



**APPLICATION FOR
SPECIAL PERMIT AND SITE PLAN APPROVAL
(Planning Board)
And
VARIANCES
(Zoning Board)
FOR
PERSONAL WIRELESS SERVICE FACILITY

SUPPLEMENT No. 1**

Applicant: Vertex Towers, LLC
Site Id: VT-MA-0019F
Property Address: 26 Martin Road, Buckland, MA 01338
Tax Assessors: 8-0-60 (facility)
8-0-60.1 (access)
Property Owner: Amos M. Franceschelli and Christopher Franceschelli
Date: May 13, 2022

1. Response to Letter from Buckland Planning Board dated April 21, 2022
2. Revised Project Narrative
3. Revised Affidavit of Site Acquisition Specialist
4. Revised Affidavit of RF Engineer and Revised and Supplemental RF Coverage Plots
5. Revised Site (RF) Emissions Report
6. Typical Verizon Wireless antenna and equipment specifications
7. Typical AT&T Wireless antenna and equipment specifications
8. Supplemental Site Plans

Respectfully submitted,

A handwritten signature in black ink, appearing to be "F. Parisi".

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May 13, 2022

Buckland Planning Board
17 State Street
Shelburne Falls, MA 01320

Buckland Zoning Board of Appeals
17 State Street
Shelburne Falls, MA 01320

RE: Application for Special Permit and Site Plan Approval (Planning Board)
and Variances (Zoning Board) for Personal Wireless Service Facility)

Applicant: Vertex Towers, LLC
Site Id: VT-MA-0019F
Property Address: 26 Martin Road, Buckland, MA 01338
Tax Assessors: 8-0-60 (facility)
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Property Owner: Amos M. Franceschelli and Christopher Franceschelli

Dear Members of the Planning Board and Zoning Board:

Reference is made to the letter of the Buckland Planning Board dated April 21, 2022 with respect to the above referenced Application.

The Applicant respectfully disagrees that the Planning Board has not received a complete application. Without waiving any rights to require the Planning Board or the Zoning Board to act timely pursuant to state and federal law, the Applicant responds as follows:

1. *Section 10-4 of the bylaw states, in part, "If feasible, personal wireless service facilities shall be located on pre-existing structures unless the applicant demonstrates that there are no feasible existing structures. ... The applicant shall have the burden of proving that there are no existing structures."*

The application at page 8 refers to an affidavit from a radio frequency engineer and a site acquisition specialist. In Section 8, the statement of Stephen Kelleher of Vertex Kelleher does not address existing structures, it states that of other candidates for cell towers, no other location is "superior." The affidavit of Jose Hernandez, a radio frequency engineer, states that a wireless transmission facility in the proposed area would help eliminate a gap in coverage and the proposed facility is the minimum height necessary. Neither affidavit demonstrates or proves, or even indicates there was a thought about, installing a structure on a potential existing structure. Please provide the demonstration or proof that there are not feasible existing structures on which to put a cell tower.

As was stated in the first Report of Stephen Kelleher:

5. Part of my site acquisition and development duties include identifying potential candidates within an area identified as having a significant gap in coverage. The candidate identification process includes reviewing the applicable zoning ordinance with legal counsel, engineers, wetland scientists, and other professionals to identify areas where the proposed Site is allowed and feasible. First, I explore the area to determine whether there are any existing structures of sufficient height and structural capacity from which an antenna installation on such a structure would provide sufficient coverage. If there are no such existing structures, I identify properties, located within the narrowly defined search area, that appear to be suitable for the installation of a communications facility, while also eliminating certain properties that would not be suitable due various limitations or concerns related but not limited to, parcel size, access issues, landlocked parcels, conservation restrictions, wetlands, visibility, elevation, terrain and constructability. In order to be viable, a candidate must (i) provide adequate coverage to the identified significant gap in coverage and (ii) have a willing landowner with whom commercially reasonable lease terms may be negotiated. Preference is given to locations that closely comply with local zoning ordinances, or in the event no viable candidates are found within the search area, I attempt to identify other potentially suitable properties, with preference always given to existing structures.

Attached to first Report of Stephen Kelleher is a map showing all existing wireless service facilities in the Town of Buckland and surrounding area (including a site in Ashfield, MA that was recently approved but has not yet been constructed).

As noted in the revised Report of Mr. Kelleher, “7. Based on my personal knowledge of the proposed Site and the surrounding area, there are no existing structures of sufficient height from which an antenna installation on such a structure would provide sufficient coverage.”

2. *Section 10-4 of the bylaw states that, “If the applicant has demonstrated that there are no feasible pre-existing structures to support personal wireless service facilities for the intended use, then all facilities shall be designed so as to be camouflaged to the greatest extent possible...”*

The application at page 8 and elsewhere states that there will be “only a minimal amount” of clearing, and vegetation will be preserved as much as possible. The proposed facility will be of non- reflective galvanized steel with internal cabling. Please define “only a minimal amount” and describe any other camouflaging that has been considered or planned, other than the non-reflective steel.

As is clearly shown on the Site Plans, the proposed Facility will be located on a 23 acre substantially undeveloped parcel, and consists of a 60' x 60' fenced in compound and some additional clearing to implement required erosion control measures. Including the access driveway, the length of which is required to meet setback requirements, avoid steep slopes and also get to a point on the property to get above area terrain to provide the requisite telecommunications signal to satisfy the gap in coverage, total tree clearing is only 52,030 square ft, which is 1.2 acres, or only approximately 5% of the total area of the property.

The word "camouflage" is not defined in the Bylaw; however, placing the tower on a 23 acre undeveloped and heavily vegetated lot set back substantially from abutting properties and public rights of way is certainly one form of camouflage. The typical cell tower is a "lattice" style design (similar to the towers recently built by Vertex in Colrain and Shutesbury), but given the town's desire for camouflage, the Applicant proposes building a "monopole" style tower with internal cabling, which many towns in Massachusetts have approved to address aesthetic concerns. The tower can be colored whatever color the Town desires, but having built many cell towers, the Applicant believes that a non-reflective galvanized steel color is the most visually unobtrusive color, and that any attempts to color it otherwise will just draw more attention to it. The Applicant also considered other alternative design elements that have been used in the past to "camouflage" cell towers (i.e. fake pine trees, fake palm trees, fake cactus trees, or putting signage around the antennas, etc.), but believes that such alternative designs would be inappropriate for this location.

3. *Section 10-5(a) states that, "The Applicant shall demonstrate that the proposed personal wireless service facility is the minimum height necessary to accommodate the transmitter receiver. "*

The application and affidavits repeatedly state that the tower has been designed to be the minimum height necessary to satisfy the coverage needs of multiple wireless carriers. While the Planning Board understands that the facility is designed to accommodate multiple carriers, the application does not demonstrate that the facility is the minimum height necessary. For example, Vertex provided the Ashfield Planning Board with maps showing potential coverage of the proposed tower at different heights. Buckland Planning Board would like to see similar maps provided for the proposed facility in Buckland, or other means to demonstrate that reduced heights would not fill the coverage gap.

Accompanying this Response is a coverage plot showing the anticipated coverage from the proposed Facility at lower heights (i.e 85' which would be the height of the antenna on a tower 10' above the height of average tree canopy, and 55' which would be the height of the lowest antennas on a 4 carrier facility).

4. *The applicant has requested a variance to allow a height to exceed 10 ft above the tree canopy as described in Section 10-5(a)2 of the bylaw. We expect the Zoning Board of Appeals would appreciate knowing the average tree canopy height in the direct vicinity of where the cell tower and access road will be placed as they evaluate this variance request.*

Included with this Response is Supplemental Plan Sheet SP-1 illustrating a tree canopy height mapping depicting tree canopy heights across the entire site and beyond. Additionally, civil engineers have taken a sampling of tree heights in the vicinity of the site, indicating an average tree height of 80', as noted on Supplemental Plan Sheet SP-1

5. *Section 10-6 covers Design Standards and states, "The installation of a personal wireless service facility shall be designed to minimize visual impact, the maximum amount of natural vegetation shall be preserved; details of construction and finish shall blend with the surroundings; additional vegetative screening shall be employed where practical and particularly to screen abutting residential property whether developed or not. Siting shall be such that the view of the personal wireless service facility from other areas of Town shall be as minimal as possible."*

Please describe further how the construction and finish will blend with the surroundings, and how the view from other areas of town is as minimal as possible.

As was stated in the Project Narrative and clearly shown on the Site Plans, the Facility will be amply set back from abutting properties and buffered by a dense stand of existing trees, and only a minimal amount of clearing will occur to facilitate construction so as to preserve natural vegetation as much as possible to reduce the visual impact of the Facility. The proposed Facility has been designed as a monopole style tower made of a non-reflective galvanized steel with internal cabling and will not require FAA lighting or marking, which will minimize the visual impact as much as possible.

As is noted in the Affidavit of Jose Hernandez, the Facility is necessary to close a significant gap in coverage, and the height of the Facility is the minimum height necessary to satisfy the coverage needs. As is noted in the Report of Stephen Kelleher, the proposed location is the only viable alternative to fill this gap in coverage. Given the gap in coverage, the need for the height to fill this gap and the lack of viable alternatives, siting of the Facility is such that the view of the Facility from other areas of Town will be as minimal as possible.

As is required by the Bylaw, the Applicant has agreed to conduct a visibility demonstration to show where the proposed Facility will be, and will not be, visible by engaging consultants to float a balloon at and to the height of the

proposed Facility. After the visibility demonstration, the Applicant's consultants will provide a map and photos showing where the balloon was and was not visible, along with photo simulations showing what the Facility will look like from those vantage points where it will be visible.

6. *10-8 states that, "Lighting should be limited to that needed for emergencies and/or as required by the FAA (Federal Aviation Administration)." "*

The application at page 14 states that the proposed Facility will not require FAA lighting or marking under current FAA regulations. Please clarify if any other lighting, such as that needed for emergencies, will be installed along the access road or at the base of the facility.

No permanent lighting will be installed along the access road or at the base of the Facility.

7. *Section 10-12 in the bylaw covers Environmental Standards. It states that excavation and clearing shall be performed in a manner that will maximize the preservation of natural beauty and conservation of natural resources.*

Though the application includes assurances to this effect, please describe excavation and clearing methods that are planned, soils on site, and how the methods are with the bylaw. Plan EC-1 shows that total earth disturbance is 55,550 square ft, which is 1.25 acres. Tree clearing is 52,030 square ft, which is 1.2 acres.

The path of the proposed access driveway up to the Facility follows a winding route that was designed to minimize the amount of disturbance to the greatest extent possible. The length of the driveway is also required to meet all setback requirements imposed by the Bylaw and also get to a point on the property to get above area terrain to provide the requisite telecommunications signal to satisfy the gap in coverage. Due to the steepness of slopes being traversed, a straight path to the Facility is not possible. As is shown on the Site Plans, proposed clearing and disturbance was held tightly to the limits of areas requiring grading and for erosion control. All driveway elevations were set to reduce as much as practicable the extent to which grading is required. The difference between tree clearing and total disturbance is due to some areas at the beginning of the proposed driveway do not have any trees to clear.

8. *10-15.2 (b) states that the applicant should submit, "A Survey of any and all sites for the installation of personal wire service facilities that are feasible for providing the intended services. "*

Section 8 of the application provides a list of 6 alternative sites. The statement from Stephen Kelleher in Section 8 says that no other site would be “superior.” Are there any other sites that would be sufficient to fill the gap in service? Is the list of 6 sites “any and all” potential sites? Were any town-owned sites considered? What facility heights and elevations were evaluated at these locations?

As was stated in the Report of Stephen Kelleher:

5. Part of my site acquisition and development duties include identifying potential candidates within an area identified as having a significant gap in coverage. The candidate identification process includes reviewing the applicable zoning ordinance with legal counsel, engineers, wetland scientists, and other professionals to identify areas where the proposed Site is allowed and feasible. First, I explore the area to determine whether there are any existing structures of sufficient height and structural capacity from which an antenna installation on such a structure would provide sufficient coverage. If there are no such existing structures, I identify properties, located within the narrowly defined search area, that appear to be suitable for the installation of a communications facility, while also eliminating certain properties that would not be suitable due various limitations or concerns related but not limited to, parcel size, access issues, landlocked parcels, conservation restrictions, wetlands, visibility, elevation, terrain and constructability. In order to be viable, a candidate must (i) provide adequate coverage to the identified significant gap in coverage and (ii) have a willing landowner with whom commercially reasonable lease terms may be negotiated. Preference is given to locations that closely comply with local zoning ordinances, or in the event no viable candidates are found within the search area, I attempt to identify other potentially suitable properties, with preference always given to existing structures.

As further clarification, Mr. Kelleher notes in his revised Report that “7. ...there are no other properties located within this geographically search area to construct a PWSF on, that would provide sufficient coverage to meet the coverage objective. Based on my experience and in my professional opinion, the proposed PWSF to be located on Martin Road is the least intrusive and only available and viable alternative to adequately meet the coverage objective and fill this gap in coverage.

9. *10-15.2(b) lists Filing Requirements.*

“(3) A line map to scale showing the lot lines of the subject property and all properties within 1000 feet and the location of all buildings, accessory structures identified by their proper location and use. This may be done on a reproduced copy of the appropriate Town Assessor's Maps.

(5) The proposed locations of all existing and future personal wireless service facilities in Buckland on a town wide map for this carrier.

(6) A locus map, utilizing the most recent U.S.G.S. topographic maps of the area, which shall show all streets, bodies of water, historic sites, habitats for endangered species within 1000 feet, and all buildings within 1000 feet.”

Please provide items (3) and (6) or provide statements as to why they are not necessary or applicable. For item (5) please provide any information that may be available currently about “future” facilities in Buckland.

Supplemental Site Plan Sheet SP-2 shows all lot lines of the subject parcel and properties within 1000 feet, utilizing USGS Topographic maps, as well as buildings from GIS and land uses per Town Assessment. Per Massachusetts State MASSMAPPER GIS, no areas of NHESP habitat (or estimated habitat) for rare species are present within 1000 feet of the locus parcels, nor are there any Historic sites, per GIS within 1000 feet as well. A note is included in Supplemental Site Plan SP-2 regarding these resources.

The Applicant provided a map (attached to the Report of Stephen Kelleher) showing all existing wireless service facilities in the Town of Buckland and surrounding area (including a site in Ashfield, MA that was recently approved but not yet constructed). The Applicant is not proposing and does not anticipate at time building any other wireless facilities in Buckland.

10. *Section 10-15.3 lists Siting Filing Requirements.*

“(8) Contours at each two feet AMSL for the subject property and adjacent properties within 300 feet.

(9) Tree cover on the subject property and adjacent properties within 300 feet, by dominant species and average height, as measured by or available from a verifiable source.

(10) All proposed changes to the existing property, including excavating, grading vegetation removal and temporary or permanent roads and driveways.”

*Please provide items (8), (9), and (10). In particular, the Planning Board needs additional detail on existing vegetation (measured by or available from a **verifiable source**) and proposed vegetation removal.*

Supplemental Plan Sheet SP-2 includes this information. Supplemental Plan Sheet SP-1 illustrates a tree canopy height mapping depicting canopy heights across the entire site and beyond, utilizing 'ATOLL' engineering software. In addition, the Notes on SP-1 indicate that a sampling of tree heights was taken in the vicinity of the site by a civil engineer indicating an average tree canopy height of 80'. All proposed changes to the existing property are shown on sheets A-2, And sheets P-1 through P-3 of the original submission.

11. *10-15.3(a) and (b) address Site Lines and photographs. The planning board is assuming that these orequivalent site lines and photographs will be provided after the balloon test is completed. If not, please provide these items.*

As is required by the Bylaw, the Applicant has agreed to conduct a visibility demonstration to show where the proposed Facility will be, and will not be, visible by engaging consultants to float a balloon at and to the height of the proposed Facility. After the visibility demonstration, the Applicant's consultants will provide a map and photos showing where the balloon was and was not visible, along with photo simulations showing what the Facility will look like from those vantage points where it will be visible.

12. *Section 10-15.4 of the bylaw lists design filing requirements.*
- "a) Equipment brochures for the proposed personal wireless service facility such as manufacturer's specifications or trade journal reprints shall be provided for the antennas, mounts, equipment shelters, cables as well as cable runs, and security barrier, if any.*
 - b) Materials of the proposed personal wireless service facility specified by generic type and specific treatment (e.g. anodized aluminum, stained wood, painted fiberglass, etc.). These shall be provided for antennas, mounts, equipment shelters, cables as well as cable runs, and security barrier, if any.*
 - c) Colors of the proposed personal wireless service facility represented by a color board showing actual colors proposed. Colors shall be provided for the antennas, mounts, equipment shelters, cables as well as cable runs, and security barrier, if any.*
 - d) Dimensions of the personal wireless service facility specified for all three directions: height, width and breadth. These shall be provided for the antennas, mounts, equipment shelters, and security barrier, if any.*
 - e) Appearance shown by at least two photographic superimpositions of the personal wireless service facility within the subject property. The photographic superimpositions shall be provided for the antennas, mounts, equipment shelters, cables as well as cable runs, and security barrier, if any, for the total height, width, and breadth.*
 - f) Landscape plan including existing trees and shrubs and those proposed to be added, identified by size of specimen at installation and species.*
 - g) If lighting of the site is proposed, the applicant shall submit a manufacturers computer*

generated point to point printout, indicating the horizontal foot-candle levels at grade, within the property to be developed and twenty-five (25) feet beyond the property lines. The printout shall indicate the locations and types of luminaries proposed.”

Please provide the information requested above. Items b) and d) have been only partially provided. For f), the Planning Board notes that the application at page 24 states that there is no landscape plan, however we still require a plan showing existing trees and shrubs. For item g), the Planning Board is requesting information on any other lighting than a light at the top, if planned.

Photographs and specifications sheets for a typical AT&T installation and a typical Verizon installation for both tower mounted antennas and equipment and ground equipment, including generators, are included with this response. This includes visual representation of typical coloring and manufacturer detail of dimensions and materials.

As indicated earlier, no permanent tower or ground lighting is proposed.

The Site Plans submitted with the original application contained an aerial photo of the property clearly showing the existing trees and shrubs as well as the substantial setbacks from abutting properties and rights of way. Existing tree cover and species is described on Supplemental Site Plan Sheet SP-1. Given the extensive existing vegetative buffer, no landscaping plan is required.

As is required by the Bylaw, the Applicant has agreed to conduct a visibility demonstration to show where the proposed Facility will be, and will not be, visible by engaging consultants to float a balloon at and to the height of the proposed Facility. After the visibility demonstration, the Applicant’s consultants will provide photos with photo simulations showing what the Facility will look like from the subject property.

13. *Section 5-2 of the Buckland Zoning Bylaw addresses setback requirements. Please indicate on a map the distance from the closest point of the proposed access road and proposed utility poles to the lot line in feet.*

Section 5-2 regulates the setback requirements of structures on the property. Utility poles and access drives are not subject to these setback requirements, and the compound and tower clearly required setbacks as shown on the Site Plan. However, the requested distances are shown on Supplemental Site Plan Sheet SP-2, detail 2 “Overall Topography Plan”.

The planning board found the following factually incorrect statements that should be corrected in a revised Application and before the Public Hearing

1. *In response to Section 10-11 of the bylaw, which covers Scenic Vistas and Roads, the application on page 15 erroneously states, "The proposed Facility will not be located within 300 ft of a scenic vista, scenic landscape, or scenic road as designated by the Town."*

The proposed cell tower will be located on a hillside or ridge that lies to the east of Clesson Brook valley. Within and across the Clesson Brook valley from the opposing hillside, the proposed tower will be viewable from numerous locations in town that are designated as scenic both by the state and town. Please amend page 15 of the application to acknowledge that the proposed cell tower will lie within a scenic vista and a scenic landscape in Buckland. The following paragraphs offer documentation, for your information only.

State Route 112 has been designated a Scenic Byway in Massachusetts. Please see <https://frcog.org/publication/route-112-scenic-byway-corridor-management-plan/> for more information on the designation. While the proposed cell tower location is not within 300 feet of the scenic roadway, it is within the landscape that makes Route 112 scenic.

The Buckland Open Space and Recreation Plan was recently updated and approved by the MA Department of Energy Resources in April of 2021. Table 4-7 in that report lists Significant Scenic/Ecological/Recreational & Historic Landscapes in Buckland. The following roads are listed as Scenic, and the proposed cell tower will be potentially viewable from the following town-designated scenic roads: Route 112/Ashfield Road, Depot Road, Purington Road, Charlemont Road, Orcutt Hill Road, and Clesson Brook Road (the latter will depend on how high the cell tower will poke above the ridgeline, if at all). Buckland Center, located on Upper Street, is listed as a potential historic district. In the maps section, Orcutt Hill Road is highlighted in particular as "Scenic." Please see

<https://www.town.buckland.ma.us/recreation-committee/news/open-space-recreation-plan-approved-doer> to view this plan.

The cell tower will be viewable from three properties in Buckland that are on the National Register of Historic Places -- the Griswold House on Old Upper Street, the Robert Strong Woodward House and Studio on Upper Street, and the Wilder on Route 112/Ashfield Road. Robert Strong Woodward, a New England landscape artist, painted numerous works from his property, many of which feature the hillside on which the cell tower is proposed. These paintings include "In the Winter Hills," "Out the Bedroom Window," "Spring Tapestry," and "Valley and Hill" in addition to several window pictures painted from within his house. These paintings are all viewable on the

Robert Strong Woodward website – click on “Gallery” and look in the themes called “Landscapes” and “Window Pictures.” Website: <https://robertstrongwoodward.com/> .¹

The Applicant respectfully disagrees that the proposed Facility will be located within 300 feet of a scenic vista, scenic landscape or scenic road as specifically designated by the Town (as it does not appear that this specific property has been specifically designated by the Town as part of a scenic vista or scenic landscape, and the proposed Facility is clearly more than 300 feet from Route 112). However, the Applicant notes that if the proposed Facility IS located within 300 feet of a scenic vista or scenic landscape that has been specifically designated by the Town, the Bylaw provides that the Facility shall not exceed the height of the vegetation at the proposed location, but that if it is NOT within 300 feet of a scenic vista or scenic landscape specifically designated by the Town, Section 10-5.a.2 of the Bylaw limits the height of the Facility to not more than 10’ above the average tree canopy, for which the Applicant has already applied for a Variance from the Zoning Board.

Applicant’s response in the Project Narrative to Section 10-11 has been revised accordingly.

- 2. The Application at page 32 implies that the town of Buckland is in the metropolitan Boston region. Please correct this error.*

Please note that this statement is technically correct in that the FCC licensing covering the Town of Buckland is specifically designated by the FCC as the “Boston-Providence MTA”. However, the sentence in the Project Narrative has been modified.

- 3. The Application at page 32 states that the property “is a large commercially used parcel abutting business and industrial zones.” Please correct this error.*

This typographical error has been corrected.

- 4. In the Section 9, in an Affidavit from the Radiofrequency Engineer, Jose Hernandez describes the proposed tower as a monopine. The rest of the document refers to the proposed structure as a monopole. Please clarify.*

The reference to a monopine is a typographical error and has been corrected.

- 5. In Section 9, there are two maps titled “RF Existing & Combined VT-MA-0012A Coverage Without VT-MA-0019F@-95dBm” and “RF Existing & Combined VT-MA-0012A Coverage With VT-MA- 0019F@-95dBm” that each show “existing” and “proposed” in the same yellow color, and so it is impossible to see the difference*

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between the two. The maps would be easier to read and interpret if the key had separate colors for each.

Attached please find the requested information.

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The Applicant respectfully requests that the Planning Board and the Zoning Board schedule public hearings on the Application at their earliest possible convenience in conformity with and as required by state and federal law.

Respectfully submitted,



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**APPLICATION FOR
SPECIAL PERMIT AND SITE PLAN APPROVAL
(Planning Board)
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VARIANCES
(Zoning Board)
FOR
PERSONAL WIRELESS SERVICE FACILITY**

Applicant: Vertex Towers, LLC
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Property Address: 26 Martin Road, Buckland, MA 01338
Tax Assessors: 8-0-60 (facility)
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Property Owner: Amos M. Franceschelli and Christopher Franceschelli
Date: March 24, 2022 (revised May 13, 2022)

PROJECT NARRATIVE

INTRODUCTION

The Applicant Vertex Towers, LLC, a Massachusetts limited liability company (“Vertex”) is a telecommunications infrastructure developer. Vertex develops, manages and owns telecommunications facilities in strategic locations across the country. The Vertex team has been working in the industry since the industry was founded and has the experience and expertise to navigate the challenges of the most complex markets.

Vertex is sometimes herein referred to as the “Applicant”.

The Applicant’s proposed Personal Wireless Service Facility (the Facility”) is shown on plans submitted with this Application (the “Plans”). The Applicant proposes to construct a 150’ tall monopole style tower (156’ to top of lightning rod) at 28 Martin Road, Buckland MA 01338 Tax Assessors Parcel: 8-0-60 (the “Property”) that will structurally accommodate at least 4 wireless broadband telecommunications carriers and associated antennas, electronic equipment and cabling; and fence in the base of the tower to accommodate ground based telecommunications equipment. As shown on the Plans that accompany this Application, various telecommunications companies, including AT&T Wireless, Verizon Wireless, T-Mobile / SprintPCS and other wireless communications companies will place panel style antennas and required electronic equipment at heights of approximately 145’, 135’, 125’ and 115’ (centerline) on the tower, and each will place telecommunications equipment and backup batteries inside equipment shelter(s) and/or weatherproof cabinets to be located immediately adjacent to the base of the tower. Power/telephone cabinets will be installed just outside the fenced in compound.

Project Narrative

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Applicant's Facility is similar to the other telecommunication facilities already located in the surrounding area and has been designed in accordance with the Town's Zoning Bylaw as much as possible.

The Property is a large, 23 acres substantially undeveloped parcel in the Rural Residential Zoning District. Access to the Facility will be from Martin Road over an abutting lot, Tax Assessors Parcel: 8-0-60.1, over which the owner of the Property and the Applicant have an easement.

The Applicant respectfully requests a SPECIAL PERMIT and SITE PLAN APPROVAL from the PLANNING BOARD with certain waivers as set forth herein.

In addition, in order to construct a Facility at the Property that gets above area topography and terrain to provide the requisite telecommunications coverage and also be the minimum height necessary to accommodate multiple wireless carriers to meet other requirements of the Bylaw, the Facility must be 150' in height. The Facility will be sited to minimize the visibility of the Facility as much as possible from adjacent properties and shall be suitably screened from abutters and public rights of way. The Facility will be amply set back from abutting properties and buffered by a dense stand of existing trees. Accordingly, the Applicant respectfully requests that the ZONING BOARD grant a VARIANCE from the requirement that the Facility not project higher than ten feet above the average tree canopy height as set forth in Section 10-5(a)2 of the Town's Zoning Bylaw governing Personal Wireless Services Facilities.

The Facility as designed will be more than 150' from designated wetlands and water bodies; however, the access driveway and utilities will be within 150' from designated wetlands, for which the Applicant intends to file a Notice of Intent with the Conservation Commission. In addition, in order to construct a Facility at the Property that gets above area topography and terrain to provide the requisite telecommunications coverage, the facility and access driveway will be less than 150' from a slope in excess of five (5) percent. Accordingly, given the gap in wireless telecommunications coverage and the lack of viable alternatives, the Applicant respectfully requests that the ZONING BOARD grant a VARIANCE from the requirement that the setback from wetlands and areas with a slope in excess of five (5) percent shall be at least one hundred and fifty (150) feet as set forth in Section 10-5(b)5 of the Town's Zoning Bylaw governing Personal Wireless Service Facilities.

As is indicated throughout this Project Narrative, the Applicant is a wireless infrastructure developer, but is not a "licensed carrier" as defined by Section 10.2 of the Town's Zoning Bylaw. Given changes in and the practical reality of the wireless infrastructure market and overriding provisions of the federal Telecommunications Act of 1996 as discussed herein, the Applicant requested a WAIVER of this Filing Requirement pursuant Section 10-21(b) at the Pre-Application conference. Because the Applicant does not intend to construct the Facility until it has a commitment from a duly licensed carrier, the Applicant would be willing to accept as a CONDITION for a Special Permit the following:

Project Narrative

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As an infrastructure developer, Applicant shall provide evidence of an executed lease for antenna space with at least one (1) duly licensed wireless carrier to the Buckland Planning Board and the regional Building Commissioner, prior to issuance of a building permit to construct the wireless service facility.

Accordingly, the Applicant requests that the PLANNING BOARD grant a WAIVER of the filing requirement of 10-15.1(c) that a licensed carrier shall either be an applicant or a co applicant. To the extent that the PLANNING BOARD does not believe that it can, or is unwilling to, grant this WAIVER, the APPLICANT respectfully requests that the ZONING BOARD grant a VARIANCE from this requirement.

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THE PROJECT

Wireless telecommunications carriers are in the process of independently designing, constructing and upgrading wireless telecommunications networks to serve areas in and around the Town of Buckland. Such a network requires a grid of radio transmitting and receiving cell sites located at varying distances depending on the location of existing and proposed installations in relation to the surrounding topography. The radio transmitting and receiving facilities require a path from the facility to the user on the ground. This requires the antennas to be located in a location above the tree line where the signal is not obstructed or degraded by buildings or topographical features.

Once constructed, the Facility will be unmanned and will involve only periodic maintenance visits. The only utilities required to operate the facility are electrical power as well as telephone service which are currently available at the property. The traffic generated by the facility will be one or two vehicle trips per month by maintenance and technical personnel to ensure the telecommunications site remains in good working order. These visits will not result in any material increase in traffic or disruption to patterns of access or egress that will cause congestion hazards or cause a substantial change in the established neighborhood character. The Applicant's maintenance personnel will make use of the access roads and parking to be constructed at the Property. The proposed Facility will not obstruct existing rights-of-way or pedestrian access and will not change the daily conditions of access, egress, traffic, congestion hazard, or character of the neighborhood. The installation will not require the addition of any new parking or loading spaces.

The construction of the Applicant's Facility will enhance service coverage in the Town of Buckland and surrounding communities. The enhancement of service coverage in the Town of Buckland is desirable to the public convenience for personal use of wireless services and for community safety in times of public crisis and natural disaster. Wireless communications service also provides a convenience to residents and is an attractive feature and service to businesses. In addition, the requested use at this location will not result in a change in the appearance of the surrounding neighborhoods. The use is passive in nature and will not generate any traffic, smoke, dust, heat, glare, discharge of noxious substances, nor will it pollute waterways or groundwater. Once constructed, the facility will comply with all applicable local, state and federal safety regulations.

Moreover and most importantly:

1. The proposed Facility will promote and conserve the convenience and general welfare of the inhabitants of Buckland by enhancing telecommunications services within the Town.
2. The proposed Facility will lessen the danger from fire and natural disasters by providing emergency communications in the event of such fires and natural disasters.

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3. The proposed Facility will preserve and increase the amenities of the Town by enhancing telecommunications services.

4. The proposed Facility will facilitate the adequate provision of transportation by improving mobile telecommunications for business, personal and emergency uses.

Wireless service is important to public safety and convenience. As of the end of 2016, there were an estimated 396 million mobile wireless subscribers in the United States. See FCC's *Twentieth Report to Congress on the State of Competition in the Commercial Mobile Radio Services Marketplace*, p. 5 (September 2017). There are now more wireless subscriptions than landline telephone subscriptions in the United States, and the number of landline telephone subscribers across the nation is declining each year while the number of wireless users increases. Moreover, it is forecasted that wireless connections will become more significant as network service providers facilitate increase connectivity directly between devices, sensors, monitors, etc., and their networks. *Id.*

For many Americans, wireless devices have become an indispensable replacement for traditional landline telephones. Even when Americans maintain both types of telephone service, Americans are opting increasingly to use wireless devices over their landline telephones. For Americans living in "wireless-only" homes and for those others while away from their homes, cell phones are often their only lifeline in emergencies. Over 95% of Americans now own a cellphone of some kind and more than 77% own smartphones; more importantly, more than 50 percent of American households are now "wireless only." <http://www.pewinternet.org/fact-sheet/mobile/> The FCC estimates that approximately 70% of the millions of 911 calls made daily are placed from cell phones, and that percentage is growing. See <http://www.fcc.gov/guides/wireless-911-services>

COMPLIANCE WITH SITING CRITERIA
FOR PERSONAL WIRELESS SERVICE FACILITIES

SECTION X: BYLAW FOR PERSONAL WIRELESS SERVICE FACILITIES IN BUCKLAND, MA

10-1 STATEMENT OF PURPOSE

Personal wireless service facilities are subject to the following conditions to minimize their adverse visual and environmental impacts, to avoid damage to adjacent properties, to lessen impacts on surrounding properties, to lessen traffic impacts, to minimize the installation of towers and to reduce the number of towers constructed. The regulation of personal wireless service facilities is consistent with the purpose of the Buckland Zoning Bylaw and planning efforts at the local government level to further the conservation and preservation of developed, natural and undeveloped areas, wildlife, flora and habitats for endangered species: protection of the natural resources of Buckland: enhancement of open space areas and respect for Buckland's rural character.

The proposed Facility has been designed to fulfill the purpose and intent goals of the Town's Bylaw as much as possible. The location of the proposed Facility is on a large (23 acre) substantially undeveloped and heavily treed lot. There are no other structures of sufficient height anywhere near the Property which would provide the requisite telecommunications coverage. As a wireless infrastructure developer, Vertex encourages co-location and has relationships with all of the existing wireless telecommunications carriers licensed in this market and intends to provide space on the proposed Facility at commercially reasonable rates, which will minimize the total number of towers in the community. Once constructed, the proposed Facility will have no adverse impact on the Town's scenic and historic assets, safety, health, environment, general welfare, values and quality of life, and will facilitate the provision of telecommunications services throughout the municipality and enhance the ability of wireless carriers to provide telecommunications services to the community quickly, effectively and efficiently.

10-2 DEFINITIONS

Intentionally omitted

10-3 REGULATIONS GOVERNING PERSONAL WIRELESS SERVICE FACILITIES

a) No personal wireless service facility shall be placed, constructed or modified within the Town without first obtaining site plan approval from the Special Permit Granting Authority (SPGA). The Planning Board shall be the Special Permit Granting Authority for the issuance of a special permit to allow the placement, construction and modification of personal wireless service facilities within the town.

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The Applicant has applied for, and respectfully requests the Planning Board, grant a SPECIAL PERMIT and SITE PLAN APPROVAL for the proposed Facility.

b) The carrier must demonstrate that the facility is necessary in order to provide adequate service to the public.

Accompanying this Application is an Affidavit from a Radio Frequency Engineer and existing coverage plots demonstrating that there is gap in service coverage as well as a Report from a Site Acquisition Specialist demonstrating that there is no viable alternative structure with sufficient height or structural integrity to satisfy the coverage objective.

c) A personal wireless service facility may locate as of right on any existing monopole or electric utility transmission tower for which a special permit issued under this Bylaw is in effect, provided that the new facility shall first obtain site plan approval from the Planning Board and, provided further, that any new facility shall not exceed the terms and conditions of the special permit in effect for the existing facility on which it is to be located.

Not applicable.

d) Amateur radio towers used in accordance with the terms of any amateur radio service license issued by the Federal Communication Commission, are exempt from the provisions of this Bylaw provided that (1) the tower is not used or licensed for any commercial purpose; and (2) the tower must be removed upon loss or termination of said FCC license.

Not applicable.

10-4 LOCATION

The personal wireless service facility and its appurtenances shall be located in accordance with the Federal Communications Commission (FCC) and the Federal Aviation Administration (FAA) regulations in effect at the time of construction, and the operation of the communication structure, building and its appurtenances shall comply with all requirements of these agencies.

The Facility has been designed to be, and when constructed will be, compliant with applicable regulations of the FCC and FAA.

All permits for a personal wireless service shall comply with the following:

If feasible, personal wireless service facilities shall be located on pre existing structures unless the

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applicant demonstrates that there are no feasible pre existing structures. The installation shall preserve the character and integrity of such pre existing structures. The applicant shall have the burden of proving that there are no feasible existing structures upon which to locate.

Accompanying this Application is an Affidavit from a Radio Frequency Engineer and existing coverage plots demonstrating that there is gap in service coverage as well as a Report from a Site Acquisition Specialist demonstrating that there is no viable alternative structure with sufficient height or structural integrity to satisfy the coverage objective.

If the applicant has demonstrated that there are no feasible pre existing structures to support personal wireless service facilities for the intended use, then all facilities shall be designed so as to be camouflaged to the greatest extent possible, including but not limited to: use of compatible building materials and colors, screening, landscaping and placement within trees.

The Property on which the Facility will be located is a large, substantially undeveloped parcel with substantial tree growth and natural vegetative buffer, and the Facility will be amply set back from abutting properties and public rights of way. Only a minimal amount of clearing to facility construction will occur, therefore preserving the natural vegetation as much as possible. The proposed Facility has been designed as a monopole style tower made of a non-reflective galvanized steel with internal cabling, all of which will camouflage the Facility to the greatest extent possible.

If the applicant has demonstrated that there are no feasible pre existing structures to support personal wireless service facilities for the intended use, then any personal wireless service facility shall:

To the extent feasible, share facilities and sites with other carriers. Shared use of personal wireless service facilities is preferred. However, when technically not practical, all towers shall be separated on the site so that, if the support structure falls, it will not strike another.

As a wireless infrastructure developer, Vertex encourages co-location and has relationships with all of the existing wireless telecommunications carriers licensed in this market and intends to provide space on the proposed Facility at commercially reasonable rates, which will minimize the total number of towers in the community. Moreover, the tower has been designed to be the minimum height necessary to satisfy the coverage needs of multiple wireless carriers.

Be designed to structurally accommodate the maximum number of foreseeable users technically practicable.

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The Facility as proposed has been designed with the height and structural integrity and ground space to accommodate at least 4 wireless broadband telecommunications carriers and associated antennas, electronic equipment and cabling.

10-5 DIMENSIONAL REQUIREMENTS

Personal wireless service facilities shall comply with the following requirements:

a) Height

The Applicant shall demonstrate that the proposed personal wireless service facility is the minimum height necessary to accommodate transmitter receiver.

Accompanying this Application is an Affidavit of RF engineer indicating that the Facility as proposed has been designed to be the minimum height necessary to satisfy the coverage needs of multiple wireless carriers.

1. General. Regardless of the type of mount, personal wireless service facilities shall be no higher than ten feet above the average height of buildings within 300 feet of the facility, and in no instance will the total height of personal wireless service facilities be above 150 feet, measured from ground level (AGL), unless the facility is completely camouflaged such as within a flagpole, steeple, chimney, or similar structure, and has been granted special approval by the SPGA.

The proposed Facility will not exceed 150' in height.

2. Ground Mounted Facilities. Ground mounted personal wireless service facilities shall not project higher than ten feet above the average height of buildings within 300 feet of the proposed facility, or, if there are no buildings within 300 feet, these facilities shall not project higher than ten feet above the average tree canopy height, measured from ground level (AGL). If there are no buildings within 300 feet of the proposed site of the facility, all ground mounted personal wireless service facilities shall be surrounded by dense tree growth to screen views of the facility in all directions. These trees may exist on the subject property or planted on site. Monopoles are the preferred type of mount for taller personal wireless service facilities.

There are no buildings within 300 of the proposed Facility. However, in order to construct a Facility at the Property that gets above area topography and terrain to provide the requisite telecommunications coverage and also be the minimum height necessary to accommodate multiple wireless carriers to meet other requirements of the Bylaw, the Facility must be 150' in height. The Facility will be sited to minimize the visibility of the Facility as much as possible from adjacent properties and shall be suitably screened from abutters and public rights of way. The Facility will be amply set back from abutting properties and buffered by a dense stand of

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existing trees. Accordingly, the Applicant respectfully requests that the Zoning Board grant a VARIANCE from the requirement that the Facility not project higher than ten feet above the average tree canopy height.

The proposed facility will be a Monopole-style tower.

3. Side and Roof Mounted Facilities. Side and roof mounted personal wireless service facilities shall not project more than ten feet above the height of an existing building. Personal wireless service facilities may be located on a building that is legally non conforming with respect to height, provided that the facilities do not project above the existing building height.

Not applicable.

4. Existing Structures. New antennas located on any of the following structures existing on the effective date of this bylaw shall be exempt from the height restrictions of this bylaw: Water towers, guyed towers, lattice towers, fire towers and monopoles. Any increase in height of the existing structure must be subject to SPGA approval.

Not applicable.

5. Existing Structures (Utility). New antennas located on any of the following structures existing on the effective date of this bylaw shall be exempt from the height restrictions of this bylaw:

Electric transmission and distribution towers, telephone poles and similar existing utility structures. This exemption shall not apply within the public water and sewer district, historic districts, within 150 feet of the right of way of any scenic roadway, or in designated scenic view sheds. Any increase in height of the existing structure must be subject to SPGA approval.

Not applicable.

b) Setbacks

1. Minimum distance from the perimeter of the Communication Structure to any property line, road, habitable dwelling, business or institutional use, or public recreational area shall be the height of the structure plus 10 ft. This setback is considered a "fall zone".

The Facility as designed will meet all required setbacks of this section.

2. Minimum distance from any guy wire, anchor, or brace to any property line, road, habitable dwelling, business or institutional use, or public recreational area shall be the length of the guy

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wire, anchor, or brace plus 10 ft.

The Facility as designed will meet all required setbacks of this section.

3. Setbacks for a communication building shall comply with the set back requirements of the zoning district.

The Facility as designed will meet all required setbacks of the RR Zoning District.

4. In the event that an existing structure is proposed as a mount for a personal wireless service facility, a fall zone shall not be required, but the setback provisions of the zoning district shall apply. In the case of pre existing non conforming structures, personal wireless service facilities and their equipment shelters shall not increase any non conformities, except as provided in section (e) below.

Not applicable.

5. Setback from designated wetlands, water bodies and areas with a slope in excess of five (5) percent shall be at least one hundred and fifty (150) feet, unless the personal wireless service facility is located on a pre existing structure.

The Facility as designed will be more than 150' from designated wetlands and water bodies; however, the access driveway and utilities will be within 150' from designated wetlands, for which the Applicant intends to file a Notice of Intent with the Conservation. In addition, in order to construct a Facility at the Property that gets above area topography and terrain to provide the requisite telecommunications coverage, the facility and access driveway will be less than 150' from a slope in excess of five (5) percent.

Accordingly, given the gap in wireless telecommunications coverage and the lack of viable alternatives, the Applicant respectfully requests that the Zoning Board grant a VARIANCE from the requirement that the setback from wetlands and areas with a slope in excess of five (5) percent shall be at least one hundred and fifty (150) feet as set forth in Section 10-5(b)5.

6. In reviewing a special permit application for a personal wireless service facility, the SPGA (SPGA) may reduce the required fall zone and/or setback distance of the zoning district by as much as 50% of the required distance, if it finds that a substantially better design will result from such reduction. In making such a finding, the SPGA shall consider both the visual and safety impacts of the proposed use.

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The Facility as designed will meet all “fall zone” and/or setback distances of the RR Zoning District.

7. New personal wireless service facilities shall be considered only upon a finding by the SPGA that existing or approved facilities cannot accommodate the new proposed facility.

The Applicant respectfully requests a finding by the Planning Board that that existing or approved facilities cannot accommodate the new proposed facility.

10-6 DESIGN STANDARDS

The installation of a personal wireless service facility shall be designed to minimize visual impact, the maximum amount of natural vegetation shall be preserved; details of construction and finish shall blend with the surroundings; additional vegetative screening shall be employed where practical and particularly to screen abutting residential property whether developed or not. Siting shall be such that the view of the personal wireless service facility from other areas of Town shall be as minimal as possible.

The Facility has been designed to minimize the visual impact as much as possible, given the coverage objective and other technical requirements and limitations. The Facility will be sited to minimize the visibility of the Facility as much as possible from adjacent properties and shall be suitably screened from abutters and public rights of way. The Facility will be amply set back from abutting properties and buffered by a dense stand of existing trees, and only a minimal amount of clearing will occur to facilitate construction so as to preserve natural vegetation as much as possible to reduce the visual impact of the Facility. The proposed Facility has been designed as a monopole style tower made of a non-reflective galvanized steel with internal cabling and will not require FAA lighting or marking, which will minimize the visual impact as much as possible.

10-6.1 FENCING

Fencing shall be provided to control access to the base of the personal wireless service facility, all fencing shall be compatible with the scenic character of the Town and shall not be of barbed wire or razor wire.

As proposed the Facility will be surrounded by a six foot fence with barbed wire to impede unauthorized access. The Facility will be sited to minimize the visibility of the Facility as much as possible from adjacent properties and shall be suitably screened from abutters and public rights of way. Given the remote nature of the location and the fact that the Facility is unmanned and visited only infrequently, the Applicant respectfully requests a WAIVER of the restriction against barbed wire if possible.

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10-6.2 CAMOUFLAGE BY EXISTING BUILDINGS OR STRUCTURES:

Personal wireless service facilities shall be camouflaged as follows:

a) When a personal wireless service facility extends above the roof line of a building on which it is mounted, every effort shall be made to conceal the facility within or behind existing architectural features to limit its visibility. Facilities mounted on a roof shall be stepped back from the front facade in order to limit their impact on the building's silhouette.

Not applicable.

b) Personal wireless service facilities which are side mounted shall blend with the existing building's architecture and, if over 5 square feet, shall be painted or shielded with material which is consistent with the design features and materials of the building.

Not applicable.

10-6.3 CAMOUFLAGE BY VEGETATION

If personal wireless service facilities are not camouflaged from public viewing by existing buildings or structures, they shall be surrounded by buffers of dense tree growth and under story vegetation in all directions to create an effective year round visual buffer. Ground mounted personal wireless service facilities shall provide a vegetated buffer of sufficient height and depth to effectively screen the facility. The maximum amount of natural vegetation should be preserved. Trees and vegetation utilized for this purpose should be natural to the area and may be existing on the subject property, or installed as part of the proposed facility or a combination of both. The SPGA shall determine the types of trees and plant materials and the depth of the needed buffer based on-site conditions. If the facility must be painted to further blend into the surroundings then colors must be approved by the SPGA.

The Property on which the Facility will be located is a large, undeveloped parcel with a substantial tree growth and natural vegetative buffer, and the Facility will be amply set back from abutting properties and public rights of way. Only a minimal amount of clearing to facility construction will occur, therefore preserving the natural vegetation as much as possible. The proposed Facility has been designed as a monopole style tower made of a non-reflective galvanized steel with internal cabling and will not require FAA lighting or marking, which will minimize the visual impact of the Facility as much as possible.

10-7 EQUIPMENT SHELTERS

a) Equipment shelters shall be limited to one (1) structure per use per tower, but shall not exceed ten (10) structures per tower. If more than one (1) use, the accessory buildings shall be connected by a common wall. Each structure shall not exceed four hundred (400) square feet in size and ten (10) feet in height, shall be of the same design and color, and shall be designed consistent with one of the

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following design standards:

- 1. Equipment shelters must be located in underground vaults;**
- 2. Equipment shelters must be designed consistent with traditional materials, color and design of the area: or**
- 3. Equipment shelters must be camouflaged behind an effective year-round landscape buffer, equal to the height of the proposed building, and/or wooden fence acceptable to the permitting authority.**

All equipment shelters, if any, will be inside the fenced in compound, which will be setback substantially from all abutting properties and public rights of way and therefore camouflaged behind an effective year-round landscape buffer well in excess of the height of the equipment shelter.

10-8 SIGNAGE AND LIGHTING

a) Signs will be limited to those needed to identify the property, the owner, to warn of any danger and to provide a phone number where the licensed carrier can be reached on a twenty-four (24) hour basis. All signs shall be in conformance with the sign requirements of this Bylaw and shall be subject to the approval of the SPGA.

All signs will be limited to those needed to identify the property, the owner, to warn of any danger and to provide a phone number where the Facility owner can be reached on a twenty-four (24) hour basis, and will be in conformance with the sign requirements of this Bylaw.

b) Personal wireless service facilities shall be lighted only if required by the Federal Aviation Administration (FAA). Lighting shall be limited to that needed for emergencies and /or as required by the FAA. Such lighting shall then be directed inward, and shielded so as to not project onto surrounding properties. There shall be total cutoff of all light at the property lines of the parcel to be developed, and foot-candle measurements at the property line shall be 0.0 initial foot-candles when measured at grade.

Accompanying this Application is a FCC TOWAR database search indicating that the proposed Facility will not require FAA lighting or marking under current FAA regulations.

10-9 ROADS AND PARKING

a) Access shall be provided to a site by a roadway which respects the natural terrain, does not appear as a scar on the landscape, and is approved by the SPGA and the Fire Chief to assure emergency access

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at all times. Designs must minimize erosion, construction on unstable soils and steep slopes.

The driveway has been designed to respect the natural terrain as much as possible and will not appear as a “scar on the landscape” from abutting properties or public rights of way, and has been designed to assure emergency access and minimize erosion.

b) There shall be a minimum of one (1) parking space and a maximum of two (2) parking spaces for each personal wireless service facility, to be used in connection with the maintenance of the personal wireless service facility and the site, and not to be used for the permanent storage of vehicles.

The proposed Facility will have one parking space to be used in connection with the maintenance of the personal wireless service facility and the site, and will not be used for the permanent storage of vehicles.

10-10 HISTORIC BUILDINGS

a) Any construction on or near historic buildings is subject to Planning Board approval.

The proposed Facility will not be on or near any historic buildings.

b) Any personal wireless service facilities located on or within a historic structure shall not alter the character-defining features, distinctive construction methods, or original historic materials of the building.

Not applicable.

c) Any alteration made to a historic structure to accommodate a personal wireless service facility shall be fully reversible.

Not applicable.

10-11 SCENIC ROADS AND VISTAS

a) Any personal wireless service facility that is located within 300 feet of a scenic vista, scenic landscape or scenic road as designated by the town shall not exceed the height of vegetation at the proposed location. If the facility is located farther than 300 feet from the scenic vista, scenic landscape or scenic road, the height regulations described elsewhere in this bylaw will apply.

The Applicant does not believe that the proposed Facility will be located within 300 feet of a scenic vista, scenic landscape or scenic road as specifically designated by the Town (as it does not appear that this specific property has been specifically designated by the Town as part of a scenic vista or scenic landscape, and the proposed Facility is clearly more than 300 feet from

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Route 112). However, the Applicant notes that if the proposed Facility IS located within 300 feet of a scenic vista or scenic landscape that has been specifically designated by the Town, the Bylaw provides that the Facility shall not exceed the height of the vegetation at the proposed location, but that if it is NOT within 300 feet of a scenic vista or scenic landscape specifically designated by the Town, Section 5.a.2 of the Bylaw limits the height of the Facility to not more than 10' above the average tree canopy, for which the Applicant has already applied for a Variance from the Zoning Board.

10-12 ENVIRONMENTAL STANDARDS

a) Any excavation or clearing of vegetation shall be performed in a manner that will maximize preservation of natural beauty and conservation of natural resources. Such work shall also minimize disruption of the landscape, silting of streams, and shall also be subject to the following:

The Property on which the Facility will be located is a large undeveloped parcel, and only a minimal amount of natural vegetation will be removed to facilitate construction of the Facility thereby maximizing preservation of natural beauty and conservation of natural resources and minimizing disruption of the landscape and silting of streams.

1. The time and method of clearing rights of way should take into account soil stability, the protection of natural vegetation, the protection of adjacent resources, such as the protection of natural habitat for wildlife, and appropriate measures for the prevention of silt deposition in water courses.

The Property on which the Facility will be located is a large undeveloped parcel, and only a minimal amount of natural vegetation will be removed to facilitate construction of the Facility thereby maximizing preservation of natural habitats for wildlife. As shown in the Site Plans, there have been substantial measures taken to prevent erosion and silt deposition in water courses.

2. Clearing of natural vegetation should be limited to that material which poses a hazard to the personal wireless service facility.

Clearing of natural vegetation will be limited to that facilitating construction of the Facility and material which poses a hazard to the Facility.

3. The use of "brush blades" instead of dirt blades on bulldozers is recommended in clearing operations where such use will preserve the cover crop of grass, low growing brush, or other vegetation.

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The use of "brush blades" instead of dirt blades on bulldozers will be used as much as possible or reasonably practicable.

4. Areas should be cleared only when necessary to the operation, maintenance and construction of the personal wireless service facility.

Clearing of natural vegetation will be limited to that facilitating construction of the Facility and material which poses a hazard to the Facility.

5. The cost of any actions necessary to repair environmental damage caused by clearing for, construction of, or operation of these facilities will be borne by the applicant.

The Applicant does not believe that the clearing for, construction of, or operation of the Facility will cause any environmental damage.

6. Any excavations of more than one (1) yard in depth shall be clearly shown on all site plans.

The Site Plans delineate all excavation areas. Following the grant of a Special Permit and Site Plan Approval but the Planning Board, the Applicant will do further subsurface geotechnical analysis and its engineers will then design a foundation appropriate for the specific location of the Facility, and will provide a detailed foundation design to the Building Inspector along with an application building permit for the Facility.

b) There shall be no cutting, clearing or removal of vegetation from any route of access for a wire or cable which has been located up the side of a mountain, hill or summit on which a new or pre existing personal wireless service facility is located. Any such cable or wire from the base of the natural topographical feature up to the vicinity of the personal wireless service facility shall be strung from tree to tree or from wooden pole to wooden pole at a height of at least ten (10) feet above the ground.

As shown in the Site Plans, the utilities serving the proposed Facility will commence on the existing utility run servicing the Property, and will then extend overhead along the proposed access driveway.

c) No hazardous waste shall be discharged on the site of any personal wireless service facility. If any hazardous materials are to be used on site, there shall be provisions for full containment of such materials. An enclosed containment area shall be provided with a sealed floor, designed to contain at least 110% of the volume of the hazardous materials stored or used on the site.

No hazardous waste shall be discharged on site, and no hazardous materials will be used on site.

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d) Storm water run off shall be contained on site.

Given the extensive setbacks and vegetative buffers and extensive stormwater management details incorporated into the Site Plans, all storm water runoff will be contained on site.

e) Ground mounted equipment for personal wireless service facilities shall not generate noise in excess of 50 db at the property line.

No equipment utilized at the site will generate noise in excess of 50 db at the property line.

f) Roof mounted or side mounted equipment for personal wireless service facilities shall not generate noise in excess of 50 db at ground level at the base of the building closest to the antenna.

Not applicable.

10-13 SAFETY STANDARDS, RADIO FREQUENCY RADIATION (RFR) STANDARDS

Radio frequency Radiation (RFR) Standards. All equipment proposed for a personal wireless service facility shall be authorized per the most recent revision of "FCC Guidelines for Evaluating the Environmental Effects of Radio frequency Radiation" (FCC Guidelines), or any other applicable FCC Guidelines and regulations.

All equipment that will be used at the Facility will be compliance with all applicable FCC regulations.

10-14 APPLICATION PROCEDURES

10-14.1 SPECIAL PERMIT GRANTING AUTHORITY (SPGA)

The Special Permit Granting Authority (SPGA) for personal wireless service facilities shall be the Planning Board.

The Applicant has applied for and respectfully requests that the Planning Board grant a Special Permit for the Facility as proposed.

10-14.2 PRE-APPLICATION CONFERENCE

Prior to the submission of an application for a Special Permit under this regulation, the applicant is strongly encouraged to meet with the SPGA at a public meeting to discuss the proposed personal wireless service facility in general terms and to clarify the filing requirements.

The applicant is also encouraged to prepare sufficient preliminary architectural and/or engineering drawings to inform the SPGA of the scale and overall design of the proposed facility.

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As encouraged, the Applicant met with the Planning Board at its public meeting on February 10, 2022.

10-14.3 PRE-APPLICATION FILING REQUIREMENTS

The purpose of the conference is to inform the SPFA as to the nature of the proposed personal wireless service facility. As such, no formal filings are required for the pre-application conference. However, the applicant is encouraged to prepare sufficient preliminary architectural and /or engineering drawings to inform the SPGA of the location of the proposed facility, as well as its scale and overall design.

At the pre-application meeting on February 10, 2022, the Applicant provided the Planning Board with draft site plans showing the location, scale and design of the proposed Facility.

10-15 APPLICATION FILING REQUIREMENTS

The following shall be included with an application for a Special Permit for all personal wireless service facilities:

10-15.1 GENERAL FILING REQUIREMENTS

a) Name, address and telephone number of applicant and any co applicants as well as any agents for the applicant or co applicants.

b) Co applicants may include the landowner of the subject property, licensed carriers and tenants for the personal wireless service facility.

c) A licensed carrier shall either be an applicant or a co applicant.

d) Original signatures for the applicant and all co applicants applying for the Special Permit. If the applicant or co applicant will be represented by an agent, original signature authorizing the agent to represent the applicant and/or co applicant. Photo reproductions of signatures will not be accepted.

The Applicant has provided all of the required information. As is indicated throughout this Project Narrative, the Applicant is a wireless infrastructure developer, but is not a "licensed carrier" as defined by Section 10.2. Given changes in and the practical reality of the wireless infrastructure market and overriding provisions of the federal Telecommunications Act of 1996 as discussed herein, the Applicant requested a WAIVER of this Filing Requirement pursuant Section 10-21(b) at the Pre-Application conference.

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Because the Applicant does not intend to construct the Facility until it has a commitment from a duly licensed carrier, the Applicant would be willing to accept as a CONDITION for a Special Permit the following:

As an infrastructure developer, Applicant shall provide evidence of an executed lease for antenna space with at least one (1) duly licensed wireless carrier to the Buckland Planning Board and the regional Building Commissioner, prior to issuance of a building permit to construct the wireless service facility.

The Applicant requests that the PLANNING BOARD grant a WAIVER of the filing requirement of 10-15.1(c) that a licensed carrier shall either be an applicant or a co applicant. To the extent that the PLANNING BOARD does not believe that it can, or is unwilling to, grant this WAIVER, the APPLICANT respectfully requests that the ZONING BOARD grant a VARIANCE from this requirement.

10-15.2 FILING REQUIREMENTS

The applicant shall submit the following written information to the SPGA:

a) A survey of all existing structures that are capable of supporting the equipment necessary to provide the intended service and a technical report that demonstrates why any such structure cannot be used by the applicant.

Accompanying this Application is a Report of Site Acquisition Specialist with the required information.

b) A survey of any and all sites for the installation of personal wireless service facilities that are feasible for providing the intended services. The survey shall include a rationale for the selection of a prime and at least one alternate site. All sites in the Town of Buckland shall be located on the appropriate copy of the Buckland Assessor's Maps.

1. Identify the subject property by including the Town as well as the name of the locality, name of the nearest road or roads, and street address, if any.

2. Tax map and parcel number of subject property.

3. A line map to scale showing the lot lines of the subject property and all properties within 1000 feet and the location of all buildings, accessory structures identified by their proper location and use. This may be done on a reproduced copy of the appropriate Town Assessor's Maps.

4. A town wide map showing the other existing personal wireless service facilities in the town of

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Buckland as well as within one mile of its corporate limits.

5. The proposed locations of all existing and future personal wireless service facilities in Buckland on a town wide map for this carrier.

6. A locus map, utilizing the most recent U.S.G.S. topographic maps of the area, which shall show all streets, bodies of water, historic sites, habitats for endangered species within 1000 feet, and all buildings within 1000 feet.

Accompanying this Application are Reports and Site Plans with the requested information.

10-15.3 SITING FILING REQUIREMENTS

A site plan prepared by a registered professional engineer at a scale of 1:40 which will show the following:

- 1. Property lines for the subject property.**
- 2. Property lines of all properties adjacent to the subject property within 300 feet.**
- 3. Outline of all existing buildings, including purpose (e.g. residential buildings, garages, accessory structures, etc.) on subject property and all adjacent properties within 300 feet**
- 4. Proposed location of antenna, mount and equipment shelter.**
- 5. Location of all roads, public and private, on the subject property and on all properties within 300 feet including driveways proposed to serve the personal wireless service facility.**
- 6. Proposed security barrier, indicating type and extent as well as point of controlled entry.**
- 7. Distances, at grade, from the proposed personal wireless service facility to each building on the vicinity plan.**
- 8. Contours at each two feet AMSL for the subject property and adjacent properties within 300 feet.**
- 9. Tree cover on the subject property and adjacent properties within 300 feet, by dominant species and average height, as measured by or available from a verifiable source.**
- 10. All proposed changes to the existing property, including excavating, grading vegetation removal and temporary or permanent roads and driveways.**

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11. Representations, dimensional and to scale, of the proposed mount, antennas, equipment shelters, cable runs, parking areas and any other construction or development attendant to the personal wireless service facility.

12. Lines representing the sight line showing viewpoint (point from which view is taken) and visible point (point being viewed) from "Site Lines" sub section below.

a) Site Lines and photographs as described below:

1. Sight line representation. A site line representation shall be drawn from that portion of any public road within 300 feet that would have the clearest view of the proposed facility, and the closest facade of each residential building (viewpoint) within 300 feet to the highest point (visible point) of the personal wireless service facility. Each sight line shall be depicted in profile, drawn at one inch equals 40 feet. the profiles shall show all intervening trees and buildings. In the event there is only one (or more) residential building within 300 feet there shall be at least two Site Lines from the closest habitable structures or public roads, if any.

2. Existing (before condition) photographs. Each sight line shall be illustrated by one four inch by six inch color photograph of what can currently be seen from any public road within 300 feet.

3. Proposed (after condition). Each of the existing condition photographs shall have the proposed personal wireless service facility superimposed on it to show what will be seen from public roads if the proposed personal wireless service facility is built.

b) Siting elevations, or views at grade from the north, south, east, and west for a 50 foot radius around the proposed personal wireless service facility plus from all existing public and private roads that serve the subject property. Elevations shall be at either one quarter inch equals one foot or one eighth inch equals one-foot scale and show the following:

1. Antennas, mounts and equipment shelter(s), with total elevation dimensions and AGL of the highest point.

2. Security barrier. If the security barrier will block views of the personal wireless service facility, the barrier drawing shall be cut away to show the view behind the barrier.

3. Any and all structures on the subject property.

4. Existing trees and shrubs at current height and proposed trees and shrubs at proposed height at time of installation, with approximate elevations dimensional.

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5. Grade changes, or cuts and fills, to be shown as original grade and new grade line, with two foot contours above mean sea level.

Accompanying this Application are Site Plans showing all of the Information required by Sections 1-11 above as well as site line profiles. With respect to the photographs required by Section 12 above, the Applicant will float a balloon pursuant to Section 10-15.4(h) and thereafter submit photographs showing the visibility, and lack of visibility of the proposed Facility from several vantage points, along with photo simulations showing the proposed Facility.

10-15.4 DESIGN FILING REQUIREMENTS

a) Equipment brochures for the proposed personal wireless service facility such as manufacturer's specifications or trade journal reprints shall be provided for the antennas, mounts, equipment shelters, cables as well as cable runs, and security barrier, if any.

b) Materials of the proposed personal wireless service facility specified by generic type and specific treatment (e.g. anodized aluminum, stained wood, painted fiberglass, etc.). These shall be provided for antennas, mounts, equipment shelters, cables as well as cable runs, and security barrier, if any.

c) Colors of the proposed personal wireless service facility represented by a color board showing actual colors proposed. Colors shall be provided for the antennas, mounts, equipment shelters, cables as well as cable runs, and security barrier, if any.

d) Dimensions of the personal wireless service facility specified for all three directions: height, width and breadth. These shall be provided for the antennas, mounts, equipment shelters, and security barrier, if any.

e) Appearance shown by at least two photographic superimpositions of the personal wireless service facility within the subject property. The photographic superimpositions shall be provided for the antennas, mounts, equipment shelters, cables as well as cable runs, and security barrier, if any, for the total height, width, and breadth.

f) Landscape plan including existing trees and shrubs and those proposed to be added, identified by size of specimen at installation and species.

g) If lighting of the site is proposed, the applicant shall submit a manufacturers computer generated point to point printout, indicating the horizontal foot-candle levels at grade, within the property to be developed and twenty five (25) feet beyond the property lines. The printout shall indicate the locations and types of luminaries proposed.

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h) Within thirty (30) days prior to the public hearing, the applicant shall arrange to fly a three (3) foot diameter brightly colored and clearly visible balloon, or conduct a crane test, at the maximum height of the proposed installation. The balloon or crane shall remain raised in place for a period of at least three (3) consecutive days, including a weekend day between sunrise and sunset, and will be subject to a repeat if visibility or weather conditions require. The date, time, and location of such test shall be advertised in an newspaper of general circulation in the town at least 7 days prior to, but no more than 21 days, before the beginning date of the test. The Planning Board shall be notified of the planned dates of flight by certified mail at least two (2) weeks before flight.

Accompanying this Application are Site Plans showing all of the Information required by Sections a) to g) to the extent reasonably practicable. Given the substantial vegetative buffer, no additional landscaping is proposed. Accompanying this Application is the results of an FCC TOWAIR database review showing that the proposed Facility at this specific location and height proposed will not require FAA registration under current FAA regulations, and that therefore, no FAA lighting will be required.

The Applicant agrees to float a balloon at to the height of the proposed Facility. However, it is impossible to predict favorable weather conditions for three consecutive days between sunrise and sunset two weeks in advance. The Applicant agrees to float a balloon for up to six hours a day for a minimum of two days, one weekday and one weekend day. The date, time, and location of such test shall be advertised in a newspaper of general circulation in the town at least 7 days prior to, but no more than 21 days, before the beginning date of the test; and the Planning Board shall be notified of the planned dates of flight by certified mail at least two (2) weeks before flight.

10-15.5 NOISE FILING REQUIREMENTS

The applicant shall provide a statement listing the existing and maximum future projected measurements of noise from the proposed personal wireless service facilities, measured in decibels Ldn (logarithmic scale, accounting for greater sensitivity at night), for the following:

- 1. Existing, or ambient: the measurements of existing noise.**
- 2. Existing plus proposed personal wireless service facilities: maximum estimate of noise from the proposed personal wireless service facility plus the existing noise environment.**

Such statement shall be certified and signed by an acoustical engineer, stating that noise measurements are accurate and meet the Noise Standards of this Bylaw.

The proposed Facility has been designed to have minimal sound emissions. Most of the equipment planned for the installation will produce no sound at all, and any sounds that are produced will be adequately mitigated to prevent any significant effects on abutting properties.

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The Applicant has provided Noise Emissions Report with noise specifications from existing equipment at similar facilities.

Given that the Property on which the Facility will be located is a large, substantially undeveloped parcel with substantial tree growth and natural vegetative buffer and the Facility will be amply set back from abutting properties and public rights of way (the nearest abutting property line is over 170' from the center of the Facility) the Applicant respectfully requests a WAIVER from the requirement to provide existing / ambient noise measurements as well as the requirement that the Applicant provide a statement signed by an acoustical engineer.

10-15.6 RADIO FREQUENCY RADIATION (RFR) FILING REQUIREMENTS

The applicant shall provide a statement listing the existing and maximum future projected measurements of RFR from the proposed personal wireless service facility, for the following situations:

- a) Existing, or ambient: the measurements of existing RFR.**
- b) Existing plus proposed personal wireless service facilities: maximum estimate of RFR from the proposed personal wireless service facility plus the existing RFR environment.**
- c) Certification, signed by a RF engineer, stating that RFR measurements are accurate and meet FCC Guidelines as specified in the Radio frequency Radiation Standards sub section of this Bylaw.**

Accompanying this Application is an Affidavit of Radio Frequency Engineer as well as a MPE Report with requested estimates and certification; however the property on which the Facility will be located is a large, 23 acre substantially undeveloped property, and therefore, existing RFR measurements are de minimus; therefore, the Applicant respectfully requests a WAIVER from the requirement to provide existing / ambient RFR measurements

10-15.7 ENVIRONMENTAL FILING REQUIREMENTS

- a) The National Environmental Policy Act (NEPA) applies to all applications for personal wireless service facilities. NEPA is administered by the FCC via procedures adopted as Subpart 1, Section 1.1301 et seq. (47 CRF Ch. I). The FCC requires that an environmental assessment (EA) be filed with the FCC prior to beginning operations for any personal wireless service facility proposed in or involving any of the following: Wilderness Areas, Wildlife Preserves, Endangered Species Habitat, Historical Site, Indian Religious Site, Flood Plain, Wetlands, High intensity white lights in residential neighborhoods, Excessive Radio frequency radiation exposure.**
- b) At the time of application filing, an EA that meets FCC requirements shall be submitted to the Town**

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SPGA for each personal wireless service facility site that requires such an EA to be submitted to the FCC.

c) The applicant shall list location, type and amount (including trace elements) of any materials proposed for use within the personal wireless service facility that are considered hazardous by the federal, state or local government.

The Applicant does not anticipate that an environmental impact statement and FCC approval will be required. Upon approval of the Special Permit, the Applicant agrees to provide the Town with a copy of a final NEPA checklist concurrent with is application for a building permit.

There will be no materials proposed for use within the Facility that are considered hazardous by the federal, state or local government.

10-16 CO LOCATION

a) Licensed carriers shall share personal wireless service facilities and sites where feasible and appropriate, thereby reducing the number of personal wireless service facilities that are stand alone facilities. All applicants for a Special Permit for a personal wireless service facility shall demonstrate a good faith effort to co locate with other carriers. Such good faith effort includes:

1. A survey of all existing structures that may be feasible sites for co locating personal wireless service facilities;

2. Contact with all the other licensed carriers for commercial mobile radio services operating in the County; and

3. Sharing information necessary to determine if co location is feasible under the design configuration most accommodating to co location.

b) In the event that co location is found to be not feasible, a written statement of the reasons for the unfeasibility shall be submitted to the Town. The Town may retain a technical expert in the field of RF engineering to verify if co location at the site is not feasible or is feasible given the design configuration most accommodating to co location. The cost for such a technical expert will be at the expense of the applicant. The Town may deny a Special Permit to an applicant that has not demonstrated a good faith effort to provide for co location.

c) If the applicant does intend to co locate or to permit co location, the Town shall request drawings and studies that show the ultimate appearance and operation of the personal wireless service facility at full build out.

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d) If the SPGA approves co location for a personal wireless service facility site, the Special Permit shall indicate how many facilities of what type shall be permitted on that site. Facilities specified in the Special Permit approved shall require no further zoning approval. However, the addition of any facilities not specified in the approved Special Permit shall require a new Special Permit. Estimates of RFR emissions will be required for all facilities, including proposed and future facilities.

As is stated throughout this Project Narrative, there are existing structures of sufficient height or structural integrity anywhere near the proposed Facility that would satisfy the coverage objective. As a wireless infrastructure developer, Vertex encourages co-location and has relationships with all of the existing wireless telecommunications carriers licensed in this market and intends to provide space on the proposed Facility at commercially reasonable rates, which will minimize the total number of towers in the community. Moreover, the tower has been designed to be the minimum height necessary to satisfy the coverage needs of multiple wireless carriers.

10-17 MODIFICATIONS

A modification of a personal wireless service facility may be considered equivalent to an application for a new personal wireless service facility and will require a Special Permit when the following events apply:

a) The applicant and/or co applicant wants to alter the terms of the Special Permit by changing the personal wireless service facility in one or more of the following ways:

- 1. Change in the number of facilities permitted on the site;**
- 2. Change in the technology used for the personal wireless service facility.**

b) The applicant and/or co applicant wants to add any equipment or additional height not specified in the original design filing.

Once the Facility is constructed, the Applicant agrees to comply with all reasonably and lawfully required procedural and other conditions generally and uniformly and lawfully imposed and applied by the Town with respect to the Facility and similar facilities.

10-18 MONITORING AND MAINTENANCE

a) After the personal wireless service facility is operational, the applicant shall submit, within 90 days of beginning operations, and at annual intervals from the date of issuance of the Special Permit, existing measurements of RFR from the personal wireless service facility. Such measurements shall be signed and certified by an RF engineer, stating that RFR measurements are accurate and meet FCC Guidelines as specified in the Radio frequency Standards section of this Bylaw.

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b) After the personal wireless service facility is operational, the applicant shall submit, within 90 days of the issuance of the Special Permit, and at annual intervals from the date of issuance of the Special Permit, existing measurements of noise from the personal wireless service facility. Such measurements shall be signed by an acoustical engineer, stating that noise measurements are accurate and meet the Noise Standards sub section of this Bylaw.

c) The applicant and co applicant shall maintain the personal wireless service facility in good condition. Such maintenance shall include, but not be limited to, painting, structural integrity of the mount and security barrier, and maintenance of the buffer areas and landscaping.

Once the Facility is constructed, the Applicant agrees to comply with all reasonably and lawfully required procedural and other conditions generally and uniformly and lawfully imposed and applied by the Town with respect to the Facility and similar facilities.

10-19 ABANDONMENT OR DISCONTINUATION OF USE

a) At such time that a licensed carrier plans to abandon or discontinue operation of a personal wireless service facility, such carrier will notify the Town by certified U.S. mail of the proposed date of abandonment or discontinuation of operations. Such notice shall be given no less than 30 days prior to abandonment or discontinuation of operations. In the event that a licensed carrier fails to give such notice, the personal wireless service facility shall be considered abandoned upon such discontinuation of operations.

b) Upon abandonment or discontinuation of use, the carrier shall physically remove the personal wireless service facility within 90 days from the date of abandonment or discontinuation of use.

"Physically remove" shall include, but not be limited to:

- 1. Removal of antennas, mount, equipment shelters and security barriers from the subject property.**
- 2. Proper disposal of the waste materials from the site in accordance with local and state solid waste disposal regulations.**
- 3. Restoring the location of the personal wireless service facility to its natural condition, except that any landscaping and grading shall remain in the after condition.**

c) If a carrier fails to remove a personal wireless service facility in accordance with this section of this Bylaw, the Town shall have the authority to enter the subject property and physically remove the facility. The SPGA may require the applicant to post a bond at the time of construction to cover costs for the removal of the personal wireless service facility in the event the Town must remove the facility.

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Once the Facility is constructed, the Applicant agrees to comply with all reasonably and lawfully required procedural and other conditions generally and uniformly and lawfully imposed and applied by the Town with respect to the Facility and similar facilities.

10-20 TERM OF SPECIAL PERMIT

A Special Permit issued for any personal wireless service facility shall be valid for five (5) years. At the end of that time period, the personal wireless service facility shall be removed by the carrier or a new Special Permit shall be required.

Once the Facility is constructed, the Applicant agrees to comply with all reasonably and lawfully required procedural and other conditions generally and uniformly and lawfully imposed and applied by the Town with respect to the Facility and similar facilities.

10-21 APPROVAL

Site plan approval and a Special Permit shall be granted by the SPGA in accordance with the Massachusetts General Law and the provisions of the Bylaw relative to special permits.

a) Any extension, addition or construction of new or replacement personal wireless service facilities or transmitters shall be subject to an amendment to the Special Permit, following the same procedure as for an original grant of a special permit.

b) At a Pre-Application conference the SPGA may waive one or more of the application filing requirements if it finds that such information is not needed for a thorough review of the proposed facility.

The Applicant has applied for and respectfully requests a Special Permit and Site Plan Approval from the Planning Board. Once the Facility is constructed, the Applicant agrees to comply with all reasonably and lawfully required procedural and other conditions generally and uniformly and lawfully imposed and applied by the Town with respect to the Facility and similar facilities. As set forth herein, the Applicant has requested several WAIVERS from the application filing requirements and requests a finding that such information is not needed for a thorough review of the proposed Facility.

10-22 CONDITIONS OF USE

a) The personal wireless service facility and its transmissions shall comply in all respects with all applicable federal, state and industry standards.

b) If new technology is developed which is determined by the SPGA to be safer and less obtrusive to the landscape, it shall be substituted as soon as technologically feasible.

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c) As a condition of approval of the application for a special permit, the applicant shall agree, by the execution of a covenant, that within a period of six months, the location of any personal wireless service facility which has not operated for four consecutive months, unless the cause is major damage which prohibits operation, shall be restored to its natural condition, except that any landscaping and grading shall remain in the after condition.

d) Failure to comply with the conditions of the covenant shall be grounds for the removal of the personal wireless service facility at the owner's expense.

e) In the event that major damage has rendered the facility inoperative, repair or removal of the facility shall begin within six months and be completed within an additional six months.

f) If a carrier fails to remove a personal wireless service facility in accordance with this section of this bylaw, the Town of Buckland shall have the authority to enter the subject property and physically remove the facility. The SPGA may require the applicant to post a bond at the time of construction to cover costs for the removal of the personal wireless service facility in the event that the Town must remove the facility.

Once the Facility is constructed, the Applicant agrees to comply with all reasonably and lawfully required procedural and other conditions generally and uniformly and lawfully imposed and applied by the Town with respect to the Facility and similar facilities.

10-23 PERFORMANCE GUARANTEES

a) Insurance in a reasonable amount determined and approved by the SPGA after consultation at the expense of the Applicant with one (1) or more insurance companies shall be in force to cover damage and/or personal injury from the structure, and damage and/or personal injury from transmissions and other site liabilities. Annual proof of said insurance shall be filed with the Town Clerk.

b) The applicant shall pay or reimburse the Town for all expenses incurred by the Town in reviewing the application and reviewing the installation of the applicant's facility. These expenses may include, without limitation, engineering, planning, technical or legal services. An annual maintenance bond shall be posted for the access road, site and personal wireless service facility(s) in an amount approved by the SPGA.

c) Annual certification demonstrating continuing compliance with the standards of the Federal Communications Commission, Federal Aviation Administration and the American National Standards Institute shall be filed with the Building Inspector, the Board of Health, and The SPGA by the special permit holder.

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Once the Facility is constructed, the Applicant agrees to comply with all reasonably and lawfully required procedural and other conditions generally and uniformly and lawfully imposed and applied by the Town with respect to the Facility and similar facilities.

10-24 OPERATION

Monitoring, testing and inspection shall be in accordance with the Regulations of the Massachusetts Department of Public Health Massachusetts, 105 CMR 122 Regulations Governing Fixed Facilities Which Generate Electromagnetic Fields in the Frequency Range of 300kHz to 100 GHZ and Microwave Ovens, and other requirements of the Department.

No response required.

**COMPLIANCE WITH CRITERIA
FOR VARIANCES**

c) VARIANCES: The Zoning Board of Appeals shall hear and decide appeals or petitions for dimensional variances from the terms of this Bylaw, with respect to particular land or structures pursuant to M.G.L. Chapter 40A, Section 10, as may be amended from time to time, only in cases where the Board finds all of the following:

- 1. a literal enforcement of the provisions of this Bylaw would involve a substantial hardship, financial or otherwise, to the petitioner or applicant;**
- 2. the hardship is owing to circumstances relating to the soil conditions, shape, or topography of such land or structures, and especially affecting such land or structures but not affecting generally the zoning district in which it is located;**
- 3. desirable relief may be granted without either:**
- 4. substantial detriment to the public good; or**
- 5. nullifying or substantially derogating from the intent or purpose of this Bylaw.**

Given technical limitations with respect to:

- the location of the Facility relative to the surrounding neighborhoods and other existing telecommunication sites in and around the Town;
- the topography of the surrounding area;
- the lack of viable alternatives in the area;
- the height restrictions of the Facility imposed by the Bylaw;
- the Town's requirement to accommodate multiple wireless communications companies;
- the demand for robust and reliable telecommunications coverage; and
- the requirement to accommodate rapidly evolving technologies;

the Applicant requires the requested Variances to permit construction of the Facility as proposed. As the Plans indicate, the proposed Facility has been designed to accommodate the antennas at least 4 wireless broadband co-locators. There are no existing or previously

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approved telecommunications facilities in the area of the proposed Facility, nor are there existing structures of sufficient height in the area of the proposed Facility, that will achieve the coverage objective of the proposed Facility. The Facility has been situated on the Property in such a way to achieve the objectives of the Bylaw as much as possible.

As has been shown throughout this Project Narrative, the granting of the Variances will not be detrimental to the public safety, health or welfare or injurious to other property and will promote the public interest. The Variances will substantially secure the objectives, standards and requirements of these regulations, and a particular hardship exists and special circumstances warrant the granting of the Variances.

In 1996, the U.S. Congress enacted the Telecommunications Act of 1996, Pub. L. No. 104-104, § 704; 110 Stat. 56 (1996) (the “TCA”). The intent of the TCA enacted by the U.S. Congress was to institute a framework to promote competition and innovation within this telecommunications industry. Under their respective licenses from the FCC, wireless telecommunications providers are obligated to provide a reliable “product” [i.e. wireless communications service] to the population of the Town. Likewise, consumer expectations for increasingly robust and reliable service requires competing service providers to identify and remedy existing gaps in reliable network coverage, or gaps that result from increasing subscriber voice and data traffic beyond the limits of existing network infrastructure. A carrier’s failure to remedy network gaps in a timely fashion can result in a significant loss of subscribers to competing telecommunications carriers. The proposed Facility and corresponding relief requested are necessary to remedy a gap in reliable service coverage within the various wireless carriers’ existing network infrastructure.

The Applicant has investigated alternative sites in and around the defined geographic area within which engineers determined that a facility must be located to fill the gap in service coverage and to function effectively within the network of existing and planned facilities. No existing structure or property in or near the vicinity of the proposed Facility is feasible to accommodate the coverage network requirements.

Accordingly, a literal enforcement of the provisions of the Bylaw would prevent the Applicant from eliminating an existing gap in reliable service coverage, resulting in a potential loss of subscribers and the inability to effectively compete for subscribers with FCC licensed competitors in the market, contrary to the intent of the Bylaw and the U.S. Congress in enacting the TCA.

Moreover, this hardship is owing to the circumstances relating to topography of the surrounding area. The property is a large, substantially undeveloped property surrounded by dramatic terrain differences and dense foliage. The surrounding area provides no other feasible location in which to install and operate a wireless telecommunications facility. Existing structures and buildings in the area are insufficient in height to allow wireless carriers to operate thereon and provide adequate coverage to this significant gap in its network. The property provides a unique opportunity, given the

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existing tower as well as the location and area topography surrounding the Facility, to minimize any adverse visual impacts to the surrounding area. The proposed design conforms to the existing characteristics of the Property, and utilizes the existing structures on the property to screen the proposed Facility, thereby minimizing potential impacts.

The wireless communications systems being developed by the various telecommunications carriers operating in the area have been designed employing the most sophisticated radio frequency engineering methods available. Radio frequency engineers determine the placement of network points-of-presence using computer engineering models that simultaneously evaluate area topography and population patterns to identify specific geographic areas to be serviced by each antenna facility in the network. As a result of this modeling, combined with actual coverage data provided by existing “on air” facilities, the carriers’ radio frequency engineers have identified a limited geographic area as a necessary location for a communications facility to remedy an existing gap in reliable service coverage in the general vicinity of the Property. Without the requested relief, there would remain a substantial “gap” in reliable service coverage in the carriers’ respective networks. Radio frequency coverage maps confirm that a telecommunications facility located at the Property is required to remedy the existing gap in the wireless network coverage in the area. The requested height has been determined by engineers to be the minimum height necessary to connect coverage from the proposed Facility with coverage from adjacent cell sites in the carriers’ respective networks (i.e. to remedy the existing “gap” in service and to effect reliable handoffs between adjacent cell sites as a subscriber travels through the area).

Additionally, the requested height will allow future carriers to co-locate on the Facility hereby minimizing the number of new facilities needed to provide coverage to the Town.

In the context of a utility service where the critical criteria in the development of each facility is its ability to integrate with a network of surrounding sites and subsequently, for each cluster of sites to function within a regional/national network, there is an underlying premise that each site chosen by the Applicant for a facility possesses a unique location and topographical characteristics.

Finally, as noted in *Nextel Communications of the Mid-Atlantic, Inc. v. Town of Wayland*, 231 F.Supp. 2d 396, 406-407 [D. Mass. 2002], the “need for closing a significant gap in coverage, in order to avoid an effective prohibition of wireless services, constitutes another unique circumstance when a zoning variance is required.” No existing structure or property in an allowed zoning district is technically suitable to resolve the existing gap in the wireless service coverage in the area. In addition, the existing structures located near the Property are not at a height sufficient to provide adequate coverage to this significant gap in its network. The Facility will be the minimum height necessary to provide coverage for multiple wireless carriers. Given the location and size

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of the Property, as well as the proposed design of the Facility, the proposed installation will have a minimal visual impact to the surrounding neighborhood while achieving the carriers' requisite coverage.

- The proposed Facility will reduce the number of new structures ultimately needed to provide wireless communication services in the surrounding area by providing co-location potential;
- The proposed Facility is designed to be at the minimum height necessary to provide adequate coverage to the area and keep potential visual impacts to a minimum;
- The proposed Facility will comply in all respects with radio frequency emission standards established by the FCC;
- The proposed Facility will not have any adverse effect on the value of land and buildings in the neighborhood or on the amenities thereof. The proposed use is passive, requires no employees on the premises, and has no characteristics that are incompatible with the underlying zoning. Specifically, it will generate only about two vehicle trips per month by a service technician for routine maintenance, will be served by standard electrical and telephone service, and requires no water, septic or other town services;
- The proposed Facility will promote and conserve the convenience and general welfare of the inhabitants of the Town by enhancing telecommunications services within the town;
- The proposed Facility will lessen the danger from fire and natural disasters by providing emergency communications in the event of such fires and natural disasters;
- The proposed Facility will involve no overcrowding of land or undue concentration of population because it is an unmanned Facility;
- The proposed Facility will preserve and increase the amenities of the Town by enhancing the telecommunications services and will facilitate the adequate provisions of transportation by improving mobile telecommunications for business, personal and emergency uses;
- The proposed Facility will involve no adverse effects on public and private water supplies and indeed will utilize no water at all;
- The proposed Facility will involve no adverse effects on drainage, schools, parks, openspace, or other public requirements, and will involve no excessive

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noise or pollution to the environment;

- The proposed Facility will have no adverse effect on historic sites; and
- The proposed Facility will be an appropriate use of land within the Town.

Due to the unique size, shape, location and elevation of the subject Property and the topography of the surrounding area as well as the existing zoning of the property and surrounding area, unique circumstances exist to justify the granting of the requested Variances. Moreover, Applicant's proposed Facility will have no impact on adjoining properties and the surrounding neighborhood in that the proposed Facility will produce no objectionable noise, glare, dust, smoke, fumes, odors, of effluent, and will not have any impact of traffic or circulation.

Accordingly, the Applicant requests findings that

1. a literal enforcement of the provisions of this chapter would involve a substantial hardship to the Applicant.
2. The hardship is owing to circumstances relating to the soil conditions, shape or topography of such land or structures and especially affecting such land or structures but not affecting generally the zoning district in which it is located.
3. Desirable relief may be granted without nullifying or substantially derogating from the intent or purpose of the zoning bylaw.

In addition (or in the alternative), the Applicant requests a finding that strict compliance would cause a conflict with the TCA.

THE TELECOMMUNICATIONS ACT OF 1996

In 1996, the U.S. Congress enacted the Telecommunications Act of 1996, Pub. L. No. 104-104, § 704; 110 Stat. 56 (1996) (the “TCA” or the “Telecommunications Act”). The intent of the TCA as enacted by Congress was to institute a framework to promote competition and innovation within the telecommunications industry. Although this law specifically preserves local zoning authority with respect to the siting of wireless service facilities, it clarifies when the exercise of local zoning authority may be preempted by federal law. Section 704 of the TCA provides, in pertinent part, that

(7) PRESERVATION OF LOCAL ZONING AUTHORITY-

(A) GENERAL AUTHORITY- Except as provided in this paragraph, nothing in this Act shall limit or affect the authority of a State or local government or instrumentality thereof over decisions regarding the placement, construction, and modification of personal wireless service facilities.

(B) LIMITATIONS-

(i) The regulation of the placement, construction, and modification of personal wireless service facilities by any State or local government or instrumentality thereof--

(I) shall not unreasonably discriminate among providers of functionally equivalent services; and

(II) shall not prohibit or have the effect of prohibiting the provision of personal wireless services.

The intent of the TCA enacted by the U.S. Congress was to institute a framework to promote competition and innovation within this telecommunications industry. Under its respective licenses from the FCC, wireless telecommunications carriers are obligated to provide a reliable “product” [i.e. telecommunications service] to the population in western Massachusetts, which includes the Town of Buckland. Likewise, consumer expectations for increasingly robust and reliable service requires competing service providers to identify and remedy existing gaps in reliable network coverage, or gaps that result from increasing subscriber voice and data traffic beyond the limits of existing network infrastructure. A carrier’s failure to remedy network gaps in a timely fashion can result in a significant loss of subscribers to competing telecommunications carriers. As demonstrated in the Application and supplemental materials provided by the Applicant, the proposed Facility and corresponding relief requested are necessary to remedy a gap in reliable service coverage within the existing network infrastructure. In Daniels v. Town of Londonderry, 157 N.H. 519 (2008), the New Hampshire Supreme Court upheld the grant of use and area variances for the construction of a cell tower in an agricultural-residential zone, noting that the Londonderry ZBA correctly treated the TCA as an “umbrella” that preempted local law under certain circumstances.

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In a growing number of cases, federal courts have found that permit denials violate the TCA, even if such denials would be valid under state law. For example, in Omnipoint Wireless Service Facility v. Town of Lincoln, 107 F. Supp. 2d 108 (D. Mass. 2000), the court found that denial of a variance for a location outside of the town's wireless overlay district violated the TCA and ordered the variance to issue despite an Ordinance provision prohibiting use variances. The court in Nextel Wireless Service Facility v. Town of Wayland, 231 F. Supp. 2d 396 (D. Mass. 2002) reached the same result. In that case, the court stated: "Although the Board's statement [regarding its lack of authority to issue a use variance] may be correct statement in Massachusetts regarding variances, it is not controlling in the special case of Telecommunications facilities...Under the Telecommunications Act, the Board cannot deny the variance if in so doing it would have the effect of prohibiting wireless services." Wayland at 406-407. Most notably, in Omnipoint Holdings, Inc. v. Town of Cranston, No. 08-2491 (1st Cir. Nov. 3, 2009), the United States Court of Appeals for the First Circuit affirmed a judgment of the United States District Court for the District of Rhode Island, which found that the Cranston Zoning Board of Review violated the TCA by effectively prohibiting the provision of wireless services in Cranston when it denied an application for a special use permit and variance to construct a wireless facility in a residential area. The Court noted that "[t]he effective prohibition clause does not stand alone; it is also part of the TCA's larger goal of encouraging competition to provide consumers with cheaper, higher-quality wireless technology.... As cell phone use increases, carriers need to build more facilities, especially in populated areas, to continue providing reliable coverage, and local regulations can present serious obstacles." Cranston, p. 25. More recently, in New Cingular Wireless, LLC v. City of Manchester, Case No. 11-cv-334-SM (USDC D. NH Feb. 28, 2014), the United States District Court for the District of New Hampshire indicated that the City of Manchester impermissibly denied a variance to construct a telecommunications tower in a (non-permitted) residential zone, in that the tower addressed significant coverage gaps and provided competitive and reliable wireless services and there was no feasible alternative. The Court noted that the City must consider the public benefits of wireless services in determining whether to grant a zoning variance for a tower. Id.

The Applicant has investigated alternative sites in and around the defined geographic area within which its engineers determined that a facility must be located to fill the gap in service coverage and to function effectively within the wireless network of existing and planned facilities. No existing structure or property in or near the vicinity of the proposed Facility is feasible to accommodate the wireless network requirements. The proposed Facility is on large substantially undeveloped parcel and provides a substantial vegetative buffer. The wireless communications systems being developed by the various telecommunications carriers operating in the Buckland area have been designed employing the most sophisticated radio frequency engineering methods available. Radio frequency engineers determine the placement of network points-of-presence using computer engineering models that simultaneously evaluate are topography and population patterns to identify specific geographic areas to be serviced by each antenna facility in the network. As a result of this modeling, combined with actual coverage data provided by existing "on air" facilities, the carriers' radio frequency engineers have identified a limited geographic area as a necessary location for a communications facility to remedy an existing gap in reliable service coverage in the general vicinity of the Property. Without the requested relief, there would remain

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a substantial “gap” in reliable service coverage in the carriers’ respective networks. Radio frequency coverage maps confirm that a telecommunications facility located at the Property is required to remedy the existing gap in the wireless network coverage in the area. The requested height has been determined by engineers to be the minimum height necessary to connect coverage from the proposed Facility with coverage from adjacent cell sites in the carriers’ respective networks (i.e. to remedy the existing “gap” in service and to effect reliable handoffs between adjacent cell sites as a subscriber travels through the area).

Accordingly, denial of a permit to construct the Facility would prevent the Applicant from eliminating an existing gap in reliable service coverage, resulting in a potential loss of subscribers for the carriers and the inability to effectively compete for subscribers with other FCC licensed competitors in the market, contrary to the intent of the Ordinance and the U.S. Congress in enacting the TCA.

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SUMMARY

Because the proposed facility meets all of the requirements for a Personal Wireless Service Facility under the Buckland Zoning Bylaw other than those provisions for which VARIANCES and/or waivers have been requested, and pursuant to §704(a) of the Federal Telecommunications Act of 1996 which provides, among other things, that wireless facilities may not be prohibited in any particular area and that any denial of zoning relief must be based upon substantial evidence, the Applicant respectfully requests that the Planning Board GRANT A SPECIAL PERMIT and SITE PLAN APPROVAL with waivers and/or conditions as proposed, the ZONING BOARD grant the requested VARIANCES, and the Town grant such other permits, relief or waivers deemed necessary by the Town of Buckland under the current Bylaw and pending Bylaws amendments, if any, so that the Applicant may construct and operate the Facility as proposed.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'F. Parisi', with a horizontal line extending to the right.

Francis D. Parisi, Esq.
Parisi Law Associates, P.C.
225 Dyer Street
Providence, RI 02903
(401) 447-8500 cell
fparisi@plapc.com

3

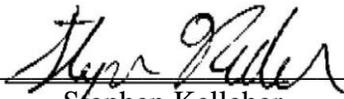
AMENDED STATEMENT OF STEPHEN KELLEHER
Vertex Towers, LLC

I, Stephen Kelleher, hereby state the following in support of the application submitted by Vertex Towers, LLC for a multi-user Personal Wireless Service Facility (“PWSF”) to be located at 28 Martin Road, Buckland, MA (the “Property”), consisting of a 150’ Monopole tower and related ground equipment contained within a fenced compound (the “Site”)

1. My name is Stephen Kelleher and I am the Manager for Vertex Towers, LLC.
2. I have worked in the telecommunications industry for 14 years overseeing and assisting in the leasing, zoning, permitting and construction of wireless communications facilities and specifically in the investigation of all feasible alternatives and options locating a wireless communications facility within a search ring which would fill a significant gap in wireless coverage.
3. I have participated directly through my present and past employment in the development and analysis of hundreds of such facilities, including wireless communication facilities similar to the proposed Site.
4. I have personally visited the Property, and the areas surrounding the Property, on numerous occasions. I submit this affidavit based on my personal knowledge of the Property and the surrounding areas, while also working together with the experience and documentation provided by civil and radio frequency engineers, environmental consultants and based on my professional experience in the development of wireless communication facilities.
5. Part of my site acquisition and development duties include identifying potential candidates within an area identified as having a significant gap in coverage. The candidate identification process includes reviewing the applicable zoning ordinance with legal counsel, engineers, wetland scientists, and other professionals to identify areas where the proposed Site is allowed and feasible. First, I explore the area to determine whether there are any existing structures of sufficient height and structural capacity from which an antenna installation on such a structure would provide sufficient coverage. If there are no such existing structures, I identify properties, located within the narrowly defined search area, that appear to be suitable for the installation of a communications facility, while also eliminating certain properties that would not be suitable due various limitations or concerns related but not limited to, parcel size, access issues, landlocked parcels, conservation restrictions, wetlands, visibility, elevation, terrain and constructability. In order to be viable, a candidate must (i) provide adequate coverage to the identified significant gap in coverage and (ii) have a willing landowner with whom commercially reasonable lease terms may be negotiated. Preference is given to locations that closely comply with local zoning ordinances, or in the event no viable candidates are found within the search area, I attempt to identify other potentially suitable properties, with preference always given to existing structures.
6. In connection with this site, I have provided site acquisition services, including researching the area, and identifying potential alternative candidates to the leased ground space on the Property.

7. Based on my personal knowledge of the proposed Site and the surrounding area, there are no existing structures of sufficient height from which an antenna installation on such a structure would provide sufficient coverage. Additionally, there are no other properties located within this geographically driven search area to construct a PWSF on, that would provide sufficient coverage to meet the coverage objective. Based on my experience and in my professional opinion, the proposed PWSF to be located on Martin Road is the least intrusive and only available and viable alternative to adequately meet the coverage objective and fill this significant gap in coverage.

Executed this 13th day of May, 2022.



Stephen Kelleher
Vertex Towers, LLC

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AFFIDAVIT OF RF ENGINEER

I, Jose Hernandez hereby state the following in support of the application for Vertex Tower, LLC (“Vertex”) of proposed Monopole at 28 Martin Road, Buckland, MA 01338 (42.577447, -72.793617). (the “Site”) and the attachment of antennas, cabling and other telecommunications equipment on and at the base of the Monopole by various wireless broadband telecommunications carriers as proposed in the attached application (the “Facility”).

1. I am a currently an independent consultant Principal/Manager Radio Frequency Engineer. I have been involved with the wireless telecommunications industry for 20 years, and have held various technical, operational and supervisory positions with Nextel Communications, T-Mobile, AT&T Mobility and Sprint PCS.
2. In order to satisfy its obligations under its radio licenses acquired from the FCC and under the Code of Federal Regulations 47 C.F.R. § 27.14(a), wireless broadband telecommunications carriers must have in place a system of strategically deployed “cell sites” to provide wireless communications services to their subscribers’ throughout their licensed area. These cell sites generally consist of an antenna support structure such as a telecommunications tower, building, water tank, or other structures used to elevate the antennas to the height necessary for providing adequate service to the targeted area. The antennas are connected via cabling to radio equipment located near the antennas and/or at the base of the support structure. The cell sites operate by transmitting and receiving low power radio frequency signals to and from their subscribers’ portable wireless communication devices such as basic handheld phones, smartphones, PDA’s, tablets, and laptop aircards. These wireless voice and data signals are then transferred through ground telephone lines, fiber, microwave or other means of backhaul transport, and routed to their destinations by sophisticated electronic equipment.
3. Cell sites are a vital and necessary part of carriers’ network infrastructure. In order to maintain effective, uninterrupted service throughout a given area, there must be a series of cell sites, interconnected to each other with slightly overlapping coverage areas. This allows for the subscribers to move freely about a geographic area while maintaining a consistent and reliable wireless connection to the network.
4. A proposed cell site must consider the locations and coverage provided by the surrounding cell sites in the network, and must be located within a limited geographical area, which is defined by factors such as terrain, land use characteristics, and population density. By locating within this limited area and at a sufficient height, the cell site would have a high probability of meeting the targeted objectives, thereby providing reliable coverage and capacity throughout the cell.
5. In compliance with the requirements of its FCC licenses, carriers are actively building their respective networks to provide coverage throughout its licensed area. In order to meet the responsibility of providing seamless, uninterrupted service, carriers must continue to acquire

interest in sites for additional facilities, and is applying for and obtaining local governmental zoning approvals to construct its sites in order to eliminate deficient service areas due to gaps in coverage or insufficient capacity. Any delays severely curtail carriers' ability to satisfy both mandated time requirements, and to achieve a market position that will allow it to compete for customers with other similar companies also issued licenses to operate in this area.

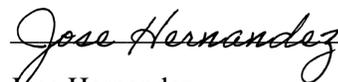
6. Using computer simulations to model radio frequency propagation, Vertex has determined that a wireless transmission facility located at or near to the proposed Facility would facilitate wireless communications within the local area along Rt.112, Upper St and surrounding areas of Buckland, MA. These simulations model characteristics such as antenna types, antenna height, output power, terrain, ground elevations and RF propagation effects of the frequency utilized.

7. In my opinion based upon substantial research and analysis, without a cell site located at or very near the proposed site, this area of Buckland, MA would not meet the typical coverage requirements for multiple wireless carriers, resulting in a substantial gap in wireless coverage.

8. Based upon the technologies currently being deployed by wireless carriers, it is my opinion that the proposed Facility is at the minimum height necessary to satisfy the coverage objectives of multiple wireless carriers providing in the area.

9. All of the transmitter facilities to be located at the proposed location are required to comply, and when constructed and operational will comply with, all applicable regulations of the FCC regarding radio frequency (RF) exposure as detailed in FCC OET Bulletin 65, Edition 97-1.

Signed and sworn under the pains and penalties of perjury, Nov, 22, 2021.

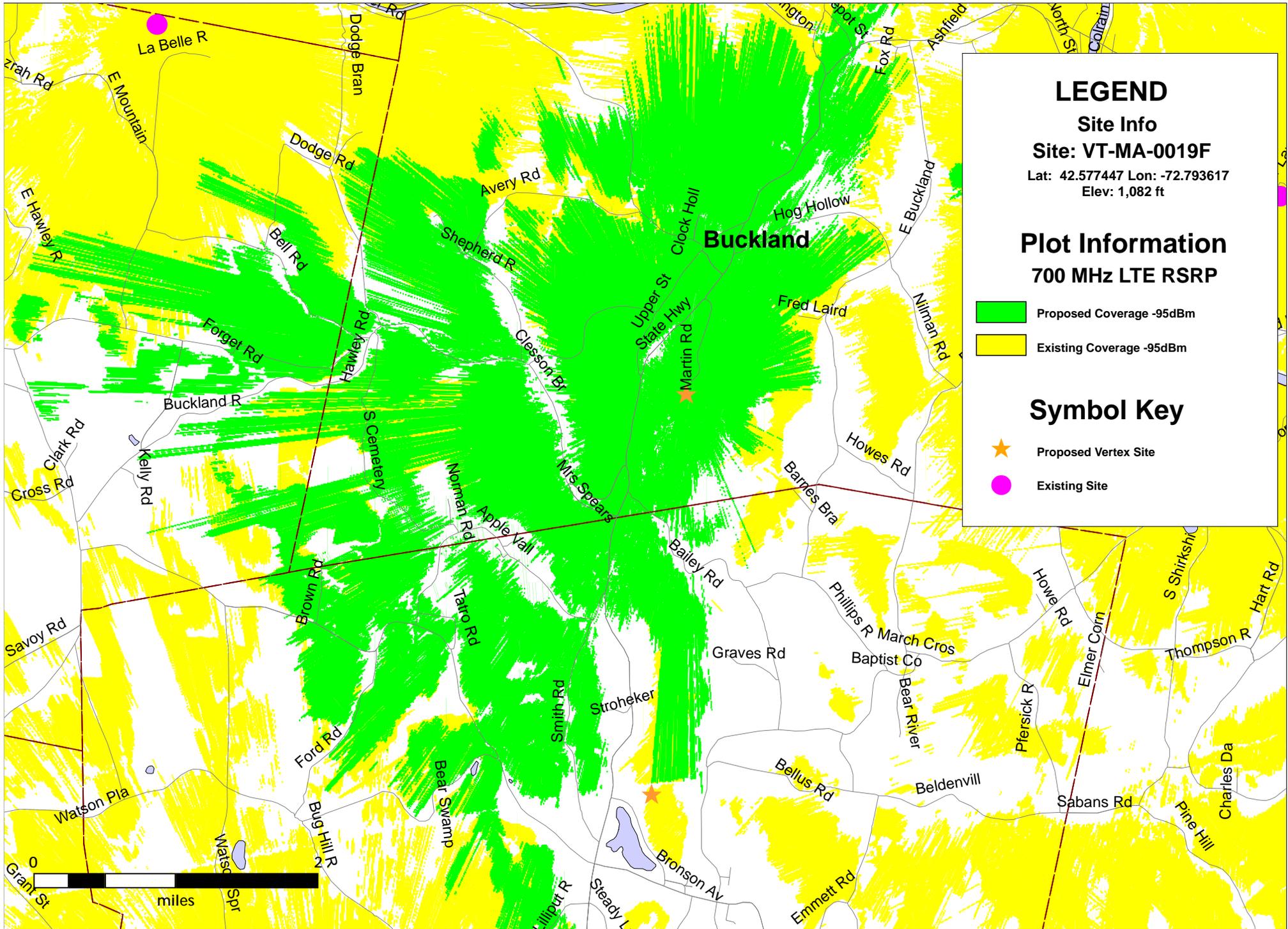
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Jose Hernandez

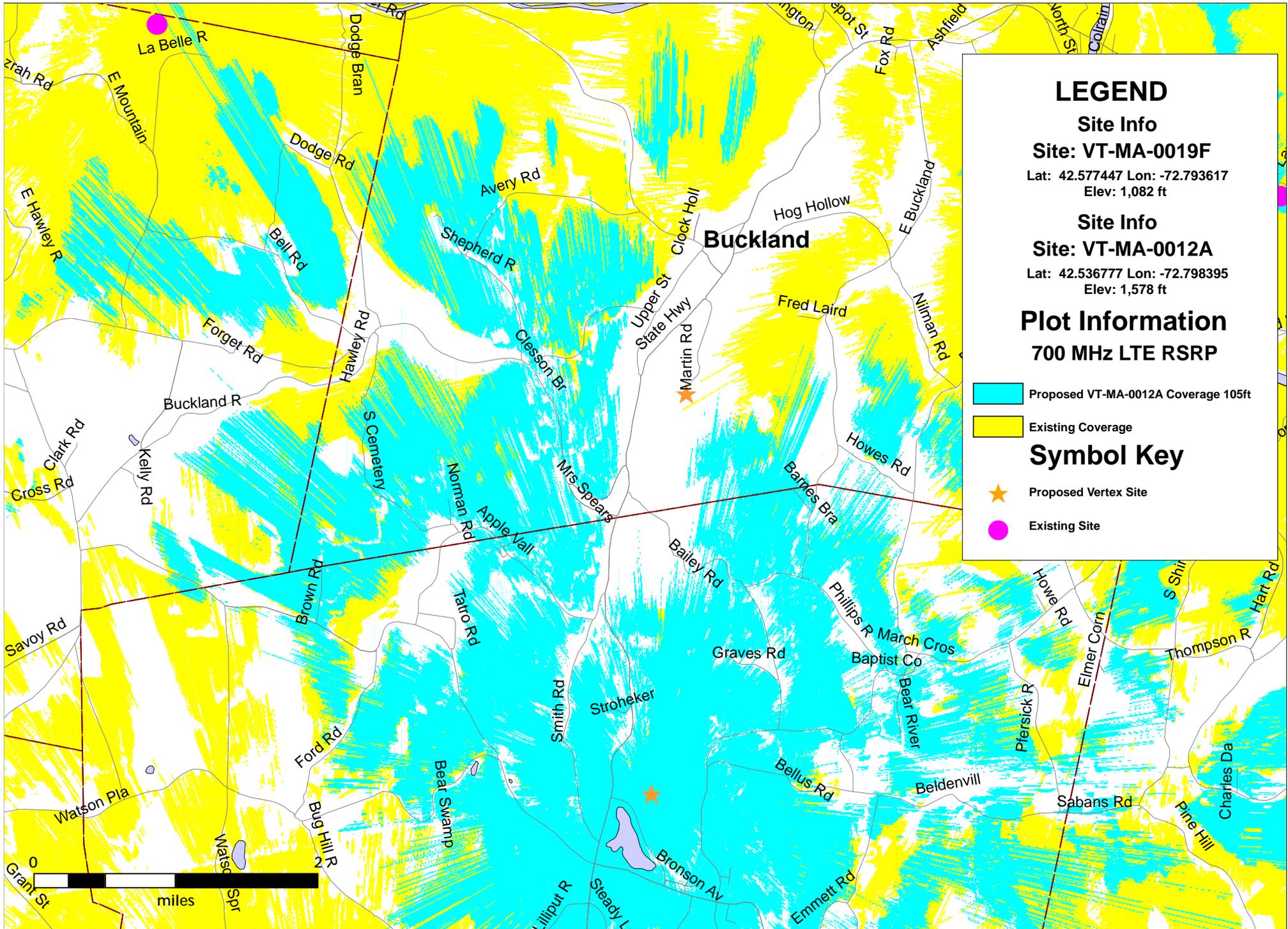
JNaerowaves.Corp

President / Principal Radio Frequency Engineer

RF Existing Coverage With VT-MA-0019F@145'



RF Existing & Combined VT-MA-0012A Coverage Without VT-MA-0019F@-95dBm



5

Site Emissions Report For Buckland, MA

Date Performed: 11/22/2021

This site emissions analysis was created for Vertex Towers, LLC. The Monopole analysis was performed to include all 4 major carriers. According to the analysis, this monopole located at 28 Martin Road, Buckland, MA 01338 (42.577447, -72.793617) does pass the FCC requirements for Radio Frequency emissions. The FCC requirements used in this report were determined from the FCC OET65 documentation and calculations.

The monopole assumes the worst case scenario which would not occur in the real world. It assumes that all 4 carriers are using all frequency bands and are all on the lowest height of the tower.

The approach taken for calculations takes into account the typical antenna used, since a Cell Site antenna is directional and has different gains at different angles.

At the lowest height of 115ft, the highest emissions does not go above 2.11 μW/cm² which is **0.211%** of the Maximum Permissible Emissions requirements, which is less than 1% of the MPE requirements.

Site Name: VT-MA-0019F

Coordinates: (42.577447/-72.793617)

Location: 28 Martin Road, Buckland, MA 01341.

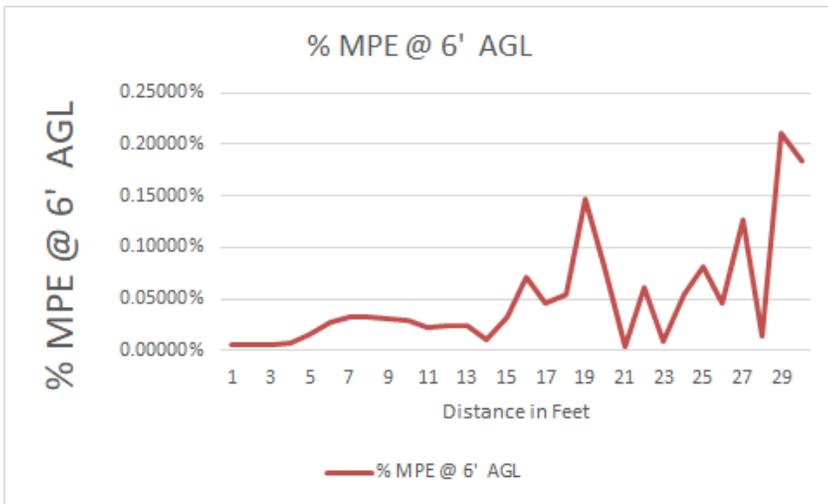
Carrier Available

Heights (ft): 145,135,125,115

Equation for Predicting RF Fields:

$$S = \frac{EIRP}{4\pi R^2} \quad (4)$$

where: EIRP = equivalent (or effective) isotropically radiated power
 S = power density (in appropriate units, e.g. mW/cm²)
 Reference: OET Bulletin 65



Wireless Service Provider	Frequency Band	ERP (Watts)
Carrier 1	1900MHz	1250
Carrier 1	700MHz	1000
Carrier 1	850MHz	1000
Carrier 1	2100MHz	2500
Carrier 2	1900MHz	2000
Carrier 2	700MHz	1000
Carrier 2	850MHz	1000
Carrier 2	2100MHz	1000
Carrier 3	1900MHz	1360
Carrier 3	2100MHz	1360
Carrier 3	700MHz	1000
Carrier 4	850MHz	400
Carrier 4	1900MHz	1360

Analysis Performed by: Jose Hernandez
 Jose Hernandez – President / Principal, RF Engineer - JNaerowaves.Corp

Jose Hernandez is an independent Radio Frequency Engineer with 20 years of experience as an engineer in the Wireless Telecommunications field. Jose has performed numerous emissions reports for the Wireless Telecommunications Industry.

11/22/2021

6

Typical Verizon Installation

Ground and tower Equipment

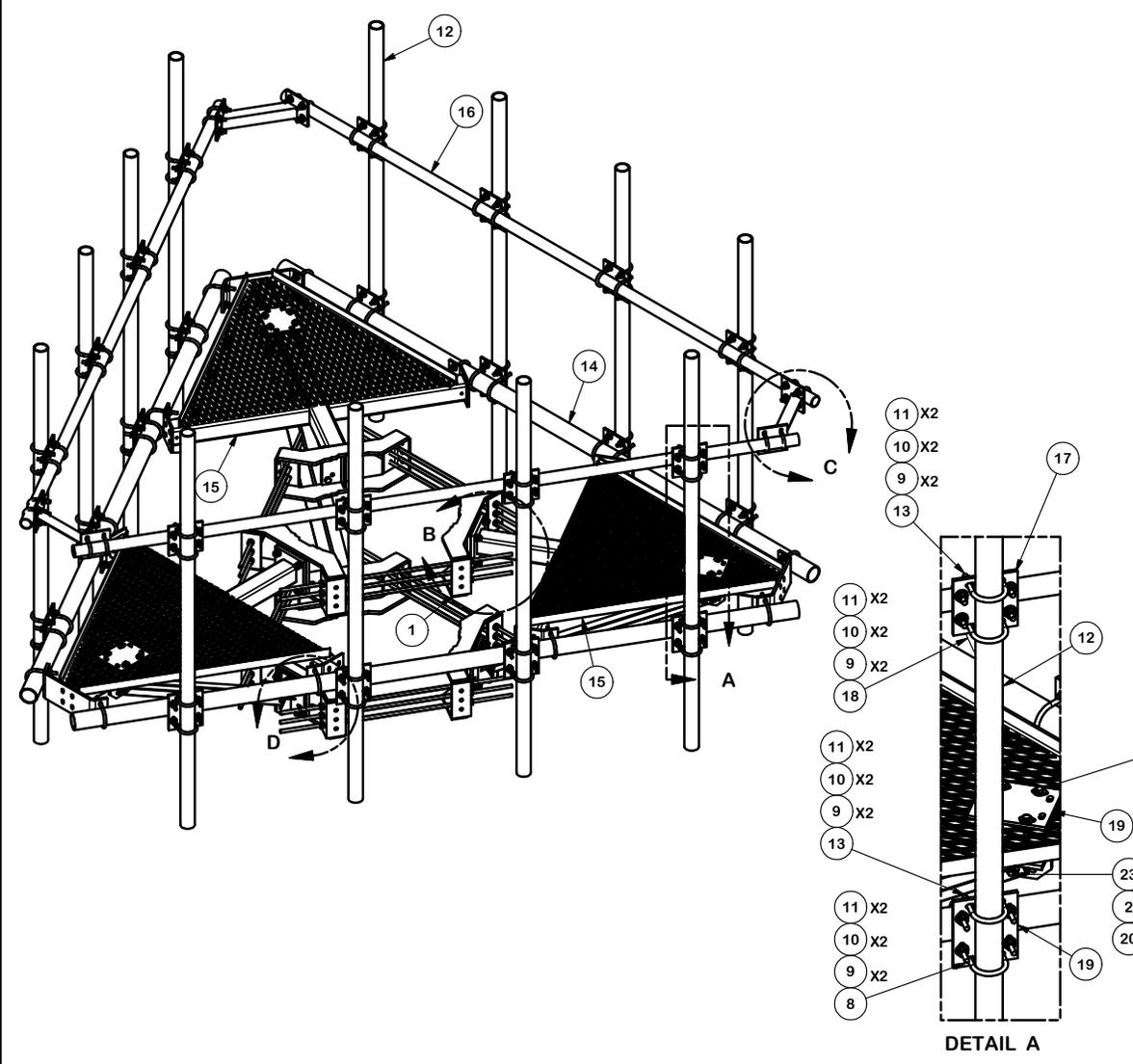
(for example only, final equipment design,
models, and configurations may differ)



Typical Verizon Antenna Level Equipment:
Equipment Mount (SitePro1 RMQP-4096-HK)
Surge Suppressor (Raycap RVZDC-6627-PF-48 or similar)
Antenna (Commscope NHH-45B-R2B)
Antenna (Commscope NHH-65B-R2B)
Antenna (Samsung MT6407)
RRH (Samsung RF4439d-25A)
RRH (Samsung RF4440d-13A)



Typical Verizon Ground Level Equipment:
Equipment Cabinet (Commscope CMC74-36E Equipment Cabinet)
Equipment Cabinet (Commscope CMC74-36B Battery Cabinet)
Weather Canopy (Perfect Vision PV-WC1012-B)
20kW Generator (Kohler Power 20REOZK-C) with a 105 gallon UL-142 listed double walled fuel tank
RFS Hybriflex or Masterline Low Inductance Hybrid Cables (or similar)



PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	6	X-LWRM	RING MOUNT WELDMNT		68.81	412.85
2	66	G58LW	5/8" HDG LOCKWASHER		0.03	1.72
3	60	A58NUT	5/8" HDG A325 HEX NUT		0.13	7.79
4	18	G58R-24	5/8" x 24" THREADED ROD (HDG.)		2.09	37.63
5	18	G58R-48	5/8" x 48" THREADED ROD (HDG.)		4.18	75.27
6	24	A58234	5/8" x 2-3/4" HDG A325 HEX BOLT	2 3/4 in	0.36	8.54
7	24	A58FW	5/8" HDG A325 FLATWASHER		0.03	0.82
8	36	X-UB1306	1/2" X 3-5/8" X 6" X 3" U-BOLT (HDG.)		0.83	29.82
9	264	G12FW	1/2" HDG USS FLATWASHER	3/32 in	0.03	9.00
10	252	G12LW	1/2" HDG LOCKWASHER	1/8 in	0.01	3.50
11	252	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	18.05
12	12	P3096	2-7/8" OD X 96" SCH 40 GALVANIZED PIPE	96 in	49.24	590.88
13	48	X-UB1300	1/2" X 3" X 5" X 2" U-BOLT (HDG.)		0.67	32.11
14	3	P3150	3-1/2" X 150" (3" SCH 40) GALVANIZED PIPE	150 in	94.80	284.40
15	3	X-SV196	LOW PROFILE PLATFORM CORNER		212.10	636.31
16	3	P2150	2-3/8" O.D. X 150" SCH 40 GALVANIZED PIPE	150 in	45.77	137.31
17	12	SCX2	CROSSOVER PLATE	7 in	4.80	57.56
18	36	X-UB1212	1/2" X 2-1/2" X 4-1/2" X 2" U-BOLT (HDG.)		0.60	21.50
19	15	SCX4	CROSSOVER PLATE	8 1/2 in	6.02	90.32
20	6	G58NUT	5/8" HDG HEAVY 2H HEX NUT		0.13	0.78
21	6	X-253993	PLATFORM REINFORCEMENT KIT ANGLE	52 25/32 in	14.33	85.99
22	6	X-TBW	T-BRACKET WELDMNT		13.60	81.60
23	6	G5802	5/8" x 2" HDG HEX BOLT GR5		0.27	1.62
24	12	G12065	1/2" x 6-1/2" HDG HEX BOLT GR5 FULL THREAD	5 1/2 in	0.41	4.91
25	3	X-AHCP	ANGLE HANDRAIL CORNER PLATE		12.92	38.76
					TOTAL WT. #	2669.03

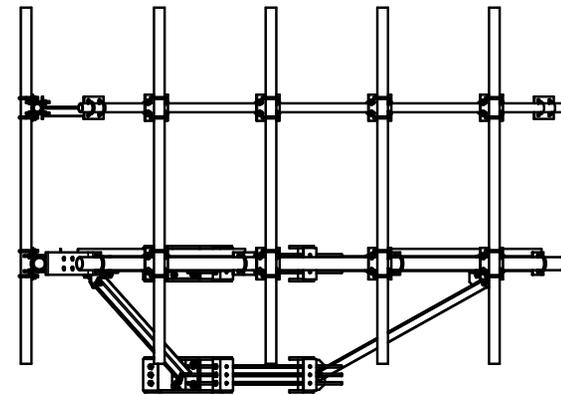
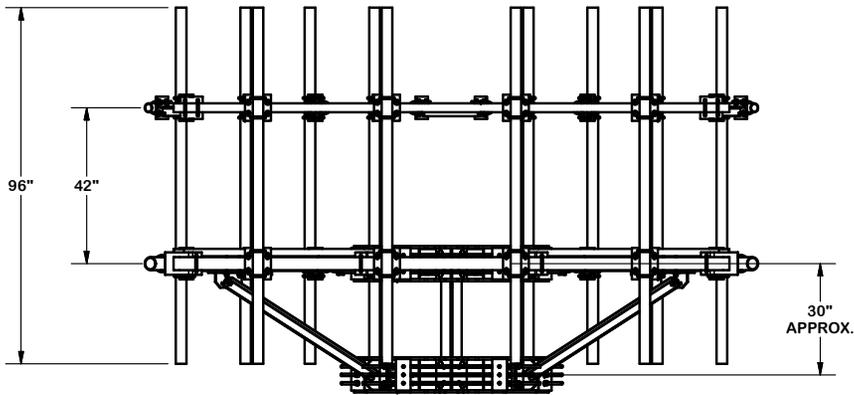
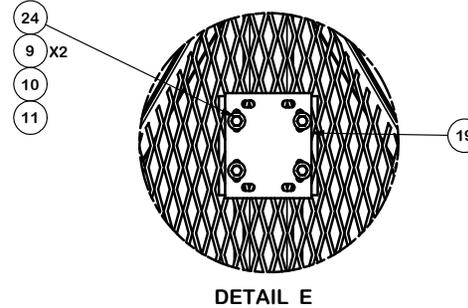
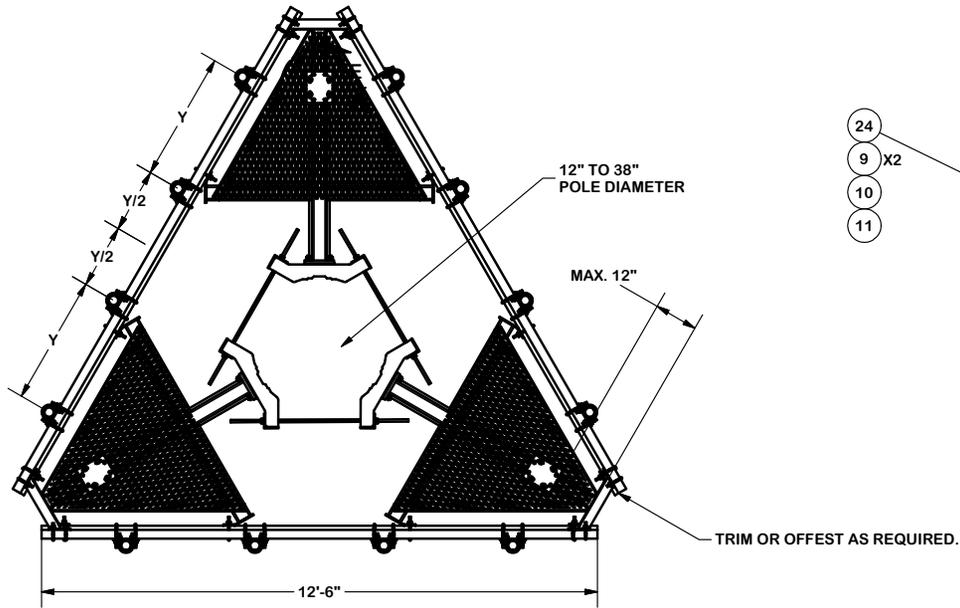
REV	DESCRIPTION OF REVISIONS	CPD	BY	DATE
B	CHANGED X-253992 TO X-TBW		CEK	9/20/2018
A	REPLACED HCP WITH X-AHCP	4488	CEK	7/14/2014
REVISION HISTORY				

TOLERANCE NOTES
 TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
 SAWED, SHEARED AND GAS CUT EDGES ($\pm 0.030"$)
 DRILLED AND GAS CUT HOLES ($\pm 0.030"$) - NO CONING OF HOLES
 LASER CUT EDGES AND HOLES ($\pm 0.010"$) - NO CONING OF HOLES
 BENDS ARE $\pm 1/2$ DEGREE
 ALL OTHER MACHINING ($\pm 0.030"$)
 ALL OTHER ASSEMBLY ($\pm 0.060"$)

PROPRIETARY NOTE:
 THE DATA AND TECHNIQUES CONTAINED IN THIS DRAWING ARE PROPRIETARY INFORMATION OF VALMONT INDUSTRIES AND CONSIDERED A TRADE SECRET. ANY USE OR DISCLOSURE WITHOUT THE CONSENT OF VALMONT INDUSTRIES IS STRICTLY PROHIBITED.

DESCRIPTION 12' 6" LOW PROFILE PLATFORM WITH TWELVE 2-7/8" ANTENNA MOUNTING PIPES, AND HANDRAIL	
CPD NO. 4488	DRAWN BY CEK 3/24/2014
CLASS 81	SUB 02
DRAWING USAGE CUSTOMER	ENG. APPROVAL BMC 7/14/2014

 A valmont COMPANY	Locations: New York, NY Atlanta, GA Los Angeles, CA Plymouth, IN Salem, OR Dallas, TX
	Engineering Support Team: 1-888-753-7446
PART NO. RMQP-4096-HK	DWG. NO. RMQP-4096-HK



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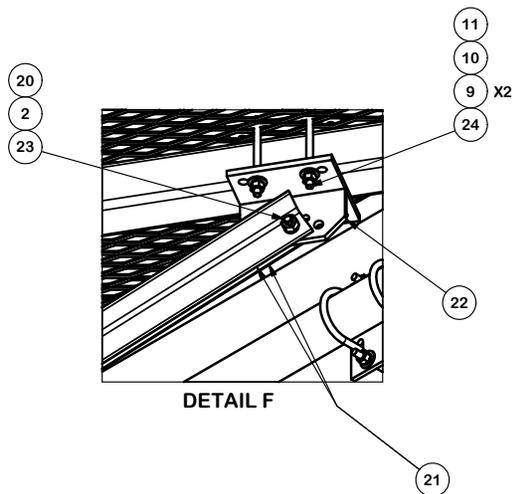
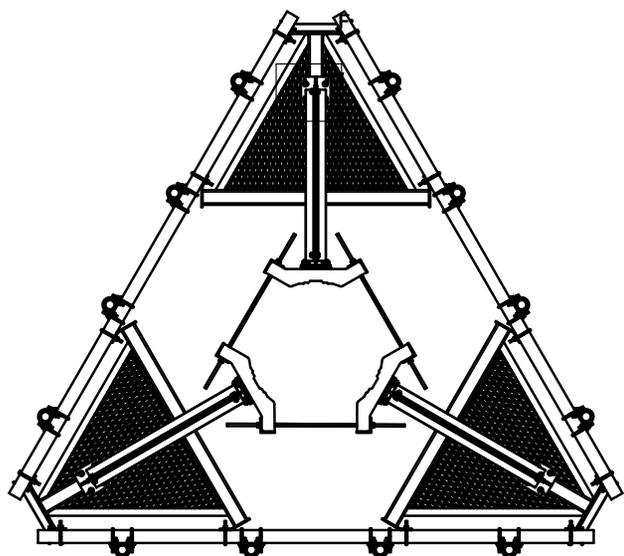
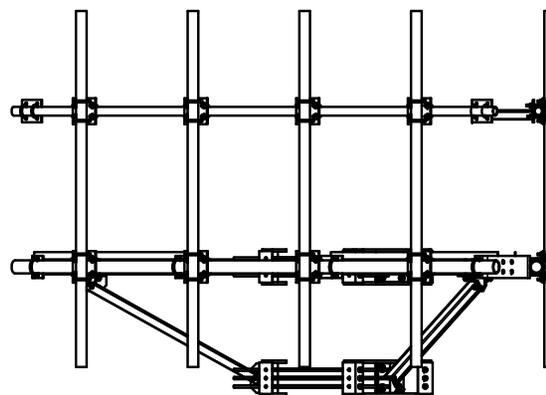
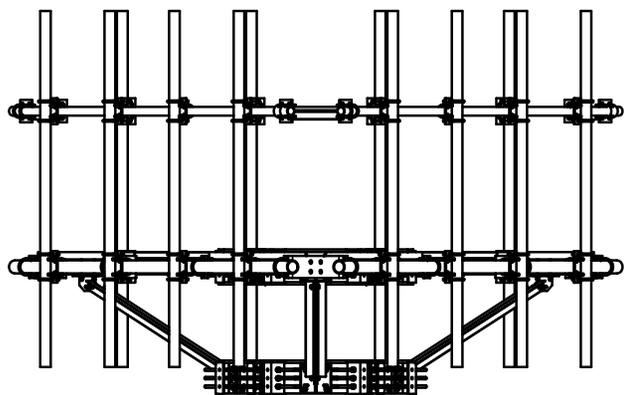
DESCRIPTION
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 WITH TWELVE 2-7/8" ANTENNA MOUTING
 PIPES, AND HANDRAIL

SITE PRO 1
 A valmont COMPANY
 Locations:
 New York, NY
 Atlanta, GA
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PART NO. RMQP-4096-HK	PAGE 2 OF 3
DWG. NO. RMQP-4096-HK	



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CPD NO. 4488 DRAWN BY CEK 3/24/2014

ENG. APPROVAL

PART NO. RMQP-4096-HK

CLASS SUB 81 02

DRAWING USAGE CUSTOMER

CHECKED BY BMC 7/14/2014

DWG. NO. RMQP-4096-HK

REV	DESCRIPTION OF REVISIONS	CPD	BY	DATE
B	CHANGED X-253992 TO X-TBW		CEK	9/20/2018
A	REPLACED HCP WITH X-AHCP	4488	CEK	7/14/2014
REVISION HISTORY				

DC Surge Protection for RRH/Integrated Antenna Radio Head RVZDC-6627-PF-48

Tower / Base / Rooftop

Raycap's flexible Tower, Base Stations and Rooftop protection and Distribution products provide protection for up to 12 Remote Radio Heads/Integrated Antennas. The solutions mitigate the risk of damage due to lightning and provide high levels of availability and reliability to radio equipment.



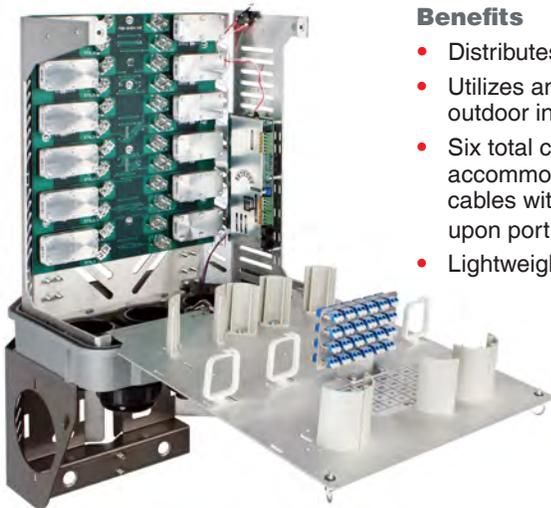
Mounting Bracket Included

Features

- Designed for distribution to 12 RRH circuits, DC power and fiber optics.
- Alarms for moisture detection and intrusion
- Digital Voltmeter with twelve (12) position switch to monitor each DC circuit
- Power alarms for wiring anomalies and power disruptions
- Employs the Strikesorb® 30-V1-2CHV Surge Protective Device (SPD) specifically designed for the Remote Radio Head (RRH) installation environment and certified for use in DC applications and at low DC operating voltages (48V)
- The Strikesorb 30-V1-2CHV is a Class I SPD certified by VDE per the IEC 61643-11 standard as suitable for installation in areas where direct lightning exposure is expected. Strikesorb 30-V1-2CHV is able to withstand direct lightning currents of up to 5kA (10/350) and induced surge currents of up to 60kA (8/20)
- Provides very low let through / clamping voltage - unique for a Class I product - as it does not employ spark gaps or other switching elements. Strikesorb offers unique protection levels to the RRH equipment as well as the Base Band Units
- RS485 communication link uses two (2) twisted pair (+ground) wires per hybrid cable, and communicates all voltage, boost system and alarm data
- Patent pending design

Benefits

- Distributes DC up to 12 Remote Radio Heads and connects up to 24 LC fiber pairs
- Utilizes an IP 67 rated enclosure, also rated to NEBS and UL, allowing for indoor or outdoor installation on a roof or tower top
- Six total cable ports for cable access with custom configurable UL rated glands that accommodate varying diameters of hybrid (combined power and fiber optic) or standard cables with diameters up to 2" (will fit most standard 1 5/8" coax class cables), depending upon port configuration
- Lightweight aerodynamic design provides maximum flexibility for tower top installation



Strikesorb
30-V1-2CHV

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G02-01-033 170615

SPECIFICATIONS

DC Surge Protection for RRH/Integrated Antenna Radio Head RVZDC-6627-PF-48

Tower / Base / Rooftop

Electrical

Model Numbers	RVZDC-6627-PF-48
Nominal Operating Voltage	48 VDC
Nominal Discharge Current [I_n]	20kA 8/20 μ s
Maximum Surge Current [I_{max}]	60kA 8/20 μ s
Maximum Impulse (Lightning) Current per IEC 61643-11	5 kA 10/350 μ s
Maximum Continuous Operating Voltage [U_c]	75 VDC
Voltage Protection Rating (VPR) per UL 1449 4th Edition	400V
Protection Class as per IEC 61643-11	Class I
Power Alarm	cross polarity, short circuit, or power outage
Intrusion Sensor	microswitch
Moisture Sensor	infrared moisture detector
Strikesorb Module Type	30-V1-2CHV Strikesorb modules installed to protect 12 Remote Radio Heads
Power Boost Ready	RS485 twisted pair connection available

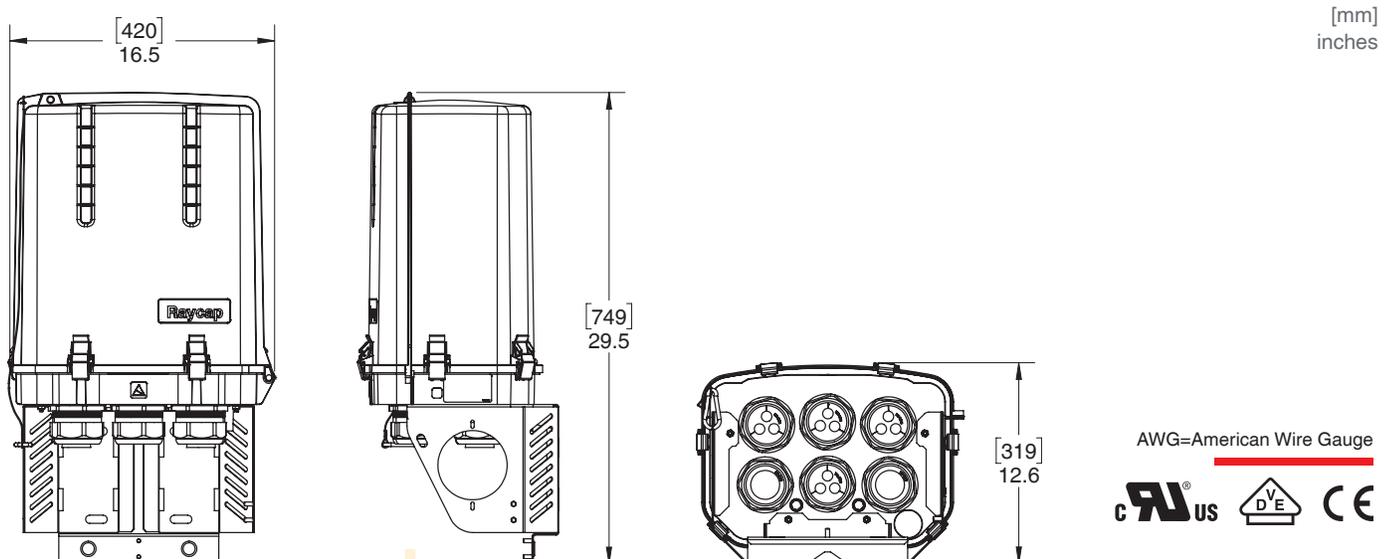
Mechanical

Suppression Connection Method	Compression lug, #14 - #2 AWG (2 mm ² - 33 mm ²)
Fiber Connection Method	LC-LC Single mode
Pressure Equalizing Vent	Gore™ Vent
Environmental Rating	IP 67
Operating Temperature	-40° C to +80° C
UV Resistant	Yes
Dimensions (L x W x H)	12.6" x 16.5" x 29.5" [319mm x 420mm 749mm]
Weight	System: 32 lbs (14.51 kg)
Combined Wind Loading	150mph (sustained): 185 lbs (823 N)

Standards Compliance

Strikesorb modules are compliant to the following Surge Protective Device (SPD) Standards	
Standards	UL 1449 4 th Edition, IEC 61643-11:2011, EN 61643-11:2012, IEEE C62.11, IEEE C62.41.2, IEEE C62.45 NEBS certified to: GR-63-CORE Issue 4, GR-1089-CORE Issue 6, GR-3108-CORE Issue 3, GR-487-CORE Issue 4, GR-950-CORE Issue 1

Product Diagram



AWG=American Wire Gauge



Raycap

www.raycap.com

G02-01-033 170615

NHH-45B-R2B

6-port sector antenna, 2x 698–896 and 4x 1695–2360 MHz, 45° HPBW, 2x RETs and 2x SBTs. Both high bands share the same electrical tilt.



- Narrow beamwidth capacity antenna for higher level of densification and enhanced data throughput
- Internal SBT on low and high band allow remote RET control from the radio over the RF jumper cable
- Separate RS-485 RET input/output for low and high band
- One LB RET and one HB RET. Both high bands are controlled by one RET to ensure same tilt level for 4x Rx or 4x MIMO

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain, dBi	16.8	17.5	19.3	19.9	20.3	20.8
Beamwidth, Horizontal, degrees	48	43	45	43	41	39
Beamwidth, Vertical, degrees	12.5	11.4	5.8	5.4	5.0	4.5
Beam Tilt, degrees	2–14	2–14	0–8	0–8	0–8	0–8
USLS (First Lobe), dB	19	22	18	18	18	17
Front-to-Back Ratio at 180°, dB	34	39	37	38	40	38
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	28	28	28	28
VSWR Return Loss, dB	1.5 14.0	1.5 14.0	1.5 14.0	1.5 14.0	1.5 14.0	1.5 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	300	300	300	300	300	250
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm					

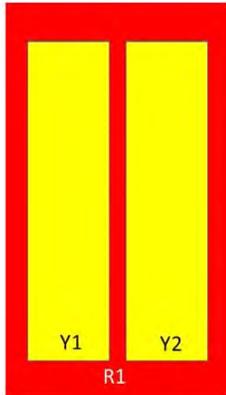
Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	16.5	17.2	19.1	19.8	20.2	20.8
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.4	±0.5	±0.4	±0.4	±0.3
Gain by Beam Tilt, average, dBi	2 ° 16.5	2 ° 17.3	0 ° 19.0	0 ° 19.7	0 ° 20.0	0 ° 20.6
	8 ° 16.6	8 ° 17.4	4 ° 19.2	4 ° 19.9	4 ° 20.2	4 ° 20.9
	14 ° 16.3	14 ° 16.9	8 ° 19.0	8 ° 19.7	8 ° 20.2	8 ° 20.6
Beamwidth, Horizontal Tolerance, degrees	±1.5	±2.8	±1.8	±1	±2.7	±1.4
Beamwidth, Vertical Tolerance, degrees	±0.7	±0.6	±0.3	±0.2	±0.3	±0.1
USLS, beampeak to 20° above beampeak, dB	19	23	16	17	16	16
Front-to-Back Total Power at 180° ± 30°, dB	24	24	29	31	33	33
CPR at Boresight, dB	25	26	19	20	18	17
CPR at Sector, dB	6	4	10	10	8	16

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, [download the whitepaper Time to Raise the Bar on BSAs.](#)

NHH-45BR2B

Array Layout

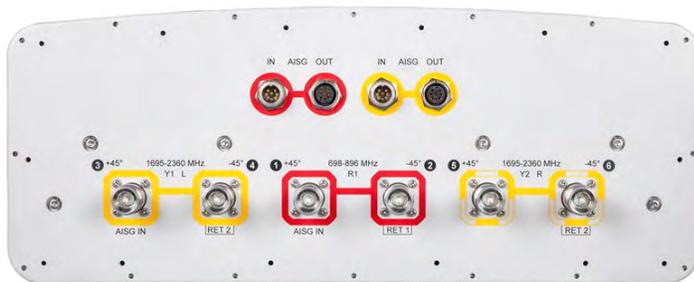


Array	Freq (MHz)	Conns	RET (SRET)	AISG RET UID
R1	698-896	1-2	1	ANxxxxxxxxxxxxxxxxx1
Y1	1695-2360	3-4	2	ANxxxxxxxxxxxxxxxxx2
Y2	1695-2360	5-6		

Left
Bottom Right

(Sizes of colored boxes are not true depictions of array sizes)

Port Configuration



General Specifications

Operating Frequency Band	1695 – 2360 MHz 698 – 896 MHz
Antenna Type	Sector
Band	Multiband
Performance Note	Outdoor usage
Total Input Power, maximum	800 W @ 50 °C

Mechanical Specifications

RF Connector Quantity, total	6
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NHH-45BR2B

RF Connector Quantity, low band	2
RF Connector Quantity, high band	4
RF Connector Interface	4.3-10 Female
Color	Light gray
Grounding Type	RF connector body grounded to reflector and mounting bracket
Radiator Material	Aluminum Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Location	Bottom
Wind Loading, frontal	1038.0 N @ 150 km/h 233.4 lbf @ 150 km/h
Wind Loading, lateral	234.0 N @ 150 km/h 52.6 lbf @ 150 km/h
Wind Speed, maximum	241 km/h 150 mph

Dimensions

Length	1829.0 mm 72.0 in
Width	457.0 mm 18.0 in
Depth	178.0 mm 7.0 in
Net Weight, without mounting kit	33.4 kg 73.6 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal Bias Tee	Port 1 Port 3
Internal RET	High band (1) Low band (1)
Power Consumption, idle state, maximum	1 W
Power Consumption, normal conditions, maximum	10 W
Protocol	3GPP/AISG 2.0 (Single RET)
RET Interface	8-pin DIN Female 8-pin DIN Male
RET Interface, quantity	2 female 2 male

Packed Dimensions

Length	1970.0 mm 77.6 in
Width	608.0 mm 23.9 in
Depth	346.0 mm 13.6 in
Shipping Weight	55.8 kg 123.0 lb

Regulatory Compliance/Certifications

Agency

RoHS 2011/65/EU
China RoHS SJ/T 11364-2006
ISO 9001:2008

Classification

Compliant by Exemption
Above Maximum Concentration Value (MCV)
Designed, manufactured and/or distributed under this quality management system



NHH-45BR2B

Included Products

BSAMNT-3 — Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

BSAMNT-M — Middle Downtilt Mounting Kit for Long Antennas for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor bracket set.

* Footnotes

Performance Note Severe environmental conditions may degrade optimum performance



NHH-65B-R2B

6-port sector antenna, 2x 698–896 and 4x 1695–2360 MHz, 65° HPBW, 2x RET. Both high bands share the same electrical tilt.

- Interleaved dipole technology providing for attractive, low wind load mechanical package
- Internal SBT on low and high band allow remote RET control from the radio over the RF jumper cable
- Separate RS-485 RET input/output for low and high band
- One RET for low band and one RET for both high bands to ensure same tilt level for 4x Rx or 4x MIMO

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain, dBi	14.9	15.0	17.7	17.9	18.4	18.7
Beamwidth, Horizontal, degrees	65	60	71	69	64	57
Beamwidth, Vertical, degrees	12.4	11.2	5.7	5.2	4.9	4.6
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS (First Lobe), dB	13	14	18	18	19	18
Front-to-Back Ratio at 180°, dB	30	29	31	30	29	31
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR Return Loss, dB	1.5 14.0	1.5 14.0	1.5 14.0	1.5 14.0	1.5 14.0	1.5 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port at 50°C, maximum, watts	300	300	300	300	300	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm					

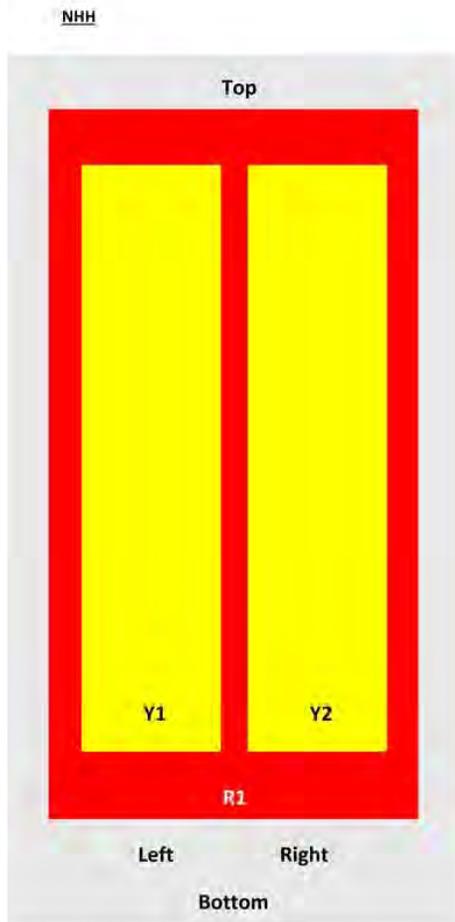
Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.5	17.3	17.7	18.1	18.5
Gain by all Beam Tilts Tolerance, dB	±0.6	±1.1	±0.4	±0.4	±0.5	±0.3
Gain by Beam Tilt, average, dBi	0° 14.4	0° 14.7	0° 17.2	0° 17.6	0° 18.0	0° 18.3
	7° 14.6	7° 14.7	4° 17.3	4° 17.7	4° 18.2	4° 18.5
	14° 14.3	14° 14.1	7° 17.3	7° 17.7	7° 18.1	7° 18.6
Beamwidth, Horizontal Tolerance, degrees	±2	±2.1	±3	±4.1	±6.5	±2.9
Beamwidth, Vertical Tolerance, degrees	±0.7	±0.7	±0.3	±0.2	±0.3	±0.2
USLS, beampeak to 20° above beampeak, dB	13	14	16	16	17	15
Front-to-Back Total Power at 180° ± 30°, dB	23	22	27	27	25	25
CPR at Boresight, dB	22	21	23	23	22	19
CPR at Sector, dB	10	7	16	13	11	4

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, [download the whitepaper Time to Raise the Bar on BSAs.](#)

NHH-65BR2B

Array Layout



Array	Freq (MHz)	Conns	RET (SRET)	AISG RET UID
R1	698-896	1-2	1	ANXXXXXXXXXXXXX1
Y1	1695-2360	3-4	2	ANXXXXXXXXXXXXX2
Y2	1695-2360	5-6		

View from the front of the antenna

(Sizes of colored boxes are not true depictions of array sizes)

General Specifications

Operating Frequency Band	1695 – 2360 MHz 698 – 896 MHz
Antenna Type	Sector
Band	Multiband
Performance Note	Outdoor usage
Total Input Power, maximum	600 W @ 50 °C

Mechanical Specifications

RF Connector Quantity, total	6
RF Connector Quantity, low band	2

NHH-65BR2B

RF Connector Quantity, high band	4
RF Connector Interface	7-16 DIN Female
Color	Light gray
Grounding Type	RF connector body grounded to reflector and mounting bracket
Radiator Material	Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Location	Bottom
Wind Loading, frontal	278.0 N @ 150 km/h 62.5 lbf @ 150 km/h
Wind Loading, lateral	230.0 N @ 150 km/h 51.7 lbf @ 150 km/h
Wind Loading, maximum	537.0 N @ 150 km/h 120.7 lbf @ 150 km/h
Wind Speed, maximum	241 km/h 150 mph

Dimensions

Length	1828.0 mm 72.0 in
Width	301.0 mm 11.9 in
Depth	180.0 mm 7.1 in
Net Weight, without mounting kit	19.8 kg 43.7 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal Bias Tee	Port 1 Port 3
Internal RET	High band (1) Low band (1)
Power Consumption, idle state, maximum	2 W
Power Consumption, normal conditions, maximum	13 W
Protocol	3GPP/AISG 2.0 (Single RET)
RET Interface	8-pin DIN Female 8-pin DIN Male
RET Interface, quantity	2 female 2 male

Packed Dimensions

Length	1952.0 mm 76.9 in
Width	409.0 mm 16.1 in
Depth	299.0 mm 11.8 in
Shipping Weight	32.3 kg 71.2 lb

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

NHH-65BR2B



Included Products

BSAMNT-1 — Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

* Footnotes

Performance Note Severe environmental conditions may degrade optimum performance

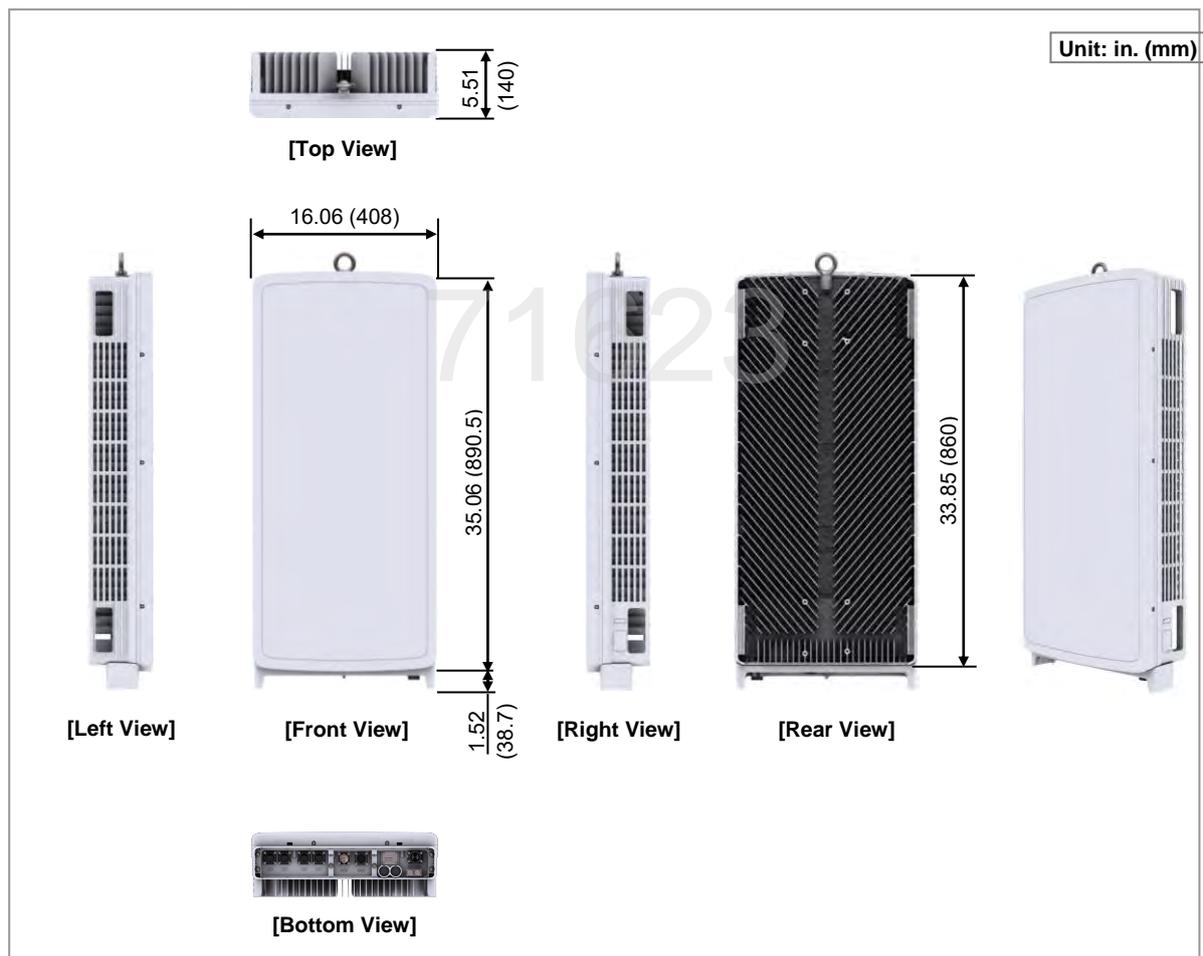
Chapter 2 Before Installation

This chapter introduces the MMU system and describes the equipment and items you should know before installation.

System Configuration and Interface

This section provides the pictorial view of the MMU and its interfaces.

Figure 2. MMU Configuration



Specifications

The following table outlines the main specifications of the MMU.

Table 1. Specifications

Item	MT6407
Air technology	5G NR
Operating Frequency (MHz)	3,700 to 3,980 MHz (n77)
RF Chain	64T64R
RF Output Power	200W Max
Carrier Bandwidth	20/40/60/80/100MHz
Optic Interface	25Gbps x 4, CPRI/eCPRI
Max. No. of Carriers	2 (Contiguous, Non-Contiguous)
Antenna Configuration	4V16H with 192AE (3x1 Sub-Array, H 0.54λ V 0.78λ @3,840MHz)
EIRP(User Beam Gain)	(User Beam Gain = 25.5dBi) 78.5dbm
IBW/OBW	280M/200M
Capacity	<ul style="list-style-type: none"> NR 1C: 20/40/60/80/100M NR 1CC+1CC 20/40/60/80/100M+ 20/40/60/80/100M
Layer	<ul style="list-style-type: none"> DL: 16Layers UL: 8Layers (16Rx) per Carrier
Input Voltage	<ul style="list-style-type: none"> -48 V DC (-38 V DC to -57 V DC)
External Alarm	UDA Support
Operating Temperature a)	-40 to 55°C (without solar load)
Operating Humidity a)	5 % - 100 % RH, non-condensing, not to exceed 30 g/m3 absolute humidity.
Dimensions (W × H × D, in.)	<ul style="list-style-type: none"> 16.06 × 35.06 × 5.51 (408 mm × 890.5 mm × 140 mm) (50.95 L)
Weight (kg)	<ul style="list-style-type: none"> 37 or less (without Bracket)
Cooling	<ul style="list-style-type: none"> Natural Convection cooling
Waterproof/Dustproof	<ul style="list-style-type: none"> IEC 60529 IP65
Earthquake	Telcordia GR-63-Core, Zone4
Power Consumption (W)	1,395 @ 100% RF load, room temperature 1,428 @ 100% RF load, all temperature

a) Temperature and humidity are measured at 1.5 m above the floor and at 400 mm away from the front panel of the equipment.

SAMSUNG

700/850MHZ MACRO RADIO

DUAL-BAND AND HIGH POWER
FOR MACRO COVERAGE

Samsung's future proof dual-band radio is designed to help effectively increase the coverage areas in wireless networks. This 700/850MHz 4T4R dual-band radio has 4Tx/4Rx to 2Tx/2Rx RF chains options and a total output power of 320W, making it ideal for macro sites.

Model Code RF4440d-13A



Homepage
[samsungnetworks.com](https://www.samsungnetworks.com)

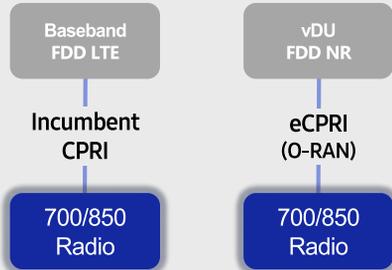


Youtube
www.youtube.com/samsung5g

Points of Differentiation

Continuous Migration

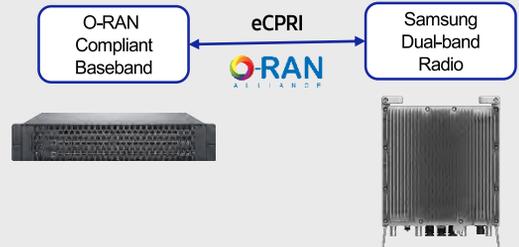
Samsung's 700/850MHz macro radio can support each incumbent CPRI interface as well as an advanced eCPRI interface. This feature provides installable options for both legacy LTE networks and added NR networks.



O-RAN Compliant

A standardized O-RAN radio can help when implementing cost-effective networks because it is capable of sending more data without compromising additional investments.

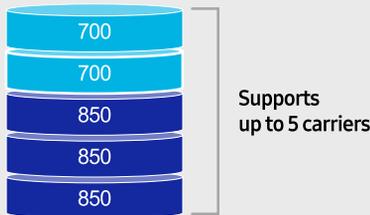
Samsung's state-of-the-art O-RAN technology will help accelerate the effort toward constructing a solid O-RAN ecosystem.



Optimum Spectrum Utilization

The number of required carriers varies according to site (region). The ability to support many carriers is essential for using all frequencies that the operator has available.

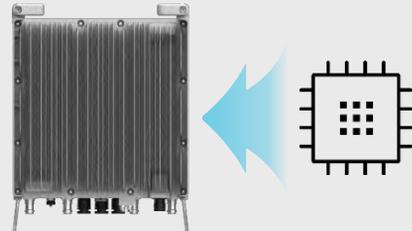
The new 700/850MHz dual-band radio can support up to 2 carriers in the B13 (700MHz) band and 3 carriers in the B5 (850MHz) band, respectively.



Secured Integrity

Access to sensitive data is allowed only to authorized software.

The Samsung radio's CPU can protect root of trust, which is credential information to verify SW integrity, and secure storage provides access control to sensitive data by using dedicated hardware (TPM).



Technical Specifications

Item	Specification
Tech	LTE / NR
Brand	B13(700MHz), B5(850MHz)
Frequency Band	DL: 746 – 756MHz, UL: 777 – 787MHz DL: 869 – 894MHz, UL: 824 – 849MHz
RF Power	(B13) 4 × 40W or 2 × 60W (B5) 4 × 40W or 2 × 60W
IBW/OBW	(B13) 10MHz / 10MHz (B5) 25MHz / 25MHz
Installation	Pole, Wall
Size/Weight	14.96 x 14.96 x 9.05inch (33.2L) / 70.33 lb

SAMSUNG

AWS/PCS MACRO RADIO

DUAL-BAND AND HIGH POWER
FOR MACRO COVERAGE

Samsung's future proof dual-band radio is designed to help effectively increase the coverage areas in wireless networks. This AWS/PCS 4T4R dual-band radio has 4Tx/4Rx to 2Tx/2Rx RF chains options and a total output power of 320W, making it ideal for macro sites.

Model Code RF4439d-25A



Homepage
samsungnetworks.com

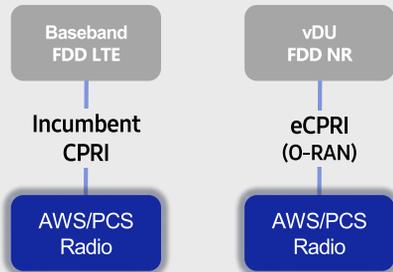


Youtube
www.youtube.com/samsung5g

Points of Differentiation

Continuous Migration

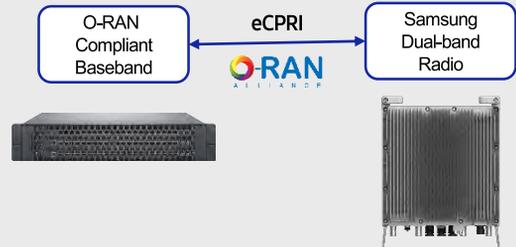
Samsung's AWS/PCS macro radio can support each incumbent CPRI interface as well as advanced eCPRI interfaces. This feature provides installable options for both legacy LTE networks and added NR networks.



O-RAN Compliant

A standardized O-RAN radio can help in implementing cost-effective networks, which are capable of sending more data without compromising additional investments.

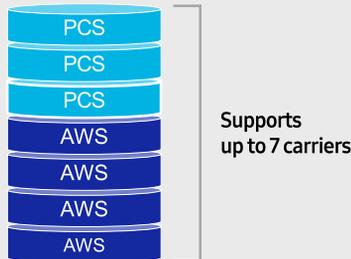
Samsung's state-of-the-art O-RAN technology will help accelerate the effort toward constructing a solid O-RAN ecosystem.



Optimum Spectrum Utilization

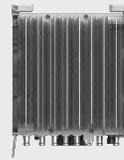
The number of required carriers varies according to site (region). Supporting many carriers is essential for using all frequencies that the operator has available.

The new AWS/PCS dual-band radio can support up to 3 carriers in the PCS (1.9GHz) band and 4 carriers in the AWS (2.1GHz) band, respectively.



Brand New Features in a Compact Size

Samsung's AWS/PCS macro radio offers several features, such as dual connectivity for baseband for both CDU and vDU, O-RAN capability, more carriers and an enlarged PCS spectrum, combined into an incumbent radio volume of 36.8L.



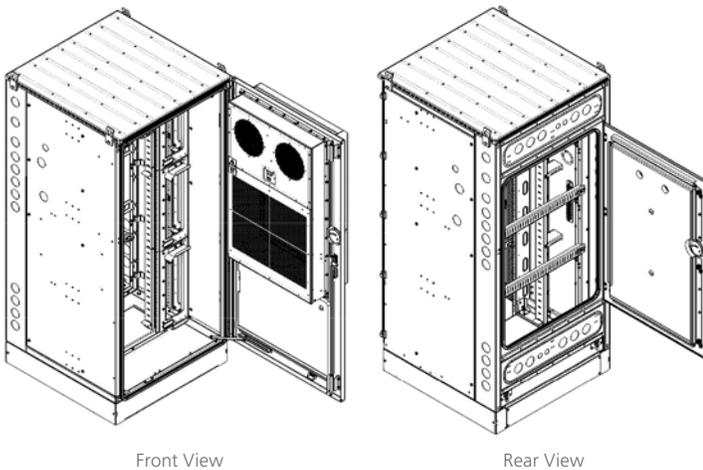
- 2 FH connectivity
- O-RAN capability
- More carriers and spectrum

Same as an incumbent radio volume

Technical Specifications

Item	Specification
Tech	LTE / NR
Brand	B25(PCS), B66(AWS)
Frequency Band	DL: 1930 – 1995MHz, UL: 1850 – 1915MHz DL: 2110 – 2200MHz, UL: 1710 – 1780MHz
RF Power	(B25) 4 × 40W or 2 × 60W (B66) 4 × 60W or 2 × 80W
IBW/OBW	(B25) 65MHz / 30MHz (B66) DL 90MHz, UL 70MHz / 60MHz
Installation	Pole, Wall
Size/Weight	14.96 x 14.96 x 10.04inch (36.8L) / 74.7lb

Model 760250058



Cabinet Features

Dimensions

Overall 74" H X 43.7" D X 36" W

(standard height, depth with air conditioner)

- With Optional 6" Plinth – 80" H X 43.7" D X 36" W (depth with air conditioner)
- Footprint – 37" D X 36" W (depth without air conditioner)

Weight: 525 lbs. (238 kg)

Weight: as Shipped: 701 lbs. (318 kg)

- Note: Cabinet Weights are without Plinth (112.4 lbs. [51 kg])

Equipment Compartment

- 4 kW Air Conditioner, DC*
- Adjustable Equipment Rack System, Up to 49 RU
 - Up to 40 RU of 23" EIA Horizontal Rack Space
 - Up to 9 RU of 19" EIA Vertical Rack Space
- Cabinet Light
- 4-Position GFCI Outlet
- Hinged Rear Access Door
- Two Interchangeable Rear Port Panels
 - Cabinet Ships with One Conduit Knockout Panel and One Blank Panel.
 - Note: Roxtec, 4-inch, Rear Panel available as optional order**.
- Knockouts on Left and Right Sides, Rear
- Solar Shield, Top
- Puck Lock System Intrusion Prevention, Front and Rear Doors
 - Cabinet can use both Electronic and Standard Keyed Puck Locks

Telcordia GR-487 Compliant

Safety Agency Listed

* Hardened Equipment to -40° C to +65° C

** See CommScope CMC Cabinet Factory Installed Unit (FIU) Options

CMC Cabinet Ordering Information

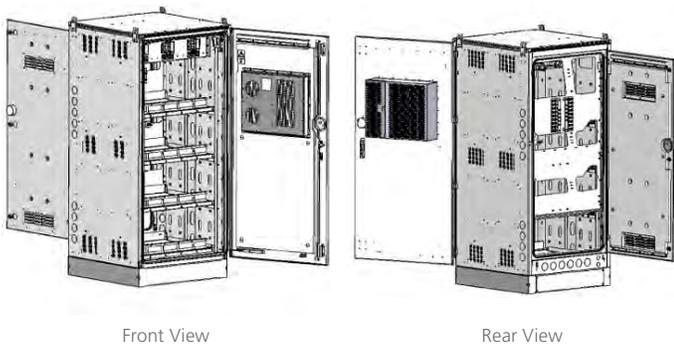
PeopleSoft Part #	Description
760250058	CMC74-36E, Equipment Cabinet, 4 kW Air Conditioner, DC

Field Replacement Units and Aftermarket Kits

PeopleSoft Part #	Description
Field Replacement Units (FRUs)	
760250972	Front Door Assembly, 4kW Air Conditioner, CMC74-36E
760250922	Handle, Front Door
760250960	Rear Door Assembly
760250935	4 kW Air Conditioner, DC
760250926	Interchangeable Conduit Panel, Rear
760250927	Solar Shield, Top
Aftermarket Kits (AMKs)	
760246443	AMK, Interconnect, 3PR, 4/0, 2", CMC74-36B
760250929	AMK, Non Electronic Puck Lock, Keyed
760251443	AMK, CMC74/85, Top Hat, Fiber Storage
760250933	AMK, 6" High Plinth, Cabinet Mounting
SK-BSP-STDV	AMK, Puck Lock, SES

NOTE: The CommScope Part # and Verizon Wireless PeopleSoft #'s are the same.

Model 760250540, 760250964, 760251393, 760251444



Cabinet Features

Dimensions

Overall 74" H x 43.7" D x 36" W

(standard height, depth with air conditioner)

- With Optional 6" Plinth – 80" H x 43.7" D x 36" W (depth with air conditioner)
- Footprint – 37" D x 36" W (depth without air conditioner)

Weight: 1060 lbs. (481 kg) – for 6-String Cabinet

Weight as Shipped: 1237 lbs. (561 kg)

- Note: Cabinet Weights are without Plinth (112.4 lbs. [51 kg]) For 5, 3, and 2-string cabinets reduce weight by 36 lbs. (16.3 kg) per string.

Battery Compartment

- 1 kW HVAC with 500 W Heater, DC*
- 4 Battery Shelves, 6-String Capacity of 24 HT200 Ah VRLA Batteries
- Master Circuit Breaker String Panel with 6 each 250-amp String Circuit Breaker Switches
- CommScope Battery Bus Bar Assembly
 - Collection Point for Battery Cabling
 - Connection Point for Battery Cabling to the Power Cabine
 - Maximum Cable Size of 4.0 AWG from Battery to Power Cabinet
- Cabinet Light
- Hinged Rear Access Door with Upper and Lower Vents
- Knockouts on Left and Right Sides, Rear
- Top and Side Solar Shields
 - Side Shield Fits Left and Right Sides, Pending Cabinet Site Orientation (one cabinet side shield only)
- Puck Lock System Intrusion Prevention, Front and Rear Doors
 - Cabinet can use both Electronic and Standard Keyed Puck Locks

CMC Cabinet Ordering Information

PeopleSoft Part #	Description
760250540	CMC74-36B, VRLA Battery Cabinet, 6-String, 1 kW HVAC with 500 W Heater, DC
760250964	CMC74-36B, VRLA Battery Cabinet, 5-String, 1 kW HVAC with 500 W Heater, DC
760251393	CMC74-36B, VRLA Battery Cabinet, 3-String, 1 kW HVAC with 500 W Heater, DC
760251444	CMC74-36B, VRLA Battery Cabinet, 2-String, 1 kW HVAC with 500 W Heater, DC

**Telcordia GR-487 Compliant
Safety Agency Listed**

* Hardened Equipment to -40° C to +65° C

Field Replacement Units and Aftermarket Kits

PeopleSoft Part #	Description
Field Replacement Units (FRUs)	
760250922	Handle, Front Door
760250925	1 kW HVAC with 500 W Heater, DC
760250928	Circuit Breaker, Battery String, 250 A
760250958	Handle, Front Door 1 kW HVAC with 500 W Heater, DC Circuit Breaker, Battery String, 250 A
760250573	Rear Door Assembly, CMC74-36B
760250961	Solar Shield, Side
760250927	Solar Shield, Top
Aftermarket Kits (AMKs)	
760246443	AMK, Interconnect, 3PR, 4/0, 2", CMC74-36B
760250929	Non Electronic Puck Lock, Keyed
760250933	6" High Plinth, Cabinet Mounting
SK-BSP-STDV	AMK, Puck Lock, SES

NOTE: The CommScope Part # and Verizon Wireless PeopleSoft #'s are the same.

20RE0ZK-C

20 kW Generator



KOHLER[®]
IN POWER. SINCE 1920.

THE ULTIMATE POWER SOLUTION FOR SMALL SPACES.

Ideal for the telecom industry, our 20REOZK-C is built to belong in tight locations — all while packing the power you need to backup your towers for years to come.

COMPACT FOOTPRINT

Our reduced rectangular footprint is specially designed for cell tower platform applications, while still providing easy maintenance touch points and 48 hours of runtime.

RELIABLE POWER

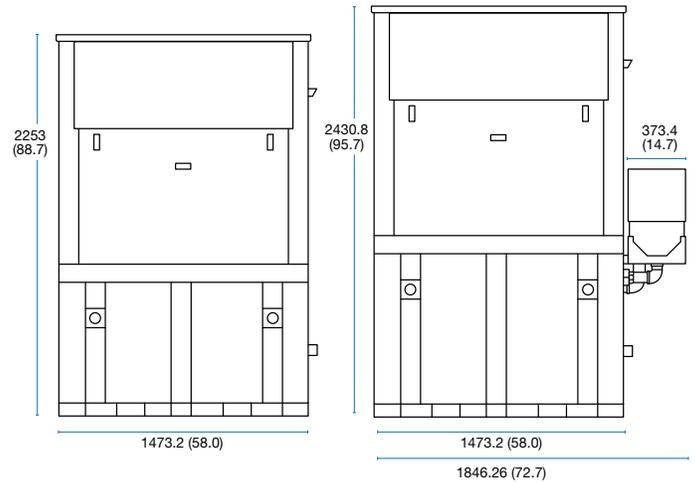
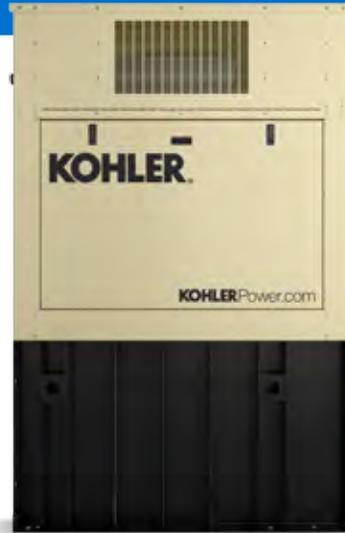
Our direct engine/alternator design eliminates the possibility of generator failure due to improper adjustment or belt breakdowns.

SINGLE-SIDE SERVICE

Maintenance is made easy with one service area. All frequently serviced touch points are located on the same side, and accessible by easy-to-remove doors.

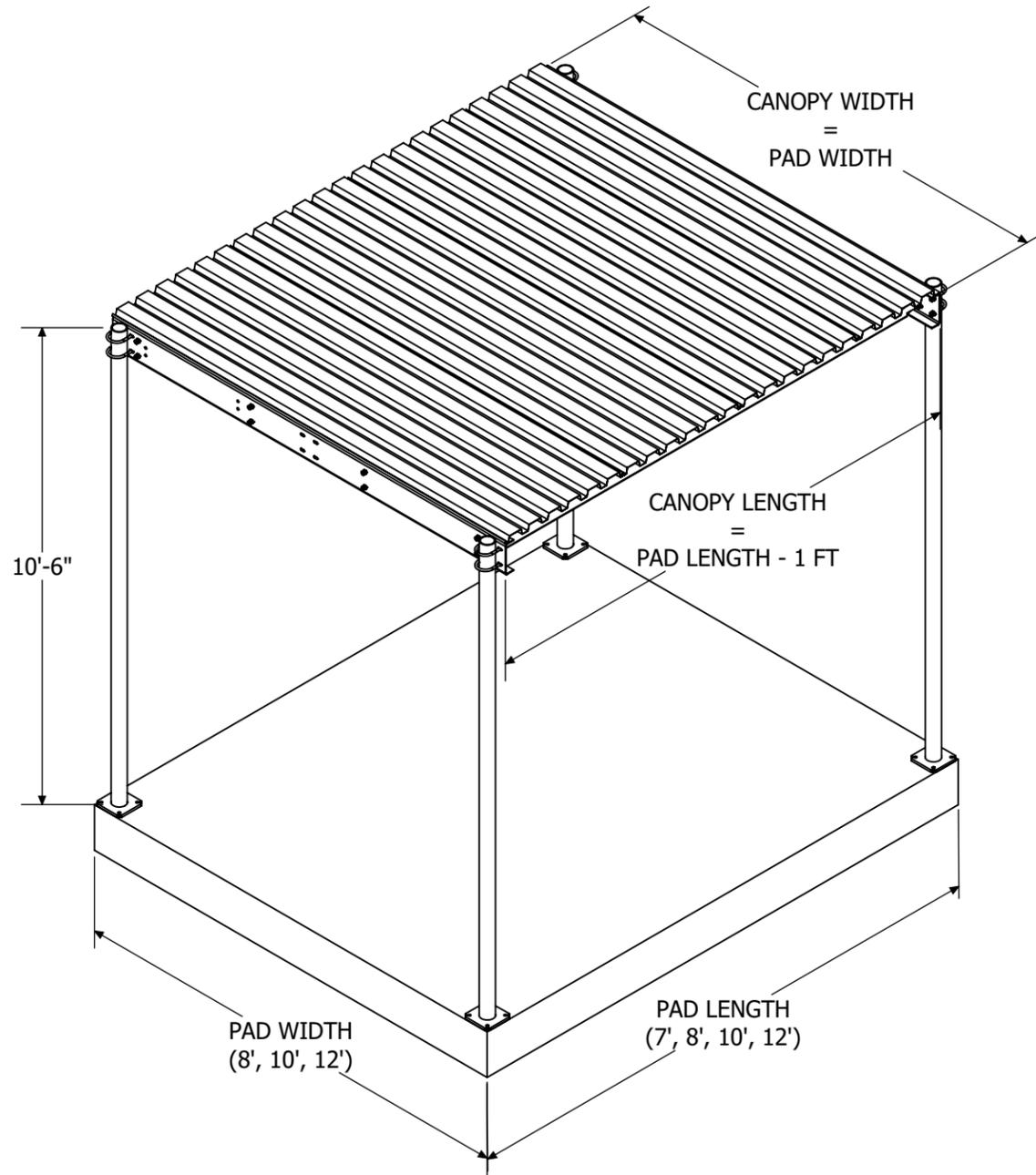
QUIET PERFORMANCE

Our sound enclosure delivers a sound performance of 65 dBA — which is among the quietest available.

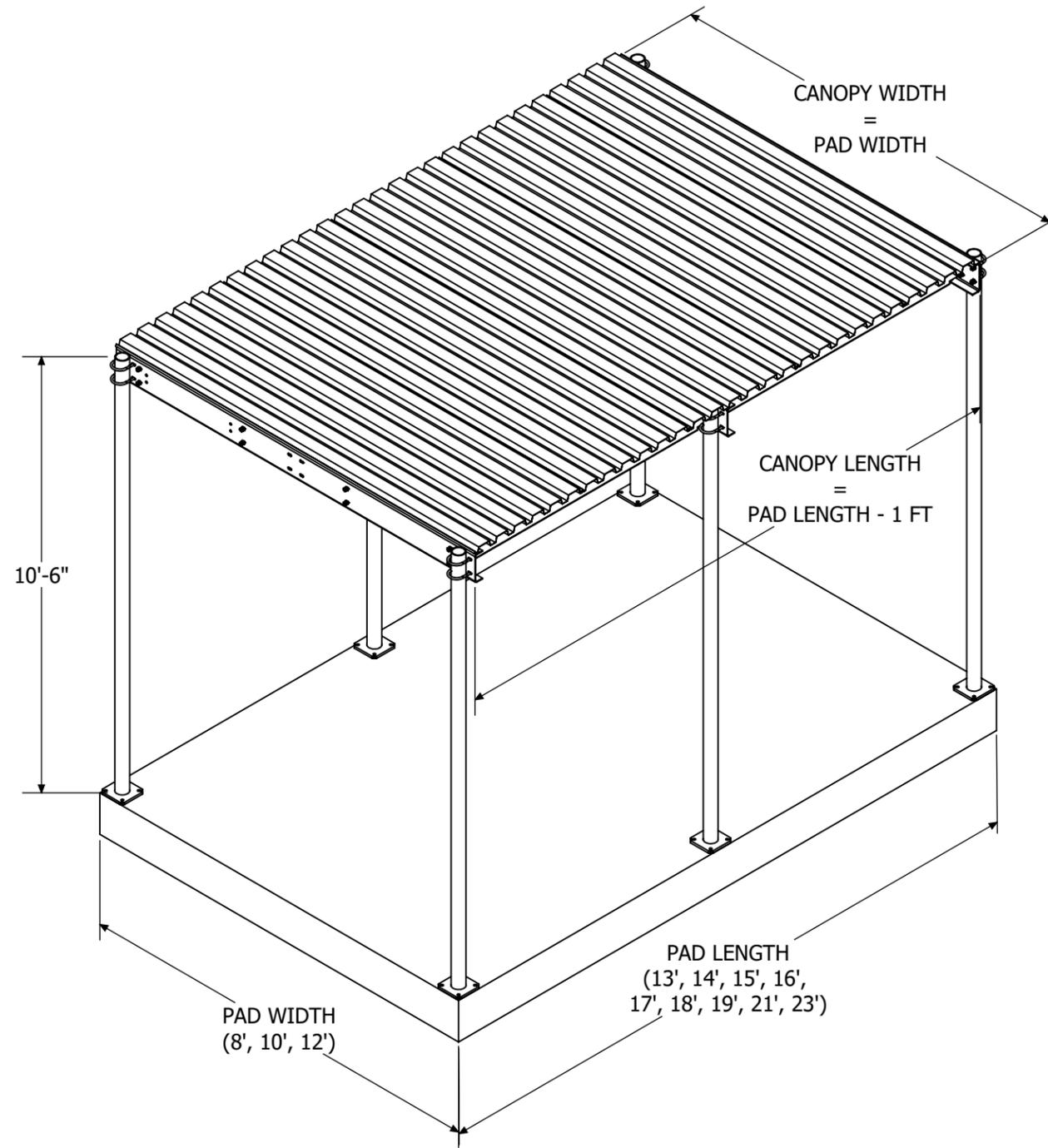


MODEL	20REOZK-C Standard Tank	20REOZK-C State Tank
Fuel Type	Diesel	
Engine Make	Kohler KDI	
Number of Cylinders	4 Inline	
Displacement, L (cu. in.)	2.5 (158)	
Operating Speed (rpm)	1800	
Controller	Kohler Decision-Maker® 3000	
Voltage	120/240, single phase	
Breaker	100A	
Alternator	Poles: 4 Bearing: 1, sealed Voltage Regulator: Digital, Integrated Steady State Voltage Regulation: ± 0.5% Insulation: NEMA MG1, Class H	
Sound Enclosure	Steel with Stainless Steel Hardware - 65 dBA	
Tank Gallons/48 Hrs @ Full Load	105	105
Footprint Dimensions, L x W x H, mm (in.)	1473.2 x 762.0 x 2253.0 (58.0 x 30.0 x 88.7)	1473.2 x 762.0 x 2430.8 (58.0 x 30.0 x 95.7)
Overall Dimensions, L x W x H, mm (in.) including spill box	1846.6 x 812.8 x 2430.8 (72.7 x 32.0 x 95.7)	
Weight (lbs.)	2,164	2,250
Diesel Fuel Consumption – Standby, Lph (gph) at % Load	100% 7.2 (1.9) 75% 5.7 (1.5) 50% 3.8 (1.0)	
State Tank Options e Tank Options	- 5 Gallon Spill Containment - High Fuel Level Switch with Alarm	

4 POST CANOPY



6 POST CANOPY



Weather Canopy Size Options

		Pad Width (Roof Slope Direction)					
		8'		10'		12'	
Pad Length	7'	PV-WC0807-B	810 lbs	PV-WC1007-B	935 lbs	PV-WC1207-B	1060 lbs
	8'	PV-WC0808-B	860 lbs	USE PV-WC0810-B		USE PV-WC0812-B	
	10'	PV-WC0810-B	950 lbs	PV-WC1010-B	1120 lbs	USE PV-WC1012-B	
	12'	PV-WC0812-B	1045 lbs	PV-WC1012-B	1240 lbs	PV-WC1212-B	1435 lbs
	13'	PV-WC0813-B	1355 lbs	PV-WC1013-B	1585 lbs	PV-WC1213-B	1815 lbs
	14'	PV-WC0814-B	1405 lbs	PV-WC1014-B	1650 lbs	PV-WC1214-B	1895 lbs
	15'	PV-WC0815-B	1450 lbs	PV-WC1015-B	1710 lbs	PV-WC1215-B	1970 lbs
	16'	PV-WC0816-B	1495 lbs	PV-WC1016-B	1770 lbs	PV-WC1216-B	2040 lbs
	17'	PV-WC0817-B	1545 lbs	PV-WC1017-B	1830 lbs	PV-WC1217-B	2120 lbs
	18'	PV-WC0818-B	1595 lbs	PV-WC1018-B	1895 lbs	PV-WC1218-B	2195 lbs
	19'	PV-WC0819-B	1640 lbs	PV-WC1019-B	1950 lbs	PV-WC1219-B	2265 lbs
	21'	PV-WC0821-B	1733 lbs	PV-WC1021-B	2075 lbs	PV-WC1221-B	2420 lbs
23'	PV-WC0823-B	1830 lbs	PV-WC1023-B	2200 lbs	PV-WC1223-B	2570 lbs	



16101 La Grande Dr.
Little Rock, AR 72223
1-800-205-8620

STAMP:

The information contained in this set of documents is proprietary by nature, any use or disclosure other than that which relates to the client named is strictly prohibited.

REVISIONS:

NO.	DATE	DESCRIPTION	BY	CHK	APD
5					
4					
3					
2					
1	4/7/16	ADDED POST KITS	DJN	AM	SS
0	4/4/16	INITIAL RELEASE	DJN	AM	SS

SITE INFORMATION:

DESIGN TYPE:

EQUIPMENT
WEATHER CANOPY

SHEET TITLE:

ENGINEERING DETAIL

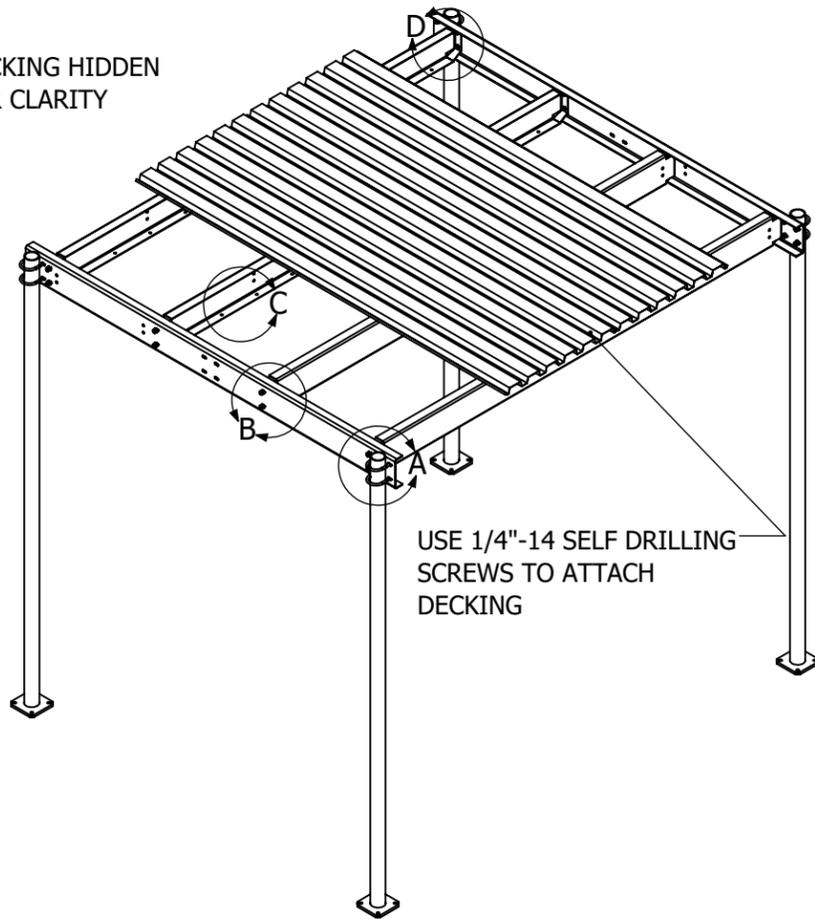
SHEET NO.:

E-1

REVISION:

1

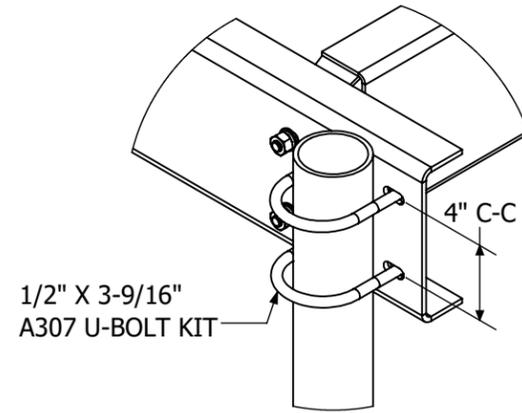
DECKING HIDDEN FOR CLARITY



EQUIPMENT WEATHER CANOPY

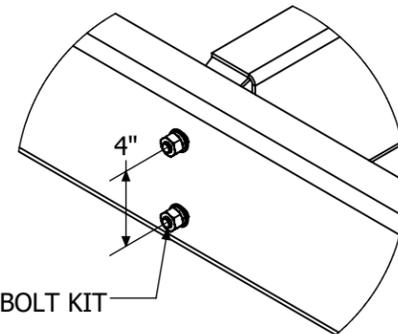
USE 1/4"-14 SELF DRILLING SCREWS TO ATTACH DECKING

CANOPY DETAILS



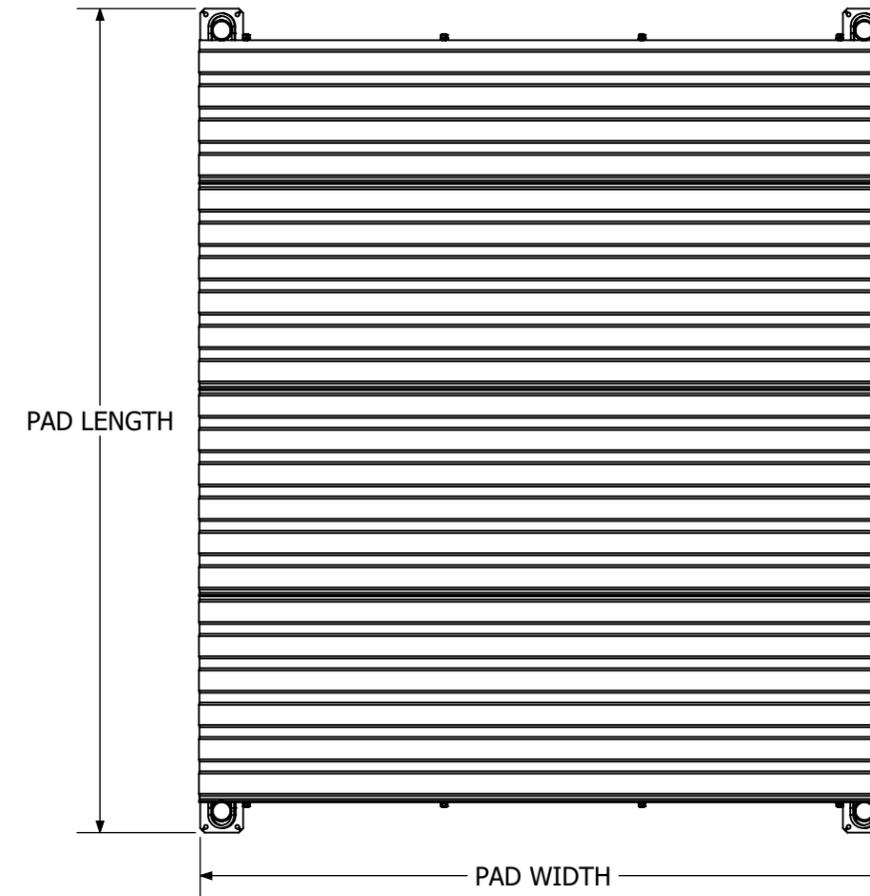
DETAIL A

1/2" X 3-9/16" A307 U-BOLT KIT

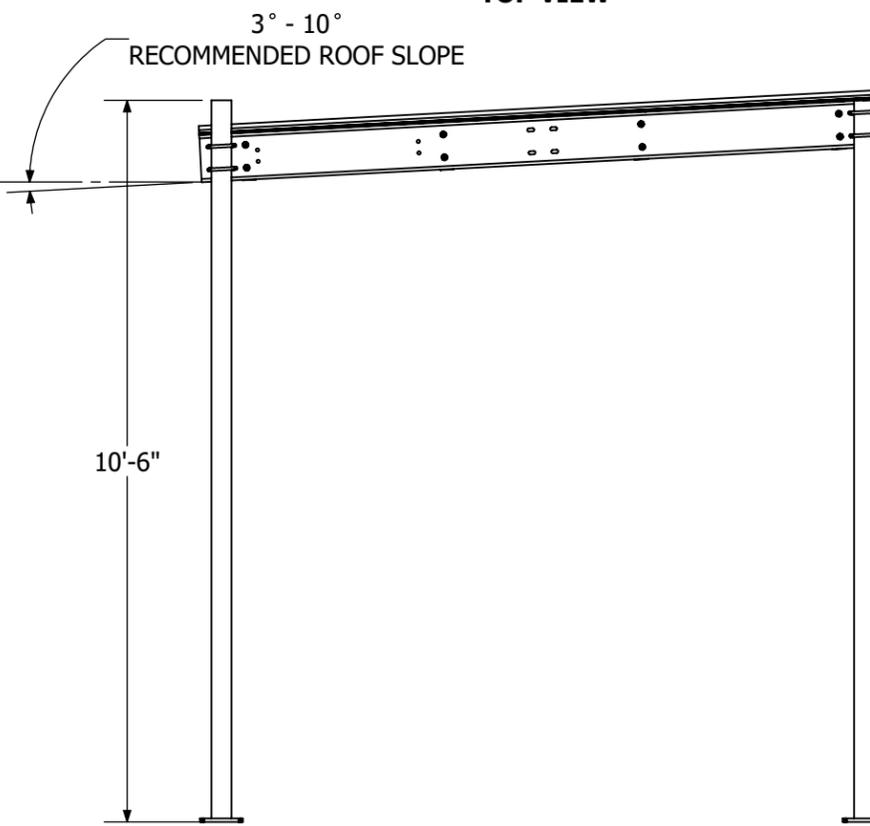


DETAIL B

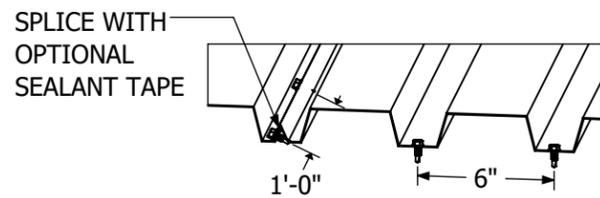
1/2" A325 BOLT KIT



TOP VIEW



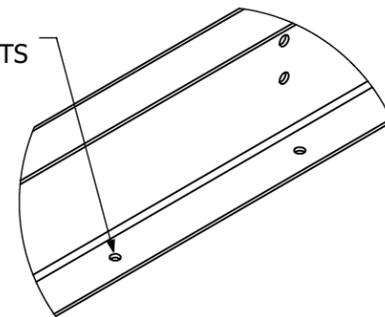
ELEVATION VIEW



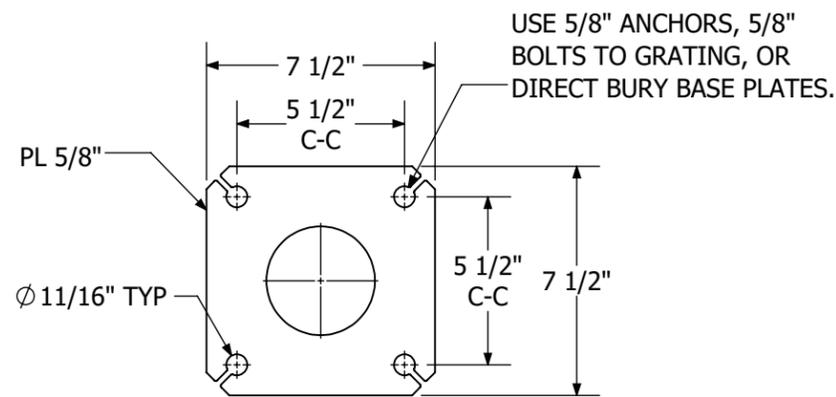
- 6" C-C MAX SPACING ALONG ALL CROSS MEMBERS
- 12" C-C MAX SPACING ALONG EXTERIOR MAIN MEMBERS
- 12" C-C MAX SPACING ALONG SPLICES

ROOF DECKING DETAIL

Ø 1/2" FOR TRAPEZE KITS

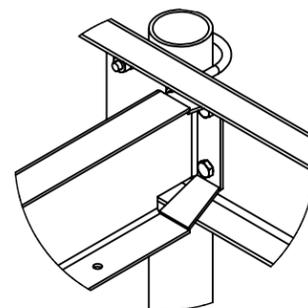


DETAIL C



BASEPLATE DETAILS

USE 5/8" ANCHORS, 5/8" BOLTS TO GRATING, OR DIRECT BURY BASE PLATES.



DETAIL D

PERFECT VISION
MANUFACTURING

16101 La Grande Dr.
Little Rock, AR 72223
1-800-205-8620

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REVISIONS:

NO.	DATE	DESCRIPTION	BY	CHK	APD
5					
4					
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1	4/7/16	ADDED POST KITS	DJN	AM	SS
0	4/4/16	INITIAL RELEASE	DJN	AM	SS

SITE INFORMATION:

DESIGN TYPE:

EQUIPMENT WEATHER CANOPY

SHEET TITLE:

ENGINEERING DETAIL

SHEET NO.:

REVISION:

E-2

1

HYBRIFLEX™ RRH Hybrid Feeder Cabling Solution

Your clear choice for world-class innovation in RRH deployments



➔ **RFS' HYBRIFLEX RRH hybrid feeder cabling solution combines optical fiber and DC power for Remote Radio Heads (RRHs) in a single lightweight aluminum corrugated cable, making it the world's most innovative solution for RRH deployments**

- Connects up to 3 sectors with a single cable
- Minimizes installation time
- On-site and pre-connectorized options
- Eliminates typical need for junction boxes
- Supports CELLFLEX® accessories range
- Extremely lightweight aluminum construction

Features	Benefits
<ul style="list-style-type: none"> • Aluminum corrugated armor with outstanding bending characteristics 	<ul style="list-style-type: none"> • Minimizes installation time and enables mechanical protection and shielding as well as the ability to ground the RRH
<ul style="list-style-type: none"> • Installation of stripped fiber optic cable pairs directly to the RRH (individual UV-protection jacket) 	<ul style="list-style-type: none"> • Reduces capital expenditures (CAPEX) and wind load by eliminating need for interconnection or split-up boxes
<ul style="list-style-type: none"> • Accessories common with RFS standard 1/2-inch and 7/8-inch feeder cables (grounding kits, hanger kits and wallglands) 	<ul style="list-style-type: none"> • Reduces inventory requirements and simplifies installation logistics
<ul style="list-style-type: none"> • Optical fiber and power cables housed in a single corrugated cable 	<ul style="list-style-type: none"> • Saves CAPEX by standardizing RRH cable installation and reducing workforce requirements
<ul style="list-style-type: none"> • Outer conductor grounding 	<ul style="list-style-type: none"> • Eliminates usual grounding cable and saves installation costs
<ul style="list-style-type: none"> • Robust cabling 	<ul style="list-style-type: none"> • Eliminates need for expensive cable trays and ducts
<ul style="list-style-type: none"> • Lightweight aluminum solution and compact design 	<ul style="list-style-type: none"> • Decreases tower load
<ul style="list-style-type: none"> • Outdoor polyethylene jacket 	<ul style="list-style-type: none"> • Ensures long-lasting cable protection
<ul style="list-style-type: none"> • Bulk delivery and factory pre-terminated options available 	<ul style="list-style-type: none"> • Provides the ability to choose the right approach for each deployment scenario

HYBRIFLEX™ RRH Hybrid Feeder Cabling Solution

RFS' unique HYBRIFLEX RRH hybrid feeder cabling solution was developed to reduce installation complexity and costs at cellular sites. HYBRIFLEX allows mobile operators deploying an RRH architecture to standardize the RRH installation process and eliminate the need for and cost of cable grounding. HYBRIFLEX combines optical fiber (multi-mode or single-mode) and power in a single corrugated cable.

Specifications

	Power cable	Fiber optic cable
Characteristics	- Used to feed the RRH or Remote Radio Unit (RRU)	- Flame-retardant PVC jacket - Fiber performance: ITU-T G.651, G.652, G.655 or G.657
Construction	Conductor: Flexible tinned copper wires Isolation: Flame-retardant PVC jacket	- secondary coating -
Norms and standards applied	- NBR NM 247-3: Isolated cables with PVC for nominal voltages up to 450/750V, - NBR NM 280: Conductors of Isolated Cables (IEC 60228 MOD) - NBR NM 247-2: Isolated cables with PVC for nominal voltages up to 450/750V, Part 2: Method of test (IEC 60227-2 MOD)	- SDT 235-350-709 (TELEBRÁS) - NBR 14106 (ABNT)

Structure

	1-sector cable	3-sector cable
Diameter corrugated aluminum armor, mm (in)	13.80 (0.54) *	25.20 (0.99) **
Diameter over jacket nominal, mm (in)	15.80 (0.62)	27.80 (1.09)
UV-protection (individual and external jacket)	Yes	Yes

* Outer conductor equivalent to LCF12-50JL ** Outer conductor equivalent to LCF78-50JL

Mechanical properties

Single bending radius, mm (in)	70 (3)	120 (5)
Multiple bending radius, mm (in)	125 (5)	250 (10)
Cable weight, kg/m (lb/ft)	0.22 (0.15)	0.55 (0.37)
Recommended/Maximum clamp spacing, m (ft)	0.6 / 1.0 (2.0 / 3.25)	0.8 / 1.0 (2.75 / 3.25)
Connectors protection during hoisting process	Bubble wrap	Bubble wrap

Electrical properties

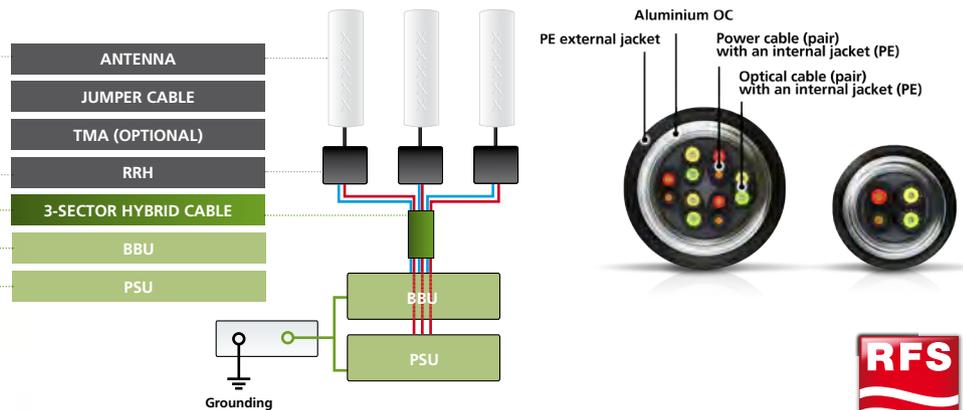
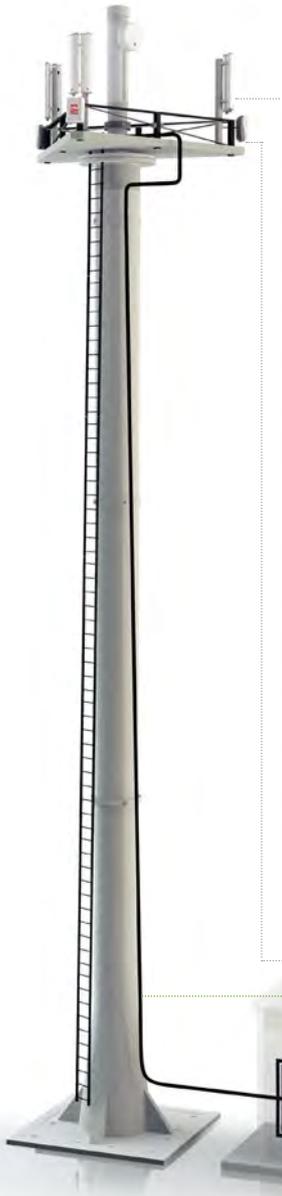
DC-resistance aluminum armor, Ω/km (Ω/1000ft)	2.78 (0.85)	1.42 (0.43)
DC-resistance power cable, Ω/km (Ω/1000ft)	2.5mm ² = 8.21 (2.5)	2.5mm ² = 8.21 (2.5)

Fiber optic properties

Fiber optic version	Multi-mode or single-mode	Multi-mode or single-mode
Fiber optic core/clad (μm)	50/125 or 9/125	50/125 or 9/125
Fiber optic primary coating (acrylate) (μm)	250	250
Fiber optic secondary protection (PVC) (μm)	900	900

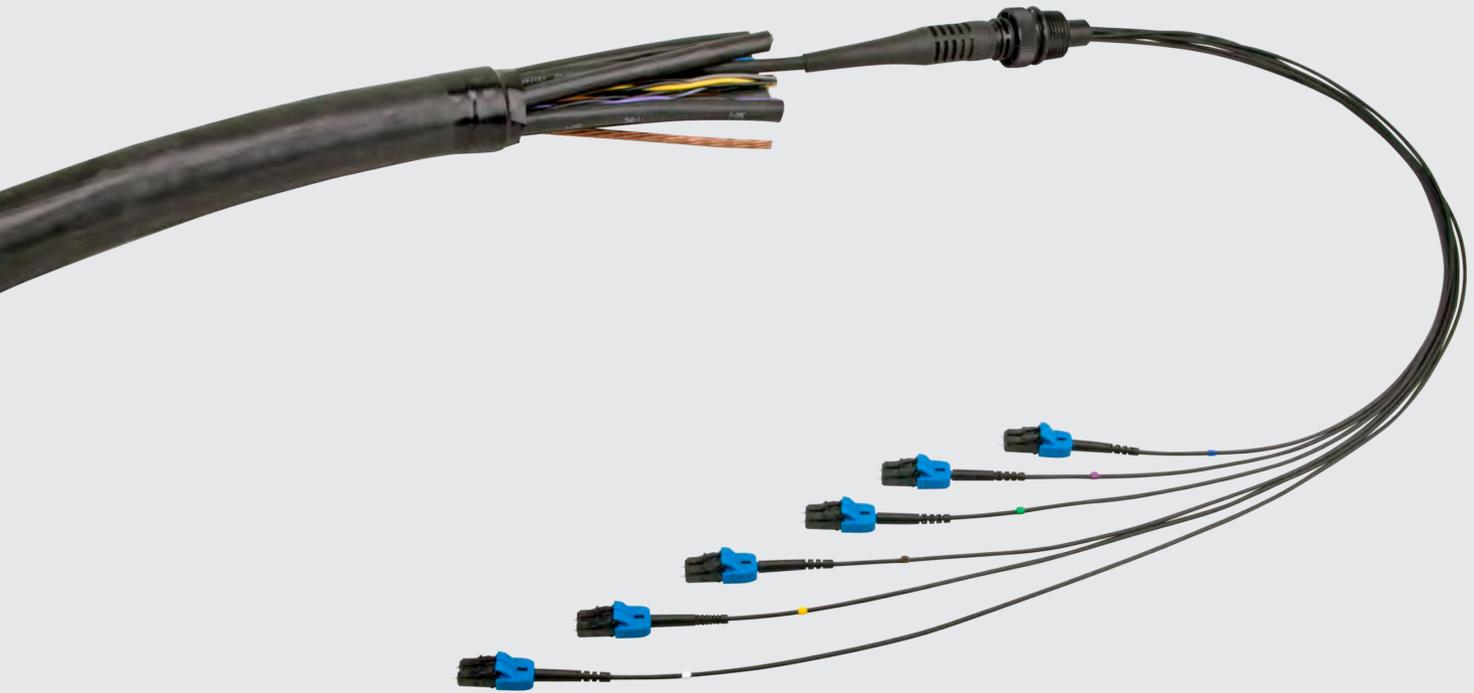
Environment

	Specifications
Installation temperature	-20°C to +65°C
Operation temperature	-20°C to +65°C



MASTERLINE Classic Hybrid

low inductance



Best in class features

- Jacket thickness for abrasion and puncture resistance
- Bend radius and flexibility for ease of routing and installation
- Ground path per NFPA lightning protection standards
- **Fastest installation time due to**
 - Elimination of ground straps at OVP's
 - (6AWG drain wire direct connect to OVP ground)
 - Compliant cable and abrasion resistance (no special handling when pulling, positioning, and mounting)
 - Fast and easy removal of jacket for length reduction (jacket is not bonded to shield, no peeling required)
- Smallest and most robust fiber bundle for easy coiling of fiber over-length (115 ft. capacity in OVP tray)
- Direct manufacturer of FullAXS connector (eliminates need for FullAXS adapter)
- Rugged IP rated cable protection (eliminates potential damage due to shipping and handling)
- Six-sigma process controls for proven reliability (20 % SPC audit guarantees continuous quality)
- On demand stocking program and distribution channels (short delivery time for materials)



MASTERLINE Classic Hybrid (MLCH) 6/12 low inductance



MASTERLINE Classic Hybrid (MLCH) 2/4 low inductance



7

Typical AT&T Installation

Ground and tower Equipment

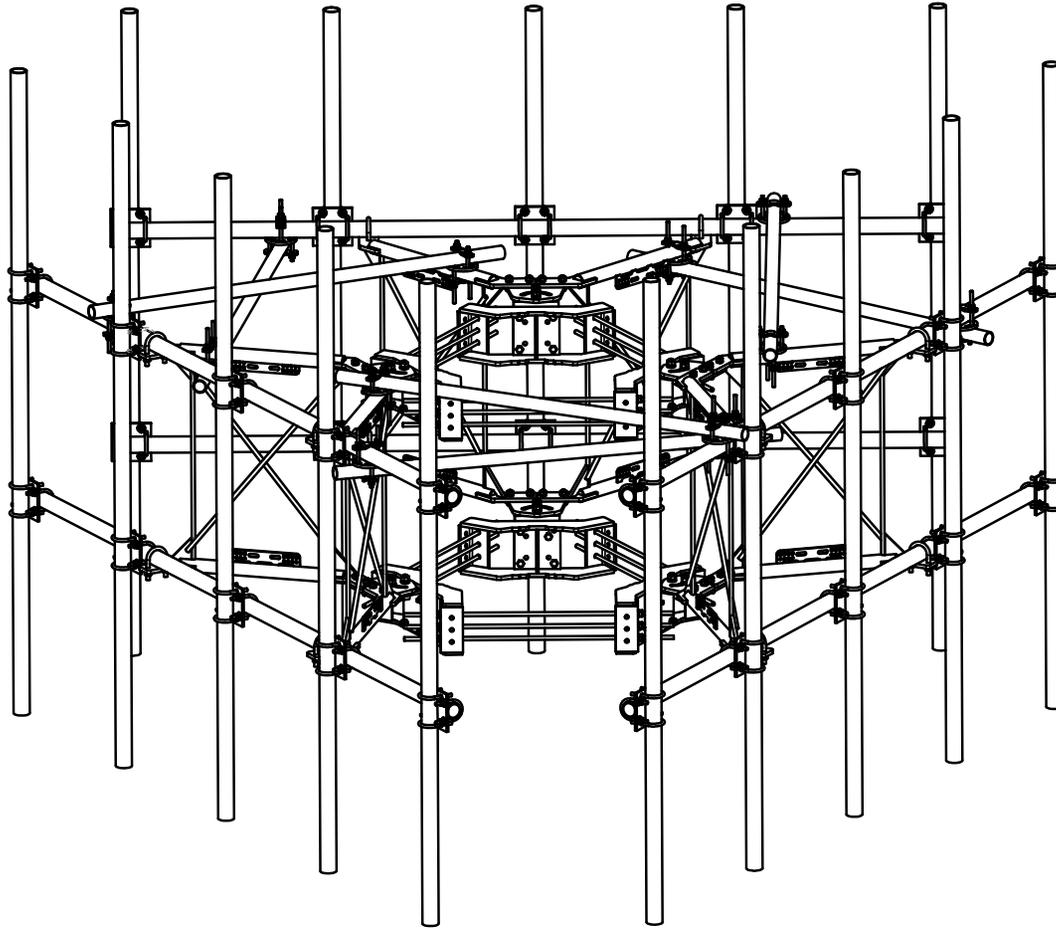
(for example only, final equipment design,
models, and configurations may differ)



Typical AT&T Antenna Level Equipment:
Equipment Mount (SitePro1 VFA12-M3-WLL)
Surge Suppressor (Raycap DC6-48-60-18-8F or similar)
Antenna (CCI TPA65R-BU8D)
Antenna (CCI DMP65R-BU8D)
RRU (Ericsson 4415)
RRU (Ericsson 4449)
RRU (Ericsson 4478)



Typical AT&T Ground Level Equipment:
Walk-In-Cabinet (WIC) (Vertiv XTE-801 Equipment Series)
20kW Generator (Generac SDC020) with a 105 gallon UL-142 listed double walled fuel tank
Rosenberg Fiber & DC cables (or similar)



PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	6	X-LWRM	RING MOUNT WELDMENT		68.81	412.85
2	6	X-RMBP	RING MOUNT BENT PLATE CONNECTION	15 1/2 in	17.02	102.13
3	6	X-VFAPL4	VFA-HD PIVOT PLATE	12 in	15.88	95.30
4	6	X-VFAW	SUPPORT ARM		71.41	428.44
5	30	SCX2	CROSSOVER PLATE	7 in	4.80	143.89
6	6	P284	2-3/8" X 84" SCH 40 GALVANIZED PIPE	84 in	26.91	161.47
7	15	P30120	2-7/8" x 120" (2-1/2" SCH. 40) GALVANIZED PIPE	120 in	58.07	870.99
8	6	P30150	2-7/8" X 150" (2-1/2" SCH. 40) GALVANIZED PIPE	150 in	76.94	461.62
9	12	X-127594	FLAT DISK CLAMP PLATE 4" CENTERS (GALV.)		2.51	30.08
10	24	X-100064	CLAMP (4" V-CLAMP) GALVANIZED		0.92	22.12
11	12	A34212	3/4" x 2-1/2" UNC HEX BOLT (A325)	2 1/2 in	0.48	5.75
12	18	G34FW	3/4" HDG USS FLATWASHER		0.06	1.06
13	12	G34LW	3/4" HDG LOCKWASHER		0.04	0.51
14	12	G34NUT	3/4" HDG HEAVY 2H HEX NUT		0.21	2.55
15	18	G58R-48	5/8" x 48" THREADED ROD (HDG.)		4.18	75.27
16	12	X-UB5300	5/8" X 3" X 5-1/4" X 2-1/2" U-BOLT (HDG.)		1.15	13.79
17	24	A582112	5/8" x 2-1/2" HDG A325 HEX BOLT	2 1/2 in	0.33	8.02
18	24	A582114	5/8" x 2-1/4" HDG A325 HEX BOLT	2 1/4 in	0.31	7.50
19	108	G58LW	5/8" HDG LOCKWASHER		0.03	2.82
20	108	G58NUT	5/8" HDG HEAVY 2H HEX NUT		0.13	14.03
21	120	X-UB1300	1/2" X 3" X 5" X 2" GALV U-BOLT		0.74	88.64
22	24	G12065	1/2" x 6-1/2" HDG HEX BOLT GR5 FULL THREAD	5 1/2 in	0.41	9.83
23	24	G1204	1/2" x 4" HDG HEX BOLT GR5 FULL THREAD	4 in	0.27	6.48
24	288	G12FW	1/2" HDG USS FLATWASHER	3/32 in	0.03	9.82
25	288	G12LW	1/2" HDG LOCKWASHER	1/8 in	0.01	4.00
26	288	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	20.63
					TOTAL WT. #	2999.58

TOLERANCE NOTES

TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
 SAWED, SHEARED AND GAS CUT EDGES ($\pm 0.030"$)
 DRILLED AND GAS CUT HOLES ($\pm 0.030"$) - NO CONING OF HOLES
 LASER CUT EDGES AND HOLES ($\pm 0.010"$) - NO CONING OF HOLES
 BENDS ARE $\pm 1/2$ DEGREE
 ALL OTHER MACHINING ($\pm 0.030"$)
 ALL OTHER ASSEMBLY ($\pm 0.060"$)

PROPRIETARY NOTE:
 THE DATA AND TECHNIQUES CONTAINED IN THIS DRAWING ARE PROPRIETARY INFORMATION OF VALMONT INDUSTRIES AND CONSIDERED A TRADE SECRET. ANY USE OR DISCLOSURE WITHOUT THE CONSENT OF VALMONT INDUSTRIES IS STRICTLY PROHIBITED.

DESCRIPTION

THREE SECTORS HEAVY WLL FRAME
 AND MONOPOLE ATTACHMENT HARDWARE
 WITH FIVE MOUNTING PIPES



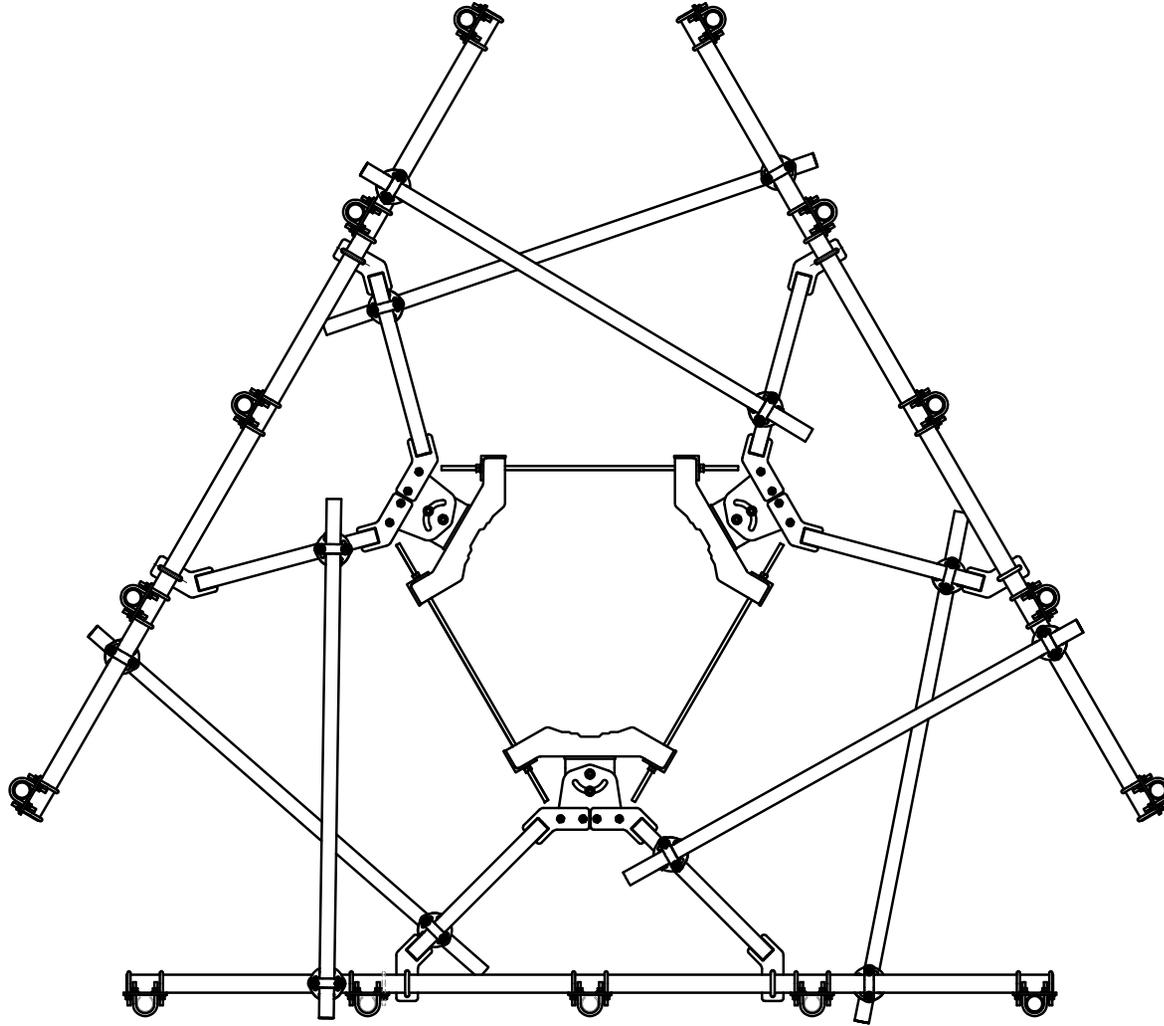
Engineering Support Team:
 1-888-753-7446

Locations:
 New York, NY
 Atlanta, GA
 Los Angeles, CA
 Plymouth, IN
 Salem, OR
 Dallas, TX

A valmont COMPANY

CPD NO.	DRAWN BY	ENG. APPROVAL
	CEK 10/26/2018	
CLASS	SUB	DRAWING USAGE
81	02	CUSTOMER
		CHECKED BY
		BMC 10/29/2018

PART NO.	VFA12-M3-WLL
DWG. NO.	VFA12-M3-WLL



TOLERANCE NOTES

TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
SAWED, SHEARED AND GAS CUT EDGES ($\pm 0.030"$)
DRILLED AND GAS CUT HOLES ($\pm 0.030"$) - NO CONING OF HOLES
LASER CUT EDGES AND HOLES ($\pm 0.010"$) - NO CONING OF HOLES
BENDS ARE $\pm 1/2$ DEGREE
ALL OTHER MACHINING ($\pm 0.030"$)
ALL OTHER ASSEMBLY ($\pm 0.060"$)

PROPRIETARY NOTE:
 THE DATA AND TECHNIQUES CONTAINED IN THIS DRAWING ARE PROPRIETARY INFORMATION OF VALMONT INDUSTRIES AND CONSIDERED A TRADE SECRET. ANY USE OR DISCLOSURE WITHOUT THE CONSENT OF VALMONT INDUSTRIES IS STRICTLY PROHIBITED.

DESCRIPTION
THREE SECTORS HEAVY WLL FRAME
AND MONOPOLE ATTACHMENT HARDWARE
WITH FIVE MOUNTING PIPES



Engineering
 Support Team:
 1-888-753-7446

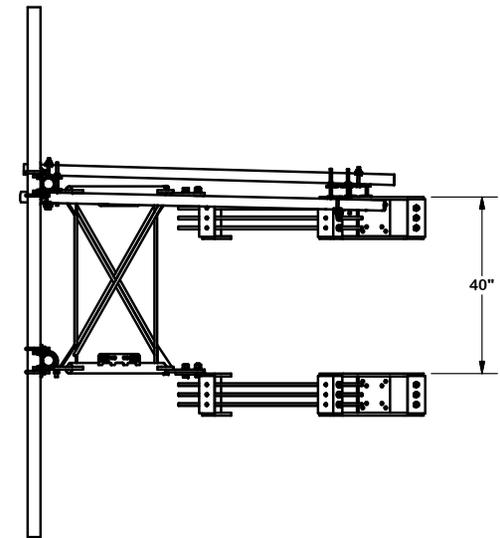
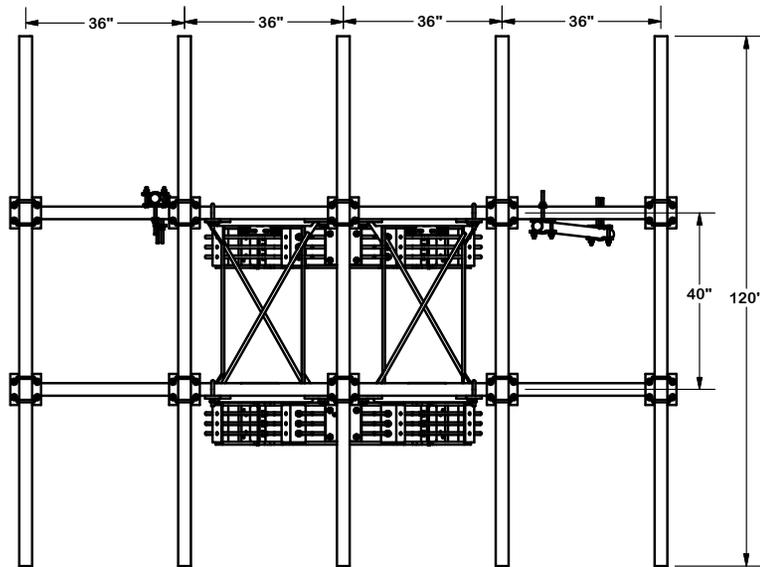
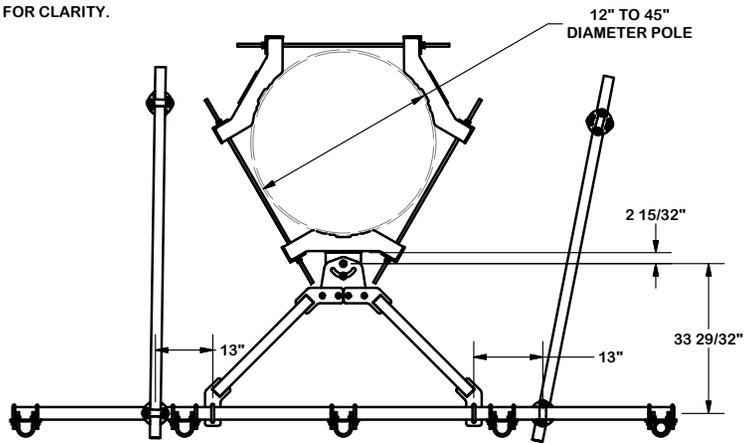
Locations:
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CPD NO.	DRAWN BY	ENG. APPROVAL
	CEK 10/26/2018	
CLASS	DRAWING USAGE	CHECKED BY
81	CUSTOMER	BMC 10/29/2018

PART NO.	VFA12-M3-WLL
DWG. NO.	VFA12-M3-WLL

NOTE:
OTHER SECTORS REMOVED FOR CLARITY.



TOLERANCE NOTES

TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
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DESCRIPTION
 THREE SECTORS HEAVY WLL FRAME
 AND MONOPOLE ATTACHMENT HARDWARE
 WITH FIVE MOUNTING PIPES

CPD NO.	DRAWN BY CEK 10/26/2018	ENG. APPROVAL
CLASS 81	SUB 02	DRAWING USAGE CUSTOMER
	CHECKED BY BMC 10/29/2018	

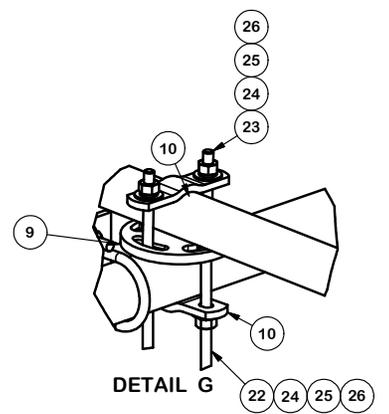
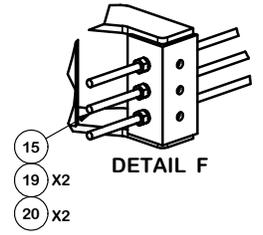
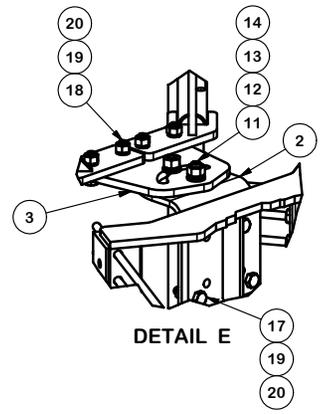
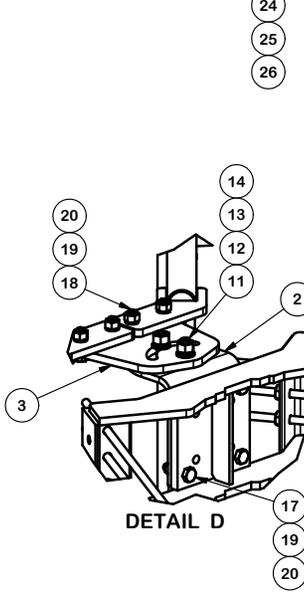
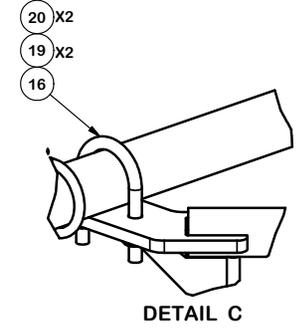
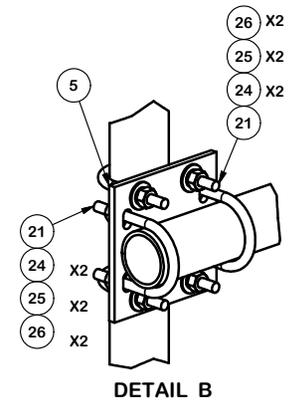
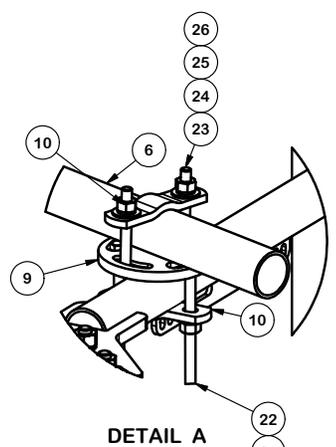
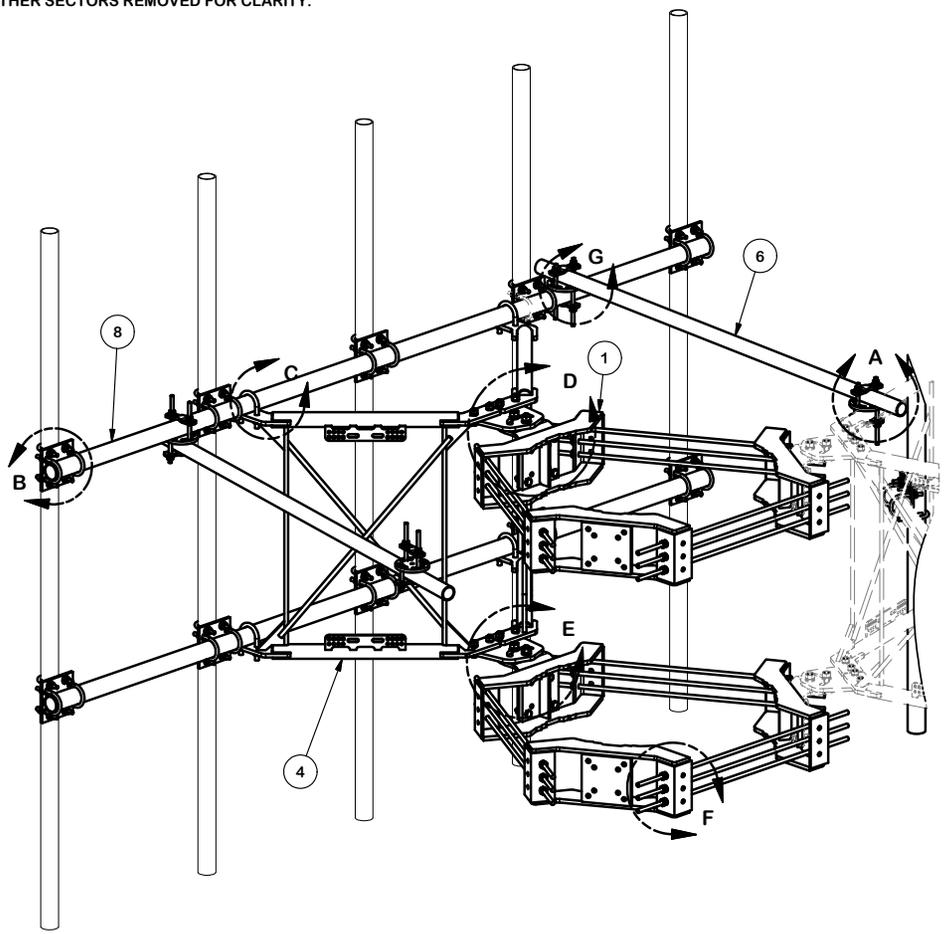


Engineering
 Support Team:
 1-888-753-7446

Locations:
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 Dallas, TX

PART NO.	VFA12-M3-WLL
DWG. NO.	VFA12-M3-WLL

NOTE:
OTHER SECTORS REMOVED FOR CLARITY.



TOLERANCE NOTES
TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
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 DRILLED AND GAS CUT HOLES ($\pm 0.030"$) - NO CONING OF HOLES
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CPD NO.		DRAWN BY CEK 10/26/2018		ENG. APPROVAL	
CLASS 81	SUB 02	DRAWING USAGE CUSTOMER		CHECKED BY BMC 10/29/2018	

 A valmont COMPANY	Locations: New York, NY Atlanta, GA Los Angeles, CA Plymouth, IN Salem, OR Dallas, TX		
	Engineering Support Team: 1-888-753-7446		
PART NO.	VFA12-M3-WLL	PAGE	4 OF 4
DWG. NO.	VFA12-M3-WLL		

POWER

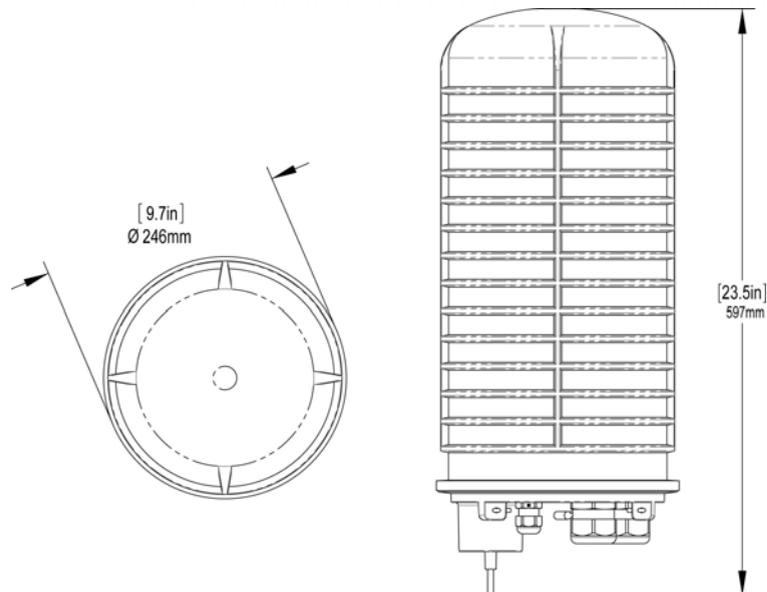
DC6-48-60-18-8F

DC Surge Suppression Solution

The DC6-48-60-18 is a dual chambered, DC surge suppression system for use in multi-circuit, Distributed Antenna Systems. The system will protect up to 6 Remote Radio Heads from voltage surges and lightning, and connect up to 18 fiber pairs. The system is enclosed in a NEMA 4 rated, waterproof enclosure.

FEATURES

- Protects up to 6 Remote Radio Heads, each with its own protection circuit.
- Flexible design allows for installation at the top of a tower for Remote Radio Head protection.
- Includes fiber connections for up to 18 pairs of fiber.
- LED indicators on individual circuits provide visual indication of suppressor status.
- Form 'C' relays allow for remote monitoring of the suppressor status.
- Patented Strikesorb technology provides over 60 kA of surge current capacity per circuit.
- Strikesorb suppression modules are fully recognized to UL 1449-3rd Edition Safety Standard, meeting all intermediate and high current fault requirements to facilitate use in OEM applications.
- Raycap recommends that DC protection system be installed within 2 meters or 6 feet of the radio.
- Dome design is lightweight and aerodynamic providing maximum flexibility for installation on top of towers.





DC6-48-60-18-8F

DC Power Surge Protection

Electrical Specifications	
Model Number	DC6-48-60-18-8F
Nominal Operating Voltage	48 VDC
Nominal Discharge Current (I_n)	20 kA 8/20 μ s
Maximum Discharge Current (I_{max}) per NEMA LS-1	60 kA 8/20 μ s
Maximum Continuous Operating Voltage (U_c)	75 VDC
Voltage Protection Rating	400 V

Mechanical Specifications	
Suppression Connection Method	Compression lug, #2-#14 AWG Copper, #2-#12 Aluminum
Fiber Connection Method	LC-LC Single mode duplex
Environmental Rating	IP 68, 7m 72hrs
Operating Temperature	-40° C to + 80° C
Storage Temperature	-70° C to + 80° C
Cold Temperature Cycling	IEC 61300-2-22e -30° C to + 60° C 200 hrs @ 5 psi
Resistance to Aggressive Materials	CEI IEC 61073-2 including acids and bases
UV Protection	ISO 4892-2 Method A Xenon-Arc 2160 hrs
Weight	20 lbs without Mounting Bracket

STANDARDS

Strikesorb modules are compliant to the following Surge Protection Device (SPD) Standards:

- ANSI/UL 1449 – 3rd Edition
- IEEE C62.41
- NEMA LS-1, IEC 61643-1:2005 2nd Edition:2005
- IEC 61643-12
- EN 61643-11:2002 (including A11:2007)



G02-00-068 REV 050610



GS-07F-0435V



Certified to ISO 9001:2000



TUV Rheinland of North America



- Eight foot (2.4 m) multiband, twelve port antenna with a 65° azimuth beamwidth covering 698-896 MHz and 1695-2400 MHz frequencies
- Eight high band ports covering 1695-2400 MHz and four low band ports covering 698-896 MHz in a single antenna enclosure
- Innovative Low and High Band Array configuration allows for 4T4R (4x4 MIMO) on Low Band and Dual 4T4R (4x4 MIMO) High Band Arrays, using full length arrays (non stacked), all in a 21.0" (534mm) width enclosure, an Industry First
- Full Spectrum Compliance for WCS and AWS-3 frequencies and Band 14 Operations
- Array configuration allows for 4T4R (4X4 MIMO) on Low Band, essential for Band 14 Operations
- LTE Optimized FBR and SPR performance, providing for an efficient use of valuable radio capacity
- LTE Optimized Boresight and Sector XPD and USL performance, essential for LTE Performance
- Exceeds minimum PIM performance requirements
- Equipped with new 4.3-10 connector, which is 40% smaller than traditional 7/16 DIN connector
- Equipped with 3 field replaceable, integrated AISG 2.0 compliant Remote Electrical Tilt (RET) Controllers (Type 1 External)
- Ordering options for External RET Controllers (Type 1) or Internally Integrated RET Controllers (Type 17)

Overview

The CCI 12-Port multiband array is a twelve port antenna, with eight wide band ports covering 1695-2400 MHz and four low band ports covering 698-896 MHz. The antenna provides the capability to deploy Dual 4x4 Multiple-input Multiple-output (MIMO) in the high band and 4X4 Multiple-input Multiple-output (MIMO) across low band ports. The CCI 12-Port allows independent tilt control between the low band ports and high band ports and independent tilt control between left and right antenna arrays.

In this three RET configuration, the 1st RET is dedicated for the four Low Band ports. The 2nd RET is dedicated for the four Left High Band ports and the 3th RET is dedicated for the four Right High Band ports. This RET arrangement allows for complete flexibility in coverage control between left and right antenna arrays.

CCI antennas are designed and produced to ISO 9001:2008 certification standards for reliability and quality in our state-of-the-art manufacturing facilities.

Applications

- Dual 4x4 MIMO for the High Band and 4X4 MIMO Low Band ports
- Ready for Network Standardization on 4.3-10 DIN connectors
- With CCI's multiband antennas, wireless providers can connect multiple platforms to a single antenna, reducing tower load, lease expense, deployment time and installation costs



SPECIFICATIONS

Multi-Band Twelve-Port Antenna

TPA65R-BU8D

Electrical

Ports	4 x Low Band Ports for 698-896 MHz	
Frequency Range	698-806 MHz	824-896 MHz
Gain ¹	15.6 dBi	16.4 dBi
Gain (Average) ²	14.6 dBi	15.5 dBi
Azimuth Beamwidth (-3dB)	73°	64°
Elevation Beamwidth (-3dB)	9.5°	7.9°
Electrical Downtilt	2° to 12°	2° to 12°
Elevation Sidelobes (1st Upper)	<-18 dB	<-17 dB
Front-to-Back Ratio @180°	> 35 dB	> 35 dB
Front-to-Back Ratio ±20°	> 32 dB	> 32 dB
Cross-Polar Discrimination at Peak	> 25 dB	> 25 dB
Cross-Polar Discrimination at Sector ²	13.2 dB	9.7 dB
Cross-Polar Port-to-Port Isolation	> 25 dB	> 25 dB
Voltage Standing Wave Ratio (VSWR)	< 1.5:1	< 1.5:1
Passive Intermodulation (2x20W)	≤ -153 dBc	≤ -153 dBc
Input Power Continuous Wave (CW)	500 watts	500 watts
Polarization	Dual Linear 45°	Dual Linear 45°
Input Impedance	50 ohms	50 ohms
Lightning Protection	DC Ground	DC Ground

¹Peak gain across sub-bands.

²Electrical specifications follow document "Recommendation on Base Station Antenna Standards" (BASTA) V9.6.

Ports	8 x High Band Ports for 1695-2400 MHz			
Frequency Range	1695-1880 MHz	1850-1990 MHz	1920-2180 MHz	2300-2400 MHz
Gain ¹	18.0 dBi	18.1 dBi	18.3 dBi	18.2 dBi
Gain (Average) ²	16.7 dBi	17.1 dBi	17.4 dBi	16.8 dBi
Azimuth Beamwidth (-3dB)	70°	66°	66°	60°
Elevation Beamwidth (-3dB)	5.7°	5.1°	4.8°	4.1°
Electrical Downtilt	0° to 8°	0° to 8°	0° to 8°	0° to 8°
Elevation Sidelobes (1st Upper)	<-17 dB	<-17 dB	<-17 dB	<-16 dB
Front-to-Back Ratio @180°	> 35 dB	> 35 dB	> 35 dB	> 35 dB
Front-to-Back Ratio ±20°	> 32 dB	> 32 dB	> 32 dB	> 32 dB
Cross-Polar Discrimination at Peak	> 19 dB	> 18 dB	> 19 dB	> 20 dB
Cross-Polar Discrimination at Sector ²	11.6 dB	9.8 dB	10.5 dB	8.6 dB
Cross-Polar Port-to-Port Isolation	> 25 dB	> 25 dB	> 25 dB	> 25 dB
Voltage Standing Wave Ratio (VSWR)	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1
Passive Intermodulation (2x20W)	≤ -153 dBc	≤ -153 dBc	≤ -153 dBc	≤ -153 dBc
Input Power Continuous Wave (CW)	300 watts	300 watts	300 watts	300 watts
Polarization	Dual Linear 45°	Dual Linear 45°	Dual Linear 45°	Dual Linear 45°
Input Impedance	50 ohms	50 ohms	50 ohms	50 ohms
Lightning Protection	DC Ground	DC Ground	DC Ground	DC Ground

¹Peak gain across sub-bands.

²Electrical specifications follow document "Recommendation on Base Station Antenna Standards" (BASTA) V9.6.



SPECIFICATIONS

Multi-Band Twelve-Port Antenna

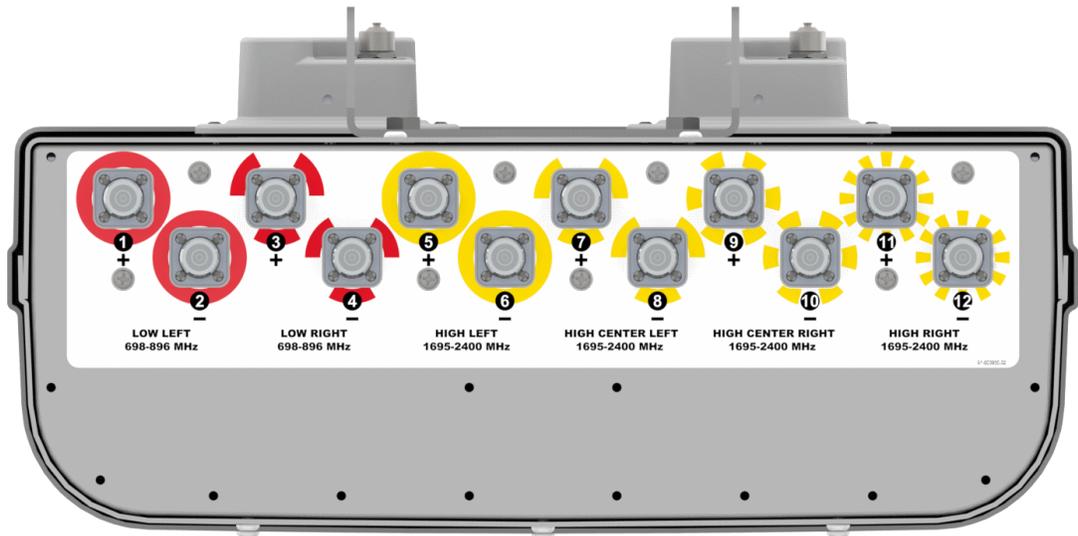
TPA65R-BU8D

Mechanical

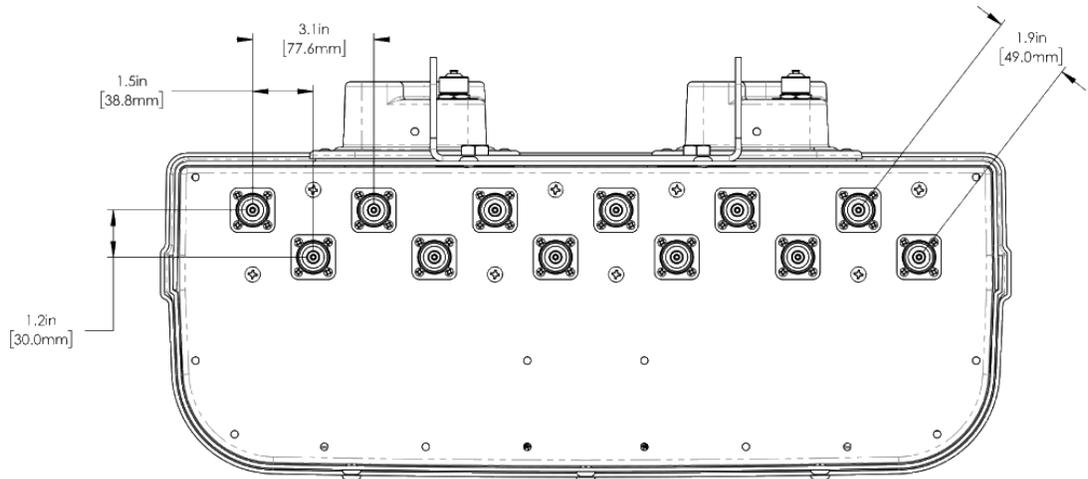
Dimensions (LxWxD)	96.0x21.0x7.8 in (2438x534x198 mm)
Survival Wind Speed	> 150 mph (> 241 kph)
Front Wind Load	463 lbs (2061 N) @ 100 mph (161 kph)
Side Wind Load	210 lbs (933 N) @ 100 mph (161 kph)
Equivalent Flat Plate Area	18.1 ft ² (1.7 m ²)
Weight *	87.5 lbs (39.7 kg)
Connector	12 x 4.3-10 female
Mounting Pole	2 to 5 in (5 to 12 cm)

* Weight excludes mounting and RET

Bottom View



Connector Spacing





- Eight foot (2.4 m) internally multiplexed MultiBand antenna, including eight external RF ports (12 RF ports internal), with a 65° azimuth beamwidth covering 698-896 MHz and 1695-2400 MHz frequencies
- Four wide high band ports covering 1695-2400 MHz and four wide low band ports covering 698-896 MHz in a single antenna enclosure
- Innovative Multiplexed/RET Control configuration, supporting Dual Band Radio Configurations (B12/B5 and B29/B5). The antenna provides Dual 4T4R (4x4 MIMO) capability, while providing independent RET control, an Industry First
- Innovative Low and High Band Array configuration allows for 4T4R (4x4 MIMO) on Low Band and 4T4R (4x4 MIMO) High Band Arrays, using full length arrays (non stacked), all in a 20.7" (525 mm) width enclosure, an Industry First
- Industry leading antenna topology and RET shielding techniques drastically mitigate PIM propagation from B12/B14/B29 operations, allowing for superior Network performance
- Full Spectrum Compliance for PCS, AWS-3 and WCS frequencies and 700/850 MHz Dual Band Radio Configurations
-
- LTE Optimized FBR and SPR performance, providing for an efficient use of valuable radio capacity
- LTE Optimized Boresight and Sector XPD and USL performance, essential for LTE Performance
- Exceeds minimum PIM performance requirements
- Equipped with new 4.3-10 connector, which is 40% smaller than traditional 7/16 DIN connector
- Ordering options for External RET Controllers (Type 1) or Internally Integrated RET Controllers (Type 17)

Overview

The CCI internally multiplexed MultiBand array is an eight port (12 RF ports internal) antenna, with four wide band ports covering 1695-2400 MHz and four low band ports covering 698-896 MHz. The antenna provides the capability to deploy 4T4R (4x4 MIMO) in the high band, with separate RET control. The antenna also provides the capability to provide independent RET control for 700/850 MHz Dual Band Radio Configurations, while maintaining 4T4R (4x4 MIMO) across the low band ports.

CCI antennas are designed and produced to ISO 9001 certification standards for reliability and quality in our state-of-the-art manufacturing facilities.

Applications

- 4x4 MIMO for the High Band and 4X4 MIMO Low Band ports
- Ready for Network Standardization on 4.3-10 DIN connectors
- With CCI's multiband antennas, wireless providers can connect multiple platforms to a single antenna, reducing tower load, lease expense, deployment time and installation costs



Electrical

Ports	4 x Low Band Ports for 698-896 MHz	
Frequency Range	698-798 MHz	824-896 MHz
Gain ¹	15.1 dBi	16.0 dBi
Gain (Average) ²	14.1 dBi	15.1 dBi
Azimuth Beamwidth (-3dB)	75°	64°
Elevation Beamwidth (-3dB)	9.5°	8.0°
Electrical Downtilt	2° to 12°	2° to 12°
Elevation Sidelobes (1st Upper)	<-19 dB	<-19 dB
Front-to-Back Ratio @180°	> 32 dB	> 35 dB
Front-to-Back Ratio ±20°	> 30 dB	> 35 dB
Cross-Polar Discrimination at Peak	> 25 dB	> 25 dB
Cross-Polar Discrimination at Sector ²	10.9 dB	11.0 dB
Cross-Polar Port-to-Port Isolation	> 25 dB	> 25 dB
Voltage Standing Wave Ratio (VSWR)	< 1.5:1	< 1.5:1
Passive Intermodulation (2x20W)	≤ -153 dBc	≤ -153 dBc
Input Power Continuous Wave (CW)	500 watts	500 watts
Polarization	Dual Linear 45°	Dual Linear 45°
Input Impedance	50 ohms	50 ohms
Lightning Protection	DC Ground	DC Ground

¹Peak gain across sub-bands.

²Electrical specifications follow document "Recommendation on Base Station Antenna Standards" (BASTA) V9.6.

Ports	4 x High Band Ports for 1695-2400 MHz			
Frequency Range	1695-1880 MHz	1850-1990 MHz	1920-2180 MHz	2300-2400 MHz
Gain ¹	17.6 dBi	17.8 dBi	18.2 dBi	18.1 dBi
Gain (Average) ²	16.7 dBi	17.0 dBi	17.3 dBi	17.2 dBi
Azimuth Beamwidth (-3dB)	70°	68°	68°	54°
Elevation Beamwidth (-3dB)	5.7°	5.1°	4.8°	4.1°
Electrical Downtilt	0° to 8°	0° to 8°	0° to 8°	0° to 8°
Elevation Sidelobes (1st Upper)	<-17 dB	<-18 dB	<-18 dB	<-17 dB
Front-to-Back Ratio @180°	> 35 dB	> 35 dB	> 35 dB	> 35 dB
Front-to-Back Ratio ±20°	> 32 dB	> 32 dB	> 32 dB	> 32 dB
Cross-Polar Discrimination at Peak	> 19 dB	> 18 dB	> 20 dB	> 20 dB
Cross-Polar Discrimination at Sector ²	10.8 dB	8.2 dB	8.5 dB	8.3 dB
Cross-Polar Port-to-Port Isolation	> 25 dB	> 25 dB	> 25 dB	> 25 dB
Voltage Standing Wave Ratio (VSWR)	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1
Passive Intermodulation (2x20W)	≤ -153 dBc	≤ -153 dBc	≤ -153 dBc	≤ -153 dBc
Input Power Continuous Wave (CW)	300 watts	300 watts	300 watts	300 watts
Polarization	Dual Linear 45°	Dual Linear 45°	Dual Linear 45°	Dual Linear 45°
Input Impedance	50 ohms	50 ohms	50 ohms	50 ohms
Lightning Protection	DC Ground	DC Ground	DC Ground	DC Ground

¹Peak gain across sub-bands.

²Electrical specifications follow document "Recommendation on Base Station Antenna Standards" (BASTA) V9.6.



SPECIFICATIONS

Diplexed Multi-Band Antenna

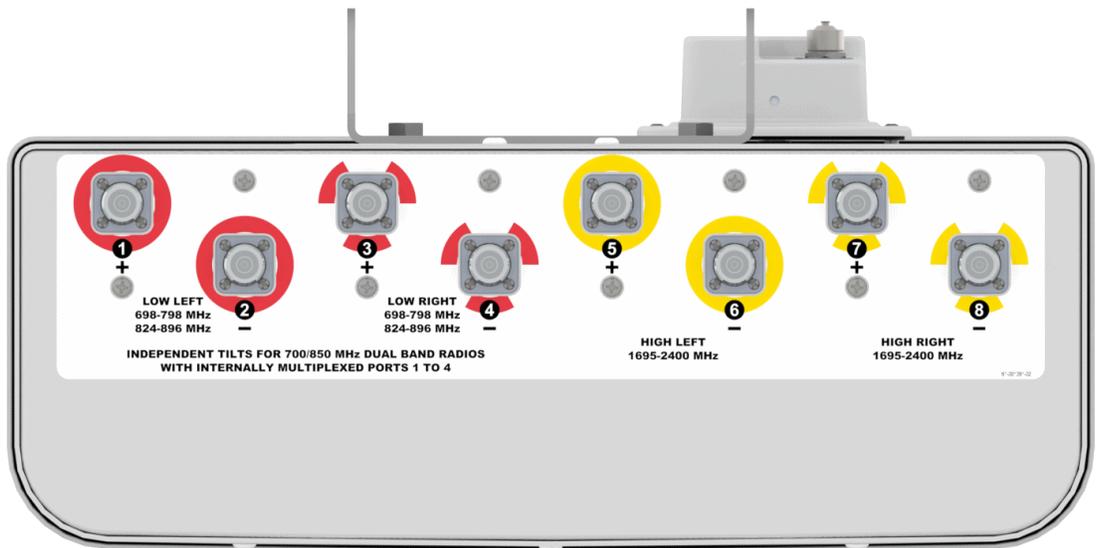
DMP65R-BU8D

Mechanical

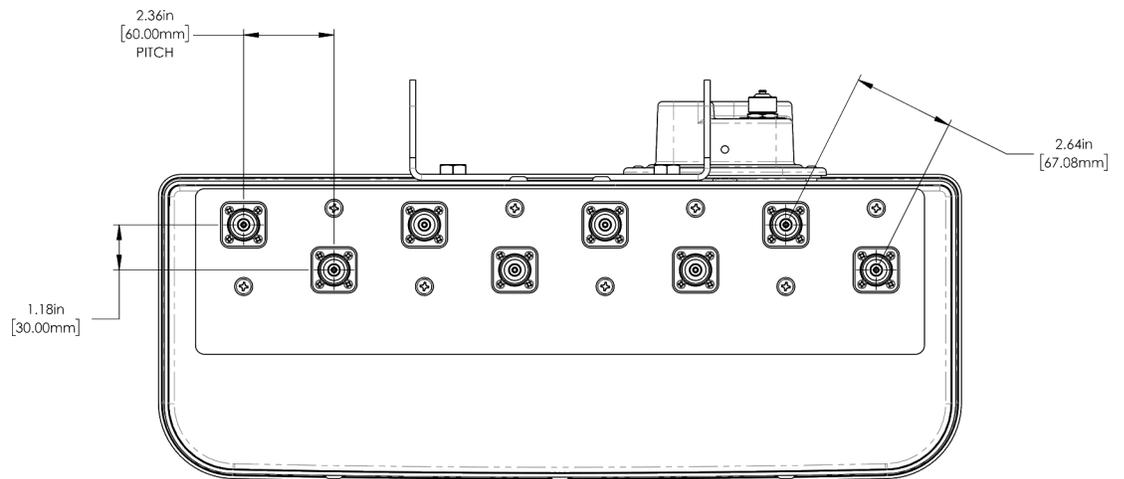
Dimensions (LxWxD)	96.0x20.7x7.7 in (2438x525x197 mm)
Survival Wind Speed	> 150 mph (> 241 kph)
Front Wind Load	457 lbs (2033 N) @ 100 mph (161 kph)
Side Wind Load	209 lbs (929 N) @ 100 mph (161 kph)
Equivalent Flat Plate Area	17.9 ft ² (1.7 m ²)
Weight *	95.7 lbs (43.4 kg)
Connector	8 x 4.3-10 female
Mounting Pole	2 to 5 in (5 to 12 cm)

* Weight excludes mounting

Bottom View



Connector Spacing



RRUS 4415 B30



- › B30 A+ B
 - TX = 2350 – 2360 MHz
 - RX = 2305 – 2315 MHz
- › CPRI 2 ports x 2.5/4.9/9.8/10.1 Gbps. **Install 2 SFPs and connect 2 fiber pair to the RRUS 4415 during initial install.**
- › Only use Ericsson supplied and approved SFP3 **RDH10247/25**
 - Exception: SFP7 RDH 10265/3 for CPRI 1.4km to 10km
 - Exception: SFP7 (pair): RDH 102 70/1 and RDH 102 70/2 for CPRI > 10km
- › 2 external alarm inputs
- › Max wind load @ **50m/sec = 260N**
- › Breaker size = **25A**, DC Power Consumption = **670 W (for dimensioning)**
- › **200mm** horizontal minimum separation required for side by side mounting
- › **200mm** separation minimum required from antenna backplane to radio
- › **400mm** vertical minimum outdoor/indoor separation required between 2 radios
- › **500mm** vertical separation below antenna
- › Min, Max DC cable size from squid to radio = **10,8 AWG**
 - Adapter is required for 2-wire connection
 - Shielded DC cable is required
- › Ground cable size = **2AWG**
- › Dimensions (incl. handles, feet and sunshield, w/o fan unit)
 - Height: **16.5"** (**420 mm**)
 - Width: **13.4"** (**342 mm**)
 - Depth: **5.9"** (**123 mm**)
- › Weight, excl. mounting hardware = **47.4 lbs (21.5 kg)**

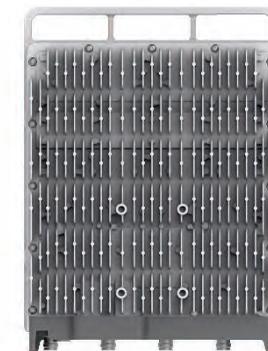


RADIO 4449 DUAL BAND B5 & B12

Target PRA: 30 Oct 2018



- › 4TX/4RX per Band (B5 & B12)
- › 320W of total power
 - 4x40 W per band (4T4R in each band)
- › Full IBW in each band
- › Carrier BW:
 - 5, 10 MHz
- › LTE: Max 6 carriers per port (DL), max 6 carriers per port (UL)
- › CPRI Support:
 - 2.5; 4.9; 9.8; 10.1
- › -48 VDC 3-wire (2-wire with adapter)
 - Two DC power ports of 20A
- › AISG TMA & RET support via RS-485 or RF connectors
 - Bias-T only be supported on antenna port A and C.
- › Four antenna connectors : 4 x 4.3-10 plus (f)
- › 2 external alarm
- › ~ 73 lb.
- › ~33L (14.96" x 13.19" x 10.43")
(Preliminary, final figures in Mar 18 pending B12 filter design)
- › IP 65, -40 to +55 °C



RADIO 4478

The macro Radio 4478 is a 4T/4R radio supporting low bands with 4x40W output power. As part of the Ericsson Radio System portfolio Radio 4478 has best in class design when it comes to radio performance and power efficiency for wide area 3GPP radio products.

Radio 4478 has by use of its small and smart dimensions support for a wide range of mounting scenarios and provides a pioneering flexibility within its product segment with the One-bolt Installation. With Radio 4478 Ericsson evolves the macro radio part of the portfolio to become even more flexible and making it easier than ever to make small and efficient single and multi-band macro radio installations.

The Radio 4478 should preferably be located near the antenna and can be located up to 40 km from the baseband unit. A fiber optic cable can be used to connect the Radio 4478 to the baseband unit and several radio units can be connected in a cascade or star configuration.

Radio 4478 provides support for AISG TMA and RET towards the antenna system. LTE is supported with up to 6 carriers in MIMO. Four duplex (TX/RX) branches provide in-built support for MIMO, antenna calibration and TX/RX diversity.



Optional installation equipment for wall and pole mount is available. To support AC installations there will be optional Power Supply Units (PSU).

Technical specification for Radio 4478

FREQUENCY BANDS

Bands: 3GPP FDD low bands (600-900 MHz)

HW CAPACITY

Carrier capacity LTE: Up to 6 carriers in MIMO
IBW: Full band IBW
MIMO: Yes, 4T4R
Output power: Up to 4 x 40 W

INTERFACE SPECIFICATIONS

Antenna ports: 4 x 4.3-10 (f)
External Antenna Line Device: RET 2.0, using DIN 8 or over the antenna port. AISG TMA & RET support
CPRI: 2 x 2.5/4.9/9.8/10.1 Gbps (exchangeable SFP modules)
Optical indicators: 5
Maintenance button: 1
External alarms: 2 (using DIN 14) or optional fan unit
Field ground: Dual lug

MECHANICAL SPECIFICATIONS

Weight: 27 kg
Volume: 24 liter
Mounting: Rail, wall and pole mount
Fans needed when mounted in non-vertical direction

ELECTRICAL SPECIFICATIONS

Power Supply: -48 VDC (3-wire)

ENVIRONMENTAL SPECIFICATIONS

Normal operating temp.: -40 °C to +55 °C (cold start at -40 °C)
Environment: Outdoor class with IP65

Technical Data Sheet

8 AWG 6 Conductor Shielded 600V Power Cable

Part Number: WR-VG86ST-BRD

Description: 8 A WG, 6 conductor shielded 600V power tray cable constructed with stranded tinned copper, polyvinylchloride and nylon insulation, an uninsulated tinned copper ground conductor, an aluminum/mylar shield with a stranded tinned copper drain wire, a tinned copper braid shield and an overall polyvinylchloride jacket. Individual conductors are manufactured in accordance with UL Standard 83, Type THHN/THWN/VW-1. Cable is manufactured in the USA in accordance with UL Standard 1277 and NEC listed Type TC, suitable for use in Class I Division II hazardous locations and approved for installation in cable trays per Article 336 of the National Electric Code. Cable may be installed in open air, in ducts or conduits, in trays or troughs and is approved for direct burial and outdoor applications. Jacket is sunlight and oil resistant and cable is (UL) TC-ER approved for 600V, 75°C Wet or 90°C Dry, and meets or exceeds the requirements of UL 1581 and 1202 (FT-4) 70,000 BTU/HR and ICEA T-29-520 210,000 BTU/HR flame tests.

1. Conductor

- 1.1 AWG Size & Stranding: 8 AWG, Class B 7 Strands
- 1.2 Material: Annealed Tinned Copper
- 1.3 DC Resistance: 0.66 ohms/1000 ft @ 20°C

2. Insulation

- 2.1 Material: Polyvinylchloride & Nylon per UL Standard 83, Type THHN/THWN/VW-1
- 2.2 Wall Thickness: 0.030" PVC & 0.006" Nylon - The minimum at any point shall not be less than 90% of the specified wall thickness

3. Color Code

- 3.1 Code: Red/Blue, Black/Blue, Red/Orange, Black/Orange, Red/Green, Black/Green

4. Assembly

- 4.1 Lay Length: Per UL Standard 1277
- 4.2 Fillers: Non-Hygroscopic Polypropylene - As required for a circular cross-section
- 4.3 Binder: Clear Mylar
- 4.4 Shield: Aluminum/Mylar Tape - 100% coverage
- 4.5 Drain Wire: 12 AWG, 7 Strand Tinned Copper
- 4.6 Shield: 36 AWG Tinned Copper Braid - 65% minimum coverage
- 4.7 Ground: Uninsulated - 10 AWG, 7 Strand Tinned Copper
- 4.8 2ND Binder: Clear Mylar

5. Jacket

- 5.1 Material: Polyvinylchloride per UL Standard 1277
- 5.2 Wall Thickness: 0.060" - The minimum at any point shall not be less than 80% of the specified wall thickness
- 5.3 Diameter: 0.774"
- 5.4 Color: Black
- 5.5 Weight: 590 lbs./Mft.

6. Markings

- 6.1 Type: Cable shall be permanently identified via surface inkjet print
- 6.2 Legend: .Rosenberger: 8AWG 6C SHIELDED (UL) TC-ER PVC/NYLON UNINSULATED GROUND
600V 90°C DRY 75°C WET PVC JACKET SUN RES DIR BUR OIL RES I FT4 "ROHS"

7. Standards

- 7.1 UL listed as Type TC-ER per UL Standard 1277 for tray cables
- 7.2 UL approved for Direct Burial, Sunlight and Oil Resistant applications
- 7.3 Individual conductors pass UL VW-1 flame test, rated THHN/THWN/VW-1
- 7.4 Cable meets UL 1581 & 1202 (FT-4) 70,000 BTU/HR & ICEA T-29-520 210,000 BTU/HR requirements
- 7.5 Meets ICEA S-95-658, where applicable
- 7.6 Cold Temperature Rating: -40°C
- 7.7 All materials used in the manufacture of this cable are RoHS compliant

ALL SPECIFIED PARAMETERS ARE NOMINAL AND SUBJECT TO VERIFICATION

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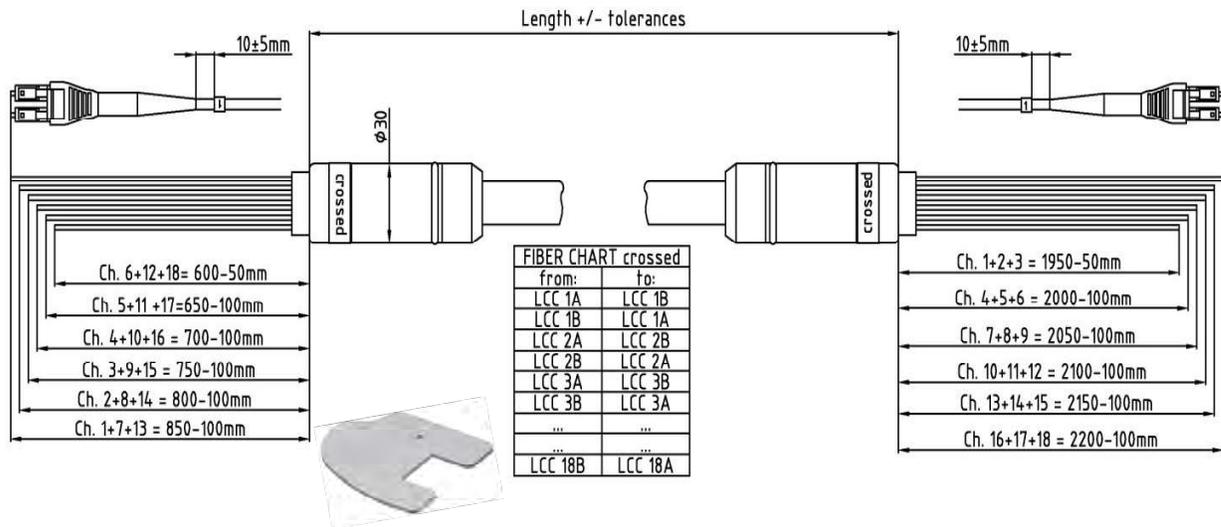
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Page 1 of 1

Technical Data Sheet

FTTA Fiber Trunk
LCC – 9uG657A2 - LCC

FB-L98B-034-XXX



All dimensions are in mm; tolerances according to ISO 2768 m-H

Description

FTTA fiber trunks are fiber optical cable assemblies connecting base stations and remote radio heads in telecommunication applications. They can be used indoor and outdoor, are UV protected and riser rated. Connectors and fan-out are IP67 protected. Divider heads on both ends facilitate the fan out. A pulling sock eases cable hoisting and ensures easy handling in an outdoor environment. Each trunk comes with a securing washer as an installation tool. Fanouts are protected with an installation tube on both ends, which is reusable for multiple installations.

Available Variants

Type	Length (mm)	weight (g) / pce
L98B-034-5000	5000±1500	450
L98B-034-25000	25000±1500	2250
L98B-034-30000	30000±1500	2700
L98B-034-50000	50000±1500	4500
L98B-034-75000	75000±1500	6750
L98B-034-100000	100000±1500	9000
L98B-034-125000	125000±1500	11250
L98B-034-150000	150000±1500	13500
L98B-034-200000	200000±1500	18000

Other length on request

Parts

Connector top	18 x LCC, single mode
Connector bottom	18 x LCC, single mode
Cable	OFNR, UL 1666; GR 20 Core

Technical Data Sheet

FTTA Fiber Trunk
LCC – 9uG657A2 - LCC

FB-L98B-034-XXX

Optical data

Cable	36 fibers				
Fiber	9/125 μm per ITU-T G657A2 single mode optical fiber; compatible to G652D.				
Attenuation Coefficient	<table> <tr> <td>≤ 0.35 dB / km</td> <td>λ = 1310 nm</td> </tr> <tr> <td>≤ 0.25 dB / km</td> <td>λ = 1550 nm</td> </tr> </table>	≤ 0.35 dB / km	λ = 1310 nm	≤ 0.25 dB / km	λ = 1550 nm
≤ 0.35 dB / km	λ = 1310 nm				
≤ 0.25 dB / km	λ = 1550 nm				
Connectors	LC Compact Duplex with unitboot.				
Insertion loss	<table> <tr> <td>typ. 0.10 dB</td> </tr> <tr> <td>max. 0.30 dB</td> </tr> </table>	typ. 0.10 dB	max. 0.30 dB		
typ. 0.10 dB					
max. 0.30 dB					
Return loss	typ. 50 dB (UPC)				
Ferrule Geometry	acc. to IEC61754-20				

Mechanical data

Cable diameter, jacket	10 mm
Protection tube diameter (both ends)	38 mm (OD)
	Ingress Protection rating IP67
Pulling force at the grip	600N
Minimum bending radius cable	
Installation	244 mm
Operation	122 mm
Max. tensile strength cable	
Installation	2700 N (607 lb)
Permanent	890 N (200 lb)
Crush resistance	2200 N / 100 mm (494 lb / 100 mm)
Minimum bending radius single fan-out	
Single	10 mm
Repeated	30 mm
Max. tensile strength	100 N (22 lb)

Environmental data

Temperature range operation	-40 °C to +80 °C (-40 °F to 176 °F) <i>Acc. to IEC61300-2-22 Category E</i>
Temperature range storage	-40 °C to +80 °C (-40 °F to 176 °F)
Temperature range installation	-10 °C to +65 °C (14 °F to 149 °F)
2002/95/EC (RoHS)	compliant
REACH	compliant

Packing

Length ≤ 20 m	1 pce in box
20 m < Length < 80 m	1 pce on cardboard drum (Ø 500 mm)
80 m ≤ Length ≤ 125 m	1 pce on cardboard drum (Ø ext. 500 mm)
Length > 125 m	1 pce on cardboard drum (Ø 800 mm)

Each product comes with installation documents and test report for every connector.
IL, RL and Fibercheck2 is online available for each connector.
Serial number tracking on request is possible for each individual product.

While the information has been carefully compiled to the best of our knowledge, nothing is intended as representation or warranty on our part and no statement herein shall be construed as recommendation to infringe existing patents. In the effort to improve our products, we reserve the right to make changes judged to be necessary.

Draft	Date	Approved	Date	Rev.	Engineering change number	Name	Date
S.Gleich	11/10/11			600	13-0004	S.Gleich	05/11/13

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ATT – WIC WALK IN CABINET XTE-801

4/30/2018, VERSION



6 X 6 FOOT WALK IN CABINET

XTE-801 - PRODUCT CONFIGURATION

- R13 Insulation, 175 MPH wind rated, 300PSF live load rated roof and Zone 4 Seismic rated configuration
 - Turn key, site ready configuration
 - Fast installation via helical installation method
- Integrated NetSure™ 7100 Power System
 - 84"H x 25"W x 23"D, 620 lbs., 3-row battery shelf
 - Full integrated, Zone 4 Rack
 - -48 VDC at 1000 amps, +24 VDC at 520 amps system
 - 12 rectifier-only positions, 12 rectifier/converter positions,
 - LVBD/MBD, Ethernet, temp comp, (58) -48 V (20) +24 V CB positions, (3) battery trays with 150A CBs
- Integrated 200A PTS with 30 pos load center, surge arrestor & generator cam lock box (ATS option arriving soon)
- Integrated high efficiency “Direct Air Cooling” primary cooling system with back up secondary 1Ton HVAC system



XTE-801 - PRODUCT CONFIGURATION

6 X 6 WALK IN CABINET – BILL OF MATERIALS

Part Number	Description	NEQ
	XTE 801 Series Walk-In-Cabinet (WIC)	
F2018001-WIC	ATT 6X6 WIC e/w the following:	NEQ.20060
	Electrical Service Entrance	
PTLC-MTS-12200-CL	UL 891 Listed, 32x22"x10 cabinet with CamLok Connector Panel, 240 VAC / 120 VAC, 200 A Power Transfer Load Center with mechanically interlocked "mains" enabling manual transfer between Utility and an Alternative Power Source connected via CamLok style connectors. PTLC includes Strikesorb surge protection, a 30-position Square D QO panelboard, and an alarm monitor for utility power loss.	NEQ.19706
F1010923	350 Amp Generator Disconnect Kit, NS15KWGENINPUTASM.	N/A
	DC Power System	
582127000203	NetSure™ 7100 SERIES -48V DC Power System sized at 1,000 Amp on the -48 VDC side and 520 A on the +24 VDC side with 3 factory-installed and wired battery trays.	NEQ.20068
	Options	
PTS 3703-WIC WOF	Rack CommBay-WIC-without Fiber Panel.	NEQ.19678
PTS3704-WIC-WF	Rack CommBay-WIC-with Fiber Panel.	NEQ.19679
AF000135	Direct Air Cooling (DAC) system. Dual Fan -48 VDC powered fresh air cooling kit with HVAC control for low voltage (24 VAC) controlled HVAC unit.	BLD.10558
ECUA12ACA036S-A5-100	1 TON WALL MOUNTED HVAC, with Controller, supply and return grills and remote sensor.	N/A
F1011119	WIC Single-Point Helical Foundation Kit – (4) WIC Corner Plates, (1) Two Step Stair, and (4) 6" x 7' Helical Piers with Leveling Hardware.	NEQ.20061

AT&T Walk In Cabinet

- NEQ 20060

AT&T Order Processing: Use CEEOT and Appropriate NESC

- Ericsson WIC – ERNSBWICID
- Nokia WIC - NONSBWICID

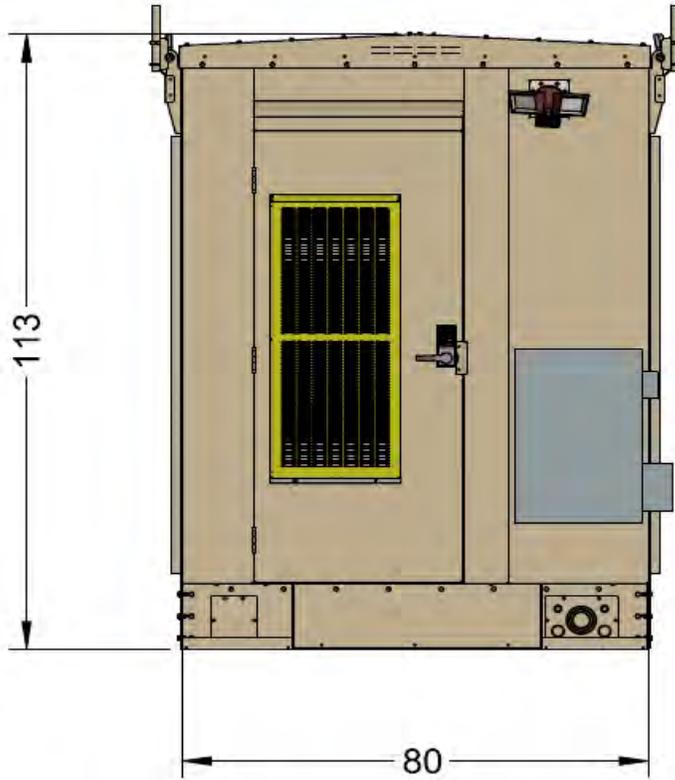
System weights

- Empty: 5500 lbs.
- Fully integrated: 7500 lbs.

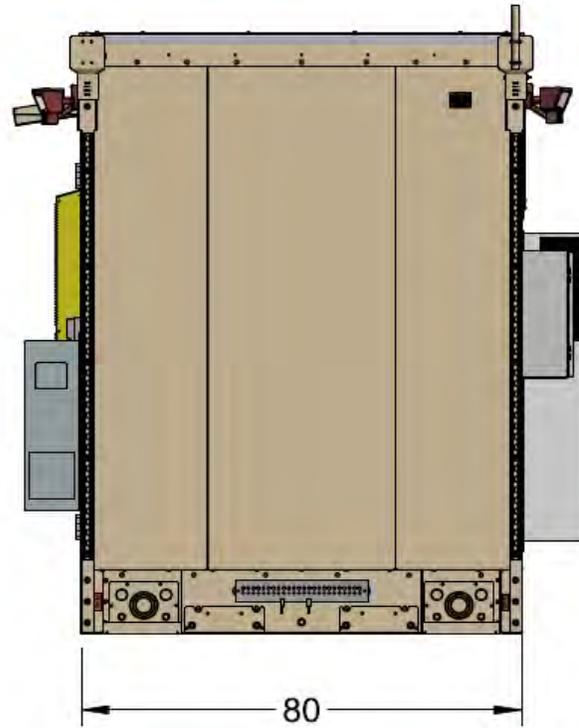
Color – Pebble-Gray, RAL7032.

6 X 6 FOOT WALK IN CABINET XTE-801 – OVERALL DIMENSIONS

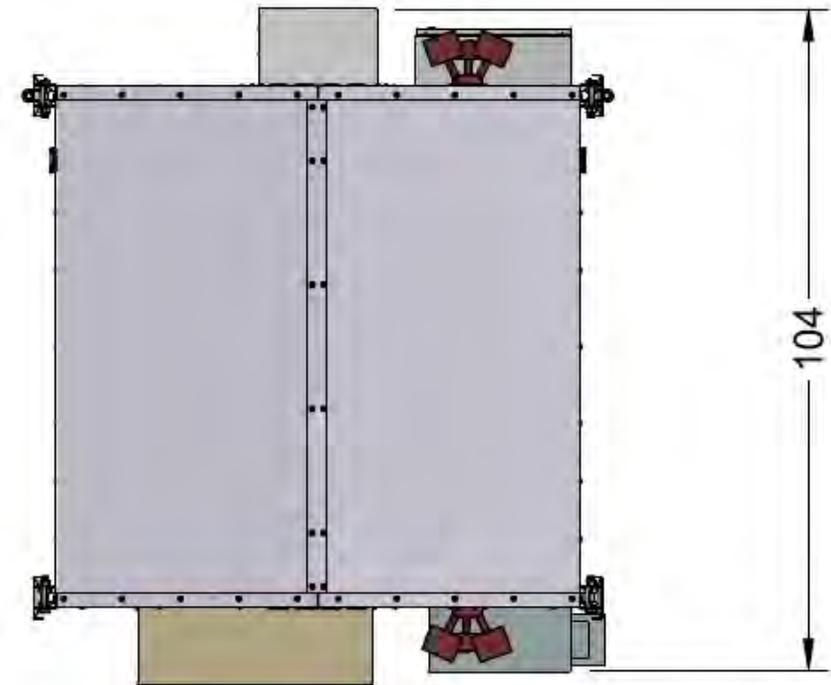
Front View



Side View



Top View



SDC020 | 2.2L | 20 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

Standby Power Rating

20 kW, 25 kVA, 60 Hz



*EPA Certified Prime ratings are not available in the US or its Territories

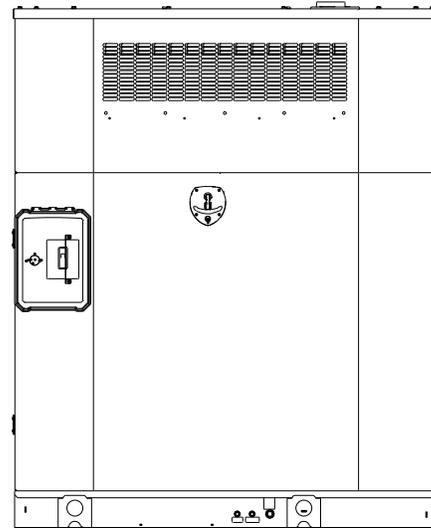


Image used for illustration purposes only

Codes and Standards

Not all codes and standards apply to all configurations. Contact factory for details.



UL2200, UL6200, UL1236, UL489, UL142



CSA C22.2, ULC S601



BS5514 and DIN 6271



SAE J1349



NFPA 37, 70, 99, 110



NEC700, 701, 702, 708



ISO 3046, 7637, 8528, 9001



NEMA ICS10, MG1, 250, ICS6, AB1



ANSI C62.41

Powering Ahead

For over 60 years, Generac has provided innovative design and superior manufacturing.

Generac ensures superior quality by designing and manufacturing most of its generator components, including alternators, enclosures and base tanks, control systems and communications software.

Generac gensets utilize a wide variety of options, configurations and arrangements, allowing us to meet the standby power needs of practically every application.

Generac searched globally to ensure the most reliable engines power our generators. We choose only engines that have already been proven in heavy-duty industrial applications under adverse conditions.

Generac is committed to ensuring our customers' service support continues after their generator purchase.

STANDARD FEATURES

ENGINE SYSTEM

- Oil Drain Extension
- Air Cleaner
- Stainless Steel Flexible Exhaust Connection
- Factory Filled Oil and Coolant
- Engine Coolant Heater

FUEL SYSTEM

- Fuel Lockoff Solenoid
- Primary Fuel Filter

COOLING SYSTEM

- Closed Coolant Recovery System
- UV/Ozone Resistant Hoses
- Factory-Installed Radiator
- Radiator Drain Extension
- 50/50 Ethylene Glycol Antifreeze

ELECTRICAL SYSTEM

- Battery Charging Alternator
- Battery Cables
- Battery Tray
- Rubber-Booted Engine Electrical Connections
- Solenoid Activated Starter Motor

ALTERNATOR SYSTEM

- UL2200 GENprotect™
- Class H Insulation Material
- 2/3 Pitch
- Skewed Stator
- Permanent Magnet Excitation
- Sealed Bearing
- Rotor Dynamically Spin Balanced
- Amortisseur Winding (3-Phase Only)
- Full Load Capacity Alternator
- Protective Thermal Switch

GENERATOR SET

- Internal Genset Vibration Isolation
- Separation of Circuits - High/Low Voltage
- Wrapped Exhaust Piping
- Standard Factory Testing
- 2 Year Limited Warranty (Standby Rated Units)
- 1 Year Limited Warranty (Prime Rated Units)
- Silencer Mounted in the Discharge Hood

ENCLOSURE

- Rust-Proof Fasteners with Nylon Washers to Protect Finish
- High Performance Sound-Absorbing Material
- Gasketed Doors
- Aluminum Enclosure
- Level 2 Sound Attenuated
- Twist-Lock Handle
- RhinoCoat™ - Textured Polyester Powder Coat Paint

FUEL TANKS (If Selected)

- UL 142/ULC S601
- Double Wall
- Normal and Emergency Vents
- Factory Pressure Tested
- Rupture Basin Alarm
- Fuel Level
- Check Valve In Supply and Return Lines
- RhinoCoat™ - Textured Polyester Powder Coat Paint
- Stainless Steel Hardware

CONTROL SYSTEM



Power Zone® 410 Controller

Features

- Programmable Auto Crank
- Selectable Low Speed Exercise
- RS-232 x2
- RS-485 x2
- 3-Phase Sensing Digital Voltage Regulator
- Time
- Date
- On/Off/Manual Switch
- Not in Auto Flashing Light
- Emergency Stop
- Modbus® RTU

- Remote Ports
- CANbus
- Full Range Standby Operation
- 3-Phase AC Volts
- 3-Phase Amps
- kW
- Power Factor
- Ruptured Tank Detection
- Auxiliary Shutdown Switch
- Remote Communications
- Compatible with NFPA 110, Level 1 or 2 (When Optional Modules Selected)
- Line Power/Gen Power
- I²T Function for Full Generator Protection

Full System Status Display

- Multilingual 128x64 Graphical Display with Heater
- Easy Status View LED Screen
- Full System Status
- Run Hours
- Service Reminders
- Fault History (Alarm Log)
- Oil Pressure
- Oil Temperature (Optional/When Equipped)
- Oil Level (Optional/When Equipped)
- Output for Fuel Level High/Low Warning
- Water Temperature
- Water Level
- Fuel Pressure/Level
- Engine Speed
- Battery Voltage
- Alternator Frequency

Alarms and Warnings

- Common Alarm Output

CONFIGURABLE OPTIONS

ENGINE SYSTEM

- Oil Heater
- Fluid Containment Pan
- Coolant Heater Isolation Ball Valves

FUEL SYSTEM

- NPT Flexible Fuel Line

ELECTRICAL SYSTEM

- 10A UL Listed Battery Charger
- Battery Warmer

ALTERNATOR SYSTEM

- Anti-Condensation Heater
- Tropical Coating

GENERATOR SET

- Extended Factory Testing
- Pad Vibration Isolators

CIRCUIT BREAKER OPTIONS

- Main Line Circuit Breaker
- Shunt Trip and Auxiliary Contact
- Electronic Trip Breakers

ENCLOSURE

- Up to 190 MPH Wind Load Rating (Contact Factory for Availability)
- AC/DC Enclosure Lighting Kit
- Door Open Alarm Switch

WARRANTY (Standby Gensets Only)

- 2 Year Extended Limited Warranty
- 5 Year Limited Warranty
- 5 Year Extended Limited Warranty
- 7 Year Extended Limited Warranty
- 10 Year Extended Limited Warranty

CONTROL SYSTEM

- NFPA 110 Compliant 21-Light Remote Annunciator
- Remote Relay Assembly (8 or 16)
- Oil Temperature Indication and Alarm
- Spare Inputs (x4) / Outputs (x4)
- Battery Disconnect Switch
- Remote E-Stop (Break Glass-Type, Surface Mount)
- Remote E-Stop (Red Mushroom-Type, Surface Mount)
- Remote E-Stop (Red Mushroom-Type, Flush Mount)
- 100 dB Alarm Horn
- Ground Fault Annunciation
- 120V GFCI and 240V Outlets
- 10A Engine Run Relay

FUEL TANKS (Size On Last Page)

- Overfill Protection Valve
- Spill Box Return Hose
- 2.5 Gallon Spill Box
- Tank Risers
- Fuel Level Switch and Alarm
- 12' Vent System
- Fire Rated Stainless Steel Fuel Hose

ENGINEERED OPTIONS

GENERATOR SET

- Special Testing

FUEL TANKS

- UL2085 Tank
- Stainless Steel Tanks
- Special Fuel Tanks

SDC020 | 2.2L | 20 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

APPLICATION AND ENGINEERING DATA

ENGINE SPECIFICATIONS

General

Make	Perkins
EPA Emissions Compliance	Stationary Emergency
EPA Emissions Reference	See Emission Data Sheet
Cylinder #	4
Type	In-Line
Displacement - in ³ (L)	135 (2.22)
Bore - in (mm)	3.3 (84)
Stroke - in (mm)	3.9 (100)
Compression Ratio	23.3:1
Intake Air Method	Naturally Aspirated
Cylinder Head	Cast Iron
Piston Type	Aluminum
Crankshaft Type	Forged Steel

Engine Governing

Governor	Electronic Isochronous
Frequency Regulation (Steady State)	±0.5%

Lubrication System

Oil Pump Type	Gear
Oil Filter Type	Full-Flow Cartridge
Crankcase Capacity - qt (L)	11.2 (10.6)

Cooling System

Cooling System Type	Pressurized Closed
Water Pump Type	Pre-Lubed, Self Sealing
Fan Type	Puller
Fan Speed - RPM	3,000
Fan Diameter - in (mm)	11 (279)

Fuel System

Fuel Type	Ultra Low Sulfur Diesel Fuel
Fuel Specifications	ASTM
Fuel Filtering (Microns)	5
Fuel Inject Pump	Distribution Injection Pump
Fuel Pump Type	Cassette
Injector Type	Indirect, Pintle Nozzle
Fuel Supply Line - in (mm)	0.31 (7.94) ID
Fuel Return Line - in (mm)	0.31 (7.94) ID

Engine Electrical System

System Voltage	12 VDC
Battery Charger Alternator	Standard
Battery Size	See Battery Index 0161970SBY
Battery Voltage	12 VDC
Ground Polarity	Negative

ALTERNATOR SPECIFICATIONS

Standard Model	K0035124Y26
Poles	4
Field Type	Revolving
Insulation Class - Rotor	H
Insulation Class - Stator	H
Total Harmonic Distortion	<5% (3-Phase Only)
Telephone Interference Factor (TIF)	<50

Standard Excitation	Permanent Magnet Excitation
Bearings	Single Sealed
Coupling	Direct via Flexible Disc
Load Capacity - Standby	100%
Prototype Short Circuit Test	Yes
Voltage Regulator Type	Digital
Number of Sensed Phases	All
Regulation Accuracy (Steady State)	±0.25%

SDC020 | 2.2L | 20 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

OPERATING DATA

POWER RATINGS

	Standby	
Single-Phase 120/240 VAC @1.0pf	20 kW, 20 kVA	Amps: 83
Three-Phase 120/208 VAC @0.8pf	20 kW, 25 kVA	Amps: 70
Three-Phase 120/240 VAC @0.8pf	20 kW, 25 kVA	Amps: 60
Three-Phase 277/480 VAC @0.8pf	20 kW, 25 kVA	Amps: 30

MOTOR STARTING CAPABILITIES (skVA)

skVA vs. Voltage Dip					
120/240 VAC 1Ø	30%	277/480 VAC 3Ø	30%	208/240 VAC 3Ø	30%
A0035044N26	50	K0035124Y26	68	K0035124Y26	50

FUEL CONSUMPTION RATES*

Fuel Pump Lift- ft (m)	Diesel - gph (Lph)	
	Percent Load	Standby
3 (1)	25%	0.6 (2.1)
	50%	0.9 (3.5)
	75%	1.3 (4.8)
	100%	1.6 (6.2)
Total Fuel Pump Flow (Combustion + Return) - gph (Lph)		
16.6 (63)		

* Fuel supply installation must accommodate fuel consumption rates at 100% load.

COOLING

		Standby
Air Flow (Fan Air Flow Across Radiator) - Compact	cfm (m ³ /min)	1,653 (46.8)
Coolant Flow	gpm (Lpm)	15.5 (58.7)
Coolant System Capacity	gal (L)	4.2 (16.0)
Heat Rejection to Coolant	BTU/hr (kW)	76,090 (22.3)
Inlet Air	cfm (m ³ /min)	1,714 (48.5)
Maximum Operating Ambient Temperature	°F (°C)	120 (50)
Maximum Operating Ambient Temperature (Before Derate)	See Bulletin No. 0199280SSD	
Maximum Additional Radiator Backpressure	in H ₂ O (kPa)	0.5 (0.12)

COMBUSTION AIR REQUIREMENTS

	Standby
Flow at Rated Power - cfm (m ³ /min)	61.4 (1.7)

ENGINE

		Standby
Rated Engine Speed	RPM	1,800
Horsepower at Rated kW**	hp	32.5
Piston Speed	ft/min (m/min)	1,182 (360)
BMEP	psi (kPa)	105.8 (729.4)

EXHAUST

		Standby
Exhaust Flow (Rated Output)	cfm (m ³ /min)	160.4 (4.5)
Maximum Allowable Backpressure	inHg (kPa)	40.9 (138.5)
Exhaust Temperature (Rated Output)	°F (°C)	950 (510)

** Refer to "Emissions Data Sheet" for maximum bHP for EPA and SCAQMD permitting purposes.

Deration – Operational characteristics consider maximum ambient conditions. Derate factors may apply under atypical site conditions.

Please contact a Generac Power Systems Industrial Dealer for additional details. All performance ratings in accordance with ISO3046, BS5514, ISO8528, and DIN6271 standards.

Standby - See Bulletin 0187500SSB

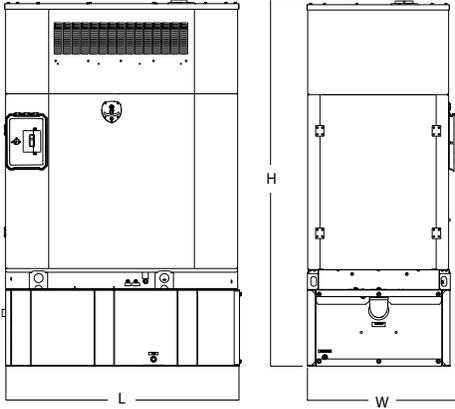
Prime - See Bulletin 0187510SSB

SDC020 | 2.2L | 20 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

DIMENSIONS AND WEIGHTS*

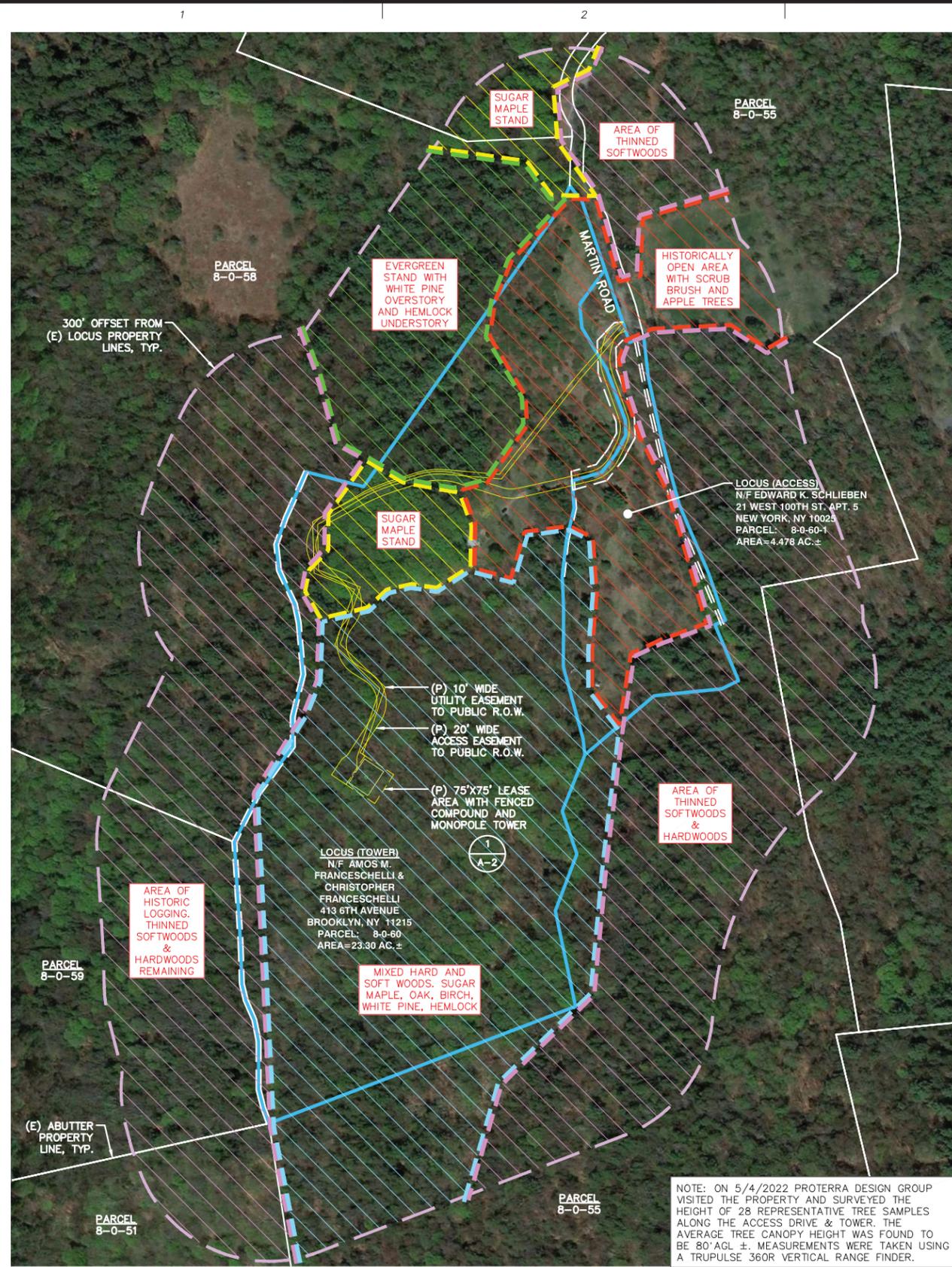


COMPACT VARIANT

Run Time - Hours	Usable Capacity - Gal (L)	L x W x H - in (mm)	Weight - lbs (kg)
No Tank	-	56.0 (1,422) x 34.5 (876) x 68.9 (1,749)	1,465 (664)
31.9	51 (193)	56.0 (1,422) x 34.5 (876) x 87.3 (2,215)	1,914 (868)
64.4	103 (390)	56.0 (1,422) x 34.5 (876) x 99.1 (2,515)	2,090 (948)

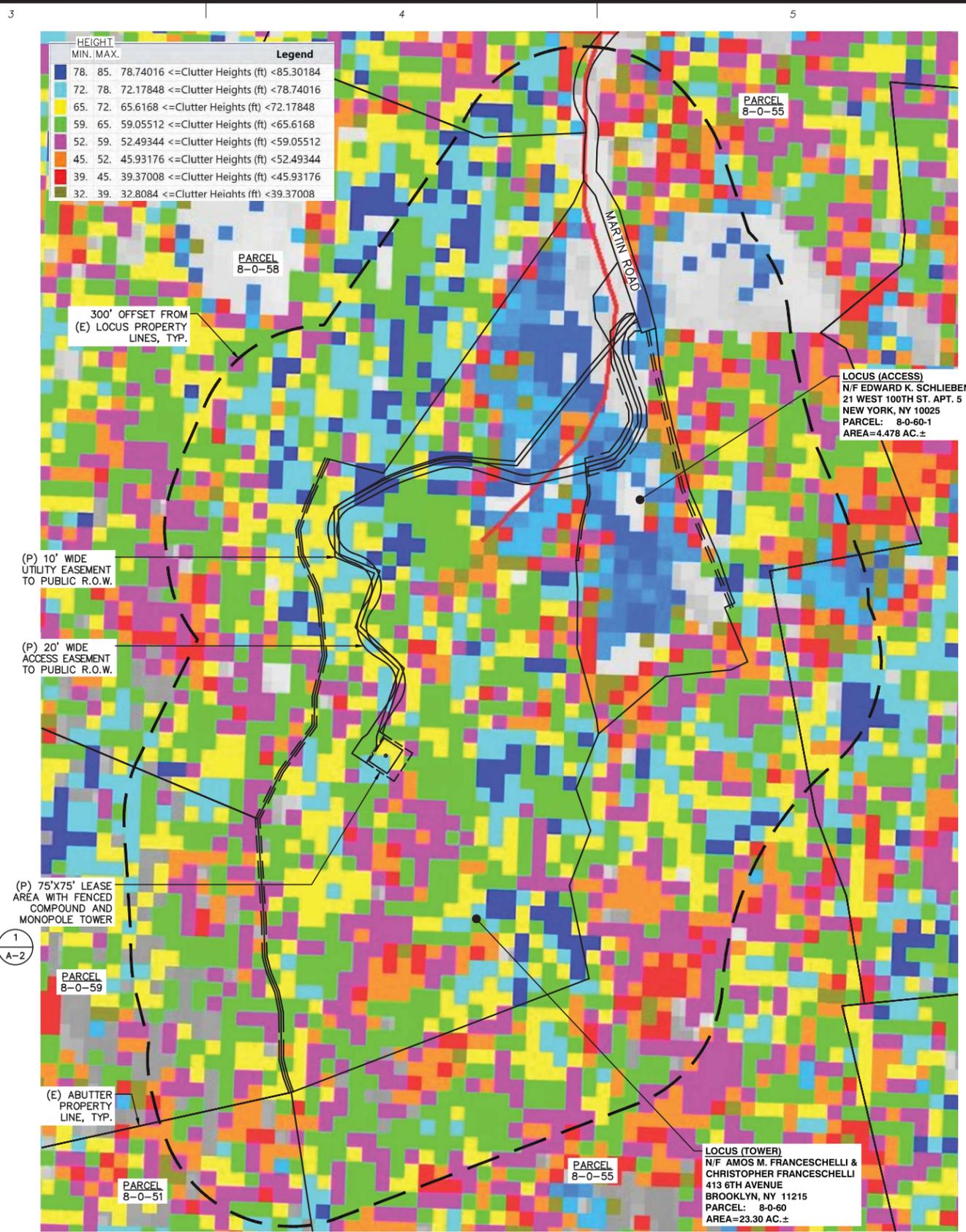
* All measurements are approximate and for estimation purposes only. Specification characteristics may change without notice. Please contact a Generac Power Systems Industrial Dealer for detailed installation drawings.

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NOTE: ON 5/4/2022 PROTERRA DESIGN GROUP VISITED THE PROPERTY AND SURVEYED THE HEIGHT OF 28 REPRESENTATIVE TREE SAMPLES ALONG THE ACCESS DRIVE & TOWER. THE AVERAGE TREE CANOPY HEIGHT WAS FOUND TO BE 80' AGL ±. MEASUREMENTS WERE TAKEN USING A TRUPULSE 360R VERTICAL RANGE FINDER.

TREE DOMINANT SPECIES PLAN
 SCALE: 1"=150' (22x34)
 1"=300' (11x17)



NOTE: THE CLUTTER HEIGHT REPRESENTS THE DIFFERENCE BETWEEN GROUND COVER/VEGETATION AND THE DIGITAL TERRAIN MODEL USING PUBLICLY AVAILABLE LIDAR.

TREE CANOPY CLUTTER HEIGHT PLAN
 SCALE: 1"=150' (22x34)
 1"=300' (11x17)

NO.	DATE	REVISIONS
01	05/13/22	SUPPLEMENT FOR PERMITTING

SITE NAME: BUCKLAND
SITE NUMBER: VT-MA-0019F
ADDRESS: 28 MARTIN ROAD
 BUCKLAND, MA 01888

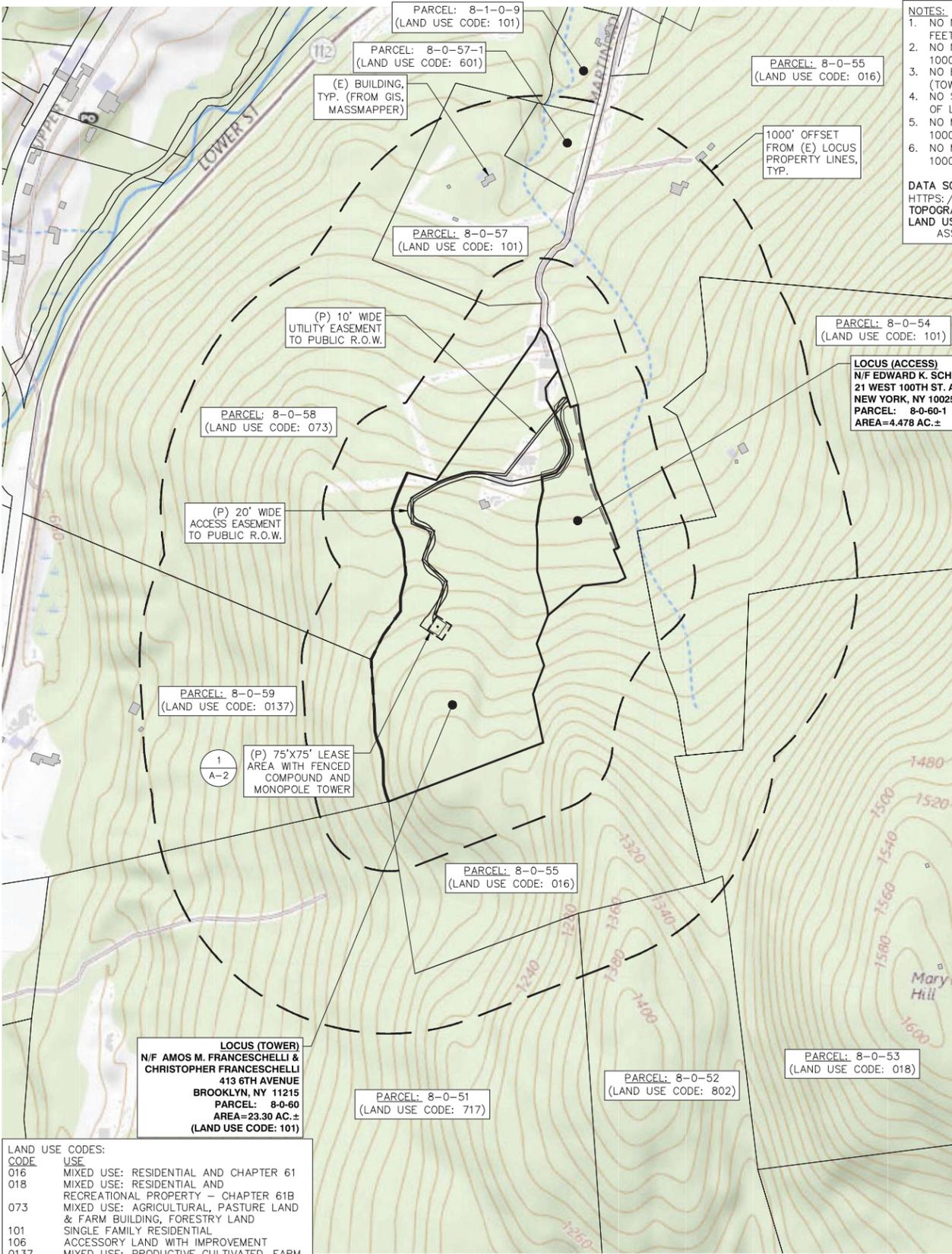
APPLICANT:
 VERTEX TOWER ASSETS, LLC
 165 SOUTH STREET
 SUITE 102
 WRENTHAM, MA 02093

VERTIX TOWERS LLC

STAMP: Jesse Moreno, PE
 Digitally signed by Jesse Moreno, PE
 DN: cn=Jesse M. Moreno, o=PE, email=jmoreno@proterra.com, c=US
 5-13-2022

DATE: 05/13/2022
DRAWN: JEB
CHECK: JMM/TEJ
SCALE: SEE PLAN
JOB NO.: 18-015
SHEET TITLE:

TREE HEIGHT & COVERAGE PLANS
SP-1



LAND USE CODES:

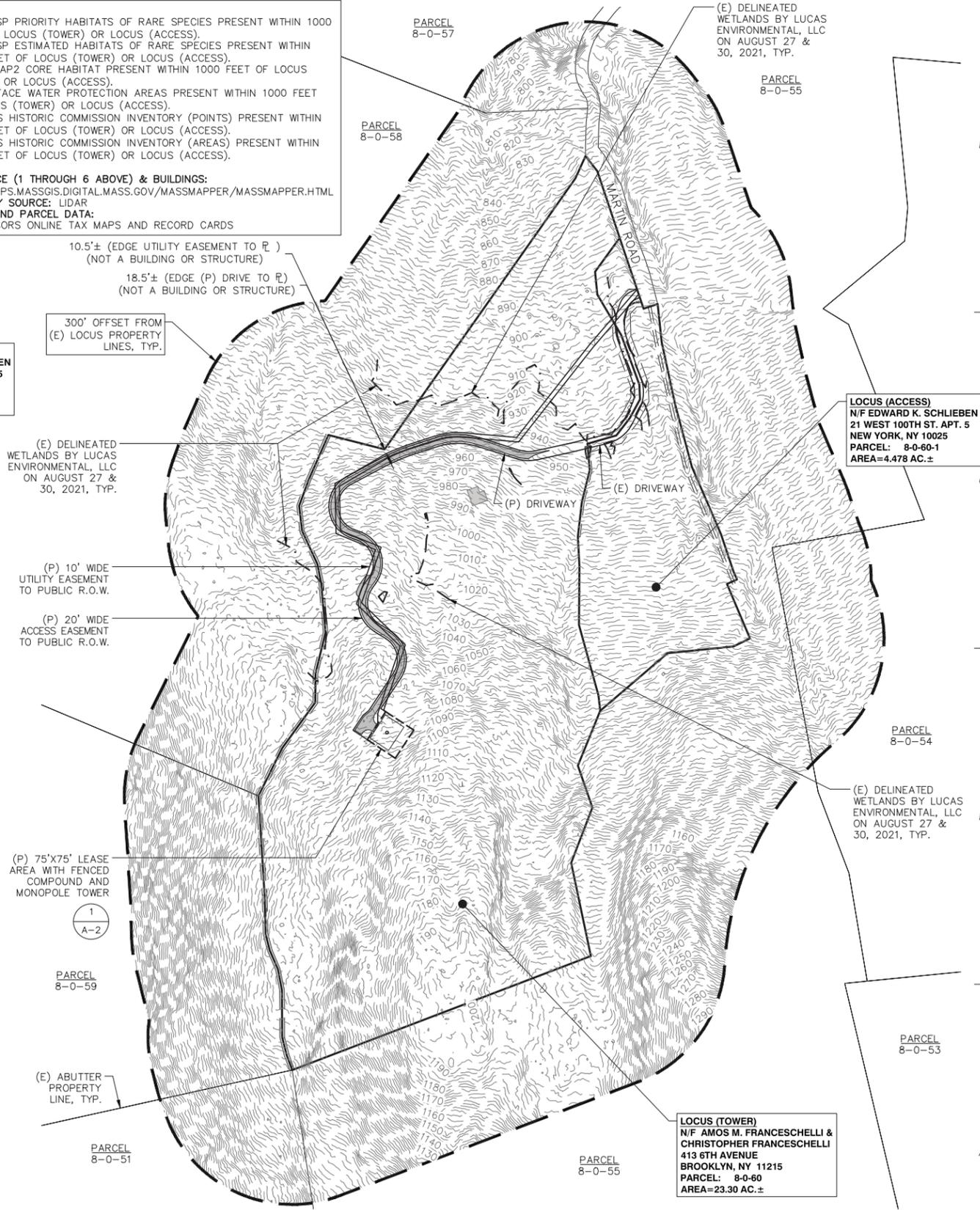
CODE	USE
016	MIXED USE: RESIDENTIAL AND CHAPTER 61
018	MIXED USE: RESIDENTIAL AND RECREATIONAL PROPERTY - CHAPTER 61B
073	MIXED USE: AGRICULTURAL, PASTURE LAND & FARM BUILDING, FORESTRY LAND
101	SINGLE FAMILY RESIDENTIAL
106	ACCESSORY LAND WITH IMPROVEMENT
0137	MIXED USE: PRODUCTIVE CULTIVATED, FARM AND GRAIN, SINGLE FAMILY RESIDENTIAL, CHAPTER 61
601	LAND DESIGNATED UNDER CHAPTER 61
717	PRODUCTIVE WOODLAND 61A WITH A FOREST MANAGEMENT PLAN; WOODLOTS
802	CAMPING - AREAS WITH SITES FOR OVERNIGHT CAMPING



NOTES:

- NO NHESP PRIORITY HABITATS OF RARE SPECIES PRESENT WITHIN 1000 FEET OF LOCUS (TOWER) OR LOCUS (ACCESS).
- NO NHESP ESTIMATED HABITATS OF RARE SPECIES PRESENT WITHIN 1000 FEET OF LOCUS (TOWER) OR LOCUS (ACCESS).
- NO BIOMAP2 CORE HABITAT PRESENT WITHIN 1000 FEET OF LOCUS (TOWER) OR LOCUS (ACCESS).
- NO SURFACE WATER PROTECTION AREAS PRESENT WITHIN 1000 FEET OF LOCUS (TOWER) OR LOCUS (ACCESS).
- NO MASS HISTORIC COMMISSION INVENTORY (POINTS) PRESENT WITHIN 1000 FEET OF LOCUS (TOWER) OR LOCUS (ACCESS).
- NO MASS HISTORIC COMMISSION INVENTORY (AREAS) PRESENT WITHIN 1000 FEET OF LOCUS (TOWER) OR LOCUS (ACCESS).

DATA SOURCE (1 THROUGH 6 ABOVE) & BUILDINGS:
 HTTPS://MAPS.MASSGIS.DIGITAL.MASS.GOV/MASSMAPPER/MASSMAPPER.HTML
TOPOGRAPHY SOURCE: LIDAR
LAND USE AND PARCEL DATA:
 ASSESSORS ONLINE TAX MAPS AND RECORD CARDS



NO.	DATE	REVISIONS
01	05/13/22	SUPPLEMENT FOR PERMITTING

SITE NAME: BUCKLAND
SITE NUMBER: VT-MA-0019F
ADDRESS: 28 MARTIN ROAD
 BUCKLAND, MA 01838

APPLICANT:
Vertex Towers LLC
 VERTEX TOWER ASSETS, LLC
 165 SOUTH STREET
 WRENTHAM, MA 02093

STAMP:

DATE: 05/13/2022
DRAWN: JEB
CHECK: JMM/TEJ
SCALE: SEE PLAN
JOB NO.: 18-015

SHEET TITLE:
USGS & OVERALL TOPOGRAPHY PLANS
SP-2