Paseo Colorado Redevelopment Project

Initial Study/Mitigated Negative Declaration

Appendix G
Noise Report

BonTerra PSOMAS

Noise and Vibration Impact Analysis

Paseo Colorado Redevelopment Project
Pasadena, California

Prepared for

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1.0 EXECUTIVE SUMMARY

The purpose of this analysis is to assess the potential noise and vibration impacts that could occur with the construction and subsequent occupancy and operation of a six-story hotel and six-story mixed-use building associated with the proposed Paseo Colorado Redevelopment Project in Pasadena, California. The results of this analysis are intended for use in an environmental document to be prepared by the City of Pasadena in accordance with the California Environmental Quality Act (CEQA).

The analysis determined that the following impacts would be less than significant without mitigation:

- Noise from project-generated traffic;
- Noise from demolition and construction, including truck traffic; and
- Noise from traffic on Los Robles Avenue to proposed residences and hotel rooms; however, data relative to interior noise levels will be required.

The analysis determined that the following impacts would be less than significant with implementation of mitigation measures:

- Noise from stationary sources, such as heating, ventilating, and air conditioning equipment;
- Noise from the hotel pool area activities;
- Noise from traffic on Colorado Boulevard to proposed residences; and
- Vibration from demolition and construction activities.

2.0 PROJECT LOCATION AND DESCRIPTION

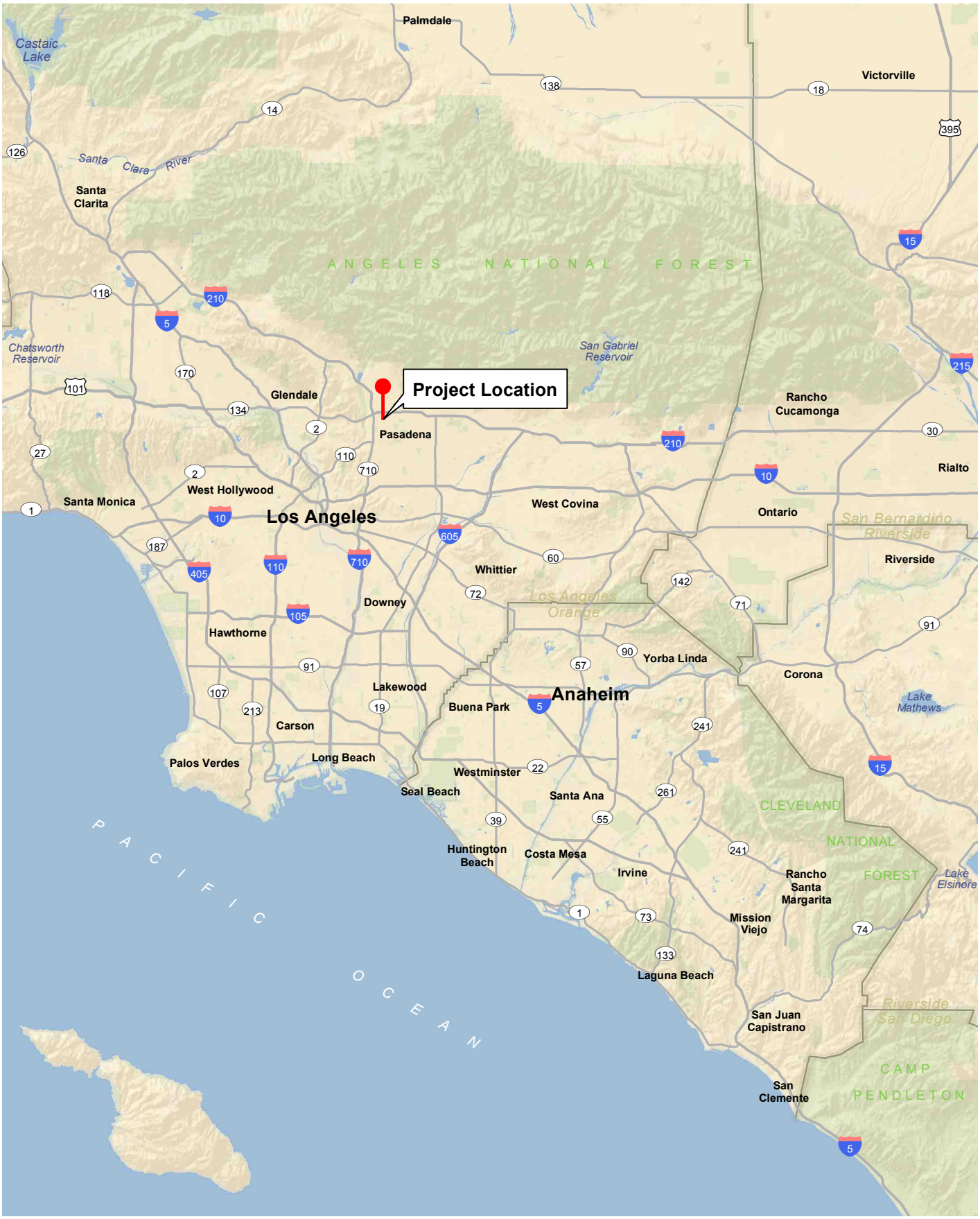
The City of Pasadena (the City) is located approximately ten miles northeast of the City of Los Angeles in the County of Los Angeles (Exhibit 1, Regional Location). Regional access to the City is provided by State Route (SR) 134, Interstate (I) 210 (Foothill Freeway), SR-110, and I-710. The project site is located at 280 Colorado Boulevard. As shown on Exhibit 2, Local Vicinity, and Exhibit 3, Aerial View and Noise Monitoring Locations, the project site is bordered by existing Paseo Colorado buildings to the west; Los Robles Avenue on the east; Green Street on the south; and Colorado Boulevard on the north.

The project site is rectangular in shape and approximately 8.3 acres in area. The project site is located within the Central District Specific Plan (Sub-district 2) and is zoned CD-2 (Civic Center/Midtown). The General Plan Land Use designation for the site is Specific Plan.

The proposed project involves (1) demolition of the existing approximately 160,000 square foot (sf) Macy's department store and a 2-story retail building north of Macy's; (2) construction and operation of the 6-story, 179-room Hyatt Place hotel; and (3) construction of a 6-story mixed-use building including approximately 21,800 sf of restaurant space and 100 for-sale residential units (See Exhibit 4, Proposed Project). The hotel would include an outdoor pool area on the west side of the building at the second floor elevation. The existing subterranean parking at the Macy's store would not be demolished and would be used for hotel parking.

3.0 NOISE BASICS AND TERMINOLOGY

Sound is a vibratory disturbance created by a moving or vibrating source and that is capable of being detected. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired



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Regional Location

Exhibit 1

Paseo Colorado Redevelopment Noise and Vibration Impact Analysis

N W E S

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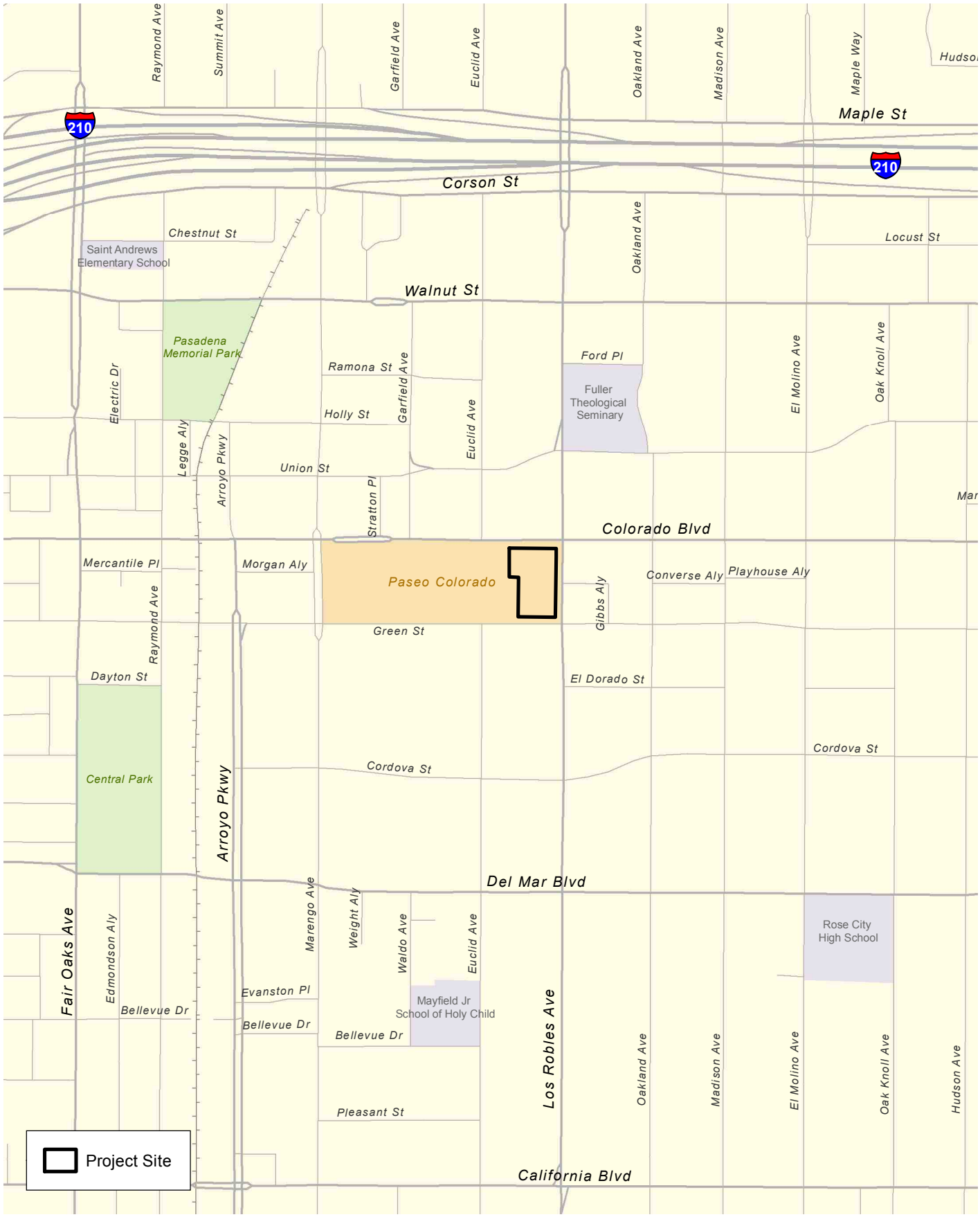

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Local Vicinity

Exhibit 2

Paseo Colorado Redevelopment Noise and Vibration Impact Analysis

N W E S

750 375 0 750

Feet

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Aerial Source: LAR-IAC 2011

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Aerial View and Noise Monitoring Locations

Exhibit 3

Paseo Colorado Redevelopment Noise and Vibration Impact Analysis

N W E S

125 62.5 0 125

Feet

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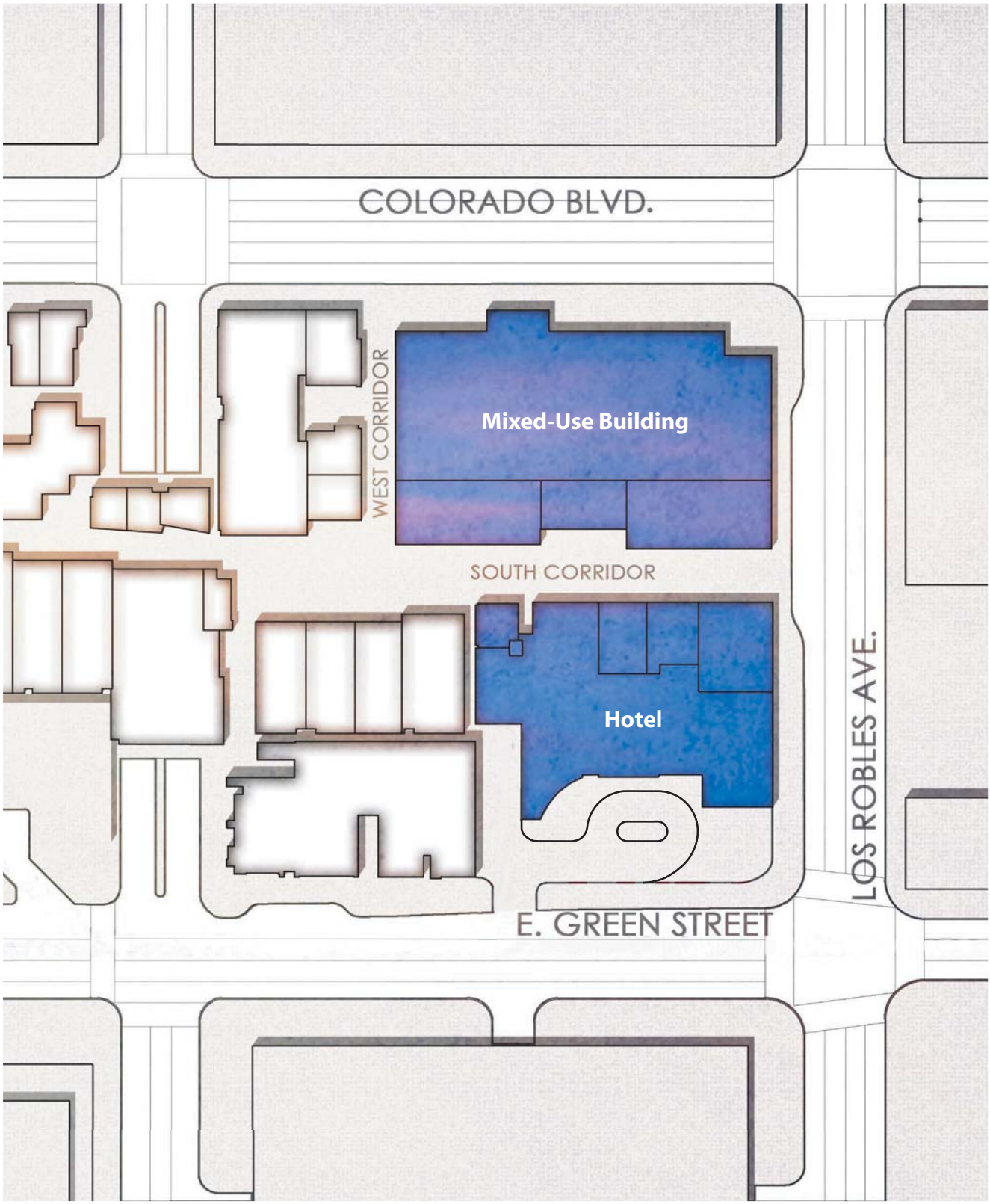

Source: DLR Group, 2014

Proposed Project

Exhibit 4

Paseo Colorado Redevelopment Noise and Vibration Impact Analysis

N
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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.

3.1 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 levels are described in units called the decibel (dB).

Decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Therefore, 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.

3.2 PERCEPTION OF NOISE AND A-WEIGHTING

A typical noise environment consists of a base of steady “background” noise that is the sum of many distant and indistinguishable noise sources. Superimposed on this background noise is the sound from individual local sources. The local sources can vary from an occasional aircraft or train passing by, to intermittent periods of sound (such as amplified music), to virtually continuous noise from, for example, traffic on a major highway.

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 dB(A) or dBA. The most common sounds vary between 40 dBA (very quiet) to 100 dBA (very loud). Normal conversation at 3 feet is approximately 60 dBA, while loud jet engine noises equate to 110 dBA, which can cause serious discomfort. Table 1 shows the relationship of various noise levels to commonly experienced noise events.

TABLE 1
TYPICAL NOISE LEVELS FOR COMMON EVENTS

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock Band
Jet Fly-over at 300 m (1,000 ft)	100	
Gas Lawn Mower at 1 m (3 ft)	90	
Diesel Truck at 15 m (50 ft) at 80 km/hr (50 mph)	80	Food Blender at 1 m (3 ft); Garbage Disposal at 1 m (3 ft)
Noisy Urban Area, Daytime Gas Lawn Mower at 30 m (100 ft)	70	Vacuum Cleaner at 3 m (10 ft)
Commercial Area, Heavy Traffic at 90 m (300 ft)	60	Normal Speech at 1 m (3 ft)
Quiet Urban Daytime	50	Large Business Office, Dishwasher in Next Room
Quiet Urban Nighttime	40	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	30	Library
Quiet Rural Nighttime	20	Bedroom at Night, Concert Hall (Background)
	10	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing
dBA: A-weighted decibels; m: meter; ft: feet; km/hr: kilometers per hour; mph: miles per hour Source: Caltrans 2009		

Human perception of noise has no simple correlation with acoustical energy. Due to subjective thresholds of tolerance, the annoyance of a given noise source is perceived very differently from person to person. Two noise sources do not “sound twice as loud” as one source. As stated above, a doubling of noise sources results in a noise level increase of 3 dBA. It is widely accepted that (1) the average healthy ear can barely perceive changes of a 3 dBA increase or decrease; (2) a change of 5 dBA is readily perceptible; and (3) an increase (decrease) of 10 dBA sounds twice (half) as loud (Caltrans 2009). In community situations, noise exposure and changes in noise levels occur over a number of years, unlike the immediate comparison made in a field study situation. The generally accepted level at which a change in community noise levels becomes “barely perceptible” typically occurs at values greater than 3 dBA. Changes of 5 dBA are defined as “readily perceptible” and a change of 10 dBA is considered twice as loud.

3.3 NOISE PROPAGATION

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

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 distance (i.e., if the noise level is 70 dBA at 25 feet, it is 64 dBA at 50 feet) for point sources. 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.

Ground Absorption: To account for ground-effect attenuation (absorption), two types of site conditions are commonly used in noise prediction: soft site and hard site conditions. 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 (e.g., soft dirt, grass, or scattered bushes and trees) and receive an excess ground attenuation value of 1.5 dBA per doubling of distance.

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, the wind has a 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.

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 (e.g., hills and dense woods) and man-made features (e.g., buildings and walls) can significantly alter noise levels. For a noise barrier to work, it must be high enough and long enough to block the view from the receiver to a road or to the noise source. Effective noise barriers can reduce noise levels by up to 15 dB.

3.4 NOISE DESCRIPTORS

Several rating scales (or noise "metrics") exist to analyze effects of noise on a community. These scales include the equivalent noise level (L_{eq}), the community noise equivalent level (CNEL), and the day-night average sound level (DNL or L_{dn}). Average noise levels over a period of minutes or hours are usually expressed as dBA L_{eq}, which is the equivalent noise level for that period of time. The period of time averaging may be specified; for example, $L_{eq(3)}$ would be a 3-hour average. When no period is specified, a one-hour average is assumed. It is important to understand that noise of short duration (i.e., substantially less than the averaging period) is averaged into ambient noise during the period of interest. Thus, a loud noise lasting many seconds or a few minutes may have minimal effect on the measured sound level averaged over a one-hour period.

To evaluate community noise impacts, L_{dn} was developed to account for human sensitivity to nighttime noise. The L_{dn} represents the 24-hour average sound level with a penalty for noise occurring at night. The L_{dn} computation divides the 24-hour day into 2 periods: daytime (7:00 AM to 10:00 PM) and nighttime (10:00 PM to 7:00 AM). The nighttime sound levels are assigned a 10 dBA penalty prior to averaging with daytime hourly sound levels. CNEL is similar to L_{dn} except that it separates a 24-hour day into 3 periods: daytime (7:00 AM to 7:00 PM), evening (7:00 PM to 10:00 PM), and nighttime (10:00 PM to 7:00 AM). The evening sound levels are assigned a 5 dBA penalty, and the nighttime sound levels are assigned a 10 dBA penalty prior to averaging with daytime hourly sound levels.

Several statistical descriptors are also often used to describe noise, including L_{max}, L_{min}, and L_x. L_{max} and L_{min} are, respectively, the highest and lowest A-weighted sound levels that occur during a noise event. The L_x signifies the noise level that is exceeded x percent of the time; for example, L_{10} denotes the level that was exceeded 10 percent of the time.

3.5 NOISE-SENSITIVE RECEPTORS

Noise-sensitive locations include areas where an excessive amount of noise would interfere with normal operations or activities and where a high degree of noise control may be necessary. Examples include schools, hospitals, and residential areas. Recreational areas may be considered noise-sensitive where quiet and solitude may be an important aspect of the specific recreational experience (Pasadena 2004a).

4.0 VIBRATION BASICS AND TERMINOLOGY

Vibration is the periodic movement of mass over time. Vibration generated by construction activity has the potential to damage structures. This damage could be structural damage (e.g., cracking of floor slabs, foundations, columns, beams, or wells) or cosmetic architectural damage (e.g., cracked plaster, stucco, or tile).

Ground vibration can be annoying to people. The primary effect of perceptible vibration is often a concern. However, secondary effects, such as the rattling of a china cabinet, can also occur, even when vibration levels are well below perception. Any effect (primary perceptible vibration, secondary effects, or a combination of the two) can lead to annoyance. The degree to which a person is annoyed depends on the activity in which they are participating at the time of the disturbance. For example, someone sleeping or reading will be more sensitive than someone who is running on a treadmill. Reoccurring primary and secondary vibration effects often lead people to believe that the vibration is damaging their home, although vibration levels are well below minimum thresholds for damage potential (Caltrans 2013).

4.1 VIBRATION DESCRIPTORS

Vibration is described in terms of frequency and amplitude and, unlike sound, there is no standard way of measuring and reporting amplitude. Vibration levels are usually expressed in terms of velocity or acceleration as a single-number measure of vibration magnitude; this measurement 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 (in/sec). Since it is related to the stresses that are experienced by buildings, ppv is often used in monitoring blasting vibration and the vibration of heavy construction equipment. Vibration is also described in decibel units, written as VdB, to distinguish from noise level decibels

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 (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.

4.2 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.

4.3 VIBRATION SOURCES AND RESPONSES

Construction vibration is generally associated with pile driving and rock blasting. However, large bulldozers, vibratory compactors, and loaded trucks can cause perceptible vibration levels at close proximity. Numerous studies have been conducted to characterize the human response to vibration and, over the years, numerous vibration criteria and standards have been suggested by researchers, organizations, and governmental agencies. These studies suggest that the thresholds for perception and annoyance vary according to duration, frequency, and amplitude of vibration. Exhibit 5, Typical Vibration Amplitudes and Thresholds, illustrates common vibration sources and typical human and structural responses.

4.4 VIBRATION-SENSITIVE RECEPTORS

Vibration-sensitive receptors are generally considered to be humans who are engaged in activities or who are utilizing land uses that may be subject to significant interference from vibration. Activities and land uses often associated with vibration-sensitive receptors are similar to those associated with noise-sensitive receptors, but also include land uses with sensitive equipment or instrumentation. Vibration generated by construction activity has the potential to cause structural damage (i.e., cracking of floor slabs, foundations, columns, beams, or wells) or cosmetic/architectural damage (i.e., cracked plaster, stucco, or tile). Older, fragile buildings are of particular concern.

5.0 APPLICABLE NOISE AND VIBRATION STANDARDS

5.1 NOISE STANDARDS

Public agencies have established noise guidelines and standards to protect citizens from potential hearing damage and various other adverse physiological and social effects associated with noise.

5.1.1 State of California

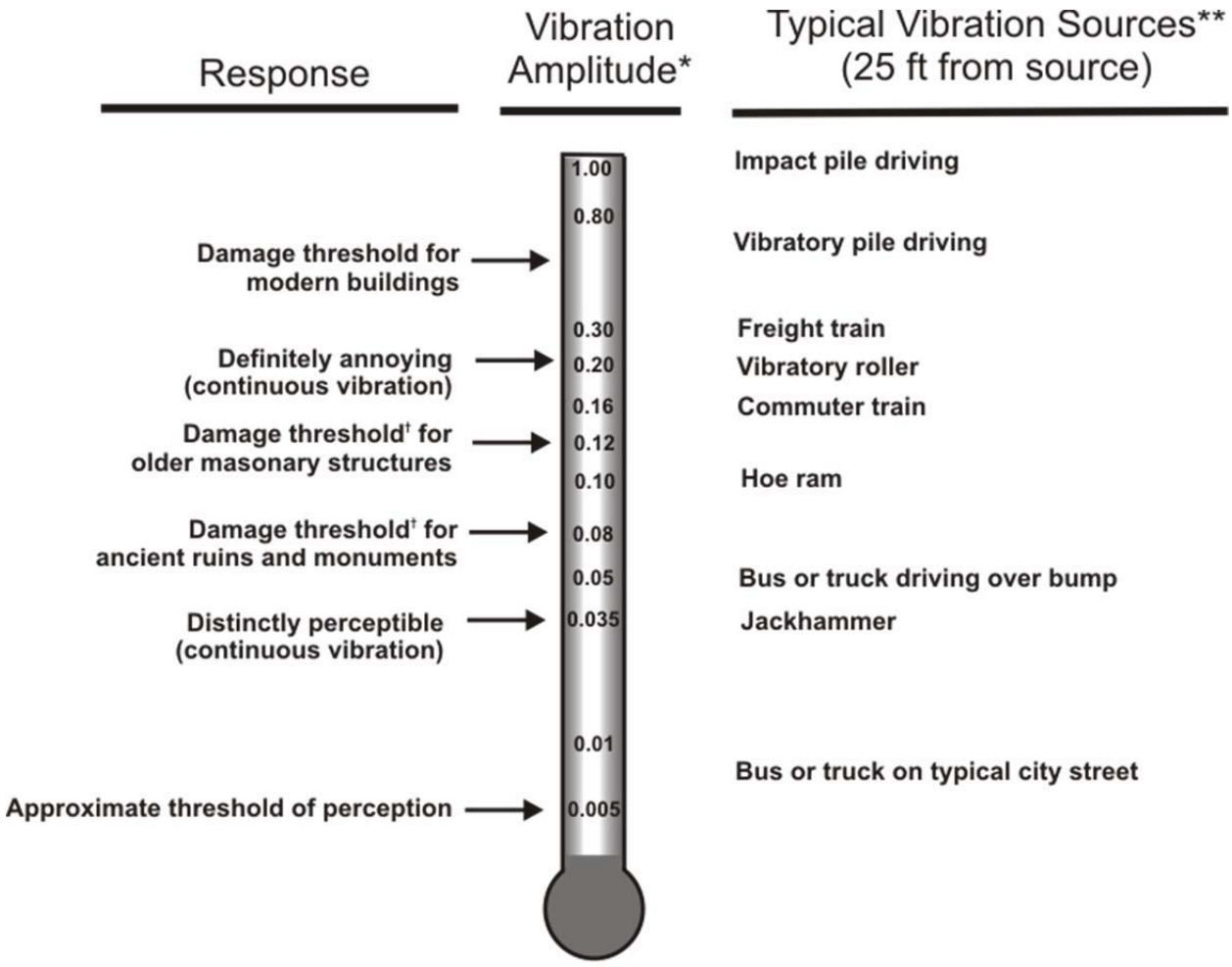
Title 24 of the *California Code of Regulations,* also known as the California Building Standards Code, establishes building standards applicable to all occupancies throughout the state. Section 1207.11.2 requires that residential structures other than detached single-family dwellings be designed to prevent the intrusion of exterior noise so that the interior noise attributable to exterior sources shall not exceed 45 dBA CNEL in any habitable room. Section 1207.12 states, “if interior allowable noise levels are met by requiring that windows be unopenable or closed, the design for the structure must also specify a ventilation or air-conditioning system to provide a habitable interior requirement. The ventilation system must not compromise the dwelling unit or guest room noise reduction”.

5.1.2 City of Pasadena

The City of Pasadena has established guidelines and standards in the General Plan and the Municipal Code.

General Plan Noise Element

The City of Pasadena is affected by several different sources of noise, including automobile traffic, Rose Bowl events, commercial activity, and periodic nuisances such as construction, loud parties, and other events. The Noise Element is intended to identify these sources and provide objectives and policies that ensure that noise from these sources does not create an unacceptable noise environment (Pasadena 2002).



* Peak particle velocity (inches/sec)
** Actual vibration levels are dependent on many factors
† Approximate threshold for cosmetic damage

Source: WIA et al. 2012

Typical Vibration Amplitudes and Thresholds

Exhibit 5

Paseo Colorado Redevelopment Noise and Vibration Impact Analysis

BonTerra PSOMAS

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The Noise Element contains guidelines for noise compatible land use as shown in Table 2.

TABLE 2
CITY OF PASADENA GUIDELINES FOR NOISE COMPATIBLE LAND USE

CLEARLY ACCEPTABLE
Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirement.

CONDITIONALLY ACCEPTABLE
If new construction or development proceeds, an analysis of the noise reduction requirements should be made and needed noise insulation features included in the design.

NORMALLY ACCEPTABLE
New construction or development should be undertaken after an analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

NORMALLY UNACCEPTALBE
New construction or development should generally not be undertaken, unless it can be demonstrated that an interior level of 45 dBA can be achieved.

Source: Pasadena 2002.

The noise element acknowledges that noise from major roadways may affect sensitive receptors and identifies Colorado Boulevard as a major roadway. The following policy and implementation measures are applicable to the project:

Policy 2a: The City will encourage noise-compatible land uses along major roadways.

Measure 1 The City will consult the guidelines for noise compatible land use shown on Figure 1 [Table 2 of this Noise Report] to guide the appropriateness of land uses relative to roadway noise.

Measure 2 An acoustical study showing the ability to meet state noise insulation standards may be required for any development proposed in an area where the noise level exceeds the "clearly acceptable level" as determined by the City and shown on Figure 1 [Table 2 of this Noise Report].

Measure 3 The City will enforce the California Noise Insulation Standards (Title 25 California Administration Code for future development and redevelopment) to ensure an acceptable interior noise level of 45 dBA L_{dn} in habitable rooms.

The Noise Element recognizes that noise generated by commercial operations, maintenance, truck deliveries, and traffic can affect adjacent residential areas and other sensitive land uses. The following objective and implementation measure are applicable to the project:

Objective 6 The City will minimize noise spillovers from commercial and industrial operations into adjacent residential neighborhoods and other sensitive uses, while maximizing the Land Use Element's objectives to encourage mixed-use development in the Central District and other Specific Plan areas as well as to promote economic vitality.

Measure 26 The City will warn new residents and other sensitive noise receptors about the potential for noise in the Central District and other mixed-use areas.

The Noise Element recognizes that construction activity is also a source of occasional temporary nuisance noise throughout the City; that these and other such nuisance noises are common to cities; and, because of their unpredictable nature, that these activities must be addressed on a case-by-case basis.

The following policies are applicable to the project:

Policy 7b: The City will encourage limitations on construction activities adjacent to sensitive noise receptors as defined in Figure 1 (Table 2 of this Noise Report).

Policy 7c: The City will encourage construction and landscaping activities that employ techniques to minimize noise.

Municipal Code

The City Municipal Code (Title 9, article IV, Chapter 9.36, Noise Restrictions) is the City's Noise Ordinance. It is the City's policy ". . . to prohibit unnecessary, excessive and annoying noises from all sources. . . . Noise at certain levels is detrimental to the health and welfare of the general public". The following sections of the Noise Ordinance are applicable to the proposed project:

9.36.050 – General noise sources.

It is unlawful for any person to create, cause, make or continue to make or permit to be made or continued any noise or sound which exceeds the ambient noise level at the property line of any property by more than 5 decibels.

9.36.070 – Construction projects.

A. No person shall operate any pile driver, power shovel, pneumatic hammer, derrick power hoist, forklift, cement mixer or any other similar construction equipment within a residential district or within a radius of 500 feet therefrom at any time other than as listed below:
   1. From 7:00 AM to 7:00 PM Monday through Friday;
   2. From 8:00 AM to 5:00 PM on Saturday; and
   3. Operation of any of the listed construction equipment is prohibited on Sundays and holidays.

B. No person shall perform any construction or repair work on buildings, structures or projects within a residential district or within a radius of 500 feet therefrom in such a manner that a reasonable person of normal sensitiveness residing in the area is caused discomfort or annoyance at any time other than as listed below:
   1. From 7:00 AM to 7:00 PM Monday through Friday;
   2. From 8:00 AM to 5:00 PM on Saturday; and
   3. Performance of construction or repair work is prohibited on Sundays and holidays.

C. For purposes of this section, holidays are New Year's Day, Martin Luther King Jr. Day, Lincoln's Birthday, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day, Day after Thanksgiving, and Christmas.

9.36.080 – Construction equipment.

It is unlawful for any person to operate any powered construction equipment if the operation of such equipment emits noise at a level in excess of 85 dBA when measured within a radius of 100 feet from such equipment.

9.36.110 – Radio, television sets and similar devices.

A. Use Restricted. It is unlawful for any person within any residential zone of the city to use or operate any radio receiving set, musical instrument, phonograph, television set or other machine or device for the producing or

reproducing of sound (between the hours of 10 PM of one day and 7 AM of the following day) in such a manner as to disturb the peace, quiet and comfort of neighboring residents or any reasonable person of normal sensitiveness residing in the area.

B. Prima Facie Violation. Any noise level exceeding the ambient base level at the property line of any property by more than 5 decibels is deemed to be prima facie evidence of a violation of the provisions of this section.

6.0 EXISTING NOISE AND VIBRATION ENVIRONMENT

6.1 SURROUNDING USES

As shown in Exhibit 3, Aerial View and Noise Monitoring Locations, the project site is located in an urban area on one of the City's main commercial streets; it is surrounded by commercial, retail, and residential land uses. Adjacent to the project's western boundary are the Terraces at Paseo Colorado Apartment Homes and Paseo Colorado retail shops. Across Colorado Boulevard to the north is the Western Assets Plaza, a commercial office building. Across Los Robles Avenue to the east are a bank and retail developments. South of the project site across Green Street is a public parking structure for the use of residents at the Terraces at Paseo Colorado Apartment Homes and visitors to the Paseo Colorado development.

6.2 NOISE SOURCES

The primary source of noise to the project site is vehicle traffic on Colorado Boulevard, which includes relatively frequent bus traffic. Traffic on Los Robles Avenue and Green Street contribute additional noise. The area is also subject to heavy foot traffic; pedestrians visiting the various retail shops are also a source of noise.

6.3 NOISE-SENSITIVE LAND USES

Noise-sensitive receptors are defined in Section 3.5 of this report. The noise-sensitive land use adjacent to the west side of the project site is the six-story Terraces at Paseo Colorado Apartment Homes.

The guestrooms in the proposed hotel and the residences in the proposed mixed-use building would be noise-sensitive land uses.

6.4 EXISTING NOISE CONDITIONS

Ambient noise monitoring occurred on August 16, 2013. Noise level measurements were taken using a Larson Davis Laboratories Model 831 integrating sound level meter (LD 831). The LD 831 sound level meter and microphone were mounted on a tripod, approximately five feet above the ground and equipped with a windscreen during all measurements. The LD 831 was calibrated before and after use with a Larson Davis Model CAL200 acoustical calibrator to ensure that the measurements would be accurate.

The sound level meter was programmed to record noise levels in "slow" mode in A-weighted form. Meteorological conditions during all measurement periods were favorable with clear skies, and the temperature was approximately 88 degrees Fahrenheit (°F). Except for an occasional light breeze, there was little or no wind for most of the measurement period.

Noise level measurements were collected at 3 locations for a minimum period of 20 minutes each. The L_{eq}, L_{max}, and L_{min} values taken at each ambient noise measurement location are

presented in Table 3. The complete noise monitoring results are included in Attachment A. Ambient noise survey locations are shown in Exhibit 3. The existing background noise environment (i.e., ambient noise) in the project area is primarily influenced by vehicle traffic on the roads adjacent to the project site.

TABLE 3
SUMMARY OF SHORT-TERM AMBIENT NOISE LEVEL MEASUREMENTS

Measurement Number*	Location	Start Time, Duration	Noise Levels (dBA)			Primary Noise Source
			L_{eq}	L_{max}	L_{min}	
1	South edge of the project site, approximately 25 ft from Green St's northern edge.	11:00 AM, 20 minutes	65	83	52	Vehicles on Green St.
2	East side of the project site across Los Robles Ave, approximately 25 ft from Los Robles Ave's eastern edge.	11:38 AM, 20 minutes	66	83	53	Vehicles on Los Robles Ave.
3	North edge of the project site, approximately 25 ft from Colorado Blvd's southern edge.	12:15 PM, 20 minutes	69	82	59	Vehicles on Colorado Blvd.

dBA: A-weighted decibels; L_{eq}: equivalent noise level; L_{max}: maximum noise level; L_{min}: minimum noise level; ft: feet.
[a] See Exhibit 3 for measurement locations.

Considering the location of the residences in the existing Terraces at Paseo Colorado Apartment Homes adjacent to the project site and the exposure of those residences to the traffic in the surrounding area, the existing average daytime noise level at the east facade of the Terraces at Paseo Colorado Apartment Homes is estimated at 59 dBA L_{eq}. Based on 24 hour traffic counts included in the project traffic study (Raju 2014), the CNEL at receptors adjacent to Green Street west of Los Robles Avenue would be 2 dBA higher than the 11:00 AM noise level, which is typical of urban and suburban areas. Thus, the CNEL at the existing Terraces at Paseo Colorado Apartment Homes is estimated at 61 dBA.

6.5 VIBRATION-SENSITIVE RECEPTORS

Vibration-sensitive receptors are defined in Section 4.4 of this report. The vibration-sensitive land use adjacent to the west side of the project site is the six-story Terraces at Paseo Colorado Apartment Homes.

7.0 REGULATORY REQUIREMENT AND PROJECT DESIGN FEATURE

7.1 PROJECT DESIGN FEATURES

Project design features (PDFs) are elements of the project design that contribute to the avoidance or minimization of impactst and are important to the impact analysis.

PDF Noise-1 The guest rooms in the proposed hotel and the residences in the proposed mixed-use building will include mechanical ventilation systems to allow occupancy with windows closed.

8.0 NOISE IMPACT ANALYSIS

8.1 THRESHOLDS OF SIGNIFICANCE

According to Appendix G of the State CEQA Guidelines, a project will normally have a significant adverse environmental impact on noise if it will:

1. Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
2. Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.
3. Expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
4. Expose persons to or generate excessive groundborne vibration or groundborne noise levels.
5. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels.
6. For a project within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels.

Under CEQA, consideration must be given to the magnitude of the increase and the ambient noise level at noise-sensitive receptors in order to determine if the noise increase is substantial.

The standards of the City Noise Ordinance included in Section 5.1.2 are thresholds of significance for noise impacts. Specifically, for operational, long-term noise,

- Section 9.36.050 prohibits making noise that exceeds the ambient noise levels by 5 dBA.

For short-term, construction noise

- Section 9.36.080 prohibits operating construction equipment that makes noise exceeding 85 dBA at a distance of 100 feet.

In addition, according to the City of Pasadena General Plan EIR, a significant noise impact will be created if (Pasadena 2004b):

- Development pursuant to the project will increase ambient noise levels above the “normally acceptable” category for any land use, as established in the City’s noise/land use compatibility matrix in the Noise Element.
- The project will allow new noise-sensitive development (such as residences) to be located in areas experiencing above “normally acceptable” levels of noise.

The above criteria are applicable to long-term noise impacts.

There are no applicable federal, State, or local standards for significant vibration impacts. For this impact analysis, the thresholds of significance for vibration are 0.4 in/sec ppv for potential damage to fragile buildings and 0.5 in/sec ppv for human annoyance. The derivation of these thresholds is discussed in the Threshold 4 analysis below.

8.2 IMPACT ANALYSIS

Threshold 1 Would the result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

The proposed project would contribute operational (post-construction) noise to the existing environment through (1) off-site traffic and (2) on-site sources, which include stationary sources, pool area activities, and driveway/loading dock noise.

Off-Site Traffic

The proposed project would generate traffic along roadways in the project vicinity. The average daily trips (ADT) generated by the proposed project, minus the trips generated by retail uses removed by the project (not including Macy's, which is assumed to be vacant) would be 2,867 ADT (Raju 2014). Table 4 shows traffic volume and traffic noise increases attributable to the proposed project. As shown in Table 4, noise increases would not exceed 0.16 dBA, which would be less than the 5 dBA threshold and would not be perceptible. The impact would be less than significant. No mitigation is required.

TABLE 4
TRAFFIC NOISE LEVEL INCREASES

Street Segment	Average Daily Traffic			Noise Increase dBA
	Existing (2013) Baseline	Project	Existing (2013) Plus Project	
Marengo Ave between Corson St and Walnut St	19,328	293	19,621	0.07
Marengo Ave between Walnut St and Holly St	19,140	387	19,527	0.09
Marengo Ave between Cordova St and Del Mar Blvd	13,443	186	13,629	0.06
Marengo Ave between Del Mar Blvd and California Blvd	14,545	143	14,688	0.04
Euclid Ave between Corson St and Walnut St	2,765	75	2,840	0.12
Euclid Ave between Cordova St and Del Mar Blvd	2,546	14	2,560	0.02
Los Robles Ave between Walnut St and Union St	20,594	319	20,913	0.07
Los Robles Ave between Colorado Blvd and Green St	17,512	555	18,067	0.14
Los Robles Ave between Cordova St & Del Mar Blvd	13,570	220	13,790	0.07
Los Robles Ave between Del Mar Blvd and California Blvd	12,803	104	12,907	0.04
El Molino Ave between Walnut St and Union St	7,151	72	7,223	0.04
El Molino Ave between Del Mar Blvd and California Blvd	5,550	28	5,578	0.02
Walnut St between Raymond Ave and Marengo Ave	11,871	244	12,115	0.09
Union St between Garfield Ave and Euclid Ave	7,987	39	8,026	0.02

TABLE 4
TRAFFIC NOISE LEVEL INCREASES

Street Segment	Average Daily Traffic			Noise Increase dBA
	Existing (2013) Baseline	Project	Existing (2013) Plus Project	
Union St between Oak Knoll Ave and Hudson Ave	7,013	43	7,056	0.03
Colorado Blvd between Arroyo Pkwy and Marengo Ave	21,071	416	21,487	0.08
Colorado Blvd between Marengo Ave and Garfield Ave	20,943	674	21,617	0.14
Colorado Blvd between Euclid Ave and Los Robles Ave	20,999	671	21,670	0.14
Colorado Blvd between Los Robles Ave and Oakland Ave	21,465	312	21,777	0.06
Green St between Arroyo Pkwy and Marengo Ave	12,995	161	13,156	0.05
Green St between Marengo Ave and Euclid Ave	12,123	153	12,276	0.05
Green St between Euclid Ave and Los Robles Ave	11,851	454	12,305	0.16
Green St between Los Robles Ave and Oakland Ave	8,934	221	9,155	0.11
Green St between Oakland Ave and Madison Ave	8,676	221	8,897	0.11
Cordova St between Los Robles Ave and Oakland Ave	10,076	58	10,134	0.02

dBA: A-weighted decibel

Source: Raju 2014

On-Site Sources

Operational noise sources associated with the proposed uses would include but would not be limited to mechanical equipment (e.g., heating, ventilating, and air conditioning [HVAC] units and swimming pool pumps); outdoor activities at the swimming pool area; and vehicles entering and leaving the subterranean parking area and loading docks.

As previously noted, the threshold of significance for operational noise sources is Section 9.36.050 of the Noise Ordinance, which prohibits making noise that exceeds the ambient noise levels by 5 dBA.

Stationary Sources

HVAC units, swimming pool pumps, and other stationary equipment would be required to be selected and installed to comply with Section 9.36.050 of the City Noise Ordinance. HVAC units and pool pumps would potentially operate continuously at night. Based on a review of traffic count data, nighttime traffic noise levels at the Terraces at Paseo Colorado may be as low as 41 dBA L_{eq}, occurring in the early morning hours. Therefore, in order to avoid exceeding the ambient noise level by more than 5 dBA, stationary equipment should be selected, located, and shielded to ensure that the noise levels at the property lines do not exceed 45 dBA. Because the stationary sources would be installed as required by the noise ordinance, the impact would

be less than significant. However, Mitigation Measure (MM) Noise-1 should be incorporated into the project to ensure compliance with the Noise Ordinance.

Pool Area Activities

Noise would be generated at the hotel swimming pool area, which would be east of the Terraces at Paseo Colorado Apartment Homes (see Exhibit 6, Hotel 2nd Floor Plan).

Noise from exuberant children's play and typical pool area activities may be heard by nearby residents because the character of the noise would be different than the existing traffic noise and noise from nearby commercial activities. The magnitude of the pool area noise at the closest Terrace Apartment Homes is calculated based on the following scenario:

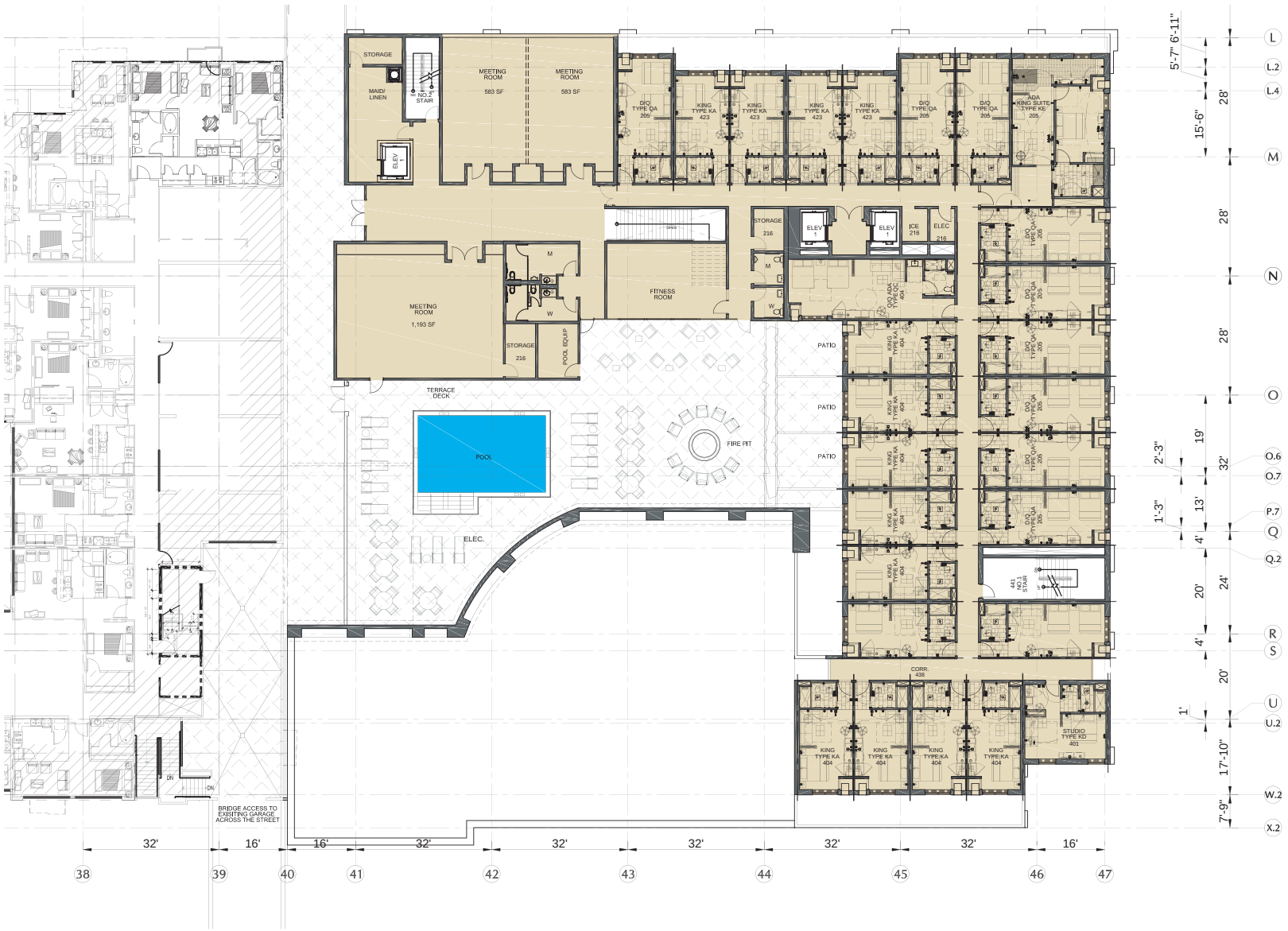
- Yelling children: children making noise of 70 dBA measured at a distance of 5 feet for 10 minutes in an hour.
- Loud talking: assumed as 5 people talking simultaneously, each making noise of 65 dBA measured at a distance of 5 feet for 30 minutes in an hour
- Noise may be generated throughout the pool area, which would have an east-west length of approximately 98 feet. The average location of the above noise sources would be at the center of the pool area, and the distance from the center of the pool area to the closest point of the Terrace Apartment Homes building would be approximately 63 feet.
- The daytime average hourly background noise at the east edge of the Terraces at Paseo Colorado Apartment Homes building is calculated at 59 dBA L_{eq}, and the 11:00 PM background noise is calculated at approximately 52 dBA L_{eq}, based on the existing traffic volume on Green Street.

With this scenario, the noise from the pool area at the nearest point of the Terraces at Paseo Colorado Apartment Homes building would be approximately 52 dBA L_{eq}. Noise from the pool area would be less than the daytime ambient noise level and approximately the same as the 11:00 PM noise level; therefore, noise would not exceed the ambient noise level by 5 dBA. The impact would be less than significant and no mitigation would be required.

Noise from amplified music at any time in the pool area could be disturbing to adjacent residents; this would violate the general noise ordinance provision that prohibits noise that causes annoyance to persons of normal sensitiveness residing in the area and would be a potential significant impact. Similarly, noise from nighttime activities in the pool area after 11:00 PM, when the ambient traffic noise would likely be less than 50 dBA Leq, could be disturbing to adjacent residents and would be a potential significant impact. To avoid these impacts, MMs Noise-2 and Noise-3 would be incorporated into the project. MM Noise-2 would prohibit the use of amplified noise equipment in the pool area; MM Noise-3 would prohibit use of the pool area after 10:00 PM. With the implementation of MMs Noise-2 and Noise-3, the impact would be less than significant.

Driveway/Loading Dock

The loading docks for the hotel would be the same loading docks used for the Macy's store. Vehicles would access the hotel garage and loading docks through the same driveway used for the loading docks. The structure covering the hotel garage entry and loading docks would block the loading dock and garage entry noise to the Terraces at Paseo Colorado residences. The impact would be less than significant.



Source: DLR Group, 2014

Hotel 2nd Floor Plan

Exhibit 6

Paseo Colorado Redevelopment Noise and Vibration Impact Analysis

N W E S

BonTerra PSOMAS

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Threshold 2	**Would the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?**

The primary noise sources during typical construction activities are the diesel engines of construction equipment and the impact noise from operations such as pile driving, blasting, and jackhammering. There would be no pile driving or blasting during construction of the proposed project. Variation in power is an element in characterizing the noise source level from construction equipment and is accounted for by describing the full power or maximum noise level and the duty cycle. The duty cycle is the percent of time that the equipment is operating at full power. Typical maximum noise levels and duty cycles of representative types of equipment are listed in Table 5, Typical Maximum Noise Levels and Duty Cycles for Construction Equipment.

During construction, nearby receptors would be exposed to occasional high noise levels associated with operation of heavy equipment, including excavators, backhoes, forklifts, cranes, and concrete pumps. The noisiest phase of the project would be demolition of the existing Macy's building, which would occur for approximately three months. The primary noise sources would be the operation of excavators, loaders, and trucks. Following demolition, there would be less use of heavy equipment, and noise levels would be lower. Construction activities would be limited to the hours of 7:00 AM to 7:00 PM Monday through Friday and 8:00 AM to 5:00 PM Saturday, as required by the Pasadena Municipal Code for construction within a residential district or within a radius of 500 feet therefrom. Because the project site is not within a residential district, and construction at other hours would result in a potentially significant impact, the limitations on construction hours would be included in the project as MM Noise-4.

TABLE 5
TYPICAL MAXIMUM NOISE LEVELS AND DUTY CYCLES
FOR CONSTRUCTION EQUIPMENT

Equipment	Noise Level (dBA) at 50 ft	Typical Duty Cycle
Auger Drill Rig	85	20%
Backhoe	80	40%
Chain Saw	85	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%
Jackhammer	85	20%
Mounted Jackhammer (hoe ram)	90	20%
Paver	85	50%

TABLE 5
TYPICAL MAXIMUM NOISE LEVELS AND DUTY CYCLES
FOR CONSTRUCTION EQUIPMENT

Equipment	Noise Level (dBA) at 50 ft	Typical Duty Cycle
Pneumatic Tools	85	50%
Pumps	77	50%
Rock Drill	85	20%
Scraper	85	40%
Tractor	84	40%
Vacuum Excavator (vac-truck)	85	40%
Vibratory Concrete Mixer	80	20%

dBA: A-weighted decibels; ft: feet; KVA: kilovolt amps

Note: Machinery equipped with noise-control devices or other noise-reducing design features do not generate the same level of noise emissions as those shown in this table.

Source: Thalheimer 2000.

Construction equipment noise would not be constant because of the variations of power, cycles, and equipment location. Average noise levels are calculated assuming all equipment is operating at the center of the site. For maximum noise events, the analysis considers a single piece of equipment operating at the shortest distance from the work area to the receptor.

The closest noise-sensitive receptors to the project site are the residences at the Terraces at Paseo Colorado Apartments, which are adjacent to the project site's western property line. The distance from the Terraces at Paseo Colorado Apartments to the center of the hotel site is approximately 100 feet. For average noise levels during demolition activities, it is assumed that a jackhammer, a hoe ram, and a heavy truck would be operating simultaneously. The average construction noise level at the Terraces at Paseo Colorado Apartments is estimated to be 80 dBA L_{eq} (see Table 6). The demolition phase is estimated to last for about three months. Following demolition, there would be an approximate 1-month period of excavation and grading for foundations and utilities and then approximately 18 months for building the hotel and mixed-use building. Estimated average noise levels at the Terraces at Paseo Colorado Apartments for each phase are shown in Table 6. Where a range of values is shown, the higher number is calculated from the "specification" noise values shown in Table 5. The lower number represents "actual" values based on many measurements made at work sites (FHWA 2011). Where there is no range shown, the results using specification and actual values are the same.

Table 6 also shows maximum noise levels, which could occur occasionally and intermittently when the loudest piece of equipment, a hoe-ram, is at full power and is operating at a location on the site at a distance of 25 feet from the equipment (source) to a window (receptor) at the Terraces at Paseo Colorado Apartments.

TABLE 6
CONSTRUCTION NOISE LEVELS AT THE TERRACES AT PASEO COLORADO APARTMENTS

Phase	Distance from center of project site (feet)	Average Construction Noise (dBA L_{eq})	Existing Average Daytime Noise Level (dBA L_{eq})[a]	Distance from edge of project site (feet)	Maximum Construction Noise (dBA L_{max})
Demolition	100	80	59	25	96
Grading	100	76–79	59	25	87–91
Building	100	73–75	59	25	85–86

dBA: A-weighted decibels; L_{eq}: equivalent energy noise level; L_{max}: maximum noise level.
[a] See discussion following Table 3.

During construction, maximum construction noise levels would not exceed City's Noise Ordinance threshold of 85 dBA at 100 feet. Therefore, the impact associated with construction noise would be less than significant. However, the increase in average noise levels at the Terraces at Paseo Colorado Apartments would be in the range of 14 to 21 dBA L_{eq} and maximum noise levels could exceed 85 dBA when the source to receptor distance is less than 100 feet.. . Given the proximity of existing residential uses to the project site, and consistent with General Plan Policy 7b and 7c (see Section 5.1.2), MMs Noise-5 and Noise-6 would be incorporated into the project to reduce noise impacts. MM Noise-5 includes noise-abatement measures relative to equipment noise and the location and orientation of noise sources. MM Noise-6 requires the hotel construction plan to enclose the west walls of the hotel at the earliest feasible time in order to reduce noise impacts to the residents at the Terraces at Paseo Colorado Apartments.

Project demolition would generate approximately 15 haul truck round trips per day for 3 months. It is assumed that the trucks will use Colorado Boulevard and similar arterials to access and depart from the project site. During this period, truck trips would increase the average hourly noise level adjacent to Colorado Boulevard by approximately 1 dBA, which would not be perceptible to most persons and would not be a significant impact. The noise increase would be less than significant, and no mitigation is required.

Threshold 3	**Would the project expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?**

Traffic Noise Impacts to Proposed Residential Uses

Los Robles Avenue

As shown in Table 3, the existing daytime noise level measured adjacent to Los Robles Avenue was 66 dBA L_{eq}. This value is consistent with traffic volume and speed data published by the City of Pasadena (Pasadena 2013, 2011). The existing traffic volume on Los Robles Avenue is 17,512 ADT; the future traffic volume with cumulative projects and the proposed project is estimated at 18,067 ADT (Raju 2014). Using 24-hour counts for Los Robles Avenue, the future CNEL at the proposed hotel's and mixed-use building's Los Robles Avenue facades is estimated at 68 dBA.

As shown in Table 2, the future noise environment for residential units facing Los Robles Avenue is classified as follows:

> NORMALLY ACCEPTABLE. New construction or development should be undertaken after an analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, with closed windows and fresh air supply systems or air conditioning will normally suffice.

Because the proposed hotel and residences in the mixed-use building facing Los Robles Avenue would not be located in an area experiencing above "normally acceptable" noise levels. Therefore, consistent with the City's General Plan EIR, the impact would be less than significant and no mitigation is required.

As required by Title 24 of the *California Code of Regulations,* the interior noise level shall be 45 dBA CNEL or less (see Section 5.1.1). Thus, the building construction must reduce the estimated 68 dBA CNEL exterior noise level by at least 23 dBA. The proposed hotel and mixed-use building would have conventional construction for multi-family buildings and air conditioning (PDF Noise-1). The City of Pasadena Noise Element provides the following guidance (Pasadena 2002):

> If a 20–25 dBA reduction is needed, the following may suffice:
>
> a. Air conditioning or a mechanical ventilation system; and
> b. Windows and sliding glass doors should be double-paned glass and mounted in low air infiltration rate frames (0.5 cubic feet per minute or less, per American National Standard Institute [ANSI] specifications); and
> c. Solid core exterior doors with perimeter weather stripping and threshold seals; and
> d. Exterior walls consist of stucco or brick veneer. Wood siding with a ½″ minimum thickness fiberboard underlayer may also be used; and
> e. Glass in both windows and doors should not exceed 20% of the floor area in a room; and
> f. Roof or attic vents facing the noise source should be baffled.

The project would be built with conventional construction and air conditioning. No mitigation is required; however, to ensure compliance with the State law and the City General Plan guidelines, MM Noise-7 would be included in the project, requiring an analysis of the noise reduction capability for residential units and hotel rooms facing Los Robles Avenue.

Colorado Boulevard

As shown in Table 3, the existing daytime noise level measured on the project site adjacent to Colorado Boulevard was 69 dBA L_{eq}. This value is consistent with traffic volume and speed data published by the City of Pasadena (Pasadena 2013, 2011). The CNEL is estimated at 70 dBA. The existing traffic volume on Colorado Boulevard is 20,690 ADT; the future traffic volume with cumulative projects and the proposed project is estimated at 21,670 ADT (Raju 2014). Using 24-hour counts for Colorado Boulevard, the future CNEL at the Colorado Boulevard facade of the proposed mixed-use building is estimated at 70 to 71 dBA.

As shown in Table 2, the future noise environment for residential units facing Colorado Boulevard is classified as follows:

> CONDITIONALLY ACCEPTABLE. If new construction or development proceeds, an analysis of the noise reduction requirements should be made and needed noise insulation features included in the design.

Because the proposed mixed-use building would be located in an area experiencing above "normally acceptable" noise levels, the impact would be potentially significant and mitigation is required. Therefore, MM Noise-7 would be included in the project, requiring an analysis of the noise reduction capability for residential units facing Colorado Boulevard.

As required by Title 24 of the *California Code of Regulations* and MM Noise-7, the interior noise level shall be 45 dBA CNEL or less (see Section 5.1.1). Thus, the building construction must reduce the estimated 70 to 71 dBA CNEL exterior noise level by at least 26 dBA. The proposed mixed-use building would have conventional construction for multi-family buildings and air conditioning (PDF Noise-1). The City of Pasadena Noise Element provides the following guidance (Pasadena 2002):

> If a 25–30 dBA reduction is needed, the following may suffice:
>
> a. The six measures stated in the Los Robles Avenue analysis above for 20–25 dBA reduction; and
>
> b. The interior sheetrock of exterior wall assemblies should be attached to studs by resilient channels. Staggered studs or double walls are acceptable alternatives; and
>
> c. Window assemblies should have a laboratory-tested STC [sound transmission class] rating of 30 or greater (Windows that provide superior noise reduction capability and that are laboratory-tested are sometimes called "sound-rated" windows. In general, these windows have thicker glass and/or increased air space between panes. In contrast, standard energy conservation double-pane glazing with a $^1/_8$″ or $^1/_4$″ air space may be less effective in reducing noise from some noise sources than single pane glazing).

Other Noise Impacts to Proposed Residential Uses

The proposed Project would be located in a mixed-use area with nearby commercial uses and restaurants. Commercial activities may generate noise that could be unusual and disturbing because of the loudness, character of the noise, or the time of occurrence. Noise events exceeding the traffic noise levels would be occasional and would not be of the frequency and magnitude to substantially increase the CNEL. Therefore, this would not be a significant impact and no mitigation is required. However, MM Noise-8, implementing Measure 26 of the General Plan Noise Element, requiring residents of the proposed project to be advised of the potential for noise disturbances, would be incorporated into the project.

Compliance with the Municipal Code

As discussed under Threshold 1, with implementation of MM Noise-1, noise generated from stationary sources would not exceed the Noise Ordinance limit of a 5 dBA increase above ambient conditions. As discussed under Threshold 2, construction would be limited to the hours specified in the noise ordinance.

Therefore, with incorporation of mitigation measures, the proposed project would not expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance or any applicable standards of other agencies.

Threshold 4	**Would the project expose persons to or generate excessive groundborne vibration or groundborne noise levels?**

Construction of the proposed project has the potential to generate vibration to the adjacent structures and their occupants. Operation of heavy construction equipment—particularly pile drivers and other impact devices such as pavement breakers—creates seismic waves that radiate along the surface of the ground and downward into the earth. These surface waves can be felt as ground vibration. Vibration from operation of this equipment can result in effects ranging from annoyance to structural damage.

Construction that can result in significant levels of ground vibration generally falls into two categories that are best characterized by the cause of the vibration and its duration. Vibration that is steady-state and more or less continuous can be caused by vibratory compaction of soil, vibratory pile driving, movement of large equipment, and other sources. In contrast, vibration that is much more transient in nature and intermittent due to impulsive forces can be caused by pile driving and blasting. The proposed project would not include pile driving or blasting.

Thresholds of Significance

There are no applicable standards for structural damage from vibration. The California Department of Transportation (Caltrans) vibration damage potential guideline thresholds are shown in Table 7 (Caltrans 2013). Federal Transit Authority (FTA) guideline vibration damage criteria are shown in Table 8.

TABLE 7
GUIDELINE VIBRATION DAMAGE POTENTIAL THRESHOLD CRITERIA

Structure and Condition	Maximum ppv (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

ppv: peak particle velocity; in/sec: inch(es) per second

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Source: Caltrans 2013.

TABLE 8
CONSTRUCTION VIBRATION DAMAGE CRITERIA

Building Category	ppv (in/sec)
I. Reinforced-concrete, steel or timber (no plaster)	0.5
II. Engineered concrete and masonry (no plaster)	0.3
III. Non-engineered timber and masonry buildings	0.2
IV. Buildings extremely susceptible to vibration damage	0.12
ppv: peak particle velocity; in/sec: inch(es) per second Source: FTA 2006.	

The Terraces at Paseo Colorado is a relatively new residential structure; however, the type of concrete and reinforcement is not known. Based on the guidance in Tables 7 and 8 and preliminary assessment of the building age and construction, a vibration level of 0.4 ppv in/sec (is selected for this analysis as threshold for a potential significant vibration impact for construction damage.

There are no applicable standards for human annoyance from vibration. The Caltrans guidelines for human response to vibration are shown in Table 9 (Caltrans 2013).

TABLE 9
HUMAN RESPONSE TO TRANSIENT VIBRATION

Average Human Response	ppv (in/sec)
Severe	2.0
Strongly perceptible	0.9
Distinctly perceptible	0.24
Barely perceptible	0.035
ppv: peak particle velocity; in/sec: inch(es) per second Source: Caltrans 2013.	

For the anticipated limited periods of demolition and construction activity that would occur near sensitive receptors, the perception of some vibration is considered acceptable. Therefore, based on the guidance in Table 9, the vibration level of 0.24 ppv in/sec is used in this analysis as threshold for a potential significant vibration impact for human annoyance.

Construction of the proposed hotel and mixed-use building would not require pile driving or blasting, which are generally the sources of the most severe vibration. However, conventional construction equipment would be used for demolition of the existing buildings and paving and heavy trucks may be used for export of demolished and excavated materials. Table 10 summarizes typical vibration levels measured during construction activities for various vibration-inducing pieces of equipment at a distance of 25 feet.

TABLE 10
VIBRATION LEVELS DURING CONSTRUCTION

Equipment	ppv at 25 ft (in/sec)
Large bulldozer	0.089
Caisson drilling	0.089
Loaded trucks	0.076
Jackhammer	0.035
Small bulldozer	0.003
ppv: peak particle velocity; ft: feet; in/sec: inches per second. Source: FTA 2006.	

Demolition and construction activities could occur as close or closer than 25 feet to the existing Terraces at Paseo Colorado building. Based on FTA and Caltrans methods, if large bulldozers, loaded trucks, or similar equipment were to operate at a distance of 15 feet from the Terraces at Paseo Colorado, the vibration level is estimated at less than 0.2 ppv in/sec. Thus, the vibration level would not exceed the 0.4 ppv in/sec significance threshold for damage or the 0.24 ppm in/sec threshold for annoyance. The Caltrans and FTA guidance do not define "large" bulldozers or "heavy" trucks. However, when comparing construction in an urban infill site with the construction of freeways, it is reasonable to assume that "large" bulldozers would not be used on the proposed project site.

Additional data relative to construction equipment vibration are shown in Table 11; testing at one particular site indicates the 0.24 ppv in/sec threshold would not likely to be exceeded when light-to moderate equipment is located within 15 feet of the vibration-sensitive receptor. Based on the available data, if demolition and construction does not occur closer than 15 feet to the Terraces at Paseo Colorado Apartments, the vibration impacts would be less than significant.

TABLE 11
EXAMPLE OF ESTIMATED STANDOFF DISTANCES IN FEET FOR CONSTRUCTION ACTIVITIES NEEDED TO MAINTAIN VIBRATION INTENSITIES (PPV) BELOW SPECIFIED LEVELS, BASED ON SITE-SPECIFIC TESTING AT ONE PARTICULAR SITE

ppv (in/sec)	Demolition		Site Clearing and Excavation		New Foundations	
	Light-to-Moderate Equipment[a]	Heavy Equipment[b]	Light-to-Moderate Equipment[c]	Heavy Equipment[d]	Drilled Piers	Micropiles
0.5	9	12	5	12	8	3
0.4[e]	***11***	***14.5***	***6***	***14***	***9***	***3.5***
0.3	13	17	7	16	10	4
0.12	21	28	12	27	17	6
0.05	34	45	19	43	28	10

ppv: peak particle velocity; ft: feet; in/sec: inches per second.

Note: Values at other sites will vary.

[a] "Light-to-moderate demolition equipment" includes pneumatic chipping hammers, small hydraulic breakers, small excavators, and loaders.
[b] "Heavy demolition equipment" includes large hydraulic breakers, excavators, loaders, and bulldozers.
[c] "Light-to-moderate equipment" includes small and large bulldozers, excavators, and loaders.
[d] "Heavy equipment" includes pavement breakers and similar heavy equipment.
[e] Data for 0.4 ppv (in/sec) interpolated.

Source: Johnson et al. 2013.

However, demolition would occur closer than 15 feet to the Terraces at Paseo Colorado Apartments and MM Noise-9 would be incorporated into the project because the exact locations of demolition, excavation, and compacting; types of equipment to be used; and soil conditions are not known. MM Noise-9 is a performance standard requirement that would ensure that vibration levels at the Terraces at Paseo Colorado do not exceed 0.24 ppv in/sec threshold or an alternative threshold, based on new site data, if determined appropriate by a professional structural engineer. With the implementation of MM Noise-9, the vibration impacts would be less than significant.

Mitigation Measures

MM Noise-1 Prior to the issuance of each building permit, the Applicant shall provide data to the Director of Planning and Community Development demonstrating that the noise level from heating, ventilation, and air conditioning (HVAC) units, swimming pool equipment, and similar mechanical equipment would be less than 45 A-weighted decibels (dBA) when measured at the property line.

MM Noise-2 Prior to the issuance of the hotel occupancy permit, the Applicant shall provide data to the Director of Planning and Community Development demonstrating that the hotel regulations include a prohibition on the use of radios, televisions, "boom boxes", and similar devices in the pool area and other outdoor common areas unless the devices are used with headphones, ear buds, or similar devices.

MM Noise-3 Prior to the issuance of the hotel occupancy permit, the Applicant shall provide data to the Director of Planning and Community Development demonstrating that the building's Covenants, Conditions, and Restrictions (CC&Rs) or equivalent regulations include a prohibition on the use of the pool area between 10:00 PM and 5:00 AM and that signs with pool hours are posted at the pool area.

MM Noise-4 Prior to approval of grading plans and/or prior to issuance of demolition, grading and building permits, the construction hours limits stated in Pasadena Municipal Code Section 9.36.070, as stated below, shall be included in the construction plans or specifications:

a. No person shall operate any pile driver, power shovel, pneumatic hammer, derrick power hoist, forklift, cement mixer or any other similar construction equipment at any time other than as listed below:
    1. From 7:00 AM to 7:00 PM Monday through Friday;
    2. From 8:00 AM to 5:00 PM on Saturday; and
    3. Operation of any of the listed construction equipment is prohibited on Sundays and holidays.

b. No person shall perform any construction or repair work on buildings, structures or projects in such a manner that a reasonable person of normal sensitiveness residing in the area is caused discomfort or annoyance at any time other than as listed below:
    1. From 7:00 AM to 7:00 PM Monday through Friday;
    2. From 8:00 AM to 5:00 PM on Saturday; and
    3. Performance of construction or repair work is prohibited on Sundays and holidays.

3. Applicable holidays are New Year's Day, Martin Luther King Jr. Day, Lincoln's Birthday, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day, Day after Thanksgiving, and Christmas.

MM Noise-5 Prior to approval of grading plans and/or prior to issuance of demolition, grading and building permits, the following noise-reduction measures shall be included in the construction plans or specifications:

a. The construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards.

b. The construction contractors shall place all stationary construction equipment so that the equipment is as far as feasible from noise-sensitive receptors and orient the equipment so emitted noise is directed away from noise-sensitive receptors.

c. The construction contractors shall locate equipment staging in areas that will create the greatest distance between staging area noise sources and noise-sensitive receptors.

d. The construction contractors shall use the quietest equipment and methods reasonably feasible when planning and executing demolition and grading within 50 feet of the windows in the Terraces at Paseo Colorado Apartments.

MM Noise-6 Prior to the issuance of the building permits for the hotel, the Applicant shall present data to the Director of Planning and Community Development demonstrating that the construction plans include requirements to install temporary or permanent exterior wall sections opposite the Terraces at Paseo Colorado Building at the earliest feasible time.

MM Noise-7 Prior to the issuance of the building permits for the mixed-use building and the hotel, the Applicant shall present data to the Director of Planning and Community Development demonstrating that the interior noise levels in habitable room of residential units facing Colorado Boulevard or Los Robles Avenue will not exceed 45 decibels (dB) on the Community Noise Equivalent Level (CNEL).

MM Noise-8 Prior to the issuance of the occupancy permit for the mixed use building, the Applicant shall present information to the Director of Planning and Community Development demonstrating that appropriate sale or lease transfer documents for residential units include an advisory that the residence is located in the Central District, an area where there is a potential for noise from commercial and nighttime activities. The following language is provided as an example:

> *All potential buyers and/or renters of residential property in the building at the southwest corner of Colorado Boulevard and Los Robles Avenue, which is in Pasadena's Central District Specific Plan area, are hereby notified that they may be subject to audible noise levels attributed to business and entertainment-related activities common to such areas, including amplified sound, music, delivery vehicles, pedestrian and vehicular traffic, and other urban noise.*

MM Noise-9 Prior to approval of grading plans and/or prior to issuance of demolition, grading and building permits, the Applicant shall retain a Professional Structural Engineer with experience in structural vibration analysis and monitoring to perform the following tasks:

- Review the project plans for demolition and construction.
- Survey the project site and the Terraces at Paseo Colorado, including geological testing, if required.
- Prepare and submit a report to the Director of Planning and Community Development to include but not be limited to the following:
  - Description of existing conditions at the Terraces at Paseo Colorado;
  - Vibration level limits based on building conditions, soil conditions, and planned demolition and construction methods to ensure vibration levels below the potential for damage to the Terraces at Paseo Colorado;
  - Specific measures to be taken during construction to ensure the specified vibration level limits are not exceeded; and
  - If considered appropriate, a monitoring plan to be implemented during demolition and construction that includes post-construction and post-demolition surveys of the Terraces at Paseo Colorado.
- Examples of measures that may be specified for implementation during demolition or construction include, but are not limited to
  - Prohibition of certain types of impact equipment;
  - Requirement for lighter tracked or wheeled equipment;
  - The specification that demolition occur by non-impact methods, such as sawing concrete;
  - The specification that phasing operations avoid simultaneous vibration sources; and
  - Installation of vibration-measuring devices to guide decision making for subsequent activities.

9.0 REFERENCES

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ATTACHMENT A

NOISE MONITORING RESULTS

FIELD NOISE MEASUREMENT DATA

BonTerra CONSULTING

PROJECT: Paseo Colorado PROJ. # **RMCDON0-J0001.00**

SITE IDENTIFICATION: ST1 - Green Street OBSERVER(S): Victor Ortiz
START DATE / TIME: 8/16/13 @ 11am END DATE / TIME: 11:23 AM 8/16/13
ADDRESS: 400 West Colorado Blvd

METEROLOGICAL CONDITIONS:
TEMP: 84 °F HUMIDITY: _____ %R.H. WIND: (CALM) LIGHT MODERATE VARIABLE
WINDSPEED: 1 MPH DIR: N NE E SE (S) (SW) W NW STEADY GUSTY
SKY: (SUNNY) (CLEAR) OVRCST PRTLY CLOUDY FOG RAIN OTHER:

ACOUSTIC MEASUREMENTS:
INSTRUMENT: Larson Davis 831 TYPE: (1) 2 SERIAL #: 1742
CALIBRATOR: Larson Davis CAL200 SERIAL #: 6674
CALIBRATION CHECK: PRE-TEST 114 dBA SPL POST-TEST 114 dBA SPL WINDSCREEN X

SETTINGS: (A-WEIGHTED) (SLOW) FAST FRONTAL (RANDOM) ANSI OTHER: _____

REC #	START	END	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	OTHER:	(TYPE?)	
001	11:00	11:20	65.4	83.3	52.3	55.9	62.5	68.8			

COMMENTS:

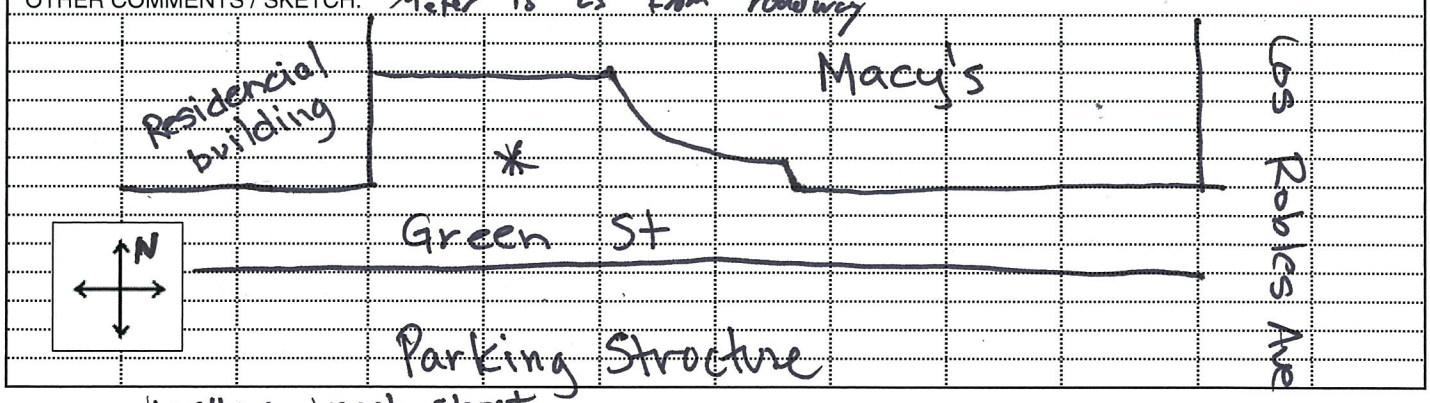
SOURCE INFO AND TRAFFIC COUNTS:
PRIMARY NOISE SOURCE: (TRAFFIC) AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER: _____
ROADWAY TYPE: _____
TRAFFIC COUNT DURATION: 20 -MIN

	SPEED NB / (EB)	SPEED SB / WB	#2 COUNT NB / EB	#2 COUNT SB / WB	SPEED NB / EB	SPEED SB / WB
AUTOS:	209					
MED. TRUCKS:	III					
HVY TRUCKS:	I					
BUSES:						
MOTORCYCLES:	I					

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER SOURCES: (DIST. AIRCRAFT) / RUSTLING LEAVES / DIST. BARKING DOGS / (BIRDS) / DIST. INDUSTRIAL
DIST. CHILDREN PLAYING / DIST. TRAFFIC / DIST. LANDSCAPING ACTIVITIES / OTHER:

DESCRIPTION / SKETCH:
TERRAIN: (HARD) SOFT MIXED FLAT OTHER: _____
PHOTOS: _____
OTHER COMMENTS / SKETCH: Meter is 25' from roadway



11:04 AM trash shoot

FIELD NOISE MEASUREMENT DATA

BonTerra CONSULTING

PROJECT: Paseo Colorado PROJ. # **RMCDON0-J0001.00**

SITE IDENTIFICATION: St 2 - Los Robles OBSERVER(S): Victor Ortiz
START DATE / TIME: 8/16/13 11:30 END DATE / TIME: 8/16/13 11:59
ADDRESS: 400 West Colorado Blvd

METEROLOGICAL CONDITIONS:
TEMP: 88 °F HUMIDITY: _____ %R.H. WIND: **CALM** (**LIGHT**) **MODERATE VARIABLE**
WINDSPEED: 3 MPH DIR: **N NE E SE S** (**SW**) **W NW** **STEADY GUSTY**
SKY: (**SUNNY**) (**CLEAR**) **OVRCST PRTLY CLOUDY FOG RAIN OTHER:**

ACOUSTIC MEASUREMENTS:
INSTRUMENT: Larson Davis 831 TYPE: (1) 2 SERIAL #: 1742
CALIBRATOR: Larson Davis CAL200 SERIAL #: 6674
CALIBRATION CHECK: PRE-TEST 114 dBA SPL POST-TEST _____ dBA SPL WINDSCREEN X

SETTINGS: (**A-WEIGHTED**) (**SLOW**) **FAST FRONTAL** (**RANDOM**) **ANSI OTHER:** _____

REC #	START	END	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	OTHER:	(TYPE?)	
002	11:58	11:58	65.8	83.0	53.2	56.0	62.4	69.1			

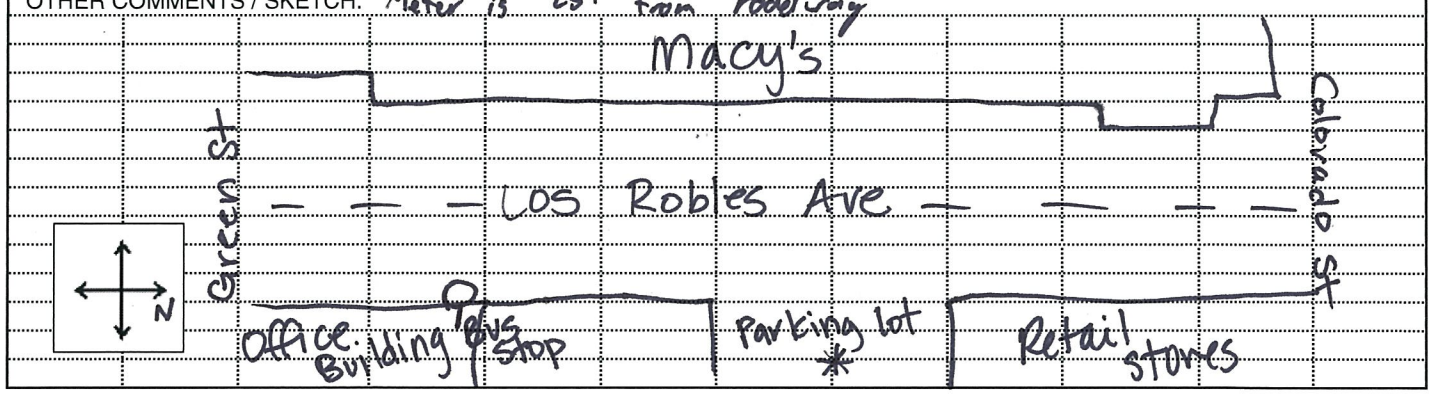
COMMENTS:

SOURCE INFO AND TRAFFIC COUNTS:
PRIMARY NOISE SOURCE: (**TRAFFIC**) **AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER:** _____
ROADWAY TYPE: _____
TRAFFIC COUNT DURATION: 20 -MIN

	#1 COUNT NB / EB	#1 COUNT SB / WB	SPEED NB / EB	SPEED SB / WB	#2 COUNT NB / EB	#2 COUNT SB / WB	SPEED NB / EB	SPEED SB / WB
AUTOS:	191	182						
MED. TRUCKS:								
HVY TRUCKS:		1						
BUSES:	1							
MOTORCYCLES:		1						

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**
OTHER SOURCES: **DIST. AIRCRAFT / RUSTLING LEAVES / (DIST. BARKING DOGS) / BIRDS / DIST. INDUSTRIAL**
DIST. CHILDREN PLAYING / DIST. TRAFFIC / DIST. LANDSCAPING ACTIVITIES / OTHER:

DESCRIPTION / SKETCH:
TERRAIN: **HARD SOFT** (**MIXED**) **FLAT OTHER:** _____
PHOTOS:
OTHER COMMENTS / SKETCH: Meter is 25' from roadway



FIELD NOISE MEASUREMENT DATA

BonTerra CONSULTING

PROJECT: Paseo Colorado PROJ. # **RMCDON0-J0001.00**

SITE IDENTIFICATION: ST 3 Colorado Blvd OBSERVER(S): Victor Ortiz
START DATE / TIME: 8/16/13 12:15 END DATE / TIME: 12:38pm 8/16/13
ADDRESS: 400 West Colorado Blvd

METEROLOGICAL CONDITIONS:
TEMP: 90 °F HUMIDITY: ____ %R.H. WIND: **CALM** (**LIGHT**) **MODERATE VARIABLE**
WINDSPEED: 1.5 MPH DIR: **N NE E SE S SW** (**W**) **NW** **STEADY GUSTY**
SKY: (**SUNNY**) (**CLEAR**) **OVRCST PRTLY CLOUDY FOG RAIN OTHER:**

ACOUSTIC MEASUREMENTS:
INSTRUMENT: Larson Davis 831 TYPE: (1) 2 SERIAL #: 1742
CALIBRATOR: Larson Davis CAL200 SERIAL #: 6674
CALIBRATION CHECK: PRE-TEST 114 dBA SPL POST-TEST ____ dBA SPL WINDSCREEN X

SETTINGS: (**A-WEIGHTED**) (**SLOW**) **FAST FRONTAL** (**RANDOM**) **ANSI OTHER:** ____

REC #	START	END	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	OTHER:	(TYPE?)	
003	12:15	12:35	69.2	82.4	58.6	63.1	66.9	71.8			

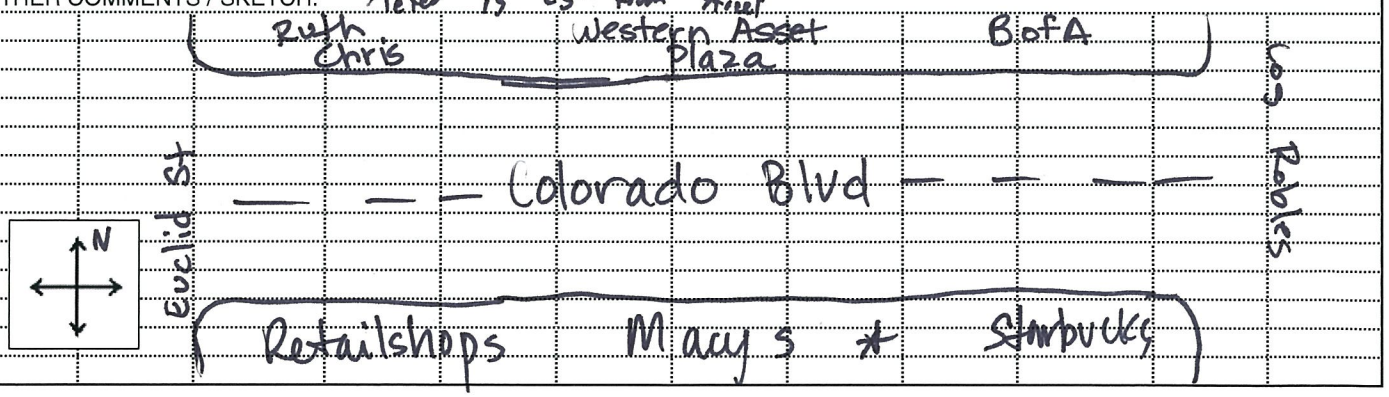
COMMENTS:

SOURCE INFO AND TRAFFIC COUNTS:
PRIMARY NOISE SOURCE: (**TRAFFIC**) **AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER:** ____
ROADWAY TYPE: ____
TRAFFIC COUNT DURATION: 20 -MIN

	SPEED		#2 COUNT		SPEED	
	NB / (EB)	SB / (WB)	NB / EB	SB / WB	NB / EB	SB / WB	NB / EB	SB / WB
AUTOS:	258	308						
MED. TRUCKS:	////	///						
HVY TRUCKS:	///	//						
BUSES:	///	////						
MOTORCYCLES:	/							

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**
OTHER SOURCES: **DIST. AIRCRAFT / RUSTLING LEAVES / DIST. BARKING DOGS / BIRDS / DIST. INDUSTRIAL**
DIST. CHILDREN PLAYING / DIST. TRAFFIC / DIST. LANDSCAPING ACTIVITIES / OTHER:

DESCRIPTION / SKETCH:
TERRAIN: (**HARD**) **SOFT MIXED FLAT OTHER:** ____
PHOTOS: ____
OTHER COMMENTS / SKETCH: Meter is 25' from Street



Summary			
Filename	831_Data.001		
Serial Number	1742		
Model	Model 831		
Firmware Version	2.000		
User			
Location	ST-1		
Job Description	Paseo Colorado		
Note			
Measurement Description			
Start	2013/08/16 11:00:06		
Stop	2013/08/16 11:20:09		
Duration	0:20:00.8		
Run Time	0:20:00.8		
Pause	0:00:00.0		
Overall Settings			
RMS Weight	A Weighting		
Peak Weight	A Weighting		
Detector	Slow		
Preamp	PRM831		
Integration Method	Linear		
Gain	0.0 dB		
Overload	144.0 dB		
	A	**C**	
Under Range Peak	**76.4**	73.4 dB	
Under Range Limit	**26.3**	26.6 dB	
Noise Floor	17.2	17.5 dB	
Results			
LAeq	65.4 dB		
LApeak (max)	2013/08/16 11:03:58	103.6	
LASmax	2013/08/16 11:03:58	83.3	
LASmin	2013/08/16 11:00:29	52.3	
Statistics			
LAS5.00	70.8 dB		
LAS10.00	68.8 dB		
LAS33.30	64.8 dB		
LAS50.00	62.5 dB		
LAS66.60	60.0 dB		
LAS90.00	55.9 dB		

Record #	Date	Time	Duration	Run Time	LAeq	LASmin	Time	LASmax	Time
1	2013/08/16	11:00:06	00:00:53.3	00:00:53.3	62.3	52.3	11:00:29	69.7	11:00:18
2	2013/08/16	11:01:00	00:01:00.0	00:01:00.0	64.3	52.6	11:01:00	70.8	11:01:18
3	2013/08/16	11:02:00	00:01:00.0	00:01:00.0	64.8	54.0	11:02:02	70.2	11:02:37
4	2013/08/16	11:03:00	00:01:00.0	00:01:00.0	68.6	57.1	11:03:09	83.3	11:03:58
5	2013/08/16	11:04:00	00:01:00.0	00:01:00.0	65.2	54.9	11:04:44	76.7	11:04:00
6	2013/08/16	11:05:00	00:01:00.0	00:01:00.0	67.3	53.6	11:05:54	75.6	11:05:16
7	2013/08/16	11:06:00	00:01:00.0	00:01:00.0	66.5	53.9	11:06:00	73.9	11:06:39
8	2013/08/16	11:07:00	00:01:00.0	00:01:00.0	65.5	55.5	11:07:21	71.3	11:07:47
9	2013/08/16	11:08:00	00:01:00.0	00:01:00.0	63.7	53.8	11:08:21	72.2	11:08:52
10	2013/08/16	11:09:00	00:01:00.0	00:01:00.0	64.1	56.0	11:09:46	67.2	11:09:25
11	2013/08/16	11:10:01	00:01:00.0	00:01:00.0	61.8	56.3	11:11:00	66.8	11:10:06
12	2013/08/16	11:11:01	00:01:00.0	00:01:00.0	63.9	54.2	11:11:29	71.4	11:11:40
13	2013/08/16	11:12:01	00:01:00.0	00:01:00.0	64.7	57.0	11:12:38	72.1	11:12:48
14	2013/08/16	11:13:01	00:01:00.0	00:01:00.0	65.4	52.7	11:13:51	73.0	11:13:27
15	2013/08/16	11:14:01	00:01:00.0	00:01:00.0	65.9	54.8	11:14:01	72.2	11:14:57
16	2013/08/16	11:15:01	00:01:00.0	00:01:00.0	67.5	54.4	11:15:13	76.5	11:15:51
17	2013/08/16	11:16:01	00:01:00.0	00:01:00.0	67.0	54.5	11:16:31	74.7	11:16:03
18	2013/08/16	11:17:02	00:01:00.0	00:01:00.0	60.4	54.0	11:17:10	68.1	11:17:38
19	2013/08/16	11:18:02	00:01:00.0	00:01:00.0	63.9	55.6	11:18:03	68.5	11:18:55
20	2013/08/16	11:19:02	00:01:00.0	00:01:00.0	67.3	55.5	11:19:32	75.6	11:19:15
21	2013/08/16	11:20:02	00:00:07.5	00:00:07.5	56.2	55.7	11:20:08	60.7	11:20:02

Summary			
Filename	831_Data.002		
Serial Number	1742		
Model	Model 831		
Firmware Version	2.000		
User			
Location	ST-2		
Job Description	Paseo Colorado		
Note			
Measurement Description			
Start	2013/08/16 11:36:56		
Stop	2013/08/16 11:57:00		
Duration	0:20:00.7		
Run Time	0:20:00.7		
Pause	0:00:00.0		
Overall Settings			
RMS Weight	A Weighting		
Peak Weight	A Weighting		
Detector	Slow		
Preamp	PRM831		
Integration Method	Linear		
Gain	0.0 dB		
Overload	144.1 dB		
	A	**C**	
Under Range Peak	**76.6**	73.6 dB	
Under Range Limit	**26.3**	26.7 dB	
Noise Floor	17.2	17.5 dB	
Results			
LAeq	65.8 dB		
LApeak (max)	2013/08/16 11:49:11	97.4	
LASmax	2013/08/16 11:42:36	83.0	
LASmin	2013/08/16 11:53:03	53.2	
Statistics			
LAS5.00	70.4 dB		
LAS10.00	69.1 dB		
LAS33.30	65.1 dB		
LAS50.00	62.4 dB		
LAS66.60	60.0 dB		
LAS90.00	56.0 dB		

Record #	Date	Time	Duration	Run Time	LAeq	LASmin	Time	LASmax	Time
1	2013/08/16	11:36:56	00:00:04.0	00:00:04.0	58.8	59.3	11:36:58	64.1	11:36:56
2	2013/08/16	11:37:00	00:01:00.0	00:01:00.0	63.3	53.5	11:37:11	70.6	11:37:24
3	2013/08/16	11:38:00	00:01:00.0	00:01:00.0	67.6	54.9	11:39:00	77.1	11:38:32
4	2013/08/16	11:39:00	00:01:00.0	00:01:00.0	65.5	54.2	11:39:01	73.4	11:39:46
5	2013/08/16	11:40:00	00:01:00.0	00:01:00.0	64.6	54.0	11:40:21	74.4	11:40:57
6	2013/08/16	11:41:00	00:01:00.0	00:01:00.0	64.5	54.2	11:41:47	71.5	11:41:00
7	2013/08/16	11:42:00	00:01:00.0	00:01:00.0	71.2	59.4	11:43:00	83.0	11:42:36
8	2013/08/16	11:43:00	00:01:00.0	00:01:00.0	64.7	53.3	11:43:37	70.0	11:43:12
9	2013/08/16	11:44:00	00:01:00.0	00:01:00.0	66.3	54.1	11:44:56	71.0	11:44:37
10	2013/08/16	11:45:01	00:01:00.0	00:01:00.0	64.5	53.5	11:45:22	71.4	11:45:30
11	2013/08/16	11:46:01	00:01:00.0	00:01:00.0	64.5	56.6	11:46:16	69.6	11:46:57
12	2013/08/16	11:47:01	00:01:00.0	00:01:00.0	61.9	53.4	11:47:42	67.5	11:47:25
13	2013/08/16	11:48:01	00:01:00.0	00:01:00.0	62.7	55.4	11:48:46	69.8	11:48:16
14	2013/08/16	11:49:01	00:01:00.0	00:01:00.0	65.4	54.1	11:49:53	74.7	11:49:11
15	2013/08/16	11:50:02	00:01:00.0	00:01:00.0	64.5	55.4	11:50:42	72.3	11:50:16
16	2013/08/16	11:51:02	00:01:00.0	00:01:00.0	66.5	54.7	11:51:50	75.9	11:51:33
17	2013/08/16	11:52:02	00:01:00.0	00:01:00.0	65.3	53.3	11:53:02	71.1	11:52:35
18	2013/08/16	11:53:02	00:01:00.0	00:01:00.0	68.1	53.2	11:53:03	79.7	11:53:21
19	2013/08/16	11:54:02	00:01:00.0	00:01:00.0	66.4	55.7	11:54:21	75.6	11:54:59
20	2013/08/16	11:55:03	00:01:00.0	00:01:00.0	63.6	54.4	11:55:42	69.3	11:55:03
21	2013/08/16	11:56:03	00:00:56.7	00:00:56.7	63.3	53.7	11:56:31	68.6	11:56:10

Summary			
Filename	831_Data.003		
Serial Number	1742		
Model	Model 831		
Firmware Version	2.000		
User			
Location	ST-3		
Job Description	Paseo Colorado		
Note			
Measurement Description			
Start	2013/08/16 12:15:09		
Stop	2013/08/16 12:35:13		
Duration	0:20:00.9		
Run Time	0:20:00.9		
Pause	0:00:00.0		
Overall Settings			
RMS Weight	A Weighting		
Peak Weight	A Weighting		
Detector	Slow		
Preamp	PRM831		
Integration Method	Linear		
Gain	0.0 dB		
Overload	143.9 dB		
	A	**C**	
Under Range Peak	**76.4**	73.4 dB	
Under Range Limit	**26.3**	26.6 dB	
Noise Floor	17.2	17.5 dB	
Results			
LAeq	69.2 dB		
LApeak (max)	2013/08/16 12:25:34	95.9	
LASmax	2013/08/16 12:23:34	82.4	
LASmin	2013/08/16 12:16:52	58.6	
Statistics			
LAS5.00	73.9 dB		
LAS10.00	71.8 dB		
LAS33.30	68.2 dB		
LAS50.00	66.9 dB		
LAS66.60	65.5 dB		
LAS90.00	63.1 dB		

Record #	Date	Time	Duration	Run Time	LAeq	LASmin	Time	LASmax	Time
1	2013/08/16	12:15:09	00:00:50.7	00:00:50.7	66.5	61.4	12:15:13	70.2	12:15:23
2	2013/08/16	12:16:00	00:01:00.0	00:01:00.0	64.7	58.6	12:16:52	72.4	12:16:34
3	2013/08/16	12:17:00	00:01:00.0	00:01:00.0	68.8	63.6	12:17:03	74.1	12:17:38
4	2013/08/16	12:18:00	00:01:00.0	00:01:00.0	71.7	63.1	12:18:42	81.9	12:18:12
5	2013/08/16	12:19:00	00:01:00.0	00:01:00.0	65.3	60.4	12:19:47	69.0	12:19:20
6	2013/08/16	12:20:01	00:01:00.0	00:01:00.0	71.5	61.4	12:20:54	80.3	12:20:25
7	2013/08/16	12:21:01	00:01:00.0	00:01:00.0	65.9	61.7	12:21:03	70.9	12:21:06
8	2013/08/16	12:22:01	00:01:00.0	00:01:00.0	68.4	61.6	12:22:14	72.5	12:22:28
9	2013/08/16	12:23:01	00:01:00.0	00:01:00.0	73.3	65.8	12:23:11	82.4	12:23:34
10	2013/08/16	12:24:01	00:01:00.0	00:01:00.0	71.0	67.1	12:24:48	76.2	12:24:10
11	2013/08/16	12:25:01	00:01:00.0	00:01:00.0	70.1	64.4	12:25:23	78.0	12:25:52
12	2013/08/16	12:26:01	00:01:00.0	00:01:00.0	66.5	61.5	12:26:47	70.0	12:26:01
13	2013/08/16	12:27:01	00:01:00.0	00:01:00.0	70.5	64.5	12:27:09	79.2	12:27:41
14	2013/08/16	12:28:01	00:01:00.0	00:01:00.0	68.5	61.0	12:28:59	74.0	12:28:30
15	2013/08/16	12:29:01	00:01:00.0	00:01:00.0	70.4	59.7	12:29:12	78.6	12:29:49
16	2013/08/16	12:30:01	00:01:00.0	00:01:00.0	69.5	64.2	12:30:03	72.4	12:30:51
17	2013/08/16	12:31:02	00:01:00.0	00:01:00.0	69.6	66.4	12:31:32	74.7	12:32:01
18	2013/08/16	12:32:02	00:01:00.0	00:01:00.0	66.9	61.4	12:32:45	74.6	12:32:02
19	2013/08/16	12:33:02	00:01:00.0	00:01:00.0	66.6	59.6	12:33:52	72.6	12:33:10
20	2013/08/16	12:34:02	00:01:00.0	00:01:00.0	65.5	62.6	12:34:59	69.4	12:34:07
21	2013/08/16	12:35:02	00:00:10.2	00:00:10.2	64.8	62.9	12:35:02	65.7	12:35:09