13 November 2025

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Subject: Willow Apartments
Environmental Noise Study
Salter Project 24-0542

Dear Caroline:

We have conducted an environmental noise study for the project. The purpose of the study is to determine the noise environment at the project site, compare the measured data with applicable standards, and propose initial mitigation measures as necessary. This report summarizes the results of our study based on the 16 June 2025 site plan (see attached) and updates to the building design (e.g., room and window sizes).

PROJECT CRITERIA

California Building Code (Title 24)

Section 1206.4 of the California Building Code (CBC) requires that the indoor noise level in residential units of multi-family dwellings not exceed DNL[1] 45 dB.

City of Hercules

Zoning Ordinance Chapter 13-31.300.11 states[2]:

- Indoor noise levels for new housing units are not to exceed DNL 45 dB, which is in agreement with Title 24.

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1 DNL (Day-Night Average Sound Level) – A descriptor for a 24-hour A-weighted average noise level. DNL accounts for the increased acoustical sensitivity of people to noise during the nighttime hours. DNL penalizes sound levels by 10 dB during the hours from 10 PM to 7 AM. DNL is sometimes written as Ldn.

2 https://www.codepublishing.com/CA/Hercules/#!/Hercules13/Hercules1331.html

- Single-event noise (e.g., train passbys) should not exceed L_{max}[3] 50 dB in bedrooms and 55 dB in other habitable rooms.
- Outdoor noise levels should not exceed DNL 60 dB for residential areas. DNL 65 dB might apply at the private balconies, at the City's discretion.
- The outdoor noise goal is DNL 70 dB when the noise source is a railroad.

CALGreen

CALGreen Code Section 5.507.4 addresses acoustical issues for non-residential spaces. If a building is exposed to an exterior $L_{eq}(h)$[4] of 65 dB during any hour of operation, the building envelope must reduce the interior noise environment to $L_{eq}(h)$ of 50 dB in occupied areas. We have assumed this will apply at the clubhouse.

NOISE ENVIRONMENT

The project site is along Willow Avenue, east of Interstate 80 (I-80), south of State Route 4 (CA-4), and north of the Burlington Northern Santa Fe (BNSF) railway. The noise environment at the site is predominantly controlled by traffic on Willow Avenue, the freeways, and the railway.

To quantify the existing noise environment, we conducted three long-term noise measurements between 6 and 8 January 2025 (see **Figure 1** for the measurement locations and measured noise levels). The noise monitors were at a height of 12 feet above grade, except for the on-site monitor, which was about 7-feet above grade.

A traffic analysis[5] has been provided for this project. However, the study does not include future cumulative traffic predictions (only "with project" increases). Therefore, we have added 1 dB to our measured noise levels to account for future traffic increases[6].

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[3] L_{max30} (Typical Maximum Sound Level) – There is no standardized metric to quantify "typical" maximum sound levels in an environment (instead of the absolute maximum sound level for a measurement period). The metric L_{max30} comes from a paper by Rob Greene ("Max Level Intrusive Noise Limit: 1982 National Conference on Environmental and Occupational Noise"). It is based on the logarithmic average of the noisiest 30 percent of single events (e.g., train passbys, aircraft flyovers).

[4] $L_{eq}(h)$ – The equivalent steady-state A-weighted sound level that in an hour would contain the same acoustic energy as the time-varying sound level during that hour.

[5] Traffic Study from Hexagon Transportation Consultants dated 7 October 2025.

[6] The California Department of Transportation (DOT) assumes a traffic volume increase of three-percent per year, which corresponds to a 1 dB increase in DNL over a ten-year period.

RECOMMENDATIONS

Interior Noise (Code)

Using the 10 April 2025 entitlement submittal drawings and the 16 June 2025 site plan, we calculated the window and exterior door STC[7] ratings needed to meet the project criteria, as shown in **Figure 2.** For our calculations, we have assumed the following:

- All spaces will have hard-surfaced (non-carpeted) flooring
- Ceilings will be 9-feet high
- The exterior wall achieves minimum STC 45 (equivalent to 7/8-inch-thick stucco over wood sheathing)

The recommended STC ratings are for full window and door assemblies (glass and frame) rather than just the glass itself. Tested sound-rated assemblies should be used. For reference, typical one-inch glazing assemblies (two 1/4-inch-thick panes with 1/2-inch airspace) typically achieve an STC rating of 32. STC ratings above 32 should include laminated glass. STC ratings above 38 might require an IGU greater than one-inch thick. This will vary depending on the window manufacturer.

Where windows need to be closed to achieve an indoor DNL of 45 dB, an alternative method of supplying fresh air (e.g., mechanical ventilation) should be considered. This applies to all locations. This issue should be discussed with the project mechanical engineer.

Interior Noise (Single-Event Noise)

To meet the single-event criteria, it will be necessary to provide upgraded exterior wall assemblies at the southern facades of Buildings 5 and 6. The exterior wall needs to achieve STC 55 (e.g. double-stud construction). With these upgrades, windows and exterior doors in these facades would need STC ratings up to STC 42, as shown in **Figure 3**.

Exterior Noise

The City has a DNL 60 dB goal for outdoor spaces. This applies at the clubhouse patio and dog park. It might be applied to private apartment balconies on a case-by-case basis (as determined by the City).

We expect noise levels at the clubhouse patio and the dog run to be up to DNL 73 dB. We recommend a sound wall on the west and south sides of the patio that blocks line-of-site to Interstate I-80 and the train line. A sound wall should also be considered at the north and west sides of the dog run. See **Figure 4** for the location of the sound walls.

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[7] STC (Sound Transmission Class) – A single-number rating defined in ASTM E90 that quantifies the airborne sound insulating performance of a partition under laboratory conditions. Increasing STC ratings correspond to improved airborne sound insulation.

We have estimated the noise level on the patio for different sound-wall heights. We have also calculated the average noise level on the patio during daytime hours (L_{eq}(daytime)[8]). See **Table 1** below for estimated noise levels on the patio with various wall heights.

Table 1: Noise Levels on Clubhouse Patio with Various Wall Heights

Wall Height	DNL	L_{eq}(daytime)
0 ft	73 dB	70 dB
6 ft	68 dB	65 dB
8 ft	67 dB	64 dB
10 ft	66 dB	63 dB
12 ft	64 dB	61 dB

We expect noise on private balconies to be between DNL 67 and 77 dB. However, due to the proximity to the freeway, mitigating the noise on all balconies below DNL 65 dB is not feasible without fully enclosing the balconies.

* * *

This concludes our environmental noise study for the project. Please feel free to reach out with any questions.

Best,

SALTER

Zamar Bravo Tapia
Consultant

Eric Mori, PE
Executive Vice President

[8] L_{eq}(daytime) – Average sound level between the hours of 7am and 10pm.

Salter

San Francisco

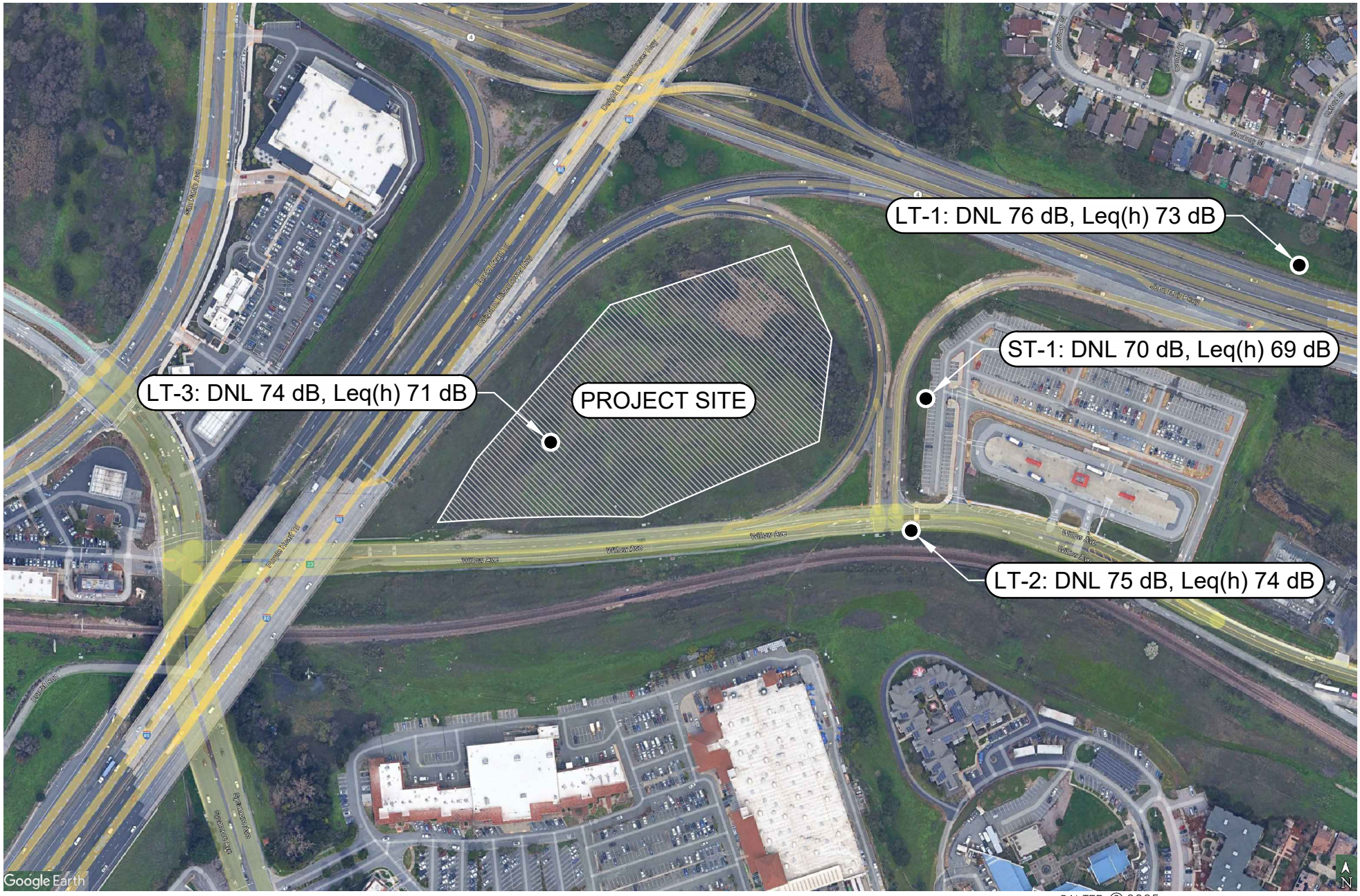
San Jose

Los Angeles

Honolulu

Seattle

www.salter-inc.com



WILLOW APARTMENTS
MEASUREMENT LOCATIONS AND MEASURED NOISE LEVELS

FIGURE 1

Salter # 24-0542

BCW/EBM
08.05.25

Salter

San Francisco

San Jose

Los Angeles

Honolulu

Seattle

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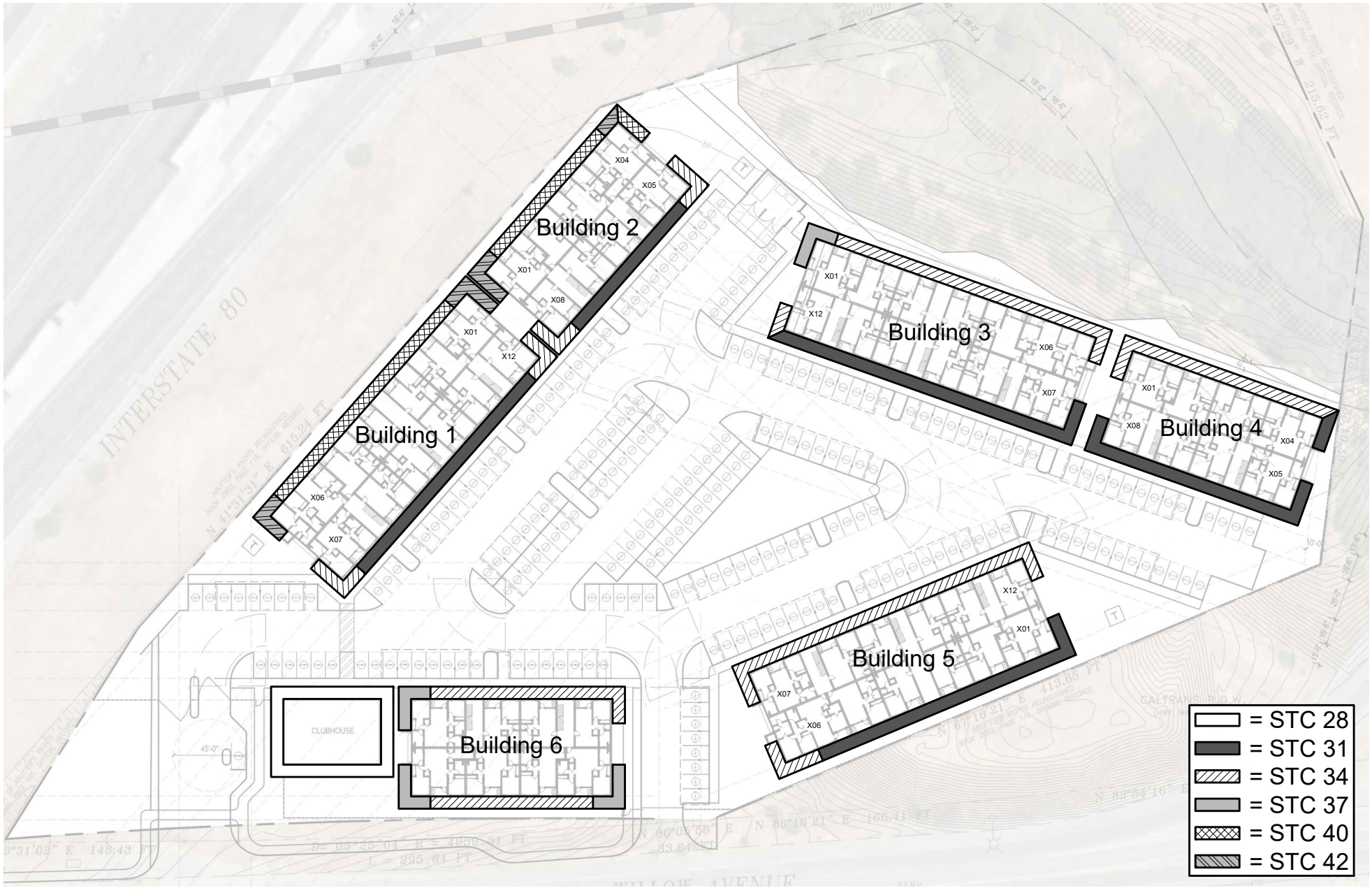

NOTE: STC RATINGS ARE FOR THE COMPLETE ASSEMBLY (E.G., GLASS, FRAME, AND OPERABLE SECTIONS) BASED ON TEST REPORTS FROM AN NVLAP-ACCREDITED LAB

WILLOW APARTMENTS
MINIMUM CODE–REQUIRED STC RATINGS FOR WINDOWS AND EXTERIOR DOORS (ALL FLOORS)

FIGURE 2

Salter # 24–0542

BCW/EBM
08.05.25

Salter

San Francisco

San Jose

Los Angeles

Honolulu

Seattle

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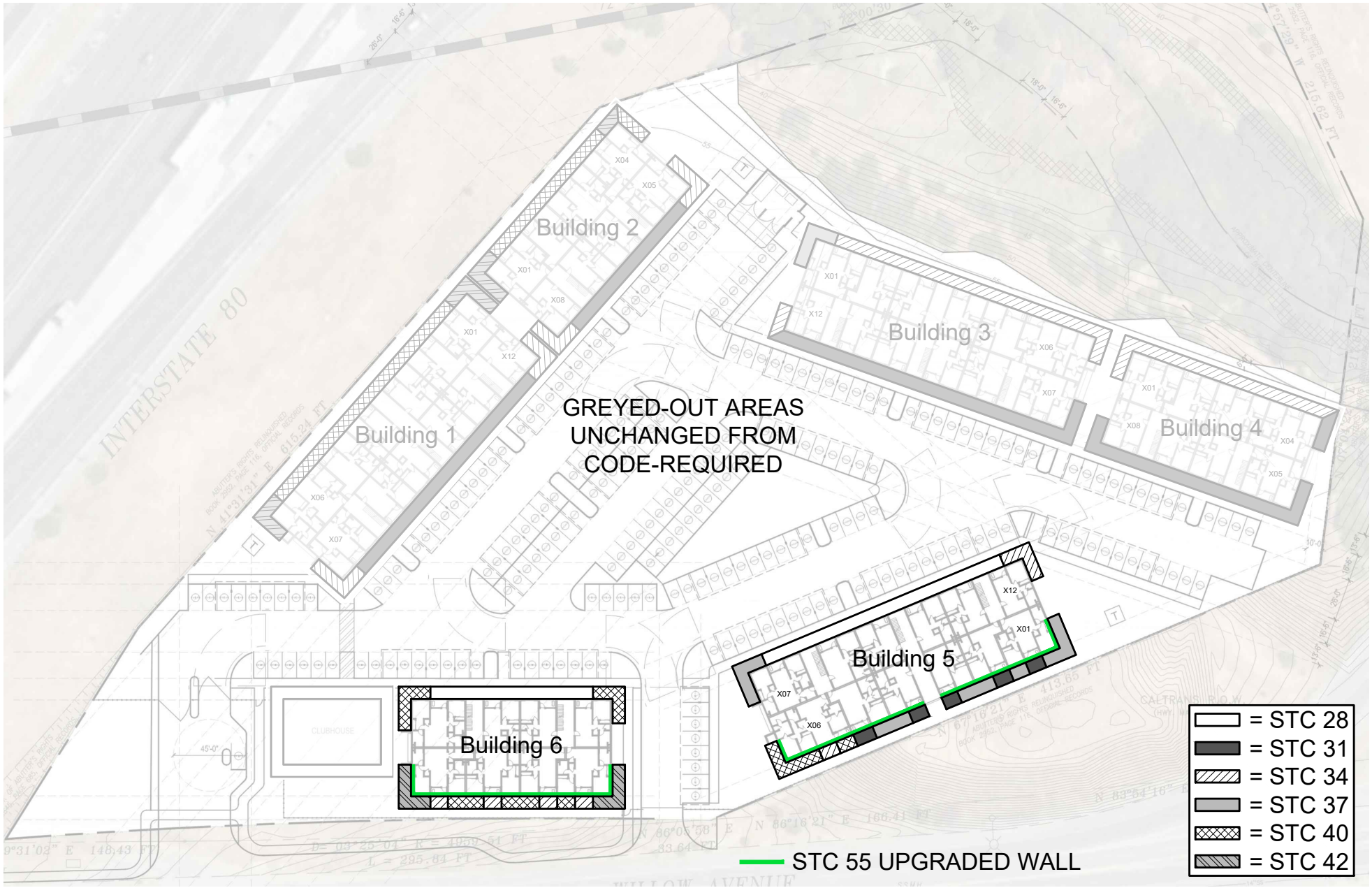

NOTE: STC RATINGS ARE FOR THE COMPLETE ASSEMBLY (E.G., GLASS, FRAME, AND OPERABLE SECTIONS) BASED ON TEST REPORTS FROM AN NVLAP-ACCREDITED LAB

WILLOW APARTMENTS
MINIMUM SINGLE-EVENT CRITERIA STC RATINGS FOR WINDOWS AND EXTERIOR DOORS (ALL FLOORS)

FIGURE 3

Salter # 24-0542

BCW/EBM
08.05.25

Salter

San Francisco

San Jose

Los Angeles

Honolulu

Seattle

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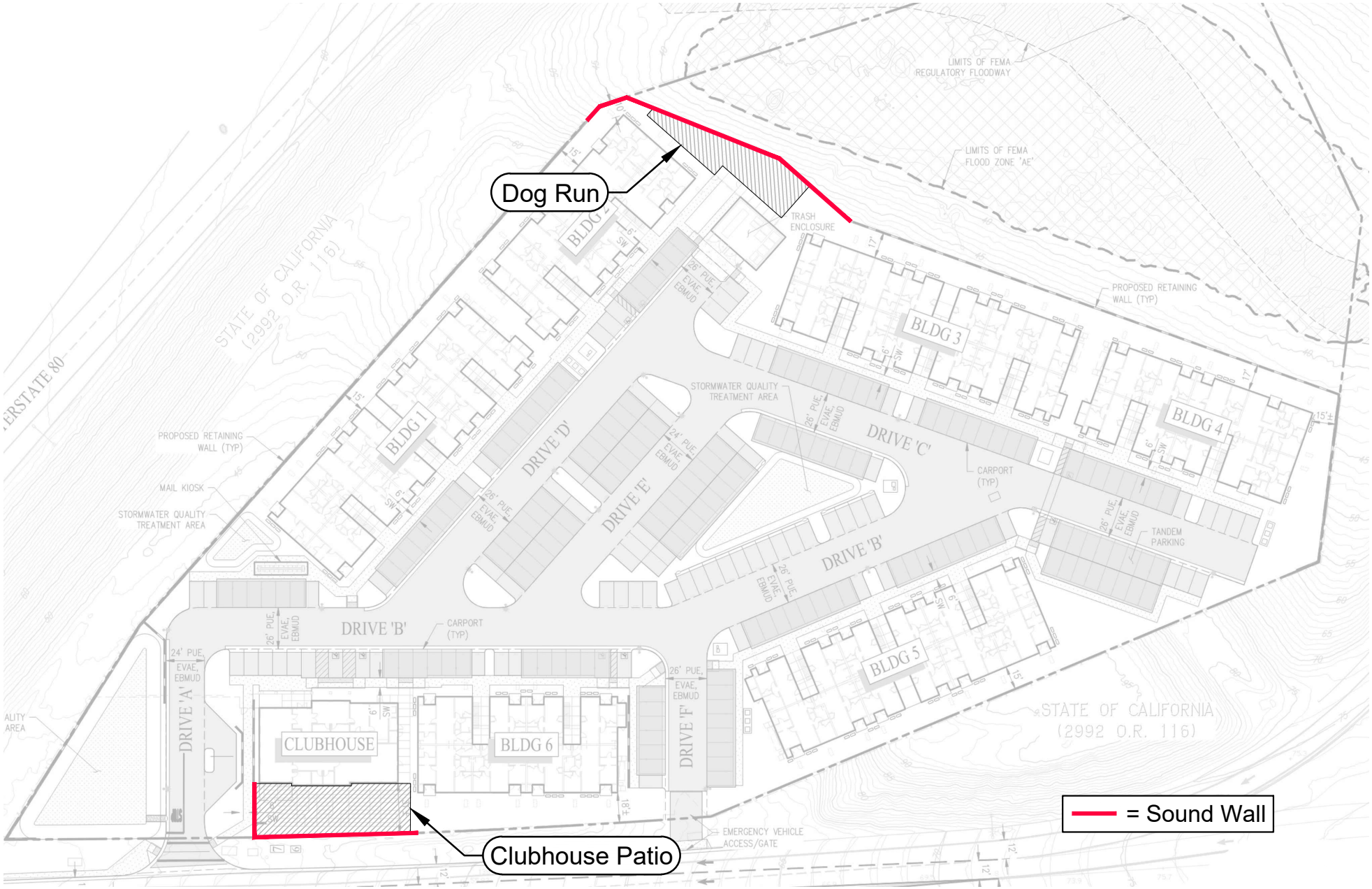

WILLOW APARTMENTS
PROPOSED SOUND WALL LOCATIONS

FIGURE 4

Salter #	BCW/EBM
24–0542	11.13.25

LEGEND:

- PROJECT BOUNDARY
- RIGHT-OF-WAY
- STORMWATER QUALITY TREATMENT AREA
- CARPORT (6 & 8 STALL)
- LIMITS OF FEMA FLOOD ZONE "AE"

SEE SHEET C.05 FOR STREET SECTIONS

INTERSTATE 80

STATE OF CALIFORNIA (2992 O.R. 116)

WILLOW AVENUE OFF-RAMP

LIMITS OF FEMA REGULATORY FLOODWAY

LIMITS OF FEMA FLOOD ZONE 'AE'

BLDG 1

BLDG 2

BLDG 3

BLDG 4

BLDG 5

BLDG 6

CLUBHOUSE

TRASH ENCLOSURE

PROPOSED RETAINING WALL (TYP)

MAIL KIOSK

STORMWATER QUALITY TREATMENT AREA

DRIVE 'A'

DRIVE 'B'

DRIVE 'C'

DRIVE 'D'

DRIVE 'E'

DRIVE 'F'

CARPORT (TYP)

TANDEM PARKING

26' PUE, EVAE, EBMUD

24' PUE, EVAE, EBMUD

EMERGENCY VEHICLE ACCESS/GATE

4' WIDE PEDESTRIAN SIDEWALK (TO SYCAMORE AVENUE)

WILLOW AVENUE

STRIPED MEDIAN

SEE BELOW

SEE ABOVE

SYCAMORE AVE

SITE PLAN
SUBDIVISION 9715
VESTING TENTATIVE MAP
FOR CONDOMINIUM PURPOSES
EMBLEM HERCULES

CITY OF HERCULES CONTRA COSTA COUNTY CALIFORNIA

SCALE: 1"=40' DATE: JUNE 16, 2025

0 40 80 120

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