Project Name "Sonoma Cho Dispensary"
1825 Empire Industrial Court • Santa Rosa, California

Statement of Hammett & Edison, Inc., Consulting Engineers

The firm of Hammett & Edison, Inc., Consulting Engineers, has been retained on behalf of Jeffrey Rome & Associates, to evaluate the proposed installation of condensing units next to the commercial building (Project Name "Sonoma Cho Dispensary") located at 1825 Empire Industrial Court in Santa Rosa, California, for compliance with appropriate guidelines limiting sound levels from the installation.

Executive Summary

It is proposed to install condensing units at the commercial building sited at 1825 Empire Industrial Court in Santa Rosa, California. Noise levels from these units are calculated to comply with the pertinent noise limits.

Prevailing Standard

The City of Santa Rosa has set forth limits on sound levels in Chapter 17-16 ("Noise") of the Santa Rosa Municipal Code. Section 17-16.30 includes a table that defines reference ambient noise levels by zoning district: §17-16.120 limits noise from operation of mechanical equipment to a maximum increase of 5 dBA, averaged over a period of 15 minutes:

Zone	Daytime *7 am to 7 pm*	Evening *7 pm to 10 pm*	Night *10 pm to 7 am*
Residential (R1 & R2)	55 dBA	50 dBA	45 dBA
Multi-Family Residential (R3)	55 dBA	55 dBA	50 dBA
Office & Commercial	60 dBA	60 dBA	55 dBA
Intensive Commercial	55 dBA	55 dBA	65 dBA
Industrial	70 dBA	70 dBA	70 dBA

These levels are used as a base against which additional noise levels can be compared.

Figure 1 attached describes the calculation methodology used to determine applicable noise levels for evaluation against the prevailing standard.

Site & Facility Description

Based upon information provided by Jeffrey Rome & Associates, including construction drawings dated August 15, 2018, it is proposed to install fifteen York Model YD120 condensing units, oriented in rows of five, seven, and three units next to the southwest side of the building located at 1825 Empire Industrial Court in Santa Rosa. An 8-foot concrete-block sound wall would be constructed on the west and south sides of each of the three rows; the units would be set back no more than 3½ feet from the walls.

The subject parcel is zoned "industrial," and the nearest property line is to the southwest, about 28 feet from the nearest condensing unit. The nearest residential parcel is a mobile home park, located across the railroad tracks to the southwest, about 80 feet from the nearest condensing unit. The next nearest residential parcel is located to the north, adjacent to the subject parcel, about 140 feet away.

Study Results

Based on data from the manufacturers, the maximum noise level from a single condensing unit is 75.3 dBA, measured at a reference distance of 1.5 meters.

The maximum calculated noise levels for continuous operation of all fifteen condensing units at the nearest property line, taking into account attenuation from the concrete-block sound walls, is 57.2 dBA, increasing the defined 70 dBA industrial ambient level to 70.2 dBA, an increase of 0.2 dBA, well below the allowed +5 dBA increase.

The maximum calculated noise levels for continuous operation of all fifteen condensing units at the residential parcels to the southwest and north, taking into account attenuation from the concrete-block sound walls and, to the north, attenuation from the commercial building itself, are 48.2 and 47.7 dBA, respectively, increasing the most restrictive nighttime residential ambient level of 45 dBA to 49.9 and 49.6 dBA, an increase of +4.9 and +4.6 dBA, respectively, both less than the allowed +5 dBA increase.

Conclusion

Based on the information and analysis above, it is the undersigned's professional opinion that the operation of the condensing units proposed to be located at 1825 Empire Industrial Court in Santa Rosa, California, will comply with the City's requirements limiting acoustic noise emission levels.

Authorship

The undersigned author of this statement is a qualified Professional Engineer, holding California Registration Nos. E-13026 and M-20676, which expire on June 30, 2019. This work has been carried out under his direction, and all statements are true and correct of his own knowledge except, where noted, when data has been supplied by others, which data he believes to be correct.

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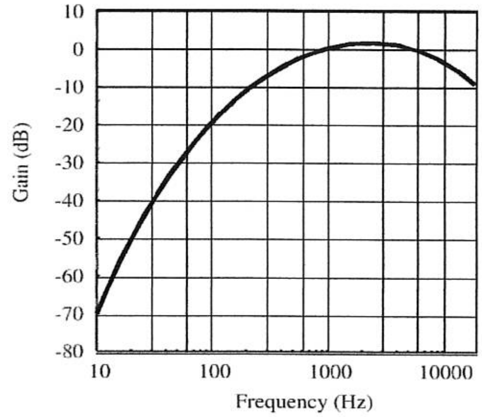
September 14, 2018

Noise Level Calculation Methodology

Most municipalities and other agencies specify noise limits in units of dBA, which is intended to mimic the reduced receptivity of the human ear to Sound Pressure ("L_P") at particularly low or high frequencies. This frequency-sensitive filter shape, shown in the graph to the right as defined in the International Electrotechnical Commission Standard No. 179, the American National Standards Institute Standard No. 5.1, and various other standards, is also incorporated into most calibrated field test equipment for measuring noise levels.



30 dBA	library
40 dBA	rural background
50 dBA	office space
60 dBA	conversation
70 dBA	car radio
80 dBA	traffic corner
90 dBA	lawnmower

The dBA units of measure are referenced to a pressure of 20 μPa (micropascals), which is the threshold of normal hearing. Although noise levels vary greatly by location and noise source, representative levels are shown in the box to the left.

Manufacturers of many types of equipment, such as air conditioners, generators, and telecommunications devices, often test their products in various configurations to determine the acoustical emissions at certain distances. This data, normally expressed in dBA at a known reference distance, can be used to determine the corresponding sound pressure level at any particular distance, such as at a nearby building or property line. The sound pressure drops as the square of the increase in distance, according to the formula:

$$L_P = L_K + 20\log(D_K/D_P),$$

where L_P is the sound pressure level at distance D_p and L_K is the known sound pressure level at distance D_K.

Individual sound pressure levels at a particular point from several different noise sources cannot be combined directly in units of dBA. Rather, the units need to be converted to scalar sound intensity units in order to be added together, then converted back to decibel units, according to the formula:

$$L_T = 10\log\left(10^{L_1/10} + 10^{L_2/10} + \ldots\right),$$

where L_T is the total sound pressure level and L_1, L_2, etc are individual sound pressure levels.

Certain equipment installations may include the placement of barriers and/or absorptive materials to reduce transmission of noise beyond the site. Noise Reduction Coefficients ("NRC") are published for many different materials, expressed as unitless power factors, with 0 being perfect reflection and 1 being perfect absorption. Unpainted concrete block, for instance, can have an NRC as high as 0.35. However, a barrier's effectiveness depends on its specific configuration, as well as the materials used and their surface treatment.