NOISE IMPACT ANALYSIS
LONG BEACH DOWNTOWN COMMUNITY PLAN
LONG BEACH, CALIFORNIA

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CHAPTER 1.0
INTRODUCTION AND PURPOSE

The proposed project is the adoption and implementation of the Long Beach Downtown Community Plan (Community Plan) that would replace the existing land use, zoning, and planned development districts as the land use and design document for all future development in the proposed Community Plan area. The Community Plan incorporates zoning, development standards, and design guidelines to be followed in implementing the Community Plan. Full implementation of the Community Plan would increase the density and intensity of existing Downtown land uses by allowing up to approximately 9,200 new residential units; 1.5 million square feet of new office, civic, cultural, and similar uses; 480,000 square feet of new retail; and 3,200 new hotel rooms. The additional development assumed in the Community Plan would occur over a 25-year period.

The proposed Community Plan would encompass an area bounded by the Los Angeles River on the west and Ocean Boulevard on the south. The north boundary generally follows portions of 7th and 10th streets; and the east boundary includes land on both sides of Alamitos Avenue. 1 locates the project in a regional context and 2 depicts the project boundary and the immediate vicinity.

This noise analysis provides a brief discussion of noise terminology, the existing noise environment, and regulatory setting, and evaluates the potential for noise impacts form the overall changes in land use in the project area through the year 2035, the assumed buildout year. This report does not provide an analysis of noise impacts based on detailed plans for any proposed specific development projects.

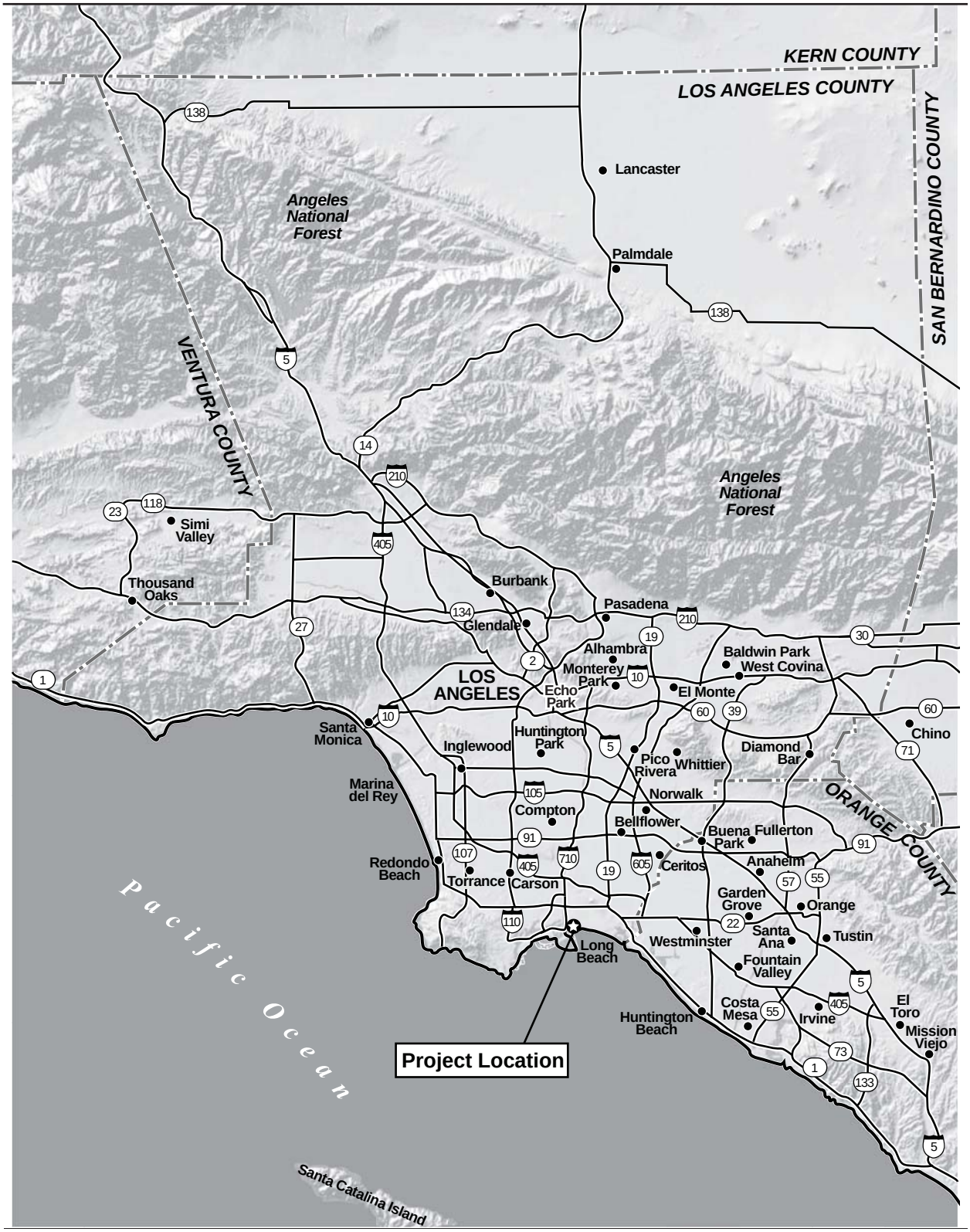

Figure 1
Regional Map

Figure 2
Vicinity Map

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CHAPTER 2.0
PROJECT DESCRIPTION

2.1 PROJECT LOCATION

The proposed Community Plan would encompass an area of approximately 667 acres bounded by the Los Angeles River on the west and Ocean Boulevard on the south (see Figure 2). The north boundary generally follows portions of 7th and 10th streets; and the east boundary includes land on both sides of Alamitos Avenue. 3 is an aerial photograph of the Community Plan area and surrounding area.

2.2 PROJECT DESCRIPTION

The proposed project is the adoption and implementation of the Community Plan to replace the existing land use plans and zoning regulations for the proposed Community Plan area. The Community Plan incorporates zoning, development standards, and design guidelines that are required of all new development in the Community Plan area.

2.2.1 Proposed Land Uses

Land Use Designations

The Community Plan proposes to establish a land use district, the Downtown-General District (District), and a residential overlay, the Downtown-Neighborhood Overlay (Overlay), with the intent of providing additional housing, employment, shopping, and entertainment opportunities while preserving intact residential neighborhoods that provide a wide mix of historic and more recent housing types. The District and Overlay would be supplemented by designating certain main and secondary streets where pedestrian-oriented uses are required to be located on ground-floor street fronts. The Land Uses and Permit Requirements from the Development Standards section of the Community Plan lists uses that are permitted in the District and Overlay, uses requiring conditional or administrative use permits, accessory and temporary uses, and prohibited uses.

Downtown-General District. The District encompasses the entire Downtown Plan area. It is intended to accommodate mid- and high-rise residential development; financial and professional offices; personal services facilities; hotels and motels; and retail, cultural, entertainment, and dining destinations. Most automotive-related uses are prohibited or require special review

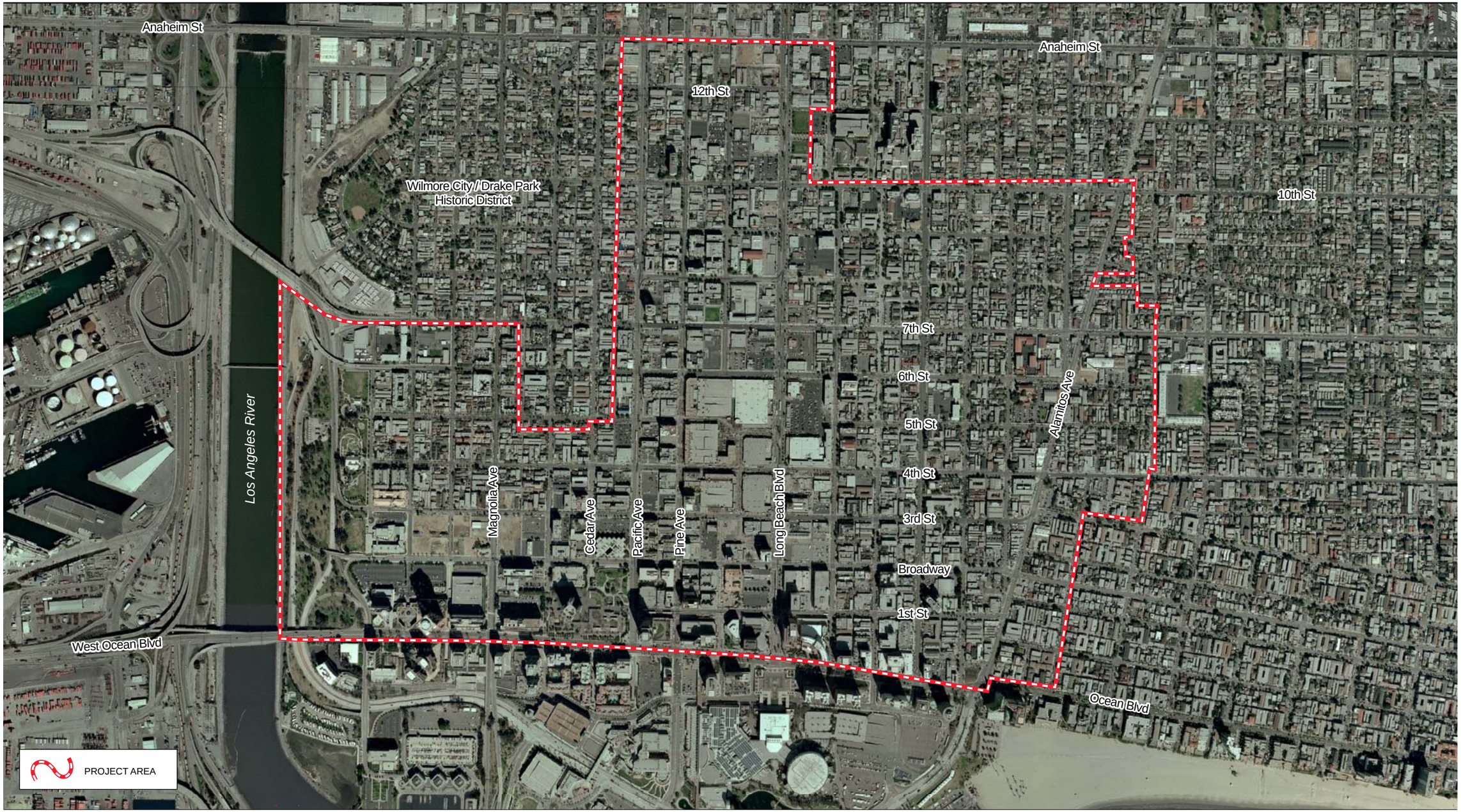
through a conditional or administrative use permit. Single-family residences would not be permitted within the District unless located within the Overlay.

Downtown-Neighborhood Overlay. The Overlay is established to ensure that primarily residential uses are maintained within specific areas identified in 4. The Overlay is intended to preserve a range of housing types at lower densities that are within walking distance of employment and services available within Downtown's commercial core. In addition to residential uses, other uses permitted in the Overlay include shopkeeper or artist studios accessory to residential use, day care or preschool up to 14 children, flower stand or newsstand, and park or community gardens. Most neighborhood-serving commercial uses would require an administrative use permit, such as for restaurants, retail sales, dry cleaners, professional and medical offices, barber/beauty shops, small appliance and bicycle repair, and pet grooming. Uses that would require a conditional use permit in the Overlay include on- and off-premise alcoholic beverage sales, motorcycle/scooter sales, internet café, live or movie theaters (less than 100 seats only), fitness centers or dance studios, laundromats, churches, schools, and youth hostels.

Additional Zoning Standards: Pedestrian-Oriented Uses. Areas designated as main streets within the District are to have a minimum of 80 percent of the ground-floor street fronts contain active uses such as restaurants and on-premise alcoholic beverage sales; retail sales; dry cleaners; banks; professional and medical offices; barber/beauty shops; small appliance and bicycle repair; pet grooming; computer arcade or internet café; live or movie theaters; clubs and pool halls; financial, professional, and personal services; fitness center or dance studio; churches; museums; and business schools. In areas designated as secondary streets, 60 percent of the ground-floor street fronts are required to contain these active uses. Percentages would be based on building frontage and determined on a parcel-by-parcel basis. Proposed uses would also be required to conform to the list of uses allowed in the District or Overlay.

Project Objectives

The purpose of the Community Plan is to replace the existing planned development zoning for the Community Plan area and provide more up-to-date guidance to respond to Downtown's current development context and trends, and to provide direction regarding the type, character, and standard of quality desired for development in the Downtown area. As described in the proposed Community Plan, the guiding principles include:



Source: ESRI 2008

900 450 0 900 feet

Scale: 1:10,800; 1 inch = 900 feet

Figure 3
Aerial Photograph of Community Plan Area

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Source: ESRI 2008

900 450 0 900 feet

Scale: 1:10,800; 1 inch = 900 feet

Figure 4
Noise Measurement Locations

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- **Promote the development of a distinctive Downtown skyline and a vibrant, compact city core attracting cosmopolitan and creative people.** An intense and attractive Downtown is key to developing a vibrant city center and minimizing growth pressures on surrounding existing mature neighborhoods. The increased residential population and the mix of uses envisioned by the Community Plan, as well as the walkability, connectivity, and the convenience of transit, will contribute to Downtown's vitality by offering easy access to business, shopping, cultural attractions, and residences.

- **Position Downtown as the lively heart of the city, connecting with neighborhoods and the coastline.** Downtown Long Beach is the heart of Long Beach and its commercial, civic, and tourism center. With a strong historic street grid, and a rich multimodal transit system, the Community Plan will maintain and strengthen connections to surrounding neighborhoods, the region, and the waterfront.

- **Develop in a way that is less dependent on fossil fuels and more focused on walking, bicycling, and public transportation.** The Community Plan intends to build upon concepts of smart growth to position Downtown as a pedestrian-friendly mixed-use center. Walkable and bicycle-friendly streets and development, accessible transit, and pedestrian-oriented uses are all crucial ingredients for creating a vibrant mixed-use community that allows people to live, work, and play within the Downtown area.

- **Support new industries to continue to diversify the economy and promote job growth while strengthening the existing backbone of convention, tourism, and port businesses.** The Community Plan encourages a range of uses to support a diverse economy and a wealth of jobs and housing in Downtown, while continuing to support the hub of convention, tourist, and port activity for which Long Beach is known.

- **Encourage bold architecture, planning, and construction utilizing green building technology and incorporating sustainable energy.** Well-designed buildings are the foundation for achieving great streets and neighborhoods. The Community Plan encourages innovative buildings that are urban in nature, with high-quality materials and designs. The Community Plan encourages the integration of green building design and energy efficiency.

- **Demand quality in building practices in order to ultimately create historical masterpieces.** The design of new development projects should attempt to distinguish their own place in time and ultimately achieve the same level of distinction as past eras without replication. The Community Plan calls for the use of best practices for high-quality design and construction.

- **Value buildings of historic merit and seek to preserve or restore them through adaptive reuse.** Downtown Long Beach is composed of buildings that reflect a rich history and a range of architectural periods, from Craftsman to Spanish, and Art Deco to Modern. All of these styles represent design innovations and a distinct place in the history of Long Beach. The Community Plan encourages the adaptive reuse and preservation of these buildings.

- **Include the best aspects of an innovative global city: dynamic architecture, strong public spaces and open space, celebration of this unique culture, and respect for the natural environment.** Downtown Long Beach will provide an intense, yet livable environment. The Community Plan provides direction for incorporating open space within new development, and strengthening and respecting the character of existing places and neighborhoods while encouraging innovative new development.

CHAPTER 3.0
METHODOLOGY

3.1 NOISE TERMINOLOGY AND CONCEPTS

Sound is a vibratory disturbance created by a moving or vibrating source, which is capable of being detected by the hearing organs. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired and may therefore be classified as a more specific group of sounds. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and in the extreme, hearing impairment (Caltrans 2009).

Decibels and Frequency

In its most basic form, a continuous sound can be described by its frequency or wavelength (pitch) and its amplitude (loudness). Frequency is expressed in cycles per second, or hertz. Frequencies are heard as the pitch or tone of sound. High-pitched sounds produce high frequencies; low-pitched sounds produce low frequencies. Sound pressure amplitude is measured in micro-Pascals (mPa). Sound pressure amplitudes for different kinds of noise environments can range from 20 to 100,000,000 mPa. Because this huge range of values is cumbersome and difficult to use, a logarithmic scale is used to describe sound pressure level in terms of decibels (dB). The threshold of hearing for young people is about 0 dB, which corresponds to 20 mPa (Caltrans 2009).

As dB are measured on a logarithmic scale that quantifies sound intensity, similar to the Richter scale used for earthquake magnitudes, dB cannot be added or subtracted through ordinary arithmetic. A doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by 3 dB; a halving of the energy would result in a 3 dB decrease. For example, if an air conditioner produces a sound pressure level of 85 dB at 50 feet, two air conditioners at the same distance would produce 88 dB—not 170 dB.

Perception of Noise at the Receiver and A-Weighting

The human ear is not equally sensitive to all frequencies within the sound spectrum. To accommodate this phenomenon, the A-scale, which approximates the frequency response of the average young ear when listening to most ordinary everyday sounds, was devised. When people make relative judgments of the loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Therefore, the “A-weighted” noise scale is used

for measurements and standards involving the human perception of noise. Noise levels using A-weighted measurements are written dBA or dB(A). 1 shows the relationship of various noise levels to commonly experienced noise events.

Table 1
Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	--110--	Rock Band
Jet Fly-over at 300 meters (1,000 feet)	--100--	
Gas Lawn Mower at 1 meter (3 feet)	--90--	
Diesel Truck at 15 meters (50 feet), at 80 km/hr (50 mph)	--80--	Food Blender at 1 meter (3 feet) Garbage Disposal at 1 meter (3 feet)
Noisy Urban Area, Daytime Gas Lawn Mower at 30 meters (100 feet)	--70--	Vacuum Cleaner at 3 meters (10 feet)
Commercial Area Heavy Traffic at 90 meters (300 feet)	--60--	Normal Speech at 1 meter (3 feet)
Quiet Urban Daytime	--50--	Large Business Office Dishwasher in Next Room
Quiet Urban Nighttime	--40--	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	--30--	Library
Quiet Rural Nighttime	--20--	Bedroom at Night, Concert Hall (Background)
	--10--	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	--0--	Lowest Threshold of Human Hearing

Source: Caltrans 2009

Human perception of noise has no simple correlation with acoustical energy. The perception of noise is not linear in terms of dBA or in terms of acoustical energy. Two noise sources do not "sound twice as loud" as one source. It is widely accepted that the average healthy ear can barely perceive changes of a 3 dBA increase or decrease; that a change of 5 dBA is readily perceptible; and that an increase (decrease) of 10 dBA sounds twice (half) as loud (Caltrans 2009).

Noise Propagation

From the source to the receiver, noise changes both in level and in the frequency spectrum. The most obvious is the decrease in noise as the distance from the source increases. The manner in which noise reduces with distance depends on the important factors described in the following discussion.

Geometric spreading from point and line sources: Sound from a small localized source (approximating 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 the distance. The movement of the vehicles makes the source of the sound appear to emanate from a line (line source) rather than a point when viewed over some time interval. The sound level attenuates or drops off at a rate of 3 dBA per doubling of distance for line sources (Crocker 2007 et al.).

Ground absorption: Hard sites (i.e., sites with a reflective surface between the source and the receiver, such as parking lots or smooth bodies of water) receive no excess ground attenuation, and the changes in noise levels with distance (drop-off rate) are simply the geometric spreading of the source. Soft sites are sites that have an absorptive ground surface such as soft dirt, grass, or scattered bushes and trees and receive an excess ground attenuation value of 1.5 dBA per doubling of distance (Crocker 2007).

Atmospheric effects: Wind speed will bend the path of sound to "focus" it on the downwind side and make a "shadow" on the upwind side of the source. At short distances, up to 164 feet, the wind has minor influence on the measured sound level. For longer distances, the wind effect becomes appreciably greater. Temperature gradients create effects similar to those of wind gradients, except that they are uniform in all directions from the source. On a sunny day with no wind, temperature decreases with altitude, giving a shadow effect for sound. On a clear night, temperature may increase with altitude, focusing sound on the ground surface (Caltrans 2009).

Shielding by natural and man-made features, noise barriers, diffraction, and reflection: A large object in the path between a noise source and a receiver can significantly attenuate noise levels at that receiver location. The amount of attenuation provided by this "shielding" depends on the size of the object and the frequencies of the noise levels. Natural terrain features such as hills and dense woods, as well as fabricated features such as buildings and walls, can significantly alter noise levels.

Noise Descriptors

The intensity of environmental noise fluctuates over time, and several different descriptors of time-averaged noise levels are used. The selection of a proper noise descriptor for a specific source depends on the spatial and temporal distribution, duration, and fluctuation of both the noise source and the environment. The noise descriptors used in this report to describe environmental noise are defined below.

- L_{max} *(Maximum Noise Level):* The highest A-weighted integrated noise level occurring during a specific period of time.

- *L_{min} (Minimum Noise Level):* The lowest A-weighted integrated noise level during a specific period of time.
- *Peak:* The highest weighted or unweighted instantaneous peak-to-peak value occurring during a measurement period.
- *L_n (Statistical Descriptor):* The noise level exceeded n% of a specific period of time, generally accepted as an hourly statistic. An L_{10} would be the noise level exceeded 10% of the measurement period.
- *L_{eq} (Equivalent Noise Level):* The energy mean (average) noise level. The steady-state sound level that, in a specified period of time, contains the same acoustical energy as a varying sound level over the same time period.
- *L_{dn} (Day-Night Noise Level):* The 24-hour L_{eq} with a 10-dBA "penalty" applied during nighttime noise-sensitive hours, 10:00 p.m. through 7:00 a.m. The L_{dn} attempts to account for the fact that noise during this specific period of time is a potential source of disturbance with respect to normal sleeping hours.

3.2 VIBRATION TERMINOLOGY AND CONCEPTS

Groundborne vibration consists of oscillatory waves that propagate from the source through the ground to adjacent structures. The frequency of a vibrating object describes how rapidly it is oscillating. The number of cycles per second of oscillation is the vibration frequency, which is described in terms of hertz, abbreviated Hz. The normal frequency range of most groundborne vibration that can be felt generally starts from a low frequency of less than 1 Hz to a high of about 200 Hz (Crocker 2007).

Perception of Vibration at the Receiver

While people have varying sensitivities to vibrations at different frequencies, in general they are most sensitive to low-frequency vibration. Vibration in buildings caused by construction activities may be perceived as motion of building surfaces or rattling of windows, items on shelves, and pictures hanging on walls. Vibration of building components can also take the form of an audible low-frequency rumbling noise, which is referred to as groundborne noise. Groundborne noise is usually only a problem when the originating vibration spectrum is dominated by frequencies in the upper end of the range (60 to 200 Hz), or when foundations or utilities, such as sewer and water pipes, connect the structure and the construction activity (U.S. Department of Transportation, Federal Transit Administration [FTA] 2006).

Although groundborne vibration is sometimes noticeable in outdoor environments, groundborne vibration is almost never annoying to people who are outdoors (FTA 2006). The primary concern from vibration is the ability to be intrusive and annoying to local residents and other vibration-sensitive land uses.

Vibration Propagation

Vibration energy spreads out as it travels through the ground, causing the vibration level to diminish with distance away from the source. High-frequency vibrations reduce much more rapidly than low frequencies, so that low frequencies tend to dominate the spectrum at large distances from the source. Discontinuities in the soil strata can also cause diffractions or channeling effects that affect the propagation of vibration over long distances. When vibration encounters a building, a ground-to-foundation coupling loss will usually reduce the overall vibration level. However, under certain circumstances, the ground-to-foundation coupling may also amplify the vibration level due to structural resonances of the floors and walls.

Vibration Descriptors

Vibration levels are usually expressed as a single-number measure of vibration magnitude, in terms of velocity or acceleration, which describes the severity of the vibration without the frequency variable. The peak particle velocity (ppv) is defined as the maximum instantaneous positive or negative peak of the vibration signal, usually measured in inches per second. Since it is related to the stresses that are experienced by buildings, ppv is often used in monitoring of blasting vibration. Although ppv is appropriate for evaluating the potential of building damage, it is not suitable for evaluating human response (FTA 2006). It takes some time for the human body to respond to vibrations. In a sense, the human body responds to an average vibration amplitude. Because vibration waves are oscillatory, the net average of a vibration signal is zero. Thus, the root mean square (rms) amplitude is used to describe the "smoothed" vibration amplitude (Crocker 2007). The rms of a signal is the square root of the average of the squared amplitude of the signal, usually measured in inches per second. The average is typically calculated over a 1-second period. The rms amplitude is always less than the ppv and is always positive. Decibel notation is used to compress the range of numbers required to describe vibration.

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CHAPTER 4.0
EXISTING CONDITIONS

4.1 PROJECT AREA

Ocean Boulevard marks the southern boundary of the proposed Community Plan. Land uses located along the south side of Ocean Boulevard are high-density residential, mixed-use (retail and residential), and financial institutions. South of these uses are visitor-serving facilities, including the Aquarium of the Pacific, Long Beach Convention Center, Performing Arts Center, and Long Beach Arena. The Pike at Rainbow Harbor, the Shoreline Village, and hotels, recreational facilities, parks, beaches, and marinas are also located along the waterfront.

Land uses in the north portion of the Community Plan area, generally north of 10th Street between Pine and Atlantic avenues, are primarily commercial, hospital and medical services, multiple-family residential, schools, and churches. Northeast of 10th Street and Atlantic Avenue, land uses are primarily a mix of single-family and low-rise multiple-family. The Willmore City/Drake Park Historic District abuts the project site to the northwest and primarily contains older single-family homes and multiple-family residences.

Land uses to the east are primarily a mix of single-family and low-rise multiple-family residences and also include retail and restaurant uses along the main commercial corridors of 7th and 4th streets and Broadway. The Los Angeles River channel borders the project area on the west.

4.2 PROJECT SITE

The project site contains a variety of commercial, residential, civic, and cultural uses that exist within six "character areas." Each of these areas has unique characteristics and contains a variety of residential, commercial, and civic uses that are not strictly contained within a distinct character area.

> ***Business and Entertainment Area.*** This area is generally located between Pacific Avenue and Elm Avenue, extending from Ocean Boulevard north to 6th Street and it contains modern office buildings, hotels, shopping, and night spots, and includes Long Beach City Place, a mixed-use area of high-density residential, retail, and entertainment uses. The Metro Blue Line fixed-rail transit service loops through this area as do several Long Beach Transit and Metro bus routes.

North Pine. The northern portion of Pine Avenue includes newer mid-rise condominiums, older one- and two-story apartment buildings, and single-family residences. Neighborhood services such as markets, drug stores, restaurants, and other commercial uses, including office buildings, are located in this area, as well as schools and churches. Saint Mary's Medical Center is located just north of 10th Street and other short-term outpatient medical service facilities are located within the project area south of 10th Street.

Civic Center. The Long Beach Civic Center, public library, and Lincoln Park are located in this area. The Civic Center is located on the north side of Ocean Boulevard, west of Pacific Avenue, east of Golden Shore Drive, and south of Broadway. Also located in this area are the Long Beach Graduate Campuses of Pepperdine University, the World Trade Center Long Beach, and the Marriott and Hilton hotels. Several bank and office buildings are also located along both sides of this portion of Ocean Boulevard.

West End. The West End is located at the west side of Downtown, east of the I-710 freeway, north of Broadway, and south of 7th Street. This area is defined by low-rise, single- and multiple-family residential uses and neighborhood-compatible land uses, such as churches and schools. Several newer mid-rise multiple-family residences are located north of Broadway along Maine and Golden avenues, and Cesar Chavez Park is located on Golden Avenue. A bed and breakfast inn and a boutique hotel are also located in the West End.

Willmore Historic District. This historic district, which includes the Drake Park neighborhood, features residences from the early 1900s, and tree-lined streets. Most of this historic district is located offsite to the northwest of the Community Plan area. The southern boundary of this district extends into the project area along 4th Street and on Magnolia Avenue and Crystal Court. The eastern historic district boundary is Pacific Avenue.

East Village. East Village is the center of local arts and culture in Long Beach, primarily in the area from Ocean Boulevard to 3rd Street and from Elm Avenue to Alamitos Avenue. This neighborhood includes a collection of businesses, galleries, and shops. Low- and mid-rise apartment buildings provide most of the housing in this area, which also contains several motels, schools and churches, and neighborhood-serving markets and eateries.

4.3 SENSITIVE NOISE RECEPTORS

Noise-sensitive receptors are generally considered humans engaged in activities or utilizing land uses that may be subject to the stress of significant interference from noise. Activities usually associated with sensitive receptors include, but are not limited to, talking, reading, and sleeping. Land uses often associated with sensitive receptors include residential dwellings, mobile homes, hotels, motels, hospitals, nursing homes, education facilities, and libraries.

Existing noise-sensitive human receptors in the project vicinity would include all residential land uses within and adjacent to the Community Plan area.

4.4 EXISTING NOISE LEVELS

Existing noise level measurements at sites shown in Figure 4 were conducted on March 4, 2010, and March 5, 2010. Short-term measurements were conducted on March 4, 2010, between 9:30 a.m. and 4:00 p.m. A 24-hour long term measurement (shown as site "LT" in Figure 4) was conducted near Cesar Chavez Park in the western portion of the Community Plan area, which began on March 4, 2010, at 9:00 a.m. The weather was partially cloudy to clear and dry with moderate breezes from the west averaging 1 to 3 miles per hour with occasional gusts of up to 8 miles per hour.

Noise measurements were taken with two Larson Davis 820 sound level meters set on "slow" response and "A-weighting." The meters were positioned 5 feet above the existing ground elevation at all measurement locations. The results of the short-term noise measurements are summarized in 2 and the 24-hour measurement is summarized in 3. Detailed measurement data are provided in Appendix A.

Table 2
Short-term Noise Measurement Summary

Site	Location	Start Time of Measurement	L_{eq} dBA
1	Olive Avenue and 9th Street	9:30 a.m.	64
2	Pacific Avenue and 7th Street	10:00 a.m.	66
3	50 feet north of Broadway	11:00 a.m.	65
4	75 feet east of Atlantic Avenue	11:30 a.m.	58
5	50 feet west of Golden Avenue, Cesar Chavez Park	12:30 p.m.	66
6	50 feet east of Magnolia Avenue	2:00 p.m.	62
7	35 feet south of 5th Avenue	3:00 p.m.	61

* The Site ID corresponds to locations shown in Figure 4.

Table 3
24-hour Noise Measurement Summary – Cesar Chavez Park

Time	Noise Level (dBA L_{eq})
0:00	58
1:00	57
2:00	56
3:00	58
4:00	59
5:00	61
6:00	65
7:00	67
8:00	69
9:00	66
10:00	65
11:00	65
12:00	66
13:00	66
14:00	66
15:00	67
16:00	68
17:00	67
18:00	66
19:00	66
20:00	64
21:00	60
22:00	60
23:00	58
Maximum L_{eq}	69
L_{dn}	70

The predominant noise source in the Community Plan area was from vehicles on local roadways. Other sources include aircraft overflights, Metro Blue Line operations, animal vocalizations, pedestrians, and general activities associated with local businesses. Measured noise levels are typical for an urban environment. As shown in Table 3, the L_{dn} is approximately 1 dBA higher than the highest hourly L_{eq}.

4.5 APPLICABLE STANDARDS

Noise Element of the General Plan

The City adopted a General Plan Noise Element in March 1975. The Noise Element recommends "that the Long Beach Planning Commission and the Long Beach City Council continue to take affirmative action to preserve the City's quietness and to reduce and control noise." 4 shows the recommended criteria for maximum acceptable noise in Long Beach. The Noise Element

establishes criteria based on three separate parameters, including existing ambient levels; existing land use patterns; and existing health, communication, and physical setting needs, to provide an acceptable noise environment for the City (Long Beach 1975). Based on these parameters, categorical recommendations were made to achieve the goals and objectives of the City.

Table 4
Maximum Acceptable Noise Levels in dBA[1]

	Outdoor			Indoor
Land Use Type	**Max. Single Hourly Peak**	**L10[2]**	**L50[3]**	**Ldn[4]**
Residential[5] 7 a.m. 10 p.m.	70	55	45	45
Residential[5] 10 p.m. 7 a.m.	60	45	35	35
Commercial (anytime)	75	65	55	--[6]
Industrial (anytime)	85	70	60	--[6]

[1] Based on existing ambient level ranges in Long Beach and recommended U.S. Environmental Protection Agency ratios and standards for interference and annoyance.
[2] Noise levels exceeded 10 percent of the time
[3] Noise levels exceeded 50 percent of the time
[4] Day-Night average sound level. The 24-hour A-weighted equivalent sound level with a 10-decibel penalty applied to nighttime levels.
[5] Includes all residential categories and all noise-sensitive land uses such as hospitals, schools, etc.
[6] Since different types of commercial and industrial activities appear to be associated with different noise levels, identification of a maximum indoor level for activity interference is infeasible.
Source: Long Beach 1975

City of Long Beach Municipal Code

The Long Beach Municipal Code contains the City's noise control ordinances (Long Beach 1977 and as amended). Noise standards vary by land use districts identified by the noise control office. The proposed project site and surrounding area are within District One. It is common for noise ordinances to exempt construction noise from long-term exterior noise limitations; however, the City does not make this exemption for construction noise.

Section 8.80.160 establishes requirements for exterior noise and states that "no person shall operate or cause to be operated any source of sound at any location within the incorporated limits of the city or allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, which causes the noise level when measured from any other property, either incorporated or unincorporated, to exceed:

- The noise standard for that land use district for a cumulative period of more than thirty minutes in any hour; or

- The noise standard plus five decibels for a cumulative period of more than fifteen minutes in any hour; or
- The noise standard plus ten decibels for a cumulative period of more than five minutes in any hour; or
- The noise standard plus fifteen decibels for a cumulative period of more than one minute in any hour; or
- The noise standard plus twenty decibels or the maximum measured ambient, for any period of time."

In addition, "if the measured ambient level exceeds that permissible within [the first four of the above categories], the allowable noise exposure standard shall be increased in five decibels increments in each category as appropriate to encompass or reflect the ambient noise level. In the event the ambient noise level exceeds the fifth [category listed above], the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level." Exterior noise limits for District One are presented in 5.

Table 5
Long Beach Noise Ordinance, Exterior Noise Limits

Time Period	Noise Level (dBA)
Night: 10:00 p.m. to 7:00 a.m.	45
Day: 7:00 a.m. to 10:00 p.m.	50

Source: Long Beach 1977

Section 8.80.170 establishes standards for interior noise in various land use districts. Interior noise limits for District One are provided in 6.

Table 6
Long Beach Noise Ordinance, Interior Noise Limits

Receiving Land Use Designation	Type of Land Use	Time Interval	Allowable Interior Noise Level (dBA)
All	Residential	10:00 p.m. to 7:00 a.m. 7:00 a.m. to 10:00 p.m.	35 45
All	School	7:00 a.m. to 10:00 p.m. (While school is in session)	45
All	Hospital, designated quiet zones and noise sensitive zones	Anytime	40

Source: Long Beach 1977

Section 8.80.200 regulates noise disturbances, including vibration. A violation of the noise ordinance would occur if the operation of any device that creates vibration above the "vibration perception threshold" of an individual cannot occur at or beyond the property boundary of the source on private property or at 150 feet from the source on public space or right-of-way. "Vibration perception threshold" is defined as the "minimum ground or structure-borne vibrational motion necessary to cause a normal person to be aware of the vibration [through] touch or visual observation of moving objects." The perception threshold is .001 g's in the 0–30 hertz frequency range and .003 g's in the 30–100 hertz frequency range. Additional noise disturbances include:

1. Creating or causing the creation of any sound within any noise-sensitive zone, so as to exceed the specified land use noise standards set forth in Sections 8.80.150 and 8.80.170; or
2. Creating or causing the creation of any sound within or adjacent to any noise-sensitive zone containing a hospital, nursing home, school, court or other designated use so as to interfere with the functions of such activity or annoy the patients or participants of such activity.

Section 8.80.202(a) through 8.80.202(e) establishes construction activity-noise regulations for weekdays, federal holidays, Saturdays, and Sundays. Construction activities are prohibited between the hours of 7:00 p.m. and 7:00 a.m. the following day on weekdays and federal holidays. In addition, construction activities are prohibited between the hours of 7:00 p.m. on Friday and 9:00 a.m. on Saturday and after 6:00 p.m. on Saturday. No construction activities may occur on Sunday unless a permit is issued from the noise control officer, and is limited to the hours of 9:00 a.m. and 6:00 p.m. Emergency work authorized by the building official is exempt from these restrictions.

Construction Noise Level Limits

Project construction noise criteria should take into account the existing noise environment, the absolute noise levels during construction activities, the duration of the construction, and the adjacent land use. While the City does not have specific noise level criteria for assessing construction noise impact, the Federal Transit Authority (FTA) has developed guidance for determining if construction of a project would expose local sensitive receptors to adverse noise levels or if a project would result in a substantial temporary increase in noise levels. The noise levels in 7 can be considered reasonable criteria for this assessment. If the criteria identified in 8 are exceeded, there may be adverse community reaction (FTA 2006). Additionally, in urban

areas with high ambient noise levels, noise levels from construction operations should not exceed existing ambient noise levels by more than 10 dBA (FTA 2006).

Table 7
Construction Noise Level Limits

Land Use	8-hour Noise Limit (dBA L_{eq})
Residential	80
Commercial	85
Industrial	90

Source: FTA 2006

Table 8
Significant Change in Ambient Noise Levels

Existing Ambient Noise Level, CNEL/L_{dn}	Significant Increase
< 60 dBA	+ 5 dBA or greater
> 60 dBA	+ 3 dBA or greater

CNEL = community noise equivalent level; L_{dn} = day-night average noise level; dBA = decibels
Sources: Adapted from FICAN 1992; Caltrans 2009

Degradation of the Ambient Community Noise Environment

In addition to the criteria described above, another consideration in defining impact criteria is based on the degradation of the existing ambient noise environment. In community noise assessments, it is "generally not significant" if no noise-sensitive sites are located within the project vicinity, or if permanent increases in noise levels associated with implementation of a project would increase by 3 dBA or less at noise-sensitive locations in the project vicinity (Caltrans 2009). A limitation in using a single value to evaluate an impact related to a noise level increase would be the failure to account for the preexisting ambient noise environment to which a person has become accustomed. Studies assessing the percentage of people highly annoyed by changes in ambient noise levels indicate that when ambient noise levels are low, a greater change is needed to cause a response. As ambient noise levels increase, a lesser change in noise levels is required to elicit significant annoyance. The significance criteria listed in Table 8 are considered to correlate well with human response to changes in ambient noise levels and assess degradation of the ambient community noise environment.

Generally, a project may have a significant effect on the environment if it would result in a permanent substantial increase to the ambient noise levels for adjoining areas, as shown in Table 8, or expose people to severe noise levels.

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CHAPTER 5.0
IMPACTS

5.1 CONSTRUCTION

Noise impacts from construction are a function of the noise generated by the construction equipment, the location and sensitivity of nearby land uses, and the timing and duration of the noise-generating activities. Noise levels within and adjacent to the specific construction sites would increase during the construction period. Construction would not cause long-term impacts since it would be a temporary occurrence; and daily construction activities would be limited by the City's Noise Ordinance (Section 8.80.202) to hours of less noise sensitivity.

In general, construction activities are carried out in phases and each phase has its own noise characteristics based on the mix of construction equipment in use. Typical maximum noise levels at a distance of 50 feet from various pieces of construction equipment are shown in 9.

Typical construction projects, with equipment moving from one point to another, work breaks, and idle time, have long-term noise averages that are lower than loud short-term noise events. For purposes of analysis of this project, a maximum 1-hour average noise level of 80 dBA L_{eq} at a distance of 50 feet from the construction area is assumed to occur. Noise levels of other activities, such as framing or paving, would be less. Higher maximum noise events, 85 to 90 dBA L_{max}, may occur during trenching and excavation, when there may be a combination of noise from several pieces of equipment in close proximity, including the noise of backup alarms.

Noise levels from construction activities are typically considered as point sources and would drop off at a rate of 6 dBA per doubling of distance over hard sites, such as streets and parking lots; the drop-off rate would increase slightly over soft sites, such as grass fields and open terrain with vegetation (FTA 2006). The Community Plan area is considered acoustically hard and all potential exterior receptors were assumed to be 5 feet above grade. All construction equipment is assumed to have an exhaust outlet height (source height) of 11 feet to 14 feet.

Residences are located within some portions of the Community Plan area and at its periphery to north, east, and west. Commercial and governmental land uses are located throughout the Community Plan area. Residences and businesses within, and in the vicinity of, the Community Plan area would be affected by construction noise during buildout of the Community Plan.

Table 9
Typical Maximum Construction Equipment Noise Levels

Equipment	Noise Level at 50 ft (dBA L_{max})	Typical Duty Cycle
Auger Drill Rig	85	20%
Backhoe	80	40%
Blasting	94	1%
Chain Saw	85	20%
Clam Shovel	93	20%
Compactor (ground)	80	20%
Compressor (air)	80	40%
Concrete Mixer Truck	85	40%
Concrete Pump	82	20%
Concrete Saw	90	20%
Crane (mobile or stationary)	85	20%
Dozer	85	40%
Dump Truck	84	40%
Excavator	85	40%
Front End Loader	80	40%
Generator (25 KVA or less)	70	50%
Generator (more than 25 KVA)	82	50%
Grader	85	40%
Hydra Break Ram	90	10%
Impact Pile Driver (diesel or drop)	95	20%
Insitu Soil Sampling Rig	84	20%
Jackhammer	85	20%
Mounted Impact Hammer (hoe ram)	90	20%
Paver	85	50%
Pneumatic Tools	85	50%
Pumps	77	50%
Rock Drill	85	20%
Roller	74	40%
Scraper	85	40%
Tractor	84	40%
Vacuum Excavator (vac-truck)	85	40%
Vibratory Concrete Mixer	80	20%
Vibratory Pile Driver	95	20%

Source: FTA 2006; Thalheimer 2000
KVA = kilovolt amps

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. Major noise-generating construction activities would include removal of existing pavement and structures, site grading and excavation, building framing, paving, and landscaping. For most areas that may be developed under the Community Plan, the distance from these activities to noise-sensitive receptors would be less than 100 feet.

The highest construction noise levels during typical construction activities would be generated during grading excavation and foundation work, with lower noise levels occurring during building construction. As shown in Table 9, large pieces of earth-moving equipment, such as graders, scrapers, and bulldozers, generate maximum noise levels of 85 to 90 dBA L_{max} at a distance of 50 feet. However, typical hourly average construction-generated noise levels are about 80 dBA L_{eq} measured at a distance of 50 feet from the site during busy construction periods. Pile driving may occur at some development sites, particularly within the central core of the district where higher structures would be allowed and encouraged. This type of construction activity can produce very high noise levels of approximately 95 dBA at 50 feet, which are difficult to control (FTA 2006).

As discussed, noise levels drop off at a rate of about 6 dBA per doubling of distance between the noise source and receptor. However, intervening structures would also result in lower noise levels. Sound levels may be attenuated 3.0 to 5.0 dBA by a first row of houses/buildings and 1.5 dBA for each additional row of houses in built-up environments (U.S. Department of Transportation, Federal Highway Administration [FHWA] 1978). These factors generally limit the distance construction noise travels and ensure noise impacts from construction are localized.

Although construction noise would be localized to the individual sites during construction, businesses and residences throughout the Community Plan area could be intermittently exposed to temporary elevated levels of noise throughout the years of construction. This is a potentially ***significant impact***. Due to the potential for high short-term and instantaneous noise levels during peak construction activity at nearby residential properties, measures have been identified that would reduce noise levels associated with construction.

5.2 NOISE-LAND USE COMPATIBILITY AND FUTURE TRAFFIC NOISE LEVELS

The proposed Community Plan contains a number of strategies to increase development densities within the Community Plan area. The Community Plan would allow additional sensitive land uses in areas where noise levels could exceed acceptable standards. The Community Plan would also facilitate an increase in traffic along area roadways, which could permanently increase existing traffic noise levels.

Modeled Existing Peak-Hour Noise Levels

The FHWA's Traffic Noise Prediction Model (RD-77-108) was used to predict existing and future peak-hour traffic noise levels at specific receptor locations within the project site. Inputs to the model include distance; ground attenuation; and vehicle volumes, by type of vehicle, and

speeds (FHWA 1978). Traffic volumes were taken from the project traffic report (Iteris 2010). Peak-hour traffic volumes in the project traffic report were evaluated and the greatest peak hour volume was then used in the noise modeling. The traffic mix used in the modeling was developed from traffic counts taken during the noise measurements. Traffic speeds were taken from the project traffic report and observed speed limits. All roadways were modeled an acoustically hard ground type, which produces a drop-off rate of 3 dBA per doubling of distance. The model outputs include noise levels at 50 feet and distances to selected noise levels. The results of the noise modeling and the current and projected traffic volumes are attached in Appendix B of this report. Predicted existing peak-hour noise levels for streets oriented north to south and streets oriented east to west are presented in s 10 and 11, respectively.

As shown in Tables 10 and 11, the project site is currently exposed to noise levels ranging from 57 to 70 dBA L_{dn}. As shown in Table 11, the highest noise levels occur along Ocean Boulevard.

Modeled Future Peak-Hour Noise Levels

s 12 and 13 provide predicted noise levels for the future conditions with the Community Plan. Future traffic volumes were taken from the project traffic report (Iteris 2010). All other parameters were unchanged from the existing conditions model. Future predicted noise levels, which includes existing, general growth, and the proposed Community Plan's traffic volumes, are shown in Tables 12 and 13.

The proposed Community Plan contains a number of strategies to increase development densities within the Community Plan area. The Community Plan would potentially allow additional sensitive land uses in areas where noise levels could exceed acceptable standards.

Calculations based on projected increases in traffic volumes on area roadways with Community Plan implementation show that the future noise environment throughout the Community Plan area would be between 57 to 71 dBA L_{dn} at a distance of 50 feet from the centerlines of local roadways. The 65-dBA L_{dn} contour would be located a maximum of 217 feet from the centerline of Ocean Boulevard. The 65-dBA L_{dn} contour would be located less than 100 feet from the centerline of all other roadways with the exception of portions of Broadway and 7th Street. Additionally, the 65-dBA L_{dn} contour would fall within 50 feet of the centerline of Pacific Avenue, Pine Avenue, 10th Street, and all but one segment of Magnolia Avenue, between Broadway and Ocean Boulevard.

Table 10
Existing Modeled Noise Levels – Streets Oriented North to South

Roadway	Segment	Noise Level at 50 feet from Centerline of Roadway	Distance to Noise Level from Roadway Centerline (feet)			
			70 dB	65 dB	60 dB	55 dB
Magnolia Avenue	North of Anaheim Street	62	--	25	78	246
	Anaheim Street to 10th Street	62	--	27	84	267
	10th Street to 7th Street	62	--	24	75	237
	7th Street to 6th Street	62	--	24	75	238
	6th Street to 3rd Street	61	--	20	63	198
	3rd Street to Broadway	61	--	21	67	212
	Broadway to Ocean Boulevard	63	--	33	106	334
Pacific Avenue	North of Anaheim Street	63	--	32	102	323
	Anaheim Street to 10th Street	63	--	30	96	304
	10th Street to 7th Street	63	--	32	102	324
	7th Street to 6th Street	63	--	33	105	333
	6th Street to 3rd Street	63	--	30	94	299
	3rd Street to Broadway	61	--	21	65	206
	Broadway to Ocean Boulevard	62	--	25	79	251
Pine Avenue	North of Anaheim Street	58	--	--	31	98
	Anaheim Street to 10th Street	59	--	--	36	114
	10th Street to 7th Street	58	--	--	30	96
	7th Street to 6th Street	59	--	--	43	137
	6th Street to 3rd Street	60	--	--	46	145
	3rd Street to Broadway	59	--	--	44	138
	Broadway to Ocean Boulevard	61	--	20	63	198
	Ocean Boulevard to Shoreline Drive	60	--	--	46	145
Long Beach Boulevard	North of Anaheim Street	65	--	49	155	489
	Anaheim Street to 10th Street	65	--	49	156	495
	10th Street to 7th Street	64	--	41	129	409
	7th Street to 6th Street	64	--	42	132	417
	6th Street to 3rd Street	63	--	33	103	326
	3rd Street to Broadway	62	--	27	84	266
	Broadway to Ocean Boulevard	62	--	24	76	240

Roadway	Segment	Noise Level at 50 feet from Centerline of Roadway	Distance to Noise Level from Roadway Centerline (feet)			
			70 dB	65 dB	60 dB	55 dB
Atlantic Avenue	North of Anaheim Street	65	--	47	150	473
	Anaheim Street to 10th Street	65	--	47	149	471
	10th Street to 7th Street	63	--	35	112	353
	7th Street to 6th Street	63	--	33	105	333
	6th Street to 3rd Street	62	--	25	78	245
	3rd Street to Broadway	61	--	--	61	194
	Broadway to Ocean Boulevard	60	--	--	50	157
Martin Luther King Avenue	North of Anaheim Street	62	--	23	72	228
	Anaheim Street to 10th Street	60	--	--	54	170
	10th Street to 7th Street	60	--	--	48	153
	7th Street to 6th Street	65	--	49	155	490
Alamitos Avenue	North of Anaheim Street	65	--	53	168	531
	Anaheim Street to 10th Street	65	--	45	141	447
	10th Street to 7th Street	64	--	42	134	422
	7th Street to 6th Street	65	--	47	147	466
	6th Street to 4th Street	65	--	54	172	543
	4th Street to 3rd Street	65	--	55	175	553
	3rd Street to Broadway	66	--	64	204	644
	Broadway to Ocean Boulevard	65	--	48	152	481
Orange Avenue	North of 10th Street	61	--	20	63	199
	10th Street to 7th Street	58	--	--	35	111
	7th Street to 3rd Street	58	--	--	34	106
	3rd Street to Broadway	57	--	--	25	80
	Broadway to Ocean Boulevard	56	--	--	19	62

Note: -- = Less than 20 feet, assumed to be within roadway.

Table 11
Existing Modeled Noise Levels – Streets Oriented East to West

Roadway	Segment	Noise Level at 50 feet from Centerline of Roadway	Distance to Noise Level from Roadway Centerline (feet)			
			70 dB	65 dB	60 dB	55 dB
Anaheim Street	West of Magnolia Avenue	67	24	75	237	748
	Magnolia Avenue to Pacific Avenue	66	22	70	222	703
	Pacific Avenue to Pine Avenue	67	23	74	233	737
	Pine Avenue to Long Beach Boulevard	65	--	46	146	461
	Long Beach Boulevard to Atlantic Avenue	67	23	74	234	741
	Atlantic Avenue Martin Luther King Avenue	67	24	76	241	761
	Martin Luther King Avenue to Alamitos Avenue	67	27	86	271	855
	East of Alamitos Avenue	67	26	83	261	827
10th Street	Magnolia Avenue to Pacific Avenue	60	--	14	45	144
	Pacific Avenue to Pine Avenue	61	--	22	70	221
	Pine Avenue to Long Beach Boulevard	62	--	27	85	270
	Long Beach Boulevard to Atlantic Avenue	64	--	38	119	376
	Atlantic Avenue Martin Luther King Avenue	64	--	36	113	356
	Martin Luther King Avenue to Alamitos Avenue	64	--	37	116	366
	Alamitos Avenue to Orange Avenue	63	--	31	99	314
	East of Orange Avenue	62	--	24	76	241
7th Street	West of Magnolia Avenue	64	--	37	117	368
	Magnolia Avenue to Pacific Avenue	64	--	37	116	367
	Pacific Avenue to Pine Avenue	65	--	50	158	501
	Pine Avenue to Long Beach Boulevard	64	--	41	131	414
	Long Beach Boulevard to Atlantic Avenue	64	--	44	138	437
	Atlantic Avenue Martin Luther King Avenue	64	--	44	139	440
	Martin Luther King Avenue to Alamitos Avenue	68	29	91	287	908
	Alamitos Avenue to Orange Avenue	66	22	68	217	685
	East of Orange Avenue	69	37	117	370	1,170
6th Street	West of Magnolia Avenue	66	--	60	190	602
	Magnolia Avenue to Pacific Avenue	66	20	63	199	628
	Pacific Avenue to Pine Avenue	66	21	66	209	661
	Pine Avenue to Long Beach Boulevard	66	22	69	217	687
	Long Beach Boulevard to Atlantic Avenue	66	20	64	203	642

Roadway	Segment	Noise Level at 50 feet from Centerline of Roadway	Distance to Noise Level from Roadway Centerline (feet)			
			70 dB	65 dB	60 dB	55 dB
3rd Street	West of Magnolia Avenue	63	--	32	102	324
	Magnolia Avenue to Pacific Avenue	63	--	32	103	325
	Pacific Avenue to Pine Avenue	63	--	28	89	283
	Pine Avenue to Long Beach Boulevard	63	--	31	98	310
	Long Beach Boulevard to Atlantic Avenue	62	--	27	87	275
	Atlantic Avenue to Alamitos Avenue	62	--	25	78	245
	Alamitos Avenue to Orange Avenue	63	--	29	93	294
	East of Orange Avenue	62	--	26	81	256
Broadway	West of Magnolia Avenue	66	21	66	209	660
	Pacific Avenue to Pine Avenue	67	25	78	247	782
	Pacific Avenue to Pine Avenue	67	27	85	269	850
	Pine Avenue to Long Beach Boulevard	67	25	80	252	797
	Long Beach Boulevard to Atlantic Avenue	67	25	80	252	798
	Atlantic Avenue to Alamitos Avenue	67	26	81	258	815
	Alamitos Avenue to Orange Avenue	67	25	80	252	796
	East of Orange Avenue	67	26	81	256	810
Ocean Boulevard	West of Golden Shore Avenue	69	36	115	363	1,149
	Golden Shore Avenue to Magnolia Avenue	70	53	166	526	1,662
	Magnolia Avenue to Pacific Avenue	70	54	170	539	1,703
	Pacific Avenue to Pine Avenue	70	48	152	480	1,519
	Pine Avenue to Long Beach Boulevard	70	51	160	507	1,602
	Long Beach Boulevard to Atlantic Avenue	70	51	160	505	1,598
	Atlantic Avenue to Alamitos Avenue	70	49	154	487	1,541
	Alamitos Avenue to Orange Avenue	70	45	143	451	1,425
	East of Orange Avenue	69	42	132	418	1,321

Note: -- = Less than 20 feet, assumed to be within roadway.

Table 12
Future with Project Modeled Noise Levels – Streets Oriented North to South

Roadway	Segment	Noise Level at 50 feet from Centerline of Roadway	Distance to Noise Level from Roadway Centerline (feet)			
			70 dB	65 dB	60 dB	55 dB
Magnolia Avenue	North of Anaheim Street	62	--	27	86	273
	Anaheim Street to 10th Street	63	--	29	93	294
	10th Street to 7th Street	62	--	27	86	271
	7th Street to 6th Street	63	--	35	110	346
	6th Street to 3rd Street	63	--	34	109	344
	3rd Street to Broadway	63	--	35	111	352
	Broadway to Ocean Boulevard	65	--	53	168	532
Pacific Avenue	North of Anaheim Street	64	--	41	130	411
	Anaheim Street to 10th Street	64	--	39	124	392
	10th Street to 7th Street	64	--	41	129	408
	7th Street to 6th Street	65	--	48	151	478
	6th Street to 3rd Street	64	--	42	134	423
	3rd Street to Broadway	63	--	29	93	293
	Broadway to Ocean Boulevard	63	--	33	104	330
Pine Avenue	North of Anaheim Street	58	--	--	31	98
	Anaheim Street to 10th Street	59	--	--	39	123
	10th Street to 7th Street	59	--	--	42	132
	7th Street to 6th Street	61	--	--	60	189
	6th Street to 3rd Street	61	--	22	70	220
	3rd Street to Broadway	62	--	27	87	274
	Broadway to Ocean Boulevard	62	--	24	75	236
	Ocean Boulevard to Shoreline Drive	61	--	--	56	178
Long Beach Boulevard	North of Anaheim Street	67	23	73	232	734
	Anaheim Street to 10th Street	67	23	72	227	719
	10th Street to 7th Street	66	21	65	207	654
	7th Street to 6th Street	66	22	69	217	686
	6th Street to 3rd Street	65	--	56	176	555
	3rd Street to Broadway	65	--	49	154	486
	Broadway to Ocean Boulevard	64	--	37	117	369

Roadway	Segment	Noise Level at 50 feet from Centerline of Roadway	Distance to Noise Level from Roadway Centerline (feet)			
			70 dB	65 dB	60 dB	55 dB
Atlantic Avenue	North of Anaheim Street	66	21	66	209	660
	Anaheim Street to 10th Street	66	21	66	208	658
	10th Street to 7th Street	65	--	55	175	554
	7th Street to 6th Street	65	--	52	163	516
	6th Street to 3rd Street	64	--	39	122	386
	3rd Street to Broadway	63	--	29	92	290
	Broadway to Ocean Boulevard	62	--	23	72	227
Martin Luther King Avenue	North of Anaheim Street	62	--	23	72	228
	Anaheim Street to 10th Street	60	--	--	54	170
	10th Street to 7th Street	60	--	--	51	162
	7th Street to 6th Street	66	22	69	219	692
Alamitos Avenue	North of Anaheim Street	67	25	78	245	775
	Anaheim Street to 10th Street	66	22	69	218	690
	10th Street to 7th Street	66	21	67	212	669
	7th Street to 6th Street	67	26	83	262	828
	6th Street to 4th Street	68	28	90	284	899
	4th Street to 3rd Street	67	27	86	273	864
	3rd Street to Broadway	67	28	88	279	883
	Broadway to Ocean Boulevard	66	20	63	200	632
Orange Avenue	North of 10th Street	61	--	20	63	199
	10th Street to 7th Street	59	--	--	36	115
	7th Street to 3rd Street	58	--	--	35	110
	3rd Street to Broadway	57	--	--	26	81
	Broadway to Ocean Boulevard	56	--	--	22	68

Note: -- = Less than 20 feet, assumed to be within roadway.

Table 13
Future with Project Modeled Noise Levels – Streets Oriented East to West

Roadway	Segment	Noise Level at 50 feet from Centerline of Roadway	Distance to Noise Level from Roadway Centerline (feet)			
			70 dB	65 dB	60 dB	55 dB
Anaheim Street	West of Magnolia Avenue	67	24	75	237	748
	Magnolia Avenue to Pacific Avenue	66	22	70	222	703
	Pacific Avenue to Pine Avenue	67	23	74	233	737
	Pine Avenue to Long Beach Boulevard	65	--	46	146	461
	Long Beach Boulevard to Atlantic Avenue	67	23	74	234	741
	Atlantic Avenue Martin Luther King Avenue	67	24	76	241	761
	Martin Luther King Avenue to Alamitos Avenue	67	27	86	271	855
	East of Alamitos Avenue	67	26	83	261	827
10th Street	Magnolia Avenue to Pacific Avenue	60	--	--	49	155
	Pacific Avenue to Pine Avenue	62	--	25	78	247
	Pine Avenue to Long Beach Boulevard	63	--	30	94	296
	Long Beach Boulevard to Atlantic Avenue	64	--	40	125	395
	Atlantic Avenue Martin Luther King Avenue	64	--	38	121	383
	Martin Luther King Avenue to Alamitos Avenue	64	--	38	121	384
	Alamitos Avenue to Orange Avenue	63	--	32	100	317
	East of Orange Avenue	62	--	24	76	241
7th Street	West of Magnolia Avenue	67	24	75	238	753
	Magnolia Avenue to Pacific Avenue	67	23	71	226	714
	Pacific Avenue to Pine Avenue	67	24	75	238	753
	Pine Avenue to Long Beach Boulevard	66	20	62	198	625
	Long Beach Boulevard to Atlantic Avenue	66	--	61	192	608
	Atlantic Avenue Martin Luther King Avenue	66	--	56	178	563
	Martin Luther King Avenue to Alamitos Avenue	68	34	107	339	1,072
	Alamitos Avenue to Orange Avenue	67	27	85	268	849
	East of Orange Avenue	70	47	148	467	1,477
6th Street	West of Magnolia Avenue	68	32	101	320	1,010
	Magnolia Avenue to Pacific Avenue	68	29	92	290	919
	Pacific Avenue to Pine Avenue	68	29	91	287	907
	Pine Avenue to Long Beach Boulevard	68	30	94	296	935
	Long Beach Boulevard to Atlantic Avenue	67	24	77	244	772

Roadway	Segment	Noise Level at 50 feet from Centerline of Roadway	Distance to Noise Level from Roadway Centerline (feet)			
			70 dB	65 dB	60 dB	55 dB
3rd Street	West of Magnolia Avenue	66	--	57	181	571
	Magnolia Avenue to Pacific Avenue	65	--	56	176	556
	Pacific Avenue to Pine Avenue	65	--	54	171	541
	Pine Avenue to Long Beach Boulevard	66	21	66	209	660
	Long Beach Boulevard to Atlantic Avenue	65	--	45	141	447
	Atlantic Avenue to Alamitos Avenue	64	--	41	131	413
	Alamitos Avenue to Orange Avenue	64	--	38	119	376
	East of Orange Avenue	63	--	34	107	337
Broadway	West of Magnolia Avenue	69	36	113	356	1,127
	Pacific Avenue to Pine Avenue	69	39	123	389	1,231
	Pacific Avenue to Pine Avenue	69	40	127	403	1,275
	Pine Avenue to Long Beach Boulevard	69	42	133	421	1,330
	Long Beach Boulevard to Atlantic Avenue	68	35	111	351	1,110
	Atlantic Avenue to Alamitos Avenue	68	33	106	334	1,056
	Alamitos Avenue to Orange Avenue	67	28	89	280	886
	East of Orange Avenue	68	29	91	286	906
Ocean Boulevard	West of Golden Shore Avenue	69	43	137	433	1,368
	Golden Shore Avenue to Magnolia Avenue	71	65	206	653	2,064
	Magnolia Avenue to Pacific Avenue	71	69	217	688	2,174
	Pacific Avenue to Pine Avenue	71	63	199	630	1,992
	Pine Avenue to Long Beach Boulevard	71	68	213	675	2,135
	Long Beach Boulevard to Atlantic Avenue	71	67	212	669	2,115
	Atlantic Avenue to Alamitos Avenue	71	65	206	651	2,058
	Alamitos Avenue to Orange Avenue	71	60	189	598	1,891
	East of Orange Avenue	71	56	178	564	1,782

Note: -- = Less than 20 feet, assumed to be within roadway.

Where exterior noise levels are below 65 dBA L_{dn}, interior noise levels for new construction would typically meet the interior 45-dBA community noise equivalent level (CNEL) standard established in the California Code of Regulations, Title 24, Chap. 2-35. Typical residential construction in California provides approximately 15 dBA of noise reduction from exterior noise sources with windows partially open, and approximately 20 to 25 dBA of noise reduction with windows kept closed. Where exterior noise levels are below 65 to 70 dBA L_{dn}, interior noise can be mitigated with standard wall and window construction, and the inclusion of mechanical forced-air ventilation to allow occupants the option of maintaining windows closed to control noise. Where exterior noise levels exceed 70 dBA CNEL, residential units would not normally be able to meet the 45-dBA CNEL interior standard simply through typical construction methods. Thus, noise-sensitive uses located along Ocean Boulevard may require additional noise reduction measures, such as windows and doors with high Sound Transition Class (STC) ratings to meet the City's 45-dBA L_{dn} criteria. This would be a potentially ***significant impact***. Mitigation measures have been identified that would reduce this impact to less than significant.

Commercial uses developed under the Community Plan along most of the Community Plan area roadways would meet the 1-hour exterior commercial land use compatibility guideline of 75 dBA.

The City does not include a criterion for interior noise levels in commercial uses. Retail construction with forced-air mechanical ventilation typically provides 20 to 30 dBA of noise reduction to interior spaces. As a result, noise levels inside commercial uses throughout most of the Community Plan area would be below 45 dBA L_{dn} and would not exceed 51 L_{dn}. This would be a ***less than significant impact***.

The Community Plan could implement development of new residential uses adjacent to existing commercial and retail uses. In addition, new residential uses may be proposed adjacent to or sometimes within the same building as noise-generating commercial uses. Noise levels resulting from existing and proposed noise-generating uses (i.e., office and retail uses) could expose such noise-sensitive uses to noise levels in excess of the City's General Plan and/or Noise Ordinance limits. This would be a potentially ***significant impact***. Mitigation measures have been identified that would reduce this impact to less than significant.

5.3 OPERATIONAL NOISE

The Community Plan would also facilitate an increase in traffic along area roadways, which could permanently increase existing traffic noise levels.

The dominant noise generated by the operation of the proposed project would be from traffic; the project would contribute to an increase in local traffic volumes, resulting in higher noise levels along local roadways. Other noise sources would include mechanical equipment, such as air conditioners, which would be required to comply with the City's noise ordinance. Traffic noise levels were analyzed along several roadway segments that would be affected by project-generated motor vehicle trips, as identified in s 14 and 15.

As shown in Tables 14 and 15, while noise levels would increase by 3 dBA along 7th Street, west of Magnolia Avenue; Pine Avenue, 3rd Street to Broadway; and 3rd Street, Pine Avenue to Long Beach Boulevard, the project would not cause these increases or contribute to them. That is, the future noise levels along these roadway segments would be the same without or with the proposed Community Plan.

The traffic noise level increases directly attributable to the project (i.e., traffic noise level increases that would not occur if the project were not approved) are estimated to be no greater than 1 dBA, which would not be perceptible. These increases would be less than the 3 dBA significance criterion. Therefore, traffic noise level increase due to the proposed project would be ***less than significant***.

5.4 VIBRATION

Construction of projects implemented under the Community Plan would likely be located adjacent to existing structures. Construction activities may include demolition of existing structures, site preparation work, excavation of parking and subfloors, foundation work, and building construction. Demolition for an individual site may last several weeks to months and may produce substantial vibration. Excavation for underground levels could also occur on some project sites and vibratory pile driving could be used to stabilize the walls of excavated areas. Piles or drilled caissons may also be used to support building foundations.

Pile driving has the potential to generate the highest groundborne vibration levels and is the primary concern for structural damage when it occurs within 100 feet of structures. Vibration levels generated by pile driving activities would vary depending on project conditions, such as soil conditions, construction methods, and equipment used. Other project construction activities, such as caisson drilling, the use of jackhammers and other high-power or vibratory tools, compactors, and tracked equipment, may also potentially generate substantial vibration in the immediate vicinity, typically within 25 feet of the equipment. Building construction is not anticipated to be a source of substantial vibration.

Table 14
Modeled Peak-Hour Noise Level Increases in the Project Vicinity – Streets Oriented North to South

Roadway	Segment	Existing	Future without Project	Increase without Project	Future with Project	Increase over Future No Project
Magnolia Avenue	North of Anaheim Street	62	62	0	62	0
	Anaheim Street to 10th Street	62	63	1	63	0
	10th Street to 7th Street	62	62	0	62	0
	7th Street to 6th Street	62	63	1	63	0
	6th Street to 3rd Street	61	63	2	63	0
	3rd Street to Broadway	61	63	2	63	0
	Broadway to Ocean Boulevard	63	65	2	65	0
Pacific Avenue	North of Anaheim Street	63	64	1	64	0
	Anaheim Street to 10th Street	63	64	1	64	0
	10th Street to 7th Street	63	64	1	64	0
	7th Street to 6th Street	63	64	1	65	1
	6th Street to 3rd Street	63	64	1	64	0
	3rd Street to Broadway	61	62	1	63	1
	Broadway to Ocean Boulevard	62	63	1	63	0
Pine Avenue	North of Anaheim Street	58	58	0	58	0
	Anaheim Street to 10th Street	59	59	0	59	0
	10th Street to 7th Street	58	59	1	59	0
	7th Street to 6th Street	59	60	1	61	1
	6th Street to 3rd Street	60	61	1	61	0
	3rd Street to Broadway	59	62	3	62	0
	Broadway to Ocean Boulevard	61	62	1	62	0
	Ocean Boulevard to Shoreline Drive	60	60	0	61	1
Long Beach Boulevard	North of Anaheim Street	65	66	1	67	1
	Anaheim Street to 10th Street	65	66	1	67	1
	10th Street to 7th Street	64	66	2	66	0
	7th Street to 6th Street	64	66	2	66	0
	6th Street to 3rd Street	63	65	2	65	0
	3rd Street to Broadway	62	64	2	65	1
	Broadway to Ocean Boulevard	62	63	1	64	1

Roadway	Segment	Existing	Future without Project	Increase without Project	Future with Project	Increase over Future No Project
Atlantic Avenue	North of Anaheim Street	65	66	1	66	0
	Anaheim Street to 10th Street	65	66	1	66	0
	10th Street to 7th Street	63	65	2	65	0
	7th Street to 6th Street	63	65	2	65	0
	6th Street to 3rd Street	62	63	1	64	1
	3rd Street to Broadway	61	62	1	63	1
	Broadway to Ocean Boulevard	60	61	1	62	1
Martin Luther King Avenue	North of Anaheim Street	62	62	0	62	0
	Anaheim Street to 10th Street	60	60	0	60	0
	10th Street to 7th Street	60	60	0	60	0
	7th Street to 6th Street	65	66	1	66	0
Alamitos Avenue	North of Anaheim Street	65	66	1	67	1
	Anaheim Street to 10th Street	65	66	1	66	0
	10th Street to 7th Street	64	66	2	66	0
	7th Street to 6th Street	65	66	1	67	1
	6th Street to 4th Street	65	67	2	68	1
	4th Street to 3rd Street	65	67	2	67	0
	3rd Street to Broadway	66	67	1	67	0
	Broadway to Ocean Boulevard	65	65	0	66	1
Orange Avenue	North of 10th Street	61	61	0	61	0
	10th Street to 7th Street	58	59	1	59	0
	7th Street to 3rd Street	58	58	0	58	0
	3rd Street to Broadway	57	57	0	57	0
	Broadway to Ocean Boulevard	56	56	0	56	0

Table 15
Modeled Peak-Hour Noise Level Increases in the Project Vicinity – Streets Oriented East to West

Roadway	Segment	Existing[1]	Future without Project[1]	Increase without Project	Future with Project[1]	Increase over Future No Project
Magnolia Avenue	West of Magnolia Avenue	67	67	0	67	0
	Magnolia Avenue to Pacific Avenue	66	66	0	66	0
	Pacific Avenue to Pine Avenue	67	67	0	67	0
	Pine Avenue to Long Beach Boulevard	65	65	0	65	0
	Long Beach Boulevard to Atlantic Avenue	67	67	0	67	0
	Atlantic Avenue Martin Luther King Avenue	67	67	0	67	0
	Martin Luther King Avenue to Alamitos Avenue	67	67	0	67	0
	East of Alamitos Avenue	67	67	0	67	0
10th Street	Magnolia Avenue to Pacific Avenue	60	60	0	60	0
	Pacific Avenue to Pine Avenue	61	62	1	62	0
	Pine Avenue to Long Beach Boulevard	62	63	1	63	0
	Long Beach Boulevard to Atlantic Avenue	64	64	0	64	0
	Atlantic Avenue Martin Luther King Avenue	64	64	0	64	0
	Martin Luther King Avenue to Alamitos Avenue	64	64	0	64	0
	Alamitos Avenue to Orange Avenue	63	63	0	63	0
	East of Orange Avenue	62	62	0	62	0
7th Street	West of Magnolia Avenue	64	67	3	67	0
	Magnolia Avenue to Pacific Avenue	64	66	2	67	1
	Pacific Avenue to Pine Avenue	65	67	2	67	0
	Pine Avenue to Long Beach Boulevard	64	66	2	66	0
	Long Beach Boulevard to Atlantic Avenue	64	66	2	66	0
	Atlantic Avenue Martin Luther King Avenue	64	65	1	66	1
	Martin Luther King Avenue to Alamitos Avenue	68	68	0	68	0
	Alamitos Avenue to Orange Avenue	66	67	1	67	0
	East of Orange Avenue	69	69	0	70	1

Roadway	Segment	Existing[1]	Future without Project[1]	Increase without Project	Future with Project[1]	Increase over Future No Project
6th Street	West of Magnolia Avenue	66	68	2	68	0
	Magnolia Avenue to Pacific Avenue	66	67	1	68	1
	Pacific Avenue to Pine Avenue	66	68	2	68	0
	Pine Avenue to Long Beach Boulevard	66	68	2	68	0
	Long Beach Boulevard to Atlantic Avenue	66	67	1	67	0
3rd Street	West of Magnolia Avenue	63	65	2	66	1
	Magnolia Avenue to Pacific Avenue	63	65	2	65	0
	Pacific Avenue to Pine Avenue	63	65	2	65	0
	Pine Avenue to Long Beach Boulevard	63	66	3	66	0
	Long Beach Boulevard to Atlantic Avenue	62	64	2	65	1
	Atlantic Avenue to Alamitos Avenue	62	64	2	64	0
	Alamitos Avenue to Orange Avenue	63	64	1	64	0
	East of Orange Avenue	62	63	1	63	0
Broadway	West of Magnolia Avenue	66	68	2	69	1
	Pacific Avenue to Pine Avenue	67	68	1	69	1
	Pacific Avenue to Pine Avenue	67	69	2	69	0
	Pine Avenue to Long Beach Boulevard	67	69	2	69	0
	Long Beach Boulevard to Atlantic Avenue	67	68	1	68	0
	Atlantic Avenue to Alamitos Avenue	67	68	1	68	0
	Alamitos Avenue to Orange Avenue	67	67	0	67	0
	East of Orange Avenue	67	67	0	68	1
Ocean Boulevard	West of Golden Shore Avenue	69	69	0	69	0
	Golden Shore Avenue to Magnolia Avenue	70	71	1	71	0
	Magnolia Avenue to Pacific Avenue	70	71	1	71	0
	Pacific Avenue to Pine Avenue	70	71	1	71	0
	Pine Avenue to Long Beach Boulevard	70	71	1	71	0
	Long Beach Boulevard to Atlantic Avenue	70	71	1	71	0
	Atlantic Avenue to Alamitos Avenue	70	71	1	71	0
	Alamitos Avenue to Orange Avenue	70	70	0	71	1
	East of Orange Avenue	69	70	1	71	1

[1] Noise levels presented represent the CNEL at 50 feet from the centerline of the roadway segment.

Past studies have established a peak vertical particle velocity of 0.20 inches/sec, ppv as the limit where vibration would begin to annoy people in buildings and at which there is a risk of cosmetic damage to normal dwellings (Caltrans 2002). The City has established 0.001 g's in the 0–30 hertz frequency range and 0.003 g's in the 30–100 hertz frequency range. Pile driving activities generate vibrations at various hertz range. The dominant frequency of propagating waves from impact sources ranges mostly between 3 Hz and 60 Hz (Svinkin 2010). Using the middle range, equipment operating at a frequency range of 30 Hz would exceed the perceptible range at approximately 100 feet. Vibration levels generated by construction activities would vary depending on project conditions, such as soil conditions, construction methods, and equipment used. Depending on the proximity of existing structures to each construction site, the structural soundness of the existing buildings, and the methods of construction used, vibration levels caused by pile driving or other foundation work with a substantial impact component such as blasting, rock or caisson drilling, and site excavation/compaction, may be high enough to damage existing structures. This would be a ***significant impact***.

As with any type of construction, vibration levels during any phase may at times be perceptible. However, non-pile driving or foundation work construction phases that have the highest potential of producing vibration (such as jackhammering and other use of high power tools) would be intermittent and would only occur for short periods of time for any individual project site. By use of administrative controls, such as scheduling construction activities with the highest potential to produce perceptible vibration to hours with the least potential to affect nearby properties, perceptible vibration can be kept to a minimum and as such would result in a ***less than significant impact*** with respect to perception.

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CHAPTER 6.0
NOISE ABATEMENT AND MITIGATION MEASURES

To reduce potential noise-related impacts, the City will verify that the following noise abatement measures will be incorporated into each project, as applicable.

6.1 CONSTRUCTION

N-1 The following measures are required of all construction projects implemented under the proposed Community Plan to reduce noise associated with construction:

- All internal combustion-engine-driven equipment will be equipped with mufflers that are in good operating condition and appropriate for the equipment.
- "Quiet" models of air compressors and other stationary construction equipment will be employed where such technology exists.
- Stationary noise-generating equipment will be located as far as reasonable from sensitive receptors when sensitive receptors adjoin or are within 150 feet of a construction site.
- Unnecessary idling of internal combustion engines (i.e., in excess of 5 minutes) will be prohibited.
- Foundation pile holes will be predrilled, as feasible based on geologic conditions, to minimize the number of impacts required to seat the pile.
- Construction-related traffic will be routed along major roadways and away from noise-sensitive receptors.
- Construction activities, including the loading and unloading of materials and truck movements, will be limited to the hours specified in the City Noise Ordinance (Section 8.80.202).
- Businesses, residences, and noise-sensitive land uses within 150 feet of construction sites will be notified of the construction in writing. The notification will describe the activities anticipated, provide dates and hours, and provide contact information with a description of the complaint and response procedure.
- Each project implemented as part of the Community Plan will designate a "construction liaison" that would be responsible for responding to any local

complaints about construction noise. The liaison would determine the cause of the noise complaints (e.g., starting too early, bad muffler, etc.) and institute reasonable measures to correct the problem. A telephone number for the liaison will be conspicuously posted at the construction site.

- If a noise complaint(s) is registered, the liaison, or project representative, will retain a City-approved noise consultant to conduct noise measurements at the location that registered the complaint. The noise measurements will be conducted for a minimum of 1 hour and will include 1-minute intervals. The consultant will prepare a letter report summarizing the measurements and potential measures to reduce noise levels to the maximum extent feasible. The letter report will include all measurement and calculation data used in determining impacts and resolutions. The letter report will be provided to code enforcement for determining the adequacy and if the recommendations are adequate.

Significance after Mitigation: Less than significant.

N-2 The following measures are required of all construction projects within 150 feet of residential uses implemented under the proposed Community Plan to reduce noise impacts associated with construction:

- Temporary noise barriers will be constructed around construction sites adjacent to, or within 150 feet of, operational business, residences, or other noise-sensitive land uses. Temporary noise barriers must be constructed of material with a minimum weight of 4 pounds per square foot with no gaps or perforations. Noise barriers may be constructed of, but are not limited to, 5/8-inch plywood, 5/8-inch oriented strand board, or hay bales.

- Erect a temporary sound control blanket barrier, if necessary, along building façades facing construction sites. This mitigation would only be necessary if conflicts occurred that were irresolvable by proper scheduling and other means of noise control were unavailable. The sound blankets are required to have a minimum breaking and tear strength of 120 pounds and 30 pounds, respectively. The sound blankets will have a minimum sound transmission classification of 27 and noise reduction coefficient of 0.70. The sound blankets will be of sufficient length to extend from the top of the building and drape on the ground or be sealed at the ground. The sound blankets will have a minimum overlap of 2 inches.

Significance after Mitigation: Less than significant.

6.2 NOISE COMPATIBILITY

N-3 In areas where new residential development would be exposed to an L_{dn} of greater than 65 dBA, site-specific noise studies should be conducted to determine the area of impact and to present appropriate mitigation measures, which may include the following:

- Utilize site planning to minimize noise in shared residential outdoor activity areas by locating the areas behind the buildings or in courtyards, or orienting the terraces to alleyways rather than streets, whenever possible.
- Provide mechanical ventilation in all residential units proposed along roadways or in areas where noise levels could exceed 65 dBA L_{dn} so that windows can remain closed at the choice of the occupants to maintain interior noise levels below 45 dBA L_{dn}.
- Install sound-rated windows and construction methods to provide the requisite noise control for residential units proposed along roadways or in areas where noise levels could exceed 70 dBA L_{dn}.

6.3 OPERATION

N-4 Limit exterior noise levels in noise-sensitive outdoor use areas resulting from non-transportation noise sources to those contained in Section 8.80.170 of the City Municipal Code (see Table 6). Meeting these noise performance standards would be the responsibility of the developer of the proposed use and not the responsibility of the existing use. In areas where new residential development would be located adjacent to noise-generating uses, site-specific noise studies should be conducted to determine the area of impact and to present appropriate mitigation measures, which would include the measures recommended in Mitigation Measure N-2.

6.4 VIBRATION

N-5 For projects where construction will include vibration-generating activities, such as pile driving, within 100 feet of existing structures, site-specific vibration studies shall be conducted to determine the area of impact and to present appropriate mitigation measures that may include the following:

- Identify sites that would include vibration compaction activities such as pile driving and have the potential to generate groundborne vibration, and the sensitivity of nearby structures to groundborne vibration. This task should be conducted by a qualified structural engineer.

- Develop a vibration monitoring and construction contingency plan to identify structures where monitoring would be conducted; set up a vibration monitoring schedule; define structure-specific vibration limits; and address the need to conduct photo, elevation, and crack surveys to document before and after construction conditions. Construction contingencies would be identified for when vibration levels approached the limits.
- At a minimum, monitor vibration during initial demolition activities and during pile driving activities. Monitoring results may indicate the need for more or less intensive measurements.
- When vibration levels approach limits, suspend construction and implement contingencies to either lower vibration levels or secure the affected structures.
- Conduct post-survey on structures where either monitoring has indicated high levels or complaints of damage have been made. Make appropriate repairs or compensation where damage has occurred as a result of construction activities.

CHAPTER 7.0
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APPENDIX A

NOISE MEASUREMENT DATA

Meas Site	Date	Time	Duration	Leq		Lmax	Lmin	Peak	L(90)
1	04Mar 10	14:07:00	59.5	66.4	2.60E+08	74.1	56.1	87.1	57.1
1	04Mar 10	14:08:00	60	63	1.20E+08	70.2	55.7	83.4	56.8
1	04Mar 10	14:09:00	60	64.9	1.85E+08	68.6	59.2	89.7	61.9
1	04Mar 10	14:10:00	60	63.6	1.37E+08	69.5	56.1	82.9	58.4
1	04Mar 10	14:11:00	60	60.9	7.38E+07	68	55.1	80.9	56.7
1	04Mar 10	14:12:00	60	62	9.51E+07	68.3	53.6	81.4	55.4
1	04Mar 10	14:13:00	60	61.2	7.91E+07	65.9	57.3	83.6	58.3
1	04Mar 10	14:14:00	60	66.2	2.50E+08	70.9	58.5	86.8	63.1
1	04Mar 10	14:15:00	60	62.4	1.04E+08	68.5	53.9	80.2	55.1
1	04Mar 10	14:16:00	60	63.2	1.25E+08	71.4	51.9	82.9	53.7
1	04Mar 10	14:17:00	60	63.5	1.34E+08	69.8	57.5	84.6	59.4
1	04Mar 10	14:18:00	60	65.5	2.13E+08	74.1	53.4	86.7	54.7
1	04Mar 10	14:19:00	60	62.5	1.07E+08	70	53	82.6	54.1
1	04Mar 10	14:20:00	60	63	1.20E+08	68	57.6	81.8	59
1	04Mar 10	14:21:00	60	61.7	8.87E+07	66.1	55.2	82.1	56.4
1	04Mar 10	14:22:00	0.7	62.9	1.36E+06	63	62.7	73.9	62.7
		sum	900.2		2.09E+09	**74.1**	**51.9**	**73.9**	**58.2**
		min/ave	15.00	**63.7**					**53.7**
		Hours	0.3						**63.1**
2	04Mar 10	9:30:00	59.6	61	7.50E+07	69.6	50.5	84.6	51.7
2	04Mar 10	9:31:00	60	64.2	1.58E+08	73.5	52.9	84.4	54.8
2	04Mar 10	9:32:00	60	65.9	2.33E+08	77.9	52	88.7	54.2
2	04Mar 10	9:33:00	60	62.6	1.09E+08	68.8	53.9	82.2	55.8
2	04Mar 10	9:34:00	60	59.7	5.60E+07	67.7	51.3	82.2	52.8
2	04Mar 10	9:35:00	60	66.1	2.44E+08	73.2	53.4	88.8	54.5
2	04Mar 10	9:36:00	60	65.4	2.08E+08	75.1	55.3	87	56.7
2	04Mar 10	9:37:00	60	59.6	5.47E+07	69	50.7	81.2	53.3
2	04Mar 10	9:38:00	60	72.1	9.73E+08	78.5	55.5	93.4	56.7
2	04Mar 10	9:39:00	60	67.9	3.70E+08	75.4	53.5	93.5	55.9
2	04Mar 10	9:40:00	60	66.3	2.56E+08	73.7	52	90	54.2
2	04Mar 10	9:41:00	60	67.6	3.45E+08	77.3	51.8	90.2	54.2
2	04Mar 10	9:42:00	60	58.8	4.55E+07	66.6	49.3	84.9	51.2
2	04Mar 10	9:43:00	60	66	2.39E+08	74	49.3	93.2	51.4
2	04Mar 10	9:44:00	60	65.1	1.94E+08	69.9	54.7	83.4	56.6
2	04Mar 10	9:45:00	0.9	63.6	2.06E+06	69.3	53.3	80.4	57.2
		sum	900.5		3.56E+09	**78.5**	**49.3**	**80.4**	**54.6**
		min/ave	15.01	**66.0**					**51.2**
		Hours	0.3						**57.2**

3	04Mar 10	10:14:00	59.8	67.4	3.29E+08	78.1	56.9	90.7	58.7
3	04Mar 10	10:15:00	60	65.1	1.94E+08	76.8	57.7	93.2	59.4
3	04Mar 10	10:16:00	60	65.5	2.13E+08	73.7	57.2	88.7	58.4
3	04Mar 10	10:17:00	60	68.8	4.55E+08	76.4	56.3	88.3	57.8
3	04Mar 10	10:18:00	60	62.2	9.96E+07	67.8	55.6	81.1	56.6
3	04Mar 10	10:19:00	60	61.4	8.28E+07	67.6	54.8	80.8	56
3	04Mar 10	10:20:00	60	63.2	1.25E+08	68.7	57	82.8	57.8
3	04Mar 10	10:21:00	60	66.6	2.74E+08	78.9	56	90.7	57.8
3	04Mar 10	10:22:00	60	67.5	3.37E+08	76.8	55	91.2	56
3	04Mar 10	10:23:00	60	62.3	1.02E+08	69.7	55.8	81.8	57.2
3	04Mar 10	10:24:00	60	64.8	1.81E+08	73.5	54.4	85.3	56.1
3	04Mar 10	10:25:00	60	63.2	1.25E+08	68.1	55.5	85.1	57.7
3	04Mar 10	10:26:00	60	66.7	2.81E+08	78.5	52.8	90.2	55.2
3	04Mar 10	10:27:00	60	64.4	1.65E+08	68.2	57.8	81.8	60.4
3	04Mar 10	10:28:00	60	63.5	1.34E+08	68.2	57.1	80.9	59.1
3	04Mar 10	10:29:00	1.2	63.6	2.75E+06	63.7	63.5	74.6	63.5
		sum	901		3.10E+09	**78.9**	**52.8**	**74.6**	**57.9**
		min/ave	15.02	**65.4**					**55.2**
		Hours	0.3						**63.5**
4	04Mar 10	13:36:00	59.7	53.2	1.25E+07	58.8	48.9	79.9	49.6
4	04Mar 10	13:37:00	60	55.7	2.23E+07	62.7	51.3	83.3	52.2
4	04Mar 10	13:38:00	60	51.2	7.91E+06	59.6	49	78.4	49.6
4	04Mar 10	13:39:00	60	57.5	3.37E+07	64.5	50.6	82.2	52.3
4	04Mar 10	13:40:00	60	58.7	4.45E+07	64.4	53.5	76.2	54.3
4	04Mar 10	13:41:00	60	56.6	2.74E+07	67.5	47.6	86.1	50.1
4	04Mar 10	13:42:00	60	55.1	1.94E+07	61	47.5	74.2	49.6
4	04Mar 10	13:43:00	60	55.1	1.94E+07	64.5	48.5	81.3	48.7
4	04Mar 10	13:44:00	60	54.8	1.81E+07	63.2	50.5	78.8	51.1
4	04Mar 10	13:45:00	60	58.1	3.87E+07	64	52	79.3	53.7
4	04Mar 10	13:46:00	60	55.1	1.94E+07	61.5	50.7	77.5	51.5
4	04Mar 10	13:47:00	60	54.4	1.65E+07	59	51.6	86.2	52.2
4	04Mar 10	13:48:00	60	55	1.90E+07	65.7	49.8	79.8	50.3
4	04Mar 10	13:49:00	60	62.3	1.02E+08	71.6	48.9	87.6	49.5
4	04Mar 10	13:50:00	60	65.1	1.94E+08	74.9	48.3	90.2	49.1
4	04Mar 10	13:51:00	1	49.8	9.55E+04	50.1	49.6	60.8	49.6
		sum	900.7		5.95E+08	**74.9**	**47.5**	**60.8**	**51.3**
		min/ave	15.01	**58.2**					**48.7**
		Hours	0.3						**54.3**

5	04Mar 10	15:40:00	59.9	66.5	2.68E+08	82.5	68.7	95.9	71.2
5	04Mar 10	15:41:00	60	61.4	8.28E+07	78.3	54.8	90.6	59.4
5	04Mar 10	15:42:00	60	67.9	3.70E+08	75.7	54	86.6	59.5
5	04Mar 10	15:43:00	60	65.7	2.23E+08	73.2	50.3	84.7	52.5
5	04Mar 10	15:44:00	60	69.6	5.47E+08	79.1	52.5	90.5	57
5	04Mar 10	15:45:00	60	67.5	3.37E+08	79.9	51.4	92.6	52.3
5	04Mar 10	15:46:00	60	67	3.01E+08	73.8	53	87.2	56.3
5	04Mar 10	15:47:00	60	62.9	1.17E+08	70.2	50.2	82.7	51.4
5	04Mar 10	15:48:00	60	65.7	2.23E+08	71.7	54.8	83.6	58
5	04Mar 10	15:49:00	60	64.9	1.85E+08	73.3	54.1	85.1	57
5	04Mar 10	15:50:00	60	65.8	2.28E+08	71.7	48.6	83.9	52
5	04Mar 10	15:51:00	60	66.6	2.74E+08	76.7	50.5	87.6	51.7
5	04Mar 10	15:52:00	60	65.4	2.08E+08	77.7	53.7	91	57.1
5	04Mar 10	15:53:00	60	67.4	3.30E+08	80.8	52	94	54.7
5	04Mar 10	15:54:00	60	62.5	1.07E+08	71.2	50.5	82.2	51.5
5	04Mar 10	15:55:00	0.5	68.3	3.38E+06	81.6	50.6	92.4	52
		sum	900.4		3.80E+09	**82.5**	**48.6**	**82.2**	**61.0**
		min/ave	15.01	**66.3**					**51.4**
		Hours	0.3						**71.2**
6	04Mar 10	14:49:06	53	60.1	5.42E+07	63.1	55.9	77.2	56.7
6	04Mar 10	14:50:00	60	59.5	5.35E+07	64.7	55.2	78.2	55.6
6	04Mar 10	14:51:00	60	60.2	6.28E+07	84.5	56.5	96.1	58.1
6	04Mar 10	14:52:00	60	59.9	5.86E+07	64.1	55.7	77.6	56.5
6	04Mar 10	14:53:00	60	59	4.77E+07	63.3	55.9	78.3	57.2
6	04Mar 10	14:54:00	60	63.7	1.41E+08	71.6	54.9	89.8	55.7
6	04Mar 10	14:55:00	60	60.3	6.43E+07	70	55.1	84.3	55.7
6	04Mar 10	14:56:00	60	66.2	2.50E+08	72.7	57.9	89.6	61
6	04Mar 10	14:57:00	60	62.4	1.04E+08	68.5	55.2	81.8	56.4
6	04Mar 10	14:58:00	60	59.3	5.11E+07	62.2	56.5	75.4	57.3
6	04Mar 10	14:59:00	60	59.3	5.11E+07	65.4	54.2	85.8	54.5
6	04Mar 10	15:00:00	60	59.7	5.60E+07	65.4	55.7	78.2	56.4
6	04Mar 10	15:01:00	60	66.1	2.44E+08	71.7	59.8	88.3	62.2
6	04Mar 10	15:02:00	60	61.5	8.48E+07	67.3	57.8	80.2	58.5
6	04Mar 10	15:03:00	60	62.4	1.04E+08	65.9	58.8	88.1	59.8
6	04Mar 10	15:04:00	6.7	58	4.23E+06	60.2	56.4	70.6	56.6
		sum	899.7		1.43E+09	**84.5**	**54.2**	**70.6**	**58.0**
		min/ave	15.00	**62.0**					**54.5**
		Hours	0.2						**62.2**

7	04Mar 10	13:55:59	0.7	71.9	1.08E+07	73.4	70.8	87.8	70.8
7	04Mar 10	13:56:00	60	65.5	2.13E+08	76.5	56	89.4	56.5
7	04Mar 10	13:57:00	60	62.5	1.07E+08	70.7	54	86	55
7	04Mar 10	13:58:00	60	57.2	3.15E+07	61.7	51	76.5	52.4
7	04Mar 10	13:59:00	60	57.9	3.70E+07	65.6	53.1	82.7	54
7	04Mar 10	14:00:00	60	58.8	4.55E+07	63.1	56	77.9	56.6
7	04Mar 10	14:01:00	60	59.4	5.23E+07	69.9	55.6	93.5	56.3
7	04Mar 10	14:02:00	60	58.4	4.15E+07	66.3	54.8	87.5	55.2
7	04Mar 10	14:03:00	60	59	4.77E+07	68.2	54.9	85.4	55.4
7	04Mar 10	14:04:00	60	68	3.79E+08	74.5	55.2	88.1	57.9
7	04Mar 10	14:05:00	60	58.9	4.66E+07	64	55.7	86.6	56.3
7	04Mar 10	14:06:00	60	59.1	4.88E+07	75.3	57.7	89.6	58.4
7	04Mar 10	14:07:00	60	57.2	3.15E+07	58.8	55.3	73.5	55.6
7	04Mar 10	14:08:00	60	57.9	3.70E+07	64.8	55.2	79.1	55.3
7	04Mar 10	14:09:00	60	57.4	3.30E+07	66.4	54.2	79.5	54.4
7	04Mar 10	14:10:00	60	58.5	4.25E+07	65.7	54	82.7	54.8
7	04Mar 10	14:11:00	5	61.8	7.57E+06	65	59.2	80.8	60.2
		sum	905.7		1.21E+09	**76.5**	**51**	**73.5**	**55.9**
		min/ave	15.10	**61.3**					**52.4**
		Hours	0.3						**60.2**

APPENDIX B

TRAFFIC DATA AND CALCULATIONS

Street/Segment	Existing	Future No Project	Future With Project
North South Streets			
Magnolia Avenue			
North of Anaheim Street	726	782	807
Anaheim Street to 10th Street	789	845	869
10th Street to 7th Street	699	776	800
7th Street to 6th Street	704	990	1023
6th Street to 3rd Street	585	951	1015
3rd Street to Broadway	627	936	1038
Broadway to Ocean Boulevard	987	1362	1571
Pacific Avenue			
North of Anaheim Street	953	1141	1214
Anaheim Street to 10th Street	898	1086	1158
10th Street to 7th Street	956	1132	1206
7th Street to 6th Street	983	1289	1412
6th Street to 3rd Street	882	1126	1249
3rd Street to Broadway	609	800	866
Broadway to Ocean Boulevard	741	926	974
Pine Avenue			
North of Anaheim Street	290	290	290
Anaheim Street to 10th Street	337	353	364
10th Street to 7th Street	282	365	390
7th Street to 6th Street	405	507	557
6th Street to 3rd Street	428	572	650
3rd Street to Broadway	408	673	809
Broadway to Ocean Boulevard	584	757	697
Ocean Boulevard to Shoreline Drive	427	430	526
Long Beach Boulevard			
North of Anaheim Street	1445	1947	2168
Anaheim Street to 10th Street	1461	1903	2124
10th Street to 7th Street	1207	1707	1931
7th Street to 6th Street	1231	1806	2026
6th Street to 3rd Street	962	1446	1640
3rd Street to Broadway	784	1274	1435
Broadway to Ocean Boulevard	710	952	1090
Atlantic Avenue			
North of Anaheim Street	1397	1770	1950
Anaheim Street to 10th Street	1391	1764	1944
10th Street to 7th Street	1043	1457	1635
7th Street to 6th Street	982	1354	1525
6th Street to 3rd Street	724	1006	1139
3rd Street to Broadway	573	742	857
Broadway to Ocean Boulevard	465	549	671
Martin Luther King Avenue			
North of Anaheim Street	672	672	672
Anaheim Street to 10th Street	501	501	501
10th Street to 7th Street	451	479	479
7th Street to 6th Street	1448	1847	2043
Alamitos Avenue			
North of Anaheim Street	1569	2051	2289
Anaheim Street to 10th Street	1319	1800	2038
10th Street to 7th Street	1247	1729	1975
7th Street to 6th Street	1377	2041	2445
6th Street to 4th Street	1602	2252	2655
4th Street to 3rd Street	1633	2144	2551
3rd Street to Broadway	1901	2248	2607
Broadway to Ocean Boulevard	1419	1582	1867
Orange Avenue			
North of 10th Street	588	588	588
10th Street to 7th Street	329	339	339
7th Street to 3rd Street	313	322	326
3rd Street to Broadway	237	240	240
Broadway to Ocean Boulevard	182	189	201

East-West Streets			
Anaheim Street			
West of Magnolia Avenue	2210	2210	2210
Magnolia Avenue to Pacific Avenue	2075	2075	2075
Pacific Avenue to Pine Avenue	2175	2175	2175
Pine Avenue to Long Beach Boulevard	1361	1361	1361
Long Beach Boulevard to Atlantic Avenue	2188	2188	2188
Atlantic Avenue Martin Luther King Avenue	2248	2248	2248
Martin Luther King Avenue to Alamitos Avenue	2526	2526	2526
East of Alamitos Avenue	2441	2441	2441
10th Street			
Magnolia Avenue to Pacific Avenue	424	458	458
Pacific Avenue to Pine Avenue	652	726	729
Pine Avenue to Long Beach Boulevard	797	872	874
Long Beach Boulevard to Atlantic Avenue	1110	1167	1167
Atlantic Avenue Martin Luther King Avenue	1052	1130	1130
Martin Luther King Avenue to Alamitos Avenue	1081	1134	1134
Alamitos Avenue to Orange Avenue	926	936	936
East of Orange Avenue	712	712	712
7th Street			
West of Magnolia Avenue	757	1497	1547
Magnolia Avenue to Pacific Avenue	755	1408	1467
Pacific Avenue to Pine Avenue	1029	1536	1547
Pine Avenue to Long Beach Boulevard	851	1248	1284
Long Beach Boulevard to Atlantic Avenue	898	1211	1249
Atlantic Avenue Martin Luther King Avenue	903	1135	1156
Martin Luther King Avenue to Alamitos Avenue	1866	2173	2203
Alamitos Avenue to Orange Avenue	1407	1640	1744
East of Orange Avenue	2404	2837	3035
6th Street			
West of Magnolia Avenue	1236	1989	2076
Magnolia Avenue to Pacific Avenue	1290	1786	1887
Pacific Avenue to Pine Avenue	1358	1839	1863
Pine Avenue to Long Beach Boulevard	1412	1881	1921
Long Beach Boulevard to Atlantic Avenue	1319	1553	1586
3rd Street			
West of Magnolia Avenue	665	1049	1173
Magnolia Avenue to Pacific Avenue	667	1041	1142
Pacific Avenue to Pine Avenue	581	1012	1112
Pine Avenue to Long Beach Boulevard	637	1211	1355
Long Beach Boulevard to Atlantic Avenue	564	829	919
Atlantic Avenue to Alamitos Avenue	504	774	849
Alamitos Avenue to Orange Avenue	603	744	773
East of Orange Avenue	526	660	692
Broadway			
West of Magnolia Avenue	1355	1933	2316
Pacific Avenue to Pine Avenue	1606	2256	2528
Pacific Avenue to Pine Avenue	1747	2347	2619
Pine Avenue to Long Beach Boulevard	1637	2499	2732
Long Beach Boulevard to Atlantic Avenue	1639	2122	2280
Atlantic Avenue to Alamitos Avenue	1674	2046	2169
Alamitos Avenue to Orange Avenue	1636	1754	1820
East of Orange Avenue	1665	1747	1861
Ocean Boulevard			
West of Golden Shore Avenue	2360	2673	2810
Golden Shore Avenue to Magnolia Avenue	3415	3889	4241
Magnolia Avenue to Pacific Avenue	3499	4049	4467
Pacific Avenue to Pine Avenue	3120	3654	4093
Pine Avenue to Long Beach Boulevard	3292	3837	4386
Long Beach Boulevard to Atlantic Avenue	3282	3875	4346
Atlantic Avenue to Alamitos Avenue	3165	3763	4228
Alamitos Avenue to Orange Avenue	2928	3582	3885
East of Orange Avenue	2713	3371	3661

Roadway	Segment	Existing	Future Without Project	Increase Without Project	Future With Project	Increase Over Existing
Anaheim Street	North of Anaheim Street	63	63	0	63	0
	Anaheim Street to 10th Street	63	64	1	64	0
	10th Street to 7th Street	63	63	0	63	0
	7th Street to 6th Street	63	64	1	64	0
	6th Street to 3rd Street	62	64	2	64	0
	3rd Street to Broadway	62	64	2	64	0
	Broadway to Ocean Boulevard	64	66	2	66	0
Pacific Avenue	North of Anaheim Street	64	65	1	65	0
	Anaheim Street to 10th Street	64	65	1	65	0
	10th Street to 7th Street	64	65	1	65	0
	7th Street to 6th Street	64	65	1	66	1
	6th Street to 3rd Street	64	65	1	65	0
	3rd Street to Broadway	62	63	1	64	1
	Broadway to Ocean Boulevard	63	64	1	64	0
Pine Avenue	North of Anaheim Street	59	59	0	59	0
	Anaheim Street to 10th Street	60	60	0	60	0
	10th Street to 7th Street	59	60	1	60	0
	7th Street to 6th Street	60	61	1	62	1
	6th Street to 3rd Street	61	62	1	62	0
	3rd Street to Broadway	60	63	3	63	0
	Broadway to Ocean Boulevard	62	63	1	63	0
	Ocean Boulevard to Shoreline Drive	61	61	0	62	1
Long Beach Boulevard	North of Anaheim Street	66	67	1	68	1
	Anaheim Street to 10th Street	66	67	1	68	1
	10th Street to 7th Street	65	67	2	67	0
	7th Street to 6th Street	65	67	2	67	0
	6th Street to 3rd Street	64	66	2	66	0
	3rd Street to Broadway	63	65	2	66	1
	Broadway to Ocean Boulevard	63	64	1	65	1
Atlantic Avenue	North of Anaheim Street	66	67	1	67	0
	Anaheim Street to 10th Street	66	67	1	67	0
	10th Street to 7th Street	64	66	2	66	0
	7th Street to 6th Street	64	66	2	66	0
	6th Street to 3rd Street	63	64	1	65	1
	3rd Street to Broadway	62	63	1	64	1
	Broadway to Ocean Boulevard	61	62	1	63	1
Martin Luther King Avenue	North of Anaheim Street	63	63	0	63	0
	Anaheim Street to 10th Street	61	61	0	61	0
	10th Street to 7th Street	61	61	0	61	0
	7th Street to 6th Street	66	67	1	67	0
Alamitos Avenue	North of Anaheim Street	66	67	1	68	1
	Anaheim Street to 10th Street	66	67	1	67	0
	10th Street to 7th Street	65	67	2	67	0
	7th Street to 6th Street	66	67	1	68	1
	6th Street to 4th Street	66	68	2	69	1
	4th Street to 3rd Street	66	68	2	68	0
	3rd Street to Broadway	67	68	1	68	0
	Broadway to Ocean Boulevard	66	66	0	67	1
Orange Avenue	North of 10th Street	62	62	0	62	0
	10th Street to 7th Street	59	60	1	60	0
	7th Street to 3rd Street	59	59	0	59	0
	3rd Street to Broadway	58	58	0	58	0
	Broadway to Ocean Boulevard	57	57	0	57	0

Roadway	Segment					
Magnolia Avenue	West of Magnolia Avenue	68	68	0	68	0
	Magnolia Avenue to Pacific Avenue	67	67	0	67	0
	Pacific Avenue to Pine Avenue	68	68	0	68	0
	Pine Avenue to Long Beach Boulevard	66	66	0	66	0
	Long Beach Boulevard to Atlantic Avenue	68	68	0	68	0
	Atlantic Avenue Martin Luther King Avenue	68	68	0	68	0
	Martin Luther King Avenue to Alamitos Avenu	68	68	0	68	0
	East of Alamitos Avenue	68	68	0	68	0
10th Street	Magnolia Avenue to Pacific Avenue	61	61	0	61	0
	Pacific Avenue to Pine Avenue	62	63	1	63	0
	Pine Avenue to Long Beach Boulevard	63	64	1	64	0
	Long Beach Boulevard to Atlantic Avenue	65	65	0	65	0
	Atlantic Avenue Martin Luther King Avenue	65	65	0	65	0
	Martin Luther King Avenue to Alamitos Avenu	65	65	0	65	0
	Alamitos Avenue to Orange Avenue	64	64	0	64	0
	East of Orange Avenue	63	63	0	63	0
7th Street	West of Magnolia Avenue	65	68	3	68	0
	Magnolia Avenue to Pacific Avenue	65	67	2	68	1
	Pacific Avenue to Pine Avenue	66	68	2	68	0
	Pine Avenue to Long Beach Boulevard	65	67	2	67	0
	Long Beach Boulevard to Atlantic Avenue	65	67	2	67	0
	Atlantic Avenue Martin Luther King Avenue	65	66	1	67	1
	Martin Luther King Avenue to Alamitos Avenu	69	69	0	69	0
	Alamitos Avenue to Orange Avenue	67	68	1	68	0
	East of Orange Avenue	70	70	0	71	1
6th Street	West of Magnolia Avenue	67	69	2	69	0
	Magnolia Avenue to Pacific Avenue	67	68	1	69	1
	Pacific Avenue to Pine Avenue	67	69	2	69	0
	Pine Avenue to Long Beach Boulevard	67	69	2	69	0
	Long Beach Boulevard to Atlantic Avenue	67	68	1	68	0
3rd Street	West of Magnolia Avenue	64	66	2	67	1
	Magnolia Avenue to Pacific Avenue	64	66	2	66	0
	Pacific Avenue to Pine Avenue	64	66	2	66	0
	Pine Avenue to Long Beach Boulevard	64	67	3	67	0
	Long Beach Boulevard to Atlantic Avenue	63	65	2	66	1
	Atlantic Avenue to Alamitos Avenue	63	65	2	65	0
	Alamitos Avenue to Orange Avenue	64	65	1	65	0
	East of Orange Avenue	63	64	1	64	0
Broadway	West of Magnolia Avenue	67	69	2	70	1
	Pacific Avenue to Pine Avenue	68	69	1	70	1
	Pacific Avenue to Pine Avenue	68	70	2	70	0
	Pine Avenue to Long Beach Boulevard	68	70	2	70	0
	Long Beach Boulevard to Atlantic Avenue	68	69	1	69	0
	Atlantic Avenue to Alamitos Avenue	68	69	1	69	0
	Alamitos Avenue to Orange Avenue	68	68	0	68	0
	East of Orange Avenue	68	68	0	69	1
Ocean Boulevard	West of Golden Shore Avenue	70	70	0	70	0
	Golden Shore Avenue to Magnolia Avenue	71	72	1	72	0
	Magnolia Avenue to Pacific Avenue	71	72	1	72	0
	Pacific Avenue to Pine Avenue	71	72	1	72	0
	Pine Avenue to Long Beach Boulevard	71	72	1	72	0
	Long Beach Boulevard to Atlantic Avenue	71	72	1	72	0
	Atlantic Avenue to Alamitos Avenue	71	72	1	72	0
	Alamitos Avenue to Orange Avenue	71	71	0	72	1
	East of Orange Avenue	70	71	1	72	1