350 WINCHESTER BOULEVARD MIXED-USE AT SANTANA ROW PROJECT NOISE AND VIBRATION ASSESSMENT SAN JOSÉ, CALIFORNIA

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INTRODUCTION

The 350 Winchester Boulevard Mixed-Use at Santana Row Project is located on a single 0.89-acre parcel on the east side of Winchester Boulevard approximately 0.10 mile south of Stevens Creek Boulevard in the City of San José. The project site is surrounded on three sides by the Santana Row development. To the north, there is a six-story parking garage, a five-story mixed-use building is located to the south, an at-grade parking lot is located to the east, and single-story commercial uses are located to the west (across South Winchester Boulevard). An existing structure, parking lot, and parking garage would be demolished as part of the project. Several on-site trees would also be removed. The project proposes construction of a 25-story approximately 610,000 square foot building with a maximum height of 375 feet above the ground. A mix of uses would occupy the building, including retail, office, restaurant, and residential units. The retail uses would front Winchester Boulevard and the office space would be provided on the second floor. Residential units would be located in the floors above, except for the 25th floor where a restaurant is proposed to be located. Associated landscaping, vehicular garage access, and pedestrian walkways would also be provided as part of the project.

This report evaluates the project's potential to result in significant 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 – Noise and Land use Compatibility 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 mitigation measures, where necessary, to provide a compatible project in relation to adjacent noise sources and land uses.

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* (*DNL* or L_{dn}) 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 vibration levels produce.

The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at much 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.

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 induce structural 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. Studies have shown that the threshold of perception for average persons is in the range of 0.008 to 0.012 in/sec PPV. 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 minor cracking of building elements, or may threaten the integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher and there is no general consensus as to what amount of vibration may pose a threat for structural damage to the building. 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.

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 sound 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

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.01	Barely perceptible	No effect
0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.1	Strongly perceptible	Virtually no risk of damage to normal buildings
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential dwellings such as plastered walls or ceilings
0.5	Severe - Vibrations considered unpleasant	Threshold at which there is a risk of damage to newer residential 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 contains guidelines 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) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

(b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;

(c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;

(d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;

(e) For a project located within an airport land use plan or where such a plan has not been adopted within two miles of a public airport or public use airport, if the project would expose people residing or working in the project area to excessive noise levels;

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

Pursuant to recent court decisions, the impacts of site constraints such as exposure of the proposed project to excessive levels of noise and vibration identified in Checklist Questions (a), (b), (e), and (f) are not included in the Impacts and Mitigation Section of this report. These items are discussed in a separate section addressing Noise and Land Use Compatibility for consistency with the policies set forth in the City's General Plan.

CEQA does not define what noise level increase would be considered substantial. Typically, an increase in the DNL noise level resulting from the project at noise sensitive land uses of 3 dBA or greater would be considered a significant impact when projected noise levels would exceed those considered acceptable for the affected land use. An increase of 5 dBA DNL or greater would be considered a significant impact when projected noise levels would remain within those considered acceptable for the affected land use. Items (e) and (f) are not applicable to this project because the project is not located within an airport land use plan, is not within two miles of an airport, and is not in the vicinity of a private air strip.

2013 California Building Code, Title 24, Part 2. The current (2013) California Building Code (CBC) does not place limits on interior noise levels attributable to exterior environmental noise sources. The July 1, 2015 Supplement to the 2013 CBC corrects this omission, reinstating limits on interior noise levels attributable to exterior environmental noise sources which had been contained in all prior versions of the CBC dating back to 1974. In keeping with the provisions of the 2015 supplement, this report considers interior noise levels attributable to exterior environmental noise sources to be limited to a level not exceeding 45 dBA L_{dn} in any habitable room for new dwellings other than detached single-family dwellings.

2013 California Green Building Standards Code. The State of California established exterior sound transmission control standards for new non-residential buildings as set forth in the 2013 California Green Building Standards Code (Section 5.507.4.1 and 5.507.4.2). 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 CNEL 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.

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-1.3 Mitigate noise generation of new nonresidential land uses to 55 dBA DNL at the property line when located adjacent to existing or planned noise-sensitive residential and public/quasi-public land 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.

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. The code is not explicit in terms of the acoustical descriptor associated with the noise level limit. However, a reasonable interpretation of this standard, which is based on policy EC-1.3 of the City's General Plan, would identify the ambient base noise level criteria as a day-night average noise level (DNL).

Chapter 20.100.450 of the 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.

***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 (2022 Aircraft Noise Contours).

Policy N-4 No residential or transient lodging construction shall be permitted within the 65 dB CNEL contour boundary unless it can be demonstrated that the resulting interior sound levels will be less than 45 dB CNEL and there are no outdoor patios or outdoor activity areas associated with the residential portion of a mixed use residential project or a multi-unit residential project. (Sound wall noise

mitigation measures are not effective in reducing noise generated by aircraft flying overhead.)

Regulatory Background – Vibration

City of San José General Plan. The Environmental Leadership Chapter in the Envision San José 2040 General Plan sets forth policies to achieve the goal of minimizing vibration impacts on people, residences, and business operations 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 proposed 350 Winchester Boulevard project is in close proximity to another project being considered, the Santana West project. Noise measurements were conducted for both projects at the same time, and because these neighboring projects are being evaluated concurrently, data from both surveys will be used in this analysis.

The 350 Winchester Boulevard project site is located in the middle of the block at 350 Winchester Boulevard in San José, California. The project site is surrounded by mostly commercial land uses, along with some residential and mixed-use land uses. Adjacent to the project site to the north is a six-story parking garage, with Stevens Creek Boulevard at the end of the block. Another small parking lot and garage are to the east of the site, and past that are the residential mixed-uses at 333 Santana Row, as well as the Valencia Hotel to the southeast. A commercial building and gym are along the southern property line, with a commercial and residential land use at the Santana Row Apartments just past. Across Winchester Boulevard to the west are commercial uses, with residences on Spar Avenue and further to the west located behind the commercial uses.

A noise monitoring survey was performed in the vicinity of the project site beginning on Thursday, February 25, 2016 and concluding on Tuesday, March 1, 2016. The monitoring survey included two long-term (LT-1 and LT-2) noise measurements and two short-term (ST-1 and ST-2) noise measurements. Two long-term measurements from the Santana West project were incorporated into this study as LT-3 and LT-4. All measurement locations are shown in Figure 1 and the daily trends in noise levels for the long-term measurements are shown in Appendix A. The noise environment at the site and at the nearby land uses results primarily from vehicular traffic along Winchester Boulevard and Stevens Creek Boulevard. Commercial traffic along Tatum Lane and Russelia Lane also contributes to the noise environment. Large rooftop mechanical equipment including cooling towers on the roof of the adjacent building were noted during the noise survey.

Long-term noise measurement LT-1 was made in front of 350 Winchester Boulevard, 66 feet from the Winchester Boulevard centerline. Hourly average noise levels at this location typically ranged from 62 to 73 dBA L_{eq} during the day, and from 55 to 67 dBA L_{eq} at night. The day-night average noise level from Thursday, February 25, 2016 through Tuesday, March 1, 2016 ranged from 69 to 71 dBA DNL.

LT-2 was measured in the rear of the project site, 132 feet east of the existing building. Hourly average noise levels at this location typically ranged from 59 to 70 dBA L_{eq} during the day, and from 46 to 67 dBA L_{eq} at night. The day-night average noise level from Thursday, February 25, 2016 through Tuesday, March 1, 2016 ranged from 66 to 67 dBA DNL.

LT-3 (from the Santana West project) was measured on Olin Ave across from the Flames restaurant, 135 feet west of the Winchester Boulevard centerline. Hourly average noise levels at this location typically ranged from 60 to 73 dBA L_{eq} during the day, and from 52 to 69 dBA L_{eq} at night. The day-night average noise level from Thursday, February 25, 2016 through Tuesday, March 1, 2016 ranged from 66 to 70 dBA DNL.

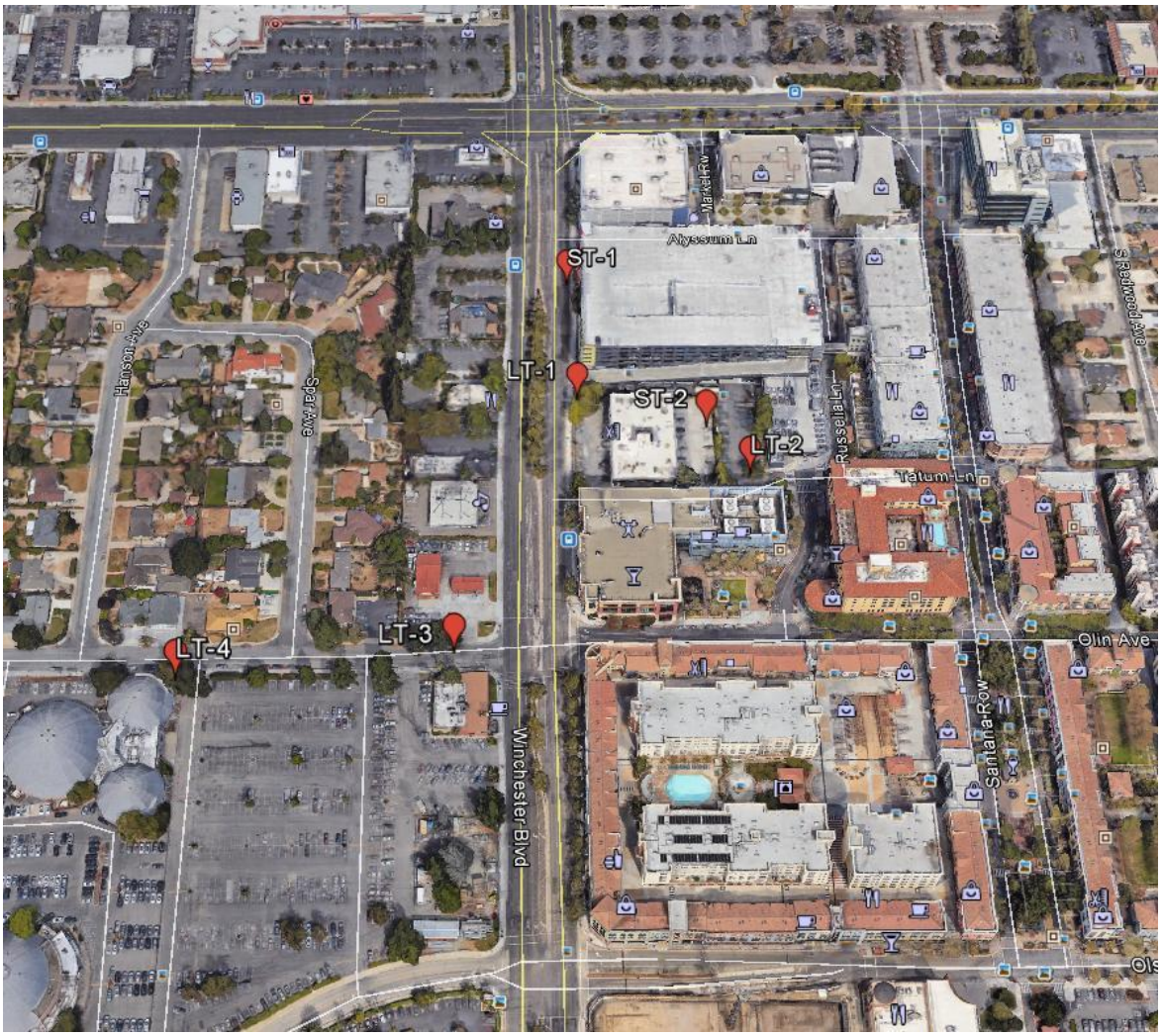
LT-4 (from the Santana West project) was measured across from 3165 Olin Avenue, 160 feet east of Hanson Avenue and 430 feet west of Winchester Boulevard. Due to an equipment failure, noise measurements at this location were only taken for an approximate 27 hour period from Thursday, February 25, 2016 through Friday, February 26, 2016. Hourly average noise levels at this location typically ranged from 54 to 64 dBA L_{eq} during the day, and from 48 to 58 dBA L_{eq} at night. The day-night average noise level from Thursday, February 25, 2016 through Friday, February 26, 2016 was 61 dBA DNL.

Short-term noise measurement ST-1 was made on the 6th floor of the northern parking structure on the west side along Winchester Boulevard. The 10-minute average noise level measured at this location between 11:10 am and 11:20 am on Tuesday, March 1, 2016 was 61 dBA L_{eq}. Short-term noise measurement ST-2 was made in the parking area behind 350 Winchester Boulevard. During the survey there was considerable construction noise from a project at Santana Row. The 10-minute average noise level measured at this location between 11:50 am and 12:00 pm on Tuesday, March 1, 2016 was 60 dBA L_{eq}. Table 4 summarizes the results of the short-term measurements.

TABLE 4 350 Winchester Blvd Summary of Short-Term Noise Measurement Data

Noise Measurement Location	**L_{max}**	**$L_{(1)}$**	**$L_{(10)}$**	**$L_{(50)}$**	**$L_{(90)}$**	**L_{eq}**
ST-1: On 6th floor of the northern parking structure on the west side along Winchester Blvd. (3/1/2016, 11:10 am-11:20 am)	70	66	64	61	58	61
ST-2: In parking area behind 350 Winchester Blvd. (3/1/2016, 11:50 am-12:00 pm)	71	67	61	58	56	59

FIGURE 1 350 Winchester Boulevard Noise Measurement Locations



Source: Google Earth

GENERAL PLAN CONSISTENCY - 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 project site is not located near a significant source of groundborne vibration such as a railroad train, and is more than two miles from an airport so policies related to these issues do not require evaluation. The applicable General Plan policies were presented in detail in the Regulatory Background section and are summarized below for 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.

    - The City's acceptable exterior noise level objective is 60 dBA DNL or less for the proposed residential uses and 70 dBA DNL for the proposed commercial uses (Table EC-1). 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.

    - The City's standard for interior noise levels in residences is 45 dBA DNL.

The project proposes the construction of a 25-story, approximately 610,000 square foot building, with a maximum height of 375 feet above the ground. A mix of uses would occupy the building, including retail, office, restaurant, and residential units. The retail uses would front Winchester Boulevard and the office space would be provided on the second floor. Residential units would be located in the floors above, except for the 25th floor where a restaurant is proposed to be located. Associated landscaping, vehicular garage access, and pedestrian walkways would also be provided as part of the project.

The future noise environment at the project site would continue to result primarily from traffic along the surrounding roadways and commercial activities including parking lot traffic, truck loading and circulation, and mechanical equipment associated with the buildings in Santana Row. Existing noise sources generate noise levels of 67 to 71 dBA DNL at the ground level façades of the proposed building. The future noise level along Winchester Boulevard was calculated to increase by about 2 dBA DNL resulting in a level of 73 dBA DNL using cumulative future traffic volume data developed by *Hexagon Transportation Consultants*. Noise levels are anticipated to be 1 to 2 dBA higher at 3rd and 4th floor residences, resulting in 74 – 75 dBA DNL. Above the 4th floor, noise levels drop off as the distance from the ground level noise source increases. Future exterior noise levels at the project site would exceed the exterior noise thresholds (60 dBA DNL residential and 70 dBA LDN commercial) established in the Envision San José 2040 General Plan. Interior noise levels would be expected to exceed 45 dBA DNL assuming standard construction methods, the limit established in the Plan and the State Building Code.

Future Exterior Noise Environment

Outdoor space for the residents would include private balconies and common open space areas on the third floor and the roof. The City's goal for noise in residential common open space is 60 dBA DNL. The orientation of both open spaces face east, away from Winchester Boulevard and are shielded by the building itself. Both have parapets approximately 3.5 feet high surrounding the common open spaces. Given the orientation, height above the ground, and shielding by the parapets, the noise levels throughout most of the outdoor areas will range from 55 to 60 dBA DNL. This would conform to the City's guidelines and be compatible with the future noise environment.

Future Interior Noise Environment

The California Building Code and the City of San José General Plan require that interior noise levels be maintained at 45 dBA DNL or less for residences. Residential units would be located at the third level through the 24th level. The exterior traffic noise exposure at these facades would be up to 75 dBA DNL for the western facing façade, 72 dBA DNL at the northern and southern facing facades, and 69 dBA DNL at the eastern facing facade. Four large cooling towers and other mechanical equipment are located on the roof of the building adjoining the southern property line of the project. The residential units on floors on the southern façade above the elevation of the roof of the adjoining building would be exposed to noise from this equipment that could elevate the overall noise level and be potentially disturbing to the residents due to its tonal characteristics.

Interior noise levels would vary depending upon the design of the buildings (relative window area to wall area) and the selected construction materials and methods. Preliminary building plans indicate that the exterior of the building would be glass. Standard residential construction provides approximately 15 dBA of exterior-to-interior noise reduction, assuming the windows are partially open for ventilation. Standard construction with the windows and doors closed provides approximately 20 to 25 dBA of noise reduction in interior spaces. Where exterior noise levels range from 60 to 65 dBA DNL, the inclusion of adequate forced-air mechanical ventilation is often the method selected to reduce interior noise levels to acceptable levels by closing the windows to control noise. Where noise levels exceed 65 dBA DNL, forced-air mechanical ventilation systems and sound-rated construction methods are normally required. Such methods or materials may include a combination of sound-rated windows and doors, sound-rated exterior wall assemblies, and mechanical ventilation so windows may be kept closed at the occupant's discretion. For the proposed project, the interior noise levels with standard construction and windows open would be up to 60 dBA DNL, and with windows and doors closed, interior noise levels would be up to 55 dBA DNL. This would exceed the City's threshold for interior noise.

For consistency with the General Plan the following Conditions of Approval are recommended for consideration by the City:

- Provide a suitable form of forced-air mechanical ventilation, as determined by the local building official, for all residential units, so that windows can be kept closed to control noise.

- A qualified acoustical specialist shall prepare a detailed analysis of interior residential noise levels resulting from all exterior sources (transportation and non-transportation) during the design phase pursuant to requirements set forth in the State Building Code. The study will also establish appropriate criteria for noise levels inside the commercial and office spaces affected by traffic noise. The study will review the final site plan, building elevations, and floor plans prior to construction and recommend building treatments to reduce residential interior noise levels to 45 dBA DNL or lower and reduce levels to the established criteria for the business and commercial uses; and, address and adequately control the noise from rooftop equipment on the adjacent building. Treatments would include, but are not limited to, sound-rated windows and doors, acoustical caulking, protected ventilation openings, etc. The specific determination of what noise insulation treatments are necessary shall be conducted on a unit-by-unit basis during final design of the project. Results of the analysis, including the description of the necessary noise control treatments, shall be submitted to the City, along with the building plans and approved design, prior to issuance of a building permit.

NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

Paraphrasing from the currently applicable CEQA checklist questions in Appendix G of the CEQA Guidelines, a project would normally result in significant noise impact if it would cause traffic or other on-going sources of operational noise to result in a substantial permanent noise increase, if it would cause ambient noise levels at sensitive receivers to increase substantially during construction, or if it would generate excessive groundborne vibration levels. The following criteria were used to evaluate the significance of environmental noise resulting from the project:

- A significant impact would be identified if project generated traffic or operational noise sources would substantially increase noise levels at sensitive receivers in the vicinity. A substantial increase would occur if: a) the noise level increase is 5 dBA DNL or greater, with a future noise level of less than 60 dBA DNL, or b) the noise level increase is 3 dBA DNL or greater, with a future noise level of 60 dBA DNL or greater.

- A significant noise impact would be identified if construction-related noise would temporarily increase ambient noise levels at sensitive receptors. Hourly average noise levels exceeding 60 dBA L_{eq} at the property lines shared with residential land uses, and the ambient by at least 5 dBA L_{eq}, for a period of more than one year would constitute a significant temporary noise increase at adjacent residential land uses.

- A significant impact would be identified if the construction of the project would expose persons to excessive vibration levels. Groundborne vibration levels exceeding 0.2 in/sec PPV would have the potential to result in cosmetic damage to normal buildings.

Impact 1: **Project-Generated Traffic Noise.** The proposed project would result in a permanent noise level increase at existing noise sensitive land uses due to project-generated traffic. **This is a less-than-significant impact.**

A significant impact would result if traffic generated by the project would substantially increase noise levels at sensitive receptors in the vicinity. A substantial increase would occur if: a) the noise level increase is 5 dBA DNL or greater, with a future noise level of less than 60 dBA DNL, or b) the noise level increase is 3 dBA DNL or greater, with a future noise level of 60 dBA DNL or greater.

The project's traffic study[1] provided AM and PM project trip assignments for intersections surrounding the project site. Traffic volume information was reviewed to calculate the permanent noise increase attributable to project-generated traffic. Traffic volumes under the Existing Plus Project scenario were compared to the Existing scenario to calculate the relative increase in the hourly average traffic noise level (L_{eq}) attributable to the proposed project. The change in the DNL would be the same as the change in the peak hour L_{eq}. After analyzing all the traffic volumes along roadway segments relevant to the project site, noise levels would increase less than 1 dBA DNL in all the roadway segments. This increase would not be considered to be substantial and would result in a **less-than-significant** impact.

Mitigation Measure 1: **None required.**

Impact 2: **Operational Noise.** Mechanical equipment associated with the project and on site vehicle deliveries could generate noise in excess of the City's noise policy goal of 55 dBA DNL. **This is a potentially significant impact.**

Mechanical Equipment

Multi-use structures typically include various mechanical equipment, such as air conditioners, exhaust fans, and air handling equipment for the buildings and the underground parking levels. Due to the number of variables inherent in the mechanical equipment needs of the project (number and types of units, locations, size, housing, specs, etc.), the impacts of mechanical equipment noise on nearby noise-sensitive uses should be assessed during the final project design stage. The most substantial noise-generating equipment would likely be large exhaust fans and building cooling and air conditioning units. Design planning should take into account the noise criteria associated with such equipment and utilize site planning to locate equipment in less noise-sensitive areas. Other controls could include, but shall not be limited to, fan silencers, enclosures, and screen walls.

The nearest noise sensitive uses include the Hotel Valencia about 160 feet east, the residences at 333 Santana Row about 250 feet east, the Santana Row Apartments about 300 feet south, and the residences on Spar Avenue about 300 feet west. Under the City's Noise Element, noise levels

[1] 350 Winchester Boulevard Project, San Jose, CA, Hexagon Transportation Consultants, Inc., March 4, 2015.

from building equipment would be limited to a noise level of 55 dBA DNL at receiving noise-sensitive land use. Given the distance between the rooftop equipment located on top of a 250 foot high structure and nearby noise-sensitive uses and the shielding provided by the roof structure, mechanical equipment noise is not anticipated to exceed 55 dBA DNL at these nearby residences or other sensitive uses. However, the final site plan should be reviewed by a qualified acoustical consultant to address any potential conflicts.

Truck Deliveries

Truck deliveries for the ground-level commercial uses on the project site would also have the potential to generate noise. Typical noise levels generated by loading and unloading of truck deliveries would be similar to noise levels generated by truck movements on local roadways and by similar activities at surrounding uses. These are not anticipated to impact the nearby noise-sensitive land uses.

Mitigation Measure 2:

The following mitigation measures shall be included in the project to reduce the impact to a less-than-significant level:

- A detailed acoustical study shall be prepared during building design to evaluate the potential noise generated by building mechanical equipment and to identify the necessary noise controls that are included in the design to meet the City's 55 dBA DNL noise limit at the shared property line. The study shall evaluate the noise from the equipment and predict noise levels at noise-sensitive locations. Noise control features, such as sound attenuators, baffles, and barriers, shall be identified and evaluated to demonstrate that mechanical equipment noise would not exceed 55 dBA DNL at noise-sensitive locations, such as residences. The study shall be submitted to the City of San José for review and approval prior to issuance of any building permits.

- Ensure that noise-generating activities, such as maintenance activities and loading/unloading activities, are limited to the hours of 7:00 am and 9:00 pm.

Impact 3: **Construction Noise.** Existing noise-sensitive land uses would be exposed to construction noise levels in excess of the significance thresholds for a period of more than one year. **This is a potentially significant impact**.

Noise impacts resulting from construction depend upon the noise generated by various pieces of construction equipment, the timing and duration of noise-generating activities, and the distance between construction noise sources and noise-sensitive areas. 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.

Where noise from construction activities exceeds 60 dBA L_{eq} and exceeds the ambient noise environment by at least 5 dBA L_{eq} at noise-sensitive residential in the project vicinity for a

period exceeding one year, the impact would be considered significant. For commercial uses, a significant impact would be identified if construction noise were to exceed 70 dBA L_{eq} and exceeds the ambient noise environment by at least 5 dBA L_{eq} for a period exceeding one year. Additionally, the City considers significant construction noise impacts to have occurred 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, according to Policy EC-1.7 of the General Plan.

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 Table 5. Most demolition and construction noise falls with the range of 80 to 90 dBA at a distance of 50 feet from the source.

Construction activities generate considerable amounts of noise, especially during earth-moving activities when heavy equipment is used. The construction of the proposed project would involve demolition of existing structures and pavement, substantial grading and excavating to create the below-grade parking garage and to lay foundations, trenching, building erection, and paving. The hauling of excavated materials and construction materials would generate truck trips on local roadways, as well. Table 6 shows the calculated construction noise levels for each phase of construction, based on the equipment specified for the project, at a distance of 100 feet from the center of the construction activity.

TABLE 5 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.

TABLE 6 Calculated Construction Noise Levels for Each Phase of Construction

Construction Phase	At Distance of 100 ft.	
	L_{eq}, dBA	L_{max}, dBA
Demolition (January - March, 2017)	75	75
Site Preparation (March 2017)	71	71
Grading/Excavation (April - June, 2017)	83	83
Foundation/Pile Driving (June 2017)	88	99
Trenching (July 2017)	81	81
Building-Exterior (August 2017 – September 2018)	82	82
Building-Interior (January - December, 2018)	Minimal Off-Site	Minimal Off-Site
Paving (December 2018)	75	75

[1] Calculated using a standard drop off rate for point sources of 6 dB per doubling of distance.

The highest noise levels would be generated during pile driving. The method for constructing the buildings foundation was not included in the list of construction phases for the project; however, given the height of the building, it is assumed for the purposes for this analysis that pile driving would occur. The maximum noise level would range up to 99 dBA L_{max} at a distance of 100 feet. The constriction of large buildings from steel structures could also cause considerable noise for fairly long durations. At 100 feet from the noise source, maximum noise levels generated by project construction equipment (excluding pile driving) would typically range from 71 to 83 dBA L_{max}.

The nearest noise sensitive uses include the Hotel Valencia about 160 feet east, the residences at 333 Santana Row about 250 feet east, the Santana Row Apartments about 300 feet south, and the residences on Spar Avenue about 300 feet west. Residences along Spar Avenue and Hanson Avenue to the west of the project site could also be affected by construction noise. The range of noise levels at surrounding land uses resulting from construction are summarized in Table 7.

TABLE 7 Range of Construction Noise Levels

Receiver	350 Winchester Blvd	
	Pile Driving (dBA L_{eq}/L_{max})	Typical (dBA L_{eq})
Hotel Valencia	84/95	67 - 79
333 Santana Row Residences	80/91	63 - 75
Santana Row Apartments	78/89	61 - 73
Spar Avenue Residences	78/89	61 - 73
Hanson Avenue Residences	70/81	53 - 65
Maplewood Avenue Residences	68/79	51 - 63

The upper limit of typical construction noise would range from 79 dBA L_{eq} outside the Hotel Valencia down to 63 dBA L_{eq} outside the Maplewood Avenue residences. The elevated noise levels would occur intermittently from the beginning of the demolition phase through the completion of the building exterior phase, a period of about 21 months. During pile driving noise maximum instantaneous noise levels outside the nearest sensitive receivers would approach or exceed 90 dBA L_{max} and 80 dBA $L_{eq,}$ resulting in speech and activity interference. Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of the distance between the source and receptor. Shielding by buildings can provide an additional 5 to 10 dBA noise reduction from ground level construction activities at distant receptors. However, nearby structures would not provide shielding from upper level construction activity or elevated sources such as a pile driver hammer. Construction noise would result in a significant impact upon land uses in the vicinity of the project.

Mitigation Measure 3:

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:

- Construction activities shall be limited to the hours 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.

- 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.

- Evaluate alternatives to driven piles for the foundation, such as drilled piers (caissons) with mat slabs over top or rammed aggregate piers.

- If pile driving is necessary, pre-drill foundation pile holes to minimize the number of impacts required to seat the pile.

- If pile driving is necessary, consider the use of "acoustical blankets" for receptors located within 100 feet of the site.

- If pile driving is necessary, consider the use of a noise attenuating shroud on the pile driving hammer.

- 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 would reduce construction noise levels emanating from the site, limit construction hours, and minimize disruption and annoyance. Even with the implementation of these measures, the project would substantially increase noise levels intermittently at sensitive receptors over a period of nearly two years. **The impact would be significant and unavoidable.**

Impact 4: **Groundborne Vibration During Construction.** Residences and local businesses in the vicinity of the project site would be exposed to construction-related vibration, particularly during impact pile driving events. **This is a potentially significant impact.**

The construction of the project may generate perceptible vibration when heavy equipment or impact tools (e.g. jackhammers, hoe rams) are used. Construction activities would include site demolition work, preparation work, excavation of below-grade levels, foundation work, pile driving, and new building framing and finishing. Table 8 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet.

TABLE 8 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)	Approximate L_v at 25 ft. (VdB)
Pile Driver (Impact)	upper range	1.158	112
	typical	0.644	104
Pile Driver (Sonic)	upper range	0.734	105
	typical	0.170	93
Clam shovel drop		0.202	94
Hydromill (slurry wall)	in soil	0.008	66
	in rock	0.017	75
Vibratory Roller		0.210	94
Hoe Ram		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, May 2006.

According to Policy EC-2.3 of the City of San José General Plan, a vibration limit of 0.08 in/sec PPV shall be used to minimize the potential for cosmetic damage to sensitive historical structures, and a vibration limit of 0.20 in/sec PPV shall be used to minimize damage at buildings of normal conventional construction. With no known historical buildings in the vicinity of the project site, a significant impact would occur if nearby buildings were exposed to vibration levels in excess of 0.20 in/sec PPV.

Use of pile drivers and to a lesser extent other construction equipment would require some attention to ensure that structures in the vicinity of the project, especially the buildings within 200 feet from such activities are sufficiently protected. Impact pile driving has the potential to generate the highest ground vibration levels and would be the primary concern to structural damage, particularly when it occurs within 100 to 200 feet of structures, given that impact pile driving could be anticipated to generate vibration levels of 0.644 in/sec PPV but could reach levels up to 1.158 in/sec PPV at 25 feet. Other project construction activities, such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.) may also generate substantial vibration in the immediate vicinity. Jackhammers typically generate vibration levels of 0.035 in/sec PPV, and drilling typically generates vibration levels of 0.09 in/sec PPV at a distance of 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used.

The nearest structure is a commercial building 40 feet across Tatum Lane from the project site. The parking garages to the north and east (60 and 80 feet, respectively) are the next closest structures. The nearest vibration sensitive uses include the Hotel Valencia about 160 feet east, the residences at 333 Santana Row about 250 feet east, the Santana Row Apartments about 300 feet south, and the residences on Spar Avenue about 300 feet west. Residences along Spar Avenue and Hanson Avenue to the west of the project site could also be affected by construction vibration.

All of the potentially affected structures and land uses would be exposed to construction vibration levels less than the City's vibration threshold, with the exception of pile driving. At the closest 40-foot structure, impact pile driving vibration levels would range from 0.4 to 0.7 in/sec PPV. At 60 feet the level would range from 0.25 to 0.4 in/sec PPV, and at 80 feet the level would range from 0.2 to 0.3 in/sec PPV. Vibration from pile driving would not exceed the City's threshold at any other structures or land uses.

At these locations, and in other surrounding areas where vibration would not be expected to cause structural damage, vibration levels may still be perceptible. However, as with any type of construction, this would be anticipated and would not be considered significant, given the intermittent and short duration of the phases that have the highest potential of producing vibration (pile driving and use of jackhammers and other high power tools). By use of administrative controls, such as notifying neighbors of scheduled construction activities and scheduling construction activities with the highest potential to produce perceptible vibration during hours with the least potential to affect nearby businesses, perceptible vibration can be kept to a minimum.

Based on the scope of construction, there is a potentially significant impact due to groundborne vibrations from pile driving. This potential impact ranges from no perceptible vibrations to readily perceptible vibration and vibrations high enough to cause possible damage to structures to the three nearest structures.

Mitigation Measure 4:

The following measures, in addition to the best construction practices specified in Mitigation Measure 3, are recommended to reduce vibration impacts from construction activities to a less-than-significant impact:

- Avoid impact pile driving where possible. Drilled piers or rammed aggregate piers cause lower vibration levels where geological conditions permit their use.

- A construction vibration monitoring plan shall be implemented to document conditions 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 the sensitivity of nearby structures to groundborne vibration. Vibration limits should be established for the commercial building across Tatum Lane and the parking garages to the north and east of the project site.

- Performance of a photo survey, elevation survey, and crack monitoring survey for each these structures. Surveys shall be performed prior to any construction activity, in regular interval during construction and after project completion and shall include internal and external crack monitoring in structures, settlement, and distress and shall document the condition of foundations, walls and other structural elements in the interior and exterior of said structures.

- Development of a vibration monitoring and construction contingency plan to identify structures where monitoring would be conducted, set up a vibration monitoring schedule, define structure-specific vibration limits, and address the need to conduct photo, elevation, and crack surveys to document before and after construction conditions. Construction contingencies would be identified for when vibration levels approached the limits.

- If vibration levels approach limits, suspend construction and implement contingencies to either lower vibration levels or secure the affected structures.

- 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.

- Conduct post-survey on structures where either monitoring has indicated high levels or complaints of damage has been made. Make appropriate repairs or compensation where damage has occurred as a result of construction activities.

- The results of all 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.

Impact 5: **Cumulative Traffic Noise.** The project would result in a substantial increase in noise levels above existing noise levels along area roadways. The project would make a "cumulatively considerable" contribution to noise levels that would be substantially increased as a result of cumulative growth in the area. **This is a less-than-significant impact.**

A substantial permanent cumulative noise increase would occur if the project contributed a minimum noise increase of 1 dBA DNL where the noise level increase is 5 dBA DNL or greater, with a future noise level of less than 60 dBA DNL, or the noise level increase is 3 dBA DNL or greater, with a future noise level of 60 dBA DNL or greater.

The project traffic study provided AM and PM project trip assignments for intersections surrounding the project site. Traffic volume information was reviewed to calculate the permanent noise increase attributable to project-generated traffic. Traffic volumes under the Cumulative Plus Project scenario were compared to the Existing scenario to calculate the relative increase in the hourly L_{eq} traffic noise attributable to the proposed project. The change in the DNL would be the same as the change in the peak hour L_{eq}. After analyzing all the traffic volumes along roadway segments relevant to the project site, there are no segments where the project would make a cumulatively considerable contribution to the noise increase. There would therefore be no cumulative impact.

Mitigation Measure 5: **None required.**

Impact 6: **Cumulative Construction Noise.** Existing noise-sensitive land uses would be exposed to cumulative construction noise levels in excess of the significance thresholds for a period of more than one year. **This is a significant impact.**

The construction of the 350 Winchester Boulevard project would be occurring at the same time as the construction of the Santana Row West project's Block 1.[2] The construction for both projects will begin in early 2017 and last for approximately two years. The Santana Row Apartments along Winchester Boulevard and the residences along Olin Avenue, Spar Avenue, Hanson Avenue, and Maplewood Avenue are land uses that would be affected by the construction noise of both projects. The cumulative noise exposure, both the noise level and the noise exposure time, would be increased because of the two projects happening simultaneously. Each project individually would result in significant construction noise impact at these land uses, and the two together would result in a significant cumulative construction noise impact.

Mitigation Measure 6:

The mitigation measures recommended for the cumulative project construction would be the same as those for the projects (Mitigation Measure 3). Implementation of the mitigation measures would reduce construction noise levels emanating from the site, limit construction hours, and minimize disruption and annoyance. Even with the implementation of these measures, the cumulative construction noise impact would substantially increase noise levels intermittently at sensitive receptors over a period of two years. **The impact would be significant and unavoidable.**

[2] "Santana Row West Project Noise and Vibration Assessment". Illingworth & Rodkin, Inc. April 2016.

APPENDIX A: Long Term Noise Level Daily Trends