

Memo

Date: November 25, 2020
To: Nate Bisbee, Bisbee Architecture + Design
From: Michael Thill, Illingworth & Rodkin, Inc.
SUBJECT: Santa Rosa Memorial Hospice House, Santa Rosa, California (IR Job # 20-155)

This memo summarizes Illingworth & Rodkin, Inc.'s (I&R) evaluation of noise produced by the operation of mechanical equipment proposed as part of the Santa Rosa Memorial Hospice House project in Santa Rosa, California. The proposed building is a 1-story hospice house with 12 patient rooms, visitor and staff areas. The project will be a licensed 24-hour facility.

Applicable Regulatory Criteria

The City of Santa Rosa has adopted a quantitative noise ordinance in Chapter 17-16 of the Municipal Code. Section 17-16.120 regulates noise from machinery and equipment:

“It is unlawful for any person to operate any machinery, equipment, pump, fan, air conditioning apparatus, or similar mechanical device in any manner so as to create any noise which would cause the noise level at the property line of any property to exceed the ambient base noise level by more than 5 decibels.”

The applicable ambient noise level criteria are shown in Table 1, following;

TABLE 1: City of Santa Rosa Municipal Code Ambient Base Noise Levels

Land Use Zone	Daytime Level (7am to 7pm)	Evening Level (7pm to 10pm)	Nighttime Level (10pm to 7am)
Single-Family Residential	55 dBA	50 dBA	45 dBA
Multi-Family Residential	55 dBA	55 dBA	50 dBA
Office and Commercial	60 dBA	60 dBA	55 dBA
Intensive Commercial	65 dBA	65 dBA	55 dBA
Industrial	70 dBA	70 dBA	70 dBA

Single-family residences border the site to the east and south. As shown in Table 1, the ambient base noise levels for single-family residential properties are 55 dBA during the daytime, 50 dBA during the

evening, and 45 dBA at night. Per Section 17-16.120, noise from stationary machinery and equipment shall not exceed the ambient base noise level by more than five decibels; therefore, the applicable residential noise limits are 60 dBA during the daytime, 55 dBA during the evening, and 50 dBA at night. Properties to the west and north are commercially zoned. The ambient base noise levels for office and commercial property are 60 dBA during the daytime and evening, and 55 dBA at night. Per Section 17-16.120, the applicable noise limits for office and commercial properties are 65 dBA during the daytime and evening, and 60 dBA at night.

Existing Noise Environment

I&R quantified the existing noise environment in the project vicinity through a noise monitoring survey between Wednesday, October 21, 2020 and Friday, October 23, 2020. One long-term noise measurement and one short-term noise measurement was made to quantify existing noise levels at the nearest residential receptors (LT-1 and ST-1). Figure 1 is the overall site plan showing the location of ambient noise measurements made to establish existing conditions in the project vicinity.

Noise measurements were made using Larson-Davis Laboratories precision Type 1 sound level meters fitted with ½-inch pre-polarized condenser microphones and windscreens. The sound level meters were calibrated before and after installation with an LDL acoustical calibrator. Weather conditions were generally good for the purposes of noise monitoring.

Long-term noise measurement LT-1 was made along the east boundary of the site adjacent to Talbot Avenue residences. Noise levels measured at this location were primarily the result of distant traffic along Sonoma Avenue and Doyle Park Drive and were representative of the adjacent residential outdoor use area. Figures 2-4 are graphical summaries of the noise data collected at Site LT-1. A review of these data indicates that hourly equivalent noise levels (L_{eq}) typically ranged from 40 to 55 dBA L_{eq} . The calculated day-night average noise level was 56 dBA L_{dn} on Thursday, October 22, 2020.

Short-term noise measurement ST-1 quantified existing noise levels on the morning of Wednesday, October 21, 2020 in the vicinity of residences located nearest to Doyle Park Drive. Noise sources documented at this location included Doyle Park traffic (58 to 65 dBA) and Sonoma Avenue traffic (51 to 53 dBA). The average equivalent noise level was 54 dBA L_{eq} .

The results of the noise measurements show that the ambient noise level criteria are appropriate for the assessment of mechanical equipment noise resulting from the project.

Mechanical Equipment Noise

The roof plan shown in Figure 5 identifies the locations of mechanical equipment proposed by the project include heating, ventilation, and air conditioning equipment (HVAC), and an exhaust fan. Figures 6 and 7 shows the two potential locations for the emergency generator (A and B). The HVAC equipment and exhaust fan could run anytime day or night; therefore, the 50 dBA nighttime noise limit would be the most restrictive limit applied at the residential properties to the east and south. For office and commercial properties to the north and west, the most restrictive noise limit would be 60 dBA. The generator would be tested for a period of about 30 minutes per month during the daytime; therefore, the

daytime noise limits are 60 dBA for residential land uses and 65 dBA for office and commercial land uses. Noise produced by the emergency operation of the generator would be exempt from the Municipal Code noise limits.

A review of the manufacturer's noise data for the selected HVAC equipment indicate that the condenser would produce a sound power level (PWL)¹ of 85 dBA and the each of the three HVAC units would produce a PWL of 81 dBA. The combined PWL for the four pieces of mechanical equipment located in the rooftop mechanical equipment well is 89 dBA. The PWL of the commercial exhaust fan is 76 dBA. Two 78-in. rooftop screens would shield the condenser, HVAC units, and exhaust fan. Based on the results of the calculations made assuming the acoustical attenuation provided by the rooftop equipment screens, noise levels are predicted to be 60 dBA or less at the nearest commercial properties to the north and west, 45 dBA or less at the nearest residential properties to the south, and 43 dBA or less at the nearest residential properties to the east. The results of the calculations indicate that the operation of the proposed condensing unit, HVAC units, and exhaust fan would not exceed the City's 60 dBA limit at the nearest commercial property or the City's 50 dBA limit at the nearest residential property. No additional mitigation is required for these equipment to achieve the Municipal Code noise limits.

The manufacturer's noise data for the emergency generator indicates that the unit produces a sound pressure level (SPL) of 71 dBA at 23 feet when fitted with a Level 2 sound enclosure. Assuming the placement of the generator in Location A (Figure 6), at the northeast corner of the property approximately 8 feet from the nearest residential property line, the estimated operational noise level would reach 80 dBA. The unattenuated noise level would exceed the 60 dBA residential noise limit by approximately 20 dBA. Preliminary estimates indicate that it is infeasible to achieve 20 dBA of noise reduction with an enclosure at Location A, particularly if openings are required for air intake and exhaust. Location A was determined to not be a suitable location for the generator recognizing the limits of possible noise control options and resultant noise levels assuming the implementation of best available controls.

Generator Location B (Figure 7) would be within the mechanical equipment well on the rooftop of the northwest corner of the building. A 78-in. rooftop screen would shield the generator from direct view from the adjacent commercial properties to the north and west, while the building's roofline would shield the generator from the adjacent residential properties to the south and east. Based on the results of the calculations made assuming the acoustical attenuation provided by the rooftop equipment screen and roofline, noise levels are predicted to be 65 dBA or less at the nearest commercial properties to the north and west, 55 dBA or less at the nearest residential properties to the south, and 50 dBA or less at the nearest residential properties to the east. The results of the calculations indicate that the daytime testing of the proposed generator at Location B would not exceed the City's 65 dBA limit at the nearest commercial property or the City's 60 dBA limit at the nearest residential property. No additional mitigation is required to achieve the Municipal Code noise limits assuming the emergency generator is sited at Location B.

¹ Sound power level is the acoustic energy emitted by a source which produces a sound pressure level at some distance. While the sound power level of a source is fixed, the sound pressure level depends upon the distance from the source and the acoustic characteristics of the area in which it is located.

**Noise Levels at Noise Measurement Site LT-1
East End of Property Adjacent to Talbot Avenue Residences
Wednesday, October 21, 2020**

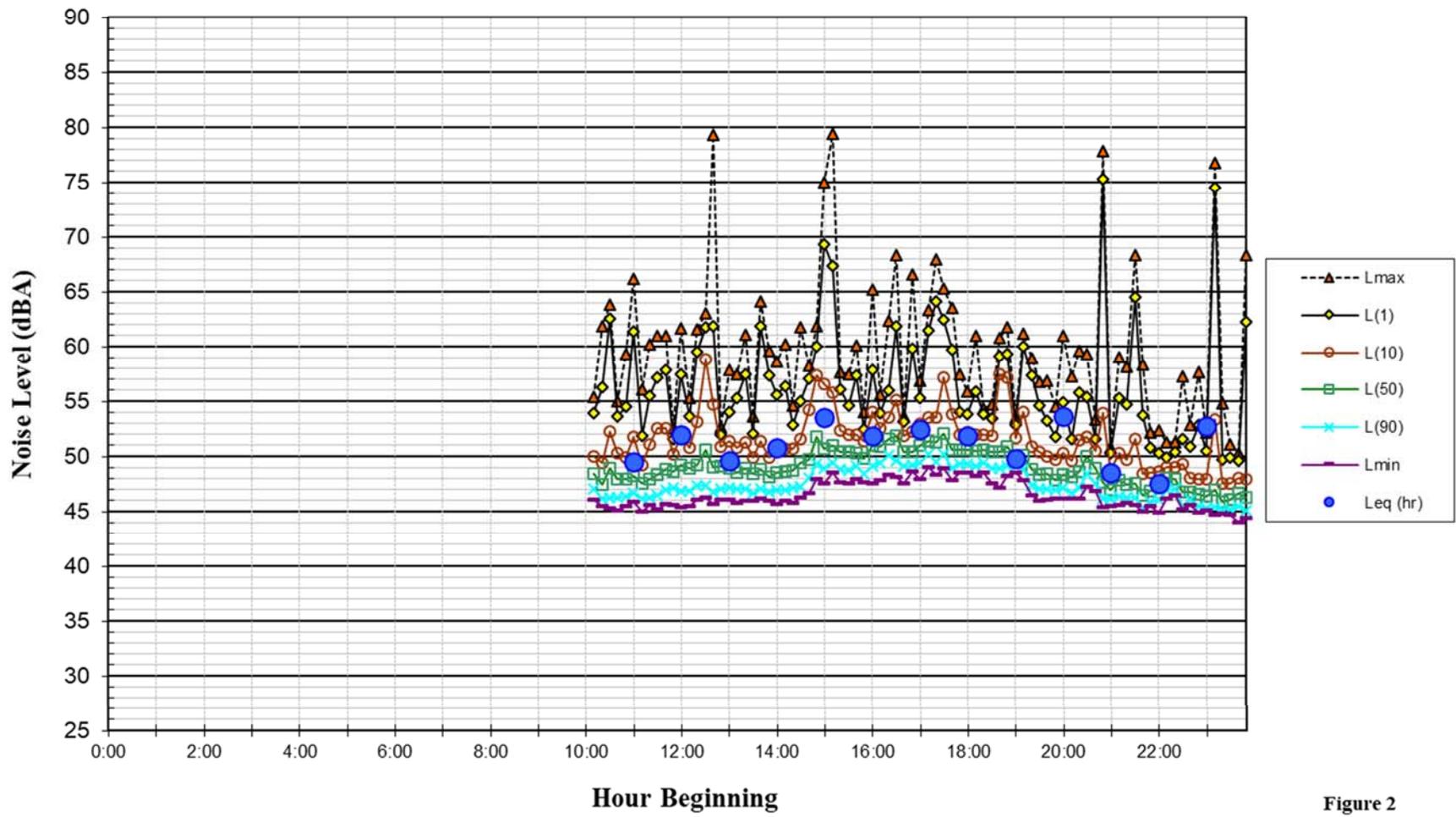


Figure 2

Noise Levels at Noise Measurement Site LT-1 East End of Property Adjacent to Talbot Avenue Residences Thursday, October 22, 2020

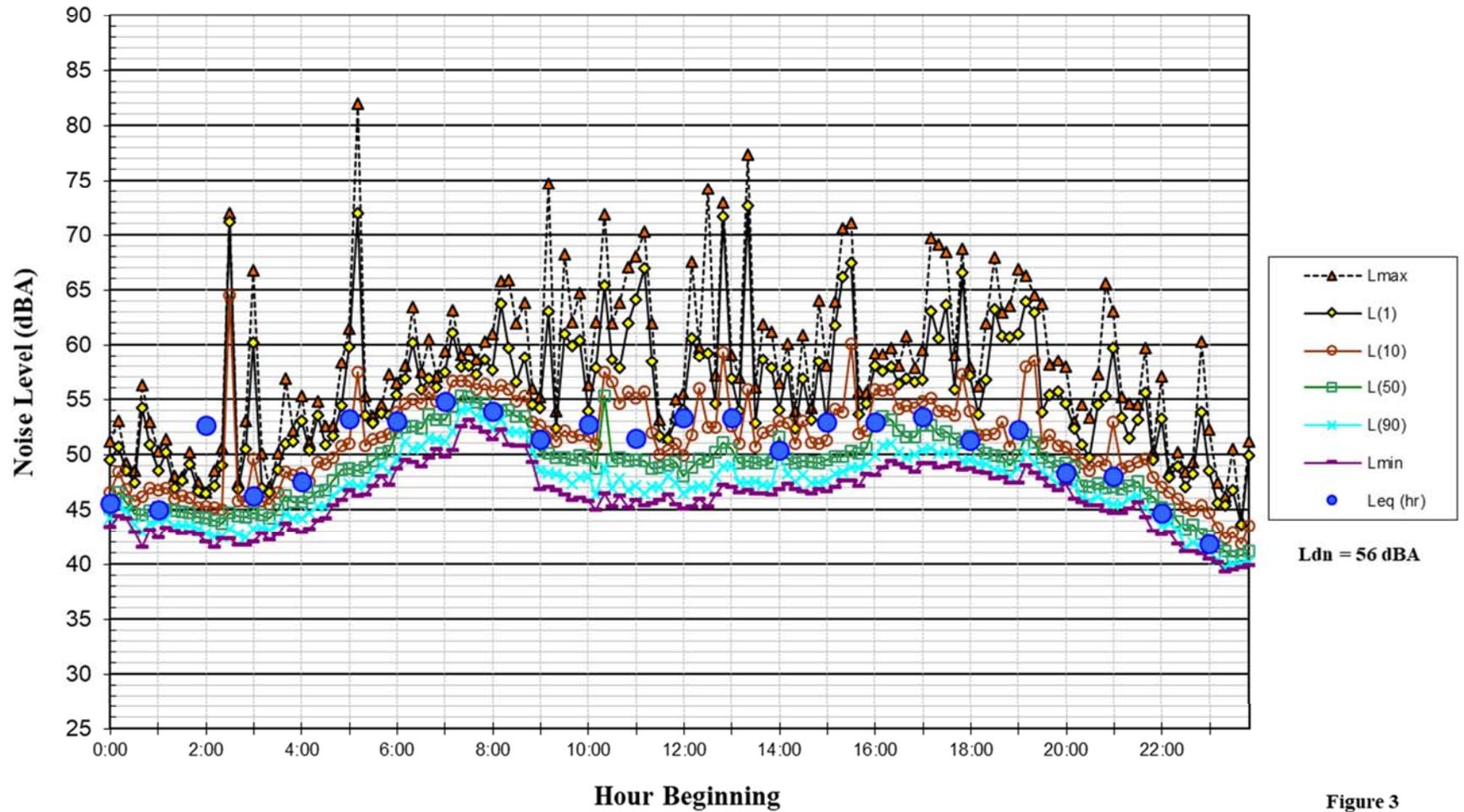


Figure 3

Noise Levels at Noise Measurement Site LT-1 East End of Property Adjacent to Talbot Avenue Residences Friday, October 23, 2020

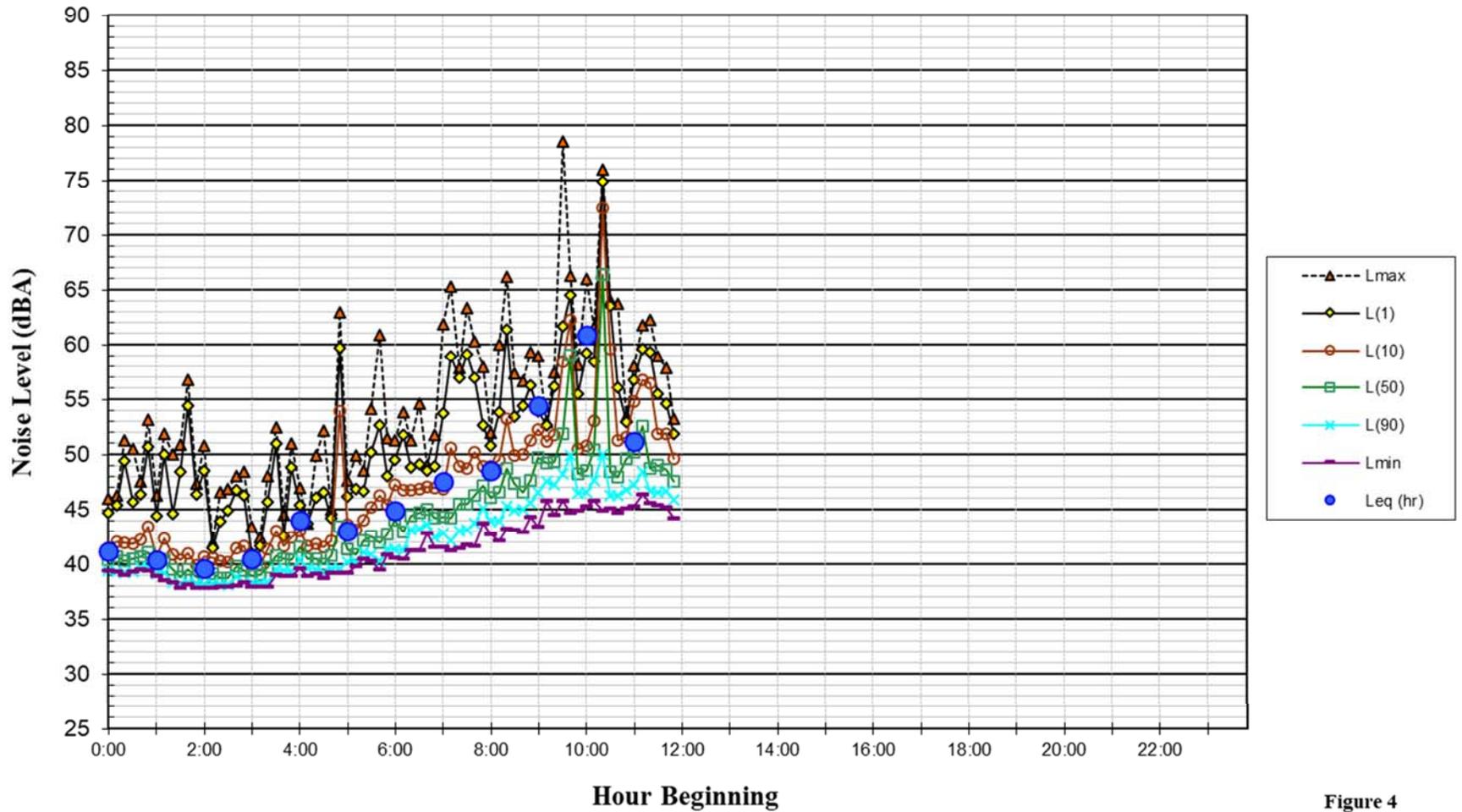
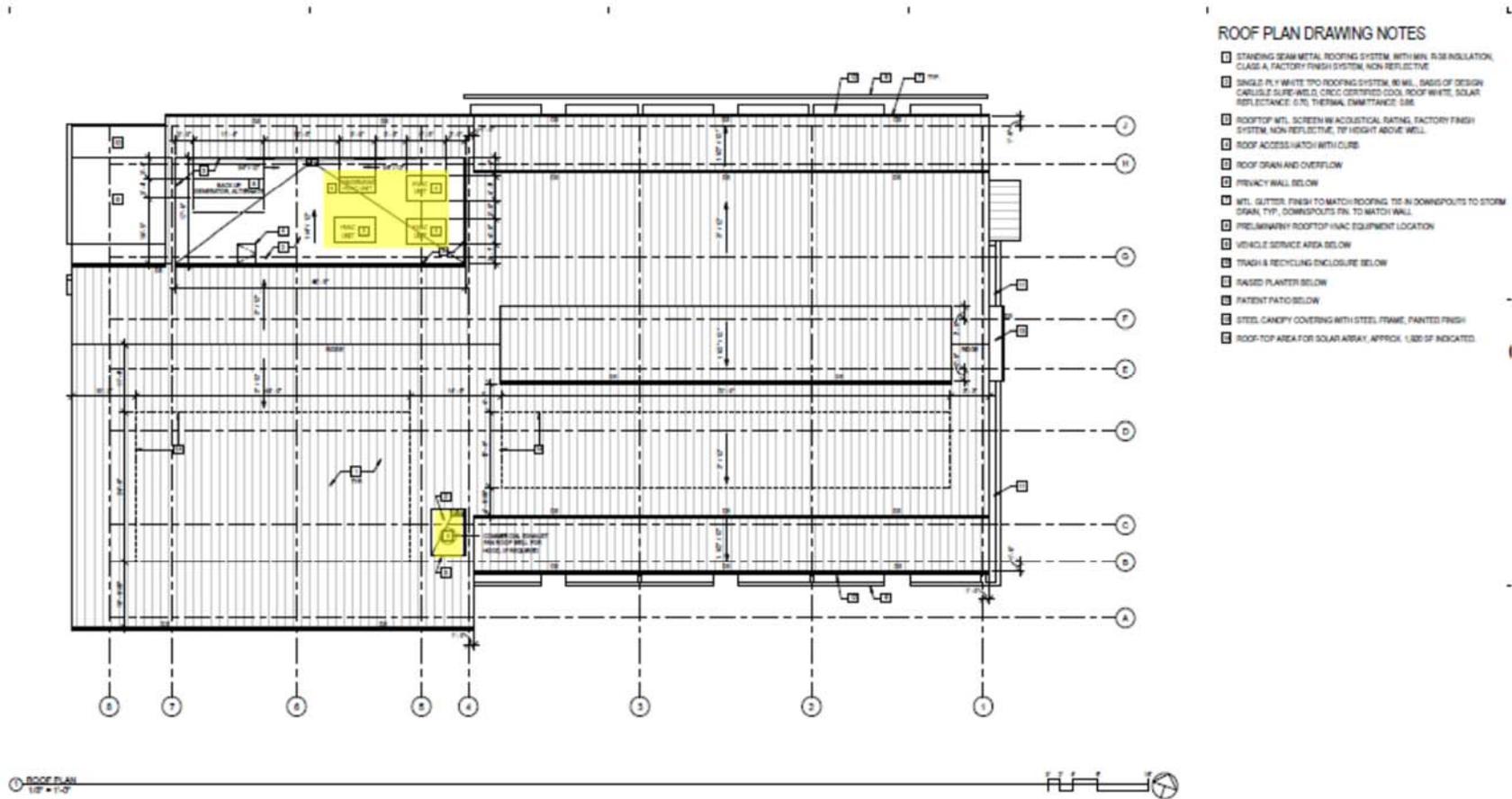


Figure 4

FIGURE 5 Roof Plan Showing HVAC Equipment and Exhaust Fan Locations



Source: Roof Plan, Bisbee Architecture + Design, October 30, 2020.

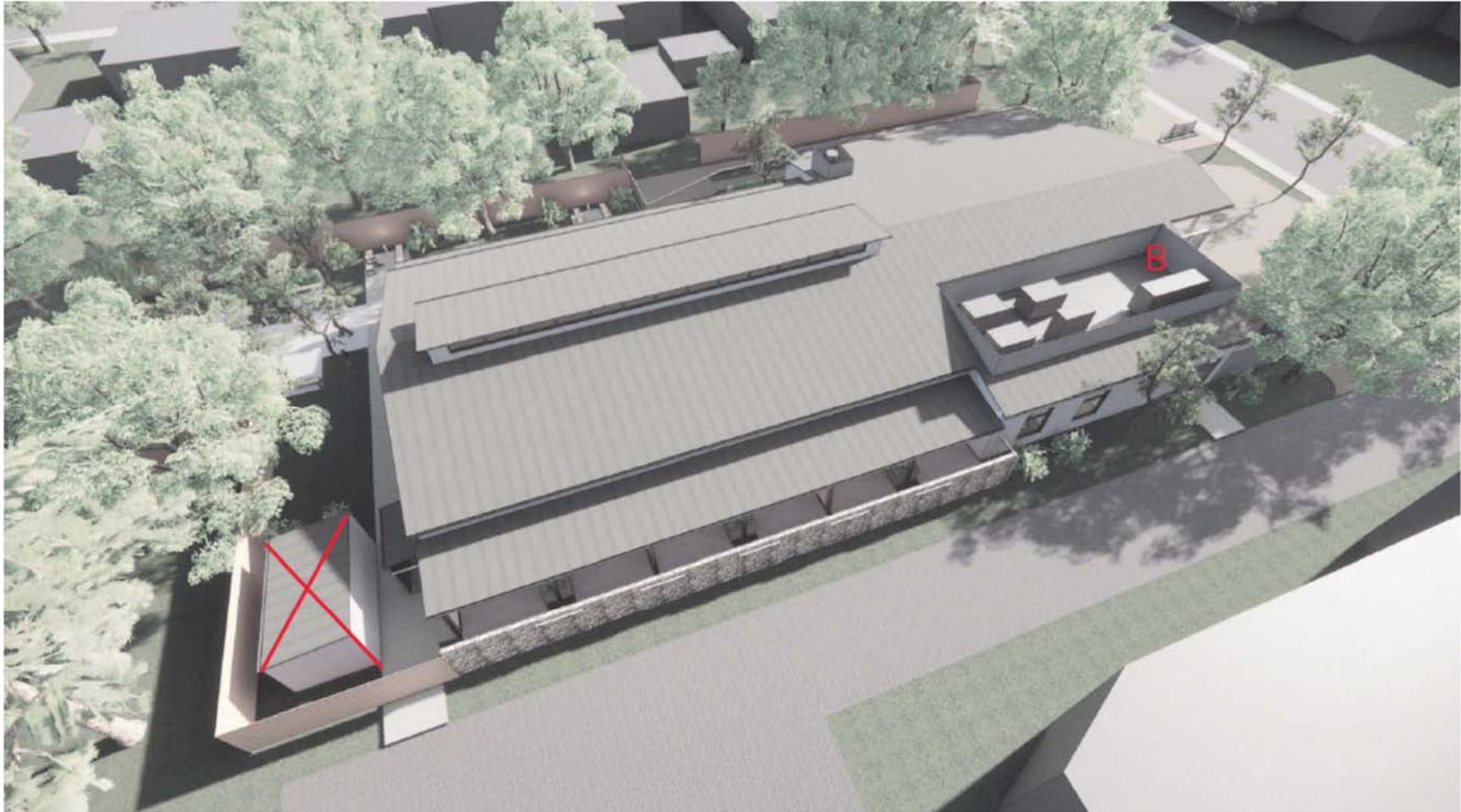
FIGURE 6 Generator Location A (View Looking South)



Source: Bisbee Architecture + Design, November 25, 2020.

Note: This figure is diagrammatic and only for the purpose of locating the generator.

FIGURE 7 Generator Location B (View Looking South)



Source: Bisbee Architecture + Design, November 25, 2020.

Note: This figure is diagrammatic and only for the purpose of locating the generator.