Environmental Noise Assessment

Rocklin Academy Charter School
Buildings 6550, 6552 and 6554

City of Rocklin, California

Job # 2015-176

Prepared For:

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July 24, 2015

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EXECUTIVE SUMMARY

The following provides a summary of the results of this analysis based upon the project design:

1. Play areas are located outside of the future S.R. 65 roadway 70 dBA Ldn noise level standard for instructional areas;

2. The interior noise levels of the school will comply with the 45 dBA Leq interior noise level standard;

3. The project will not result in a significant increase in local roadway traffic noise levels;

4. Play areas are not expected to result in an exceedance of the 55 dBA Leq noise level standard at any nearby office buildings.

INTRODUCTION

During the 2014-2015 school year, the Rocklin Academy Gateway School at 6550 / 6552 Lonetree Blvd housed 820 PreK–8 students in 56,024 s.f. and 23,000 s.f. buildings located in the western end of the Rocklin 65 Business Park. The school is entitled to expand to 1,200 students. The proposed project will make use of the building at 6554 Lonetree Blvd and increase the total enrollment to 1,308 K-12 students and 72 pre-school students, or 1,340 students total. Figure 1 shows the project area, and Figure 2 shows the project site plan.

Based upon the proximity of the project to S.R. 65 this analysis will evaluate the potential roadway traffic noise levels at the project site. In addition, this analysis will evaluate the increase in traffic noise levels along Lonetree Boulevard and Adams Drive, and the potential for the project to generate noise levels due to student activity areas.

ENVIRONMENTAL SETTING

Noise Background

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. Often, someone's music is described as noise by another.

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 dBA. 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 dBA, and changes in levels (dBA) correspond closely to human perception of relative loudness.

Figure 1
Project Area

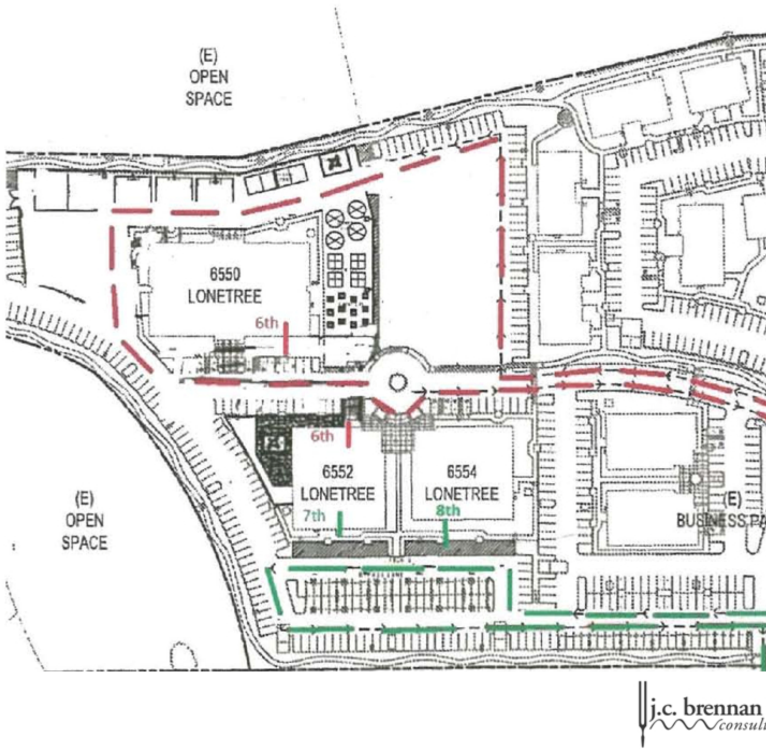
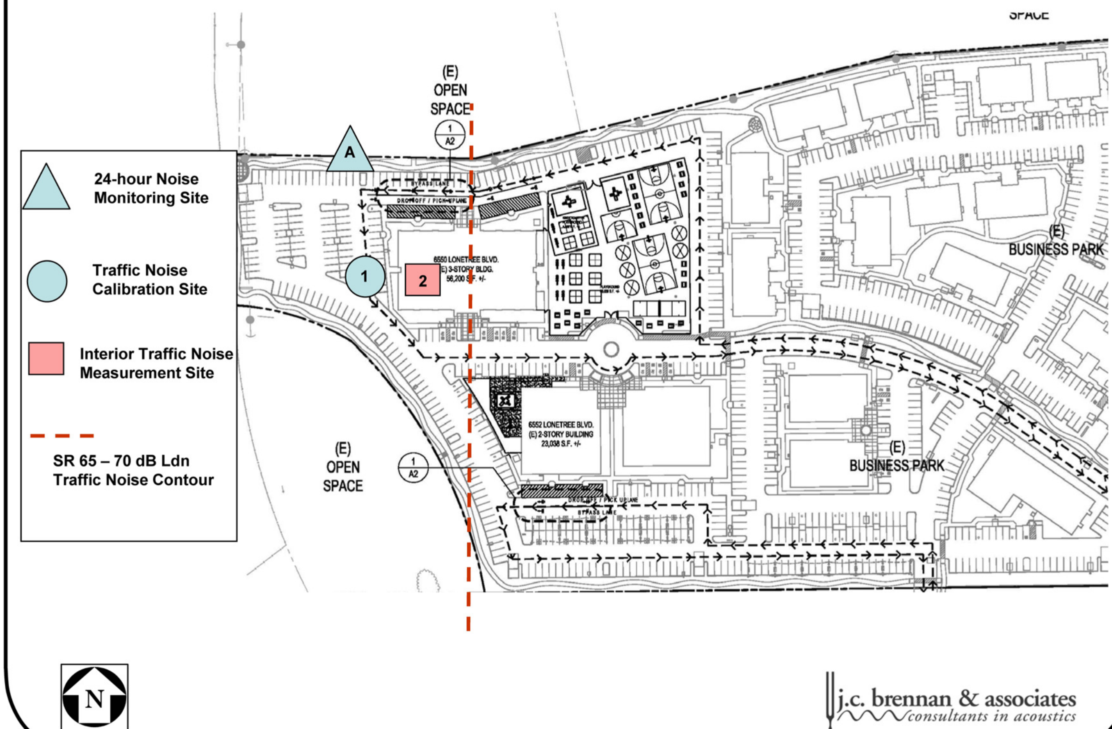


Figure 2
Rocklin Charter School
Project Site Plan – Noise Measurement Sites



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 may be expressed as dBA, unless otherwise noted.

The decibel scale is logarithmic, not linear. In other words, two sound levels 10 dBA 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 (Leq), 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 Leq is the foundation of the composite noise descriptor, Ldn, and shows very good correlation with community response to noise.

The day/night average level (Ldn) 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 Ldn represents a 24-hour average, it tends to disguise short-term variations in the noise environment.

Table 1 lists several examples of maximum noise levels associated with common noise sources.

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
- 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.

Table 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. November 2009.		

With regard to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA 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 dBA 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.

A complete listing of acoustical terminology is provided in Appendix A.

EXISTING NOISE ENVIRONMENT IN PROJECT VICINITY

The primary noise sources in the project vicinity include roadway traffic on S.R. 65, traffic on local roadway arterial streets and parking lot activities.

To quantify existing ambient noise levels in the vicinity of the project site, j.c. brennan & associates, Inc., conducted continuous 24-hour noise measurements on the project site on December 11-12, 2013. The noise level measurements were conducted to determine typical existing background noise levels associated with S.R. 65 on the project site. A summary of the results of the continuous hourly ambient noise survey are shown in Table 2. Figure 3 graphically shows the results of the noise measurements. Figure 2 shows the location of the noise measurement site.

Equipment used for the noise measurement survey included a Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meter. The meter was calibrated 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).

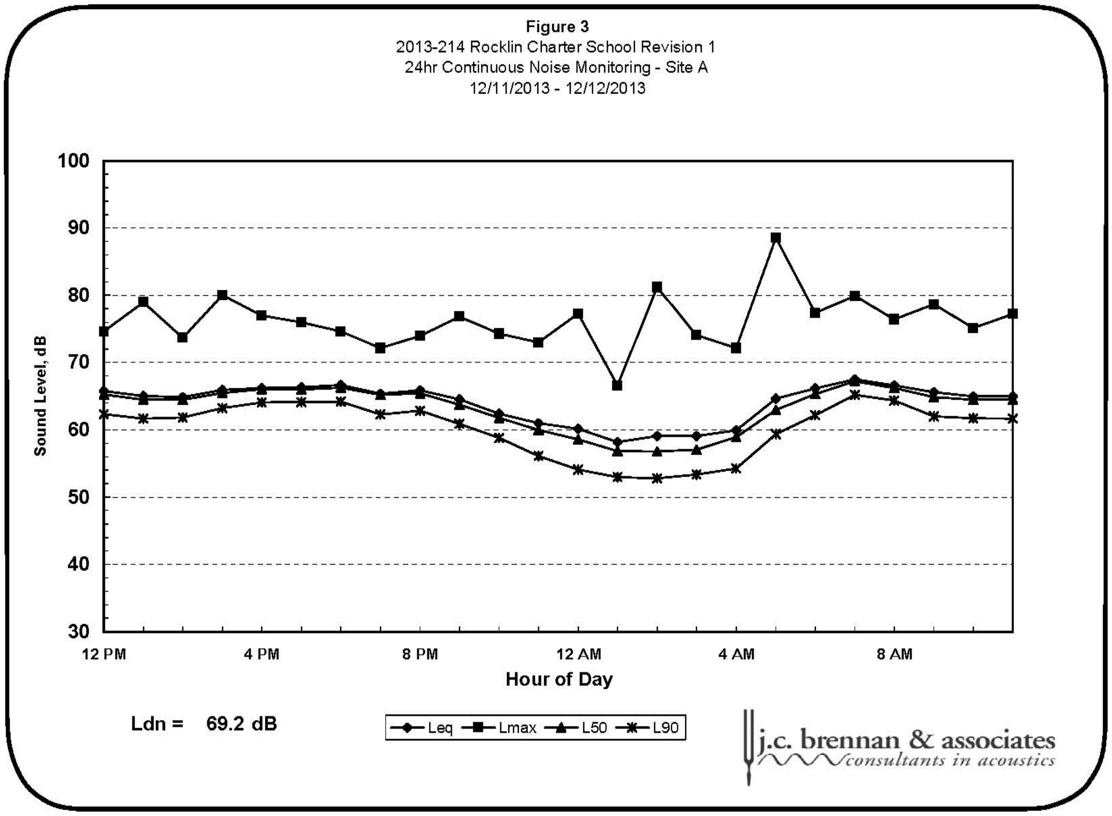


Figure 3
2013-214 Rocklin Charter School Revision 1
24hr Continuous Noise Monitoring - Site A
12/11/2013 - 12/12/2013

Table 2 Summary of Measured Ambient Noise Levels Rocklin Charter School December 11-12, 2013							
Site	Measured Ldn	Average Hourly Daytime (7:00am - 10:00pm)			Average Hourly Nighttime (10:00pm – 7:00am)		
		Leq	L50	Lmax	Leq	L50	Lmax
A	69.2	65.8	65	76.3	62.0	60	76.1
Source: j.c. brennan & associates, Inc. - 2013							

Site A: Noise Measurement Site A was a continuous hourly noise measurement site which conducted noise measurements for a 24-hour period. This site was located on the north property line of the project site, and represents the project play area.

REGULATORY FRAMEWORK

Federal

There are no federal regulations related to noise that apply to the Proposed Project.

State

There are no state regulations related to noise that apply to the Proposed Project.

Rocklin General Plan Noise Element

The City of Rocklin has a General Plan which includes a Noise Element. The General Plan Noise Element includes criteria for stationary noise sources. The proposed General Plan also establishes noise level criteria for transportation noise sources. Tables 3 and 4 below show the proposed stationary and transportation noise source criteria, respectively, from the General Plan.

Table 3

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).

Table 4
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.

Significance of Changes in Ambient Noise Levels

The significance of project-related noise impacts are also determined by comparison of project-related noise levels to existing no-project noise levels, as required by CEQA. An increase in similar noise levels of less than 3 dBA is generally not perceptible. An increase of at least 3 dBA in similar noise sources is usually required before most people will perceive a change in noise levels, and an increase of 5 dBA is required before the change will be clearly noticeable.

PROJECT IMPACT NOISE ASSESSMENT

On-Site S.R. 65 Exterior Traffic Noise Impacts

To accurately evaluate the traffic noise associated with S.R. 65 on the project site, j.c. brennan & associates, Inc. employs the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA RD-77-108) for the prediction of traffic noise levels. The FHWA model is the analytical method currently favored for traffic noise prediction by most state and local agencies, including the California Department of Transportation (Caltrans). The model is based upon the CALVENO 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.

j.c. brennan & associates, Inc. conducted noise level measurements and concurrent counts of S.R. 65 traffic on the project site on December 12, 2013. The purpose of the traffic noise level measurements is to determine the accuracy of the FHWA model in describing the existing noise environment on the project site, accounting for actual travel speeds, roadway condition, and the influence of heavy trucks. Noise measurement results were compared to the FHWA model results by entering the observed traffic volume, speed and distance as inputs to the FHWA model.

Instrumentation used for the measurements was a Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meter which was calibrated in the field before use with an LDL CA-200 acoustical calibrator. The noise measurement site (Site 1) is shown in Figure 2. Table 5 shows the results of the traffic noise calibrations.

Based upon the calibration results, the FHWA Model was found to accurately predict S.R. 65 traffic noise levels on the project site, as shown in Table 5. Appendix B shows a complete listing of inputs to the FHWA Calibration Model.

Table 5
S.R. 65
Traffic Noise Calibration Results

Vehicles/Hr.				Speed (mph)	Dist. (Feet)	Measured L_{eq}, dB	Modeled L_{eq}, dB*
Site	Autos	Med. Trk.	Hvy.Trk.				
1	4,326	108	126	65	335	66	66

* Acoustically "soft" site assumed

Based upon the calibration results shown in Table 5 the Federal Highway Administration Highway Traffic Noise Prediction Model was used to determine the existing and future traffic noise levels at the nearest building facade. Traffic volumes were provided by the traffic consultant (kd Anderson). The results are shown in Table 6. Figure 2 shows the location of the S.R. 65 future (2025) 70 dB Ldn noise contour.

Table 6
Existing and Future Exterior S.R. 65 Traffic Noise Levels at the Project Site

Scenario	Predicted Ldn @ Nearest Building Facade	Distance to Contours (feet) *	
		70 dB Ldn	65 dB Ldn
Existing Traffic	70 dBA	353	761
2025 Traffic	73 dBA	518	1,117

Source: FHWA-RD-77-108 with inputs from kd Anderson and j.c. brennan & associates, Inc.
*Distances to traffic noise contours are measured in feet from the centerlines of the roadways.

Based upon Table 6 and Figure 2, the play areas on the east side of Building 6550, and the west side of Building 6552 will comply with the 70 dB Ldn exterior noise level standard. As described in Table 4, the 70 dB Ldn standard for a school would generally apply to areas which require good speech intelligibility and would apply at instructional areas.

On-Site S.R. 65 Interior Traffic Noise Impacts

To accurately assess the potential noise impacts at the interior of the nearest school building, j.c. brennan & associates, Inc. conducted simultaneous interior noise measurements during the traffic noise calibration process. The results indicated that the exterior to interior traffic noise level reduction by the building facade ranged between 26 dBA at the first floor, and 29 dBA at the third floor. Future exterior peak hour S.R. 65 traffic noise levels are not expected to exceed 70 dBA Leq. Based upon the measured exterior to interior noise measurements, the future interior noise levels are expected to comply with the 45 dBA Leq interior noise level standard.

Off-Site Traffic Noise Impacts

The proposed project will add traffic to the local street system. The roads which will primarily be affected by increased traffic and resulting increased traffic noise include Lonetree Boulevard and Adams Drive. The FHWA traffic noise prediction model was used to determine the traffic noise levels associated with the entitled enrollment expansion and the proposed project expansion. The traffic noise analysis assumes that the office space which the school will be utilizing is fully occupied as office. Table 7 shows the results of the analysis. Appendix C details the inputs, predicted noise levels and contour outputs of the FHWA Model.

Table 7 Off-Site Traffic Noise Levels On the Local Street System				
Roadway	Traffic Noise Level @ 100 feet (Ldn)			
	Existing Plus Entitled Enrollment	Existing Plus Project Build Out	Cumulative Plus Entitled Enrollment	Cumulative Plus Project Build Out
Lonetree - North of Adams	65 dB	65 dB	67 dB	67 dB
Lonetree - South of Adams	65 dB	65 dB	67 dB	67 dB
Adams - West of Lonetree	53 dB	53 dB	53 dB	53 dB
Source: FHWA-RD-77-108 with inputs from kd Anderson and j.c. brennan & associates, Inc., 2014 *Distances to traffic noise contours are measured in feet from the centerlines of the roadways.				

Based upon Table 7, the proposed project will not result in any significant increases in traffic noise levels as compared to the noise levels generated by the entitled 1,200 student enrollment.

On-Site Playground Activity Noise

Based upon the project descriptions and recess schedules, recess generally lasts for approximately 20 minutes, with the number of students (children) per recess of approximately 120. Although the uses adjacent to the school site are not considered to be noise-sensitive, the office uses may consider the playground activities to be a source of noise.

Play area noise associated with children playing could generate noise by occasional shouting and cheering associated with typical play areas. j.c. brennan & associates, Inc. file data collected at various playgrounds and parks indicate that average noise levels generated during games with approximately 100 children is approximately 60 dB Leq at a distance of 75 feet from the focal point or effective noise center of the play areas. This assumes that the students are on the play area for the entire hour. Assuming recess occurs for 20 minutes, the hourly Leq would be 55 dB Leq. Occasional maximum noise levels can reach 75 dB. Based upon a distance of approximately 140 feet from the center of the play areas to the nearest buildings to the east, the predicted noise levels are 52 dB Leq, with an interior noise level of approximately 35 dB Leq. Noise levels associated with typical outdoor activities, including students yelling, are not expected to result in annoyance at the interior spaces of the offices. Hard-court noise associated with bouncing basketballs result in low frequency impact sounds which may be considered annoying to some occupants of the offices to the east. If this occurs, treatments to the windows can be provided in the future. However, the noise levels will not exceed the hourly noise level standard of 55 dB Leq, as it applies to noise-sensitive land uses such as residential uses.

Appendix A

Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space 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 an acoustic signal.
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, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
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 signal, expressed in cycles per second or hertz.
Ldn	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
Leq	Equivalent or energy-averaged sound level.
Lmax	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 L50 is the sound level exceeded 50% of the time during the one hour period.
Loudness	A subjective term for the sensation of the magnitude of sound.
Noise	Unwanted sound.
Peak Noise	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the "Maximum" level, which is the highest RMS level.
RT_{60}	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 sabin.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.
Impulsive	Sound of short duration, usually less than one second, with an abrupt onset and rapid decay.
Simple Tone	Any sound which can be judged as audible as a single pitch or set of single pitches.

Appendix B

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

Project Information:	Job Number:	2013-214
	Project Name:	Rocklin Charter School Revision 1
	Roadway Tested:	SR 65
	Test Location:	Exterior First Floor Site 2a 6550 Adams Drive
	Test Date:	December 12, 2013
Weather Conditions:	Temperature (Fahrenheit):	50
	Relative Humidity:	Dry
	Wind Speed and Direction:	0-5 from West
	Cloud Cover:	Clear
Sound Level Meter:	Sound Level Meter:	LDL Model 820
	Calibrator:	LDL Model CA200
	Meter Calibrated:	Immediately before and after test
	Meter Settings:	A-weighted, slow response
Microphone:	Microphone Location:	On Project Site
	Distance to Centerline (feet):	336
	Microphone Height:	5 feet above ground
	Intervening Ground (Hard or Soft):	**Soft**
	Elevation Relative to Road (feet):	5
Roadway Condition:	Pavement Type	Asphalt
	Pavement Condition:	Good
	Number of Lanes:	4
	Posted Maximum Speed (mph):	65
Test Parameters:	Test Time:	10:041:00 AM
	Test Duration (minutes):	10
	Observed Number Automobiles:	721
	Observed Number Medium Trucks:	18
	Observed Number Heavy Trucks:	21
	Observed Average Speed (mph):	65
Model Calibration:	Measured Average Level (L_{eq}):	66.1
	Level Predicted by FHWA Model:	66.1
	Difference:	***0.0 dB***

Conclusions:

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Appendix C

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2015-176 Rocklin Charter School Revision
Description: Existing Plus Entitled Enrollment (1,200 Students)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Lonetree Boulevard	North of Adams Drive	17,559	87		13	2	1	45	100	
2	Lonetree Boulevard	South of Adams Drive	18,036	87		13	2	1	45	100	
3	Adams Drive	West of Lonetree Boulevard	4,093	90		10	2	1	25	100	
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Appendix C

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

Project #: 2015-176 Rocklin Charter School Revision
Description: Existing Plus Entitled Enrollment (1,200 Students)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Lonetree Boulevard	North of Adams Drive	63.6	55.0	56.5	65
2	Lonetree Boulevard	South of Adams Drive	63.7	55.1	56.6	65
3	Adams Drive	West of Lonetree Boulevard	49.3	44.1	48.7	53

Appendix C

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

Project #: 2015-176 Rocklin Charter School Revision
Description: Existing Plus Entitled Enrollment (1,200 Students)
Ldn/CNEL: Ldn
Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Lonetree Boulevard	North of Adams Drive	21	45	97	210	452
2	Lonetree Boulevard	South of Adams Drive	21	46	99	213	460
3	Adams Drive	West of Lonetree Boulevard	3	7	15	33	70

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Appendix C

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

Data Input Sheet

Project #: 2015-176 Rocklin Charter School Revision
Description: Existing Plus Project Build Out
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Lonetree Boulevard	North of Adams Drive	17,964	87		13	2	1	45	100	
2	Lonetree Boulevard	South of Adams Drive	18,492	87		13	2	1	45	100	
3	Adams Drive	West of Lonetree Boulevard	4,292	90		10	2	1	25	100	
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FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Predicted Levels

Project #: 2015-176 Rocklin Charter School Revision
Description: Existing Plus Project Build Out
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Lonetree Boulevard	North of Adams Drive	63.7	55.1	56.6	65
2	Lonetree Boulevard	South of Adams Drive	63.8	55.2	56.7	65
3	Adams Drive	West of Lonetree Boulevard	49.5	44.3	48.9	53

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

Project #: 2015-176 Rocklin Charter School Revision
Description: Existing Plus Project Build Out
Ldn/CNEL: Ldn
Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Lonetree Boulevard	North of Adams Drive	21	46	99	213	459
2	Lonetree Boulevard	South of Adams Drive	22	47	101	217	468
3	Adams Drive	West of Lonetree Boulevard	3	7	16	34	72

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FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2015-176 Rocklin Charter School Revision
Description: Cumulative Plus Entitled Enrollment (1,200 Students)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Lonetree Boulevard	North of Adams Drive	28,680	87		13	2	1	45	100	
2	Lonetree Boulevard	South of Adams Drive	28,760	87		13	2	1	45	100	
3	Adams Drive	West of Lonetree Boulevard	4,240	90		10	2	1	25	100	
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Appendix C

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

Project #: 2015-176 Rocklin Charter School Revision
Description: Cumulative Plus Entitled Enrollment (1,200 Students)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Lonetree Boulevard	North of Adams Drive	65.7	57.1	58.6	67
2	Lonetree Boulevard	South of Adams Drive	65.7	57.1	58.6	67
3	Adams Drive	West of Lonetree Boulevard	49.5	44.2	48.9	53

Appendix C

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

Noise Contour Output

Project #: 2015-176 Rocklin Charter School Revision
Description: Cumulative Plus Entitled Enrollment (1,200 Students)
Ldn/CNEL: Ldn
Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Lonetree Boulevard	North of Adams Drive	29	63	135	291	627
2	Lonetree Boulevard	South of Adams Drive	29	63	135	291	628
3	Adams Drive	West of Lonetree Boulevard	3	7	15	33	72

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Appendix C

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

Data Input Sheet

Project #: 2015-176 Rocklin Charter School Revision
Description: Cumulative Plus Project Build Out (1,340 Students)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Lonetree Boulevard	North of Adams Drive	29,085	87		13	2	1	45	100	
2	Lonetree Boulevard	South of Adams Drive	29,216	87		13	2	1	45	100	
3	Adams Drive	West of Lonetree Boulevard	4,439	90		10	2	1	25	100	
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FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Predicted Levels

Project #: 2015-176 Rocklin Charter School Revision
Description: Cumulative Plus Project Build Out (1,340 Students)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Lonetree Boulevard	North of Adams Drive	65.8	57.2	58.6	67
2	Lonetree Boulevard	South of Adams Drive	65.8	57.2	58.7	67
3	Adams Drive	West of Lonetree Boulevard	49.7	44.4	49.1	53

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

Project #: 2015-176 Rocklin Charter School Revision
Description: Cumulative Plus Project Build Out (1,340 Students)
Ldn/CNEL: Ldn
Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Lonetree Boulevard	North of Adams Drive	29	63	136	294	632
2	Lonetree Boulevard	South of Adams Drive	29	63	137	294	634
3	Adams Drive	West of Lonetree Boulevard	3	7	16	34	74