RACE STREET AND WEST SAN CARLOS STREET COMMERCIAL REDEVELOPMENT PROJECT NOISE AND VIBRATION ASSESSMENT SAN JOSÉ, CALIFORNIA

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INTRODUCTION

The Race Street and West San Carlos Street Commercial Redevelopment Project is proposed at an existing 2.04 acre commercial site at the southeast corner of the Race Street and W. San Carlos Street intersection in San José, California. The project proposes to replace the approximate 30,000 square-foot Mel Cottons Sporting Goods store with an approximate 29,600 square-foot Smart & Final Extra! grocery store and an approximate 100-space parking lot.

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 the noise and land use compatibility of the proposed project utilizing policies established by the State of California, Santa Clara County, and the City of San José; and 3) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts upon sensitive receivers, provides a discussion of each project impact, and presents measures, where necessary, to mitigate the identified impacts to a less-than-significant level.

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.

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, Santa Clara County, 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 the Noise and Land Use Compatibility of the project.

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.

2016 California Building 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). 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. Commercial projects are considered compatible with aircraft noise levels of 65 dBA CNEL or less.

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:

Exterior Noise Levels

- The City's acceptable exterior noise level objective is 70 dBA DNL or less for office buildings, business commercial uses, and professional offices (Table EC-1).

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. Chapter 20.40.600 states the sound pressure level generated by any use or combination of uses shall not exceed 60 dBA at any property line shared with land zoned for commercial/industrial uses, except upon issuance and in compliance with a Conditional Use Permit.

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.

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 project site is located at the southeast corner of Race Street and W. San Carlos Street in San José, California. Figure 1 shows the project site plan overlaid on an aerial image of the site vicinity. The project site is primarily bordered by commercial land uses to the east and south. There is a commercial building and a multi-family housing building west of the project site opposite Race Street. There are also commercial land uses, as well as single- and multi-family housing, located north of the project site opposite W. San Carlos Street.

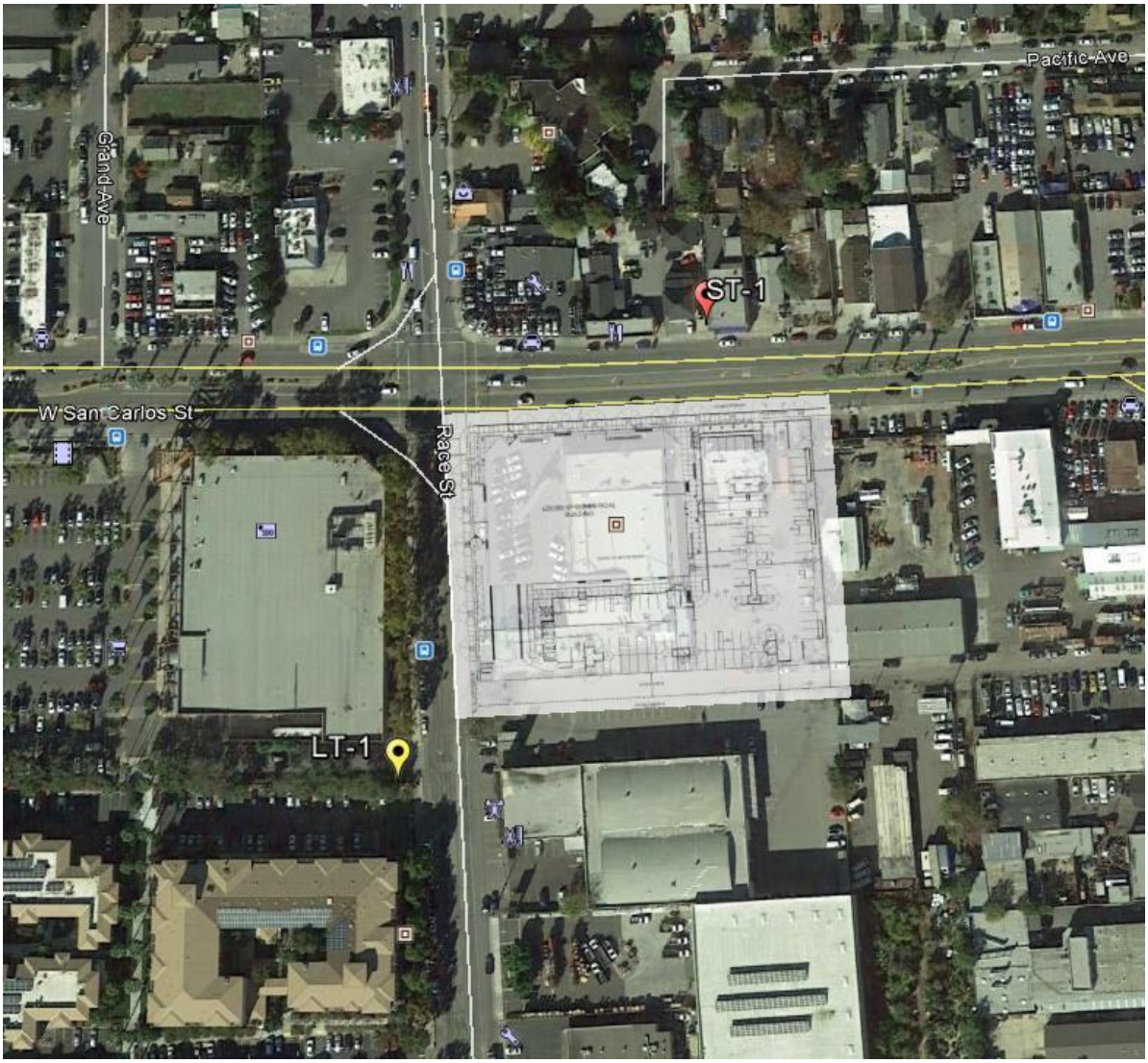
A noise monitoring survey was performed to quantify and characterize ambient noise levels at the project site and in the project vicinity between Wednesday, February 22, 2017 and Friday, February 24, 2017. The noise monitoring survey included one long-term noise measurement (LT-1) and one short-term noise measurement (ST-1), as indicated in Figure 1. The noise environment at the site and at the nearby land uses in the project vicinity results primarily from vehicular traffic along W. San Carlos Street and Race Street. Aircraft associated with Mineta San José International Airport and Valley Transportation Authority (VTA) light-rail trains also contribute to the noise environment in the area.

Long-term noise measurement LT-1 was made on the property line between the Parkview Apartments and the Safeway on Race Street, approximately 50 feet west of the Race Street centerline and approximately 400 feet south of the W. San Carlos Street centerline. Hourly average noise levels at this location ranged from 61 to 69 dBA L_{eq} during the day, and from 53 to 63 dBA L_{eq} at night. The day-night average noise level on Thursday, February 23, 2017 was 66 dBA DNL. The daily trend in noise levels at LT-1 is shown in Figure 2.

Short-term noise measurement ST-1 was made in front of 1237 W. San Carlos Street, approximately 50 feet north of the W. San Carlos Street centerline and approximately 280 feet east of the Race Street centerline. The 10-minute average noise level measured at this location between 12:00 p.m. and 12:10 p.m. on Wednesday, February 22, 2017 was 65 dBA L_{eq} and the estimated day-night average noise level was 68 dBA DNL. Table 4 summarizes the results of the short-term measurements. Long-term noise data from *Illingworth & Rodkin, Inc.* files confirmed that the day-

night average noise level along W. San Carlos Street is approximately 69 dBA DNL at a distance of approximately 55 feet from the roadway centerline.

FIGURE 1 Race and San Carlos Commercial Road Noise Measurement Locations



Source: Google Earth

FIGURE 2 Long Term Noise Level Daily Trends

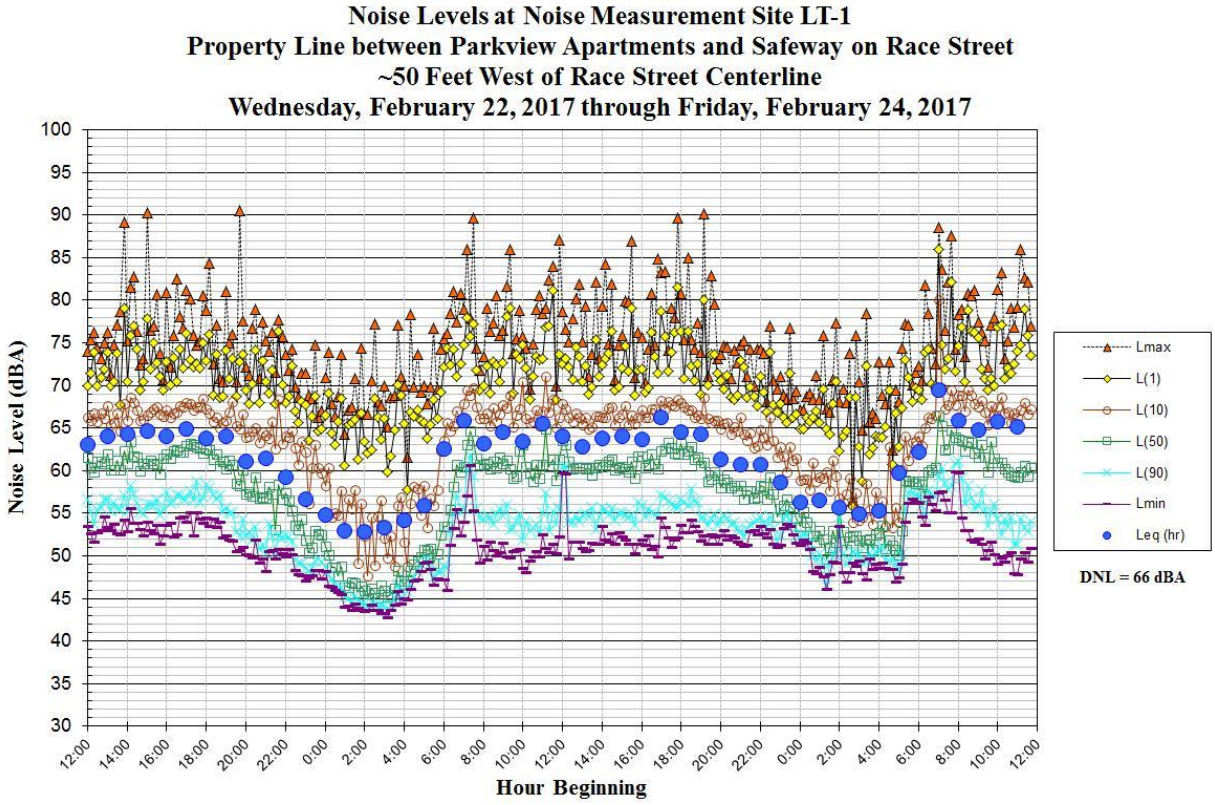


TABLE 4 Summary of Short-Term Noise Measurement Data (dBA)

Noise Measurement Location	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	L_{eq}	DNL
ST-1: In front of 1237 W. San Carlos St. (2/22/2017, 12:00 p.m. - 12:10 9.m.)	76	72	68	63	54	65	68

Note: The DNL is determined by correlating the short-term measurement with the representative long-term measurement.

GENERAL PLAN CONSISTENCY ANALYSIS – COMPATIBILITY OF PROJECT WITH NOISE AND VIBRATION AFFECTING THE SITE

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 objective is 70 dBA DNL or less for the proposed commercial use (Table EC-1).

- The California Green Building Code limits interior noise levels within new non-residential land uses to an hourly equivalent noise level ($L_{eq\ (1\text{-}hr)}$) of 50 dBA in occupied areas during any hour of operation.

Future Exterior Noise Environment

Based on a review of the current site plan, there appear to be no sensitive outdoor spaces proposed as part of the project. The future noise environment at the project site would continue to result primarily from vehicular traffic along W. San Carlos Street. The Envision San José 2040 General Plan EIR[1] estimated future noise level increases in the project vicinity. From this data, traffic noise along W. San Carlos Street would increase by up to 1 dBA DNL by the year 2035. Therefore, future noise exposures at the proposed commercial building are calculated to reach up to 70 dBA DNL on the northern façade of the building and 67 dBA DNL on the western façade of the building.

Future Interior Noise Environment

The State requires interior noise levels to be maintained at or below 50 dBA $L_{eq(1\text{-}hr)}$ during hours of operation. Assuming a 1 dBA increase in noise levels from W. San Carlos Street, the proposed commercial building would be exposed to future exterior noise levels up to 67 dBA $L_{eq(1\text{-}hr)}$ during daytime hours. Standard commercial construction provides at least 30 dBA of outdoor to indoor noise reduction assuming that the building includes adequate forced-air mechanical ventilation systems so that the windows and doors may remain closed to control noise. Assuming standard commercial construction methods with the windows and doors closed, interior noise levels are calculated to be up to 37 dBA $L_{eq(1\text{-}hr)}$ during daytime hours, which would be below the Cal Green Code standard of 50 dBA $L_{eq(1\text{-}hr)}$.

Aircraft Noise

Mineta San José International Airport is a public-use airport located approximately 1.9 miles north of the project site. The project site lies outside the 2027 60 dBA CNEL noise contour shown in the Norman Y. Mineta San José International Airport Master Plan Update Project for the airport. Noise levels resulting from aircraft would be less than 65 dBA CNEL at the project site and compatible with the proposed land use.

NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

Paraphrasing from Appendix G of the CEQA Guidelines, a project would normally result in significant noise impacts if noise levels generated by the project conflict with adopted environmental standards or plans, if the project would generate excessive groundborne vibration levels, or if ambient noise levels at sensitive receivers would be substantially increased over a permanent, temporary, or periodic basis. The following criteria were used to evaluate the significance of environmental noise resulting from the project:

[1] Environmental Impact Report for the Envision San José 2040 General Plan, City of San José, June 2011.

- **Noise Levels 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.

- **Groundborne Vibration from Construction:** 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. Groundborne vibration levels exceeding 0.08 in/sec PPV would have the potential to result in cosmetic damage to sensitive historic structures.

- **Project-Generated Traffic Noise Increases:** A significant impact would be identified if traffic generated by the project 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.

- **Construction Noise:** 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. Hourly average noise levels exceeding 70 dBA L_{eq} at the property lines shared with commercial land uses, and the ambient by at least 5 dBA L_{eq}, for a period of more than one year would also constitute a significant temporary noise.

Impact 1: **Noise Levels in Excess of Standards.** The proposed project would not generate noise levels in excess of established standards at the nearby sensitive receptors. **This is a less-than-significant impact.**

Construction Noise

Chapter 20.100.450 of the City'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. This analysis assumes that construction activities will occur between 7:00 am and 7:00 pm Monday through Friday and not on weekends. Project construction activities will be consistent with the code limits and the impact is less-than-significant.

Mechanical Equipment Noise

General Plan Policy EC-1.3 states, "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." Chapter 20.30.700 of the City's Municipal Code

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 20.40.600 states the sound pressure level generated by any use or combination of uses shall not exceed 60 dBA at any property line shared with land zoned for commercial/industrial uses, except upon issuance and in compliance with a Conditional Use Permit.

The proposed project would include mechanical equipment, such as refrigeration systems, air conditioning systems, exhaust fans, and ventilation systems. Specific project details regarding the number, type, size, and location of the mechanical equipment units to be used in the proposed project were not available at the time of this study. A credible worst-case scenario would assume that the equipment would be located on the roof of the building above the mechanical and cooling rooms proposed along the westernmost portion of the building. Such equipment would typically generate noise levels ranging from 60 dBA to 75 dBA L_{eq} at distances of 5 to 12 feet.

The closest noise sensitive receptors would be the residences across W. San Carlos Street approximately 260 feet north of the proposed mechanical equipment. At this distance, mechanical equipment noise levels would range from 33 to 48 dBA L_{eq} and 39 to 54 dBA DNL assuming unshielded conditions, which would be below the City's 55 dBA L_{eq} and 55 dBA DNL thresholds. In addition, noise levels from the mechanical equipment at the proposed project would be below ambient traffic noise levels from W. San Carlos Street. Residential land uses located across Race Street and approximately 330 feet southwest of the proposed mechanical equipment would similarly be exposed to mechanical noise levels below the City's 55 dBA L_{eq} and DNL thresholds assuming unshielded conditions and accounting for the additional distance between the noise source and receptors. This is a less-than-significant impact.

Truck Loading Dock and Parking Lot Activity Noise

Noise at the loading docks would be produced by trucks entering and leaving the loading dock area, trucks idling in the area, and the unloading of products. The loading dock for heavy-duty trucks would be located on the southwest corner of the proposed commercial building. The heavy-duty trucks would back into the loading dock. Maximum noise levels at such a loading dock results from the truck engines starting and from trucks accelerating out of the loading dock. Noise sources at the loading dock would be expected to generate noise levels of about 50 to 60 dBA L_{eq} at 150 feet depending on the number of trucks accessing the loading dock and frequency of other extraneous noise sources associated with receiving areas (e.g., forklifts, etc.).

The nearest sensitive receptor to the loading dock would be the multi-family residences across Race Street approximately 240 feet southwest of the loading dock's noise sources. At this distance, loading dock noise levels would range from 46 to 56 dBA L_{eq}. Hourly average noise levels at the nearest sensitive receptors ranged from 61 to 69 dBA L_{eq} during the day, and from 53 to 63 dBA L_{eq} at night. Given the occasional use of the loading dock and the ambient traffic noise levels from Race Street exceeding the worst-case loading dock noise levels, the operation of the loading dock would not be expected to exceed applicable thresholds or ambient noise conditions. This is a less than significant impact.

Noise associated with the use of parking lots would include vehicular circulation, engine starts, car alarms, door slams, and human voices. Hourly average noise level resulting from all of these noise-generating activities in a busy parking lot could range from 35 dBA to 45 dBA L_{eq} at a distance of 150 feet from the parking area.

The closest sensitive receptor to the parking lot would be the residences across W. San Carlos Street approximately 130 feet north from the parking lot's noise sources. At this distance, parking lot noise levels would range from 36 to 46 dBA L_{eq} and 42 to 52 dBA DNL, which would be below the City's 55 dBA L_{eq} and 55 dBA DNL threshold. This is a less-than-significant impact.

Mitigation Measure 1: None required.

Impact 2: Exposure to Excessive Groundborne Vibration due to Construction. Construction-related vibration levels resulting from activities at the project site, with the implementation of standard construction vibration measures, would not exceed 0.2 in/sec PPV at the nearest commercial land uses. **This is a less-than-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 the demolition of existing structures, site preparation work, excavation and grading, foundation work, paving, and new building framing and finishing. This analysis assumes pile driving would not be a required construction technique for this project, which can cause excessive vibration.

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.

Table 5 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. 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, if uncontrolled, 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.

TABLE 5 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.

* Pile driving not proposed by project.

The residential land uses surrounding to the project site include the single- and multi-family residences approximately 100 feet north of the site opposite W. San Carlos Street and the multi-family housing approximately 190 feet southwest of the site opposite Race Street. At these distances, vibration levels at the residential land uses would be up to 0.05 in/sec PPV, which would be below the 0.2 in/sec PPV threshold. The closest commercial land use is the adjacent commercial building approximately five feet to the east of the site. At this distance, vibration levels at the adjacent commercial building produced by the equipment having the highest potential for high vibration levels (i.e., vibratory roller, impact tools, etc.) would be up to 1.2 in/sec PPV, which would exceed the 0.2 in/sec PPV threshold. Other commercial land uses near the project site include a commercial building approximately 90 feet south of the site and commercial buildings approximately 100 feet west and north of the site opposite Race Street and W. San Carlos Street. At these distances, vibration levels would be up to 0.05 in/sec PPV, which would be below the 0.2 in/sec PPV threshold.

At affected 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 (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.

The following standard measures are included in the project to reduce vibration impacts from construction activities:

Standard Permit Conditions:

- Prohibit the use of heavy vibration-generating construction equipment, such as vibratory rollers or excavation using clam shell or chisel drops, within 30 feet of any adjacent building.

- 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.

The implementation of these standard measures would reduce the impact to a less-than- significant level.

Mitigation Measure 2: **No further mitigation required.**

Impact 3: **Substantial Permanent Noise Increase due to Project-Generated Traffic.** Project-generated traffic would not cause a permanent noise level increase at existing noise-sensitive land uses in the project vicinity. **This is a less-than-significant impact.**

A significant noise impact would occur if traffic generated by the project would substantially increase noise levels at sensitive receptors in the project 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. Noise-sensitive land uses along W. San Carlos Street and Race Street are exposed to noise levels greater than 60 dBA DNL; therefore, a significant impact would occur if project-generated traffic would permanently increase noise levels by 3 dBA DNL. For reference, traffic volumes would have to double for noise levels to increase by 3 dBA DNL.

The traffic report provided by *Hexagon Transportation Consultants*[2] provided peak hour volumes for the project-generated traffic at local and major roadways in the immediate project vicinity. 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 is assumed to correlate to the change in the peak hour L_{eq}. The permanent noise level increase due to this project-generated traffic would be approximately 1 dBA DNL or less at noise-sensitive receptors in project vicinity. Therefore, the proposed project would not cause a substantial permanent noise level increase at the nearby noise-sensitive receptors.

Mitigation Measure 3: **None required.**

[2] Hexagon Transportation Consultants, "W. San Carlos Street and Race Street Commercial Development TIA", March 2017.

Impact 4: **Substantial Temporary Noise Increase due to Construction.** Existing noise-sensitive land uses would be exposed to construction noise levels in excess of the significance thresholds, but not for a period of more than one year. **This is a less-than-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. Project construction is anticipated to occur over an approximate period of approximately seven months, starting in the spring of 2017.

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 uses 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 Tables 6 and 7. Table 6 shows the average noise level ranges, by construction phase, and Table 7 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 6 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 7 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

Equipment Category	L_{max} Level (dBA)1,2	Impact/Continuous
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 activities generate considerable amounts of noise, especially during earth-moving activities and during the construction of the building's foundation when heavy equipment is used. The construction of the proposed project would consist of demolishing existing structures, grading and excavating 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.

Nearby noise sensitive land uses include single- and multi-family residences to the north of the site opposite W. San Carlos Street and the multi-family residences southwest of the site opposite Race Street. Hourly average noise levels due to construction activities during busy construction periods outdoors would range from about 83 to 88 dBA L_{eq} at a distance of 50 feet. Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of the distance between the source and receptor. The noise sensitive land uses are approximately 100 feet and 190 feet from the project site. At these distances, hourly average noise levels during busy construction periods would range from 77 to 82 dBA L_{eq} for the residences across W. San Carlos Street and from 71 to 76 dBA L_{eq} for the residences across Race Street. Construction noise levels would be expected to exceed 60 dBA L_{eq} and exceed the ambient noise environment by at least 5 dBA L_{eq} at noise-sensitive residential uses in the project vicinity, but construction activities would last for a period less than one year. Commercial land uses surround the project site. The commercial land uses would be exposed to construction noise levels of 103 to 108 dBA L_{eq} at the commercial building five feet east of the project site, 78 to 83 dBA L_{eq} at the commercial building 90 feet south of the project site, and 77 to 82 dBA L_{eq} at the commercial buildings 100 feet west and north of the project site opposite Race Street and W. San Carlos Street. These noise levels would exceed 70 dBA L_{eq} and the ambient noise environment by at least 5 dBA $L_{eq,}$ but construction activities would last for a period less than one year.

Although construction noise levels would be expected to exceed both the 60 dBA L_{eq} residential and 70 dBA L_{eq} commercial thresholds and exceed the ambient noise environment by at least 5 dBA L_{eq} at noise-sensitive uses in the project vicinity, construction activities are expected to last approximately seven months. Typically, small construction projects do not generate significant noise impacts when the duration of the noise generating construction period is limited to one year or less. Construction noises associated with projects of this type are disturbances that are necessary for the construction or repair of buildings and structures in urban areas. Reasonable regulation of the hours of construction, as well as regulation of the arrival and operation of heavy equipment and the delivery of construction materials, are necessary to protect the health and safety of persons, promote the general welfare of the community, and maintain the quality of life. Project construction is expected to last less than one year; therefore, the temporary noise impact resulting from project construction activities would be considered less-than-significant.

Mitigation Measure 4: **None required.**