Appendix H
Noise Analysis

Methodology

656 South San Vicente Medical Office Project

1. Noise and Vibration Methodology

1. Introduction

ESA conducted a comprehensive noise and vibration impact analysis and report for the 656 South San Vicente Medical Office Project (Project). Noise and vibration associated with construction and operation of the Project were quantified. This technical report describes the methodology used to measure the existing site's ambient noise levels and estimate noise and vibration from construction and operations of the Project.

2. Noise and Vibration Methodology

This section describes the methodology used to measure the existing site's noise environment and calculate noise and vibration resulting from Project construction and operational activities and to evaluate the associated impacts. Construction activities would generate noise from equipment usage and truck hauling. Long-term operational activities would generate emissions through vehicle trips (e.g. tenants, employees, visitors, waste disposal, deliveries), stationary sources (e.g. generators, heating, ventilation, and cooling) and outdoor areas.

a) Noise

(1) Noise Attenuation

When noise propagates over a distance, the noise level reduces with distance depending on the type of noise source and the propagation path. Noise from a localized source (i.e., point source) propagates uniformly outward in a spherical pattern, referred to as "spherical spreading." Noise levels generated by stationary point sources, including stationary mobile sources, such as idling vehicles, are attenuated at a rate between 6 dBA for acoustically "hard" sites and 7.5 dBA for "soft" sites for each doubling of distance from the reference measurement, as their energy is continuously spread out over a spherical surface (e.g., for hard surfaces, 80 dBA at 50 feet attenuates to 74 dBA at 100 feet, 68 dBA at 200 feet, etc.). Hard sites are those with a reflective surface between the source and the receiver, such as asphalt or concrete surfaces or smooth bodies of water. No excess ground attenuation is assumed for hard sites and the reduction in noise levels with distance (drop-off rate) is simply the geometric spreading of the noise from the source. Soft sites have an absorptive ground surface, such as soft dirt, grass, or scattered bushes and trees, which in addition to geometric spreading, provides an excess ground attenuation value of 1.5 dBA (per doubling distance).[1]

Roadways and highways consist of several localized noise sources on a defined path and, hence, are treated as “line” sources, which approximate the effect of several point sources. Noise from a line source propagates over a cylindrical surface, often referred to as “cylindrical spreading.” Noise from line sources (e.g., traffic noise from vehicles) are attenuated at a rate between 3 dBA for hard sites and 4.5 dBA for soft sites for each doubling of distance from the reference measurement.[2] Therefore, noise due to a line source is attenuated less with distance than that of a point source with increased distance.

Additionally, receptors located downwind from a noise source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Atmospheric temperature inversion (i.e., increasing temperature with elevation) can increase sound levels at long distances (e.g., more than 500 feet). Other factors, such as air temperature, humidity, and turbulence, can also have an effect on noise levels.[3]

(2) Foundations of Vibration

Vibration can be interpreted as energy transmitted in waves through the ground or man-made structures, which generally dissipate with distance from the vibration source. Because energy is lost during the transfer of energy from one particle to another, vibration becomes less perceptible with increasing distance from the source.

As described in the Federal Transit Administration’s (FTA) Transit Noise and Vibration Impact Assessment, common sources of groundborne vibration are trains, heavy trucks traveling on rough roads, and construction activities, such as blasting, pile-driving, and operation of heavy earth-moving equipment.[4]

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal in inches per second (in/sec), and is most frequently used to describe vibration impacts to buildings. The root mean square (RMS) amplitude is defined as the average of the squared amplitude of the signal and is most frequently used to describe the effect of vibration on the human body. Decibel notation (VdB) is commonly used to measure RMS. The relationship of PPV to RMS velocity is expressed in terms of the “crest factor,” defined as the ratio of the PPV amplitude to the RMS amplitude. PPV is typically a factor of 1.7 to 6 times greater than RMS vibration velocity.[5] The decibel notation VdB acts to compress the range of numbers required to describe vibration. Typically, groundborne

1 Caltrans, TeNS, September 2013, Section 2.1.4.2.
2 Caltrans, TeNS, September 2013, Section 2.1.4.1.
3 Caltrans, TeNS, September 2013, Section 2.1.4.3.
4 Caltrans, Transportation and Construction Vibration Guidance Manual, September 2013, p. 1.
5 FTA, Transit Noise and Vibration Impact Assessment Manual, 2018, Section 5.1.

vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Sensitive receptors for vibration include buildings where vibration would interfere with operations within the building or cause damage (especially historic buildings and older non-engineered timber and masonry structures), locations where people sleep, and locations with vibration sensitive equipment.[6]

The effects of groundborne vibration include movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, the vibration can cause damage to buildings. Building damage is not a factor for most projects, with the occasional exception of blasting and pile-driving during construction or when construction is immediately adjacent to a fragile historic resource. Annoyance from vibration often occurs when the vibration levels exceed the threshold of perception by only a small margin. A vibration level that causes annoyance will be well below the damage threshold for normal buildings.

(3) Existing Noise and Vibration Levels

(a) Noise-Sensitive Receptor Locations

Some land uses are considered more sensitive to noise than others due to the types of activities typically involved at the receptor location, and the effect that noise can have on those activities and the persons engaged in them. The City of Los Angeles CEQA Thresholds Guide states that residences, schools, motels and hotels, libraries, religious institutions, hospitals, nursing homes, and parks are generally more sensitive to noise than commercial and industrial land uses.[7] The Noise Element of the City of Beverly Hills General Plan defines potentially noise-sensitive land uses in the City of Beverly Hills as residences (including residences for the elderly), schools, churches, and libraries; commercial uses are not defined as noise sensitive receptors.

Existing noise-sensitive uses, or receptors, within 500 feet of the Project Site include the following:

- N1: Multi-family residential uses approximately 20 feet to the east fronting the east side of South Sweetzer Avenue at Orange Street in the City of Los Angeles;
- N2: Multi-family residential uses approximately 50 feet to the north across Orange Street in the City of Los Angeles;
- N3: Multi-family residential uses approximately 185 feet to the northeast fronting the south side of Orange Street at South Sweetzer Avenue in the City of Los Angeles;
- N4: Multi-family residential uses approximately 60 feet to the east fronting the east side of South Sweetzer Avenue at Orange Street in the City of Los Angeles;
- N5: Nursing home approximately 410 feet to the northeast in the City of Los Angeles

[6] FTA, Transit Noise and Vibration Impact Assessment Manual, 2018, Sections 6.1, 6.2, and 6.3.
[7] City of Los Angeles, L.A. CEQA Thresholds Guide, page I.1-3, 2006.

- N6: Multi-family residential uses approximately 280 feet to the south along Schumacher Drive in the City of Los Angeles; and
- N7: Multi-family residential uses approximately 300 feet to the southwest along South Tower Drive in the City of Beverly Hills

(b) Vibration-Sensitive Receptor Locations

Typically, ground-borne vibration generated by man-made activities (i.e., rail and roadway traffic, operation of mechanical equipment and typical construction equipment) diminishes rapidly with distance from the vibration source. Energy is lost during the transfer of energy from one particle to another and as a result, vibration becomes less perceptible with increasing distance from the source. Typical sources of ground-borne vibration are construction activities (e.g., blasting, pile driving, and operating heavy-duty earthmoving equipment), steel-wheeled trains, and occasional traffic on rough roads. Issues with ground-borne vibration and noise from these sources are usually localized to areas within approximately 100 feet for highly vibration-sensitive buildings (e.g., historic buildings, hospitals with vibration sensitive equipment, Category 1) and 50 feet for residential uses (Category 2) from the vibration source.[8] Therefore, structures, with respect to potential structural damage, and people, with respect to human annoyance, in proximity (adjacent) to the Project Site are considered vibration sensitive.

With respect to human annoyance, vibration sensitive land uses include buildings where use of vibration-sensitive equipment is used (e.g., hospitals, research, and manufacturing), residential land uses and buildings where people normally sleep, schools, churches, and doctor’s offices. Industrial or commercial (including office) land uses are not considered vibration-sensitive.[9] Therefore, all buildings and structures adjacent to the Project Site have been considered vibration-sensitive for potential structural damage, while all adjacent inhabited buildings, except for industrial and commercial uses, have been considered for human annoyance.

(c) Ambient Noise Levels

The predominant existing noise source near the Project Site is vehicle traffic noise from South San Vicente Boulevard to the west, Wilshire Boulevard to the south, Sweetzer Avenue to the east, and Orange Street to the north. Other noise sources include general residential and commercial activities associated with refuse collection and truck loading and unloading, stationary mechanical equipment (e.g., generators, fans, condenser units, etc.).

To establish a conservative baseline for ambient noise levels, short-term (15-minute duration) daytime ambient noise measurements were conducted at six locations corresponding to noise-sensitive receptors in the vicinity of the Project Site on February 19, 2020 from approximately 7:00 a.m. to 9:00 a.m. One noise measurement location (see “L” designations in Figure IV.G-3 of the DEIR) represents noise levels at multiple noise sensitive receptor locations (see “N” designations in Figure IV.G-3 of the DEIR). The existing ambient noise environment at all measurement locations currently exceed the City’s presumed daytime ambient noise standard of 50 dBA (L_{eq}) for residential use. Therefore, consistent with LAMC procedures, the measured noise levels are used as the baseline conditions for the purposes of determining Project impacts. The measurement

8 FTA, Transit Noise and Vibration Impact Assessment Manual, September 2018, Table 6-8.
9 FTA, Transit Noise and Vibration Impact Assessment Manual, September 2018, Table 6-1.

locations representing the existing noise environment are shown in Figure IV.G-3 of the DEIR.

The ambient noise measurements were conducted using the Larson-Davis 820 Precision Integrated Sound Level Meter ("SLM"). The Larson-Davis 820 SLM is a Type 1 standard instrument as defined in the American National Standard Institute S1.4. All instruments were calibrated and operated according to the applicable manufacturer specification.

A summary of the noise measurement data is provided in **Table 1,** *Summary of Ambient Noise Measurements*. Noise levels ranged from 55.9 dBA L_{eq} to 66.8 dBA L_{eq}.

TABLE 1
SUMMARY OF AMBIENT NOISE MEASUREMENTS AT NOISE SENSITIVE RECEPTORS

Receptor Location	Approximate Distance from Project Site to Property Line, Feet	Measured Daytime Ambient Noise Levels,[a] dBA L_{eq}
L1. Multi-family residential uses along Orange Street at South Sweetzer Avenue	20	61.1
L2. Multi-family residential uses along Orange Street between South San Vicente Boulevard and South Sweetzer Avenue	50	59.2
L3. Multi-family residential uses along Orange Street at South Sweetzer Avenue	185	59.0
L4. Multi-family residential uses along South Sweetzer Avenue at Orange Street	60	55.9
L5. Nursing home approximately 400 feet to the northeast in the City of Los Angeles	410	59.2 [b]
L6. Multi-family residential uses along Schumacher Drive	280	66.8
L7. Multi-family residential uses along South Tower Drive	300	62.7

(d) Existing Roadway Noise Levels

In July 2019, the City adopted new Transportation Assessment Guidelines (TAG), which changed the focus of traffic analysis pursuant to CEQA from being primarily based on assessment of intersection levels of service (LOS) to one based primarily on vehicle miles traveled (VMT). In February 2020, the Project's Memorandum of Understanding (MOU) for the Project's Traffic Assessment was executed with LADOT.[10] The intersections

10 Gibson Transportation Consulting, Inc., Transportation Assessment for the 656 South San Vicente Medical Office Project, April 2020. Provided in Appendix J-1 of this Draft EIR.

identified in the Project's MOU with LADOT, still serve as the basis for the mobile source noise analysis provided in this section of the Draft EIR.

Existing roadway noise levels were calculated (in CNEL) for roadway segments located within the study area, based on traffic volume turning movement data at intersections identified for traffic impact analysis by the City.[11] Turning movements at each studied intersection were used to determine traffic volumes along 23 roadway segments within the Project vicinity. These roadways, when compared to roadways located farther away from the Project Site, would experience the greatest percentage increase in traffic generated by the Project (as distances are increased from the Project Site, traffic is spread out over a greater geographic area and its effects are reduced).

Existing roadway CNEL noise levels were calculated using the FHWA's Highway Traffic Noise Model (FHWA-TNM)[12] and traffic volumes at the study intersections reported in the Project's Transportation Assessment.[13] FHWA-TNM calculates the 24-hour average CNEL noise levels along roadway segments based on the traffic volumes, average speeds, and site environmental conditions. The traffic noise levels along these roadway segments are presented in **Table 2,** *Modeled Existing Traffic Noise Levels*.

As shown in Table 2, the ambient noise environment in the Project Site vicinity can be characterized by 24-hour CNEL levels attributable to existing traffic volumes on local roadway segments, at a reference distance of 30 feet perpendicular in each direction from the roadway centerline towards receptor locations. The calculated CNEL from existing traffic volumes on the analyzed roadway segments ranged from 51.5 to 72.3 dBA for residential, educational, and commercial areas.

TABLE 2
MODELED EXISTING TRAFFIC NOISE LEVELS

Roadway Segment	Existing Land Uses Located Along Roadway Segment	CNEL (dBA)	Land Use Compatibility (Levels Defined at the Bottom of the Table) [a]
6th Street			
Between San Vicente Boulevard and Sweetzer Avenue	Residential	64.3	A
Between Sweetzer Avenue and La Jolla Avenue	Residential	64.0	A
East of La Jolla Avenue	Residential	63.2	A

11 Gibson Transportation Consulting, Inc., Transportation Assessment for the 656 South San Vicente Medical Office Project, April 2020. The MOU is provided in Appendix J-1 of this Draft EIR.

12 The traffic noise model which was developed based on calculation methodologies provided in the Caltrans TeNS document and traffic data provided in the Project's Transportation Assessment provided in Appendix J of this Draft EIR. This methodology, considered an industry standard, allows for the definition of roadway configurations, barrier information (if any), and receiver locations.

13 Gibson Transportation Consulting, Inc., Transportation Assessment for the 656 South San Vicente Medical Office Project, April 2020. The MOU is provided in Appendix J-1 of this Draft EIR.

Roadway Segment	Existing Land Uses Located Along Roadway Segment	CNEL (dBA)	Land Use Compatibility (Levels Defined at the Bottom of the Table) [a]
La Cienega Boulevard			
North of Wilshire Boulevard	Commercial	72.0	C
South of Wilshire Boulevard	Commercial	71.9	C
La Jolla Avenue			
Between 6th Street and Wilshire Boulevard	Residential/Commercial	60.3	A
North of 6th Street	Residential	60.3	A
South of Wilshire Boulevard	Residential/Commercial	51.5	A
McCarthy Vista/Camarrillo Drive			
South of San Vicente Boulevard	Residential/Commercial /-Educational	66.0	C
North of San Vicente Boulevard	Residential	66.5	C
Orange Street			
Between San Vicente Boulevard Frontage Road and Sweetzer Avenue	Residential/Commercial	53.9	A
San Vicente Boulevard			
Between Wilshire Boulevard and McCarthy Vista/Carrillo Drive	Residential/Commercial	71.6	C
East of McCarthy Vista/Carrillo Drive	Residential	69.9	C
Between 6th Street and Orange Street	Commercial	69.6	C
North of 6th Street	Commercial	72.3	C
San Vicente Boulevard Frontage Road			
Between Orange Street and Wilshire Boulevard	Commercial	69.0	C
Sweetzer Avenue			
Between 6th Street and Orange Street	Residential	55.5	A
Between Orange Street and Wilshire Boulevard	Residential/Commercial	53.6	A
North of 6th Street	Residential	57.5	A
Wilshire Boulevard			
Between La Cienega Boulevard and San Vicente Boulevard	Commercial	71.4	C
Between San Vicente Boulevard and La Jolla Avenue	Commercial	70.6	C
East of La Jolla Avenue	Commercial	70.3	C
West of La Cienega Boulevard	Commercial	71.4	C

Roadway Segment	Existing Land Uses Located Along Roadway Segment	CNEL (dBA)	Land Use Compatibility (Levels Defined at the Bottom of the Table) [a]

[a] Refer to Table IV.G-3. As discussed therein:

A = Normally Acceptable: Specified land use is satisfactory, based upon the assumption buildings involved are conventional construction, without any special noise insulation.

C = Conditionally Acceptable: New construction or development only after a detailed analysis of noise mitigation is made and needed noise insulation features are included in project design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will suffice.

N – Normally Unacceptable: New construction or development generally should be discouraged. A detailed analysis of the noise reduction requirements must be made and noise insulation features included in the design of a project.

U – Clearly Unacceptable: New construction or development should generally not be undertaken.

SOURCE: ESA, 2020.

(4) On-Site Construction

On-site construction noise impacts were evaluated by determining the noise levels generated by the different types of construction activity anticipated, calculating the construction-related noise level generated by the mix of equipment assumed for all construction activities at nearby sensitive receptor locations, and comparing these construction-related noise levels to existing ambient noise levels (i.e., noise levels without construction noise) at those receptors. More specifically, the following steps were undertaken to assess construction-period noise impacts.

1. Ambient noise levels at surrounding sensitive receptor locations were determined based on field measurements (see Table 1, above). Ambient noise measurements were conducted using the Larson-Davis 820 Precision Integrated Sound Level Meter (sound meter). The Larson-Davis 820 sound meter is a Type 1 standard instrument as defined in the American National Standard Institute S1.4. All instruments were calibrated and operated according to the applicable manufacturer specification. The microphone was placed at a height of 5 feet above the local grade.
2. Typical noise levels for each type of construction equipment expected were obtained from the FHWA Roadway Construction Noise Model (RCNM).
3. Distances between construction site locations (noise sources) and surrounding off-site noise-sensitive receptors were measured using Project architectural drawings, site plans, and Google Earth.
4. The construction noise level was then calculated, in terms of hourly L_{eq}, for sensitive receptor locations based on the standard point-source noise-distance attenuation factor of 6 dBA L_{eq} for each doubling of distance over a hard surface.
5. Construction noise levels were then compared to the construction noise significance threshold discussed below.

Project construction includes the following nine construction stages: (1) demolition, (2) site preparation (3) grading/excavation, (4) drainage/ utilities/ trenching, (5) foundation concrete pour, (6) building construction, (8) paving, and (9) architectural coating. According to the phasing schedule provided by the Project construction team, the following overlaps in stages would occur: (a) building construction and foundation concrete pour, and (b) building construction, paving, and architectural coating. Since construction of the Project as a whole would last more than 10 days, based on the criteria provided in the 2006 L.A. CEQA Thresholds Guide, the construction noise significance threshold used in this analysis is an increase in the ambient exterior noise level of 5 dBA L_{eq} or more at a noise-sensitive use.

It should also be noted that the 2006 L.A. CEQA Thresholds Guide contains screening criteria, including (1) whether construction activities occur within 500 feet of a noise sensitive use; and (2) whether construction occurs between the hours of 9:00 P.M. and 7:00 A.M. Monday through Friday, before 8:00 A.M. or after 6:00 P.M. on Saturday, or anytime on Sunday. A "no" response to these questions indicates that construction would not occur between these hours and there would normally be no significant construction noise impacts from the project. The Project would occur within 500 feet of a noise sensitive use and would potentially include construction activity between the hours of 9:00 P.M. and 7:00 A.M. Monday through Friday, before 8:00 A.M. and/or after 6:00 P.M. on Saturday, and/or potentially on Sunday.

(5) Off-Site Roadway Noise (Construction and Operation)

Roadway noise impacts were evaluated using the FHWA Traffic Noise Model (TNM) and the Caltrans TeNS method based on the roadway traffic volume data provided in the Traffic Study prepared for the Project.[14] This method represents a noise prediction model that takes into account traffic volumes at the study intersections analyzed in the Transportation Impact Analysis prepared for the Project. This method, considered an industry standard, allows for the definition of roadway configurations, barrier information (if any), and receiver locations. Roadway noise attributable to Project development was calculated and compared to baseline noise levels that would occur under the "Without Project" condition.

Since construction activities would last more than 10 days for all phases, the construction noise significance threshold used in this analysis is an increase in the ambient exterior noise level of 5 dBA L_{eq} or more at a noise-sensitive use.

For operations, the operational noise significance threshold used in this analysis is whether the project causes the ambient noise level measured at the property line of affected uses to increase by 3 dBA in CNEL to or within the "normally unacceptable" or "clearly unacceptable" category; or any 5 dBA or greater noise increase.

[14] Gibson Transportation Consulting, Inc., Transportation Assessment for the 656 South San Vicente Medical Office Project, April 2020. Provided in Appendix J-1 of this Draft EIR.

(6) On-Site Stationary Noise (Operation)

Stationary point-source noise levels were evaluated by identifying the noise levels generated by outdoor stationary noise sources such as rooftop mechanical equipment, parking structure automobile operations, and loading/refuse collection area activity, calculating the hourly L_{eq} noise level from each noise source at sensitive receiver property lines, and comparing such noise levels to existing ambient noise levels. More specifically, the following steps were undertaken to calculate outdoor stationary noise impacts:

1. Ambient noise levels at surrounding off-site sensitive receptor locations were determined based on field measurement data (see **Table 1**).
2. Distances between stationary noise sources and surrounding sensitive receptor locations were measured using Project architectural drawings, site plans, and Google Earth.
3. Stationary source noise levels were then calculated for each sensitive receptor location based on the standard point-source noise-distance attenuation factor of 6 dBA for each doubling of distance over a hard surface.
4. Noise level increases were compared to the stationary source noise significance thresholds discussed below.
5. For outdoor mechanical equipment, the maximum allowable noise emissions from any and all outdoor mechanical equipment were specified such that noise levels would not exceed the significance threshold discussed below.
6. Parking related noise levels were estimated utilizing the methodology recommended by the FTA for the general assessment of stationary transit noise sources. Using this methodology, the Project's peak hourly noise level that would be generated by the on-site parking levels was estimated using the following FTA equation for a parking lot:[15]

   $L_{eq}(h) = SEL_{ref} + 10\log(NA/1000) – 35.6$, where

   $L_{eq}(h)$ = hourly L_{eq} noise level at 50 feet

   SEL_{ref} = reference noise level for stationary noise source represented in sound exposure level (SEL) at 50 feet

   N_A = number of automobiles per hour

7. The combined noise levels from each operational noise source were estimated and the combined noise level increases were compared to the significance thresholds discussed below.

For operational stationary noise, the operational stationary noise significance threshold used in this analysis is whether the project causes the ambient noise level measured at

[15] FTA, Section 4.4, Tables 4.13-14, September 2018.

the property line of affected uses to increase by 5 dBA in accordance with Los Angeles Municipal Code (LAMC), Chapter XI, Section 112.02.

(7) Groundborne Vibration (Construction and Operation)

Groundborne vibration impacts were evaluated by identifying potential vibration sources, measuring the distance between vibration sources and surrounding structure locations, and making a determination based on the significance criteria described in the Vibration Impacts section.

The City currently does not have significance criteria to assess vibration impacts during construction. Thus, FTA guidelines set forth in their 2018 Transit Noise and Vibration Assessment are used to evaluate potential impacts related to construction vibration for both potential building damage and human annoyance. The FTA guidelines regarding construction vibration are the most current guidelines and are commonly used in evaluating vibration impacts.

Based on the FTA guidance, groundborne vibration could result in building damage if any of the following were to occur:

- Project construction activities cause groundborne vibration levels to exceed 0.5 in/sec PPV at the nearest offsite reinforced-concrete, steel, or timber building.
- Project construction activities cause groundborne vibration levels to exceed 0.3 in/sec PPV at the nearest offsite engineered concrete and masonry building.
- Project construction activities cause groundborne vibration levels to exceed 0.2 in/sec PPV at the nearest offsite non-engineered timber building.
- Project construction activities cause groundborne vibration levels to exceed 0.12 in/sec PPV at buildings extremely susceptible to vibration damage, such as historic buildings.

Structural impacts from the Project were evaluated based on Caltrans' Transit Noise and Vibration Impact Assessment which provides PPV values for different types of equipment at a distance of 25 feet (See Table 7-4 of the Assessment). The standardized PPV values can then be attenuated based on the measured distance of the vibration sensitive receptor from the Project Site. The standard attenuation formula is as follows:

$$PPV_{equip} = PPV_{ref} \times (25/D)^n$$

Where: PPV_{equip} is the PPV in in/sec of the equipment adjusted for distance

PPV_{ref} is the reference vibration level in in/sec at 25 feet

D is the distance from the equipment to the receiver n is the soil type classification (typically ranging from 1 to 1.5; a factor of 1.5 was used for this analysis)

Based on FTA guidance, construction vibration could be perceived as annoying to humans if any of the following were to occur:

- Project construction activities cause groundborne vibration levels to exceed 72 VdB at off-site sensitive uses, including residential uses.

The FTA guidance further classifies the vibration levels above based on whether the vibration-producing events are frequent, occasional, or infrequent. “Frequent Events” is defined as more than 70 vibration events of the same source per day. “Occasional Events” is defined as between 30 and 70 vibration events of the same source per day. “Infrequent Events” is defined as fewer than 30 vibration events of the same kind per day. The values listed above are applicable to “Frequent Events.” For purposes of conservative analysis, the vibration analysis provided herein for potential human annoyance compares the estimated vibration levels generated during construction and operation of the Project to the 72 VdB significance threshold for off-site residential uses for “Frequent Event.”

Similar to structural impacts, the Project’s human annoyance impacts are calculated using the same methodology from Caltrans’ Transit Noise and Vibration Impact Assessment which provides VdB values for different types of equipment at a distance of 25 feet (See Table 6-3 of the Assessment). The standardized PPV values can then be attenuated based on the measured distance of the vibration sensitive receptor from the Project Site. The standard attenuation formula is as follows:

$VdB_{equip} = \quad VdB_{ref} - 30 \times \log(D/25)$

Where: VdB_{equip} is the noise level in velocity decibels of the equipment adjusted for distance

VdB_{ref} is the reference vibration level in velocity decibels at 25 feet

D is the distance from the equipment to the receiver

656 South San Vicente Medical Office Project

2. Noise and Vibration Worksheets

Noise and Vibration Calculations and Model Outputs

Noise and Vibration Worksheets

Noise Measurements

Summary

File Name on Meter	ST-1
File Name on PC	
Serial Number	0004161
Model	SoundTrack LxT®
Firmware Version	2.402
User	
Location	656 San Vicente
Job Description	
Note	

Measurement

Description	
Start	2020-02-19 07:11:46
Stop	2020-02-19 07:26:46
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre Calibration	2020-02-19 07:08:19
Post Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting			
Peak Weight	A Weighting			
Detector	Slow			
Preamp	PRMLxT1			
Microphone Correction	Off			
Integration Method	Exponential			
Overload	144.7 dB			
	A	**C**	**Z**	
Under Range Peak	**100.7**	97.7	102.7	dB
Under Range Limit	**37.9**	37.5	44.6	dB
Noise Floor	28.7	28.4	35.4	dB

Results

LASeq	55.9 dB	
LASE	85.5 dB	
EAS	39.218 µPa²h	
EAS8	1.255 mPa²h	
EAS40	6.275 mPa²h	
LApeak (max)	2020-02-19 07:19:07	83.9 dB
LASmax	2020-02-19 07:26:26	68.8 dB
LASmin	2020-02-19 07:24:11	45.6 dB
SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	0	0.0 s
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0 s
LCSeq	69.7 dB	
LASeq	55.9 dB	
LCSeq - LASeq	13.7 dB	
LAIeq	57.7 dB	
LAeq	55.9 dB	
LAIeq - LAeq	1.8 dB	

	A		C		Z	
	dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
Leq	55.9					
Ls(max)	68.8	2020/02/19 07:26:26				
Ls(min)	45.6	2020/02/19 07:24:11				
LPeak(max)	83.9	2020/02/19 07:19:07				

Summary

File Name on Meter	ST-2
File Name on PC	SLM_0004161_LxT_Data_135.00.ldbin
Serial Number	0004161
Model	SoundTrack LxT®
Firmware Version	2.402
User	
Location	656 San Vicente
Job Description	
Note	

Measurement

Description	
Start	2020-02-19 08:47:08
Stop	2020-02-19 09:02:08
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre Calibration	2020-02-19 07:08:17
Post Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting			
Peak Weight	A Weighting			
Detector	Slow			
Preamp	PRMLxT1			
Microphone Correction	Off			
Integration Method	Exponential			
Overload	144.7 dB			
	A	**C**	**Z**	
Under Range Peak	**100.7**	97.7	102.7	dB
Under Range Limit	**37.9**	37.5	44.6	dB
Noise Floor	28.7	28.4	35.4	dB

Results

LAseq	59.0 dB	
LASE	88.6 dB	
EAS	79.645 µPa²h	
EAS8	2.549 mPa²h	
EAS40	12.743 mPa²h	
LApeak (max)	2020-02-19 08:47:48	94.6 dB
LASmax	2020-02-19 08:47:48	74.4 dB
LASmin	2020-02-19 08:57:45	46.2 dB
SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	0	0.0 s
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0 s
LCseq	70.2 dB	
LAseq	59.0 dB	
LCseq - LAseq	11.2 dB	
LAIeq	61.0 dB	
LAeq	59.0 dB	
LAIeq - LAeq	1.9 dB	

	A		C		Z	
	dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
Leq	59.0					
Ls(max)	74.4	2020/02/19 8:47:48				
Ls(min)	46.2	2020/02/19 8:57:45				
LPeak(max)	94.6	2020/02/19 8:47:48				

Summary

File Name on Meter	ST-3
File Name on PC	SLM_0004161_LxT_Data_133.00.ldbin
Serial Number	0004161
Model	SoundTrack LxT®
Firmware Version	2.402
User	
Location	656 San Vicente
Job Description	
Note	

Measurement

Description	
Start	2020-02-19 08:01:48
Stop	2020-02-19 08:16:48
Duration	
Run Time	00:00:00.0
Pause	
Pre Calibration	2020-02-19 07:08:17
Post Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting			
Peak Weight	A Weighting			
Detector	Slow			
Preamp	PRMLxT1			
Microphone Correction	Off			
Integration Method	Exponential			
Overload	144.7 dB			
	A	**C**	**Z**	
Under Range Peak	**100.7**	97.7	102.7	dB
Under Range Limit	**37.9**	37.5	44.6	dB
Noise Floor	28.7	28.4	35.4	dB

Results

LASeq	66.8 dB	
LASE	96.3 dB	
EAS	478.014 µPa²h	
EAS8	15.296 mPa²h	
EAS40	76.482 mPa²h	
LApeak (max)	2020-02-19 08:15:20	94.3 dB
LASmax	2020-02-19 08:08:59	75.8 dB
LASmin	2020-02-19 08:13:41	54.4 dB
SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	0	0.0 s
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0 s
LCSeq	75.8 dB	
LASeq	66.8 dB	
LCSeq - LASeq	9.0 dB	
LAIeq	68.0 dB	
LAeq	66.8 dB	
LAIeq - LAeq	1.2 dB	

	A		**C**		**Z**	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	66.8					
Ls(max)	75.8	2020/02/19 8:08:59				
Ls(min)	54.4	2020/02/19 8:13:41				
LPeak(max)	94.3	2020/02/19 8:15:20				

Summary

File Name on Meter	ST-4
File Name on PC	SLM_0004161_LxT_Data_134.00.ldbin
Serial Number	0004161
Model	SoundTrack LxT®
Firmware Version	2.402
User	
Location	656 San Vicente
Job Description	
Note	

Measurement

Description	
Start	2020-02-19 08:19:20
Stop	2020-02-19 08:34:20
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	12:008:00 AM
Pre Calibration	2020-02-19 07:08:17
Post Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting			
Peak Weight	A Weighting			
Detector	Slow			
Preamp	PRMLxT1			
Microphone Correction	Off			
Integration Method	Exponential			
Overload	144.7 dB			
	A	**C**	**Z**	
Under Range Peak	**100.7**	97.7	102.7	dB
Under Range Limit	**37.9**	37.5	44.6	dB
Noise Floor	28.7	28.4	35.4	dB

Results

LASeq	62.7 dB	
LASE	92.2 dB	
EAS	185.149 µPa²h	
EAS8	5.925 mPa²h	
EAS40	29.624 mPa²h	
LApeak (max)	2020-02-19 08:24:12	94.8 dB
LASmax	2020-02-19 08:24:02	75.2 dB
LASmin	2020-02-19 08:31:44	54.9 dB
SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	0	0.0 s
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0 s
LCSeq	72.6 dB	
LASeq	62.7 dB	
LCSeq - LASeq	9.9 dB	
LAIeq	65.2 dB	
LAeq	62.7 dB	
LAIeq - LAeq	2.6 dB	

	A		**C**		**Z**	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	62.7					
Ls(max)	75.2	2020/02/19 08:24:02				
Ls(min)	54.9	2020/02/19 08:31:44				
LPeak(max)	94.8	2020/02/19 08:24:12				

Summary

File Name on Meter	ST-5
File Name on PC	SLM_0004161_LxT_Data_132.00.ldbin
Serial Number	0004161
Model	SoundTrack LxT®
Firmware Version	2.402
User	
Location	656 San Vicente
Job Description	
Note	

Measurement

Description	
Start	2020-02-19 07:43:44
Stop	2020-02-19 07:58:44
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre Calibration	2020-02-19 07:08:17
Post Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting		
Peak Weight	A Weighting		
Detector	Slow		
Preamp	PRMLxT1		
Microphone Correction	Off		
Integration Method	Exponential		
Overload	144.7 dB		
	A	**C**	**Z**
Under Range Peak	**100.7**	97.7	102.7 dB
Under Range Limit	**37.9**	37.5	44.6 dB
Noise Floor	28.7	28.4	35.4 dB

Results

LASeq	59.2 dB	
LASE	88.8 dB	
EAS	83.675 µPa²h	
EAS8	2.678 mPa²h	
EAS40	13.388 mPa²h	
LApeak (max)	2020-02-19 07:48:51	86.6 dB
LASmax	2020-02-19 07:48:52	73.0 dB
LASmin	2020-02-19 07:44:11	48.3 dB
SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	0	0.0 s
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0 s
LCSeq	69.8 dB	
LASeq	59.2 dB	
LCSeq - LASeq	10.6 dB	
LAIeq	60.7 dB	
LAeq	59.2 dB	
LAIeq - LAeq	1.5 dB	

	A		C		Z	
	dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
Leq	59.2					
Ls(max)	73.0	2020/02/19 07:48:52				
Ls(min)	48.3	2020/02/19 07:44:11				
LPeak(max)	86.6	2020/02/19 07:48:51				

Summary

File Name on Meter	ST-6
File Name on PC	SLM_0004161_LxT_Data_131.00.ldbin
Serial Number	0004161
Model	SoundTrack LxT®
Firmware Version	2.402
User	
Location	656 San Vicente
Job Description	
Note	

Measurement

Description	
Start	2020-02-19 07:27:41
Stop	2020-02-19 07:42:41
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre Calibration	2020-02-19 07:08:17
Post Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting			
Peak Weight	A Weighting			
Detector	Slow			
Preamp	PRMLxT1			
Microphone Correction	Off			
Integration Method	Exponential			
Overload	144.7 dB			
	A	**C**	**Z**	
Under Range Peak	**100.7**	97.7	102.7	dB
Under Range Limit	**37.9**	37.5	44.6	dB
Noise Floor	28.7	28.4	35.4	dB

Results

LASeq	61.1 dB	
LASE	90.7 dB	
EAS	129.187 µPa²h	
EAS8	4.134 mPa²h	
EAS40	20.670 mPa²h	
LApeak (max)	2020-02-19 07:30:58	89.7 dB
LASmax	2020-02-19 07:30:58	77.3 dB
LASmin	2020-02-19 07:40:56	49.7 dB
SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	0	0.0 s
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0 s
LCSeq	73.7 dB	
LASeq	61.1 dB	
LCSeq - LASeq	12.6 dB	
LAIeq	62.8 dB	
LAeq	61.1 dB	
LAIeq - LAeq	1.7 dB	

	A		C		Z	
	dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
Leq	61.1					
Ls(max)	77.3	2020/02/19 07:30:58				
Ls(min)	49.7	2020/02/19 07:40:56				
LPeak(max)	89.7	2020/02/19 07:30:58				

Construction Noise

Project: 656 San Vicente

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

				L1					L2				
Construction Phase **Equipment Type**	**No. of Equip.**	**Reference Noise Level at 50ft, Lmax**	**Acoustical Usage Factor**	**Distance (ft)**	**Lmax**	**Leq**	**L10**	**Estimated Noise Shielding, dBA**	**Distance (ft)**	**Lmax**	**Leq**	**L11**	**Estimated Noise Shielding, dBA**
Demolition					***99***	***92***				***91***	***84***		
Concrete Saw	1	90	20%	20	98	91	94	0	50	90	83	86	0
Tractor/Loader/Backhoe	2	80	25%	20	91	85	88	0	50	83	77	80	0
Excavator	2	81	40%	95	78	74	77	0	155	74	70	73	0
Forklift	1	75	10%	95	69	59	62	0	155	65	55	58	0
Dozer	2	82	40%	235	72	68	71	0	330	69	65	68	0
Front End Loader	1	79	40%	235	66	62	65	0	330	63	59	62	0
Site Preparation					***93***	***87***				***85***	***79***		
Forklift	1	75	10%	95	69	59	62	0	155	65	55	58	0
Front End Loader	1	79	40%	235	66	62	65	0	330	63	59	62	0
Tractor/Loader/Backhoe	3	80	25%	20	93	87	90	0	50	85	79	82	0
Grading/Excavation					***96***	***90***				***88***	***83***		
Bore/Drill Rig Truck	2	79	20%	20	90	83	86	0	50	82	75	78	0
Excavator	2	81	40%	20	92	88	91	0	50	84	80	83	0
Compactor (ground)	1	83	20%	20	91	84	87	0	50	83	76	79	0
Forklift	1	75	10%	95	69	59	62	0	155	65	55	58	0
Rubber Tired Loader	1	79	40%	95	73	69	72	0	155	69	65	68	0
Front End Loader	1	79	40%	235	66	62	65	0	330	63	59	62	0
Tractor/Loader/Backhoe	3	80	25%	235	71	65	68	0	330	68	62	65	0
Drainage/Utilities/Trenching					***89***	***85***				***82***	***78***		
Excavator	1	81	40%	20	89	85	88	0	50	81	77	80	0
Forklift	2	75	10%	95	72	62	65	0	155	68	58	61	0
Front End Loader	1	79	40%	95	73	69	72	0	155	69	65	68	0
Tractor/Loader/Backhoe	2	80	25%	235	70	64	67	0	330	67	61	64	0
Other Equipment	1	85	50%	235	72	69	72	0	330	69	66	69	0
Building Construction/Foundations					***95***	***92***				***88***	***85***		
Man Lift	1	75	20%	20	83	76	79	0	50	75	68	71	0
Air Compressor	1	78	40%	20	86	82	85	0	50	78	74	77	0
Cement and Mortar Mixers	1	79	40%	20	87	83	86	0	50	79	75	78	0
Cranes	1	81	16%	95	75	67	70	0	155	71	63	66	0
Forklift	4	75	10%	95	75	65	68	0	155	71	61	64	0
Generator Sets	3	81	50%	95	80	77	80	0	155	76	73	76	0
Concrete Saw	4	90	20%	235	83	76	79	0	330	80	73	76	0
Welders	6	74	40%	235	68	64	67	0	330	65	61	64	0
Foundations					***97***	***89***				***89***	***82***		
Cement and Mortar Mixers	4	79	40%	95	79	75	78	0	155	75	71	74	0
Cranes	1	81	16%	95	75	67	70	0	155	71	63	66	0
Forklift	2	75	10%	20	86	76	79	0	50	78	68	71	0
Pumps	2	81	50%	20	92	89	92	0	50	84	81	84	0
Front End Loader	1	79	40%	235	66	62	65	0	330	63	59	62	0
Tractor/Loader/Backhoe	2	80	25%	235	70	64	67	0	330	67	61	64	0
Architectural Coating					***86***	***82***				***78***	***74***		
Air Compressor	1	78	40%	20	86	82	85	0	50	78	74	77	0
Paving					***97***	***94***				***89***	***86***		
Paver	2	77	50%	20	88	85	88	0	50	80	77	80	0
Other Equipment	2	85	50%	20	96	93	96	0	50	88	85	88	0
Roller	2	80	20%	95	77	70	73	0	155	73	66	69	0
Forklift	1	75	10%	235	62	52	55	0	330	59	49	52	0
Overlapping Phase Noise Levels													
Building Construction + Foundations					***98.8***	***93.7***				***91.7***	***86.7***		
Building Construction + Arch Coating + Paving					***99.0***	***96.0***				***91.7***	***88.5***		
Maximum Combined Noise Levels					**99.0**	**96.0**				**91.7**	**88.5**		

Source for Ref. Noise Levels: LA CEQA Guides, 2006 & FHWA RCNM, 2005

Project: 656 San Vicente

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

				L3					L4					L5					L6					L7				
***Construction Phase* Equipment Type**	**No. of Equip.**	**Reference Noise Level at 50ft, Lmax**	**Acoustical Usage Factor**	**Distance (ft)**	**Lmax**	**Leq**	**L12**	**Estimated Noise Shielding, dBA**	**Distance (ft)**	**Lmax**	**Leq**	**L11**	**Estimated Noise Shielding, dBA**	**Distance (ft)**	**Lmax**	**Leq**	**L12**	**Estimated Noise Shielding, dBA**	**Distance (ft)**	**Lmax**	**Leq**	**L13**	**Estimated Noise Shielding, dBA**	**Distance (ft)**	**Lmax**	**Leq**	**L14**	**Estimated Noise Shielding, dBA**
Demolition					*75*	*69*				*89*	*83*				*73*	*67*				*76*	*70*				*76*	*70*		
Concrete Saw	1	90	20%	185	74	67	70	5	60	88	81	84	0	410	72	65	68	0	280	75	68	71	0	300	74	67	70	0
Tractor/Loader/Backhoe	2	80	25%	185	67	61	64	5	60	81	75	78	0	410	65	59	62	0	280	68	62	65	0	300	67	61	64	0
Excavator	2	81	40%	235	66	62	65	5	165	74	70	73	0	570	63	59	62	0	470	65	61	64	0	360	67	63	66	0
Forklift	1	75	10%	235	57	47	50	5	165	65	55	58	0	570	54	44	47	0	470	56	46	49	0	360	58	48	51	0
Dozer	2	82	40%	315	64	60	63	5	340	68	64	67	0	715	62	58	61	0	580	64	60	63	0	430	66	62	65	0
Front End Loader	1	79	40%	315	58	54	57	5	340	62	58	61	0	715	56	52	55	0	580	58	54	57	0	430	60	56	59	0
Site Preparation					*69*	*63*				*83*	*77*				*67*	*61*				*70*	*64*				*70*	*64*		
Forklift	1	75	10%	235	57	47	50	5	165	65	55	58	0	570	54	44	47	0	470	56	46	49	0	360	58	48	51	0
Front End Loader	1	79	40%	315	58	54	57	5	340	62	58	61	0	715	56	52	55	0	580	58	54	57	0	430	60	56	59	0
Tractor/Loader/Backhoe	3	80	25%	185	68	62	65	5	60	83	77	80	0	410	66	60	63	0	280	70	64	67	0	300	69	63	66	0
Grading/Excavation					*73*	*67*				*86*	*81*				*71*	*65*				*74*	*68*				*74*	*68*		
Bore/Drill Rig Truck	2	79	20%	185	66	59	62	5	60	80	73	76	0	410	64	57	60	0	280	67	60	63	0	300	66	59	62	0
Excavator	2	81	40%	185	68	64	67	5	60	82	78	81	0	410	66	62	65	0	280	69	65	68	0	300	68	64	67	0
Compactor (ground)	1	83	20%	185	67	60	63	5	60	81	74	77	0	410	65	58	61	0	280	68	61	64	0	300	67	60	63	0
Forklift	1	75	10%	235	57	47	50	5	165	65	55	58	0	570	54	44	47	0	470	56	46	49	0	360	58	48	51	0
Rubber Tired Loader	1	79	40%	235	61	57	60	5	165	69	65	68	0	570	58	54	57	0	470	60	56	59	0	360	62	58	61	0
Front End Loader	1	79	40%	315	58	54	57	5	340	62	58	61	0	715	56	52	55	0	580	58	54	57	0	430	60	56	59	0
Tractor/Loader/Backhoe	3	80	25%	315	64	58	61	5	340	68	62	65	0	715	62	56	59	0	580	63	57	60	0	430	66	60	63	0
Drainage/Utilities/Trenching					*70*	*65*				*80*	*76*				*67*	*63*				*70*	*66*				*71*	*67*		
Excavator	1	81	40%	185	65	61	64	5	60	79	75	78	0	410	63	59	62	0	280	66	62	65	0	300	65	61	64	0
Forklift	2	75	10%	235	60	50	53	5	165	68	58	61	0	570	57	47	50	0	470	59	49	52	0	360	61	51	54	0
Front End Loader	1	79	40%	235	61	57	60	5	165	69	65	68	0	570	58	54	57	0	470	60	56	59	0	360	62	58	61	0
Tractor/Loader/Backhoe	2	80	25%	315	62	56	59	5	340	66	60	63	0	715	60	54	57	0	580	62	56	59	0	430	64	58	61	0
Other Equipment	1	85	50%	315	64	61	64	5	340	68	65	68	0	715	62	59	62	0	580	64	61	64	0	430	66	63	66	0
Building Construction/Foundations					*79*	*75*				*87*	*84*				*77*	*73*				*79*	*75*				*81*	*77*		
Man Lift	1	75	20%	185	59	52	55	5	60	73	66	69	0	410	57	50	53	0	280	60	53	56	0	300	59	52	55	0
Air Compressor	1	78	40%	185	62	58	61	5	60	76	72	75	0	410	60	56	59	0	280	63	59	62	0	300	62	58	61	0
Cement and Mortar Mixers	1	79	40%	185	63	59	62	5	60	77	73	76	0	410	61	57	60	0	280	64	60	63	0	300	63	59	62	0
Cranes	1	81	16%	235	63	55	58	5	165	71	63	66	0	570	60	52	55	0	470	62	54	57	0	360	64	56	59	0
Forklift	4	75	10%	235	63	53	56	5	165	71	61	64	0	570	60	50	53	0	470	62	52	55	0	360	64	54	57	0
Generator Sets	3	81	50%	235	67	64	67	5	165	75	72	75	0	570	65	62	65	0	470	66	63	66	0	360	69	66	69	0
Concrete Saw	4	90	20%	315	75	68	71	5	340	79	72	75	0	715	73	66	69	0	580	75	68	71	0	430	77	70	73	0
Welders	6	74	40%	315	61	57	60	5	340	65	61	64	0	715	59	55	58	0	580	60	57	60	0	430	63	59	62	0
Foundations					*75*	*68*				*88*	*80*				*73*	*65*				*76*	*68*				*76*	*69*		
Cement and Mortar Mixers	4	79	40%	235	67	63	66	5	165	75	71	74	0	570	64	60	63	0	470	66	62	65	0	360	68	64	67	0
Cranes	1	81	16%	235	63	55	58	5	165	71	63	66	0	570	60	52	55	0	470	62	54	57	0	360	64	56	59	0
Forklift	2	75	10%	185	62	52	55	5	60	76	66	69	0	410	60	50	53	0	280	63	53	56	0	300	62	52	55	0
Pumps	2	81	50%	185	68	65	68	5	60	82	79	82	0	410	66	63	66	0	280	69	66	69	0	300	68	65	68	0
Front End Loader	1	79	40%	315	58	54	57	5	340	62	58	61	0	715	56	52	55	0	580	58	54	57	0	430	60	56	59	0
Tractor/Loader/Backhoe	2	80	25%	315	62	56	59	5	340	66	60	63	0	715	60	54	57	0	580	62	56	59	0	430	64	58	61	0
Architectural Coating					*62*	*58*				*76*	*72*				*60*	*56*				*63*	*59*				*62*	*58*		
Air Compressor	1	78	40%	185	62	58	61	5	60	76	72	75	0	410	60	56	59	0	280	63	59	62	0	300	62	58	61	0
Paving					*73*	*70*				*87*	*84*				*71*	*68*				*74*	*71*				*74*	*70*		
Paver	2	77	50%	185	64	61	64	5	60	78	75	78	0	410	62	59	62	0	280	65	62	65	0	300	64	61	64	0
Other Equipment	2	85	50%	185	72	69	72	5	60	86	83	86	0	410	70	67	70	0	280	73	70	73	0	300	72	69	72	0
Roller	2	80	20%	235	65	58	61	5	165	73	66	69	0	570	62	55	58	0	470	64	57	60	0	360	66	59	62	0
Forklift	1	75	10%	315	54	44	47	5	340	58	48	51	0	715	52	42	45	0	580	54	44	47	0	430	56	46	49	0

Overlapping Phase Noise Levels

	L3 Lmax	L3 Leq	L4 Lmax	L4 Leq	L5 Lmax	L5 Leq	L6 Lmax	L6 Leq	L7 Lmax	L7 Leq
Building Construction + Foundations	*80.6*	*76.0*	*90.4*	*85.5*	*78.3*	*73.8*	*80.5*	*75.9*	*82.3*	*77.8*
Building Construction + Arch Coating + Paving	*80.1*	*76.4*	*90.4*	*87.2*	*77.9*	*74.3*	*80.2*	*76.6*	*81.8*	*78.1*
Maximum Combined Noise Levels	**80.6**	**76.4**	**90.4**	**87.2**	**78.3**	**74.3**	**80.5**	**76.6**	**82.3**	**78.1**

Source for Ref. Noise Levels: LA CEQA Guides, 2006 & FHWA RCNM, 2005

Project: 656 San Vicente - Mitigated

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

				L1					**L2**				
Construction Phase **Equipment Type**	**No. of Equip.**	**Reference Noise Level at 50ft, Lmax**	**Acoustical Usage Factor**	**Distance (ft)**	**Lmax**	**Leq**	**L10**	**Estimated Noise Shielding, dBA**	**Distance (ft)**	**Lmax**	**Leq**	**L11**	**Estimated Noise Shielding, dBA**
Demolition					***89***	***82***				***81***	***74***		
Concrete Saw	1	90	20%	20	88	81	84	10	50	80	73	76	10
Tractor/Loader/Backhoe	2	80	25%	20	81	75	78	10	50	73	67	70	10
Excavator	2	81	40%	95	68	64	67	10	155	64	60	63	10
Forklift	1	75	10%	95	59	49	52	10	155	55	45	48	10
Dozer	2	82	40%	235	62	58	61	10	330	59	55	58	10
Front End Loader	1	79	40%	235	56	52	55	10	330	53	49	52	10
Site Preparation					***83***	***77***				***75***	***69***		
Forklift	1	75	10%	95	59	49	52	10	155	55	45	48	10
Front End Loader	1	79	40%	235	56	52	55	10	330	53	49	52	10
Tractor/Loader/Backhoe	3	80	25%	20	83	77	80	10	50	75	69	72	10
Grading/Excavation					***86***	***80***				***78***	***73***		
Bore/Drill Rig Truck	2	79	20%	20	80	73	76	10	50	72	65	68	10
Excavator	2	81	40%	20	82	78	81	10	50	74	70	73	10
Compactor (ground)	1	83	20%	20	81	74	77	10	50	73	66	69	10
Forklift	1	75	10%	95	59	49	52	10	155	55	45	48	10
Rubber Tired Loader	1	79	40%	95	63	59	62	10	155	59	55	58	10
Front End Loader	1	79	40%	235	56	52	55	10	330	53	49	52	10
Tractor/Loader/Backhoe	3	80	25%	235	61	55	58	10	330	58	52	55	10
Drainage/Utilities/Trenching					***79***	***75***				***72***	***68***		
Excavator	1	81	40%	20	79	75	78	10	50	71	67	70	10
Forklift	2	75	10%	95	62	52	55	10	155	58	48	51	10
Front End Loader	1	79	40%	95	63	59	62	10	155	59	55	58	10
Tractor/Loader/Backhoe	2	80	25%	235	60	54	57	10	330	57	51	54	10
Other Equipment	1	85	50%	235	62	59	62	10	330	59	56	59	10
Building Construction					***85***	***82***				***78***	***75***		
Man Lift	1	75	20%	20	73	66	69	10	50	65	58	61	10
Air Compressor	1	78	40%	20	76	72	75	10	50	68	64	67	10
Cement and Mortar Mixers	1	79	40%	20	77	73	76	10	50	69	65	68	10
Cranes	1	81	16%	95	65	57	60	10	155	61	53	56	10
Forklift	4	75	10%	95	65	55	58	10	155	61	51	54	10
Generator Sets	3	81	50%	95	70	67	70	10	155	66	63	66	10
Concrete Saw	4	90	20%	235	73	66	69	10	330	70	63	66	10
Welders	6	74	40%	235	58	54	57	10	330	55	51	54	10
Foundations					***87***	***79***				***79***	***72***		
Cement and Mortar Mixers	4	79	40%	95	69	65	68	10	155	65	61	64	10
Cranes	1	81	16%	95	65	57	60	10	155	61	53	56	10
Forklift	2	75	10%	20	76	66	69	10	50	68	58	61	10
Pumps	2	81	50%	20	82	79	82	10	50	74	71	74	10
Front End Loader	1	79	40%	235	56	52	55	10	330	53	49	52	10
Tractor/Loader/Backhoe	2	80	25%	235	60	54	57	10	330	57	51	54	10
Architectural Coating					***76***	***72***				***68***	***64***		
Air Compressor	1	78	40%	20	76	72	75	10	50	68	64	67	10
Paving					***87***	***84***				***79***	***76***		
Paver	2	77	50%	20	78	75	78	10	50	70	67	70	10
Other Equipment	2	85	50%	20	86	83	86	10	50	78	75	78	10
Roller	2	80	20%	95	67	60	63	10	155	63	56	59	10
Forklift	1	75	10%	235	52	42	45	10	330	49	39	42	10

Overlapping Phase Noise Levels

	L1 Lmax	L1 Leq	L2 Lmax	L2 Leq
Building Construction + Foundations	*88.8*	*83.7*	*81.7*	*76.7*
Building Construction + Arch Coating + Paving	*89.0*	*86.0*	*81.7*	*78.5*
Maximum Combined Noise Levels	**89.0**	**86.0**	**81.7**	**78.5**

Source for Ref. Noise Levels: LA CEQA Guides, 2006 & FHWA RCNM, 2005

Project: 656 San Vicente - Mitigated

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

				L3					L4					L5					L6					L7				
Construction Phase **Equipment Type**	**No. of Equip.**	**Reference Noise Level at 50ft, Lmax**	**Acoustical Usage Factor**	**Distance (ft)**	**Lmax**	**Leq**	**L12**	**Estimated Noise Shielding, dBA**	**Distance (ft)**	**Lmax**	**Leq**	**L11**	**Estimated Noise Shielding, dBA**	**Distance (ft)**	**Lmax**	**Leq**	**L12**	**Estimated Noise Shielding, dBA**	**Distance (ft)**	**Lmax**	**Leq**	**L13**	**Estimated Noise Shielding, dBA**	**Distance (ft)**	**Lmax**	**Leq**	**L14**	**Estimated Noise Shielding, dBA**
Demolition					*65*	*59*				*79*	*73*				*53*	*47*				*66*	*60*				*66*	*60*		
Concrete Saw	1	90	20%	185	64	57	60	15	60	78	71	74	10	410	52	45	48	20	280	65	58	61	10	300	64	57	60	10
Tractor/Loader/Backhoe	2	80	25%	185	57	51	54	15	60	71	65	68	10	410	45	39	42	20	280	58	52	55	10	300	57	51	54	10
Excavator	2	81	40%	235	56	52	55	15	165	64	60	63	10	570	43	39	42	20	470	55	51	54	10	360	57	53	56	10
Forklift	1	75	10%	235	47	37	40	15	165	55	45	48	10	570	34	24	27	20	470	46	36	39	10	360	48	38	41	10
Dozer	2	82	40%	315	54	50	53	15	340	58	54	57	10	715	42	38	41	20	580	54	50	53	10	430	56	52	55	10
Front End Loader	1	79	40%	315	48	44	47	15	340	52	48	51	10	715	36	32	35	20	580	48	44	47	10	430	50	46	49	10
Site Preparation					*59*	*53*				*73*	*67*				*47*	*41*				*60*	*54*				*60*	*54*		
Forklift	1	75	10%	235	47	37	40	15	165	55	45	48	10	570	34	24	27	20	470	46	36	39	10	360	48	38	41	10
Front End Loader	1	79	40%	315	48	44	47	15	340	52	48	51	10	715	36	32	35	20	580	48	44	47	10	430	50	46	49	10
Tractor/Loader/Backhoe	3	80	25%	185	58	52	55	15	60	73	67	70	10	410	46	40	43	20	280	60	54	57	10	300	59	53	56	10
Grading/Excavation					*63*	*57*				*76*	*71*				*51*	*45*				*64*	*58*				*64*	*58*		
Bore/Drill Rig Truck	2	79	20%	185	56	49	52	15	60	70	63	66	10	410	44	37	40	20	280	57	50	53	10	300	56	49	52	10
Excavator	2	81	40%	185	58	54	57	15	60	72	68	71	10	410	46	42	45	20	280	59	55	58	10	300	58	54	57	10
Compactor (ground)	1	83	20%	185	57	50	53	15	60	71	64	67	10	410	45	38	41	20	280	58	51	54	10	300	57	50	53	10
Forklift	1	75	10%	235	47	37	40	15	165	55	45	48	10	570	34	24	27	20	470	46	36	39	10	360	48	38	41	10
Rubber Tired Loader	1	79	40%	235	51	47	50	15	165	59	55	58	10	570	38	34	37	20	470	50	46	49	10	360	52	48	51	10
Front End Loader	1	79	40%	315	48	44	47	15	340	52	48	51	10	715	36	32	35	20	580	48	44	47	10	430	50	46	49	10
Tractor/Loader/Backhoe	3	80	25%	315	54	48	51	15	340	58	52	55	10	715	42	36	39	20	580	53	47	50	10	430	56	50	53	10
Drainage/Utilities/Trenching					*60*	*55*				*70*	*66*				*47*	*43*				*60*	*56*				*61*	*57*		
Excavator	1	81	40%	185	55	51	54	15	60	69	65	68	10	410	43	39	42	20	280	56	52	55	10	300	55	51	54	10
Forklift	2	75	10%	235	50	40	43	15	165	58	48	51	10	570	37	27	30	20	470	49	39	42	10	360	51	41	44	10
Front End Loader	1	79	40%	235	51	47	50	15	165	59	55	58	10	570	38	34	37	20	470	50	46	49	10	360	52	48	51	10
Tractor/Loader/Backhoe	2	80	25%	315	52	46	49	15	340	56	50	53	10	715	40	34	37	20	580	52	46	49	10	430	54	48	51	10
Other Equipment	1	85	50%	315	54	51	54	15	340	58	55	58	10	715	42	39	42	20	580	54	51	54	10	430	56	53	56	10
Building Construction					*69*	*65*				*77*	*74*				*57*	*53*				*69*	*65*				*71*	*67*		
Man Lift	1	75	20%	185	49	42	45	15	60	63	56	59	10	410	37	30	33	20	280	50	43	46	10	300	49	42	45	10
Air Compressor	1	78	40%	185	52	48	51	15	60	66	62	65	10	410	40	36	39	20	280	53	49	52	10	300	52	48	51	10
Cement and Mortar Mixers	1	79	40%	185	53	49	52	15	60	67	63	66	10	410	41	37	40	20	280	54	50	53	10	300	53	49	52	10
Cranes	1	81	16%	235	53	45	48	15	165	61	53	56	10	570	40	32	35	20	470	52	44	47	10	360	54	46	49	10
Forklift	4	75	10%	235	53	43	46	15	165	61	51	54	10	570	40	30	33	20	470	52	42	45	10	360	54	44	47	10
Generator Sets	3	81	50%	235	57	54	57	15	165	65	62	65	10	570	45	42	45	20	470	56	53	56	10	360	59	56	59	10
Concrete Saw	4	90	20%	315	65	58	61	15	340	69	62	65	10	715	53	46	49	20	580	65	58	61	10	430	67	60	63	10
Welders	6	74	40%	315	51	47	50	15	340	55	51	54	10	715	39	35	38	20	580	50	47	50	10	430	53	49	52	10
Foundations					*65*	*58*				*78*	*70*				*53*	*45*				*66*	*58*				*66*	*59*		
Cement and Mortar Mixers	4	79	40%	235	57	53	56	15	165	65	61	64	10	570	44	40	43	20	470	56	52	55	10	360	58	54	57	10
Cranes	1	81	16%	235	53	45	48	15	165	61	53	56	10	570	40	32	35	20	470	52	44	47	10	360	54	46	49	10
Forklift	2	75	10%	185	52	42	45	15	60	66	56	59	10	410	40	30	33	20	280	53	43	46	10	300	52	42	45	10
Pumps	2	81	50%	185	58	55	58	15	60	72	69	72	10	410	46	43	46	20	280	59	56	59	10	300	58	55	58	10
Front End Loader	1	79	40%	315	48	44	47	15	340	52	48	51	10	715	36	32	35	20	580	48	44	47	10	430	50	46	49	10
Tractor/Loader/Backhoe	2	80	25%	315	52	46	49	15	340	56	50	53	10	715	40	34	37	20	580	52	46	49	10	430	54	48	51	10
Architectural Coating					*52*	*48*				*66*	*62*				*40*	*36*				*53*	*49*				*52*	*48*		
Air Compressor	1	78	40%	185	52	48	51	15	60	66	62	65	10	410	40	36	39	20	280	53	49	52	10	300	52	48	51	10
Paving					*63*	*60*				*77*	*74*				*51*	*48*				*64*	*61*				*64*	*60*		
Paver	2	77	50%	185	54	51	54	15	60	68	65	68	10	410	42	39	42	20	280	55	52	55	10	300	54	51	54	10
Other Equipment	2	85	50%	185	62	59	62	15	60	76	73	76	10	410	50	47	50	20	280	63	60	63	10	300	62	59	62	10
Roller	2	80	20%	235	55	48	51	15	165	63	56	59	10	570	42	35	38	20	470	54	47	50	10	360	56	49	52	10
Forklift	1	75	10%	315	44	34	37	15	340	48	38	41	10	715	32	22	25	20	580	44	34	37	10	430	46	36	39	10

Overlapping Phase Noise Levels

	L3 Lmax	L3 Leq	L4 Lmax	L4 Leq	L5 Lmax	L5 Leq	L6 Lmax	L6 Leq	L7 Lmax	L7 Leq
Building Construction + Foundations	*70.6*	*66.0*	*80.4*	*75.5*	*58.3*	*53.8*	*70.5*	*65.9*	*72.3*	*67.8*
Building Construction + Arch Coating + Paving	*70.1*	*66.4*	*80.4*	*77.2*	*57.9*	*54.3*	*70.2*	*66.6*	*71.8*	*68.1*
Maximum Combined Noise Levels	**70.6**	**66.4**	**80.4**	**77.2**	**58.3**	**54.3**	**70.5**	**66.6**	**72.3**	**68.1**

Source for Ref. Noise Levels: LA CEQA Guides, 2006 & FHWA RCNM, 2005

Roadway Traffic Noise - Offsite Construction

Street	Roadway Segment	Existing Land Uses Located Along Roadway Segment	Traffic Noise Levels (dBA CNEL) Existing	Offsite Construction	Existing + Offsite Construction	Increase over Existing	Significant Impact?
La Cienega Boulevard	n/o Wilshire Boulevard	Commercial	72.0	60.3	72.3	0.3	No
La Cienega Boulevard	s/o Wilshire Boulevard	Commercial	71.9	60.3	72.1	0.3	No
San Vicente Boulevard	between Wilshire Boulevard and McCarthy Vista/Carrillo Drive	Residential/Commercial	71.6	60.3	71.9	0.3	No
San Vicente Boulevard	e/o McCarthy Vista/Carrillo Drive	Residential	69.9	60.3	70.3	0.5	No
San Vicente Boulevard	between 6th Street and Orange Street	Commercial	69.6	60.3	70.0	0.5	No
San Vicente Boulevard	n/o 6th Street	Commercial	72.3	60.3	72.6	0.3	No
San Vicente Boulevard Frontage I	between Orange Street and Wilshire Boulevard	Commercial	69.0	60.3	69.5	0.6	No
Wilshire Boulevard	between La Cienega Boulevard and San Vicente Boulevard	Commercial	71.4	60.3	71.7	0.3	No
Wilshire Boulevard	between San Vicente Boulevard and La Jolla Avenue	Commercial	70.6	60.3	70.9	0.4	No
Wilshire Boulevard	e/o La Jolla Avenue	Commercial	70.3	60.3	70.7	0.4	No
Wilshire Boulevard	w/o La Cienega Boulevard	Commercial	71.4	60.3	71.8	0.3	No

TRAFFIC NOISE ANALYSIS TOOL

Project: 656 San Vicente
Scenario: Construction
Source: Gibson

Roadway	Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
				Auto	MT	HT	Auto	MT	HT		
La Cienega Boulevard	n/o Wilshire Boulevard	Hard	30	35	35	30	10	1	15	60.0	60.3
La Cienega Boulevard	s/o Wilshire Boulevard	Hard	30	35	35	30	10	1	15	60.0	60.3
San Vicente Boulevard	between Wilshire Boulevard and McCarthy Vista/Carrillo Drive	Hard	30	35	35	30	10	1	15	60.0	60.3
San Vicente Boulevard	e/o McCarthy Vista/Carrillo Drive	Hard	30	35	35	30	10	1	15	60.0	60.3
San Vicente Boulevard	between 6th Street and Orange Street	Hard	30	35	35	30	10	1	15	60.0	60.3
San Vicente Boulevard	n/o 6th Street	Hard	30	35	35	30	10	1	15	60.0	60.3
San Vicente Boulevard Frontage Rc	between Orange Street and Wilshire Boulevard	Hard	30	35	35	30	10	1	15	60.0	60.3
Wilshire Boulevard	between La Cienega Boulevard and San Vicente Boulevard	Hard	30	35	35	30	10	1	15	60.0	60.3
Wilshire Boulevard	between San Vicente Boulevard and La Jolla Avenue	Hard	30	35	35	30	10	1	15	60.0	60.3
Wilshire Boulevard	e/o La Jolla Avenue	Hard	30	35	35	30	10	1	15	60.0	60.3
Wilshire Boulevard	w/o La Cienega Boulevard	Hard	30	35	35	30	10	1	15	60.0	60.3

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

Operational Traffic Noise

Roadway Traffic Noise - Existing

Street	Roadway Segment	Existing Land Uses Located Along Roadway Segment	Traffic Noise Levels (dBA CNEL) Existing	Existing with Project	Increase over Existing	Significant Impact?
6th Street	between San Vicente Boulevard and Sweetzer Avenue	Residential	64.3	64.6	0.3	No
6th Street	between Sweetzer Avenue and La Jolla Avenue	Residential	64.0	64.1	0.2	No
6th Street	e/o La Jolla Avenue	Residential	63.2	63.5	0.3	No
La Cienega Boulevard	n/o Wilshire Boulevard	Commercial	72.0	72.0	0.0	No
La Cienega Boulevard	s/o Wilshire Boulevard	Commercial	71.9	71.9	0.1	No
La Jolla Avenue	between 6th Street and Wilshire Boulevard	Residential/Commercial	60.3	60.3	0.0	No
La Jolla Avenue	n/o 6th Street	Residential	60.3	60.3	0.0	No
La Jolla Avenue	s/o Wilshire Boulevard	Residential/Commercial	51.5	51.5	0.0	No
McCarthy Vista/Carrillo Drive	s/o San Vicente Boulevard	Residential/Commercial/Educational	66.0	66.0	0.0	No
McCarthy Vista/Carrillo Drive	n/o San Vicente Boulevard	Residential	66.5	66.5	0.0	No
Orange Street	between San Vicente Boulevard Frontage Rd and Sweetzer Avenue	Residential/Commercial	53.9	58.0	4.1	No
San Vicente Boulevard	between Wilshire Boulevard and McCarthy Vista/Carrillo Drive	Residential/Commercial	71.6	71.7	0.1	No
San Vicente Boulevard	e/o McCarthy Vista/Carrillo Drive	Residential	69.9	70.0	0.2	No
San Vicente Boulevard	between 6th Street and Orange Street	Commercial	69.6	69.9	0.4	No
San Vicente Boulevard	n/o 6th Street	Commercial	72.3	72.4	0.1	No
San Vicente Boulevard Frontage F	between Orange Street and Wilshire Boulevard	Commercial	69.0	69.4	0.4	No
Sweetzer Avenue	between 6th Street and Orange Street	Residential	55.5	59.8	4.3	No
Sweetzer Avenue	between Orange Street and Wilshire Boulevard	Residential/Commercial	53.6	54.5	0.9	No
Sweetzer Avenue	n/o 6th Street	Residential	57.5	57.6	0.1	No
Wilshire Boulevard	between La Cienega Boulevard and San Vicente Boulevard	Commercial	71.4	71.6	0.1	No
Wilshire Boulevard	between San Vicente Boulevard and La Jolla Avenue	Commercial	70.6	70.6	0.1	No
Wilshire Boulevard	e/o La Jolla Avenue	Commercial	70.3	70.4	0.1	No
Wilshire Boulevard	w/o La Cienega Boulevard	Commercial	71.4	71.5	0.1	No

Roadway Traffic Noise - Future

			Traffic Noise Levels (dBA CNEL)			
Street	**Roadway Segment**	**Existing Land Uses Located Along Roadway Segment**	**Future Year (2023)**	**Future Year (2023) with Project**	**Increase over Existing**	**Significant Impact?**
6th Street	between San Vicente Boulevard and Sweetzer Avenue	Residential	64.5	64.8	0.3	No
6th Street	between Sweetzer Avenue and La Jolla Avenue	Residential	64.3	64.4	0.2	No
6th Street	e/o La Jolla Avenue	Residential	63.6	63.9	0.3	No
La Cienega Boulevard	n/o Wilshire Boulevard	Commercial	72.4	72.4	0.0	No
La Cienega Boulevard	s/o Wilshire Boulevard	Commercial	72.2	72.3	0.1	No
La Jolla Avenue	between 6th Street and Wilshire Boulevard	Residential/Commercial	60.8	60.8	0.0	No
La Jolla Avenue	n/o 6th Street	Residential	60.7	60.7	0.0	No
La Jolla Avenue	s/o Wilshire Boulevard	Residential/Commercial	51.7	51.7	0.0	No
McCarthy Vista/Carrillo Drive	s/o San Vicente Boulevard	Residential/Commercial/Educational	66.1	66.1	0.0	No
McCarthy Vista/Carrillo Drive	n/o San Vicente Boulevard	Residential	66.7	66.7	0.0	No
Orange Street	between San Vicente Boulevard Frontage Rd and Sweetzer Avenue	Residential/Commercial	54.8	58.4	3.6	No
San Vicente Boulevard	between Wilshire Boulevard and McCarthy Vista/Carrillo Drive	Residential/Commercial	71.8	71.9	0.1	No
San Vicente Boulevard	e/o McCarthy Vista/Carrillo Drive	Residential	70.2	70.4	0.2	No
San Vicente Boulevard	between 6th Street and Orange Street	Commercial	69.8	70.2	0.3	No
San Vicente Boulevard	n/o 6th Street	Commercial	72.6	72.6	0.1	No
San Vicente Boulevard Frontage F	between Orange Street and Wilshire Boulevard	Commercial	69.2	69.6	0.4	No
Sweetzer Avenue	between 6th Street and Orange Street	Residential	57.2	60.5	3.3	No
Sweetzer Avenue	between Orange Street and Wilshire Boulevard	Residential/Commercial	54.6	56.0	1.4	No
Sweetzer Avenue	n/o 6th Street	Residential	57.7	57.8	0.1	No
Wilshire Boulevard	between La Cienega Boulevard and San Vicente Boulevard	Commercial	71.8	71.9	0.1	No
Wilshire Boulevard	between San Vicente Boulevard and La Jolla Avenue	Commercial	71.0	71.0	0.1	No
Wilshire Boulevard	e/o La Jolla Avenue	Commercial	70.9	70.9	0.1	No
Wilshire Boulevard	w/o La Cienega Boulevard	Commercial	71.9	71.9	0.1	No

Roadway Traffic Noise - Cumulative

Street	Roadway Segment	Existing Land Uses Located Along Roadway Segment	Traffic Noise Levels (dBA CNEL) Existing	Future Year (2023) with Project	Increase over Existing	Significant Impact?	Project Increment
6th Street	between San Vicente Boulevard and Sweetzer Avenue	Residential	64.3	64.8	0.5	No	0.3
6th Street	between Sweetzer Avenue and La Jolla Avenue	Residential	64.0	64.4	0.5	No	0.2
6th Street	e/o La Jolla Avenue	Residential	63.2	63.9	0.7	No	0.3
La Cienega Boulevard	n/o Wilshire Boulevard	Commercial	72.0	72.4	0.4	No	0.0
La Cienega Boulevard	s/o Wilshire Boulevard	Commercial	71.9	72.3	0.4	No	0.1
La Jolla Avenue	between 6th Street and Wilshire Boulevard	Residential/Commercial	60.3	60.8	0.5	No	0.0
La Jolla Avenue	n/o 6th Street	Residential	60.3	60.7	0.3	No	0.0
La Jolla Avenue	s/o Wilshire Boulevard	Residential/Commercial	51.5	51.7	0.2	No	0.0
McCarthy Vista/Carrillo Drive	s/o San Vicente Boulevard	Residential/Commercial/Educational	66.0	66.1	0.2	No	0.0
McCarthy Vista/Carrillo Drive	n/o San Vicente Boulevard	Residential	66.5	66.7	0.2	No	0.0
Orange Street	between San Vicente Boulevard Frontage Rd and Sweetzer Avenue	Residential/Commercial	53.9	58.4	4.5	No	3.6
San Vicente Boulevard	between Wilshire Boulevard and McCarthy Vista/Carrillo Drive	Residential/Commercial	71.6	71.9	0.3	No	0.1
San Vicente Boulevard	e/o McCarthy Vista/Carrillo Drive	Residential	69.9	70.4	0.5	No	0.2
San Vicente Boulevard	between 6th Street and Orange Street	Commercial	69.6	70.2	0.6	No	0.3
San Vicente Boulevard	n/o 6th Street	Commercial	72.3	72.6	0.3	No	0.1
San Vicente Boulevard Frontage R	between Orange Street and Wilshire Boulevard	Commercial	69.0	69.6	0.7	No	0.4
Sweetzer Avenue	between 6th Street and Orange Street	Residential	55.5	60.5	5.0	No	3.3
Sweetzer Avenue	between Orange Street and Wilshire Boulevard	Residential/Commercial	53.6	56.0	2.4	No	1.4
Sweetzer Avenue	n/o 6th Street	Residential	57.5	57.8	0.3	No	0.1
Wilshire Boulevard	between La Cienega Boulevard and San Vicente Boulevard	Commercial	71.4	71.9	0.5	No	0.1
Wilshire Boulevard	between San Vicente Boulevard and La Jolla Avenue	Commercial	70.6	71.0	0.5	No	0.1
Wilshire Boulevard	e/o La Jolla Avenue	Commercial	70.3	70.9	0.7	No	0.1
Wilshire Boulevard	w/o La Cienega Boulevard	Commercial	71.4	71.9	0.5	No	0.1

TRAFFIC NOISE ANALYSIS TOOL

Project: 656 San Vicente
Scenario: Existing
Source: Gibson

Roadway	Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
				Auto	MT	HT	Auto	MT	HT		
6th Street	between San Vicente Boulevard and Sweetzer Avenue	Hard	30	25	25	25	983	20	10	64.0	64.3
6th Street	between Sweetzer Avenue and La Jolla Avenue	Hard	30	25	25	25	909	19	9	63.7	64.0
6th Street	e/o La Jolla Avenue	Hard	30	25	25	25	763	16	8	62.9	63.2
La Cienega Boulevard	n/o Wilshire Boulevard	Hard	30	35	35	30	2838	59	29	71.7	72.0
La Cienega Boulevard	s/o Wilshire Boulevard	Hard	30	35	35	30	2761	57	29	71.6	71.9
La Jolla Avenue	between 6th Street and Wilshire Boulevard	Hard	30	25	25	25	387	8	4	60.0	60.3
La Jolla Avenue	n/o 6th Street	Hard	30	25	25	25	395	8	4	60.0	60.3
La Jolla Avenue	s/o Wilshire Boulevard	Hard	30	25	25	25	52	1	1	51.2	51.5
McCarthy Vista/Carrillo Drive	s/o San Vicente Boulevard	Hard	30	25	25	25	1445	30	15	65.7	66.0
McCarthy Vista/Carrillo Drive	n/o San Vicente Boulevard	Hard	30	25	25	25	1644	34	17	66.2	66.5
Orange Street	between San Vicente Boulevard Frontage Rd and Sweetzer Aven	Hard	30	25	25	25	90	2	1	53.6	53.9
San Vicente Boulevard	between Wilshire Boulevard and McCarthy Vista/Carrillo Drive	Hard	30	35	35	30	2625	54	27	71.3	71.6
San Vicente Boulevard	e/o McCarthy Vista/Carrillo Drive	Hard	30	35	35	30	1746	36	18	69.6	69.9
San Vicente Boulevard	between 6th Street and Orange Street	Hard	30	35	35	30	1629	34	17	69.3	69.6
San Vicente Boulevard	n/o 6th Street	Hard	30	35	35	30	3070	63	32	72.0	72.3
San Vicente Boulevard Frontage Rc	between Orange Street and Wilshire Boulevard	Hard	30	35	35	30	1415	29	15	68.7	69.0
Sweetzer Avenue	between 6th Street and Orange Street	Hard	30	25	25	25	130	3	1	55.2	55.5
Sweetzer Avenue	between Orange Street and Wilshire Boulevard	Hard	30	25	25	25	83	2	1	53.3	53.6
Sweetzer Avenue	n/o 6th Street	Hard	30	25	25	25	207	4	2	57.2	57.5
Wilshire Boulevard	between La Cienega Boulevard and San Vicente Boulevard	Hard	30	35	35	30	2501	52	26	71.1	71.4
Wilshire Boulevard	between San Vicente Boulevard and La Jolla Avenue	Hard	30	35	35	30	2047	42	21	70.3	70.6
Wilshire Boulevard	e/o La Jolla Avenue	Hard	30	35	35	30	1926	40	20	70.0	70.3
Wilshire Boulevard	w/o La Cienega Boulevard	Hard	30	35	35	30	2508	52	26	71.1	71.4

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

TRAFFIC NOISE ANALYSIS TOOL

Project: 656 San Vicente
Scenario: Existing + Project
Source: Gibson

Roadway	Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
				Auto	MT	HT	Auto	MT	HT		
6th Street	between San Vicente Boulevard and Sweetzer Avenue	Hard	30	25	25	25	1053	22	11	64.3	64.6
6th Street	between Sweetzer Avenue and La Jolla Avenue	Hard	30	25	25	25	947	20	10	63.8	64.1
6th Street	e/o La Jolla Avenue	Hard	30	25	25	25	819	17	8	63.2	63.5
La Cienega Boulevard	n/o Wilshire Boulevard	Hard	30	35	35	30	2846	59	29	71.7	72.0
La Cienega Boulevard	s/o Wilshire Boulevard	Hard	30	35	35	30	2809	58	29	71.6	71.9
La Jolla Avenue	between 6th Street and Wilshire Boulevard	Hard	30	25	25	25	387	8	4	60.0	60.3
La Jolla Avenue	n/o 6th Street	Hard	30	25	25	25	395	8	4	60.0	60.3
La Jolla Avenue	s/o Wilshire Boulevard	Hard	30	25	25	25	52	1	1	51.2	51.5
McCarthy Vista/Carrillo Drive	s/o San Vicente Boulevard	Hard	30	25	25	25	1452	30	15	65.7	66.0
McCarthy Vista/Carrillo Drive	n/o San Vicente Boulevard	Hard	30	25	25	25	1649	34	17	66.2	66.5
Orange Street	between San Vicente Boulevard Frontage Rd and Sweetzer Avenue	Hard	30	25	25	25	231	5	2	57.7	58.0
San Vicente Boulevard	between Wilshire Boulevard and McCarthy Vista/Carrillo Drive	Hard	30	35	35	30	2677	55	28	71.4	71.7
San Vicente Boulevard	e/o McCarthy Vista/Carrillo Drive	Hard	30	35	35	30	1821	38	19	69.7	70.0
San Vicente Boulevard	between 6th Street and Orange Street	Hard	30	35	35	30	1770	37	18	69.6	69.9
San Vicente Boulevard	n/o 6th Street	Hard	30	35	35	30	3120	64	32	72.1	72.4
San Vicente Boulevard Frontage Rc	between Orange Street and Wilshire Boulevard	Hard	30	35	35	30	1562	32	16	69.1	69.4
Sweetzer Avenue	between 6th Street and Orange Street	Hard	30	25	25	25	350	7	4	59.5	59.8
Sweetzer Avenue	between Orange Street and Wilshire Boulevard	Hard	30	25	25	25	102	2	1	54.2	54.5
Sweetzer Avenue	n/o 6th Street	Hard	30	25	25	25	212	4	2	57.3	57.6
Wilshire Boulevard	between La Cienega Boulevard and San Vicente Boulevard	Hard	30	35	35	30	2583	53	27	71.3	71.6
Wilshire Boulevard	between San Vicente Boulevard and La Jolla Avenue	Hard	30	35	35	30	2087	43	22	70.3	70.6
Wilshire Boulevard	e/o La Jolla Avenue	Hard	30	35	35	30	1967	41	20	70.1	70.4
Wilshire Boulevard	w/o La Cienega Boulevard	Hard	30	35	35	30	2545	53	26	71.2	71.5

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

TRAFFIC NOISE ANALYSIS TOOL

Project: 656 San Vicente
Scenario: Future Baseline
Source: Gibson

Roadway	Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
				Auto	MT	HT	Auto	MT	HT		
6th Street	between San Vicente Boulevard and Sweetzer Avenue	Hard	30	25	25	25	1041	22	11	64.2	64.5
6th Street	between Sweetzer Avenue and La Jolla Avenue	Hard	30	25	25	25	977	20	10	64.0	64.3
6th Street	e/o La Jolla Avenue	Hard	30	25	25	25	832	17	9	63.3	63.6
La Cienega Boulevard	n/o Wilshire Boulevard	Hard	30	35	35	30	3140	65	32	72.1	72.4
La Cienega Boulevard	s/o Wilshire Boulevard	Hard	30	35	35	30	3013	62	31	71.9	72.2
La Jolla Avenue	between 6th Street and Wilshire Boulevard	Hard	30	25	25	25	436	9	5	60.5	60.8
La Jolla Avenue	n/o 6th Street	Hard	30	25	25	25	427	9	4	60.4	60.7
La Jolla Avenue	s/o Wilshire Boulevard	Hard	30	25	25	25	53	1	1	51.4	51.7
McCarthy Vista/Carrillo Drive	s/o San Vicente Boulevard	Hard	30	25	25	25	1490	31	15	65.8	66.1
McCarthy Vista/Carrillo Drive	n/o San Vicente Boulevard	Hard	30	25	25	25	1705	35	18	66.4	66.7
Orange Street	between San Vicente Boulevard Frontage Rd and Sweetzer Avenue	Hard	30	25	25	25	111	2	1	54.5	54.8
San Vicente Boulevard	between Wilshire Boulevard and McCarthy Vista/Carrillo Drive	Hard	30	35	35	30	2739	57	28	71.5	71.8
San Vicente Boulevard	e/o McCarthy Vista/Carrillo Drive	Hard	30	35	35	30	1888	39	20	69.9	70.2
San Vicente Boulevard	between 6th Street and Orange Street	Hard	30	35	35	30	1740	36	18	69.5	69.8
San Vicente Boulevard	n/o 6th Street	Hard	30	35	35	30	3252	67	34	72.3	72.6
San Vicente Boulevard Frontage Rc	between Orange Street and Wilshire Boulevard	Hard	30	35	35	30	1498	31	15	68.9	69.2
Sweetzer Avenue	between 6th Street and Orange Street	Hard	30	25	25	25	189	4	2	56.9	57.2
Sweetzer Avenue	between Orange Street and Wilshire Boulevard	Hard	30	25	25	25	106	2	1	54.3	54.6
Sweetzer Avenue	n/o 6th Street	Hard	30	25	25	25	214	4	2	57.4	57.7
Wilshire Boulevard	between La Cienega Boulevard and San Vicente Boulevard	Hard	30	35	35	30	2703	56	28	71.5	71.8
Wilshire Boulevard	between San Vicente Boulevard and La Jolla Avenue	Hard	30	35	35	30	2252	46	23	70.7	71.0
Wilshire Boulevard	e/o La Jolla Avenue	Hard	30	35	35	30	2198	45	23	70.6	70.9
Wilshire Boulevard	w/o La Cienega Boulevard	Hard	30	35	35	30	2785	57	29	71.6	71.9

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

TRAFFIC NOISE ANALYSIS TOOL

Project: 656 San Vicente
Scenario: Future + Project
Source: Gibson

Roadway	Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
				Auto	MT	HT	Auto	MT	HT		
6th Street	between San Vicente Boulevard and Sweetzer Avenue	Hard	30	25	25	25	1112	23	12	64.5	64.8
6th Street	between Sweetzer Avenue and La Jolla Avenue	Hard	30	25	25	25	1015	21	11	64.1	64.4
6th Street	e/o La Jolla Avenue	Hard	30	25	25	25	888	18	9	63.6	63.9
La Cienega Boulevard	n/o Wilshire Boulevard	Hard	30	35	35	30	3148	65	33	72.1	72.4
La Cienega Boulevard	s/o Wilshire Boulevard	Hard	30	35	35	30	3061	63	32	72.0	72.3
La Jolla Avenue	between 6th Street and Wilshire Boulevard	Hard	30	25	25	25	436	9	5	60.5	60.8
La Jolla Avenue	n/o 6th Street	Hard	30	25	25	25	427	9	4	60.4	60.7
La Jolla Avenue	s/o Wilshire Boulevard	Hard	30	25	25	25	53	1	1	51.4	51.7
McCarthy Vista/Carrillo Drive	s/o San Vicente Boulevard	Hard	30	25	25	25	1497	31	15	65.8	66.1
McCarthy Vista/Carrillo Drive	n/o San Vicente Boulevard	Hard	30	25	25	25	1710	35	18	66.4	66.7
Orange Street	between San Vicente Boulevard Frontage Rd and Sweetzer Avenue	Hard	30	25	25	25	251	5	3	58.1	58.4
San Vicente Boulevard	between Wilshire Boulevard and McCarthy Vista/Carrillo Drive	Hard	30	35	35	30	2792	58	29	71.6	71.9
San Vicente Boulevard	e/o McCarthy Vista/Carrillo Drive	Hard	30	35	35	30	1962	41	20	70.1	70.4
San Vicente Boulevard	between 6th Street and Orange Street	Hard	30	35	35	30	1882	39	19	69.9	70.2
San Vicente Boulevard	n/o 6th Street	Hard	30	35	35	30	3302	68	34	72.3	72.6
San Vicente Boulevard Frontage Rc	between Orange Street and Wilshire Boulevard	Hard	30	35	35	30	1644	34	17	69.3	69.6
Sweetzer Avenue	between 6th Street and Orange Street	Hard	30	25	25	25	409	8	4	60.2	60.5
Sweetzer Avenue	between Orange Street and Wilshire Boulevard	Hard	30	25	25	25	146	3	2	55.7	56.0
Sweetzer Avenue	n/o 6th Street	Hard	30	25	25	25	220	5	2	57.5	57.8
Wilshire Boulevard	between La Cienega Boulevard and San Vicente Boulevard	Hard	30	35	35	30	2786	57	29	71.6	71.9
Wilshire Boulevard	between San Vicente Boulevard and La Jolla Avenue	Hard	30	35	35	30	2293	47	24	70.7	71.0
Wilshire Boulevard	e/o La Jolla Avenue	Hard	30	35	35	30	2239	46	23	70.6	70.9
Wilshire Boulevard	w/o La Cienega Boulevard	Hard	30	35	35	30	2822	58	29	71.6	71.9

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

Vibration

656 San Vicente

Vibration Level Calculations

Based on Federal Transit Administration, Office of Planning and Environment

N =	1.5

Construction Equipment	**Project Equipment**	**Equipment Peak Particle Velocity @ 25 Feet* (inches/second)**	**Distance to Receptor for < 0.5 PPV (Feet)**	**Estimated Velocity Decibels @ Distance** (VdB)**	**Estimated Peak Particle Velocity @ Distance*** (inches/second)**
Unmitigated Vibration Levels					
V1					
Large Bulldozer or Bore/Drill Rig	Yes	0.089	20	89.9	0.124
Loaded Trucks	Yes	0.076	20	88.5	0.106
Jackhammer	Yes	0.035	20	81.7	0.049
Small Bulldozer	Yes	0.003	20	60.4	0.004
V2					
Large Bulldozer or Bore/Drill Rig	Yes	0.089	60	75.5	0.024
Loaded Trucks	Yes	0.076	60	74.2	0.020
Jackhammer	Yes	0.035	60	67.4	0.009
Small Bulldozer	Yes	0.003	60	46.1	0.001
V3					
Large Bulldozer or Bore/Drill Rig	Yes	0.089	65	74.5	0.021
Loaded Trucks	Yes	0.076	65	73.1	0.018
Jackhammer	Yes	0.035	65	66.4	0.008
Small Bulldozer	Yes	0.003	65	45.1	0.001
V4					
Large Bulldozer or Bore/Drill Rig	Yes	0.089	60	75.5	0.024
Loaded Trucks	Yes	0.076	60	74.2	0.020
Jackhammer	Yes	0.035	60	67.4	0.009
Small Bulldozer	Yes	0.003	60	46.1	0.001
V5					
Large Bulldozer or Bore/Drill Rig	Yes	0.089	55	76.7	0.027
Loaded Trucks	Yes	0.076	55	75.3	0.023
Jackhammer	Yes	0.035	55	68.6	0.011
Small Bulldozer	Yes	0.003	55	47.2	0.001

Source:

Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual,* 2018.

Notes:

* Values taken from Table 7-4.

** Based on the formula VdB = 20 x LOG10 (v/v_{ref}), where v_{ref} is equal to 1×10^{-6} in/sec (see page 111).

The approximate rms vibration velocity level (v) is calculated from PPV using a crest factor of 4 (see page 184).

*** Based on the formula PPV(D) = PPV(25 ft) x $(25/D)^N$, where D is equal to the distance (see page 185).

N = soil type classification factor (typically ranges from 1 to 1.5)