Appendix E

State Route 32 Widening Project
Noise Impact Assessment, Chico, California

STATE ROUTE 32 WIDENING PROJECT NOISE IMPACT ASSESSMENT CHICO, CALIFORNIA

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EXECUTIVE SUMMARY

This noise study report evaluates noise impacts associated with the proposed project to improve State Route 32 (SR 32) in Chico, California. The City of Chico, in conjunction with the Butte County Association of Governments (BCAG), proposes to improve safety and operational level of service along SR 32 with the project. The project extends along SR 32 from the west end at the intersection of State Route 99 to east of Yosemite Drive.

This report has been prepared to comply with the California Environmental Quality Act (CEQA) using the City of Chico guidelines.

A field noise investigation was conducted to quantify existing noise levels in the project area through noise measurements. These measurements were supplemented with traffic noise modeling. Federal Highway Administration's (FHWA's) Traffic Noise Model Version 2.5 was used in this analysis to evaluate traffic noise for design year (2030) conditions.

Traffic noise level increases of 2-4 dBA[1] are predicted to occur along the highway without the project. These increases are due to projected growth in the area. Project related noise levels would increase on the side of the widening, primarily the north side of SR 32, by up to an additional 5 dBA and. Noise levels would generally remain the same or be slightly lower than the no-build alternative on the south side of the highway away from the widening. Traffic noise level impacts were addressed by comparing the existing worst hour noise levels against the future build worst hour noise levels.

CEQA requirements as interpreted under the criteria established by the City of Chico. An increase in noise of 1.5 to 5 dBA L_{dn} is considered a substantial increase, depending on the existing noise level (see Section 6.0 for a complete explanation), so the impacts are considered significant at a number of receptors. Two of the projects components, the use of Open Graded Asphalt Concrete (OGAC), which has been shown to reduce traffic noise levels at the source, and wooden fences designed to have a sound transmission loss of 10dB or greater will reduce the traffic noise impacts. Based on ongoing research conducted by Illingworth and Rodkin, a conservative 3dB reduction in noise was assumed with the use of OGAC as a part of the analysis. See Table ES1 for the noise levels and the receptors that have a significant impact before and after applying the reduction due to using OGAC and wooden fences.

Construction activity would result in temporary increases to noise levels at some locations. Construction activities would be conducted in accordance with Caltrans' standard specifications, which require compliance with applicable local regulations and would be short-term and intermittent. Measures to mitigate this noise are included in this report.

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[1] dBA is decibels, A-weighted.

TABLE ES1 - SUMMARY OF CEQA IMPACTS

Receptor ID	Number of Residences Represented	Existing (Ldn)	2030 No-Build (Ldn)	2030 Build (Ldn) WithOut/OGAC	Increase of Future No-Build over Existing	Increase of Future Build W/OGAC over Existing (Cumulative)	2030 Build (Ldn) With/OGAC	Increase of Future Build W/OGAC over Future No-Build (Project Impacts)	2030 Build with OGAC and 6' wooden fence	Increase of Future Build W/OGAC and 6' wooden fence over Future No-Build (Project Impacts)	City Of Chico CEQA Criteria (Ldn)	CEQA Impact (Project Level)	Cumulative Impact
R1	4	66	68	70	2	2	67	-1	61	-9	1.5	LTS	No
R2	5	61	65	66	4	2	63	-2	59	-7	3	LTS	No
R3	3	64	67	69	3	2	66	-1	62	-7	1.5	LTS	No
R4	3	64	66	69	2	2	66	0	62	-7	1.5	LTS	No
R5 - ST 15	3	65	67	71	2	3	68	1	64	-7	1.5	LTS	No
R6	2	65	67	71	2	4	68	1	64	-7	1.5	LTS	No
R7 - ST 14	2	65	68	71	2	2	68	0	62	-9	1.5	LTS	No
R8	2	64	67	71	2	3	68	1	64	-6	1.5	LTS	No
R17 - ST13	3	65	67	71	2	3	67	1	65	-6	1.5	LTS	No
R49	1	65	67	72	2	4	69	2	63	-9	1.5	LTS	No
R50	2	65	67	72	2	4	69	2	68	-4	1.5	LTS	No
R51	2	64	67	72	2	4	69	2	65	-7	1.5	LTS	No
R52	2	64	67	72	2	4	69	2	65	-7	1.5	LTS	No
R53	3	65	67	71	2	4	68	1	64	-7	1.5	LTS	No
R54	2	65	67	71	2	3	68	1	64	-7	1.5	LTS	No
R55	2	64	66	70	2	3	67	1	63	-7	1.5	LTS	No
R9 - ST 17	4	62	64	63	2	-1	60	-4	58	-5	3	LTS	No
R11	4	66	68	69	2	0	66	-3	58	-10	1.5	LTS	No
R12	6	66	68	68	2	0	65	-3	58	-10	1.5	LTS	No
R13	2	64	66	65	2	-1	62	-4	57	-8	1.5	LTS	No
R14	6	65	68	68	2	0	65	-3	58	-9	1.5	LTS	No
R16	4	63	65	65	2	0	62	-3	58	-7	1.5	LTS	No
R27	2	57	59	60	2	1	57	-2	55	-5	5	LTS	No
R28	1	64	66	70	2	4	67	1	61	-9	1.5	LTS	No
R30	1	67	70	72	2	2	69	-1	64	-8	1.5	LTS	No
R31	2	65	67	70	2	3	67	0	60	-10	1.5	LTS	No
R18	1	60	63	64	3	0	61	-3	61	-3	3	LTS	No
R19	1	61	64	65	3	1	62	-2	62	-3	3	LTS	No
R20	2	62	65	67	4	2	64	-1	63	-4	1.5	LTS	No
R21	1	61	65	67	4	2	64	-1	63	-4	3	LTS	No
R22	1	59	63	65	4	2	62	-1	62	-3	3	LTS	No
R23 - ST 12	1	65	68	71	4	3	68	0	67	-4	1.5	LTS	No
R24	1	62	65	66	4	1	63	-2	64	-2	1.5	LTS	No
R25	2	61	64	66	3	2	63	-1	63	-3	3	LTS	No
R36 - ST 1	4	64	65	69	2	4	66	1	63	-6	1.5	LTS	No
R37 - ST 8	6	64	66	69	2	2	66	-1	64	-5	1.5	LTS	No
R38 - ST 2	Rec Area	62	64	69	2	5	66	2	62	-7	3	LTS	No
R39	4	60	62	66	2	4	63	1	58	-8	3	LTS	No
R41	6	61	64	69	3	5	66	2	60	-9	3	LTS	No
R42 - ST 4	3	62	65	69	2	4	66	1	58	-11	3	LTS	No
R43 - ST 5	4	60	62	65	2	3	62	0	57	-8	3	LTS	No
R44	3	58	60	64	2	4	61	1	57	-7	3	LTS	No
R45	3	60	63	65	2	3	62	0	59	-6	3	LTS	No

LTS - Less than Significant
S - Significant Impact　Levels may not add up exactly due to rounding

2. ACRONYMS

CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
Caltrans or Department	California Department of Transportation
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
FHWA	Federal Highway Administration
Ft	foot/feet
GIS	Geographic information system
HDM	Highway Design Manual
Km	kilometer(s)
KP	kilometer post
M	meter(s)
Mi	mile(s)
NAC	Noise Abatement Criteria
PM	post mile
SR	State Route
STAA	Surface Transportation Assistance Act
TNAP	Technical Noise Analysis Protocol
TeNS	Technical Noise Supplement
TBD	To be determined

A Glossary of Technical Terms is provided as Appendix A of this document

3. INTRODUCTION

This noise impact assessment evaluates the potential for significant noise impacts resulting from the State Route (SR) 32 widening project in Chico, California. This assessment presents the fundamentals of environmental noise, describes regulatory criteria that would be applicable to the project, summarizes existing noise conditions at noise-sensitive receivers in the vicinity of the project, and discusses the predicted changes in noise levels resulting from the project. Noise increases are evaluated in the impact assessment with respect to significance criteria developed for the project, and noise reduction measures are presented to reduce the effects of project-generated noise.

The analysis has been prepared to comply with CEQA and the local policy document, the City of Chico General Plan – November 1994 – Revised 2000. The objective of this study is to identify noise sensitive receivers where noise levels exceed the City of Chico's noise significance thresholds and to mitigate noise impacts to a less-than-significant level.

4. PROJECT DESCRIPTION

The proposed project would widen and improve approximately 2.6 miles of SR 32, beginning at the SR 99 interchange at the west end of the project corridor and extending east past Yosemite Drive where the roadway width would transition down from four lanes to two lanes.

Between the park-and-ride lots and Bruce Road, the project proposes to widen the highway to four lanes with all widening likely to the north within existing state right of way. As the project approaches Bruce Road, the widening will likely become more symmetrical around the centerline with most of the widening to the north and some widening to the south.

Along the SR 32 limits there are various intersections that will require modifications and conforms including the intersections at the interchange, Fir Street, Forest Avenue, El Monte Avenue, Bruce Road and Yosemite Drive. The design of the project includes the south leg of the Yosemite Drive intersection to provide access to the Oak Valley subdivision that was recently approved by the City of Chico. The intersection at Bruce Road may be reconstructed as a roundabout.

The widening will result in three lanes in both directions from SR 99 through Fir Street and two 12-foot lanes and 8-foot shoulders in both directions with no curbs or dikes at the edge of pavement. Construction of the project would require the removal of existing vegetation within the state right-of-way. Based on preliminary design, the project would require removal of trees on the north and south sides of the road between Fir Street and El Monte Avenue. The entire length of the project will be paved with OGAC to help reduce the traffic noise levels. In addition certain areas will have a 6-foot wood fence installed to reduce traffic noise, see Appendix B, Noise Receptor Maps for locations.

5. FUNDAMENTALS OF ENVIRONMENTAL NOISE

Technical acoustical terms commonly used in this report are defined in Table 1. Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its *pitch* or its loudness. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is the intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

5.1. Decibels and Frequency

In addition to the concepts of pitch and loudness, there are several noise measurement scales, which are used to describe noise. The *decibel (dB)* is a unit of measurement, which indicates the relative amplitude of a sound. Zero on the decibel scale is based on the lowest sound level that a healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10-decibel increase in sound level is perceived as approximately a doubling of loudness over a wide range of intensities. Since decibels are logarithmic units, sound pressure levels are not added arithmetically. Two sounds of equal sound pressure level are added; the result is a sound pressure level that is 3 dB higher. For example, if the sound pressure level were 70 dB when 100 cars pass an observer, then it would be 73 dB when 200 cars pass the same observer. Doubling the amount of energy would result in a 3 dB increase to the sound pressure level.

Frequency relates to the number of pressure oscillations per second, or Hertz (Hz). The range of sound frequencies that can be heard by healthy human ears ranges from about 20 Hz at the low frequency end to 20,000 Hz (20kHz) at the high frequency end.

Although the A-weighted noise level may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a conglomeration of noise from distant sources, which create a relatively steady background noise in which no particular source is identifiable. To describe the time-varying character of environmental noise, the statistical noise descriptors, L_{01}, L_{10}, L_{50}, and L_{90}, are commonly used. They are the A-weighted noise levels equaled or exceeded during 1%, 10%, 50%, and 90% of a stated time period. A single number descriptor called the L_{eq} is also widely used. The L_{eq} is the average A-weighted noise level during a stated period of time.

Table 2 shows typical A-weighted noise levels that occur in human environments.

5.2. Noise Descriptors

Because sound levels can vary over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This energy-equivalent sound/noise descriptor is called L_{eq}. A common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration. The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA.

5.3. Human Response to Noise

Studies have shown that under controlled conditions in an acoustics laboratory, a healthy human ear is able to discern changes in sound levels of 1 dBA. In the normal environment, the healthy human ear can detect changes of about 2 dBA; however, it is widely accepted that changes of 3 dBA in the normal environment are considered barely detectable to most people. A change of 5 dBA is readily perceptible and a change of 10 dBA is perceived as being twice as loud.

5.4. Sound Propagation

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

- *Geometric spreading.* Sound from a single source (i.e., a "point" source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates (or drops off) at a rate of 6 dBA for each doubling of distance. Highway noise is not a single, stationary point source of sound. The movement of the vehicles on a highway makes the source of the sound appear to emanate from a line (i.e., a "line" source) rather than from a point. This results in cylindrical spreading rather than the spherical spreading resulting from a point source. The change in sound level from a line source is 3 dBA per doubling of distance.
- *Ground absorption.* Most often, the noise path between the highway and the observer is very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is done for simplification only; for distances of less than 60 meters (300 feet), prediction results based on this scheme are sufficiently accurate. For acoustically "hard" sites (i.e., sites with a reflective surface, such as a parking lot or a smooth body of water, between the source and the receiver), no excess ground attenuation is assumed. For acoustically absorptive or "soft" sites (i.e., sites with an absorptive ground surface, such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dBA per doubling of distance is normally assumed. When added to the geometric spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dBA per doubling of distance for a line source and 7.5 dBA per doubling of distance for a point source.
- *Atmospheric effects.* Research by Caltrans and others has shown that atmospheric conditions can have a significant effect on noise levels, especially locations beyond 60 meters (200 feet) of a highway. Wind has been shown to be the single most important meteorological factor within approximately 150 meters (500 feet), whereas vertical air temperature gradients are more important over longer distances. Other factors, such as air temperature, humidity, and turbulence, also have significant effects. Receivers located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lower noise levels. Increased sound levels can also occur because of temperature inversion conditions (i.e., increasing temperature with elevation).
- *Shielding by natural or human-made features.* A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the

receiver. The amount of attenuation provided by this shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (such as hills and dense woods) and human-made features (such as buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receiver to specifically reduce noise. A barrier that breaks the line of sight between a source and a receiver will typically result in at least 5 dB of noise reduction. A higher barrier may provide as much as 20 dB of noise reduction.

TABLE 1 – DEFINITIONS OF ACOUSTICAL TERMS USED IN THIS REPORT

Term	Definitions
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e.g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, Leq	The average A-weighted noise level during the measurement period. The hourly Leq used for this report is denoted as dBA $L_{eq\,[h]}$.
Lmax RMS Level	The maximum root-mean-square (RMS) sound pressure level during a measurement – measured using the “fast” exponential time constant.
Linear Peak Level	Peak sound pressure level based on the largest absolute value of the instantaneous sound pressure over the frequency range from 20 Hz to 20,000 Hz.
L_{01}, L_{05}, L_{10}, L_{90}	The A-weighted noise levels that are exceeded 1%, 5%, 10%, and 90% of the time during the measurement period.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

TABLE 2 – TYPICAL NOISE LEVELS IN THE ENVIRONMENT

Common Outdoor Noise Source	Noise Level (dBA)	Common Indoor Noise Source
	120 dBA	
Jet fly-over at 300 meters		Rock concert
	110 dBA	
Pile driver at 20 meters	100 dBA	
		Night club with live music
	90 dBA	
Large truck pass by at 15 meters		
	80 dBA	Noisy restaurant
		Garbage disposal at 1 meter
Gas lawn mower at 30 meters	70 dBA	Vacuum cleaner at 3 meters
Commercial/Urban area daytime		Normal speech at 1 meter
Suburban expressway at 90 meters	60 dBA	
Suburban daytime		Active office environment
	50 dBA	
Urban area nighttime		Quiet office environment
	40 dBA	
Suburban nighttime		
Quiet rural areas	30 dBA	Library
		Quiet bedroom at night
Wilderness area	20 dBA	
Most quiet remote areas	10 dBA	Quiet recording studio
Threshold of human hearing	0 dBA	Threshold of human hearing

6. *REGULATIONS, STANDARDS, AND POLICIES*

CEQA contains general guidelines to evaluate the significance of effects of environmental noise attributable to a proposed project. Under CEQA,[2] a project would be considered to have a significant impact if it causes:

- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project; or
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The Noise Element of the City of Chico General Plan provides general goals and policies to guide development in the City. Applicable policies identified in the General Plan state that the City should include appropriate noise attenuation techniques in the design of all new arterial streets, and construction operations should use available noise suppression devices and techniques. The noise element of the General Plan contains planning guidelines relating to noise. The noise element identifies goals and policies to support achievement of those goals. The goal and policies contained in the General Plan are applicable through out the City.

Policy N-1-1 - State that noise created by new transportation noise sources should be mitigated so as not to exceed the levels specified in Table 4 at outdoor activity areas or interior spaces of existing noise-sensitive land uses.

Policy N-1-2 - It is anticipated that roadway improvement projects will be needed to accommodate build out of the general plan. Therefore, existing noise-sensitive uses may be exposed to increased noise levels due to roadway improvement projects as a result of increased roadway capacity, increases in travel speeds, etc. It may not be practical to reduce increased traffic noise levels consistent with those contained in Table 4. Therefore, as an alternative, the following criteria may be used as a test of significance for the environmental review of a roadway improvement project:

Where existing traffic noise levels are less than 60 dB L_{dn} at the outdoor activity areas of noise-sensitive uses, a +5 dB L_{dn} increase in noise levels due to a roadway improvement project will be considered significant; and

Where existing traffic noise levels range between 60 and 65 dB L_{dn} at the outdoor activity areas of noise sensitive uses, a +3 dB L_{dn} increase in noise levels due to a roadway improvement project will be considered significant; and

Where existing traffic noise levels are greater than 65 dB L_{dn} at the outdoor activity areas of noise sensitive uses, a +1.5 dB L_{dn} increase in noise levels due to a roadway improvement project will be considered significant.

[2] Noise and land use compatibility, vibration and airport-related CEQA issues have been omitted because they are not applicable to this project.

TABLE 4 - 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	60[4]	45	
Hospitals, Nursing Homes	60[3]	45	
Theaters, Auditoriums, Music Halls			35
Churches, Meeting Halls	60[3]		40
Office Buildings			45
Schools, Libraries, Museums	60[3]		45
Playgrounds, Neighborhood Parks	70		

[1] Where the location of outdoor activity areas is unknown, the exterior noise level standard shall be applied to the property line of the receiving land use.

[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.

[4] In the case of hotel/motel facilities or other transient lodging, outdoor activity areas such as pool areas may not be included in the project design. In these cases, only the interior noise level criterion will apply.

NOTE: Roadway improvement projects can result in increased travel speed and/or an increase in roadway capacity. An analysis of noise impacts associated with a roadway improvement project should evaluate the projected future traffic volumes; speeds, traffic distribution and truck mix with and without the project. Therefore, the changes in traffic speeds and traffic volumes along those roadways, which are attributed solely to the roadway project, will be evaluated with respect to the above-mentioned criteria.

7. STUDY METHODS AND PROCEDURES

7.1. Identification of Receiver Locations

Noise receiver locations exposed to potential traffic noise impacts were identified along the project route. Land uses in the vicinity of the project area, including apartment complexes and single-family homes, were identified through a review of aerial photos of the project area and a subsequent visit to the study area.

7.2. Measurement of Existing Sound Levels

Noise measurements were conducted at twenty-two Category B receiver locations on October 26-28, 2005. The noise measurement survey consisted of a combination of long-term measurements (24 hours in duration) and short-term measurements (10 minutes in duration). Five long-term noise measurement locations and seventeen short-term noise measurement locations were selected to represent the varying noise exposures of the identified receivers (see Table 5).

Table 5 – Summary of Long-Term and Short-Term Noise Measurement Data

Site No.	Location	Type of Development	Date	Time	L_{eq}	L_1	L_{10}	L_{50}	L_{90}	Worst Hourly Noise Level (dBA)
LT-1	Turning Point Commons	Residential	10/26/05 to 10/28/05	2:20 PM – 10:00 AM						64
LT-2	Backyard of #24 Stansbury	Residential	10/27/06 to 10/28/05	2:40 PM – 9:40 AM						58
LT-3	Backyard of #21 Stansbury	Residential	10/26/05 to 10/28/05	3:00 PM - 9:30 AM						58
LT-4	Backyard of #11 Hunter Court	Residential	10/26/05 to 10/28/05	2:20 PM - 9:20 AM						64
LT-5	Front yard of Sierra Lakeside Apartments	Residential	10/26/05 to 10/28/05	3:50 PM- 10:20 AM						68
ST-1	75 ft From R/W Fence at corner of Sierra lakeside lane and Sierra Sunrise Terrace	Residential	9/20/05	3:50 PM	60.6	71.2	63.9	57.4	45.7	63
ST-2	Tennis courts on Sierra Sunrise Terrace	Park	9/20/05	4:10 PM	59.2	66.0	63.4	57.4	44.5	61
ST-3	On a lot in the Mission Vista Hills subdivision 50 ft from SR 32 R/W	Residential	9/20/05	4:40 PM	63.0	71.3	66.6	61.3	48.4	63
ST-4	Near pool of new apartments west of Yosemite Drive	Residential	10/27/05	9:50 AM	61.8	72.9	63.5	56.3	44.5	60
ST-5	#43 Terrace Apartments – Possible reflections from apartment building	Residential	10/27/05	9:50 AM	65.0	75.6	66.3	59.4	49.4	58
ST-6	Oak Valley Property 93 ft south of SR 32	Vacant Land	10/27/05	10:30 AM	60.8	72.1	64.6	53.0	41.8	61
ST-7	Oak Valley Property 185 ft south of SR 32	Vacant Land	10/27/05	10:30 AM	52.7	63.6	55.4	47.5	41.3	56
ST-8	65’ From R/W Fence at corner of Sierra lakeside lane and Sierra Sunrise Terrace	Residential	10/27/05	11:00 AM	64.0 61.3	72.4 69.5	68.2 65.3	61.1 57.8	50.1 48.5	63
ST-9	105 ft south and east of Bruce Road	Vacant Land	10/27/05	11:10 AM	59.8	70.0	63.0	51.2	46.4	61
ST-10	135 ft north and east of Bruce Road on SR 32	Vacant Land	10/27/05	11:40 AM	60.4	68.7	63.0	58.6	52.6	61
ST-11	105 ft south of the center line of SR 32	Vacant Land	10/27/05	11:40 AM	58.3	68.2	61.0	55.0	48.5	60
ST-12	In front of Bed and Breakfast	Residential	10/27/05	12:10	63.8	70.7	66.7	63.0	55.2	64
ST-13	Backyard of 1897 Modoc	Residential	10/27/05	12:40	62.4	67.5	65.1	62.2	55.5	64
ST-14	Back side of Turning Point Commons	Residential	10/27/05	1:10	64.0	68.8	66.9	63.7	57.0	64
ST-15	Near patio of #1692 Alpine Street in the Turning Point Commons Apartments	Residential	10/27/05	1:10	65.2	70.0	67.9	64.7	60.4	65
ST-16	Community Care Options	Residential	10/27/05	1:50	58.7	62.9	60.8	58.7	54.5	61
ST-17	Behind Community Care Options equivalent distance from SR 32 to the apartments on the adjacent parcel	Residential	10/27/05	1:50	70.8	76.0	73.7	70.6	61.0	71

Long-term noise measurements were conducted to show the trend in both 10-minute and hourly noise levels throughout a 24–hour period. Long-term noise measurement locations were selected to generally represent “worst-case” human activity areas. Some locations were only used to evaluate the trend in traffic noise levels. Care was taken to select sites that were primarily affected by noise from SR 32 and to avoid sites in which noise contamination from sources other than the roadway may occur.

Short-term noise measurements were conducted simultaneous with traffic counts at twenty-seven locations throughout the study area in ten-minute intervals. Measurements were repeated at some locations to confirm traffic noise levels or assess variability due to noise sources other than adjacent highways. Short-term noise measurements were conducted outdoors at areas of frequent human activity or at acoustically equivalent locations. The microphones were located approximately 5 feet above the surrounding ground and at least 15 feet from structures. Peak-hour noise levels at each receiver were calculated by adjusting for differences in traffic conditions during measurements and the loudest existing hourly traffic conditions. The adjusted peak-hour noise levels were compared to trends measured at nearby long-term noise measurement locations.

Noise measurement locations are used as noise modeling receivers for prediction of future noise levels. Locations of these receivers are shown on the project plans shown in Appendix B.

Noise measurements were made using Larson Davis Model 820 Integrating Sound Level Meters. The Model 820 Sound Level Meter was equipped with G.R.A.S. Type 40AQ ½-inch random incidence microphones. The sound level measuring assemblies were calibrated prior to each measurement using a Larson Davis Model CA250 Calibrator. The response of the system was checked after each measurement session and was always found to be within 0.2 dBA. No calibration adjustments were made to the sound levels measured by the SLMs. All noise levels are reported in decibels A-weighted re 20 micropascals (μPa) with the sound level meter set at “slow” response.

Meteorological conditions were observed during long-term and short-term noise measurements and consisted generally of clear skies, calm to light winds, and warm temperatures.

7.3. Geometric Plans

Roadway plans and topography data of the project vicinity were provided by Mark Thomas & Company, Inc maps dated November 17, 2005. Subsequently updated January 16, 2006. Barrier, receiver, and roadway information were based on these plans and digitally input into a three-dimensional reference coordinate system used by the traffic noise model, TNM 2.5.

7.4. Noise Model Calibration

TNM V2.5 was the primary traffic noise model used in the noise impact analysis for this project. The digitized roadway, barrier, and receiver locations were input into the traffic noise model for calibration. Traffic counts conducted simultaneously with noise measurements were adjusted to reflect one-hour conditions assuming that traffic volumes during the noise measurement interval (10 minutes) were equal during the six ten-minute intervals. These one-hour volumes were input into the model for calibration. Traffic volumes were classified into three vehicle types: 1) light-duty autos and trucks, 2) medium-duty trucks (typically trucks with 2 axles and more than 4 wheels, and 3) heavy-duty trucks (typically trucks with more than 2 axles).

Terrain features and structures provide acoustical shielding at the receiver locations to reduce traffic noise levels generated by the roadway. For this reason, noise measurements are conducted and traffic noise model calibration factors are developed. Calibration factors or model adjustments are used to adjust the model to closer represent measured conditions. Modeled results that vary more than 2 dB from measurements are adjusted. This is done after all measurement and modeled data are carefully reviewed. The adjustment was calculated as follows:

Adjustment = Measured – Modeled

Adjustments were only applied to bring the model within 2 dBA of the measured level; therefore, allowing a "conservative" estimate of the noise level.

7.5. Traffic Noise Level Prediction

Once the traffic noise model was calibrated, existing, future no-project, and future with project worst-hour traffic noise levels were predicted. Traffic volume inputs into the traffic noise model were taken from the project traffic projections provided by Fehr & Peers, Transportation Consultants Traffic noise levels for the following conditions were calculated: 1) existing peak hour conditions, 2) future build for year 2030 and future no-build conditions also in 2030.

The noisiest hour is not necessarily the hour with peak traffic volumes. Congestion results in slower speeds, which substantially reduces noise levels. The loudest hour is typically an hour where traffic flows freely at or near capacity conditions.

Traffic mix was based on the average of traffic counts taken during the measurement period and on estimates provided by Fehr & Peers, Transportation Consultants. The existing and future traffic mix was applied to the counted and projected volumes and was modeled as follows:

Roadway	Light-Duty Autos	Medium-Duty Trucks	Heavy-Duty Trucks
SR 32	95%	2%	3%
Forest Avenue	98%	1%	1%
El Monte Avenue	98%	1%	1%
Bruce Road	98%	1%	1%
Yosemite Drive	98%	1%	1%

Free-flow traffic speeds observed in the field during the noise monitoring survey were between 45 and 55 mph for traffic on SR 32. For the purposes of traffic noise modeling for future year conditions with the project, light-duty vehicles and trucks were modeled at speeds similar to those observed.

8. EXISTING NOISE ENVIRONMENT

The project proposes to widen and improve SR 32 from SR 99 to Yosemite Drive. Land uses in the vicinity of the project site are a mixture of single, multi-family residential, commercial uses and vacant land. The noise environment in the study area results primarily from vehicular traffic along SR 32. From the beginning of project at SR 99 to Forest Avenue on the north side of SR

32 is a mixture of high density (apartments) and single family residential. Along the south side of SR 32 is a mixture of commercial, high density residential and residential. The area closest to SR 99 is primarily commercial with the residential area being closer to Forest Avenue. From Forest Avenue to El Monte Avenue on the north side of SR 32 there is a small subdivision west of Dead Horse Slough. On the east side of Dead Horse Slough there is a Bed and Breakfast and two residential receptors on large lots. On the south side of SR 32 it is a mixture of single-family residential units on large lots and vacant lots.

From El Monte Avenue to Bruce Road along the north side of SR 32 there is one commercial receptor located on the northeast corner of El Monte Avenue and SR 32. All other parcels are vacant undeveloped land. Along the south side of SR 32 and to the east of El Monte Avenue is the new Mission Vista Hills development; a mixture of two commercial buildings and thirty-three single-family homes. These properties are currently under construction and a 6-foot high wall is under construction along SR 32 adjacent to the single-family homes. The remainder of the land on the east side is undeveloped land.

On the south side of SR 32 from Bruce Road to the end of the project there is undeveloped vacant land. The primary concern is the 43-acre parcel (the Oak Valley subdivision) south of SR 32 that has been proposed for development. On the north side of SR 32 from Bruce Road east to the end of project mixture of commercial and medium to high-density residential units.

A summary of measured noise levels and corresponding noisiest hour noise levels are shown in Table 5. Figures 1, 2, 3, 4 and 5 show the trends in hourly noise levels measured at long-term (24-hour) measurement locations. The estimated peak-hour noise levels were based on daytime measurement data and trends in hourly noise levels measured at representative 24-hour measurement locations.

8.1. Noise Measurements

A noise monitoring survey was conducted from October 26, 2005 to October 28, 2005 to quantify the existing noise environment in the project vicinity. Five long-term noise measurements and seventeen short-term noise measurements were made at representative locations of receivers in the project area. Noise measurement locations are shown in Figures 1A, 1B, and 1C. Noise measurements were made using Larson-Davis Model 820 integrating sound level meters fitted with precision microphones and windscreens. The sound level measuring assemblies were calibrated before and after the noise monitoring survey, and the response of the systems were always found to be within 0.2 dB of the calibrated level. No calibration adjustments were made to the measured noise levels.

Long-term measurement LT-1 was conducted on the north side of SR 32 at unit #19 of Turning Point Commons, approximately 170 feet from the center of westbound SR 32. Daytime hourly average noise levels ranged from 60 dBA L_{eq} to 64 dBA L_{eq} and dropped to a low of 47 dBA L_{eq} at night. LT-1 noise level (day-night average) was 64 dBA. The data collected at LT-1 are summarized in Figure 1.

Long-term measurement, LT-2, was conducted on the north side of SR 32 at #24 Stansbury Lane, approximately 135 feet from the center of the westbound travel way. Hourly average noise levels ranged from 55 dBA to 58 dBA L_{eq} and dropped to a low of 47 dBA L_{eq} at night. The calculated L_{dn} noise level (day-night average) was 59 dBA. The data collected at LT-2 are summarized in Figure 2.

Long-term measurement LT-3 was conducted on the north side of SR 32 at #21 Stansbury Lane, approximately 175 feet from the center of the westbound travel way. Hourly average noise levels at LT-3 were similar to the noise measured at LT-2 and the calculated $\mathbf{L_{dn}}$ noise level (day-night average) was 59 dBA. The data collected at LT-3 are summarized in Figure 3.

Long-term noise measurement LT-4 was located on the south side of SR 32 in the backyard of #11 Hunter Court, approximately 95 feet from the center of roadway. Hourly-equivalent daytime noise levels ranged from approximately 60 dBA to 64 dBA L_{eq} and dropped to a low of 50 dBA L_{eq} at night. The calculated L_{dn} noise level (day-night average) at LT-4 was 65 dBA. The daily distribution of noise levels at LT-4 is summarized in Figure 4.

Long-term measurement LT-5 was conducted on the north side of SR 32 near the corner of Sierra Lakeside Drive and Sierra Sunrise Terrace, approximately 135 feet from the center of the roadway. Hourly-equivalent daytime noise levels ranged from approximately 61 dBA to 68 dBA L_{eq} and dropped to a low of 51 dBA L_{eq} at night. The calculated $\mathbf{L_{dn}}$ noise level (day-night average) at LT-5 was 68 dBA. The daily distribution of noise levels at LT-5 is summarized in Figure 5.

Short-term noise measurements were conducted at seventeen additional locations throughout the project (ST-1 to ST-17). Noise measurement locations were selected to quantify traffic noise levels along SR 32 at the setbacks of existing representative noise sensitive receptors in the vicinity of the project area. Table 5 summarizes the results of the short-term noise measurements. The $\mathbf{L_{dn}}$ is estimated by correlating the short-term measurement to a corresponding time period at the long-term reference site.

TABLE 6 – EXISTING NOISE LEVELS

Receiver I.D.	Location or Address	Type of Development	Number of Units Represented	Existing worst Hour Noise Level, Leq (hr), (dBA)	Noise Level Measured* or Modeled
R-1	Vista Verde Apartments 1666 Vista Verde Avenue	Residential	7	65	Modeled
R-2	Vista Verde Apartments 1666 Vista Verde Avenue	Residential	6	60	Modeled
R-3	Turning Point Commons Apartments 1668-1674 Vista Verde Avenue	Residential	4	63	Modeled
R-4	Turning Point Commons Apartments 1676-1682 Vista Verde Avenue	Residential	4	63	Modeled
R-5 (ST-15)	Turning Point Commons Apartments 1692 Vista Verde Avenue	Residential	4	64	Measured
R-6 (LT-1)	Unit 19 Turning Point Commons 25 Via La Paz	Residential	2	64	Modeled
R-7 (ST-14)	Turning Point Commons 25 Via La Paz	Residential	3	64	Measured
R-8	1869 Modoc Drive	Residential	3	63	Modeled
R-9 (ST-17)	Community Care Options 1530 Humboldt Road.	Residential	4	61	Measured
ST-16	Near R/W Line behind Community Care Options1530 Humboldt Road	Undeveloped Land	N/A	71	Measured
R-11	Humboldt Park Apartments 1850 Humboldt Avenue	Residential	4	65	Modeled
R-12	Humboldt Park Apartments 1850 Humboldt Avenue	Residential	6	65	Modeled
R-13	Humboldt Park Apartments 1850 Humboldt Avenue	Residential	2	63	Modeled
R-14	Humboldt Ridge Apartments 1880 Humboldt Avenue	Residential	6	64	Modeled
R-15	Residence located on Humboldt Avenue between Forest Ave. and El Monte Ave.	Residential	3	61	Modeled
R-16	Humboldt Ridge Apartments 1880 Humboldt Avenue	Residential	4	62	Modeled

Receiver I.D.	Location or Address	Type of Development	Number of Units Represented	Existing worst Hour Noise Level, Leq (hr), (dBA)	Noise Level Measured* or Modeled
R-17 (ST-13)	1897 Modoc Drive	Residential	4	64	Measured
R-18 (LT-3)	#24 Stansbury Court	Residential	1	59	Measured
R-19	#23 Stansbury court	Residential	2	60	Modeled
R-20 (LT-2)	#21 Stansbury Court	Residential	1	61	Measured
R-21	#20 Stansbury Court	Residential	1	60	Modeled
R-22	#19 Stansbury Court	Residential	2	58	Modeled
R-23 (ST-12)	El Monte Avenue	Hotel	1	64	Measured
R-24	1223 El Monte Avenue	Residential	1	61	Modeled
R-25	1145-1147-1149 El Monte Avenue	Residential	3	60	Modeled
R-26	Evers Veterinary Clinic	Commercial	1	60	Modeled
R-27	1884 Humboldt Avenue	Residential	2	56	Modeled
R-28	#8 Hunter Court	Residential	1	63	Modeled
R-29	Residence located on Humboldt Ave. between Forest Ave. and El Monte Ave.	Residential	1	56	Modeled
R-30	#9 Hunter Court	Residential	2	66	Modeled
R-31	#11 Hunter Court	Residential	1	64	Measured
R-32	Residence located on Humboldt Ave. between Forest Ave. and El Monte Ave.	Residential	2	56	Modeled
R-33	Residence located on Humboldt Ave. between Forest Ave. and El Monte Ave.	Residential	1	57	Modeled
(ST-3)	Mission Hills Development	Residential	13	63	Measured
ST-10	Undeveloped Land	Undeveloped Land	N/A	61	Measured
R-36 (ST-1)	Sierra Lakeside Apartments	Residential	4	63	Measured
R-37 (ST-8)	Sierra Lakeside Apartments	Residential	6	63	Measured

Receiver I.D.	Location or Address	Type of Development	Number of Units Represented	Existing worst Hour Noise Level, Leq (hr), (dBA)	Noise Level Measured* or Modeled
ST-2	Tennis Courts	Active Sports area	N/A	61	Measured
R-39	Sierra Sunrise Apartments 2701 Sierra Sunrise Terrace	Residential	4	59	Modeled
ST-11	Undeveloped Land	Undeveloped Land	N/A	60	Measured
R-41	Sierra Manor 2770 Sierra Sunrise Terrace	Residential	6	60	Modeled
R-42 (ST-4)	Yosemite Terrace Apartments 101 Ahwahnee Commons	Residential	3	61	Measured
R-43 (ST-5)	Yosemite Terrace Apartments 101 Ahwahnee Commons	Residential	4	59	Measured
R-44	Yosemite Terrace Apartments 101 Ahwahnee Commons	Residential	3	57	Modeled
R-45	Yosemite Terrace Apartments 101 Ahwahnee Commons	Residential	3	59	Modeled
St-9	Undeveloped Land	Undeveloped Land	N/A	61	Measured
ST-6	Undeveloped Land	Undeveloped Land	N/A	61	Measured
ST-7	Undeveloped Land	Undeveloped Land	N/A	56	Measured
R-49	#3 Greg Court	Residential	2	64	Modeled
R-50	#4 Greg Court	Residential	2	64	Modeled
R-51	#3 Merle Court	Residential	2	63	Modeled
R-52	1959 Modoc Drive	Residential	3	63	Modeled
R-53	1877 Modoc Drive	Residential	2	64	Modeled
R-54	1795 Modoc Drive	Residential	3	64	Modeled
R-55	1793 Modoc Drive	Residential	2	63	Modeled

*All measurements shown reflect worst-hour noise levels, i.e. they were either measured during the noisiest hour or were adjusted to worst hour traffic characteristics.

Figure 1: Daily Trend in Noise Levels at LT-1

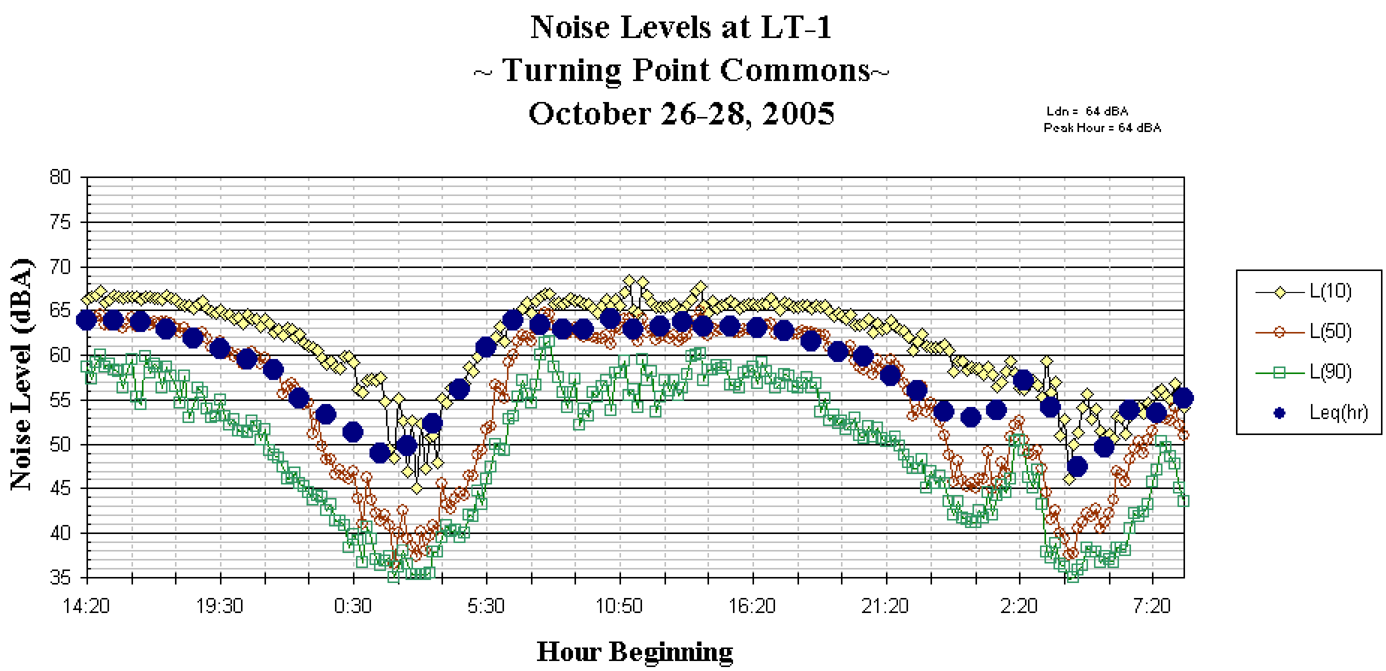


Figure 2: Daily Trend in Noise Levels at LT-2

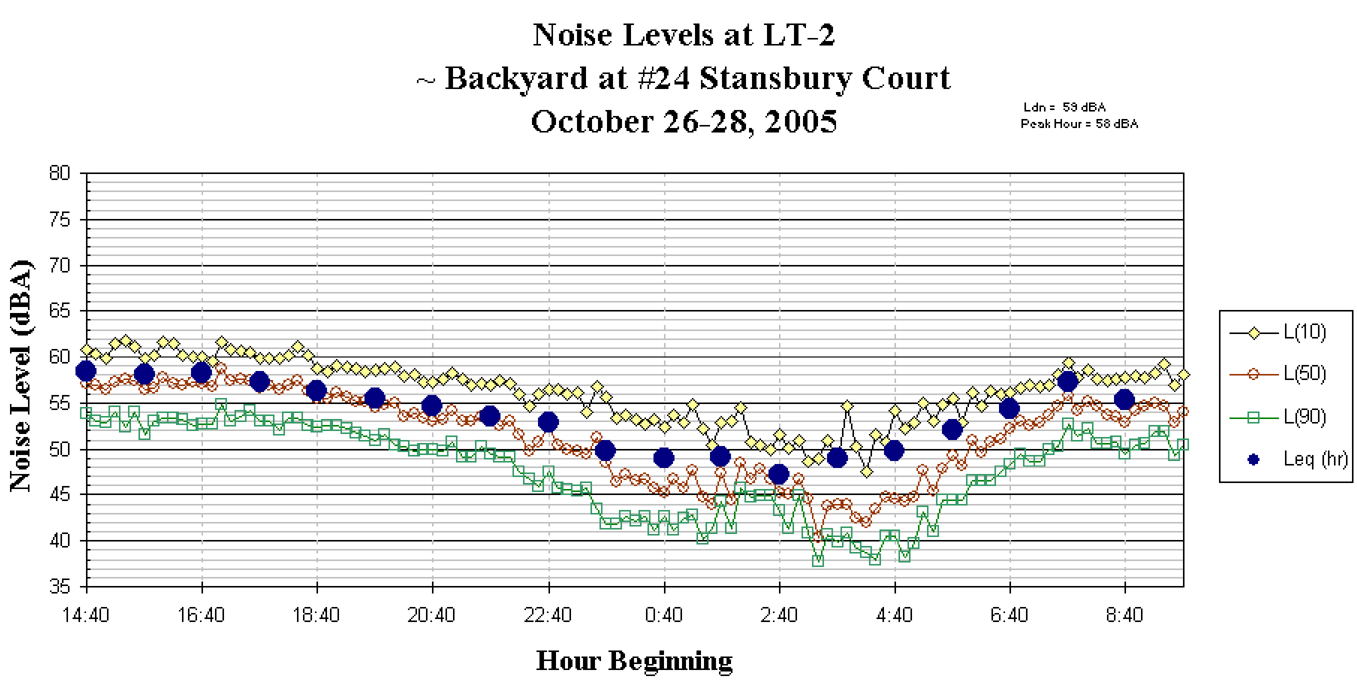


Figure3: Daily Trend in Noise Levels at LT-3

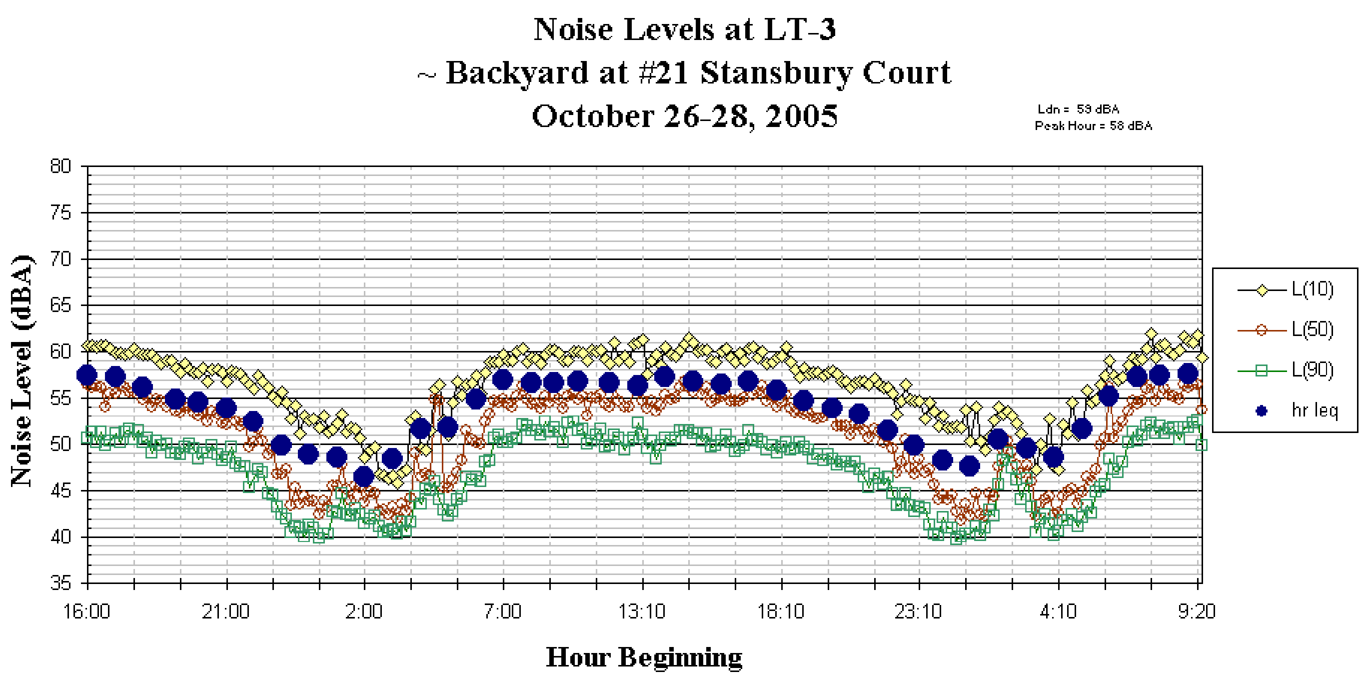


Figure 4: Daily Trend in Noise Levels at LT-4

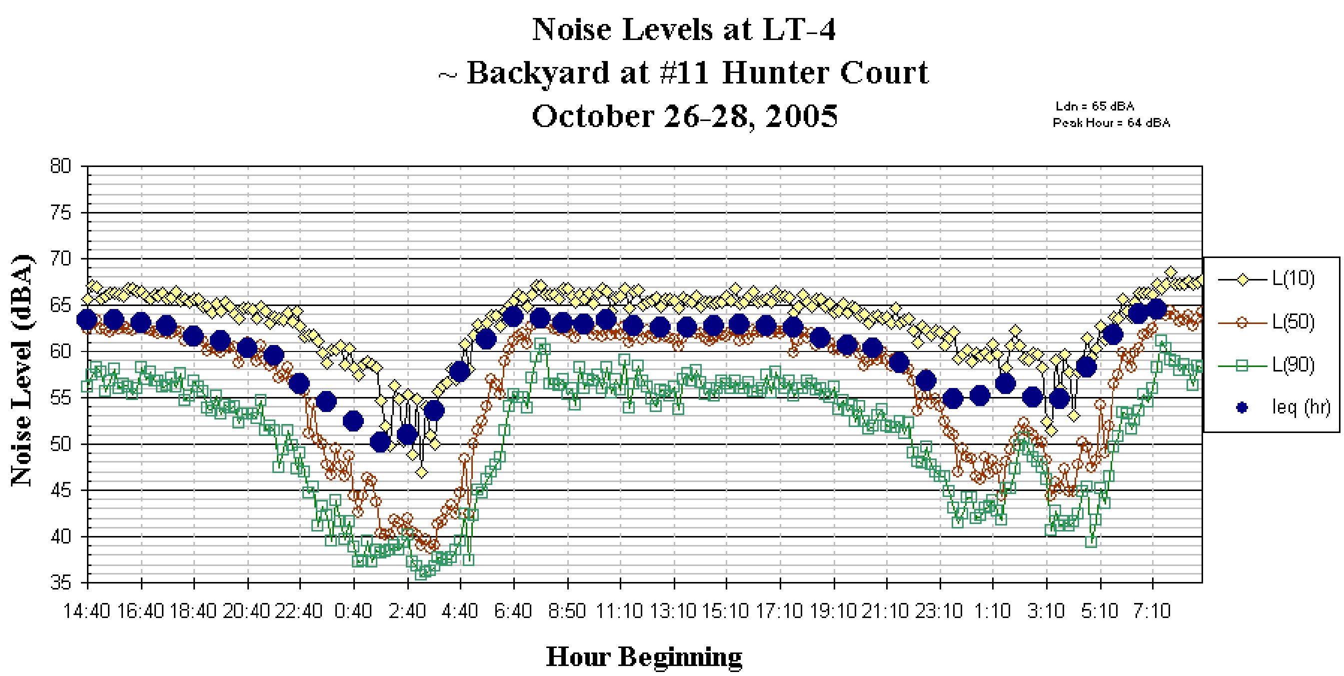
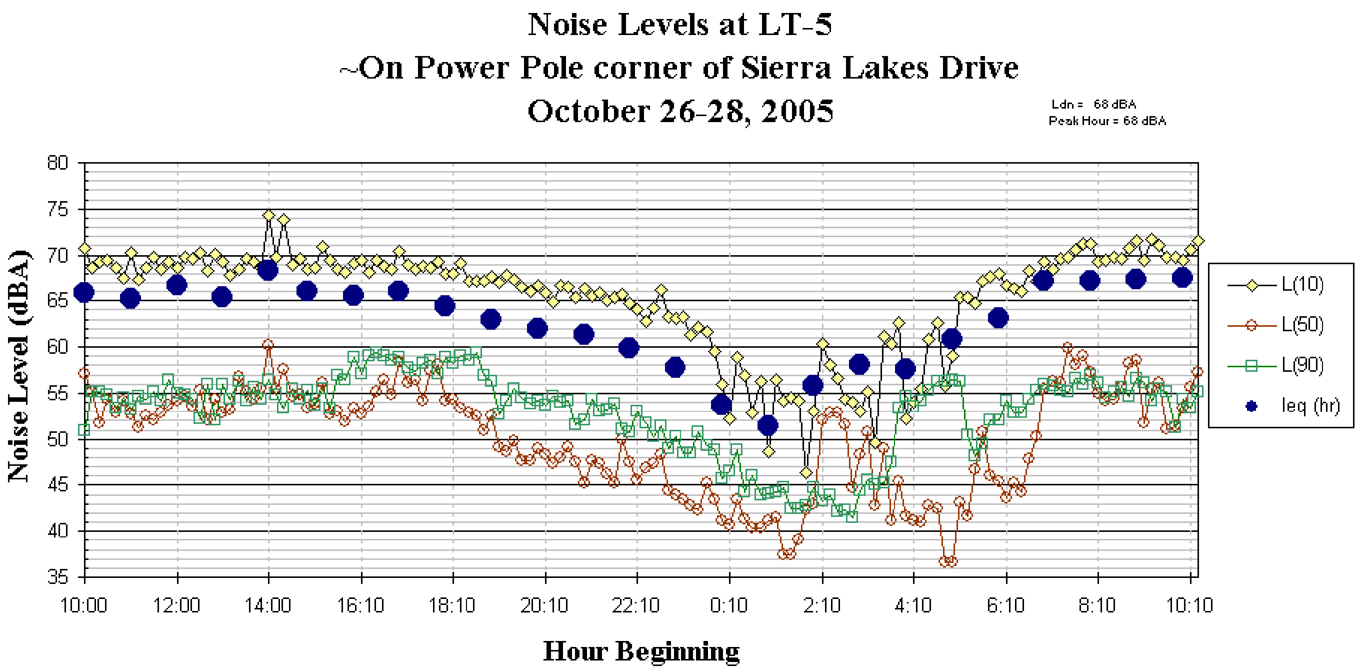


Figure 5: Daily Trend in Noise Levels at LT-5



9. FUTURE NOISE ENVIRONMENT, IMPACTS AND CONSIDERED NOISE MITIGATION

This section discusses the results of the noise modeling conducted for (1) existing and (2) future build conditions.

9.1. Future Noise Environment, Impacts

Modeling of future year (2030) traffic conditions predicts that noise levels will increase without the project by approximately 2 to 4 dBA resulting from general growth in the area. Noise levels are expected to increase by approximately 1 to 8 dBA L_{eq} (hr) at receivers in the study area with the project. This analysis evaluates impacts and mitigation following the CEQA and City of Chico guidelines.

9.2. CEQA Analysis

The SR 32 Widening project would increase the number of through travel lanes shifting the travel way closer to some of the existing residential land uses in the vicinity of the project. Noise levels generated by future no-build traffic along the proposed alignment were compared to proposed project conditions to evaluate the potential for a substantial permanent noise level increase at receivers in the project vicinity. Future noise levels were calculated with the FHWA's Traffic Noise Model (FHWA TNM v. 2.5).

Roadway, barrier, and receiver locations were digitized and input into the traffic noise model. Three-dimensional geometrics were based on the roadway improvement plans provided by Mark Thomas & Company, Inc. PM peak hour traffic volumes, the estimated vehicle mix, and traffic speeds were also input into the model to calculate the expected noise level increase associated with the project. Vehicle mix and traffic speeds were estimated based on field observations. The traffic noise model was calibrated to reflect measured noise conditions at each receiver. All receiver locations, measured (Reference - LT, Short-term – ST) and modeled (R), are shown in Appendix B.

Impact 1 **Substantial Noise Increase at Noise-Sensitive Receptors in the Project Area.** The SR 32 Widening project will move travel lanes closer to existing residences and facilitate traffic volume increases. Exterior L_{dn} noise levels are anticipated to increase substantially at some receiver locations between Fir Street and Yosemite Drive. **This is considered a significant impact** because it would result in an increase in exterior noise levels up to 8 dBA L_{dn}.

Noise impacts resulting from the project will vary along the project alignment. Noise increases of 1 to 8 dBA L_{dn} are common throughout the study area as a result of the widening and increased traffic. Table 7 summarizes the results of the traffic noise modeling using CEQA criteria.

TABLE 7 – Traffic Noise Modeling Results - CEQA Criteria

****Receptor ID**	**2030 No-Build Noise Level**	**Predicted Build Noise Level**	***Increase in Noise Levels**	**CEQA Threshold of Significance**	**CEQA Impact of Build Without OGAC**	***Increase in Build With OGAC**	**CEQA Impact of Build with OGAC**	**Cumulative Impact**
R-1	68	70	2	1.5	S	-1	LTS	No
R-2	65	66	1	3	LTS	-2	LTS	No
R-3	67	69	2	1.5	S	-1	LTS	No
R-4	66	69	3	1.5	S	0	LTS	No
R-5 (ST-15)	67	70	4	1.5	S	1	LTS	Yes
R-6 (LT-1)	67	71	4	1.5	S	1	LTS	Yes
R-7 (ST-14)	68	71	3	1.5	S	0	LTS	No
R-8	67	71	4	1.5	S	1	LTS	Yes
R-9 (ST-17)	64	63	-1	3	LTS	-4	LTS	No
R-11	68	69	1	1.5	LTS	-3	LTS	No
R-12	68	68	0	1.5	LTS	-3	LTS	No
R-13	66	65	-1	1.5	LTS	-4	LTS	No
R-14	68	68	0	1.5	LTS	-3	LTS	No
R-15	64	65	1	3	LTS	-2	LTS	No
R-16	65	65	0	1.5	LTS	-3	LTS	No
R-17 (ST-13)	67	71	4	1.5	S	1	LTS	Yes
R-18	63	64	1	3	LTS	-2	LTS	No
R-19	64	65	1	3	LTS	-2	LTS	No
R-20 (LT-2)	65	67	2	1.5	S	-1	LTS	No
R-21	65	67	2	1.5	S	-1	LTS	No
R-22	63	65	2	3	S	-1	LTS	No
R-23 (ST-12)	68	71	3	1.5	S	0	LTS	No
R-24	65	67	1	1.5	LTS	-2	LTS	No
R-25	64	66	2	3	S	-1	LTS	No
R-27	59	60	1	5	LTS	-2	LTS	No
R-28	66	70	4	1.5	S	1	LTS	Yes
R-29	61	61	0	3	LTS	-3	LTS	No
R-30	70	72	2	1.5	S	-1	LTS	No
R-31	67	70	3	1.5	S	0	LTS	No
R-32	61	61	0	3	LTS	-3	LTS	No
R-33	62	62	0	3	LTS	-3	LTS	No
R-36 (ST-1)	65	69	4	1.5	S	1	LTS	Yes
R-37 (ST-8)	66	69	2	1.5	S	-1	LTS	No
ST-2	64	69	5	3	S	2	LTS	Yes
R-39	62	66	4	3	S	1	LTS	Yes
R-41	64	66	5	3	S	2	LTS	Yes
R-42 (ST-4)	65	65	4	3	S	1	LTS	Yes
R-43 (ST-5)	62	64	3	3	S	0	LTS	No
R-44	60	64	4	3	S	1	LTS	Yes
R-45	62	65	3	3	LTS	0	LTS	No
R-49	67	72	5	1.5	S	2	S	Yes
R-50	67	72	5	1.5	S	2	S	Yes
R-51	67	72	5	1.5	S	2	S	Yes
R-52	67	72	5	1.5	S	2	S	Yes
R-53	67	71	4	1.5	S	1	LTS	Yes
R-54	67	71	4	1.5	S	1	LTS	Yes
R-55	66	70	4	3	S	1	LTS	Yes

*Levels may not add up exactly due to rounding of modeled results.
**Reference sites not included.
LTS – Less than Significant
S - Significant

9.2.1. Fir Street to Forest Avenue

A separated four-lane facility currently exists from Fir Street to approximately 1,100 feet east of Fir Street where it transitions into a two-lane facility with left turn pockets at Forest Avenue. With the construction of the project, the two-lane section of the existing facility will be widened to a four-lane facility, moving the traffic closer to the homes on the westbound (south side) of SR 32. Along eastbound SR 32 there is a mixture of commercial, assisted living housing, multi-family apartments, and single-family residences. Along the westbound (north side) of SR 32 there is a mixture of multi-family and single family residences.

AREA 2

Impact 1-A - An assisted living center (Community Care Options) is located on the south side of SR 32. The widening will move the westbound traffic farther away as compared to the current configuration. The combination of this and the setback of the facility from SR 32 results in noise levels that are expected to be slightly lower with the project than without the project. Noise levels are expected to decrease by approximately 1 dBA L_{dn}. Mitigation is not required.

Impact 1-B - There are two apartment complexes east of the assisted living center along this section of SR 32, Humboldt Park and Humboldt Ridge Apartments. These complexes back up to the highway right-of-way and noise levels are expected to increase from a future no-build noise level of between 65 and 68 dBA L_{dn} to a future build noise level of between 65 and 69 dBA L_{dn}. Paving SR 32 with OGAC will reduce noise levels by 3 dBA; this would reduce the impact to a ***less-than-significant level.***

Impact 1-C - Noise levels at the single-family residences located on Hunter Court are expected to increase 2 to 4 dBA, from the future no-build noise levels of 66 to 70 dBA L_{dn} to a future build noise level of 70 to 72 dBA L_{dn}. Paving SR 32 with OGAC will reduce noise levels by 3 dBA; this would reduce the impact to a ***less-than-significant level***.

AREA 1

Impact 1-D - Future no-build noise levels at the Vista Verde apartment complex and the Turning Point Commons Cooperative on the north side of SR 32 are expected to increase by an average of 3 dBA from an average of 67 dBA L_{dn} to 70 dBA L_{dn}. Paving SR 32 with OGAC will reduce noise levels by 3 dBA; this would reduce the impact to a ***less-than-significant level*** at the Vista Verde apartment and at the Turning Point Commons Cooperative.

Impact 1-E – Noise levels at the homes adjacent to the highway along Modoc Drive, Greg Court and Merle Court are expected to increase between 3 to 5 dBA from 66 to 67 dBA L_{dn} to 70 to 72 dBA L_{dn}. Paving SR 32 with OGAC will reduce noise levels by 3 dBA; this would not reduce the impact to a less-than-significant level, additional mitigation would be required in the form of a sound wall. A sound wall 6 feet in height will reduce the noise levels to a ***less-than-significant level***. The soundwall as shown on Figure 15a and 15b, Noise Receptor Maps 1 and 2 of 4 shows the wall location.

9.2.2. SR 32 from Forest Avenue to El Monte Avenue

The existing SR 32 is a two-lane facility with left turn lanes at the intersection of both Forest Avenue and El Monte Avenue. The widening will be to the north of the existing SR 32. The receptors on the south side of SR 32 are set back from the roadway on large parcels. On the southeast corner of Forest Avenue and SR 32 there is a commercial receptor. On the northeast corner of SR 32 and Forest Avenue there is a small subdivision. To the east of the subdivision is Dead Horse Slough. East of Dead Horse Slough is a bed and breakfast, a music school in a private residence and two homes.

AREA 3A and 3B

Impact 1-F – There are six homes located on the south side of SR 32 between Forest Avenue and El Monte Avenue. The widening will move the westbound traffic farther from the homes than the current configuration. The combination of this and the setback of the homes from SR 32 results in noise levels that are expected to remain the same or slightly higher (1 dBA, L_{dn}) with the project than without the project. At this location the CEQA threshold of significance is 3 dB, L_{dn} above the existing, this is not considered a substantial increase and mitigation is not required.

Impact 1-G - There are six receptors located adjacent to SR 32 on Stansbury Court. The noise levels at these receptors are expected to increase from a predicted future no-build average noise level of 64 dBA L_{dn} to a future build noise level of 66 dBA L_{dn}. Paving SR 32 with OGAC will reduce noise levels by 3 dBA; this would reduce the impact to a ***less-than-significant*** level at all of the receptor locations.

Impact 1-H – The noise levels at the outdoor area of the bed and breakfast are expected to increase from a future no-build noise level of 68 dBA L_{dn} to a future build level of 71 dBA L_{dn}. The noise levels at the music school and the private residences are expected to increase from a future no-build noise level of 65 dBA L_{dn} to a future build level of 66 dBA L_{dn}. Paving SR 32 with OGAC will reduce noise levels by 3 dBA, L_{dn}. This would reduce the impact to a ***less-than-significant level.***

9.2.3. SR 32 from El Monte Avenue to Bruce Road

East of El Monte Avenue the widening will transition from the widening on the north side of SR 32 to both sides of SR 32. On the south side of SR 32 there is one subdivision under construction, the Mission Vista Hills, a 33 home development. To the east of this is undeveloped land. On the north side of SR 32 there is a veterinary clinic located on the corner of El Monte Avenue and SR 32, east of this is primarily undeveloped land adjacent to SR 32.

AREA 4

Impact 1-I – The noise levels at the veterinary clinic are expected to increase form an existing level of 67 dBA L_{dn} to a future build level of 70 dBA L_{dn}. There is no threshold of significance for noise level increases for commercial applications and the noise increase is therefore not considered a significant impact and mitigation is not required.

Impact 1-J – The noise levels at the Mission Vista Hills Subdivision with the construction of sound wall as required by the building permit are expected to increase from a future no-build level of 61 dBA L_{dn} to a future build level of 62 dBA L_{dn}. At this location the CEQA threshold of significance is 3 dBA, L_{dn} above the existing, this is not considered a substantial increase and mitigation is not required.

9.2.4. SR 32 from Bruce Road to Yosemite Drive

On the south side of SR 32 a 340-acre subdivision, Oak Valley Subdivision, has been approved by the City for construction. A Final Environmental Impact Report was completed in November of 2004 for a 43-acre section of the 340-acre subdivision. The Vesting Tentative Subdivision Map indicates that there will be approximately 15 parcels along SR 32. Along the north side of SR 32 there are four apartment complexes adjacent to SR 32.

AREA 5

Impact 1-K - The noise levels at the Sierra Lakeside apartment complex on the north side of SR 32 are expected to increase by an average of 3 dBA, L_{dn} from 66 dBA L_{dn} to 69 dBA L_{dn}. Paving SR 32 with OGAC will reduce noise levels by 3 dBA at the Sierra Lakeside apartments; this would reduce the impact to a ***less-than-significant level***.

Impact 1-L - The noise levels at the Sierra Sunrise Village apartment complex on the north side of SR 32 are expected to increase by an average of 6 dBA from an average of 63 dBA L_{dn} to 68 dBA L_{dn}. Paving SR 32 with OGAC will reduce noise levels by 3 dBA, L_{dn} at the Sierra Sunrise apartments; this would reduce the impact to a ***less-than-significant level***.

Impact 1-M - The noise levels at the Sierra Manor apartment complex on the north side of SR 32 are expected to increase by an average 4 dBA, L_{dn} from 62 dBA L_{dn} to 66 dBA L_{dn}. Paving SR 32 with OGAC will reduce noise levels by 3 dBA L_{dn} at the Sierra Manor apartments; this would reduce the impact to a ***less-than-significant level***.

Impact 1-N - The noise levels at the Yosemite Terrace apartment complex on the north side of SR 32 are expected to increase by an average of 3 dBA L_{dn} from 62 dBA L_{dn} to 65 dBA L_{dn}. Paving SR 32 with OGAC will reduce noise levels by 3 dBA at the Yosemite Terrace apartments; this would reduce the impact to a ***less-than-significant level***.

Impact 1-O - The proposed building sites in the Oak Valley subdivision indicate that the homes will be set back at such a distance that there will be no impact from the proposed SR 32 widening. Without final design plans with exact location and elevations of the proposed homes an accurate determination is not possible.

Mitigation 1-O – Using OGAC will reduce noise levels by 3 dBA L_{dn}, this would account for any additional noise increases from the widening, which was not accounted for in the analysis for the final EIR prepared for the Oak Valley subdivision.

9.3. CEQA Cumulative Impact

CEQA Guidelines, Section 15355, defines a cumulative impact as follows: "*Cumulative impacts" refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.*

To define the potential cumulative impacts in the project area the following criteria were applied. The determination was based on a comparison of future noise levels with the project versus existing noise levels. Two further tests were then applied. First, would the increase exceed the City's noise threshold (L_{dn} 60 dBA)? If it would then the second question is whether or not the project makes a cumulatively considerable contribution (1 dB or more) to the total increase. If both conditions and tests were met then there would be a significant cumulative impact and mitigation would need to be analyzed.

With the addition of OGAC and without the 6' wooden fence, there are three areas that would have a cumulative impact, see Table 8. The first is the area on the north side of SR32 between the beginning of the project and Forest Avenue. The second area is on the south side of SR32 east of the Humboldt Ridge Apartments to Forest Avenue. The third area is between on the north side of SR32 between Bruce Road and the end of the project. All the other areas do not meet the definition

The construction of a six (6') foot tall wall/fence is included as a feature of the project to reduce the impact to less than 1 dBA L_{dn} (a cumulatively considerable level). The wall/fence could be made up of any material that has a transmission loss at least 10 dBA greater than the desired noise reduction. Transmission loss is defined as the amount of energy or noise stopped or absorbed by the material used in the barrier. For example if the amount of reduction required by a barrier or wall was 5 dB than the barrier material would need to have a transmission loss of 15 dB or greater. Typically a one-inch thick wood fence has a transmission loss of 21 dBA. The following tables show the areas where cumulative impacts would occur.

Table 8 - Summary of Cumulative Impacts

Area #1 from Beginning of project to Forest Avenue (North Side of SR32)- Noise levels in LDN

Receptor ID	Number of Residences Represented	Existing (Ldn)	2030 No-Build (Ldn)	Increase of Future No-Build over Existing	Increase of Future Build W/OGAC over Existing (Cumulative)	2030 Build (Ldn) With/OGAC	Increase of Future Build W/OGAC over Future No-Build (Project Impacts)	With 6' Barrier at the ROW Line	City Of Chico CEQA Criteria (Ldn)	CEQA Impact (Project Level)	Cumulative Impact
R1	4	66	68	2	2	67	-1	61	1.5	LTS	No
R2	5	61	65	4	2	63	-2	59	3	LTS	No
R3	3	64	67	3	2	66	-1	62	1.5	LTS	No
R4	3	64	66	2	2	66	0	62	1.5	LTS	No
R5 - ST 15	3	65	67	2	3	68	1	64	1.5	LTS	No
R6	2	65	67	2	4	68	1	64	1.5	LTS	No
R7 - ST 14	2	65	68	2	2	68	0	62	1.5	LTS	No
R8	2	64	67	2	3	68	1	64	1.5	LTS	No
R17 - ST13	3	65	67	2	3	67	1	65	1.5	LTS	No
R49	1	65	67	2	4	69	2	64	1.5	LTS	No
R50	2	65	67	2	4	69	2	68	1.5	LTS	No
R51	2	64	67	2	4	69	2	65	1.5	LTS	No
R52	2	64	67	2	4	69	2	65	1.5	LTS	No
R53	3	65	67	2	4	68	1	64	1.5	LTS	No
R54	2	65	67	2	3	68	1	64	1.5	LTS	No
R55	2	64	66	2	3	67	1	63	1.5	LTS	No

Area #1 from Beginning of project to Forest Avenue (South Side of SR32)- Noise levels in LDN

Receptor ID	Number of Residences Represented	Existing (Ldn)	2030 No-Build (Ldn)	Increase of Future No-Build over Existing	Increase of Future Build W/OGAC over Existing (Cumulative)	2030 Build (Ldn) With/OGAC	Increase of Future Build W/OGAC over Future No-Build (Project Impacts)	With 6' Barrier at the ROW Line	City Of Chico CEQA Criteria (Ldn)	CEQA Impact (Project Level)	Cumulative Impact
R9 - ST 17	4	62	64	2	-1	58	-6	58	3	LTS	No
R11	4	66	68	2	0	66	-3	58	1.5	LTS	No
R12	6	66	68	2	0	65	-3	58	1.5	LTS	No
R13	2	64	66	2	-1	62	-4	57	1.5	LTS	No
R14	6	65	68	2	0	65	-3	58	1.5	LTS	No
R16	4	63	65	2	0	62	-3	58	1.5	LTS	No
R27	2	57	59	2	1	57	-2	55	5	LTS	No
R28	1	64	66	2	4	67	1	61	1.5	LTS	No
R30	1	67	70	2	2	69	-1	61	1.5	LTS	No
R31	2	65	67	2	3	67	0	63	1.5	LTS	No

Area #3A from Forest Avenue to Dead Horse Slough- Noise levels in LDN

Receptor ID	Number of Residences Represented	Existing (Ldn)	2030 No-Build (Ldn)	Increase of Future No-Build over Existing	Increase of Future Build W/OGAC over Existing (Cumulative)	2030 Build (Ldn) With/OGAC	Increase of Future Build W/OGAC over Future No-Build (Project Impacts)	With 6' Barrier at the ROW Line	City Of Chico CEQA Criteria (Ldn)	CEQA Impact (Project Level)	Cumulative Impact
R18	1	60	63	3	0	61	-3	61	3	LTS	No
R19	1	61	64	3	1	62	-2	62	3	LTS	No
R20	2	62	65	4	2	64	-1	63	1.5	LTS	No
R21	1	61	65	4	2	64	-1	63	3	LTS	No
R22	1	59	63	4	2	62	-1	62	3	LTS	No

LTS - Less than Significant

S - Significant Impact

Levels may not add up exactly due to rounding

A barrier is considered any material with a sufficant Transmission Loss to meet the required reduction (see section 9.3)

Table 8 - Summary of Cumulative Impacts (continued)

Area #3B From Dead Horse Slough to El Monte Avenue- Noise levels in LDN											
Receptor ID	Number of Residences Represented	Existing (Ldn)	2030 No-Build (Ldn)	Increase of Future No-Build over Existing	Increase of Future Build W/OGAC over Existing (Cumulative)	2030 Build (Ldn) With/OGAC	Increase of Future Build W/OGAC over Future No-Build (Project Impacts)	With 6' Barrier at the ROW Line	City Of Chico CEQA Criteria (Ldn)	CEQA Impact (Project Level)	Cumulative Impact
R23 - ST 12	1	65	68	4	3	68	0	67	1.5	LTS	No
R24	1	62	65	4	1	63	-2	64	1.5	LTS	No
R25	2	61	64	3	2	63	-1	63	3	LTS	No
Area #4 From Bruce Road to Yosemite Drive - Noise levels in LDN											
Receptor ID	Number of Residences Represented	Existing (Ldn)	2030 No-Build (Ldn)	Increase of Future No-Build over Existing	Increase of Future Build W/OGAC over Existing (Cumulative)	2030 Build (Ldn) With/OGAC	Increase of Future Build W/OGAC over Future No-Build (Project Impacts)	With 6' Barrier at the ROW Line	City Of Chico CEQA Criteria (Ldn)	CEQA Impact (Project Level)	Cumulative Impact
R36 - ST 1	4	64	65	2	4	66	1	63	1.5	LTS	No
R37 - ST 8	6	64	66	2	2	66	-1	64	1.5	LTS	No
R38 - ST 2	Rec Area	62	64	2	5	66	2	62	3	LTS	No
R39	4	60	62	2	4	63	1	58	3	LTS	No
R41	6	61	64	3	5	66	2	60	3	LTS	No
R42 - ST 4	3	62	65	2	4	66	1	58	3	LTS	No
R43 - ST 5	4	60	62	2	3	62	0	57	3	LTS	No
R44	3	58	60	2	4	61	1	57	3	LTS	No
R45	3	60	63	2	3	62	0	59	3	LTS	No

LTS - Less than Significant
S - Significant Impact
A barrier is considered any material with a sufficant Transmission Loss to meet the required reduction (see section 9.3)
Levels may not add up exactly due to rounding

9.3.1. Changes to Noise Levels at Distant Receivers Behind Sound Walls

Some community members have indicated that they believe that sound walls have increased noise levels at distant receivers that are behind a sound wall. There is no question that sound walls reduce noise levels behind sound walls within about 500 feet (depending upon the topography). In the past, residents' have made complaints approximately 1,300 to 3,300 feet behind new sound walls that their noise levels increased because of new sound walls. Caltrans has conducted studies (Caltrans 1989 and 1991) or contracted studies (Woodward-Clyde Consultants and Illingworth & Rodkin, Inc. 1994, 1999a, 1999b and 1999c) to evaluate this effect. These studies included before and after sound wall measurements of traffic noise, traffic volume (by vehicle type), traffic speed, and meteorological conditions. Before and after sound wall measurements were carefully matched by meteorological conditions (primarily wind and vertical temperature gradient data) and normalized for different traffic conditions. The conclusion reached in all studies is that sound wall did not affect noise levels at distant receivers. The studies found that traffic noise levels varied by up to 10 dBA, due to changes in meteorological conditions.

9.3.2. Pavement Effects on Traffic Noise Levels

Recent research has found a considerable variation in traffic noise levels associated with different pavement types. An ongoing traffic noise study along Interstate 80 in Davis, California found a 5-dBA decrease in traffic noise when aged (old) asphalt concrete (AC) pavement was replaced with OGAC. The new FHWA noise model indicates that there is a difference of about 3-dBA between OGAC and Portland Cement Concrete (PCC) pavement types. Recent research indicates differences of up to 10 dBA immediately adjacent to roadways. Caltrans and other states are conducting extensive research to identify the noise conditions associated with different pavement types.

10. CONSTRUCTION NOISE

Construction activities associated with the proposed Widening of State Route 32 Project will include clearing of vegetation, grading, construction of a new structure for crossing Dead Horse Slough, roadway construction of travel lanes on SR 32, reconstruction of the existing intersections, and the possible construction of sound wall.

10.1. Construction Noise Impacts

Impact **Increased Noise During Construction.**
Construction activities would result in temporary noise level increases at receivers along the project alignment. Assuming that there will be no night time work this impact is considered less than significant given the anticipated construction schedule and the time that particular noise-sensitive receivers would be affected by the project.

Construction of the project would generate noise, and would temporarily increase noise levels at adjacent residential receptors. Road construction is anticipated to begin at the earliest in Spring 2009 and be completed in approximately one year. Construction equipment would likely include air compressors, paving machines, forklift trucks, loaders, pavement grinders, dump trucks, trenching machines, compactors, and backhoes. The park-and -ride lots at the west end of the project have been identified as potential staging areas for the contractor.

TABLE 13 – CONSTRUCTION EQUIPMENT NOISE

Type of Construction Equipment	Maximum Level, dBA at 15 meters
Scrapers	89
Bulldozers	85
Heavy trucks	88
Backhoe	80
Pneumatic tools	85
Concrete Pump	82
Impact Pile Driver	95 to 105
Source: National Cooperative Highway Research Program, Synthesis of Highway Practice 218, Mitigation of Nighttime Construction Noise, Vibrations, and Other Nuisances. 1999	

Noise impacts resulting from construction depend on the noise generated by various pieces of construction equipment, the timing and duration of noise generating activities, and the distance between construction noise sources and noise sensitive receptors. Construction activities generate considerable amounts of noise, especially when heavy equipment is used. At times, these activities would occur immediately adjacent to residential receivers. Tables 13 and 14 show typical noise levels generated by construction equipment at a distance of 50 feet from the source and at a distance of 50 feet from the construction activity center, respectively. The highest maximum noise levels generated by project construction would typically range from about 90 to 98 dBA L_{max} at a distance of 50 feet from the noise source. Typical hourly average construction generated noise levels are about 79 dBA to 88 dBA L_{eq} measured at a distance of 50 feet from the center of the site during busy construction periods. Noise levels described above would be expected when construction occurs in the immediate vicinity of receivers along the project alignment. Construction generated noise levels drop off at a rate of about 6 dBA per doubling of distance between the source and receptor. Shielding provided by buildings or terrain result in lower construction noise levels at distant receptors. Construction noise levels would at times exceed 60 dBA L_{eq} and the ambient by at least 5 dBA L_{eq} at nearby receivers. Noise generated by roadway construction does not typically last over extended periods of time as activities move along the right-of-way as construction proceeds.

Construction noise impacts primarily result when construction activities occur during noise-sensitive times of the day (early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise sensitive land uses, or when construction durations last over extended periods of time. Limiting the hours when construction can occur to daytime hours is often a simple method to reduce the potential for noise impacts. In areas immediately adjacent to construction, controls such as constructing temporary sound wall and utilizing "quiet" construction equipment can also reduce the potential for noise impacts.

10.2. Construction Noise Control Measures

Although the impact is considered less than significant, the following standard construction noise control measures should be implemented at the construction site to reduce the effects of construction noise on adjacent residential land uses.

1. Noise-generating activities at the construction site or in areas adjacent to the construction site associated with the project in any way should be restricted to the hours of 7:00 a.m. to 7:00 p.m., Monday through Friday. Should it become necessary to work on weekends, holidays, or after 7:00 p.m., residents should be notified and noise levels for the needed work should be subject to a special provision that would limit noise levels from construction activities to not exceed 82 dB at 50 feet.

2. Equip all internal combustion engine driven equipment with intake and exhaust mufflers, which are in good condition and appropriate for the equipment.

3. “Unnecessary” idling of internal combustion engines should be strictly prohibited.

4. Avoid staging of construction equipment within 200 feet of residences and locate all stationary noise-generating construction equipment, such as air compressors and portable power generators, as far as practical from existing noise sensitive receptors. Construct temporary barriers to screen stationary noise generating equipment when located in areas adjoining noise sensitive land uses.

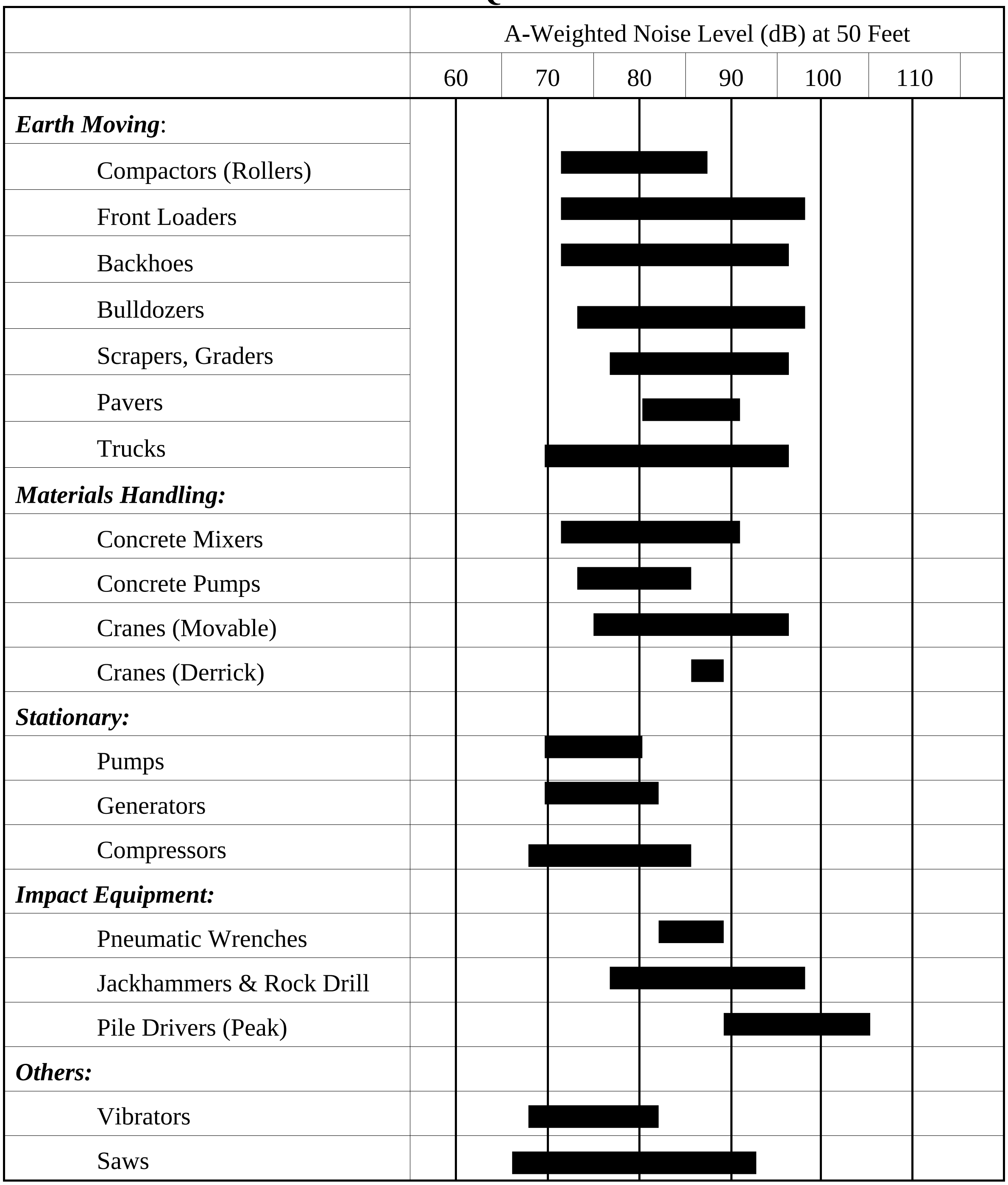
5. Utilize "quiet" air compressors and other stationary noise sources where technology exists.

6. Route all construction traffic to and from the project site via designated truck routes. Prohibit construction related heavy truck traffic in residential areas where feasible. Prohibit construction truck traffic in the project vicinity during non-allowed hours.

7. Notify adjacent residents to the project site of the construction schedule in writing.

8. Designate a "noise disturbance coordinator" who would be responsible for responding to any local complaints about construction noise. The disturbance coordinator would determine the cause of the noise complaint (e.g., starting too early, bad muffler, etc.) and would require that reasonable measures warranted to correct the problem be implemented. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include it in the notice sent to neighbors regarding the construction schedule. (The City should be responsible for designating a noise disturbance coordinator and the contractor should be responsible for posting the phone number and providing construction schedule notices).

TABLE 14 – CONSTRUCTION EQUIPMENT NOISE LEVEL RANGE



Source: Handbook of Noise Control, Cyril M. Harris, 1979

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13. APPENDIX A – GLOSSARY OF TECHNICAL TERMS

List of Technical Terms

Term	**Definitions**
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base of 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency, Hz	The number of complete pressure fluctuations per second above and below the atmospheric pressure.
A-weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted, unless reported otherwise.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1, 10, 50, and 90 percent of the time during the measurement period.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of 10 decibels to sound levels measured in the night between 10:00 p.m. and 7:00 a.m.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.

14. APPENDIX B - PLAN SHOWING NOISE RECEIVER LOCATIONS

Figure 15a. Noise Receptor Map

INDEX

R-1	Modeled Receptor Locations
ST-15	Short Term Noise Measurement Locations
LT-1	Long Term Noise Measurement Locations

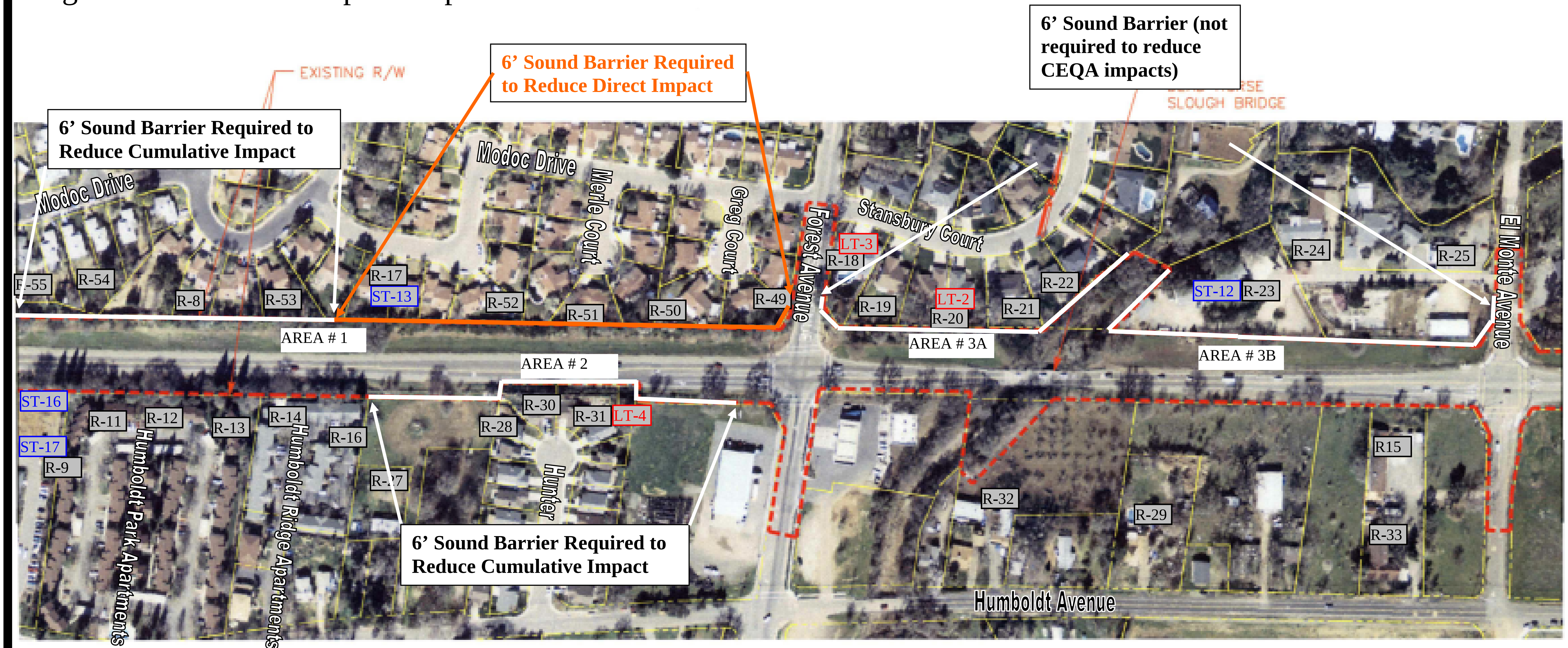
STATE ROUTE 32 WIDENING PROJECT

(State Route 99 to Yosemite Drive)

Noise Measurement and Modeled Receiver locations

NOT TO SCALE SHEET 1 OF 4

Figure 15 b. Noise Receptor Map



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R-1	Modeled Receptor Locations
ST-15	Short Term Noise Measurement Locations
LT-1	Long Term Noise Measurement Locations

STATE ROUTE 32 WIDENING PROJECT

(State Route 99 to Yosemite Drive)

Noise Measurement and Modeled Receiver locations

NOT TO SCALE

SHEET 2 OF 4

Figure 15c. Noise Receptor Map

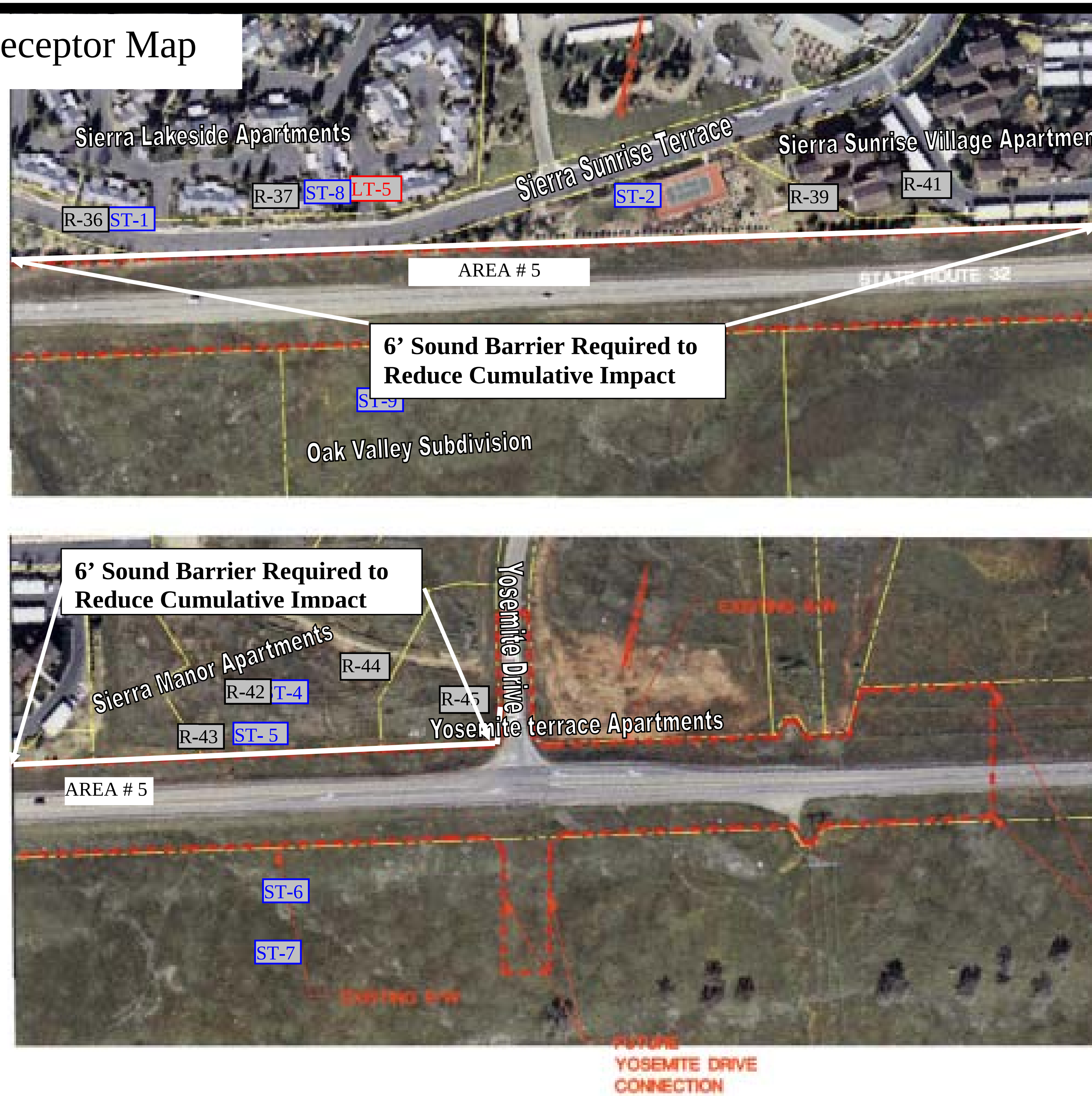
INDEX

R-1	Modeled Receptor Locations
ST-15	Short Term Noise Measurement Locations
LT-1	Long Term Noise Measurement Locations

STATE ROUTE 32 WIDENING PROJECT
(State Route 99 to Yosemite Drive)
Noise Measurement and Modeled Receiver locations

NOT TO SCALE SHEET 3 OF 4

Figure 15d. Noise Receptor Map



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R-1	Modeled Receptor Locations
ST-15	Short Term Noise Measurement Locations
LT-1	Long Term Noise Measurement Locations

STATE ROUTE 32 WIDENING PROJECT

(State Route 99 to Yosemite Drive)

Noise Measurement and Modeled Receiver locations

NOT TO SCALE

SHEET 4 OF 4

15. APPENDIX C - SAMPLE TNM 2.5 MODEL INPUT AND OUTPUT FILES

SR32 WIDENING
NOISE ANALYSIS SUMMARY

Receptor ID	Number of Residences Represented	Existing (Ldn)	2030 No-Build (Ldn)	2030 Build (Ldn) WithOut OGAC	Build with OGAC	6 ft. all above R/W Line with out OGAC	6ft wall With OGAC	8 ft wall above R/W Line without OGAC	8 ft wall With OGAC
Location Option B2 - North Side of SR 32									
R1	4	66	68	70	67	64	61	62	59
R2	5	61	65	66	63	62	59	61	58
R3	3	64	67	69	66	65	62	63	60
R4	3	64	66	69	66	65	62	63	60
Area #1 North Side of SR 32 - Base Project									
R5 - ST 15	3	65	67	71	68	67	64	65	62
R6	2	65	67	71	68	67	64	65	62
R7 - ST 14	2	65	68	71	68	65	62	63	60
R8	2	64	67	71	68	67	64	65	62
R17 - ST13	3	65	67	71	68	68	65	66	63
R49	1	65	67	72	69	67	64	65	62
R50	2	65	67	72	69	71	68	67	64
R51	2	64	67	72	69	68	65	64	61
R52	2	64	67	72	69	68	65	65	62
R53	3	65	67	71	68	67	64	65	62
R54	2	65	67	71	68	67	64	64	61
R55	2	64	66	70	67	66	63	63	60
Area #1 - South Side of SR 32 - Base Project									
R28	1	64	66	70	67	64	61	63	60
R30	1	67	70	72	69	64	61	63	60
R31	2	65	67	70	67	63	60	62	59
Location Option B1 - North Side of SR 32									
R18	1	60	63	64	61	64	61	63	60
R19	1	61	64	65	62	65	62	62	59
R20	2	62	65	67	64	66	63	63	60
R21	1	61	65	67	64	66	63	63	60
R22	1	59	63	65	62	65	62	63	60
Location Option B2 - North Side of SR 32									
R23 - ST 12	1	65	68	71	68	70	67	67	64
R24	1	62	65	66	63	67	64	66	63
R25	2	61	64	66	63	66	63	66	63
Area #4 North Side of SR 32 - Base Project									
R36 - ST 1	4	64	65	69	66	66	63	64	61
R37 - ST 8	6	64	66	69	66	67	64	65	62
R38 - ST 2	Rec Area	62	64	69	66	65	62	63	60
R39	4	60	62	66	63	61	58	60	57
R41	6	61	64	68	65	63	60	61	58
R42 - ST 4	3	62	65	69	66	61	58	59	56
R43 - ST 5	4	60	62	65	62	60	57	59	56
R44	3	58	60	64	61	60	57	59	56
R45	3	60	63	65	62	62	59	60	57