hertz (Hz).

Noise is a subjective reaction to different types of sounds. Noise is typically defined as (airborne) sound that is loud, unpleasant, unexpected or undesired, and may therefore be classified as a more specific group of sounds. Perceptions of sound and noise are highly subjective from person to person.

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the hearing threshold (20 micropascals), as a point of reference, defined as 0 dB. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB, and changes in levels (dB) correspond closely to human perception of relative loudness.

The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by A-weighted sound levels. There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way the human ear perceives sound. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels, but are expressed as dB, unless otherwise noted.

The decibel scale is logarithmic, not linear. In other words, two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted, an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70 dBA sound is half as loud as an 80 dBA sound, and twice as loud as a 60 dBA sound.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (L_{eq}), which corresponds to a steady-state A weighted sound level containing the same total energy as a time varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptor, L_{dn}, and shows very good correlation with community response to noise.

The day/night average level (L_{dn}) is based upon the average noise level over a 24-hour day, with a +10 decibel weighing applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because L_{dn} represents a 24-

hour average, it tends to disguise short-term variations in the noise environment. CNEL is similar to L_{dn}, but includes a +5 dB penalty for evening noise. Table 3.11-1 lists several examples of the noise levels associated with common situations.

TABLE 3.11-1: TYPICAL NOISE LEVELS

COMMON OUTDOOR ACTIVITIES	*NOISE LEVEL (DBA)*	*COMMON INDOOR ACTIVITIES*
	--110--	Rock Band
Jet Fly-over at 300 m (1,000 ft)	--100--	
Gas Lawn Mower at 1 m (3 ft)	--90--	
Diesel Truck at 15 m (50 ft), at 80 km/hr (50 mph)	--80--	Food Blender at 1 m (3 ft) Garbage Disposal at 1 m (3 ft)
Noisy Urban Area, Daytime Gas Lawn Mower, 30 m (100 ft)	--70--	Vacuum Cleaner at 3 m (10 ft)
Commercial Area Heavy Traffic at 90 m (300 ft)	--60--	Normal Speech at 1 m (3 ft)
Quiet Urban Daytime	--50--	Large Business Office Dishwasher in Next Room
Quiet Urban Nighttime	--40--	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	--30--	Library
Quiet Rural Nighttime	--20--	Bedroom at Night, Concert Hall (Background)
	--10--	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	--0--	Lowest Threshold of Human Hearing

SOURCE: CALTRANS, TECHNICAL NOISE SUPPLEMENT, TRAFFIC NOISE ANALYSIS PROTOCOL. SEPTEMBER 2013.

EFFECTS OF NOISE ON PEOPLE

The effects of noise on people can be placed in three categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction;
- Interference with activities such as speech, sleep, and learning; and
- Physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so-called ambient noise level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a 1 dBA change cannot be perceived;
- Outside of the laboratory, a 3 dBA change is considered a just-perceivable difference;

- A change in level of at least 5 dBA is required before any noticeable change in human response would be expected; and
- A 10 dBA change is subjectively heard as approximately a doubling in loudness, and can cause an adverse response.

Stationary point sources of noise – including stationary mobile sources such as idling vehicles – attenuate (lessen) at a rate of approximately 6 dB per doubling of distance from the source, depending on environmental conditions (i.e. atmospheric conditions and either vegetative or manufactured noise barriers, etc.). Widely distributed noises, such as a large industrial facility spread over many acres, or a street with moving vehicles, would typically attenuate at a lower rate.

EXISTING NOISE LEVELS

Existing Surrounding Land Uses

North Village. On the west side of the site, a single residential home site is surrounded by the project. West of the North Village, the Sierra College's Rocklin campus is located on the southwest corner. James Drive is immediately east of the North Village site with an approved equestrian facility and rural residential parcels in the Town of Loomis located east of James Drive. Rocklin Road forms the site's south boundary and Rocklin Manor Apartments are south of Rocklin Road. The parcel north of the site is vacant and vegetated with oak woodland and grassland.

South Village. Rocklin Road and El Don Road are located north and west of the South Village site, respectively, and the Sierra College campus is located immediately north of Rocklin Road. The Rocklin LDS Institute and office buildings are situated in two separate areas south of Rocklin Road, outside of the project site. West of the South Village, office and commercial uses are on the southwest corner of El Don Drive and Rocklin Road. Single-family residential, including the Cresleigh Sierra project, are west, south and east of the site.

Existing Ambient Noise Levels

To quantify the existing ambient noise environment in the project vicinity short-term and continuous (24-hour) noise level measurements were conducted on each of the project sites on October 9th and 10th, 2019. The noise measurement locations are shown on Figures 3.11-1 and 3.11-2. The noise level measurement survey results are provided in Table 3.11-2. Appendix B shows the complete results of the continuous noise monitoring at Site A and Site B.

The sound level meters were programmed to collect hourly noise level intervals at each site during the survey. The maximum value (L_{max}) represents the highest noise level measured during an interval. The average value (L_{eq}) represents the energy average of all of the noise measured during an interval. The median value (L_{50}) represents the sound level exceeded 50 percent of the time during an interval.

Larson Davis Laboratories (LDL) Model 820 and 824 precision integrating sound level meters were used for the ambient noise level measurement survey. The meters were calibrated before and

after use with an LDL Model CAL200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 sound level meters (ANSI S1.4).

TABLE 3.11-2: SUMMARY OF EXISTING BACKGROUND NOISE MEASUREMENT DATA

SITE	LOCATION	L_{DN}	AVERAGE MEASURED HOURLY NOISE LEVELS, dB					
			DAYTIME (7AM-10PM)			NIGHTTIME (10PM-7AM)		
			L_{EQ}	L_{50}	L_{MAX}	L_{EQ}	L_{50}	L_{MAX}
Continuous (24-hour) Noise Level Measurements								
A	North Village SW Portion of Site	63.3 dB	60.8	58.4	76.0	*55.7*	*49.5*	*74.1*
B	South Village SW Portion of Site	53.7 dB	49.6	47.6	64.7	*46.7*	*44.8*	*58.1*
Short-term Noise Level Measurements								
1	SW Portion of Site	NA	56.8	55.0	69.5	*@12:15 A.M. ROCKLIN RD AND SIERRA COLLEGE BLVD*		
2								
3	South Village SE Corner of the Site	NA	42.7	40.3	54.2	*@ 11.15 A.M. DISTANT TRAFFIC FROM ROCKLIN ROAD*		
4	South Village West Portion of Site	NA	58.6	56.2	73.4	*@11:45 A.M. ROCKLIN ROAD IS DOMINANT NOISE*		

SOURCE: J.C. BRENNAN & ASSOCIATES, INC., 2019.

Existing Roadway Noise Levels

To predict existing noise levels due to traffic, the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA RD-77-108) was used. The model is based upon the Calveno reference noise emission factors for automobiles, medium trucks, and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site. The FHWA model was developed to predict hourly L_{eq} values for free-flowing traffic conditions.

Traffic volumes for existing conditions were obtained from the traffic study prepared for the project (Fehr & Peers). Truck percentages and vehicle speeds on the local area roadways were estimated from field observations.

Traffic noise levels are predicted at the sensitive receptors located at the closest typical setback distance along each project-area roadway segment. Where traffic noise barriers for single family residences, or where common outdoor areas are provided for multi-family residences, predominately exist along a roadway segment, a -5 dB offset was added to the noise prediction model. In some locations sensitive receptors may be located at distances which vary from the assumed calculation distance and may experience shielding from intervening barriers or sound walls. However, the traffic noise analysis is believed to be representative of the majority of sensitive receptors located closest to the project-area roadway segments analyzed in this report.

Table 3.11-3 shows the existing traffic noise levels in terms of L_{dn} at closest sensitive receptors along each roadway segment. A complete listing of the FHWA Model input data is contained in Appendix B of the Noise Study.

TABLE 3.11-3: EXISTING TRAFFIC NOISE LEVELS @ 75-FEET FROM ROADWAY CENTERLINES

ROADWAY	*SEGMENT*	*EXTERIOR TRAFFIC NOISE LEVEL, DB LDN* [1]
Rocklin Road	West of Aguilar Road	69
Rocklin Road	Aguilar Road to El Don Dr.	69
Rocklin Road	El Don Dr. to Havenhurst Cir.	62
Rocklin Road	Havenhurst Cir. to Sierra College	62
Rocklin Road	Sierra College to Rocklin Manor West	60
Rocklin Road	Rocklin Manor West to Barton Rd	65
Sierra College Blvd	North of I-80	68
Sierra College Blvd	I-80 to Schriber Way	69
Sierra College Blvd	Schriber Way to Stadium Entrance	69
Sierra College Blvd	Stadium Entrance to Rocklin Rd	69
Sierra College Blvd	Rocklin Rd. to El Don Dr.	64
Sierra College Blvd	South of El Don Dr.	63
El Don Dr.	Rocklin Rd. to Wildflower Ln.	54
El Don Dr.	South of Wildflower Ln.	52
Barton Road	North of Rocklin Rd.	56
Barton Road	South of Rocklin Rd.	61

SOURCE: FHWA-RD-77-108 WITH INPUTS FROM FEHR & PEERS, AND J.C. BRENNAN & ASSOCIATES, INC. 2020.

3.11.2 Regulatory Setting

Federal

There are no federal regulations related to noise that apply to the proposed project.

State

California Environmental Quality Act

The California Environmental Quality Act (CEQA) Guidelines, Appendix G, indicate that a significant noise impact may occur if a project exposes persons to noise or vibration levels in excess of local general plans or noise ordinance standards, or cause a substantial permanent or temporary increase in ambient noise levels. CEQA standards are discussed more below under the Thresholds of Significance criteria section.

California State Building Codes

The State Building Code, Title 24, Part 2 of the State of California Code of Regulations establishes uniform minimum noise insulation performance standards to protect persons within new buildings which house people, including hotels, motels, dormitories, apartment houses and dwellings other than single-family dwellings. Title 24 mandates that interior noise levels attributable to exterior sources shall not exceed 45 dB L_{dn} or CNEL in any habitable room.

Title 24 also mandates that for structures containing noise-sensitive uses to be located where the L_{dn} or CNEL exceeds 60 dB, an acoustical analysis must be prepared to identify mechanisms for limiting exterior noise to the prescribed allowable interior levels. If the interior allowable noise levels are met by requiring that windows be kept closed, the design for the structure must also specify a ventilation or air conditioning system to provide a habitable interior environment

City of Rocklin

The City of Rocklin General Plan

The City of Rocklin General Plan Noise Element contains goals & policies, and noise level criteria for assessing noise impacts within the City. Listed below are the noise goals & policies, and criteria that are applicable to the proposed project:

Goal: Protect City residents from the harmful and annoying effects of exposure to excessive noise.

Goal: To protect the economic base of the City by discouraging noise-sensitive land uses fom encroaching upon existing or planned noise-producing uses.

Goal: To encourage the application of innovative land use planning methodologies in areas of potential noise conflict.

Policies

N-1: Determine noise compatibility between land uses, and to provide a basis for developing mitigation, an acoustical analysis shall be required as part of the environmental review process for all noise-sensitive land uses which are proposed in areas exposed to existing or projected exterior noise levels exceeding the level standards contained within this Noise Element.

N-2: Emphasize site planning and project design to achieve the standards of this Noise Element. The use of noise barriers shall be considered a means of achieving the noise standards; however, the construction of aesthetically intrusive wall heights shall be discouraged.

Goal: To prevent noise-sensitive land uses from being adversely affected by stationary noise sources.

Policies

N-3: Ensure that stationary noise sources do not interfere with sleep by applying an interior hourly maximum noise level design standard of 45 dBA in the enclosed sleeping areas of residences affected by stationary noise sources. This standard assumes doors and windows are closed.

N-4. Restrict development of noise-sensitive land uses where the noise levels due to existing or planned stationary noise sources will exceed the exterior stationary noise level design standards of the Noise Element, unless effective noise mitigation measures have been incorporated into the project.

N-5. Evaluate and mitigate as appropriate, noise created by proposed stationary noise sources so that the exterior stationary noise level design standards of the Noise Element are not exceeded.

N-6. Apply the noise level design standards contained within Table 2-1 of the Noise Element to Policies N-4 and N-5.

***TABLE 3.11-4* - TABLE 2-1 OF THE NOISE ELEMENT EXTERIOR NOISE LEVEL DESIGN STANDARDS FRO NEW PROJECTS AFFECTED BY OR INCLUDING STATIONARY NOISE SOURCES**

Noise level Descriptor	Daytime (7:00 a.m. - 10:00 p.m.)	Nighttime (10:00 p.m. - 7:00 a.m.)
Hourly Leq	55 dBA	45 dBA

The City can impose noise level standards that are more restrictive than those specified above based upon determination of existing low ambient noise levels.

"Fixed" noise sources which are typically of concern include, but are not limited to the following:

HVAC Systems	Cooling Towers/Evaporative Condensers
Pump Stations	Lift Stations
Emergency Generators	Boilers
Steam Valves	Steam Turbines
Generators	Fans
Air Compressors	Heavy Equipment
Conveyor Systems	Transformers
Pile Drivers	Grinders
Drill Rigs	Gas or Diesel Motors
Welders	Cutting Equipment
Outdoor Speakers	Blowers

The types of uses which may typically produce the noise sources described above include but are not limited to: industrial facilities including pump stations, trucking operations, tire shops, auto maintenance shops, metal fabricating shops, shopping centers, drive-up windows, car washes, loading docks, batch plants, bottling and canning plants, recycling centers, electric generating stations, race tracks, landfills, sand and gravel operations, and athletic fields.

NOTE: The point of measurement for noise levels is at a location at least 5 feet inside the property line of the receiving land use and at a point 5 feet above ground level. In the case of lots where the noise-sensitive use has a reasonable outdoor activity area for outdoor enjoyment, the stationary noise source criteria can be applied at a designated outdoor activity area (at the discretion of the Community Development Director).

Goal: To prevent noise-sensitive land uses from being adversely affected by transportation noise sources.

Policies

N-7: Restrict development of noise-sensitive land uses in areas exposed to existing or projected levels of noise from transportation noise sources that exceed the noise level standards contained within the Noise Element, unless the project design includes effective mitigation that results in noise exposure which meets standards.

N-8. Evaluate and mitigate as appropriate, noise created by new roadway noise sources not contained within the General Plan, so as not to exceed the noise level standards of the Noise Element.

N-9. Apply the noise level design criteria contained within Table 2-2 of the Noise Element to Policies N-7 and N-8 of the Noise Element.

***TABLE 3.11-5* - TABLE 2-2 OF THE GENERAL PLAN MAXIMUM ALLOWABLE NOISE EXPOSURE (LDN) TRANSPORTATION NOISE SOURCES**

Land Use	Outdoor Activity Areas [1]	Interior Spaces	
	Ldn/CNEL, dBA	Ldn/CNEL, dBA	Leq, dBA [2]
Residential	60 [3]	45	--
Transient Lodging	60 [4]	45	--
Hospitals, Nursing Homes	60 [3]	45	--
Theaters, Auditoriums	--	--	35
Non-Commercial Places of Public Assembly	60 [3]	--	40
Office Buildings	--	--	45
Schools, Libraries, Museums	--	--	45
Playgrounds, Neighborhood Parks	70	--	--

Notes:

[1]The outdoor activity area is generally considered to be the location where individuals may generally congregate for relaxation, or where individuals may require adequate speech intelligibility. Such places may include patios of residences, picnic facilities, or instructional areas.

Where it is not practical to mitigate exterior noise levels at patio or balconies of apartment complexes, a common area such as a pool or recreation area may be designated as the outdoor activity area.

At the discretion of the City, where no outdoor activity areas are provided or known, only the interior noise level criteria can be applied to the project.

[2]As determined for a typical worst-case hour during periods of use.

[3]Where it is not possible to reduce noise in outdoor activity areas to 60 dB L_{dn}/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB L_{dn}/CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table.

The City of Rocklin Construction Noise Guidelines

The City of Rocklin has established a noise policy on all construction projects within or near residential areas.

- No Noise on Weekdays before 7 a.m. or after 7 p.m.
- No noise on Weekends before 8 a.m. or after 7 p.m.

VIBRATION STANDARDS

Vibration is like noise in that it involves a source, a transmission path, and a receiver. While vibration is related to noise, it differs in that noise is generally considered to be pressure waves transmitted through air, whereas vibration usually consists of the excitation of a structure or surface. As with noise, vibration consists of an amplitude and frequency. A person's perception to the vibration will depend on their individual sensitivity to vibration, as well as the amplitude and frequency of the source and the response of the system which is vibrating.

Vibration can be measured in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration measures in terms of peak particle velocities in inches per second. Standards pertaining to perception as well as damage to structures have been developed for vibration levels defined in terms of peak particle velocities.

The City of Rocklin does not have specific policies pertaining to vibration levels. However, vibration levels associated with construction activities and railroad operations are addressed as potential noise impacts associated with project implementation.

Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events. Table 3.11-6 indicates that the threshold for damage to structures ranges from 2 to 6 peak particle velocity in inches per second (in/sec p.p.v). One-half this minimum threshold or 1 in/sec p.p.v. is considered a safe criterion that would protect against architectural or structural damage. The general threshold at which human annoyance could occur is noted as 0.1 in/sec p.p.v.

TABLE 3.11-6: EFFECTS OF VIBRATION ON PEOPLE AND BUILDINGS

PEAK PARTICLE VELOCITY		HUMAN REACTION	EFFECT ON BUILDINGS
MM/SEC.	IN./SEC.		
0.15-0.30	0.006-0.019	Threshold of perception; possibility of intrusion	Vibrations unlikely to cause damage of any type
2.0	0.08	Vibrations readily perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
2.5	0.10	Level at which continuous vibrations begin to annoy people	Virtually no risk of "architectural" damage to normal buildings
5.0	0.20	Vibrations annoying to people in buildings (this agrees with the levels established for people standing on bridges and subjected to relative short periods of vibrations)	Threshold at which there is a risk of "architectural" damage to normal dwelling - houses with plastered walls and ceilings. Special types of finish such as lining of walls, flexible ceiling treatment, etc., would minimize "architectural" damage
10-15	0.4-0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage.

SOURCE: CALTRANS. TRANSPORTATION RELATED EARTHBORN VIBRATIONS. TAV-02-01-R9601 FEBRUARY 20, 2002.

3.11.3 IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the CEQA Guidelines, the project will have a significant impact related to noise if it will result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without project;
- For a project located within 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, expose people residing or working in the project area to excessive noise levels within two miles of a public airport or public use airport; or
- For a project within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels.

The Project site is not located within two miles of a public or private airport or airstrip. Therefore, airport and airport noise is not discussed further in this analysis.

Determination of a Significant Increase in Noise Levels

California Environmental Quality Act (CEQA) guidelines define a significant impact of a project if it "increases substantially the ambient noise levels for adjoining areas". The City of Rocklin General Plan Noise Element discusses the subjective reaction to changes in noise levels. The Rocklin General Plan indicates that a 6 dB change is considered to be "Clearly Noticeable". For this project, an increase in noise levels of 6 dB due to the project will be used as a test of significance.

IMPACTS AND MITIGATION MEASURES

Impact 3.11-1: The proposed project has the potential to increase traffic noise levels at existing receptors (less than significant)

Proposed Project Analysis

Table 3.11-7 shows the predicted traffic noise level increases on the local roadway network for existing and cumulative project and no project conditions. Appendix B of the Noise Study provides the complete inputs and results of the FHWA traffic noise modeling.

Based upon Table 3.7-11, the project will result in increases in traffic noise levels between 0 dB and 1 dB under the Existing + Project scenario. The project will result in increases in traffic noise levels between 0 dB and 2 dB under the Cumulative + Project scenario. Some noise sensitive receptors located along the project-area roadways are currently exposed to exterior traffic noise levels exceeding the City of Rocklin exterior noise level standard for residential uses. As shown by Table 3.11-7, these receptors will continue to experience elevated exterior noise levels with implementation of the proposed project. However, the project will not result in a significant increase in traffic noise levels. In one case, under the Existing + Project scenario, the project will result in an exceedance of the 60 dB Ldn standard by 1 dB (Rocklin Road between Sierra College Blvd. and Rocklin Manor West). However, this is an apartment complex, and the common outdoor area is located more than 200-feet from the roadway, and the predicted traffic noise levels will be less than 60 dB Ldn.

MITIGATION MEASURES

NONE REQUIRED

TABLE 3.11-7: EXISTING AND CUMULATIVE TRAFFIC NOISE LEVELS @ 75-FEET FROM ROADWAY CENTERLINE

ROADWAY	SEGMENT	NOISE LEVELS (L_{DN}, dB) AT NEAREST SENSITIVE RECEPTORS 1					
		EXISTING	EXISTING + PROJECT	CHANGE	CUMULATIVE	CUMULATIVE + PROJECT	CHANGE
Rocklin Road	West of Aguilar Road	69	70	+1	70	71	+1
Rocklin Road	Aguilar Road to El Don Dr.	69	69	0	69	70	+1
Rocklin Road	El Don Dr. to Havenhurst Cir.	62	63	+1	63	64	+1
Rocklin Road	Havenhurst Cir. to Sierra College	62	63	+1	63	64	+1
Rocklin Road	Sierra College to Rocklin Manor West	60	61	+1	57	58	+1
Rocklin Road	Rocklin Manor West to Barton Rd	65	65	0	67	67	0
Sierra College Blvd	North of I-80	68	68	0	71	71	0
Sierra College Blvd	I-80 to Schriber Way	69	69	0	72	72	0
Sierra College Blvd	Schriber Way to Stadium Entrance	69	69	0	72	73	+1
Sierra College Blvd	Stadium Entrance to Rocklin Rd	69	69	0	72	72	0
Sierra College Blvd	Rocklin Rd. to El Don Dr.	63	64	+1	67	68	+1
Sierra College Blvd	South of El Don Dr.	63	63	0	67	67	0
El Don Dr.	Rocklin Rd. to Wildflower Ln.	54	55	+1	55	57	+2
El Don Dr.	South of Wildflower Ln.	52	52	0	55	55	0
Barton Road	North of Rocklin Rd.	56	56	0	60	60	0
Barton Road	South of Rocklin Rd.	61	61	0	61	62	+1

[1] *EXTERIOR NOISE LEVELS AT THIS LOCATION ARE PREDICTED TO EXCEED 60 DB L_{DN} DUE TO THE PROJECT. HOWEVER, THE RESULTING NOISE LEVEL OF 61.2 DB IS STILL WITHIN THE CITY'S CONDITIONALLY ACCEPTABLE EXTERIOR NOISE LEVEL STANDARD OF 65 DB L_{DN}.*

[2] *EXISTING NOISE LEVEL AT THIS LOCATION IS BASED UPON THE MEASURED AMBIENT NOISE OF 49.2 DB LDN AT SITE B.*

SOURCE: J.C. BRENNAN & ASSOCIATES, INC. 2020.

Impact 3.11-2: The proposed project has the potential to increase noise levels associated with construction activities (less than significant)

During the construction of the project including roads, water and sewer lines and related infrastructure, noise from construction activities would add to the noise environment in the project vicinity. Activities involved in construction would generate maximum noise levels, as indicated in Table 3.11-8, ranging from 76 to 90 dB at a distance of 50 feet. Construction activities would be temporary in nature and are anticipated to occur during normal daytime working hours.

Noise would also be generated during the construction phase by increased truck traffic on area roadways. A significant project-generated noise source would be truck traffic associated with transport of heavy materials and equipment to and from construction sites. This noise increase would be of short duration, and would likely occur primarily during daytime hours.

TABLE 3.11-8: CONSTRUCTION EQUIPMENT NOISE

TYPE OF EQUIPMENT	*MAXIMUM LEVEL, DB AT 50 FEET*
Backhoe	78
Compactor	83
Compressor (air)	78
Concrete Saw	90
Dozer	82
Dump Truck	76
Excavator	81
Generator	81
Jackhammer	89
Pneumatic Tools	85

SOURCE: ROADWAY CONSTRUCTION NOISE MODEL USER'S GUIDE. FEDERAL HIGHWAY ADMINISTRATION. FHWA-HEP-05-054. JANUARY 2006.

The City of Rocklin recognizes that construction activities are required to implement the General Plan. The City has developed Construction Noise Guidelines which are described earlier in this report.

MITIGATION MEASURES

Mitigation Measure 3.11-1: *Construction activities shall adhere to the requirements of the City of Rocklin Construction Noise Guidelines with respect to days and hours of operation.*

Mitigation Measure 3.11-2: *All equipment shall be fitted with factory equipped mufflers, and in good working order.*

Impact 3.11-3: The proposed project has the potential to increase noise vibration association with construction activities (less than significant)

The primary vibration-generating activities associated with the proposed project would occur during construction when activities such as grading, utilities placement, and parking lot construction occur. Sensitive receptors which could be impacted by construction related vibrations, especially vibratory compactors/rollers, are located approximately 100 feet or further from the project primary construction area. At this distance construction vibrations are not predicted to exceed acceptable levels. Additionally, construction activities would be temporary in nature and would likely occur during normal daytime working hours.

Construction vibration impacts include human annoyance and building structural damage. Human annoyance occurs when construction vibration rises significantly above the threshold of perception. Building damage can take the form of cosmetic or structural. Table 3.11-9 shows the typical vibration levels produced by construction equipment.

TABLE 3.11-9: VIBRATION LEVELS FOR VARYING CONSTRUCTION EQUIPMENT

TYPE OF EQUIPMENT	*PEAK PARTICLE VELOCITY @ 50 FEET (INCHES/SECOND)*	*PEAK PARTICLE VELOCITY @ 100 FEET (INCHES/SECOND)*
Large Bulldozer	0.039	0.011
Loaded Trucks	0.029	0.010
Small Bulldozer	0.000	0.000
Auger/drill Rigs	0.036	0.011
Jackhammer	0.009	0.004
Vibratory Hammer	0.026	0.009
Vibratory Compactor/roller	0.920	0.026

SOURCE: FEDERAL TRANSIT ADMINISTRATION, TRANSIT NOISE AND VIBRATION IMPACT ASSESSMENT GUIDELINES, MAY 2006

Table 3.11-9 data indicate that construction vibration levels anticipated for the project are less than the 0.1 in/sec criteria at distances of 100 feet. Therefore, construction vibrations are not predicted to cause damage to existing buildings or cause annoyance to sensitive receptors. Implementation of the proposed project would have a **less than significant** impact relative to this environmental topic.

MITIGATION MEASURES

None Required

Impact 3.11-4: The proposed project has the potential to expose new sensitive receptors to excessive transportation noise (less than significant with mitigation)

The FHWA traffic noise prediction model was used to predict Cumulative + Project traffic noise levels at the proposed residential land uses associated with the project. Table 3.11-10 shows the predicted traffic noise levels at the proposed residential uses adjacent to Sierra College Boulevard.

Table 3.11-10 also indicates the property line noise barrier heights required to achieve compliance with an exterior noise level standards of the normally acceptable 60 dB Ldn and the upper end 65 dB Ldn.

Appendices B and C of the Noise Study provides the complete inputs and results to the FHWA traffic noise prediction model and barrier calculations. The modeled noise barriers for Sierra College Boulevard include the grading plans provided by the project engineer (Wood-Rogers). The grading plans provided detailed analyses of the roadway, building pad and property line elevations which were detailed from north to south.

Table 3.11-10: Cumulative + Project Transportation Noise Levels at Proposed Residential Uses

Location	*Approximate Residential Setback, feet*[1]	*ADT*	*Required Barrier Heights to Achieve Exterior Noise Level Standards*	
			65 dB Ldn	*60 dB Ldn*
College Park North - Sierra College Boulevard				
Village 8				
Pad @ +8.5-feet			6-feet	10-feet
Pad @ +5.0-feet			6-feet	10-feet
Pad @ +6.0-feet			6-feet	10-feet
Pad @ +5.5-feet			6-feet	10-feet
Pad @ +3.5-feet	75-feet	50.650	6.5-feet	10-feet
Pad @ +2.0-feet			6.5-feet	10.5-feet
Pad @ +1.0-feet			7-feet	11-feet
Pad @ +1.5-feet			6.5-feet	11-feet
Pad @ +2.5-feet			6.5-feet	10.5-feet
Pad @ +3.0-feet			6.5-feet	10.5-feet
Village 5	250-feet	50,650	6-feet	6-feet
Future Mixed Use	75-feet	50.650	Alternative Mitigation	
College Park North - Rocklin Road				
Villages 2, 4, and 5	650-feet	21,410	None	None
Future Mixed Use	75-feet	21,410	Alternative Mitigation	
College Park South - Rocklin Road				
Village 1	960-feet	21,140	None	None
Future Mixed Use	75-feet	2,140	Alternative Mitigation	
College Park South - El Don Drive				
Village 1	75-feet	5,940	None	None

[1] *Setback distances are measured in feet from the centerlines of the roadways to the center of residential backyards.*

[2] *The modeled noise barriers assume flat site conditions where roadway elevations, base of wall elevations, and building pad elevations are approximately equivalent.*

Source: FHWA-RD-77-108 with inputs from Fehr & Peers, and J.C. Brennan & Associates, Inc. 2020.

Table 3.11-10 analysis of barrier heights applies primarily to single family residential or duplex type units. However, where mixed uses occur, such as on the North Site Plan (High Density Residential

and General Commercial), the mitigation measures for residential units can be evaluated at the design review stage of the project. The mitigation measures for the High Density Residential units in the North Site Plan can take the form of barriers, or site design. The site design can include setbacks, shielding of outdoor activity areas with building facades, or a combination of the two. Other types of mitigation can be applied. With respect to the High Density Residential shown on the attached South Site Plan, the project proponent has indicated that no residential shall be located within the north "finger" of that designation. Based upon the project traffic noise levels from Rocklin Road, the residential units will be located outside of the 60 dB Ldn noise contour, and will comply with the City of Rocklin exterior noise level standards.

The following are examples of mitigating traffic noise levels at mixed use areas:

- Creating setbacks from roadways, based upon distances to contours shown in Appendix B;
- Shielding primary outdoor activity areas such as backyard and sideyard patios by residential building facades;
- Shielding residential uses by including commercial or business uses between roadways and the residential areas.

Mitigation Measures

Mitigation Measure 3.11-3: *Barriers should be consistent with those shown in Table 3.11.10.* Mitigation for Mixed Uses or High Density Residential can be evaluated at the Design Review stage.

Interior Noise Impacts:

Modern construction typically provides a 25 dB exterior-to-interior noise level reduction with windows closed. Therefore, sensitive receptors exposed to exterior noise of 70 dB L_{dn}, or less, will typically comply with the City of Rocklin 45 dB L_{dn} interior noise level standard. Additional noise reduction measures, such as acoustically rated windows are generally required for exterior noise levels exceeding 70 dB L_{dn}.

It should be noted that exterior noise levels are typically 2-3 dB higher at second floor locations. Additionally, noise barriers do not reduce exterior noise levels at second floor locations. Table 3.11-11 shows the predicted exterior and interior noise levels for each of the two project sites.

Building plans, floor plans and elevations were provided for the Village 8 adjacent to Sierra College Boulevard. In order to calculate interior noise levels for the actual project construction adjacent to Sierra College Boulevard, it is necessary to determine the noise reduction provided by the residential building facades. This may be calculated by using a measured A-weighted noise frequency spectrum for typical arterial traffic. The composite transmission loss and resulting noise level in the receiving room is first determined. After correcting for room absorption, the overall noise level in the room is calculated. Appendix D shows the predicted interior noise levels. Second

floor facades of the first three rows of buildings will require STC 32 windows and sliding glass doors on the parallel and perpendicular facades to Sierra College Boulevard. STC rated windows will not be required on the building facades opposite of Sierra College Boulevard.

The proposed construction types of the buildings are as follows:

- Metal or wood studs at 16" O.C.;
- Insulation in the stud cavities;
- Exterior walls are either a stucco, fibre cement board (hardiboard) or metal over sheeting
- Interior walls are 5/8" Type X gypsum board.

Table 3.11-11: Cumulative + Project Transportation Interior Noise Levels at Proposed Residential Uses

Location	*Approximate Residential Setback, feet*[1]	*Predicted Exterior Unmitigated Traffic Noise Level*	*Predicted Interior Noise Level*	*Required Mitigation*
College Park North - Sierra College Boulevard				
Village 8 First Floor Second Floor	75-feet	 73 dB Ldn 76 dB Ldn	 48 dB Ldn 51 dB Ldn	 Installation of Barriers STC 32 Windows
Village 5 First Floor Second Floor	250-feet	 65 dB Ldn 68 dB Ldn	 40 dB Ldn 43 dB Ldn	 None Required None Required
Villages 1 through 4 and Villages 7 and 8	Sufficient setbacks and shielding and will comply with the City's 45 dB Ldn interior standard			
College Park North - Rocklin Road				
Villages 2, 4 and 5 First Floor Second Floor	650-feet	 65 dB Ldn 68 dB Ldn	 40 dB Ldn 43 dB Ldn	 None Required None Required
College Park South - Rocklin Road				
Village 1	960-feet	Setbacks and will comply with the City's 45 dB Ldn interior standard		
Future Mixed Use First Floor Residential	75-feet	 64 dB Ldn 67 dB Ldn	 39 dB Ldn 42 dB Ldn	 None Required None Required
College Park South - El Don Drive				
Village 1 First Floor Second Floor	75-feet	 55 dB Ldn 58 dB Ldn	 30 dB Ldn 33 dB Ldn	 None Required None Required

[1] *Setback distances are measured in feet from the centerlines of the roadways to the center of residential backyards.*

[2] *The modeled noise barriers assume flat site conditions where roadway elevations, base of wall elevations, and building pad elevations are approximately equivalent.*

Source: FHWA-RD-77-108 with inputs from Fehr & Peers, and J.C. Brennan & Associates, Inc. 2020.

Mitigation Measures

Mitigation Measure 3.11-4: *Based upon Table3.11-11, the residences within Village 8, which are within 100-feet from the Sierra College Boulevard centerline will require STC 32 or higher windows and sliding glass doors in second floor rooms. This will apply to windows and sliding glass doors parallel and perpendicular to Sierra College Boulevard.*

Impact 3.11-5: The proposed project has the potential to expose sensitive receptors to substantial noise from proposed commercial mixed-uses (less than significant with mitigation)

Commercial and Office Land Uses

Commercial and office land use activities can produce noise levels which affect adjacent sensitive land uses. These noise sources can be continuous and may contain tonal components which may be annoying to individuals who live in the nearby vicinity. In addition, noise generation from fixed noise sources may vary based upon climatic conditions, time of day and existing ambient noise levels. The primary noise sources generally include truck deliveries, trash pickup, parking lot use, and HVAC equipment operation. These sources may result in noise levels in excess of the City's standards at nearby receptors.

Mechanical Equipment

Heating, air conditioning, and ventilation equipment can be a primary noise source associated with commercial or office uses. These types of equipment are often mounted on roof tops, located on the ground, or located within mechanical rooms. The noise sources can take the form of fans, pumps, air compressors, chillers, or cooling towers. Noise levels from these types of equipment can vary significantly. Noise levels from these types of sources generally range between 45 dB to 70 dB at a distance of 50 feet and could exceed City standards at nearby receptors.

Loading Docks and Truck Deliveries

Loading docks and delivery areas can be a source of noise. Generally, when medium trucks such as UPS delivery trucks or Federal Express trucks (dual axle) provide deliveries, these types deliveries occur at the front of stores and they do not create increases in noise levels above typical parking lots. However, when large eighteen-wheeler truck deliveries occur, they can be a source of noise. Generally, loading docks are associated with these large truck deliveries.

Large 18-wheeler truck passbys and loading dock operations produce an average Sound Exposure Level (SEL) of 88 dBA at a distance of 50 feet. This includes deliveries, unloading of trucks, and departures. This included the use of back-up beepers, revving of engines, and air brake use which may be used during the arrivals / departures, and the loading or unloading from the trucks. In order to calculate the hourly average (L_{eq}) for truck passbys, the following equation can be used, but depends upon a typical number of hourly operations. For this analysis, it assumes 2 large truck deliveries in a peak hour:

$$L_{eq} = SEL + 10*\log(\#\text{ of events}) - 35.6$$

Where the number of events is 2, and 35.6 is the log of the number of seconds in an hour.

The resulting truck loading dock and circulation noise levels at a distance of 50-feet is 55 dBA Leq.

MEASURES TO REDUCE NOISE EXPOSURE

Use of Setbacks

Noise exposure may be reduced by increasing the distance between the noise source and receiving use. Setbacks can take the form of open space, frontage roads, recreational areas, etc. The available noise attenuation from this technique is limited by the characteristics of the noise source, but is generally 3 to 6 dB per doubling of distance from the source. The rule-of-thumb is that most traffic and railroad noise levels will decrease or increase by approximately 4.5 dB per doubling, or halving of distance, respectively. Noise from point sources, such as HVAC equipment, will generally attenuate at 6 dB per doubling of distance.

Use of Barriers

Noise reduction can be accomplished by placing walls, berms or other structures, such as buildings, between the noise source and the receiver. In addition, intervening topography can be an effective barrier for noise control. The effectiveness of a barrier depends upon blocking line-of-sight between the source and receiver, and is improved with increases in distance the sound must travel to pass over the barrier as compared to a straight line from source to receiver. The difference between the distance over a barrier and a straight line between source and receiver is called the "path length difference," and is the basis for calculating barrier noise reduction.

In general, barriers are most effective when placed close to either the receiver or the source. An intermediate barrier location yields a smaller path length difference for a given increase in barrier height than does a location closer to either source or receiver.

Site Design, Building Locations, and Building Orientations

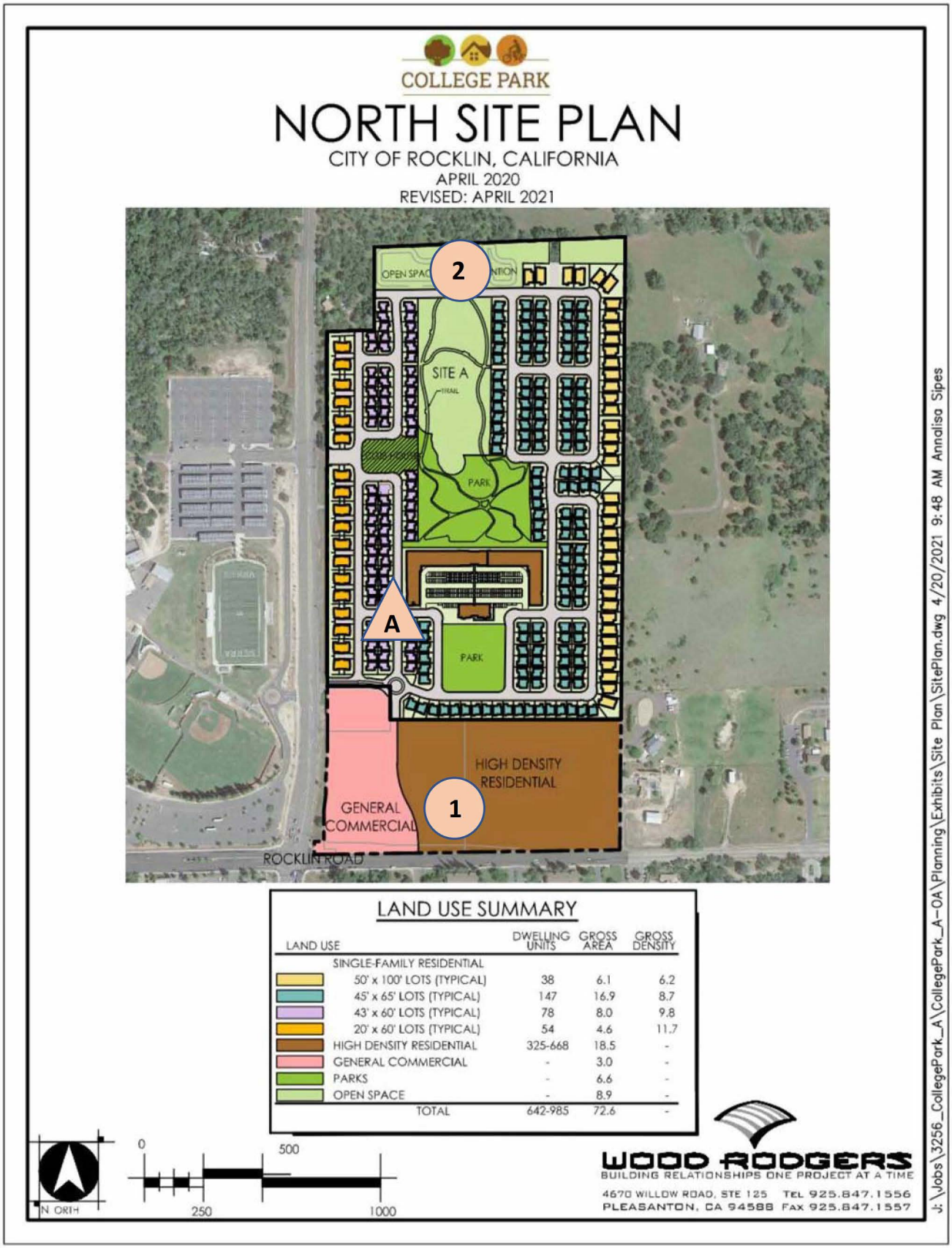
Buildings can be placed on a project site to shield other structures or areas, to remove them from noise-impacted areas, and to prevent an increase in noise levels caused by reflections. As an example, carports or garages can be used to form or complement a barrier, or shield an outdoor activity area. Placement of outdoor activity areas on the opposite side of the building facades from the noise source, or within the shielded portion of a building complex, such as a central courtyard, can also be an effective method of providing a quiet retreat in an otherwise noisy environment. Where residential uses abut commercial uses, it is always recommended that single story units in combination with sound walls occur at the first or second row of units. This shields upper floors from commercial noise.

With implementation of the following exterior mitigation measures, the proposed project would have a **less than significant** impact relative to this environmental topic.

MITIGATION MEASURES

MM 3. 11-5: Where commercial, business professional, office, or similar uses abut residential uses or where loading docks or truck circulation routes face residential areas, the following mitigation measures shall be included in the project design:

- All heating, cooling and ventilation equipment shall be located within mechanical rooms where possible or shielded from view with solid barriers;
- Emergency generators shall comply with the City's noise criteria at the nearest noise-sensitive receivers;
- Delivery/loading activities shall comply with the City's noise ordinance standards.
- Sound walls with a minimum height of 6-feet shall be considered in the project design.
- Where noisy activities associated with commercial uses occur adjacent to residences, consideration should be given to combinations of sound walls and single story residences.
- The applicant shall submit a noise study to verify that the appropriate noise control measures have been incorporated into the project design and will achieve compliance with the City's noise level standards.



Short-term Noise Monitoring Sites

Continuous 24-hour Noise Monitoring Site

Figure 3.11-1
North Site Plan

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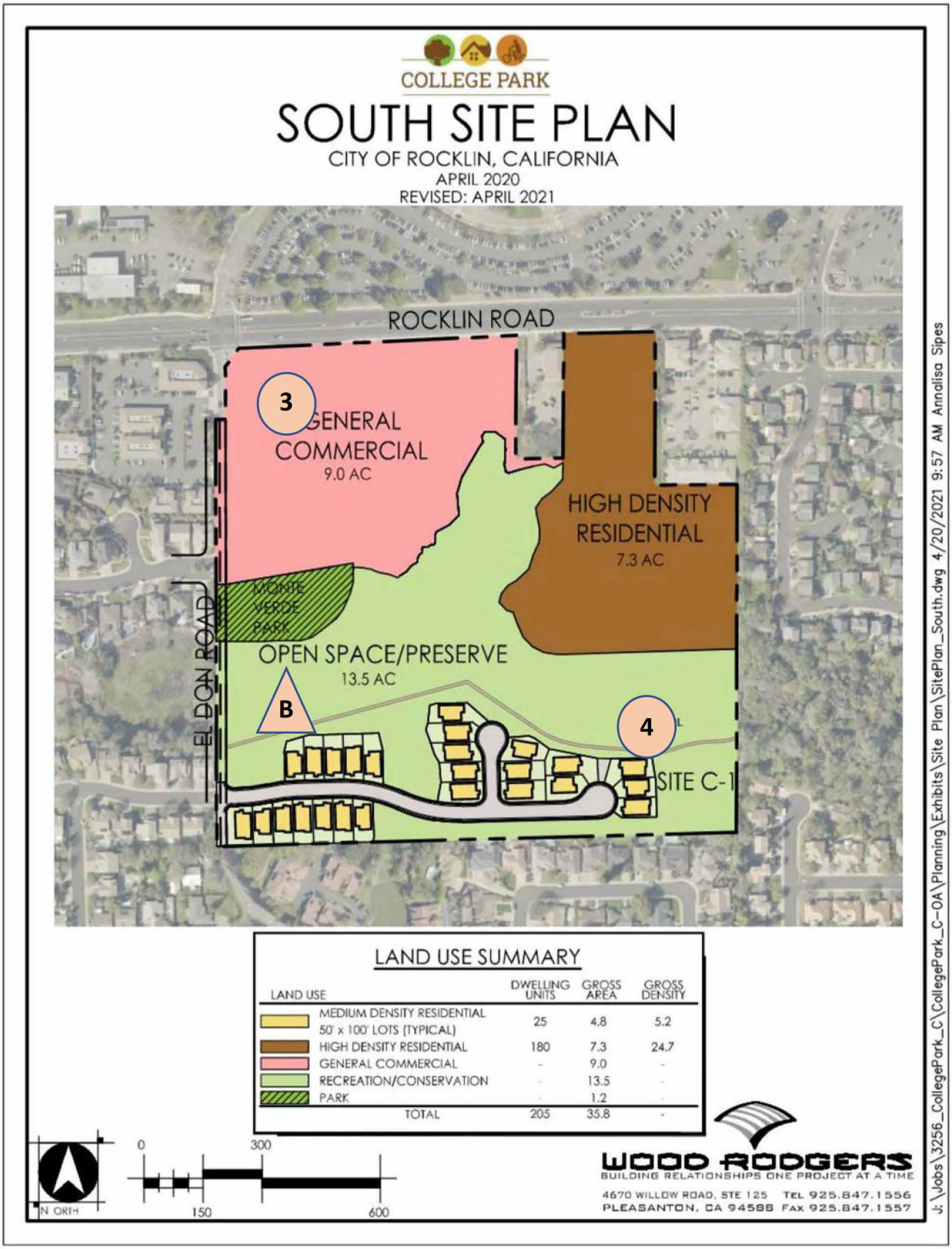
Date:
6/15/2020



Short-term Noise Monitoring Sites

Continuous 24-hour Noise Monitoring Site

Figure 3.11-2
South Site Plan

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Date:
6/15/2020

Appendix A
2019-140 College Park North
24hr Continuous Noise Monitoring - Site A
Thursday, October 10, 2019

Hour	Leq	Lmax	L50	L90
0:00	53	77	46	41
1:00	50	72	43	39
2:00	52	71	51	44
3:00	53	78	47	43
4:00	54	70	49	46
5:00	58	78	54	49
6:00	60	76	57	51
7:00	61	74	59	54
8:00	61	75	59	52
9:00	60	78	57	50
10:00	58	74	55	49
11:00	60	85	57	50
12:00	60	77	58	50
13:00	60	74	57	49
14:00	61	78	58	51
15:00	61	76	60	53
16:00	62	75	61	54
17:00	62	74	60	54
18:00	62	74	61	55
19:00	62	76	60	56
20:00	61	78	59	54
21:00	59	74	56	51
22:00	55	70	51	45
23:00	55	74	47	41

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	62.4	58.3	60.8	60.5	50.4	55.7
Lmax (Maximum)	85.0	73.7	76.0	78.0	70.4	74.1
L50 (Median)	60.8	55.5	58.4	56.6	43.0	49.5
L90 (Background)	55.6	48.9	52.2	51.2	39.2	44.5

Computed Ldn, dB	63.3
% Daytime Energy	84%
% Nighttime Energy	16%

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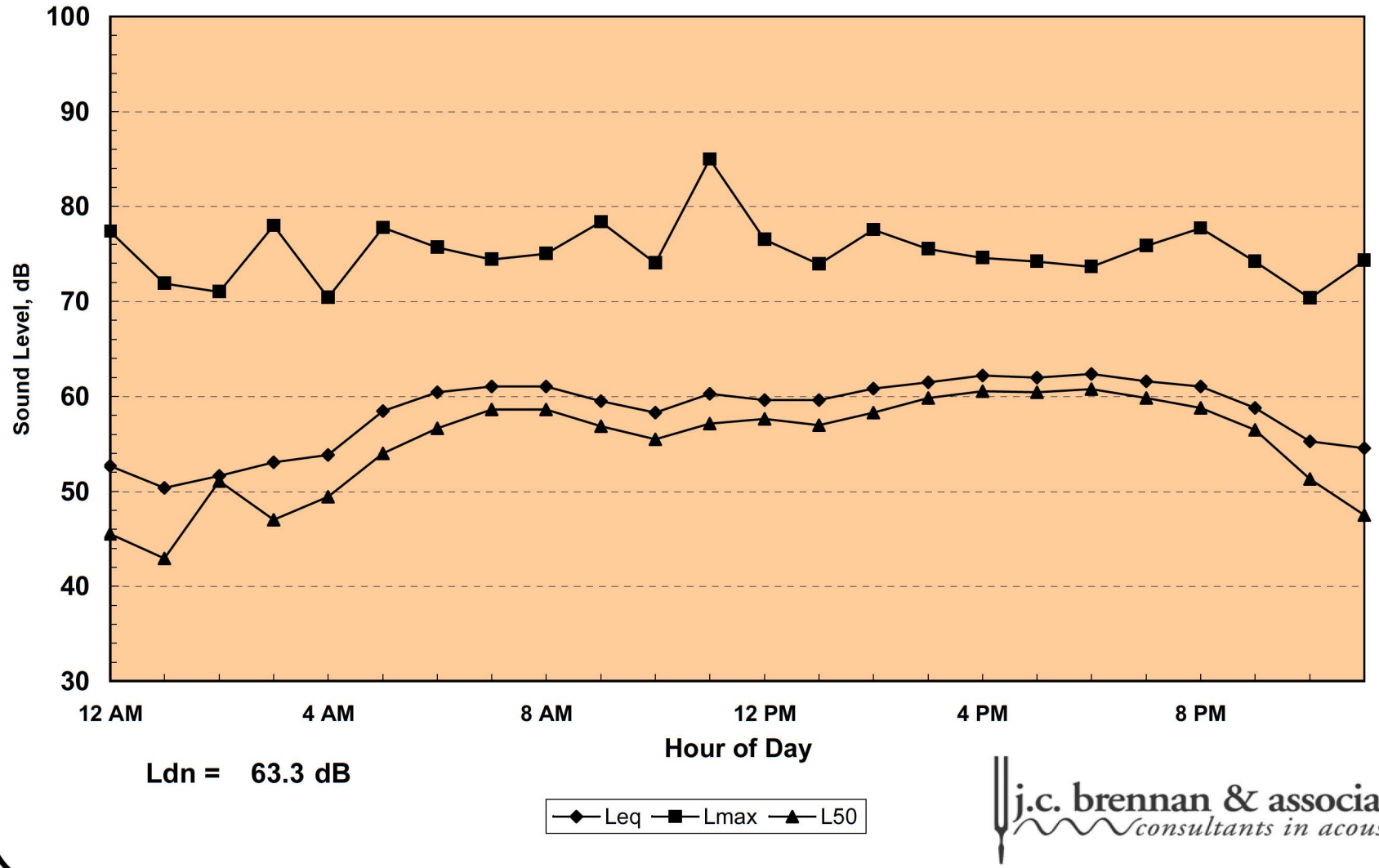
Appendix A
2019-140 College Park North
24hr Continuous Noise Monitoring - Site A
Thursday, October 10, 2019



Ldn = 63.3 dB

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Appendix A
2019-140 College Park South
24hr Continuous Noise Monitoring - Site B
Thursday, October 10, 2019

Hour	Leq	Lmax	L50	L90
0:00	45	61	44	41
1:00	43	50	42	39
2:00	43	54	42	39
3:00	45	55	44	41
4:00	47	64	47	44
5:00	49	59	49	47
6:00	51	61	51	49
7:00	53	78	52	50
8:00	51	61	51	49
9:00	51	63	50	48
10:00	49	64	48	47
11:00	47	57	46	43
12:00	45	66	44	40
13:00	47	69	45	40
14:00	49	69	47	43
15:00	48	63	46	43
16:00	48	62	46	41
17:00	50	70	48	45
18:00	50	59	50	47
19:00	50	61	49	47
20:00	50	72	46	43
21:00	48	57	47	44
22:00	45	58	43	40
23:00	44	62	42	39

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	53.4	45.4	49.6	51.0	42.6	46.7
Lmax (Maximum)	77.7	56.8	64.7	64.4	50.1	58.1
L50 (Median)	51.9	43.6	47.6	50.5	41.6	44.8
L90 (Background)	50.2	39.7	44.7	48.9	39.1	42.2

Computed Ldn, dB	53.7
% Daytime Energy	76%
% Nighttime Energy	24%

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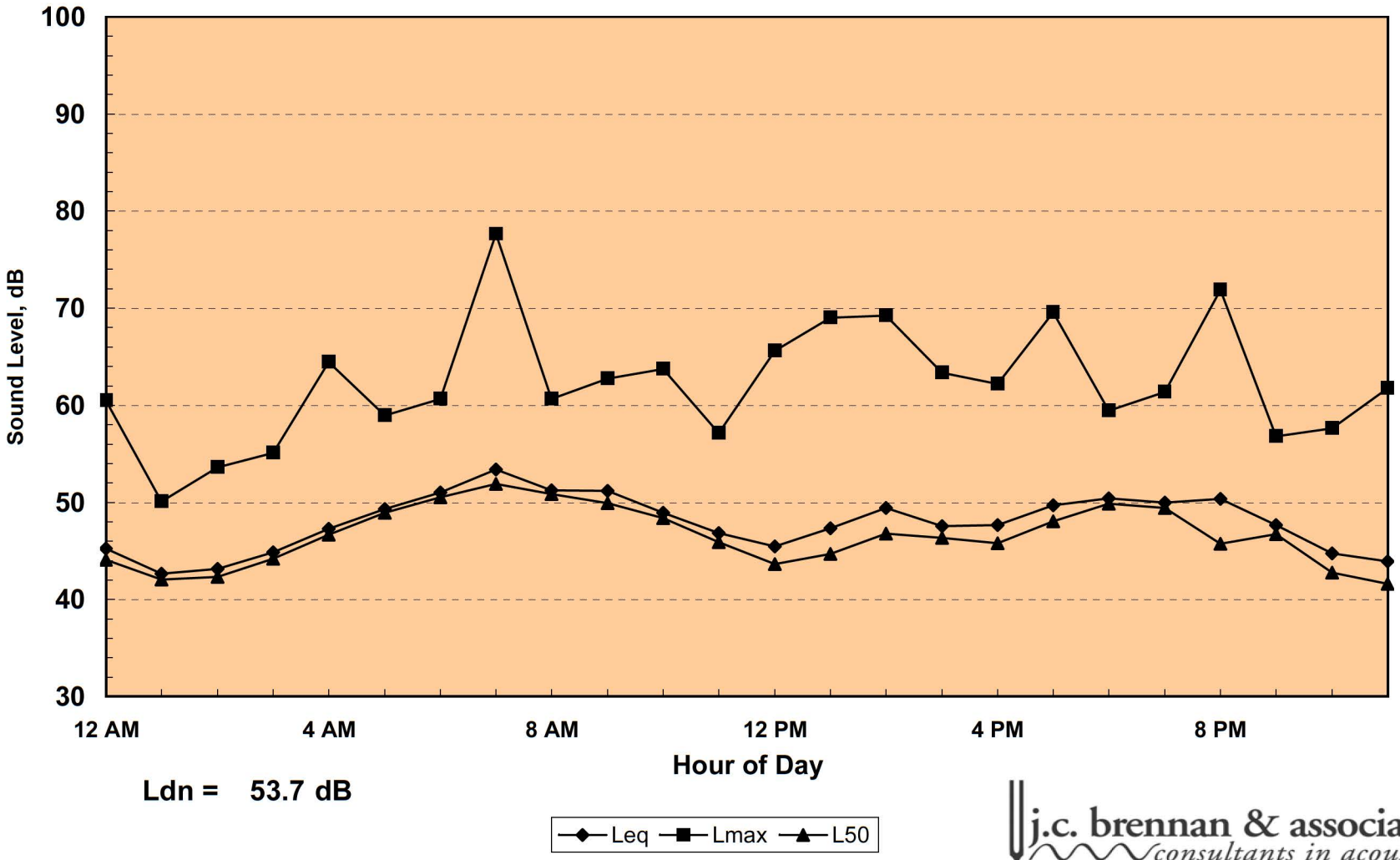
Appendix A
2019-140 College Park South
24hr Continuous Noise Monitoring - Site B
Thursday, October 10, 2019



Ldn = 53.7 dB

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Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Data Input Sheet

Project #: 2019-140
Description: College Park Existing
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Rocklin Road	West of Aguilar Rd	22,920	80		20	2	1	45	75	
2	Rocklin Road	Aguilar Rd to El Don Dr	21,130	80		20	2	1	45	75	
3	Rocklin Road	El Don to Havenhurst	14,260	80		20	2	1	45	75	-5
4	Rocklin Road	Havenhurst to Sierra College	13,570	80		20	2	1	45	75	-5
5	Rocklin Road	Sierra College to Rocklin Manor W	9,030	80		20	2	1	45	75	-5
6	Rocklin Road	Rocklin Manor W to Barton Rd	8,580	80		20	2	1	45	75	
7	Sierra College Blvd	North of I-80	19,430	80		20	2	1	45	75	
8	Sierra College Blvd	I-80 to Schriber Way	22,280	80		20	2	1	45	75	
9	Sierra College Blvd	Schriber Way to Stadium Entrance	22,420	80		20	2	1	45	75	
10	Sierra College Blvd	Stadium Entrance to Rocklin Rd	21,460	80		20	2	1	45	75	
11	Sierra College Blvd	Rocklin Rd to El Don	22,340	80		20	2	1	45	75	-5
12	Sierra College Blvd	South of El Don	20,480	80		20	2	1	45	75	-5
13	El Don	Rocklin Rd to Wildflower	3,090	80		20	1	0.5	25	75	
14	El Don	South of Wildflower	2,290	80		20	1	0.5	25	75	
15	Barton Road	North of Rocklin Rd	2,370	80		20	1	0.5	35	75	
16	Barton Road	South of Rocklin Rd	8,320	80		20	1	0.5	35	75	
17											
18											
19											
20											
21											
22											
23											
24											
25											

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Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Predicted Levels

Project #: 2019-140
Description: College Park Existing
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Rocklin Road	West of Aguilar Rd	67.7	59.1	60.6	69
2	Rocklin Road	Aguilar Rd to El Don Dr	67.4	58.8	60.2	69
3	Rocklin Road	El Don to Havenhurst	60.7	52.0	53.5	62
4	Rocklin Road	Havenhurst to Sierra College	60.4	51.8	53.3	62
5	Rocklin Road	Sierra College to Rocklin Manor W	58.7	50.1	51.6	60
6	Rocklin Road	Rocklin Manor W to Barton Rd	63.4	54.8	56.3	65
7	Sierra College Blvd	North of I-80	67.0	58.4	59.9	68
8	Sierra College Blvd	I-80 to Schriber Way	67.6	59.0	60.5	69
9	Sierra College Blvd	Schriber Way to Stadium Entrance	67.6	59.0	60.5	69
10	Sierra College Blvd	Stadium Entrance to Rocklin Rd	67.4	58.8	60.3	69
11	Sierra College Blvd	Rocklin Rd to El Don	62.6	54.0	55.5	64
12	Sierra College Blvd	South of El Don	62.2	53.6	55.1	63
13	El Don	Rocklin Rd to Wildflower	51.7	43.4	48.0	54
14	El Don	South of Wildflower	50.4	42.1	46.7	52
15	Barton Road	North of Rocklin Rd	54.8	44.5	46.7	56
16	Barton Road	South of Rocklin Rd	60.2	50.0	52.2	61

Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Noise Contour Output

Project #: 2019-140
Description: College Park Existing
Ldn/CNEL: Ldn
Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Rocklin Road	West of Aguilar Rd	30	64	138	297	640
2	Rocklin Road	Aguilar Rd to El Don Dr	28	61	131	281	606
3	Rocklin Road	El Don to Havenhurst	10	22	47	100	216
4	Rocklin Road	Havenhurst to Sierra College	10	21	45	97	209
5	Rocklin Road	Sierra College to Rocklin Manor W	7	16	34	74	160
6	Rocklin Road	Rocklin Manor W to Barton Rd	15	33	72	154	332
7	Sierra College Blvd	North of I-80	27	57	123	266	573
8	Sierra College Blvd	I-80 to Schriber Way	29	63	135	291	628
9	Sierra College Blvd	Schriber Way to Stadium Entrance	29	63	136	293	630
10	Sierra College Blvd	Stadium Entrance to Rocklin Rd	28	61	132	284	612
11	Sierra College Blvd	Rocklin Rd to El Don	14	29	63	135	292
12	Sierra College Blvd	South of El Don	13	28	59	128	275
13	El Don	Rocklin Rd to Wildflower	3	6	13	29	61
14	El Don	South of Wildflower	2	5	11	23	50
15	Barton Road	North of Rocklin Rd	4	8	18	39	84
16	Barton Road	South of Rocklin Rd	9	19	42	90	195

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Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Data Input Sheet

Project #: 2019-140
Description: College Park Existing + Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Rocklin Road	West of Aguilar Rd	27,710	80		20	2	1	45	75	
2	Rocklin Road	Aguilar Rd to El Don Dr	25,120	80		20	2	1	45	75	
3	Rocklin Road	El Don to Havenhurst	17,310	80		20	2	1	45	75	-5
4	Rocklin Road	Havenhurst to Sierra College	16,760	80		20	2	1	45	75	-5
5	Rocklin Road	Sierra College to Rocklin Manor W	11,280	80		20	2	1	45	75	-5
6	Rocklin Road	Rocklin Manor W to Barton Rd	9,310	80		20	2	1	45	75	
7	Sierra College Blvd	North of I-80	20,400	80		20	2	1	45	75	
8	Sierra College Blvd	I-80 to Schriber Way	25,360	80		20	2	1	45	75	
9	Sierra College Blvd	Schriber Way to Stadium Entrance	25,520	80		20	2	1	45	75	
10	Sierra College Blvd	Stadium Entrance to Rocklin Rd	25,020	80		20	2	1	45	75	
11	Sierra College Blvd	Rocklin Rd to El Don	24,000	80		20	2	1	45	75	-5
12	Sierra College Blvd	South of El Don	20,490	80		20	2	1	45	75	-5
13	El Don	Rocklin Rd to Wildflower	3,830	80		20	1	0.5	25	75	
14	El Don	South of Wildflower	2,290	80		20	1	0.5	25	75	
15	Barton Road	North of Rocklin Rd	2,430	80		20	1	0.5	35	75	
16	Barton Road	South of Rocklin Rd	8,790	80		20	1	0.5	35	75	
17											
18											
19											
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21											
22											
23											
24											
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Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Predicted Levels

Project #: 2019-140
Description: College Park Existing + Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Rocklin Road	West of Aguilar Rd	68.5	59.9	61.4	70
2	Rocklin Road	Aguilar Rd to El Don Dr	68.1	59.5	61.0	69
3	Rocklin Road	El Don to Havenhurst	61.5	52.9	54.4	63
4	Rocklin Road	Havenhurst to Sierra College	61.4	52.8	54.2	63
5	Rocklin Road	Sierra College to Rocklin Manor W	59.6	51.0	52.5	61
6	Rocklin Road	Rocklin Manor W to Barton Rd	63.8	55.2	56.7	65
7	Sierra College Blvd	North of I-80	67.2	58.6	60.1	68
8	Sierra College Blvd	I-80 to Schriber Way	68.2	59.5	61.0	69
9	Sierra College Blvd	Schriber Way to Stadium Entrance	68.2	59.6	61.1	69
10	Sierra College Blvd	Stadium Entrance to Rocklin Rd	68.1	59.5	61.0	69
11	Sierra College Blvd	Rocklin Rd to El Don	62.9	54.3	55.8	64
12	Sierra College Blvd	South of El Don	62.2	53.6	55.1	63
13	El Don	Rocklin Rd to Wildflower	52.7	44.3	49.0	55
14	El Don	South of Wildflower	50.4	42.1	46.7	52
15	Barton Road	North of Rocklin Rd	54.9	44.7	46.8	56
16	Barton Road	South of Rocklin Rd	60.5	50.2	52.4	61

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FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Noise Contour Output

Project #: 2019-140
Description: College Park Existing + Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Rocklin Road	West of Aguilar Rd	34	73	156	337	726
2	Rocklin Road	Aguilar Rd to El Don Dr	32	68	146	316	680
3	Rocklin Road	El Don to Havenhurst	11	25	53	114	246
4	Rocklin Road	Havenhurst to Sierra College	11	24	52	112	241
5	Rocklin Road	Sierra College to Rocklin Manor W	9	19	40	86	185
6	Rocklin Road	Rocklin Manor W to Barton Rd	16	35	76	163	351
7	Sierra College Blvd	North of I-80	27	59	127	275	592
8	Sierra College Blvd	I-80 to Schriber Way	32	68	147	318	684
9	Sierra College Blvd	Schriber Way to Stadium Entrance	32	69	148	319	687
10	Sierra College Blvd	Stadium Entrance to Rocklin Rd	31	68	146	315	678
11	Sierra College Blvd	Rocklin Rd to El Don	14	31	66	142	306
12	Sierra College Blvd	South of El Don	13	28	59	128	275
13	El Don	Rocklin Rd to Wildflower	3	7	15	33	71
14	El Don	South of Wildflower	2	5	11	23	50
15	Barton Road	North of Rocklin Rd	4	9	18	40	86
16	Barton Road	South of Rocklin Rd	9	20	43	94	202

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FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Data Input Sheet

Project #: 2019-140
Description: College Park Existing + Cumulative No Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Rocklin Road	West of Aguilar Rd	30,760	80		20	2	1	45	75	
2	Rocklin Road	Aguilar Rd to El Don Dr	25,870	80		20	2	1	45	75	
3	Rocklin Road	El Don to Havenhurst	18,510	80		20	2	1	45	75	-5
4	Rocklin Road	Havenhurst to Sierra College	18,190	80		20	2	1	45	75	-5
5	Rocklin Road	Sierra College to Rocklin Manor W	4,860	80		20	2	1	45	75	-5
6	Rocklin Road	Rocklin Manor W to Barton Rd	14,610	80		20	2	1	45	75	
7	Sierra College Blvd	North of I-80	36,600	80		20	2	1	45	75	
8	Sierra College Blvd	I-80 to Schriber Way	45,880	80		20	2	1	45	75	
9	Sierra College Blvd	Schriber Way to Stadium Entrance	51,610	80		20	2	1	45	75	
10	Sierra College Blvd	Stadium Entrance to Rocklin Rd	47,200	80		20	2	1	45	75	
11	Sierra College Blvd	Rocklin Rd to El Don	51,270	80		20	2	1	45	75	-5
12	Sierra College Blvd	South of El Don	50,000	80		20	2	1	45	75	-5
13	El Don	Rocklin Rd to Wildflower	4,200	80		20	1	0.5	25	75	
14	El Don	South of Wildflower	3,780	80		20	1	0.5	25	75	
15	Barton Road	North of Rocklin Rd	5,880	80		20	1	0.5	35	75	
16	Barton Road	South of Rocklin Rd	8,730	80		20	1	0.5	35	75	
17											
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23											
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FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Predicted Levels

Project #: 2019-140
Description: College Park Existing + Cumulative No Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Rocklin Road	West of Aguilar Rd	69.0	60.4	61.9	70
2	Rocklin Road	Aguilar Rd to El Don Dr	68.2	59.6	61.1	69
3	Rocklin Road	El Don to Havenhurst	61.8	53.2	54.7	63
4	Rocklin Road	Havenhurst to Sierra College	61.7	53.1	54.6	63
5	Rocklin Road	Sierra College to Rocklin Manor W	56.0	47.4	48.9	57
6	Rocklin Road	Rocklin Manor W to Barton Rd	65.8	57.2	58.6	67
7	Sierra College Blvd	North of I-80	69.7	61.1	62.6	71
8	Sierra College Blvd	I-80 to Schriber Way	70.7	62.1	63.6	72
9	Sierra College Blvd	Schriber Way to Stadium Entrance	71.2	62.6	64.1	72
10	Sierra College Blvd	Stadium Entrance to Rocklin Rd	70.9	62.2	63.7	72
11	Sierra College Blvd	Rocklin Rd to El Don	66.2	57.6	59.1	67
12	Sierra College Blvd	South of El Don	66.1	57.5	59.0	67
13	El Don	Rocklin Rd to Wildflower	53.1	44.7	49.4	55
14	El Don	South of Wildflower	52.6	44.3	48.9	55
15	Barton Road	North of Rocklin Rd	58.7	48.5	50.7	60
16	Barton Road	South of Rocklin Rd	60.4	50.2	52.4	61

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FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Noise Contour Output

Project #: 2019-140
Description: College Park Existing + Cumulative No Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Rocklin Road	West of Aguilar Rd	36	78	168	361	778
2	Rocklin Road	Aguilar Rd to El Don Dr	32	69	149	322	693
3	Rocklin Road	El Don to Havenhurst	12	26	55	119	257
4	Rocklin Road	Havenhurst to Sierra College	12	25	55	118	254
5	Rocklin Road	Sierra College to Rocklin Manor W	5	11	23	49	106
6	Rocklin Road	Rocklin Manor W to Barton Rd	22	47	102	220	474
7	Sierra College Blvd	North of I-80	41	87	188	406	874
8	Sierra College Blvd	I-80 to Schriber Way	47	102	219	471	1016
9	Sierra College Blvd	Schriber Way to Stadium Entrance	51	110	237	510	1099
10	Sierra College Blvd	Stadium Entrance to Rocklin Rd	48	104	223	480	1035
11	Sierra College Blvd	Rocklin Rd to El Don	24	51	109	236	508
12	Sierra College Blvd	South of El Don	23	50	108	232	499
13	El Don	Rocklin Rd to Wildflower	3	8	16	35	75
14	El Don	South of Wildflower	3	7	15	33	70
15	Barton Road	North of Rocklin Rd	7	15	33	72	154
16	Barton Road	South of Rocklin Rd	9	20	43	93	201

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FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Data Input Sheet

Project #: 2019-140
Description: College Park Existing + Cumulative Plus Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Rocklin Road	West of Aguilar Rd	34,540	80		20	2	1	45	75	
2	Rocklin Road	Aguilar Rd to El Don Dr	29,880	80		20	2	1	45	75	
3	Rocklin Road	El Don to Havenhurst	21,650	80		20	2	1	45	75	-5
4	Rocklin Road	Havenhurst to Sierra College	21,410	80		20	2	1	45	75	-5
5	Rocklin Road	Sierra College to Rocklin Manor W	6,280	80		20	2	1	45	75	-5
6	Rocklin Road	Rocklin Manor W to Barton Rd	15,320	80		20	2	1	45	75	
7	Sierra College Blvd	North of I-80	37,570	80		20	2	1	45	75	
8	Sierra College Blvd	I-80 to Schriber Way	48,960	80		20	2	1	45	75	
9	Sierra College Blvd	Schriber Way to Stadium Entrance	55,190	80		20	2	1	45	75	
10	Sierra College Blvd	Stadium Entrance to Rocklin Rd	50,650	80		20	2	1	45	75	
11	Sierra College Blvd	Rocklin Rd to El Don	53,440	80		20	2	1	45	75	-5
12	Sierra College Blvd	South of El Don	50,000	80		20	2	1	45	75	-5
13	El Don	Rocklin Rd to Wildflower	5,940	80		20	1	0.5	25	75	
14	El Don	South of Wildflower	3,780	80		20	1	0.5	25	75	
15	Barton Road	North of Rocklin Rd	5,940	80		20	1	0.5	35	75	
16	Barton Road	South of Rocklin Rd	9,380	80		20	1	0.5	35	75	
17											
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19											
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21											
22											
23											
24											
25											

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FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Predicted Levels

Project #: 2019-140
Description: College Park Existing + Cumulative Plus Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Rocklin Road	West of Aguilar Rd	69.5	60.9	62.4	71
2	Rocklin Road	Aguilar Rd to El Don Dr	68.9	60.3	61.7	70
3	Rocklin Road	El Don to Havenhurst	62.5	53.9	55.3	64
4	Rocklin Road	Havenhurst to Sierra College	62.4	53.8	55.3	64
5	Rocklin Road	Sierra College to Rocklin Manor W	57.1	48.5	50.0	58
6	Rocklin Road	Rocklin Manor W to Barton Rd	66.0	57.4	58.8	67
7	Sierra College Blvd	North of I-80	69.9	61.3	62.7	71
8	Sierra College Blvd	I-80 to Schriber Way	71.0	62.4	63.9	72
9	Sierra College Blvd	Schriber Way to Stadium Entrance	71.5	62.9	64.4	73
10	Sierra College Blvd	Stadium Entrance to Rocklin Rd	71.2	62.6	64.0	72
11	Sierra College Blvd	Rocklin Rd to El Don	66.4	57.8	59.3	68
12	Sierra College Blvd	South of El Don	66.1	57.5	59.0	67
13	El Don	Rocklin Rd to Wildflower	54.6	46.3	50.9	57
14	El Don	South of Wildflower	52.6	44.3	48.9	55
15	Barton Road	North of Rocklin Rd	58.8	48.5	50.7	60
16	Barton Road	South of Rocklin Rd	60.8	50.5	52.7	62

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FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Noise Contour Output

Project #: 2019-140
Description: College Park Existing + Cumulative Plus Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Rocklin Road	West of Aguilar Rd	39	84	181	390	841
2	Rocklin Road	Aguilar Rd to El Don Dr	35	76	164	354	763
3	Rocklin Road	El Don to Havenhurst	13	29	62	133	286
4	Rocklin Road	Havenhurst to Sierra College	13	28	61	132	284
5	Rocklin Road	Sierra College to Rocklin Manor W	6	13	27	58	125
6	Rocklin Road	Rocklin Manor W to Barton Rd	23	49	105	227	489
7	Sierra College Blvd	North of I-80	41	89	192	413	889
8	Sierra College Blvd	I-80 to Schriber Way	49	106	229	492	1061
9	Sierra College Blvd	Schriber Way to Stadium Entrance	53	115	248	533	1149
10	Sierra College Blvd	Stadium Entrance to Rocklin Rd	50	108	234	504	1085
11	Sierra College Blvd	Rocklin Rd to El Don	24	52	112	242	522
12	Sierra College Blvd	South of El Don	23	50	108	232	499
13	El Don	Rocklin Rd to Wildflower	4	9	20	44	95
14	El Don	South of Wildflower	3	7	15	33	70
15	Barton Road	North of Rocklin Rd	7	16	33	72	155
16	Barton Road	South of Rocklin Rd	10	21	45	98	211

College Park Barrier Analysis for Sierra College Blvd

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Data Input Sheet

Project #: 2020-117
Description: Cumulative Plus Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Sierra College Blvd	Pad + 8.5 feet	50,650	80		20	2	1	45	75	
2	Sierra College Blvd	Pad + 5.0 feet	50,650	80		20	2	1	45	75	
3	Sierra College Blvd	Pad + 6.0 feet	50,650	80		20	2	1	45	75	
4	Sierra College Blvd	Pad + 5.5 feet	50,650	80		20	2	1	45	75	
5	Sierra College Blvd	Pad + 3.5 feet	50,650	80		20	2	1	45	75	
6	Sierra College Blvd	Pad + 2.0 feet	50,650	80		20	2	1	45	75	
7	Sierra College Blvd	Pad + 1.0 feet	50,650	80		20	2	1	45	75	
8	Sierra College Blvd	Pad + 1.5 feet	50,650	80		20	2	1	45	75	
9	Sierra College Blvd	Pad + 2.5 feet	50,650	80		20	2	1	45	75	
10	Sierra College Blvd	Pad + 3.0 feet	50,650	80		20	2	1	45	75	
11											
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FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Predicted Levels

Project #: 2020-117
Description: Cumulative Plus Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Sierra College Blvd	Pad + 8.5 feet	71.2	62.6	64.0	72
2	Sierra College Blvd	Pad + 5.0 feet	71.2	62.6	64.0	72
3	Sierra College Blvd	Pad + 6.0 feet	71.2	62.6	64.0	72
4	Sierra College Blvd	Pad + 5.5 feet	71.2	62.6	64.0	72
5	Sierra College Blvd	Pad + 3.5 feet	71.2	62.6	64.0	72
6	Sierra College Blvd	Pad + 2.0 feet	71.2	62.6	64.0	72
7	Sierra College Blvd	Pad + 1.0 feet	71.2	62.6	64.0	72
8	Sierra College Blvd	Pad + 1.5 feet	71.2	62.6	64.0	72
9	Sierra College Blvd	Pad + 2.5 feet	71.2	62.6	64.0	72
10	Sierra College Blvd	Pad + 3.0 feet	71.2	62.6	64.0	72

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FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Noise Contour Output

Project #: 2020-117
Description: Cumulative Plus Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Sierra College Blvd	Pad + 8.5 feet	50	108	234	504	1085
2	Sierra College Blvd	Pad + 5.0 feet	50	108	234	504	1085
3	Sierra College Blvd	Pad + 6.0 feet	50	108	234	504	1085
4	Sierra College Blvd	Pad + 5.5 feet	50	108	234	504	1085
5	Sierra College Blvd	Pad + 3.5 feet	50	108	234	504	1085
6	Sierra College Blvd	Pad + 2.0 feet	50	108	234	504	1085
7	Sierra College Blvd	Pad + 1.0 feet	50	108	234	504	1085
8	Sierra College Blvd	Pad + 1.5 feet	50	108	234	504	1085
9	Sierra College Blvd	Pad + 2.5 feet	50	108	234	504	1085
10	Sierra College Blvd	Pad + 3.0 feet	50	108	234	504	1085

Appendix C

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2020-117
Description Cumulative Plus Project
Roadway Name: Sierra College Blvd
Location(s): 1

Noise Level Data:

Year: 2025
Auto L_{dn}, dB: 71
Medium Truck L_{dn}, dB: 63
Heavy Truck L_{dn}, dB: 64

Site Geometry:

Receiver Description: Pad + 8.5 feet
Centerline to Barrier Distance (C_1): 65
Barrier to Receiver Distance (C_2): 10
Automobile Elevation: 0
Medium Truck Elevation: 2
Heavy Truck Elevation: 8
Pad/Ground Elevation at Receiver: 8.5
Receiver Elevation[1]: 13.5
Base of Barrier Elevation: 8.5
Starting Barrier Height 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	L_{dn}, dB				Barrier Breaks Line of Sight to...		
		Autos	Medium Trucks	Heavy Trucks	Total	Autos?	Medium Trucks?	Heavy Trucks?
14.5	6	63	55	57	**65**	Yes	Yes	Yes
15.5	7	62	53	56	**63**	Yes	Yes	Yes
16.5	8	60	52	54	**62**	Yes	Yes	Yes
17.5	9	59	51	53	**61**	Yes	Yes	Yes
18.5	10	58	50	52	**60**	Yes	Yes	Yes
19.5	11	57	49	51	**59**	Yes	Yes	Yes
20.5	12	57	48	50	**58**	Yes	Yes	Yes
21.5	13	57	48	50	**58**	Yes	Yes	Yes
22.5	14	56	47	49	**57**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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Appendix C

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2020-117
Description Cumulative Plus Project
Roadway Name: Sierra College Blvd
Location(s): 2

Noise Level Data:

Year: 2025
Auto L_{dn}, dB: 71
Medium Truck L_{dn}, dB: 63
Heavy Truck L_{dn}, dB: 64

Site Geometry:

Receiver Description: Pad + 5.0 feet
Centerline to Barrier Distance (C_1): 65
Barrier to Receiver Distance (C_2): 10
Automobile Elevation: 0
Medium Truck Elevation: 2
Heavy Truck Elevation: 8
Pad/Ground Elevation at Receiver: 5
Receiver Elevation[1]: 10
Base of Barrier Elevation: 5
Starting Barrier Height 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	L_{dn}, dB				Barrier Breaks Line of Sight to...		
		Autos	Medium Trucks	Heavy Trucks	Total	Autos?	Medium Trucks?	Heavy Trucks?
11	6	64	56	58	**65**	Yes	Yes	Yes
12	7	62	54	57	**64**	Yes	Yes	Yes
13	8	61	53	55	**62**	Yes	Yes	Yes
14	9	60	51	54	**61**	Yes	Yes	Yes
15	10	59	50	53	**60**	Yes	Yes	Yes
16	11	58	49	52	**59**	Yes	Yes	Yes
17	12	57	49	51	**58**	Yes	Yes	Yes
18	13	57	48	50	**58**	Yes	Yes	Yes
19	14	56	47	49	**57**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2020-117
Description Cumulative Plus Project
Roadway Name: Sierra College Blvd
Location(s): 3

Noise Level Data:

Year: 2025
Auto L_{dn}, dB: 71
Medium Truck L_{dn}, dB: 63
Heavy Truck L_{dn}, dB: 64

Site Geometry:

Receiver Description: Pad + 6.0 feet
Centerline to Barrier Distance (C_1): 65
Barrier to Receiver Distance (C_2): 10
Automobile Elevation: 0
Medium Truck Elevation: 2
Heavy Truck Elevation: 8
Pad/Ground Elevation at Receiver: 6
Receiver Elevation[1]: 11
Base of Barrier Elevation: 6
Starting Barrier Height 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	L_{dn}, dB Autos	Medium Trucks	Heavy Trucks	Total	Barrier Breaks Line of Sight to... Autos?	Medium Trucks?	Heavy Trucks?
12	6	64	55	58	**65**	Yes	Yes	Yes
13	7	62	54	56	**64**	Yes	Yes	Yes
14	8	61	52	55	**62**	Yes	Yes	Yes
15	9	60	51	54	**61**	Yes	Yes	Yes
16	10	59	50	53	**60**	Yes	Yes	Yes
17	11	58	49	52	**59**	Yes	Yes	Yes
18	12	57	48	51	**58**	Yes	Yes	Yes
19	13	57	48	50	**58**	Yes	Yes	Yes
20	14	56	47	49	**57**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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Appendix C

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2020-117
Description Cumulative Plus Project
Roadway Name: Sierra College Blvd
Location(s): 4

Noise Level Data:

Year: 2025
Auto L_{dn}, dB: 71
Medium Truck L_{dn}, dB: 63
Heavy Truck L_{dn}, dB: 64

Site Geometry:

Receiver Description: Pad + 5.5 feet
Centerline to Barrier Distance (C_1): 65
Barrier to Receiver Distance (C_2): 10
Automobile Elevation: 0
Medium Truck Elevation: 2
Heavy Truck Elevation: 8
Pad/Ground Elevation at Receiver: 5.5
Receiver Elevation[1]: 10.5
Base of Barrier Elevation: 5.5
Starting Barrier Height 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	L_{dn}, dB Autos	Medium Trucks	Heavy Trucks	Total	Barrier Breaks Line of Sight to... Autos?	Medium Trucks?	Heavy Trucks?
11.5	6	64	55	58	**65**	Yes	Yes	Yes
12.5	7	62	54	57	**64**	Yes	Yes	Yes
13.5	8	61	52	55	**62**	Yes	Yes	Yes
14.5	9	60	51	54	**61**	Yes	Yes	Yes
15.5	10	59	50	53	**60**	Yes	Yes	Yes
16.5	11	58	49	52	**59**	Yes	Yes	Yes
17.5	12	57	49	51	**58**	Yes	Yes	Yes
18.5	13	57	48	50	**58**	Yes	Yes	Yes
19.5	14	56	47	49	**57**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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Appendix C

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2020-117
Description Cumulative Plus Project
Roadway Name: Sierra College Blvd
Location(s): 5

Noise Level Data:

Year: 2025
Auto L_{dn}, dB: 71
Medium Truck L_{dn}, dB: 63
Heavy Truck L_{dn}, dB: 64

Site Geometry:

Receiver Description: Pad + 3.5 feet
Centerline to Barrier Distance (C_1): 65
Barrier to Receiver Distance (C_2): 10
Automobile Elevation: 0
Medium Truck Elevation: 2
Heavy Truck Elevation: 8
Pad/Ground Elevation at Receiver: 3.5
Receiver Elevation[1]: 8.5
Base of Barrier Elevation: 3.5
Starting Barrier Height 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	L_{dn}, dB Autos	Medium Trucks	Heavy Trucks	Total	Barrier Breaks Line of Sight to... Autos?	Medium Trucks?	Heavy Trucks?
9.5	6	64	56	58	**66**	Yes	Yes	Yes
10.5	7	62	54	57	**64**	Yes	Yes	Yes
11.5	8	61	53	55	**63**	Yes	Yes	Yes
12.5	9	60	52	54	**62**	Yes	Yes	Yes
13.5	10	59	51	53	**60**	Yes	Yes	Yes
14.5	11	58	50	52	**59**	Yes	Yes	Yes
15.5	12	57	49	51	**59**	Yes	Yes	Yes
16.5	13	57	48	50	**58**	Yes	Yes	Yes
17.5	14	56	48	49	**57**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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Appendix C

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2020-117
Description Cumulative Plus Project
Roadway Name: Sierra College Blvd
Location(s): 6

Noise Level Data:

Year: 2025
Auto L_{dn}, dB: 71
Medium Truck L_{dn}, dB: 63
Heavy Truck L_{dn}, dB: 64

Site Geometry:

Receiver Description: Pad + 2.0 feet
Centerline to Barrier Distance (C_1): 65
Barrier to Receiver Distance (C_2): 10
Automobile Elevation: 0
Medium Truck Elevation: 2
Heavy Truck Elevation: 8
Pad/Ground Elevation at Receiver: 2
Receiver Elevation[1]: 7
Base of Barrier Elevation: 2
Starting Barrier Height 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	L_{dn}, dB: Autos	Medium Trucks	Heavy Trucks	Total	Barrier Breaks Line of Sight to... Autos?	Medium Trucks?	Heavy Trucks?
8	6	64	56	59	**66**	Yes	Yes	Yes
9	7	63	55	57	**64**	Yes	Yes	Yes
10	8	61	53	56	**63**	Yes	Yes	Yes
11	9	60	52	54	**62**	Yes	Yes	Yes
12	10	59	51	53	**61**	Yes	Yes	Yes
13	11	58	50	52	**60**	Yes	Yes	Yes
14	12	57	49	51	**59**	Yes	Yes	Yes
15	13	57	48	50	**58**	Yes	Yes	Yes
16	14	57	48	50	**58**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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Appendix C

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2020-117
Description Cumulative Plus Project
Roadway Name: Sierra College Blvd
Location(s): 7

Noise Level Data:

Year: 2025
Auto L_{dn}, dB: 71
Medium Truck L_{dn}, dB: 63
Heavy Truck L_{dn}, dB: 64

Site Geometry:

Receiver Description: Pad + 1.0 feet
Centerline to Barrier Distance (C_1): 65
Barrier to Receiver Distance (C_2): 10
Automobile Elevation: 0
Medium Truck Elevation: 2
Heavy Truck Elevation: 8
Pad/Ground Elevation at Receiver: 1
Receiver Elevation[1]: 6
Base of Barrier Elevation: 1
Starting Barrier Height 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	L_{dn}, dB: Autos	Medium Trucks	Heavy Trucks	Total	Barrier Breaks Line of Sight to... Autos?	Medium Trucks?	Heavy Trucks?
7	6	64	56	59	**66**	Yes	Yes	Yes
8	7	63	55	57	**65**	Yes	Yes	Yes
9	8	61	53	56	**63**	Yes	Yes	Yes
10	9	60	52	55	**62**	Yes	Yes	Yes
11	10	59	51	54	**61**	Yes	Yes	Yes
12	11	58	50	52	**60**	Yes	Yes	Yes
13	12	57	49	51	**59**	Yes	Yes	Yes
14	13	57	48	51	**58**	Yes	Yes	Yes
15	14	57	48	50	**58**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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Appendix C

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2020-117
Description Cumulative Plus Project
Roadway Name: Sierra College Blvd
Location(s): 8

Noise Level Data:

Year: 2025
Auto L_{dn}, dB: 71
Medium Truck L_{dn}, dB: 63
Heavy Truck L_{dn}, dB: 64

Site Geometry:

Receiver Description: Pad + 1.5 feet
Centerline to Barrier Distance (C_1): 65
Barrier to Receiver Distance (C_2): 10
Automobile Elevation: 0
Medium Truck Elevation: 2
Heavy Truck Elevation: 8
Pad/Ground Elevation at Receiver: 1.5
Receiver Elevation[1]: 6.5
Base of Barrier Elevation: 1.5
Starting Barrier Height 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	L_{dn}, dB				Barrier Breaks Line of Sight to...		
		Autos	Medium Trucks	Heavy Trucks	Total	Autos?	Medium Trucks?	Heavy Trucks?
7.5	6	64	56	59	**66**	Yes	Yes	Yes
8.5	7	63	55	57	**64**	Yes	Yes	Yes
9.5	8	61	53	56	**63**	Yes	Yes	Yes
10.5	9	60	52	54	**62**	Yes	Yes	Yes
11.5	10	59	51	53	**61**	Yes	Yes	Yes
12.5	11	58	50	52	**60**	Yes	Yes	Yes
13.5	12	57	49	51	**59**	Yes	Yes	Yes
14.5	13	57	48	50	**58**	Yes	Yes	Yes
15.5	14	57	48	50	**58**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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Appendix C

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2020-117
Description Cumulative Plus Project
Roadway Name: Sierra College Blvd
Location(s): 9

Noise Level Data:

Year: 2025
Auto L_{dn}, dB: 71
Medium Truck L_{dn}, dB: 63
Heavy Truck L_{dn}, dB: 64

Site Geometry:

Receiver Description: Pad + 2.5 feet
Centerline to Barrier Distance (C_1): 65
Barrier to Receiver Distance (C_2): 10
Automobile Elevation: 0
Medium Truck Elevation: 2
Heavy Truck Elevation: 8
Pad/Ground Elevation at Receiver: 2.5
Receiver Elevation[1]: 7.5
Base of Barrier Elevation: 2.5
Starting Barrier Height 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	L_{dn}, dB				Barrier Breaks Line of Sight to...		
		Autos	Medium Trucks	Heavy Trucks	Total	Autos?	Medium Trucks?	Heavy Trucks?
8.5	6	64	56	59	**66**	Yes	Yes	Yes
9.5	7	63	55	57	**64**	Yes	Yes	Yes
10.5	8	61	53	56	**63**	Yes	Yes	Yes
11.5	9	60	52	54	**62**	Yes	Yes	Yes
12.5	10	59	51	53	**61**	Yes	Yes	Yes
13.5	11	58	50	52	**59**	Yes	Yes	Yes
14.5	12	57	49	51	**59**	Yes	Yes	Yes
15.5	13	57	48	50	**58**	Yes	Yes	Yes
16.5	14	56	48	50	**57**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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Appendix C

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2020-117
Description Cumulative Plus Project
Roadway Name: Sierra College Blvd
Location(s): 10

Noise Level Data:

Year: 2025
Auto L_{dn}, dB: 71
Medium Truck L_{dn}, dB: 63
Heavy Truck L_{dn}, dB: 64

Site Geometry:

Receiver Description: Pad + 3.0 feet
Centerline to Barrier Distance (C_1): 65
Barrier to Receiver Distance (C_2): 10
Automobile Elevation: 0
Medium Truck Elevation: 2
Heavy Truck Elevation: 8
Pad/Ground Elevation at Receiver: 3
Receiver Elevation[1]: 8
Base of Barrier Elevation: 3
Starting Barrier Height 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	L_{dn}, dB				Barrier Breaks Line of Sight to...		
		Autos	Medium Trucks	Heavy Trucks	Total	Autos?	Medium Trucks?	Heavy Trucks?
9	6	64	56	59	**66**	Yes	Yes	Yes
10	7	63	54	57	**64**	Yes	Yes	Yes
11	8	61	53	56	**63**	Yes	Yes	Yes
12	9	60	52	54	**62**	Yes	Yes	Yes
13	10	59	51	53	**61**	Yes	Yes	Yes
14	11	58	50	52	**59**	Yes	Yes	Yes
15	12	57	49	51	**59**	Yes	Yes	Yes
16	13	57	48	50	**58**	Yes	Yes	Yes
17	14	56	48	50	**57**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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Appendix D

Building Facade Noise Reduction Worksheet

Village 8 adjacent to Sierra College Boulevard

Plans Dated:

Analysis Date: 6/5//2020 12:00:00 AM

Room Description: Second Floor

Parallel Panel Size, ft²: 198 **Perpendicular Panel Size, ft²:** 198

Parallel Exterior level, dB: 76 **Perpendicular Exterior level, dB:** 76

Correction Factor, dB: 0

Noise Source Information:

Arterial Traffic	Parallel, dB	57	59	59	62	62	63	63	66	69	68	67	65	63	61	56	52
Arterial Traffic	Perpendicular, dB	57	59	59	62	62	63	63	66	69	68	67	65	63	61	56	52

		One-Third Octave Band Center Frequency (Hz)															
Material	***Area(ft²)***	***125***	***160***	***200***	***250***	***315***	***400***	***500***	***630***	***800***	***1K***	***1.25K***	***1.6K***	***2K***	***2.5K***	***3.15K***	***4K***

Sound Absorption Data:

Gyp Board	849	0.29	0.29	0.10	0.10	0.10	0.05	0.05	0.05	0.04	0.04	0.04	0.07	0.07	0.07	0.09	0.09
Glass	82	0.35	0.35	0.25	0.25	0.25	0.18	0.18	0.18	0.12	0.12	0.12	0.01	0.01	0.01	0.04	0.04
Carpet, on foam rubber pad	484	0.08	0.08	0.24	0.24	0.24	0.57	0.57	0.57	0.69	0.69	0.69	0.71	0.71	0.71	0.73	0.73
Soft Furnishings	60	0.19	0.19	0.37	0.37	0.37	0.56	0.56	0.56	0.67	0.67	0.67	0.61	0.61	0.61	0.59	0.59
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Absorption Parallel, dB:	-2	-2	-1	-1	-1	-3	-3	-3	-3	-3	-3	-3	-3	-3	-4	-4
	Absorption Perpendicular, dB:	-2	-2	-1	-1	-1	-3	-3	-3	-3	-3	-3	-3	-3	-3	-4	-4

Transmission Loss Information: Parallel Façade

Wall - Stucco Wall (Egen)	198	21	21	33	33	33	41	41	41	46	46	46	47	47	47	51	51
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Transmission Loss Information: Perpendicular Façade

Wall - Stucco Wall (Egen)	167	21	21	33	33	33	41	41	41	46	46	46	47	47	47	51	51
Window - Typical STC 32	70	22	23	17	20	25	29	31	35	37	38	39	36	35	32	34	37
Other - Opening	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Summary

Composite TL - Parallel, dB:	21	21	33	33	33	41	41	41	46	46	46	47	47	47	51	51
Composite TL - Perpendicular, dB:	21	22	22	25	29	34	35	38	41	42	43	41	40	37	39	42
Absorption Parallel, dB:	-2	-2	-1	-1	-1	-3	-3	-3	-3	-3	-3	-3	-3	-3	-4	-4
Absorption Perpendicular, dB:	-2	-2	-1	-1	-1	-3	-3	-3	-3	-3	-3	-3	-3	-3	-4	-4
Safety Factor, dB:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interior Level - Parallel, dB:	34	36	25	28	28	19	19	23	19	19	18	15	13	11	2	-3
Interior Level - Perpendicular, dB:	34	36	36	36	32	27	25	25	24	23	21	21	20	21	13	6

Parallel Outside Level, dB: 76 *Perpendicular Outside Level, dB:* 76

Parallel Noise Reduction, dB: 36 *Perpendicular Noise Reduction, dB:* 33

Parallel Interior Level, dB: 40 *Perpendicular Interior Level, dB:* 43

Total Interior Noise Level, dB: **44**

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