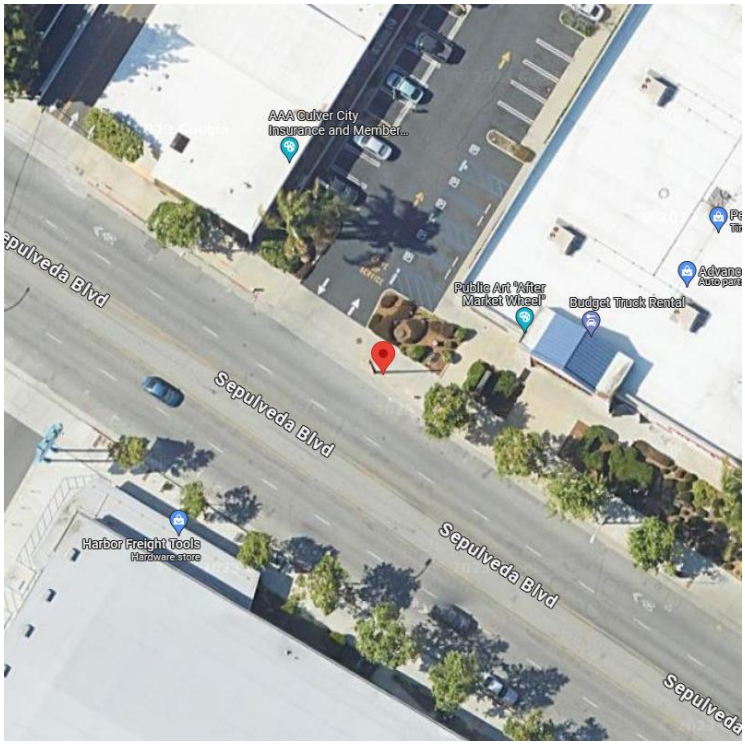
Noise Study Analysis

SITE – SCL CULVER 13 • 4604 Sepulveda Blvd. Culver City, CA 90232

Prepared For - Crown Castle
200 Spectrum Center Drive. Irvine, CA - 92618



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Report Date: 11/21/2023

Executive Summary

Crown Castle has contracted MobileNet Services to evaluate the output acoustical noise levels of a proposed small cell site and its compliancy with those of the limits set forth by the municipality of Culver City, CA. Crown Castle proposes to install a single canister type antenna with accompanying remote radio units mounted on a wooden utility pole in the public right-of-way near 4604 Sepulveda Blvd. Culver City, CA 90232. Noise from the proposed operation of this site will comply with the City's appropriate noise limits/regulations.

Site Name: SCL CULVER 13

Latitude: 34.001845°

Longitude: -118.404724°

Structure Type: Wooden Utility Pole

Address: 4604 Sepulveda Blvd. Culver City, CA 90232

Current Municipal Standards

The City of Culver City establishes guidelines pertaining to limits on maximum noise levels in the General Plan Noise Element Document. Table N.3 Interior and Exterior Noise Standards, shown below, defines Community Noise Equivalent Levels (CNEL) for different categories of land use. The proposed location of the site places it in an area zoned for commercial usage.

Table 1: Culver City General Plan Noise Element – Interior and Exterior Noise Standards

Proposed Land Use Categories		Design Standard CNEL	
Categories	**Uses**	**Interior**	**Exterior**
Residential	Single Family, Duplex,	45[a]	65
	Multiple Family	45	65
	Mobile Home	---	65[b]
Commercial Industrial Institutional	Hotel, Motel, Transient Lodging	45	65[c]
	Commercial Retail, Bank, Restaurant	55	–
	Office Building, Research and Development, Professional Offices, City Office Building	50	–
	Amphitheater, Concert Hall, Auditorium, Meeting Hall	45	–
	Gymnasium (Multipurpose)	50	–
	Sports Club	55	–
	Manufacturing, Warehousing, Wholesale, Utilities	65	–
	Movie Theatres	45	–
Institutional	Hospital, School Classroom	45	65
	Church, Library	45	–
Open Space	Parks	–	65

– No applicable standard.

[a] Noise level requirement with closed windows. Mechanical ventilation system or other means of natural ventilation shall be provided as of Chapter 12, Section 1205 of the 1974 Uniform Building Code.

[b] Exterior noise levels should be such that interior noise level will not exceed 45 decibels Community Noise Equivalent Level.

[c] Except those areas affected by aircraft noise.

Source: Culver City 1973, as amended (Noise Element)

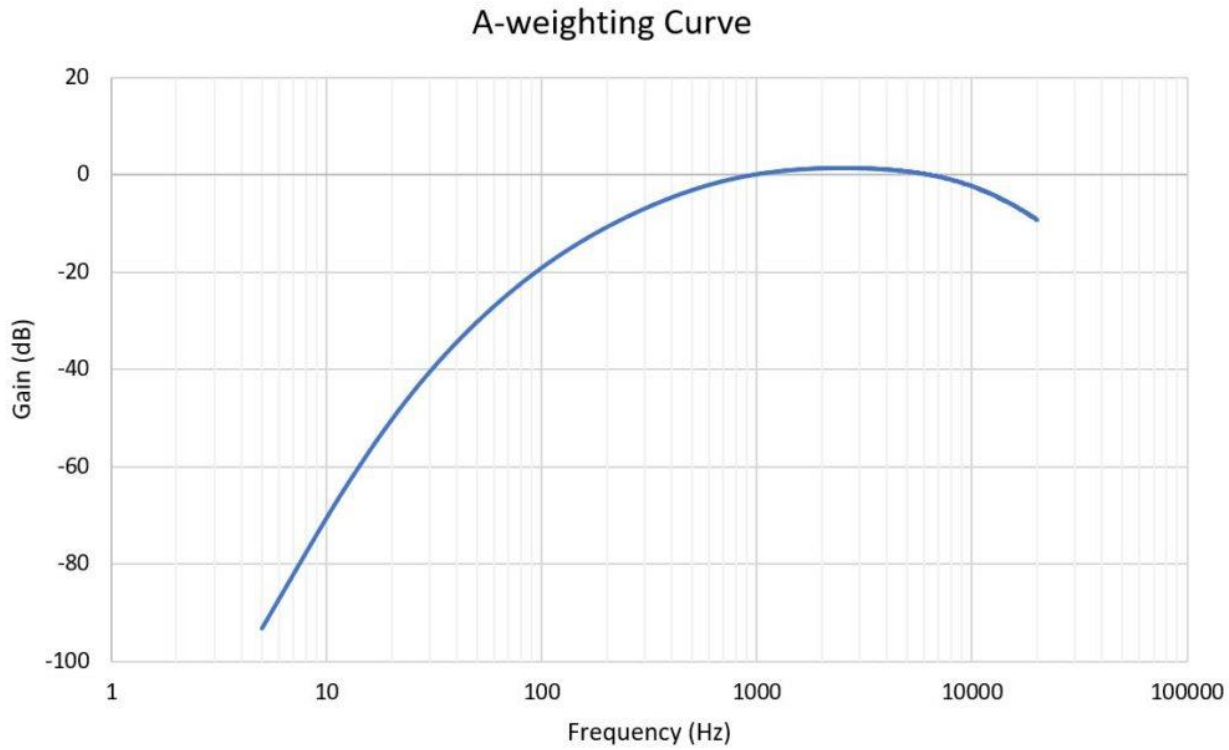
Fundamentals and Calculation Methodology

The amplitude of pressure waves generated by a sound source determines the loudness of that source. Sound pressure amplitude is measured in micro-Pascals (mPa). One mPa is approximately one hundred billionth (0.00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 to 100,000,000 mPa. Because of this huge range of values, sound is rarely expressed in terms of mPa. Instead, a logarithmic scale is used to describe sound pressure level (SPL) in terms of decibels (dB). The threshold of hearing for young people is about 0 dB, which corresponds to 20 mPa.

However, the decibel scale alone does not adequately characterize how humans perceive noise.

Human hearing is limited in the range of audible frequencies as well as in the way it perceives the SPL in that range. In general, people are most sensitive to the frequency range of 1,000–8,000 Hz and perceive sounds within that range better than sounds of the same amplitude in higher or lower frequencies. To approximate the response of the human ear, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies. Then, an "A-weighted" sound level (expressed in units of dBA) can be computed based on this information.

The A-weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. This frequency response (shown below) as defined by the International Standard IEC 61672:2003 is incorporated into most calibrated field test equipment used to measure noise level.



The table below describes typical A-weighted noise levels for various noise sources.

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	— 110 —	Rock band
Jet fly-over at 1000 feet		
	— 100 —	
Gas lawn mower at 3 feet		
	— 90 —	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	— 80 —	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	— 70 —	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	— 60 —	
		Large business office
Quiet urban daytime	— 50 —	Dishwasher next room
Quiet urban nighttime	— 40 —	Theater, large conference room (background)
Quiet suburban nighttime		
	— 30 —	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	— 20 —	
		Broadcast/recording studio
	— 10 —	
Lowest threshold of human hearing	— 0 —	Lowest threshold of human hearing

Source: Caltrans 2013.

Manufacturers of a variety of equipment such as but not limited to HVAC systems, power generators and telecommunication devices will usually test their products to determine the noise level at a particular known set distance. From this information provided by the manufacturers we can determine the corresponding sound pressure level at any distance such as nearby buildings and or property lines with the following formula:

$$SPL_2 = SPL_1 - 20\log\left({}^{r_2}/_{r_1}\right), \qquad \text{... (1)}$$

where SPL_1 is the noise level at distance r_1 and SPL_2 is the noise level at distance r_2.

Because decibels are logarithmic units, SPL cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions. Mathematically we can also calculate the addition of multiple sources by the following formula:

$$SPL_{\text{Total}} = 10\log\left[\, 10^{SPL_1/10} + 10^{SPL_2/10} + \, 10^{SPL_3/10} \ldots + 10^{SPL_N/10}\right], \qquad \text{... (2)}$$

where SPL_1 and SPL_N are the separate sound pressure level, and N is the total number of individual noise sources.

Proposed Equipment

Based on the information provided by Crown Castle the carrier plans to install a single canister type antenna with accompanying remote radio units mounted atop a streetlight pole in the public right-of-way adjacent to a Commercial (General Corridor) classified zone of Culver City. The nearest property line to the noise source is approximately 7.0 feet to the North.

Study Results

Per the manufacturers' specification sheet, the maximum noise level is as follows:

Equipment	Maximum Noise Level (dBA)	Reference Distance (meters)
Ericsson Radio 8843 B2/B66A	28	1
Ericsson Radio 8863 B77D	28	1

It is assumed that there are no other stationary noise sources nearby. Since the canister antenna is a passive unit and does not emit any audible noise. Therefore, the maximum calculated noise level for the combined continuous operation of the two installed remote radio units is 23.3 dBA. This is below the City's most restrictive Exterior A-Weighted Noise Level of 65 dBA for the exterior of a commercial designated zoned areas of Culver City.

Conclusion

From the analysis above and all provided information it is believed that the operation of the Crown Castle small cell, located at 4604 Sepulveda Blvd. Culver City, CA 90232 will comply with that City's requirements for limiting the emission of noise levels.

Certification

I certify that the attached Noise Study analysis and report for SCL CULVER 13, located at 4604 Sepulveda Blvd. Culver City, CA 90232 is correct to the best of my knowledge, and all calculations, assumptions and conclusions are based on generally acceptable engineering practices.