Fremont Boulevard Mixed Use

Fremont, California

Environmental Noise Assessment

10 April 2018

Prepared for:

SiliconSage Builders
Shaivali Desai
560 South Mathilda Avenue
Sunnyvale, CA 94086
Phone: (408) 630-0923
Email: shaivali@siliconsage.com

Prepared by:

Charles M. Salter Associates, Inc.
Justin P. Reidling
Joshua M. Roper, PE, LEED® AP
100 W. San Fernando, Suite 430
San Jose, CA 95113
Phone: 408.295.4944
Email: josh.roper@cmsalter.com

Salter Project Number: 17-0504

INTRODUCTION

This report summarizes our environmental noise assessment for the Fremont Boulevard Mixed-Use project in Fremont, California. The project will consist of approximately 72 three-story townhomes, 64 residential apartment units, and approximately 25,000 square feet of retail space along Fremont Boulevard. A proposed project variant would consist of increase the apartment count to 90, extending the building along Fremont Boulevard. Outdoor use space is expected to consist of community gardens in the western portion of the site and a pool, BBQ area, and a Tot Lot near the center of the site. The site is located at 37358 – 37494 Fremont Boulevard, and is currently occupied by several businesses and a vacant fire station. It is approximately 300 feet south and east of active railroad tracks used by Amtrak, ACE, and freight trains, with an at-grade crossing at Fremont Boulevard.

Following is a summary of our findings:

1. Estimated future noise levels at the planned residences fall into the City's *normally acceptable* and *conditionally acceptable* category for land use compatibility.
2. Preliminary estimates indicate that it will not be feasible to meet the City's maximum instantaneous noise level goal in bedrooms, due to train horns. Incorporating the window and door sound insulation ratings shown in Figures 2 and 3, attached, will reduce estimated future transportation noise to the Code requirement, and attempt to achieve the maximum instantaneous noise level goal with commercially available residential style windows.
3. Incorporating the window and exterior door sound insulation ratings shown in Figure 4, attached, will reduce estimated traffic noise to the CalGreen criterion in commercial spaces.
4. Incorporating a solid noise barrier at the community garden will reduce estimated future transportation noise to the City's DNL 65 dB goal at common outdoor use spaces. Reducing traffic noise to DNL 60 dB would also require a noise barrier along the western edge of the Club House for the base project design. However, if the variant is pursued then the space would meet the outdoor noise goal without this second barrier.
5. Exterior-to-interior sound isolation, and outdoor noise barrier design, will need to be refined as the design continues.

ACOUSTICAL CRITERIA

City of Fremont General Plan

The Noise section of the Fremont General Plan (adopted December 2011) includes land use compatibility guidelines for community exterior noise environments. Noise levels are characterized in terms of Day/Night Average Sound Levels[1] (DNL). The guidelines for multi-family residential and commercial land uses are summarized in Table 1 below.

[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.

Table 1: Summary of Table 10-4: Land Use Compatibility for Community Noise Environments

Exterior DNL		Land-Use Compatibility Level
Multi-Family Residential	Commercial	
less than 60 dB[2]	70 dB or less	*Normally Acceptable* – Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special insulation requirements
60 to 75 dB	70 to 80 dB	*Conditionally Acceptable* – Specified land use may be permitted only after a detailed analysis of the noise reduction requirements and needed noise insulation features included in the design
greater than 75 dB	80 dB or greater	*Unacceptable* – New construction or development should generally not be undertaken because mitigation is usually not feasible to comply with noise element policies

In addition, the General Plan includes the following acoustic goals and policies:

- Implementation Policy 10-8.1.A states the following:
  - The interior noise goal is DNL 45 dB or lower in residences. Typical maximum instantaneous noise levels in bedrooms at night should not exceed 50 dB. Typical maximum instantaneous noise levels in bedrooms and other rooms during the day should not exceed 55 dB.[3]
  - The outdoor noise goal is DNL 60 dB, and is applied where outdoor use is a major consideration. If the outdoor noise goal cannot be achieved with feasible mitigation, the City Council may permit outdoor noise levels up to DNL 65 dB. This standard is not normally applied to small decks associated with apartments and condominiums.
  - The policy states, "Railroad noise sources may create instances when outdoor noise exposure criteria can exceed DNL 65 up to DNL 70 for future development, recognizing that train noise is characterized by relatively few loud events. Railroad noise shall be evaluated independent of other noise sources. Indoor noise level shall not exceed a DNL of 45 dB in new housing units."
- Implementation Policy 10-8.3 requires the evaluation of mitigation measures for projects under the following circumstances:
  - The project would cause the DNL to increase by 5 dB or more, but would remain below 60 dB; or
  - The project would cause the DNL to increase by 3 dB or more, and exceed 60 dB; or
  - The project has the potential to generate significant adverse community response, due to the unusual character of the noise
- Implementation Policy 10-8.5.B requires best practices to limit noise in sensitive areas and long-term construction projects, such as maintaining construction equipment in good condition and use of mufflers on internal combustion engines, installation of temporary noise barriers, prohibiting idling time of internal combustion engines, locating staging areas away from sensitive receptors and other feasible best management practices.

City of Fremont Municipal Code

Section 18.160.010 of the City of Fremont Municipal Code states that construction activity within 500 feet of residences, lodging facilities, nursing homes or inpatient hospitals shall be limited to the weekday hours of 7:00 AM to 7:00 PM and the Saturday or holiday hours of 9:00 AM to 6:00 PM. Sunday construction is not allowed.

[2] A-Weighted Sound Level (dB) — The sound level is obtained by use of a standard sound level meter and is expressed in decibels.
[3] The policy defines typical maximum instantaneous noise levels as "the maximum level that is exceeded during 30 percent of the measured passbys, based on the measurement of at least 10 events during the daytime and the nighttime." This assessment considers nighttime hours to be from 10:00 PM to 7:00 AM.

California Building Code (CBC)

The California Building Code limits indoor noise from outdoor sources to DNL 45 dB in habitable rooms of attached housing.[4]

Section 5.507.4 of the 2016 CALGreen Code provides both prescriptive and performance-based criteria for interior noise levels in non-residential spaces where day/night or hourly average sound levels exceed DNL or $L_{eq}(h)$[5] 65 dB, which are summarized as follows:[6]

- Prescriptive method: Wall and roof-ceiling assemblies exposed to the noise source shall have a composite STC rating of at least 50, with exterior windows having a minimum STC rating of 40
- Performance method: Wall and roof-ceiling assemblies shall reduce average hourly noise levels to $L_{eq}(h)$ 50 dB, or lower, in occupied areas during any hour of operation

This analysis uses the CALGreen performance method to determine the necessary sound insulation at non-residential spaces.

NOISE ENVIRONMENT

Existing Noise Environment

Environmental noise levels at the site are most influenced by train horns and vehicle traffic on local roadways including Fremont and Peralta Boulevards. To quantify the existing noise environment, three multi-day monitors continuously measured noise levels at the site between 9 and 14 August 2017. In addition, short-term "spot" measurements were conducted at additional locations and compared with corresponding time periods of the multi-day monitors to determine how noise levels vary with location and elevation. Table 2, below, summarizes measured noise levels. Figure 1, attached, shows the approximate measurement locations.

Table 2: Existing Noise Environment

Site	Location	Date / Time	DNL	$L_{eq}(h)$
L1	Peralta Boulevard Monitor Approximately 30' east of Peralta centerline, 12' above grade	9 – 14 August 2017	72 dB*	76 dB
L2	Fremont Boulevard Monitor Approximately 30' north of Fremont centerline, 12' above grade		74 dB*	74 dB
L3	Parish Avenue Monitor Approximately 20' west of Parish centerline, 12' above grade		66 dB	70 dB
S1	Fremont and Peralta Corner Spot Approximately 45' north of Fremont centerline, 45' east of Peralta centerline, 5' above grade	1:20 – 1:35 PM 20 June 2017	73 dB	n/a
S2	Fremont Boulevard Spot Approximately 50' north of Fremont centerline, 5' and 16' above grade	1:50 – 2:05 PM 20 June 2017	69 dB	n/a

* Siren noise events excluded from the data during the 17:00 and 22:00 hours on 10 August 2017

Following is additional information on noise from trains passing the site, based on the measurement data:

- Approximately 84 passenger trains were scheduled to pass by the site during the measurement period

[4] California Code of Regulations, Title 24, Part 2: 2016 California Building Code, Chapter 12, Section 1207: Sound Transmission.
[5] L_{eq} (Time-Average Sound Level) – The average sound level for a specified measurement period (in this case, one hour), as described in ASTM 1686 and ANSI S1.1.
[6] California Code of Regulations, Title 24, Part 11: 2016 California Green Building Standards Code, Chapter 5, Section 5.507.4: Acoustical Control.

- Measurement data suggest that 3 to 4 unscheduled freight trains passed the site each night
- Observed noise levels from train horns were 83 to 89 dB at measurement location S1 (while on-site)
- Typical maximum instantaneous noise levels from train horns during day and nighttime hours were 88 and 93 dB, respectively, at monitor location L1

Future Noise Environment

A report by Hexagon Transportation Consultants, Inc. titled "Silicon Sage Mixed-Use Development Transportation Impact Analysis", dated 20 March 2018, provides existing year 2017 and cumulative with project year 2035 peak hour traffic volumes for Fremont Boulevard, Peralta Boulevard, and Parish Avenue adjacent to the project. In summary, peak hour traffic volumes are expected to increase from 1,709 to 2,448 vehicles along Fremont Boulevard, from 915 to 1,394 vehicles along Peralta Boulevard, and from 357 to 463 vehicles along Parish Avenue. This corresponds with an increase in DNL of approximately 2 dB due to traffic on Fremont Boulevard and Peralta Boulevard, and 1 dB due to traffic on Parish Avenue. The estimated future noise levels outlined below assume these increases in environmental noise (and assumes train noise will not change significantly in the future).

The proposed project variant would generate fewer peak hour trips than the (baseline) project, as described in the Transportation Impact Analysis. However, these project variant-generated traffic volumes do not differ enough from the project-generated traffic volumes to affect the increase in DNL estimated at the site. Therefore, the estimated future traffic noise increases apply to both the project and the project variant scenarios.

ANALYSIS AND RECOMMENDATIONS

Land Use Compatibility

Estimated future noise levels at the site range from below DNL 60 dB to 75 dB, depending on location and exposure to noise sources. This falls into the City's *normally acceptable* and *conditionally acceptable* land use compatibility category for multi-family residential and commercial usages. Exterior building assemblies will need to be sound-rated to reduce environmental noise to the criteria outlined above.

Exterior to Interior Noise

Residential Units

As outlined above, the interior noise goals for residences are DNL 45 dB, and to reduce typical maximum instantaneous noise from trains to 50 dB in bedrooms at night and 55 dB in other habitable rooms and in bedrooms during the day.

For reference, standard construction grade dual-pane windows and sliding glass doors typically have sound insulation ratings of STC 26 to 28. Dual pane windows with laminated glass can achieve sound insulation ratings up to approximately STC 36. Windows with higher sound insulation ratings, generally up to approximately STC 44 to 46, are available from some specialty window manufacturers and typically use a dual-sash system with three or four panes of glass.

Preliminary estimates suggest that window and exterior door sound insulation ratings of up to approximately STC[7] 43 will be needed to meet City and State goals in habitable rooms other than

[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.

bedrooms, but that bedroom windows would need to have sound insulation ratings up to approximately STC 55 to meet the instantaneous noise goal from train horns at night. This exceeds the level of sound isolation provided by commercially available residential windows. Therefore, it will not be feasible to reduce maximum instantaneous train noise to the City's goal in bedrooms.

Figures 2 and 3, attached, provide initial window and exterior door sound insulation ratings intended to meet the Code requirement of DNL 45 dB indoors, and to attempt to meet the City's maximum instantaneous noise from trains, with a cap at STC 44 windows. They will need to be updated as the design progresses, and are based on the following assumptions:

- Site plan, elevations, and townhome residential plans dated 25 July 2017
- An assumed room size for flats in the mixed-use building of 12 by 15 feet in living rooms, and 10 by 12 feet in bedrooms, with 9-foot ceilings
- Standard exterior walls will be equivalent to 7/8-inch thick stucco over wood sheeting with batt insulation in stud cavities and 1 layer of gypsum board on the unit interior
- Where upgraded walls are noted on Figures 2 and 3, a second layer of gypsum board should be added to unit interiors, and walls will either be staggered stud assemblies or interior gypsum board will be attached with resilient clips (e.g., Pliteq GenieClip RST)

Sound insulation ratings should be for the complete assembly, including glass and frame, and should be based on laboratory test reports of similar sized samples from an NVLAP accredited lab.

Ventilation systems, exhaust fans, vents, and similar elements must not compromise sound insulation of the exterior wall assemblies. This will need to be coordinated with the mechanical design as the project progresses.

Non-Residential Space

Commercial space is planned along Fremont Boulevard on the first floor, and residential amenity spaces are planned on the second and third floors of the eastern mixed-use building, and in the clubhouse at the pool area. The following preliminary estimates are intended to reduce transportation noise to the $L_{eq}(h)$ 50 dB indoor criterion, based on the site plan dated 25 July 2017. Consider the following:

- The estimated future outdoor $L_{eq}(h)$ during the louder hours at the clubhouse is approximately 69 dB. Preliminary estimates show that windows and exterior doors of STC 32 will be needed on the southern facade. Preliminary estimates assume approximately 90-percent of the exterior façade will be window.
- The estimated future outdoor $L_{eq}(h)$ during the louder hours at the proposed setback of the commercial and amenity spaces in the mixed-use building ranges from 76 to 79 dB. Preliminary estimates of sound insulation ratings needed to meet the CalGreen criteria are shown in Figure 4.

Outdoor Use Spaces

As outlined above, the City's noise goal for outdoor use spaces is DNL 60 dB, due to traffic, and DNL 70 dB due to trains. Where it is not feasible to reduce traffic noise to DNL 60 dB, the General Plan allows traffic noise to be DNL 65 dB. The 25 July 2017 plans show outdoor use space in the form of community gardens in the western portion of the site and a pool, BBQ area, and Tot Lot near the center of the site.

- Community Gardens – Estimated future noise levels at the community gardens are approximately DNL 68 to 70 dB due to vehicular traffic, and DNL 68 dB due to trains. Therefore, a noise barrier will

be needed to reduce traffic noise to an appropriate level. Consider the following:
  - Incorporating an 11-foot tall noise barrier at the location indicated in Figure 2, attached, will reduce estimated future traffic noise to approximately DNL 60 dB
  - Alternatively, the planned 8-foot tall noise barrier in the same location would reduce estimated future traffic noise to approximately DNL 65 dB
- Pool Area – Estimated future traffic noise at the pool, BBQ, and Tot Lot areas is DNL 65 dB. For reference, incorporating approximately a 6-foot tall noise barrier extending past the west side of the Club House would reduce estimated future traffic noise to approximately DNL 60 dB or below for the base project design. However, if the project variant design is pursued then the pool area would meet the outdoor noise goal without a solid barrier.

Estimates are based on the grading plan in the drawing set dated 20 February 2018 and will need to be reviewed when grading plans are finalized. Effective noise barriers may be comprised of various materials including CMU, plaster, wood (enhanced fencing), glass, plastic, and earthen berm. They should be solid from bottom to top with no cracks or gaps and should have a minimum surface density of approximately three pounds per square foot.

Mechanical Equipment Noise (Associated with the Project)

Project buildings are expected to include garage exhaust fans, rooftop air-handling units, condensing units, and building exhaust fans. An acoustical consultant should review manufacturer's noise level data for the proposed units during the design phase to determine if noise reduction measures should be recommended. If recommended, these may include a combination of selecting quiet units, maintaining minimum distances to property lines, physical barriers and/or enclosures.

Traffic Noise (Associated with the Project)

The "Silicon Sage Mixed-Use Development Transportation Impact Analysis", dated 20 March 2018, provides project-generated peak hour traffic volumes. In summary, buildout of the project or the project variant will increase peak hour traffic volumes at study intersections in the project vicinity by less than 25-percent. This corresponds with an increase in environmental noise of less than 1 dB, which does not trigger the evaluation of mitigation measures as outlined in General Plan Implementation Policy 10-8.3.

Construction Noise

The project shall comply with limitations on hours of construction and the best practices listed in the Acoustical Criteria section above, as outlined in General Plan Implementation Policy 10-8.5B. This includes items such as using mufflers on internal combustion engines, prohibiting idling times, locating staging areas as far as feasible from acoustically sensitive receivers, etc.

* * *

Charles M Salter Associates Inc 100 West San Fernando Street San Jose California 95113 Tel 408 295 4944 www.cmsalter.com

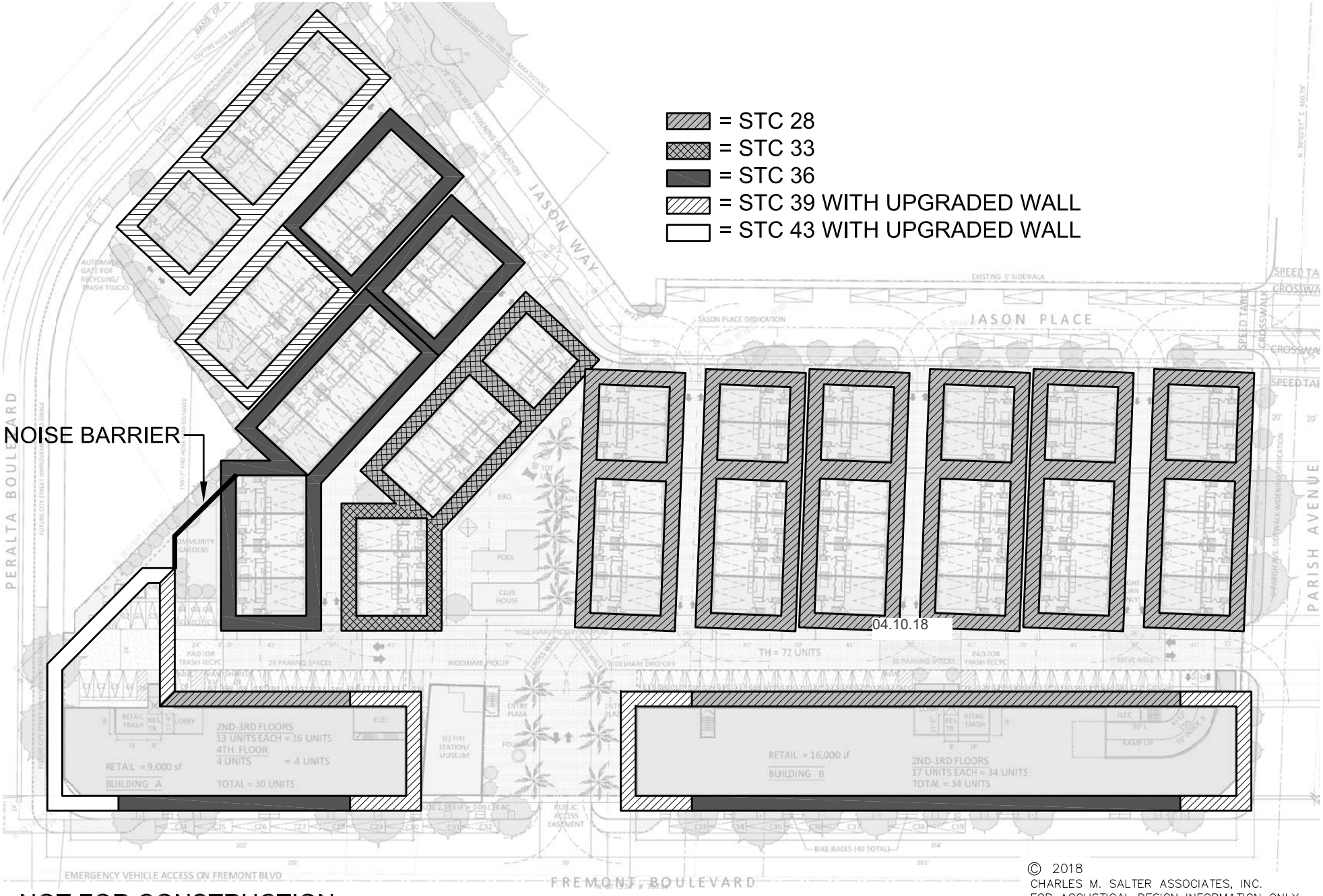
FREMONT BUILDING MIXED-USE
MEASUREMENT LOCATIONS AND MEASURED DNL

FIGURE 1

Salter # 17-0504

JPR/JMR
04.10.18

Charles M Salter Associates Inc 100 West San Fernando Street San Jose California 95113 Tel 408 295 4944 www.cmsalter.com



NOT FOR CONSTRUCTION

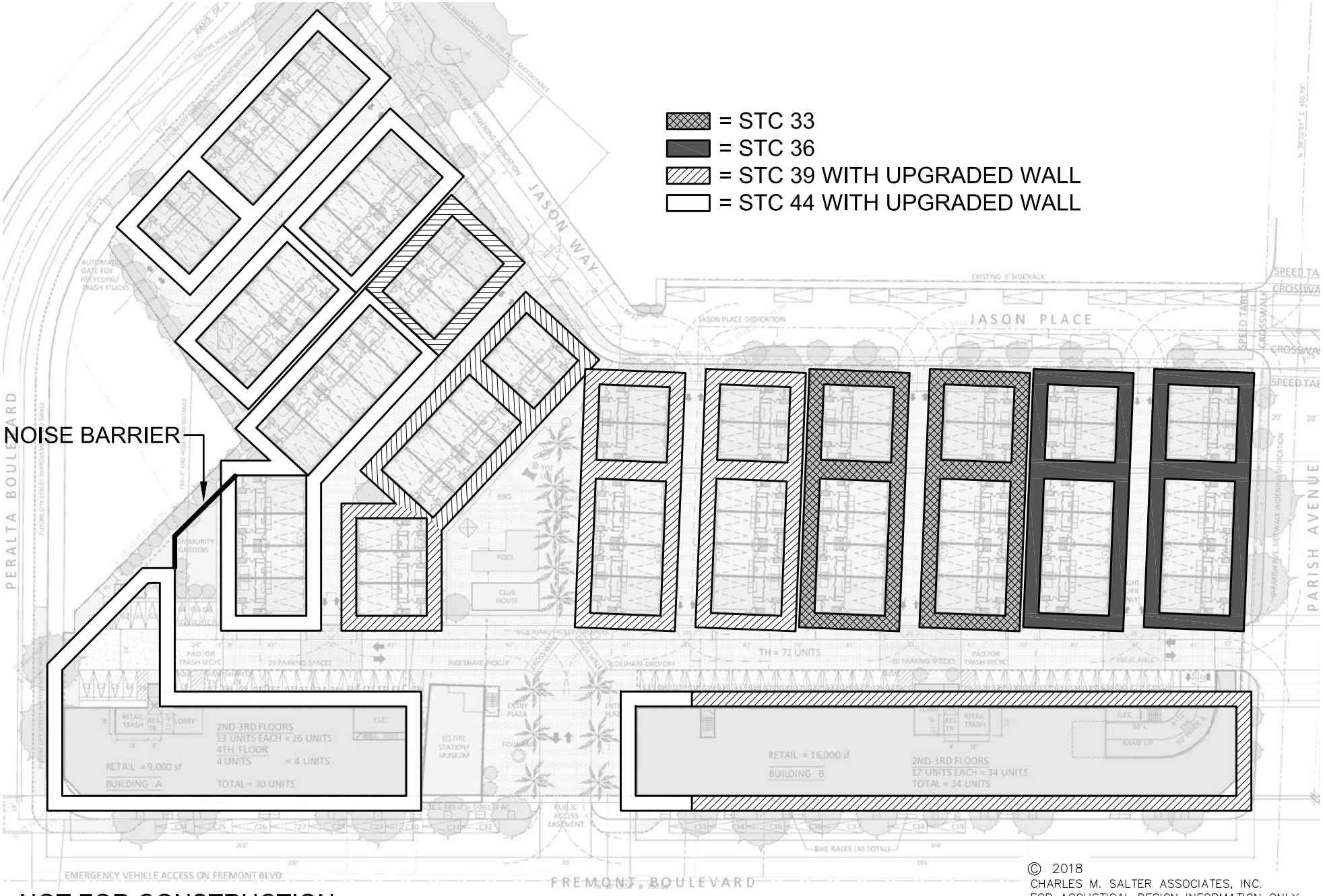
FREMONT BOULEVARD MIXED-USE PRELIMINARY MINIMUM STC RATINGS FOR WINDOWS AND EXTERIOR DOORS (NON-BEDROOMS)

FIGURE 2

Salter # 17-0504

JPR/JMR
04.10.18

Charles M Salter Associates Inc 100 West San Fernando Street San Jose California 95113 Tel 408 295 4944 www.cmsalter.com



NOT FOR CONSTRUCTION

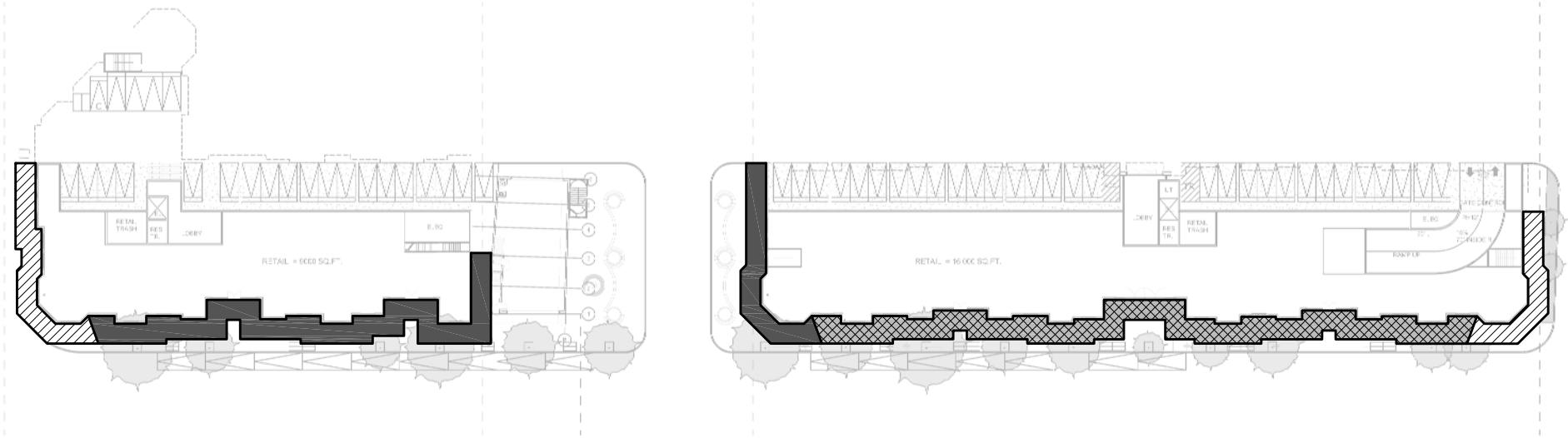
FREMONT BOULEVARD MIXED-USE PRELIMINARY MINIMUM STC RATINGS FOR WINDOWS AND EXTERIOR DOORS (BEDROOMS)

FIGURE 3

Salter # 17-0504

JPR/JMR
04.10.18

Charles M Salter Associates Inc 100 West San Fernando Street San Jose California 95113 Tel. 408 295 4944 www.cmsalter.com



= STC 33
= STC 36
= STC 39

NOT FOR CONSTRUCTION

FREMONT BOULEVARD MIXED-USE
MINIMUM RECOMMENDED STC RATINGS FOR WINDOWS AND EXTERIOR DOORS (COMMERCIAL)

FIGURE 4

Salter # 17-0504

JPR/JMR
04.10.18