

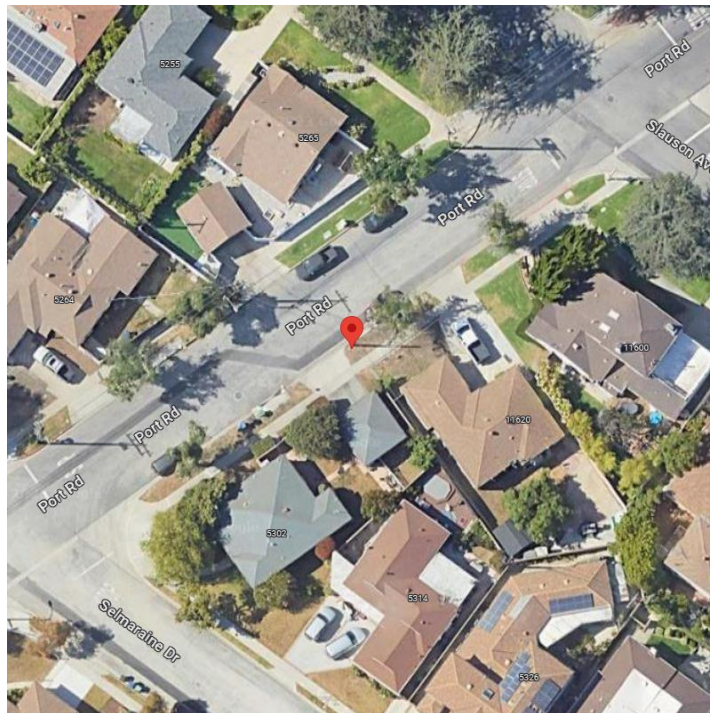
RF Emissions Compliance Report

SITE – CA002_CLC_CULVER_023 • 11622 Port Rd. Culver City, CA 90230

Prepared For

Crown Castle

200 Spectrum Center Drive. Irvine, CA - 92618



Certification

I certify that the attached RF exposure analysis and report for CA002_CLC_CULVER_023, located at 11622 Port Rd. Culver City, CA 90230 is correct to the best of my knowledge, and all calculations, assumptions and conclusions are based on generally acceptable engineering practices.



Executive Summary

Crown Castle has contracted MobileNet Services to evaluate the Radiofrequency Electromagnetic Compliance of the proposed site below. Compliance is based on the Federal Communication Commission (FCC) Rules and Regulations for human exposure to electromagnetic fields.



Site Name: CA002_CLC_CULVER_023

Latitude: 33.991039°

Longitude: -118.403864°

Structure Type: Wooden Utility Pole

Address: 11622 Port Rd. Culver City, CA 90230

FCC RF Exposure Guidelines

The Federal Communications Commission (FCC) has provided standards (FCC 96-326) for RF exposure which are derived from recommendations of two expert organizations, the National Council on Radiation Protection and Measurements (NCRP) Section 17.4.5 Report No. 86 and the Institute of Electrical and Electronics Engineers (IEEE) Sections 4.2.1 and 4.2.2 C95.1-1992. The FCC consulted with the Environmental Protection Agency (EPA), the Food and Drug Administration (FDA), and the Occupational Safety and Health Administration (OSHA) and obtained their support for the guidelines that the FCC is using. The exposure guidelines incorporate prudent margins of safety.

The FCC has classified Radio Frequency (RF) exposure limits into two tiers - General Population or “Uncontrolled Environment” and Occupational or “Controlled Environment”. These limits apply to accessible areas where workers or the general public may be exposed to RF electromagnetic fields. The General Public limits are generally five times more restrictive than the Occupational limit.

- *General Population/Uncontrolled* – Exposure limits apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.
- *Occupational/Controlled* – Exposure limits apply in situations in which persons are exposed as a consequence of their employment and are fully aware of the potential for exposure and can exercise control over their exposure.

Maximum Permissible Exposure (MPE) – FCC OET Bulletin 65 Table 1 of 47 C.F.R. § 1.1310

Frequency Range (MHz)	General Population/Uncontrolled Exposure Limit (mW/cm²)	Averaging Time (mins.)	Occupational/Controlled Exposure Limit (mW/cm²)	Averaging Time (mins.)
30-300	0.2	30	1	6
300-1500	$f/1500$	30	$f/300$	6
1500-100,000	1.0	30	5	6

where f = frequency in MHz





In situations where the predicted MPE exceeds the General Population threshold in an accessible area because of emissions from multiple transmitters, FCC licensees that contribute greater than 5% of the aggregate MPE share responsibility for mitigation per 47 C.F.R § 1.1307(b)(3).

Analysis

Based on the information provided by Crown Castle, the proposed site will contain (3) 5G integrated panel antennas mounted on an existing wooden utility pole in the public right-of-way of Culver City, California. The predictive RF power density resulting from each transmitter at any location is expressed as a percentage of the FCC limit. It is assumed that all antenna specified channels are transmitting simultaneously, and that the radio transmitters are operating at maximum power. As predicted by RoofMaster™ the maximum permissible exposure (MPE) values for both ground and antenna levels as well as any other applicable reference planes are shown in the table below. From all provided and gathered information there are currently no existing neighboring transmitters that contribute to the MPE levels for CA002_CLC_CULVER_023. The predictive exposure levels listed below are solely based on the proposed equipment for said site and should be mitigated accordingly.

Maximum Permissible Exposure (MPE) at Ground Level/General Public Accessible Areas & Antenna Level

Reference Plane	Maximum Permissible Exposure (MPE) Level: General Population (%)	Maximum Permissible Exposure (MPE) Level: Occupational (%)
Ground Level	0.09	0.02
Antenna Level	363.80	72.76

	5% - 100% MPE	Safe Area
	100% - 500% MPE	Area exceeds the FCC's General Population Limits
	500% - 5000%. MPE	Area exceeds the FCC's Occupational Population Limits
	≥ 5000% MPE	Area exceeds the 10x FCC's Occupational Population Limits

From Figure 2 in the Elevation Detail Plots, the following keep-back distances to the FCC limits is determined to be as follows:

Distance to FCC 100% MPE Limits at the Antenna Level

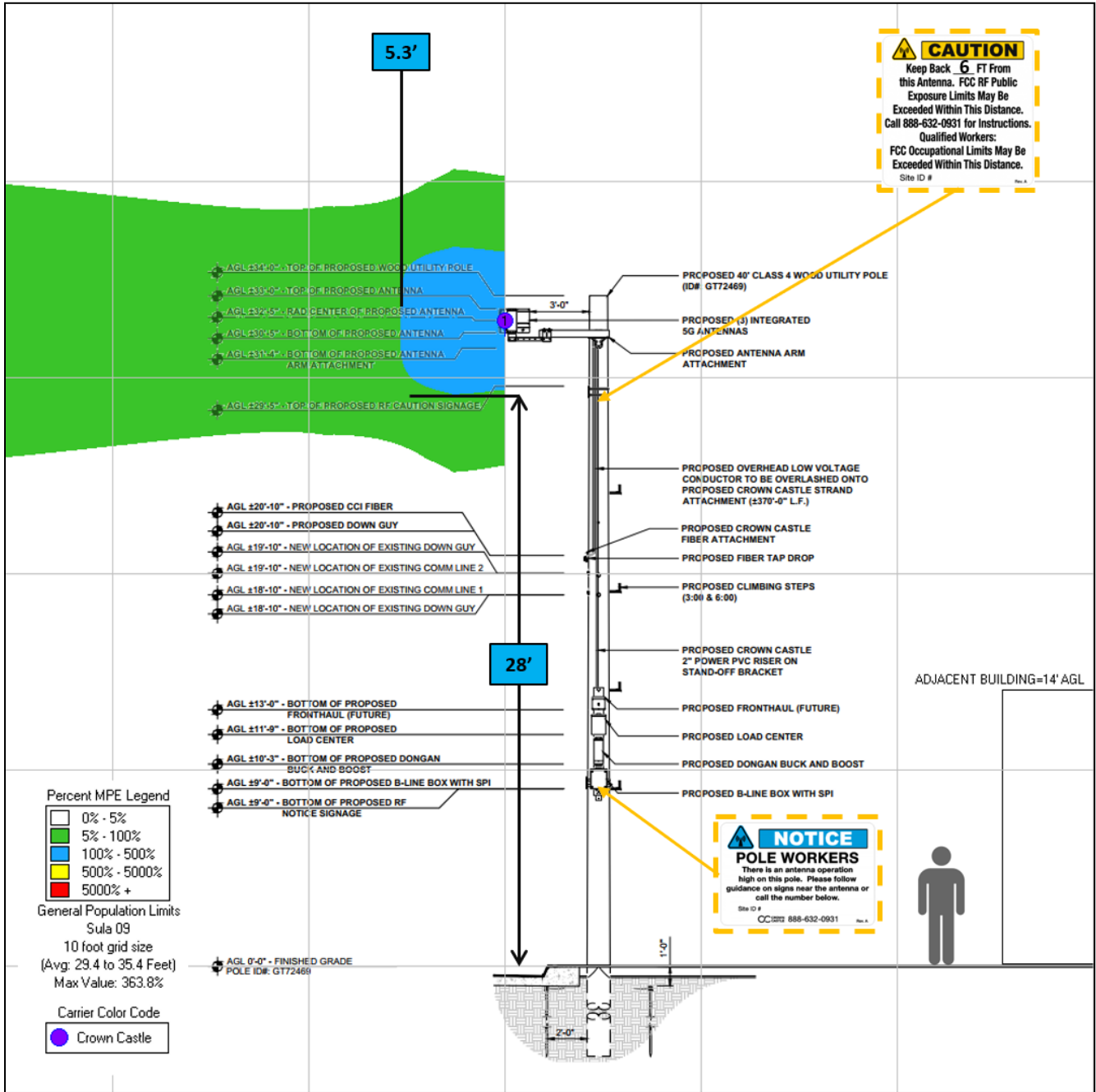
- Vertical Stand-off Distance (General Population) 2.9 feet
- Vertical Stand-off Distance (Occupational) n/a
- Horizontal Stand-off Distance (General Population) 5.3 feet
- Horizontal Stand-off Distance (Occupational) n/a

Distance to FCC 100% MPE Limits at Ground Level

- Horizontal Stand-off Distance (General Population) n/a
- Horizontal Stand-off Distance (Occupational) n/a

Elevation Detail

Figure 1: Predicted MPE level in relation to the center of a 6-foot vertical space that a person(s) can occupy at Ground Level



<p>General Pop. Limit exceeded at 28' AGL</p> <p>Structure Type: Wooden Utility Pole Antenna Rad Center Height: 32'- 5" AGL</p>	<p>NOTICE POLE WORKERS There is an antenna operation high on this pole. Please follow guidance on signs near the antenna or call the number below. Site ID # CC022 888-632-0931</p>	<p>CAUTION Keep Back 6 FT From this Antenna. FCC RF Public Exposure Limits May Be Exceeded Within This Distance. Call 888-632-0931 for Instructions. Qualified Workers: FCC Occupational Limits May Be Exceeded Within This Distance. Site ID #</p>	<p>Percent MPE Legend</p> <ul style="list-style-type: none"> 0% - 5% 5% - 100% 100% - 500% 500% - 5000% 5000% + <p>General Population Limits Sula 09 Vertical 10 foot grid size Mid Zone Avg</p>
---	--	---	---

Figure 2: Top-Down Detailed view at Antenna Level

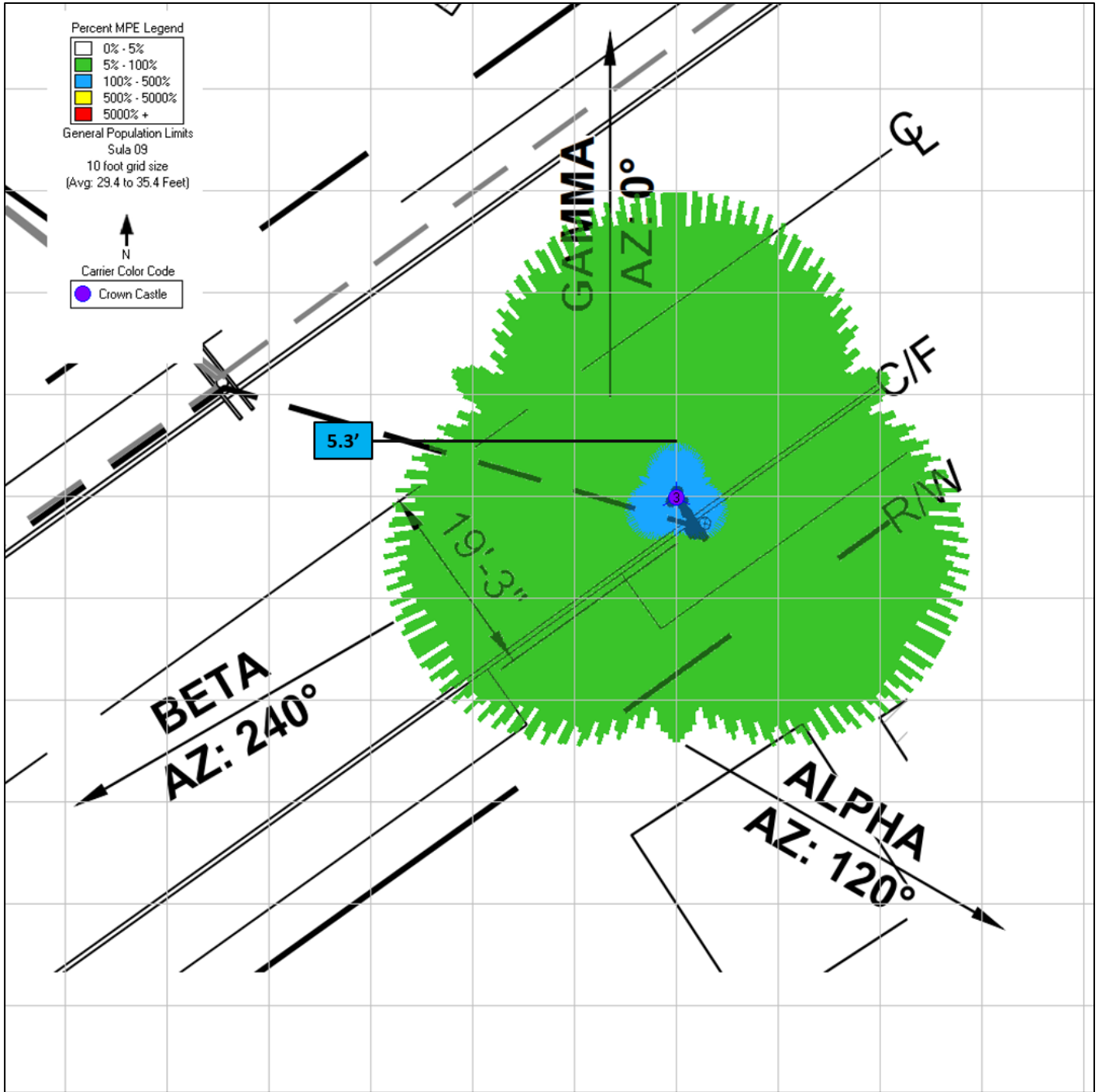
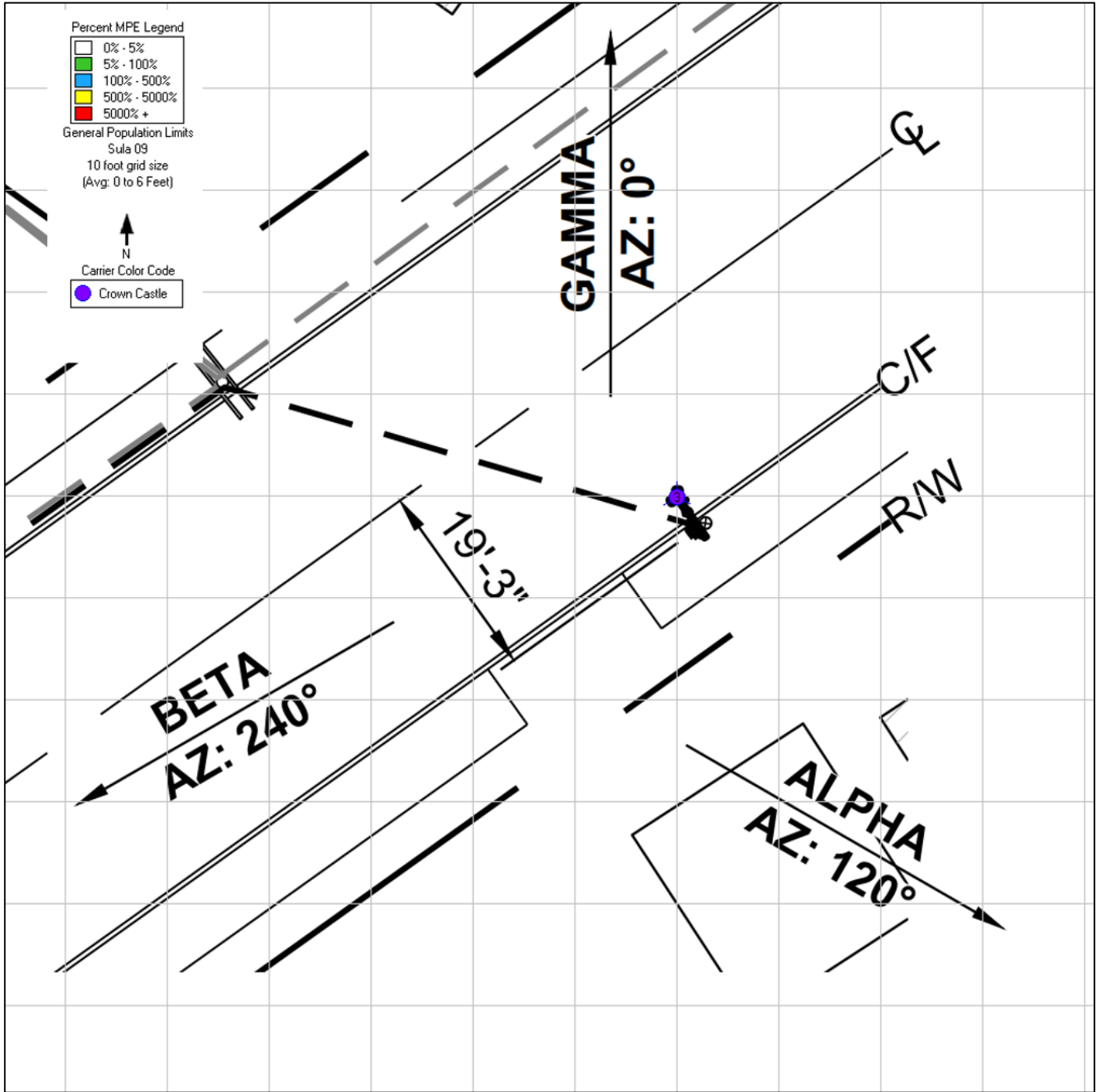


Figure 3: Top-Down Detailed view at Ground Level



Antenna Inventory

Antenna Number	Antenna ID	Operator	Antenna Mfg.	Antenna Model	Freq. (MHz)	Azimuth (deg)	Tilt (deg)	HBW (deg)	Antenna Aperture (ft)	TPO (W) per Path	Paths	TPO (W)	Loss (db)	Antenna Gain (dbd)	EIRP (W)	ERP (W)	RAD Center AGL (ft)
1	1	Verizon Wireless	ERICSSON	SON SM6705 CM1 02.07.22 28GHz VZW	28000	120	0	4	1.31	0.6	2	1.2	0	26.14	809	493	32.4
2	2	Verizon Wireless	ERICSSON	SON SM6705 CM1 02.07.22 28GHz VZW	28000	240	0	4	1.31	0.6	2	1.2	0	26.14	809	493	32.4
3	3	Verizon Wireless	ERICSSON	SON SM6705 CM1 02.07.22 28GHz VZW	28000	0	0	4	1.31	0.6	2	1.2	0	26.14	809	493	32.4

Evaluation

Ground Level - For any person standing at accessible areas such as the ground level, calculations resulted in exposure levels well below the FCC's General Population MPE limit.

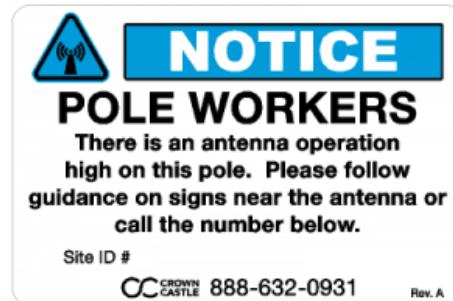
Adjacent Building Level - For any person standing at accessible areas such as the adjacent buildings rooftop, calculations resulted in exposure levels well below the FCC's General Population MPE limit. No action is required to maintain a safe working environment.

Antenna Level – Any areas exceeding 100% of the General Population Limits are displayed as Blue. As seen in Figures 1 and 2 the FCC's general population limit may be exceeded within 6ft of the antenna at the horizontal distance and 3ft from the antenna at the vertical distance. Any personnel accessing the pole and working within the area exceeding 100% of the limit should coordinate with the wireless operator or work should be performed by personnel trained in proper RF safety. Any work on the pole where the area is displayed as either Green or shows no color does not exceed hazardous exposure levels and requires no action to maintain a safe working environment.

RF Signage Recommendation

For the facility to be classified as Occupational/Controlled environment the following actions are recommended in accordance with the FCC's and Crown Castle's RF safety guidelines:

- Install NOTICE sign(s) near the bottom of the pole or on the shroud any time there is a zone near the antenna that exceeds the General Population limit. This sign should be mounted where it is easily visible to workers on the ground as they approach the pole. Recommend placing on pole about 7-9' above ground level (AGL).



- Install CAUTION sign(s) on or near the antenna(s) with the maximum Keep Back Distance of **6ft**. Keep Back distance must be filled in on the sign. This sign must be mounted on or just below the radiating antenna where it is visible to workers approaching the antenna in a lift or bucket truck. Recommend placing on pole at 28ft above ground level (AGL) where the vertical General Population Limit is no longer exceeded.



Calculation Methodology

MobileNet Services has performed theoretical modeling using RoofMaster™ developed by Waterford Consultants, LLC to predict the overall maximum permissible exposure (MPE) possible at any particular location given the spatial orientation and operating parameters of multiple RF sources. The input data for the calculations is based upon information provided by the client.

RoofMaster™ predictive models comprise of the Far Field model as specified in OET-65 as well as use of the OET-65 Cylindrical Model (Sula09). These models utilize several operational specifications for different types of antennas to produce a plot of spatially averaged power densities that can be conveyed as a percentage of the applicable exposure limit.

The power density in the Far Field of an RF source is described by OET-65 Equation (4) as the following equation:

$$S = \frac{EIRP}{4 \cdot \pi \cdot R^2} \text{ (mW/cm}^2\text{)},$$

where EIRP is the Effective Radiated Power relative to an isotropic antenna and R is the distance between the antenna and the point of study. At any location, the predicted power density in the Far Field is the spatial averaging of points within a 0-to-6-foot vertical space that a person would occupy.

The Near field power density is described by OET-65 Equation (20) is represented as the following equation:

$$S = \left(\frac{180}{\theta_{BW}} \right) \cdot \frac{100 \cdot P_{in}}{\pi \cdot R \cdot h} \text{ (mW/cm}^2\text{)},$$

where P_{in} is the power input to the antenna, h is the aperture length and θ_{BW} is the beam width of the antenna in degrees.

Conclusion

The proposed site will be **COMPLIANT** with the FCC guidelines limiting public exposure to RF energy. These limits apply for continuous exposures and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health. The RF exposure levels from the proposed site will be well below the maximum permissible levels and complies with Radiofrequency Radiation Exposure Limits of 47 C.F.R § 1.1307(b)(3) and 47 CFR § 1.1310.