PAGE STREET HOUSING PROJECT NEPA NOISE ASSESSMENT

San José, California

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Prepared for:

Amber Sharpe
Project Manager
David J. Powers & Associates, Inc.
1871 The Alameda, Suite 200
San José, CA 95126

Prepared by:

Michael S. Thill

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality
429 East Cotati Avenue
Cotati, CA 94931
(707) 794-0400

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INTRODUCTION

This report presents the results of the noise assessment completed for the multi-family residential housing project proposed on Page Street, between W. San Carlos Street and Douglas Street, in City of San José. The proposed project would demolish all buildings currently on site and construct a five-story, 82-unit apartment complex consisting of 81 affordable studio units and one three-bedroom manager's unit.

The project's potential to result in adverse effects with respect to applicable National Environmental Policy Act (NEPA) guidelines is assessed in this report. The report is divided into two sections. 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. The NEPA Noise Assessment Section evaluates noise effects resulting from the project.

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.

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.

Regulatory Background

The U.S. Department of Housing and Urban Development (HUD) environmental noise regulations are set forth in 24CFR Part 51B (Code of Federal Regulations). The following exterior noise standards for new housing construction would be applicable to this project:

- 65 dBA DNL or less – acceptable.

- Exceeding 65 dBA DNL but not exceeding 75 dBA DNL – normally unacceptable (appropriate sound attenuation measures must provide an additional 5 decibels of attenuation over that typically provided by standard construction in the 65 dBA DNL to 70 dBA DNL zone; 10 decibels additional attenuation in the 70 dBA DNL to 75 dBA DNL zone).

- Exceeding 75 dBA DNL – unacceptable.

These noise standards also apply, "… at a location 2 meters from the building housing noise sensitive activities in the direction of the predominant noise source…" and "…at other locations where it is determined that quiet outdoor space is required in an area ancillary to the principal use on the site."

A goal of 45 dBA DNL is set forth for interior noise levels and attenuation requirements are geared toward achieving that goal. It is assumed that with standard construction any building will provide sufficient attenuation to achieve an interior level of 45 dBA DNL or less if the exterior level is 65 dBA DNL or less. Where exterior noise levels range from 65 dBA DNL to 70 dBA DNL, the project must provide a minimum of 25 decibels of attenuation, and a minimum of 30 decibels of attenuation is required in the 70 dBA DNL to 75 dBA DNL zone. Where exterior noise levels range from 75 dBA DNL to 80 dBA DNL, the project must provide a minimum of 35 decibels of attenuation to achieve an interior level of 45 dBA DNL or less.

Existing Noise Environment

A noise monitoring survey was performed to quantify and characterize ambient noise levels at the site and in the project vicinity between Wednesday, March 28, 2018 and Monday, April 2, 2018. The monitoring survey included one long-term noise measurement (LT-1), and three short-term noise measurements (ST-1, ST-2, and ST-3) as shown in Figure 1. The noise environment at the site and at the nearby land uses results primarily from vehicular traffic along Page Street, W. San Carlos Street, and Willard Avenue.

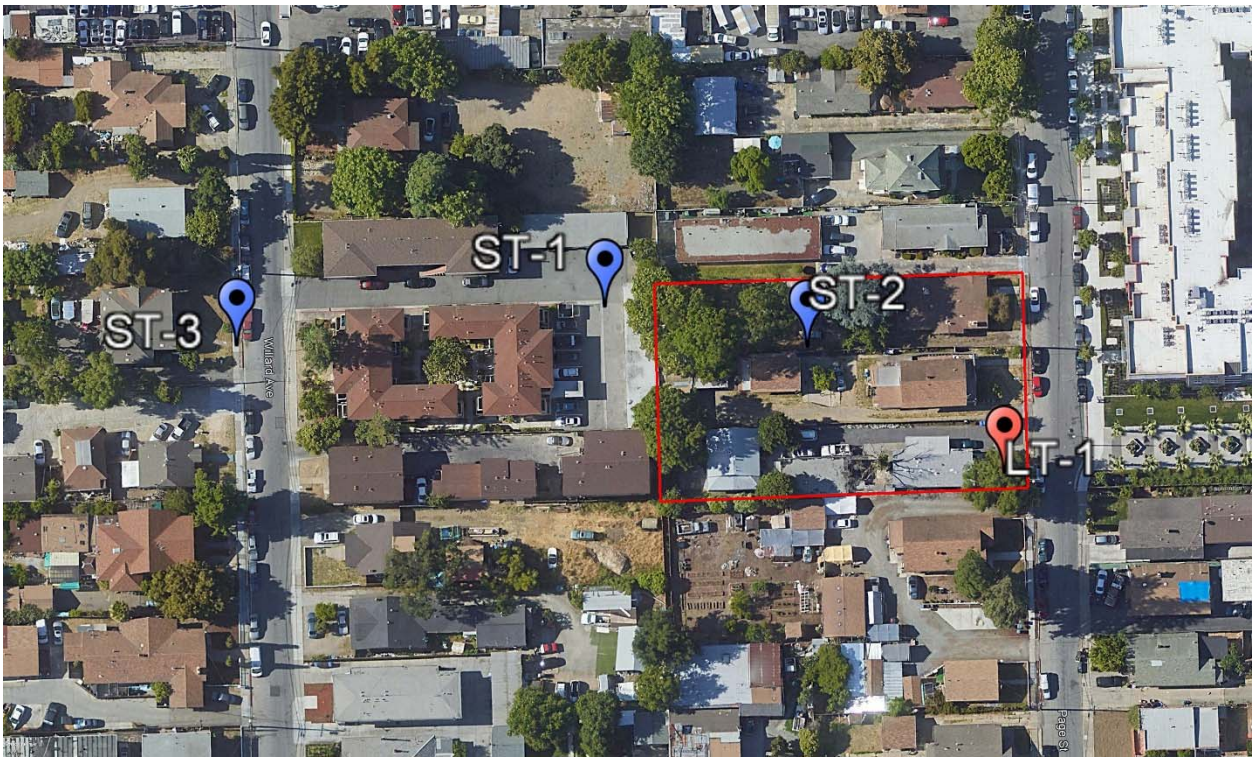
Long-term noise measurement LT-1 was made in front of 349 Page Street, approximately 30 feet west of the Page Street centerline. This location was selected to quantify noise levels due to traffic along Page Street and to quantify noise levels at nearby residential receptors. Hourly average noise levels at this location ranged from 52 to 63 dBA L_{eq} during the day and from 41 to 58 dBA L_{eq} at night. The day-night average noise level between Wednesday and Monday averaged 62 dBA DNL. The daily trend in noise levels at LT-1 for all measured days is shown in Figure 2.

Short-term noise measurements ST-1 through ST-3 were made on Monday, April 2, 2018 in ten-minute intervals starting at 1:20 p.m. and concluding at 2:20 p.m. ST-1 was made at the rear of 332 Willard Avenue, approximately 210 feet from the centerline of Willard Avenue. This location was selected to quantify the ambient noise levels at multi-family residences west of the site. The 10-minute average noise level measured at this location was 47 dBA L_{eq}. Short-term noise measurement ST-2 was made near the northernmost boundary of the site, approximately 150 feet west of the Page Street centerline. This location was selected to quantify noise levels within the site and at adjacent residential receptors. The 10-minute average noise level measured at this location was 46 dBA L_{eq}. Short-term noise measurement ST-3 was along Willard Avenue, approximately 15 feet west of the centerline of the roadway. This location was selected to quantify noise levels due to traffic on Willard Avenue. The 10-minute average noise level measured at this location was 53 dBA L_{eq}. Table 4 summarizes the results of the short-term measurements.

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

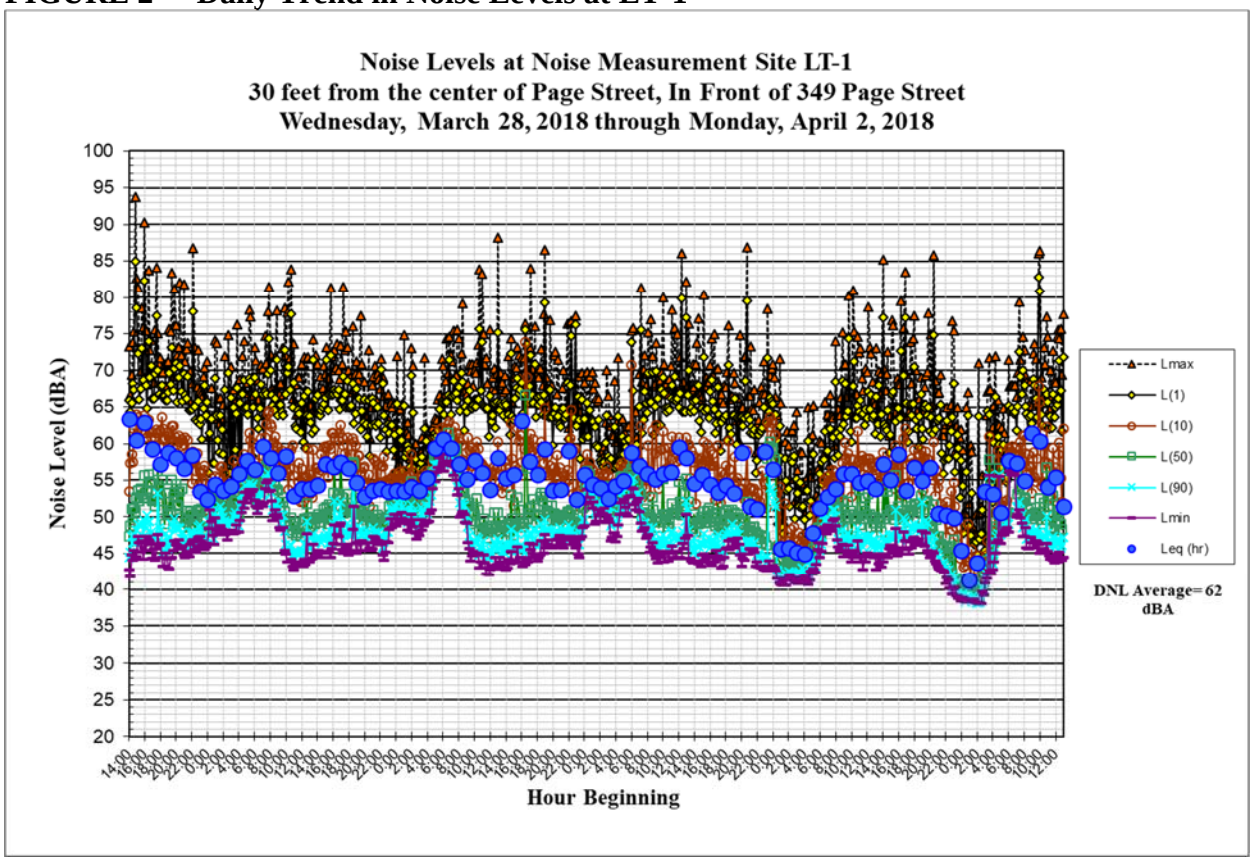
Noise Measurement Location	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	L_{eq}
ST-1: Parking lot of 332 Willard Avenue. (4/2/2018, 1:20 p.m. - 1:30 p.m.)	58	52	49	46	43	47
ST-2: Mid site, behind 341 Page Street. (4/2/2018, 1:50 p.m. - 2:00 p.m.)	56	54	48	45	42	46
ST-3: In front of 325 Willard Avenue. (4/2/2018, 2:10 p.m. - 2:20 p.m.)	66	62	55	50	47	53

FIGURE 1 Noise Measurement Locations



Source: Google Earth

FIGURE 2 Daily Trend in Noise Levels at LT-1



NEPA NOISE ASSESSMENT

Significance Criteria

An adverse effect would result if noise levels at the project site would exceed HUD Guidelines for acceptability. Exterior noise levels exceeding 65 dBA DNL or interior noise levels exceeding 45 dBA DNL would exceed HUD's noise compatibility criteria.

Future Exterior Noise Environment

Pursuant to the HUD Guidelines, the noise exposure at least 10 years in the future must be considered in addition to the existing noise exposure. The future noise environment at the project site would continue to result from transportation related noise sources including traffic along Page Street, W. San Carlos Street, and Willard Avenue. Peak hour traffic volumes and forecasts for the W. San Carlos Street and Meridian Avenue intersection were provided by *Fehr & Peers*[1]. A review of the volumes and forecasts indicates that traffic noise levels would increase by up to 1 dBA along W. San Carlos Street due to background conditions. Due to rising traffic volumes in the immediate area, noise due to traffic on Page Street is conservatively estimated to increase by 1 dBA DNL in the future. Future noise exposures at the eastern project area border along Page Street are calculated to reach up to 63 dBA DNL. The future noise exposure at the eastern façade of the building would be the greatest because of acoustical shielding from nearby residences and larger setback distances from Page Street.

[1] *Fehr & Peers*, "SJ17_1776 Peak Hour Traffic Volumes Forecasts" Jan 2018.

Mineta San José International Airport is a public-use airport located approximately 2 miles north of the project site. The project area lies outside the 60 dBA CNEL 2027 noise contour of the airport, according to the Mineta San José International Airport Master Plan Update Project[2] report published in February 2010 as an addendum to the Environmental Impact Report. Although aircraft-related noise could occasionally be audible at the project site, noise from aircraft would not substantially contribute to ambient noise levels.

The project proposes outdoor activity areas including balconies, two common roof decks, and a common court. Private balconies along the east facade of the proposed building would experience noise levels up to 63 dBA DNL. Private balconies along the north, west, and south building facades would experience noise levels below 60 dBA DNL. When accounting for acoustical shielding, the proposed common roof decks on Levels 3 and 6 would experience noise levels due to traffic at or below 60 dBA DNL, when measured at the center of the outdoor use area. The proposed ground level common court outdoor use area would experience levels up to 63 dBA DNL at 30 feet of the roadway centerline. At distances of 60 feet or greater from the center of Page Street, noise levels due to traffic are expected to be below 60 dBA DNL. Noise environments of 65 dBA DNL or less are considered "acceptable" by HUD. Additional noise controls are not required.

Future Interior Noise Environment

As noted above, the future exterior noise levels at the site would be 63 dBA DNL or less. Where exterior noise levels are 65 dBA DNL or less, standard construction methods will provide sufficient attenuation to achieve an interior level of 45 dBA DNL. In addition, the project proposes split heat pump systems to allow for windows and doors to be kept closed at the occupant's discretion to control noise intrusion indoors. Interior noise levels with the windows and doors closed would range from 38 to 43 dBA DNL, which would be considered "acceptable" by HUD. Additional noise controls are not required.

[2] City of San José, "Norman Y. Mineta San José International Airport Master Plan Update Project: Eighth Addendum to the Environmental Impact Report," City of San José Public Project File No. PP 10-024, February 10, 2010.