Environmental Noise Assessment

Coker Property Residential

City of Rocklin, California

Job # 2015-217

Prepared For:

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INTRODUCTION

The Coker Property project includes the development of a 72-unit single-family residential project in the City of Rocklin, California. The project is bounded to the north by Pacific Street, the west by Grove Street, and the south and east by existing single-family residential uses.

Figure 1 shows an aerial photo of the project site. Figure 2 shows the project site plan.

The purpose of this study is to determine whether noise levels from the adjacent Pacific Street would exceed the City of Rocklin exterior or interior noise level standards at the proposed residential uses. Additionally, the project may fall within the 60 dB L_{dn} noise contour for the Union Pacific Railroad and Interstate 80. Therefore, these noise sources will also be addressed in this study. Predicted noise levels will be compared to the noise level standards of the City of Rocklin General Plan Noise Element. If necessary, noise control measures will be recommended for the proposed project.

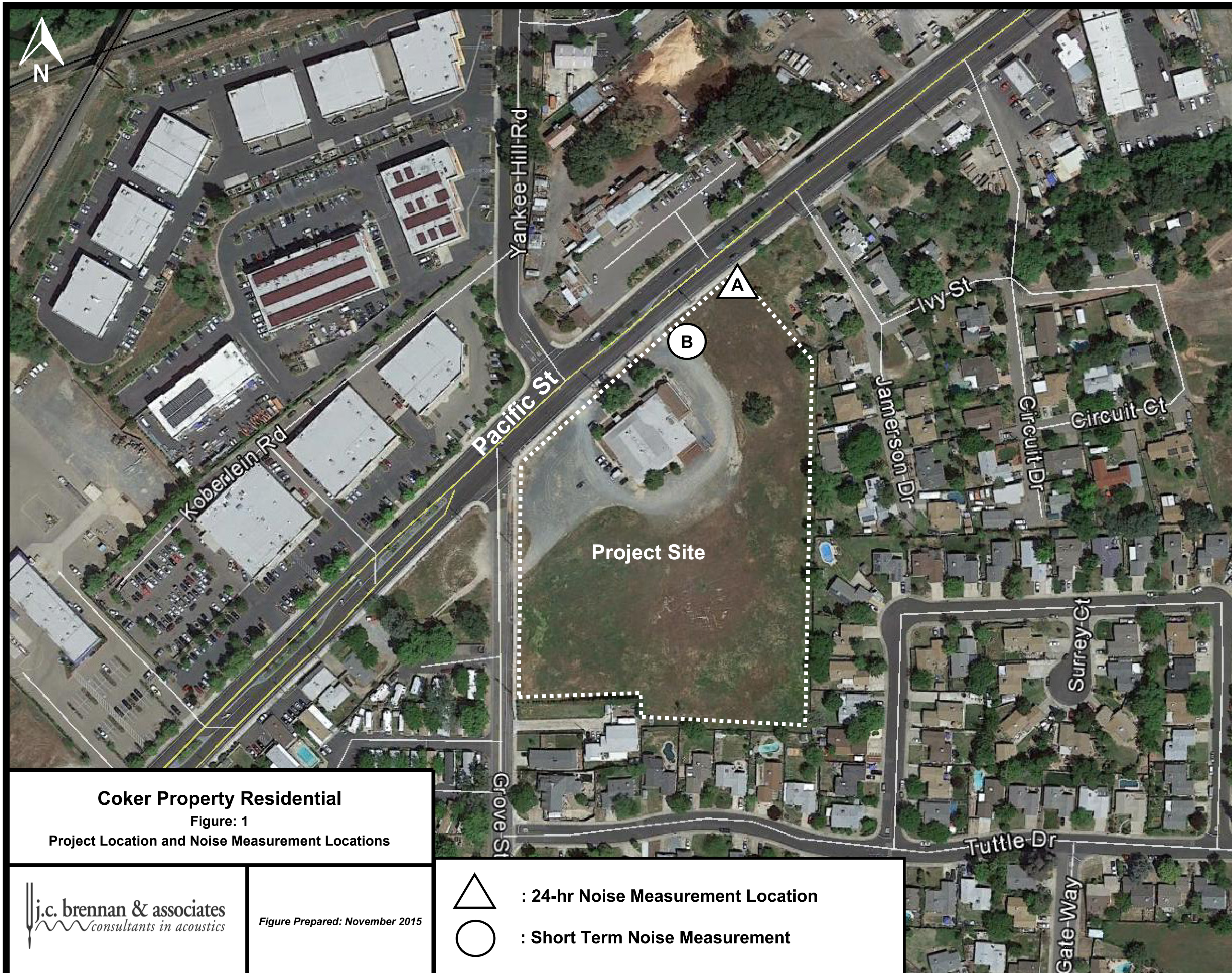

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Figure: 1

Project Location and Noise Measurement Locations

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Figure Prepared: November 2015

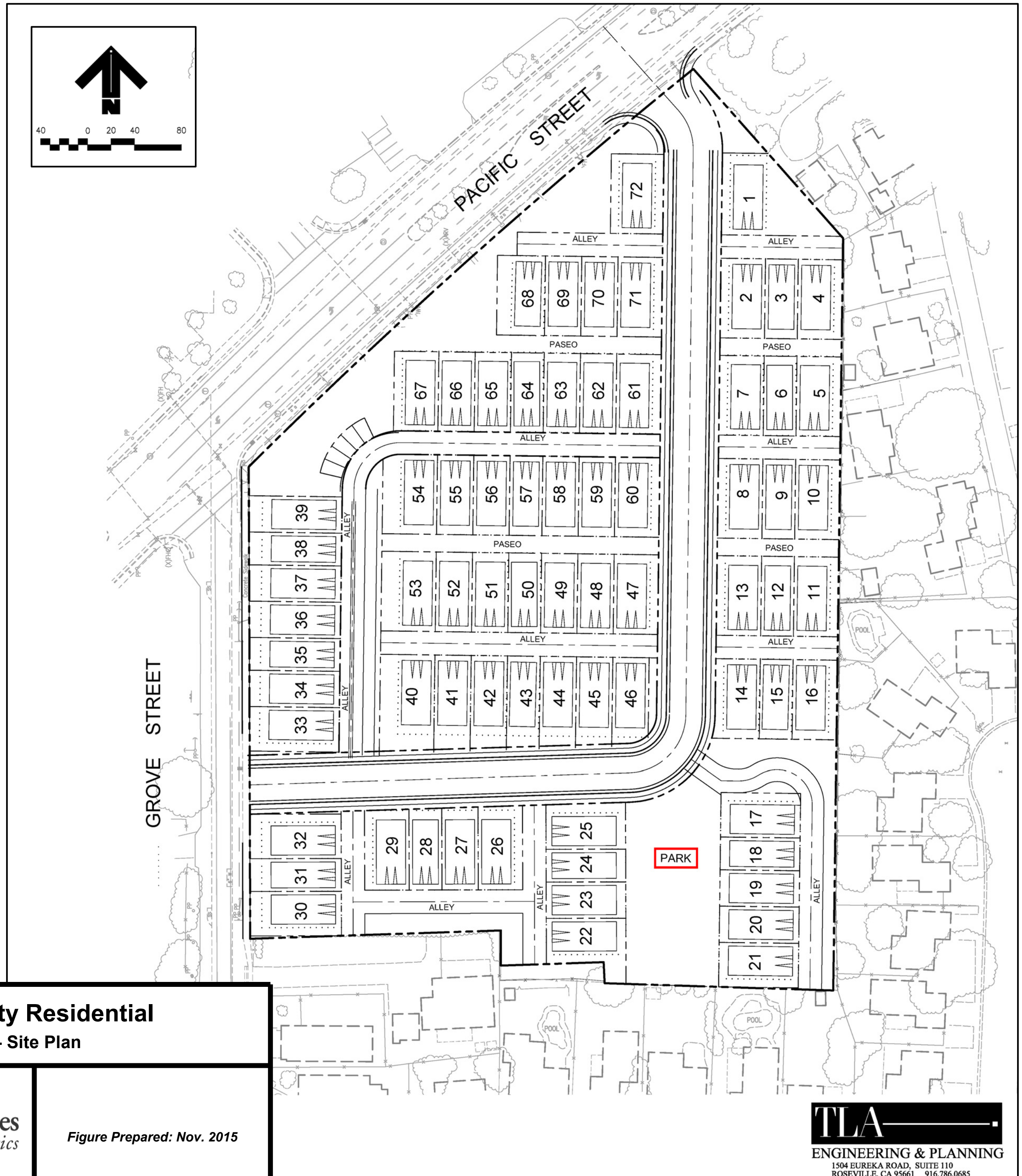

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Figure: 2 - Site Plan

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Figure Prepared: Nov. 2015

ENVIRONMENTAL SETTING

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, 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 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.

Table 1 lists several examples of the noise levels associated with common situations. Appendix A provides a summary of acoustical terms used in this report.

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.

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.

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 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.

REGULATORY CONTEXT

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.

LOCAL

City of Rocklin General Plan Noise Element

The City of Rocklin General Plan (October 2012) includes criteria for stationary (non-transportation) and transportation noise sources. Tables 2 and 3 below show the stationary and transportation noise source criteria, respectively (Tables 2-1 and 2-2 of the General Plan).

TABLE 2
EXTERIOR NOISE LEVEL DESIGN STANDARDS FOR NEW PROJECTS AFFECTED BY OR INCLUDING STATIONARY NOISE SOURCES

Noise Level Descriptor	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Hourly L_{eq}, dB	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.

TABLE 3
MAXIMUM ALLOWABLE NOISE EXPOSURE
TRANSPORTATION NOISE SOURCES

Land Use	Outdoor Activity Areas[1] L_{dn}/CNEL, dB	Interior Spaces	
		L_{dn}/CNEL, dB	L_{eq}, dB[2]
Residential	60[3]	45	--
Transient Lodging	65[4]	45	--
Hospitals, Nursing Homes	60[3]	45	--
Theaters, Auditoriums, Music Halls	--	--	35
Non-Commercial Places of Public Assembly	60[3]	--	40
Office Buildings	--	--	45
Schools, Libraries, Museums	--	--	45
Playgrounds, Neighborhood Parks	70	--	--

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.

EXISTING NOISE LEVELS ON THE PROJECT SITE

j.c. brennan & associates, Inc. staff conducted continuous 24-hour noise level measurements at the project site from Tuesday November 3rd to Wednesday November 4th, 2015. See Figure 1 for noise measurement locations.

A Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meter was used for the ambient noise level measurement survey. The meter was 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).

The sound level meter was programmed to collect hourly noise level intervals during the survey. The maximum value (L_{max}) represents the highest noise level measured during each one hour period, the average value (L_{eq}) represents the energy average of all of the noise measured during each one hour period, and the median value (L_{50}) represents the sound level exceeded 50 percent of the time during each one hour period.

The noise level measurement survey results are provided in Table 2. Appendix B provides the complete results of the continuous noise level measurement.

Table 2
Summary of Existing Background Noise Measurement Data

				Average Measured Hourly Noise Levels, dB					
				Daytime (7am-10pm)			Nighttime (10pm-7am)		
Site	Location	Date	DNL	L_{eq}	L_{50}	L_{max}	L_{eq}	L_{50}	L_{max}
Continuous (24-hour) Noise Level Measurements									
A	Project Site – 85 feet to centerline of Pacific Street.	Tuesday 11/3/2015 - Wednesday 11/4/2015	65	63	60	79	57	45	72
Source: j.c. brennan & associates, Inc., 2015.									

EVALUATION OF EXTERIOR NOISE LEVELS AT THE PROJECT SITE

Traffic Noise Prediction Methodology

j.c. brennan & associates, Inc., utilizes the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA RD-77-108) for the prediction of traffic noise levels. 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.

On Tuesday, November 3rd and Wednesday, November 4th, 2015 j.c. brennan & associates, Inc. conducted continuous (24-hour) noise measurements of traffic on Pacific Street. Figure 1 shows the continuous noise measurements location, labeled as Site A. A Traffic calibration measurement was also conducted at Site B.

Instrumentation used for the measurement was a Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meter which was calibrated in the field before use with an LDL CAL-200 acoustical calibrator.

The short-term noise measurement data was used to determine the accuracy of the FHWA model in describing the existing noise environment on the project site, while accounting for site conditions, travel speeds, roadway geometry, etc. Noise measurement results were compared to the FHWA model results by entering the existing traffic volume, speeds, and distances of Pacific Street as inputs to the FHWA model. The model was found to accurately predict traffic noise levels to within 1 dB. Therefore, no offsets were applied to the FHWA model.

Appendix B graphically shows the results of the continuous noise monitoring conducted at Site A. A complete listing of FHWA Model Calibration inputs are provided in Appendix C.

Future Traffic Noise Levels

Interstate 80 Traffic Noise

Interstate 80 is located approximately 3,000 feet to the southeast of the project site. The City of Rocklin General Plan Noise Element indicates that the 60 dB Ldn noise contour distance for Interstate 80 is predicted to be 2,094 feet under 2030 conditions. This distance does not account for shielding from intervening structures which would provide substantial shielding to the project site. Accounting for a conservative shielding offset of -10 dB, Interstate 80 noise levels are predicted to be 48 dBA L_{dn}. This level complies with the City's 60 dB L_{dn} exterior noise level standard.

Pacific Street

To determine the future traffic noise levels on the project site, j.c. brennan & associates, Inc., utilized Cumulative Plus Project traffic predictions for University Avenue prepared by DKS Transportation consultants for the City of Rocklin General Plan Update (August, 2011).

Table 4 shows the predicted future traffic noise levels at the proposed residential uses located closest to Pacific Street and Midas Avenue. A complete listing of the FHWA Traffic Noise Prediction Model inputs is provided in Appendix D.

It should be noted that the City of Rocklin 60 dB L_{dn} exterior noise level standard applies specifically to outdoor use areas or "outdoor activity" areas. In addition to outdoor activity areas, noise levels are predicted at the project building facades located closest to each of the project-area roadways. These building façade noise levels are used for predicting interior noise levels are not subject to the City's exterior noise level standard. For example, the 2nd floor façades of the units along Pacific Street would be exposed to exterior noise levels of 72 dB L_{dn}. This is not an exceedance of the City's 60 dB L_{dn} exterior noise level standard as no outdoor use occurs at this location.

TABLE 4
PREDICTED FUTURE TRAFFIC NOISE LEVELS

Location	Distance (ft)	Traffic Noise Levels, L_{dn}
Pacific Street – East of Midas Avenue (ADT 26,200)		
Lot 1- Floor 1	130'	65 dB
Lot 1- Floor 2	130'	68 dB
Lot 72- Floor 1	70'	69 dB
Lot 72- Floor 2	70'	72 dB
Lot 68- Floor 1	75'	69 dB
Lot 68- Floor 2	75'	72 dB
Lot 67- Floor 1	75'	69 dB
Lot 67- Floor 2	75'	72 dB
Lot 39- Floor 1	80'	69 dB
Lot 39-Floor 2	80'	72 dB
Park **(Outdoor Activity Area)**	500'	52 dB
Sources: j.c. brennan & associates, Inc., City of Rocklin General Plan, and FHWA RD-77-108		

The Table 4 data indicates that future traffic noise levels at outdoor activity areas of the proposed project are predicted to comply with the City of Rocklin 60 dB L_{dn} exterior noise level standard, as proposed. Therefore, no additional exterior traffic noise reduction measures would be required.

Railroad Noise Levels at the Project Site

j.c. brennan & associates, Inc. recently conducted noise monitoring of the Union Pacific Railroad for the proposed multi-family residential development at the northeast corner of the intersection of Pacific Street and Midas Avenue. Based upon this noise monitoring, the exterior noise level due to train operations was found to be approximately 72 dB L_{dn} at a distance of 170 feet. At its closest point, the proposed project is located approximately 675 feet south of the UP railroad. Additionally, there are a number of intervening building located between the project site and the UP railroad. It is expected that these intervening structures would provide a minimum of -5 dB shielding for railroad noise. Adjusting for distance and shielding, railroad noise levels of 58 dB L_{dn} are predicted at the north edge of the project site. At the proposed park site (outdoor activity area), located approximately 1,200 feet from the railroad, noise levels are predicted to be 54 dB L_{dn}. Therefore, railroad noise levels are predicted to comply with the City of Rocklin exterior noise level standards.

Interior Traffic Noise Levels

Standard construction practices, consistent with the uniform building code typically provides an exterior-to-interior noise level reduction of approximately 25 dB, assuming that air conditioning is included for each unit, which allows residents to close windows for the required acoustical isolation. Based upon an exterior noise exposure of up to 72 dB L_{dn}, interior noise levels of up to 47 dB L_{dn} are predicted along Pacific Street. Therefore, interior noise control measures would be required.

In order to achieve compliance with the City of Rocklin 45 dB L_{dn} interior noise level standard, j.c. brennan & associates, Inc. recommends that windows with a sound transmission class (STC) 35 rating, or higher, should be installed in all facades with a view of Pacific Street. These requirements would apply to the first row of units in the project, including facades with a perpendicular view of Pacific Street.

CONCLUSIONS

The proposed project is predicted to be exposed to transportation noise levels exceeding the City of Rocklin 45 dB L_{dn} interior noise level standard. Therefore, the following noise control measures should be implemented:

- All windows or glass doors with a view of Pacific Street should be fitted with STC 35 minimum rated assemblies. This would apply specifically to the first row of units closest to Pacific Street. This conclusion assumes the use of 3-coat stucco building construction and carpeted rooms. As an alternative to this blanket requirement, a detailed analysis of interior noise control measures may be conducted when project building plans and flooring types are available. The detailed analysis shall outline specific window, door, and building façade noise control measures utilized to achieve compliance with the 45 dB L_{dn} interior noise level standard.

- j.c. brennan & associates, Inc. recommends that mechanical ventilation penetrations for bath fans not face towards Pacific Street. Where feasible these vents should be routed towards the opposite side of the building to minimize sound intrusion to sensitive areas of the building.

  Where vents must face towards Pacific Street, it is recommended that the duct work be increased in length and is make as many "S" turns as feasible prior to exiting the dwelling. This separates the openings between the noise source and the living space with a long circuitous route. Each time the sound turns a corner, it is reduced slightly. Flexible duct work is the preferred ducting for this noise mitigation. Where the vent exits the building, a spring loaded flap with a gasket should installed to reduce sound entering the duct work when the vent is not in use.

- Mechanical ventilation shall be provided to allow occupants to keep doors and windows closed for acoustic isolation.

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 (Hz).
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% of the time during the one hour period.
Loudness	A subjective term for the sensation of the magnitude of sound.
Noise	Unwanted sound.
NRC	Noise Reduction Coefficient. NRC is a single-number rating of the sound-absorption of a material equal to the arithmetic mean of the sound-absorption coefficients in the 250, 500, 1000, and 2,000 Hz octave frequency bands rounded to the nearest multiple of 0.05. It is a representation of the amount of sound energy absorbed upon striking a particular surface. An NRC of 0 indicates perfect reflection; an NRC of 1 indicates perfect absorption.
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 AMaximum@ 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.
SEL	Sound Exposure Level. SEL is s 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.
STC	Sound Transmission Class. STC is an integer rating of how well a building partition attenuates airborne sound. It is widely used to rate interior partitions, ceilings/floors, doors, windows and exterior wall configurations.
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.

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Appendix B
Coker Residential
24hr Continuous Noise Monitoring - Site A
November 3rd-4th, 2015

Hour	Leq	Lmax	L50	L90
13:00:00	63	75	61	53
14:00:00	63	79	62	55
15:00:00	64	79	62	55
16:00:00	64	77	63	56
17:00:00	64	81	63	56
18:00:00	63	85	60	50
19:00:00	60	74	57	47
20:00:00	59	75	56	47
21:00:00	60	74	53	43
22:00:00	53	69	44	39
23:00:00	55	71	46	38
0:00:00	55	72	40	36
1:00:00	49	67	37	34
2:00:00	48	69	39	36
3:00:00	54	73	43	40
4:00:00	53	72	45	41
5:00:00	59	77	52	45
6:00:00	63	76	60	51
7:00:00	63	75	62	54
8:00:00	63	77	62	55
9:00:00	62	78	61	53
10:00:00	62	77	60	53
11:00:00	65	94	61	55
12:00:00	64	85	61	54

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	65	59	63	63	48	57
Lmax (Maximum)	94	74	79	77	67	72
L50 (Median)	63	53	60	60	37	45
L90 (Background)	56	43	52	51	34	40

Computed Ldn, dB	65
% Daytime Energy	88%
% Nighttime Energy	12%

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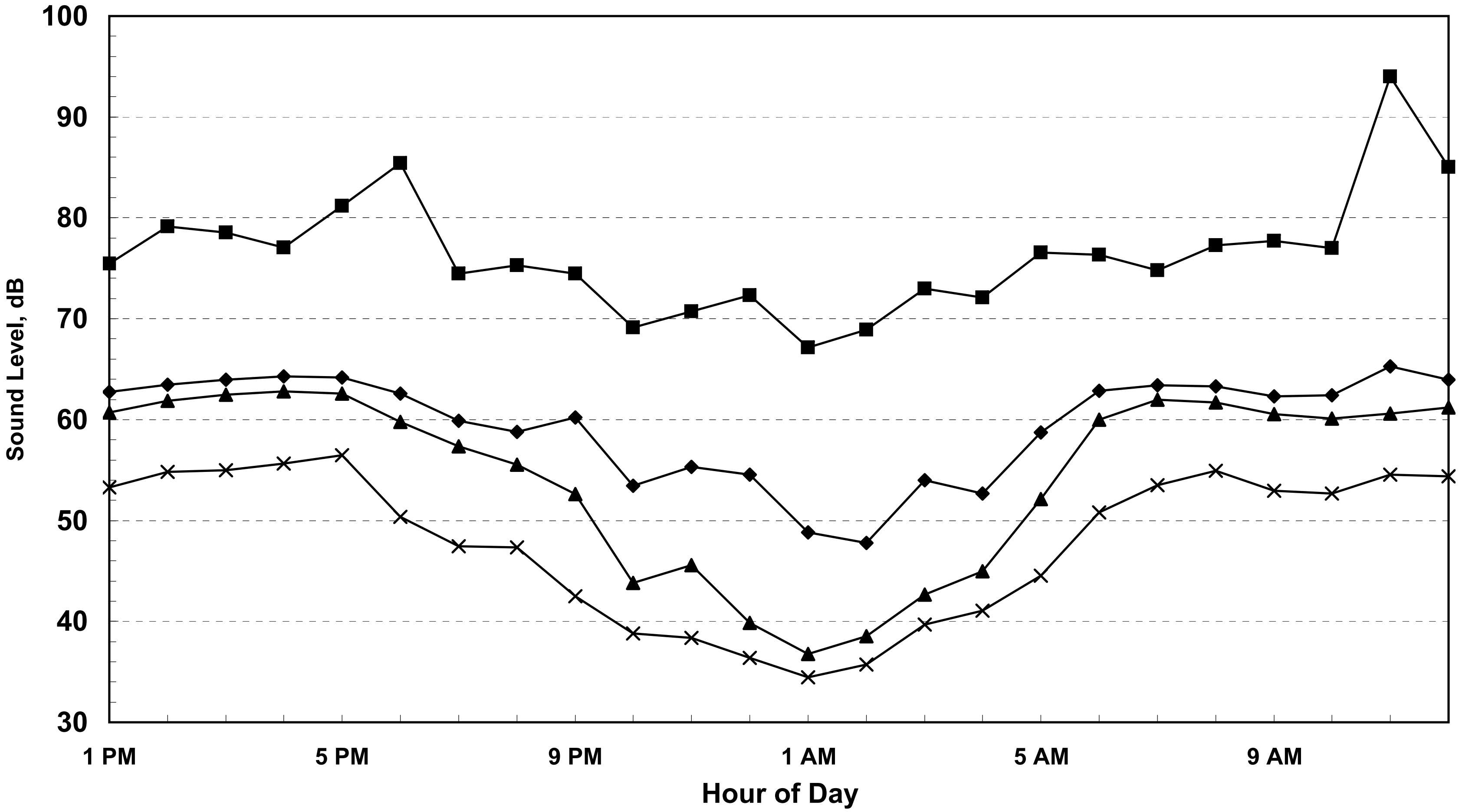
Appendix B
Coker Residential
24hr Continuous Noise Monitoring - Site A
November 3rd-4th, 2015



Ldn = 65 dB

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Appendix C

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

Project Information:	Job Number:	2015-217
	Project Name:	FHWA Model
	Roadway Tested:	Pacific Street
	Test Location:	Site 2
	Test Date:	November 3rd, 2015
Weather Conditions:	Temperature (Fahrenheit):	64
	Relative Humidity:	Moderate
	Wind Speed and Direction:	5-10 from West
	Cloud Cover:	Party Cloudy
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):	99
	Microphone Height:	5
	Intervening Ground (Hard or Soft):	**Soft**
	Elevation Relative to Road (feet):	0
Roadway Condition:	Pavement Type	Asphalt
	Pavement Condition:	Good
	Number of Lanes:	4
	Posted Maximum Speed (mph):	40
Test Parameters:	Test Time:	11:45 AM
	Test Duration (minutes):	10
	Observed Number Automobiles:	154
	Observed Number Medium Trucks:	1
	Observed Number Heavy Trucks:	0
	Observed Average Speed (mph):	45
Model Calibration:	Measured Average Level (L_{eq}):	62.1
	Level Predicted by FHWA Model:	61.6
	Difference:	***-0.5 dB***

Conclusions:

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Appendix D-1

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

Data Input Sheet

Project #: 2015-217 Coker Residential
Description: Cumulative Plus Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Location	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Pacific Street	Lot 1- Floor 1	26,200	88		12	3	2	45	130	0
2	Pacific Street	Lot 1- Floor 2	26,200	88		12	3	2	45	130	3
3	Pacific Street	Lot 72- Floor 1	26,200	88		12	3	2	45	70	0
4	Pacific Street	Lot 72- Floor 2	26,200	88		12	3	2	45	70	3
5	Pacific Street	Lot 68- Floor 1	26,200	88		12	3	2	45	75	0
6	Pacific Street	Lot 68- Floor 2	26,200	88		12	3	2	45	75	3
7	Pacific Street	Lot 67- Floor 1	26,200	88		12	3	2	45	75	0
8	Pacific Street	Lot 67- Floor 2	26,200	88		12	3	2	45	75	3
9	Pacific Street	Lot 39- Floor 1	26,200	88		12	3	2	45	80	0
10	Pacific Street	Lot 39-Floor 2	26,200	88		12	3	2	45	80	3
11	Pacific Street	Park	26,200	88		12	3	2	45	500	-5
	Pacific Street	Existing, 24-hr Site - Meas. 65 dB	12,800	88		12	3	2	45	85	0

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Appendix D-2

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

Project #: 2015-217 Coker Residential
Description: Cumulative Plus Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Location	Autos	Medium Trucks	Heavy Trucks	Total
1	Pacific Street	Lot 1- Floor 1	63	57	59	65
2	Pacific Street	Lot 1- Floor 2	66	60	62	68
3	Pacific Street	Lot 72- Floor 1	67	61	63	69
4	Pacific Street	Lot 72- Floor 2	70	64	66	72
5	Pacific Street	Lot 68- Floor 1	67	60	63	69
6	Pacific Street	Lot 68- Floor 2	70	63	66	72
7	Pacific Street	Lot 67- Floor 1	67	60	63	69
8	Pacific Street	Lot 67- Floor 2	70	63	66	72
9	Pacific Street	Lot 39- Floor 1	66	60	62	69
10	Pacific Street	Lot 39-Floor 2	69	63	65	72
11	Pacific Street	Park	50	43	46	52
0	Pacific Street	Existing, 24-hr Site - Meas. 65 dB	63	56	59	65

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