1881 WEST SAN CARLOS STREET CONDOMINUM AND SENIOR CARE NOISE AND VIBRATION ASSESSMENT

San José, California

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INTRODUCTION

The 1.23-acre project site is located north of W. San Carlos Street and between Brooklyn Avenue and Boston Avenue in the City of San José. The site is currently developed with four commercial buildings, an accessory structure, and associated parking. The proposed project would demolish the existing buildings and construct one new building with two components (condominium component and senior care component). The building would include six stories tall of up to 61 condominium dwelling units and seven stories of up to 246 senior care units. Below-grade parking would be provided. Retail space would be provided on the ground floor of the building, and an outdoor courtyard would be located near the center of the project site.

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 and groundborne vibration, summarizes applicable regulatory criteria, and discusses existing noise levels in the project vicinity; 2) the General Plan Consistency Section discusses noise and land use compatibility utilizing policies in the City's General Plan; and, 3) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents measures, where necessary, to mitigate the impacts of the project on sensitive receptors in the vicinity.

SETTING

Fundamentals of Environmental Noise

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

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

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

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

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

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

Effects of Noise

Sleep and Speech Interference

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

Annoyance

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

Fundamentals of Groundborne Vibration

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

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

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

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

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

TABLE 1 Definition of Acoustical Terms Used in this Report

Term	Definition
Decibel, dB	A unit describing, the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20 micro Pascals.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e. g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic 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	Threshold at which there is a risk of damage to fragile buildings with no risk of damage to most buildings
0.25	Strongly perceptible to severe	Threshold at which there is a risk of damage to historic and some old buildings.
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential structures
0.5	Severe - Vibrations considered unpleasant	Threshold at which there is a risk of damage to new residential and modern commercial/industrial structures

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

Regulatory Background - Noise

This section describes the relevant guidelines, policies, and standards established by State Agencies, Santa Clara County, and the City of San José. 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 California Environmental Quality Act (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) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

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

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

2019 California Building Code, Title 24, Part 2. The current version of the California Building Code (CBC) requires interior noise levels in multi-family residential units attributable to exterior environmental noise sources to be limited to a level not exceeding 45 dBA DNL/CNEL in any habitable room.

2019 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 2019 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, which are relevant to this project:

4.3.2.1 Noise Compatibility Policies

Policy N-2 In addition to the other policies herein, the Noise Compatibility Policies presented in Table 4-1 shall be used to determine if a specific land use is consistent with this CLUP.

Policy N-3 Noise impacts shall be evaluated according to the Aircraft Noise Contours presented on Figure 5 (2022 Aircraft Noise Contours, not shown in this report).

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.)

Table 4 - 1

NOISE COMPATIBILITY POLICIES

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

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

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

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

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

Interior Noise Levels

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

Exterior Noise Levels

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

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

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

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

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

Normally Acceptable:

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

Conditionally Acceptable:

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

Unacceptable:

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

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

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

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

EC-1.3 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-1.7 Require construction operations within San José to use best available noise suppression devices and techniques and limit construction hours near residential uses per the City's Municipal Code. The City considers significant construction

noise impacts to occur if a project located within 500 feet of residential uses or 200 feet of commercial or office uses would:

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

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

EC-1.11 Require safe and compatible land uses within the Mineta San José International Airport noise zone (defined by the 65 CNEL contour as set forth in State law) and encourage aircraft operating procedures that minimize noise.

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 continuous vibration impacts to adjacent uses during demolition and construction. For sensitive historic structures, including ruins and ancient monuments or building that are documented to be structurally weakened, a continuous 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 continuous vibration limit of 0.20 in/sec PPV will be used to minimize the potential for cosmetic damage at buildings of normal conventional construction. Equipment or activities typical of generating continuous vibration include but are not limited to: excavation equipment; static compaction equipment; vibratory pile drivers; pile-extraction equipment; and vibratory compaction equipment. Avoid use of impact pile drivers within 125 feet of any buildings, and within 300 feet of historical buildings, or buildings in poor condition. On a project-specific basis, this distance of 300 feet may be reduced where warranted by a technical study by a qualified professional that verifies that there will be virtually no risk of cosmetic damage to sensitive buildings from the new development during demolition and construction. Transient vibration impacts may exceed a vibration limit of 0.08 in/sec PPV only when and where warranted by a technical study by a qualified professional that verifies that there will be virtually no risk of cosmetic damage to sensitive buildings from the new development during demolition and construction.

Existing Noise Environment

The approximately 1.23-acre site is comprised of seven parcels (APNs 274-16-049, -050, -051, -052, -053, -069, and -070) located between Brooklyn Avenue and Boston Avenue and north of West San Carlos Street in the City of San José. Residential land uses adjoin the site to the north. Commercial land uses are located opposite Boston Avenue to the east, Brooklyn Avenue to the west, and W. San Carlos Street to the south.

Due to regional shelter-in-place restrictions implemented by the State of California at the time of this study, traffic volumes along the surrounding roadways were reduced and not representative of typical conditions. Therefore, a noise monitoring survey was not completed to document ambient noise levels. Instead, noise data collected as part of previous projects were reviewed to establish the existing noise environment.

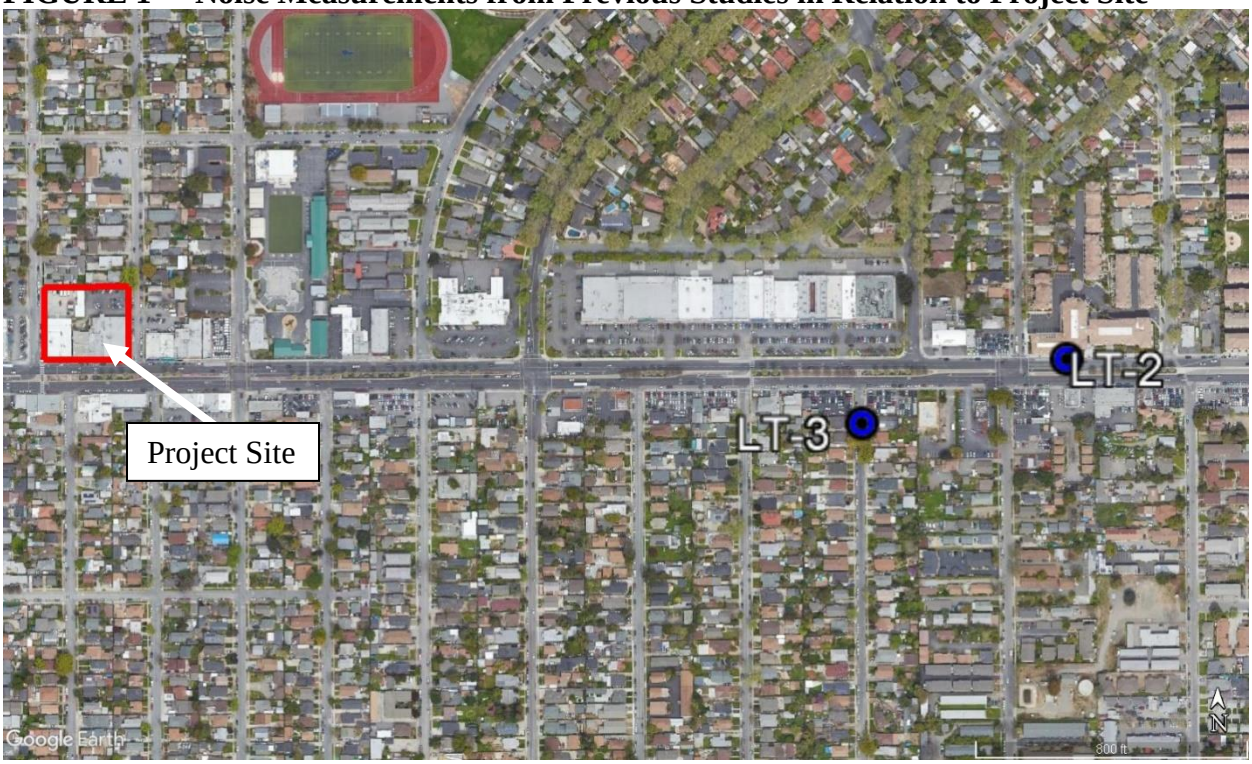
In addition, the Federal Highway Administration's (FHWA) Traffic Noise Model, version TNM 2.5, (TNM 2.5) was used to calculate existing noise conditions specific to the project area. Calculations accounted for the source of noise (traffic), the topography of the area, and existing buildings and barriers. Existing peak hour traffic data obtained from the project's traffic study was input into the model for local roadways along with traffic speed data based on the posted speed limits.

Noise levels from previous studies along W. San Carlos Street were used to validate the model and calculate overall day-night levels. The first study[1] in 2017 documented a noise level of 65 dBA DNL at a distance of 148 feet from the centerline of W. San Carlos Street. This measurement (identified in the study as LT-3) was approximately 0.4 miles east of the project site at Menker Avenue and W. San Carlos Street. The second study[2] in 2019 documented a noise level of 72 dBA DNL at a distance of 45 feet from the centerline of W. San Carlos Street. This measurement (identified in the study as LT-2) was approximately 0.5 miles east of the project site, in front of 1535 W. San Carlos Street. Trends in daily noise levels for both long-term measurements are included in Appendix A.

Based on the TNM model calculations, the existing noise level at a setback of 50 feet from the centerline of W. San Carlos Street is estimated to be 71 dBA DNL. These modeled results are within 1 dBA of noise levels measured in the previous studies along W. San Carlos Street. The noise levels at the project site are representative of the existing noise environment at receptors to the south, east, and west of the project site with a similar setback distance from W. San Carlos Street. Taking into consideration acoustic shielding from existing buildings at the project site, existing noise levels would be approximately 57 dBA DNL at the shared property line with the residential land uses to the north.

[1] Illingworth & Rodkin, Inc., "Noise Assessment for West San José Urban Villages Project," Prepared for David J. Powers & Associates, Inc. Report not published.
[2] Illingworth & Rodkin, Inc., "1530-1544 West San Carlos Street Mixed-Use Development Noise and Vibration Assessment," Prepared for David J. Powers & Associates, Inc. October 21, 2019.

FIGURE 1 Noise Measurements from Previous Studies in Relation to Project Site



Source: Google Earth 2021.

PLAN CONSISTENCY ANALYSIS

Noise and Land Use Compatibility

The exterior noise threshold established in the City's General Plan for new multi-family residential projects is 60 dBA DNL at usable outdoor activity areas, excluding private balconies and porches. The City also requires that noise levels within residential units be maintained at 45 dBA DNL. Interior noise levels within proposed retail uses would be required to meet the California Green Building Standards Code's 50 dBA $L_{eq(1\text{-}hr)}$ performance standard during operational hours.

The future noise environment at the project site would continue to result primarily from vehicular traffic along W. San Carlos Street. Existing and future traffic conditions from the project's traffic study were compared to estimate future traffic noise increases in the project vicinity. For purposes of estimating the worst-case scenario, the background plus project traffic scenario was used to estimate future peak hour noise levels. Based on these results, future noise levels attributable to traffic conditions are anticipated to increase by up to 1 dBA DNL in the project site vicinity. Therefore, the future noise environment along W. San Carlos Street would be up to 72 dBA DNL at the setback of the building.

Future Exterior Noise Environment

The site plan shows one courtyard at ground level in-between the proposed condominium and senior care components. This outdoor use area would be located near the center of the project site and shielded from W. San Carlos Street by the proposed condominiums. Considering the setback distance from W. San Carlos Street and acoustic shielding provided by the proposed building, the courtyard would have future exterior noise levels below 60 dBA DNL at the center of the outdoor space.

A second residential outdoor use area is shown in the southwestern corner of the roof. This common area would be approximately 2,176 square feet and would be facing W. San Carlos Street. The center of the rooftop common area would be approximately 65 feet from the centerline of W. San Carlos Street. The elevation of the building would provide partial shielding for the traffic noise. Additionally, the site plan shows a stucco barrier wall along the edge of the roof, which would also provide shielding for the outdoor area. The height of this barrier was not specified, but it appears to be a minimum of six feet tall. At the center of the area, the future exterior noise levels would be below 60 dBA DNL, with or without the six-foot barrier wall located at the edge of the roof.

Noise levels at the proposed common use areas would meet the City's normally acceptable noise threshold as proposed.

Future Interior Noise Environment

Residential Uses

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 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 smaller window and door sizes as a percentage of the total building façade facing the noise source, sound-rated windows and doors, sound rated exterior wall assemblies, and mechanical ventilation so windows may be kept closed at the occupant's discretion.

The residential and senior care units located along the southern building façade would be setback from the centerline of W. San Carlos Street by approximately 50 feet. At this distance, residential units would be exposed to future exterior noise levels of up to 72 dBA DNL. Assuming standard construction materials with windows partially open for ventilation, future interior noise levels would be up to 57 dBA DNL.

The eastern and western façades of the building would be set back approximately 20 feet from the centerline of Boston Avenue and Brooklyn Avenue, respectively. Residential and senior care units

along these building façades would be exposed to future exterior noise levels ranging from 60 dBA DNL at the northern end of the building to 72 dBA DNL at the southern end of the building. Assuming standard construction materials with windows partially open for ventilation, future interior noise levels within units along these façades would range from 45 to 57 dBA DNL.

The northern building façade would be shielded from W. San Carlos Street. Senior care units along this façade would be exposed to future exterior noise levels ranging from 57 to 62 dBA DNL, depending on the setback distance from Boston Avenue and Brooklyn Avenue. Assuming standard construction materials with windows partially open for ventilation, future interior noise levels within units along this façade would range from 39 to 45 dBA DNL.

Based on the site plan dated June 4th, 2020, preliminary calculations were made to calculate the minimum STC ratings of windows and doors necessary to meet the interior noise level requirement of 45 dBA DNL. It was assumed that the exterior finish of the building would consist of three-coat (7/8" thick) stucco or equivalent that would have a sound isolation rating of STC 46. With these assumptions included in the calculations, the exterior windows and doors along the southern façade would require a minimum STC rating of 34 to reduce interior noise levels to less than 45 dBA DNL with an adequate margin of safety. Exterior windows and doors along the western and eastern façades of the building, within approximately 120 feet of the centerline of W. San Carlos Street would also require minimum STC ratings of 34. Standard dual-pane, thermal insulating windows (STC 28) would be sufficient for all remaining units. Improved STC recommendations for affected external-facing units are shown in Appendix A.

Commercial Uses

The retail component of the proposed project would be located on the ground level, along the southern façade of the building. The setback of the ground level retail uses would be approximately 50 feet from the centerline of W. San Carlos Street. At this distance, future hourly average noise levels during daytime hours would range from 69 to 74 dBA $L_{eq(1\text{-}hr)}$.

Standard construction materials for commercial uses would provide about 25 dBA of noise reduction in interior spaces. The inclusion of adequate forced-air mechanical ventilation systems is normally required so windows may be kept closed at the occupant's discretion and would provide an additional 5 dBA reduction. The standard construction materials in combination with forced-air mechanical ventilation would satisfy the daytime threshold of 50 dBA $L_{eq(1\text{-}hr)}$. Standard construction materials would satisfy the Cal Green Code.

Noise Insulation Features to Reduce Future Interior Noise Levels

The following noise insulation features shall be incorporated into the proposed project to reduce interior noise levels to levels below 45 dBA DNL for residential and senior care units and 50 dBA $L_{eq(1\text{-}hr)}$ for commercial retail.

- Provide a suitable form of forced-air mechanical ventilation, as determined by the local building official, for all residential, senior care, and retail units, so that windows can be

kept closed at the occupant's discretion to control interior noise and achieve the interior noise standards.

- Preliminary calculations indicate that units along the southern building façade would require windows and doors with a minimum rating of 34 STC to meet the interior noise threshold of 45 dBA DNL.

- Preliminary calculations indicate that units along the eastern and western building façades, within approximately 120 feet of the centerline of W. San Carlos Street, would require windows and doors with a minimum rating of 34 STC to meet the interior noise threshold of 45 dBA DNL.

- A qualified acoustical specialist shall prepare a detailed analysis of interior residential noise levels resulting from all exterior sources 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 spaces affected by environmental 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. Treatments would include, but are not limited to, sound-rated windows and doors, sound-rated wall and window constructions, 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.

The implementation of these noise insulation features would reduce interior noise levels to 45 dBA DNL or less within residential units and 50 dBA $L_{eq(1\text{-}hr)}$ or less within nonresidential areas.

NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

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

- A significant noise impact would be identified if the project would generate a substantial temporary or permanent noise level increase over ambient noise levels at existing noise-sensitive receptors surrounding the project site and that would exceed applicable noise standards presented in the General Plan at existing noise-sensitive receptors surrounding the project site.

    - A significant noise impact would be identified if construction-related noise would temporarily increase ambient noise levels at sensitive receptors. The City of San José considers large or complex projects involving substantial noise-generating

activities and lasting more than 12 months significant when within 500 feet of residential land uses or within 200 feet of commercial land uses or offices.

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

- 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.

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

- A significant noise impact would be identified if the project would expose people residing or working in the project area to excessive aircraft noise levels.

Impact 1a: **Temporary Construction Noise.** Existing noise-sensitive land uses would be exposed to a temporary increase in ambient noise levels due to project construction activities. The incorporation of construction best management practices as project conditions of approval would result in a **less-than-significant** temporary noise 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.

Policy EC-1.7 of the City's General Plan requires that all construction operations within the City to use best available noise suppression devices and techniques and to limit construction hours near residential uses per the Municipal Code allowable hours, which are between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday when construction occurs within 500 feet of a residential land use. Further, 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.

Existing residences to the north of the project site are within 5 feet of the shared boundary. At these residences, existing ambient noise levels would be approximately 57 to 62 dBA DNL, depending on the presence of buildings at the project site. Following demolition of the existing buildings at the project site, these residences would no longer be shielded from traffic along W. San Carlos Street and would be exposed to noise levels up to 61 dBA DNL. As the proposed

building is constructed, the residences to the north would be shielded from W. San Carlos Street and would be exposed to noise levels as low as 57 dBA DNL. Based on a comparison of the results from the TNM model with trends in noise measurements collected at LT-2, daytime noise levels would typically range from 49 to 62 dBA L_{eq}, depending on the progress of building construction at the project site.

Existing commercial properties along W. San Carlos Street to the south, east, and west of the project site would be exposed to similar noise levels as were modeled at the project site. Based on a comparison with trends in noise measurements collected at LT-2, daytime noise levels would typically range from 64 to 72 dBA L_{eq}.

The typical range of maximum instantaneous noise levels produced by construction equipment necessary to construct the proposed project would be 70 to 90 dBA L_{max} at a distance of 50 feet from the equipment (see Table 4). Table 5 shows the range of average noise levels expected during each construction phase. Hourly average noise levels generated by construction are about 65 to 88 dBA L_{eq} for a residential development measured at a distance of 50 feet from the center of a busy construction site. Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of the distance between the source and receptor. Shielding by buildings or terrain often result in lower construction noise levels at distant receptors.

Project construction is expected to start in September 2022 and continue through May 2024. A detailed list of equipment expected to be used during each phase of construction was provided and is summarized in Table 6. FHWA's Roadway Construction Noise Model (RCNM) was used to calculate the hourly average noise levels for each phase of construction, assuming every piece of equipment would operate simultaneously, which would represent the worst-case scenario. This construction noise model includes representative sound levels for the most common types of construction equipment and the approximate usage factors of such equipment that were developed based on an extensive database of information gathered during the construction of the Central Artery/Tunnel Project in Boston, Massachusetts (CA/T Project or "Big Dig"). The usage factors represent the percentage of time that the equipment would be operating at full power.

For each phase of construction, the worst-case hourly average noise level, as estimated at the property line of each surrounding land use, is shown in Table 6. Construction would occur throughout the site, and hourly average noise levels at each of the receiving land uses would vary depending on the location of the active construction site. For the purposes of estimating the worst-case scenario, noise levels in Table 6 were calculated assuming the center of the active construction site would be located at the center of the project building.

As shown in Table 6, ambient noise levels at the surrounding uses would potentially be exceeded by 5 dBA L_{eq} or more at various times throughout construction. Since total project construction would last for a period of more than one year and considering the project site is within 500 feet of existing and future residences, the construction of the proposed project would cause a significant temporary noise impact.

TABLE 4 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.

TABLE 5 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 6 Estimated Construction Noise Levels at Nearby Land Uses

Phase of Construction	Time Duration	Construction Equipment (Quantity)	Calculated Hourly Average Noise Levels, L_{eq} (dBA)			
			North Res. (105 ft)	East Res. and Comm. (175 ft)	West Comm. (175 ft)	South Comm. (200 ft)
Demolition	9/6/2022-9/15/2022	Excavator (1)	70	66	66	65
Site Preparation	9/16/2022-9/28/2022	Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (1)	73	68	68	67
Grading/Excavation	9/29/2022-10/28/2022	Excavator (1) Grader (1) Tractor/Loader/Backhoe (1)	76	72	72	71
Trenching/Foundation	10/31/2022-11/21/2022	Tractor/Loader/Backhoe (1) Excavator (1)	72	68	68	66
Building Exterior	11/22/2022-11/21/2023	Crane (1) Forklift (1) Tractor/Loader/Backhoe (1) Welder (1)	71	67	67	66
Building Interior/Architectural Coating	11/22/2023-5/21/2024	Air Compressor (1)	67	63	63	62
Paving	11/22/2023-12/21/2023	Paving Equipment (1) Roller (1)	70	66	66	65

Reasonable regulation of the hours of construction, as well as regulation of the arrival and operation of heavy equipment and the delivery of construction material, are necessary to protect the health and safety of persons, promote the general welfare of the community, and maintain the quality of life. The following standard noise control measures shall be implemented as part of project conditions of approval to reduce and avoid construction-related noise impacts. The Municipal Code requires that reasonable noise reduction measures be incorporated into the construction plan and implemented during all phases of construction activity. The following standard noise control measures shall be implemented as project conditions of approval:

- Construction will be limited to the hours of 7:00 a.m. to 7:00 p.m. Monday through Friday for any on-site or off-site work within 500 feet of any residential unit. Construction outside of these hours may be approved through a development permit based on a site-specific "construction noise mitigation plan" and a finding by the Director of Planning, Building and Code Enforcement that the construction noise mitigation plan is adequate to prevent noise disturbance of affected residential uses.

- The contractor shall use "new technology" power construction equipment with state-of-the-art noise shielding and muffling devices. All internal combustion engines used on the project site shall be equipped with adequate mufflers and shall be in good mechanical condition to minimize noise created by faulty or poorly maintained engines or other components.

- Unnecessary idling of internal combustion engines shall be prohibited.

- Staging areas and stationary noise-generating equipment shall be located as far as possible from noise-sensitive receptors such as residential uses (a minimum of 200 feet).

- The surrounding neighborhood shall be notified early and frequently of the construction activities.

- A "noise disturbance coordinator" shall be designated to respond to any local complaints about construction noise. The disturbance coordinator would determine the cause of the noise complaints (e.g., beginning work too early, bad muffler, etc.) and institute reasonable measures warranted to correct the problem. A telephone number for the disturbance coordinator would be conspicuously posted at the construction site.

While the proposed project would not be considered a large project, the close proximity of the site to the existing residences to the north and the extended construction duration (i.e., more than one construction season) would require that a "construction noise logistics plan," in accordance with Policy EC-1.7, be included as part of the project conditions of approval. Typical construction noise logistics plan would include, but not be limited to, the following measures to reduce construction noise levels as low as practical:

- Utilize 'quiet' models of air compressors and other stationary noise sources where technology exists.

- Equip all internal combustion engine-driven equipment with mufflers, which are in good condition and appropriate for the equipment.

- Construct temporary noise barriers, where feasible, to screen stationary noise-generating equipment when located within 200 feet of adjoining sensitive land uses. Temporary noise barrier fences would provide a 5 dBA noise reduction if the noise barrier interrupts the line-of-sight between the noise source and receptor and if the barrier is constructed in a manner that eliminates any cracks or gaps. Typically, a minimum height of 8 feet would be adequate.

- If stationary noise-generating equipment must be located near receptors, adequate muffling (with enclosures where feasible and appropriate) shall be used. Any enclosure openings or venting shall face away from sensitive receptors.

- Ensure that generators, compressors, and pumps are housed in acoustical enclosures.

- Locate cranes as far from adjoining noise-sensitive receptors as possible.

- During final grading, substitute graders for bulldozers, where feasible. Wheeled heavy equipment are quieter than track equipment and should be used where feasible.

- Substitute nail guns for manual hammering, where feasible.

- Substitute electrically-powered tools for noisier pneumatic tools, where feasible.

- The contractor shall prepare a detailed construction plan identifying the schedule for major noise-generating construction activities. The construction plan shall identify a procedure for coordination with adjacent residential land uses so that construction activities can be scheduled to minimize noise disturbance.

With the implementation of GP Policy EC-1.7, Municipal Code requirements relating to allowable hours of construction, and the above construction best management practices, the temporary construction noise impact would be reduced to a less-than-significant level.

Mitigation Measure 1a: No further mitigation required.

Impact 1b: **Permanent Noise Level Increase.** The proposed project is not expected to cause a substantial permanent noise level increase at the existing residential land uses in the project vicinity. **This is a less-than-significant impact.**

According to Policy EC-1.2 of the City's General Plan, a significant permanent noise increase would occur if the project would increase noise levels at noise-sensitive receptors by 3 dBA DNL or more where ambient noise levels exceed the "normally acceptable" noise level standard. Where ambient noise levels are at or below the "normally acceptable" noise level standard, noise level increases of 5 dBA DNL or more would be considered significant. The City's General Plan defines the "normally acceptable" outdoor noise level standard for the residential land uses to be 60 dBA

DNL. Existing ambient levels, based on the measurements made in the project vicinity, exceed 60 dBA DNL. Therefore, a significant impact would occur if traffic due to the proposed project would permanently increase ambient levels by 3 dBA DNL. For reference, a 3 dBA DNL noise increase would be expected if the project would double existing traffic volumes along a roadway.

The traffic study prepared for the proposed project included peak hour turning movements for existing traffic conditions at five intersections along W. San Carlos Street. Peak hour turning movements for project trips were also included. When these project trips were added to the existing traffic volumes, the existing plus project scenario was calculated. By comparing the existing plus project traffic volumes to the existing traffic volumes, a noise level increase of up to 1 dBA DNL was calculated along every roadway segment included in the traffic study. The project would not result in doubling of the traffic, and therefore, the proposed project would not result in a permanent noise increase of 3 dBA DNL or more. This is a less-than-significant impact.

Mitigation Measure 1b: None required.

Impact 1c: Noise Levels in Excess of Standards. The proposed project would not generate noise in excess of standards established in the City's General Plan at the nearby sensitive receptors. However, the project could potentially exceed the City's Municipal Code threshold of 55 dBA DNL. Implementation of measures as a project condition of approval would ensure noise levels to be below 55 dBA DNL. **This is a less-than-significant impact.**

The City's General Plan does not include policies specifically addressing operational noise generated by residential land uses. However, the mechanical noise for these types of uses should be addressed with respect to the City's Municipal Code threshold of 55 dBA DNL to minimize disturbance to the existing and future residences surrounding the project site.

For the commercial component of the proposed project, Policies EC-1.3 and EC-1.6 of the City's General Plan state that noise generated by new nonresidential land uses should not exceed 55 dBA DNL at the property lines of adjacent existing or planned noise-sensitive uses.

Mechanical Equipment

Site plans for the proposed project indicate utility rooms and a boiler room within the underground parking garage. An electrical room is also shown on the first floor. Details pertaining to the location, type, size, and manufacturer-provided noise level information of mechanical equipment, such as HVAC systems and exhaust fans were not available at the time of this study.

Most of the equipment is anticipated to be located within the interior of the building or on the rooftop. Typically, HVAC units for residential and commercial projects are located on the rooftop. Assuming HVAC units are located near the center of the building, the closest shared property line would be approximately 50 feet. At this distance, and assuming partial shielding from the rooftop itself, noise levels attributable to HVAC units for projects of this size are not expected to exceed 55 dBA DNL at the surrounding land uses.

Additionally, an emergency generator is expected as part of the project site. Details regarding the size and capacity of the emergency generator are unavailable at this time. However, for a building of this size, the generator may have a capacity up to 1,000 kW. Generators of this size would typically result in noise levels up to 89 dBA at a distance of 50 feet. With the inclusion of sufficient noise control features, noise levels could be reduced to 65 dBA at 50 feet from the generator room. Emergency generators are typically tested monthly for a period of one hour between 7:00 a.m. and 10:00 p.m. Further, it is assumed that the City's thresholds would not apply during emergency conditions when the generators may run continuously during daytime and nighttime hours. During the testing periods, the threshold would apply.

The site plan shows the generator room on the ground level in the northeastern portion of the building. The generator room would be 65 feet from the northern property line shared with existing residential land uses. At this distance, noise levels due to the generator would be 67 dBA L_{eq} without noise control features and 43 dBA L_{eq} with noise control features, both assuming a conservative 20 dBA reduction due to the building façade and an eight-foot concrete masonry unit (CMU) fence shown in the site plan along the northern property line. The estimated day-night average noise level at the nearest residential property line would range from 29 dBA DNL with noise control features to 53 dBA DNL without noise control features.

It is expected that mechanical equipment noise for the proposed project would meet the City's applicable noise limits. However, noise levels from mechanical equipment should be examined once specific equipment has been selected to ensure compliance with the City's 55 dBA DNL threshold. A qualified acoustical consultant shall be retained to determine specific noise reduction measures necessary to reduce noise to comply with the City's General Plan and Municipal Code noise level requirements, as applicable. Noise reduction measures could include, but are not limited to, selection of equipment that emits low noise levels and installation of noise barriers, such as enclosures and parapet walls, to block the line-of-sight between the noise source and the nearest receptors.

Truck Deliveries

The proposed senior care and commercial retail use would likely require regular truck deliveries. While details pertaining to the number of deliveries and hours of deliveries were not available at the time of this study, it is assumed that trucks would make deliveries once per day. A drop-off zone would be located near the southeast corner of the building, along W. San Carlos Street. At this location, residential receptors to the north would be shielded from truck deliveries by the proposed building. Taking into consideration the ambient noise levels along W. San Carlos Street and the infrequency of truck deliveries, this would be a less-than-significant impact.

Mitigation Measure 1c: No further mitigation required.

Impact 2: Exposure to Excessive Groundborne Vibration due to Construction. Construction-related vibration levels may produce vibration levels exceeding 0.2 in/sec PPV at the nearest residential land use. **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 demolition, site preparation work, foundation work, and new building framing and finishing. While pile driving equipment can cause excessive vibration, it is not expected to be required for the proposed project.

According to Policy EC-2.3 of the City of San Jose 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 conventional construction. Based on the Historical Resources Inventory for the City of San José,[3] there are several buildings of historical significance located within 500 feet of the project boundary. These include structures at 24 Brooklyn Avenue, 36 Brooklyn Avenue, 12 Boston Avenue, 19 Boston Avenue, 30 Boston Avenue, 57 Boston Avenue, 47 Wabash Avenue, and 39 Wabash Avenue.

Table 7 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet and a summary of the vibration levels at conventional and historic buildings. Vibration levels were estimated under the assumption that each piece of equipment was operating along the nearest boundary of the project site, which would represent the worst-case scenario. 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 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.

As shown in Table 7, all commercial buildings surrounding the site are located 50 feet or more from the nearest boundary of the project site. At the nearest commercial buildings, vibration levels would be at or below 0.2 in/sec PPV, which is below the City's 0.2 in/sec PPV threshold for conventional buildings.

The nearest historical structures would be located at 24 Brooklyn Avenue and 19 Boston Avenue, which would be as close as 5 feet from the shared property line to the north. At this distance, vibration levels would be up to 1.233 in/sec PPV. The historic structure at 12 Boston Avenue would be as close as 55 feet from the shared property line to the east. At this distance, vibration levels would be up to 0.088 in/sec PPV. Historic buildings that are located further to the north and east would be exposed to vibration levels below 0.08 in/sec PPV. The City's threshold of 0.08 in/sec PPV for historical buildings would potentially be exceeded at the nearest residences to the north and east of the project site when construction activities occur near the property lines.

A study completed by the US Bureau of Mines analyzed the effects of blast-induced vibration on buildings in USBM RI 8507.[4] The findings of this study have been applied to buildings affected

[3] https://www.sanjoseca.gov/home/showpublisheddocument?id=24021

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

by construction-generated vibrations.[5] As reported in USBM RI 8507[4] and reproduced by Dowding,[5] Figure 2 presents the damage probability, in terms of "threshold damage," "minor damage," and "major damage," at varying vibration levels. Threshold damage, which is described as cosmetic damage in this report, would entail hairline cracking in plaster, the opening of old cracks, the loosening of paint or the dislodging of loose objects. Minor damage would include hairline cracking in masonry or the loosening of plaster, and major structural damage would include wide cracking or shifting of foundation or bearing walls. As shown in Figure 2, maximum vibration levels of 1.2 in/sec PPV would result in approximately 20% of cosmetic damage, while no minor or major damage was observed with maximum vibration levels of 1.2 in/sec PPV. Below 0.4 in/sec PPV, no minor or major damage would be expected, and there would be a less than 5% chance of cosmetic damage.

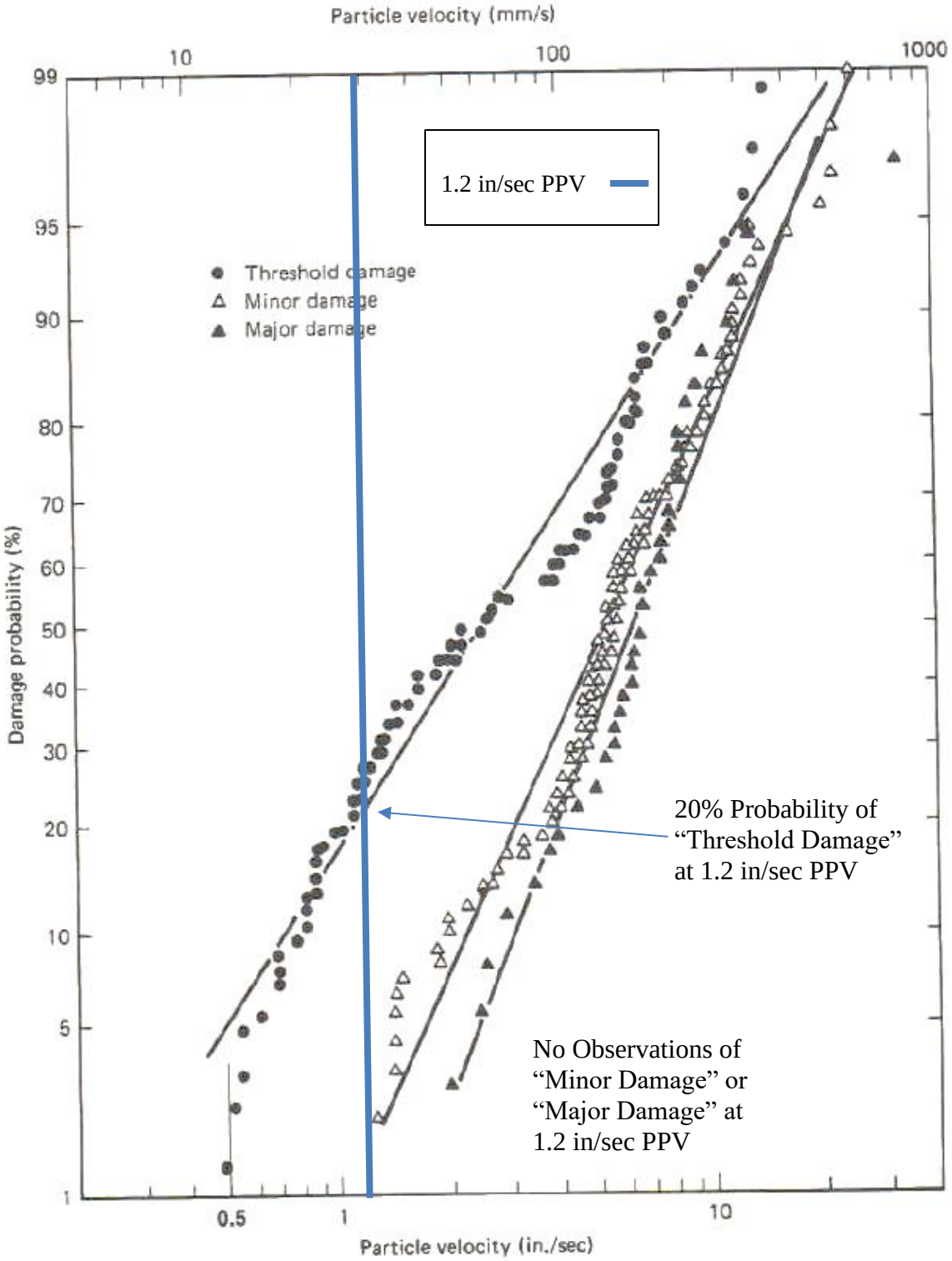
[5] Dowding, C.H., Construction Vibrations, Prentice Hall, Upper Saddle River, 1996.

TABLE 7 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)	Vibration Levels at Nearest Conventional Buildings (in/sec PPV)		Vibration Levels at Nearest Historical Buildings (in/sec PPV)				
			Commercial Structure East (50 feet)	Commercial Structures South and West (100 feet)	Residential Structures North (5 feet)	Residential Structure East (55 feet)	Residential Structure North (90 feet)	Residential Structure Northeast (130 feet)	Residential Structure North (180 feet)
Clam shovel drop		0.202	0.094	0.044	1.186	0.085	0.049	0.033	0.023
Hydromill (slurry wall)	in soil	0.008	0.004	0.002	0.047	0.003	0.002	0.001	0.001
	in rock	0.017	0.008	0.004	0.100	0.007	0.004	0.003	0.002
Vibratory Roller		0.21	0.098	0.046	1.233	0.088	0.051	0.034	0.024
Hoe Ram		0.089	0.042	0.019	0.523	0.037	0.022	0.015	0.010
Large bulldozer		0.089	0.042	0.019	0.523	0.037	0.022	0.015	0.010
Caisson drilling		0.089	0.042	0.019	0.523	0.037	0.022	0.015	0.010
Loaded trucks		0.076	0.035	0.017	0.446	0.032	0.019	0.012	0.009
Jackhammer		0.035	0.016	0.008	0.206	0.015	0.009	0.006	0.004
Small bulldozer		0.003	0.001	0.001	0.018	0.001	0.001	0.000	0.000

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, May 2006, as modified by Illingworth & Rodkin, Inc., January 2021.

FIGURE 2 Probability of Cracking and Fatigue from Repetitive Loading



Source: Dowding, C.H., Construction Vibrations, Prentice Hall, Upper Saddle River, 1996, as modified by Illingworth & Rodkin, Inc., January 2021.

Vibratory construction equipment or the dropping of heavy objects would have the potential to produce vibration levels of 0.2 in/sec PPV or more at the nearest conventional building and 0.08 in/sec PPV or more at the nearest historical building. While no minor or major damage would occur, there is a slight potential that cosmetic damage could occur. This is a significant impact.

At surrounding areas within 200 feet, vibration levels would potentially be perceptible. 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.

Mitigation Measure 2:

The following measures, in addition to the best practices specified in Impact 1a of this report, are recommended to reduce vibration impacts from construction activities to a less-than-significant impact:

- Prohibit impact or vibratory pile driving. Drilled piles or mat slab foundations cause lower vibration levels where geological conditions permit their use.

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

- Place operating equipment on the construction site at least 30 feet from vibration-sensitive receptors.

- Use the smallest equipment available to complete the task and minimize vibration levels as low as feasible.

- Avoid using vibratory rollers and tampers near sensitive areas.

- Select demolition methods not involving impact tools.

- Modify/design or identify alternative construction methods to reduce vibration levels below the limits.

- Avoid dropping heavy objects or materials.

- A construction vibration-monitoring plan shall be implemented to document conditions of properties within 30 feet of the project site to the north and at the historical structure at 12 Boston Avenue, during, and after vibration generating construction activities. All plan tasks shall be undertaken under the direction of a licensed Professional Structural Engineer in the State of California and be in accordance with industry accepted standard methods.

The construction vibration monitoring plan should be implemented to include the following tasks:

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

- Performance of a photo survey, elevation survey, and crack monitoring survey for the historic structures within 60 feet of the site. Surveys shall be performed prior to, in regular intervals during, and after completion of vibration generating construction activities and shall include internal and external crack monitoring in the structure, settlement, and distress and shall document the condition of the foundation, walls and other structural elements in the interior and exterior of said structure.

- Development of a vibration monitoring and construction contingency plan to identify 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. Construction contingencies, such as alternative construction methods and equipment, or securing the structure, would be identified when vibration levels approach the limits. If vibration levels approach limits, suspend construction and implement these contingencies to either lower vibration levels or secure the affected structure.

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

- The results of 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.

- 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 measures would reduce the impact to a less-than-significant level.

Impact 3: **Excessive Aircraft Noise.** The project site is located approximately 1.9 miles from the nearest airport, and the proposed project would not expose people working at the site to excessive aircraft noise. **This is a less-than-significant impact.**

Norman Y. Mineta San José International Airport is a public-use airport located approximately 1.8 miles northeast of the project site. Figure 4 shows that the project site lies well outside the 2037 60 dBA CNEL noise contour of the airport, according to the City's new Airport Master Plan Environmental Impact Report.[6] This means that future exterior noise levels due to aircraft would not exceed 60 dBA CNEL/DNL. According to Policy EC-1.11 of the City's General Plan, the required safe and compatible threshold for exterior noise levels would be at or below 65 dBA CNEL/DNL for aircraft. Therefore, the proposed project would be compatible with applicable noise standards related to aircraft noise. This is a less-than-significant impact.

Mitigation Measure 3: **None required.**

[6] David J. Powers & Associates, Inc., Integrated Final Environmental Impact Report, Amendment to Norman Y. Mineta San Jose International Airport Master Plan, April 2020.

FIGURE 3 2037 CNEL Noise Contours for SJIA Relative to Project Site

Figure 5
Scenario 2: With Project 2037 Noise Contour Map

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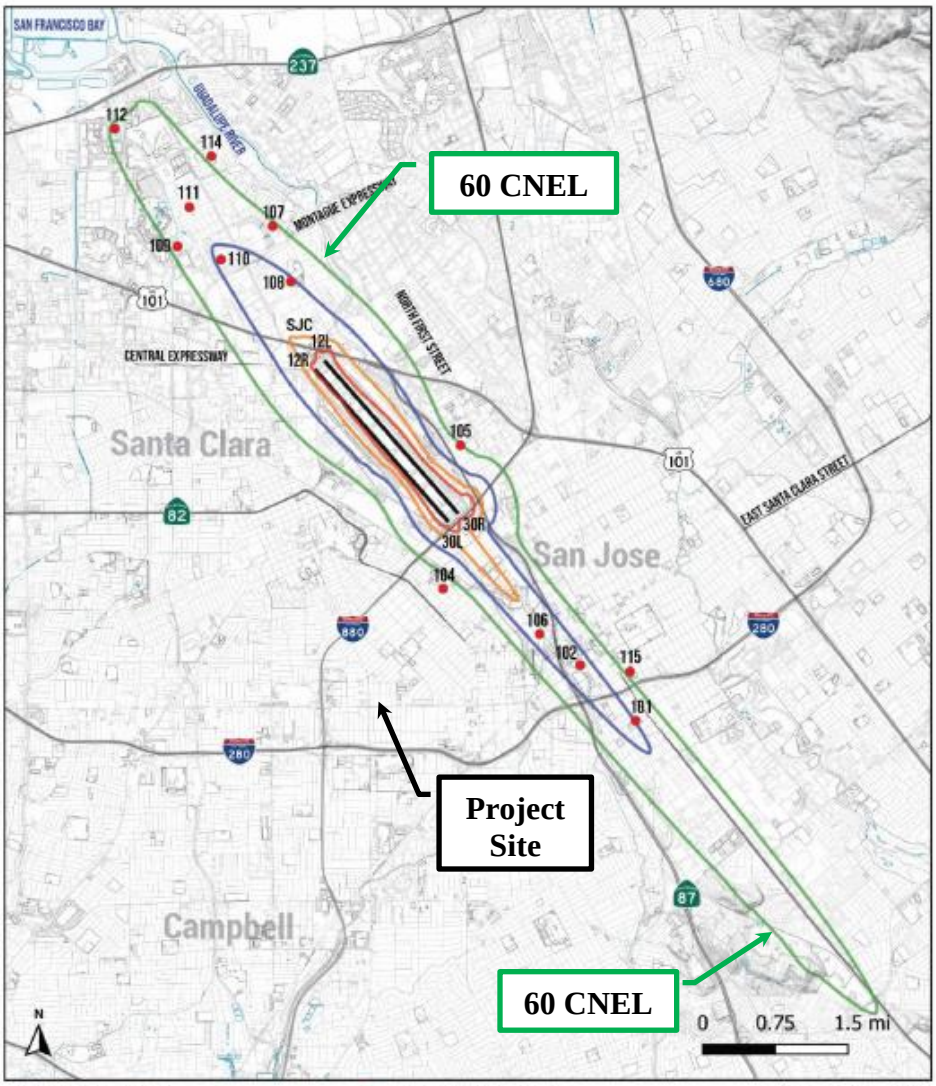


NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT

Noise Monitoring Station
101 Site ID
Runway
75 dBA and Greater CNEL Contour
70 dBA and Greater CNEL Contour
65 dBA and Greater CNEL Contour
60 dBA and Greater CNEL Contour

Figure 5 Scenario 2: With Project 2037 Noise Contour Map

Source: BridgeNet International 2019

Appendix A

Noise Levels at Noise Measurement Site LT-2
1535 W San Carlos Street, San Jose
Tuesday, April 30, 2019

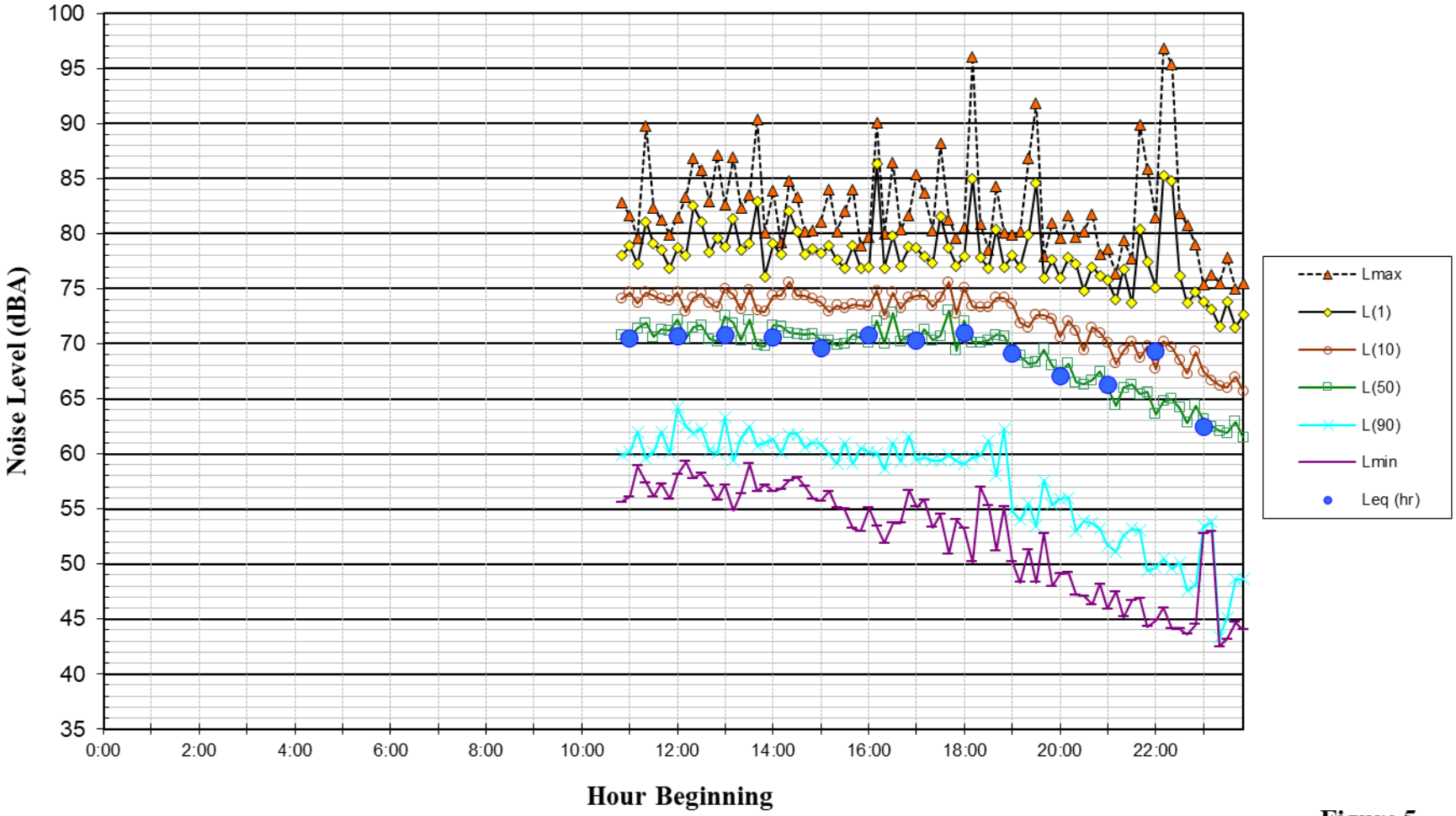
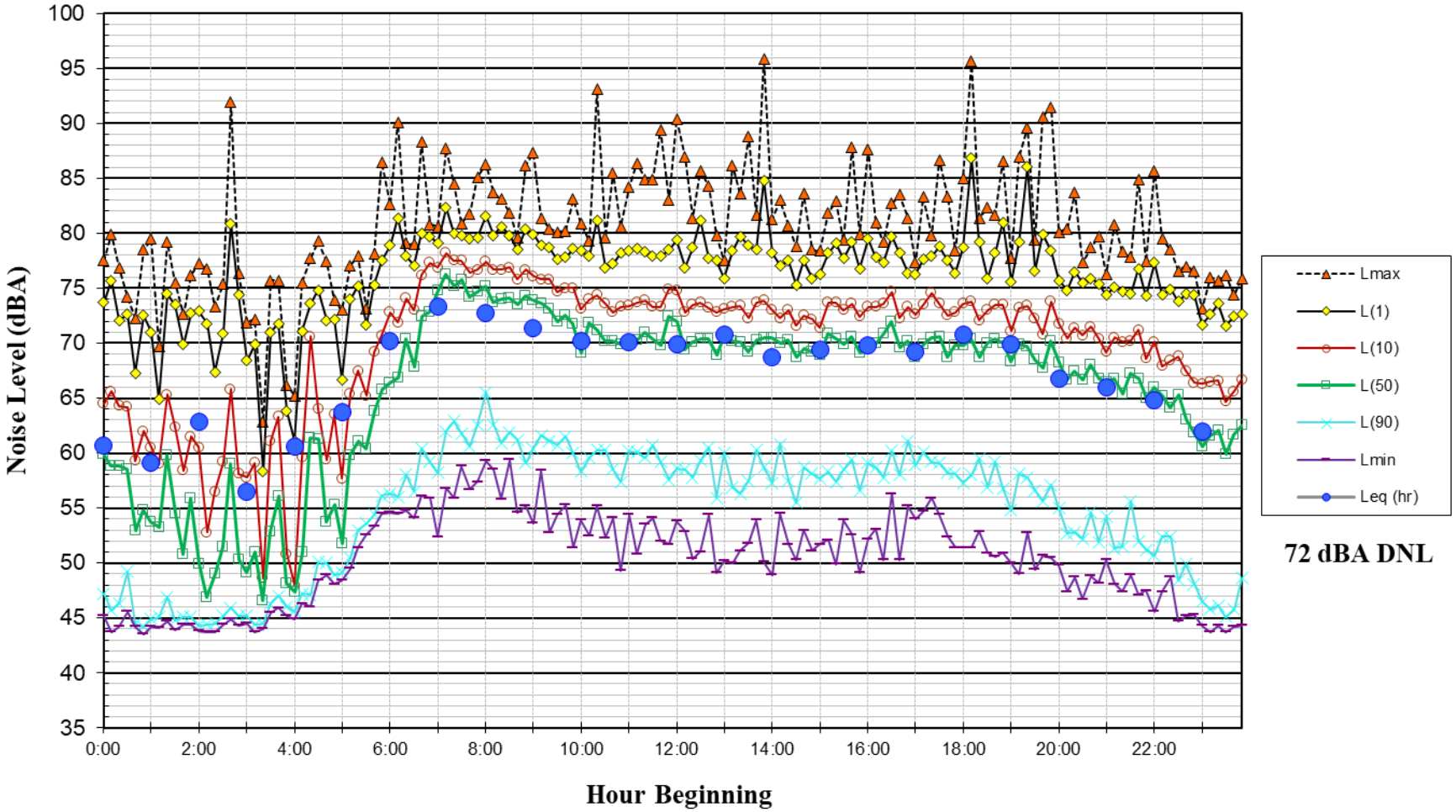


Figure 5

Noise Levels at Noise Measurement Site LT-2
1535 W San Carlos Street, San Jose
Wednesday, May 1, 2019



72 dBA DNL

Figure 6

Noise Levels at Noise Measurement Site LT-2
1535 W San Carlos Street, San Jose
Wednesday, May 2, 2019

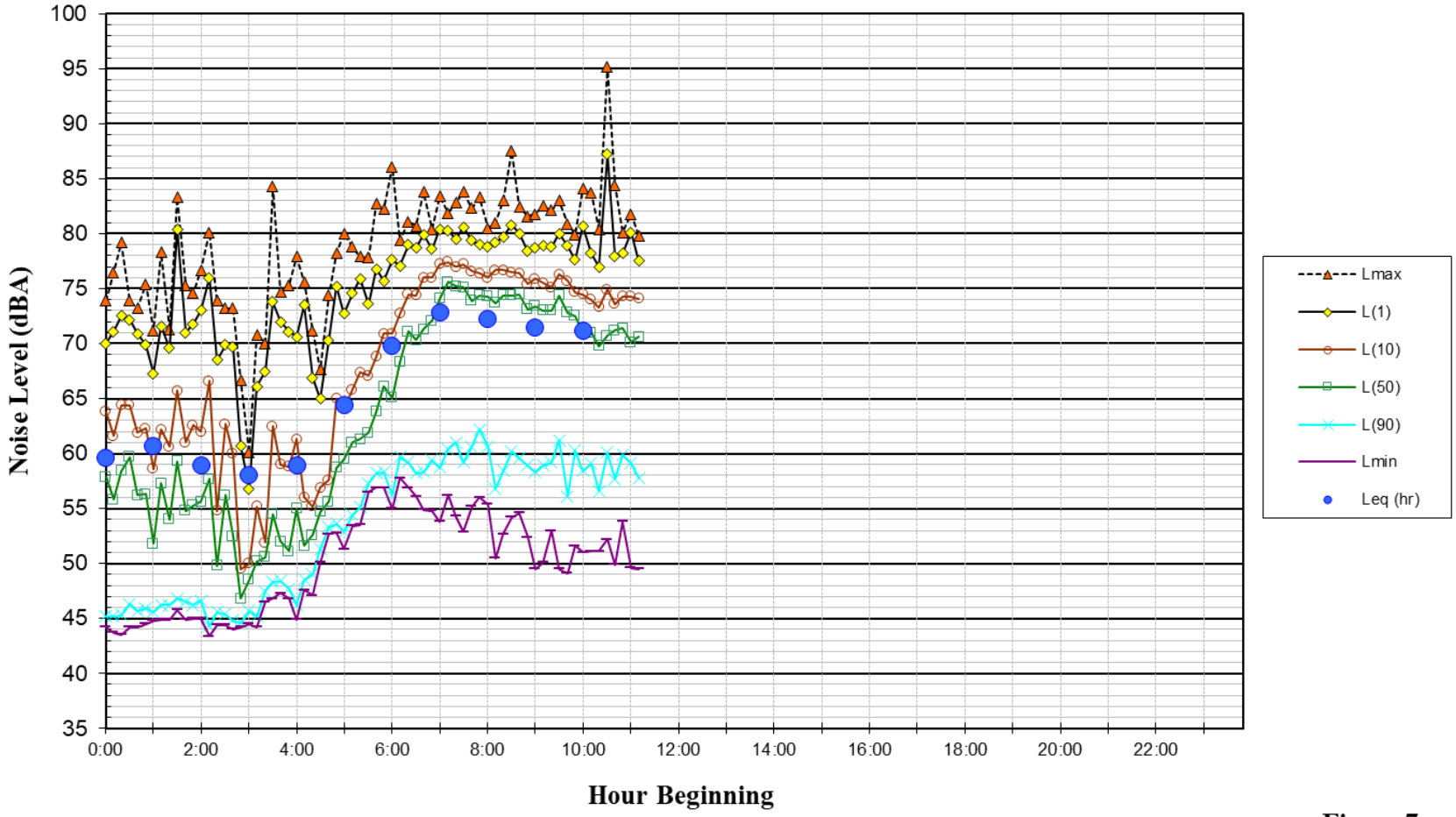
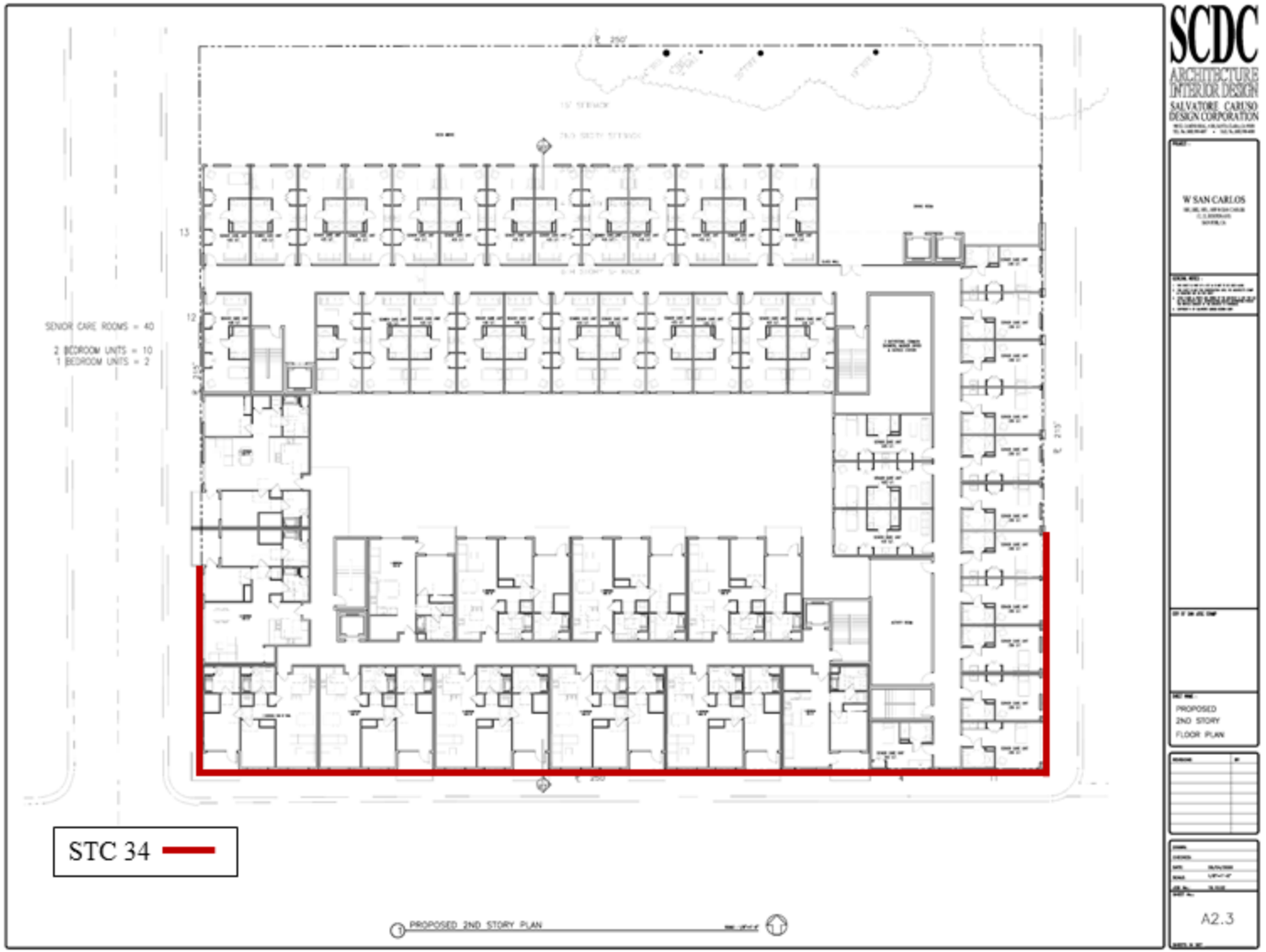


Figure 7

Appendix B


SENIOR CARE ROOMS = 40
2 BEDROOM UNITS = 10
1 BEDROOM UNITS = 2
STC 34
PROPOSED 2ND STORY PLAN
SCDC
ARCHITECTURE
INTERIOR DESIGN
SALVATORE CARUSO
DESIGN CORPORATION
W SAN CARLOS
PROPOSED
2ND STORY
FLOOR PLAN
A2.3

① PROPOSED EAST ELEVATION

STC 34

STC 34

① PROPOSED SOUTH ELEVATION

STC 34