HOMEKEY HOTEL CONVERSIONS PAVILION INN 1280 N. FOURTH STREET NEPA NOISE ASSESSMENT

San José, California

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INTRODUCTION

This report presents the results of the noise assessment completed for the Homekey Hotel Conversion Project at the Pavilion Inn, located at 1280 N. Fourth Street in San José, California. The Pavilion Inn is a two-story hotel containing 62 rooms and a lobby. The proposed project is the purchase and acquisition of the Pavilion Inn, for the purpose of utilizing the building as transitional housing for people experiencing homelessness in the Bay Area.

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. Temporary construction noise is also evaluated. Based on the results of the analysis, existing construction is not sufficient to achieve HUD's noise standards and additional noise abatement is required.

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.

Existing Noise Environment

The existing Pavilion Inn is located at 1280 N. Fourth Street in San José, California. The hotel is located just north of I-880 and just east of N. Fourth Street. The primary noise source along the I-880 façade is I-880 traffic, and the primary noise source along the N. Fourth Street façade is also I-880 traffic. Distant traffic from area roadways that are shielded from the site (i.e., E. Rosemary Street, do not measurably contribute to ambient noise levels at the site. Figure 1 shows the existing hotel, adjacent land uses, and transportation noise sources in the project vicinity.

A noise monitoring survey was made to quantify existing ambient noise levels at the project site between Thursday, December 16, 2021 and Friday, December 17, 2021. The noise monitoring survey included one long-term noise measurement (LT-1) and two short-term measurements (ST-1a and ST-1b), as shown in Figure 1. All noise measurements were conducted with Larson Davis Laboratories (LDL) Model LxT1 Type I Sound Level Meters fitted with ½-inch pre-polarized condenser microphones and windscreens. The meters were calibrated with a Larson Davis precision acoustic calibrator prior to and following the measurement survey.

Long-term noise measurement LT-1 was located approximately 125 feet from the centerline of I-880, and observations made during the survey identified vehicle traffic along I-880 as the predominant noise source at the southeast building façade. Data collected at the site are summarized in Figure 2, and the results of the measurements indicated that DNL noise level was 73 dBA DNL from 10:00 a.m. Thursday, December 16, 2021 through 10:00 a.m. Friday, December 17, 2021. The HUD DNL calculator (Appendix 1) was also used to estimate the existing noise exposure at this location. Based on the results of the modeling, the existing worst-case noise exposure at the southeast façade of the hotel is calculated to be 77 dBA DNL.

Two short-term noise measurements were made to quantify the transmission loss provided by the existing building's construction. Short-term noise measurement ST-1a was made outside the worst-case unit adjacent to I-880 and short-term noise measurement ST-1b was made simultaneously within the same unit. Figures 3 and 4 show the microphone positions. Based on the results of the simultaneous measurements (72 dBA L_{eq} outside and 42 dBA L_{eq} inside), the transmission loss of the existing building is 30 dB.

NEPA NOISE ASSESSMENT

<u>Significance Criteria</u>

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.

<u>Future Exterior Noise Environment</u>

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 exterior noise environment at the project site was calculated using the HUD DNL calculator. Under future conditions, traffic on area roadways is expected to continue to be the dominant noise source at the project site. An increase of 1-2% in volume per year has been assumed for traffic due to general growth throughout the City and surrounding region. Based on this future traffic volume estimate, the future noise environment on the project site would be up to 1 decibel higher than existing noise levels, resulting in worst-case DNL noise levels of 78 dBA along the I-880 façade.

Outdoor areas at the site consist of vehicle circulation paths and parking only. There are no other outdoor activity areas on site.

<u>Future Interior Noise Environment</u>

Residential units adjacent to I-880 would be exposed to future worst-case exterior noise levels reaching 48 dBA DNL. Based on the measured transmission loss of the building partition, the existing construction provides 30 dBA of attenuation indoors. Forced air mechanical ventilation systems are provided so that windows and doors can be kept closed at the occupant's discretion to control noise intrusion indoors, therefore, the existing building construction does not provide sufficient attenuation. Future interior noise levels below 45 dBA DNL would not be maintained, and HUD's interior noise criterion would not be met. Additional noise abatement is required.

Isolation of interior building spaces from exterior sound is important if building spaces are to properly serve their intended purposes. Sound transmission into building spaces is generally through the weakest element, and the weakest element is usually the windows.

Often, acoustically deficient windows of an existing building are replaced with new ones that provide the needed sound isolation performance. Other times, it is desirable to maintain the existing windows and to improve their sound isolation performance through the installation of a storm sash. Storm sash is usually a monolithic glazing system applied to the interior or the exterior of an existing window. Exterior storm sash, also known as "storm windows," uses lightweight monolithic glass in a vented, operable aluminum frame. Because they are lightweight and are usually vented, conventional storm windows are unsuited for sound isolation purposes. Acoustical storm sash requires thicker glass, often laminated glass. It must be well sealed and must be generously spaced away from the prime window glass. These installation requirements are usually more easily satisfied inside the prime window, hence the term interior acoustical storm sash.

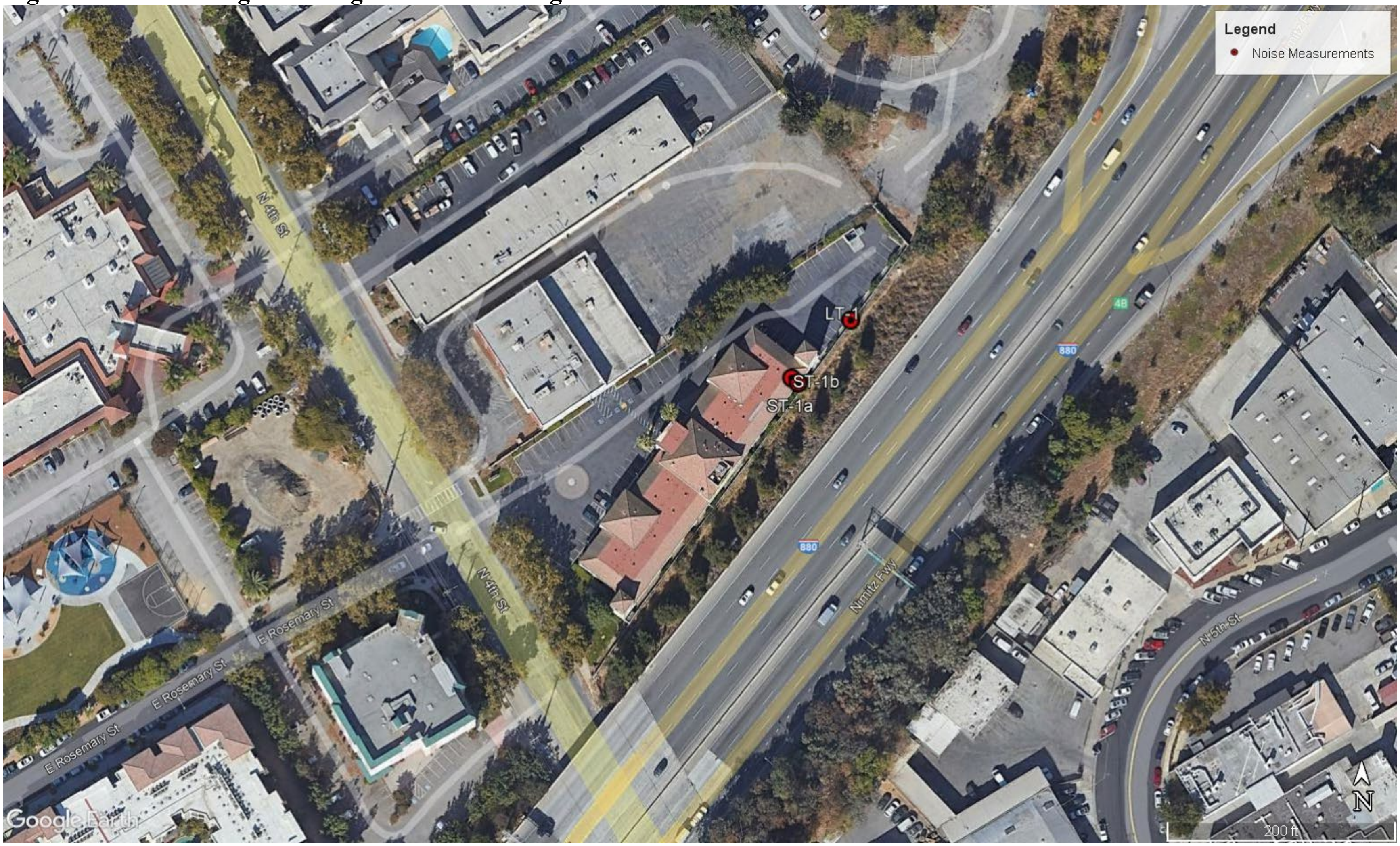
The proposed modifications to the existing building elements include new door seals to prevent noise leakage (see Figure 4 showing daylight penetrating the door and jamb) and the addition of a acoustical storm sash on the interior of the existing window. The relative areas of the building elements (walls, windows, and doors) were input into an acoustical model to calculate interior noise levels within individual rooms. It should be noted that these results are <u>preliminary</u> as detailed building plans were not available for the analysis and model input data relied on field observations and generic building assumptions.

Figures 5 and 6 summarize the above noise control recommendations and provide summary examples of the inputs used to complete the calculations of interior noise levels at residential units with the future worst-case noise exposure. Residential units facing I-880 would be exposed to future exterior noise levels reaching 78 dBA DNL. The predicted exterior noise level would exceed HUD's "normally acceptable" threshold of 65 dBA DNL by up to 13 dBA DNL. Thirty-three (33) decibels of attenuation would be required to achieve acceptable levels indoors. Based on preliminary calculations, the incorporation of the above noise insulation features would reduce interior noise levels to 45 dBA DNL.

CONSTRUCTION NOISE ASSESSMENT

The proposed project would not include any ground disturbing activities such as demolition, excavation, or construction, nor would it introduce substantial physical changes to the existing building or site. Any exterior work would include regular maintenance activities such as roof replacement and landscaping. Interior work to the property would be minimal, including such work as expanding communal spaces, combining rooms to create larger living rooms, and upgrading bathrooms. The project would not alter the existing room count. The project would not add new utilities connections. Per General Plan Policy EC-1.7, temporary noise increases due to project construction would be considered less-than-significant as the construction activity would not 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.

Figure 1: Aerial Image Showing Noise Monitoring Locations



Source: Google Earth, 2021.

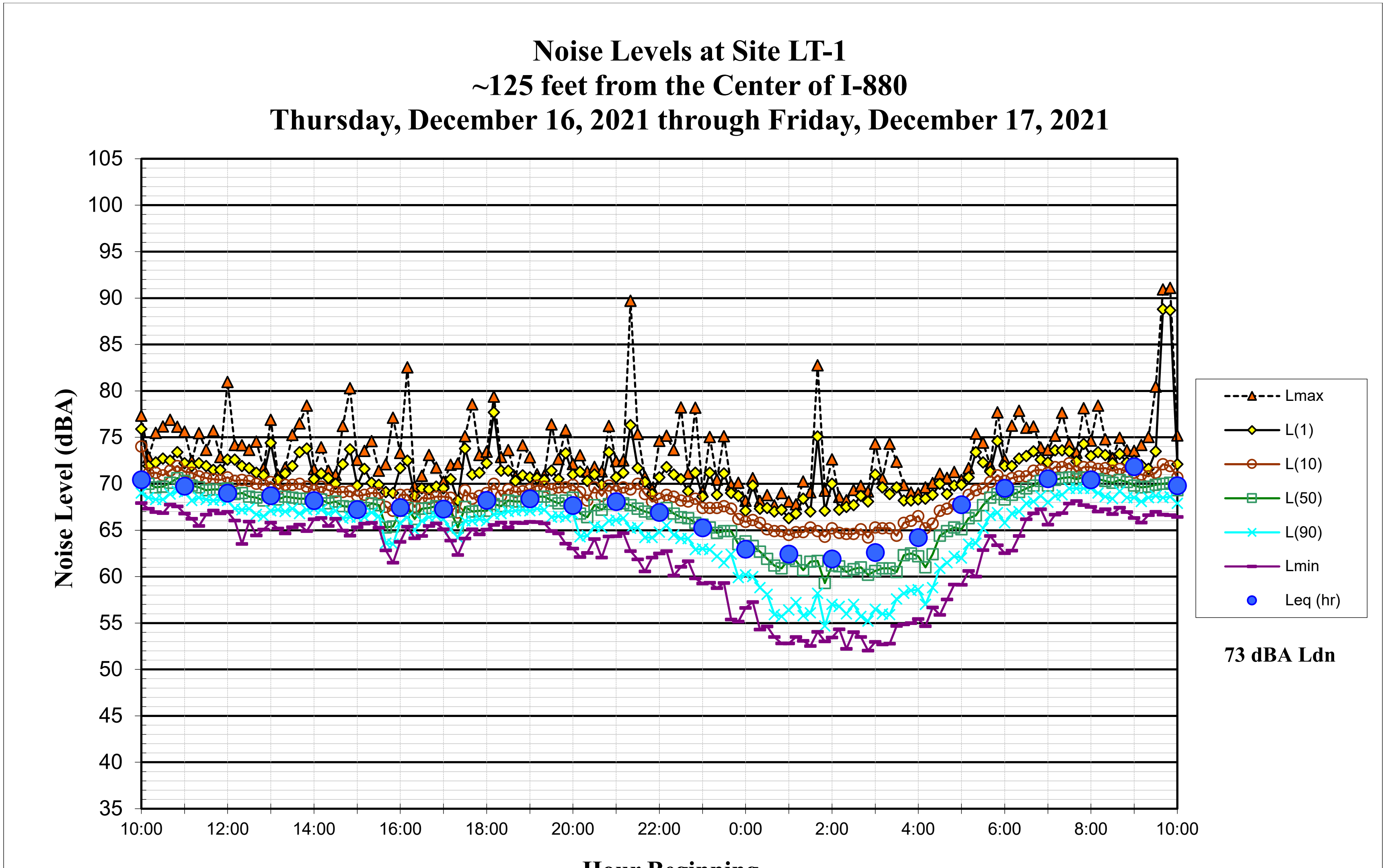

Noise Levels at Site LT-1
~125 feet from the Center of I-880
Thursday, December 16, 2021 through Friday, December 17, 2021
Noise Level (dBA)
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
2:00
4:00
6:00
8:00
10:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)
73 dBA Ldn

Figure 2

Figure 3: Microphone Position at ST-1a (Exterior)

Figure 4: Microphone Position at ST-1b (Interior)

Figure 5 HUD Figure 19 – Units facing I-880

Figure 19
Description of Noise Attenuation Measures
(Acoustical Construction)

Part I

Project Name: Pavilion Inn, 1280 N. Fourth Street, Units facing I-880 (Worst-Case Noise Exposure)

Location: San Jose, California

Sponsor/Developer: City of San Jose

Noise Level (From NAG): 78 dBA DNL Attenuation Required: 33 dBA
Primary Noise Source(s): I-880

Part II

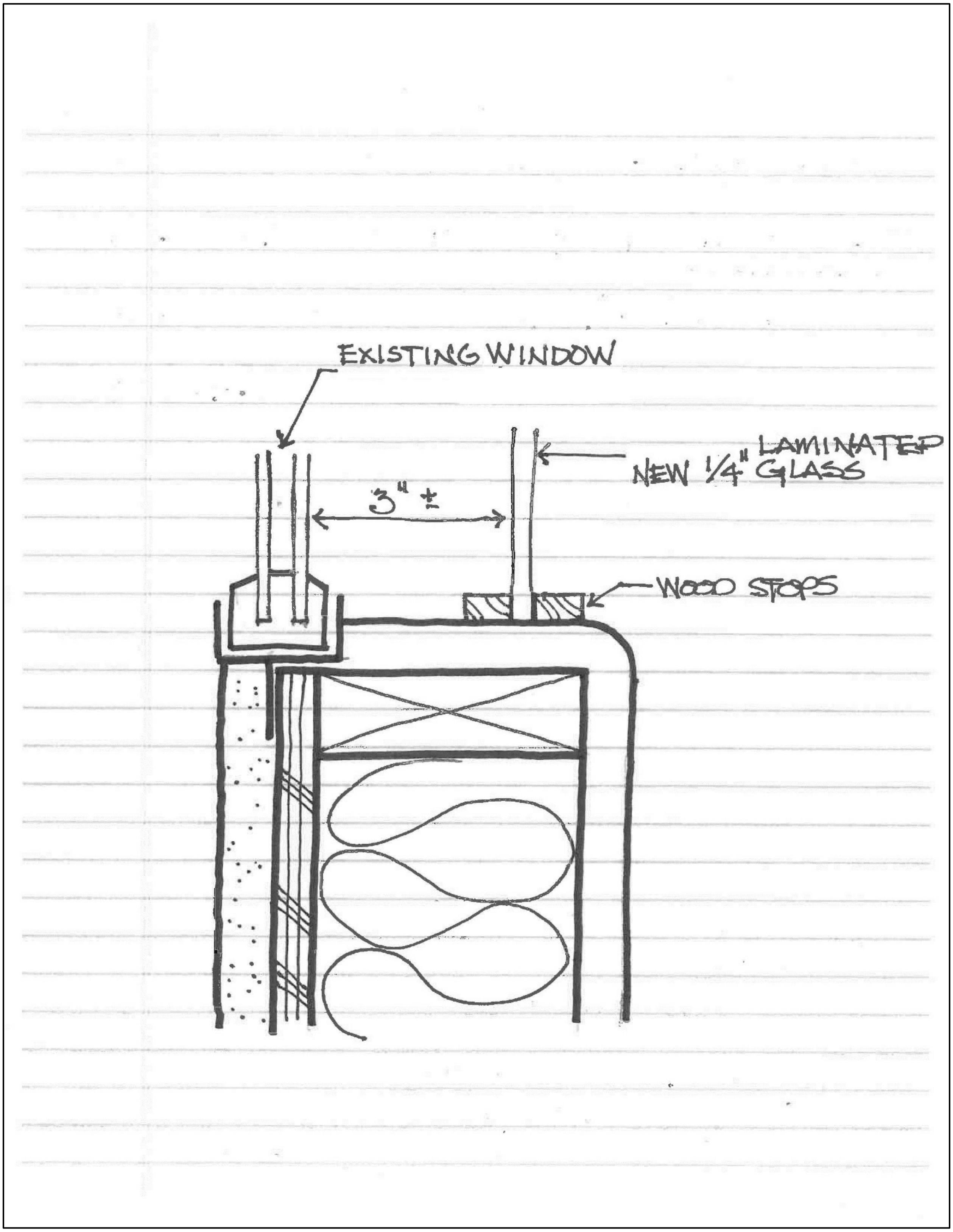
1. For wall(s) facing and parallel to the noise source(s):
   a. Description of wall construction*: Stucco exterior siding, insulated wood stud, and gypsum board interior
   b. STC rating for wall (rated for no windows or doors): STC 46
   c. Description of windows: Existing dual-pane plus acoustical storm sash
   d. STC rating for window type: STC 45 (estimated)
   e. Description of doors: NA
   f. STC rating for doors: STC 26
   g. Percentage of wall (per wall, per dwelling unit) composed of windows: 23% and doors: 18%
   h. Combined STC rating for wall component: 34 dBA

2. For walls perpendicular to noise source(s):
   a. Description of wall construction*: N/A
   b. STC rating for wall (rated for no windows or doors): N/A
   c. Description of windows: N/A
   d. STC rating for window type: N/A
   e. Description of doors: NA
   f. STC rating for doors: NA
   g. Percentage of wall (per wall, per dwelling unit) composed of windows: N/A and doors: N/A
   h. Combined STC rating for wall component: N/A

3. Roofing component (if overhead attenuation is required to aircraft noise):
   a. Description of roof construction: N/A
   b. STC rating (rated as if no skylights or other openings): N/A
   c. Description of skylights or overhead windows: N/A
   d. STC rating for skylights or overhead windows: N/A
   e. Percentage of roof composed of skylights or windows (per dwelling unit): N/A
   f. Percentage of roof composed of large, uncapped openings such as chimneys: N/A
   g. Combined STC rating for roof component: N/A

4. Description of type of mechanical ventilation provided: Satisfactory forced air mechanical ventilation system (Existing Heat Pump System).

Figure 6 **Section Drawing Showing Acoustical Storm Sash Concept**



Appendix 1 HUD DNL Calculator

DNL Calculator

The Day/Night Noise Level Calculator is an electronic assessment tool that calculates the Day/Night Noise Level (DNL) from roadway and railway traffic. For more information on using the DNL calculator, view the **Day/Night Noise Level Calculator Electronic Assessment Tool Overview.**

Guidelines

- To display the Road and/or Rail DNL calculator(s), click on the "Add Road Source" and/or "Add Rail Source" button(s) below.
- All Road and Rail input values must be positive non-decimal numbers.
- All Road and/or Rail DNL value(s) must be calculated separately before calculating the Site DNL.
- All checkboxes that apply must be checked for vehicles and trains in the tables' headers.
- **Note #1:** Tooltips, containing field specific information, have been added in this tool and may be accessed by hovering over all the respective data fields (site identification, roadway and railway assessment, DNL calculation results, roadway and railway input variables) with the mouse.
- **Note #2:** DNL Calculator assumes roadway data is always entered.

DNL Calculator

Site ID	Pavilion Inn - Southeast Facade - Current Conditions
Record Date	12/20/2021
User's Name	MPB

Road # 1 Name:	**I-880**

Road #1

Vehicle Type	**Cars** ☑	**Medium Trucks** ☑	**Heavy Trucks** ☑
Effective Distance	130	130	130
Distance to Stop Sign			
Average Speed	65	55	55
Average Daily Trips (ADT)	140964	3125	3127
Night Fraction of ADT	15	15	15
Road Gradient (%)			0
Vehicle DNL	74	66	72
Calculate Road #1 DNL	77	Reset	

DNL Calculator

Site ID	Pavilion Inn - Southeast Facade - 2032 Conditions
Record Date	12/20/2021
User's Name	MPB

Road # 1 Name:	**I-880**

Road #1

Vehicle Type	**Cars** ☑	**Medium Trucks** ☑	**Heavy Trucks** ☑
Effective Distance	130	130	130
Distance to Stop Sign			
Average Speed	65	55	55
Average Daily Trips (ADT)	171834	3810	3812
Night Fraction of ADT	15	15	15
Road Gradient (%)			0
Vehicle DNL	75	67	73
Calculate Road #1 DNL	78	Reset	