This analysis discusses the existing noise setting, identifies potential impacts and proposes mitigation measures related to noise for the proposed Elk Grove Boulevard/SR 99 Interchange Modification project. Information contained in this section is based on a Noise & Vibration Assessment conducted by Ambient Air & Noise Consulting on March 24, 2006.

DEFINITIONS

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, defined as one-tenth of the logarithm of the ratio of the sound pressure squared over the reference pressure squared.

CNEL Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise

occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours

weighted by a factor of 10 prior to averaging.

Frequency The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.

Ldn Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.

Leq Equivalent or energy-averaged sound level.

Lmax The highest root-mean-square (RMS) sound level measured over a given period of time.

Loudness A subjective term for the sensation of the magnitude of sound.

Masking The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.

Noise Unwanted sound.

Peak Noise The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the "Maximum" level, which is the highest RMS level.

RT_{60} The time it takes reverberant sound to decay by 60 dB once the source has been removed.

Sabin The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 sabin.

4.5.1 EXISTING SETTING

NOISE BACKGROUND

Noise is generally defined as unwanted or excessive sound, which can vary in intensity by over one million times within the range of human hearing. Sound is defined as any pressure variation in air that the human ear can detect and is characterized by both its amplitude and frequency (or pitch). The human ear does not hear all frequencies equally. In particular, the ear deemphasizes low and very high frequencies. Measuring sound directly in terms of pressure would require a very large and awkward range of numbers; therefore, to better approximate the sensitivity of human hearing, the A-weighted decibel scale has been developed. There is a strong correlation between A-weighted sound levels (expressed as dBA) and community response to noise. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment, and is used in this document. **Table 4.5-1** includes examples of A-weighted noise levels from common indoor and outdoor activities.

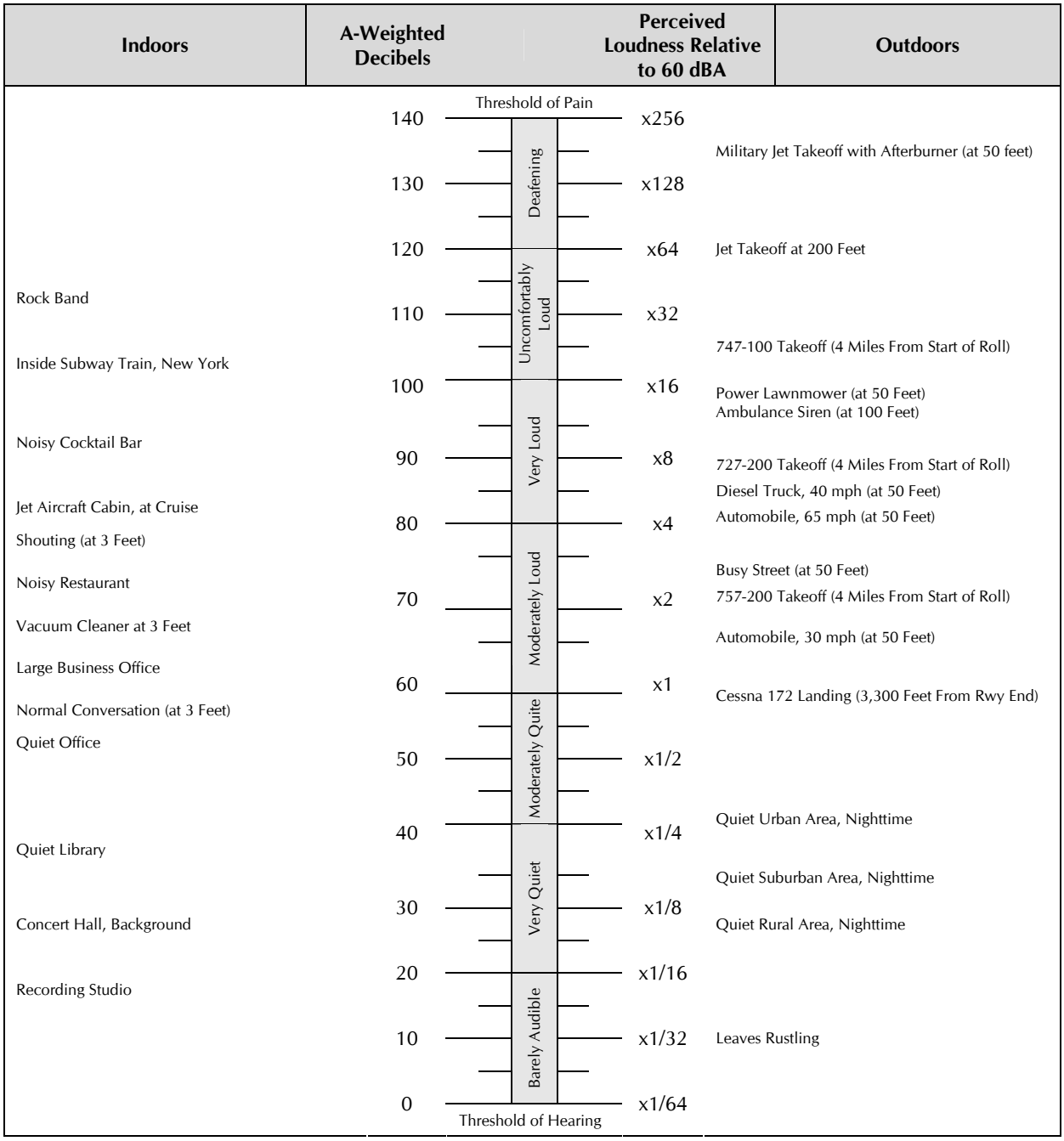
Noise can be generated by a number of sources, including mobile sources such as automobiles, trucks, and airplanes, and stationary sources such as construction sites, machinery, and industrial operations. Noise generated by mobile sources typically attenuates (is reduced) at a rate between 3.0 and 4.5 dBA per doubling of distance. The rate depends on the ground surface and the number or type of objects between the noise source and the receiver. Hard and flat surfaces, such as concrete or asphalt, have an attenuation rate of 3.0 dBA per doubling of distance. Soft surfaces, such as uneven or vegetated terrain, have an attenuation rate of about 4.5 dBA per doubling of distance. Noise generated by stationary sources typically attenuates at a rate between 6.0 and about 7.5 dBA per doubling of distance.

There are a number of metrics used to characterize community noise exposure, which fluctuate constantly over time. One such metric, the equivalent sound level (Leq), represents a constant sound that, over the specified period, has the same sound energy as the time-varying sound. Noise exposure over a longer period of time is often evaluated based on the Day-Night Sound Level (Ldn). This is a measure of 24-hour noise levels that incorporates a 10-dBA penalty for sounds occurring between 10 pm and 7 am. The penalty is intended to reflect the increased human sensitivity to noises occurring during nighttime hours, particularly at times when people are sleeping and there are lower ambient noise conditions. Typical Ldn noise levels for light and medium density residential areas range from 55-65 dBA.

Two of the primary factors that reduce levels of environmental sounds are increasing the distance between the sound source to the receiver and having intervening obstacles such as walls, buildings, or terrain features between the sound source and the receiver. Factors that act to increase the loudness of environmental sounds include moving the sound source closer to the receiver, sound enhancements caused by reflections, and focusing caused by various meteorological conditions.

Stationary point sources of noise, including stationary mobile sources such as idling vehicles, attenuate (lessen) at a rate of 6-9 dB per doubling of distance from the source, depending on environmental conditions (i.e., atmospheric conditions and noise barriers, either vegetative or manufactured, etc.).

TABLE 4.5-1
NOISE ENVIRONMENT



Sources: California Department of Transportation, January 2002, California Airport Land Use Planning Handbook; M. David Egan, McGraw Hill, 1972, Concepts in Architectural Acoustics; and U.S. Department of Housing and Urban Development, Office of Community Planning and Development, The Noise Guidebook.

VIBRATION BACKGROUND

Vibration is a unique form of noise in that its energy is carried through structures and the earth, whereas noise is carried through the air. Thus, vibration is generally felt rather than heard. Some vibration effects can be caused by noise; for example, the rattling of windows from truck pass-bys. This phenomenon is related to the coupling of the acoustic energy at frequencies that are close to the resonant frequency of the material being vibrated. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration.

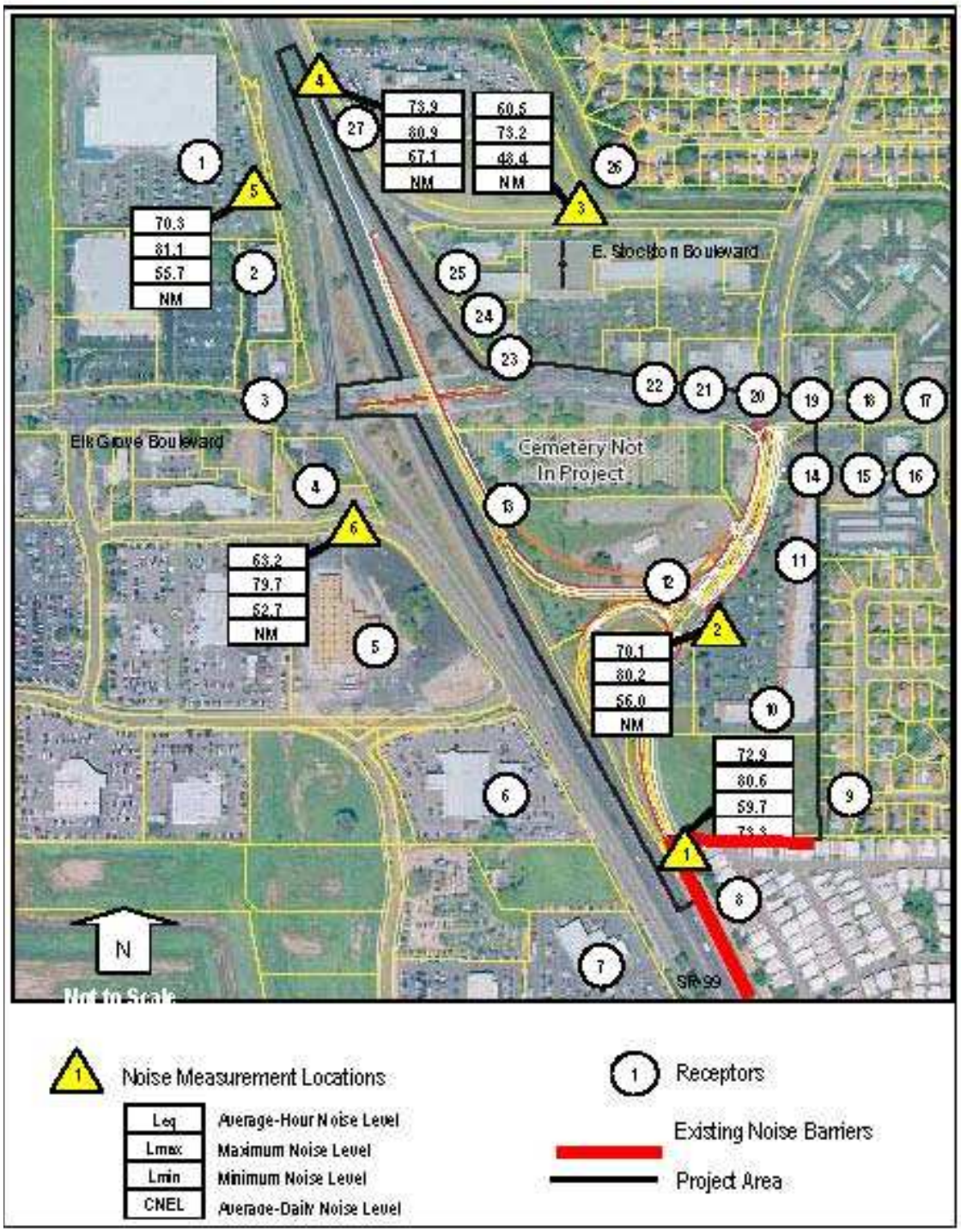
The peak particle velocity (PPV) or the root mean square (RMS) velocity are usually used to describe vibration amplitudes. PPV is defined as the maximum instantaneous peak of the vibration signal, while RMS is defined as the square root of the average of the squared amplitude of the signal. PPV is more appropriate for evaluating potential building damage, whereas RMS is typically more suitable for evaluating human response.

EXISTING NOISE ENVIRONMENT

The project area consists of the existing Elk Grove Boulevard/SR 99 Interchange and is located in the City of Elk Grove. Land uses in the project area consist primarily of commercial uses to the west and a mix of commercial and residential uses to the east. The principal noise source in the vicinity of the project study area is vehicular traffic on SR 99. Intermittent noise generated by nearby commercial and residential uses (e.g., people talking, parking lot noise, operation of landscape maintenance equipment) also contribute, to a lesser extent, to the existing noise environment.

As shown in **Figure 4.5-1**- Existing Sound Environment, the nearest residential land uses are single-family dwelling units located to the north and south of Elk Grove Boulevard, east of East Stockton Boulevard, as well as multi-family residential dwellings located northeast of the Elk Grove Boulevard/East. Stockton Boulevard intersection. "The Oaks" residential trailer park is shielded from line-of-sight of SR 99 by an existing soundwall, depicted in **Figure 4.5-1**, the height of which ranges from approximately 12 feet along the western boundary, adjacent to East Stockton Boulevard, to approximately 6 feet along the northern boundary.

FIGURE 4.5-1
EXISTING NOISE ENVIRONMENT



Notes: NM = Not Measured. Receptor numbers correspond to those depicted in Tables 4.4.5 and 4.4.6 of this report.
Image Source: City of Elk Grove 2006
Source: Ambient Air & Noise Consulting, 2006

4.5.2 REGULATORY FRAMEWORK

The following describes local environmental laws and policies that are relevant to the CEQA review process. The CEQA significance criteria are also included in this section.

City of Elk Grove General Plan

The Noise Element of the City of Elk Grove General Plan (amended 2005) establishes land-use compatibility criteria for both interior and exterior areas of various land uses, including standards and guidelines for identifying and controlling transportation noise sources. Relevant noise policies that are applicable to the proposed roadway improvements are found in the Noise Element within the General Plan and are summarized in **Table 4.5-2**, below:

TABLE 4.5-2
PROJECT CONSISTENCY WITH THE CITY OF ELK GROVE GENERAL PLAN NOISE POLICIES

General Plan Policies	Consistency with General Plan	Analysis
Policy NO-6: It is anticipated that roadway improvement projects (such as widening of existing roadways) 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 NO-C [in the General Plan]. Therefore, the following criteria shall be used as a test of significance for roadway improvement projects which are not directly tied to a development project: • Where existing traffic noise levels are less than 60 dBA Ldn at the outdoor activity areas of noise-sensitive uses, a +5 dBA Ldn increase in noise levels due to roadway improvement projects will be considered significant; and • Where existing traffic noise levels range between 60 and 65 dBA Ldn at the outdoor activity area of noise-sensitive uses, a +3 dBA Ldn increase in noise levels due to roadway improvement projects will be considered significant; and • Where existing traffic noise levels are greater than 65 dBA Ldn at the outdoor activity areas of noise-sensitive uses, a +1.5 dBA Ldn increase in noise levels due to roadway improvement projects will be considered significant.	Yes	The City evaluates the significance of construction and operational noise form project activities using this significance criteria under impacts 4.5.1 and 4.5.3 described below.

General Plan Policies	Consistency with General Plan	Analysis
Policy NO-7: The City shall not require the installation of soundwalls in front yard areas to reduce noise to acceptable levels in residential areas, which were originally constructed without soundwalls. The City shall emphasize other methods to reduce noise levels in these situations.	Yes	Operational noise impacts from the project are predicted to be less than significant, and will not require installation of soundwalls or noise barriers for mitigation.
Policy NO-9: Where soundwalls or noise barriers are constructed, the City shall strongly encourage and may require the use of a combination of berms and walls to reduce apparent height of the wall and produce a more aesthetically appealing streetscape.	Yes	Operational noise impacts from the project are predicted to be less than significant, and will not require installation of soundwalls or noise barriers for mitigation

City of Elk Grove Noise Ordinance

The City of Elk Grove noise control ordinance (Noise Ordinance) regulates noise generated by non-transportation sources. Section 6.68.090 of the Noise Ordinance restricts construction activities to the less noise-sensitive daytime hours. In accordance with the Noise Ordinance, construction activities are typically limited to between the hours of 6 a.m. and 8 p.m., Monday through Friday, and between the hours of 7 a.m. and 8 p.m. on Saturday and Sunday.

4.5.3 IMPACTS AND MITIGATION MEASURES

STANDARD OF SIGNIFICANCE

Section 15064.7 of the CEQA Guidelines encourages local agencies to develop and publish the thresholds that the agency uses in determining the significance of environmental effects caused by projects under its review. However, agencies may also rely upon the guidance provided by the expanded Initial Study checklist contained in Appendix G of the CEQA Guidelines (Environmental Checklist Form), which provides examples of impacts that would normally be considered significant. Based on these examples, a noise impact would normally be considered significant when it would result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

An evaluation of whether or not a noise impact would be substantial must consider both the project impact itself and how it fits into the existing context. Impacts are sometimes locally important, but not significant according to CEQA. The reason for this is that although the impacts would result in an adverse alteration of existing conditions, they would not substantially diminish, or result in the permanent loss of, quality of life on a population-wide or region-wide basis.

METHODOLOGY

In March 2006, Ambient Air & Noise Consulting prepared a Noise & Vibration Assessment based on monitoring conducted on November 16, 2005 (Noise Assessment). Measurements of existing noise levels were taken at six sites within the vicinity of the project area (**Figure 4.5-1**) using a Larson Davis Laboratories Model 820, Type I, integrating sound-level meter, which was calibrated before and after with a Larson Davis CA-250 acoustical calibrator. Receptors 8, 9, 17, and 26 are the nearest residential land uses located to the north and south of Elk Grove Boulevard, east of SR 99. Receptor 8 is residential community park shielded from SR 99 by an existing soundwall.

Existing average-hourly and average-daily traffic (ADT) noise levels at nearby land uses were calculated using the Federal Highway Administration's Traffic Noise Model (TNM) for free-flow traffic conditions in the project area. The model incorporates: vehicle traffic volumes, including

percentages of automobiles, medium-duty and heavy-duty trucks; vehicle speeds; ground attenuation factors; roadway widths; and elevation data to predict traffic noise levels.

Predicted traffic noise levels were calculated using the FHWA TNM computer model. TNM input data included day/night percentages of automobiles, medium-duty, and heavy-duty trucks; vehicle speeds; ground attenuation factors; and roadway widths. Traffic noise modeling included northbound and southbound segments of SR 99 and E. Stockton Boulevard, the eastbound and westbound segments of Elk Grove Boulevard, as well as the existing and proposed northbound and southbound ramps of SR 99. Modeling was conducted for buildout (year 2010) conditions and future cumulative (year 2030) traffic conditions, with and without implementation of the proposed project. For modeling purposes, receptors were located at the nearest building setback location of nearby commercial land uses and at the nearest property line/outdoor activity area of noise-sensitive land uses. Traffic volumes were obtained from the traffic analysis prepared for the proposed project (Fehr & Peers 2006).

The accuracy of the TNM model used for this analysis was verified by comparing measured traffic noise levels with the predicted traffic noise levels. A comparison of measured and predicted traffic noise levels are depicted in **Table 4.5-3**. In comparison to the measured data, the TNM model was accurate to within approximately 0.3 dBA. Predicted existing traffic noise levels at nearby land uses are summarized in **Table 4.5-4**.

TABLE 4.5-3
TRAFFIC NOISE MODEL VERIFICATION EXISTING CONDITIONS

Measurement Location		Measured Leq/Ldn	Modeled Leq/Ldn	Difference
1	Vacant Parcel, SE Quadrant	72.9	72.7	-0.2
2	Elk Village Commercial Center	70.1	70.3	0.2
3	Vacant Parcel, NE Quadrant	60.5	60.7	0.2
4	Elk Grove Chrysler/Jeep	73.9	73.8	-0.1
5	Wal-Mart	70.3	70.4	0.1
6	Elk Grove Auto Mall	63.2	63.5	0.3

Measurement locations correspond to those depicted in Figure 4.5-1.
Source: Ambient Air & Noise Consulting, 2006.

TABLE 4.5-4
PREDICTED EXISTING TRAFFIC NOISE LEVELS

Receptor Number	Receptor Description	Land Use Designation	Predicted Exterior Traffic Noise Level (dBA Leq/Ldn)
1	Wal-Mart	Commercial	65.6
2	Laguna-99 Shopping Center	Commercial	63.0
3	Conoco Phillips Service Station	Commercial	65.5

Receptor Number	Receptor Description	Land Use Designation	Predicted Exterior Traffic Noise Level (dBA Leq/Ldn)
4	AM-PM Service Station	Commercial	66.7
5	Elk Grove Auto Mall – Elk Grove Toyota	Commercial	59.4
6	Elk Grove Auto Mall – Elk Grove Honda	Commercial	64.0
7	Elk Grove Auto Mall – Elk Grove Volkswagen	Commercial	66.0
8	The Oaks Residential Community	Residential	58.6
9	Single-Family Residential Dwellings, SE Quadrant	Residential	56.4
10	Elk Village Shopping Center, Southern Building	Commercial	59.6
11	Elk Village Shopping Center, Northern Building	Commercial	61.1
12	Vacant/Light Industrial, SE Quadrant	Commercial	63.2
13	Cemetery, Western Boundary	Public	65.7
14	Valero Service Station	Commercial	65.3
15	Elk Grove Animal Hospital	Commercial	64.5
16	Jimboy's Taco	Commercial	64.5
17	Emerald Vista Apartments	Residential	62.4
18	Subway Restaurant/Misc. Commercial	Commercial	62.4
19	Burger King	Commercial	63.2
20	Shell Service Station	Commercial	63.7
21	Kentucky Fried Chicken	Commercial	63.9
22	SpeeDee Oil Change	Commercial	64.4
23	Corner Stone Restaurant/Misc. Commercial	Commercial	64.2
24	Long's Drug/Big Lots/Misc. Commercial	Commercial	63.8
25	Express Car Wash	Commercial	65.9
26	Single-Family Residential Dwellings, NE Quadrant	Residential	53.0
27	Elk Grove Chrysler/Jeep	Commercial	69.1

Predicted traffic noise levels at residential land uses were calculated at the nearest property line/outdoor activity area, based on aerial photo interpretation. Predicted exterior noise levels may vary, depending on proximity to other nearby noise sources and degree of noise shielding from nearby structures and terrain. Receptor numbers correspond to those depicted in Figure 4.5-1.
Source: Ambient Air & Noise Consulting, 2006.

Based on the monitoring conducted, ambient noise levels in the project area are influenced primarily by vehicle traffic on area roadways. Average-hourly noise levels vary by time of day and were generally loudest during the early morning and late afternoon commute hours. The

measured average-daily noise level (in L_{dn}/CNEL) was roughly equivalent (within approximately 0.4 dBA) to measured peak average-hourly noise levels. Noise measurement locations and corresponding noise levels are depicted in **Figure 4.5-1**.

PROJECT IMPACTS AND MITIGATION MEASURES

Build Alternative

Project Construction

Noise

Impact 4.5-1 Construction activities associated with the proposed project would generate noise that would affect sensitive receptor locations in the vicinity of the project site. This is considered a **potentially significant** impact unless mitigation is incorporated.

The U.S. Environmental Protection Agency (U.S. EPA) has compiled data regarding the noise generating characteristics of specific types of construction equipment. Noise levels generated by heavy equipment can range from approximately 68 dB(A) to noise levels in excess of 100 dB(A) when measured at 50 feet. However, these noise levels diminish rapidly with distance from the construction site at a rate of approximately 6.0 dB(A) per doubling of distance. For example, a noise level of 68 dB(A) measured at 50 feet from the noise source to the receptor would reduce to 62 dB(A) at 100 feet from the source to the receptor, and further reduce by another 6.0 dB(A) to 56 dB(A) at 200 feet from the source to the receptor.

Project construction activities would occur over an approximately 18-month period and would primarily include site preparation, hauling of materials to and from the project site, pouring of concrete, and application of asphalt paving materials. Trucks would be used to deliver and move fill materials, equipment, and building materials, and to haul away waste materials. High noise levels created during this phase would be sporadic, with individual equipment noise levels ranging from approximately 79 dBA to 88 dBA at 50 feet.[1,2]

The nearest noise-sensitive land uses are single-family dwellings located east of E. Stockton Boulevard and south of Elk Grove Boulevard (**Figure 4.5-1**, Receptors 8 and 9), as well as multi-family residential dwellings located east of E. Stockton Boulevard and north of Elk Grove Boulevard (**Figure 4.5-1**, Receptor 17). In comparison to existing ambient noise levels, construction-generated noise levels occurring during the daytime hours would be partially masked by vehicle traffic noise emanating from SR 99 and local roadways. In addition, nearby residential dwellings would, for the most part, be shielded from construction activities by intervening buildings, terrain, and existing sound walls. However, because exterior ambient noise levels typically decrease during the late evening and nighttime hours as a result of decreased community activities (e.g., industrial activities, vehicle traffic), construction activities being performed during these more noise-sensitive periods of the evening can result in increased levels of annoyance and potential sleep disruption to occupants of nearby residential dwellings.

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[1] U.S. Environmental Protection Agency (U.S. EPA). 1971. Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances.

[2] Federal Transit Administration (FTA). April 1995. Transit Noise and Vibration Impact Assessment.

The Noise Ordinance would restrict proposed construction activities to 6:00 a.m. to 8:00 p.m. weekdays, when residents are less likely to be disturbed, and from 7:00 a.m. to 8:00 p.m. on weekends, when residents could be disturbed by construction. Nevertheless, construction noise would represent a short-term significant impact based on the potential to exceed City noise standards.

Mitigation Measures

MM 4.5-1a Site preparation and construction activities shall be limited to between the hours of 7:00 A.M. to 7:00 P.M. whenever such activity is adjacent to residential uses. Construction equipment maintenance shall be limited to the same hours. If nighttime work will be required, no construction equipment shall be used that would exceed the nighttime noise standard dBA.

Timing/Implementation: *During all construction phases of the project*

Enforcement/Monitoring: *City of Elk Grove Development Services*

MM 4.5-1b All construction equipment shall be equipped with appropriate mufflers in good working condition.

Timing/Implementation: *During all construction phases of the project*

Enforcement/Monitoring: *City of Elk Grove Development Services*

MM 4.5-1c Construction staging areas shall be located as far from noise-sensitive uses as is feasible.

Timing/Implementation: *During all construction phases of the project.*

Enforcement/Monitoring: *City of Elk Grove Planning Department.*

Implementation of the above Mitigation Measures would ensure that noise generated by construction activities would comply with City of Elk Grove noise standards and would reduce impacts to **less than significant.**

Vibration

Impact 4.5-2 Construction activities associated with the proposed project would temporarily increase the level of groundborne vibration in nearby areas. This increase is considered a **less than significant** impact.

Ground vibration generated by construction equipment spreads through the ground and diminishes in strength with distance. The effects of ground vibration can vary from no perceptible effects at the lowest levels, to low rumbling sounds and detectable vibrations at moderate levels, to slight damage to nearby structures at the highest levels. At the highest levels of vibration, damage to structures is primarily architectural (e.g., loosening and cracking of plaster or stucco coatings) and rarely results in structural damage.

Construction activities can result in varying degrees of groundborne vibration, depending on the equipment used and activities being performed. The ground vibration levels associated with various types of construction equipment are depicted in Table 4.5-6. As depicted, ground-

vibration levels associated with typical construction equipment (excluding pile drivers) range from approximately 0.0003 to 0.089 in/sec at 25 feet. Vibration levels associated with pile drivers vary by type, ranging from a low of approximately 0.17 in/sec to a high of 1.518 in/sec.3

TABLE 4.5-5
REPRESENTATIVE VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment		Peak Particle Velocity at 25 feet (in/sec)
Pile Driver (impact)	upper range	1.518
	typical	0.644
Pile Driver (sonic)	upper range	0.734
	typical	0.170
Large Bulldozer		0.089
Caisson Drilling		0.089
Loaded Trucks		0.076
Jackhammer		0.035
Small Bulldozer		0.003

Source: FTA 1995

For most structures, a peak particle velocity (ppv) threshold of 0.2 inch per second (in/sec) is sufficient to avoid structural damage, with the exception of fragile historic structures or ruins. For the protection of fragile and historic structures, Caltrans recommends a more conservative threshold of 0.08 in/sec ppv.[4] However, there are currently no federal, state, or local standards for vibration.

The proposed project would not be anticipated to involve the use of any equipment or processes (e.g., pile driving) that would result in potentially significant levels of ground vibration at nearby structures. Ground vibration generated by the proposed construction activities would be associated primarily with the onsite use of tractors, haul trucks, and jackhammers; which, as shown in **Table 4.5-5**, would result in vibration levels of less than 0.09 in/sec ppv at 25 feet. As a result, predicted vibration levels at the nearest structures, which are located in excess of 25 feet from proposed construction areas, would not be anticipated to exceed 0.2 in/sec ppv. Because there are no known fragile or historic structures near the proposed project construction area, this impact is considered less than significant.

Project Operation

Noise

Impact 4.5-3 Redistribution of traffic along the modified Elk Grove Boulevard/SR 99 on-ramp would result in a change in ambient noise levels in the vicinity of the proposed project. This change is considered a **less than significant** impact.

[3] Federal Transit Administration (FTA). April 1995. Transit Noise and Vibration Impact Assessment.

[4] California Department of Transportation (Caltrans). 2002. Transportation Related Earthborne Vibrations.

As depicted in **Table 4.5-6**, land uses located in the northern and southwestern interchange quadrants would experience minimal increases (i.e., 0.3 dBA or less) in ambient noise levels. With implementation of the proposed improvements, predicted traffic noise levels at some land uses located in the northern quadrants (**Figure 4.5-1**, Receptors 1, 2, 25, 26, and 27), are projected to decrease slightly due to the redistribution of vehicle traffic and projected decreased traffic volumes on the existing northbound onramp. The greatest increase in predicted traffic noise levels would occur at land uses located in the southeastern quadrant of the interchange, particularly those located adjacent to the proposed onramp, including the nearby cemetery and material storage yard (**Figure 4.5-1**, Receptors 12 and 13, respectively).

Predicted traffic noise levels at nearby land uses would not exceed applicable exterior noise abatement criteria. In addition, implementation of the proposed improvements would not result in substantial increases in ambient traffic noise levels at nearby land uses. It is also important to note that predicted increases in traffic noise levels at nearby residential dwellings (**Figure 4.5-1**, Receptors 8, 9, 17, and 26) would not exceed applicable City of Elk Grove General Plan noise criteria for evaluation of increases in traffic noise levels (City of Elk Grove General Plan, Policy NO-6). As a result, predicted increases in traffic noise levels would be considered less than significant.

TABLE 4.5-6
PREDICTED TRAFFIC NOISE LEVELS

Receptor Number	Receptor Description	Year 2030							
		Without Project	With Project	Difference	Substantial Increase?[2]	Without Project	With Project	Difference	Substantial Increase? [2]
Northwest Interchange Quadrant									
1	Wal-Mart	66.0	65.9	-0.1	No	67.2	67.1	-0.0031	No
2	Laguna-99 Shopping Center	63.4	63.3	-0.1	No	64.6	64.5	-0.1	No
3	Conoco Phillips Service Station	66.8	66.8	0.0	No	67.5	67.6	0.1	No
Southwest Interchange Quadrant									
4	AM-PM Service Station	68.2	68.3	0.1	No	69.0	69.1	0.1	No
5	Elk Grove Toyota	66.2	66.3	0.1	No	68.0	68.2	0.2	No
6	Elk Grove Honda	68.4	68.4	0.0	No	70.2	70.2	0.0	No
7	Elk Grove Volks-wagen	66.5	66.5	0.0	No	68.3	68.4	0.1	No
Southeast Interchange Quadrant									
8	The Oaks Residential Community	59.2	59.3	0.1	No	60.7	60.7	0.0	No
9	Residential Dwellings, SE Quadrant	57.3	57.4	0.1	No	58.7	59.3	0.6	No
10	Elk Village Shopping Center	60.6	60.8	0.2	No	61.8	62.5	0.7	No

Receptor Number	Receptor Description	Year 2030							
		Without Project	With Project	Difference	Substantial Increase?[2]	Without Project	With Project	Difference	Substantial Increase? [2]
11	Elk Village Shopping Center	62.6	63.1	0.5	No	63.0	63.7	0.7	No
12	Material Yard, SE Quadrant	64.3	66.8	2.5	No	64.9	67.5	2.6	No
13	Cemetery, Western Boundary	66.9	68.1	1.2	No	67.8	69.6	1.8	No
14	Valero Service Station	66.8	67.1	0.3	No	67.0	67.4	0.4	No
15	Elk Grove Animal Hospital	65.6	65.9	0.3	No	65.9	66.3	0.4	No
16	JimBoy's Taco	65.5	65.6	0.1	No	65.7	65.9	0.2	No
Northeast Interchange Quadrant									
17	Emerald Vista Apartments	63.3	63.4	0.1	No	63.6	63.7	0.1	No
18	Subway Restaurant/Misc.	63.3	63.4	0.1	No	63.6	63.7	0.1	No
19	Burger King	64.1	64.3	0.2	No	64.4	64.7	0.3	No
20	Shell Service Station	65.0	64.9	-0.1	No	65.4	65.5	0.1	No
21	Kentucky Fried Chicken	65.3	65.1	-0.2	No	65.7	65.7	0.0	No
22	SpeeDee Oil Change	65.7	65.5	-0.2	No	66.2	66.2	0.0	No

Receptor Number	Receptor Description	Year 2030							
		Without Project	With Project	Difference	Substantial Increase?[2]	Without Project	With Project	Difference	Substantial Increase? [2]
23	Restaurant/ Misc. Commercial	65.2	65.0	-0.2	No	66.0	66.0	0.0	No
24	Long's/Big Lots/Misc. Comm.	64.5	64.4	-0.1	No	65.5	65.5	0.0	No
25	Express Car Wash	66.4	66.2	-0.2	No	67.3	67.2	-0.1	No
26	Residential Dwellings, NE Quadrant	53.5	53.4	-0.1	No	54.6	54.5	-0.1	No
27	Elk Grove Chrysler/Jeep	69.6	69.4	-0.2	No	70.7	70.5	-0.2	No

Source: AMBIENT Air Quality & Noise Consulting 2006

1. *Depicts predicted exterior noise levels based on distance to building setback locations of commercial land uses and nearest property line/exterior activity areas of residential land uses. Receptor numbers correspond to those depicted in Figure 4.5-1.*
2. *Substantial increase defined as an increase of 12 dBA, or greater (Caltrans 2000).*
3.

Vibration

Impact 4.5-4 Implementation of the proposed project would result in a redistribution of vehicle traffic along the existing local roadway network, but would not result in the relocation of vehicle traffic on new roadway alignments that would be appreciably closer to existing buildings. Thus, long-term vibration impacts associated with operation of the proposed project is anticipated to be **less than significant.**

The traditional view has been that highway traffic poses no threat to buildings and structures, and that annoyance to people would be minimal. Traffic vibration levels are typically highest associated with truck passbys. Automobile traffic normally generates vibration peaks of one-fifth to one-tenth that of trucks. Based on measurements conducted by Caltrans, even the highest truck generated vibrations, which were measured at approximately 16 feet from the centerline of the near travel-lane, were not found to exceed 0.08 in/sec. This level coincides with the maximum recommended "safe level" for ruins and historic structures.

In addition, structures located near the proposed northbound SR 99 onramp are located in excess of approximately 60 feet from the proposed onramp. In comparison to the measured vibration levels commonly associated with vehicle traffic, as noted above, predicted ground vibration levels at nearby structures associated with vehicle traffic on existing or proposed roads would not be anticipated to exceed the Caltrans-recommended threshold of 0.2 in/sec.

No Build Alternative

Under the No Build alternative, no changes to the roadway or ramp designs at the interchange in the project area would occur because the project would not be implemented. There would not be any short-term noise impacts from project construction. As depicted in **Table 4.5-6** predicted traffic noise levels at most land uses and receptors in the study area without implementation of the proposed improvements are similar to the levels with the project, except that traffic noise levels are predicted to be slightly higher without the project at the existing northbound SR99 onramp signal. The greatest increase in predicted traffic noise levels with the project would occur at land uses located in the southeastern quadrant of the interchange, particularly those located adjacent to the proposed onramp, including the nearby cemetery and material storage yard (**Figure 4.5-1**, Receptors 12 and 13, respectively).

Thus, overall noise impacts under the No Build Alternative would be similar to impacts with the project.

4.5.4 CUMULATIVE SETTING, IMPACTS, AND MITIGATION MEASURES

CUMULATIVE SETTING

The cumulative setting for noise impacts within the project area includes the City of Elk Grove Planning Area. The overall Elk Grove Planning Area is characterized by urbanized development including, residential, commercial and industrial uses. The character and landscape of the region has been gradually changing from agricultural to residential and commercial uses since the 1970's. This change will continue to occur as the city of Elk Grove expands. The analysis of the cumulative noise impacts associated with the Elk Grove Boulevard/SR 99 Interchange Modification project assumes full buildout of planned development patterns set forth in the Elk Grove General Plan, as well as large-scale proposed and approved development projects identified in **Table 4.0-1**.

CEQA guidelines and the Sacramento County General Plan Noise Element have been used to establish cumulative noise impact standards for this section. Implementation of the project would result in significant cumulative noise impacts if the project would result in either of the following:

1) Exposure of persons to or generation of noise levels in excess of standards established in the Sacramento County General Plan, or applicable standards of other agencies.

2) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project, as defined by **Table 4.5-6**, above.

IMPACTS AND MITIGATION MEASURES

Impact 4.5-5 Implementation of the Elk Grove Boulevard/SR 99 Interchange Modification project, along with approved and planned development in the region, would increase traffic volumes within and adjacent to the project area which would increase transportation related noise levels. This would result in a **less than cumulatively significant** impact.

Predicted increases in traffic noise levels would be greatest in future years due to increases in vehicle traffic volumes from approved projects and development in the southern Sacramento County area, including the City of Elk Grove. These projects, shown in **Table 4.0-1**, all have the potential to adversely noise levels in the region. The increases in future noise levels would not result in a substantial increase in ambient traffic noise levels nor exceed applicable City of Elk Grove General Plan noise criteria.

Under future cumulative (year 2030) traffic conditions, traffic noise levels at the nearby cemetery and material storage yard (**Figure 4.5-1**, Receptors 12 and 13, respectively) would range from approximately 1.8 dBA at the western boundary of the cemetery to approximately 2.6 dBA at the southern boundary of the material storage yard. Predicted increases in noise levels at other nearby commercial land uses would be approximately 0.7 dBA, or less. Predicted increases in traffic noise levels at nearby residential dwellings (**Figure 4.5-1**, Receptors 8, 9, 17, and 26) would be approximately 0.6 dBA, or less.

These predicted noise levels would not exceed applicable City of Elk Grove General Plan noise criteria for evaluation of increases in traffic noise levels (City of Elk Grove General Plan, Policy NO-6). Additionally, an approximately 10-foot high retaining wall would be constructed as part of this project near the west side of the cemetery and would also serve as a soundwall. As a result, predicted increases in traffic noise levels would be considered less than significant.

4.5.5 REFERENCES

Ambient Noise and Air Quality Consulting,. March 24, 2006. *Noise and Vibration Impact Assessment for SR99/ Elk Grove Boulevard Interchange Improvement Project, Elk Grove, CA.*

City of Elk Grove. 1993. *The City of Elk Grove General Plan.*

City of Elk Grove. Municipal Code.