Crown Castle • Node No. MIV_43
Verizon Wireless • Small Cell No. 448280
Southeast 78th Street • Mercer Island, Washington

Statement of Hammett & Edison, Inc., Consulting Engineers

The firm of Hammett & Edison, Inc., Consulting Engineers, has been retained on behalf of Verizon Wireless, a wireless telecommunications carrier, to evaluate modifications to a small cell in its network in Mercer Island, Washington, for compliance with municipal limits on sound levels from the installation.

Executive Summary

Verizon proposes to install new antennas and equipment on a replacement utility pole sited in the public right-of-way on Southeast 78th Street in Mercer Island. Noise from the proposed operation will comply with the pertinent noise limits.

Prevailing Standard

The City of Mercer Island regulates noise from small wireless facilities in Section 19.06.075 "Small Wireless Facility Deployments – Design and Concealment Standards" of its Municipal Code. Section 19.06.075.A.2 states that "noiseless small wireless facilities are required if feasible," otherwise requiring "the facility with the lowest noise profile." Figure 1 attached describes the calculation methodology used to determine applicable noise levels for evaluation against the prevailing standard.

General Facility Requirements

Wireless telecommunications facilities ("cell sites") typically consist of two distinct parts: the electronic base transceivers ("radios"), that are connected to traditional wired telephone lines, and the antennas, that send wireless signals created by the transceivers out to be received by individual subscriber units. The cabinets are connected to the antennas by coaxial cables. Some cabinets require fans to cool the electronics inside, often integrated into the cabinets.

Site & Facility Description

According to information provided by Crown Castle, including drawings by Shift Companies, LLC, dated February 17, 2022, Verizon presently has installed antennas on top of the existing utility pole sited in the public right-of-way at the southwest corner of the intersection between Southeast 78th Street and 84th Avenue Southeast in Mercer Island. Verizon proposes to remove the existing antennas and to install new antennas and radios, retaining its existing radio shroud. Within a shroud on top of the pole would be one JMA Wireless Model CYL2Q24GR-1xyz cylindrical antenna and two Ericsson Model 6701 antennas, with integrated radios, all mounted at least 46 feet above ground. One Ericsson Model 8843 radio would be installed within a shroud mounted on the side of the pole, above the existing CommScope Model FlexWave Prism radio shroud. The nearest property line is about 9 feet to the south.

©2022

Study Results

The cylindrical antenna is passive, generating no noise. Ericsson reports that the maximum noise from two of its Model 6701 antennas is 31.5 dBA,* at a reference distance of 5 feet, and that its Model 8843 radio does not have cooling fans. CommScope reports that its Model FlexWave Prism is fitted with an IP-55 cooling fan, from which the maximum noise level is 20.3 dBA, measured at a reference distance of 5 feet.

The maximum noise level for a person at the base of the pole, that is, 40 feet from base of the antenna shroud, is calculated to be 26.0 dBA. As noted in Figure 1, this is quieter than even in a library, and so it is believed these modifications meet the City's requirement of "lowest noise profile" possible.

Conclusion

Based on the information and analysis above, it is the undersigned's professional opinion that operation of this Verizon Wireless small cell in Mercer Island will, under the conditions noted above, comply with the municipal standards 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, 2023. 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.

REGISTERED PROFESSIONAL ENGINEER
WILLIAM F. HAMMETT
E-13026
M-20676
Exp. 6-30-2023
ELECTRICAL
MECHANICAL
STATE OF CALIFORNIA

August 31, 2022

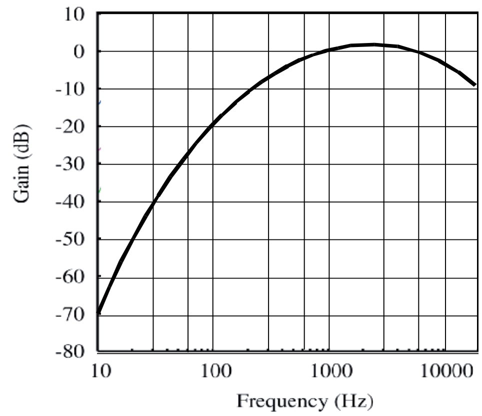
William F. Hammett, P.E.
707/996-5200

* Based on manufacturer data, adjusted to reflect record high temperature of 99° F in Mercer Island.

©2022

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.

©2022