NOISE ANALYSIS TECHNICAL REPORT

ALAMEDA NORTH NEIGHBORHOOD PROECTION PLAN – PHASE 2

A. INTRODUCTION

This Noise Analysis Technical Report ("Noise Report") analyzes potential traffic noise for the Alameda North Neighborhood Protection Plan ("proposed Project"). This reports discusses applicable federal, State, and local noise regulations, monitoring data, applicable noise thresholds, and the methodology used to analyze potential noise impacts.

B. PROJECT DESCRIPTION

Alameda North ("Project site") is a residential neighborhood of approximately 200 acres located north of Alameda Avenue and Olive Avenue near the Burbank Media District. The Project site is bounded by Verdugo Avenue to the north, Alameda Avenue and Olive Avenue to the south, and Buena Vista Street to the east. The Project site is bisected by Oak Street, which runs east and west between Hollywood Way and Buena Vista Street. In addition, an alley approximately 125 feet north of Alameda Avenue and Olive Avenue runs nearly the entire width of the neighborhoods to the east and west directions.

The proposed Project plans to reduce cut-through traffic within the Project site and to reduce speeding within the residential neighborhoods. The Project features include speed humps, bulb-outs, raised and/or planted medians, signs, and other traffic calming measures. Nearly all of the streets within the neighborhood are residential streets for single family residential units providing direct access to adjacent land uses. The speed limit throughout the neighborhood is 25 miles per hour.

C. ENVIRONMENTAL SETTING

Fundamentals of Sound

Sound is technically described in terms of loudness and frequency. The loudness of sound or noise, two terms that are used interchangeably throughout this section, is measured using a logarithmic scale with 10 as the base. The standard unit of sound measurement is the decibel (dB), or dB scale, which describes the physical intensity of the pressure vibrations that make up any sound; the decibel scale sets the hearing threshold as 0 dB. The frequency of the sound is related to the pressure vibration, which is measured in Hertz (Hz), which is measured in cycles per second.

The human ear can detect a wide range of frequencies and sound pressure levels; the subjective audible sound pressure range is from 0 dB to 140 dB. Human ears can detect not only changes in overall sound pressure level but can also detect sound with a sound pressure well below the background noise level.

The hearing thresholds show considerable variability from individual to individual with a standard variation among individuals of about 5 dB. The just noticeable difference is typically around 1 dB for sound level. Studies have shown that sound is perceived to be twice as loud for sound level increase of 10 dB; a 20 dB increase in the sound level is perceived as four times as loud by the normal human ear.

In response to this sensitivity of the human ear to different frequencies, the A-weighted noise level, referenced in units of dBA, was developed to better correspond with subjective judgment of sound levels by individuals.

A doubling of sound energy results in a 3 dBA increase in sound, which means that a doubling of sound wave energy (e.g., doubling the volume of traffic on a roadway) would result in a barely perceptible change in sound level. In general, changes in a noise level of less than 3 dBA are not typically noticed by the human ear.[1] Changes from 3 to 5 dBA may be noticed by some individuals who are extremely sensitive to changes in noise. An increase of greater than 5 dBA is readily noticeable, while the human ear perceives a 10 dBA increase in sound level to be a doubling of sound volume.

Noise sources can generally be categorized as one of two types: 1) point sources, such as stationary mechanical equipment; and 2) line sources, such as a roadway. Sound generated by a point source typically diminishes or attenuates at a rate of 6 dBA for each doubling of distance from the source to the receptor at acoustically hard sites and at a rate of 7.5 dBA at acoustically soft sites. A hard or reflective site consists of asphalt, concrete, and very hard-packed soil, which does not provide any excess ground-effect attenuation while an acoustically soft site consists of normal earth and ground with vegetation.[2]

As an example, a 60 dBA noise level measured at 50 feet from a point source at an acoustically hard site would be 54 dBA at 100 feet from the source and it would be 48 dBA at 200 feet from the source. Noise from the same point source at an acoustically soft site would be 52.5 dBA at 100 feet and 45 dBA at 200 feet from the source. Sound generated by a line source typically attenuates at a rate of 3 dBA and 4.5 dBA per doubling of distance from the source to the receptor for hard and soft sites, respectively.[3]

Man-made or natural barriers can also attenuate sound levels. Solid walls and berms may reduce noise levels by 5 to 10 dBA.[4] Sound levels from a source may also be attenuated 3 to 5 dBA by the first row of houses and 1.5 dBA for each additional row of houses in a residential neighborhood.

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1 U.S. Department of Transportation. 1980. Federal Highway Administration, Fundamentals and Abatement of Highway Traffic Noise. September), p. 81.

2 Ibid,. p. 97.

3 Ibid, p. 97.

4 Ibid, p. 18.

The minimum attenuation of exterior to interior noise provided by typical residential and institutional buildings in California is 17 dBA with open windows and 25 dBA with closed windows.

Environmental Noise

Noise level increases are used to determine the effect of noise in environmental settings. Many methods have been developed for evaluating community noise to account for, among other things:

- The variation of noise levels over time;
- The influence of periodic individual loud events; and
- The community response to changes in the community noise environment.

Table 1, Noise Descriptors, identifies various noise descriptors developed to measure sound levels over different periods.

Table 1
Noise Descriptors

Term	Definition
Decibel (dB)	The unit for measuring the volume of sound equal to 10 times the logarithm (base 10) of the ratio of the pressure of a measure sound to a reference pressure.
A-Weighted Decibel [dBA]	A sound measurement scale that adjusts the pressure of individual frequencies according to human sensitivities. The scale accounts for the fact that the region of highest sensitivity for the human ear is between 2,000 and 4,000 cycles per second (hertz).
Equivalent Sound Level (L_{eq})	The sound level containing the same total energy as a time varying signal over a given time period. The L_{eq} is the value that expresses the time averaged total energy of a fluctuating sound level. L_{eq} can be measured over any time period, but is typically measured for 1-minute, 15-minute, 1-hour, or 24-hour periods.
Community Noise Equivalent Level (CNEL)	A rating of community noise exposure to all sources of sound that differentiates between daytime, evening, and nighttime noise exposure. These adjustments add 5 dBA for the evening, 7:00 PM to 10:00 PM, and add 10 dBA for the night, 10:00 PM to 7:00 AM. The 5 and 10 decibel penalties are applied to account for increased noise sensitivity during the evening and nighttime hours. The logarithmic effect of adding these penalties to the 1-hour L_{eq} measurements typically results in a CNEL measurement that is within approximately 3 dBA of the peak-hour L_{eq}.[1]
Sound pressure level	The sound pressure is the force of sound on a surface area perpendicular to the direction of the sound. The sound pressure level is expressed in dB.
Ambient Noise	The level of noise that is all encompassing within a given environment, being usually a composite of sounds from many and varied sources near to and far from the observer. No specific source is identified in the ambient.

Note:

1 California Department of Transportation. 2009. Technical Noise Supplement; A Technical Supplement to the Traffic Noise Analysis Protocol, Sacramento, California. November, pp. N51-N54.

Health Effects of Noise

Human response to sound is highly individualized. Annoyance is the most common issue associated with community noise levels. Many factors influence the response to noise including the character of the noise, the variability of the sound level, the presence of tones or impulses, and the time of day of the occurrence. Additionally, non-acoustical factors, such as individual opinion of the noise source, the ability to adapt to the noise, the attitude towards the source and those associated with it, and the predictability of the noise, all influence the response to noise. These factors result in the reaction to noise being highly subjective with the perceived effect of a particular noise varying widely among individuals in a community.

The effects of noise can be grouped into three general categories:

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

Noise-induced hearing loss usually takes years to develop. Hearing loss is one of the most obvious and easily quantifiable effects of excessive exposure to noise. While the loss may be temporary at first, it can become permanent after continued exposure. When combined with hearing loss associated with aging, the amount of hearing loss directly due to the environment is difficult to quantify. Although the major cause of noise-induced hearing loss is occupational, non-occupational sources may also be a factor.

Noise can mask important sounds and disrupt communication between individuals in a variety of settings. This process can cause anything from a slight irritation to a serious safety hazard, depending on the circumstance. Noise can disrupt face-to-face communication and telephone communication, and the enjoyment of music and television in the home. Interference with communication has proved to be one of the most important components of noise-related annoyance. Noise-induced sleep interference is one of the critical components of community annoyance. Sound level, frequency distribution, duration, repetition, and variability can make it difficult to fall asleep and may cause momentary shifts in the natural sleep pattern, or level of sleep. It can produce short-term effects, with the possibility of more serious effects on health if it continues over long periods.

Annoyance can be defined as the expression of negative feelings resulting from interference with activities, as well as the disruption of one's peace of mind and the enjoyment of one's environment. The consequences of noise-induced annoyance are privately held dissatisfaction, publicly expressed complaints to authorities, and potential adverse health effects, as discussed above.

Existing Off-Site Roadway Noise Levels

Noise-prediction modeling was conducted and based on vehicular traffic volumes along nearby roadway segments to determine the ambient roadway noise environment related to traffic near the Project site. The average daily trips (ADTs) for these local roadway segments were obtained from the traffic impact analysis for the proposed Project prepared by Gibson Transportation Consulting, Inc.[5]

Existing roadway noise levels were modeled using the Federal Highway Administration Highway Prediction Noise Model (FHWA-RD-77-108). The model calculates the average noise level in dB(A) CNEL at a given roadway segment based on traffic volumes, vehicle mix, average speeds, roadway geometry, and site conditions. The noise model assumes a "hard" site condition (i.e., providing for the minimum amount of sound attenuation allowed by the traffic noise model, a 6.0 dB(A) noise reduction per doubling of distance), and no barriers between the roadway and receivers. Traffic noise levels were calculated for sensitive receptors at distances of 75 feet from the center of the roadway.

The data collected before and after implementation of the temporary street closures was analyzed to identify the predominate traffic patterns in Alameda North and to help determine traffic shifts caused by temporary closures. Directional data was analyzed during the morning (6:00 AM to 10:00 AM) and afternoon (3:00 PM to 7:00 PM) peak periods.

The estimated existing roadway noise levels for the north-south street segments north of Oak Street, from Cordova Street on the west to Frederick Street to the east are provided in **Table 2, Modeled Existing Roadway Noise Levels North-South Streets North of Oak Street.** The existing modeled vehicle generated noise levels at these street segments during the AM peak hour ranged from a low of 33.8 dB(A) CNEL at Florence Street north of Oak Street (northbound) to a high of 43.1 dB(A) CNEL at California Street north of N. Whitnall Highway (southbound). In addition, noise levels during the PM peak hour ranged from a low of 37.0 dB(A) CNEL at both Catalina Street north of Oak Street (southbound) and at Florence Street north of Oak Street (southbound) to a high of 43.3 dB(A) CNEL at Avon Street north of Oak Street (northbound).

5 Gibson Transportation Consulting, Inc., *Traffic Analysis for the Alameda North Neighborhood Protection Plan,* July 2016.

Table 2
Modeled Existing Roadway Noise Levels
North-South Streets North of Oak Street

No.	Location	Time	Direction	Before Temporary Street Closure (dBA CNEL)
2	Cordova Street n/o Oak Street	AM	NB	36.7
			SB	40.0
		PM	NB	39.4
			SB	39.8
3	Avon Street n/o Oak Street	AM	NB	42.2
			SB	41.9
		PM	NB	43.3
			SB	40.6
4	California Street n/o N. Whitnall Hwy	AM	NB	40.1
			SB	43.1
		PM	NB	43.4
			SB	41.4
5	Ontario Street n/o Oak Street	AM	NB	35.8
			SB	37.8
		PM	NB	38.4
			SB	37.2
6	Fairview Street n/o Oak Street	AM	NB	36.6
			SB	39.7
		PM	NB	40.8
			SB	37.5
7	Niagara Street n/o Oak Street	AM	NB	36.0
			SB	40.2
		PM	NB	40.7
			SB	37.1
8	Catalina Street n/o Oak Street	AM	NB	36.7
			SB	39.4
		PM	NB	41.2
			SB	37.0
9	Florence Street n/o Oak Street	AM	NB	33.8
			SB	36.4
		PM	NB	40.0
			SB	37.0
10	Naomi Street n/o Oak Street	AM	NB	37.4

No.	Location	Time	Direction	Before Temporary Street Closure (dBA CNEL)
			SB	40.3
		PM	NB	41.9
			SB	39.0
11	Frederick Street n/o Oak Street	AM	NB	36.7
			SB	39.1
		PM	NB	41.8
			SB	37.6

Note: Roadway noise levels are modeled 75 feet from the center of the roadway.
n/o = north of; NB = northbound; SB = southbound.

The estimated existing roadway noise levels for the north-south street segments south of Oak Street, from Cordova Street on the west to Frederick Street to the east are provided in **Table 3, Modeled Existing Roadway Noise Levels North-South Streets South of Oak Street.** The existing modeled vehicle generated noise levels at these street segments during the AM peak hour ranged from a low of 34.9 dB(A) CNEL at N. Whitnall Highway south of Oak Street (northbound) to a high of 45.6 dB(A) CNEL at Catalina Street south of Oak Street (northbound). In addition, noise levels during the PM peak hour ranged from a low of 36.4 dB(A) CNEL at N. Whitnall Highway south of Oak Street (southbound) to a high of 45.6 dB(A) CNEL at Catalina Street south of Oak Street (northbound).

Table 3
Modeled Existing Roadway Noise Levels
North-South Streets South of Oak Street

No.	Location	Time	Direction	Before Temporary Street Closure (dBA CNEL)
19	Cordova Street s/o Oak Street	AM	NB	35.2
			SB	41.3
		PM	NB	36.1
			SB	41.5
20	Avon Street s/o Oak Street	AM	NB	40.1
			SB	40.8
		PM	NB	44.0
			SB	38.4
21	Lima Street s/o Oak Street	AM	NB	39.3
			SB	40.3
		PM	NB	42.8
			SB	39.2
22	California Street s/o Oak Street	AM	NB	39.7
			SB	41.3
		PM	NB	42.8
			SB	39.7
23	N. Whitnall Hwy s/o Oak Street	AM	NB	34.9
			SB	35.6
		PM	NB	37.6
			SB	36.4
24	Fairview Street s/o Oak Street	AM	NB	45.2
			SB	43.4
		PM	NB	45.2
			SB	43.4
25	Niagara Street s/o Oak Street	AM	NB	35.2
			SB	39.6
		PM	NB	40.9
			SB	37.5
26	Catalina Street s/o Oak Street	AM	NB	45.6
			SB	44.9
		PM	NB	45.6
			SB	44.9
27	Florence Street s/o Oak Street	AM	NB	35.6

No.	Location	Time	Direction	Before Temporary Street Closure (dBA CNEL)
			SB	39.6
		PM	NB	40.5
			SB	37.5
28	Naomi Street s/o Oak Street	AM	NB	36.7
			SB	37.9
		PM	NB	42.2
			SB	36.8
29	Frederick Street s/o Oak Street	AM	NB	38.2
			SB	39.9
		PM	NB	42.8
			SB	38.0
31	Fairview Street s/o N. Whitnall Hwy	AM	NB	37.6
			SB	40.4
		PM	NB	42.4
			SB	38.8

Note: Roadway noise levels are modeled 75 feet from the center of the roadway.
s/o = south of; NB = northbound; SB = southbound.

The estimated existing roadway noise levels for various segments of Oak Street, from east of Hollywood Way to west of Buena Vista Street are provided in **Table 4, Modeled Existing Roadway Noise Levels Oak Street.** The existing modeled vehicle generated noise levels at these street segments during the AM peak hour ranged from a low of 42.1 dB(A) CNEL at Oak Street west of Buena Vista Street (westbound) to a high of 45.5 dB(A) CNEL Oak Street east of Hollywood Way (westbound). In addition, noise levels during the PM peak hour ranged from a low of 44.0 dB(A) CNEL at Oak Street east of Catalina Street (eastbound) to a high of 48.0 dB(A) CNEL at Oak Street east of Hollywood Way (westbound).

Table 4
Modeled Existing Roadway Noise Levels
Oak Street

No.	Location	Time	Direction	Before Temporary Street Closure
12	Oak Street e/o Hollywood Way	AM	EB	44.7
			WB	45.5
		PM	EB	46.8
			WB	48.0
13	Oak Street e/o Cordova Street	AM	EB	43.6
			WB	44.6
		PM	EB	45.0
			WB	47.6
14	Oak Street e/o California Street	AM	EB	42.3
			WB	43.4
		PM	EB	44.5
			WB	44.3
15	Oak Street e/o Fairview Street	AM	EB	42.8
			WB	42.8
		PM	EB	44.6
			WB	44.7
16	Oak Street e/o Catalina Street	AM	EB	42.7
			WB	42.0
		PM	EB	44.0
			WB	44.3
17	Oak Street w/o Buena Vista Street	AM	EB	43.8
			WB	42.1
		PM	EB	45.4
			WB	44.2

Note: Roadway noise levels are modeled 75 feet from the center of the roadway.
e/o = eastbound; EB = eastbound; WB = westbound.

The estimated existing roadway noise levels for various segments of the east-west alley just north of Alameda Avenue and Olive Avenue are provided in **Table 5, Modeled Existing Roadway Noise Levels East-West Alley North of Alameda Avenue.** The existing modeled vehicle generated noise levels at these street segments during the AM peak hour ranged from a low of 29.4 dB(A) CNEL at the Alley between Lima Street and California Street (westbound) to a high of 40.4 dB(A) CNEL at the Alley between Cordova Street and Avon Street (westbound). Noise levels during the PM peak hour ranged from a low of 32.9 dB(A) CNEL at the Alley between Lima Street and California Street (westbound) to a high of 40.7 dB(A) CNEL at the alley between Cordova Street and Avon Street (eastbound).

Table 5
Modeled Existing Roadway Noise Levels
East-West Alley North of Alameda Avenue

No.	Location	Time	Direction	Before Temporary Street Closure
32	Alley between Cordova Street and Avon Street	AM	EB	36.1
			WB	40.4
		PM	EB	40.7
			WB	37.6
33	Alley between Avon Street and Lima Street	AM	EB	35.4
			WB	31.2
		PM	EB	34.5
			WB	33.2
34	Alley between Lima Street and California Street	AM	EB	33.2
			WB	29.4
		PM	EB	32.7
			WB	32.9
36	Alley between Ontario Street and Fairview Street (Behind El Torito)	AM	EB	36.1
			WB	36.6
		PM	EB	38.8
			WB	36.9

Note: Roadway noise levels are modeled 75 feet from the center of the roadway.
EB = eastbound; WB = westbound.

D. REGULATORY FRAMEWORK

Specific Noise policies are enacted at the local level. Key federal, state, and local laws, regulations, and specific policies that regulate are summarized.

Federal

Federal Transit Administration

The FTA has published guidelines for assessing the impacts of groundborne vibration associated with construction activities, which have been applied by other jurisdictions to other types of projects. The FTA's measure of the threshold of architectural damage for conventional sensitive structures (e.g., residential units) is 0.2 in/sec PPV.6 The vibration threshold of perception is 0.01 in/sec PPV. With respect to human annoyance, the FTA provides criteria for various land use categories and based on the frequency of vibration events. According to the FTA, a vibration criterion of 72 VdB should be used for residential land uses. With respect to potential building damage (primarily from construction activities), the FTA provides guidelines for the evaluation of potential groundborne vibration damage applicable to various building categories. According to FTA guidelines, a vibration criterion of 0.20 in/sec, or 106 VdB, should be considered as the significant impact level for nonengineered timber and masonry buildings. Structures engineered with concrete and masonry (no plaster) have vibration damage criteria of 0.3 in/sec, or 110 VdB. All structures or buildings constructed of reinforced concrete, steel, or timber, have vibration damage criteria of 0.50 in/sec, or 114 VdB.

U.S Environmental Protection Agency

The U.S. Environmental Protection Agency's (USEPA) Office of Noise Abatement and Control was originally established to coordinate federal noise control activities. After its inception, USEPA's Office of Noise Abatement and Control issued the Federal Noise Control Act of 1972, which established programs and guidelines to identify and address the effects of noise on public health, welfare, and the environment. In 1981, EPA administrators determined that subjective issues, such as noise, would be better addressed at lower levels of government, thereby allowing more individualized control for specific issues by designated federal, state, and local government agencies. Accordingly, in 1982, responsibilities for regulating noise control policies were transferred to designated federal agencies and state and local governments. However, noise control guidelines and regulations contained in EPA rulings from prior years remain in place.

6 US Department of Transportation, Federal Transit Administration, *Transit and Vibration Impact Assessment*, FTA-VA-90-1003-06 (May 2006).

State

The State of California has adopted noise standards in areas of regulation not preempted by the federal government. State standards regulate noise levels of motor vehicles, sound transmission through buildings, occupational noise control, and noise insulation.

California Green Building Standards Code

Title 24 of the California Code of Regulations, also known as the California Green Building Standards Code, establishes building standards applicable to all occupancies throughout the state. The code provides acoustical regulations for exterior-to-interior sound insulation, as well as for sound and impact isolation between adjacent spaces of various occupied units. Title 24, Part 2, Chapter 12, Section 1207.11.2, states that interior noise levels generated by exterior noise sources shall not exceed 45 dBA L_{dn} in any habitable room.

Local Regulations

Burbank2035 Noise Element

The City of Burbank has established non-transportation related noise standards of 55 dBA Leq[h] for daytime hours (7:00 AM to 10:00 PM) and 45 dBA Leq[h] for nighttime hours (10:00 PM to 7:00 AM), and land use compatibility noise standards of up to 65 dBA Ldn for outdoor activity areas and 45 dBA Ldn for interior spaces for residential land uses. The City of Burbank exempts construction noise that occurs between the hours of 7:00 AM to 7:00 PM weekdays, and 8:00 AM to 5:00 PM Saturdays. Construction noise is held to regular noise standards outside the hours listed above and on Sundays and federal Holidays.

Burbank Noise Ordinance

The Burbank Noise Ordinance (Title 9, Building Regulations; Chapter 3, Environmental Protection; Article 2, Noise Control of the Burbank Municipal Code [BMC]) contains performance standards for the purpose of prohibiting unnecessary, excessive, and annoying sounds that, at certain levels and frequencies, are detrimental to the health and welfare of the city's residents. In addition, the Construction Hours of the Burbank Municipal Code identifies the days and hours that construction, alteration, movement, enlargement, replacement, repair, equipment, maintenance, removal, and demolition work can take place in the City.

The following sections of the City's Noise Ordinance are applicable to the proposed Project.

9-1-1-105.8: Construction Hours

The following construction hours shall apply to all construction, alteration, movement, enlargement, replacement, repair, equipment, maintenance, removal, and demolition work regulated by this code:

Construction Hours:

Monday – Friday: 7:00 AM to 7:00 PM
Saturday: 8:00 AM to 5:00 PM
Sunday and City Holidays: None

Exceptions:

1. 1. Single-family residential owner-builder permits when work is performed solely by the owner and family members:

   Monday – Friday: 7:00 AM to 7:00 PM

   Saturday: 8:00 AM to 5:00 PM

   Sunday and City Holidays: 8:00 AM to 5:00 PM

2. 2. Where work must be performed in an emergency situation, as defined in Section 9-3-204 of the Burbank Municipal Code.

3. 3. The Community Development Director may grant exceptions wherever there are practical difficulties involved in carrying out the provisions of this section or other specific onsite activity warrants unique consideration.

4. 4. The Planning Board or City Council may grant exceptions pursuant to land use entitlements.

9-3-208: Machinery, Equipment, Fans and Air Conditioning

5. A. Decibel Limit: No person shall operate any machinery, equipment, pump, fan, air conditioning apparatus, or similar mechanical device in such a manner as to cause the ambient noise level to be exceeded by more than five decibels. In the case of leaf blowers, as defined by Section 9-3-214 of this article, the ambient noise level may not be exceeded by more than 20 decibels.

6. B. Ambient Noise Base Level: For the purposes of this section only, all ambient noise measurements shall commence at the following ambient noise base levels in the zones and during the times shown:

Noise Level (dB)	Time of day	Land Use
45	Night	Residential
55	Day	Residential
65	Any	Commercial
70	Any	All other

Accordingly, and by way of illustration, the ambient noise level in commercial zones shall be deemed to be sixty five (65) dB notwithstanding a lower reading; provided, however, that when the ambient noise base level for the property on which the machinery, equipment, pump, fan, air conditioning apparatus or similar mechanical device is located is higher than the ambient noise base level for adjacent property, the ambient noise base level for the adjacent property shall apply. Properties separated by a street shall be deemed to be adjacent to one another.

E. METHODOLOGY

Analysis of the existing and future noise environments presented in this section is based on technical reports, noise monitoring, and noise prediction modeling. Predicted vibration impacts resulting from the implementation of the Project were determined using data from the Federal Transportation Administration (FTA). Noise modeling procedures involved the calculation of existing and future vehicular noise levels along individual roadway segments. This was accomplished using the Federal Highway Administration Highway Transportation Noise Model (TNM). This model calculates the average noise levels at specific locations based on traffic volumes, average speeds, roadway geometry, and site conditions.

For traffic-related noise, impacts are considered significant if Project-generated traffic results in exposure of sensitive receptors to an unacceptable increase in noise levels. Recommendations contained in the May 2006 Transit Noise and Vibration Impact Assessment prepared by the FTA were used to determine whether or not increase in roadway noise would be significant. The allowable noise exposure increase is reduced with increasing ambient noise exposure; such that higher ambient noise levels have a lower allowable noise exposure increase. **Table 6, Significance of Changes in Operational Roadway Noise Exposure,** shows the significance thresholds for increases in traffic-related noise levels caused either by the Project alone or by cumulative development. If sensitive receptors would be exposed to traffic noise increases exceeding the criteria shown in **Table 6,** impacts would be considered significant.

Data was collected both before and after implementation of the temporary street closures, in January 2015 and February 2015. The street segment data was collected at 36 locations over three days during each count (six days total). The speed data was collected at 15 locations on a single day during each (two days total). The intersection peak period data was collected at eight locations on two days during each count (four days total).

Table 6
Significance of Changes in Operational Roadway Noise Exposure

Existing Noise Exposure	Allowable Noise Exposure Increase
Ldn or Leq in dB(A)	
45-50	7
50-55	5
55-60	3
60-65	2
65-74	1
75+	0

Source: Federal Transit Administration (FTA), May 2006.

F. RESULTS AND ANALYSIS

According to the *Burbank2035* General Plan, Mobility Element, the dominant noise source in Burbank is traffic noise. Most of this noise originates from major roads such as Alameda Avenue, S. San Fernando Boulevard, Olive Avenue, and Glenoaks Boulevard and from freeway traffic on the Golden State (I-5) and Glendale (SR134). In addition, the City recognizes that the most efficient and effective means of controlling noise is to reduce noise at the source. However, the City also recognizes that it has no direct control over noise produced by trucks, cars, and trains because federal and state regulations preempt local laws. Therefore, the City does not provide any thresholds for vehicular noise. Nevertheless, vehicular noise can potentially affect land uses located along the studied roadway system.

North of Oak Street

Table 7, Before and After Temporary Street Closures Noise Levels North-South Streets – North of Oak Street, summarizes the post-closure street segments noise levels for the segments north of Oak Street. The modeled vehicle generated noise levels after temporary street closures at these street segments during the AM peak hour would range from a decrease of 3.4 dB(A) at Avon Street north of Oak Street (southbound) to an increase of 3.7 dB(A) at Florence Street north of Oak Street (southbound). In addition, vehicle noise levels during the PM peak hour would range from a decrease of 2.6 dB(A) at Avon Street north of Oak Street (northbound) to an increase of 1.2 dB(A) at Florence Street north of Oak Street (southbound). The roadway noise level increase of 3.7 dB(A) would be within the allowable noise increase for an existing noise exposure of 35-40 dB(A).

Table 7
Before and After Temporary Street Closures Noise Levels
North-South Streets – North of Oak Street

No.	Location	Time	Direction	Before Temporary Street Closure	After Temporary Street Closure	Difference	Significant Impact?
2	Cordova Street n/o Oak Street	AM	NB	36.7	37.3	0.6	No
			SB	40.0	39.0	-1.0	No
		PM	NB	39.4	39.0	-0.4	No
			SB	39.8	39.8	0.0	No
3	Avon Street n/o Oak Street	AM	NB	42.2	40.7	-1.5	No
			SB	41.9	38.5	-3.4	No
		PM	NB	43.3	40.7	-2.6	No
			SB	40.6	39.0	-1.6	No
4	California Street n/o N. Whitnall Hwy	AM	NB	40.1	39.9	-0.2	No
			SB	43.1	43.0	1.9	No
		PM	NB	43.4	42.1	-1.3	No
			SB	41.4	40.9	-0.5	No
5	Ontario Street n/o Oak Street	AM	NB	35.8	34.7	-1.1	No
			SB	37.8	37.5	-0.3	No
		PM	NB	38.4	38.0	-0.4	No
			SB	37.2	36.9	-0.3	No
6	Fairview Street n/o Oak Street	AM	NB	36.6	38.0	1.4	No
			SB	39.7	40.3	0.6	No
		PM	NB	40.8	41.2	0.4	No
			SB	37.5	38.2	0.7	No
7	Niagara Street n/o Oak Street	AM	NB	36.0	36.4	0.4	No
			SB	40.2	39.7	-0.5	No
		PM	NB	40.7	40.8	0.1	No
			SB	37.1	37.6	0.5	No
8	Catalina Street n/o Oak Street	AM	NB	36.7	37.2	0.5	No
			SB	39.4	39.7	0.3	No
		PM	NB	41.2	41.3	0.1	No
			SB	37.0	37.6	0.6	No
9	Florence Street n/o Oak Street	AM	NB	33.8	36.3	2.5	No
			SB	36.4	40.1	3.7	No
		PM	NB	40.0	40.0	0.0	No
			SB	37.0	38.2	1.2	No

No.	Location	Time	Direction	Before Temporary Street Closure	After Temporary Street Closure	Difference	Significant Impact?
10	Naomi Street n/o Oak Street	AM	NB	37.4	37.1	-0.3	No
			SB	40.3	40.7	0.4	No
		PM	NB	41.9	41.6	-0.3	No
			SB	39.0	39.1	0.1	No
11	Frederick Street n/o Oak Street	AM	NB	36.7	37.4	0.7	No
			SB	39.1	40.7	1.6	No
		PM	NB	41.8	41.8	0.0	No
			SB	37.6	36.7	0.1	No

Note: Roadway noise levels are modeled 75 feet from the center of the roadway.
n/o = north of; NB = northbound; SB = southbound.

South of Oak Street

Table 8, Before and After Temporary Street Closures Noise Levels North-South Streets – South of Oak Street, summarizes the post-closure street segments noise levels for the segments south of Oak Street. The modeled vehicle generated noise levels after temporary street closures at these street segments during the AM peak hour would range from a decrease of 8.0 dB(A) at Catalina Street south of Oak Street (northbound) to an increase of 5.5 dB(A) at N. Whitnall Highway south of Oak Street (southbound). In addition, vehicle noise levels during the PM peak hour would range from a decrease of 6.4 dB(A) at Catalina Street south of Oak Street (southbound) to an increase of 3.8 dB(A) at N. Whitnall Highway south of Oak Street (northbound). The 5.5 dB(A) and 3.8 dB(A) increase would be within the allowable noise increase for an existing noise exposure of 35-40 dB(A), respectively.

Table 8
Before and After Temporary Street Closures Noise Levels
North-South Streets – South of Oak Street

No.	Location	Time	Direction	Before Temporary Street Closure	After Temporary Street Closure	Difference	Significant Impact?
19	Cordova Street s/o Oak Street	AM	NB	35.2	39.5	4.3	No
			SB	41.3	36.0	-5.3	No
		PM	NB	36.1	39.2	3.1	No
			SB	41.5	41.4	-0.1	No
20	Avon Street s/o Oak Street	AM	NB	40.1	38.4	-1.7	No
			SB	40.8	36.2	-4.6	No
		PM	NB	44.0	38.4	-5.6	No
			SB	38.4	38.0	-0.4	No
21	Lima Street s/o Oak Street	AM	NB	39.3	37.6	-1.7	No
			SB	40.3	34.7	-5.6	No
		PM	NB	42.8	36.5	-6.3	No
			SB	39.2	38.0	-1.2	No
22	California Street s/o Oak Street	AM	NB	39.7	39.9	0.2	No
			SB	41.3	37.3	-4.0	No
		PM	NB	42.8	38.5	-4.3	No
			SB	39.7	40.1	0.4	No
23	N. Whitnall Hwy s/o Oak Street	AM	NB	34.9	38.9	4.0	No
			SB	35.6	41.1	5.5	No
		PM	NB	37.6	41.4	3.8	No
			SB	36.4	38.9	2.5	No
24	Fairview Street s/o Oak Street	AM	NB	45.2	37.3	-7.9	No
			SB	43.4	40.1	-3.3	No
		PM	NB	45.2	41.7	-3.5	No
			SB	43.4	37.4	-6.0	No
25	Niagara Street s/o Oak Street	AM	NB	35.2	36.9	1.7	No
			SB	39.6	38.4	-1.2	No
		PM	NB	40.9	41.7	0.8	No
			SB	37.5	34.2	-3.3	No
26	Catalina Street s/o Oak Street	AM	NB	45.6	37.6	-8.0	No
			SB	44.9	41.4	-3.5	No

No.	Location	Time	Direction	Before Temporary Street Closure	After Temporary Street Closure	Difference	Significant Impact?
		PM	NB	45.6	42.2	-3.4	No
			SB	44.9	38.5	-6.4	No
27	Florence Street s/o Oak Street	AM	NB	35.6	36.7	1.1	No
			SB	39.6	40.2	0.6	No
		PM	NB	40.5	40.2	-0.3	No
			SB	37.5	37.3	-0.2	No
28	Naomi Street s/o Oak Street	AM	NB	36.7	33.2	-3.5	No
			SB	37.9	35.8	-2.1	No
		PM	NB	42.2	41.2	-1.0	No
			SB	36.8	37.4	0.6	No
29	Frederick Street s/o Oak Street	AM	NB	38.2	38.7	0.5	No
			SB	39.9	41.2	1.3	No
		PM	NB	42.8	42.9	0.1	No
			SB	38.0	38.2	0.2	No
31	Fairview Street s/o N. Whitnall Hwy	AM	NB	37.6	40.8	3.2	No
			SB	40.4	43.7	3.3	No
		PM	NB	42.4	44.5	2.1	No
			SB	38.8	40.7	1.9	No

Note: Roadway noise levels are modeled 75 feet from the center of the roadway.
s/o = south of; NB = northbound; SB = southbound.

Oak Street

Table 9, Before and After Temporary Street Closures Noise Levels – Oak Street, summarizes the post-closure street segments noise levels for the various segments of Oak Street, from east of Hollywood Way to west of Buena Vista Street. The modeled vehicle generated noise levels after temporary street closures at these street segments during the AM peak hour would range from a decrease of 0.9 dB(A) at Oak Street west of Buena Vista Street (eastbound) to an increase of 3.1 dB(A) at Oak Street east of California Street (eastbound). In addition, vehicle noise levels during the PM peak hour would range from a decrease of 1.3 dB(A) at Oak Street east of Hollywood Way (westbound) to an increase of 1.6 dB(A) at Oak Street east of California Street (westbound). The 3.1 dB(A) increase would be within the allowable noise increase for an existing noise exposure of 40-45 dB(A).

Table 9
Before and After Temporary Street Closures Noise Levels – Oak Street

No.	Location	Time	Direction	Before Temporary Street Closure	After Temporary Street Closure	Difference	Significant Impact?
12	Oak Street e/o Hollywood Way	AM	EB	44.7	44.4	-0.3	No
			WB	45.5	46.6	1.1	No
		PM	EB	46.8	47.1	0.3	No
			WB	48.0	46.7	-1.3	No
13	Oak Street e/o Cordova Street	AM	EB	43.6	44.3	0.7	No
			WB	44.6	46.0	1.4	No
		PM	EB	45.0	46.3	1.3	No
			WB	47.6	46.4	-1.2	No
14	Oak Street e/o California Street	AM	EB	42.3	45.4	3.1	No
			WB	43.4	44.3	0.9	No
		PM	EB	44.5	45.3	0.8	No
			WB	44.3	45.9	1.6	No
15	Oak Street e/o Fairview Street	AM	EB	42.8	44.3	1.5	No
			WB	42.8	43.0	0.2	No
		PM	EB	44.6	44.6	0.0	No
			WB	44.7	45.3	0.6	No
16	Oak Street e/o Catalina Street	AM	EB	42.7	43.5	0.8	No
			WB	42.0	42.0	0.0	No
		PM	EB	44.0	44.3	0.3	No
			WB	44.3	44.3	0.0	No
17	Oak Street w/o Buena Vista Street	AM	EB	43.8	43.8	0.0	No
			WB	42.1	41.2	-0.9	No
		PM	EB	45.4	44.6	-0.8	No
			WB	44.2	43.2	-1.0	No

Note: Roadway noise levels are modeled 75 feet from the center of the roadway.
e/o = east of; EB = eastbound; WB = westbound.

Alley North of Alameda Avenue and Olive Avenue

Table 10, Before and After Temporary Street Closures Noise Levels East-West Alley – North of Alameda Avenue and Olive Avenue, summarizes the post-closure street segments noise levels for the various segments of the east-west alley just north of Alameda Avenue and Olive Avenue. The modeled vehicle generated noise levels after temporary street closures at these street segments during the AM peak would range from a decrease of 11.0 dB(A) at the alley between Cordova Street and Avon Street (westbound) to an increase of 2.1 dB(A) at the alley between Lima Street and California Street (westbound). In addition, vehicle noise levels during the PM peak hour would range from a decrease of 9.4 dB(A) at the alley between Cordova Street and Avon Street (westbound) to an increase of 0.7 dB(A) at the alley between Ontario Street and Fairview Street (westbound). The increase of 2.1 dB(A) would be within the allowable noise increase for an existing noise exposure of 25-30 dB(A).

Table 10
Before and After Temporary Street Closure Noise Levels
East-West Alley – North of Alameda Avenue and Olive Avenue

No.	Location	Time	Direction	Before Temporary Street Closure	After Temporary Street Closure	Difference	Significant Impact?
32	Alley between Cordova Street and Avon Street	AM	EB	36.1	31.5	-4.6	No
			WB	40.4	29.4	-11.0	No
		PM	EB	40.7	32.7	-8.0	No
			WB	37.6	28.2	-9.4	No
33	Alley between Avon Street and Lima Street	AM	EB	35.4	33.2	-2.2	No
			WB	31.2	32.7	1.5	No
		PM	EB	34.5	30.8	-3.7	No
			WB	33.2	30.8	-2.4	No
34	Alley between Lima Street and California Street	AM	EB	33.2	32.4	-0.8	No
			WB	29.4	31.5	2.1	No
		PM	EB	32.7	31.5	-1.2	No
			WB	32.9	30.4	-2.5	No
36	Alley between Ontario Street and Fairview Street (Behind El Torito)	AM	EB	36.1	38.1	2.0	No
			WB	36.6	37.6	1.0	No
		PM	EB	38.8	38.4	-0.4	No
			WB	36.9	37.6	0.7	No

Note: Roadway noise levels are modeled 75 feet from the center of the roadway.
EB = eastbound; WB = westbound.

Existing with Permanent Improvement Package

Table 11, Existing with Permanent Improvement Package Conditions Noise Levels, shows the results of applying the City's residential street segment traffic significance thresholds to the 27 local street segments. As shown in **Table 11,** maximum noise level increases along roadways adjacent to residential uses by permanent improvement package would range from a decrease of 8.1 dB(A) at the alley between Cordova Street and Avon Street to an increase of 3.4 dB(A) at N. Whitnall Highway south of Oak Street. The roadway noise level increase of 3.4 dB(A) at N. Whitnall Highway south of Oak Street would be within the 7 dB(A) allowable noise increase for an existing noise exposure of 45-50 dB(A).

Table 11
Existing With Permanent Improvement Package Conditions Noise Levels

No.	Roadway Segment	Existing	Existing with Permanent Improvement Package	Change due to Project	Significant Impact?
1	Alley between Hollywood Way and Cordova Street n/o Oak Street	44.3	44.9	0.6	No
2	Cordova Street n/o Oak Street	47.9	47.7	-0.2	No
3	Avon Street n/o Oak Street	50.4	48.2	-2.2	No
5	Ontario Street n/o Oak Street	46.2	45.8	-0.4	No
6	Fairview Street n/o Oak Street	48.0	48.3	0.3	No
7	Niagara Street n/o Oak Street	47.6	47.8	0.2	No
8	Catalina Street n/o Oak Street	47.6	48.0	0.4	No
9	Florence Street n/o Oak Street	46.2	47.7	1.5	No
10	Naomi Street n/o Oak Street	48.9	48.7	-0.2	No
11	Frederick Street n/o Oak Street	48.0	48.5	0.5	No
18	Alley between Hollywood Way and Cordova Street s/o Oak Street	44.7	45.7	1.0	No
19	Cordova Street s/o Oak Street	48.3	48.9	0.6	No
20	Avon Street s/o Oak Street	49.7	47.0	-2.7	No
21	Lima Street s/o Oak Street	49.1	48.0	-1.1	No

No.	Roadway Segment	Existing	Existing with Permanent Improvement Package	Change due to Project	Significant Impact?
23	N. Whitnall Hwy s/o Oak Street	45.3	48.7	3.4	
24	Fairview Street s/o Oak Street	47.4	48.3	0.9	No
25	Niagara Street s/o Oak Street	47.6	47.5	-0.1	No
26	Catalina Street s/o Oak Street	48.2	48.8	0.6	No
27	Florence Street s/o Oak Street	47.5	47.8	0.3	No
28	Naomi Street s/o Oak Street	48.3	47.4	-0.9	No
29	Frederick Street s/o Oak Street	48.7	49.4	0.7	No
31	Fairview street s/o N. Whitnall Hwy	49.4	51.5	2.1	No
32	Alley between Cordova Street and Avon Street	47.7	39.6	-8.1	No
33	Alley between Avon Street and Lima Street	42.3	41.1	-1.2	No
34	Alley between Lima Street and California Street	41.3	40.4	-0.9	No
35	Ontario Street n/o Alameda Avenue	42.7	42.1	-0.6	No
36	Alley between Ontario Street and Fairview Street (Behind El Torito)	47.0	47.3	0.3	No

Note: Roadway noise levels are modeled 75 feet from the center of the roadway.
n/o = north of; s/o = south of.

G. CUMULATIVE IMPACTS

The cumulative conditions analysis compares the Cumulative No Project conditions to the Cumulative with Permanent Improvement Package Conditions. Both analysis scenarios include related project traffic and the infrastructure improvements that would occur outside of the Project improvements. **Table 12, Cumulative Conditions with Permanent Improvement Package Noise Levels,** shows the result of the analysis for 27 local street segments. As shown in **Table 12,** maximum cumulative noise level increase along roadways adjacent to residential uses by permanent improvement package would range from a decrease in 7.2 dB(A) at the alley between Cordova Street and Avon Street to an increase of 3.0 dB(A) at N. Whitnall Highway south of Oak Street. The roadway noise level increase of 3.0 dB(A) at N. Whitnall Highway south of Oak Street would be within the 7 dB(A) allowable noise increase for an existing noise exposure of 45-50 dB(A).

Table 12
Cumulative Conditions with Permanent Improvement Package Noise Levels

No.	Roadway Segment	Cumulative	Cumulative with Permanent Improvement Package	Change due to Project	Significant Impact?
1	Alley between Hollywood Way and Cordova Street n/o Oak Street	44.7	45.2	0.5	No
2	Cordova Street n/o Oak Street	48.4	48.0	-0.4	No
3	Avon Street n/o Oak Street	50.5	48.1	-2.4	No
5	Ontario Street n/o Oak Street	46.2	46.1	-0.1	No
6	Fairview Street n/o Oak Street	48.0	48.1	0.1	No
7	Niagara Street n/o Oak Street	47.6	47.7	0.1	No
8	Catalina Street n/o Oak Street	47.6	47.8	0.2	No
9	Florence Street n/o Oak Street	46.2	46.7	0.5	No
10	Naomi Street n/o Oak Street	49.0	48.9	-0.1	No
11	Frederick Street n/o Oak Street	48.0	48.5	0.5	No
18	Alley between Hollywood Way and Cordova Street s/o Oak Street	44.7	45.7	1.0	No
19	Cordova Street s/o Oak Street	48.8	49.3	0.5	No
20	Avon Street s/o Oak Street	50.0	47.5	-2.5	No
21	Lima Street s/o Oak Street	49.3	48.2	-1.1	No
23	N. Whitnall Hwy s/o Oak Street	45.7	48.7	3.0	No

24	Fairview Street s/o Oak Street	47.5	48.2	0.7	No
25	Niagara Street s/o Oak Street	47.7	47.6	-0.1	No
26	Catalina Street s/o Oak Street	48.3	48.7	0.4	No
27	Florence Street s/o Oak Street	47.5	47.4	-0.1	No
28	Naomi Street s/o Oak Street	48.4	47.7	-0.7	No
29	Frederick Street s/o Oak Street	48.8	49.3	1.5	No
31	Fairview street s/o N. Whitnall Hwy	49.6	51.4	1.8	No
32	Alley between Cordova Street and Avon Street	47.9	40.7	-7.2	No
33	Alley between Avon Street and Lima Street	42.9	41.9	-1.0	No
34	Alley between Lima Street and California Street	42.1	42.1	0.0	No
35	Ontario Street n/o Alameda Avenue	42.7	42.1	-0.6	No
36	Alley between Ontario Street and Fairview Street (Behind El Torito)	47.2	47.4	0.2	No

Note: Roadway noise levels are modeled 75 feet from the center of the roadway.
n/o = north of; s/o = south of.

H. CONCLUSION

As shown in **Table 7,** vehicle noise levels for the post-closure segments at the segments north of Oak Street during the AM peak hour would range from a decrease of 3.4 dB(A) at Avon Street north of Oak Street (southbound) to an increase of 3.7 dB(A) at Florence Street north of Oak Street (southbound). In addition, vehicle noise levels during the PM peak hour would range from a decrease of 2.6 dB(A) at Avon Street north of Oak Street (northbound) to an increase of 1.2 dB(A) at Florence Street north of Oak Street (southbound). The roadway noise level increase of 3.7 dB(A) would be within the allowable noise increase for an existing noise exposure of 35-40 dB(A).

As shown in **Table 8,** vehicle noise levels for the post-closure segments at the segments south of Oak Street during the AM peak hour would range from a decrease of 8.0 dB(A) at Catalina Street south of Oak Street (northbound) to an increase of 5.5 dB(A) at N. Whitnall Highway south of Oak Street (southbound). In addition, vehicle noise levels during the PM peak hour would range from a decrease of 6.4 dB(A) at Catalina Street south of Oak Street (southbound) to an increase of 3.8 dB(A) at N. Whitnall

Highway south of Oak Street (northbound). The 5.5 dB(A) and 3.8 dB(A) increase would be within the allowable noise increase for an existing noise exposure of 35-40 dB(A), respectively.

As shown in **Table 9,** vehicle noise levels for post-closure street segments of Oak Street, from east of Hollywood way to west of Buena Vista Street during the AM peak hour would range from a decrease of 0.9 dB(A) at Oak Street west of Buena Vista Street (eastbound) to an increase of 3.1 dB(A) at Oak Street east of California Street (eastbound). In addition, vehicle noise levels during the PM peak hour would range from a decrease of 1.3 dB(A) at Oak Street east of Hollywood Way (westbound) to an increase of 1.6 dB(A) at Oak Street east of California Street (westbound). The 3.1 dB(A) increase would be within the allowable noise increase for an existing noise exposure of 40-45 dB(A).

As shown in **Table 10,** vehicle noise levels for the post-closure street segments of the east-west alley just north of Alameda Avenue and Olive Avenue during the AM peak would range from a decrease of 11.0 dB(A) at the alley between Cordova Street and Avon Street (westbound) to an increase of 2.1 dB(A) at the alley between Lima Street and California Street (westbound). In addition, vehicle noise levels during the PM peak hour would range from a decrease of 9.4 dB(A) at the alley between Cordova Street and Avon Street (westbound) to an increase of 0.7 dB(A) at the alley between Ontario Street and Fairview Street (westbound). The increase of 2.1 dB(A) would be within the allowable noise increase for an existing noise exposure of 25-30 dB(A).

As shown in **Table 11,** with incorporation of the permanent improvement package conditions, vehicle noise levels would range from a decrease of 8.1 dB(A) at the alley between Cordova Street and Avon Street to an increase of 3.4 dB(A) at N. Whitnall Highway south of Oak Street. The roadway noise level increase of 3.4 dB(A) at N. Whitnall Highway south of Oak Street would be within the 7 dB(A) allowable noise increase for an existing noise exposure of 45-50 dB(A).

As shown in **Table 12,** cumulative vehicle noise levels by the permanent improvement package would range from a decrease in 7.2 dB(A) at the alley between Cordova Street and Avon Street to an increase of 3.0 dB(A) at N. Whitnall Highway south of Oak Street. The roadway noise level increase of 3.0 dB(A) at N. Whitnall Highway south of Oak Street would be within the 7 dB(A) allowable noise increase for an existing noise exposure of 45-50 dB(A).