CITY VIEW PLAZA ENVIRONMENTAL NOISE AND VIBRATION ASSESSMENT

San José, California

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INTRODUCTION

The project proposes to develop a 19-story office building with approximately 3.6 million square feet (sf) of office space, 15,449 sf of retail space, and five levels of below-grade parking with 6,246 spaces. The building would be comprised of three towers (towers A, B, and C) and connected by multistory bridges between levels 5 and 19. The project occupies an 8.1-acre site bound by West San Fernando Street to the north, South Market Street to the east, Park Avenue to the south, and South Almaden Boulevard to the west. Nine existing commercial and office buildings and associated parking structures currently located on the site would be demolished.

This report evaluates the project's potential to result in significant noise and vibration impacts with respect to applicable California Environmental Quality Act (CEQA) guidelines. The report is divided into three sections: 1) the Setting Section provides a brief description of the fundamentals of environmental noise, summarizes applicable regulatory criteria, and discusses the results of the ambient noise monitoring survey completed to document existing noise conditions; 2) the General Plan Consistency Section discusses noise and land use compatibility utilizing policies in the City's General Plan; and, 3) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents measures, where necessary, to mitigate or reduce the impacts of the project on sensitive receptors in the vicinity.

SETTING

Fundamentals of Environmental Noise

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its *pitch* or its *loudness*. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise in a particular location. A *decibel (dB)* is a unit of measurement which indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10 decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1.

There are several methods of characterizing sound. The most common in California is the *A-weighted sound level (dBA).* This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA

are shown in Table 2. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This *energy-equivalent sound/noise descriptor* is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The *Community Noise Equivalent Level* (*CNEL*) is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 pm - 10:00 pm) and a 10 dB addition to nocturnal (10:00 pm - 7:00 am) noise levels. The *Day/Night Average Sound Level* (L_{dn} or *DNL*) is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

Effects of Noise

Sleep and Speech Interference

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noises of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA DNL. Typically, the highest steady traffic noise level during the daytime is about equal to the DNL and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12-17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is therefore possible when exterior noise levels are about 57-62 dBA DNL with open windows and 65-70 dBA DNL if the windows are closed. Levels of 55-60 dBA are common along collector streets and secondary arterials, while 65-70 dBA is a typical value for a primary/major arterial. Levels of 75-80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed; those facing major roadways and freeways typically need special glass windows.

Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The DNL as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources. When measuring the percentage of the population highly annoyed, the threshold for ground vehicle noise is about 50 dBA DNL. At a DNL of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the DNL increases to 70 dBA, the percentage of the population highly annoyed increases to about 25-30 percent of the population. There is, therefore, an increase of about 2 percent per dBA between a DNL of 60-70 dBA. Between a DNL of 70-80 dBA, each decibel increase increases by about 3 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the DNL is 60 dBA, approximately 30-35 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about 3 percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a 4 percent increase in the percentage of the population highly annoyed.

Fundamentals of Groundborne Vibration

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One method is the Peak Particle Velocity (PPV). The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. In this report, a PPV descriptor with units of mm/sec or in/sec is used to evaluate construction generated vibration for building damage and human complaints. Table 3 displays the reactions of people and the effects on buildings that continuous or frequent intermittent vibration levels produce. The guidelines in Table 3 represent syntheses of vibration criteria for human response and potential damage to buildings resulting from construction vibration.

Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest construction related groundborne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess groundborne vibration and almost exclusively to assess the potential of vibration to cause damage and the degree of annoyance for humans.

The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life, are evaluated against different vibration limits. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels, such as people in an urban environment, may tolerate a higher vibration level.

Structural damage can be classified as cosmetic only, such as paint flaking or minimal extension of cracks in building surfaces; minor, including limited surface cracking; or major, that may

threaten the structural integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher. The damage criteria presented in Table 3 include several categories for ancient, fragile, and historic structures, the types of structures most at risk to damage. Most buildings are included within the categories ranging from “Historic and some old buildings” to “Modern industrial/commercial buildings”. Construction-induced vibration that can be detrimental to the building is very rare and has only been observed in instances where the structure is at a high state of disrepair and the construction activity occurs immediately adjacent to the structure.

The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage.

TABLE 1 Definition of Acoustical Terms Used in this Report

Term	Definition
Decibel, dB	A unit describing, the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20 micro Pascals.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e. g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sounds are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 pm to 10:00 pm and after addition of 10 decibels to sound levels measured in the night between 10:00 pm and 7:00 am.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: Handbook of Acoustical Measurements and Noise Control, Harris, 1998.

TABLE 2 Typical Noise Levels in the Environment

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110 dBA	Rock band
Jet fly-over at 1,000 feet		
	100 dBA	
Gas lawn mower at 3 feet		
	90 dBA	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80 dBA	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	70 dBA	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60 dBA	
		Large business office
Quiet urban daytime	50 dBA	Dishwasher in next room
Quiet urban nighttime	40 dBA	Theater, large conference room
Quiet suburban nighttime		
	30 dBA	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20 dBA	
		Broadcast/recording studio
	10 dBA	
	0 dBA	

Source: Technical Noise Supplement (TeNS), California Department of Transportation, September 2013.

TABLE 3 Reaction of People and Damage to Buildings from Continuous or Frequent Intermittent Vibration Levels

Category	Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
1	0.01	Barely perceptible	No effect
2	0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
3	0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
4	0.1	Strongly perceptible	Threshold at which there is a risk of damage to fragile buildings with no risk of damage to most buildings
5	0.25	Strongly perceptible to severe	Threshold at which there is a risk of damage to historic and some old buildings.
6	0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential structures
7	0.5	Severe - Vibrations considered unpleasant	Threshold at which there is a risk of damage to new residential and modern commercial/industrial structures

Source: Transportation and Construction Vibration Guidance Manual, California Department of Transportation, September 2013.

Regulatory Background - Noise

The State of California and the City of San José have established regulatory criteria that are applicable in this assessment. The State CEQA Guidelines, Appendix G, are used to assess the potential significance of impacts pursuant to local General Plan policies, Municipal Code standards, or the applicable standards of other agencies. A summary of the applicable regulatory criteria is provided below.

State CEQA Guidelines. The CEQA guidelines are used in this analysis to evaluate the significance of effects of environmental noise attributable to a proposed project. Under CEQA, noise impacts would be considered significant if the project would result in:

(a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies;

(b) Generation of excessive groundborne vibration or groundborne noise levels; or

(c) For a project located within the vicinity of a private airstrip or 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, if the project would expose people residing or working in the project area to excessive noise levels.

2019 California Green Building Standards Code (Cal Green Code). The State of California established exterior sound transmission control standards for new non-residential buildings as set forth in the 2016 California Green Building Standards Code (Section 5.507.4.1 and 5.507.4.2). Section 5.507 states that either the prescriptive (Section 5.507.4.1) or the performance method (Section 5.507.4.2) shall be used to determine environmental control at indoor areas. The prescriptive method is very conservative and not practical in most cases; however, the performance method can be quantitatively verified using exterior-to-interior calculations. For the purposes of this report, the performance method is utilized to determine consistency with the Cal Green Code. The sections that pertain to this project are as follows:

> **5.507.4.1 Exterior noise transmission, prescriptive method.** Wall and roof-ceiling assemblies exposed to the noise source making up the building envelope shall meet a composite STC rating of at least 50 or a composite OITC rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 when the building falls within the 65 dBA L_{dn} noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway noise source, as determined by the local general plan noise element.
>
> **5.507.4.2 Performance method.** For buildings located, as defined by Section 5.507.4.1, wall and roof-ceiling assemblies exposed to the noise source making up the building envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level ($L_{eq\ (1\text{-}hr)}$) of 50 dBA in occupied areas during any hour of operation.

The performance method, which establishes the acceptable interior noise level, is the method typically used when applying these standards.

Santa Clara County Airport Land Use Commission Comprehensive Land Use Plan. The Comprehensive Land Use Plan adopted by the Santa Clara County Airport Land Use Commission contains standards for projects within the vicinity of San José International Airport, which are relevant to this project:

4.3.2.1 Noise Compatibility Policies

Policy N-3 Noise impacts shall be evaluated according to the Aircraft Noise Contours presented on Figure 5.

Policy N-6 Noise level compatibility standards for other types of land uses shall be applied in the same manner as the above residential noise level criteria. Table 4-1 presents acceptable noise levels for other land uses in the vicinity of the Airport.

Table 4 - 1

NOISE COMPATIBILITY POLICIES

LAND USE CATEGORY	CNEL					
	55-60	60-65	65-70	70-75	75-80	80-85
Residential – low density Single-family, duplex, mobile homes	*	**	***	****	****	****
Residential – multi-family, condominiums, townhouses	*	**	***	****	****	****
Transient lodging - motels, hotels	*	*	**	****	****	****
Schools, libraries, indoor religious assemblies, hospitals, nursing homes	*	***	****	****	****	****
Auditoriums, concert halls, amphitheaters	*	***	***	****	****	****
Sports arena, outdoor spectator sports, parking	*	*	*	**	***	****
Playgrounds, neighborhood parks	*	*	***	****	****	****
Golf courses, riding stables, water recreation, cemeteries	*	*	*	**	***	****
Office buildings, business commercial and professional, retail	*	*	**	***	****	****
Industrial, manufacturing, utilities, agriculture	*	*	*	***	***	****
* Generally Acceptable	Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements. Mobile homes may not be acceptable in these areas. Some outdoor activities might be adversely affected.					
** Conditionally Acceptable	New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Outdoor activities may be adversely affected. Residential: Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.					
*** Generally Unacceptable	New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design. Outdoor activities are likely to be adversely affected.					
**** Unacceptable	New construction or development shall not be undertaken.					

Source: Based on General Plan Guidelines, Appendix C (2003), Figure 2 and Santa Clara County ALUC 1992 Land Use Plan, Table 1

Source: Comprehensive Land Use Plan Santa Clara County, Norman Y. Mineta San José International Airport, May 25, 2011, Amended May 23, 2019.

City of San José General Plan. The Environmental Leadership Chapter in the Envision San José 2040 General Plan sets forth policies with the goal of minimizing the impact of noise on people through noise reduction and suppression techniques, and through appropriate land use policies in the City of San José. The following policies are applicable to the proposed project:

EC-1.1 Locate new development in areas where noise levels are appropriate for the proposed uses. Consider federal, state, and City noise standards and guidelines as a part of new development review. Applicable standards and guidelines for land uses in San José include:

Interior Noise Levels

- The City's standard for interior noise levels in residences, hotels, motels, residential care facilities, and hospitals is 45 dBA DNL. Include appropriate site and building design, building construction and noise attenuation techniques in new development to meet this standard. For sites with exterior noise levels of 60 dBA DNL or more, an acoustical analysis following protocols in the City-adopted California Building Code is required to demonstrate that development projects can meet this standard. The acoustical analysis shall base required noise attenuation techniques on expected Envision General Plan traffic volumes to ensure land use compatibility and General Plan consistency over the life of this plan.

Exterior Noise Levels

- The City's acceptable exterior noise level objective is 60 dBA DNL or less for residential and most institutional land uses (Table EC-1). The acceptable exterior noise level objective is established for the City, except in the environs of the San José International Airport and the Downtown, as described below:

    - For new multi-family residential projects and for the residential component of mixed-use development, use a standard of 60 dBA DNL in usable outdoor activity areas, excluding balconies and residential stoops and porches facing existing roadways. Some common use areas that meet the 60 dBA DNL exterior standard will be available to all residents. Use noise attenuation techniques such as shielding by buildings and structures for outdoor common use areas. On sites subject to aircraft overflights or adjacent to elevated roadways, use noise attenuation techniques to achieve the 60 dBA DNL standard for noise from sources other than aircraft and elevated roadway segments.

Table EC-1: Land Use Compatibility Guidelines for Community Noise in San José

LAND USE CATEGORY	EXTERIOR NOISE EXPOSURE (DNL IN DECIBELS (DBA)) 55	60	65	70	75	80
1. Residential, Hotels and Motels, Hospitals and Residential Care[1]						
2. Outdoor Sports and Recreation, Neighborhood Parks and Playgrounds						
3. Schools, Libraries, Museums, Meeting Halls, Churches						
4. Office Buildings, Business Commercial, and Professional Offices						
5. Sports Arena, Outdoor Spectator Sports						
6. Public and Quasi-Public Auditoriums, Concert Halls, Amphitheaters						

[1]Noise mitigation to reduce interior noise levels pursuant to Policy EC-1.1 is required.

Normally Acceptable:

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

Conditionally Acceptable:

- Specified land use may be permitted only after detailed analysis of the noise reduction requirements and needed noise insulation features included in the design.

Unacceptable:

- New construction or development should generally not be undertaken because mitigation is usually not feasible to comply with noise element policies.

EC-1.2 Minimize the noise impacts of new development on land uses sensitive to increased noise levels (Categories 1, 2, 3 and 6) by limiting noise generation and by requiring use of noise attenuation measures such as acoustical enclosures and sound barriers, where feasible. The City considers significant noise impacts to occur if a project would:

- Cause the DNL at noise sensitive receptors to increase by five dBA DNL or more where the noise levels would remain "Normally Acceptable;" or

- Cause the DNL at noise sensitive receptors to increase by three dBA DNL or more where noise levels would equal or exceed the "Normally Acceptable" level.

EC-1.4 Include appropriate noise attenuation techniques in the design of all new General Plan streets projected to adversely impact noise sensitive uses.

EC-1.6 Regulate the effects of operational noise from existing and new industrial and commercial development on adjacent uses through noise standards in the City's Municipal Code.

EC-1.7 Require construction operations within San José to use best available noise suppression devices and techniques and limit construction hours near residential uses per the City's Municipal Code. The City considers significant construction noise impacts to occur if a project located within 500 feet of residential uses or 200 feet of commercial or office uses would:

- Involve substantial noise generating activities (such as building demolition, grading, excavation, pile driving, use of impact equipment, or building framing) continuing for more than 12 months.

For such large or complex projects, a construction noise logistics plan that specifies hours of construction, noise and vibration minimization measures, posting or notification of construction schedules, and designation of a noise disturbance coordinator who would respond to neighborhood complaints will be required to be in place prior to the start of construction and implemented during construction to reduce noise impacts on neighboring residents and other uses.

EC-1.9 Require noise studies for land use proposals where known or suspected loud intermittent noise sources occur which may impact adjacent existing or planned land uses. For new residential development affected by noise from heavy rail, light rail, BART, or other single-event noise sources, implement mitigation so that recurring maximum instantaneous noise levels do not exceed 50 dBA L_{max} in bedrooms and 55 dBA L_{max} in other rooms.

City of San José Municipal Code. The City's Municipal Code contains a Zoning Ordinance that limits noise levels at adjacent properties. Chapter 20.30.700 states that sound pressure levels generated by any use or combination of uses on a property shall not exceed 55 dBA at any property line shared with land zoned for residential use, except upon issuance and in compliance with a Conditional Use Permit.

Chapter 20.100.450 of the City of San José Municipal Code establishes allowable hours of construction within 500 feet of a residential unit between 7:00 a.m. and 7:00 p.m. Monday through Friday unless permission is granted with a development permit or other planning approval. No construction activities are permitted on the weekends at sites within 500 feet of a residence.

Regulatory Background – Vibration

City of San José General Plan. The Environmental Leadership Chapter in the Envision San José 2040 General Plan sets forth policies with the goal of minimizing the impact of vibration through appropriate land use policies in the City of San José. The following policies are applicable to the proposed project:

EC-2.3 Require new development to minimize vibration impacts to adjacent uses during demolition and construction. For sensitive historic structures, a vibration limit of 0.08 in/sec PPV (peak particle velocity) will be used to minimize the potential for cosmetic damage to a building. A vibration limit of 0.20 in/sec PPV will be used to minimize the potential for cosmetic damage at buildings of normal conventional construction.

Existing Noise Environment

The project site is located on an 8.1-acre site bounded by West San Fernando Street to the north, South Market Street to the east, Park Avenue to the south, and South Almaden Boulevard to the west. The site is surrounded primarily by high-rise office and hotel buildings to the north and west. To the east is the Plaza de César Chávez public park, and to the south are the Tech Interactive museum and Parkside Hall convention center.

A noise monitoring survey was performed in the vicinity of the project site on Tuesday, December 3, 2019 to supplement monitoring conducted in October of 2017. The 2019 monitoring survey included four short-term measurements (ST-1 through ST-4). The 2017 monitoring survey included two long-term noise measurements (LT-1 and LT-2) and two short-term measurements (ST-5 and ST-6). Measurement locations are shown in Figure 1. Table 5 summarizes the results of the short-term measurements. The results of the long-term noise measurements are shown in Figures 2 and 3.

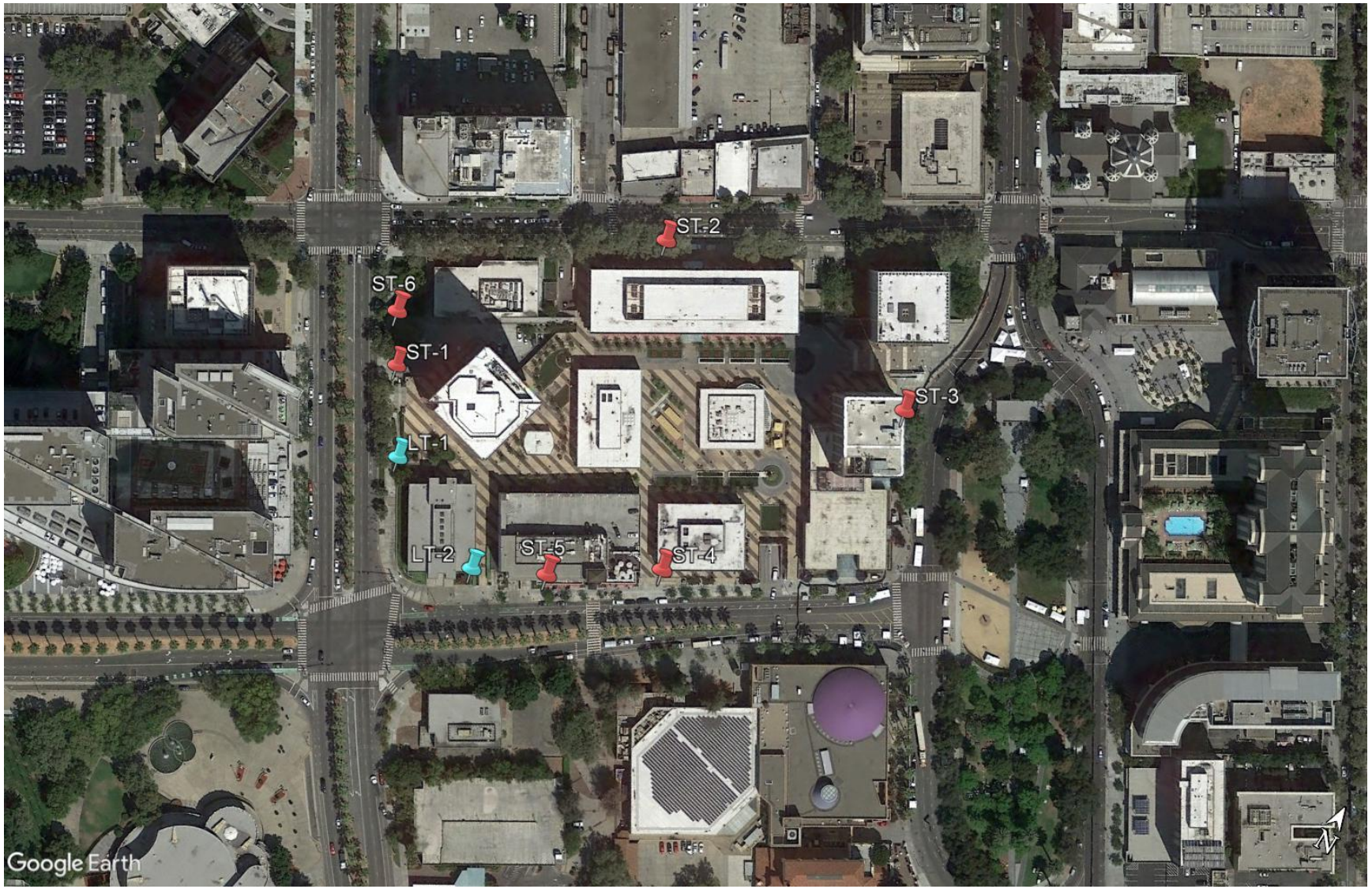
The noise environment at the site and in the surrounding areas results primarily from vehicular traffic along local roadways. Traffic from State Route 87 (SR 87) and intermittent overhead aircraft flyovers associated with the Norman Y. Mineta San José International Airport also affect the noise environment. During attended measurements ST-1 through ST-4, 3 to 4 jets flew over the site every 10 minutes, generating maximum noise levels in the range of 77 to 82 dBA L_{max}. Two Santa Clara Valley Transportation Authority (VTA) light rail train (LRT) routes run along West San Carlos Street, approximately 630 feet to the south of the site, with trains running frequently between the hours of 4:30 am and 12:30 am daily. LRT bell soundings occur as the trains exit the stop located on West San Carlos Street, east of South Almaden Boulevard. Based on observations made during the noise monitoring survey, LRT operations are not a significant contributor to the noise environment at the site.

Long-term noise measurement LT-1 was made about 75 feet from the center of South Almaden Boulevard at the north-west corner of the proposed project site. The primary noise source at this location was traffic along South Almaden Boulevard, with occasional noises generated by aircraft overflights. Hourly average noise levels ranged from 65 to 68 dBA L_{eq} at this location during

daytime hours, and from 57 to 65 dBA L_{eq} at night. Maximum intermittent noise levels reached up to 94 dBA L_{max}, with daytime maximum levels typically in the range of 72 to 80 dBA L_{max}. The day-night average noise level on Wednesday, October 25, 2017 was 69 dBA DNL.

LT-2 was measured at the south edge of the proposed site, about 85 feet from center of Park Avenue. The primary noise sources at this location were traffic on Park Avenue and South Almaden Boulevard, and intermittent jet overflights. Hourly average noise levels at this location ranged from 64 to 66 dBA L_{eq} during the day and from 58 to 65 dBA L_{eq} at night. Maximum intermittent noise levels reached 86 to 90 dBA L_{max}, with daytime maximum levels typically in the range of 72 to 86 dBA L_{max}. The day-night average noise level on Wednesday, October 25, 2017 was 68 dBA DNL.

FIGURE 1 Noise Measurement Locations



Source: Google Earth, 2019

TABLE 5 Summary of Short-Term Noise Measurement Data, December 3, 2019

ID	Location (Start Time)	Measured Noise Levels, dBA				Calculated DNL, dBA*	Primary noise source
		L_{10}	L_{50}	L_{90}	L_{eq}		
ST-1	In front of 150 S. Almaden Boulevard, 70 feet east of the centerline (12:20 pm - 12:30 pm, Tuesday, December 3, 2019)	68	63	60	66	69	Aircraft flyovers, local traffic, highway traffic, construction.
ST-2	In front of 110 W. San Fernando Street, 50 feet south of the center line (12:40 pm - 12:50 pm, Tuesday, December 3, 2019)	68	62	59	65	68	Aircraft flyovers, local traffic, highway traffic.
ST-3	In front of 125 S. Market Street, 50 feet west of the center line (1:00 pm - 1:10 pm, Tuesday, December 3, 2019)	67	60	57	63	66	Aircraft flyovers, local traffic.
ST-4	In front of 177 Park Avenue, 60 feet north of the center line (1:20 pm - 1:30 pm, Tuesday, December 3, 2019)	67	59	55	65	69	Aircraft flyovers, local traffic, highway traffic, construction.
ST-5	In front of 185 Park Avenue, 75 feet north of the center line (12:00 pm - 12:20 pm, Thursday, October 26, 2017)	67	60	58	64	68	Aircraft flyovers, local traffic
		69	60	58	65		
ST-6	In front of 134 South Almaden Boulevard, 85 feet east of the centerline (12:00 pm - 12:20 pm, Thursday, October 26, 2017)	67	62	58	65	67	Aircraft flyovers, local traffic
		66	60	57	63		

*DNL levels calculated through comparison between short-term and long-term noise levels.

FIGURE 2 Daily Trend in Noise Levels at LT-1

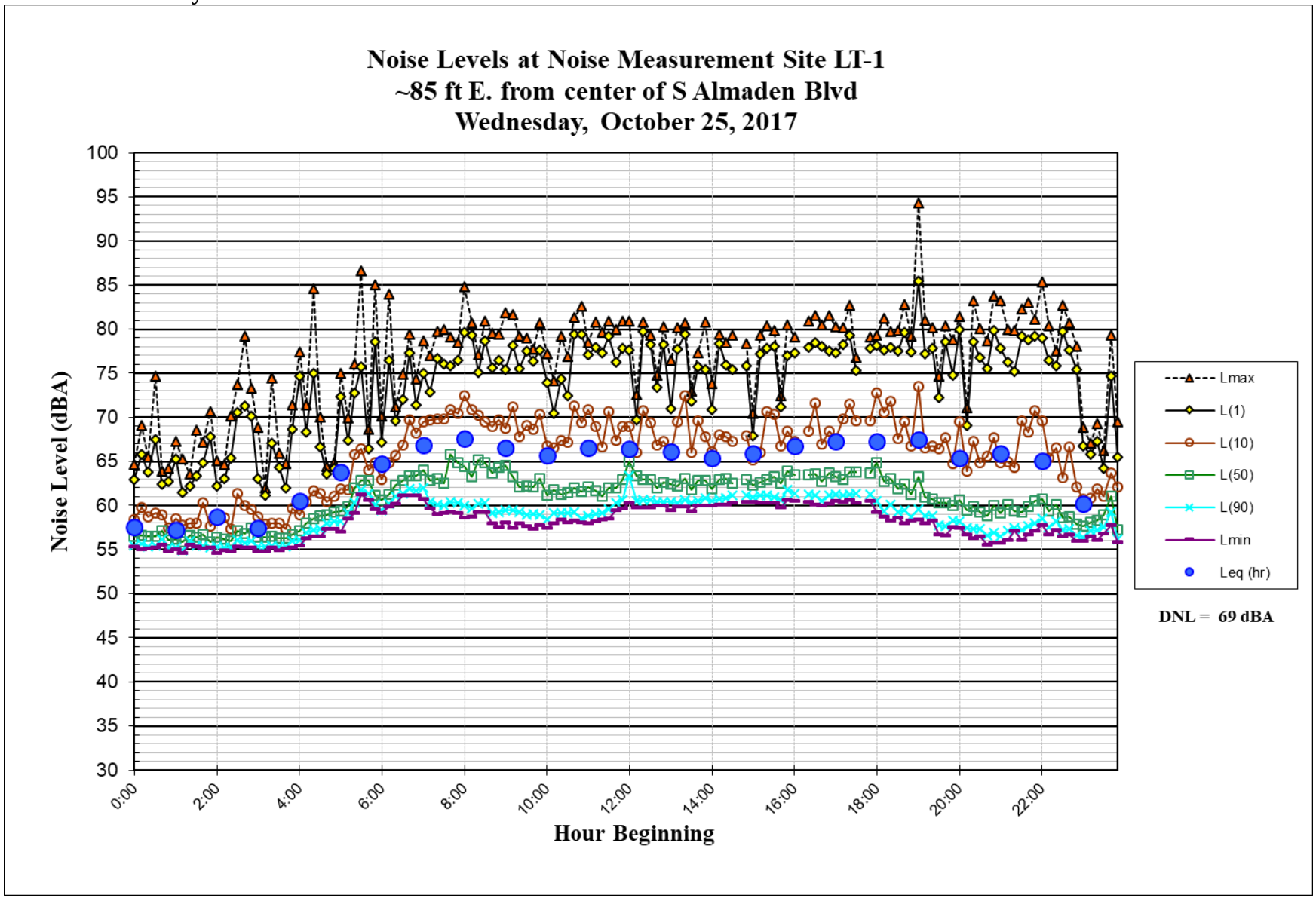
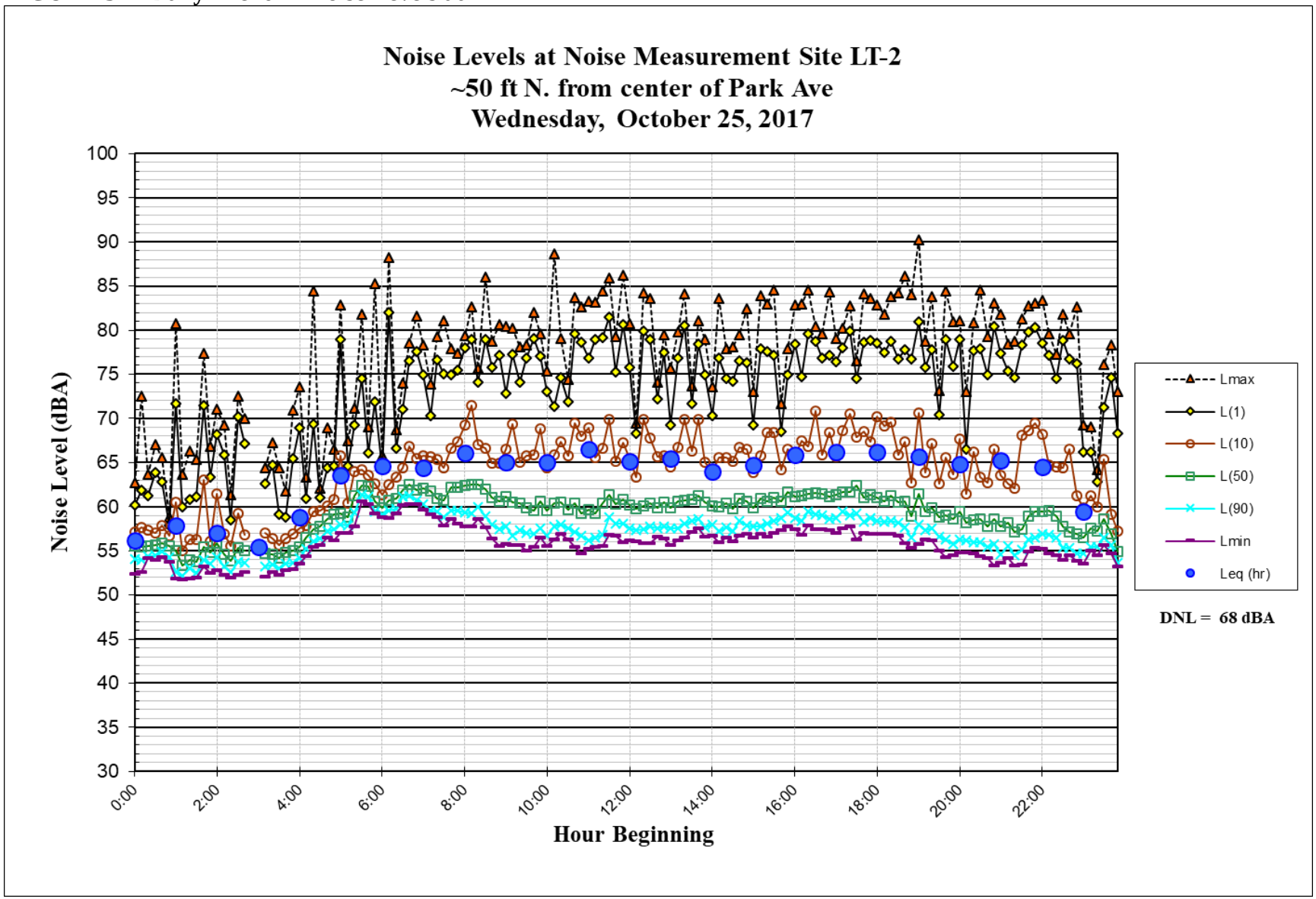


FIGURE 3 Daily Trend in Noise Levels at LT-2



GENERAL PLAN CONSISTENCY ANALYSIS

Noise and Land Use Compatibility

The Environmental Leadership Chapter in the Envision San José 2040 General Plan sets forth policies with the goal of minimizing the impact of noise on people through noise reduction and suppression techniques, and through appropriate land use policies in the City of San José. The applicable General Plan policies were presented in detail in the Regulatory Background section and are summarized below for the proposed project:

- The City's acceptable exterior noise level standard is 70 dBA DNL or less for the proposed office land use.

- The Cal Green Code standards specify an interior noise environment attributable to exterior sources not to exceed an hourly equivalent noise level ($L_{eq\ (1\text{-}hr)}$) of 50 dBA in occupied areas of non-residential uses during any hour of operation.

The future noise environment at the project site would continue to result primarily from traffic on local roadways and SR 87, and from aircraft overflights from Norman Y. Mineta San José International Airport. Based on a review of the traffic volumes contained in the *Downtown San José Strategy Plan 2040 EIR*[1], traffic noise levels at the project site are anticipated to increase by up to 2 dBA DNL above existing conditions by 2040.

Future Exterior Noise Environment

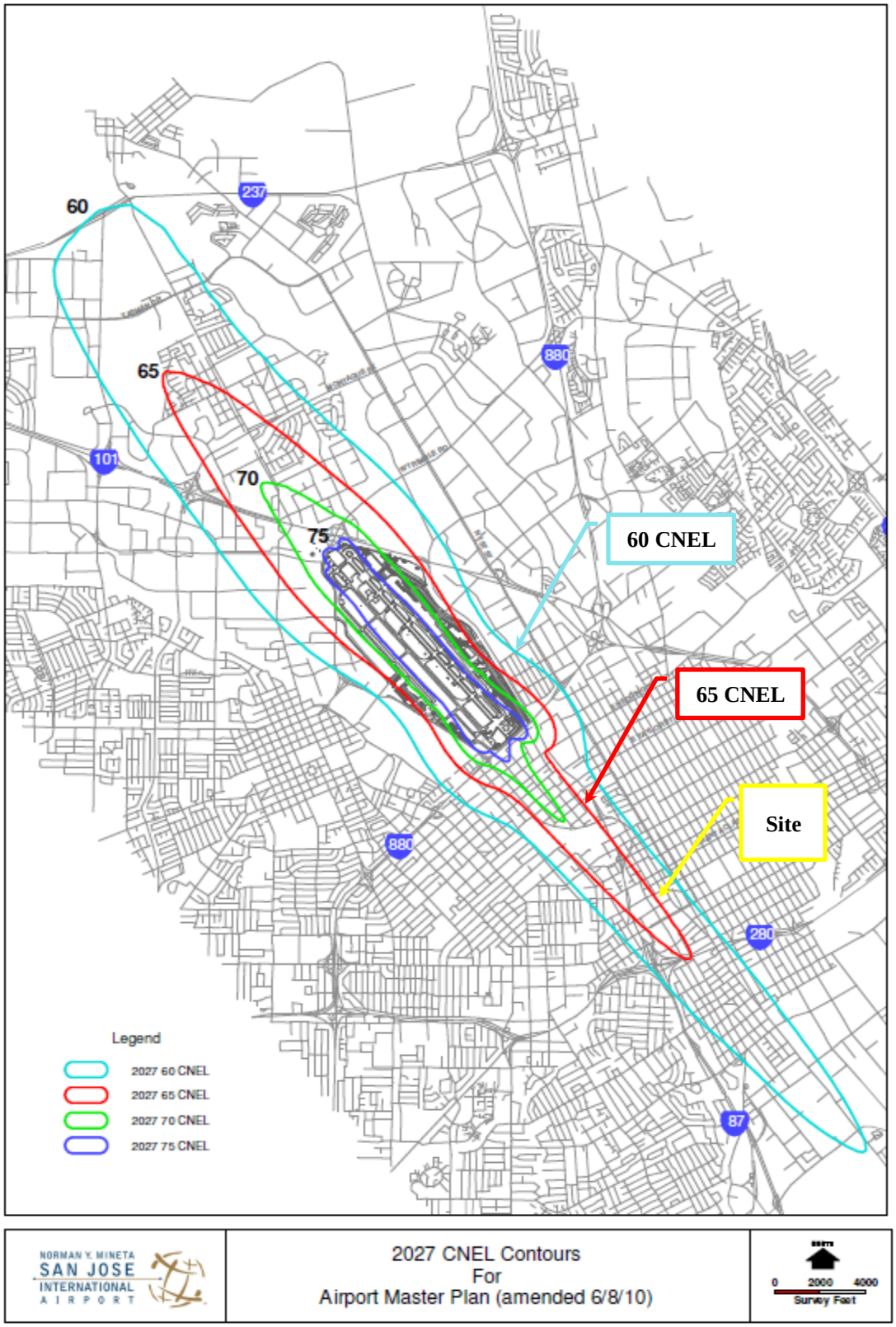
The exterior noise threshold established in the City's General Plan for new office buildings is 70 dBA DNL at usable outdoor activity areas. According to site plans dated November 15, 2019, there will be outdoor spaces including a ground-floor plaza and terraces located at various levels throughout the property.

Aircraft Noise Exposure

Norman Y. Mineta San José International Airport is a public-use airport located approximately two miles northwest of the project site. Aircraft overflights occur regularly (about every 2 to 3 minutes during the day) and typically generate maximum noise levels in the range of 70 to 80 dBA L_{max}. The aircraft noise exposure of the site is estimated to be 60 – 65 dBA CNEL/DNL, based on the 2027 CNEL contours shown in Figure 4. A portion of the western half of the site is within the 65 dBA CNEL contour, with the remaining area of the site to the east within the 60 dBA CNEL contour. For the purposes of this noise analysis, the worst-case scenario is used, with the site being exposed to aircraft noise levels of up to 65 dBA CNEL.

1 City of San José, "Downtown San José Strategy Plan 2040 Environmental Impact Report," December 2018.

FIGURE 4 Norman Y. Mineta San Jose International Airport 2027 CNEL Contours



Traffic Noise Exposure

Project geometry and roadway characteristics were input into SoundPLAN 8.1 to calculate future traffic noise levels at proposed outdoor use areas and office façades. SoundPLAN is a three-dimensional noise modeling software that considers site geometry, the characteristics of the noise sources, and shielding from structures and barriers. Local traffic volumes were supplied by *Hexagon Transportation Consultants, Inc*. (November 22, 2019). Traffic volumes along SR 87 were based on the most recently-available data from Caltrans[2]. The noise model was calibrated using the measurement data shown in Table 5, along with concurrent traffic counts made during the noise monitoring survey.

Based on the results of SoundPLAN modeling, future traffic noise levels are calculated to be 62 to 68 dBA DNL at exterior façades facing South Almaden Boulevard and SR 87 to the west, 61 to 67 dBA DNL at exterior façades facing San Fernando Street to the north, 57 to 61 dBA DNL at exterior façades facing Market Street to the east, and 59 to 66 dBA DNL at exterior façades facing Park Avenue to the south. Noise levels at façades not along the perimeter of the site are anticipated to be lower.

Combined Noise Exposure from Aircraft and Traffic Noise Sources

Table 6 indicates the traffic, aircraft, and total DNL noise exposure of site building façades. Table 7 indicates the traffic, aircraft, and total DNL noise exposure at outdoor use locations shown in project plans. It is not anticipated that the combination of traffic and aircraft activity will result in noise levels at the site exceeding the City of San José General Plan standard of 70 dBA DNL for office building use. Therefore, exterior noise levels at the site would be considered compatible with the proposed land use.

TABLE 6 Future Noise Exposure at Building Façades

Location	Future Noise Exposure by Source (dBA DNL)		
	Traffic	Aircraft Activity	Total
West Side Facing South Almaden Boulevard and SR 87	62 – 68	65	67 – 70
North Side Facing East San Fernando Street	61 – 67	65	66 – 69
East Side Facing Market Street	57 – 61	65	66
South Side Facing Park Avenue	59 – 66	65	66 – 69

2 Traffic Census Program, State of California, Department of Transportation, https://dot.ca.gov/programs/traffic-operations/census, 2017.

TABLE 7 Future Noise Exposure at Outdoor Use Areas

Location	Future Noise Exposure by Source (dBA DNL)		
	Traffic	Aircraft Activity	Total
Tower A East Terraces	50 – 65	65	65 – 68
Tower A West Terrace	59	65	66
East Bridge Terraces	39 – 53	65	65
Tower B Terraces	54 – 63	65	65 – 68
West Bridge Terraces	45 – 54	65	65
Tower C East Terrace	56	65	66
Tower C West Terraces	56 – 69	65	65 – 70
Ground Floor Plaza	47 – 58	65	65 – 66

Future Interior Noise Environment

The Cal Green Code standards specify an interior noise environment attributable to exterior sources not to exceed an hourly equivalent noise level ($L_{eq\ (1\text{-}hr)}$) of 50 dBA in occupied areas of non-residential uses during any hour of operation.

As indicated in Table 6, the exterior noise exposure resulting from both aircraft and vehicular traffic at building façades would range from 66 to 70 dBA DNL. Based on the results of long-term measurements LT-1 and LT-2, loudest hour noise levels are approximately 2 dBA below the corresponding DNL levels. Applying this relationship to the modeled results, it is anticipated that the loudest hour exterior noise exposure of building façades would range from 64 to 68 dBA L_{eq}.

Interior noise levels would vary depending on the design of the buildings (relative window to wall area) and the selected construction materials and methods. Standard modern construction with the windows closed provides approximately 20 to 25 dBA of noise reduction in interior spaces. Assuming modern construction, as indicated in project plans, and inclusion of forced-air mechanical ventilation to allow occupants the option of keeping windows closed, interior noise levels are anticipated to be between 39 and 48 dBA L_{eq} during the loudest hours of combined traffic and aircraft activity. This would comply with Cal Green Code standards.

NOISE IMPACTS AND MITIGATION MEASURES

This section describes the significance criteria used to evaluate project impacts under CEQA, provides a discussion of each project impact, and presents mitigation measures, where necessary, to reduce project impacts to less-than-significant levels.

Significance Criteria

The following criteria were used to evaluate the significance of environmental noise and vibration resulting from the project:

1. **Temporary or Permanent Noise Increases in Excess of Established Standards.** A significant noise impact would be identified if the project would generate a substantial temporary or permanent noise level increase in ambient noise levels at existing noise-sensitive receptors in excess of the applicable noise standards presented in the General Plan or Municipal Code, as follows:

    - Temporary Noise Increase. A significant noise impact would be identified if construction-related noise would temporarily increase ambient noise levels at sensitive receptors. The City of San José considers large or complex projects involving substantial noise-generating activities and lasting more than 12 months significant when within 500 feet of residential land uses or within 200 feet of commercial land uses or offices.

    - Permanent Noise Increase. A significant permanent noise level increase would occur if the project would result in: a) a noise level increase of 5 dBA DNL or greater, with a future noise level of less than 60 dBA DNL, or b) a noise level increase of 3 dBA DNL or greater, with a future noise level of 60 dBA DNL or greater.

    - Operational Noise in Excess of Standards. A significant noise impact would be identified if the project would expose persons to or generate noise levels that would exceed applicable noise standards presented in the General Plan or Municipal Code.

2. **Generation of Excessive Groundborne Vibration.** A significant impact would be identified if the construction of the project would generate excessive vibration levels surrounding receptors. Groundborne vibration levels exceeding 0.08 in/sec PPV would have the potential to result in cosmetic damage to historic buildings, and groundborne vibration levels exceeding 0.2 in/sec PPV would have the potential to result in cosmetic damage to normal buildings.

3. **Excessive Aircraft Noise Levels.** A significant noise impact would be identified if the project would expose people residing or working in the project area to excessive aircraft noise levels. Aircraft noise levels of 65 dBA CNEL or less would be considered compatible with office land uses (see Table 4-1).

Impact 1a: **Temporary Construction Noise.** Existing noise-sensitive land uses would be exposed to a temporary increase in ambient noise levels due to project construction activities. The incorporation of construction best management practices as project conditions of approval would result in lower noise levels, however there would still be a **significant and unavoidable** temporary noise impact.

Chapter 20.100.450 of the City of San José's Municipal Code establishes allowable hours of construction within 500 feet of a residential unit between 7:00 am and 7:00 pm Monday through Friday unless permission is granted with a development permit or other planning approval. No construction activities are permitted on the weekends at sites within 500 feet of a residence. Policy EC-1.7 of the City of San José's General Plan requires that all construction operations within the City use best available noise suppression devices and techniques and to limit construction hours near residential uses per the Municipal Code allowable hours. Further, the City of San José considers significant construction noise impacts to occur if a project located within 500 feet of residential uses or 200 feet of commercial or office uses would involve substantial noise-generating activities (such as building demolition, grading, excavation, pile driving, use of impact equipment, or building framing) continuing for more than 12 months.

The significance of temporary noise increases resulting from construction depend upon the noise levels generated by various pieces of construction equipment, the timing and duration of noise-generating activities, the distance between construction noise sources and noise-sensitive areas, and the presence of intervening shielding features such as buildings or terrain. Construction noise impacts primarily result when construction activities occur during noise-sensitive times of the day (e.g., early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise-sensitive land uses, or when construction lasts over extended periods of time.

Construction activities for individual projects are typically carried out in stages. During each stage of construction, there would be a different mix of equipment operating, and noise levels would vary by stage and vary within stages, based on the amount of equipment in operation and the location at which the equipment is operating. Typical construction noise levels at a distance of 50 feet are shown in Tables 8 and 9. Table 8 shows the average noise level ranges, by construction phase, and Table 9 shows the maximum noise level ranges for different construction equipment. Most demolition and construction noise falls with the range of 80 to 90 dBA at a distance of 50 feet from the source.

TABLE 8 Typical Ranges of Construction Noise Levels at 50 Feet, L_{eq} (dBA)

	Domestic Housing		Office Building, Hotel, Hospital, School, Public Works		Industrial Parking Garage, Religious Amusement & Recreations, Store, Service Station		Public Works Roads & Highways, Sewers, and Trenches	
	I	**II**	**I**	**II**	**I**	**II**	**I**	**II**
Ground Clearing	83	83	84	84	84	83	84	84
Excavation	88	75	89	79	89	71	88	78
Foundations	81	81	78	78	77	77	88	88
Erection	81	65	87	75	84	72	79	78
Finishing	88	72	89	75	89	74	84	84

I - All pertinent equipment present at site.
II - Minimum required equipment present at site.

Source: U.S.E.P.A., Legal Compilation on Noise, Vol. 1, p. 2-104, 1973.

TABLE 9 Construction Equipment 50-foot Noise Emission Limits

Equipment Category	L_{max} Level (dBA)[1,2]	Impact/Continuous
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor[3]	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact
Impact Pile Driver	105	Impact
Insitu Soil Sampling Rig	84	Continuous
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous
Pumps	77	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous
Soil Mix Drill Rig	80	Continuous
Street Sweeper	80	Continuous
Tractor	84	Continuous
Truck (dump, delivery)	84	Continuous
Vacuum Excavator Truck (vac-truck)	85	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

Notes:

1 Measured at 50 feet from the construction equipment, with a "slow" (1 sec.) time constant.

2 Noise limits apply to total noise emitted from equipment and associated components operating at full power while engaged in its intended operation.

3 Portable Air Compressor rated at 75 cfm or greater and that operates at greater than 50 psi.

Source: Mitigation of Nighttime Construction Noise, Vibrations and Other Nuisances, National Cooperative Highway Research Program, 1999.

Construction of the project is estimated to occur 24 hours per day, 7 days per week for a period of approximately 69 months. A detailed list of equipment expected to be used during each phase of construction was provided and assessed for each phase of construction. Federal Highway Administration's (FHWA's) Roadway Construction Noise Model (RCNM) was used to calculate the hourly average noise levels for each phase of construction, assuming every piece of equipment would operate simultaneously, which would represent the worst-case scenario. Pile driving is not anticipated as a method of construction.

Noise sensitive uses surrounding the site include the San José Museum of Art, Café Too, and the Fairmont hotel approximately 350 feet to the east; an AT&T office, a subsidized interim housing building, a law office, and commercial uses including restaurants approximately 90 feet to the north; the Adobe offices approximately 150 feet to the west; and the Parkside Hall convention center and The Tech Interactive museum approximately 100 feet to the south. There are no permanent residences within 500 feet of the site; however, there are hotels including the Fairmont located approximately 350 feet to the east and the Hyatt Place located approximately 550 feet to the south. The Plaza Hotel building to the north is used for interim housing for the homeless. Commercial uses are located within 200 feet of the site. Additionally, the City has approved permits for construction of two residential tower projects in the site vicinity. The Greyhound residential development (San José file number SP16-021) would be located at 70 South Almaden Avenue, approximately 200 feet north of the site. North of the Greyhound development, across Post Street, would be the Post and San Pedro Tower (San José file numbers H14-023 and HA14-023-02) located at 171 Post Street, approximately 500 feet north of the site.

Hourly average construction noise levels for each construction phase, assuming all equipment operating simultaneously, are shown in Table 10 for each of the nearby noise sensitive land uses relative to the center of the active construction site. Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of the distance between the source and receptor. Noise levels in shielded areas would be anticipated to be 5 to 20 dB lower.

TABLE 10 Calculated Construction Noise Levels at Nearby Land Uses

Phase of Construction	Total Work Days	Calculated Hourly Average Noise Levels, L_{eq} (dBA)			
		Commercial, Office, and Interim Housing Uses to the North (300 ft)	Convention Center and Museum to the South (400 ft)	Offices to the West (500 ft)	Hotel, Museum, Commercial Uses to the East (650 ft)
Demolition	206	76	74	72	69
Site Preparation	45	74	72	70	67
Shoring	194	72	70	68	65
Grading/Excavation	362	73	71	69	66
Building Exterior/Interior	1,238	74	72	70	67
Paving/Hardscape	465	70	67	65	63

Ambient noise levels in the surrounding areas range from about 65 to 68 dBA L_{eq} during daytime hours and from 55 to 65 dBA L_{eq} during nighttime hours. Noise levels due to construction activities would exceed ambient levels at the nearby hotel, museums, convention center, interim housing,

and commercial buildings during most phases of construction. Construction would occur for a period of more than 12 months.

Maps for construction hauling routes to and from the project site were provided and are shown below in Figures 6 and 7. It is estimated that 1,475,000 square feet of existing structures and 500 tons of pavement would be demolished and hauled off-site, and approximately 1,000,000 cubic yards of soil would need to be excavated and hauled off-site. Cement trucks would make 27,780 total round-trips to and from the site. Due to the large amount of demolition and excavation that needs to be done, it is anticipated that the number of trips resulting from construction activities on surrounding roads will be substantial and would result in additional traffic noise increases in the site vicinity.

FIGURE 6 Hauling Routes to Project Site

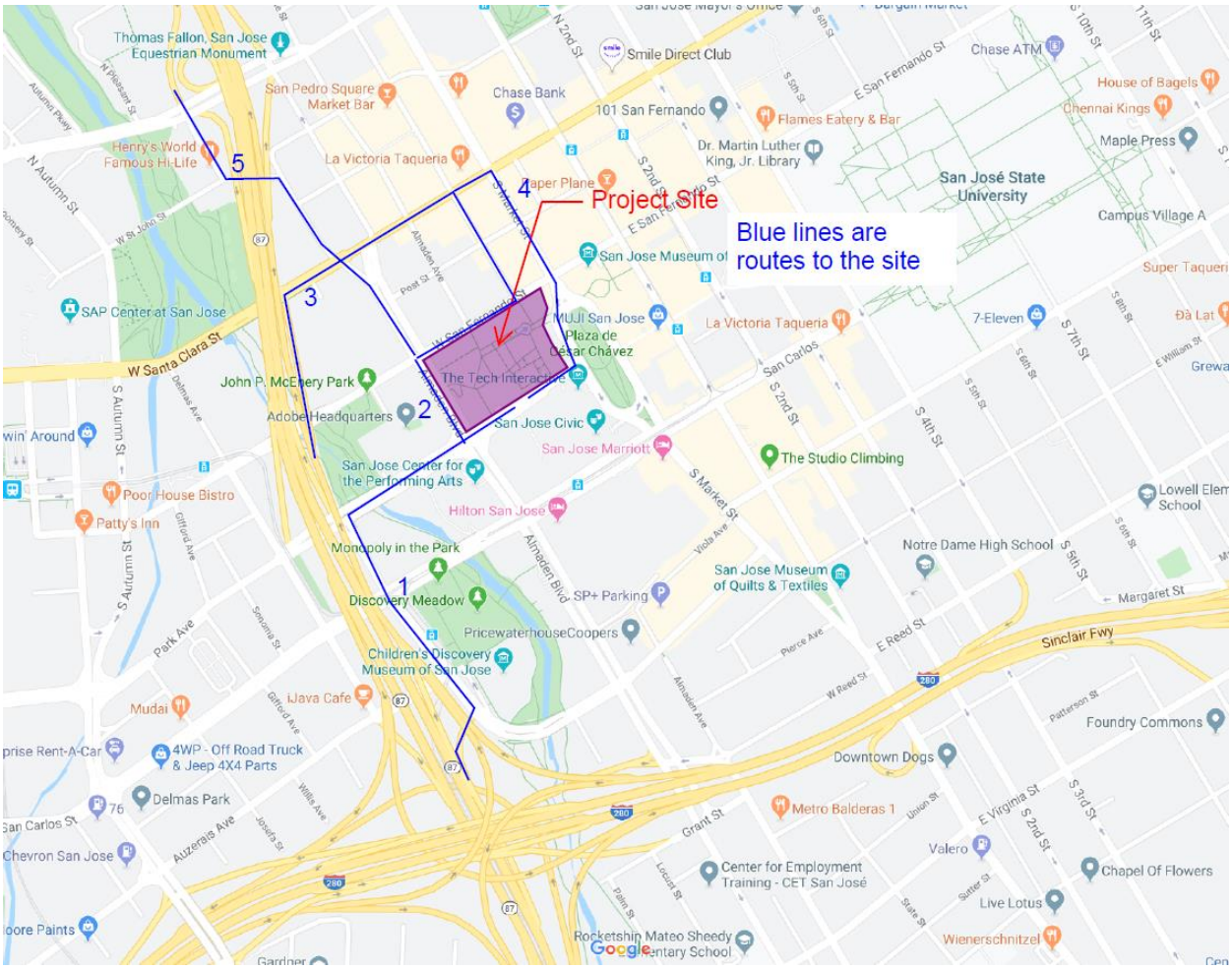
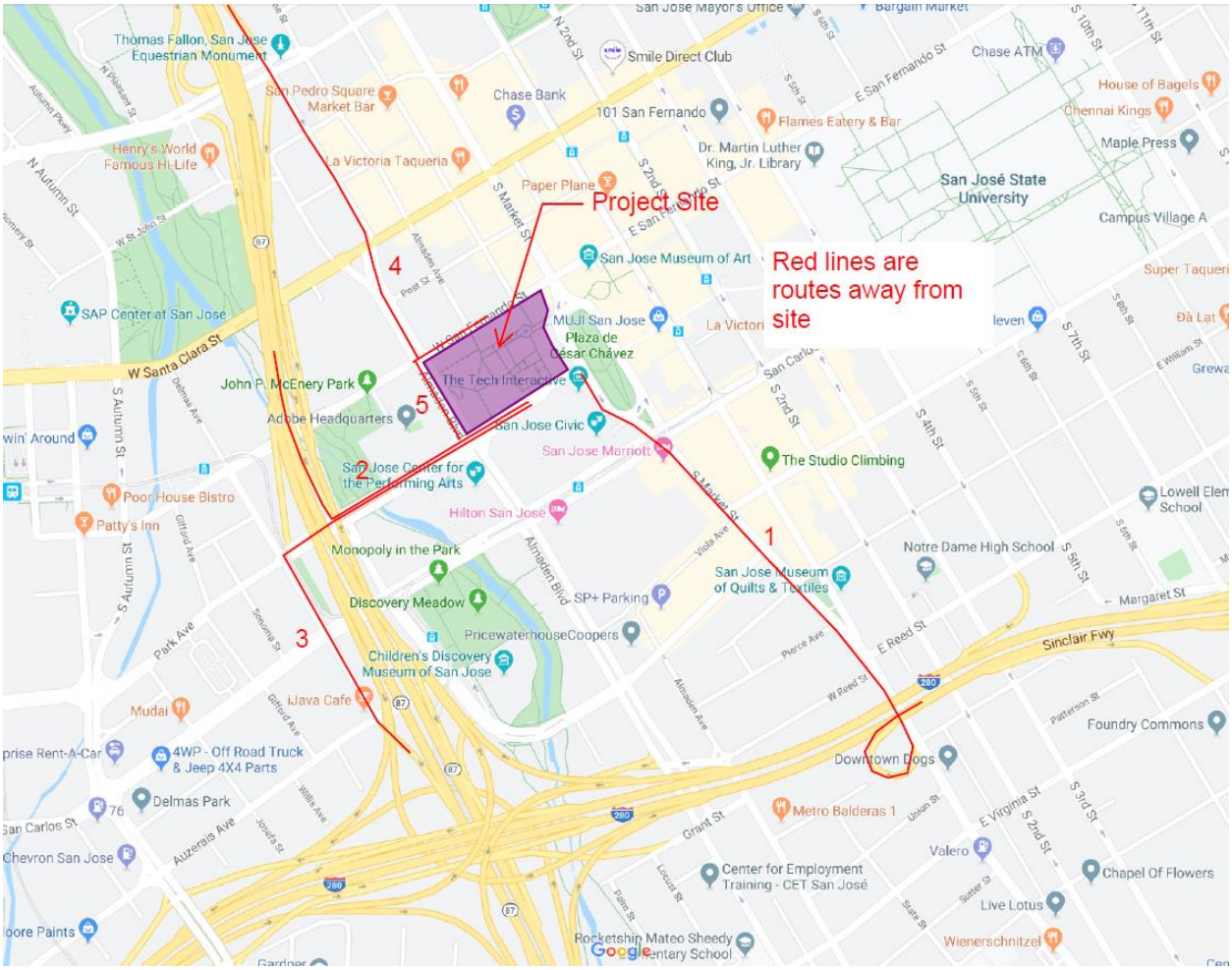


FIGURE 7 Hauling Routes from Project Site



Additionally, the project applicant seeks approval to allow for construction to take place outside of hours set in Municipal code. Nighttime construction would occur during all phases of construction, including 20 (twenty) 24-hour concrete pours which would be scheduled for Fridays and Saturdays throughout the duration of construction. Nighttime construction would not be anticipated to affect daytime use facilities, such as office or museum uses. However, nighttime construction occurring for 69 months would be anticipated to have adverse effects on hotel operations, interim housing, and future residences, should they be constructed and occupied at the time of Project construction.

The Plaza hotel, located approximately 110 feet north of the site along South Almaden Avenue, was converted to a subsidized interim housing facility in 2017. Tenants are expected to stay on average between 3 and 6 months. The building is shielded on the south side by adjacent commercial uses. Worst-case noise levels of about 81 dBA L_{eq} would occur at the building's western façade when heavy construction activities occur along the site's northern boundary, taking into account about 4 dBA of reduction from the intervening structures. Typical construction levels would range between 65 and 69 dBA L_{eq} at the building's western façade.

The Fairmont hotel is located approximately 350 feet to the east of the nearest site property line. Worst-case noise levels of about 75 dBA L_{eq} would occur at the hotel's western façade when heavy construction activities occur along the site's eastern boundary. Typical construction noise levels would range between 63 and 69 dBA L_{eq} at the hotel's western façade.

The Hyatt Place hotel is located approximately 550 feet south of the project site. Worst-case noise levels of about 71 dBA L_{eq} would occur at the hotel's northern façade when heavy construction activities occur along the site's southern boundary. Typical construction noise levels would range between 62 and 68 dBA L_{eq} at the hotel's northern façade.

Future residential towers are approved to be constructed about 200 feet north of the site at the Greyhound development, and 500 feet north of the site at the Post and San Pedro Tower development. The timeline of construction and occupation of these residential towers is not known. Worst-case noise levels of about 79 dBA L_{eq} would occur at the southern façade of the Greyhound towers when heavy construction activities occur along the site's northern boundary. Typical construction noise levels would range between 67 and 73 dBA L_{eq} at the tower's southern façade. Construction noise levels at the Post and San Pedro Tower are anticipated to be lower due to increased distance from the site and shielding provided by the Greyhound towers. Without considering shielding, the southern façade of the Post and San Pedro Tower would be exposed to worst-case noise levels of about 75 dBA L_{eq} when heavy construction activities occur along the site's northern boundary. Typical construction noise levels would range between 63 and 69 dBA L_{eq} at the tower's southern façade. With considerable progress in the construction of the Greyhound development's towers made by the time of occupancy of residences at the Post and San Pedro Tower, an additional 10 to 20 dBA L_{eq} of noise attenuation can be expected.

Standard hotel or residential tower construction with windows closed would be expected to result in 25 dBA exterior-to-interior noise reduction. As a result, construction noise levels within rooms located along the western façade of the Fairmont could reach 50 dBA L_{eq} during worst-case construction conditions, and between 38 and 44 dBA L_{eq} during more typical conditions. Construction noise levels within rooms along the northern façade of the Hyatt Place would reach 46 dBA L_{eq} during worst-case conditions, and between 36 and 42 dBA L_{eq} throughout typical conditions. Construction noise levels within rooms along the western façade of the Plaza hotel building would reach 56 dBA L_{eq} during worst-case construction conditions, and between 40 and 44 dBA L_{eq} throughout typical conditions. Construction noise levels within rooms along the southern façade of the approved Greyhound development towers would reach 54 dBA L_{eq} during worst-case construction conditions, and between 42 and 48 dBA L_{eq} throughout typical conditions. Without considering shielding provided by the Greyhound towers, construction noise levels within rooms along the southern façade of the approved Post and San Pedro Tower would reach 50 dBA L_{eq} during worst-case construction conditions, and between 38 and 44 dBA L_{eq} throughout typical conditions.

Steady noise levels above about 35 dBA and fluctuating noise levels above about 45 dBA have been shown to negatively affect sleep (see Fundamentals Section). Therefore, the project's proposed nighttime construction could interfere with the ability to sleep of hotel guests staying in rooms nearest the western façade of the Fairmont, in rooms nearest the northern façade of the Hyatt Place, and of interim housing residents in rooms along the western façade of the Plaza hotel

building. Depending on the timeline of construction and occupation of the Greyhound and Post and San Pedro Tower residences approved for development to the north of the site, residents in south-facing units of these towers would also be affected.

Since project construction would last for a period of more than one year and is within 200 feet of existing commercial uses, and within 500 feet of planned residential uses, this temporary construction impact would be considered **potentially significant** in accordance with Policy EC-1.7 of the City's General Plan. Use of nighttime construction would result in **significant and unavoidable impacts** at the Fairmont and Hyatt Place hotels to the east and south of the site and at the Plaza Hotel interim housing and occupied residences of the planned residential towers to the north.

Mitigation Measure 1a: The following measures are recommended to reduce construction noise levels emanating from the site and minimize disruption and annoyance.

Policy EC-1.7 of the City's General Plan states that for large or complex projects within 500 feet of residential land uses or within 200 feet of commercial land uses or offices involving substantial noise-generating activities lasting more than 12 months, a construction noise logistics plan that specifies hours of construction, noise and vibration minimization measures, posting or notification of construction schedules, and designation of a noise disturbance coordinator who would respond to neighborhood complaints will be required to be in place prior to the start of construction and implemented during construction to reduce noise impacts on neighboring residents and other uses.

Modification, placement, and operation of construction equipment are possible means for minimizing the impact on the existing sensitive receptors. Construction equipment should be well-maintained and used judiciously to be as quiet as possible. Additionally, construction activities for the proposed project should include the following best management practices to reduce noise from construction activities near sensitive land uses:

- Construct solid plywood fences around construction sites adjacent to operational businesses, residences, or other noise-sensitive land uses.

- Equip all internal combustion engine-driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.

- Unnecessary idling of internal combustion engines should be strictly prohibited.

- Locate stationary noise-generating equipment such as air compressors or portable power generators as far as possible from sensitive receptors. Construct temporary noise barriers to screen stationary noise-generating equipment when located near adjoining sensitive land uses. Temporary noise barriers could reduce construction noise levels by 5 dBA.

- Utilize "quiet" air compressors and other stationary noise sources where technology exists.

- Control noise from construction workers' radios to a point where they are not audible at existing residences bordering the project site.

- Notify all adjacent business, residences, and other noise-sensitive land uses of the construction schedule, in writing, and provide a written schedule of "noisy" construction activities to the adjacent land uses and nearby residences.

- A temporary noise control blanket barrier could be erected, if necessary, along building facades facing construction sites. This mitigation would only be necessary if conflicts occurred which were irresolvable by proper scheduling. Noise control blanket barriers can be rented and quickly erected.

- Designate a "disturbance coordinator" who would be responsible for responding to any complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., bad muffler, etc.) and will require that reasonable measures be implemented to correct the problem. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include in it the notice sent to neighbors regarding the construction schedule.

Implementation of the above measures could be expected to reduce noise levels resulting from construction by 5 to 10 dBA. However, guests of the Fairmont and Hyatt Place hotels, interim housing at the Plaza Hotel, and any occupied units in the of proposed residential towers to the north would experience interior noise levels greater than 40 dBA L_{eq} during nighttime construction activities. These noise levels would have the potential to affect hotel guests' ability to sleep. Because of this, noise resulting from construction remains a **significant and unavoidable** impact.

Impact 1b: **Permanent Noise Level Increase.** The proposed project is calculated to cause a substantial permanent traffic noise level increase at the existing sensitive land uses in the project vicinity. **This is a potentially significant impact.**

Policy EC-1.2 of the City's General Plan defines a significant permanent noise increase to occur if the project would increase noise levels at noise-sensitive receptors by 3 dBA DNL or more where ambient noise levels exceed the "normally acceptable" noise level standard and 5 dBA DNL or more where ambient noise levels are at or below the "normally acceptable" noise level standard. The City's General Plan defines the maximum "normally acceptable" outdoor noise level standard for the nearby hotels, churches, museums, and meeting halls to be 60 dBA DNL. Parks including the Plaza de César Chávez directly east of the site have a maximum "normally acceptable" outdoor noise level standard of 65 dBA DNL. Nearby commercial and office land uses have a maximum "normally acceptable" outdoor noise level standard of 70 dBA DNL. Existing ambient levels, based on the measurements made in the project vicinity, are between 65 and 70 dBA DNL. Therefore, a significant impact at the hotels, churches, museums, meeting halls, and parks would occur if traffic due to the proposed project would permanently increase ambient levels by 3 dBA DNL. At commercial and office uses, a significant impact would occur if traffic due to the proposed project would permanently increase ambient levels by 5 dBA DNL. For reference, a 3 dBA DNL noise increase would be expected if the project would double existing traffic volumes along a roadway.

Traffic noise increases were calculated by comparing Existing and Existing + Project traffic volumes, provided in the project's traffic study[3]. Based on this comparison, traffic noise increases attributable to the project would be significant along multiple roads in the project vicinity. A calculated increase of 3 dBA DNL on East San Fernando Avenue west of South Market Street would be considered significant due to the proximity to the San José Museum of Art and the Cathedral Basilica of St. Joseph. A calculated increase of 3 dBA DNL along Park Avenue between South Almaden Boulevard and South Market Street would be considered significant due to the proximity to The Tech Interactive museum and Parkside Hall. A calculated increase of 4 dBA DNL along South Market Street near the western side of the Plaza de César Chávez park would be considered significant. This is a **potentially significant impact**.

Mitigation Measure 1b: The following measures are recommended to reduce the impact of traffic noise level increases on surrounding sensitive uses.

The San José Downtown Strategy 2040 Plan addresses traffic noise increases in the downtown area as a result of ongoing development. The Plan offers the following methods of reducing traffic noise:

- Noise barriers could be constructed along the perimeter of the park to provide noise attenuation.

- Traffic calming could be implemented to reduce noise levels expected with the project. Each five-mph reduction in average speed provides approximately one dBA of noise reduction on an average basis (L_{eq}/DNL).

Implementation of one of the measures listed above or of acoustically equivalent measures would reduce this impact to a **less than significant** level. However, since implementation would require construction of facilities not owned by the project applicant, these measures may not be feasible. If measures are not found to be feasible, this impact would be **significant and unavoidable**.

Impact 1c: **Noise Levels in Excess of Standards.** The proposed project could generate noise in excess of standards established in the City's General Plan at the nearby sensitive receptors. This is a **potentially significant impact**.

Truck Loading and Unloading

Truck deliveries would occur on the ground level along the western and northern façades of the buildings. The western loading dock would be mostly shielded to the north and south by the surrounding buildings. The northern loading dock would be almost entirely shielded by the surrounding building. While delivery pickup times and frequency of these events were not provided at the time of this study, it is assumed that these activities, including maintenance activities, would occur during daytime hours.

All trucks making deliveries to the west tower would access the loading zone from the service lane running from South Almaden Boulevard along the northern façade of the west tower and south of

[3] *Cityview Plaza Office Development Trip Generation Estimates*, Hexagon Transportation Consultants, November 12, 2019

the 190 Park Avenue building to the north. Trucks would access the loading zone of the central and eastern towers via the entrance along the northern façade facing East San Fernando Street. Typically, trucks would travel at speeds of 5 to 10 mph in these service lanes. At a distance of 35 feet from the centerline of the driveway, a heavy truck pass-by would generate noise levels ranging from 68 to 70 dBA and would last for less than 5 minutes.

Trucks maneuvering at loading docks would generate a combination of engine, exhaust, and tire noise, as well as the intermittent sounds of back-up alarms and releases of compressed air associated with truck/trailer air-brakes. Heavy trucks used for incoming deliveries typically generate maximum instantaneous noise levels of 70 to 75 dBA L_{max} at a distance of 50 feet. The noise level of backup alarms can vary depending on the type and directivity of the sound, but maximum noise levels are typically in the range of 65 to 75 dBA L_{max} at a distance of 50 feet. Since truck maneuvering in the loading zones would be shielded from the land uses to the north and to the south by the building façades, the only buildings that would be exposed to loading zone truck noise would be the Adobe offices to the west across South Almaden Boulevard, approximately 200 feet away.

Assuming up to 2 deliveries per day at the western tower, the highest noise levels due to truck deliveries would be expected at the Adobe offices to the west, where levels would reach 49 dBA DNL. Noise resulting from truck deliveries would be lower at other surrounding land uses. Truck deliveries occurring at the proposed project site are not expected to generate levels exceeding 50 dBA DNL or existing ambient conditions at the nearby noise-sensitive land uses including commercial uses and interim housing to the north, the Plaza de César Chávez park to the east, the Tech Interactive museum and Parkside Hall convention center to the south, or the Adobe offices to the west.

Mechanical Equipment Noise

High-rise structures typically include various mechanical equipment for heating, ventilation, and air-conditioning (HVAC) needs. Site plans indicate that each of the three towers would have rooms for HVAC equipment, electrical equipment, and emergency generators located on the rooftop penthouse level. At the time of this analysis, specific details such as manufacturer's noise data for such equipment was not available; however, the generators have been specified to be provided with enclosures which would reduce generator noise levels by 25 dBA. For the purpose of this analysis, noise data of HVAC equipment and generators used for similar facilities was used. The analysis assumes 3 rooftop generators with sound power levels of 110 dBA and 5 rooftop chillers with sound power levels of 107 dBA. Results of the model show that noise levels at receiving noise-sensitive land uses would reach a maximum of 50 dBA DNL. This would not exceed the 55 dBA DNL standard established within the City's Noise Element. However, due to the number of variables inherent in the mechanical equipment needs of the project, the impacts of mechanical equipment noise on nearby noise-sensitive uses should be assessed during the final project design stage. The final design plans should be reviewed by a qualified acoustical consultant to address any potential conflicts.

Mitigation Measure 1c:

Prior to the issuance of building permits, mechanical equipment shall be selected and designed to reduce impacts on surrounding uses to meet the City's 55 dBA DNL requirement. A qualified acoustical consultant shall be retained by the project applicant to review mechanical noise as the equipment systems are selected in order to determine specific noise reduction measures necessary to reduce noise to comply with the City's noise limit at the shared property lines. Noise reduction measures could include, but are not limited to, selection of equipment that emits low noise levels and/or installation of noise barriers, such as mechanical equipment screens or enclosures.

With implementation of Mitigation Measure 1c, this would be a **less-than-significant** impact.

Impact 2: **Generation of Excessive Groundborne Vibration.** Construction-related vibration levels are expected to potentially exceed applicable vibration thresholds at a nearby sensitive land use. **This is a potentially significant impact.**

Demolition and construction activities required for construction often generate perceptible vibration levels and levels that could affect nearby structures when heavy equipment or impact tools (e.g. jackhammers, pile drivers, hoe rams) are used in the vicinity of nearby sensitive land uses. Building damage generally falls into three categories. Cosmetic damage (also known as threshold damage) is defined as hairline cracking in plaster, the opening of old cracks, the loosening of paint or the dislodging of loose objects. Minor damage is defined as hairline cracking in masonry or the loosening of plaster. Major structural damage is defined as wide cracking or the shifting of foundation or bearing walls.

Policy EC-2.3 of the City of San José General Plan establishes a vibration limit of 0.08 in/sec PPV to minimize the potential for cosmetic damage to sensitive historic structures, and a vibration limit of 0.2 in/sec PPV to minimize damage at buildings of normal conventional construction. The vibration limits contained in this policy are conservative and designed to provide the ultimate level of protection for existing buildings in San José.

The California Department of Transportation published a Transportation and Construction Guidance Manual in 2013. The Manual developed a synthesis of various vibration criteria to assess the damage potential for representative categories of structures and effects upon people. The guideline criteria, summarized in Table 3 of the Setting section, refine the categories and thresholds set forth in Policy EC-2.3, establishing seven separate categories. The first two categories (Categories 1 and 2) address human perceptibility of vibration only. The five remaining categories (Categories 3-7) address human perceptibility and potential for damage to buildings described as "Extremely fragile historic buildings, ruins, ancient monuments", "Fragile buildings", "Historic and some old buildings", "Older residential structures", "New residential structures", and "Modern industrial/commercial buildings". Most, if not all buildings in the downtown area would fall into Categories 5-7. The goal in establishing vibration limits is to mitigate potential vibration impacts associated with demolition and construction activities to a less-than-significant level by establishing safe limits to protect structures from potential damage and to minimize vibration impacts on people and businesses. The vibration limits contained in Policy EC-2.3 utilized criteria from literature available to the City in 2008 that are conservative, and given the broad categories, are now believed to be too general for buildings in the Downtown Strategy 2040 Plan area. Given that the new guideline criteria best accomplish the goal to identify and mitigate

construction vibration impacts, the Downtown Strategy 2040 Integrated Final EIR recommends that these criteria be utilized to implement General Plan Policy EC-2.3 for projects facilitated by the Downtown Strategy 2040 Plan.

According to the City of San José Historic Resources Inventory,[4] historic buildings within 500 feet of the site include the Old Post Office, the Alameda French Bakery, the San Jose Center for the Performing Arts, the Civic Auditorium, St. Joseph's Church, the Market Post Tower, Hotel Metropole, and the Berger Building. These historic buildings would be classified as Category 5 structures and the 0.25 in/sec PPV Caltrans threshold criteria would apply. The remaining buildings surrounding the site would fall under Category 7 for modern commercial and industrial structures and the 0.5 in/sec PPV threshold criteria would apply.

Construction activities associated with the project would include demolition of existing site improvements, site preparation, foundation work, new building framing and finishing, and paving. According to construction information provided by the project design team, due to the density in the immediate area and proximity to other structures, no piles will need to be driven.

Table 11 presents typical vibration levels from construction equipment at 25 feet. Jackhammers typically generate vibration levels of 0.035 in/sec PPV, and drilling typically generates vibration levels of 0.09 in/sec PPV at 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used. Table 11 also presents construction vibration levels at various distances from the construction equipment. Calculations were made to estimate vibration levels at distances of 10 feet from the site to represent the distance between the building at 190 Park Avenue and the nearest site property line, as well as distances of 70 and 115 feet from the site to represent other nearby buildings. Vibration levels are highest close to the source, and then attenuate with increasing distance at the rate $(D_{ref}/D)^{1.1}$, where D is the distance from the source in feet and D_{ref} is the reference distance of 25 feet.

4 "City of San José Historic Resources Inventory." City of San José, February 8, 2016, www.sanjoseca.gov/DocumentCenter/View/35475 .

TABLE 11 Vibration Levels for Construction Equipment at Various Distances

Equipment		PPV at 10 ft. (in/sec)	PPV at 25 ft. (in/sec)	PPV at 70 ft. (in/sec)	PPV at 115 ft. (in/sec)
Clam shovel drop		0.553	0.202	0.065	0.038
Hydromill (slurry wall)	in soil	0.022	0.008	0.003	0.001
	in rock	0.047	0.017	0.005	0.003
Vibratory Roller		0.575	0.210	0.068	0.039
Hoe Ram		0.244	0.089	0.029	0.017
Large bulldozer		0.244	0.089	0.029	0.017
Caisson drilling		0.244	0.089	0.029	0.017
Loaded trucks		0.208	0.076	0.024	0.014
Jackhammer		0.096	0.035	0.011	0.007
Small bulldozer		0.008	0.003	0.001	0.001

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration.

The nearest historic building, the Old Post Office, is located approximately 115 feet to the east of the site. As shown in Table 11, vibration levels at this distance would not be anticipated to exceed the 0.25 in/sec PPV Caltrans threshold for historic and old structures, nor would they be anticipated to exceed the City's more conservative 0.08 in/sec PPV threshold for historic structures.

As indicated in Table 11, heavy vibration generating construction equipment, such as vibratory rollers and clam shovel drops, would have the potential to produce vibration levels greater than 0.5 in/sec PPV within about 12 feet of construction. One structure, the 190 Park Avenue building, is located within 12 feet of the site.

The US Bureau of Mines has analyzed the effects of blast-induced vibration on buildings in USBM RI 85075, and these findings have been applied to vibrations emanating from construction equipment on buildings[6]. Figure 5 presents the damage probability as reported in USBM RI 8507 and reproduced by Dowding assuming a maximum vibration level of 0.6 in/sec PPV. As shown on Figure 5, these studies indicate an approximate 7% probability of "threshold damage" (referred to as cosmetic damage elsewhere in this report) at vibration levels of 0.6 in/sec PPV or less and no observations of "minor damage" or "major damage" at vibration levels of 0.6 in/sec PPV or less. Based on these data, cosmetic or threshold damage would be manifested in the form of hairline cracking in plaster, the opening of old cracks, the loosening of paint or the dislodging of loose objects. However, minor damage (e.g., hairline cracking in masonry or the loosening of plaster) or major structural damage (e.g., wide cracking or shifting of foundation or bearing walls) to the structure at 190 Park Avenue would not be anticipated to occur assuming a maximum vibration level of 0.6 in/sec PPV.

5 Siskind, D.E., M.S. Stagg, J.W. Kopp, and C.H. Dowding, Structure Response and Damage Produced by Ground Vibration form Surface Mine Blasting, RI 8507, Bureau of Mines Report of Investigations, U.S. Department of the Interior Bureau of Mines, Washington, D.C., 1980.

6 Dowding, C.H., Construction Vibrations, Prentice Hall, Upper Saddle River, 1996.

Groundborne vibration levels from project construction would be anticipated to exceed 0.5 in/sec PPV when construction is located within 12 feet of the structure at 190 Park Avenue. Vibration levels may still be perceptible in areas further from the site during periods of heavy construction but would not be expected to cause structural damage. This is a **potentially significant impact**.

Mitigation Measure 2: The following measures are recommended to reduce vibration impacts from construction activities to a less-than-significant impact:

- Limit the use of vibratory rollers and avoid clam shovel drops within 15 feet of the property lines shared with 190 Park Avenue.

- A list of all heavy construction equipment to be used for this project and the anticipated time duration of using the equipment that is known to produce high vibration levels (clam shovel drops, vibratory rollers, hoe rams, large bulldozers, caisson drillings, loaded trucks, jackhammers, etc.) shall be submitted by the contractor. This list shall be used to identify equipment and activities that would potentially generate substantial vibration and to define the level of effort required for continuous vibration monitoring. Where possible, use of the heavy vibration-generating construction equipment shall be prohibited within 25 feet of any adjacent building.

- Place operating equipment on the construction site as far as possible from vibration-sensitive receptors.

- Use smaller equipment to minimize vibration levels below the limits.

- Select demolition methods not involving impact tools.

- Avoid dropping heavy objects or materials near vibration sensitive locations.

- A list of all heavy construction equipment to be used for this project known to produce high vibration levels (tracked vehicles, vibratory compaction, jackhammers, hoe rams, etc.) shall be submitted to the City by the contractor. This list shall be used to identify equipment and activities that would potentially generate substantial vibration and to define the level of effort required for continuous vibration monitoring.

- A construction vibration-monitoring plan shall be implemented to document conditions at the 190 Park Avenue building prior to, during, and after vibration generating construction activities. All plan tasks shall be undertaken under the direction of a licensed Professional Structural Engineer in the State of California and be in accordance with industry accepted standard methods. The construction vibration monitoring plan should be implemented to include the following tasks:

    - Identification of sensitivity to ground-borne vibration of the 190 Park Avenue building. A vibration survey (generally described below) would need to be performed.

- Performance of a photo survey, elevation survey, and crack monitoring survey for the 190 Park Avenue building. Surveys shall be performed prior to and after completion of vibration generating construction activities located within 25 feet of the structure. The surveys shall include internal and external crack monitoring in the structure, settlement, and distress, and shall document the condition of the foundation, walls and other structural elements in the interior and exterior of the structure.

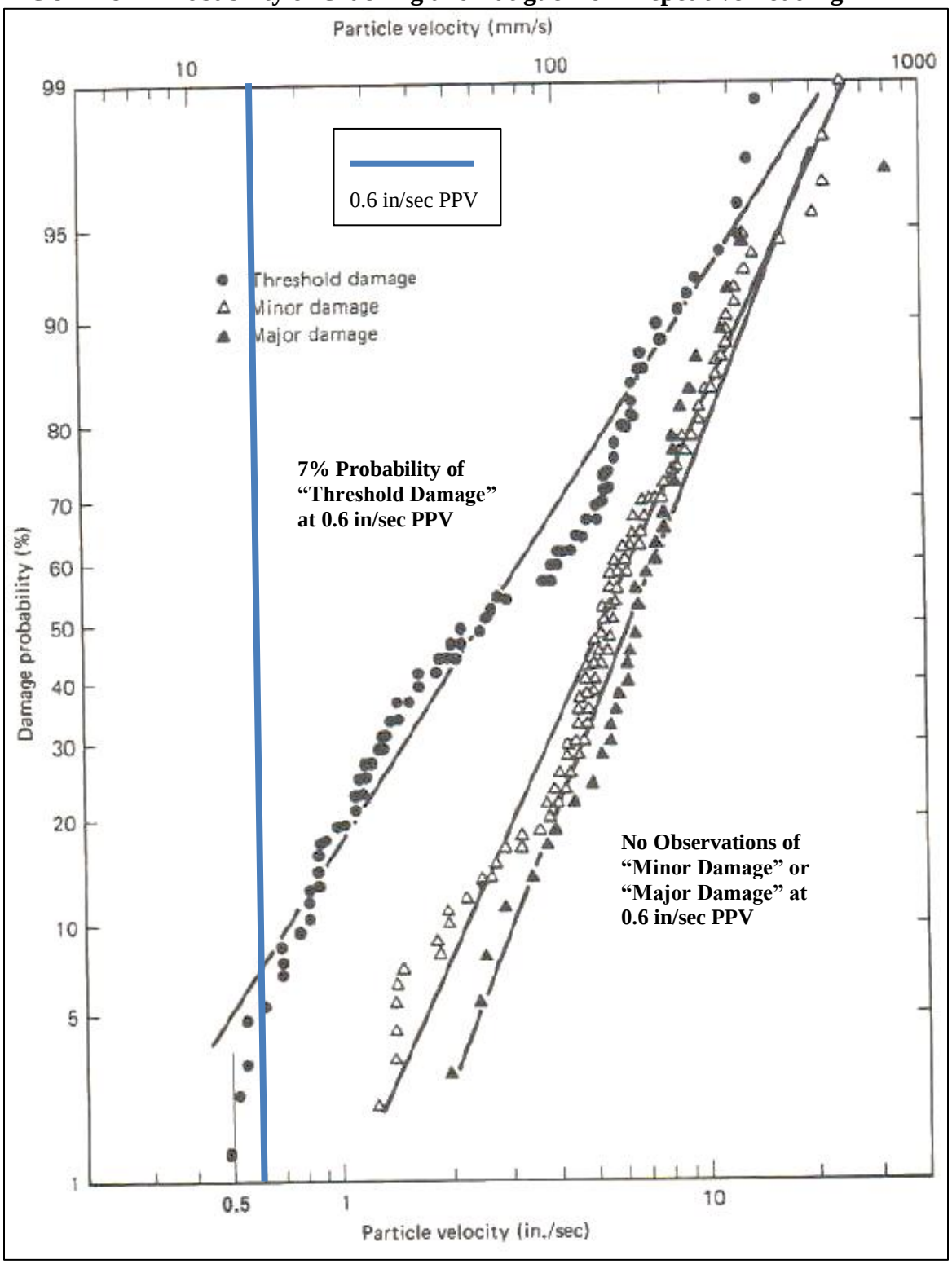
- Conduct a post-survey on the structure where either monitoring has indicated high levels or complaints of damage. Make appropriate repairs in accordance with the Secretary of the Interior's Standards where damage has occurred as a result of construction activities.

- The results of any vibration monitoring shall be summarized and submitted in a report shortly after substantial completion of each phase identified in the project schedule. The report will include a description of measurement methods, equipment used, calibration certificates, and graphics as required to clearly identify vibration-monitoring locations. An explanation of all events that exceeded vibration limits will be included together with proper documentation supporting any such claims.

- Designate a person responsible for registering and investigating claims of excessive vibration. The contact information of such person shall be clearly posted on the construction site.

Implementation of these measures would reduce the impact to a **less-than-significant** level.

FIGURE 8 Probability of Cracking and Fatigue from Repetitive Loading



Source: Dowding, C.H., Construction Vibrations, Prentice Hall, Upper Saddle River, 1996 as modified by Illingworth & Rodkin, Inc., December 2019.

Impact 3: **Exposure of Residents or Workers to Excessive Noise Levels in the Vicinity of a Private Airstrip or an Airport Land Use Plan.** The project is compatible with aircraft noise levels occurring at the site. This is a **less-than-significant** impact.

Norman Y. Mineta San José International Airport is a public-use airport located approximately two miles northwest of the project site. According to the Norman Y. Mineta San José International Airport Master Plan Update Project report published in May 2018 and seen in Figure 4, part of the western half of the project site lies within the 65 dBA CNEL 2027 noise contour for the airport, with the rest of the site lying within the 60 dBA CNEL noise contour. According to Table 4-1 of the Santa Clara County Airport Land Use Commission Comprehensive Land Use Plan, aircraft noise levels between 60 and 65 dBA CNEL are considered "Generally Acceptable" for office building uses. The City's General Plan considers noise levels up to 70 dBA CNEL/DNL "Normally Acceptable" for office building uses. The proposed project would be compatible with standards for aircraft noise and would not expose workers to excessive noise levels. This is a **less-than-significant** impact.

Mitigation Measure 3: **None required.**