



Telecommunications Transmission Facility
Committee
Tower Coordinator Recommendation

Application Number: 2024052263 **Type:** Colocation **Received (date):** 5/10/2024

Revised: 6/12/2024

Applicant: Crown Castle Fiber LLC on behalf of T-Mobile

Site Name/Location: Pepco 806428-080690/9609 New Hampshire Ave, Silver Spring

Zoning Standard: R-60 **Property Owner:** State Highway ROW

Description: Install a strand mounted small cell with a RAD center of 25'9" on an existing 49' 10" wood utility light pole, consisting of one (1) Ericsson 6523 antenna, one (1) Ericsson 6525 antenna, two (2) 4402 radio units, one (1) Ericsson 4435 RRH, two (2) diplexers and antenna strand bracket.

Tower Coordinator Recommendation: Recommended. Recommendation is subject to compliance with all applicable laws.

Signature:

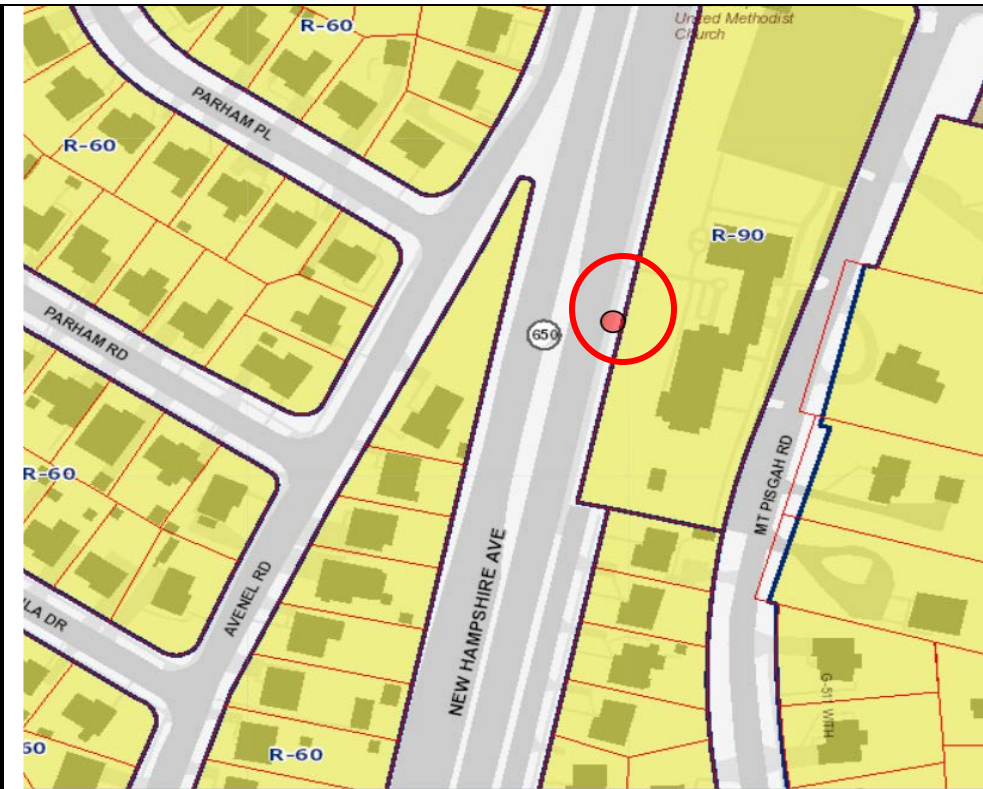
Date: 6/26/24

Impact on land-owning agency: N/A

Existing or future public safety telecommunications facilities and plans: N/A

Colocation options: Crown Castle is applying on behalf of T-Mobile. This location was selected in consultation with the utility structure owner (PEPCO) as it meets the relevant County zoning requirements, utility standards, and wireless coverage/capacity needs of the wireless carrier.

Implications to surrounding area: The MCAtlas zoning map (below) shows the location of the utility pole and proposed strand-mounted antenna (circled) along with the general vicinity.



The photo below obtained from a May 21, 2024, site survey shows the 49'10" utility pole with a red arrow indicating the approximate attachment height of the proposed antennas on the proposed strand. The pole is noted to be at least 70 feet from the closest dwellings.



Attachments: Application

Comments: The proposed strand-mounted antennas and associated equipment will be mounted to a strand/messenger cable secured to the existing 49'10" wood utility pole with the RAD center of 25'9". All proposed antenna and equipment attachments meet the length and volume requirements set forth in the Montgomery County Ordinance, with the maximum length of the proposed antenna being 7.87" for a total volume of 0.07 cubic feet. The proposed installation meets the minimum mounting height and setback requirements under Montgomery County Zoning Ordinance Section 3.5.14.c Antenna on Existing Structure as Limited Use.

The maximum effective radiated power (Max ERP) for this installation (387 watts and 86 watts) falls below the FCC's maximum permissible exposure limits. CTC verified the applicant's categorical exclusion calculations using the data submitted. Based on these calculations, the application is categorically excluded from requiring a detailed environmental analysis.

The applicant provided owner's consent documentation in the form of a Notice To Proceed agreement signed by PEPCO for the proposed work involving this pole.

We recommend this application on its engineering merits.

App No:

2024052263

Application General Information

Applicant Name	Crown Castle Fiber LLC	Received	5/10/2024
Application Type	Colocated	Ann. Plan?	Yes
Carrier	T-Mobile	Will site be used to support government telecommunications facilities or other equipment for government use?	No
Solution Type	Small Cell		
Existing	Existing		
		Gvt. Use Desc.	

Application Description

Install a strand mounted small cell with a RAD center of 25'9" on an existing 49' 10" wood utility light pole, consisting of one (1) Ericsson 6523 antenna, one (1) Ericsson 6525 antenna, two (2) 4402 radio units, one (1) Ericsson 4435 RRH, two (2) diplexers and antenna strand bracket.

Site Information

Site Id	668	Zoning	R-60
Structure Type	Utility Pole	Latitude	39.013263
Street Address	9609 New Hampshire Ave	Longitude	-76.978298
County Site Name	Pepco 806428-080690	Ground Elevation	214
Carrier Site Name	MNG-386	City	Silver Spring
Site Owner	State Highway ROW	Lease Status	Leased
Structure Owner	PEPCO	Does the structure require an antenna structure registration under FCC Title 47	Yes NO
Existing Structure Height	49.8	Distance to Residential Property (New, Colocation Only)	70.6
Provide the proposed height of the replacement structure without any antenna (New Apps Only)		Distance to Commercial Property (New, Colocation Only)	278.5

Justification of why this site was selected:

Provides additional coverage to 9600 block of New Hampshire Avenue and vicinity.

NearbySites (New Apps Only):

Tuesday, May 14, 2024

7:53:02 PM

App No: 2024052263

Screening considerations(New, Colocation Apps Only):

N/A - Strand mounted facility

App No:

2024052263

6409 Questions

Does this qualify as a 6409 application? (Minor Mod, Colocations Only)

~~Yes~~

NO

For towers outside the public ROW will the proposed installation increase the height of the structure by: (1) more than 10% or (2) more than 20 feet, whichever is greater?

No

Will the proposed installation increase the width by adding appurtenance to the body of the structure that would protrude from the edge of the structure by more than 6 feet?

No

For towers outside the public ROW will the proposed installation increase the width by adding appurtenance to the body of the structure that would protrude from the edge of the structure by more than 20 feet?

No

Will the proposed installation require more the standard number of new equipment cabinets for the technology involved, but not to exceed four cabinets?YN

No

Will the proposed installation increase the height of the structure by: (1) more than 10% or (2) more than 10 feet, whichever is greater?

No

Does the structure or current installation have concealment elements/measures?

No

Will the proposed installation require excavation or expansion outside the current boundaries of the site?

No

If yes, describe how the proposed installation does not defeat the existing concealment.

Small Wireless Facility Information

Small Wireless Facility Questions

Small Wireless Facility?

Yes

Is the structure 10% taller than adjacent structures?

Cumulative volume of the proposed wireless equipment(s) exclusive of antennas in cubic feet

0.633

Please list adjacent structure heights

Cumulative volume of the proposed antenna(s) exclusive of equipment in cubic feet

0.07

Tribal Lands?

No

ROW Information

PROW?

Yes

Pole Number

806429-080690

ROW owner

State Highway Administration

ROW width

130.1

Tuesday, May 14, 2024

7:53:02 PM

App No: 2024052263

Antenna Information

Antenna ComplianceYes

Compliance Desc

Antenna LocationNo

Antenna Loc. Desc.

Env. Assessment

Cat. Excluded?YES

Routine Env. EvaluationcheckedNo

Antenna ModelEricsson 6523

Frequency1735-1755 1850-1865 1910-1915 1930-1945 1965-1975 1990-1995 2135-2155

RAD Center25'9"Max ERP86Antenna Dimensions7.87x7.87x0.98Quantity1

Antenna Model Ericsson 6525

Frequency 2535-2552.5MHz, 2584-2590MHz

RAD Center 25'9" Max ERP 387 Antenna Dimensions 7.87 x 7.87 x 0.98

Quantity 1

CROWN CASTLE FIBER LLC TITLE SHEET

CODE COMPLIANCE

ALL WORK AND MATERIALS SHALL BE PERFORMED AND INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THE LATEST EDITIONS OF THE FOLLOWING CODES.

- COMAR 9.12.53, ADAAG & FHAG
- 2018 ICC INTERNATIONAL BUILDING CODE INCORPORATING MONTGOMERY COUNTY AMENDMENTS PUBLISHED PER ECR #31-19
- 2018 ICC INTERNATIONAL RESIDENTIAL CODE
- 2018 ICC INTERNATIONAL EXISTING BUILDING CODE
- MBRC MARYLAND BUILDING REHABILITATION CODE
- 2012 IGCC GREEN BUILDING CODE
- 2018 ICC INTERNATIONAL ENERGY CONSERVATION
- 2018 ICC INTERNATIONAL FUEL/GAS CODE
- 2018 ICC INTERNATIONAL MECHANICAL CODE
- 2017 NFPA 70 NATIONAL ELECTRICAL CODE
- 2013 NFPA 72
- 2013 COMAR NFPA 72
- 2015 NFPA 1 & 101
- WSSC PLUMBING CODE
- WSSC FUEL GAS CODE
- 2013 NFPA 13D
- 2013 COMAR NFPA 13D
- 2013 NFPA 13/13R
- 2013 COMAR NFPA 13/13R
- TIA-222-H-2016

SCOPE OF WORK

SCOPE OF WORK CONSISTS OF INSTALLING A NEW STRAND MOUNT AND AUXILIARY EQUIPMENT ON NEW STRAND / MESSENGER CABLE. STRAND / MESSENGER CABLE WILL BE ATTACHED TO EXISTING WOODEN UTILITY POLE. NEW ANTENNA, DIPLEXER, AND RADIO SHALL BE MOUNTED ON A PROPOSED BRACKET MOUNT AND THE BRACKET MOUNT, SPLICE BOX, AND POWER CONVERTER WILL ALL BE MOUNTED ON NEW STRAND / MESSENGER CABLE.



DPS BATCH STAMP

CROWN CASTLE FIBER LLC
SITE NAME: MNG-386
9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903

JURISDICTION: MONTGOMERY COUNTY/SHA(650)
PROPOSED STRAND MOUNT INSTALLATION

INDEX OF SHEETS

T-1	TITLE SHEET
GN-1	GENERAL NOTES
GN-2	GENERAL NOTES
C-1	SITE PLAN
C-2	ENLARGED SITE PLAN
C-3	EXISTING ELEVATIONS
C-4	PROPOSED ELEVATIONS
C-5	ENLARGED ELEVATION
D-1	PLUMBING DIAGRAM
D-2	EQUIPMENT & ANTENNA DETAILS
D-3	POWER CONVERTER & DISCONNECT ASSEMBLY DETAILS
G-1	GROUNDING DETAILS
TCP-1	TRAFFIC CONTROL PLANS

NODE:
MNG-386 (474995)

ENGINEER:
NB+C
TOTALLY COMMITTED.
NB+C ENGINEERING SERVICES, LLC.
6000 MARSHALL DRIVE, SUITE 300
KENSINGTON, MD 20705
(301) 713-7002

OWNER/DEVELOPER:
CROWN CASTLE
CROWN CASTLE FIBER LLC
10980 GRANTCHESTER WAY, 4TH FLOOR
COLUMBIA, MD 21044

TITLE:
MNG-386
9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903
JURISDICTION: MONTGOMERY COUNTY

LATITUDE: 39.013263
LONGITUDE: -76.978298



PROFESSIONAL, LICENSURE, I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND. LICENSE NO. 55491, EXPIRATION DATE 01/06/2024

ENGINEER OF RECORD

TRENT TRAVIS SNARR, P.E.
MARYLAND PROFESSIONAL ENGINEER
LICENSE #55491

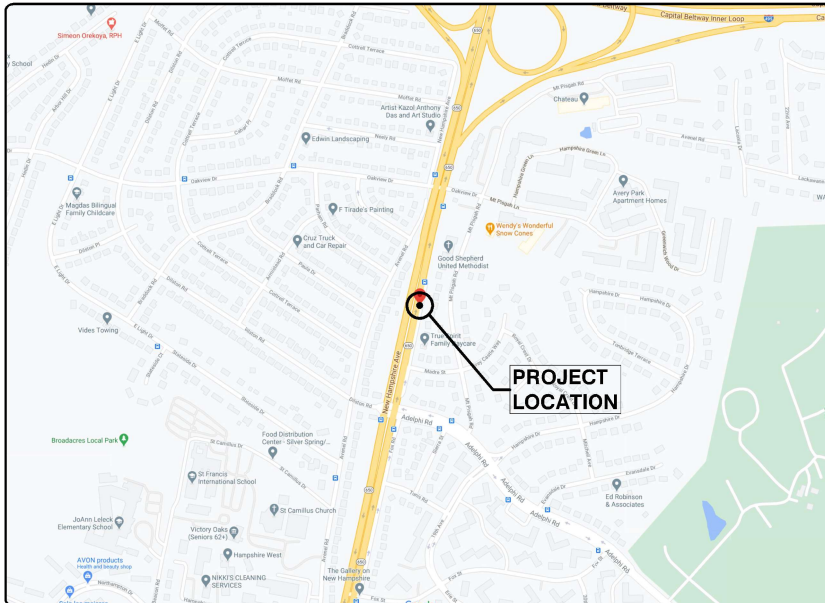
REVISIONS

REV	DATE	DESCRIPTION	BY
1	08-16-23	IKE UPDATE REVISION	JED
0	08-25-23	FINAL CDL	SDR
A	07-29-22	PRELIMINARY CDs	PEM

DRAWN BY:	CHECKED BY:	APPROVED BY:
PEM	SDR	TJA

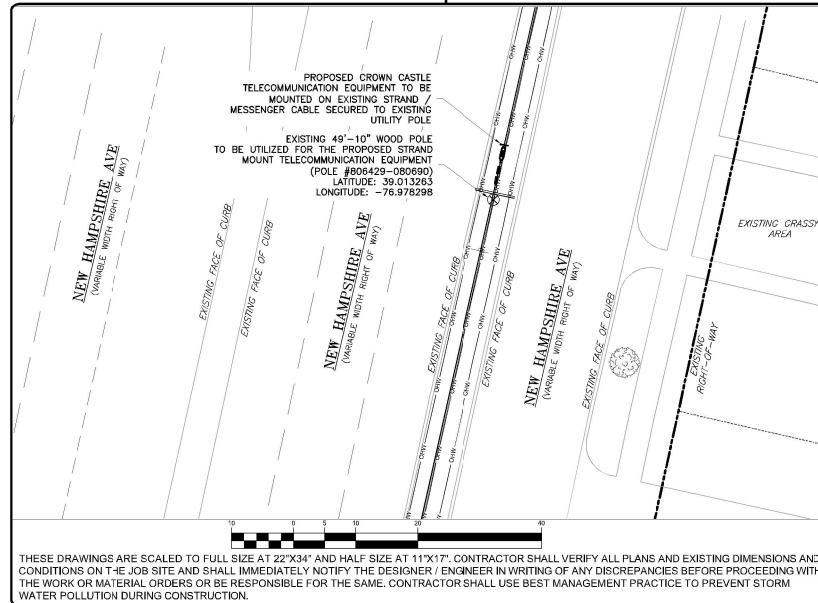
PROJECT NUMBER:	100505
FILE NAME:	STRAND MOUNT DWG
DATE DRAWN:	07-29-22
SCALE:	AS SHOWN

SHEET:
T-1



LOCATION MAP

NODE LOCATION:
LATITUDE: 39.013263° (N 39° 00' 47.8")
LONGITUDE: -76.978298° (W 76° 58' 41.9")



NODE PLACEMENT

9609 NEW HAMPSHIRE AVE
POLE TAG ID: 806429-080690
PEPCO FACILITY ID: 806429-080690
ZONING CLASSIFICATION = R90

SCALE: 1" = 10'-0"



ANTENNA 6523

Integrated Directional Antenna 6523

The modular Micro Radio 4402 supports installations with an integrated directional antenna or external antenna systems.

Antenna 6523 is the integrated directional antenna for Radio 4402 for the 3GPP Band B1, B2/B25, B3 and B66A for Licensed Assisted Access usage and is mounted on the front of Radio 4402 and when used replaces the cover.

The antenna pattern, with a broad horizontal beam, is beneficial for small cell coverage. The fixed electrical tilt is -8 degrees. An optional mechanical down tilt bracket is also available.

Antenna 6523 is designed for optimal performance in all Radio 4402 configurations and integrated for very low visual impact in urban installations.

Micro Radio 4402

The Micro Radio 4402 is part of the Ericsson Radio System portfolio. Radio 4402 has best in class design, superior radio performance and power efficiency when it comes to medium range 3GPP radio products.

Radio 4402 has, by use of its small and smart dimensions, support for a wide range of mounting scenarios and has a pioneering flexibility within its product segment. With the Radio 4402, Ericsson evolves the micro radio portfolio to become even more flexible thus making it easier than ever to make small and efficient single and multi-band micro radio installations.



Antenna 6525

Integrated Directional Antenna 6525

The modular Micro Radio 4402 and Radio 4408 support installations with an integrated directional antenna or external antenna systems.

Antenna 6525 is the integrated directional antenna for Radio 4402 and Radio 4408 for the 3GPP Bands B7 B38A B40 B41 (2300 – 2690 MHz) and is mounted on the front of Radio 4402 and Radio 4408 and when used replaces the cover.

The antenna pattern, with a broad horizontal beam, is beneficial for small cell coverage. The fixed electrical tilt is -8 degrees. An optional mechanical down tilt bracket is also available.

Antenna 6525 is designed for optimal performance in all Radio 4402 and Radio 4408 configurations and integrated for very low visual impact in urban installations.

Micro Radio 4402/Micro Radio 4408

The Micro Radio 4402/4408 is part of the Ericsson Radio System portfolio. Radio 4402/4408 has best in class design, superior radio performance and power efficiency when it comes to medium range 3GPP radio products.

Radio 4402/4408 has, by use of its small and smart dimensions, support for a wide range of mounting scenarios and has a pioneering flexibility within its product segment. With the Radio 4402/4408, Ericsson evolves the micro radio portfolio to become even more flexible thus making it easier than ever to make small and efficient single and multi-band micro radio installations.

Technical Specification Antenna 6525

PRODUCT NUMBER KRE 105283/1

3GPP Band: B7 B38A B40 B41

Frequency range: 2300 – 2690 MHz

Average gain: 9 dBi

Horizontal pattern

Beam width, 3 dB (0dBi) : 82° (120°)

Beam tracking error $\pm 60^\circ$: ≤ 3 dB

Beam pointing error 0° : $\leq 5^\circ$

Vertical pattern

Beam width, 3 dB: 43°

Fixed electrical down-tilt: 8°

Front-to-back $180 \pm 30^\circ$: > 20 dB

VSWR (Return loss): < 1.5 (> 14 dB)

Isolation > 20 dB

Cross Polarization Ratio > 15 dB(at boresight), > 10 dB(at sector)

Antenna pattern files: Contact local Ericsson sales representative

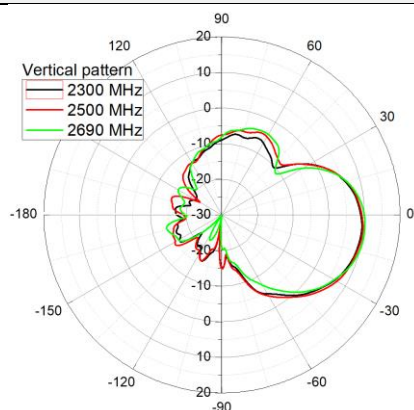
Mechanical specification

Main Dimensions, WxDxH: 200mm x 25mm x 200 mm

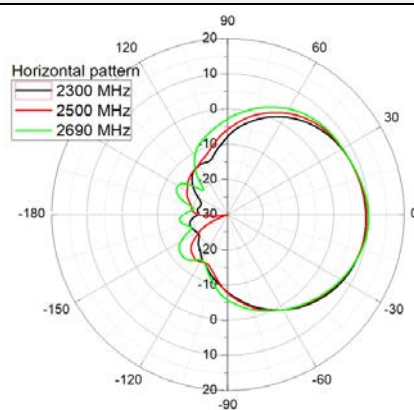
Weight: 800 g

Volume: 1,0 l

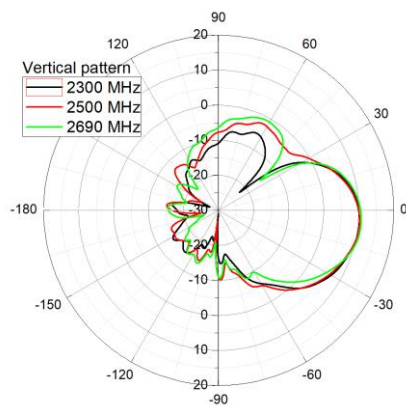
Environmental: IP55, Type 3R



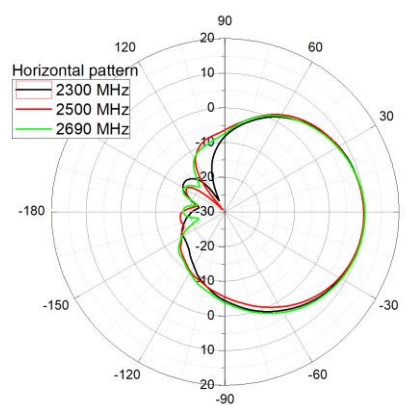
+45_V-Plane



+45_H-Plane



-45_V-Plane



-45_H-Plane

Technical Specification Antenna 6523

PRODUCT NUMBER KRE 105 280/1

3GPP Band: B1 B2/B25 B3 B66A

Frequency range: 1700 - 2200 MHz

Average gain: 8.5 dBi

Horizontal pattern

Beam width, 3 dB (0dBi) : 82° (120°)

Beam tracking error $\pm 60^\circ$: ≤ 5 dB

Beam pointing error 0° : $\leq 7^\circ$

Vertical pattern

Beam width, 3 dB: 43°

Fixed electrical tilt: -8°

Front-to-back $180 \pm 30^\circ$: > 15 dB

VSWR (Return loss): < 1.57 (> 13 dB)

Isolation > 20 dB

Cross Polarization Ratio > 10 dB(at boresight), > 5 dB(at sector)

Antenna pattern files: Contact local Ericsson sales representative

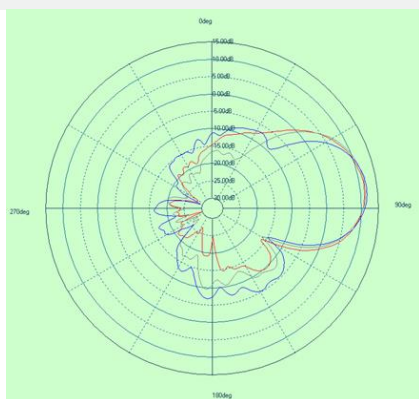
Mechanical specification

Main Dimensions, WxDxH: 200mm x 25mm x 200 mm

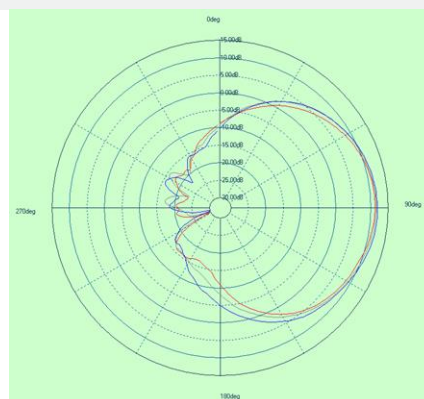
Weight: < 800 g

Volume: 1,0 l

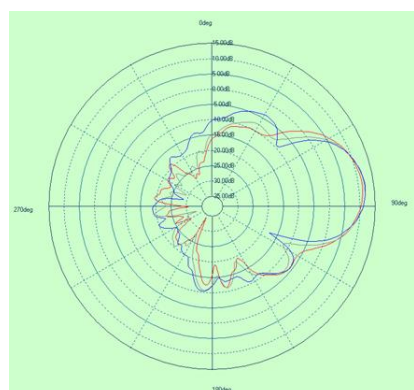
Environmental: IP55, Type 3R



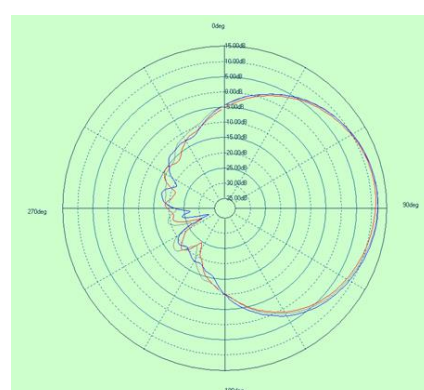
+45_V-Plane



+45_H-Plane



-45_V-Plane

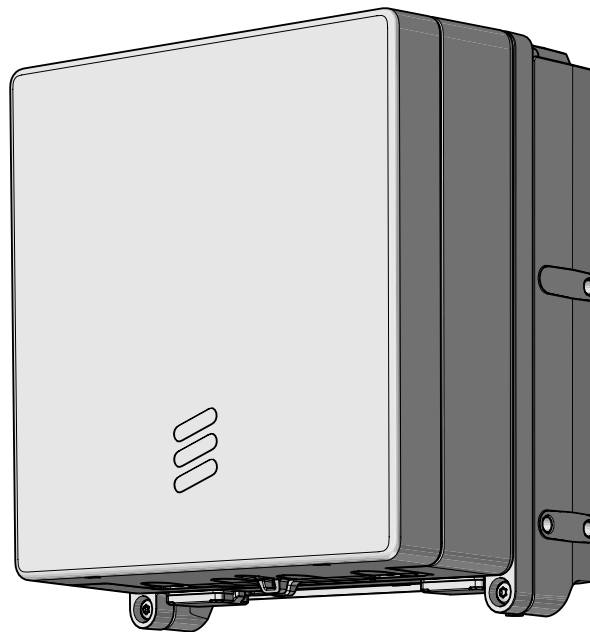


-45_H-Plane

Radio Description

Radio 4402

Description



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1 Introduction

1.1 Warranty Seal

The product is equipped with a warranty seal sticker.

Note: Seals that have been implemented by Ericsson must not be broken or removed, as it otherwise voids warranty.



2 Product Overview

The radio expands coverage and performance in denser urban areas, where the use of small handheld devices demand high capacity on the operators networks. It is designed to be located in cities and in demanding radio environments.

The radio is part of a modular radio building concept that enables a variety of installation alternatives that is also easy to expand. Flexible mounting solutions are provided using rails and pole clamps. The small size of the radio together with the flexible mounting solutions reduces the site volume. The lower weight also improves the handling of the radio.

The radio can be connected in a star or cascade configuration using optical cable links. An optic cable connects the radio to the main unit, or to an expanded Radio System.

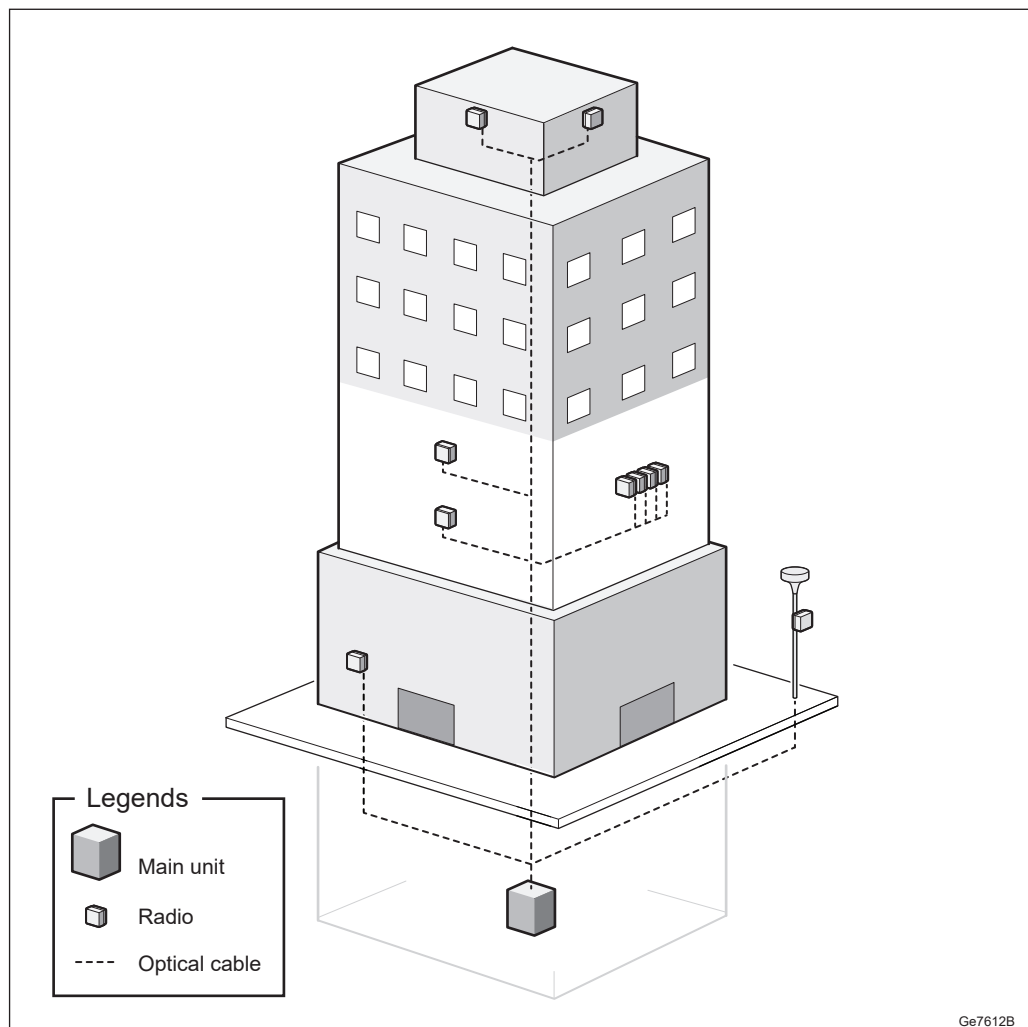


Figure 1 Radio Installations

2.1 Main Features

The following are the main features of the radio:

- WCDMA, LTE FDD, and NB-IoT
- Duplex transmitter/receiver (4TX/4RX) branches with 5 W per branch
- Up to 10.1 Gbps CPRI (optical)
- Complies with 3GPP base station classes Medium Range. For a list of relevant standards, see [Radio Standards Compliance](#) on page 33.



2.2 Optional Equipment

The optional equipment for the radio is the following:

- External antenna equipment
- Integrated directional antenna
- Rail installation equipment



3 Technical Data

Table 1 lists regulatory approved configurations. The listed standards on a specific frequency band may not be generally available on all markets. Contact the local Ericsson responsible for details.

Table 1 Radio 4402 Technical Data

Description	Value
Maximum nominal output power ⁽¹⁾	4 × 5 W
Number of carriers per branch	LTE: 6 downlink, 6 uplink WCDMA: 6 downlink, 6 uplink NB-IoT in-band mode: 1 NB-IoT carrier per configured LTE host carrier NB-IoT standalone mode: 1 carrier per RF port NB-IoT guard band mode: 1 NB-IoT carrier per configured LTE host carrier
Number of carriers per radio	LTE: 4 × 6 downlink, 4 × 6 uplink WCDMA: 4 × 6 downlink, 4 × 6 uplink NB-IoT in-band mode: 1 NB-IoT carrier per configured LTE host carrier NB-IoT standalone mode: 4 × 1 carriers per RF port NB-IoT guard band mode: 1 NB-IoT carrier per configured LTE host carrier
Frequency ⁽²⁾	B66A for WCDMA, LTE, NB-IoT in-band mode, NB-IoT standalone mode, and NB-IoT guard band mode 1710–1780 MHz uplink 2110–2180 MHz downlink
Dimensions with Cover, Single Radio	
Height (A)	213.5 mm
Width (B)	200 mm
Depth (C)	105 mm
Dimensions with Antenna, Single Radio	
Height (A)	213.5 mm
Width (B)	200 mm
Depth (C)	125 mm



Description	Value
Weight	
Radio 4402 with Cover, Single Radio	4.7 kg
Radio 4402 with Antenna, Single Radio	5.1 kg
Color	
Body	NCS S 1002-B

(1) For detailed information about licenses and HWAC, see the following:

WCDMA: Licenses and Hardware Activation Codes in Ericsson Software Model in the WCDMA RAN CPI library.

LTE: Manage Licenses and Hardware Activation Codes in the Radio Node libraries.

(2) For information about IBW, see RBS Configurations.

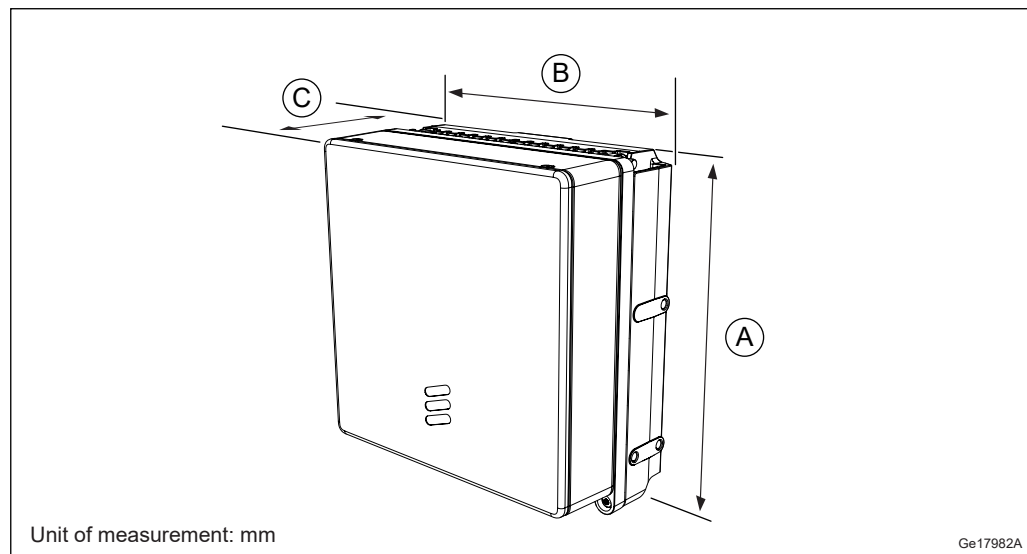


Figure 2 Radio 4402 Dimensions with Cover, Single Radio

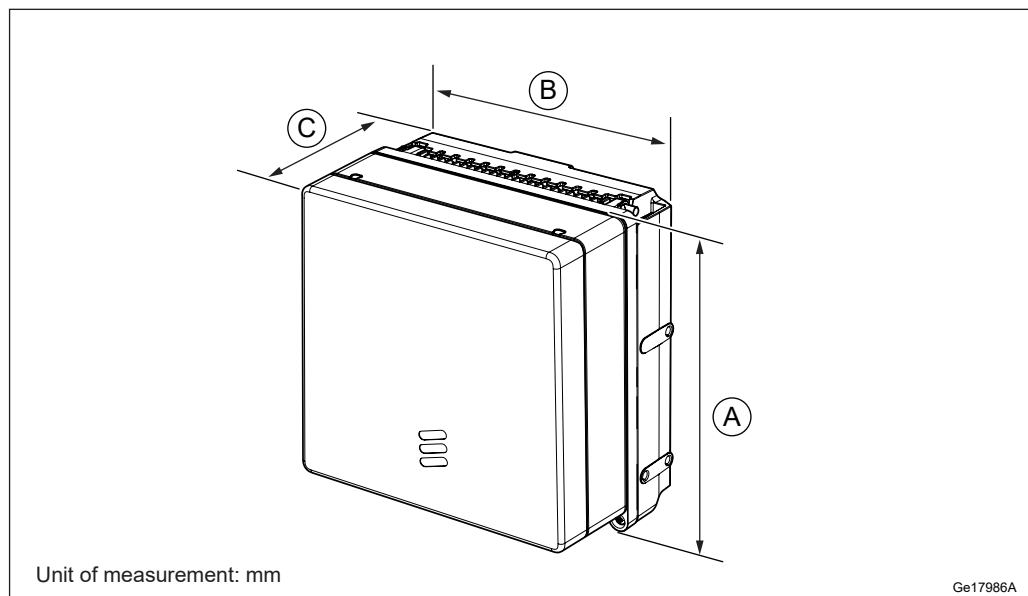


Figure 3 Radio 4402 Dimensions with Antenna, Single Radio

Table 2 Antenna Data

Antenna	Frequency Band	Frequency
6523 Directional	B1, B2/B25, B3, and B66A	1710–2200 MHz

3.1 Installation Recommendations

To ensure reliable operation and maximum performance, an appropriate installation location must be chosen.

When using the optional integrated directional antenna make sure the radio is not pointing at any elements that can disturb the radio signals.

3.1.1 Indoor Locations to Avoid

Although the unit is designed for outdoor use, it can be used indoors. For indoor locations Ericsson recommends to operate according to ETSI EN 300 019-1-3 class 3.1, 3.2, 3.3, and 3.6. This does not cover installation with heat traps or installation in lofts, where air ventilation does not exist. To ensure smooth performance, avoid installing the unit in a potential microclimate location, for example, places with unventilated lofts, with heat traps, or where the product is exposed to direct sunlight through windows. Avoid installing the equipment under glass covers or skylight windows without proper ventilation.



3.1.2 Outdoor Locations to Avoid

Although Ericsson declares this product suitable for outdoor environments, avoid installing the unit in a potential microclimate location. Typical examples of microclimate locations are sites where the product is not only exposed to the actual surrounding temperature, but additional temperature as heat coming from dark colored planes, for example, reflections from the floor or walls. The additional temperature can generate heat traps with temperatures up to 10°C higher than expected.

Avoid installing equipment in the following locations:

- Near the exhaust of building ventilation systems
- Near the exhaust of chimneys
- Opposite large surfaces made of glass or new concrete

If the unit is to be placed in an environment subjected to lightning strike, an external Surge Protection Device (SPD) is needed.

3.1.3 Other Considerations

Installing the radio close to other electronic equipment can cause interferences.

For sites with risk of ground fire, the recommended minimum installation height is 3 m.

3.1.4 Painting Disclaimer

Ericsson recommends to not paint the product as it can affect performance of the product.

Ericsson applies limitations to the warranty and service contract if the product is painted.

If the product is painted, the following commercial limitations apply:

- Failure modes directly related to overheating because of painting are not valid for repair within the scope of the warranty or standard service contract.
- Product failures related to paint contamination of components of the unit are not valid for repair within the scope of warranty or standard service contract.
- When a painted unit is repaired, it might be restored to the standard color before being returned to the market. It is not possible to guarantee that the same unit is sent back to the same place. This is also valid for units repaired under a service contract.



- For repairs within the warranty period or a standard service contract, the customer is charged the additional costs for replacing all painted parts of the unit or the complete unit.

If adaptations are required, contact Ericsson for information.

3.2 Installation Alternatives

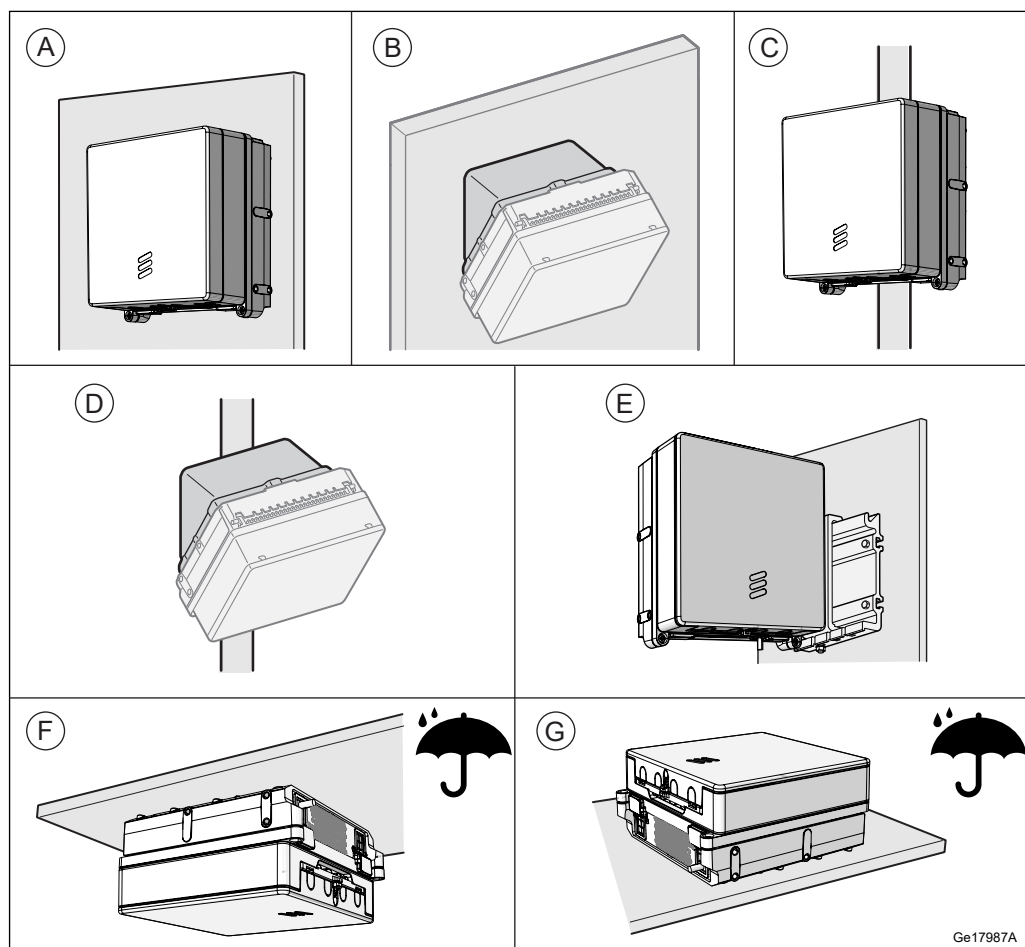


Figure 4 Alternative Installation Methods

Table 3 Key to Alternative Installation Methods

Installation Method	Description
A	Wall installation
B	Wall installation with tilt installation kit
C	Pole installation



Installation Method	Description
D	Pole installation with tilt installation kit
E	Rail installation (Single Radio only)
F	Ceiling installation
G	Horizontal installation

The integrated directional antenna is not applicable to installation alternatives E, F, and G.

For mounting direction F or G in an outdoor environment the Radio needs to be protected from direct rain.

3.3 Space Requirements

3.3.1 Generic Requirements

The radios can be placed directly against each other side by side. To ensure sufficient working space, allow adequate free space in front of the radio.

3.3.2 Wall Installation

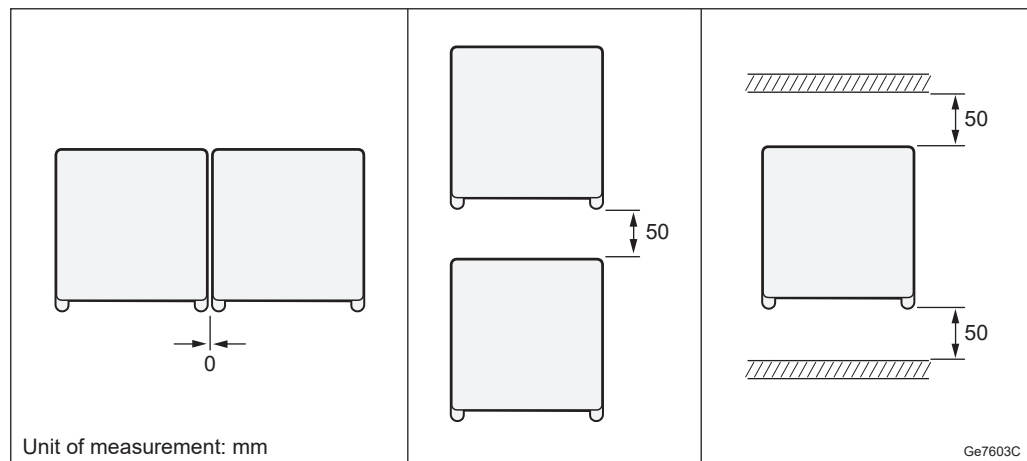


Figure 5 Wall Installation, Single Radio

To ensure adequate airflow between the units, allow a minimum of 50 mm free space between the radio and the roof, and between radios installed on a wall, on top of one another.



3.3.3

Wall or Pole Installation Using a Tilt Installation Kit

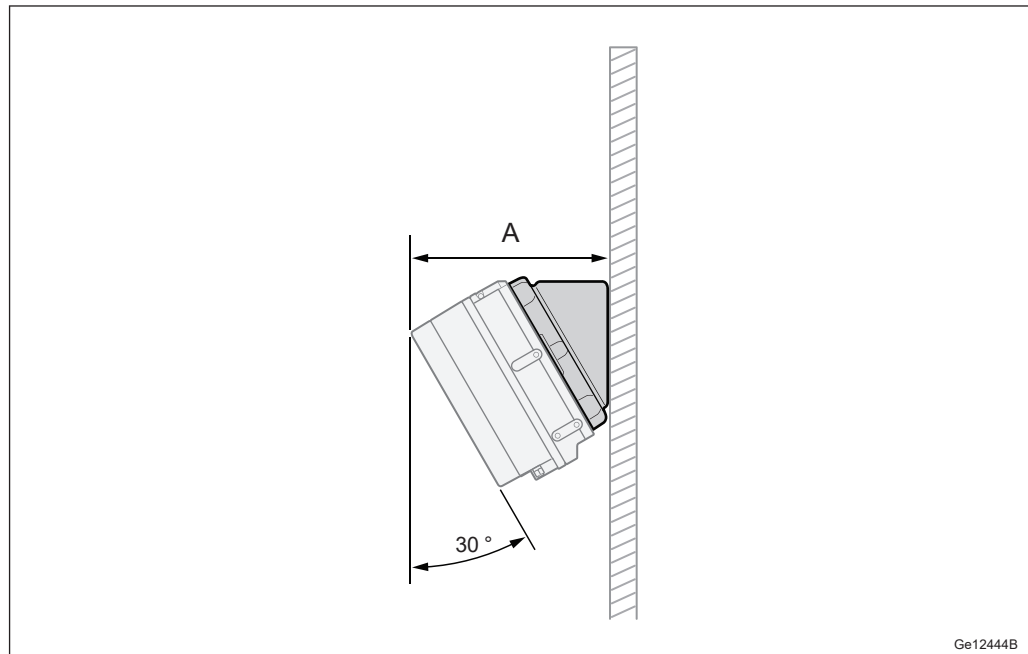


Figure 6 Tilt Installation Kit, Single Radio

Table 4 Tilt Installation Kit, Single Radio

Description	Value A (mm)
Distance with cover	198
Distance with high-band antenna	216
Distance with low-band antenna	224



3.3.4

Pole Installation

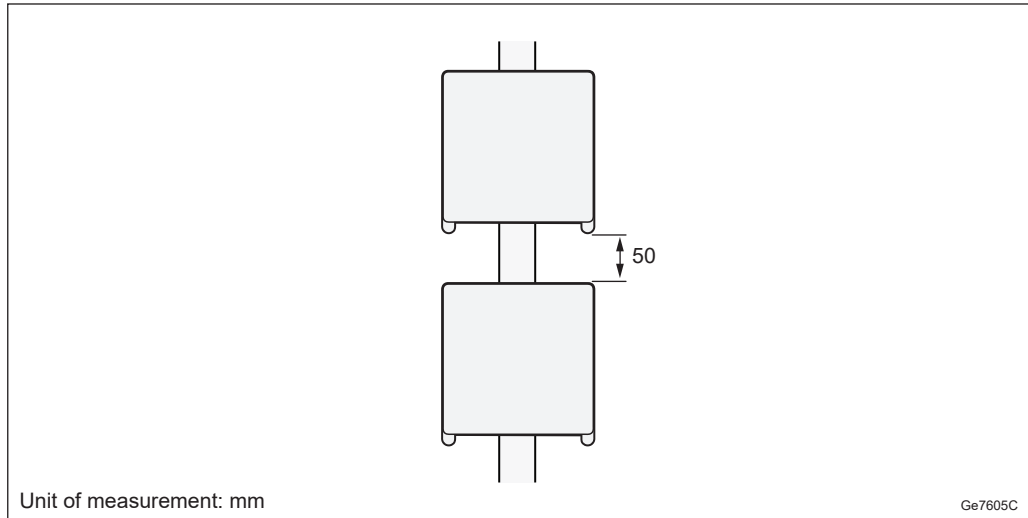


Figure 7 Pole Installation, Single Radio

To ensure adequate airflow between the units, allow a minimum of 50 mm free space above and below each radio.

Table 5 Pole Dimensions

Pole Clamp Type	Minimum Dimension (mm)	Maximum Dimension (mm)
Hose clamp steel, Range 40-150 mm	Ø40	Ø150
Hose clamp steel, Range 140-300 mm	Ø140	Ø300
Hose clamp steel, Range 250-500 mm	Ø250	Ø500



3.3.5

Rail Installation

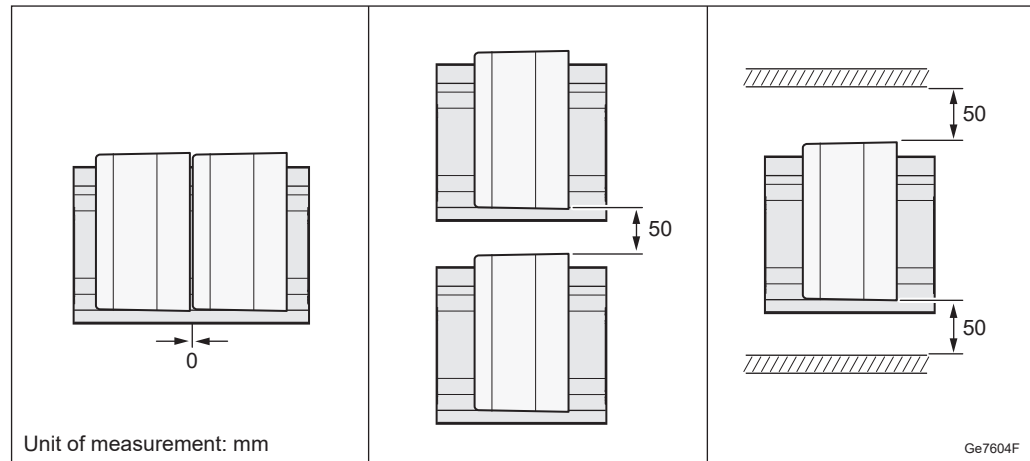


Figure 8 Rail Installation

To ensure adequate airflow between the units, allow a minimum of 50 mm free space above and below each radio, and between the radio and the wall.

3.3.6

Ceiling Installation

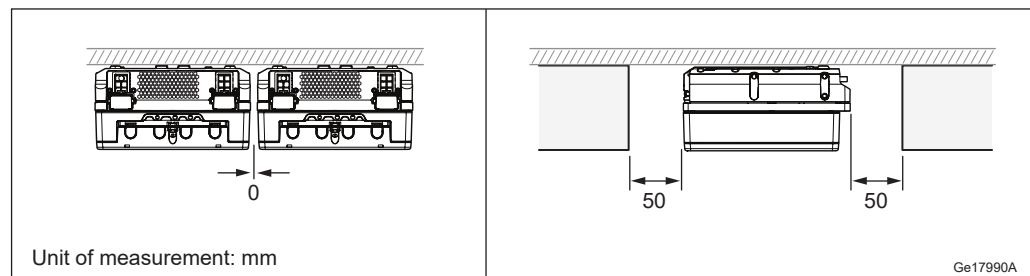


Figure 9 Ceiling Installation

To ensure adequate airflow between the units, allow a minimum of 50 mm free space between the radio and the wall, and 50 mm between radios installed on a roof beside one another.



3.3.7 Horizontal Installation

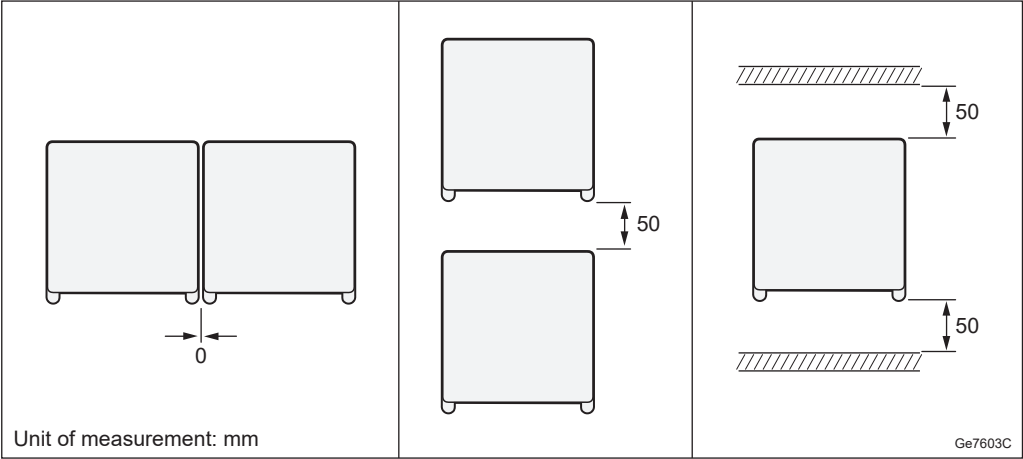


Figure 10 Horizontal Installation, Single Radio

To ensure adequate airflow between the units, allow a minimum of 50 mm free space between the radio and the roof, and between radios installed horizontally.

3.4 Acoustic Noise

With the fan, the acoustic noise is ambient temperature dependent, as listed below.

Table 6 Maximum Sound Pressure Level for Radio 4402 with Fan

Temperature (°C)	Radio 4402 Sound Pressure Level (dB)
+20	49
+30	52
+40	55
+55	60

3.5 Environmental Characteristics

This section contains operating environment data for the radio.

3.5.1 Operating Environment

The following are the values for the normal operating environment of the radio:

Temperature⁽¹⁾ -40°C to +55 °C



Solar radiation	$\leq 1120 \text{ W/m}^2$
Relative humidity	5 – 100%
Absolute humidity	$0.26 - 40 \text{ g/m}^3$
Maximum temperature change	$0.5 \text{ }^\circ\text{C/min}$
Maximum wind load at 150 km/h (pole installed single case)	Radio with cover: 55 N (front), 18 N (side) Radio with antenna: 56 N (front), 24 N (side)

- (1) Depending on product variant, installation scenario, traffic load, and configuration, the product can, in the highest $10 \text{ }^\circ\text{C}$ temperature range, temporarily reduce the output power. This depends on the durations of the high ambient temperature.

3.5.2 Heat Dissipation

The radio is designed for outdoor installation.

Avoid indoor installation in a room without adequate ventilation and cooling.

Table 7 Radio Heat Dissipation

Unit	Output Power (W)	Maximum Heat Dissipation (W)
Radio 4402 B66A	4×5	120

Table 8 Support Heat Dissipation

Unit	Heat Dissipation (W)
Support 6501	12
Support 6502	12

3.5.3 Vibration

The radio operates reliably during seismic activity as specified by test method IEC 60068-2-57 Ff.

Maximum level of Required Response Spectrum (RRS)	50 m/s^2 within 2–5 Hz for DR=2%
Frequency range	0.3–50 Hz
Time history signal	Verteq II

The radio operates reliably during random vibration as specified by test method IEC 60068-2-64 Fh method 1

Random vibration, normal operation	$+12 \text{ m}^2/\text{s}^3$	$0.3 \text{ m}^2/\text{s}^3$	$-12 \text{ m}^2/\text{s}^3$
Frequency range	5–10 Hz	10–50 Hz	50–150 Hz



3.5.4 Materials

All Ericsson products fulfill the legal and market requirements regarding the following:

- Material declaration
- Materials' fire resistance, components, wires, and cables
- Recycling
- Restricted and banned material use

3.6 Power Characteristics

This section describes the power supply requirements, power consumption, and fuse and circuit breaker recommendations for the radio.

The power for the radios can be provided from an AC or a DC power supply.

3.6.1 DC Power Characteristics

The power supply voltage for the radio is –48 V DC.

Table 9 Radio DC Power Supply Requirements

Conditions	Values and Ranges
Nominal voltage	–48 V DC
Normal voltage range at radio input connector	–36.0 to –58.5 V DC
Non-destructive range	0 to –60 V DC

Fuse and Circuit Breaker Recommendations

The recommendations given in this section are based on peak power consumption and do not provide information on power consumption during normal operation.

The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60934.

Table 10 Radio Fuse or Circuit Breaker Recommendations

Unit (DC powered)	Output Power (W)	Minimum Fuse Rating (A)	Maximum Allowed Fuse Rating ⁽¹⁾ (A)
Radio 4402 B66A	4 × 5	6	32



(1) The absolute maximum fuse class in accordance with radio design restrictions.

3.6.2 AC Power Characteristics

The normal voltage range for the radio is 100 to 250 V AC.

Table 11 Radio AC Power Supply Requirements

Conditions	Values and Ranges
100–250 V	85–275 V AC
Connection	Line-neutral, line-line
Frequency range	45–65 Hz
Voltage harmonics	≤ 10% at full load ⁽¹⁾
Shut-off allowance	At undervoltage or overvoltage
Inrush current peak	< 10 A
Inrush current duration	< 100 ms
AC system	TN, TT and IT

(1) Must comply with IEC 61000-3-2

Fuse and Circuit Breaker Recommendations

The recommendations given in this section are based on peak power consumption and do not provide information on power consumption during normal operation.

The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60934.

When the radio connected Line-Line a 2-pole circuit breaker or dual fuses are required for interruption of both lines. This is also valid when the radio is used in an IT system.

Table 12 Radio Fuse or Circuit Breaker Recommendations

Unit (AC powered)	Output Power (W)	Minimum Fuse Rating (A)	Maximum Allowed Fuse Rating ⁽¹⁾ (A)
Radio 4402 B66A	4 × 5	4	16

(1) The absolute maximum fuse class in accordance with radio design restrictions.

3.6.3 Power Consumption

For information on power consumption, see [Power Consumption Calculations](#).



3.7 System Characteristics

This section describes the system characteristics of the Radio System.

3.7.1 RF Electromagnetic Exposure

For general information on RF EMF exposure, see [Radio Frequency Electromagnetic Fields](#).

The following tables list the compliance boundaries (exclusion zones), outside of which the RF EMF exposure from Radio 4402 is below the limits applicable in:

- USA (47 CFR 1.1310)
- Canada (Health Canada Safety Code 6)

Table 13 Dimensions of the Box-Shaped Compliance Boundary for General Public (GP) and Occupational (O) Exposure Applicable in the USA and Markets Employing the FCC RF Exposure Limits (Including 0.6 dB Output Power Tolerance)

Mode and Output Power for Radio 4402				Dimensions of the Box-Shaped Compliance Boundary ⁽¹⁾ (m)							
				Distance in Front of Radio		Width		Height		Distance Behind Radio	
Band	Single/Dual Radio Version	Nominal Peak Output Power from the Radio	IEC 62232 Installation Class	GP	O	GP	O	GP	O	GP	O
B66A	Single	4 × 5 W	E+	1.9	0.9	1.6	0.8	1.3	0.6	0.2	0.2

(1) The compliance boundaries are determined for maximum output power with power tolerance.

Table 14 Dimensions of the Box-Shaped Compliance Boundary for General Public (GP) and Occupational (O) Exposure Applicable in Canada (Including 0.6 dB Output Power Tolerance)

Mode and Output Power for Radio 4402				Dimensions of the Box-Shaped Compliance Boundary ⁽¹⁾ (m)							
				Distance in Front of Radio		Width		Height		Distance Behind Radio	
Band	Single/Dual Radio version	Nominal Peak Output Power from the Radio	IEC 62232 Installation Class	GP	O	GP	O	GP	O	GP	O
B66A	Single	4 × 5 W	E+	2.7	1.1	2.3	1.0	1.8	0.8	0.2	0.2

(1) The compliance boundaries are determined for maximum output power with power tolerance.

3.7.2 Software

For information on software dependencies, see [Radio Software Support](#).



3.7.3 Radio Configurations

For information about available radio configurations, see RBS Configurations.



4 Hardware Architecture

For a description of the supported radio configurations, refer to [RBS Configurations](#).

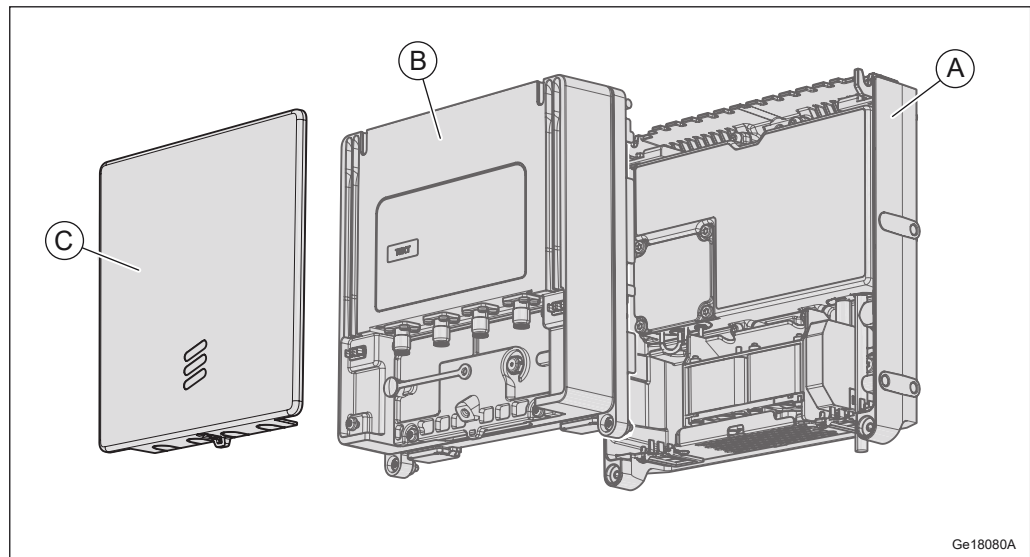


Figure 11 Radio Components, Single Radio

Table 15 Key to Radio Components, Single Radio

Position	Component
A	Support ⁽¹⁾
B	Radio Core
C	Antenna or Cover

(1) The Support has several variants. An example is shown in [Figure 11](#).

4.1 Support

The Support provides the Radio Core with integrated mechanical attachment, power conversion and cooling. It consists of a mounting bracket, a fan unit, and a PSU.

4.1.1 Mounting Bracket

The mounting bracket provides integrated mechanical attachment for wall and pole mounting, and attachment points for the rail bracket.



4.1.2 Fan Unit

The fan unit operates autonomously against ambient temperature to cool the Radio Core.

For Single Radio, the fan unit of the Support is integrated with the mounting bracket and cannot be removed.

4.1.3 PSU

The PSU provides power to the Radio Core and the fan unit.

The PSU is available in two variants to support AC input and DC -48 V input. The DC variant handles both 2-wire (DC-C) and 3-wire (DC-I) connections.

Included in the PSU is also the external alarm interface and communication between PSU and Radio Core.

4.2 Radio Core

The Radio Core handles the radio communication in the unit and consists of a thermal radiator, TRX, and the Filter Unit (FU).

The Antenna Supervision can detect the following disconnected antennas:

- Ericsson Integrated Directional Antenna
- External antenna with feeder loss < 0.5 dB

Use the LTE AILG feature to ensure enough transmitted power.

4.2.1 Thermal Radiator

The thermal radiator provides cooling to the radio.

4.2.2 TRX

The Transmitter and Receiver (TRX) provides the following:

- Analog/Digital (A/D), Digital/Analog (D/A) conversion
- Channel filtering
- Delay and gain adjustment
- RF modulation and demodulation



- Optical cable interface termination
- Control and surveillance

4.2.3 Filter Unit

The Filter Unit consists of band-pass filters.

4.3 Antenna

The optional integrated directional Antenna provides directional RF coverage for the radio, and protects the Radio Core.

4.4 Cover

The esthetic Cover protects the Radio Core when the radio is connected to an external antenna.

4.5 Optical Indicators

The radio is equipped with optical indicators that show system status.

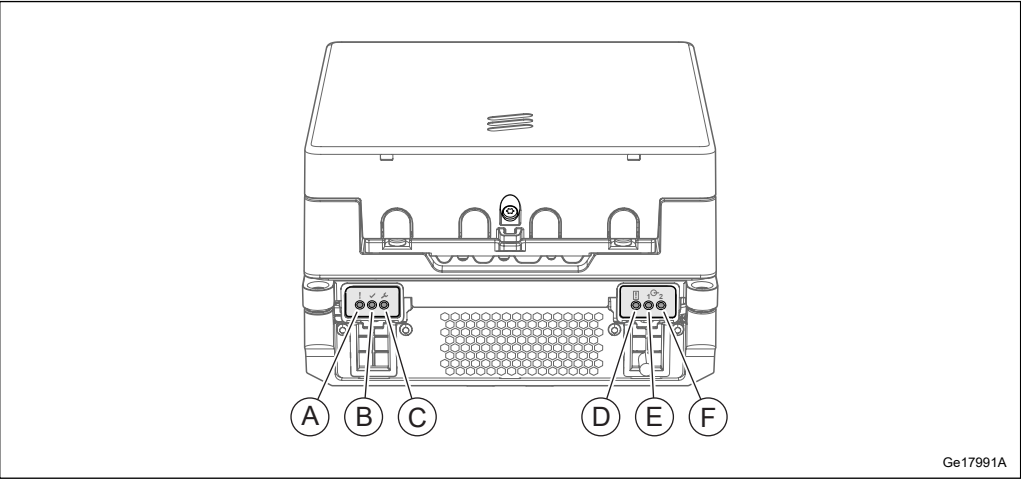


Figure 12 Optical Indicators for Single Radio

Table 16 Description of Optical Indicators for Single Radio

Position	Name	Marking
A	Fault	!



Position	Name	Marking
B	Operational	✓
C	Maintenance	🔧
D	Support System Status	⚠
E, F	Interface 1 Interface 2	↻

For more information about the behavior of the optical indicators and the maintenance button, refer to [Indicators, Buttons, and Switches](#).



5 Connection Interfaces

This section contains information about the radio connection interfaces.

5.1 Support

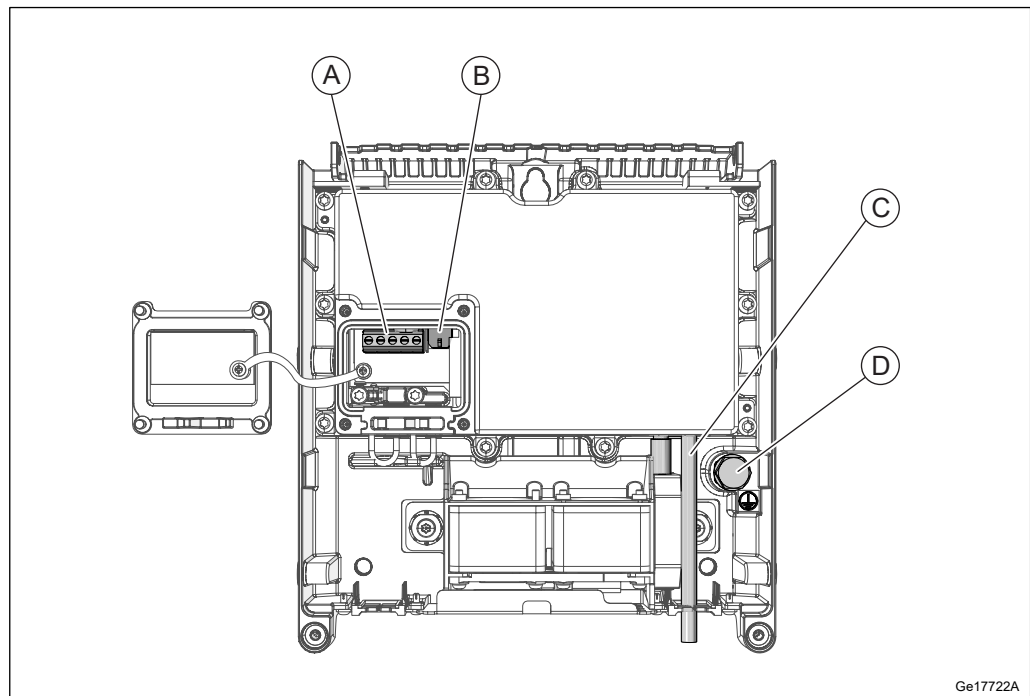


Figure 13 Connection Interfaces for Support, Single Radio

Table 17 Connection Interfaces for Support, Single Radio

Position	Description	Marking	Connector Types	Cable Illustration
A	-48 V DC power supply	-48V	Screw terminal block	—
A	AC power supply			
B	External alarm		PCB connector	
C	PSU DC output, cable preinstalled	36V	—	—



Position	Description	Marking	Connector Types	Cable Illustration
D	Grounding (With DC power supply)		M8 bolt	
D	Grounding (With AC power supply)			

Note: [Figure 13](#) shows an example of the Support for Single Radio. The actual product may differ.

For Single Radio, only 195 W Support can be used.

5.1.1 Fan Unit Interface

The fan unit provides cooling to the Radio Core.

5.1.2 External Alarm Interface

Two external alarms can be connected to the radio external alarm port.

5.1.3 AC/-48 V DC Power Interface

Depending on the version of the product, the power supply for the radio can be AC or DC.

5.1.3.1 AC Power Interface

The AC power connection is made through a screw terminal.

Table 18 AC Power Supply Cable Diameter Tolerances

Cable Length (m)	Cross-Sectional Area of Each Conductor (mm ²)	Outer Diameter over Sheath (mm)
0–100	2.5	8–9

The power cable has a wire for Line (L), a wire for Line/Neutral (L/N), and a wire for Protective Earth (PE) conductors. The wire color code for wires is market dependent.

All cables must be shielded. The shield must be folded back over the outer jacket of the cable and properly connected to the PSU chassis in the PSU strain relief, otherwise the radio overvoltage protection does not function properly.



The AC cable temperature rating must be at least 70 °C.

5.1.3.2 DC Power Interface

The -48 V DC power connection is made through a screw terminal.

Table 19 -48 V DC Power Supply Cable Diameter Tolerances

Cable Length (m)	Cross-Sectional Area of Each Conductor (mm ²)	Outer Diameter over Sheath (mm)
0–60	2.5	8–9

For 3-wire power system, the power cable screw terminal has a wire for -48 V conductors, a wire for 0 V, and one wire for FE (Functional Earth). For 2-wire power system, the power cable screw terminal has a wire for -48 V conductors, and a wire for 0 V. The wire color code is market dependent.

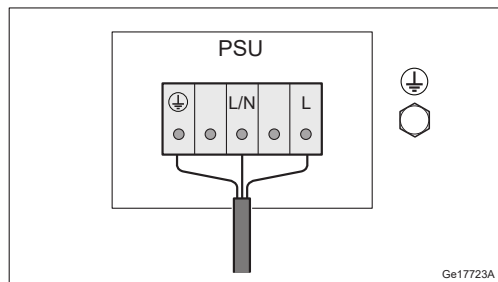
All cables must be shielded. The shield must be folded back over the outer jacket of the cable and properly connected to the PSU chassis in the PSU strain relief, otherwise the radio overvoltage protection does not function properly.

The DC cable temperature rating must be at least 70 °C.

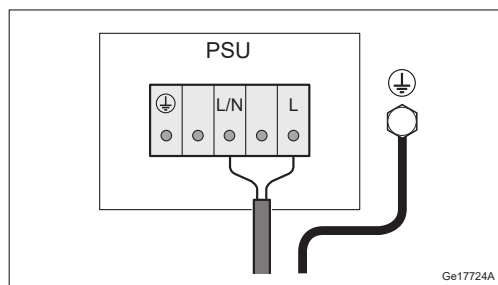
5.1.4 Grounding Interface

The possible grounding interface solutions for the radio are as follows:

AC Grounding, Single Radio

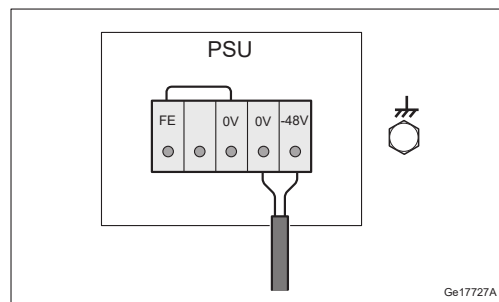


AC power with PE in PSU input terminal.

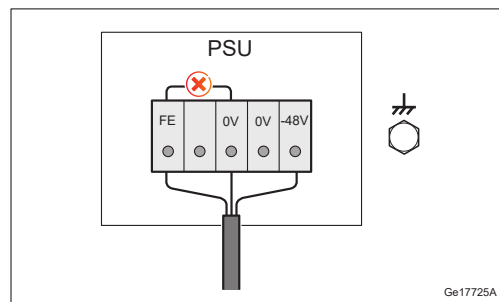


AC power with PE in the grounding interface on the mounting bracket.

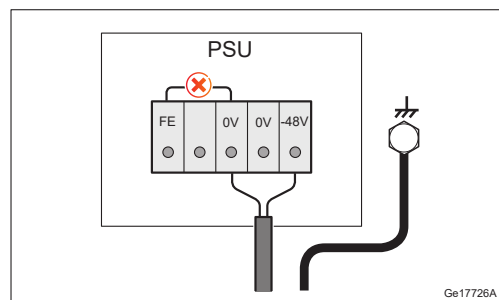
DC Grounding, Single Radio



Default 2-wire (DC-C) power system with FE in PSU input terminal.



3-wire (DC-I) power system with FE in PSU input terminal. Remove the jumper between 0V and FE.



3-wire (DC-I) power system with FE in the grounding interface on the mounting bracket. Remove the jumper between 0V and FE.

For more information about grounding principles, see [Grounding Guidelines for RBS Sites](#).

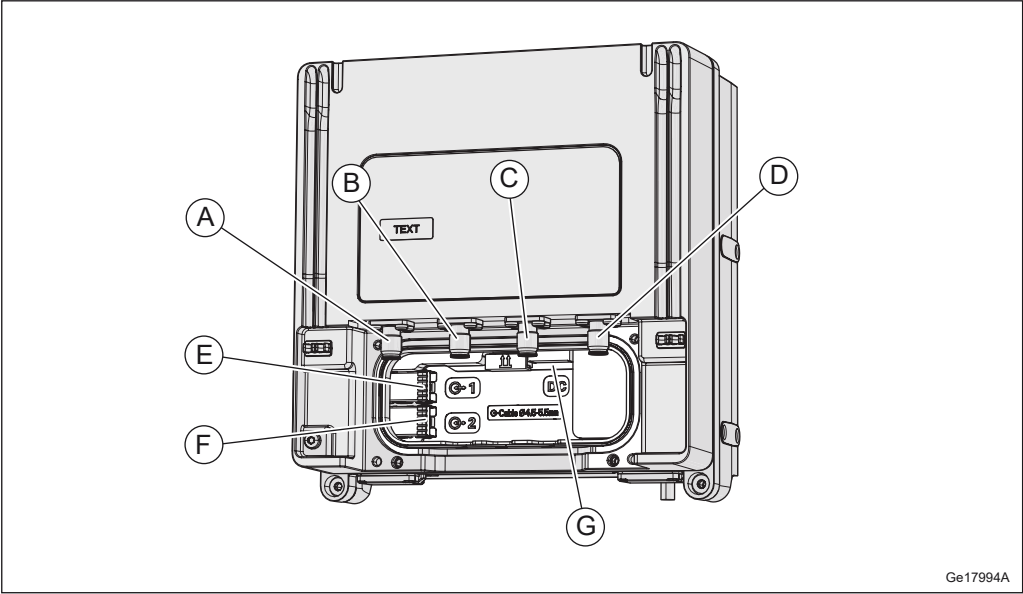
5.1.5

PSU DC Power Interface

The PSU DC power connector supplies the radio with +36 V DC and internal communication to the radio.



5.2 Radio Core



Ge17994A

Figure 14 Radio Core Connection Interfaces

Table 20 Connection Interfaces

Position	Description	Marking	Connector Types	Cable Illustration
A	Antenna A	A	NEX10	
B	Antenna B	B		
C	Antenna C	C		
D	Antenna D	D		
E	Optical cable 1	1	LC (On SFP)	
F	Optical cable 2	2		
G	DC power supply and internal communication	DC	—	—



5.2.1 Antenna Interface

The antenna interfaces provide connections for the radio to the antennas. RF cables connect the radio to the antenna.

Table 21 Radio Antenna Connection Interface Characteristics

Connector Type	Jumper Cable Type	RF Cable Type
NEX10 female	NEX10 male on one end and 4.3-10 female on the other end	50 Ω 1/2-inch coaxial, 4.3-10 male

Table 22 Radio Antenna Cable Connectors

Radio Connectors	Antenna Connectors
 A (Antenna A)	TX/RX
 B (Antenna B)	TX/RX
 C (Antenna C)	TX/RX
 D (Antenna D)	TX/RX

5.2.2 Interface for Optical Cable to Main Unit

The  1 and  2 interfaces provide connections to optical cables (with outer diameter 4.5–5.5 mm, and complies with standard G657A2) for traffic and timing signals between the radio and the main unit. An SFP+ is used to connect the optical cable to the radio.

Note: The radio uses SFP modules for optical transmission and optical radio interfaces on Data 1 and Data 2.

Only SFP+ modules approved and supplied by Ericsson are to be used. These modules fulfill the following:

- Compliance with Class 1 laser product safety requirements defined in standard IEC 60825-1
- Certification according to general safety requirements defined in standard IEC 60950-1
- Functional and performance verified to comply with Radio System specifications

Recommended SFP+ modules are obtained from the product packages for the Radio System and the Main Remote Installation products. For more information about SFP+ modules, see Spare Parts Catalog and Main-Remote Installation Products Overview.



5.2.3 DC Power Interface

The radio DC power connector supplies the radio with +36 V DC and internal communication from the PSU.



6 Standards and Regulations

This section presents a brief overview of standards, regulatory product approval, and declaration of conformity for the radio.

6.1 Regulatory Approval

The Radio System complies with the following market requirements:

- North American market requirements.
- Products containing radio equipment outside North America and in countries not recognizing the CE-mark may be labeled according to national requirements or standards.

6.1.1 Environmental Standards Compliance

The product complies with the following environmental standard:

Europe

- Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive (2011/65/EU)

6.1.2 Safety Standards Compliance

In accordance with market requirements, the Radio System complies with the following product safety standards and directives:

International

- IEC 62368-1

Europe

- EN 50385
- EN 62368-1

North America

- FCC CFR 47 Part 1.1310
- FCC CFR 47 Part 2.1091



- Health Canada Safety Code 6
- IC RSS-102
- UL 62368-1
- CSA-C22.2 No. 62368-1

6.1.2.1 Outdoor Specific Requirements

The Radio System complies with the following outdoor specific requirements:

International

- IEC 60529 (IP65, IP55 for Directional antenna)
- IEC 60950-22

Europe

- EN 60529 (IP65, IP55 for Directional antenna)
- EN 60950-22

North America

- CSA-C22.2 No. 60950-22
- UL 50E
- UL 60950-22

6.1.3 EMC Standards Compliance

The Radio System complies with the following Electromagnetic Compatibility (EMC) standards:

International

- 3GPP TS37.113

North America

- IC ICES-003 B
- FCC CFR 47 Part 15 B



FCC Compliance Statement

This device complies with Part 15 of the FCC CFR 47 rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

6.1.4 Radio Standards Compliance

The Radio System complies with the following radio standards:

International

- 3GPP TS37.141

North America

- FCC CFR 47 Part 27 (USA frequency dependent)
- FCC CFR 47 Part 2 (USA)
- IC RSS-139 (Canada frequency dependent)
- IC RSS-Gen (Canada)

6.1.5 Marking

To show compliance with legal requirements, the product is marked with the following labels:

North America

- usETL/cETL
- FCC CFR 47 Part 15 Statement
- IC ICES-003 Statement
- FCC ID
- IC ID



6.2 Other Standards and Regulations

The standards and regulations in this section are not regulatory approved.

6.2.1 Spare Parts

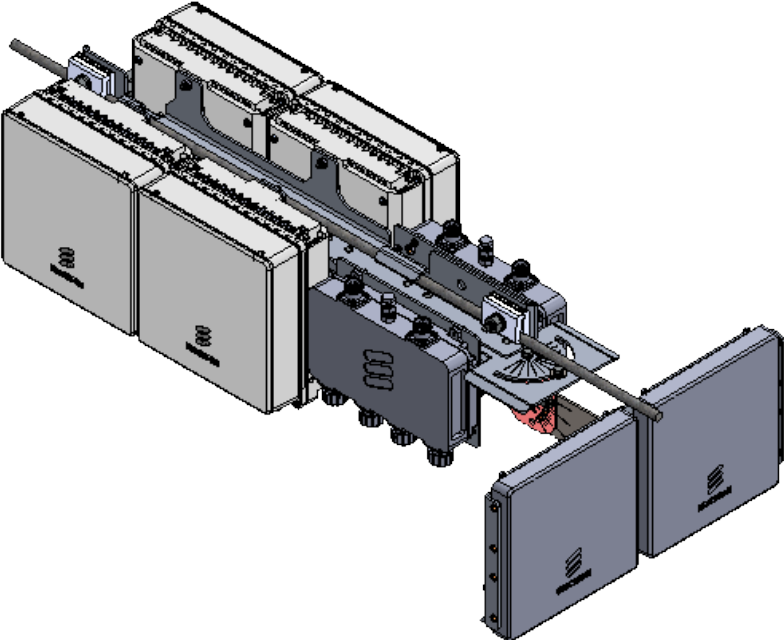
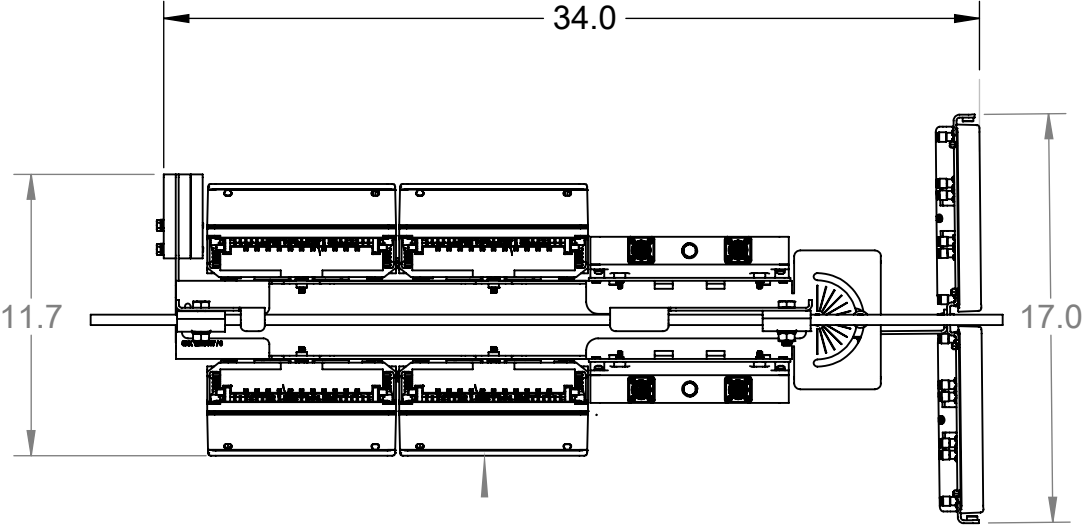
The product adheres to the Ericsson Serviceability and Spare Part Strategy.

6.2.2 Surface Quality

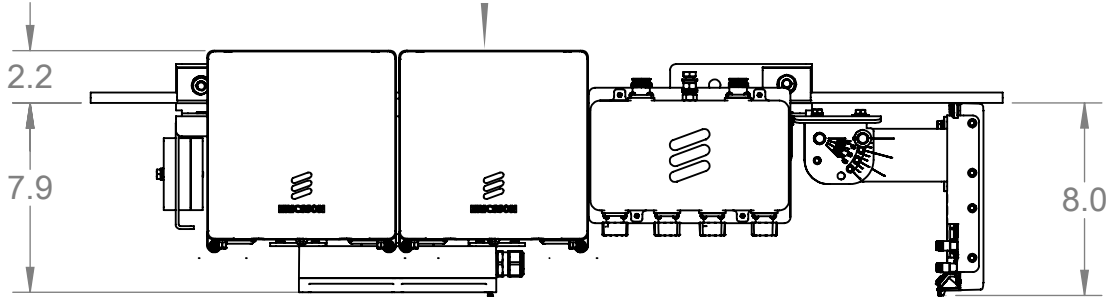
The surface quality of the radio is in accordance with Ericsson standard class A3.

6.2.3 Vandal Resistance

Unauthorized access is not possible without damaging the tamper proof warranty seal.



CONFIGURATION WILL ONLY UTILIZE (1) RADIO
ON EACH SIDE OF MOUNTING BRACKET



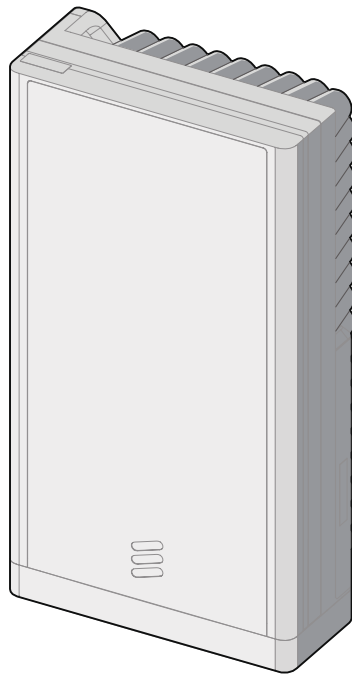
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		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± ANGULAR: MACH ±0.5°BEND ±1° TWO PLACE DECIMAL ±.03 THREE PLACE DECIMAL ±.010	DRAWN	PN	9/7/18	TITLE: ASSY., HANGER, STRAND		
			CHECKED					
			ENG APPR.					
			MFG APPR.					
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.					
		MATERIAL SEE BOM	COMMENTS:			SIZE	DWG. NO.	REV
NEXT ASSY	USED ON	FINISH				B	SXK 125 3187-6-	1
APPLICATION		DO NOT SCALE DRAWING			SCALE: 1:8	WEIGHT:	SHEET 1 OF 1	

Radio Description

Radio 4435

Description



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1 Introduction

1.1 Warranty Seal

The product is equipped with a warranty seal sticker.

Note: Seals that have been implemented by Ericsson must not be broken or removed, as it otherwise voids warranty.

2 Product Overview

The radio remotely extends the reach of the Radio System, and is designed to be located near the antenna. The radio is part of a modular radio building concept that enables a variety of installation alternatives that are also easy to expand. Flexible mounting solutions are provided using pole clamps and brackets.

An overview of different radio installations is shown in [Figure 1](#).

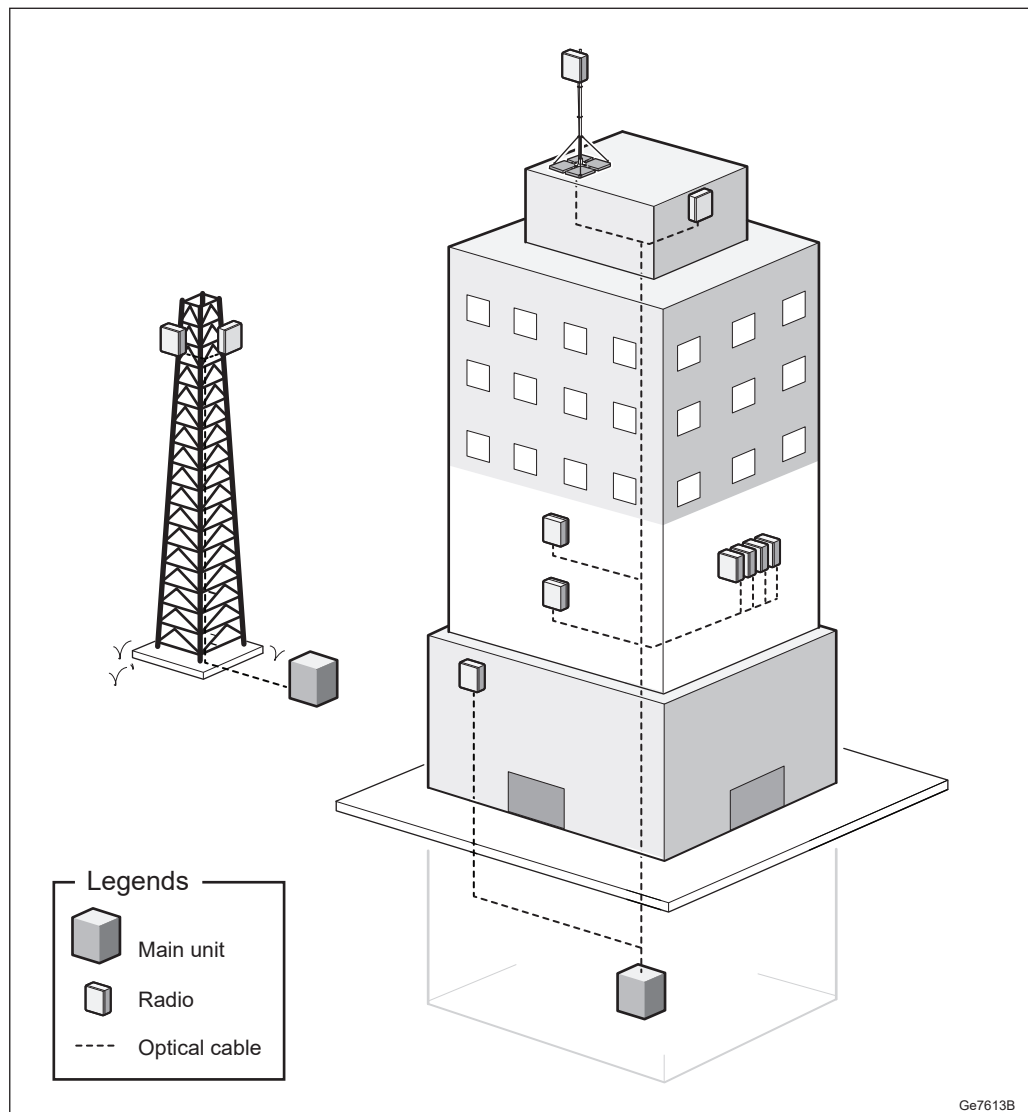


Figure 1 Radio Installations



2.1 Main Features

The following are the main features of the radio:

- LTE TDD, NR TDD
- Mixed mode, for supported mixed mode configurations, see [Supported Radio Capabilities](#).
- Duplex transmitter/receiver (4TX/4RX) branches
- DC version supports 2-wire (DC-C) and 3-wire (DC-I) power connections
- AC version supports AC power connection
- Up to 2×10.1 Gbps CPRI (optical)
- Complies with 3GPP base station class Wide Area. For a list of relevant standards, see [Radio Standards Compliance](#) on page 27.

2.2 Required Installation Equipment

Table 1 Mounting Kit

Mounting Kit	Product Name	Product Number
Tilt mounting kit	Streetmacro Wall & Pole Bracket with Tilt	SXK 109 2157/1
Bracket expansion kit for SXK 109 2157/4	Streetmacro Wall & Pole Bracket with tilt (Exp. kit)	SXK 109 2157/2
Mounting kit without tilt	Streetmacro Wall & Pole Bracket without Tilt	SXK 109 2157/3
Base bracket	Streetmacro Base Bracket	SXK 109 2157/4
Triple bracket	Streetmacro Triple Bracket	SXK 109 2157/5
Bracket for 140 mm pole diameter	Streetmacro 140mm pole dia bracket	SXK 109 2157/6



3 Technical Data

This section describes the physical characteristics, environmental data, and the power supply characteristics of the radio.

3.1 Bands, Carriers, and Output Power

For supported number of carriers, carrier bandwidth, operating bandwidth, IBW, maximum nominal output power, frequency range, RAT support, and mixed mode configurations, see [Supported Radio Capabilities](#).

Minimum configured output power per RF port without degradation in product performance is 2.5 W.

Hardware Activation Codes (HWAC) are required for total output power over 20 W.

For detailed information about output power hardware activation codes, see [Hardware-Related Capabilities](#) in the Radio Node libraries.

3.2 Physical Characteristics

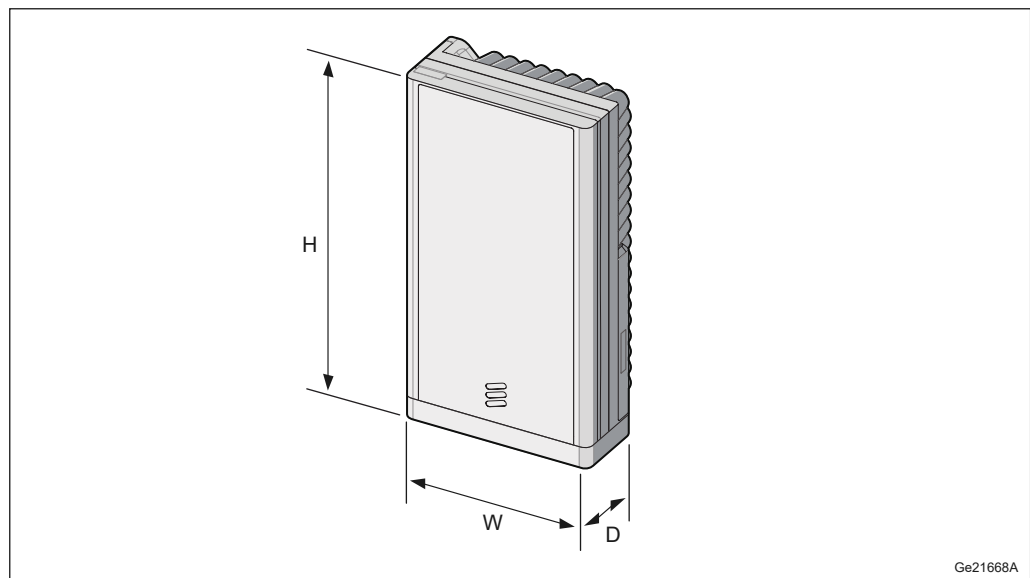


Figure 2 Radio Dimensions



Table 2 Radio Dimensions

Radio Type	Height (H) × Width (W) × Depth (D)
Radio 4435 B41	373 × 200 × 93 mm
Radio 4435 B77D	373 × 200 × 93 mm

Table 3 Radio Weight

Radio Type	Weight ⁽¹⁾
Radio 4435 B41	6.7 kg
Radio 4435 B77D	6.5 kg

(1) The weight is given with ±5% accuracy.

Table 4 Mounting Kit Weight

Mounting Kit	Weight
SXK 109 2157/1	3.2 kg
SXK 109 2157/2	2.3 kg
SXK 109 2157/3	2.0 kg
SXK 109 2157/4	0.9 kg
SXK 109 2157/5	7.9 kg
SXK 109 2157/6	2.5 kg

Table 5 Radio 4435 Color

Part	Color Code
Body	NCS S 1002-B

3.3 Installation Recommendations

To achieve reliable operation, and maximum performance, an appropriate installation location must be chosen.

3.3.1 Outdoor Locations to Avoid

Although Ericsson declares this product suitable for most outdoor environments, this does not cover installations where the planned installation site for the unit is a potential microclimate location. Typical examples of these microclimate locations are sites where the products are not only exposed to the actual temperature, but also additional temperature as heat coming from dark-colored planes, for example, reflections from the floor or walls. The additional



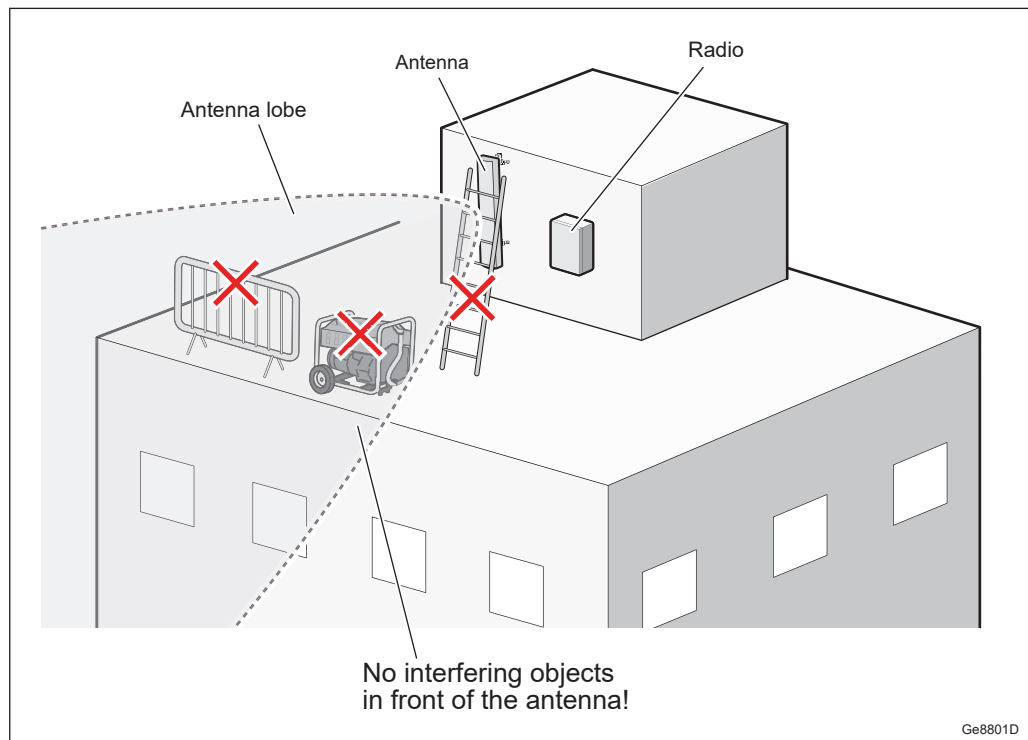
temperature can generate heat traps with temperatures up to 10°C higher than expected.

Avoid installing equipment in the following locations:

- Near the exhaust of the building ventilation system.
- Near the exhaust of the chimney.
- Opposite large surfaces made of glass or new concrete.
- Near overhanging structures such as roof overhangs.

Avoid radio interference by keeping the area directly in front of the antenna clear of the following:

- Metal surfaces or objects such as railings, ladders or chains
- Equipment generating electromagnetic fields, such as electric motors in air conditioners or diesel generators
- RBS equipment





3.3.2 Painting Disclaimer

Ericsson recommends to not paint the product as it can affect performance of the product.

Ericsson applies limitations to the warranty and service contract if the product is painted.

If the product is painted, the following commercial limitations apply:

- Failure modes directly related to overheating because of painting are not valid for repair within the scope of the warranty or standard service contract.
- Product failures related to paint contamination of components of the unit are not valid for repair within the scope of warranty or standard service contract.
- When a painted unit is repaired, it might be restored to the standard color before being returned to the market. It is not possible to guarantee that the same unit is sent back to the same place. This is also valid for units repaired under a service contract.
- For repairs within the warranty period or a standard service contract, the customer is charged the additional costs for replacing all painted parts of the unit or the complete unit.

If adaptations are required, contact Ericsson for information.



3.4 Installation Alternatives

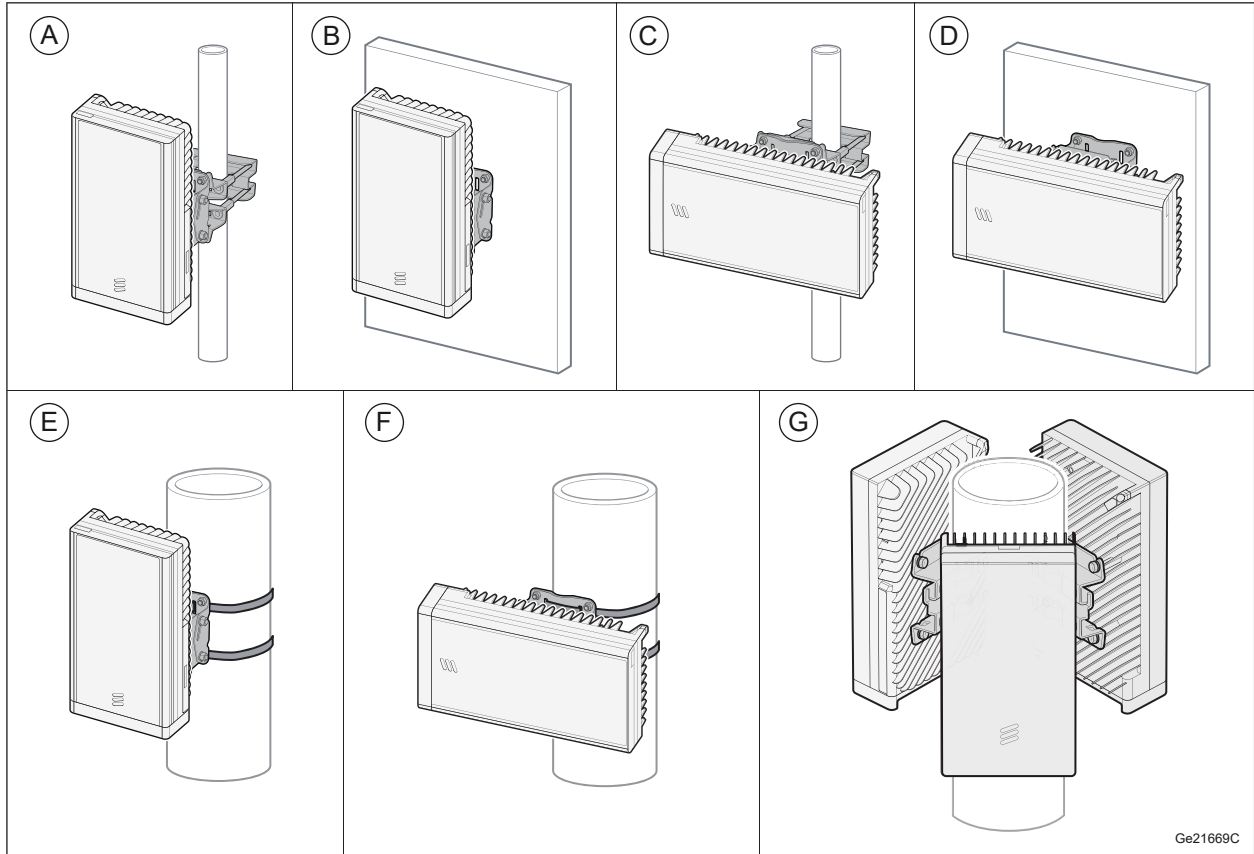


Figure 3 Installation Method Alternatives

Table 6 Key to Installation Alternatives

Installation Method	Description
A	Pole installation (pole with circular, square, or 90° angle cross section) with vertical placement
B	Wall installation with vertical placement
C	Pole installation (pole with circular, square, or 90° angle cross section) with horizontal placement ⁽¹⁾
D	Wall installation with horizontal placement ⁽¹⁾
E	Utility pole installation with vertical placement ⁽²⁾⁽³⁾⁽⁴⁾
F	Utility pole installation with horizontal placement ⁽¹⁾
G	Triple bracket pole installation

(1) See the label on the back of the radio for the correct installation direction.

(2) Steel bands for utility pole installations must be supplied locally.



- (3) The strength and size of the steel bands used must be based on local requirements and environmental factors.
- (4) For wooden utility poles, steel bands are not allowed. Use through bolt instead.

Table 7 Pole Mounting Range

Pole	Circular	Square	90° Angle
Minimum outer dimension ⁽¹⁾	Ø35 mm	30 x 30 mm	45 x 45 mm
Maximum outer dimension ⁽¹⁾	Ø300 mm	80 x 80 mm	80 x 80 mm

(1) Depends on mounting kit used. For detailed information, see [Site Installation Products Overview](#).

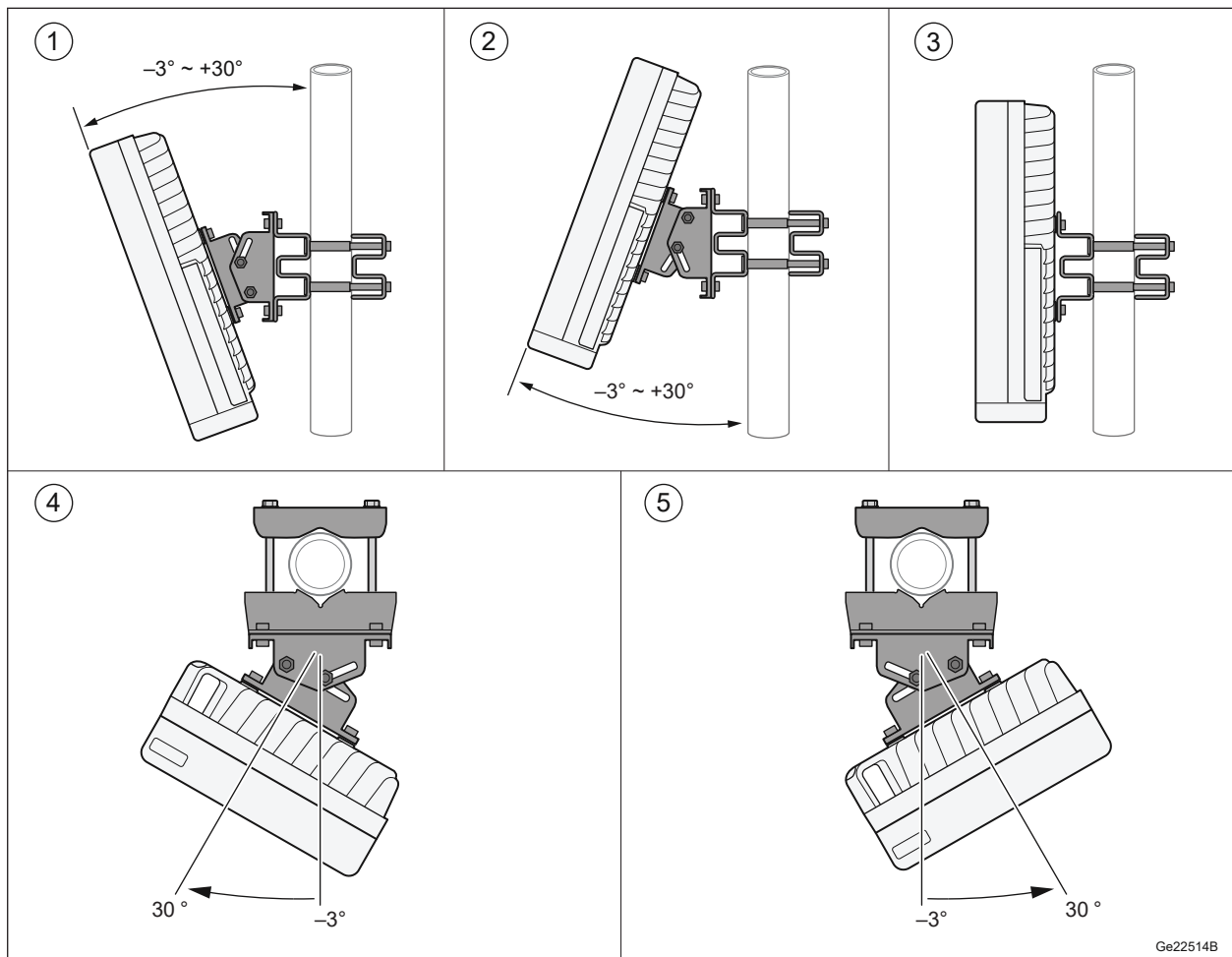


Figure 4 Tilt and Swivel Angle



3.5 Space Requirements

3.5.1 Generic Requirements

Parts of the radio can attain high temperatures during normal operation. Therefore the radio must be installed in a classified service access area. Exception applies when the radio is installed at a height that is not reachable from ground level.

Allow a sufficient working space in front of the radio.

It is recommended that the radio is installed below, or behind the antenna. Do not install the radio closer than 25 m from the main lobe of its own antenna, or antennas belonging to other services or operators using the same site.

3.5.2 Pole or Mast Installation

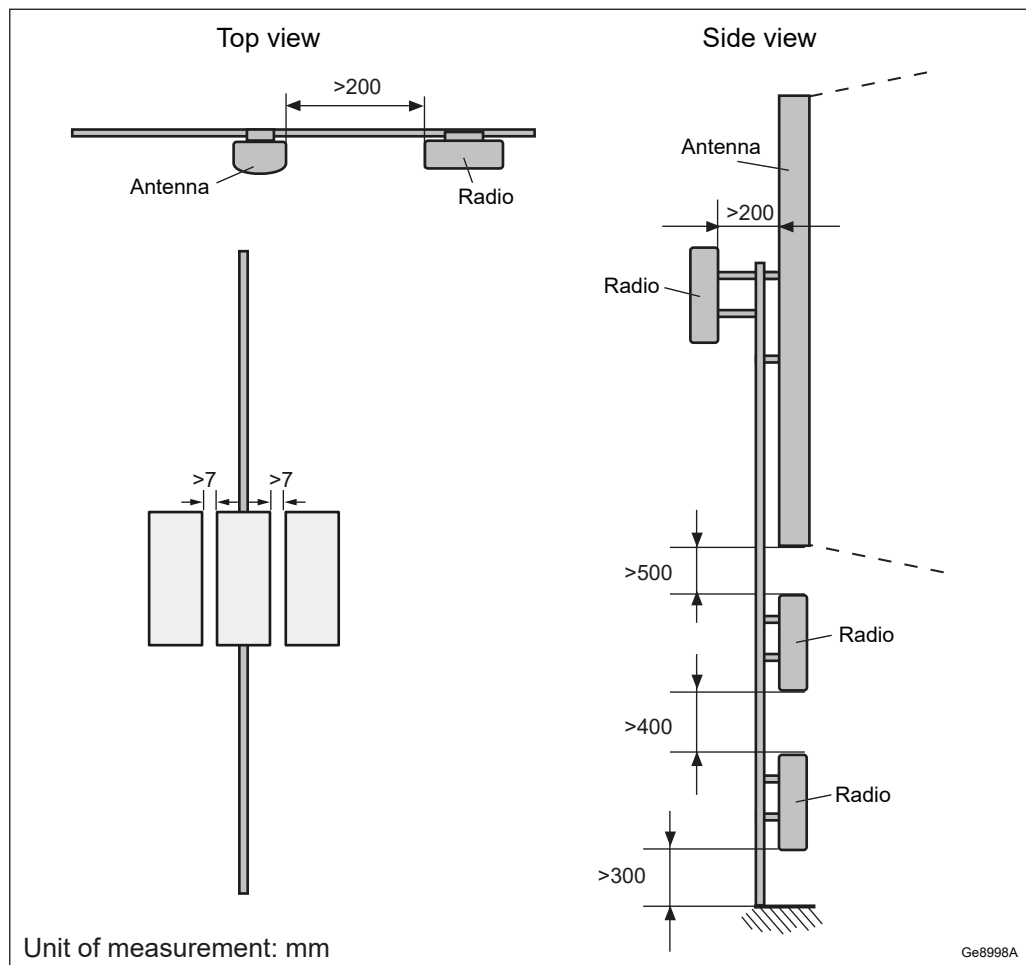


Figure 5 Radio Pole Installation Requirements



To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a single pole. Allow a minimum vertical distance of 500 mm between radio and antenna, if installed above or below an antenna. The minimum distance from the bottom of the radio to the floor is 300 mm for vertically installed radios.

Allow a minimum of 7 mm free space between radios installed side by side on the bracket when ambient temperature is expected to be below +42°C.

Allow a minimum of 100 mm free space between radios installed side by side on the bracket when ambient temperature is expected to be above +42°C and below +50°C. Only single radio installation on the bracket is supported when ambient temperature is expected to be above +50°C and below +55°C.

Note: A radio cannot be installed in the uppermost position of a pole or mast.



3.5.3

Radio Installation on Outdoor Wall

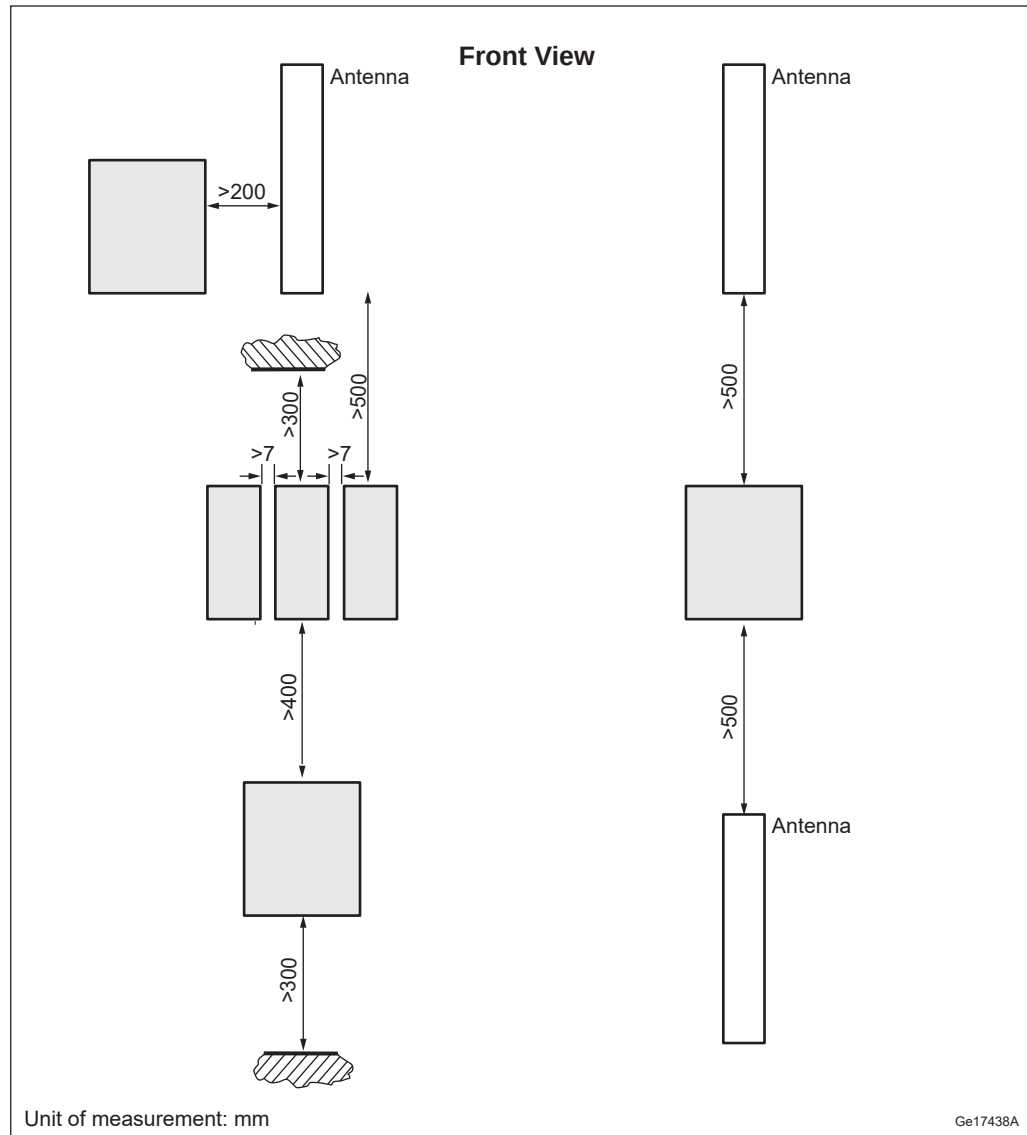


Figure 6 Radio Outdoor Wall Installation Requirements

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a wall. Allow a minimum vertical distance of 500 mm between radio and antenna, if installed above or below an antenna.

Allow a minimum of 300 mm to any overhanging roof or other structure that may obstruct airflow and create a heat trap.

The minimum distance from the bottom of the radio to the floor is 300 mm for vertically installed radios.



Allow a minimum of 7 mm free space between radios installed side by side on the bracket when ambient temperature is expected to be below +42°C.

Allow a minimum of 100 mm free space between radios installed side by side on the bracket when ambient temperature is expected to be above +42°C and below +50°C. Only single radio installation on the bracket is supported when ambient temperature is expected to be above +50°C and below +55°C.

3.6 Acoustic Noise

The radio does not have active cooling components. It can emit low levels of acoustic noise when operating on low capacity.

Radio 4435 sound pressure level is lower than 28 dBA at 1-meter distance for hemispherical distribution, based on ISO 9614-2 and ISO 11203.

3.7 Environmental Characteristics

This section contains operating environment data for the radio.

3.7.1 Operating Environment

The following are the values for the normal operating environment of the radio:

Table 8 Operating Environment

Description	Value
Temperature ⁽¹⁾	–40 to +55 °C
Solar radiation	≤ 1,120 W/m ²
Relative humidity	5–100%
Absolute humidity	0.26–40 g/m ³
Maximum temperature change	1.0 °C/min
Maximum wind load at 42 m/s (pole installed single case)	Radio 4435 B41: 121 N (front), 33 N (side) Radio 4435 B77D: 121 N (front), 33 N (side)

(1) Depending on installation scenario, traffic load, and configuration, the product can, in the highest 10 °C temperature range, temporarily reduce the output power. This depends on the durations of the high ambient temperature.

3.7.2 Heat Dissipation

The radio is convection cooled and designed for outdoor installation.



Avoid indoor installation in a room without adequate ventilation and cooling.

Max heat dissipation is calculated using the following formula:

Max Heat Dissipation = Max Power Consumption - Configured Output Power

Heat dissipation can be calculated for different traffic loads using values from Power Consumption Data. For more information, see Power Consumption Calculations.

3.7.3 Vibration

This section describes how the Radio tolerates vibrations. The Radio operates reliably during seismic activity as specified by test method IEC 60068-2-57 Ff.

Maximum level of RRS	50 m/s ² within 2–5 Hz for DR=2%
Frequency range	1–35 Hz
Time history signal	Verteq II from earthquake standard ATIS 0600329.2014

The Radio operates reliably during random vibration as specified by test method IEC 60068-2-64.

Random vibration, normal operation:

ASD-level	0.3 m ² /s ³ on horizontal axes X and Y 0.2 m ² /s ³ on vertical axis Z
Frequency range	2–200 Hz
Time per test direction	30 minutes

The Radio operates reliably during shock as specified by test method IEC 60068-2-27 Ea.

Peak acceleration	40 m/s ²
Duration	22 ms

3.7.4 Materials

All Ericsson products fulfill the legal and market requirements regarding the following:

- Material declaration
- Materials' fire resistance, components, wires, and cables
- Recycling



— Restricted and banned material use

3.8 Power Characteristics

This section describes the power supply requirements, power consumption, and fuse and circuit breaker recommendations for the radio.

Different power systems can supply power for multiple radios, if necessary.

3.8.1 DC Power Supply Characteristics

The power supply voltage for the radio is –48 V DC.

Table 9 Radio DC Power Supply Requirements

Conditions	Values and Ranges
Nominal voltage	–48 V DC
Operating voltage range	–36.0 to –58.5 V DC
Non-destructive range	0 to –60 V DC

Fuse and Circuit Breaker Recommendations

The recommendations given in this section are based on peak power consumption and give no information on power consumption during normal operation.

The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60934.

The radio has a built-in Class 1 (Type 1) SPD to protect the equipment in case of lightning and network transients. The recommended fuse or circuit breaker rating is therefore dimensioned not to trip the fuse or circuit breaker in case of most SPD operation. The minimum fuse rating can be taken into account only if it is accepted that fuses or circuit breakers trip in such situations.

Table 10 External Radio Fuse and Circuit Breaker Recommendations

Unit (DC Powered)	Output Power	Maximum Load Current at –36 V DC	Maximum Allowed Fuse Rating ⁽¹⁾
Radio 4435 B41	4 × 20 W	10 A	16 A
Radio 4435 B77D	4 × 15 W	10 A	16 A

(1) The maximum allowed fuse rating must (with a certain safety margin 10-20%) be larger than the maximum load current for reliable operation. However, it must not be larger than the next or nearest higher fuse or circuit breaker standard value in order to minimize the cable cross-section area and at the same time fully comply with relevant safety standards.



3.8.2 AC Power Supply Characteristics

The AC power source must provide protection for overcurrent, short circuit, and grounding fault.

Voltage values and ranges are listed in [Table 11](#).

Table 11 Radio AC Power Supply Requirements

Conditions	Values and Ranges
Nominal Voltage	100–250 V AC
Voltage Range including tolerance	90–275 V AC
Connection	Line-Neutral, Line-Line
Operating frequency	50/60 Hz
Voltage harmonics	< 10% at full load ⁽¹⁾
Shut-off allowance	At undervoltage or overvoltage
Inrush current peak	< 15 A
Inrush current duration	< 100 ms
AC system	TN, TT and IT

(1) Must comply with IEC 61000-3-2

Fuse and Circuit Breaker Recommendations

The recommendations given in this section are based on peak power consumption and give no information on power consumption during normal operation.

The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60947-2.

The PSU AC has a built-in Class 1 (Type 1) SPD to protect the equipment in case of lightning and network transients. The recommended fuse or circuit breaker rating is therefore dimensioned for not tripping the fuse or circuit breaker in case of SPD operation. The PSU AC is described in [Table 12](#).

Table 12 Radio 4435 Fuse and Circuit Breaker Recommendations

Unit (AC Powered)	Output Power	Nominal AC Input Voltage	Maximum AC Input Current ⁽¹⁾	Maximum Allowed Fuse Rating ⁽²⁾
Radio 4435 B41	4 × 20 W	100–127 V	5 A	10 A
		200–250 V	3 A	6 A
Radio 4435 B77D	4 × 15 W	100–127 V	5 A	10 A
		200–250 V	3 A	6 A



- (1) The Maximum AC Input Current is calculated at a total tolerance of -10% of the nominal value.
- (2) The Maximum Allowed Fuse Rating must be larger than the Maximum AC Input Current, yet still within a safety margin of 15%. This is to ensure reliable operation. However, it must not be larger than the standard value of the next or nearest higher fuse or circuit breaker. This is in order to minimize the cable cross-section area and comply with the relevant safety standard.

When the radio connected Line-Line a 2-pole circuit breaker or dual fuses are required for interruption of both lines. This is also valid when the radio is used in an IT system.

3.8.3 Power Consumption

For information on power consumption, see [Power Consumption Calculations](#) and [Power Consumption Data](#).

3.9 System Characteristics

This section describes the system characteristics of the Radio System.

3.9.1 RF Electromagnetic Field Exposure

For general information on RF EMF exposure, see [Radio Frequency Electromagnetic Fields](#).

[Table 13](#) and [Table 14](#) list the compliance boundaries (exclusion zones), outside of which the RF EMF exposure from Radio 4435 is below the limits specified by the ICNIRP, and the limits applicable in:

- EU (1999/519/EC, 2013/35/EU, EN 50385)
- USA (47 CFR 1.1310)

Table 13 Dimensions of the Box-Shaped Compliance Boundary for General Public (GP) and Occupational (O) Exposure Applicable in the EU and Markets Employing the ICNIRP RF Exposure Limits (Including 0.5 dB Transmission Loss and 0.6 dB Power Tolerance)

Mode and Output Power					Dimensions of the Box-shaped Compliance Boundary ⁽¹⁾ (m)							
					Distance in Front of Antenna		Width		Height		Distance Behind Antenna	
Product	Standard	Nominal Peak Output Power from the Radio	IEC 62232 Installation Class	TDD DL Duty Cycle	GP	O	GP	O	GP	O	GP	O
Radio 4435 B41	LTE/NR	4 × 20 W	E+	75%	8.2	3.0	5.2	1.7	2.5	1.5	<0.1	<0.1



(1) The compliance boundaries are determined for maximum output power with transmission loss, output power tolerance, and TDD downlink duty cycle included using the antenna 80020622 for an electrical tilt of 2°.

Table 14 Dimensions of the Box-Shaped Compliance Boundary for General Public (GP) and Occupational (O) Exposure Applicable in the USA and Markets Employing the FCC RF Exposure Limits (Including 0.5 dB Transmission Loss and 0.6 dB Power Tolerance)

Mode and Output Power					Dimensions of the Box-shaped Compliance Boundary ⁽¹⁾⁽²⁾ (m)							
					Distance in Front of Antenna		Width		Height		Distance Behind Antenna	
Product	Standard	Nominal Peak Output Power from the Radio	IEC 62232 Installation Class	TDD DL Duty Cycle	GP	O	GP	O	GP	O	GP	O
Radio 4435 B41	LTE/NR	4 × 20 W	E+	75%	8.7	3.9	6.2	2.8	2.5	1.9	0.3	0.2
Radio 4435 B77D	NR	4 × 15 W	E+	75%	6.4	2.9	5.0	2.3	1.8	1.5	0.3	0.2

(1) For Radio 4435 B41, the compliance boundaries are determined for maximum output power with transmission loss, output power tolerance, and TDD downlink duty cycle included using the antenna 80020622 for an electrical tilt of 2°.

(2) For Radio 4435 B77D, the compliance boundaries are determined for maximum output power with transmission loss, output power tolerance included using the antenna 80010922 for an electrical tilt of 2°.

3.9.2 Software

For information on software dependencies, see [Supported Radio Capabilities](#).

3.9.3 Radio Configurations

For information about available radio configurations, see [Radio Node Configurations](#).

3.9.4 VSWR Limitations

This unit supports return loss antenna supervision for LTE, NR and ESS carriers with 5 MHz bandwidth or higher.

For more information, see [Return Loss Antenna Supervision](#).

4

Hardware Architecture

This section describes the radio hardware structure regardless of configuration or frequency. For a description of the currently available radio configurations, see [RBS Configurations](#).

4.1

Radio Parts

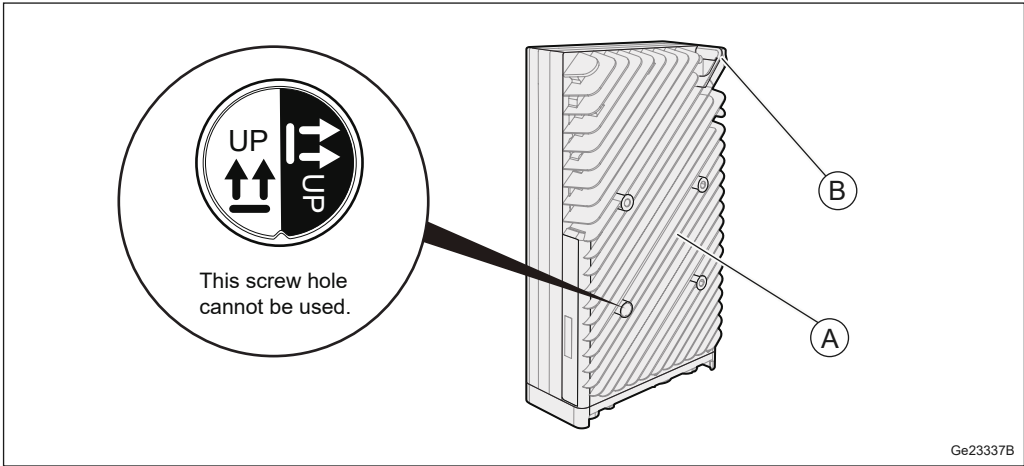


Figure 7 Radio Parts

Table 15 Key to Radio Parts

Position	Component
A	Cooling fins
B	Lifting eye

4.2

TRX

The Transmitter and Receiver (TRX) provides the following:

- Analog/Digital (A/D), Digital/Analog (D/A) conversion
- Channel filtering
- Delay and gain adjustment
- Digital predistortion



- RF modulation and demodulation
- Optical cable interface termination
- RX diversity

4.3 Optical Indicators and Maintenance Button

The radio unit is equipped with optical indicators and a maintenance button. The locations of the optical indicators and the maintenance button are shown in .

Table 16 describes how to interpret the optical indicators and maintenance button on the radio unit. For detailed information, refer to Indicators, Buttons, and Switches.

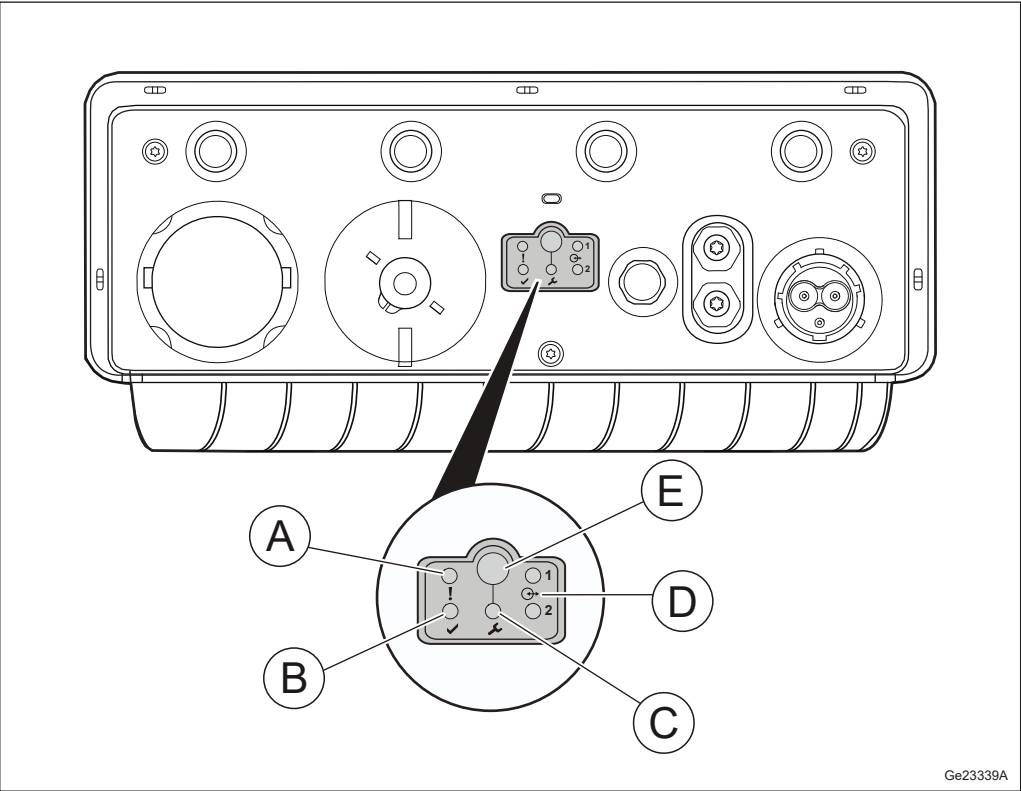
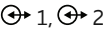


Figure 8 Optical Indicators and Maintenance Button

Table 16 Radio Unit Optical Indicators and Maintenance Button

Position	Marking	Indicator	Color	Mode	Interpretation
A	!	Fault	Red	Off	No fault detected in unit
				On	Fault detected in unit
B	✓	Operational	Green	Off	No power

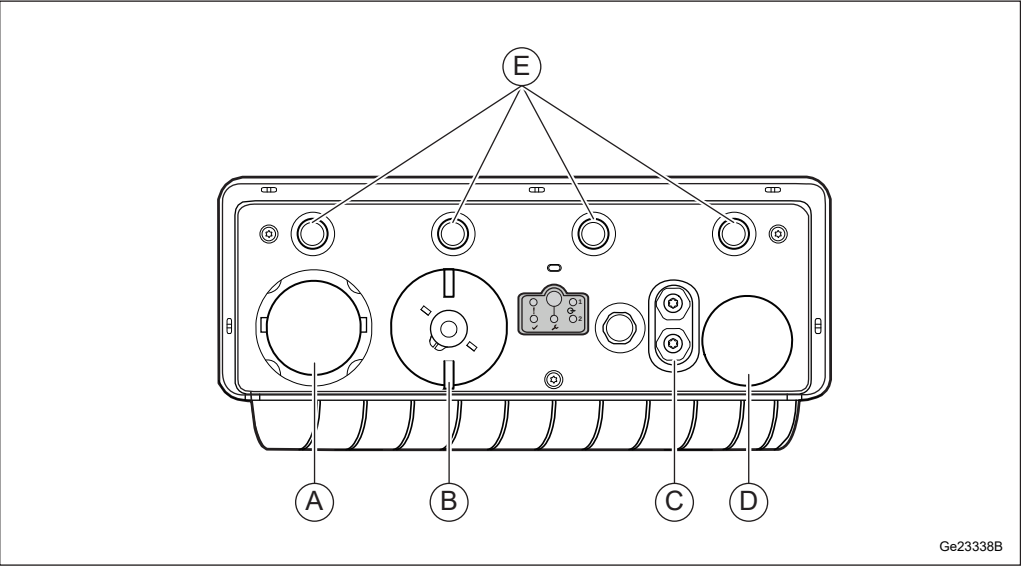


Position	Marking	Indicator	Color	Mode	Interpretation
				On	Operational
				Flashing Slowly (0.5 Hz)	Missing dependent resource
				Flickering (16 Hz)	Transitory activity
				Double flashing Off	Loading in progress No ongoing traffic
				Double flashing On	Loading in progress Traffic is ongoing
C		Maintenance	Blue	Off	No ongoing maintenance activity Traffic is ongoing
				On	Maintenance mode All traffic and alarms are suppressed
				Flashing Slowly (0.5 Hz)	Maintenance mode is initiated When traffic and alarms are removed, the indicator switches to On
D		Interface	Green	Off	Disconnected
				On	Connected
E	—	Maintenance button	—	—	—



5 Connection Interfaces

This section contains information about the connection interfaces of the radio.



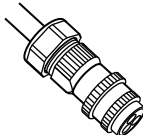
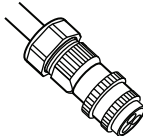
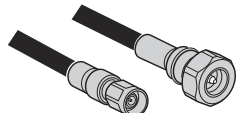
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Figure 9 Connection Interfaces

Table 17 Connection Interfaces

Position	Description	Marking	Connector Types	Cable Illustration
A	Optical cable 1	↻ 1	LC (On SFP+) with support for FullAXS	
B	Optical cable 2	↻ 2		
C	Grounding point	⏏	2 × 6 mm dual lug	



Position	Description	Marking	Connector Types	Cable Illustration
D (AC version)	100–250 V AC power supply	100–250V 	Power connector	
D (DC version)	–48 V DC power supply	–48V 	Power connector	
E	Antenna A–D (from left to right)	   	NEX10	

5.1 Antenna Interface

The antenna interfaces provide connections for the radio to antennas. The jumper and RF cables connect the radio to the antenna.

Table 18 Radio Antenna Connection Interface Characteristics

Connector Type	Jumper Cable Type	RF Cable Type
NEX10 female	NEX10 male on one end and 4.3-10 female on the other end	50 Ω 1/2-inch coaxial, 4.3-10 male

Table 19 Antenna Cable Connectors

Radio Connectors	Antenna Connectors
(Antenna A–Antenna D)	TX/RX

5.2 Interface for Optical Cable to Main Unit

The  1 and  2 interfaces provide connections to optical cables for traffic and timing signals between the radio and the main unit. An SFP+ is used to connect the optical cable to the radio.

Note: The radio uses SFP+ modules for optical transmission and optical radio interfaces on Data 1 (optical cable 1) and Data 2 (optical cable 2).

Only use SFP+ modules approved and supplied by Ericsson. These modules fulfill the following:



- Compliance with Class 1 laser product safety requirements defined in standard IEC 60825-1.
- Certification according to general safety requirements defined in standard IEC 62368-1.
- Functional and performance verified to comply with Radio System specifications.

Recommended SFP+ modules are obtained from the product packages for the Radio System and the Main Remote Installation products. For more information about SFP modules, see [SFP Module Selector Guide and Site Installation Products Overview](#).

5.3 –48 V DC or 100–250 V AC Power Supply Interface

5.3.1 –48 V DC Power Supply Interface

The –48 V DC power connection is made through a connector with a 3-wire (DC-I) connection or a connector with a 2-wire (DC-C) connection.

For power cable dimensioning, see [Site Installation Products Overview](#).

For determining which connector or junction box to use, see [Table 20](#).

Table 20 –48 V DC Power Supply Connector or Junction Box

Cross-Sectional Area of Each Conductor (mm ²)	Connector or Junction Box
6–16	For 3-wire (DC-I), used with connector RNT 447 36/01. For 2-wire (DC-C), used with connector RNT 447 37/01.
25	Used with junction box NTB 101 75/1

The power cable conductor has a wire for both the 0 V conductor and a wire for the –48 V DC conductor.

All cables must be shielded. The shielding must be properly connected both to the power connector and to the grounding in the power supply equipment; otherwise, the unit over voltage and lightning protection does not function properly.

5.3.2 100–250 V AC Power Supply Interface

The AC power connection is made through a connector (RNT 447 31/03).



Table 21 AC Power Connector Capabilities

Conditions	Values and Ranges
Cable outer diameter	6 to 18 mm
Terminal size	1.5 to 4.0 mm ²

Table 22 Minimum AC Power Supply Cable

Cable Length	Cross-Sectional Area of Each Conductor
≤ 100 m	3 x 1.5 mm ²

The power cable has a wire for Line (L), a wire for Line/Neutral (L/N), and a wire for Protective Earth (PE) conductors. The wire color code for wires is market dependent.

All cables must be shielded. The shield must be folded back over the outer jacket of the cable and properly connected to the radio chassis, otherwise the radio overvoltage does not function properly.

The AC cable temperature rating must be at least 70 °C.

5.4 Grounding Interface

Radio 4435 must be grounded to protect it from overvoltage and lightning strikes.

For more information about grounding principles, see [Grounding Guidelines for RBS Sites](#).



6 Standards and Regulations

This section presents a brief overview of standards, regulatory product approval, and declaration of conformity for the radio.

FCC Compliance Statement

"This device complies with Part 15 of the FCC CFR 47 rules. Operation is subject to the following two conditions: This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation."

6.1 Regulatory Approval

6.1.1 Environmental Standards Compliance

The product complies with the following environmental standard:

Europe

- Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive (2011/65/EU) bands not allowed or not harmonized within the EU.

6.1.2 Safety Standards Compliance

In accordance with market requirements, the product complies with the following product safety standards and directives:

Europe

- EN 50385
- EN 62368-1

North America

- Health Canada Safety Code 6
- UL 62368-1
- CSA-C22.2 No. 62328-1



6.1.2.1 Outdoor Specific Requirements

The product complies with the following outdoor specific requirements:

Europe

- EN 60529 (IP65)
- EN 60950-22

North America

- UL 50E
- UL 60950-22
- CSA-C22.2 No. 60950-22-07

6.1.3 EMC Standards Compliance

The product complies with the following Electromagnetic Compatibility (EMC) standards:

North America

- FCC CFR 47 Part 15 B
- IC ICES-003 B

6.1.4 Radio Standards Compliance

The product complies with the following radio standards:

North America

- FCC CFR 47 Part: 2, 27 (US Band/Frequency Specific)

6.1.5 Marking

To show compliance with legal requirements, the product is marked with the following labels:

North America

- cETLus
- FCC CFR 47 Part 15 Statement



- IC ICES-003 Statement
- FCC ID Number

6.2 Other Standards and Regulations

The standards and regulations in this section are not regulatory approved.

6.2.1 Spare Parts

The product adheres to the Ericsson Serviceability and Spare Part Strategy.

6.2.2 Surface Quality

The surface quality of the radio is according to Ericsson standard class A5 for the top, front, and side covers, and A6 for the heat-sink.

6.2.3 Vandal Resistance

Unauthorized access is not possible without damaging the tamper proof warranty seal.

CROWN CASTLE FIBER LLC
SITE PLAN

NOTE: MNG-386 (474995)

ENGINEER:
NB+C
TOTALLY COMMITTED.
NB+C ENGINEERING SERVICES, LLC.
1005 MARSHALLE DRIVE, SUITE 300
KILGORE, MD 21092
(410) 712-0002

OWNER/DEVELOPER:
CROWN CASTLE
CROWN CASTLE FIBER LLC
10960 GRANTCHESTER WAY, 4TH FLOOR
COLUMBIA, MD 21044

TITLE:
MNG-386
9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903
JURISDICTION: MONTGOMERY COUNTY
LATITUDE: 39.013263
LONGITUDE: -76.978298



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REVISIONS

REV	DATE	DESCRIPTION	BY
1	08-16-23	IKE UPDATE REVISION	JED
0	08-25-22	FINAL CDS	SDR
A	07-29-22	PRELIMINARY CDS	PEM

DRAWN BY:	CHECKED BY:	APPROVED BY:
PEM	SDR	TJA

PROJECT NUMBER: 100505
FILE NAME: STRAND MOUNT DWG
DATE DRAWN: 07-29-22
SCALE: AS SHOWN

SHEET: **C-1**

LEGEND

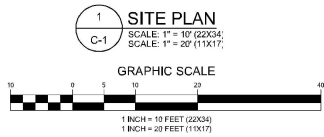
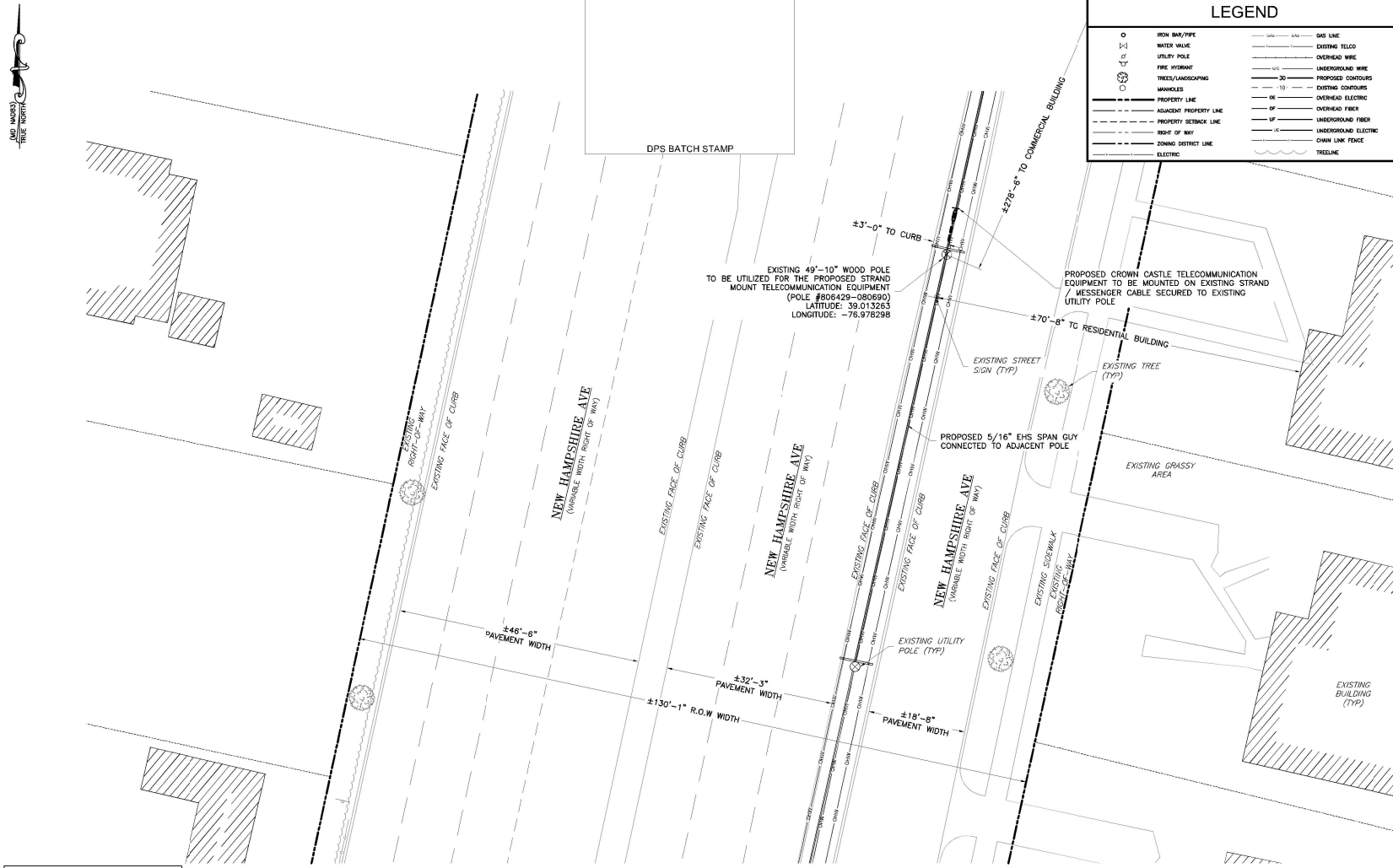
○	IRON BAR/PIPE	—	GAS LINE
⊥	WATER VALVE	—	EXISTING TELCO
⊥	UTILITY POLE	—	OVERHEAD WIRE
⊥	FIRE HYDRANT	—	UNDERGROUND WIRE
⊙	TREES/LANDSCAPING	—	PROPOSED CONTOURS
⊙	MANHOLES	—	EXISTING CONTOURS
—	PROPERTY LINE	—	OVERHEAD ELECTRIC
—	ADJACENT PROPERTY LINE	—	OVERHEAD FIBER
—	PROPERTY SERVICE LINE	—	UNDERGROUND FIBER
—	RIGHT OF WAY	—	UNDERGROUND ELECTRIC
—	ZONING DISTRICT LINE	—	CHAIN LINK FENCE
—	ELECTRIC	—	TREELINE

(AND MATCH) (THIS SHEET)

THE CONSTRUCTION MANAGER SHALL COORDINATE POWER AND TELCO UTILITY ROUTING TO THE PROPOSED EQUIPMENT PRIOR TO CONSTRUCTION.

ANTENNA AZIMUTH SHALL BE SET TO 10°

NOTE:
EXISTING UTILITY INFORMATION SHOWN REPRESENTS THE BEST DATA AVAILABLE FROM EXISTING DOCUMENTATION AND FIELD EVIDENCE. ALL LOCATIONS SHOULD BE CONSIDERED APPROXIMATE, AND A FIELD INVESTIGATION MUST BE PERFORMED IN THE VICINITY OF ANY CONSTRUCTION ACTIVITIES. NOTE THAT THESE PLANS MAY NOT SHOW ALL UTILITIES THAT ARE PRESENT AT THE SITE.





NB+C Engineering Services

Existing Utility Pole Node

Prepared for Crown Castle Mid-Atlantic

SITE INFORMATION

Address	9609 New Hampshire Avenue Silver Spring, MD 20903 Latitude: 39.013263°, Longitude: -76.978298°
Site Name	MNG-386
POLE TAG ID	806429-080690
PEPCO FACILITY ID	806429-080690
NB+C Project Number	100505
Date	August 18, 2023

August 18, 2023

Terrence L. Myers
Project Manager – MDV Market
Crown Castle
10980 Grantchester Way, Suite 4000
Columbia, MD 21044

Re: Utility Pole Structural Analysis Report

Dear Mr. Myers,

Per your request, NB+C Engineering Services is pleased to submit this “**Structural Analysis Report**” to determine the structural integrity of the existing utility pole listed on Table 1 of this report. Information we received for this analysis includes:

- Ike Office Report prepared by NB+C ES dated August 15, 2023
- Construction drawings prepared by NB+C ES dated August 16, 2023

Table 1 - Existing Utility Poles

Pole Length (Ft)	Pole Species	Pole Class	Pole Height above Grade (ft)	Embedment Depth (ft)	% Capacity (worst case loading)	Pass / Fail
55	SP	1	49.83	5.17	94%	Pass

APPLICABLE CODES AND STANDARDS

The existing structure was analyzed/designed per the provisions of following applicable codes and standards:

- *2018 International Building Code incorporating Montgomery County amendments published per ER #31-19*
- *Minimum Design Loads for Buildings and Other Structures ASCE/SEI 7-16*
- *2017 National Electric Safety Code*
- *TIA-222-H-2016*

ANALYSIS

Design Loads:

- NESC 250B Ice and Wind

CONCLUSION

Based on the performed analysis on the utility pole for applicable gravity and lateral loads, we have determined that the existing utility wood pole is adequate to support the proposed Wireless loading. The results of our analysis are included in the attached documentation. Please refer to construction drawings prepared by **NB+C ES** for additional information and structural details.

We at NB+C Engineering Services appreciate the opportunity of providing our continuing professional services to Crown Castle. If you have any questions or need further assistance on this or any other projects, please give us a call.

NB+C Engineering Services

Prepared by: Milan Paudel

Respectfully submitted by:

Trent T. Snarr, P.E.
Chief Engineer
MD License # 55491



I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND.

LICENSE NO. 55491 EXPIRATION DATE: 01/08/2024

PoleForeman - Pole Loading Analysis Report

License: NB+C

Database: progdata PEPCO.mdb

Version 7.4.37



POLE LOADING DATA

Pole: 55/1 (Wood-Cylindrical)

Soil: None

Pole Loading

Horizontal: 94% (250B)
Vertical: 9% (k=0.70)

NESC Edition: 2017

Loading District: Heavy

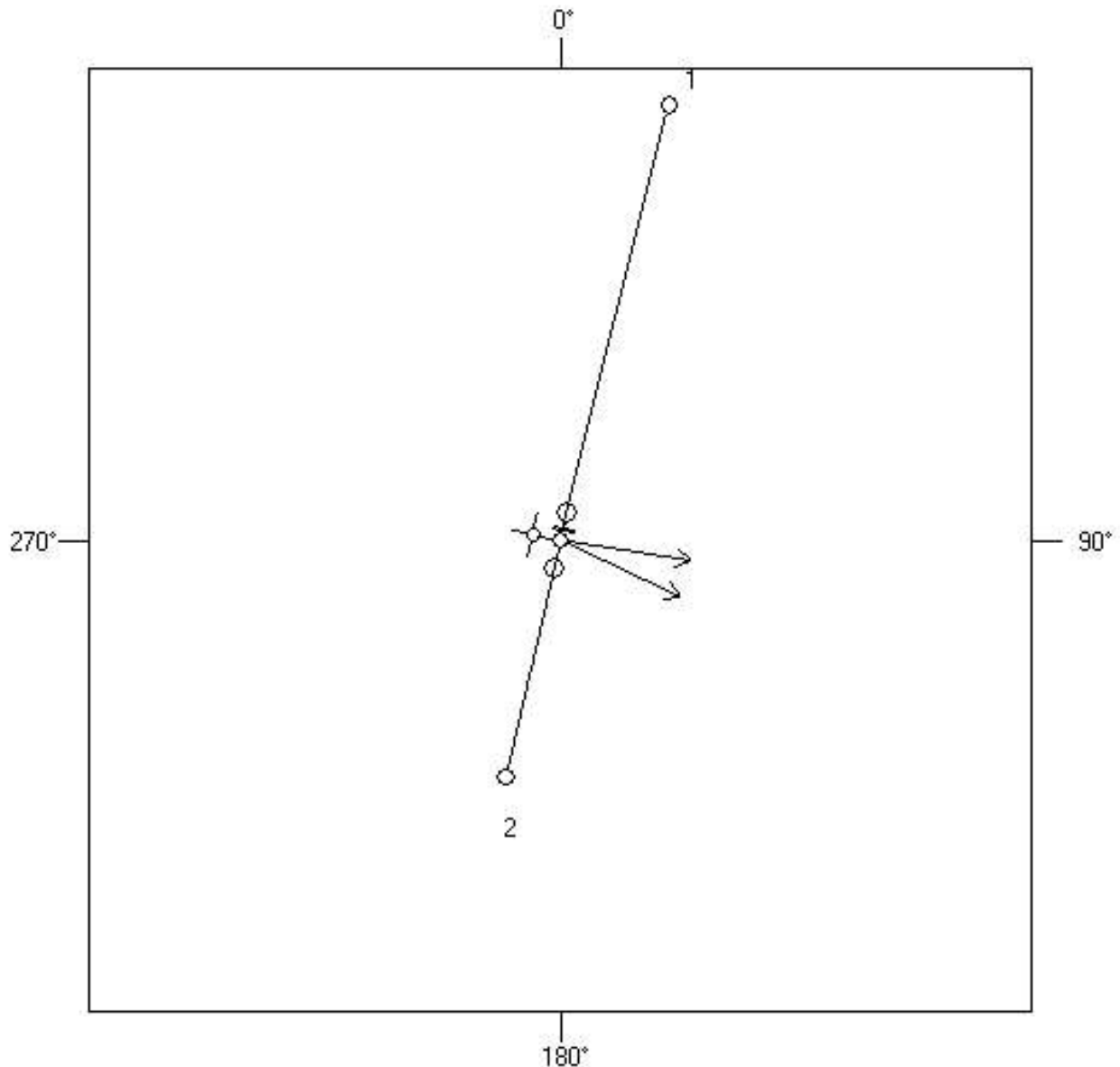
Construction: Grade C (Elsewhere)

Rule 250B: Temp=0F, Wind=4 psf, Ice=0.5 in

POLES

Pole #	Length (ft)	Depth (ft)	Elevation (ft)
0	55	5.17	0
1	50	7.08	0
2	55	6.75	0

POLE LINE TOPOLOGY



PoleForeman - Pole Loading Analysis Report

License: NB+C

Database: progdata PEPCO.mdb

Version 7.4.37

GUY STRAND DATA

Anchor	Strand	Attach (in)	Length (ft)	Direction	Tension (lbs)	Strength (lbs)	Loading
1	5/16" EHS	362"	6'	12°	7,308	10,080	73%
2	7/16" EHS	311"	7'	12°	10,625	18,000	59%

ANCHOR DATA

Anchor	Rod	Anchor	Soil	Tension (lbs)	Rod Strength (lbs)	Anchor Strength (lbs)
1	1-1/4" Rod	10" Helix	Class - 5	7,308	58,000	16,000
2	1-1/4" Rod	10" Helix	Class - 5	10,625	58,000	16,000

INSULATORS

Insulator	Attach (in)	Loading	Angle
15KV Pin	7"	25%	1°
15KV Xarm Pin	23"	40%	1°
15KV Xarm Pin	23"	40%	1°
15KV Xarm Pin	92"	40%	1°
15KV Xarm Pin	92"	40%	1°
15KV Xarm Pin	92"	40%	1°

ARM / BRACKET DATA

Arm/Bracket	Attach (in)	Vert Loading	Horz Loading
33" Single FG Pole Top Pin	7"	49%	15%
10' Single X-Arm (3.75x4.75)	23"	65%	10%
10' Single X-Arm (3.75x4.75)	92"	85%	14%

SPANS

Span: 1 **Span Length (ft): 254** **Direction: 14°**

Circuit: 1

	Ruling Span (ft)	Offset (in)	Attach A (in)	Attach B (in)	Tension (lbs)
Primary					
477 ACSR (30/7)	200	55	14"	18"	3900
477 ACSR (30/7)	200	0	-19"	12"	3900
477 ACSR (30/7)	200	-55	14"	18"	3900
Secondary					
4/0 AL QPX SECD	200	0	226"	197"	3776

Circuit: 2

	Ruling Span (ft)	Offset (in)	Attach A (in)	Attach B (in)	Tension (lbs)
Primary					
477 ACSR (30/7)	200	55	83"	76"	3900
477 ACSR (30/7)	200	20	83"	76"	3900
477 ACSR (30/7)	200	-55	83"	76"	3900

Joint Use

Joint Use Cable	Ruling Span (ft)	Diameter (in)	Weight (lbs/ft)	Attach A (in)	Offset (in)	Attach B (in)	Tension (lbs)	Description
10M-144CT-100PR w/ 4402 Strand	200	1.66	0.96	285"	1	245"	2231	
0.75" TELCO	200	0.75	0.33	311"	1	263"	2710	
1.00" TELCO	200	1.00	0.50	324"	1	275"	2905	
0.75" TELCO	200	0.75	0.33	337"	1	287"	2710	
0.50" TELCO	200	0.50	0.22	346"	1	299"	1480	

Span: 2 **Span Length (ft): 138** **Direction: 193°**

Circuit: 1

	Ruling Span (ft)	Offset (in)	Attach A (in)	Attach B (in)	Tension (lbs)
Primary					
477 ACSR (30/7)	200	55	14"	16"	3900
477 ACSR (30/7)	200	0	-19"	9"	3900
477 ACSR (30/7)	200	-55	14"	16"	3900
Secondary					
4/0 AL QPX SECD	200	0	226"	279"	3776

Circuit: 2

	Ruling Span (ft)	Offset (in)	Attach A (in)	Attach B (in)	Tension (lbs)
Primary					
477 ACSR (30/7)	200	55	83"	80"	3900
477 ACSR (30/7)	200	20	83"	80"	3900
477 ACSR (30/7)	200	-55	83"	80"	3900

PoleForeman - Pole Loading Analysis Report

License: NB+C

Database: progdata PEPCO.mdb

Version 7.4.37

Joint Use

Joint Use Cable	Ruling Span (ft)	Diameter (in)	Weight (lbs/ft)	Attach A (in)	Offset (in)	Attach B (in)	Tension (lbs)	Description
10M-144CT-100PR	200	1.66	0.96	285"	1	327"	2200	
0.75" TELCO	200	0.75	0.33	311"	1	345"	2710	
1.00" TELCO	200	1.00	0.50	324"	1	357"	2905	
0.75" TELCO	200	0.75	0.33	337"	1	369"	2710	
0.50" TELCO	200	0.50	0.22	346"	1	381"	1480	
0.75" TELCO	200	0.75	0.33	362"	1	393"	2710	

SERVICES

Service	Type	Length (ft)	Direction	Attach (in)	Tension (lbs)
1/0 AL TPX SERV	Power	76	99°	226"	400
1/0 AL TPX SERV	Power	76	115°	226"	400

EQUIPMENT

Equipment	Weight (lbs)	Attach (in)	Direction
Strand Mount Antenna - Ericsson 2204	65.0	285"	14°
User Defined Equipment	5.0	382"	193°
User Defined Equipment	5.0	502"	193°

LIGHTS

Light	Bracket	Weight (lbs)	EPA	Attach (in)	Direction
150-400W Cobra	14 FT Bracket	97	0.87	271"	281°

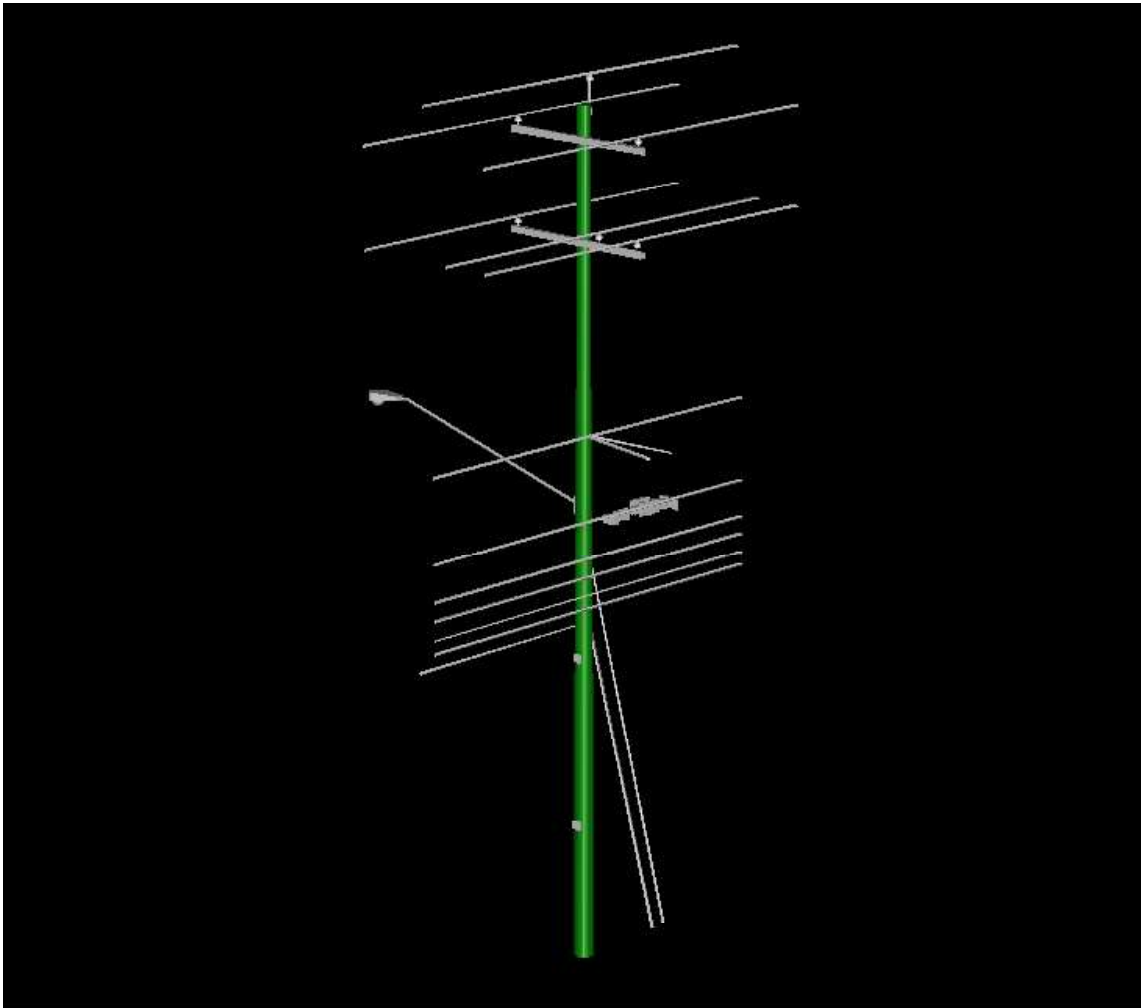
PoleForeman - Pole Loading Analysis Report

License: NB+C

Database: progdata PEPCO.mdb

Version 7.4.37

Solid Model View



MNG-386

NB+C Node Survey 2 (1 of 3)

Pole Sequence Number: 806429-80690 SCU ID: 474995 Tip: 49' 10" Circumference (") : 44

Location: (lat: 39.01327, lng: -76.9783, alt: 195' 10") Ready for Crown Castle Upload: No

IKEphoto



Tag Photos



Directional Photos #1: Directional Photos #1

North



South



East



West



31 May, 2023

12 o'clock



31 May, 2023

9 o'clock



31 May, 2023

6 o'clock



31 May, 2023

3 o'clock



31 May, 2023

Anchor #1: Anchor #1

Lead Length: 6' at 12.00°

Guys #1: Downguy > 5/16" EHS		
Owner: COMMUNICATION > Telco	Attachment Height: 19' 8"	

Anchor #2: Anchor #2

Lead Length: 7' at 12.00°

Guys #1: Downguy > 5/16" EHS		
Owner: COMMUNICATION > Telco	Attachment Height: 23' 11"	

Equipment #1: Light > 14 FT Bracket > 150-400W Cobra

Orientation: 281	Owner: UTILITY > PEPCO	Attachment Height: 27' 3"	Bottom Height: 29' 6"
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Span #1: Fore Span

Span Length: 138' 4" at 192.62°

Wire #1: COMMUNICATION > 0.75" TELCO

Mid Span Height: 16' 1"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 19' 8"
Wire #2: COMMUNICATION > 0.50" TELCO			
Mid Span Height: 17' 6"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 21'
Wire #3: COMMUNICATION > 0.75" TELCO			
Mid Span Height: 17' 9"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 21' 9"
Wire #4: COMMUNICATION > 1.00" TELCO			
Mid Span Height: 18' 9"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 22' 10"
Wire #5: COMMUNICATION > 0.75" TELCO			
Mid Span Height: 19' 11"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 23' 11"
Wire #6: COMMUNICATION > 10M-144CT-100PR			
Mid Span Height: 21'	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 26' 1"
Wire #7: SECONDARY > 4/0 AL QPX SECD			
Mid Span Height: 25' 8"	Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 31'
Wire #8: PRIMARY > 1/0 ACSR (6/1)			
Mid Span Height: 42' 2"	Quantity: 3	Owner: UTILITY > PEPCO	Attachment A Height: 42' 2"
Wire #9: PRIMARY > 477 ACSR (30/7)			
Mid Span Height: 45' 4"	Quantity: 2	Owner: UTILITY > PEPCO	Attachment A Height: 47' 11"
Wire #10: PRIMARY > 477 ACSR (30/7)			
Mid Span Height: 48' 6"	Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 49' 3"
Span #2: Back Span			
Span Length: 253' 8" at 13.72°			
Wire #1: COMMUNICATION > 0.50" TELCO			
Mid Span Height: 14' 6"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 21'
Wire #2: COMMUNICATION > 0.75" TELCO			
Mid Span Height: 15' 4"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 21' 9"
Wire #3: COMMUNICATION > 1.00" TELCO			
Mid Span Height: 16' 1"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 22' 10"
Wire #4: COMMUNICATION > 0.75" TELCO			
Mid Span Height: 18' 1"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 23' 11"
Wire #5: COMMUNICATION > 10M-144CT-100PR			
Mid Span Height: 18' 10"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 26' 1"

Wire #6: SECONDARY > 4/0 AL QPX SECD

Mid Span Height: 23' 1"	Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 31'
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Wire #7: PRIMARY > 1/0 ACSR (6/1)

Mid Span Height: 37' 6"	Quantity: 3	Owner: UTILITY > PEPCO	Attachment A Height: 42' 2"
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Wire #8: PRIMARY > 477 ACSR (30/7)

Mid Span Height: 41' 11"	Quantity: 2	Owner: UTILITY > PEPCO	Attachment A Height: 47' 11"
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Wire #9: PRIMARY > 477 ACSR (30/7)

Mid Span Height: 43' 9"	Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 49' 3"
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Span #3: Building

Span Length: 76' at 99.00°

Wire #1: SERVICE > 1/0 AL TPX SERV

Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 31'
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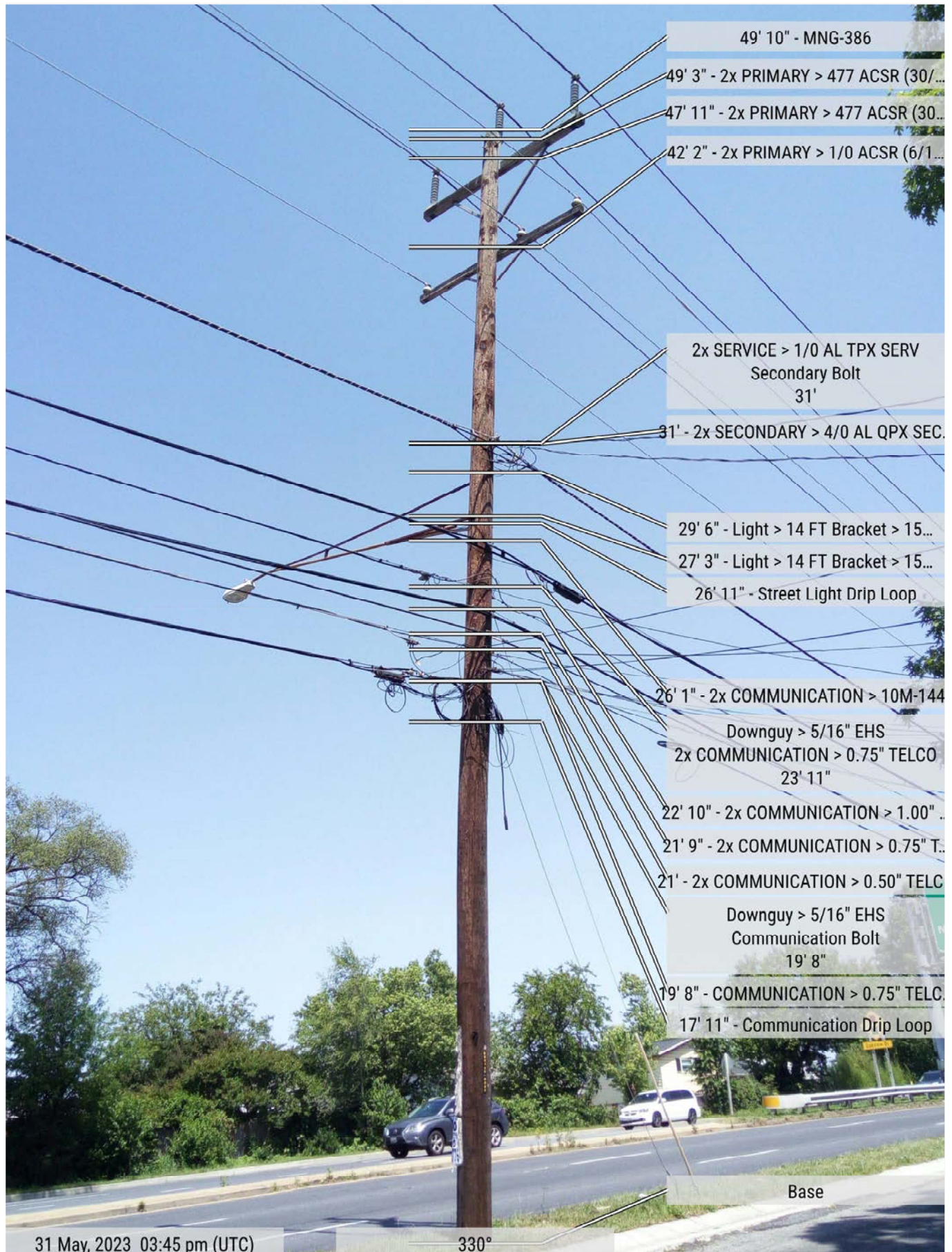
Span #4: Building

Span Length: 76' at 115.00°

Wire #1: SERVICE > 1/0 AL TPX SERV

Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 31'
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IKEphoto (2 of 6)



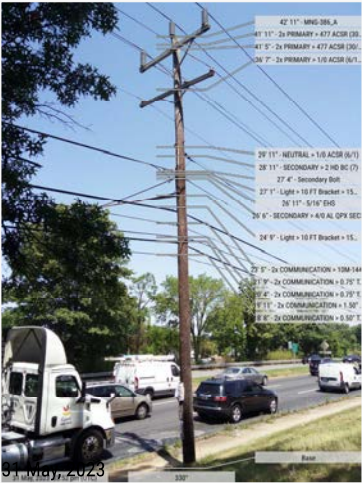
MNG-386_A

NB+C Node Survey 2 (2 of 3)

Pole Sequence Number: 806429-140950 Tip: 42' 11" Circumference ("): 44

Location: (lat: 39.01395, lng: -76.97809, alt: 203' 1") Ready for Crown Castle Upload: No

IKEphoto

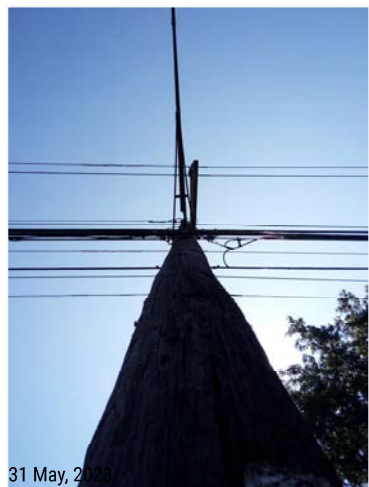


Tag Photos



Directional Photos #1: Directional Photos #1

12 o'clock



9 o'clock



6 o'clock



3 o'clock



Equipment #1: Light > 10 FT Bracket > 150-400W Cobra

Orientation: 285	Owner: UTILITY > PEPCO	Attachment Height: 24' 9"	Bottom Height: 27' 1"
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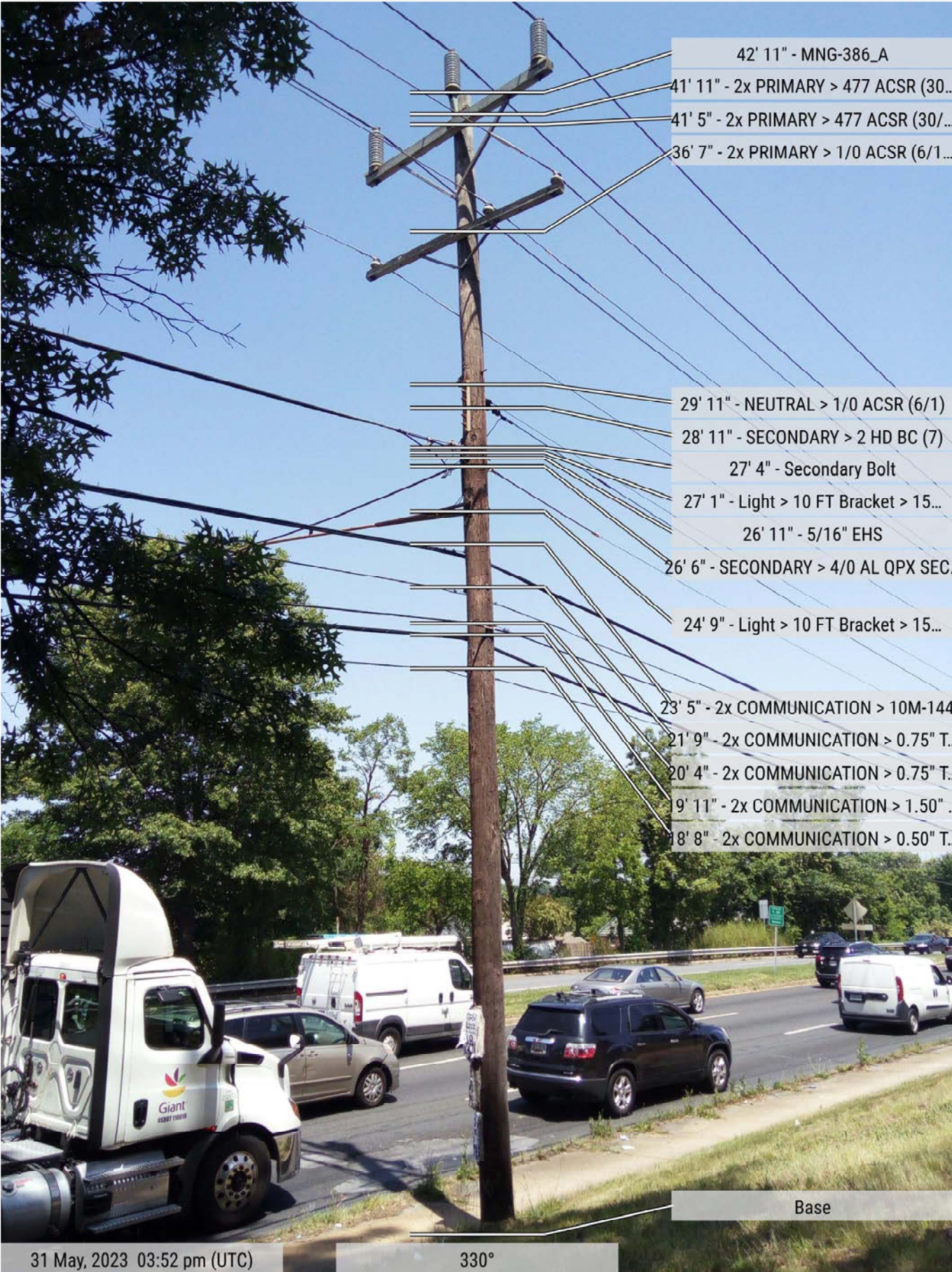
Span #1: Back Span

Span Length: 257' at 13.00°

Wire #1: COMMUNICATION > 0.50" TELCO			
Mid Span Height: 10' 9"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 18' 8"
Wire #2: COMMUNICATION > 1.50" TELCO			
Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 19' 11"	
Wire #3: COMMUNICATION > 0.75" TELCO			
Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 20' 4"	
Wire #4: COMMUNICATION > 0.75" TELCO			
Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 21' 9"	
Wire #5: COMMUNICATION > 10M-144CT-100PR			
Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 23' 5"	
Wire #6: SECONDARY > 2 HD BC (7)			
Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 28' 11"	
Wire #7: NEUTRAL > 1/0 ACSR (6/1)			
Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 29' 11"	
Wire #8: PRIMARY > 1/0 ACSR (6/1)			
Quantity: 3	Owner: UTILITY > PEPCO	Attachment A Height: 36' 7"	
Wire #9: PRIMARY > 477 ACSR (30/7)			
Quantity: 2	Owner: UTILITY > PEPCO	Attachment A Height: 41' 5"	

Wire #10: PRIMARY > 477 ACSR (30/7)**Quantity:** 1**Owner:** UTILITY > PEPCO**Attachment A Height:** 41' 11"**Span Guy #1:** 5/16" EHS**Owner:** UTILITY > PEPCO**Attachment Height:** 26' 11"**Span #2:** Fore Span**Span Length:** 253' 8" at 193.72°**Wire #1:** COMMUNICATION > 0.50" TELCO**Mid Span Height:** 10' 9"**Quantity:** 1**Owner:** COMMUNICATION > Telco**Attachment A Height:** 18' 8"**Wire #2:** COMMUNICATION > 1.50" TELCO**Quantity:** 1**Owner:** COMMUNICATION > Telco**Attachment A Height:** 19' 11"**Wire #3:** COMMUNICATION > 0.75" TELCO**Quantity:** 1**Owner:** COMMUNICATION > Telco**Attachment A Height:** 20' 4"**Wire #4:** COMMUNICATION > 0.75" TELCO**Quantity:** 1**Owner:** COMMUNICATION > Telco**Attachment A Height:** 21' 9"**Wire #5:** COMMUNICATION > 10M-144CT-100PR**Quantity:** 1**Owner:** COMMUNICATION > Telco**Attachment A Height:** 23' 5"**Wire #6:** PRIMARY > 1/0 ACSR (6/1)**Quantity:** 3**Owner:** UTILITY > PEPCO**Attachment A Height:** 36' 7"**Wire #7:** PRIMARY > 477 ACSR (30/7)**Quantity:** 2**Owner:** UTILITY > PEPCO**Attachment A Height:** 41' 5"**Wire #8:** PRIMARY > 477 ACSR (30/7)**Quantity:** 1**Owner:** UTILITY > PEPCO**Attachment A Height:** 41' 11"**Wire #9:** SECONDARY > 4/0 AL QPX SECD**Quantity:** 1**Owner:** UTILITY > PEPCO**Attachment A Height:** 26' 6"

IKEphoto (2 of 5)



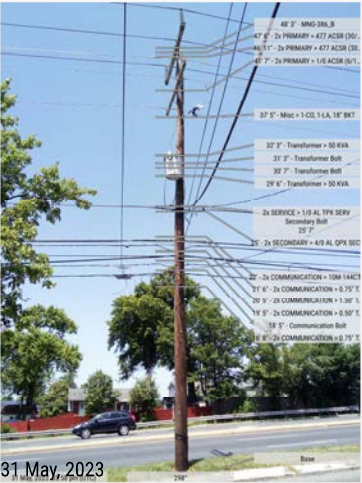
MNG-386_B

NB+C Node Survey 2 (3 of 3)

Pole Sequence Number: 806429-050550 Tip: 48' 3" Circumference ("): 44

Location: (lat: 39.0129, lng: -76.97841, alt: 185' 1") Ready for Crown Castle Upload: No

IKEphoto

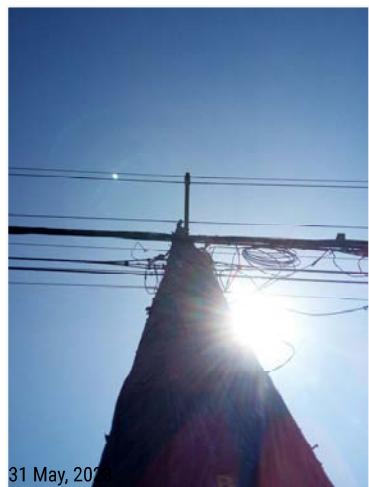


Tag Photos



Directional Photos #1: Directional Photos #1

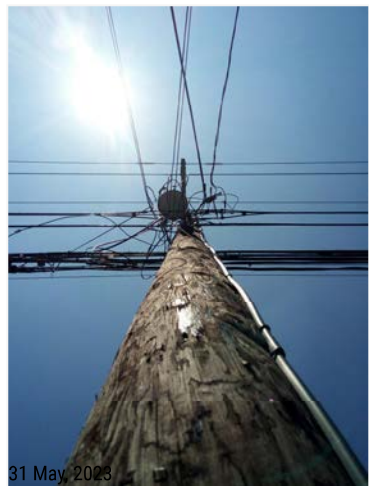
12 o'clock



9 o'clock



6 o'clock



3 o'clock



Equipment #1: Transformer > 50 KVA

Orientation: 138 Owner: UTILITY > PEPCO Attachment Height: 32' 3" Bottom Height: 29' 6"

Equipment #2: Misc > 1-CO, 1-LA, 18" BKT

Orientation: 53 Owner: UTILITY > PEPCO Attachment Height: 37' 5"

Span #1: Fore Span

Span Length: 122' at 194.00°

Wire #1: COMMUNICATION > 0.75" TELCO

Mid Span Height: 16' 9" Quantity: 1 Owner: COMMUNICATION > Telco Attachment A Height: 16' 8"

Wire #2: COMMUNICATION > 0.50" TELCO

Quantity: 1 Owner: COMMUNICATION > Telco Attachment A Height: 19' 5"

Wire #3: COMMUNICATION > 1.50" TELCO

Quantity: 1 Owner: COMMUNICATION > Telco Attachment A Height: 20' 5"

Wire #4: COMMUNICATION > 0.75" TELCO

Quantity: 1 Owner: COMMUNICATION > Telco Attachment A Height: 21' 6"

Wire #5: COMMUNICATION > 10M-144CT-100PR

Quantity: 1 Owner: COMMUNICATION > Telco Attachment A Height: 22'

Wire #6: SECONDARY > 4/0 AL QPX SECD

Quantity: 1 Owner: UTILITY > PEPCO Attachment A Height: 25'

Wire #7: PRIMARY > 1/0 ACSR (6/1)

Quantity: 3 Owner: UTILITY > PEPCO Attachment A Height: 41' 7"

Wire #8: PRIMARY > 477 ACSR (30/7)

Quantity: 2 Owner: UTILITY > PEPCO Attachment A Height: 46' 11"

Wire #9: PRIMARY > 477 ACSR (30/7)

Quantity: 1

Owner: UTILITY > PEPCO

Attachment A Height: 47' 6"

Span #2: Back Span

Span Length: 138' 4" at 12.62°

Wire #1: COMMUNICATION > 0.75" TELCO

Quantity: 1

Owner: COMMUNICATION > Telco

Attachment A Height: 16' 8"

Wire #2: COMMUNICATION > 0.50" TELCO

Quantity: 1

Owner: COMMUNICATION > Telco

Attachment A Height: 19' 5"

Wire #3: COMMUNICATION > 1.50" TELCO

Quantity: 1

Owner: COMMUNICATION > Telco

Attachment A Height: 20' 5"

Wire #4: COMMUNICATION > 0.75" TELCO

Quantity: 1

Owner: COMMUNICATION > Telco

Attachment A Height: 21' 6"

Wire #5: COMMUNICATION > 10M-144CT-100PR

Quantity: 1

Owner: COMMUNICATION > Telco

Attachment A Height: 22'

Wire #6: SECONDARY > 4/0 AL QPX SECD

Quantity: 1

Owner: UTILITY > PEPCO

Attachment A Height: 25'

Wire #7: PRIMARY > 1/0 ACSR (6/1)

Quantity: 3

Owner: UTILITY > PEPCO

Attachment A Height: 41' 7"

Wire #8: PRIMARY > 477 ACSR (30/7)

Quantity: 2

Owner: UTILITY > PEPCO

Attachment A Height: 46' 11"

Wire #9: PRIMARY > 477 ACSR (30/7)

Quantity: 1

Owner: UTILITY > PEPCO

Attachment A Height: 47' 6"

Span #3: Building

Span Length: 65' at 96.00°

Wire #1: SERVICE > 1/0 AL TPX SERV

Quantity: 1

Owner: UTILITY > PEPCO

Attachment A Height: 25' 7"

Span #4: Building

Span Length: 68' at 115.00°

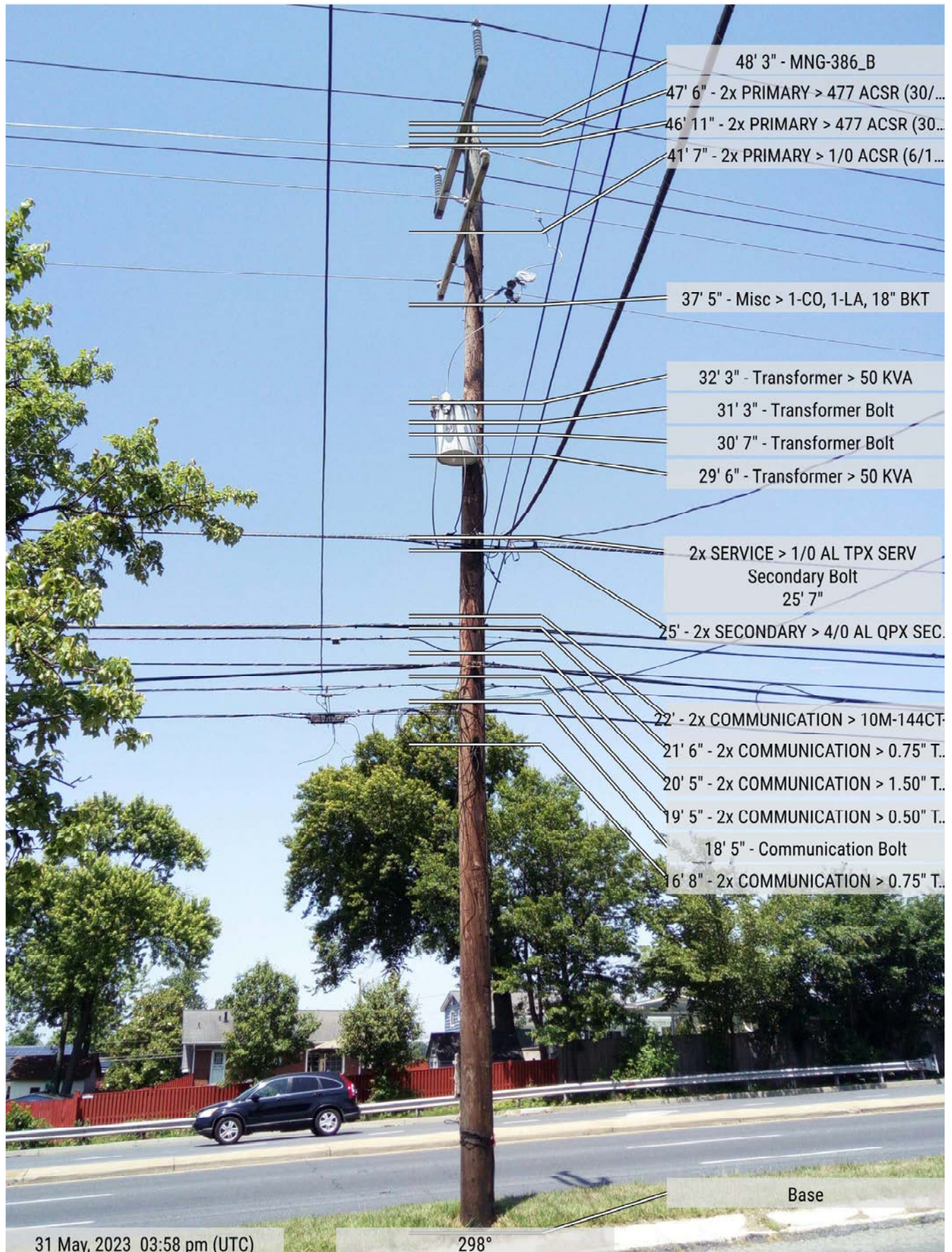
Wire #1: SERVICE > 1/0 AL TPX SERV

Quantity: 1

Owner: UTILITY > PEPCO

Attachment A Height: 25' 7"

IKEphoto (3 of 5)



ATLANTIC CITY ELECTRIC (ACE), DELMARVA POWER & LIGHT (DPL), and
POTOMAC ELECTRIC POWER (PEPCO)

STANDARD AGREEMENT Notice to Proceed (NTP)

Notice to Proceed (NTP) expires 6 months from issue Date

Issue Date: 4/26/2024

Approval Date: 5/1/2024

[(CHECK ONE)]Licensor		
☐ ATLANTIC CITY ELECTRIC ☐ DELMARVA POWER & LIGHT ☒ POTOMAC ELECTRIC POWER COMPANY		
LICENSEE NAME: CROWN CASTLE	SITE ID: MNG-386	LOCATION: Click here to enter text.
In regards to the site referenced above PHI give (Licensee) <u>CROWN CASTLE</u> Notice to proceed with the (Installation/Upgrade) of this site with the conditions outlines below.		
SCOPE OF WORK (SOW)		
PHI WORK REQUEST: 18688036	PHI APPROVED CONTRACTOR IF APPLICABLE:	
DESCRIPTION OF SOW: Specific node plan drawings are attached hereto and incorporated into this NTP by reference. Installation of the equipment set forth in these drawings is being permitted in this NTP.		
CONDITIONS:		
UTILITY POLE NUMBER: 806429-080690.	☐ This pole does not support any primary Circuits and an outage is NOT necessary to complete this work safely. ☐ All above ground work within the "power space" must be done by PHI or PHI approved contractor.	
This NTP must be presented to PHI field representative in order for work to commence. Each request installation workday may require confirmation and coordination at least 24 hours in advance with PHI field representative. Prior to Licensee installation, Licensee must obtain approval from local municipality /permitting entity to install wireless and/or strand mount equipment to any Pepco owned pole. All third-party make ready conditions must be met prior to Licensee's installation. A PHI representative must be present on site when the work is being performed. Licensee and its contractors must adhere to PHI construction protocol; Joint Use Department, Transmission Construction and Project Management PHI Standards Guidelines No. 1722 Rev D, PHI's Safety Manual.		
POST INSPECTION		
Upon completion of Installation/Upgrade work, please contact the Joint Use Project Coordinator to schedule a Post Construction Inspection. Failing Post Construction inspection locations will not have a meter placed until any and all deficiencies are corrected.		
LICENSEE SIGNATURE		
By Signing below Licensee authorized representative hereby acknowledges receipt of the documents listed herein. Name: <u>Ryan Fitzgerald</u> Date: <u>4.30.24</u>		

NODE:
MNG-386 (474995)

ENGINEER

NB+C

TOTALLY COMMITTED.

NB+C ENGINEERING SERVICES, LLC.
ONE MANAGEMENT PLAZA, SUITE 200
CHICAGO, ILLINOIS 60601
(312) 774-3000

TITLE: MNG-386

9509 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903

JURISDICTION: MONTGOMERY COUNTY

LATITUDE: 39.013263
LONGITUDE: -76.978298



TRENT TRAVIS SNARR, P.E.
MARYLAND PROFESSIONAL ENGINEER
LICENSE #55291

REVISIONS			
REV	DATE	DESCRIPTION	BY
1	09-16-23	IME UPDATE REVISION	JED
0	08-25-22	FINAL CD#	SDR
A	07-29-22	PRELIMINARY CD#	PEM

DRAWN BY:	CHECKED BY:	APPROVED BY:
PEM	SDR	TJA

PROJECT NUMBER:	100505
FILE NAME:	STRAND MOUNT DWG

GN-1

1. THE CONTRACTOR SHALL OBEY ALL ORDINANCES, LAWS, CITY ORDINANCES, LOCAL, STATE AND FEDERAL REGULATIONS AND LAWS, AND ALL ORDERS OF ANY PUBLIC AUTHORITY, LOCAL AND STATE COMPANY SPECIFICATIONS, AND ALL APPLICABLE CODES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE WORKS THE CORNER PERFORMANCE ON THE PROJECT AND THE MATERIALS SUPPLY PERFORMANCE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES.
2. THE ARCHITECT/ENGINEER HAS MADE EVERY EFFORT TO SET FORTH IN THE CONSTRUCTION AND CONTRACT DOCUMENTS THE INTENT OF THE DESIGN. THE ARCHITECT/ENGINEER HAS CAUTIONED THAT THE JOB IS NEVERTHELESS THE DRAWINGS AND SPECIFICATIONS SHALL NOT EXCLUDE THE CONTRACTOR FROM OBTAINING THE BEST QUALITY OF THE WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE WORKS THE CORNER PERFORMANCE ON THE PROJECT AND THE MATERIALS SUPPLY PERFORMANCE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES.

1. GROUNDING SHALL COMPLY WITH ARTICLE 250 OF THE NATIONAL ELECTRICAL CODE.
2. ALL GROUNDING DEVICES SHALL BE U.L. APPROVED OR LISTED FOR THEIR INTENDED USE.
3. ALL WIRES SHALL BE AWG THRU/THIN COPPER UNLESS NOTED OTHERWISE.
4. GROUNDING CONNECTIONS TO GROUND RODS, GROUND RING, WIRE AND POLE BASE, SHALL BE EXOTHERMIC "CROWFOOT" UNLESS NOTED OTHERWISE. CLEAN ALL SURFACES TO BE WELDED. GROUNDING CABLES CANNELLED TO GALVANIZED SURFACES, SPRAY CANNELLED WITH GALVANIZING PAINT.
5. GROUNDING CONNECTIONS TO GROUND BARS ARE TO BE TWO-HOLE BRASS MECHANICAL CONNECTIONS WITH

- I.E. MAST PIPES, OUTDOOR ENCLOSURES, SHROUGS, BUSS BAR HOME RUN TO EARTH GROUND. ALL EQUIPMENT HAS #6 TO BUSS BARS.

ALL EQUIPMENT THAT IS INSTALLED AND MAY CAUSE ANY KIND OF ELECTRICAL CHARGE OR BUILD UP MUST HAVE PROPER AND ADEQUATE GROUNDING IN PLACE TO PREVENT FROM EQUIPMENT DAMAGE AND SHOCK HAZARDS.

- [illegible]

IF IT HAS A PLACE FOR A GROUND - GROUND IT.

- ALL WAST PIPES SHOULD BE GROUNDED WITH AN IRON ROD.** THE WASTE PIPE GROUND IS ATTACHED TO THE MAIN ELECTRICAL GROUNDING OVER THE BART METAL TO PREVENT RUST. THE GROUND CAN BE ATTACHED MECHANICALLY OR AN EXOTHERMIC WELD (COLD WELD) MAY BE USED. IF THE MOST EFFECTIVE METHOD OF GROUNDING YOUR WASTE PIPE SHOULD HAVE A LEAKED ROD ATTACHED TO IT AS WELL.
- RELAY BOX, JUMP BOXES, SPLITTERS/PASSIVE COMPONENTS**
- IF IT HAS A PLACE FOR A GROUND TO BE INSTALLED - INSTALL IT.
- ANY STRUCTURE OR FRAME SHOULD HAVE #2 GROUND WIRE. ALL WAST PIPES OUTDOOR ENCLOSURES SHOULD BE BUSSED TO EACH OTHER AND TO EARTH GROUND. ALL EQUIPMENT HAS TO BE BUSSED.

PIPE IS THE TALLEST POINT ON A BUILDING IT SHOULD ALSO HAVE A LIGHTNING ROD ATTACHED TO IT AS WELL.

- IF IT HAS A PLACE FOR A GROUND TO BE INSTALLED -
INSTALL IT.

INSTALL IT.
ANY STRUCTURE OR FRAME SHOULD HAVE #2 GROUND WIRE.

- BAR HOME RUN TO EARTH GROUND. ALL EQUIPMENT HAS #8 TO BUSS BARS.

DPS BATCH STAMP

DPS BATCH STAMP

But,

1. USE WARP ALL CONNECTIONS WITH BLACK ELASTIC TAPE TO COVER ALL METAL SURFACES TO PREVENT CORROSION.
2. REMOVE ALL EXCESSIVE WATER FROM THE SURFACES TO BE WELDED.
3. WELD ALL JOINTS WITH 2 INCH WIRE AND BE SURE TO PROTECT SURFACES FROM OVERHEATING.
4. TWO LAYERS TO FORM A CONE LAST SHAPED TO PROTECT SURFACES TO BE WELDED.
5. BUILT WILL LAST OVER TIME.
6. CAN CUT WITH A HOT WIRE CUTTER.
7. SHOULD BE CHILLED FIRST TO MAKE THE CUTTING EASIER.
8. TOGETHER WITH FIRST CUT TO HOLD SURFACES TOGETHER.
9. CAN BE USED TO HOLD SURFACES TOGETHER AT LEAST ONE OF EACH LAYER OF THE PROSE.
10. UPON COMPLETION OF 1 LAYERS OF 2 INCH WIRE, THE SURFACES WILL BE ALIGNED TOGETHER AND CAN BE WELDED TOGETHER.
11. CAN BE WELDED TOGETHER TO HOLD SURFACES TOGETHER.
12. WILL PREVENT ANY SURFACES FROM MOVING ON THE LAYERS.
13. OVERLAP THE LAST WIRE SO THE PRODUCE LAYERS.
14. ALWAYS FINISH THE LAST WIRE OF EACH CONE UP TO THE SURFACES TO BE WELDED.
15. CAN BE USED TO HOLD SURFACES TOGETHER AND TO PROTECT SURFACES FROM OVERHEATING.
16. THE SURFACES WILL BE ALIGNED TOGETHER AND CAN BE WELDED TOGETHER.
17. WILL PREVENT ANY SURFACES FROM MOVING ON THE LAYERS.
18. OVERLAP THE LAST WIRE SO THE PRODUCE LAYERS.

1. CHECK TO MAKE SURE ALL CONNECTORS ARE TORQUED TO PROPER SPECIFICATIONS BEFORE YOU BEGIN.

3. WRAP CONNECTIONS USING TAPE. SEALANT WITH TWO PARTS MUST BE USED TO SEAL THE CONNECTION. BECAUSE THE TAPE DOES NOT ACTUALLY ADHERE, THE CONNECTOR ITSELF BUT RINGS ARE KNOWN AS SELF-ALIGNING TAPE.
4. IF THE TAPE IS NOT APPLIED TO THE BEARING, THE CONNECTOR MUST BE REMOVED. THERE MUST BE A MINIMUM OF 1/2" OF TAPE ON EACH SIDE OF THE CONNECTION.
5. TAPE MUST COVER AT LEAST 50% OF PREVIOUS TAPE. WRAP AT LEAST 2 LAYERS OF 3/4" INCH TAPE. EACH LAYER SHOULD COVER AT LEAST 50% OF PREVIOUS TAPE. ALWAYS FINISH THE LAST WARP OF TAPE GOING UP TO CREATE A SHINGLING OF THE TAPE. SO IN THE WEATHER THE TAPE DOES NOT GET LIFTED OFF THE TAPE AND LAY IT DOWN THE FINISH. DO NOT STRETCH THE END OF THE TAPE AND CREATE A FLAGGING EFFECT.

1. PRE-WRAP ALL CONNECTIONS WITH BLACK ELECTRICAL TAPE TO COVER ALL METAL SHOWING TO PREVENT DAMAGE TO CONNECTOR WHEN WEATHER SEAL IS TO BE

- USE ONLY OUTDOOR RATED HEAT SHRINK THAT HAS THE SELF-ADHESIVE WHEN HEATED PROPERLY. THIS IS WHAT WILL CREATE THE SEAL TO THE CONNECTOR.
- MAKE SURE HEAT SHRINK COVERS ALL OF THE CABLES AND CONNECTIONS. HEAT THE SHRINK TO SHRINK TIGHTLY TO THE CONNECTIONS AND CABLE TO MAKE SURE THE HEAT SHRINK IS SEALED TOP AND BOTTOM OF THE CONNECTIONS. ALSO CHECK TO MAKE SURE HEAT SHRINK WAS NOT OVER HEATED AND THOSE ARE NOT BROKEN IN SEAL THROUGH-OUT THE SHRINK TUBING.

2. APPLY ONE LAYER OF 3/4 INCH BLACK TAPE AROUND ENTIRE CONNECTOR ENDING AT LEAST 1-1/2 INCHES

- ANY MOISTURE FROM STICKING TO THE CONNECTOR.
- INSPECT THE DEVICE TO MAKE SURE IT IS NOT CHARGED OR SHORTED. IF ANY SIGNS OF NEGLIGENCE THAT WILL HARM THE DEVICE, STOP WORK IMMEDIATELY AND REPORT AWAY FROM MAKING A FULL SWEEP AROUND THE CONNECTOR.
- USE ONLY CORRECT SIZE PER CABLE AND CONNECTOR TYPE - I.E. 1/2 INCH FOR 1/2 INCH NOT 3/8TH FOR 1/2 INCH.
- FOLLOW DIRECTIONS THAT COME WITH PRODUCT - MOST CLAMP SHELL TYPE SEALANT DEVICES WRAP AROUND OF CLAMP AROUND A CONNECTION POINT.

GROUNDING AND BONDING NOTE:
GENERAL CONTRACTOR SHALL FOLLOW ALL
CONSTRUCTION GUIDELINES PER CROWN
CASTLE'S GROUNDING AND BONDING
REQUIREMENTS FOR STRAND MOUNT
NODES (oDAS) - DOCUMENT 337910.

CROWN CASTLE FIBER LLC
GENERAL NOTES

MNG-386 (474995)

ENGINEER

NB+C

TOTALLY COMMITTED

NB+C ENGINEERING SERVICES, LLC.
10000 WILSON ROAD, SUITE 100
CLARKSBURG, MD 21714
(301) 746-7600

**CROWN
CASTLE**
CROWN CASTLE FIBER LLC
10960 GRANTCHESTER WAY, 4TH FLOOR
COLUMBIA, MD 21044

TITLE: MNG-386
9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903
JURISDICTION: MONTGOMERY CO
LATITUDE: 39.013263
LONGITUDE: -76.978298



PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A QUALIFIED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND.

ENGINEER OF RECORD

TRENT TRAVIS SNARR, P.E.
MARYLAND PROFESSIONAL ENGINEER
LICENSE #55491

REVIEWS		BY
REV	DATE	DESCRIPTION
1	01-16-23	ME UPDATE REMONSON
0	08-05-22	FINAL CD#
0	07-29-22	PRELIMINARY CD#
A	07-29-22	PEM

DRAWN BY:	CHECKED BY:	APPROVED BY:
PEM	SDR	TJA

PROJECT NUMBER	100505
FILE NAME	STRAND MOUNT DWG
DATE DRAWN	07-29-22
SCALE	AS SHOWN

GN-2

GROUNDING AND BONDING NOTE:
GENERAL CONTRACTOR SHALL FOLLOW ALL
CONSTRUCTION GUIDELINES PER CROWN
CASTLE'S GROUNDING AND BONDING
REQUIREMENTS FOR STRAND MOUNT
NODES (gDAS) - DOCUMENT 337910.

DPS BATCH STAMP

[illegible]

PEPCO GUIDELINES:

[illegible][illegible]

NODE:

MNG-386 (474995)

ENGINEER



OWNER/DEVELOPER



CROWN CASTLE FIBER LLC
10950 GRANTCHESTER WAY, 4TH FLOOR
COLUMBIA, MD 21044

TITLE:

MNG-386

9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903
JURISDICTION: MONTGOMERY COUNTY

LATITUDE: 39.013263
LONGITUDE: -76.978298



PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF CALIFORNIA.

ENGINEER OF RECORD

TRENT TRAVIS SNARR, P.E.
MARYLAND PROFESSIONAL ENGINEER
LICENSE #55491

REVISIONS

REV	DATE	DESCRIPTION	BY
1	04-14-23	REV UPDATES REVISION	JED
0	06-25-22	FINAL CD	SCR
0	07-20-22	REV 00000000	SCR

DRAWN BY:	CHECKED BY:	APPROVED BY:

	PEM	SDR	TJA

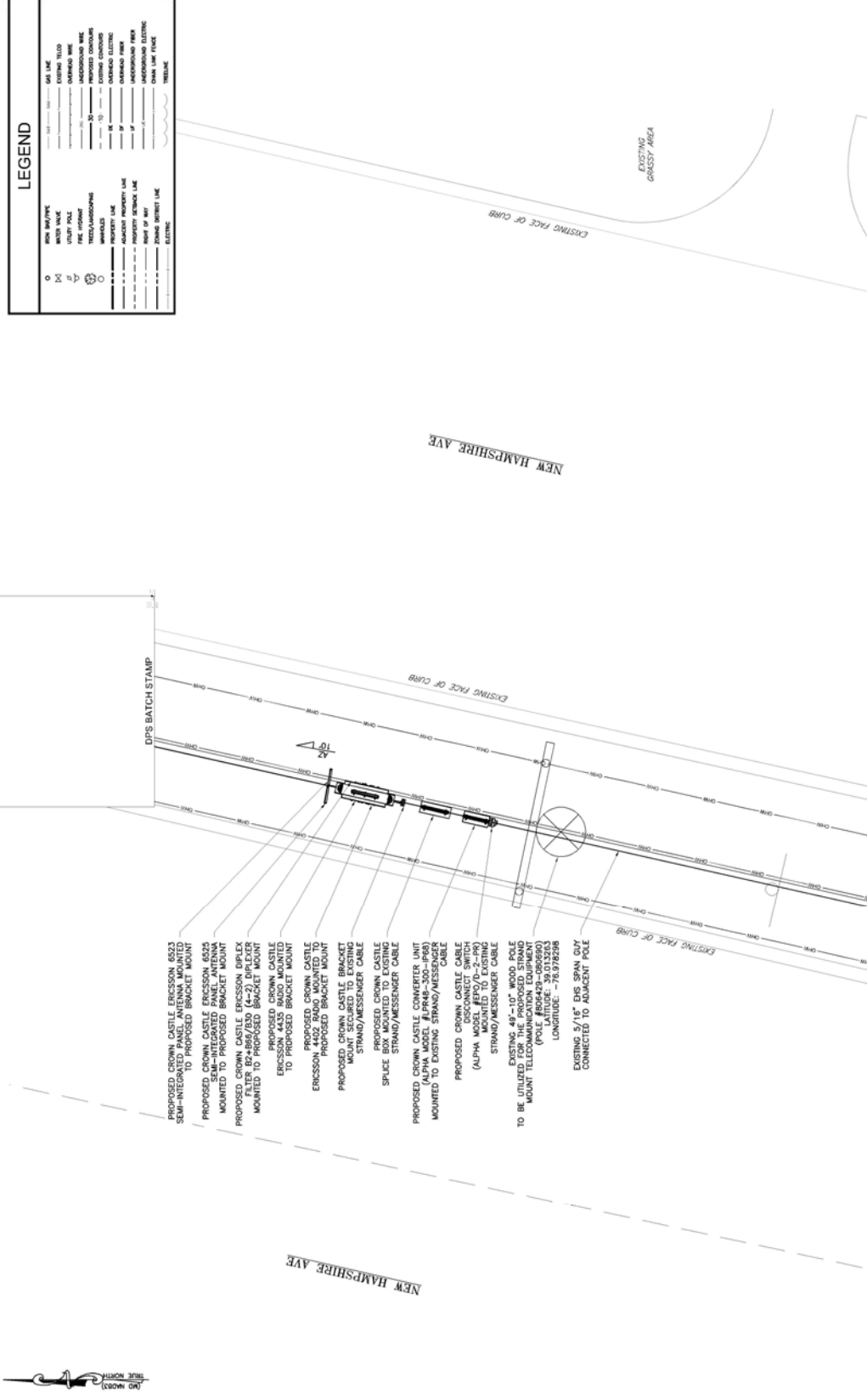
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PROJECT NUMBER	100505
STANDARD MOUNT SLUG	

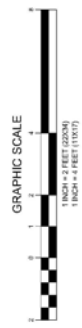
FILE NAME:	STRAND MOUNT DWG
DATE:	07-08-20

DATE DRAWN	07-29-22
DATE	AS SHOWN

C-2



1 EQUIPMENT SITE PLAN
 SCALE: 1" = 2' (22X34)
 C-2 SCALE: 1" = 4' (11X17)



THE CONSTRUCTION MANAGER SHALL COORDINATE POWER AND TELCO UTILITY ROUTING TO THE PROPOSED EQUIPMENT ROOMS TO CONSTRUCTION

NOTE:

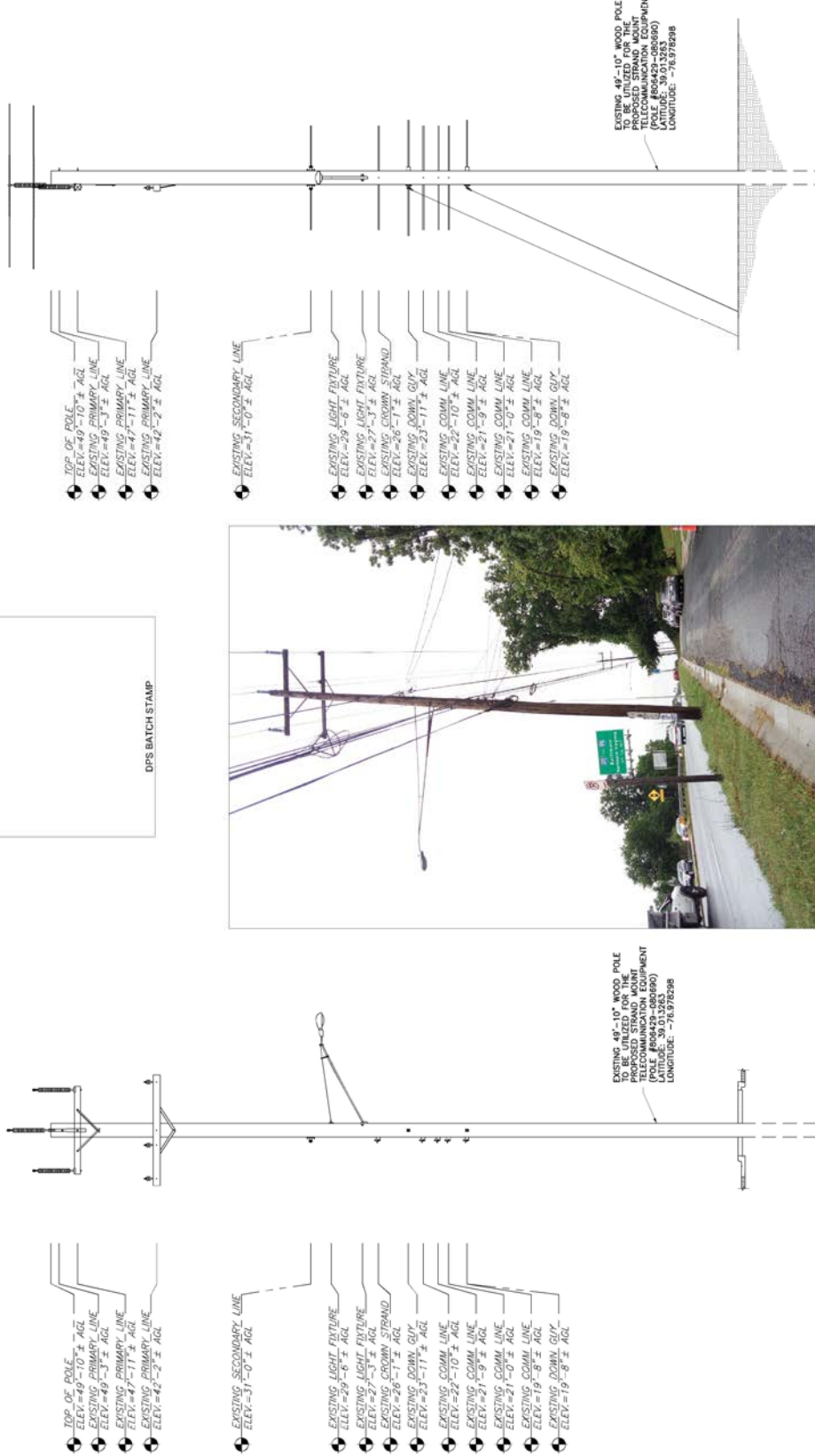
EXISTING UTILITY INFORMATION SHOWN REPRESENTS THE BEST DATA AVAILABLE FROM EXISTING DOCUMENTATION AND FIELD EVIDENCE. ALL LOCATIONS SHOULD BE CONSIDERED APPROXIMATE, AND A FIELD INVESTIGATION MUST BE PERFORMED IN THE VICINITY OF ANY CONSTRUCTION ACTIVITIES. NOTE THAT THESE PLANS MAY NOT SHOW ALL UTILITIES THAT ARE PRESENT AT THE SITE.

**CROWN CASTLE FIBER LLC
EXISTING ELEVATIONS**

NODE:

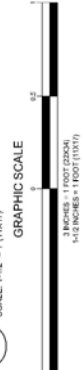
MNG-386 (474995)

DPS BATCH STAMP



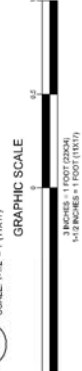
1 EXISTING CONDITIONS
NOT TO SCALE
C-3

2	POLE ELEVATION (LOOKING SOUTHEAST)
C-3	SCALE: 3" = 1' (22X34) SCALE: 1" = 1' (11X17)



MOUNTING NOTE:
IF FIELD CONDITIONS DO NOT ALLOW FOR
INSTALLATION AS DIRECTED, CONTRACTOR IS TO
CONTACT ENGINEER FOR FURTHER INSTRUCTION.

3 POLE ELEVATION (LOOKING EAST)
SCALE: 3" = 1' (22X34)
SCALE: 1-1/2" = 1' (11X17)
C-3



REV		DATE	DESCRIPTION	BY
1		06-16-23	IME UPDATE REVISION	JED
0		06-25-22	FINAL COs	SDR
A		07-28-22	PRELIMINARY COs	PCM

ENGINEER OF RECORD

TRENT TRAVIS SNARR, P.E.
MARYLAND PROFESSIONAL ENGINEER
LICENSE #55491

PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A QUALIFIED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND.

TITLE: MNG-386

9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903

JURISDICTION: MONTGOMERY COUNTY

LATITUDE: 39.013263
LONGITUDE: -76.978298

LOPER:

 **CROWN
CASTLE**

CROWN CASTLE FIBER LLC
10960 GRANTCHESTER WAY, 4TH FLOOR
COLUMBIA, MD 21044

NB+C
TOTALLY COMMITTED.
NB+C ENGINEERING SERVICES, LLC.
1805 WALSHVILLE PARK, SUITE 100
ELMWOOD, MD 20755
(410) 773-4082

**CROWN CASTLE FIBER LLC
PROPOSED ELEVATIONS**

NODE:

MNG-386 (474995)

NB+C
TOTALLY COMMITTED
NB+C ENGINEERING SERVICES, LLC.
1800 WASHINGTON DRIVE, SUITE 300
FARMINGTON, CT 06030
(860) 752-0200

DEVELOPER

 **CROWN
CASTLE**

CROWN CASTLE FIBER LLC
10950 GRANTCHESTER WAY, 4TH FLOOR
COLUMBIA, MD 21044

TITLE: MNG-386

9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903

JURISDICTION: MONTGOMERY COUNTY

LATITUDE: 39.013263
LONGITUDE: -76.978298



PROFESSIONAL CERTIFICATION, I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER IN THE STATE OF MARYLAND.

ENGINEER OF RECORD

TRENT TRAVIS SNARR, P.E.
MARYLAND PROFESSIONAL ENGINEER
LICENSE #55491

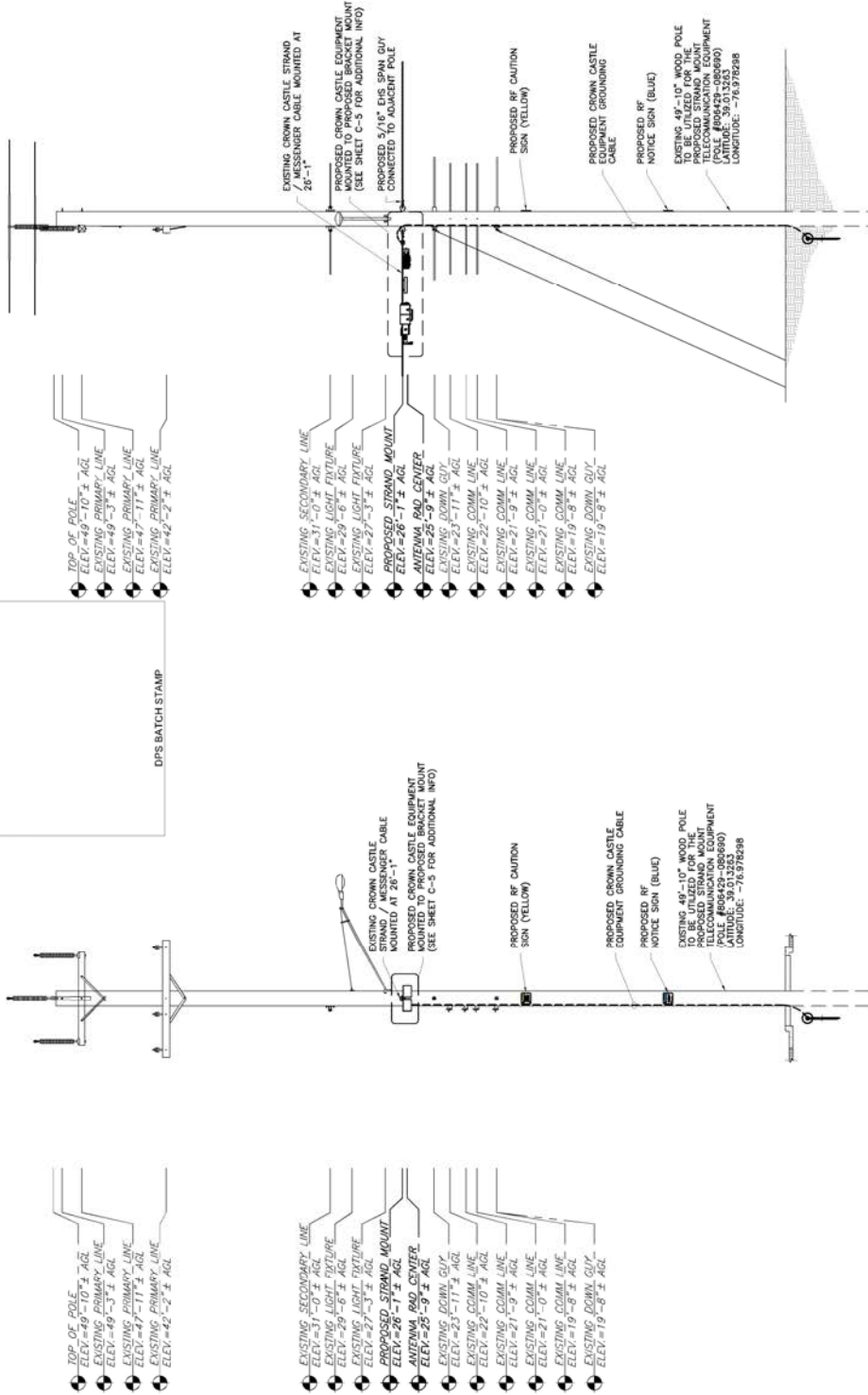
REVISIONS		
REV.	DATE	DESCRIPTION BY

1	06-18-23	IRK UPDATE REVISION	JED
0	08-25-22	FINAL CDs	SCR
A	07-29-22	PRELIMINARY CDs	PEM

DRAWN BY:	CHECKED BY:	APPROVED BY:
PEM	SDR	TJA

PROJECT NUMBER:	100505
FILE NAME	STRAND MOUNT DWG
DATE DRAWING	07-29-22
SCALE	AS SHOWN

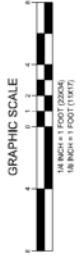
C-4



2 POLE ELEVATION (LOOKING EAST)

POLE ELEVATION

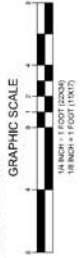
SCALE: 1/8" = 1' (11X17)



1 POLE ELEVATION (LOOKING SOUTHEAST)

POLE ELEVATION

4
SCALE: 1/8" = 1' (11X17)



MOUNTING NOTE:

IF FIELD CONDITIONS DO NOT ALLOW FOR
INSTALLATION AS DIRECTED, CONTRACTOR IS TO

NODE:

ENGINEER

CROWN
CASTLE

CROWN CASTLE FIBER LLC
10950 GRANTCHESTER WAY, 4TH FLOOR
COLUMBIA, MD 21044

MNG-386

9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903
JURISDICTION: MONTGOMERY COUNTY

LATITUDE: 39.013263
LONGITUDE: -76.978298



THIS DOCUMENT CONTAINS INFORMATION CONCERNING THE NATIONAL DEFENSE SCIENCE AND ENGINEERING AGENCY (NDEA) AND THE NATIONAL DEFENSE ACADEMY (NDA). IT IS THE POLICY OF THE NATIONAL DEFENSE ACADEMY TO MAKE AVAILABLE TO THE PUBLIC THE INFORMATION CONTAINED HEREIN IN ORDER TO PROMOTE THE UNDERSTANDING OF THE NATIONAL DEFENSE ACADEMY'S RESEARCH AND DEVELOPMENT ACTIVITIES AND TO PROMOTE THE UNDERSTANDING OF THE NATIONAL DEFENSE ACADEMY'S CONTRIBUTIONS TO THE NATIONAL DEFENSE. IT IS THE POLICY OF THE NATIONAL DEFENSE ACADEMY TO MAKE AVAILABLE TO THE PUBLIC THE INFORMATION CONTAINED HEREIN IN ORDER TO PROMOTE THE UNDERSTANDING OF THE NATIONAL DEFENSE ACADEMY'S RESEARCH AND DEVELOPMENT ACTIVITIES AND TO PROMOTE THE UNDERSTANDING OF THE NATIONAL DEFENSE ACADEMY'S CONTRIBUTIONS TO THE NATIONAL DEFENSE.

ENGINEER OF RECORD

TRENT TRAVIS SNARR, P.E.
MARYLAND PROFESSIONAL ENGINEER
LICENSE #552491

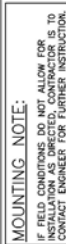
REVISIONS		
REV	DATE	DESCRIPTION
BY		

1	04-14-23	IME UPDATE REVISION	JED
0	06-25-22	FINAL CDs	SJR
A	07-28-22	PRELIMINARY CDs	PEM

DATE IN:	CHECKED BY:	APPROVED BY:
DEM	COB	TIA

PROJECT NUMBER	100505
FILE NAME	STRAND MOUNT DWG
DATE DRAWN	07-29-22
SCALE	AS SHOWN

C-5



1 CARRIER ELEVATION

CROWN CASTLE FIBER LLC
PLUMBING DIAGRAM

NOTE:

MNG-386 (474995)

ENGINEER



OWNER/DEVELOPER



TITLE

MNG-386
9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903
JURISDICTION: MONTGOMERY COUNTY
LATITUDE: 39.013263
LONGITUDE: -76.876298



ENGINEER OF RECORD

TRENT TRAVIS SMARR, P.E.
MARYLAND PROFESSIONAL ENGINEER
LICENSE #55491

REVISIONS

REV	DATE	DESCRIPTION	BY
1	06-16-23	PRELIMINARY CD	JED
2	07-28-22	PRELIMINARY CD	JED
3	07-28-22	PRELIMINARY CD	JED
4	07-28-22	PRELIMINARY CD	JED
5	07-28-22	PRELIMINARY CD	JED
6	07-28-22	PRELIMINARY CD	JED
7	07-28-22	PRELIMINARY CD	JED
8	07-28-22	PRELIMINARY CD	JED
9	07-28-22	PRELIMINARY CD	JED
10	07-28-22	PRELIMINARY CD	JED

DESIGNED BY:	PEM	SDR	TJA
CHECKED BY:			

PROJECT NUMBER	100505
FILE NAME	STRAND MOUNT DWG
DATE DRAWN	07-29-22
SCALE	AS SHOWN

D-1

SHEET

04/19/2022

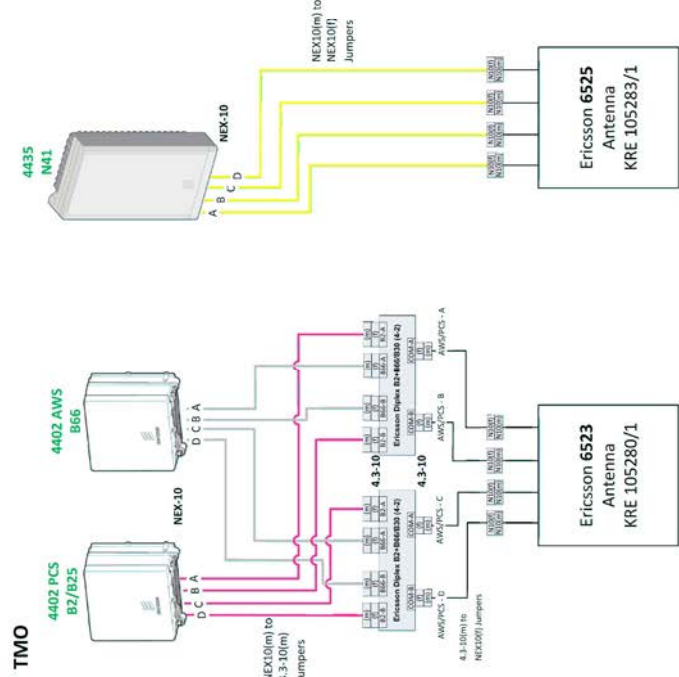
Maryland/DC/Virginia

For TMO only Strand Nodes

DPS BATCH STAMP



TMO



Proprietary and Confidential

CROWN CASTLE FIBER LLC
POWER CONVERTER & DISCONNECT ASSEMBLY DETAILS

NOTE: MNG-386 (474995)

ENGINEER



OWNER/DEVELOPER



TITLE

MNG-386
9509 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903
JURISDICTION: MONTGOMERY COUNTY
LATITUDE: 39.013263
LONGITUDE: -76.976298



ENGINEER OF RECORD

TRENT TRAVIS SMARR, P.E.
MARYLAND PROFESSIONAL ENGINEER
LICENSE #55491

REVISIONS

REV	DATE	DESCRIPTION	BY
1	08-16-23	REVISE PER DESIGN	JED
2	08-16-23	REVISE PER DESIGN	JED
3	08-16-23	REVISE PER DESIGN	JED
4	08-16-23	REVISE PER DESIGN	JED
5	08-16-23	REVISE PER DESIGN	JED
6	08-16-23	REVISE PER DESIGN	JED
7	08-16-23	REVISE PER DESIGN	JED
8	08-16-23	REVISE PER DESIGN	JED
9	08-16-23	REVISE PER DESIGN	JED
10	08-16-23	REVISE PER DESIGN	JED
11	08-16-23	REVISE PER DESIGN	JED
12	08-16-23	REVISE PER DESIGN	JED
13	08-16-23	REVISE PER DESIGN	JED

APPROVED BY: JED

DATE: 08-16-23

PROJECT NUMBER: 1005005

FILE NAME: STRAND MOUNT DWG

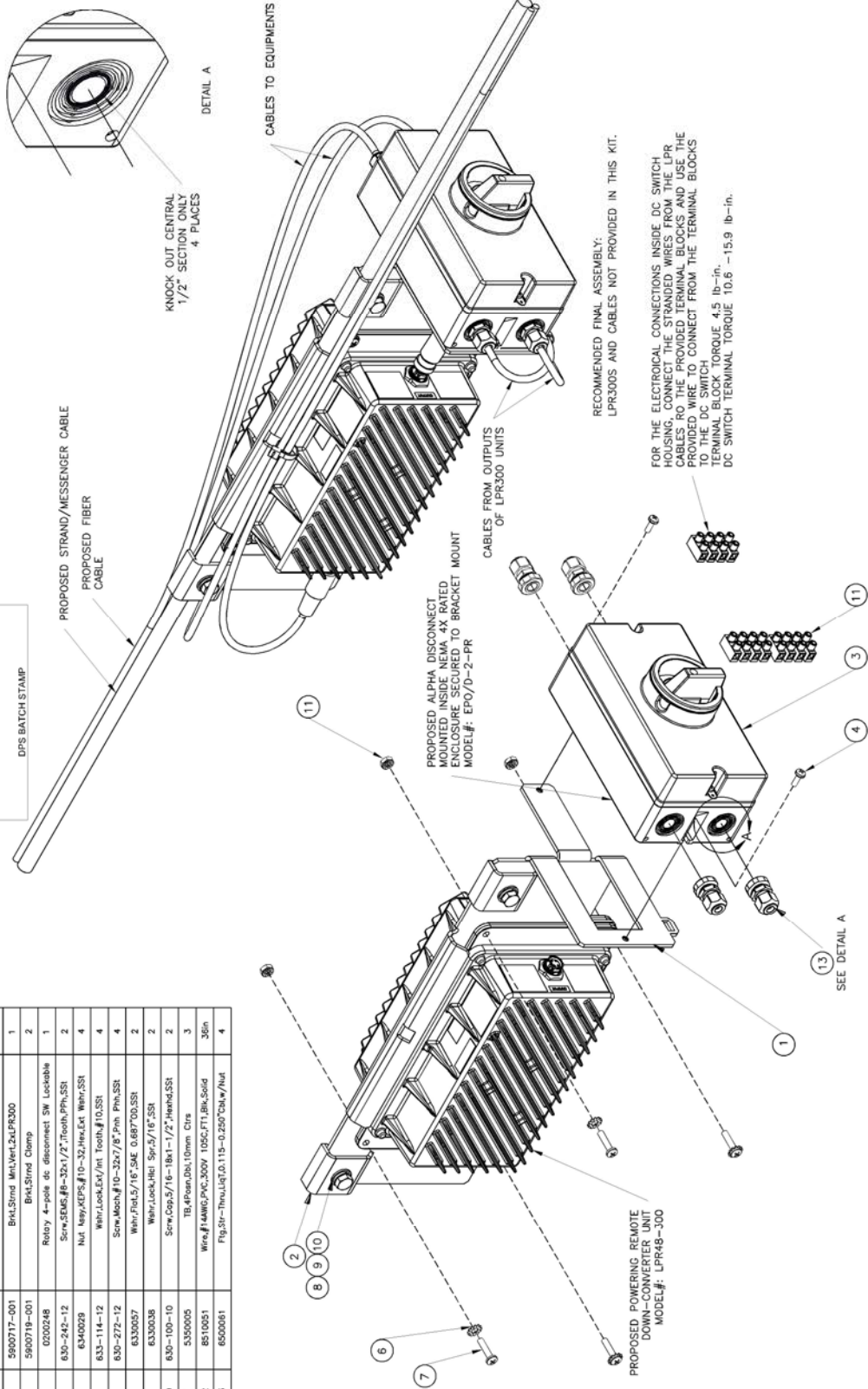
DATE DRAWN: 07-29-22

SCALE: AS SHOWN

PROJECT: D-3

KIT CONTENTS

ITEM	PART NUMBER	Description	QTY.
1	5900717-001	BktStrnd MtVertZxLPR3000	1
2	5900719-001	BktStrnd Clamp	2
3	0200248	Relay 4-pole dc disconnect SW Lockable	1
4	630-242-12	ScrewSx6-#8-2x1/2" Tooth PPH, SS1	2
5	6340029	Nut NnyxXEPS, #10-32, Hex Ext Wht, SS1	4
6	633-114-12	Wht, Lock, Ex/Int Tooth, #10, SS1	4
7	630-272-12	Screw, Mach, #10-32x2/8" Pph, Pph, SS1	4
8	6330057	Wht, Pht, 5/16" SAE, 0.687" OD, SS1	2
9	6330038	Wht, Lock, Hel Spr, 5/16" SS1	2
10	630-100-10	Screw, Cop, 5/16-18x1-1/2", Hex Hd, SS1	2
11	5350005	TB, 4 Pole, Dbl, 10mm Cts	3
12	6510051	Wire, #14 AWG, PVC, 300V, 105C, FT, Lbk, Solid	36in
13	6500061	Fig, Str-Thru, Lq, 0.115-0.250" Dia, W/Nut	4



1 POWER CONVERTER & DISCONNECT ASSEMBLY DETAILS

13

D-3

CROWN CASTLE FIBER LLC
GROUNDING DETAILS

NOTE:

MNG-386 (474995)

ENGINEER



OWNER/DEVELOPER



TITLE

MNG-386
9509 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903
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REVISIONS

REV	DATE	DESCRIPTION	BY
1	08-16-23	ISSUE FOR PERMIT	JED
2	08-16-23	REVISE PERMIT REQUIREMENTS	JED
3	08-16-23	REVISE PERMIT REQUIREMENTS	JED
4	07-28-22	PRELIMINARY CD	PEM

DESIGNED BY:	PEM	SDR	TJA
CHECKED BY:			

PROJECT NUMBER: 1005005

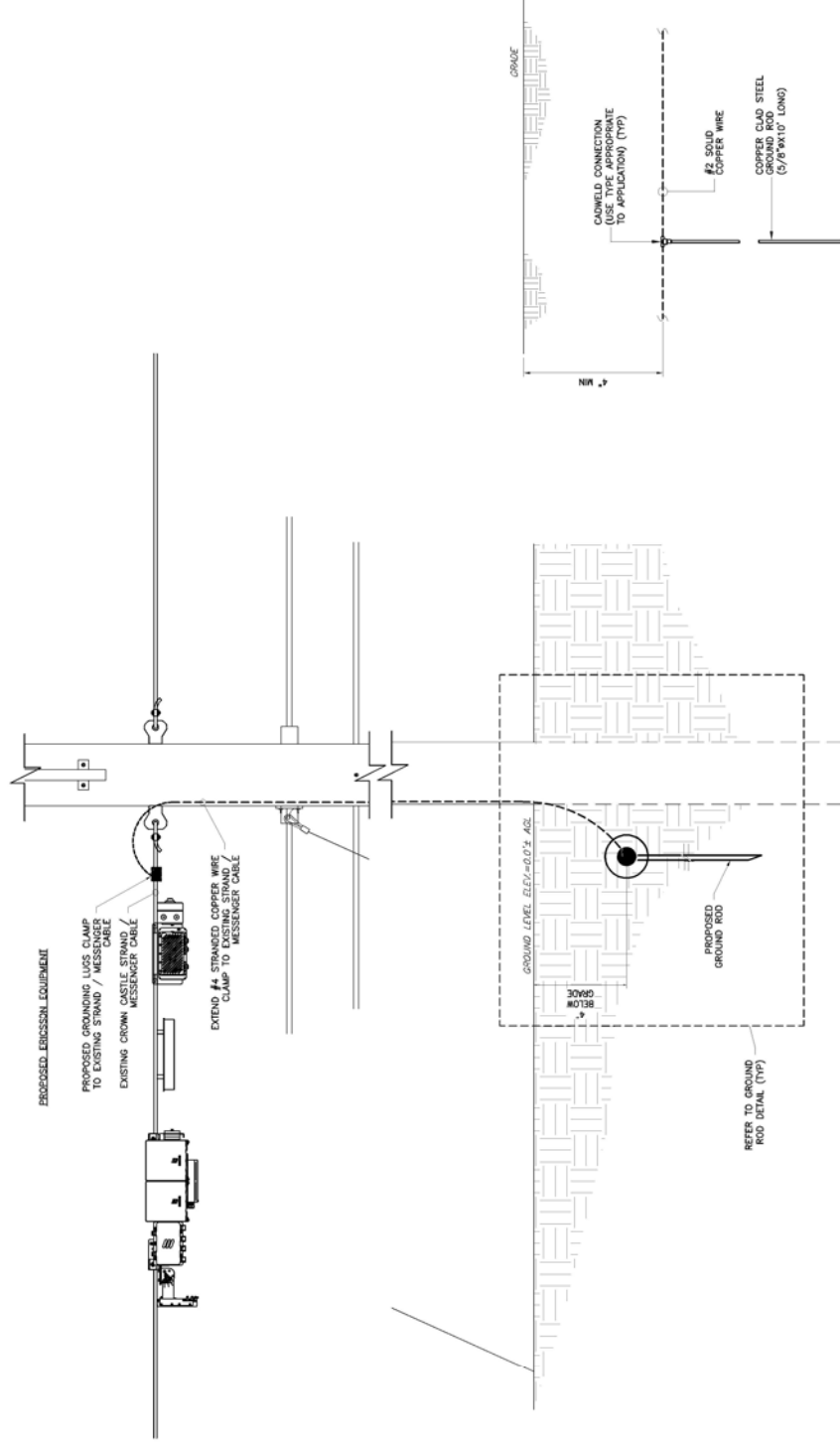
FILE NAME: STRAND MOUNT DWG

DATE DRAWN: 07-29-22

SCALE: AS SHOWN

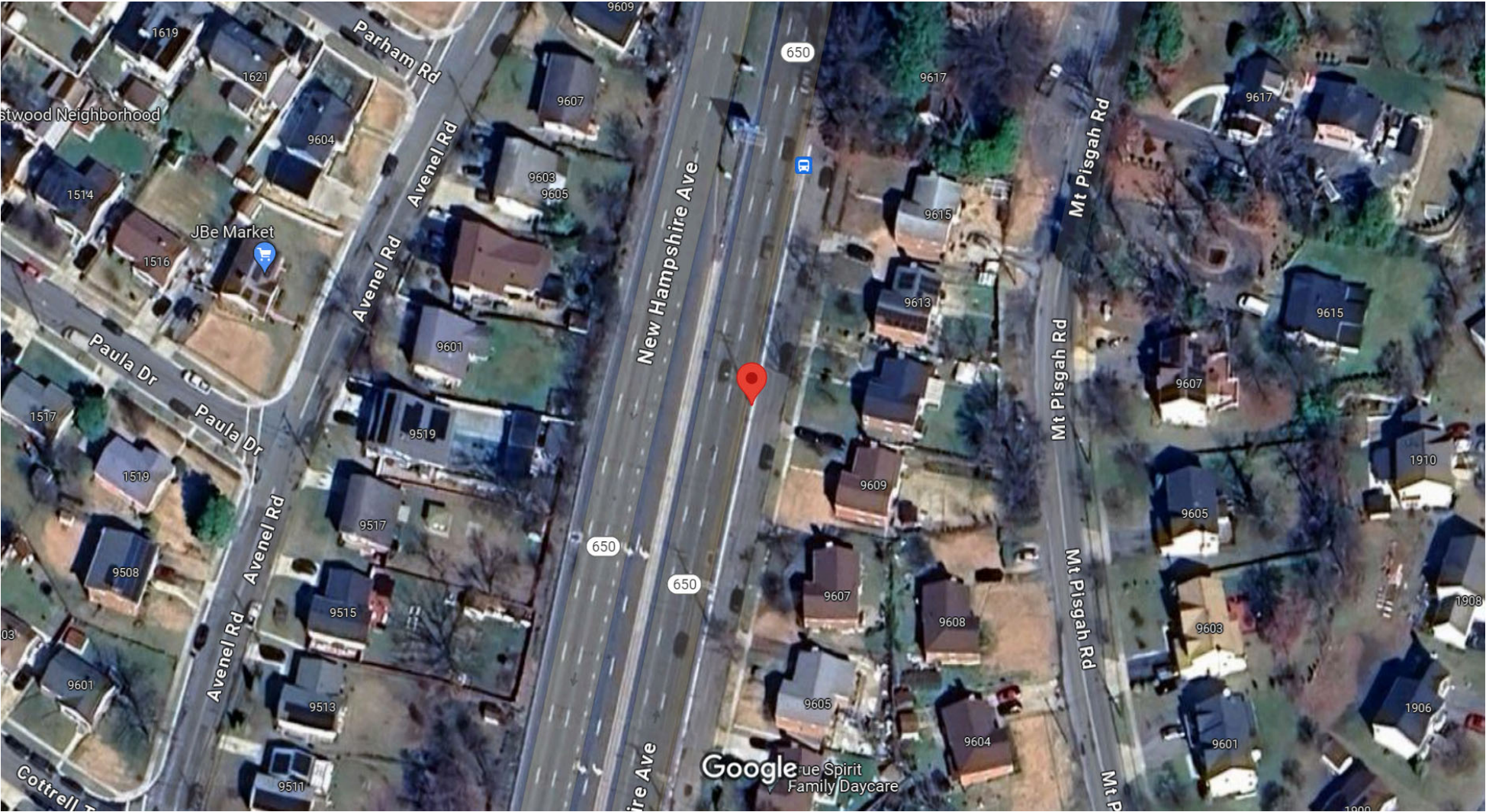
SHEET:

G-1



1 GROUNDING RISER DIAGRAM
G-1 NOT TO SCALE

2 TYPICAL GROUND ROD DETAIL
G-1 NTS





ANTENNA 6523

Integrated Directional Antenna 6523

The modular Micro Radio 4402 supports installations with an integrated directional antenna or external antenna systems.

Antenna 6523 is the integrated directional antenna for Radio 4402 for the 3GPP Band B1, B2/B25, B3 and B66A for Licensed Assisted Access usage and is mounted on the front of Radio 4402 and when used replaces the cover.

The antenna pattern, with a broad horizontal beam, is beneficial for small cell coverage. The fixed electrical tilt is -8 degrees. An optional mechanical down tilt bracket is also available.

Antenna 6523 is designed for optimal performance in all Radio 4402 configurations and integrated for very low visual impact in urban installations.

Micro Radio 4402

The Micro Radio 4402 is part of the Ericsson Radio System portfolio. Radio 4402 has best in class design, superior radio performance and power efficiency when it comes to medium range 3GPP radio products.

Radio 4402 has, by use of its small and smart dimensions, support for a wide range of mounting scenarios and has a pioneering flexibility within its product segment. With the Radio 4402, Ericsson evolves the micro radio portfolio to become even more flexible thus making it easier than ever to make small and efficient single and multi-band micro radio installations.



Antenna 6525

Integrated Directional Antenna 6525

The modular Micro Radio 4402 and Radio 4408 support installations with an integrated directional antenna or external antenna systems.

Antenna 6525 is the integrated directional antenna for Radio 4402 and Radio 4408 for the 3GPP Bands B7 B38A B40 B41 (2300 – 2690 MHz) and is mounted on the front of Radio 4402 and Radio 4408 and when used replaces the cover.

The antenna pattern, with a broad horizontal beam, is beneficial for small cell coverage. The fixed electrical tilt is -8 degrees. An optional mechanical down tilt bracket is also available.

Antenna 6525 is designed for optimal performance in all Radio 4402 and Radio 4408 configurations and integrated for very low visual impact in urban installations.

Micro Radio 4402/Micro Radio 4408

The Micro Radio 4402/4408 is part of the Ericsson Radio System portfolio. Radio 4402/4408 has best in class design, superior radio performance and power efficiency when it comes to medium range 3GPP radio products.

Radio 4402/4408 has, by use of its small and smart dimensions, support for a wide range of mounting scenarios and has a pioneering flexibility within its product segment. With the Radio 4402/4408, Ericsson evolves the micro radio portfolio to become even more flexible thus making it easier than ever to make small and efficient single and multi-band micro radio installations.

Technical Specification Antenna 6525

PRODUCT NUMBER KRE 105283/1

3GPP Band: B7 B38A B40 B41

Frequency range: 2300 – 2690 MHz

Average gain: 9 dBi

Horizontal pattern

Beam width, 3 dB (0dBi) : 82° (120°)

Beam tracking error $\pm 60^\circ$: ≤ 3 dB

Beam pointing error 0° : $\leq 5^\circ$

Vertical pattern

Beam width, 3 dB: 43°

Fixed electrical down-tilt: 8°

Front-to-back $180 \pm 30^\circ$: > 20 dB

VSWR (Return loss): < 1.5 (> 14 dB)

Isolation > 20 dB

Cross Polarization Ratio > 15 dB(at boresight), > 10 dB(at sector)

Antenna pattern files: Contact local Ericsson sales representative

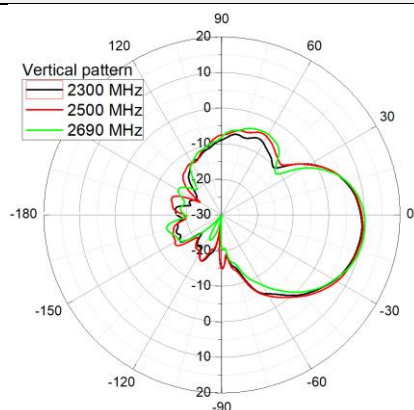
Mechanical specification

Main Dimensions, WxDxH: 200mm x 25mm x 200 mm

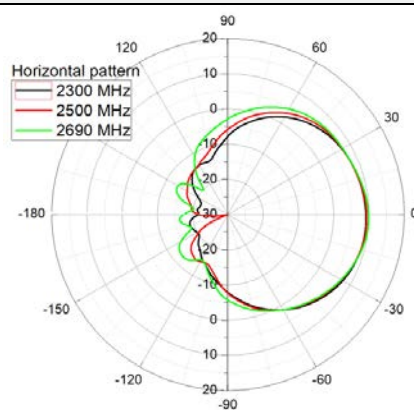
Weight: 800 g

Volume: 1,0 l

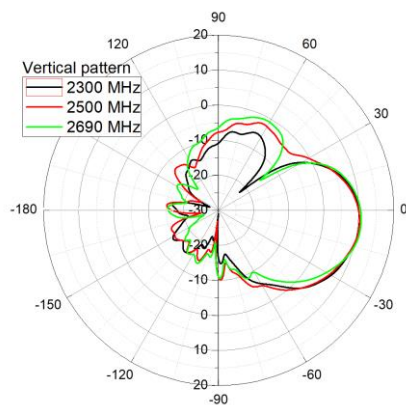
Environmental: IP55, Type 3R



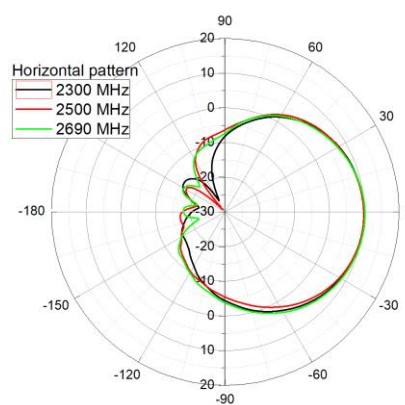
+45_V-Plane



+45_H-Plane



-45_V-Plane



-45_H-Plane

Technical Specification Antenna 6523

PRODUCT NUMBER KRE 105 280/1

3GPP Band: B1 B2/B25 B3 B66A

Frequency range: 1700 - 2200 MHz

Average gain: 8.5 dBi

Horizontal pattern

Beam width, 3 dB (0dBi) : 82° (120°)

Beam tracking error $\pm 60^\circ$: ≤ 5 dB

Beam pointing error 0° : $\leq 7^\circ$

Vertical pattern

Beam width, 3 dB: 43°

Fixed electrical tilt: -8°

Front-to-back $180 \pm 30^\circ$: > 15 dB

VSWR (Return loss): < 1.57 (> 13 dB)

Isolation > 20 dB

Cross Polarization Ratio > 10 dB(at boresight), > 5 dB(at sector)

Antenna pattern files: Contact local Ericsson sales representative

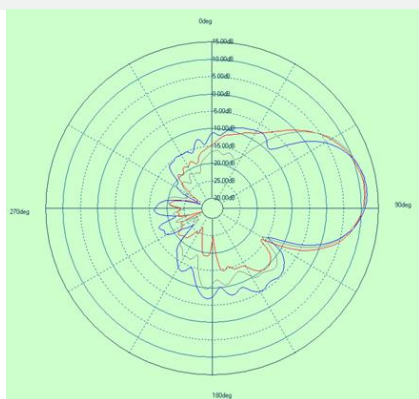
Mechanical specification

Main Dimensions, WxDxH: 200mm x 25mm x 200 mm

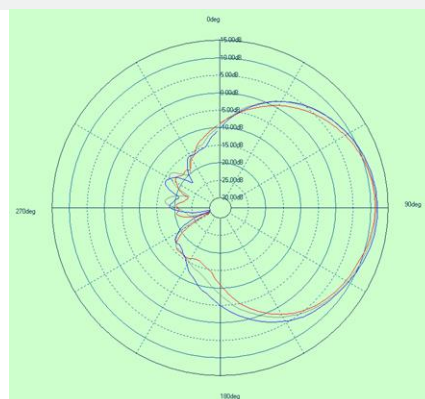
Weight: < 800 g

Volume: 1,0 l

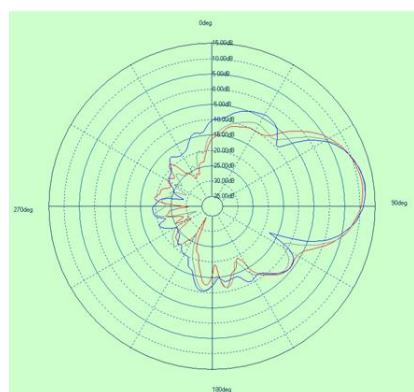
Environmental: IP55, Type 3R



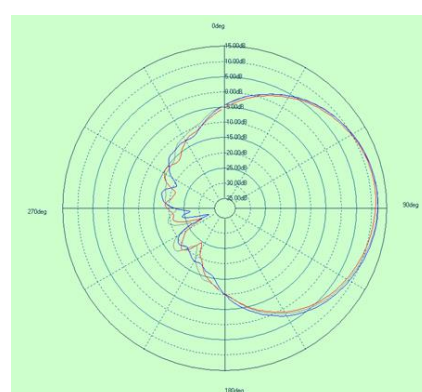
+45_V-Plane



+45_H-Plane



-45_V-Plane

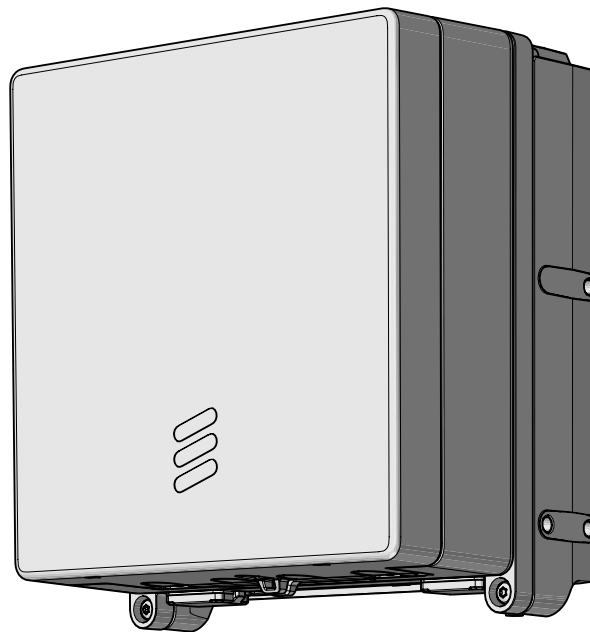


-45_H-Plane

Radio Description

Radio 4402

Description



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1 Introduction

1.1 Warranty Seal

The product is equipped with a warranty seal sticker.

Note: Seals that have been implemented by Ericsson must not be broken or removed, as it otherwise voids warranty.



2 Product Overview

The radio expands coverage and performance in denser urban areas, where the use of small handheld devices demand high capacity on the operators networks. It is designed to be located in cities and in demanding radio environments.

The radio is part of a modular radio building concept that enables a variety of installation alternatives that is also easy to expand. Flexible mounting solutions are provided using rails and pole clamps. The small size of the radio together with the flexible mounting solutions reduces the site volume. The lower weight also improves the handling of the radio.

The radio can be connected in a star or cascade configuration using optical cable links. An optic cable connects the radio to the main unit, or to an expanded Radio System.

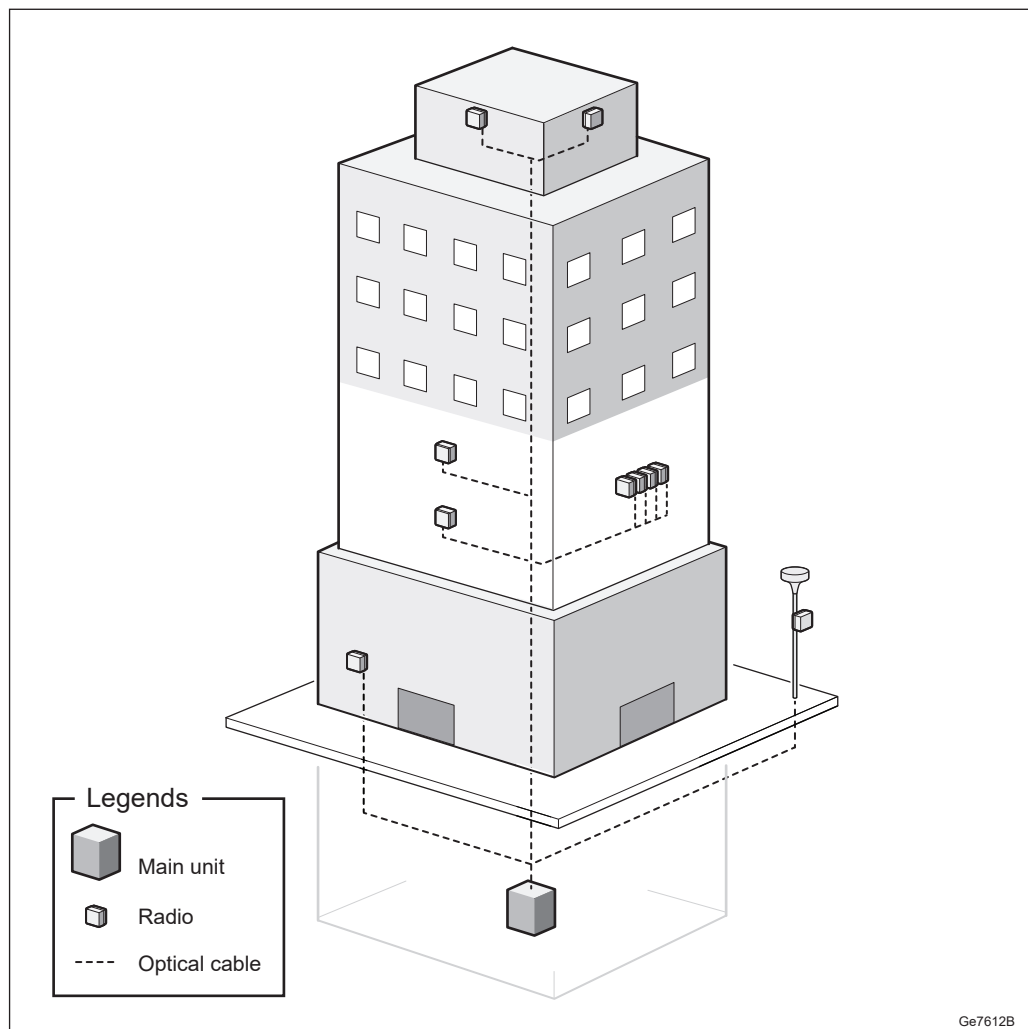


Figure 1 Radio Installations

2.1 Main Features

The following are the main features of the radio:

- WCDMA, LTE FDD, and NB-IoT
- Duplex transmitter/receiver (4TX/4RX) branches with 5 W per branch
- Up to 10.1 Gbps CPRI (optical)
- Complies with 3GPP base station classes Medium Range. For a list of relevant standards, see [Radio Standards Compliance](#) on page 33.



2.2 Optional Equipment

The optional equipment for the radio is the following:

- External antenna equipment
- Integrated directional antenna
- Rail installation equipment



3 Technical Data

Table 1 lists regulatory approved configurations. The listed standards on a specific frequency band may not be generally available on all markets. Contact the local Ericsson responsible for details.

Table 1 Radio 4402 Technical Data

Description	Value
Maximum nominal output power ⁽¹⁾	4 × 5 W
Number of carriers per branch	LTE: 6 downlink, 6 uplink WCDMA: 6 downlink, 6 uplink NB-IoT in-band mode: 1 NB-IoT carrier per configured LTE host carrier NB-IoT standalone mode: 1 carrier per RF port NB-IoT guard band mode: 1 NB-IoT carrier per configured LTE host carrier
Number of carriers per radio	LTE: 4 × 6 downlink, 4 × 6 uplink WCDMA: 4 × 6 downlink, 4 × 6 uplink NB-IoT in-band mode: 1 NB-IoT carrier per configured LTE host carrier NB-IoT standalone mode: 4 × 1 carriers per RF port NB-IoT guard band mode: 1 NB-IoT carrier per configured LTE host carrier
Frequency ⁽²⁾	B66A for WCDMA, LTE, NB-IoT in-band mode, NB-IoT standalone mode, and NB-IoT guard band mode 1710–1780 MHz uplink 2110–2180 MHz downlink
Dimensions with Cover, Single Radio	
Height (A)	213.5 mm
Width (B)	200 mm
Depth (C)	105 mm
Dimensions with Antenna, Single Radio	
Height (A)	213.5 mm
Width (B)	200 mm
Depth (C)	125 mm



Description	Value
Weight	
Radio 4402 with Cover, Single Radio	4.7 kg
Radio 4402 with Antenna, Single Radio	5.1 kg
Color	
Body	NCS S 1002-B

(1) For detailed information about licenses and HWAC, see the following:

WCDMA: Licenses and Hardware Activation Codes in Ericsson Software Model in the WCDMA RAN CPI library.

LTE: Manage Licenses and Hardware Activation Codes in the Radio Node libraries.

(2) For information about IBW, see RBS Configurations.

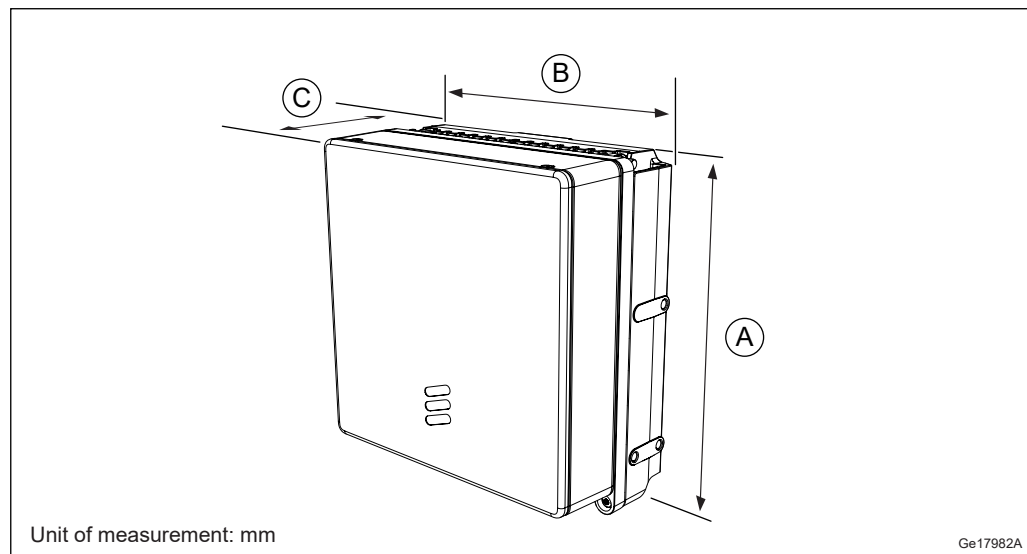


Figure 2 Radio 4402 Dimensions with Cover, Single Radio

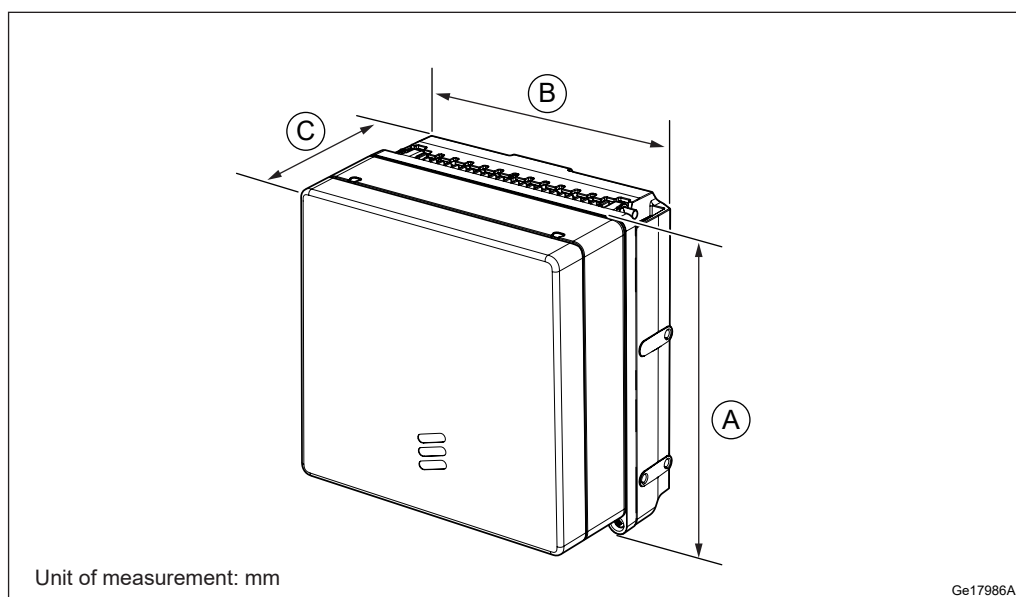


Figure 3 Radio 4402 Dimensions with Antenna, Single Radio

Table 2 Antenna Data

Antenna	Frequency Band	Frequency
6523 Directional	B1, B2/B25, B3, and B66A	1710–2200 MHz

3.1 Installation Recommendations

To ensure reliable operation and maximum performance, an appropriate installation location must be chosen.

When using the optional integrated directional antenna make sure the radio is not pointing at any elements that can disturb the radio signals.

3.1.1 Indoor Locations to Avoid

Although the unit is designed for outdoor use, it can be used indoors. For indoor locations Ericsson recommends to operate according to ETSI EN 300 019-1-3 class 3.1, 3.2, 3.3, and 3.6. This does not cover installation with heat traps or installation in lofts, where air ventilation does not exist. To ensure smooth performance, avoid installing the unit in a potential microclimate location, for example, places with unventilated lofts, with heat traps, or where the product is exposed to direct sunlight through windows. Avoid installing the equipment under glass covers or skylight windows without proper ventilation.



3.1.2 Outdoor Locations to Avoid

Although Ericsson declares this product suitable for outdoor environments, avoid installing the unit in a potential microclimate location. Typical examples of microclimate locations are sites where the product is not only exposed to the actual surrounding temperature, but additional temperature as heat coming from dark colored planes, for example, reflections from the floor or walls. The additional temperature can generate heat traps with temperatures up to 10°C higher than expected.

Avoid installing equipment in the following locations:

- Near the exhaust of building ventilation systems
- Near the exhaust of chimneys
- Opposite large surfaces made of glass or new concrete

If the unit is to be placed in an environment subjected to lightning strike, an external Surge Protection Device (SPD) is needed.

3.1.3 Other Considerations

Installing the radio close to other electronic equipment can cause interferences.

For sites with risk of ground fire, the recommended minimum installation height is 3 m.

3.1.4 Painting Disclaimer

Ericsson recommends to not paint the product as it can affect performance of the product.

Ericsson applies limitations to the warranty and service contract if the product is painted.

If the product is painted, the following commercial limitations apply:

- Failure modes directly related to overheating because of painting are not valid for repair within the scope of the warranty or standard service contract.
- Product failures related to paint contamination of components of the unit are not valid for repair within the scope of warranty or standard service contract.
- When a painted unit is repaired, it might be restored to the standard color before being returned to the market. It is not possible to guarantee that the same unit is sent back to the same place. This is also valid for units repaired under a service contract.



- For repairs within the warranty period or a standard service contract, the customer is charged the additional costs for replacing all painted parts of the unit or the complete unit.

If adaptations are required, contact Ericsson for information.

3.2 Installation Alternatives

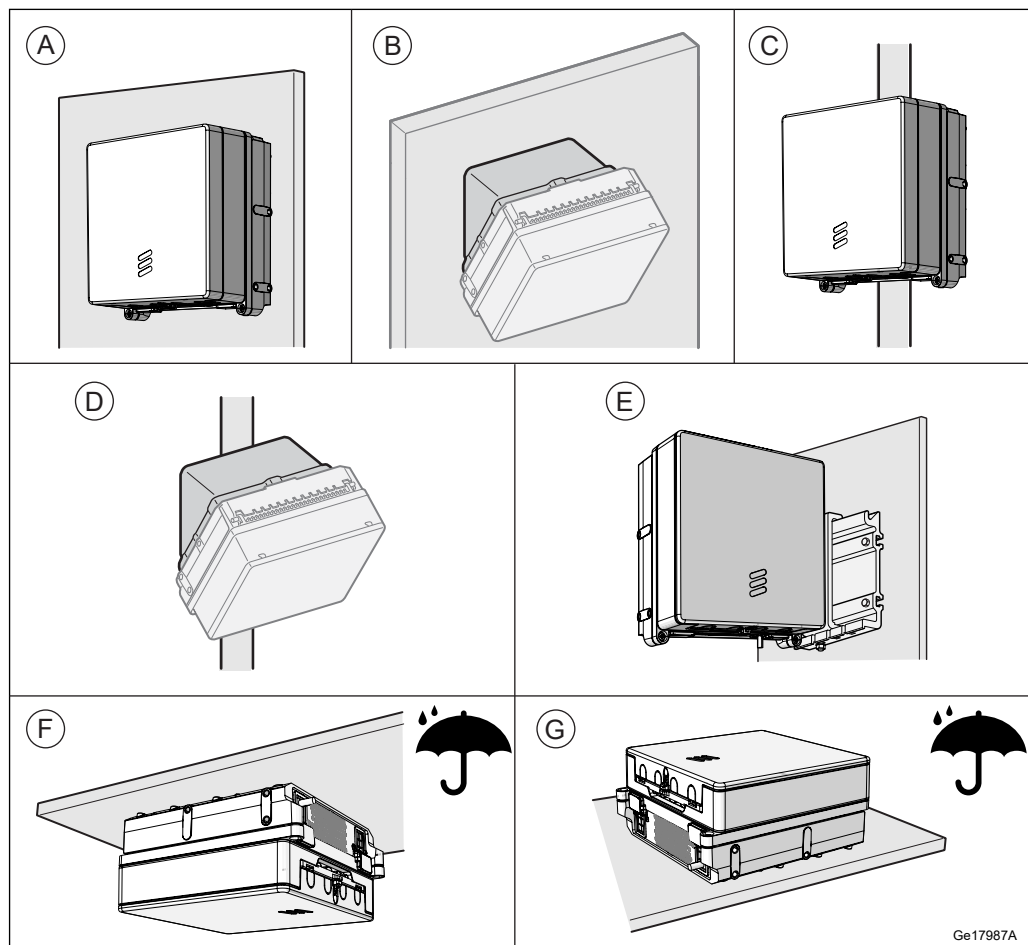


Figure 4 Alternative Installation Methods

Table 3 Key to Alternative Installation Methods

Installation Method	Description
A	Wall installation
B	Wall installation with tilt installation kit
C	Pole installation



Installation Method	Description
D	Pole installation with tilt installation kit
E	Rail installation (Single Radio only)
F	Ceiling installation
G	Horizontal installation

The integrated directional antenna is not applicable to installation alternatives E, F, and G.

For mounting direction F or G in an outdoor environment the Radio needs to be protected from direct rain.

3.3 Space Requirements

3.3.1 Generic Requirements

The radios can be placed directly against each other side by side. To ensure sufficient working space, allow adequate free space in front of the radio.

3.3.2 Wall Installation

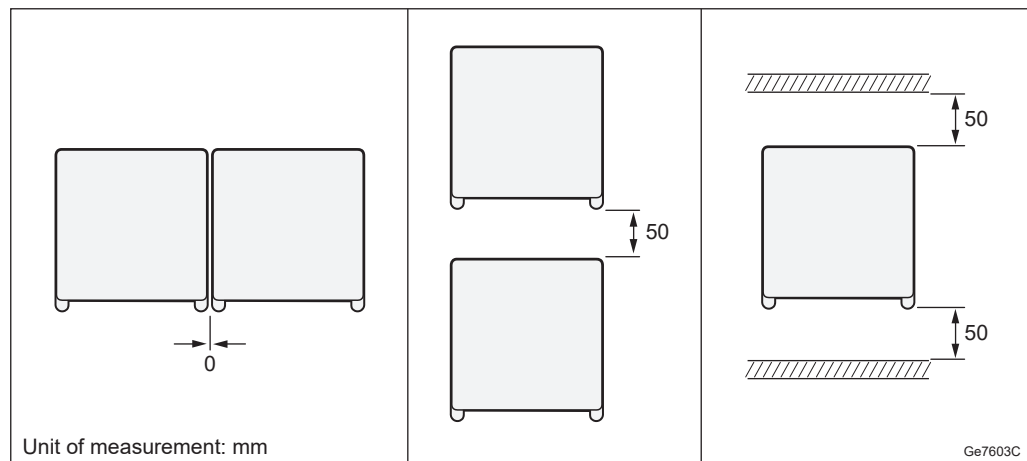


Figure 5 Wall Installation, Single Radio

To ensure adequate airflow between the units, allow a minimum of 50 mm free space between the radio and the roof, and between radios installed on a wall, on top of one another.



3.3.3

Wall or Pole Installation Using a Tilt Installation Kit

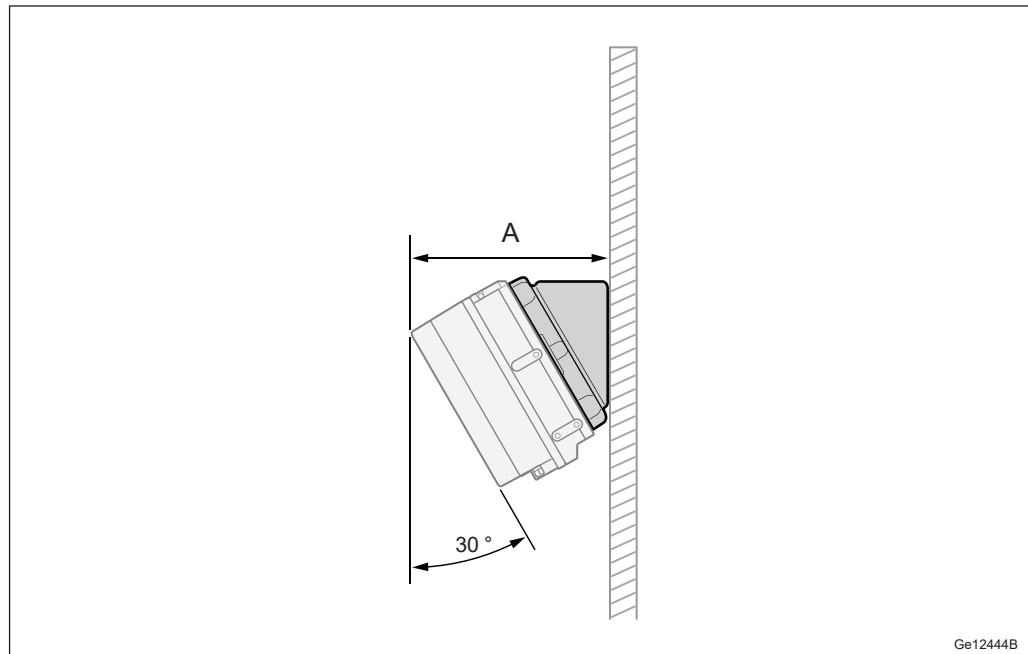


Figure 6 Tilt Installation Kit, Single Radio

Table 4 Tilt Installation Kit, Single Radio

Description	Value A (mm)
Distance with cover	198
Distance with high-band antenna	216
Distance with low-band antenna	224



3.3.4 Pole Installation

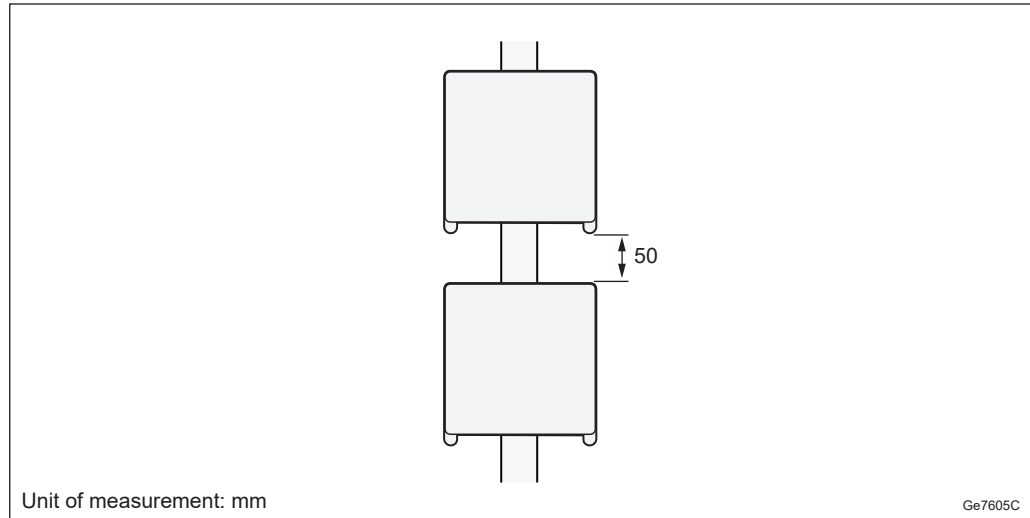


Figure 7 Pole Installation, Single Radio

To ensure adequate airflow between the units, allow a minimum of 50 mm free space above and below each radio.

Table 5 Pole Dimensions

Pole Clamp Type	Minimum Dimension (mm)	Maximum Dimension (mm)
Hose clamp steel, Range 40-150 mm	Ø40	Ø150
Hose clamp steel, Range 140-300 mm	Ø140	Ø300
Hose clamp steel, Range 250-500 mm	Ø250	Ø500



3.3.5

Rail Installation

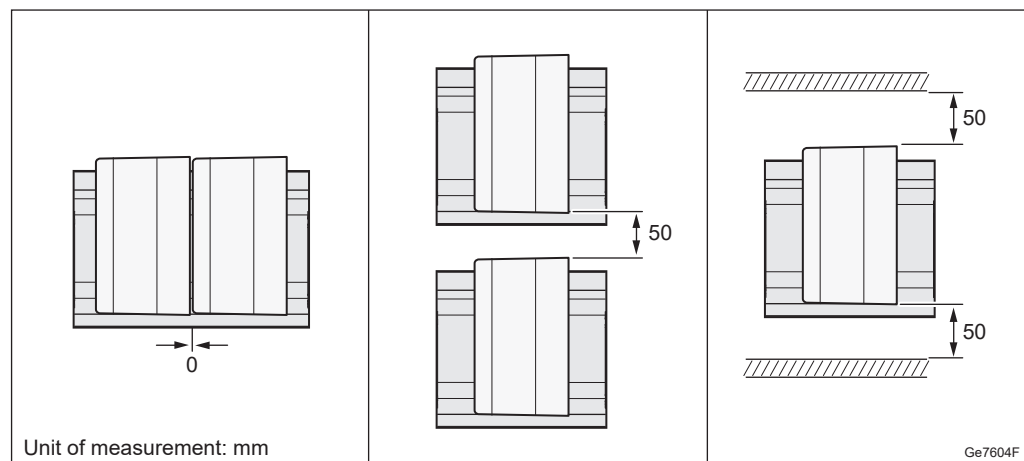


Figure 8 Rail Installation

To ensure adequate airflow between the units, allow a minimum of 50 mm free space above and below each radio, and between the radio and the wall.

3.3.6

Ceiling Installation

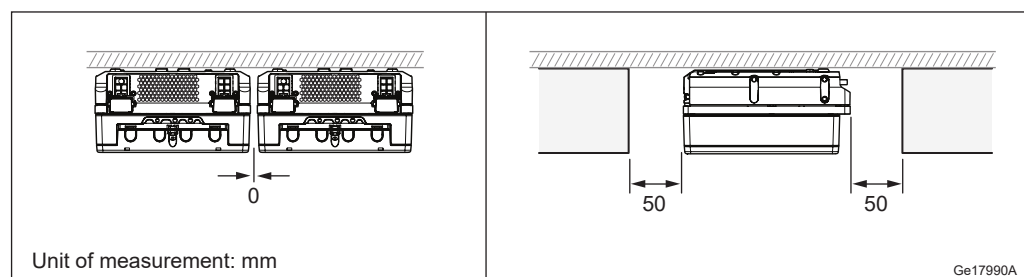


Figure 9 Ceiling Installation

To ensure adequate airflow between the units, allow a minimum of 50 mm free space between the radio and the wall, and 50 mm between radios installed on a roof beside one another.



3.3.7 Horizontal Installation

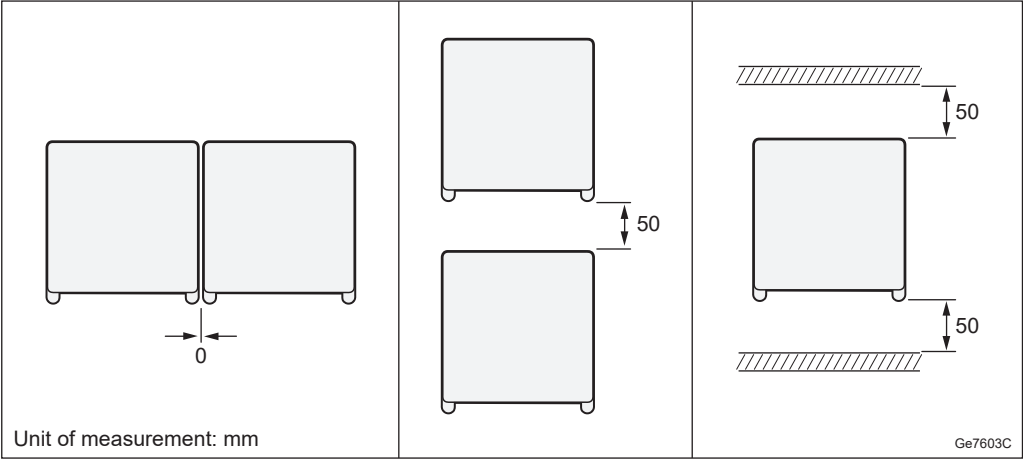


Figure 10 Horizontal Installation, Single Radio

To ensure adequate airflow between the units, allow a minimum of 50 mm free space between the radio and the roof, and between radios installed horizontally.

3.4 Acoustic Noise

With the fan, the acoustic noise is ambient temperature dependent, as listed below.

Table 6 Maximum Sound Pressure Level for Radio 4402 with Fan

Temperature (°C)	Radio 4402 Sound Pressure Level (dB)
+20	49
+30	52
+40	55
+55	60

3.5 Environmental Characteristics

This section contains operating environment data for the radio.

3.5.1 Operating Environment

The following are the values for the normal operating environment of the radio:

Temperature⁽¹⁾ -40°C to +55 °C



Solar radiation	$\leq 1120 \text{ W/m}^2$
Relative humidity	5 – 100%
Absolute humidity	$0.26 - 40 \text{ g/m}^3$
Maximum temperature change	$0.5 \text{ }^\circ\text{C/min}$
Maximum wind load at 150 km/h (pole installed single case)	Radio with cover: 55 N (front), 18 N (side) Radio with antenna: 56 N (front), 24 N (side)

- (1) Depending on product variant, installation scenario, traffic load, and configuration, the product can, in the highest $10 \text{ }^\circ\text{C}$ temperature range, temporarily reduce the output power. This depends on the durations of the high ambient temperature.

3.5.2 Heat Dissipation

The radio is designed for outdoor installation.

Avoid indoor installation in a room without adequate ventilation and cooling.

Table 7 Radio Heat Dissipation

Unit	Output Power (W)	Maximum Heat Dissipation (W)
Radio 4402 B66A	4×5	120

Table 8 Support Heat Dissipation

Unit	Heat Dissipation (W)
Support 6501	12
Support 6502	12

3.5.3 Vibration

The radio operates reliably during seismic activity as specified by test method IEC 60068-2-57 Ff.

Maximum level of Required Response Spectrum (RRS)	50 m/s^2 within 2–5 Hz for DR=2%
Frequency range	0.3–50 Hz
Time history signal	Verteq II

The radio operates reliably during random vibration as specified by test method IEC 60068-2-64 Fh method 1

Random vibration, normal operation	$+12 \text{ m}^2/\text{s}^3$	$0.3 \text{ m}^2/\text{s}^3$	$-12 \text{ m}^2/\text{s}^3$
Frequency range	5–10 Hz	10–50 Hz	50–150 Hz



3.5.4 Materials

All Ericsson products fulfill the legal and market requirements regarding the following:

- Material declaration
- Materials' fire resistance, components, wires, and cables
- Recycling
- Restricted and banned material use

3.6 Power Characteristics

This section describes the power supply requirements, power consumption, and fuse and circuit breaker recommendations for the radio.

The power for the radios can be provided from an AC or a DC power supply.

3.6.1 DC Power Characteristics

The power supply voltage for the radio is –48 V DC.

Table 9 Radio DC Power Supply Requirements

Conditions	Values and Ranges
Nominal voltage	–48 V DC
Normal voltage range at radio input connector	–36.0 to –58.5 V DC
Non-destructive range	0 to –60 V DC

Fuse and Circuit Breaker Recommendations

The recommendations given in this section are based on peak power consumption and do not provide information on power consumption during normal operation.

The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60934.

Table 10 Radio Fuse or Circuit Breaker Recommendations

Unit (DC powered)	Output Power (W)	Minimum Fuse Rating (A)	Maximum Allowed Fuse Rating ⁽¹⁾ (A)
Radio 4402 B66A	4 × 5	6	32



(1) The absolute maximum fuse class in accordance with radio design restrictions.

3.6.2 AC Power Characteristics

The normal voltage range for the radio is 100 to 250 V AC.

Table 11 Radio AC Power Supply Requirements

Conditions	Values and Ranges
100–250 V	85–275 V AC
Connection	Line-neutral, line-line
Frequency range	45–65 Hz
Voltage harmonics	≤ 10% at full load ⁽¹⁾
Shut-off allowance	At undervoltage or overvoltage
Inrush current peak	< 10 A
Inrush current duration	< 100 ms
AC system	TN, TT and IT

(1) Must comply with IEC 61000-3-2

Fuse and Circuit Breaker Recommendations

The recommendations given in this section are based on peak power consumption and do not provide information on power consumption during normal operation.

The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60934.

When the radio connected Line-Line a 2-pole circuit breaker or dual fuses are required for interruption of both lines. This is also valid when the radio is used in an IT system.

Table 12 Radio Fuse or Circuit Breaker Recommendations

Unit (AC powered)	Output Power (W)	Minimum Fuse Rating (A)	Maximum Allowed Fuse Rating ⁽¹⁾ (A)
Radio 4402 B66A	4 × 5	4	16

(1) The absolute maximum fuse class in accordance with radio design restrictions.

3.6.3 Power Consumption

For information on power consumption, see [Power Consumption Calculations](#).



3.7 System Characteristics

This section describes the system characteristics of the Radio System.

3.7.1 RF Electromagnetic Exposure

For general information on RF EMF exposure, see [Radio Frequency Electromagnetic Fields](#).

The following tables list the compliance boundaries (exclusion zones), outside of which the RF EMF exposure from Radio 4402 is below the limits applicable in:

- USA (47 CFR 1.1310)
- Canada (Health Canada Safety Code 6)

Table 13 Dimensions of the Box-Shaped Compliance Boundary for General Public (GP) and Occupational (O) Exposure Applicable in the USA and Markets Employing the FCC RF Exposure Limits (Including 0.6 dB Output Power Tolerance)

Mode and Output Power for Radio 4402				Dimensions of the Box-Shaped Compliance Boundary ⁽¹⁾ (m)							
				Distance in Front of Radio		Width		Height		Distance Behind Radio	
Band	Single/Dual Radio Version	Nominal Peak Output Power from the Radio	IEC 62232 Installation Class	GP	O	GP	O	GP	O	GP	O
B66A	Single	4 × 5 W	E+	1.9	0.9	1.6	0.8	1.3	0.6	0.2	0.2

(1) The compliance boundaries are determined for maximum output power with power tolerance.

Table 14 Dimensions of the Box-Shaped Compliance Boundary for General Public (GP) and Occupational (O) Exposure Applicable in Canada (Including 0.6 dB Output Power Tolerance)

Mode and Output Power for Radio 4402				Dimensions of the Box-Shaped Compliance Boundary ⁽¹⁾ (m)							
				Distance in Front of Radio		Width		Height		Distance Behind Radio	
Band	Single/Dual Radio version	Nominal Peak Output Power from the Radio	IEC 62232 Installation Class	GP	O	GP	O	GP	O	GP	O
B66A	Single	4 × 5 W	E+	2.7	1.1	2.3	1.0	1.8	0.8	0.2	0.2

(1) The compliance boundaries are determined for maximum output power with power tolerance.

3.7.2 Software

For information on software dependencies, see [Radio Software Support](#).



3.7.3 Radio Configurations

For information about available radio configurations, see RBS Configurations.



4 Hardware Architecture

For a description of the supported radio configurations, refer to RBS Configurations.

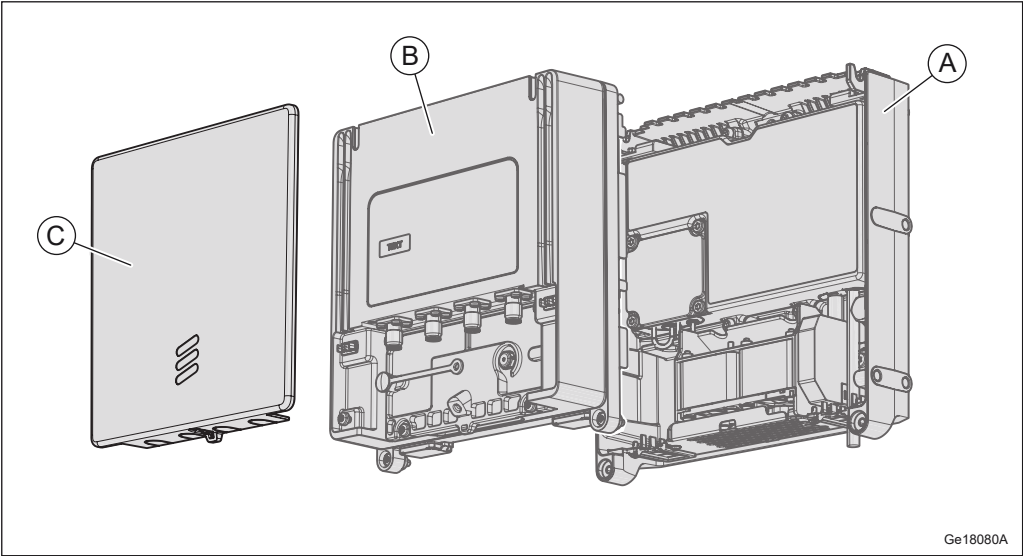


Figure 11 Radio Components, Single Radio

Table 15 Key to Radio Components, Single Radio

Position	Component
A	Support ⁽¹⁾
B	Radio Core
C	Antenna or Cover

(1) The Support has several variants. An example is shown in [Figure 11](#).

4.1 Support

The Support provides the Radio Core with integrated mechanical attachment, power conversion and cooling. It consists of a mounting bracket, a fan unit, and a PSU.

4.1.1 Mounting Bracket

The mounting bracket provides integrated mechanical attachment for wall and pole mounting, and attachment points for the rail bracket.



4.1.2 Fan Unit

The fan unit operates autonomously against ambient temperature to cool the Radio Core.

For Single Radio, the fan unit of the Support is integrated with the mounting bracket and cannot be removed.

4.1.3 PSU

The PSU provides power to the Radio Core and the fan unit.

The PSU is available in two variants to support AC input and DC -48 V input. The DC variant handles both 2-wire (DC-C) and 3-wire (DC-I) connections.

Included in the PSU is also the external alarm interface and communication between PSU and Radio Core.

4.2 Radio Core

The Radio Core handles the radio communication in the unit and consists of a thermal radiator, TRX, and the Filter Unit (FU).

The Antenna Supervision can detect the following disconnected antennas:

- Ericsson Integrated Directional Antenna
- External antenna with feeder loss < 0.5 dB

Use the LTE AILG feature to ensure enough transmitted power.

4.2.1 Thermal Radiator

The thermal radiator provides cooling to the radio.

4.2.2 TRX

The Transmitter and Receiver (TRX) provides the following:

- Analog/Digital (A/D), Digital/Analog (D/A) conversion
- Channel filtering
- Delay and gain adjustment
- RF modulation and demodulation



- Optical cable interface termination
- Control and surveillance

4.2.3 Filter Unit

The Filter Unit consists of band-pass filters.

4.3 Antenna

The optional integrated directional Antenna provides directional RF coverage for the radio, and protects the Radio Core.

4.4 Cover

The esthetic Cover protects the Radio Core when the radio is connected to an external antenna.

4.5 Optical Indicators

The radio is equipped with optical indicators that show system status.

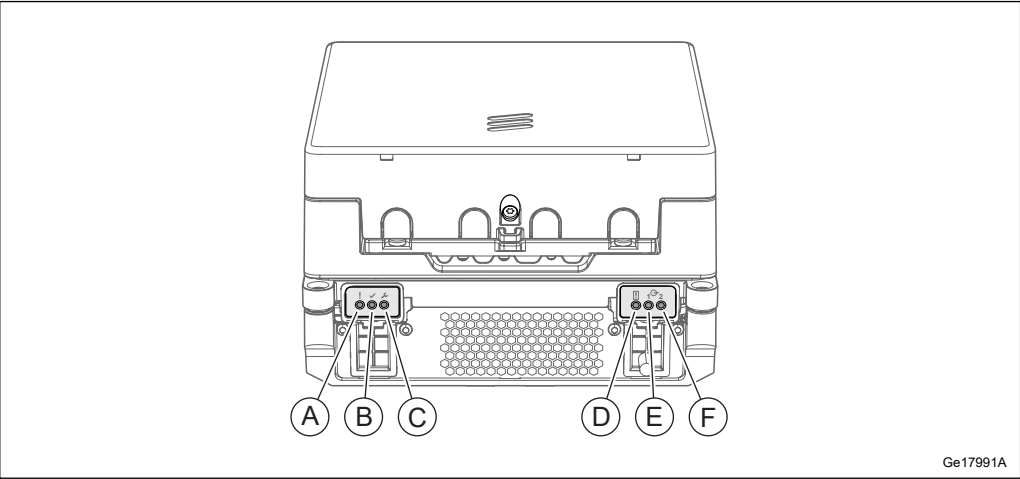


Figure 12 Optical Indicators for Single Radio

Table 16 Description of Optical Indicators for Single Radio

Position	Name	Marking
A	Fault	!



Position	Name	Marking
B	Operational	✓
C	Maintenance	🔧
D	Support System Status	⚠
E, F	Interface 1 Interface 2	↻

For more information about the behavior of the optical indicators and the maintenance button, refer to [Indicators, Buttons, and Switches](#).



5 Connection Interfaces

This section contains information about the radio connection interfaces.

5.1 Support

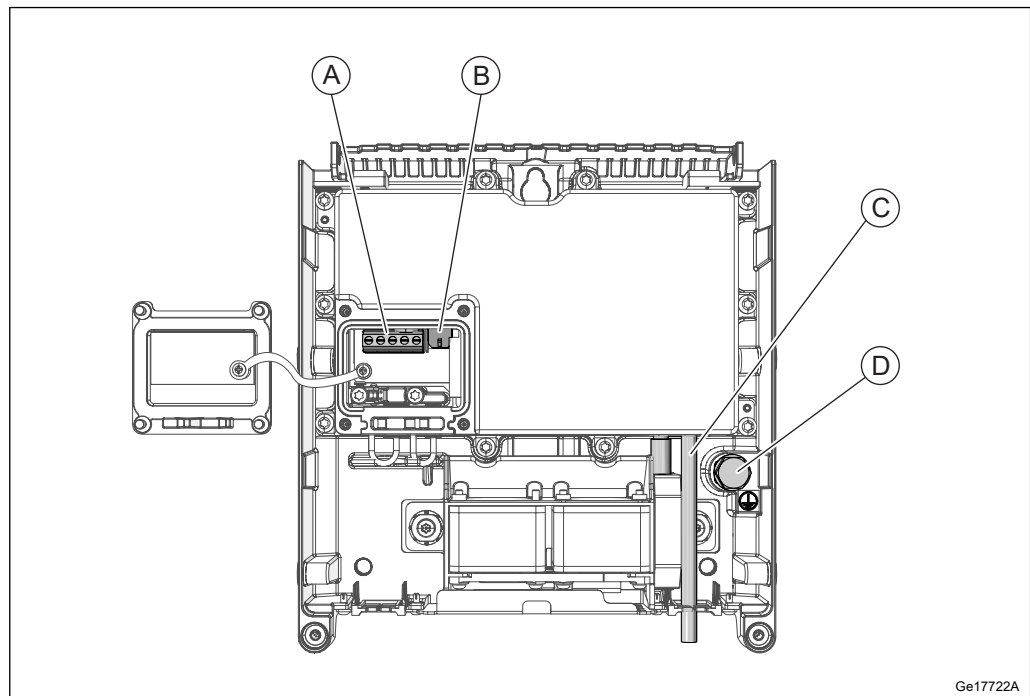
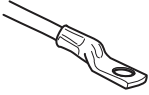


Figure 13 Connection Interfaces for Support, Single Radio

Table 17 Connection Interfaces for Support, Single Radio

Position	Description	Marking	Connector Types	Cable Illustration
A	-48 V DC power supply	-48V	Screw terminal block	—
A	AC power supply			
B	External alarm		PCB connector	
C	PSU DC output, cable preinstalled	36V	—	—



Position	Description	Marking	Connector Types	Cable Illustration
D	Grounding (With DC power supply)		M8 bolt	
D	Grounding (With AC power supply)			

Note: [Figure 13](#) shows an example of the Support for Single Radio. The actual product may differ.

For Single Radio, only 195 W Support can be used.

5.1.1 Fan Unit Interface

The fan unit provides cooling to the Radio Core.

5.1.2 External Alarm Interface

Two external alarms can be connected to the radio external alarm port.

5.1.3 AC/-48 V DC Power Interface

Depending on the version of the product, the power supply for the radio can be AC or DC.

5.1.3.1 AC Power Interface

The AC power connection is made through a screw terminal.

Table 18 AC Power Supply Cable Diameter Tolerances

Cable Length (m)	Cross-Sectional Area of Each Conductor (mm ²)	Outer Diameter over Sheath (mm)
0–100	2.5	8–9

The power cable has a wire for Line (L), a wire for Line/Neutral (L/N), and a wire for Protective Earth (PE) conductors. The wire color code for wires is market dependent.

All cables must be shielded. The shield must be folded back over the outer jacket of the cable and properly connected to the PSU chassis in the PSU strain relief, otherwise the radio overvoltage protection does not function properly.



The AC cable temperature rating must be at least 70 °C.

5.1.3.2 DC Power Interface

The -48 V DC power connection is made through a screw terminal.

Table 19 -48 V DC Power Supply Cable Diameter Tolerances

Cable Length (m)	Cross-Sectional Area of Each Conductor (mm ²)	Outer Diameter over Sheath (mm)
0–60	2.5	8–9

For 3-wire power system, the power cable screw terminal has a wire for -48 V conductors, a wire for 0 V, and one wire for FE (Functional Earth). For 2-wire power system, the power cable screw terminal has a wire for -48 V conductors, and a wire for 0 V. The wire color code is market dependent.

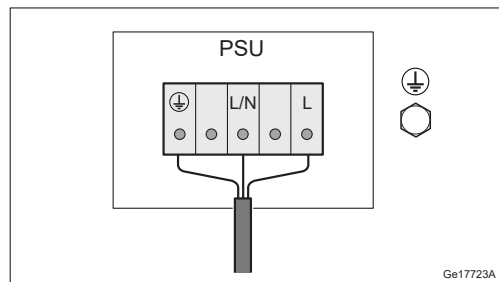
All cables must be shielded. The shield must be folded back over the outer jacket of the cable and properly connected to the PSU chassis in the PSU strain relief, otherwise the radio overvoltage protection does not function properly.

The DC cable temperature rating must be at least 70 °C.

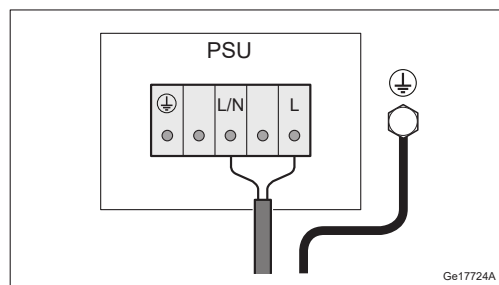
5.1.4 Grounding Interface

The possible grounding interface solutions for the radio are as follows:

AC Grounding, Single Radio

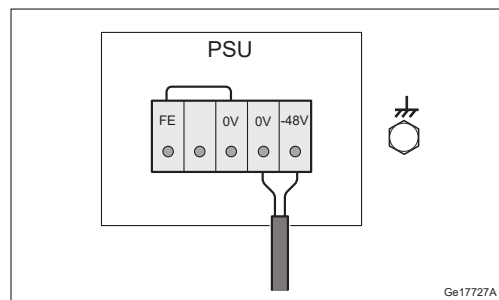


AC power with PE in PSU input terminal.

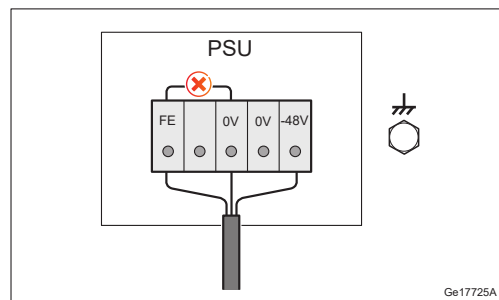


AC power with PE in the grounding interface on the mounting bracket.

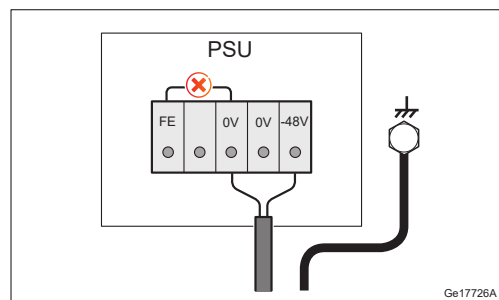
DC Grounding, Single Radio



Default 2-wire (DC-C) power system with FE in PSU input terminal.



3-wire (DC-I) power system with FE in PSU input terminal. Remove the jumper between 0V and FE.



3-wire (DC-I) power system with FE in the grounding interface on the mounting bracket. Remove the jumper between 0V and FE.

For more information about grounding principles, see [Grounding Guidelines for RBS Sites](#).

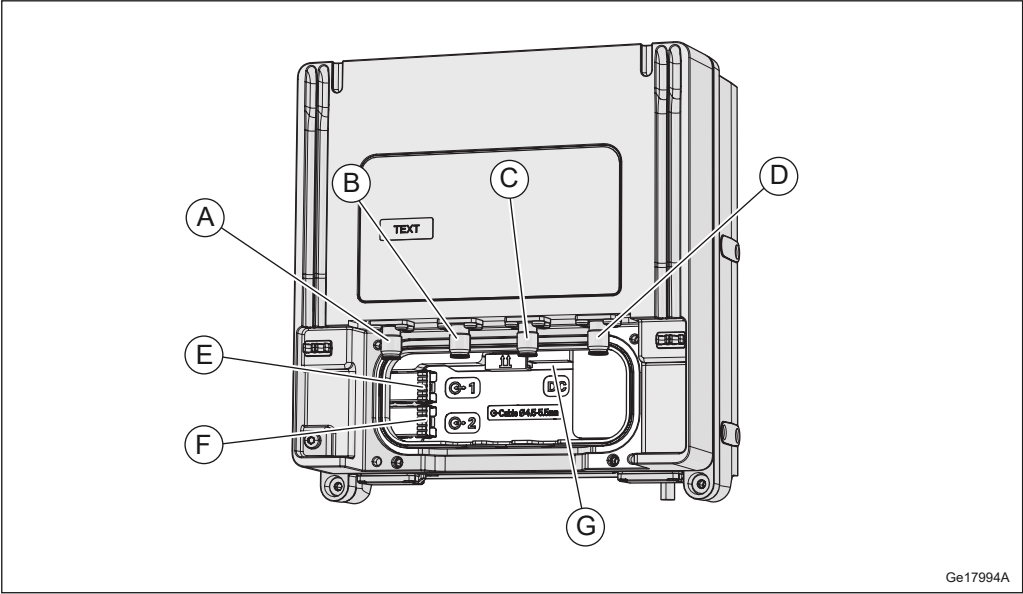
5.1.5

PSU DC Power Interface

The PSU DC power connector supplies the radio with +36 V DC and internal communication to the radio.



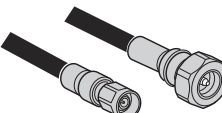
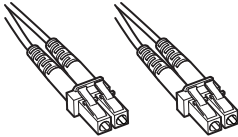
5.2 Radio Core



Ge17994A

Figure 14 Radio Core Connection Interfaces

Table 20 Connection Interfaces

Position	Description	Marking	Connector Types	Cable Illustration
A	Antenna A	 A	NEX10	
B	Antenna B	 B		
C	Antenna C	 C		
D	Antenna D	 D		
E	Optical cable 1	 1	LC (On SFP)	
F	Optical cable 2	 2		
G	DC power supply and internal communication	DC	—	—



5.2.1 Antenna Interface

The antenna interfaces provide connections for the radio to the antennas. RF cables connect the radio to the antenna.

Table 21 Radio Antenna Connection Interface Characteristics

Connector Type	Jumper Cable Type	RF Cable Type
NEX10 female	NEX10 male on one end and 4.3-10 female on the other end	50 Ω 1/2-inch coaxial, 4.3-10 male

Table 22 Radio Antenna Cable Connectors

Radio Connectors	Antenna Connectors
 A (Antenna A)	TX/RX
 B (Antenna B)	TX/RX
 C (Antenna C)	TX/RX
 D (Antenna D)	TX/RX

5.2.2 Interface for Optical Cable to Main Unit

The  1 and  2 interfaces provide connections to optical cables (with outer diameter 4.5–5.5 mm, and complies with standard G657A2) for traffic and timing signals between the radio and the main unit. An SFP+ is used to connect the optical cable to the radio.

Note: The radio uses SFP modules for optical transmission and optical radio interfaces on Data 1 and Data 2.

Only SFP+ modules approved and supplied by Ericsson are to be used. These modules fulfill the following:

- Compliance with Class 1 laser product safety requirements defined in standard IEC 60825-1
- Certification according to general safety requirements defined in standard IEC 60950-1
- Functional and performance verified to comply with Radio System specifications

Recommended SFP+ modules are obtained from the product packages for the Radio System and the Main Remote Installation products. For more information about SFP+ modules, see Spare Parts Catalog and Main-Remote Installation Products Overview.



5.2.3 DC Power Interface

The radio DC power connector supplies the radio with +36 V DC and internal communication from the PSU.



6 Standards and Regulations

This section presents a brief overview of standards, regulatory product approval, and declaration of conformity for the radio.

6.1 Regulatory Approval

The Radio System complies with the following market requirements:

- North American market requirements.
- Products containing radio equipment outside North America and in countries not recognizing the CE-mark may be labeled according to national requirements or standards.

6.1.1 Environmental Standards Compliance

The product complies with the following environmental standard:

Europe

- Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive (2011/65/EU)

6.1.2 Safety Standards Compliance

In accordance with market requirements, the Radio System complies with the following product safety standards and directives:

International

- IEC 62368-1

Europe

- EN 50385
- EN 62368-1

North America

- FCC CFR 47 Part 1.1310
- FCC CFR 47 Part 2.1091



- Health Canada Safety Code 6
- IC RSS-102
- UL 62368-1
- CSA-C22.2 No. 62368-1

6.1.2.1 Outdoor Specific Requirements

The Radio System complies with the following outdoor specific requirements:

International

- IEC 60529 (IP65, IP55 for Directional antenna)
- IEC 60950-22

Europe

- EN 60529 (IP65, IP55 for Directional antenna)
- EN 60950-22

North America

- CSA-C22.2 No. 60950-22
- UL 50E
- UL 60950-22

6.1.3 EMC Standards Compliance

The Radio System complies with the following Electromagnetic Compatibility (EMC) standards:

International

- 3GPP TS37.113

North America

- IC ICES-003 B
- FCC CFR 47 Part 15 B



FCC Compliance Statement

This device complies with Part 15 of the FCC CFR 47 rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

6.1.4 Radio Standards Compliance

The Radio System complies with the following radio standards:

International

- 3GPP TS37.141

North America

- FCC CFR 47 Part 27 (USA frequency dependent)
- FCC CFR 47 Part 2 (USA)
- IC RSS-139 (Canada frequency dependent)
- IC RSS-Gen (Canada)

6.1.5 Marking

To show compliance with legal requirements, the product is marked with the following labels:

North America

- usETL/cETL
- FCC CFR 47 Part 15 Statement
- IC ICES-003 Statement
- FCC ID
- IC ID



6.2 Other Standards and Regulations

The standards and regulations in this section are not regulatory approved.

6.2.1 Spare Parts

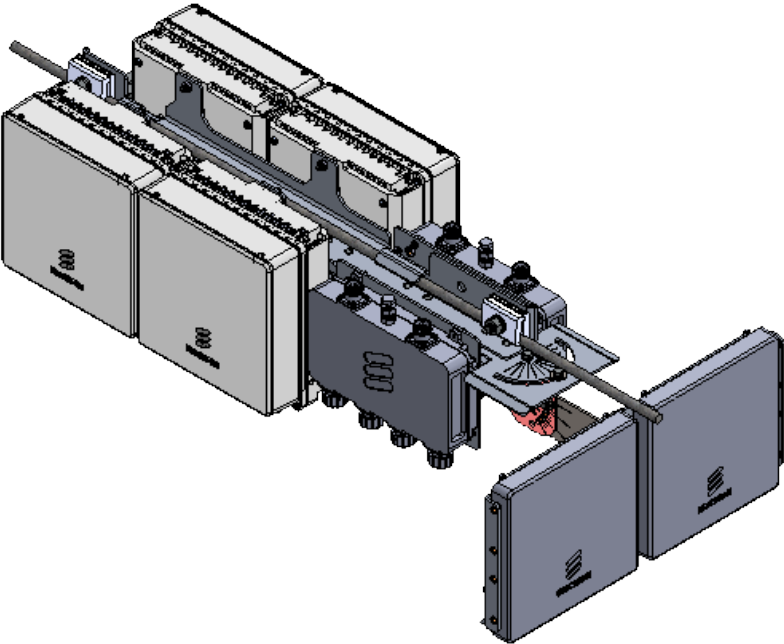
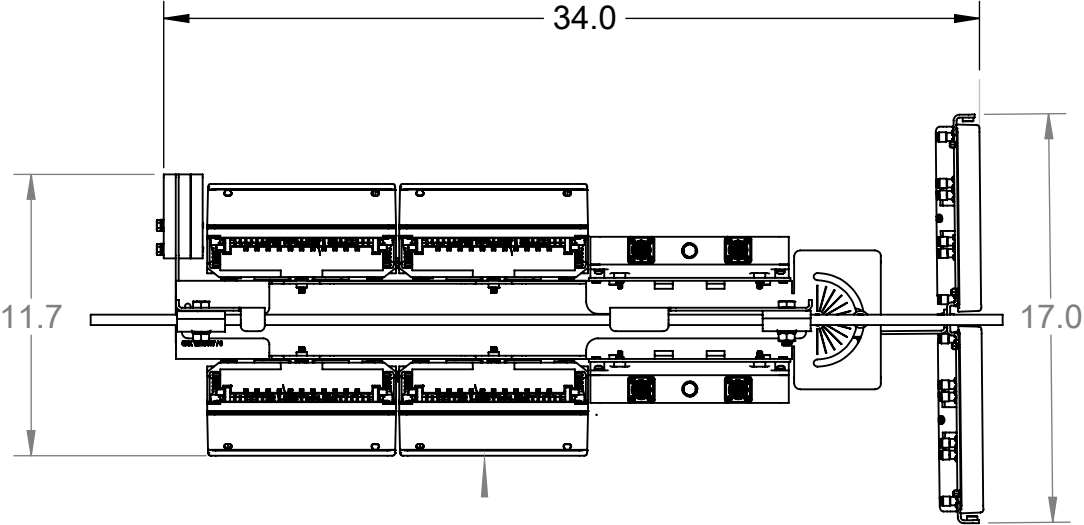
The product adheres to the Ericsson Serviceability and Spare Part Strategy.

6.2.2 Surface Quality

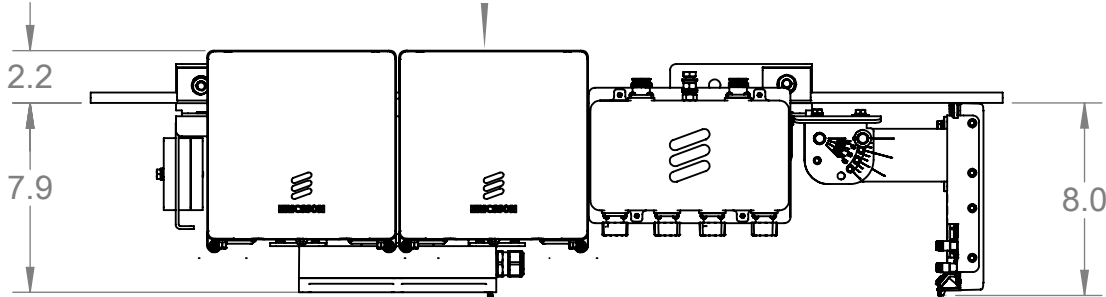
The surface quality of the radio is in accordance with Ericsson standard class A3.

6.2.3 Vandal Resistance

Unauthorized access is not possible without damaging the tamper proof warranty seal.



CONFIGURATION WILL ONLY UTILIZE (1) RADIO
ON EACH SIDE OF MOUNTING BRACKET



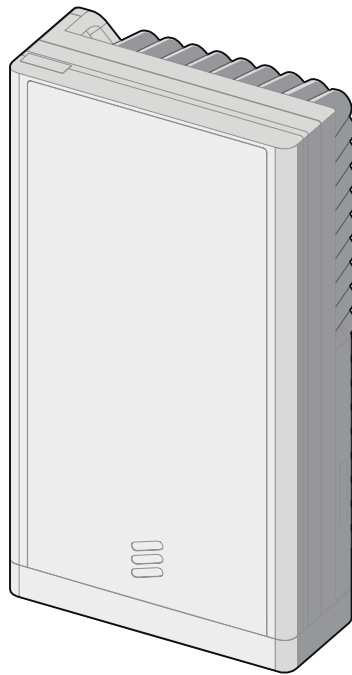
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		DIMENSIONS ARE IN INCHES	DRAWN	PN	9/7/18	TITLE: ASSY., HANGER, STRAND		
		TOLERANCES:	CHECKED					
		FRACTIONAL ±	ENG APPR.					
		ANGULAR: MACH ±0.5°BEND ±1°	MFG APPR.					
		TWO PLACE DECIMAL ±.03	Q.A.					
		THREE PLACE DECIMAL ±.010	COMMENTS:					
		INTERPRET GEOMETRIC TOLERANCING PER:						
		MATERIAL						
		SEE BOM						
		FINISH						
NEXT ASSY	USED ON							
APPLICATION		DO NOT SCALE DRAWING			SCALE: 1:8	WEIGHT:	SHEET 1 OF 1	

Radio Description

Radio 4435

Description



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1 Introduction

1.1 Warranty Seal

The product is equipped with a warranty seal sticker.

Note: Seals that have been implemented by Ericsson must not be broken or removed, as it otherwise voids warranty.



2 Product Overview

The radio remotely extends the reach of the Radio System, and is designed to be located near the antenna. The radio is part of a modular radio building concept that enables a variety of installation alternatives that are also easy to expand. Flexible mounting solutions are provided using pole clamps and brackets.

An overview of different radio installations is shown in [Figure 1](#).

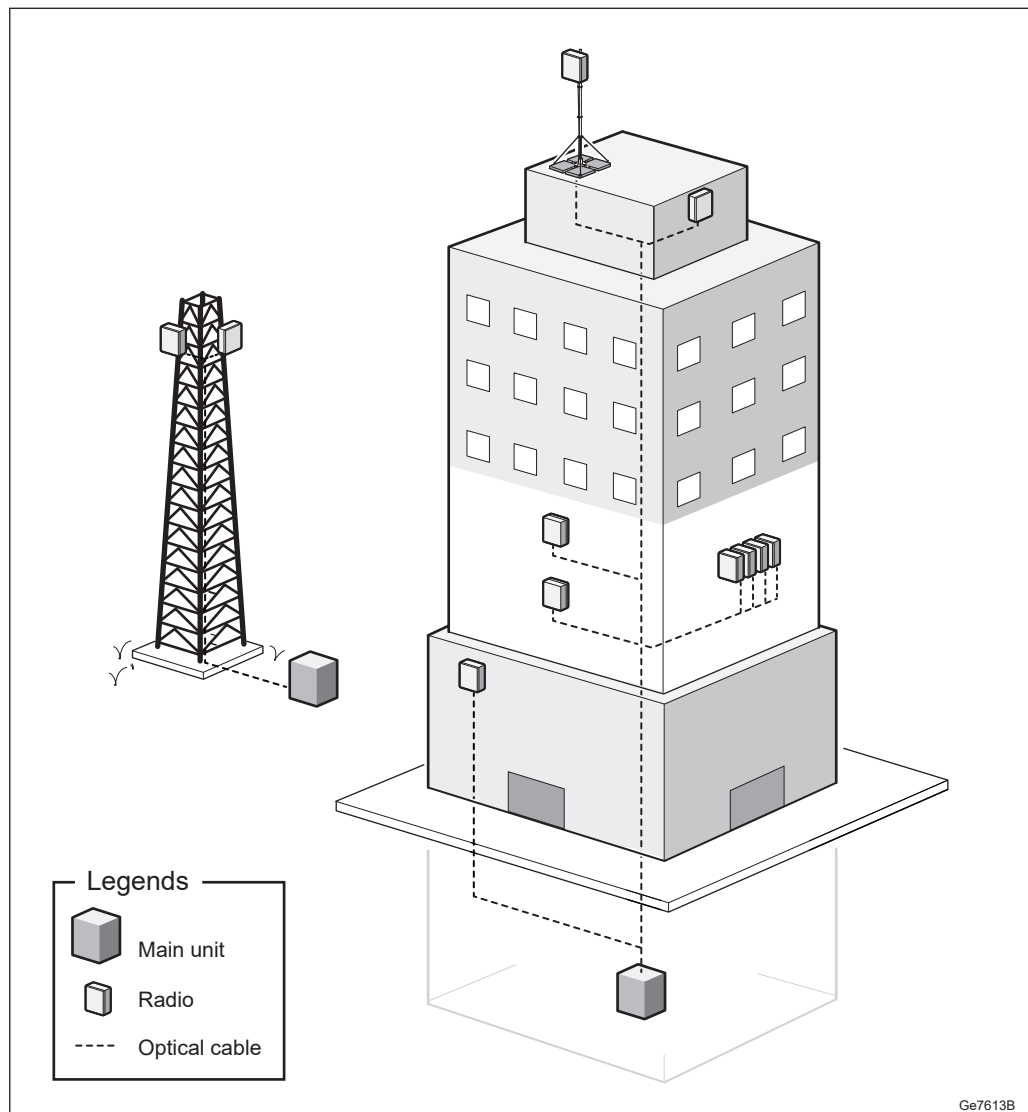


Figure 1 Radio Installations



2.1 Main Features

The following are the main features of the radio:

- LTE TDD, NR TDD
- Mixed mode, for supported mixed mode configurations, see [Supported Radio Capabilities](#).
- Duplex transmitter/receiver (4TX/4RX) branches
- DC version supports 2-wire (DC-C) and 3-wire (DC-I) power connections
- AC version supports AC power connection
- Up to 2×10.1 Gbps CPRI (optical)
- Complies with 3GPP base station class Wide Area. For a list of relevant standards, see [Radio Standards Compliance](#) on page 27.

2.2 Required Installation Equipment

Table 1 Mounting Kit

Mounting Kit	Product Name	Product Number
Tilt mounting kit	Streetmacro Wall & Pole Bracket with Tilt	SXK 109 2157/1
Bracket expansion kit for SXK 109 2157/4	Streetmacro Wall & Pole Bracket with tilt (Exp. kit)	SXK 109 2157/2
Mounting kit without tilt	Streetmacro Wall & Pole Bracket without Tilt	SXK 109 2157/3
Base bracket	Streetmacro Base Bracket	SXK 109 2157/4
Triple bracket	Streetmacro Triple Bracket	SXK 109 2157/5
Bracket for 140 mm pole diameter	Streetmacro 140mm pole dia bracket	SXK 109 2157/6



3 Technical Data

This section describes the physical characteristics, environmental data, and the power supply characteristics of the radio.

3.1 Bands, Carriers, and Output Power

For supported number of carriers, carrier bandwidth, operating bandwidth, IBW, maximum nominal output power, frequency range, RAT support, and mixed mode configurations, see [Supported Radio Capabilities](#).

Minimum configured output power per RF port without degradation in product performance is 2.5 W.

Hardware Activation Codes (HWAC) are required for total output power over 20 W.

For detailed information about output power hardware activation codes, see [Hardware-Related Capabilities](#) in the Radio Node libraries.

3.2 Physical Characteristics

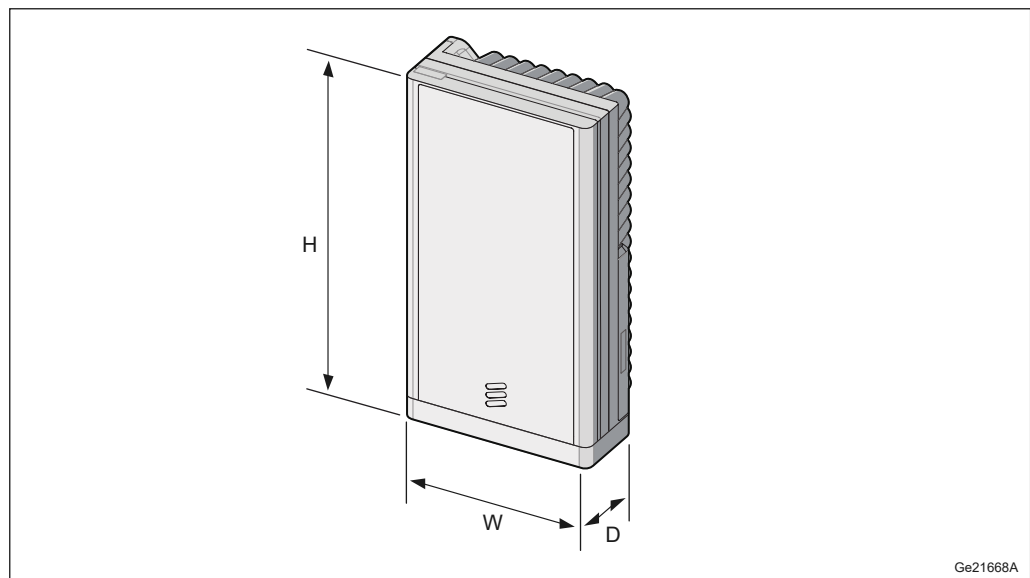


Figure 2 Radio Dimensions



Table 2 Radio Dimensions

Radio Type	Height (H) × Width (W) × Depth (D)
Radio 4435 B41	373 × 200 × 93 mm
Radio 4435 B77D	373 × 200 × 93 mm

Table 3 Radio Weight

Radio Type	Weight ⁽¹⁾
Radio 4435 B41	6.7 kg
Radio 4435 B77D	6.5 kg

(1) The weight is given with ±5% accuracy.

Table 4 Mounting Kit Weight

Mounting Kit	Weight
SXK 109 2157/1	3.2 kg
SXK 109 2157/2	2.3 kg
SXK 109 2157/3	2.0 kg
SXK 109 2157/4	0.9 kg
SXK 109 2157/5	7.9 kg
SXK 109 2157/6	2.5 kg

Table 5 Radio 4435 Color

Part	Color Code
Body	NCS S 1002-B

3.3 Installation Recommendations

To achieve reliable operation, and maximum performance, an appropriate installation location must be chosen.

3.3.1 Outdoor Locations to Avoid

Although Ericsson declares this product suitable for most outdoor environments, this does not cover installations where the planned installation site for the unit is a potential microclimate location. Typical examples of these microclimate locations are sites where the products are not only exposed to the actual temperature, but also additional temperature as heat coming from dark-colored planes, for example, reflections from the floor or walls. The additional



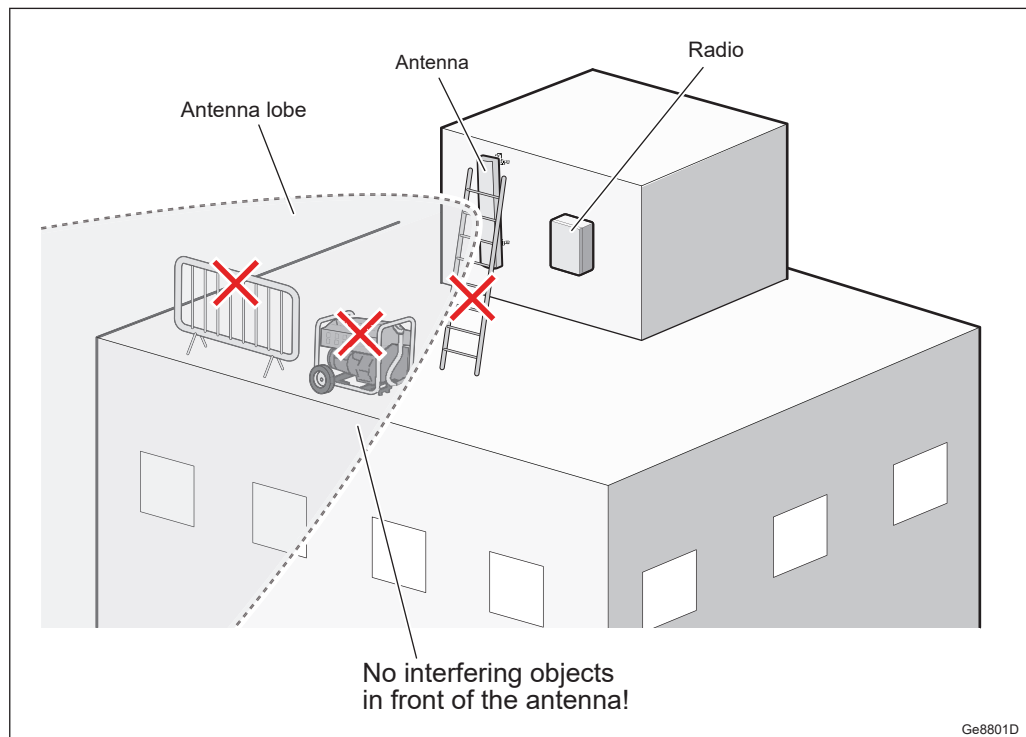
temperature can generate heat traps with temperatures up to 10°C higher than expected.

Avoid installing equipment in the following locations:

- Near the exhaust of the building ventilation system.
- Near the exhaust of the chimney.
- Opposite large surfaces made of glass or new concrete.
- Near overhanging structures such as roof overhangs.

Avoid radio interference by keeping the area directly in front of the antenna clear of the following:

- Metal surfaces or objects such as railings, ladders or chains
- Equipment generating electromagnetic fields, such as electric motors in air conditioners or diesel generators
- RBS equipment





3.3.2 Painting Disclaimer

Ericsson recommends to not paint the product as it can affect performance of the product.

Ericsson applies limitations to the warranty and service contract if the product is painted.

If the product is painted, the following commercial limitations apply:

- Failure modes directly related to overheating because of painting are not valid for repair within the scope of the warranty or standard service contract.
- Product failures related to paint contamination of components of the unit are not valid for repair within the scope of warranty or standard service contract.
- When a painted unit is repaired, it might be restored to the standard color before being returned to the market. It is not possible to guarantee that the same unit is sent back to the same place. This is also valid for units repaired under a service contract.
- For repairs within the warranty period or a standard service contract, the customer is charged the additional costs for replacing all painted parts of the unit or the complete unit.

If adaptations are required, contact Ericsson for information.



3.4 Installation Alternatives

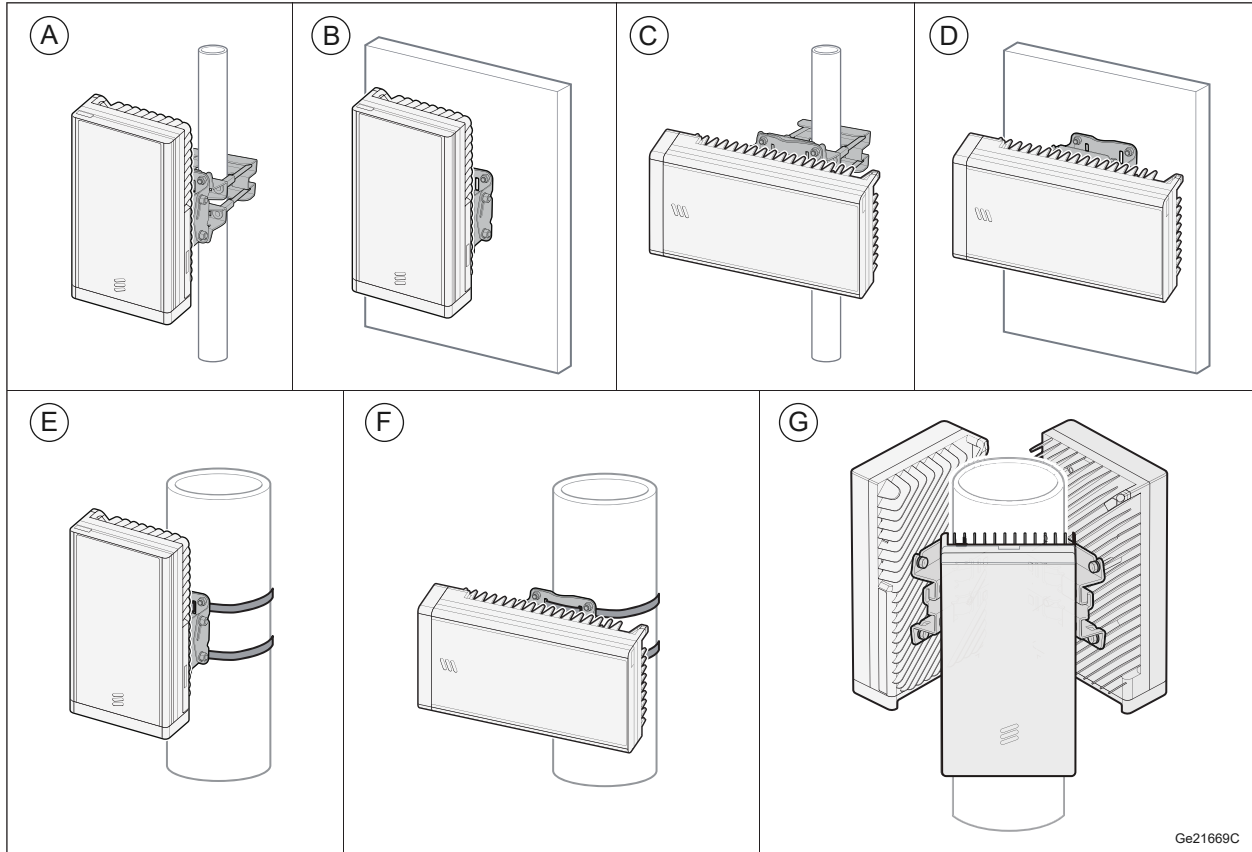


Figure 3 Installation Method Alternatives

Table 6 Key to Installation Alternatives

Installation Method	Description
A	Pole installation (pole with circular, square, or 90° angle cross section) with vertical placement
B	Wall installation with vertical placement
C	Pole installation (pole with circular, square, or 90° angle cross section) with horizontal placement ⁽¹⁾
D	Wall installation with horizontal placement ⁽¹⁾
E	Utility pole installation with vertical placement ⁽²⁾⁽³⁾⁽⁴⁾
F	Utility pole installation with horizontal placement ⁽¹⁾
G	Triple bracket pole installation

(1) See the label on the back of the radio for the correct installation direction.

(2) Steel bands for utility pole installations must be supplied locally.



- (3) The strength and size of the steel bands used must be based on local requirements and environmental factors.
- (4) For wooden utility poles, steel bands are not allowed. Use through bolt instead.

Table 7 Pole Mounting Range

Pole	Circular	Square	90° Angle
Minimum outer dimension ⁽¹⁾	Ø35 mm	30 x 30 mm	45 x 45 mm
Maximum outer dimension ⁽¹⁾	Ø300 mm	80 x 80 mm	80 x 80 mm

(1) Depends on mounting kit used. For detailed information, see [Site Installation Products Overview](#).

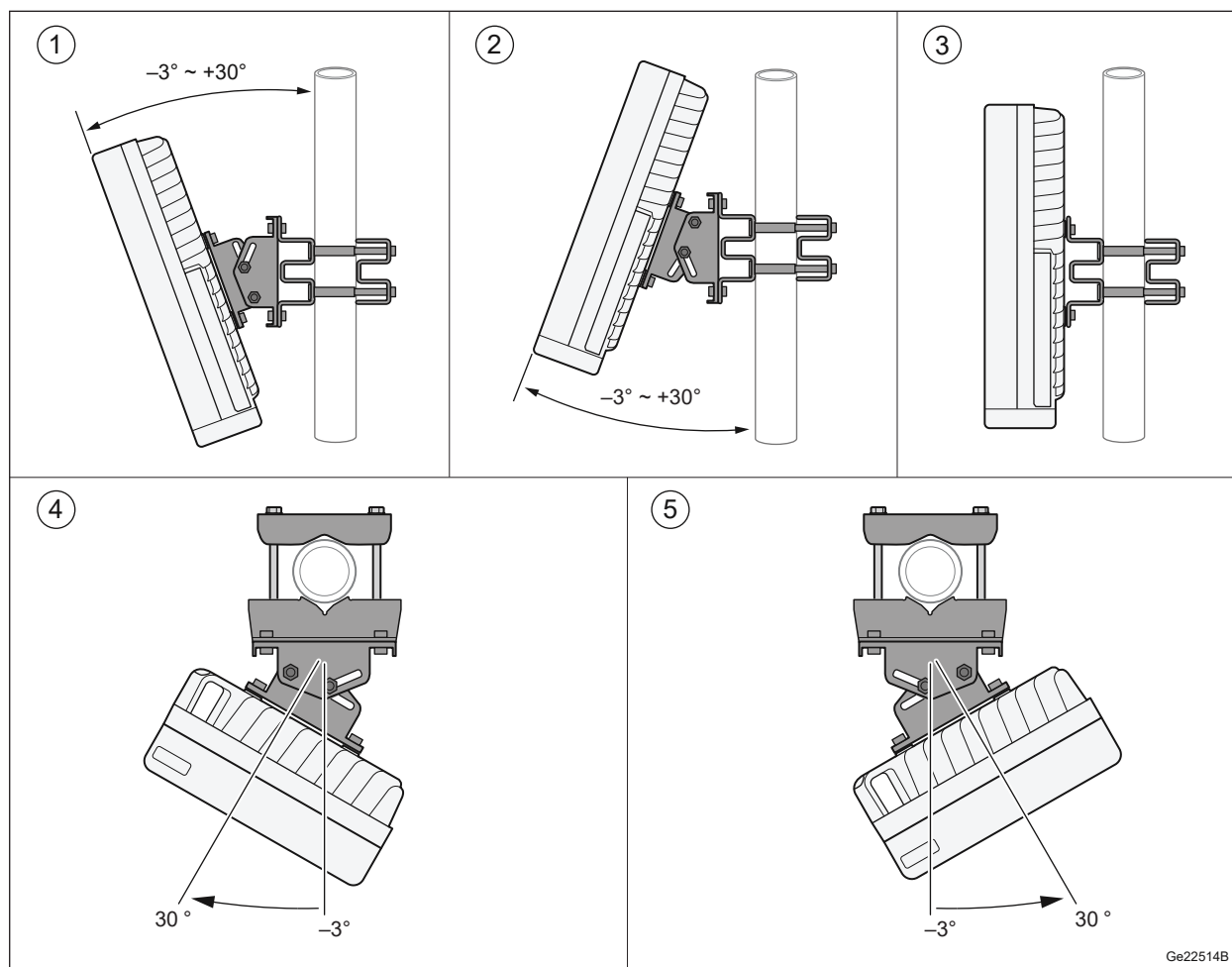


Figure 4 Tilt and Swivel Angle



3.5 Space Requirements

3.5.1 Generic Requirements

Parts of the radio can attain high temperatures during normal operation. Therefore the radio must be installed in a classified service access area. Exception applies when the radio is installed at a height that is not reachable from ground level.

Allow a sufficient working space in front of the radio.

It is recommended that the radio is installed below, or behind the antenna. Do not install the radio closer than 25 m from the main lobe of its own antenna, or antennas belonging to other services or operators using the same site.

3.5.2 Pole or Mast Installation

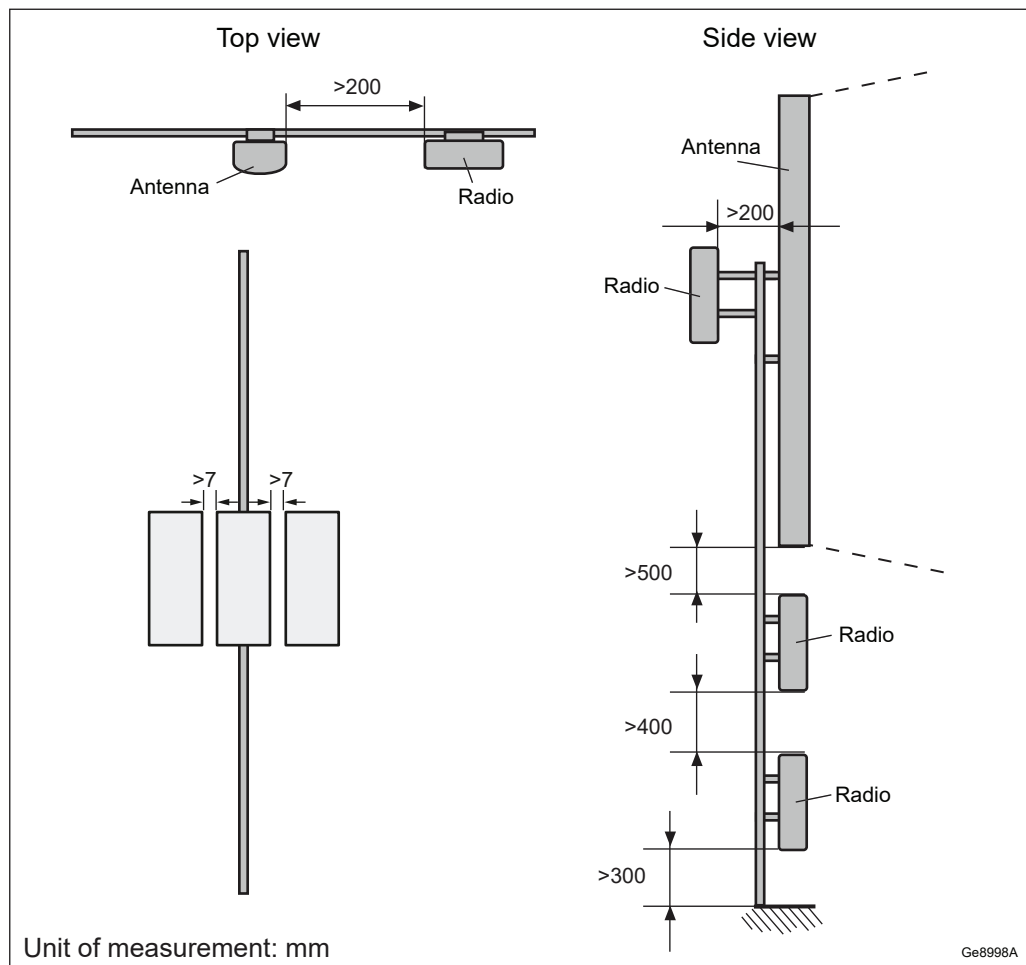


Figure 5 Radio Pole Installation Requirements



To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a single pole. Allow a minimum vertical distance of 500 mm between radio and antenna, if installed above or below an antenna. The minimum distance from the bottom of the radio to the floor is 300 mm for vertically installed radios.

Allow a minimum of 7 mm free space between radios installed side by side on the bracket when ambient temperature is expected to be below +42°C.

Allow a minimum of 100 mm free space between radios installed side by side on the bracket when ambient temperature is expected to be above +42°C and below +50°C. Only single radio installation on the bracket is supported when ambient temperature is expected to be above +50°C and below +55°C.

Note: A radio cannot be installed in the uppermost position of a pole or mast.



3.5.3 Radio Installation on Outdoor Wall

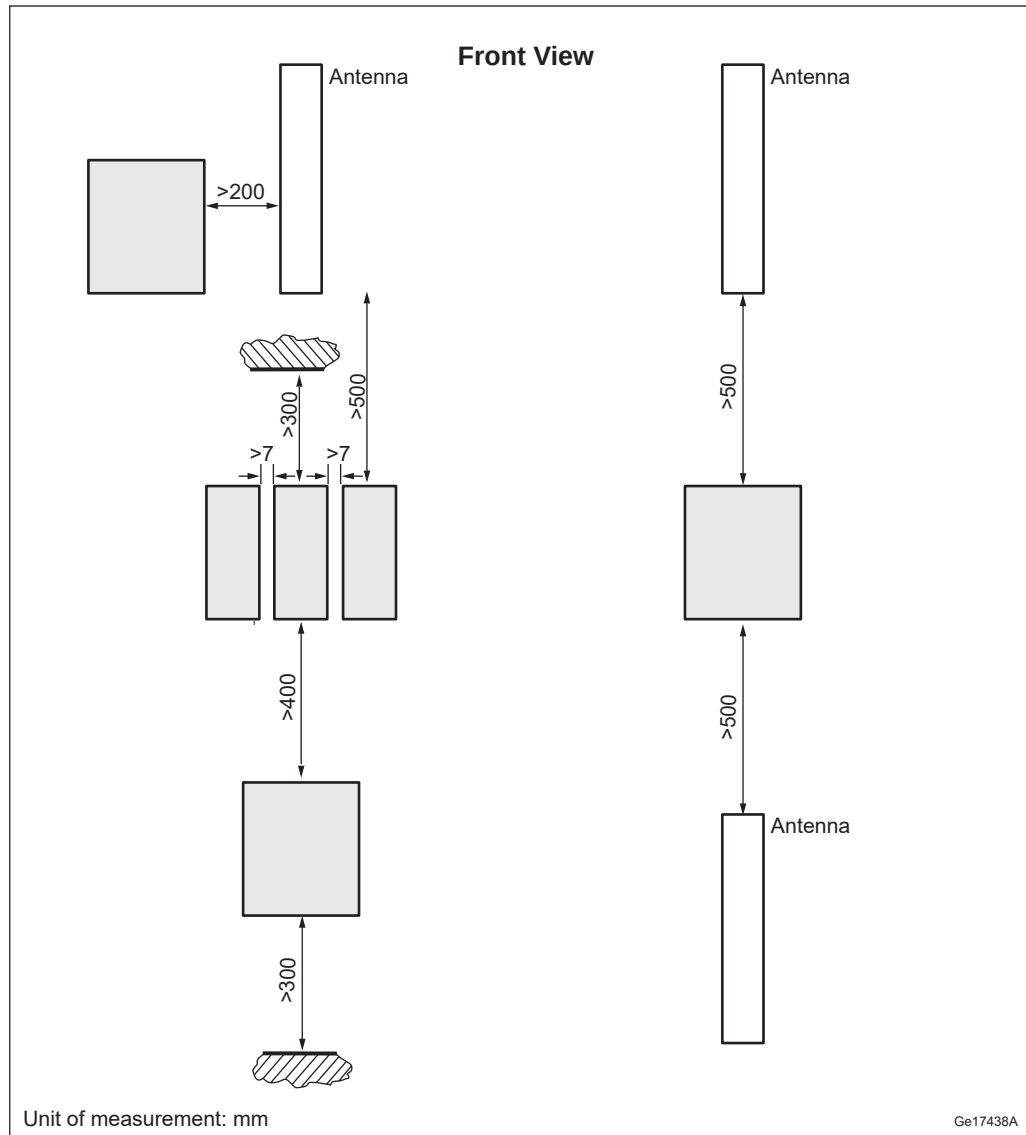


Figure 6 Radio Outdoor Wall Installation Requirements

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a wall. Allow a minimum vertical distance of 500 mm between radio and antenna, if installed above or below an antenna.

Allow a minimum of 300 mm to any overhanging roof or other structure that may obstruct airflow and create a heat trap.

The minimum distance from the bottom of the radio to the floor is 300 mm for vertically installed radios.



Allow a minimum of 7 mm free space between radios installed side by side on the bracket when ambient temperature is expected to be below +42°C.

Allow a minimum of 100 mm free space between radios installed side by side on the bracket when ambient temperature is expected to be above +42°C and below +50°C. Only single radio installation on the bracket is supported when ambient temperature is expected to be above +50°C and below +55°C.

3.6 Acoustic Noise

The radio does not have active cooling components. It can emit low levels of acoustic noise when operating on low capacity.

Radio 4435 sound pressure level is lower than 28 dBA at 1-meter distance for hemispherical distribution, based on ISO 9614-2 and ISO 11203.

3.7 Environmental Characteristics

This section contains operating environment data for the radio.

3.7.1 Operating Environment

The following are the values for the normal operating environment of the radio:

Table 8 Operating Environment

Description	Value
Temperature ⁽¹⁾	−40 to +55 °C
Solar radiation	≤ 1,120 W/m ²
Relative humidity	5–100%
Absolute humidity	0.26–40 g/m ³
Maximum temperature change	1.0 °C/min
Maximum wind load at 42 m/s (pole installed single case)	Radio 4435 B41: 121 N (front), 33 N (side) Radio 4435 B77D: 121 N (front), 33 N (side)

(1) Depending on installation scenario, traffic load, and configuration, the product can, in the highest 10 °C temperature range, temporarily reduce the output power. This depends on the durations of the high ambient temperature.

3.7.2 Heat Dissipation

The radio is convection cooled and designed for outdoor installation.



Avoid indoor installation in a room without adequate ventilation and cooling.

Max heat dissipation is calculated using the following formula:

Max Heat Dissipation = Max Power Consumption - Configured Output Power

Heat dissipation can be calculated for different traffic loads using values from Power Consumption Data. For more information, see Power Consumption Calculations.

3.7.3 Vibration

This section describes how the Radio tolerates vibrations. The Radio operates reliably during seismic activity as specified by test method IEC 60068-2-57 Ff.

Maximum level of RRS	50 m/s ² within 2–5 Hz for DR=2%
Frequency range	1–35 Hz
Time history signal	Verteq II from earthquake standard ATIS 0600329.2014

The Radio operates reliably during random vibration as specified by test method IEC 60068-2-64.

Random vibration, normal operation:

ASD-level	0.3 m ² /s ³ on horizontal axes X and Y 0.2 m ² /s ³ on vertical axis Z
Frequency range	2–200 Hz
Time per test direction	30 minutes

The Radio operates reliably during shock as specified by test method IEC 60068-2-27 Ea.

Peak acceleration	40 m/s ²
Duration	22 ms

3.7.4 Materials

All Ericsson products fulfill the legal and market requirements regarding the following:

- Material declaration
- Materials' fire resistance, components, wires, and cables
- Recycling



— Restricted and banned material use

3.8 Power Characteristics

This section describes the power supply requirements, power consumption, and fuse and circuit breaker recommendations for the radio.

Different power systems can supply power for multiple radios, if necessary.

3.8.1 DC Power Supply Characteristics

The power supply voltage for the radio is –48 V DC.

Table 9 Radio DC Power Supply Requirements

Conditions	Values and Ranges
Nominal voltage	–48 V DC
Operating voltage range	–36.0 to –58.5 V DC
Non-destructive range	0 to –60 V DC

Fuse and Circuit Breaker Recommendations

The recommendations given in this section are based on peak power consumption and give no information on power consumption during normal operation.

The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60934.

The radio has a built-in Class 1 (Type 1) SPD to protect the equipment in case of lightning and network transients. The recommended fuse or circuit breaker rating is therefore dimensioned not to trip the fuse or circuit breaker in case of most SPD operation. The minimum fuse rating can be taken into account only if it is accepted that fuses or circuit breakers trip in such situations.

Table 10 External Radio Fuse and Circuit Breaker Recommendations

Unit (DC Powered)	Output Power	Maximum Load Current at –36 V DC	Maximum Allowed Fuse Rating ⁽¹⁾
Radio 4435 B41	4 × 20 W	10 A	16 A
Radio 4435 B77D	4 × 15 W	10 A	16 A

(1) The maximum allowed fuse rating must (with a certain safety margin 10-20%) be larger than the maximum load current for reliable operation. However, it must not be larger than the next or nearest higher fuse or circuit breaker standard value in order to minimize the cable cross-section area and at the same time fully comply with relevant safety standards.



3.8.2 AC Power Supply Characteristics

The AC power source must provide protection for overcurrent, short circuit, and grounding fault.

Voltage values and ranges are listed in [Table 11](#).

Table 11 Radio AC Power Supply Requirements

Conditions	Values and Ranges
Nominal Voltage	100–250 V AC
Voltage Range including tolerance	90–275 V AC
Connection	Line-Neutral, Line-Line
Operating frequency	50/60 Hz
Voltage harmonics	< 10% at full load ⁽¹⁾
Shut-off allowance	At undervoltage or overvoltage
Inrush current peak	< 15 A
Inrush current duration	< 100 ms
AC system	TN, TT and IT

(1) Must comply with IEC 61000-3-2

Fuse and Circuit Breaker Recommendations

The recommendations given in this section are based on peak power consumption and give no information on power consumption during normal operation.

The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60947-2.

The PSU AC has a built-in Class 1 (Type 1) SPD to protect the equipment in case of lightning and network transients. The recommended fuse or circuit breaker rating is therefore dimensioned for not tripping the fuse or circuit breaker in case of SPD operation. The PSU AC is described in [Table 12](#).

Table 12 Radio 4435 Fuse and Circuit Breaker Recommendations

Unit (AC Powered)	Output Power	Nominal AC Input Voltage	Maximum AC Input Current ⁽¹⁾	Maximum Allowed Fuse Rating ⁽²⁾
Radio 4435 B41	4 × 20 W	100–127 V	5 A	10 A
		200–250 V	3 A	6 A
Radio 4435 B77D	4 × 15 W	100–127 V	5 A	10 A
		200–250 V	3 A	6 A



- (1) The Maximum AC Input Current is calculated at a total tolerance of -10% of the nominal value.
- (2) The Maximum Allowed Fuse Rating must be larger than the Maximum AC Input Current, yet still within a safety margin of 15%. This is to ensure reliable operation. However, it must not be larger than the standard value of the next or nearest higher fuse or circuit breaker. This is in order to minimize the cable cross-section area and comply with the relevant safety standard.

When the radio connected Line-Line a 2-pole circuit breaker or dual fuses are required for interruption of both lines. This is also valid when the radio is used in an IT system.

3.8.3 Power Consumption

For information on power consumption, see [Power Consumption Calculations](#) and [Power Consumption Data](#).

3.9 System Characteristics

This section describes the system characteristics of the Radio System.

3.9.1 RF Electromagnetic Field Exposure

For general information on RF EMF exposure, see [Radio Frequency Electromagnetic Fields](#).

[Table 13](#) and [Table 14](#) list the compliance boundaries (exclusion zones), outside of which the RF EMF exposure from Radio 4435 is below the limits specified by the ICNIRP, and the limits applicable in:

- EU (1999/519/EC, 2013/35/EU, EN 50385)
- USA (47 CFR 1.1310)

Table 13 Dimensions of the Box-Shaped Compliance Boundary for General Public (GP) and Occupational (O) Exposure Applicable in the EU and Markets Employing the ICNIRP RF Exposure Limits (Including 0.5 dB Transmission Loss and 0.6 dB Power Tolerance)

Mode and Output Power					Dimensions of the Box-shaped Compliance Boundary ⁽¹⁾ (m)							
					Distance in Front of Antenna		Width		Height		Distance Behind Antenna	
Product	Standard	Nominal Peak Output Power from the Radio	IEC 62232 Installation Class	TDD DL Duty Cycle	GP	O	GP	O	GP	O	GP	O
Radio 4435 B41	LTE/NR	4 × 20 W	E+	75%	8.2	3.0	5.2	1.7	2.5	1.5	<0.1	<0.1



(1) The compliance boundaries are determined for maximum output power with transmission loss, output power tolerance, and TDD downlink duty cycle included using the antenna 80020622 for an electrical tilt of 2°.

Table 14 Dimensions of the Box-Shaped Compliance Boundary for General Public (GP) and Occupational (O) Exposure Applicable in the USA and Markets Employing the FCC RF Exposure Limits (Including 0.5 dB Transmission Loss and 0.6 dB Power Tolerance)

Mode and Output Power					Dimensions of the Box-shaped Compliance Boundary ⁽¹⁾⁽²⁾ (m)							
					Distance in Front of Antenna		Width		Height		Distance Behind Antenna	
Product	Standard	Nominal Peak Output Power from the Radio	IEC 62232 Installation Class	TDD DL Duty Cycle	GP	O	GP	O	GP	O	GP	O
Radio 4435 B41	LTE/NR	4 × 20 W	E+	75%	8.7	3.9	6.2	2.8	2.5	1.9	0.3	0.2
Radio 4435 B77D	NR	4 × 15 W	E+	75%	6.4	2.9	5.0	2.3	1.8	1.5	0.3	0.2

(1) For Radio 4435 B41, the compliance boundaries are determined for maximum output power with transmission loss, output power tolerance, and TDD downlink duty cycle included using the antenna 80020622 for an electrical tilt of 2°.

(2) For Radio 4435 B77D, the compliance boundaries are determined for maximum output power with transmission loss, output power tolerance included using the antenna 80010922 for an electrical tilt of 2°.

3.9.2 Software

For information on software dependencies, see [Supported Radio Capabilities](#).

3.9.3 Radio Configurations

For information about available radio configurations, see [Radio Node Configurations](#).

3.9.4 VSWR Limitations

This unit supports return loss antenna supervision for LTE, NR and ESS carriers with 5 MHz bandwidth or higher.

For more information, see [Return Loss Antenna Supervision](#).



4 Hardware Architecture

This section describes the radio hardware structure regardless of configuration or frequency. For a description of the currently available radio configurations, see [RBS Configurations](#).

4.1 Radio Parts

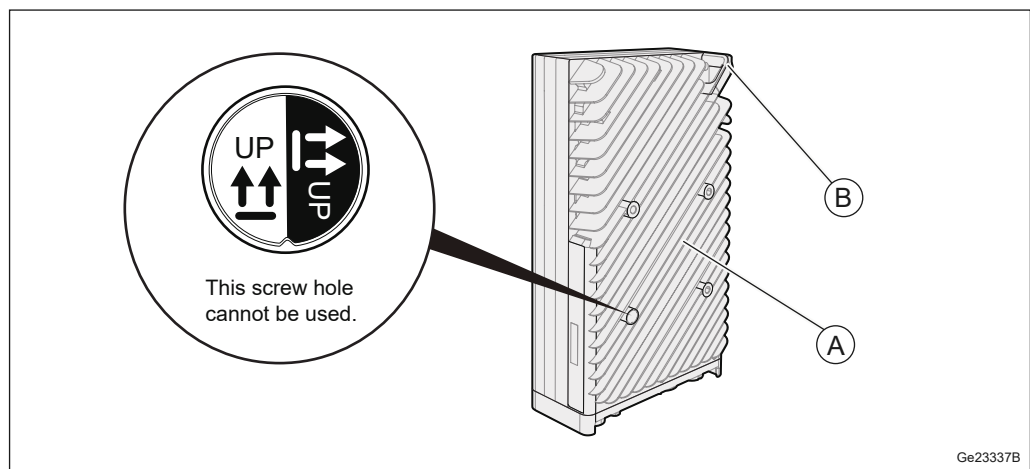


Figure 7 Radio Parts

Table 15 Key to Radio Parts

Position	Component
A	Cooling fins
B	Lifting eye

4.2 TRX

The Transmitter and Receiver (TRX) provides the following:

- Analog/Digital (A/D), Digital/Analog (D/A) conversion
- Channel filtering
- Delay and gain adjustment
- Digital predistortion



- RF modulation and demodulation
- Optical cable interface termination
- RX diversity

4.3 Optical Indicators and Maintenance Button

The radio unit is equipped with optical indicators and a maintenance button. The locations of the optical indicators and the maintenance button are shown in .

Table 16 describes how to interpret the optical indicators and maintenance button on the radio unit. For detailed information, refer to Indicators, Buttons, and Switches.

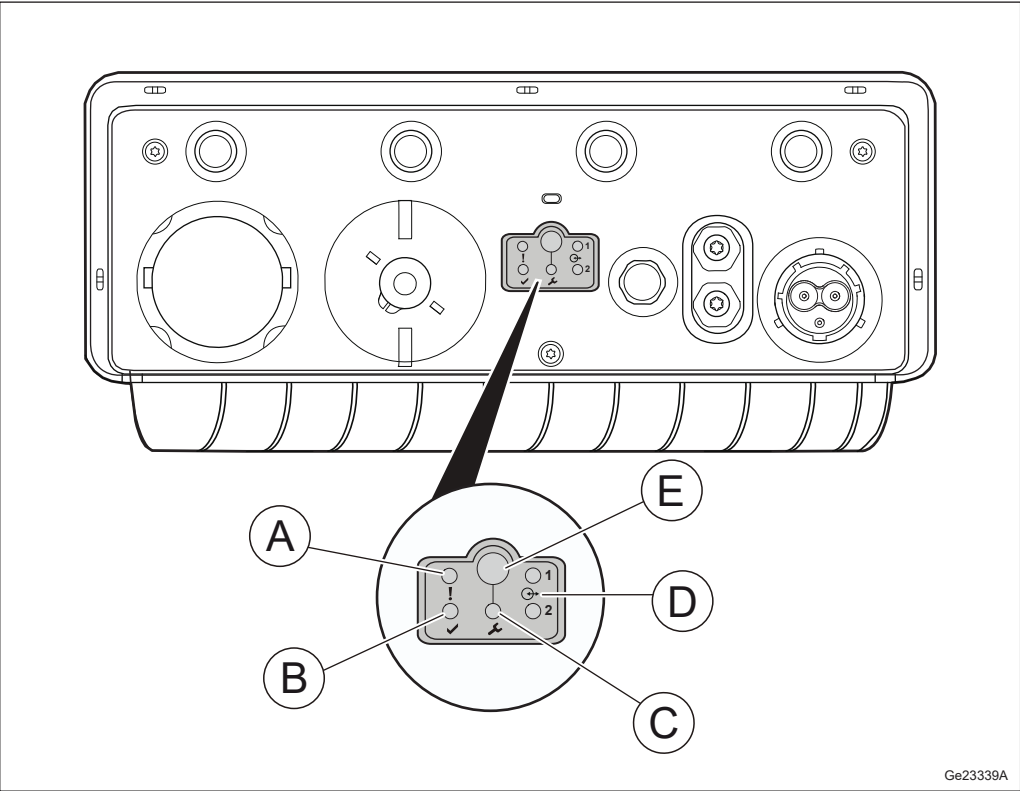
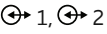


Figure 8 Optical Indicators and Maintenance Button

Table 16 Radio Unit Optical Indicators and Maintenance Button

Position	Marking	Indicator	Color	Mode	Interpretation
A	!	Fault	Red	Off	No fault detected in unit
				On	Fault detected in unit
B	✓	Operational	Green	Off	No power

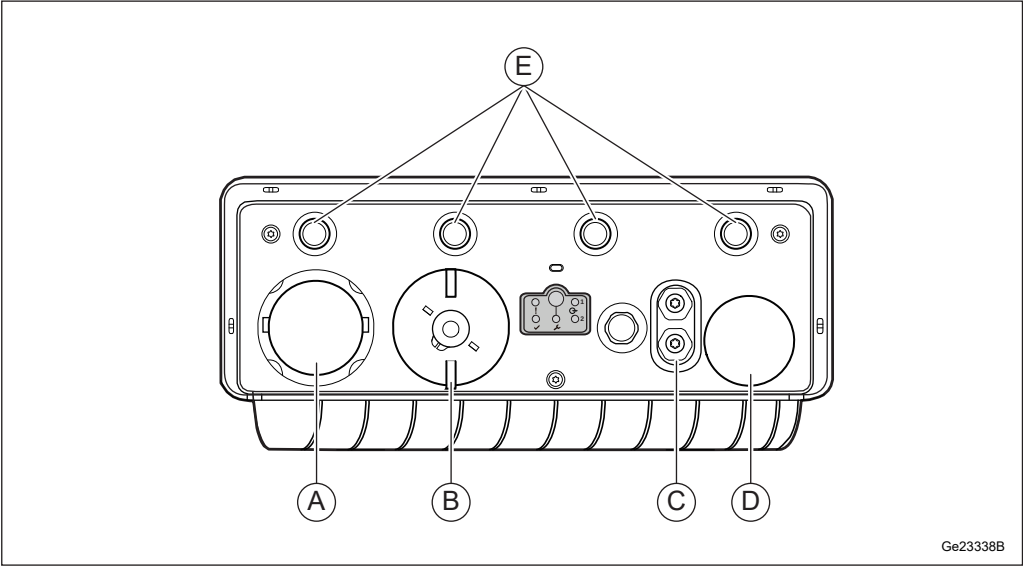


Position	Marking	Indicator	Color	Mode	Interpretation
				On	Operational
				Flashing Slowly (0.5 Hz)	Missing dependent resource
				Flickering (16 Hz)	Transitory activity
				Double flashing Off	Loading in progress No ongoing traffic
				Double flashing On	Loading in progress Traffic is ongoing
C		Maintenance	Blue	Off	No ongoing maintenance activity Traffic is ongoing
				On	Maintenance mode All traffic and alarms are suppressed
				Flashing Slowly (0.5 Hz)	Maintenance mode is initiated When traffic and alarms are removed, the indicator switches to On
D		Interface	Green	Off	Disconnected
				On	Connected
E	—	Maintenance button	—	—	—



5 Connection Interfaces

This section contains information about the connection interfaces of the radio.



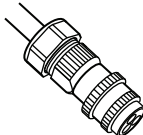
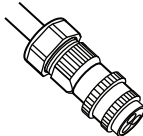
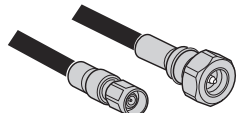
Ge23338B

Figure 9 Connection Interfaces

Table 17 Connection Interfaces

Position	Description	Marking	Connector Types	Cable Illustration
A	Optical cable 1	↻ 1	LC (On SFP+) with support for FullAXS	
B	Optical cable 2	↻ 2		
C	Grounding point	⏏	2 × 6 mm dual lug	



Position	Description	Marking	Connector Types	Cable Illustration
D (AC version)	100–250 V AC power supply	100–250V 	Power connector	
D (DC version)	–48 V DC power supply	–48V 	Power connector	
E	Antenna A–D (from left to right)	   	NEX10	

5.1 Antenna Interface

The antenna interfaces provide connections for the radio to antennas. The jumper and RF cables connect the radio to the antenna.

Table 18 Radio Antenna Connection Interface Characteristics

Connector Type	Jumper Cable Type	RF Cable Type
NEX10 female	NEX10 male on one end and 4.3-10 female on the other end	50 Ω 1/2-inch coaxial, 4.3-10 male

Table 19 Antenna Cable Connectors

Radio Connectors	Antenna Connectors
(Antenna A–Antenna D)	TX/RX

5.2 Interface for Optical Cable to Main Unit

The  1 and  2 interfaces provide connections to optical cables for traffic and timing signals between the radio and the main unit. An SFP+ is used to connect the optical cable to the radio.

Note: The radio uses SFP+ modules for optical transmission and optical radio interfaces on Data 1 (optical cable 1) and Data 2 (optical cable 2).

Only use SFP+ modules approved and supplied by Ericsson. These modules fulfill the following:



- Compliance with Class 1 laser product safety requirements defined in standard IEC 60825-1.
- Certification according to general safety requirements defined in standard IEC 62368-1.
- Functional and performance verified to comply with Radio System specifications.

Recommended SFP+ modules are obtained from the product packages for the Radio System and the Main Remote Installation products. For more information about SFP modules, see [SFP Module Selector Guide and Site Installation Products Overview](#).

5.3 –48 V DC or 100–250 V AC Power Supply Interface

5.3.1 –48 V DC Power Supply Interface

The –48 V DC power connection is made through a connector with a 3-wire (DC-I) connection or a connector with a 2-wire (DC-C) connection.

For power cable dimensioning, see [Site Installation Products Overview](#).

For determining which connector or junction box to use, see [Table 20](#).

Table 20 –48 V DC Power Supply Connector or Junction Box

Cross-Sectional Area of Each Conductor (mm ²)	Connector or Junction Box
6–16	For 3-wire (DC-I), used with connector RNT 447 36/01. For 2-wire (DC-C), used with connector RNT 447 37/01.
25	Used with junction box NTB 101 75/1

The power cable conductor has a wire for both the 0 V conductor and a wire for the –48 V DC conductor.

All cables must be shielded. The shielding must be properly connected both to the power connector and to the grounding in the power supply equipment; otherwise, the unit over voltage and lightning protection does not function properly.

5.3.2 100–250 V AC Power Supply Interface

The AC power connection is made through a connector (RNT 447 31/03).



Table 21 AC Power Connector Capabilities

Conditions	Values and Ranges
Cable outer diameter	6 to 18 mm
Terminal size	1.5 to 4.0 mm ²

Table 22 Minimum AC Power Supply Cable

Cable Length	Cross-Sectional Area of Each Conductor
≤ 100 m	3 x 1.5 mm ²

The power cable has a wire for Line (L), a wire for Line/Neutral (L/N), and a wire for Protective Earth (PE) conductors. The wire color code for wires is market dependent.

All cables must be shielded. The shield must be folded back over the outer jacket of the cable and properly connected to the radio chassis, otherwise the radio overvoltage does not function properly.

The AC cable temperature rating must be at least 70 °C.

5.4 Grounding Interface

Radio 4435 must be grounded to protect it from overvoltage and lightning strikes.

For more information about grounding principles, see [Grounding Guidelines for RBS Sites](#).



6 Standards and Regulations

This section presents a brief overview of standards, regulatory product approval, and declaration of conformity for the radio.

FCC Compliance Statement

"This device complies with Part 15 of the FCC CFR 47 rules. Operation is subject to the following two conditions: This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation."

6.1 Regulatory Approval

6.1.1 Environmental Standards Compliance

The product complies with the following environmental standard:

Europe

- Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive (2011/65/EU) bands not allowed or not harmonized within the EU.

6.1.2 Safety Standards Compliance

In accordance with market requirements, the product complies with the following product safety standards and directives:

Europe

- EN 50385
- EN 62368-1

North America

- Health Canada Safety Code 6
- UL 62368-1
- CSA-C22.2 No. 62328-1



6.1.2.1 Outdoor Specific Requirements

The product complies with the following outdoor specific requirements:

Europe

- EN 60529 (IP65)
- EN 60950-22

North America

- UL 50E
- UL 60950-22
- CSA-C22.2 No. 60950-22-07

6.1.3 EMC Standards Compliance

The product complies with the following Electromagnetic Compatibility (EMC) standards:

North America

- FCC CFR 47 Part 15 B
- IC ICES-003 B

6.1.4 Radio Standards Compliance

The product complies with the following radio standards:

North America

- FCC CFR 47 Part: 2, 27 (US Band/Frequency Specific)

6.1.5 Marking

To show compliance with legal requirements, the product is marked with the following labels:

North America

- cETLus
- FCC CFR 47 Part 15 Statement



- IC ICES-003 Statement
- FCC ID Number

6.2 Other Standards and Regulations

The standards and regulations in this section are not regulatory approved.

6.2.1 Spare Parts

The product adheres to the Ericsson Serviceability and Spare Part Strategy.

6.2.2 Surface Quality

The surface quality of the radio is according to Ericsson standard class A5 for the top, front, and side covers, and A6 for the heat-sink.

6.2.3 Vandal Resistance

Unauthorized access is not possible without damaging the tamper proof warranty seal.



NB+C Engineering Services

Existing Utility Pole Node

Prepared for Crown Castle Mid-Atlantic

SITE INFORMATION

Address	9609 New Hampshire Avenue Silver Spring, MD 20903 Latitude: 39.013263°, Longitude: -76.978298°
Site Name	MNG-386
POLE TAG ID	806429-080690
PEPCO FACILITY ID	806429-080690
NB+C Project Number	100505
Date	May 31, 2024

May 31, 2024

Terrence L. Myers
Project Manager – MDV Market
Crown Castle
10980 Grantchester Way, Suite 4000
Columbia, MD 21044

Re: Utility Pole Structural Analysis Report

Dear Mr. Myers,

Per your request, NB+C Engineering Services is pleased to submit this “**Structural Analysis Report**” to determine the structural integrity of the existing utility pole listed on Table 1 of this report. Information we received for this analysis includes:

- Ike Office Report prepared by NB+C ES dated August 15, 2023
- Construction drawings prepared by NB+C ES dated May 30, 2023

Table 1 - Existing Utility Poles

Pole Length (Ft)	Pole Species	Pole Class	Pole Height above Grade (ft)	Embedment Depth (ft)	% Capacity (worst case loading)	Pass / Fail
55	SP	1	49.83	5.17	93%	Pass

APPLICABLE CODES AND STANDARDS

The existing structure was analyzed/designed per the provisions of following applicable codes and standards:

- *2018 International Building Code incorporating Montgomery County amendments published per ER #31-19*
- *Minimum Design Loads for Buildings and Other Structures ASCE/SEI 7-16*
- *2017 National Electric Safety Code*
- *TIA-222-H-2016*

ANALYSIS

Design Loads:

- NESC 250B Ice and Wind

CONCLUSION

Based on the performed analysis on the utility pole for applicable gravity and lateral loads, we have determined that the existing utility wood pole is **adequate** to support the proposed Wireless loading. The results of our analysis are included in the attached documentation. Please refer to construction drawings prepared by **NB+C ES** for additional information and structural details.

We at NB+C Engineering Services appreciate the opportunity of providing our continuing professional services to Crown Castle. If you have any questions or need further assistance on this or any other projects, please give us a call.

NB+C Engineering Services

Prepared by: Gaurav Singh Mukati

Respectfully submitted by:

Trent T. Snarr, P.E.
Chief Engineer
MD License # 55491



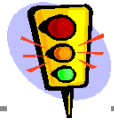
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND.

LICENSE NO. 55491 EXPIRATION DATE: 01/08/2026

PoleForeman - Pole Loading Analysis Report

License: NB+C

Version 7.4.26



POLE LOADING DATA

Pole: 55/1 (Wood-Cylindrical)

Soil: None

Pole Loading

Horizontal: 93% (250B)
Vertical: 11% (k=1.20)

NESC Edition: 2017

Loading District: Heavy

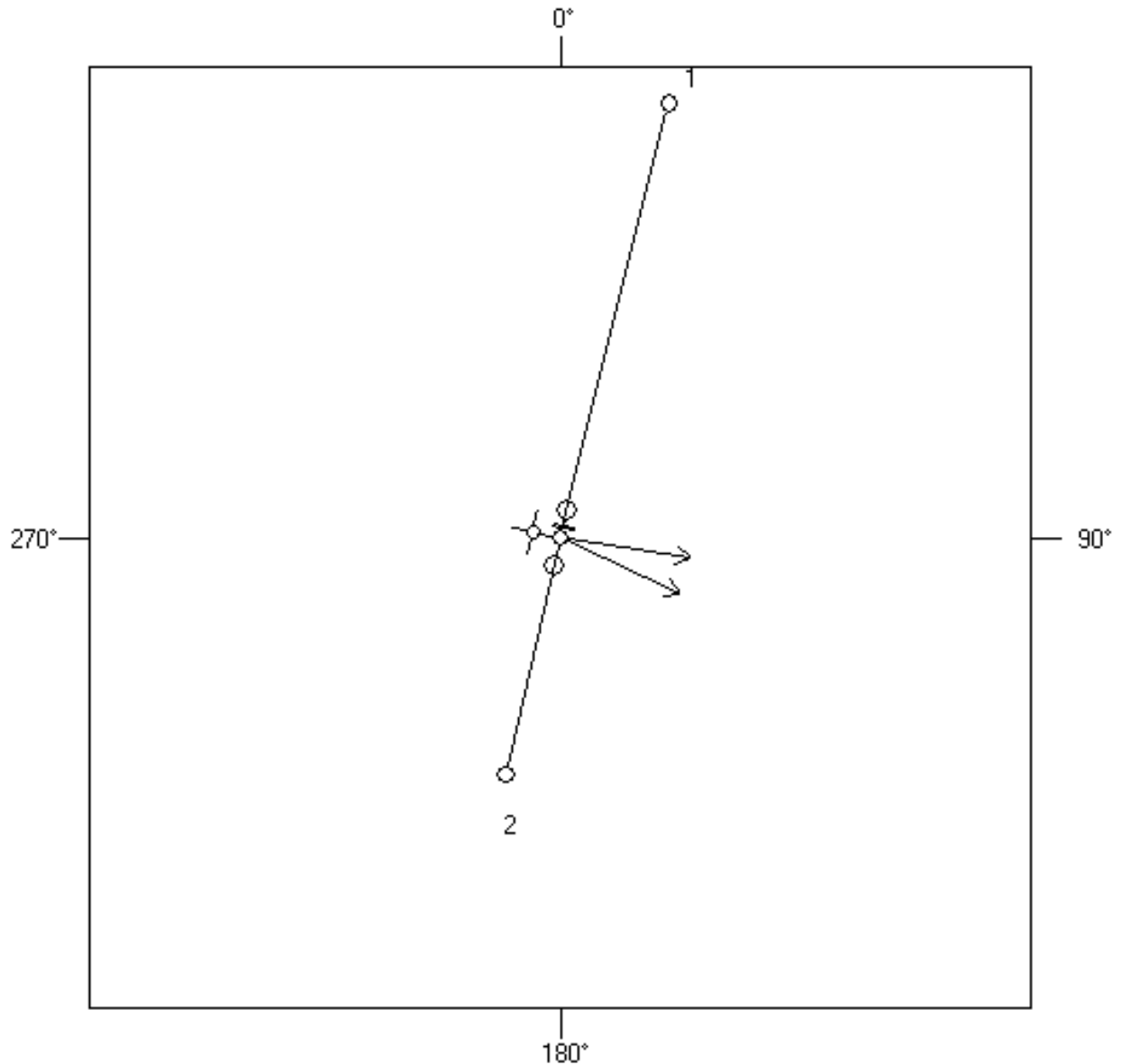
Construction: Grade C (Crossing)

Rule 250B: Temp=0F, Wind=4 psf, Ice=0.5 in

POLES

Pole #	Length (ft)	Depth (ft)	Elevation (ft)
0	55	5.17	0
1	50	7.08	0
2	55	6.75	0

POLE LINE TOPOLOGY



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GUY STRAND DATA

Anchor	Strand	Attach	Length	Direction	Tension	Strength	Loading
1	5/16" EHS	362"	6'	12°	3,368	10,080	33%
2	5/16" EHS	311"	7'	12°	4,007	10,080	40%

ANCHOR DATA

Anchor	Rod	Anchor	Soil	Tension	Rod Strength	Anchor Strength
1	1-1/4" Rod	10" Helix	Class - 5	3,368	58,000	16,000
2	1-1/4" Rod	10" Helix	Class - 5	4,007	58,000	16,000

INSULATORS

Insulator	Attach	Loading	Angle
15KV Pin	7"	30%	1°
15KV Xarm Pin	23"	48%	1°
15KV Xarm Pin	23"	48%	1°
15KV Xarm Pin	92"	56%	1°
15KV Xarm Pin	92"	56%	1°
15KV Xarm Pin	92"	56%	1°

ARM / BRACKET DATA

Arm/Bracket	Attach	Vert Loading	Horz Loading
33" Single FG Pole Top Pin	7"	47%	18%
10' Single X-Arm (3.75x4.75)	23"	63%	13%
10' Single X-Arm (3.75x4.75)	92"	70%	49%

SPANS

Span: 1 **Span Length (ft): 254** **Direction: 14°**

Circuit: 1

	Ruling Span (ft)	Offset (in)	Attach A (in)	Attach B (in)	Tension
Primary					
477 ACSR (30/7)	250	55	14	18	3900
477 ACSR (30/7)	250	0	-19	12	3900
477 ACSR (30/7)	250	-55	14	18	3900
Secondary					
4/0 AL QPX SECD	250	0	226	197	4002

Circuit: 2

	Ruling Span (ft)	Offset (in)	Attach A (in)	Attach B (in)	Tension
Primary					
1/0 ACSR (6/1)	300	55	83	76	2419
1/0 ACSR (6/1)	300	20	83	76	2419
1/0 ACSR (6/1)	300	-55	83	76	2419

Joint Use

Joint Use Cable	Ruling Span (ft)	Diameter (in)	Weight (lbs/ft)	Attach A (in)	Offset (in)	Attach B (in)	Tension (lbs)	Description
10M-144CT-100PR w/ 4402 Strand	250	1.66	0.96	285	1	285	2672	
0.75" TELCO	250	0.75	0.33	311	1	311	2986	
1.00" TELCO	250	1.00	0.50	324	1	324	3214	
0.75" TELCO	250	0.75	0.33	337	1	337	2986	
0.50" TELCO	250	0.50	0.22	346	1	346	1602	

Span: 2 **Span Length (ft): 138** **Direction: 193°**

Circuit: 1

	Ruling Span (ft)	Offset (in)	Attach A (in)	Attach B (in)	Tension
Primary					
477 ACSR (30/7)	200	55	14	16	3900
477 ACSR (30/7)	200	0	-19	9	3900
477 ACSR (30/7)	200	-55	14	16	3900
Secondary					
4/0 AL QPX SECD	200	0	226	279	3776

Circuit: 2

	Ruling Span (ft)	Offset (in)	Attach A (in)	Attach B (in)	Tension
Primary					
1/0 ACSR (6/1)	200	55	83	80	2202
1/0 ACSR (6/1)	200	20	83	80	2202
1/0 ACSR (6/1)	200	-55	83	80	2202

PoleForeman - Pole Loading Analysis Report

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Version 7.4.26

Joint Use

Joint Use Cable	Ruling Span (ft)	Diameter (in)	Weight (lbs/ft)	Attach A (in)	Offset (in)	Attach B (in)	Tension (lbs)	Description
10M-144CT-100PR	200	1.66	0.96	285	1	285	2200	
0.75" TELCO	200	0.75	0.33	311	1	311	2710	
1.00" TELCO	200	1.00	0.50	324	1	324	2905	
0.75" TELCO	200	0.75	0.33	337	1	337	2710	
0.50" TELCO	200	0.50	0.22	346	1	346	1480	
0.75" TELCO	200	0.75	0.33	362	1	362	2710	

SERVICES

Service	Type	Length (ft)	Direction	Attach (in)	Tension
1/0 AL TPX SERV	Power	76	99°	226	150
1/0 AL TPX SERV	Power	76	115°	226	150

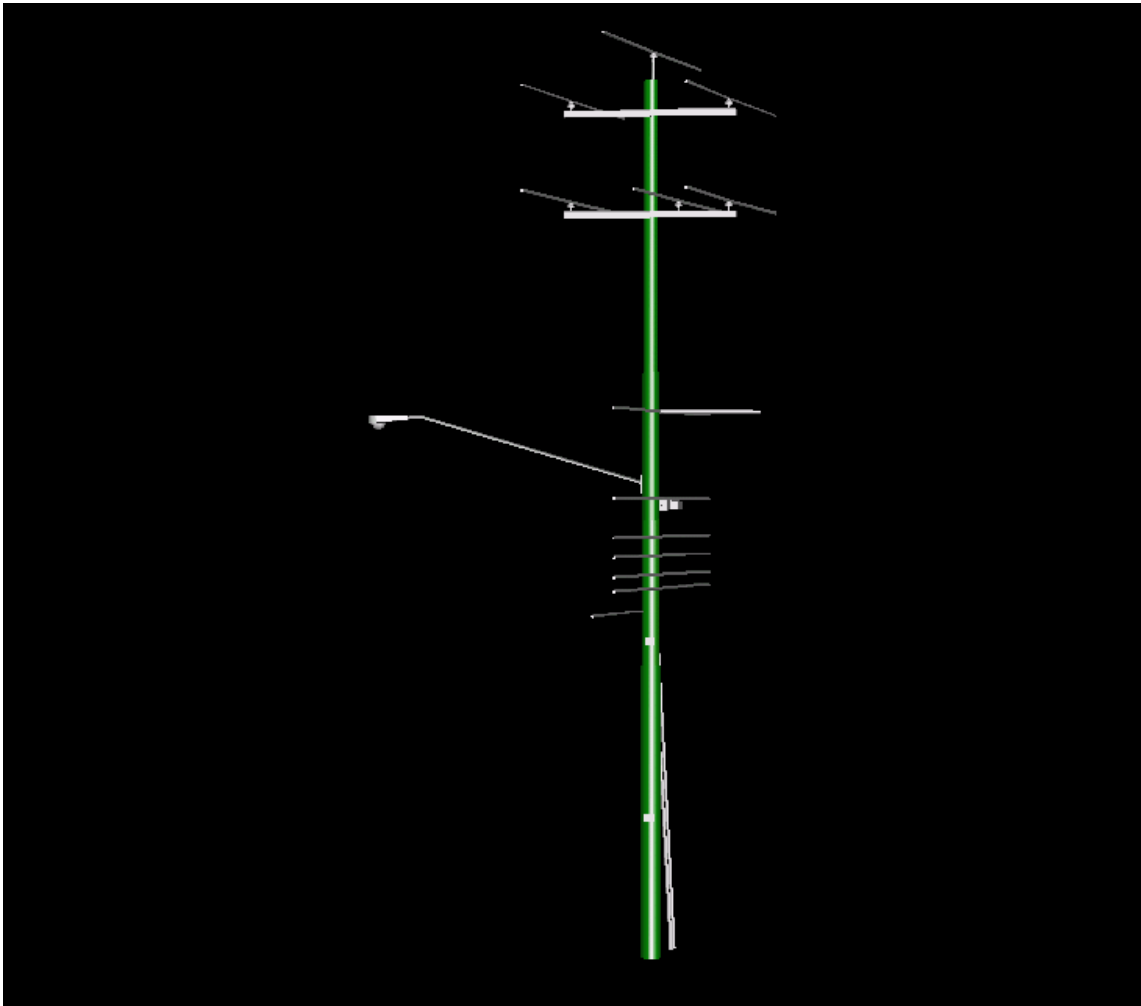
EQUIPMENT

Equipment	Weight (lbs)	Attach (in)	Direction
Strand Mount Antenna -Ericsson (1) 6523, (1) 6525	68.0	285	14°
User Defined Equipment	5.0	382	193°
User Defined Equipment	5.0	502	193°

LIGHTS

Light	Bracket	Weight	EPA	Attach	Direction
150-400W Cobra	14 FT Bracket	97	0.87	271	281°

Solid Model View



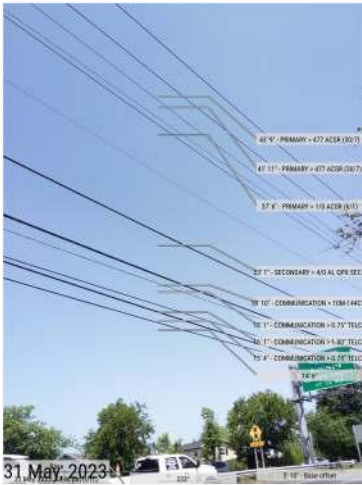
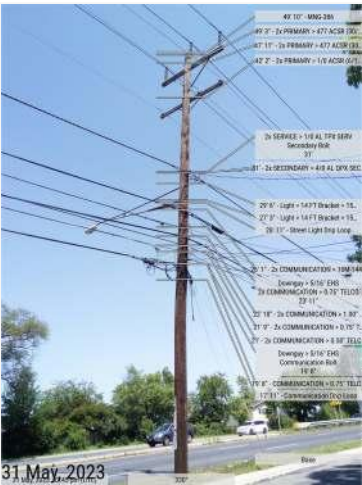
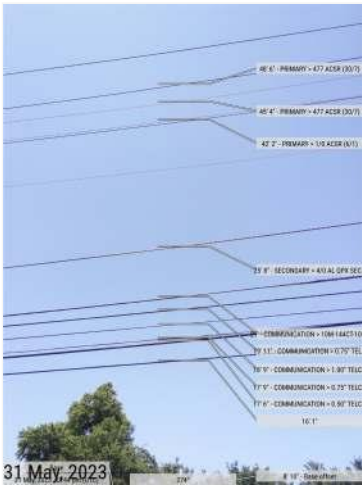
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NB+C Node Survey 2 (1 of 3)

Pole Sequence Number: 806429-80690 SCU ID: 474995 Tip: 49' 10" Circumference (") : 44

Location: (lat: 39.01327, lng: -76.9783, alt: 195' 10") Ready for Crown Castle Upload: No

IKEphoto



Tag Photos



Directional Photos #1: Directional Photos #1

North



South



East



West



31 May, 2023

12 o'clock



9 o'clock



6 o'clock



3 o'clock



Anchor #1: Anchor #1

Lead Length: 6' at 12.00°

Guys #1: Downguy > 5/16" EHS

Owner: COMMUNICATION > Telco Attachment Height: 19' 8"

Anchor #2: Anchor #2

Lead Length: 7' at 12.00°

Guys #1: Downguy > 5/16" EHS

Owner: COMMUNICATION > Telco Attachment Height: 23' 11"

Equipment #1: Light > 14 FT Bracket > 150-400W Cobra

Orientation: 281 Owner: UTILITY > PEPCO Attachment Height: 27' 3" Bottom Height: 29' 6"

Span #1: Fore Span

Span Length: 138' 4" at 192.62°

Wire #1: COMMUNICATION > 0.75" TELCO

Mid Span Height: 16' 1"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 19' 8"
Wire #2: COMMUNICATION > 0.50" TELCO			
Mid Span Height: 17' 6"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 21'
Wire #3: COMMUNICATION > 0.75" TELCO			
Mid Span Height: 17' 9"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 21' 9"
Wire #4: COMMUNICATION > 1.00" TELCO			
Mid Span Height: 18' 9"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 22' 10"
Wire #5: COMMUNICATION > 0.75" TELCO			
Mid Span Height: 19' 11"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 23' 11"
Wire #6: COMMUNICATION > 10M-144CT-100PR			
Mid Span Height: 21'	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 26' 1"
Wire #7: SECONDARY > 4/0 AL QPX SECD			
Mid Span Height: 25' 8"	Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 31'
Wire #8: PRIMARY > 1/0 ACSR (6/1)			
Mid Span Height: 42' 2"	Quantity: 3	Owner: UTILITY > PEPCO	Attachment A Height: 42' 2"
Wire #9: PRIMARY > 477 ACSR (30/7)			
Mid Span Height: 45' 4"	Quantity: 2	Owner: UTILITY > PEPCO	Attachment A Height: 47' 11"
Wire #10: PRIMARY > 477 ACSR (30/7)			
Mid Span Height: 48' 6"	Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 49' 3"
Span #2: Back Span			
Span Length: 253' 8" at 13.72°			
Wire #1: COMMUNICATION > 0.50" TELCO			
Mid Span Height: 14' 6"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 21'
Wire #2: COMMUNICATION > 0.75" TELCO			
Mid Span Height: 15' 4"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 21' 9"
Wire #3: COMMUNICATION > 1.00" TELCO			
Mid Span Height: 16' 1"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 22' 10"
Wire #4: COMMUNICATION > 0.75" TELCO			
Mid Span Height: 18' 1"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 23' 11"
Wire #5: COMMUNICATION > 10M-144CT-100PR			
Mid Span Height: 18' 10"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 26' 1"

Wire #6: SECONDARY > 4/0 AL QPX SECD

Mid Span Height: 23' 1"	Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 31'
Wire #7: PRIMARY > 1/0 ACSR (6/1)			
Mid Span Height: 37' 6"	Quantity: 3	Owner: UTILITY > PEPCO	Attachment A Height: 42' 2"
Wire #8: PRIMARY > 477 ACSR (30/7)			
Mid Span Height: 41' 11"	Quantity: 2	Owner: UTILITY > PEPCO	Attachment A Height: 47' 11"
Wire #9: PRIMARY > 477 ACSR (30/7)			
Mid Span Height: 43' 9"	Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 49' 3"

Span #3: Building

Span Length: 76' at 99.00°

Wire #1: SERVICE > 1/0 AL TPX SERV

Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 31'
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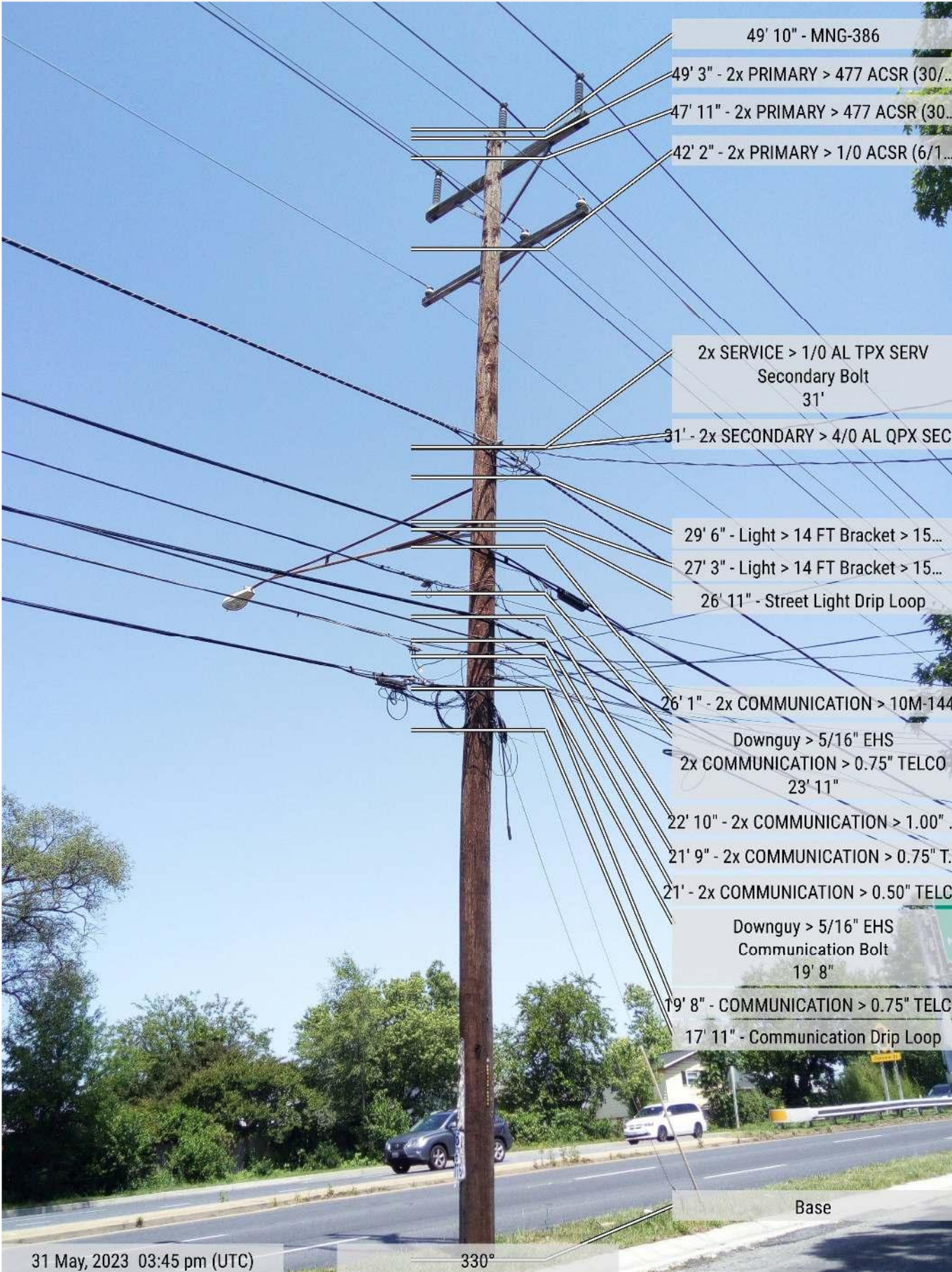
Span #4: Building

Span Length: 76' at 115.00°

Wire #1: SERVICE > 1/0 AL TPX SERV

Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 31'
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IKExphoto (2 of 6)



MNG-386_A

NB+C Node Survey 2 (2 of 3)

Pole Sequence Number: 806429-140950 Tip: 42' 11" Circumference ("): 44

Location: (lat: 39.01395, lng: -76.97809, alt: 203' 1") Ready for Crown Castle Upload: No

IKExphoto



Tag Photos



Directional Photos #1: Directional Photos #1

12 o'clock



9 o'clock



6 o'clock



3 o'clock



Equipment #1: Light > 10 FT Bracket > 150-400W Cobra

Orientation: 285	Owner: UTILITY > PEPCO	Attachment Height: 24' 9"	Bottom Height: 27' 1"
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Span #1: Back Span

Span Length: 257' at 13.00°

Wire #1: COMMUNICATION > 0.50" TELCO

Mid Span Height: 10' 9"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 18' 8"
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Wire #2: COMMUNICATION > 1.50" TELCO

Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 19' 11"
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Wire #3: COMMUNICATION > 0.75" TELCO

Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 20' 4"
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Wire #4: COMMUNICATION > 0.75" TELCO

Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 21' 9"
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Wire #5: COMMUNICATION > 10M-144CT-100PR

Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 23' 5"
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Wire #6: SECONDARY > 2 HD BC (7)

Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 28' 11"
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Wire #7: NEUTRAL > 1/0 ACSR (6/1)

Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 29' 11"
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Wire #8: PRIMARY > 1/0 ACSR (6/1)

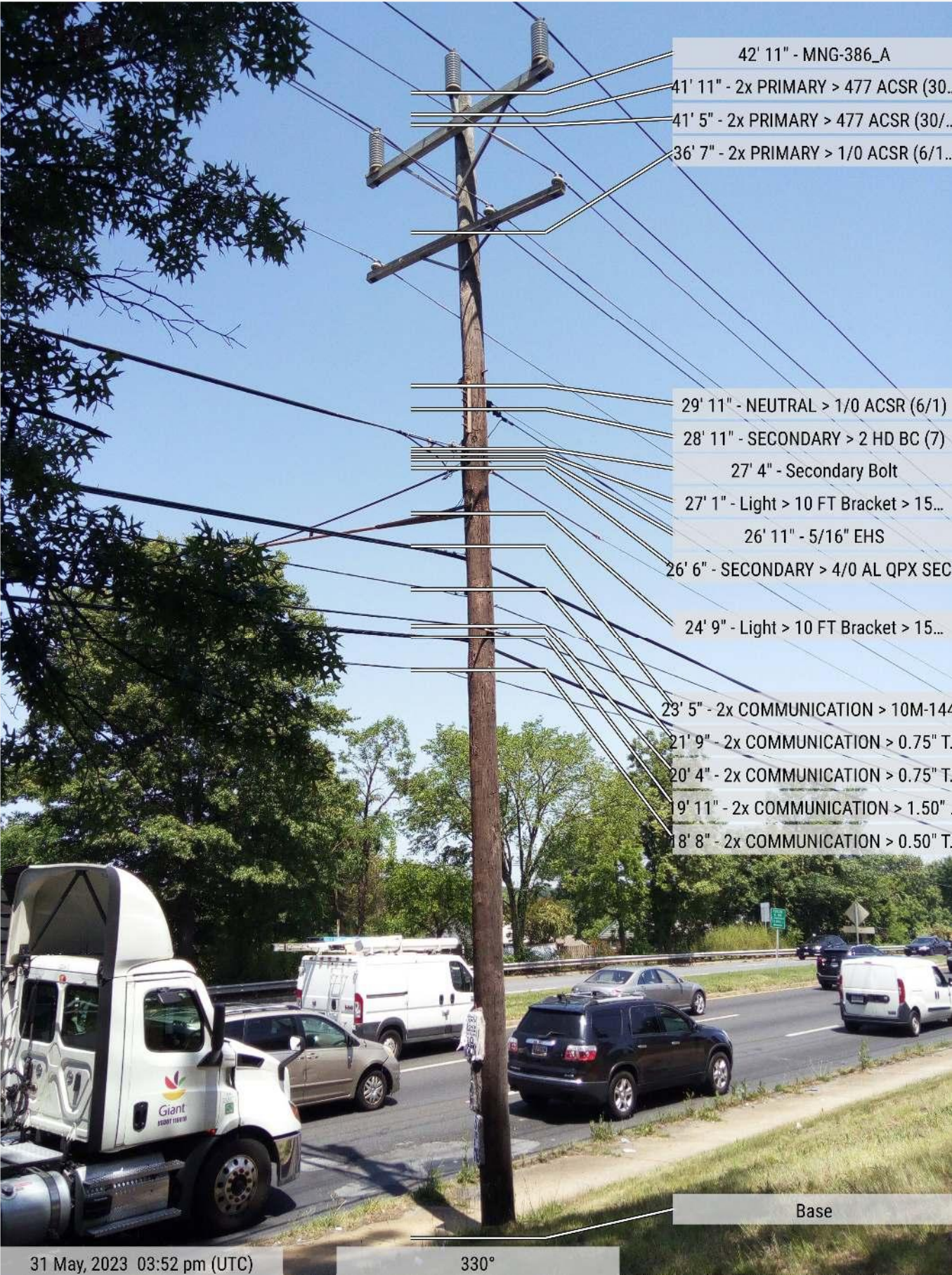
Quantity: 3	Owner: UTILITY > PEPCO	Attachment A Height: 36' 7"
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Wire #9: PRIMARY > 477 ACSR (30/7)

Quantity: 2	Owner: UTILITY > PEPCO	Attachment A Height: 41' 5"
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Wire #10: PRIMARY > 477 ACSR (30/7)			
Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 41' 11"	
Span Guy #1: 5/16" EHS			
Owner: UTILITY > PEPCO	Attachment Height: 26' 11"		
Span #2: Fore Span			
Span Length: 253' 8" at 193.72°			
Wire #1: COMMUNICATION > 0.50" TELCO			
Mid Span Height: 10' 9"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 18' 8"
Wire #2: COMMUNICATION > 1.50" TELCO			
Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 19' 11"	
Wire #3: COMMUNICATION > 0.75" TELCO			
Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 20' 4"	
Wire #4: COMMUNICATION > 0.75" TELCO			
Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 21' 9"	
Wire #5: COMMUNICATION > 10M-144CT-100PR			
Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 23' 5"	
Wire #6: PRIMARY > 1/0 ACSR (6/1)			
Quantity: 3	Owner: UTILITY > PEPCO	Attachment A Height: 36' 7"	
Wire #7: PRIMARY > 477 ACSR (30/7)			
Quantity: 2	Owner: UTILITY > PEPCO	Attachment A Height: 41' 5"	
Wire #8: PRIMARY > 477 ACSR (30/7)			
Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 41' 11"	
Wire #9: SECONDARY > 4/0 AL QPX SECD			
Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 26' 6"	

IKEphoto (2 of 5)



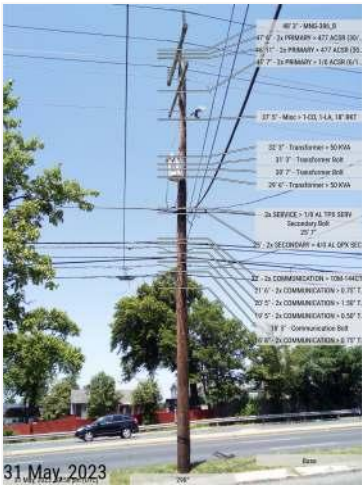
MNG-386_B

NB+C Node Survey 2 (3 of 3)

Pole Sequence Number: 806429-050550 Tip: 48' 3" Circumference ("): 44

Location: (lat: 39.0129, lng: -76.97841, alt: 185' 1") Ready for Crown Castle Upload: No

IKEphoto



Tag Photos



Directional Photos #1: Directional Photos #1

12 o'clock



9 o'clock



6 o'clock



3 o'clock



Equipment #1: Transformer > 50 KVA

Orientation: 138	Owner: UTILITY > PEPCO	Attachment Height: 32' 3"	Bottom Height: 29' 6"
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Equipment #2: Misc > 1-CO, 1-LA, 18" BKT

Orientation: 53	Owner: UTILITY > PEPCO	Attachment Height: 37' 5"
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Span #1: Fore Span

Span Length: 122' at 194.00°

Wire #1: COMMUNICATION > 0.75" TELCO

Mid Span Height: 16' 9"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 16' 8"
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Wire #2: COMMUNICATION > 0.50" TELCO

Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 19' 5"
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Wire #3: COMMUNICATION > 1.50" TELCO

Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 20' 5"
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Wire #4: COMMUNICATION > 0.75" TELCO

Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 21' 6"
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Wire #5: COMMUNICATION > 10M-144CT-100PR

Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 22'
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Wire #6: SECONDARY > 4/0 AL QPX SECD

Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 25'
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Wire #7: PRIMARY > 1/0 ACSR (6/1)

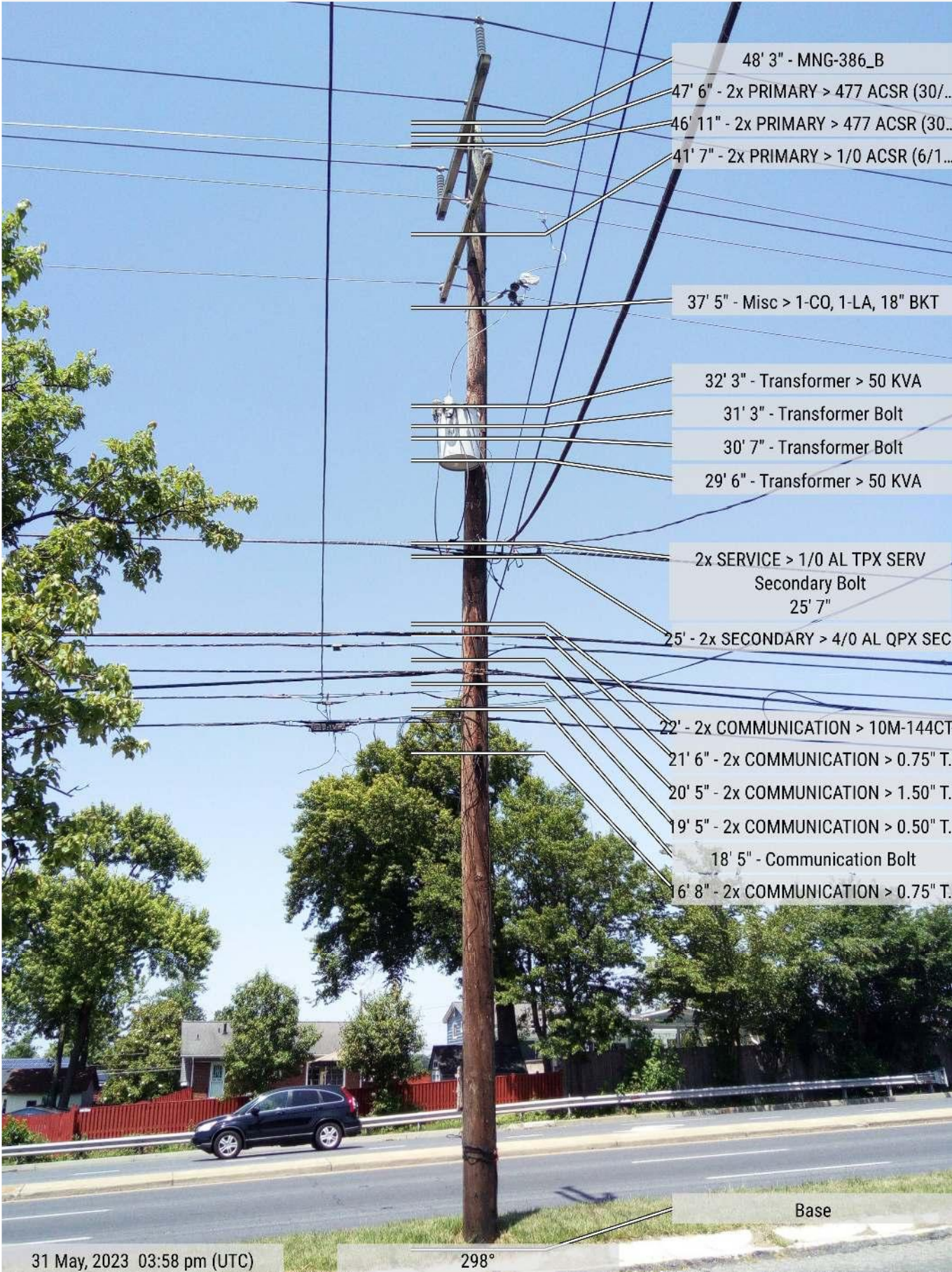
Quantity: 3	Owner: UTILITY > PEPCO	Attachment A Height: 41' 7"
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Wire #8: PRIMARY > 477 ACSR (30/7)

Quantity: 2	Owner: UTILITY > PEPCO	Attachment A Height: 46' 11"
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Wire #9: PRIMARY > 477 ACSR (30/7)		
Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 47' 6"
Span #2: Back Span		
Span Length: 138' 4" at 12.62°		
Wire #1: COMMUNICATION > 0.75" TELCO		
Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 16' 8"
Wire #2: COMMUNICATION > 0.50" TELCO		
Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 19' 5"
Wire #3: COMMUNICATION > 1.50" TELCO		
Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 20' 5"
Wire #4: COMMUNICATION > 0.75" TELCO		
Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 21' 6"
Wire #5: COMMUNICATION > 10M-144CT-100PR		
Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 22'
Wire #6: SECONDARY > 4/0 AL QPX SECD		
Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 25'
Wire #7: PRIMARY > 1/0 ACSR (6/1)		
Quantity: 3	Owner: UTILITY > PEPCO	Attachment A Height: 41' 7"
Wire #8: PRIMARY > 477 ACSR (30/7)		
Quantity: 2	Owner: UTILITY > PEPCO	Attachment A Height: 46' 11"
Wire #9: PRIMARY > 477 ACSR (30/7)		
Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 47' 6"
Span #3: Building		
Span Length: 65' at 96.00°		
Wire #1: SERVICE > 1/0 AL TPX SERV		
Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 25' 7"
Span #4: Building		
Span Length: 68' at 115.00°		
Wire #1: SERVICE > 1/0 AL TPX SERV		
Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 25' 7"

IKEphoto (3 of 5)



CROWN CASTLE FIBER LLC TITLE SHEET

CODE COMPLIANCE

ALL WORK AND MATERIALS SHALL BE PERFORMED AND INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THE LATEST EDITIONS OF THE FOLLOWING CODES:

- COMAR 9.12.53, ADAAG & FHAG
- 2018 ICC INTERNATIONAL BUILDING CODE INCORPORATING MONTGOMERY COUNTY AMENDMENTS PUBLISHED PER #31-19
- 2018 ICC INTERNATIONAL RESIDENTIAL CODE
- 2018 ICC INTERNATIONAL EXISTING BUILDING CODE
- MBRC MARYLAND BUILDING REHABILITATION CODE
- 2012 IGCC GREEN BUILDING CODE
- 2018 ICC INTERNATIONAL ENERGY CONSERVATION
- 2018 ICC INTERNATIONAL FUEL/GAS CODE
- 2018 ICC INTERNATIONAL MECHANICAL CODE
- 2017 NFPA 70 NATIONAL ELECTRICAL CODE
- 2013 NFPA 72
- 2013 COMAR NFPA 72
- 2015 NFPA 1 & 101
- WSSC PLUMBING CODE
- WSSC FUEL GAS CODE
- 2013 NFPA 13D
- 2013 COMAR NFPA 13D
- 2013 NFPA 13/13R
- 2013 COMAR NFPA 13/13R
- TIA-222-H-2016

SCOPE OF WORK

SCOPE OF WORK CONSISTS OF INSTALLING A NEW STRAND MOUNT AND AUXILIARY EQUIPMENT ON NEW STRAND / MESSENGER CABLE. STRAND / MESSENGER CABLE WILL BE ATTACHED TO EXISTING WOODEN UTILITY POLE. NEW ANTENNA, DIPLEXER, AND RADIO SHALL BE MOUNTED ON A PROPOSED BRACKET MOUNT AND THE BRACKET MOUNT, SPLICE BOX, AND POWER CONVERTER WILL ALL BE MOUNTED ON NEW STRAND / MESSENGER CABLE.



DPS BATCH STAMP

CROWN CASTLE FIBER LLC
SITE NAME: MNG-386
9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903

JURISDICTION: MONTGOMERY COUNTY/SHA(650)
PROPOSED STRAND MOUNT INSTALLATION

INDEX OF SHEETS

T-1	TITLE SHEET
GN-1	GENERAL NOTES
GN-2	GENERAL NOTES
C-1	SITE PLAN
C-2	ENLARGED SITE PLAN
C-3	EXISTING ELEVATIONS
C-4	PROPOSED ELEVATIONS
C-5	ENLARGED ELEVATION
D-1	PLUMBING DIAGRAM
D-2	EQUIPMENT & ANTENNA DETAILS
D-3	POWER CONVERTER & DISCONNECT ASSEMBLY DETAILS
G-1	GROUNDING DETAILS
TCP-1	TRAFFIC CONTROL PLANS

NODE: **MNG-386 (474995)**

ENGINEER:
NB+C
TOTALLY COMMITTED.
NB+C ENGINEERING SERVICES, LLC.
8000 HARMONDALE DRIVE, SUITE 500
BETHESDA, MD 20814
(301) 712-7802

OWNER/DEVELOPER:
CROWN CASTLE
CROWN CASTLE FIBER LLC
10060 GRANTCHESTER WAY, 4TH FLOOR
COLUMBIA, MD 21044

TITLE: **MNG-386**
9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903
JURISDICTION: MONTGOMERY COUNTY

LATITUDE: 39.013263
LONGITUDE: -76.978298



PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND. LICENSE NO. 55491. EXPIRATION DATE 11/30/2028

ENGINEER OF RECORD

TRENT TRAVIS SNARR, P.E.
MARYLAND PROFESSIONAL ENGINEER
LICENSE #55491

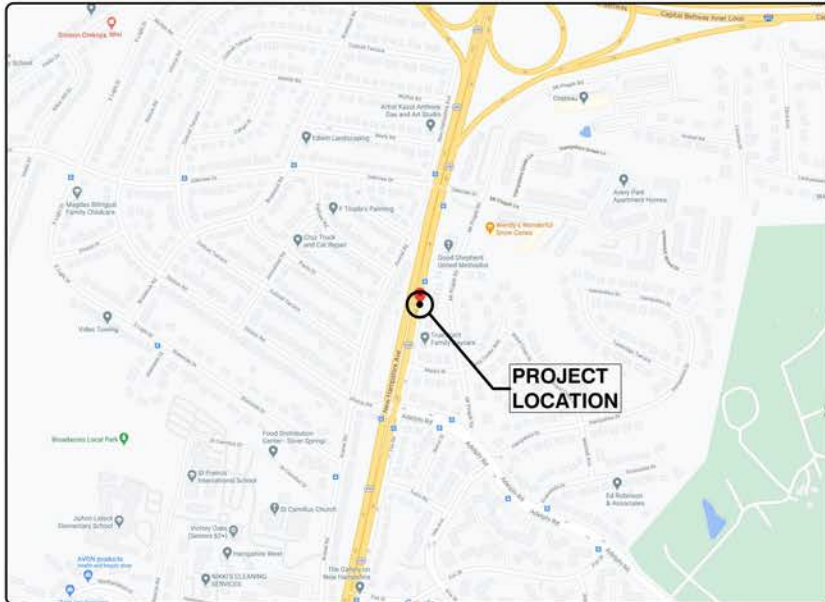
REVISIONS

REV	DATE	DESCRIPTION	BY
1	08-16-23	REVISED STAMP	SDR
2	08-16-23	REVISED STAMP	SDR
3	08-29-23	REVISED STAMP	SDR
4	07-29-22	PRELIMINARY CDS	PEM

DRAWN BY: **PEM** CHECKED BY: **SDR** APPROVED BY: **TJA**

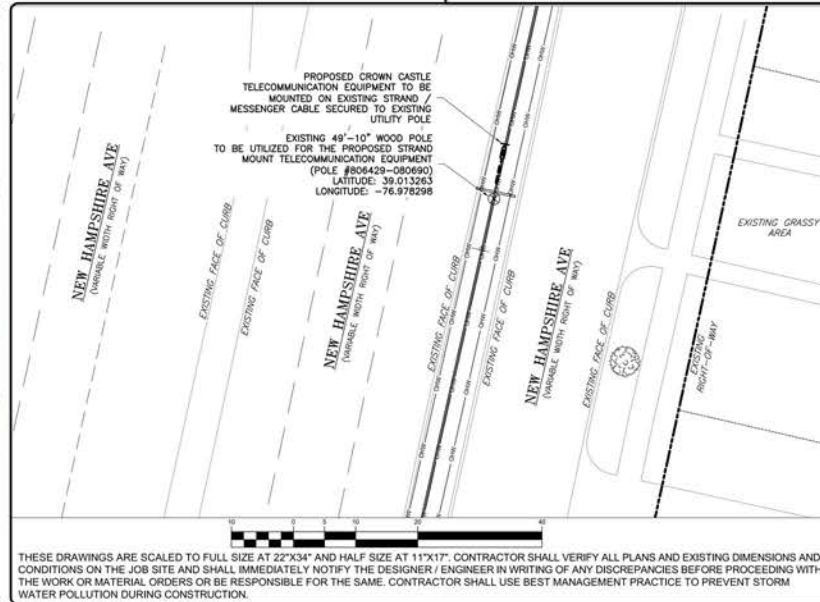
PROJECT NUMBER: **100505**
FILE NAME: **STRAND MOUNT DWG**
DATE DRAWN: **07-29-22**
SCALE: **AS SHOWN**

SHEET: **T-1**



LOCATION MAP

NODE LOCATION:
LATITUDE: 39.013263° (N 39° 00' 47.8")
LONGITUDE: -76.978298° (W 76° 58' 41.9")



THESE DRAWINGS ARE SCALED TO FULL SIZE AT 22"x34" AND HALF SIZE AT 11"x17". CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE DESIGNER / ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR MATERIAL ORDERS OR BE RESPONSIBLE FOR THE SAME. CONTRACTOR SHALL USE BEST MANAGEMENT PRACTICE TO PREVENT STORM WATER POLLUTION DURING CONSTRUCTION.

NODE PLACEMENT

9609 NEW HAMPSHIRE AVE
POLE TAG ID: 806429-080690
PEPCO FACILITY ID: 806429-080690
ZONING CLASSIFICATION = R90

CROWN CASTLE FIBER LLC
GENERAL NOTES

DPS BATCH STAMP

6. BE CAREFUL WHEN SETTING LOCKING DEVICE INTO PLACE ON CLAMP SHALL STAY SEAMANT (THEY ARE PLASTIC AND TEND TO BREAK OR CRACK IN EXTREME WEATHER CONDITIONS WHEN FLOOR DECKING BEAMS VIBRATE UNDER THE SEAL.) IF THE LOCKING MECHANISM CRACKS OR BREAKS, REPLACE IT. DO NOT TAPE THE CLAMP CLOSED OR TRY TO RE-ENGINEER IT.

7. ONCE THE CLAMP IS ON AND LOCKED AROUND THE CONNECTOR THE PROCESS IS COMPLETE.

PECC BOOT

1. PLACE BOOT OVER CABLE BEFORE CONNECTOR IS ATTACHED TO CABLE. THIS IS ONLY RATED FOR PPC TYPE CONNECTORS. (NOTE: IF THIS STEP IS SKIPPED OR NOT COMPLETED BEFORE MAKING A CONNECTOR, THE SUBCONTRACTOR WILL NOT BE ABLE TO USE THE BOOT STYLE DEVICE TO SEAL THE CONNECTOR. IT IS NOT RECOMMENDED TO WASTE A CONNECTOR AND CUT IT OFF AND START AT STEP NO. 1 AGAIN, SINCE PPC CONNECTORS ARE NOT REUSABLE AND CAN GET QUITE EXPENSIVE. DO NOT TRY TO STRETCH THE BOOT TO SLIDE IT OVER THE CONNECTION.)

2. PLACE THE BOOT OVER THE CABLE, AND THEN MAKE THE CONNECTOR.

3. TORQUE THE CONNECTION TO PROPER SPECIFICATIONS.

4. SLIDE BOOT UP TO COVER THE ENTIRE CONNECTOR, FOLLOWING THE PPC GUIDELINES.

5. THIS PROCESS IS COMPLETE AT THIS TIME.

ELECTRICAL NOTES

1. SUBMITTAL OF BID INDICATES THAT THE CONTRACTOR IS COGNIZANT OF ALL JOB SITE CONDITIONS AND WORK TO BE PERFORMED UNDER THIS CONTRACT.

2. CONTRACTOR SHALL PERFORM ALL VERIFICATIONS, OBSERVATION TESTS, AND EXAMINATION WORK PRIOR TO ORDERING OF ANY EQUIPMENT AND THE ACTUAL CONSTRUCTION. CONTRACTOR SHALL ISSUE A WRITTEN NOTICE OF ALL FINDINGS TO THE PROJECT MANAGER LISTING ALL MALFUNCTIONS, FAULTY EQUIPMENT AND DISCREPANCIES.

3. VERIFY HEIGHTS WITH PROJECT MANAGER PRIOR TO INSTALLATION.

4. THESE PLANS ARE DIAGRAMATIC ONLY, FOLLOW AS CLOSELY AS POSSIBLE.

5. CONTRACTOR SHALL COORDINATE ALL WORK BETWEEN TRACES AND ALL OTHER SCHEDULING AND PROVISIONING CIRCUMSTANCES SURROUNDING THE PROJECT.

6. CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, INSURANCE, EQUIPMENT, INSTALLATION, CONSTRUCTION TOOLS, TRANSPORTATION, ETC., FOR COMPLETE AND FUNCTIONALLY OPERATING SYSTEMS ENERGIZED AND READY FOR USE THROUGHOUT AS INDICATED ON DRAWINGS, AS SPECIFIED HEREIN AND/OR AS OTHERWISE REQUIRED.

7. ALL MATERIALS AND EQUIPMENT SHALL BE NEW AND IN PERFECT CONDITION WHEN INSTALLED AND SHALL BE OF THE BEST GRADE AND OF THE SAME MANUFACTURER THROUGHOUT FOR ALL CLASSES OF EQUIPMENT. ELECTRICAL MATERIALS SHALL BE LISTED AND APPROVED BY UNDERWRITERS LABORATORIES AND SHALL BEAR THE INSPECTION LABEL "U" WHERE SUBJECT TO SUCH APPROVAL. MATERIALS SHALL MEET WITH APPROVAL OF ALL GOVERNING AGENCIES, HAVING JURISDICTION OVER THE CONSTRUCTION. MATERIALS SHALL BE MANUFACTURED IN ACCORDANCE WITH ALL CURRENT APPLICABLE STANDARDS ESTABLISHED BY ANSI, NEMA AND NFPA. ALL MATERIALS AND EQUIPMENT SHALL BE APPROVED FOR THEIR INTENDED USE AND LOCATION.

8. ALL WORK SHALL COMPLY WITH ALL APPLICABLE GOVERNING STATE, COUNTY AND CITY CODES AND NFPA, NFPA NEC & ASHRAE REQUIREMENTS.

9. ENTRY JOBS SHALL BE GUARANTEED FOR A PERIOD OF ONE (1) YEAR AFTER THE DATE OF JOB ACCEPTANCE. ALL WORK, MATERIAL AND EQUIPMENT FOUND TO BE FAULTY DURING THAT PERIOD SHALL BE CORRECTED AT ONCE, UPON WRITTEN NOTIFICATION, AT THE EXPENSE OF THE CONTRACTOR.

10. PROPERLY SEAL ALL PENETRATIONS, PROVIDE UL LISTED FIRE-STOPPS WHERE PENETRATIONS ARE MADE THROUGH FIRE-RATED ASSEMBLIES. WATER-TIGHT USING SILICONE SEALANT.

11. LOCATE ALL PENETRATIONS SUCH THAT ALL REINFORCEMENT CONTAINED WITHIN THE EXISTING BUILDING CONSTRUCTION REMAINS INTACT AND UNDISTURBED. SUBMIT LOCATING METHOD TO PROJECT MANAGER FOR APPROVAL PRIOR TO EXECUTION.

12. DELIVER ALL BROCHURES, OPERATING MANUALS, CATALOGS AND SHOP DRAWINGS TO THE PROJECT MANAGER AT JOB COMPLETION. PROVIDE MAINTENANCE MANUALS FOR MECHANICAL EQUIPMENT AND AFFIX MAINTENANCE LABELS TO MECHANICAL EQUIPMENT.

13. ALL CONDUCTORS SHALL BE COPPER, MINIMUM CONDUCTOR SIZE SHALL BE #12 AWG., UNLESS OTHERWISE NOTED. CONDUCTORS SHALL BE THE THIN RATED IN ACCORDANCE WITH NEC 110-14(C).

14. ALL CIRCUIT BREAKERS, FUSES AND ELECTRICAL EQUIPMENT SHALL HAVE AN INTERRUPTING RATING NOT LESS THAN THE MAXIMUM INTERRUPTING CURRENT TO WHICH THEY MAY BE SUBJECTED.

15. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE, ARTICLES 250 & 810 AND THE UTILITY COMPANY STANDARDS.

16. CONDUIT, ALL ABOVE GRADE CONDUITS SHALL BE RIGID & UNCO TO 6" AS STATED BELOW.

- A. RIGID CONDUIT SHALL BE U.L. LABEL, GALVANIZED ZINC COATED WITH ZINC INTERIOR AND SHALL BE USED WHEN INSTALLED IN OR UNDER CONCRETE SLABS, IN CONTACT WITH THE EARTH, UNDER PUBLIC ROADWAYS, IN MASONRY WALLS OR FOUND ON BUILDING EXTERIOR. RIGID CONDUIT IN CONTACT WITH EARTH SHALL BE 1/2" LAPPED WRAPPED WITH HUNTS WRAP PROCESS NO. 3.
- B. ELECTRICAL METALLIC TUBING SHALL HAVE U.L. LABEL, FITTINGS SHALL BE OF THE SAME MANUFACTURER TYPE, EMT SHALL BE USED ONLY FOR INTERIOR RUNS.
- C. LIQUID-TIGHT FLEXIBLE METAL CONDUIT SHALL BE U.L. LISTED AND SHALL BE USED AT FINAL CONNECTIONS TO MECHANICAL EQUIPMENT & RECEPTS AND WHEN PERMITTED BY CODE, ALL CONDUIT IN EXCESS OF SIX FEET IN LENGTH SHALL CONTAIN A FULL-SIZE GROUND CONDUCTOR.

2. CONDUIT RUNS SHALL BE SURFACE MOUNTED ON CEILING OR WALLS UNLESS NOTED OTHERWISE. CONDUIT SHALL RUN PARALLEL OR PERPENDICULAR TO WALLS, FLOOR, DECKING, BEAMS, VERIFY EXACT ROUTING OF ALL EXPOSED CONDUIT WITH THE PROJECT MANAGER PRIOR TO INSTALLING.

3. PVC CONDUIT MAY BE PROVIDED ONLY WHERE SHOWN, OR IN UNDERGROUND INSTALLATIONS. PROVIDE UV-RESISTANT CONDUIT WHERE EXPOSED TO THE ATMOSPHERE. PROVIDE GROUND CONDUIT IN ALL PVC RUNS; EXCEPT WHERE PERMITTED BY CODE TO OMIT.

4. ALL ELECTRICAL EQUIPMENT SHALL BE LABELED WITH PERMANENT ENGRAVED PHENOLIC PLASTIC NAMEPLATES. METER, DISCONNECT ETC. BACKGROUND SHALL BE BLACK WITH WHITE LETTERS; EXCEPT AS REQUIRED BY CODE TO FOLLOW A DIFFERENT SCHEME.

5. UPON COMPLETION OF WORK, CONDUCT CONTINUITY, SHORT CIRCUIT, AND FALL OF POTENTIAL GROUNDING TESTS FOR APPROVAL. SUBMIT TEST REPORTS TO PROJECT MANAGER. GROUNDING SYSTEM RESISTANCE SHALL NOT EXCEED 5 OHMS. IF THE RESISTANCE VALUE IS EXCEEDED, NOTIFY THE PROJECT MANAGER FOR FURTHER INSTRUCTION ON METHODS FOR REDUCING THE RESISTANCE VALUE.

6. CLEAN PREMISES OF ALL DEBRIS RESULTING FROM WORK AND LEAVE WORK IN A COMPLETE AND UNDAUNGED CONDITION. LEGALLY DISPOSE OF ALL REMOVED, UNUSED AND EXCESS MATERIAL GENERATED BY THE WORK OF THIS CONTRACT. DELIVER ITEMS INDICATED ON THE DRAWINGS TO THE OWNER IN GOOD CONDITION. OBTAIN SIGNED RECEIPT UPON DELIVERY.

7. COORDINATE WITH UTILITY COMPANY FOR CONNECTION OF TEMPORARY AND PERMANENT POWER TO THE SITE. TEMPORARY POWER AND ALL HOOKUP COSTS SHALL BE PAID BY THE CONTRACTOR.

8. CONTRACTOR SHALL EXISTING CIRCUTRY PRIOR TO REMOVAL AND NEW WORK. MAINTAIN POWER TO ALL OTHER AREAS & CIRCUITS NOT SCHEDULED FOR REMOVAL.

9. RED UNED AS-BUILT PLANS SHALL BE PROVIDED TO THE CONSTRUCTION MANAGER UPON REQUEST.

PEPCO GUIDELINES:

STRUCTURAL

1. ANTENNA SUPPORT POLES SHALL BE DESIGNED TO WITHSTAND THE HEAVY LOAD CASE AS DEFINED IN NATIONAL ELECTRIC SAFETY CODE (NESC) RULE 250B. IF ANY PART OF THE ANTENNA SUPPORT/POLE PROJECTS OVER SIXTY FEET ABOVE THE GROUND, THEN THE POLE SHALL BE DESIGNED TO WITHSTAND THE NESC EXTREME WIND LOAD CASE, AS DEFINED IN RULE 250C AND NESC FIGURE 250-21(b) (120 MPH WIND SPEED). THE SPECIFIED OVERLOAD CAPACITY FACTOR FOR THE NESC LOAD CASES, ARE SPECIFIED IN SECTION 26 OF THE NESC.

2. POLES REPLACED (TO SUPPORT ANTENNAS) SHALL BE DESIGNED FOR AT LEAST GRADE B CONSTRUCTION. POLES THAT ARE NOT REPLACED AND WILL SERVE AS SUPPORTS FOR ANTENNAS CAN BE DESIGNED FOR GRADE C CONSTRUCTION PROVIDED THAT APPROPRIATE RELATED STRENGTH REDUCTION FACTORS ARE APPLIED.

3. ALL POLES REPLACED TO SUPPORT ANTENNAS SHALL BE CLASS 1 OR LARGER. INSTALLATIONS THAT REQUIRE POLES LARGER THAN A CLASS 1 SHALL USE THE APPROPRIATE POLE CLASS, HEIGHT, AND TAPE APPROVED BY STANDARDS. THE DESIGN OF THE STEEL POLE AT A MINIMUM SHALL MEET THE STRENGTH REQUIREMENTS OF THE NEXT HIGHER ANSI WOOD POLE CLASS.

4. TO MAINTAIN RELIABILITY AND ACCOMMODATE GEOMETRIC ALTERNATIONS, ALL GRAY CANDIDATE POLES WILL BE CHANGED TO A TALLER CLASS 1 OR LARGER POLE.

5. EXCEPTIONS WILL BE CONSIDERED ON A CASE-BY-CASE BASIS, WHEN THE EXISTING GRAY POLE MEETS OR EXCEEDS THE SPECIFICATIONS TO BE OBTAINED IN THIS SPECIFICATION WITHOUT REPLACING THE POLE. ALL EXCEPTIONS TO THE REQUIREMENT TO REPLACE POLES THAT CARRY GRAY FEEDERS ARE SOLELY AT THE DISCRETION OF PEPCO.

6. ALL HARDWARE USED TO SUPPORT THE ANTENNA SHALL BE GALVANIZED, IN NEW CONDITION AND CAPABLE OF WITHSTANDING ALL DESIGNED LOADS.

7. LOCK WASHERS SHALL BE USED ON ALL THRU BOLTS USED TO CONNECT ANTENNA SUPPORT BRACKETS AND OTHER CARRIER EQUIPMENT TO THE POLE.

8. SPLIT BOLTS WITH WASHERS SHALL BE INSTALLED PERPENDICULAR TO THE ANTENNA SUPPORT BRACKET BOLTS.

9. THE ANTENNA SUPPORT BRACKET SHALL BE ABLE TO WITHSTAND THE NESC HIGH WIND DESIGN LOADS SPECIFIED ABOVE.

10. ALL STRUCTURAL AND DESIGN ANALYSIS SHALL BE PERFORMED BY THE CARRIER AND BE REVIEWED BY PEPCO'S DISTRIBUTION ENGINEERING DEPARTMENT. PEPCO SHALL PROVIDE REQUESTED DATA FOR SUCH ANALYSIS AND RESERVES THE RIGHT TO VALIDATE THE ANALYSIS. DESIGNS MUST PASS THE STRUCTURAL ANALYSIS REQUIREMENTS BEFORE PROCEEDING TO THE FINAL DESIGN PHASE OR CONSTRUCTION.

11. CARRIER SHALL PROVIDE AND OWN ALL POLE TOP EXTENSIONS USED TO SUPPORT ANTENNAS ABOVE THE PEPCO OVERHEAD COVERED CONDUCTORS (SECONDARY OR PRIMARY VOLTAGES). THE CONDITION OF THE MOUNTING SURFACE AT THE TOP OF THE POLE SHALL BE INSPECTED BY APPROVED PEPCO PERSONNEL. IF ANY DETEIORATION IS FOUND, THE POLE SHALL BE REPLACED BEFORE MOUNTING. THE TOP EXTENSIONS SHALL BE AT LEAST 5' BUT NOT TO EXCEED 8'; AND NOT BE USED IN THE FOLLOWING INSTANCES:

- a. TO SUPPORT ELECTRICAL CONDUCTORS.
- b. TO SUPPORT ANTENNAS ON GRAY POLES.

12. THE LOWEST GROUNDED POINT OF A CARRIER'S EQUIPMENT SHALL MAINTAIN THE FOLLOWING MINIMUM SEPARATIONS:

- AT LEAST 4FT FOR OVERHEAD SECONDARY FACILITIES.
- AT LEAST 8FT FOR OVERHEAD PRIMARY FACILITIES.
- CLEARANCES SHALL BE INCREASED AS REQUIRED, FOR BUCKET ACCESS.

13. POLE ANALYSIS SHALL BE BASED ON FIELD MEASUREMENTS.

SAFETY:

1. AUTHORIZED PEPCO PERSONNEL SHALL INSTALL ALL THE EQUIPMENT SUCH AS ANTENNA SUPPORT BRACKETS, ANTENNAS, JUMPERS AND COAXIAL CABLE AND APPROPRIATE CHANNEL RACKS NEARBY AREAS MUST BE ABOVE THE COMMUNICATION AND SAFETY ZONES ON EACH POLE.

2. BOTH RF AND POWER SUPPLY DISCONNECT SWITCHES SHALL BE PROVIDED. THE RF DISCONNECT SWITCH SHALL BE A "LOCK-OUT" TYPE TO MAKE THE EQUIPMENT FREQUENCY (RF) TRANSMITTER EQUIPMENT NONOPERABLE. SUCH THAT ELECTRIC UTILITY CREWS WILL HAVE TOTAL CONTROL OVER OPERATION OF THE EQUIPMENT. THE "LOCK-OUT" DEVICE SHALL BE DESIGNED INTO ANY SYSTEM DEPLOYED IN PEPCO'S SERVICE TERRITORY. THE DISCONNECT MECHANISM SHALL BE OF A CLEARLY VISIBLE MECHANICAL TYPE. PEPCO PERSONNEL MUST BE ABLE TO CLEARLY DETERMINE BY VISUAL MEANS THAT THE RF OUTPUT OF THE SUBJECT SYSTEM IS DISABLED. THE SWITCHING MECHANISM REQUIRED TO DISABLE THE RF TRANSMITTER SHALL BE CLEARLY MARKED WITH SIGNAGE AND IT SHALL BE LOCATED OUTSIDE THE MAXIMUM PERMISSIBLE RF EXPOSURE (SAFE APPROACH) DISTANCE/RADIUS FROM THE ANTENNA. A "KEEP-OUT" TAG SHALL BE PLACED ON THE DISCONNECTING DEVICES DURING SERVICE ON THE POLE.

3. AN "RF" SIGN SHALL BE PLACED ON THE POLE AND SHALL INDICATE THE SAFE/MINIMUM APPROACH DISTANCE FROM THE ANTENNA BASED ON THE MAXIMUM PERMISSIBLE EXPOSURE LEVEL AS INDICATED IN TABLE 1 OF FCC'S RULE 47CFR1.1.1310, IEEE C95.1 AND IEEE C95.3 (AS APPLICABLE) IN CONJUNCTION WITH ITS EFFECTIVE ISOTROPIC RADIATED POWER (ERP) VALUE AND THE OPERATING FREQUENCY. THE SIGN SHALL INCLUDE THE CARRIER'S NAME, AND 24-HOUR SYSTEM OPERATOR INFORMATION. INFORMATION THAT IS GIVEN TO THE APPROPRIATE PERSONNEL, IT SHALL BE AT LEAST 2" STANDARD. IN ADDITION, AN RF MAXIMUM PERMISSIBLE EXPOSURE (MPE) REPORT MUST BE SUBMITTED TO PEPCO.

4. ANY TREE TRIMMING REQUIRED FOR ANTENNA FACILITIES ABOVE THE COMMUNICATION ZONE WILL BE PERFORMED BY PEPCO AT THE CARRIER'S EXPENSE.

5. CARRIER PERSONNEL ARE NOT PERMITTED TO ACCESS THE POLE ABOVE THE COMMUNICATIONS ZONE. ONLY APPROVED PEPCO PERSONNEL OR CONTRACTORS UNDER THE DIRECTION OF AN AUTHORIZED PEPCO EMPLOYEE ARE PERMITTED TO ACCESS THIS SECTION OF THE POLE.

6. WHEN REQUIRED, ALL PERMITS SHALL BE COORDINATED BETWEEN THE CARRIER AND PEPCO'S APPROPRIATE PERSONNEL.

7. EQUIPMENT INSTALLED BELOW THE SAFETY ZONE SHALL BE MAINTAINED BY THE CARRIER.

8. IF AN ANTENNA POLE IS DAMAGED DUE TO HEAVY STORMS, PEPCO WILL NOTIFY THE CARRIER USING THE PHONE NUMBER PROVIDED ON THE CAUTION SIGN BUT SHALL NOT BE RESPONSIBLE FOR ANY EQUIPMENT DAMAGE.

9. TO ACCOMMODATE FUTURE PEPCO POLE REPLACEMENTS, THE CARRIER SHALL AGREE TO TRANSFER THEIR EQUIPMENT WITHIN 30 DAYS OF NOTIFICATION OF SUCH WORK.

CLEARANCES:

1. RF CAUTION SIGNAGE SHALL BE PLACED OUTSIDE THE SAFE APPROACH DISTANCE RADIUS OF THE ANTENNA.

2. THE SEPARATION OF ANTENNA MOUNTING BRACKET PARTS FROM UNPROTECTED (ENERGIZED) HIGH CONDUCTOR MOUNTED ON THE SAME POLE SHALL BE AT LEAST 40" FOR UP (48" FOR PEPCO).

3. CLEARANCES AT THE SUPPORT AND MID-SPAN SHALL NOT BE REDUCED, BUT SHALL BE INCREASED AS REQUIRED FOR BUCKET ACCESS.

4. FIBER OPTIC WIRE SHALL BE INSTALLED IN THE COMMUNICATION ZONE WITH 12 INCHES OF SEPARATION FROM OTHER THIRD PARTY COMMUNICATION CONDUCTORS AND SHALL MAINTAIN AT LEAST 40" FOR DP (48" FOR PEPCO) OF SEPARATION FROM THE LOWEST SECONDARY CONDUCTOR FOR NEW POLE INSTALLATIONS AND 40 INCHES FOR EXISTING INSTALLATIONS.

5. AN ANTENNA MOUNTED BELOW PEPCO'S SECONDARY CONDUCTORS WILL MAINTAIN CLEARANCES OF NO LESS THAN 40" FOR DP (48" FOR PEPCO) BETWEEN THE LOWEST SUPPLY CONDUCTOR AND THE HIGHEST POINT OF THE ANTENNA.

6. WIRELESS CARRIER'S EQUIPMENT BOX MAY BE MOUNTED AS LOW TO GROUND LEVEL AS PRACTICAL (PER RECOMMENDATION BY PEPCO FIELD PERSONNEL) IF POLE IS AT LEAST 4.5' AWAY FROM THE CURB OR ROAD.

WIFI DEVICES:

1. WIFI REFERS TO DEVICES THAT MEET IEEE 802.11 STANDARDS.

2. IF MOUNTED ON A STREETLIGHT BRACKET, THE POWER VOLTAGE REQUIREMENT OF THE RF DEVICE MUST MATCH THE EXISTING STREETLIGHT VOLTAGE. THE PHOTOCELL AND TAP CONDUCTOR SHALL BE PROVIDED BY THE CARRIER AND MUST MEET ANSI C136 REQUIREMENTS.

3. A MAXIMUM OF 1 WIFI DEVICE IS ALLOWED PER CANDIDATE POLE.

4. GROUNDOING OF MOUNTING BRACKETS (INCLUDING STREETLIGHT BRACKET) SHALL BE AS SHOWN ON DRAWINGS. THE WIRELESS CARRIER SHALL SUPPLY THE WEIGHT OF THE PROPOSED EQUIPMENT. THE EXISTING BRACKET MUST BE STRUCTURALLY SUPPORTIVE TO ANY SUPPORT THE PROPOSED DEVICE. STREETLIGHT BRACKETS WILL NOT BE CHANGED TO ACCOMMODATE THE DEVICE.

5. NESC AND MAXIMUM RF EXPOSURE LIMIT CLEARANCES IN ALL DIRECTIONS SHALL BE MET.

NAME: MNG-386 (474995)

ENGINEER: NB+C TOTALLY COMMITTED. NB+C ENGINEERING SERVICES, LLC. 6006 MARSHALL DRIVE, SUITE 300 COLUMBIA, MD 21046 (410) 712-7602

OWNER/DEVELOPER: CROWN CASTLE CROWN CASTLE FIBER LLC 10980 GRANTCHESTER WAY, 4TH FLOOR COLUMBIA, MD 21044

TITLE: MNG-386 9609 NEW HAMPSHIRE AVE SILVER SPRING, MD 20903 JURISDICTION: MONTGOMERY COUNTY LATITUDE: 39.013263 LONGITUDE: -76.978298

PROFESSIONAL ENGINEER LICENSE NO. 55491 EXPIRATION DATE 01/16/2028

ENGINEER OF RECORD TRENT TRAVIS SNARR, P.E. MARYLAND PROFESSIONAL ENGINEER LICENSE #55491

REVISIONS

REV	DATE	DESCRIPTION	BY
2	05-30-24	REVISED STAMP	SDR
1	08-16-23	WE UPDATE REVISION	JED
0	08-26-23	FINAL CD	SDR
A	07-29-22	PRELIMINARY CD	PEM

DRAWN BY: PEM

CHECKED BY: SDR

APPROVED BY: TJA

PROJECT NUMBER: 100505

FILE NAME: STRAND MOUNT DWG

DATE DRAWN: 07-29-22

SCALE: AS SHOWN

SHEET: GN-2

GROUNDING AND BONDING NOTE: GENERAL CONTRACTOR SHALL FOLLOW ALL CONSTRUCTION GUIDELINES PER CROWN CASTLE'S GROUNDING AND BONDING REQUIREMENTS FOR STRAND MOUNT NODES (oDAS) - DOCUMENT 337910.

CROWN CASTLE FIBER LLC SITE PLAN

NOTE: MNG-386 (474995)

ENGINEER:
NB+C
TOTALLY COMMITTED.
NB+C ENGINEERING SERVICES, LLC.
8000 MARSHALLS DRIVE, SUITE 200
BETHESDA, MD 20817
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9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903
JURISDICTION: MONTGOMERY COUNTY
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LONGITUDE: -76.978298



PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND. LICENSE NO. 55491, EXPIRATION DATE 11/30/2028

ENGINEER OF RECORD

TRENT TRAVIS SNARR, P.E.
MARYLAND PROFESSIONAL ENGINEER
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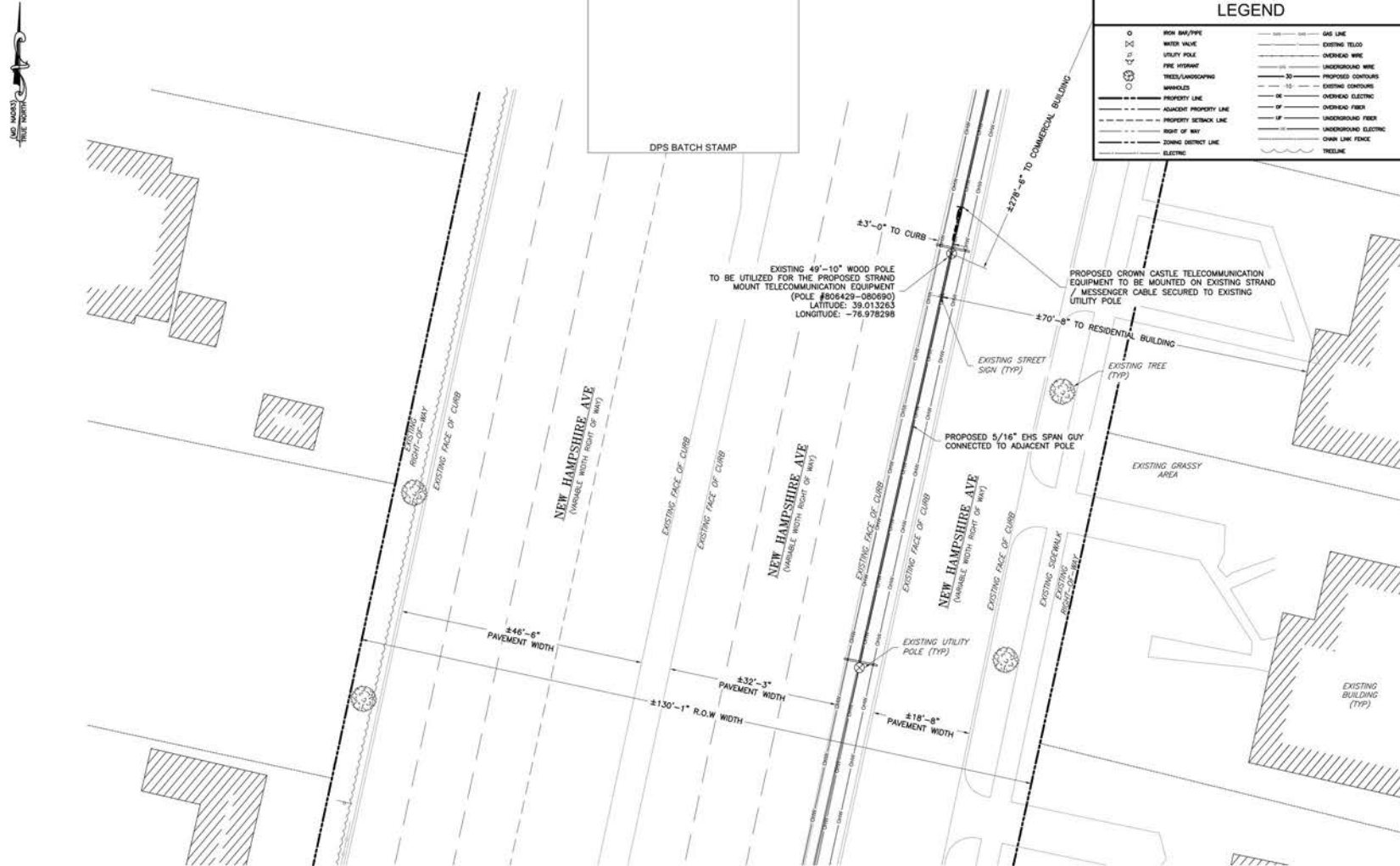
PROJECT NUMBER: 100505
FILE NAME: STRAND MOUNT DWG
DATE DRAWN: 07-29-22
SCALE: AS SHOWN

SHEET: C-1

LEGEND

○	IRON BOLT/PIPE	---	GAS LINE
⊗	WATER VALVE	---	EXISTING TELCO
⊕	UTILITY POLE	---	OVERHEAD WIRE
⊙	FIRE HYDRANT	---	UNDERGROUND WIRE
⊗	TREES/LANDSCAPING	---	PROPOSED CONTOURS
○	MANHOLES	---	EXISTING CONTOURS
---	PROPERTY LINE	---	OVERHEAD ELECTRIC
---	ADJACENT PROPERTY LINE	---	OVERHEAD FIBER
---	PROPERTY SETBACK LINE	---	UNDERGROUND FIBER
---	RIGHT OF WAY	---	UNDERGROUND ELECTRIC
---	ZONING DISTRICT LINE	---	CHAIN LINK FENCE
---	ELECTRIC	---	TREELINE

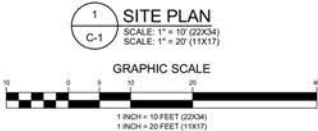
AS SHOWN
NORTH



THE CONSTRUCTION MANAGER SHALL COORDINATE POWER AND TELCO UTILITY ROUTING TO THE PROPOSED EQUIPMENT PRIOR TO CONSTRUCTION.

ANTENNA AZIMUTH SHALL BE SET TO 10°

NOTE:
EXISTING UTILITY INFORMATION SHOWN REPRESENTS THE BEST DATA AVAILABLE FROM EXISTING DOCUMENTATION AND FIELD EVIDENCE. ALL LOCATIONS SHOULD BE CONSIDERED APPROXIMATE, AND A FIELD INVESTIGATION MUST BE PERFORMED IN THE VICINITY OF ANY CONSTRUCTION ACTIVITIES. NOTE THAT THESE PLANS MAY NOT SHOW ALL UTILITIES THAT ARE PRESENT AT THE SITE.



CROWN CASTLE FIBER LLC
ENLARGED SITE PLAN



NEW HAMPSHIRE AVE

- PROPOSED CROWN CASTLE ERICSSON 6523 SEMI-INTEGRATED PANEL ANTENNA MOUNTED TO PROPOSED BRACKET MOUNT
- PROPOSED CROWN CASTLE ERICSSON 6525 SEMI-INTEGRATED PANEL ANTENNA MOUNTED TO PROPOSED BRACKET MOUNT
- PROPOSED CROWN CASTLE ERICSSON DIPLEX FILTER B2+866/830 (4-2) DIPLEXER MOUNTED TO PROPOSED BRACKET MOUNT
- PROPOSED CROWN CASTLE ERICSSON 4435 RADIO MOUNTED TO PROPOSED BRACKET MOUNT
- PROPOSED CROWN CASTLE ERICSSON 4402 RADIO MOUNTED TO PROPOSED BRACKET MOUNT
- PROPOSED CROWN CASTLE BRACKET MOUNT SECURED TO EXISTING STRAND/MESSENGER CABLE
- PROPOSED CROWN CASTLE SPLICE BOX MOUNTED TO EXISTING STRAND/MESSENGER CABLE
- PROPOSED CROWN CASTLE CONVERTER UNIT (ALPHA MODEL #LPR48-300-IP68) MOUNTED TO EXISTING STRAND/MESSENGER CABLE
- PROPOSED CROWN CASTLE CABLE DISCONNECT SWITCH (ALPHA MODEL #EPD/D-2-PR) MOUNTED TO EXISTING STRAND/MESSENGER CABLE
- EXISTING 49'-10" WOOD POLE TO BE UTILIZED FOR THE PROPOSED STRAND MOUNT TELECOMMUNICATION EQUIPMENT (POLE #B06429-080690) LATITUDE: 39.013263 LONGITUDE: -76.978298
- EXISTING 5/16" EHS SPAN GUY CONNECTED TO ADJACENT POLE

DPS BATCH STAMP

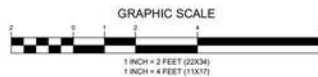
EXISTING FACE OF CURB

NEW HAMPSHIRE AVE

EXISTING FACE OF CURB

EXISTING GRASSY AREA

1 EQUIPMENT SITE PLAN
C-2 SCALE: 1" = 2' (22X34)
SCALE: 1" = 4' (11X17)



THE CONSTRUCTION MANAGER SHALL COORDINATE POWER AND TELCO UTILITY ROUTING TO THE PROPOSED EQUIPMENT PRIOR TO CONSTRUCTION.

NOTE:
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LEGEND			
○	IRON BOLT/PIPE	---	GAS LINE
□	WATER VALVE	---	EXISTING TELL
□	UTILITY POLE	---	OVERHEAD WIRE
Y	PIPE HUB/Joint	---	UNDERGROUND WIRE
○	TREE/LANDSCAPING	---	PROPOSED CONTOUR
○	MANHOLE	---	EXISTING CONTOUR
---	PROPERTY LINE	---	OVERHEAD ELECTRIC
---	ADJACENT PROPERTY LINE	---	OVERHEAD FIBER
---	PROPERTY BOUNDARY LINE	---	UNDERGROUND FIBER
---	RIGHT OF WAY	---	UNDERGROUND ELECTRIC
---	ZONING DISTRICT LINE	---	CHAIN LINK FENCE
---	ELECTRIC	---	TREELINE

NODE: MNG-386 (474995)

ENGINEER:
NB+C
TOTALLY COMMITTED.
NB+C ENGINEERING SERVICES, LLC.
8000 MARSHALLS DRIVE, SUITE 200
BETHESDA, MD 20814
(301) 713-7300

OWNER/DEVELOPER:
CROWN CASTLE
CROWN CASTLE FIBER LLC
10860 GRANTCHESTER WAY, 4TH FLOOR
COLUMBIA, MD 21044

TITLE: MNG-386
9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903
JURISDICTION: MONTGOMERY COUNTY
LATITUDE: 39.013263
LONGITUDE: -76.978298



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ENGINEER OF RECORD

TRENT TRAVIS SNARR, P.E.
MARYLAND PROFESSIONAL ENGINEER
LICENSE #55491

REVISIONS

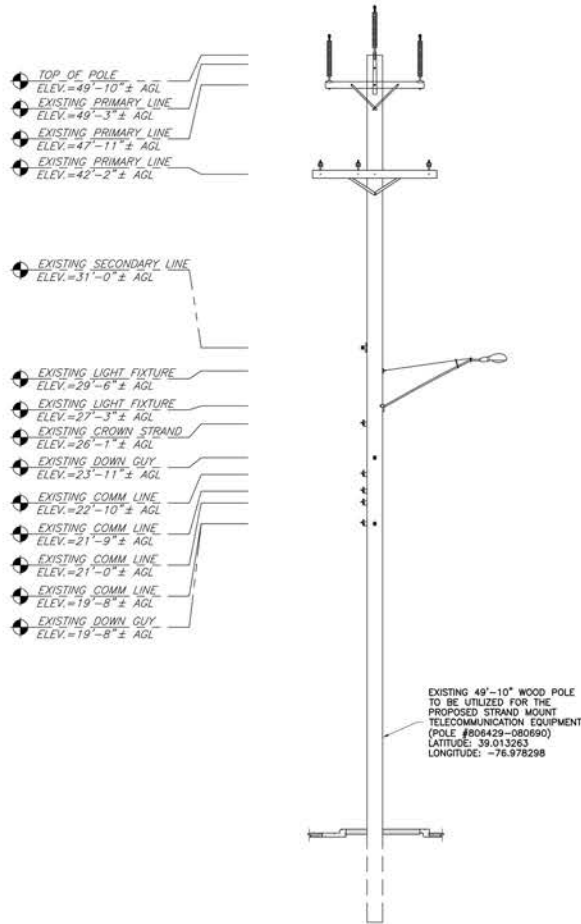
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PEM	SDR	TJA

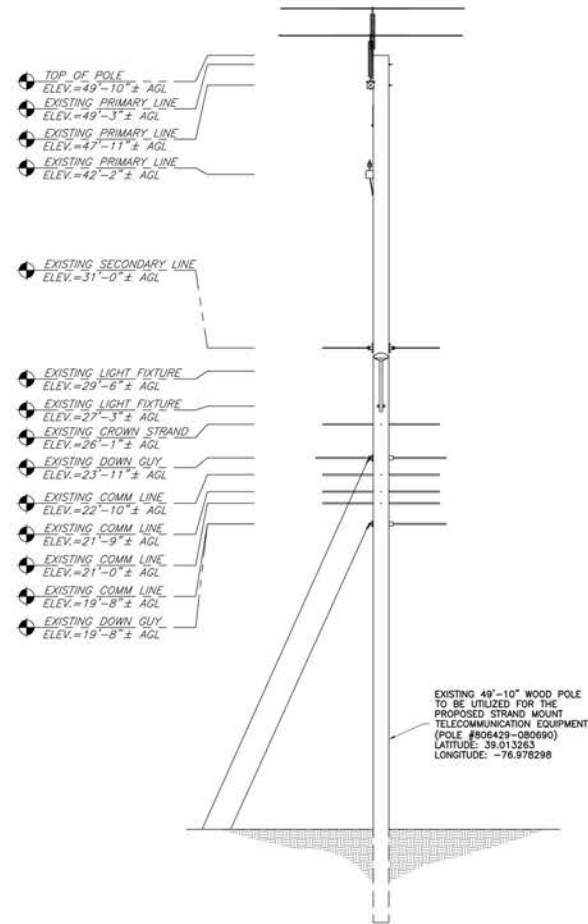
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FILE NAME: STRAND MOUNT DWG
DATE DRAWN: 07-29-22
SCALE: AS SHOWN

SHEET: C-2

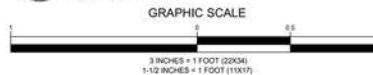
CROWN CASTLE FIBER LLC
EXISTING ELEVATIONS



1 EXISTING CONDITIONS
NOT TO SCALE



3 POLE ELEVATION (LOOKING EAST)
SCALE: 3" = 1' (22X34)
SCALE: 1-1/2" = 1' (11X17)



MOUNTING NOTE:
IF FIELD CONDITIONS DO NOT ALLOW FOR
INSTALLATION AS DIRECTED, CONTRACTOR IS TO
CONTACT ENGINEER FOR FURTHER INSTRUCTION.

NODE: MNG-386 (474995)

ENGINEER:
NB+C
TOTALLY COMMITTED.
NB+C ENGINEERING SERVICES, LLC.
8000 MARSHALLS DRIVE, SUITE 200
BETHESDA, MD 20814
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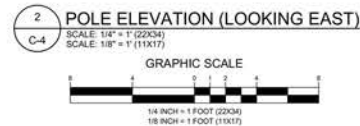
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PEM	SDR	TJA

PROJECT NUMBER:	100505
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DATE DRAWN:	07-29-22
SCALE:	AS SHOWN

SHEET: **C-3**

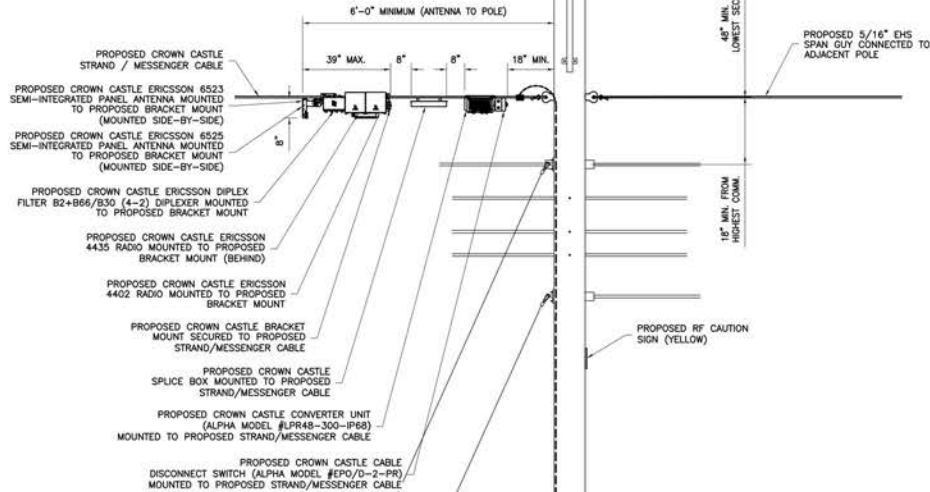
SHEET: **C-4**



CROWN CASTLE FIBER LLC
ENLARGED ELEVATION

DPS BATCH STAMP

EXISTING 49'-10" WOOD POLE
TO BE UTILIZED FOR THE PROPOSED STRAND
MOUNT TELECOMMUNICATION EQUIPMENT
(POLE #806429-080690)
LATITUDE: 39.013263
LONGITUDE: -76.978298



MOUNTING NOTE:

IF FIELD CONDITIONS DO NOT ALLOW FOR
INSTALLATION AS DIRECTED, CONTRACTOR IS TO
CONTACT ENGINEER FOR FURTHER INSTRUCTION.

1 CARRIER ELEVATION
C-5 NTS

NODE: MNG-386 (474995)

ENGINEER:
NB+C
TOTALLY COMMITTED.
NB+C ENGINEERING SERVICES, LLC.
6000 HARTMANVILLE DRIVE, SUITE 500
BETHESDA, MD 20817
(301) 712-7800

OWNER/DEVELOPER:
CROWN CASTLE
CROWN CASTLE FIBER LLC
10080 GRANTCHESTER WAY, 4TH FLOOR
COLUMBIA, MD 21044

TITLE:
MNG-386
9609 NEW HAMPSHIRE AVE
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DRAWN BY:	CHECKED BY:	APPROVED BY:
PEM	SDR	TJA

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FILE NAME:	STRAND MOUNT DWG
DATE DRAWN:	07-29-22
SCALE:	AS SHOWN

SHEET: **C-5**

CROWN CASTLE FIBER LLC
PLUMBING DIAGRAM

DPS BATCH STAMP

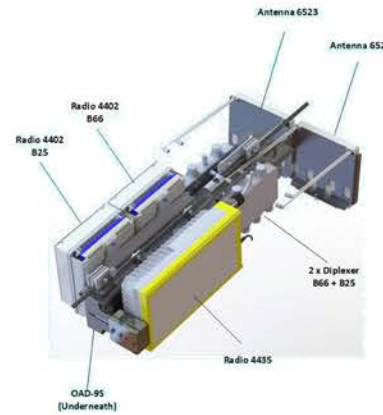
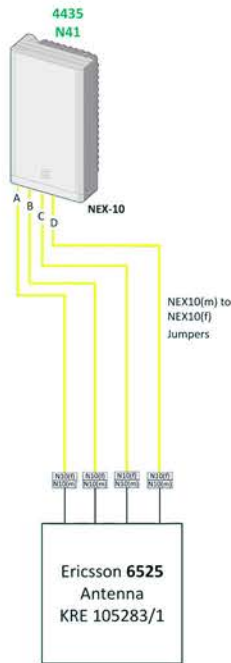
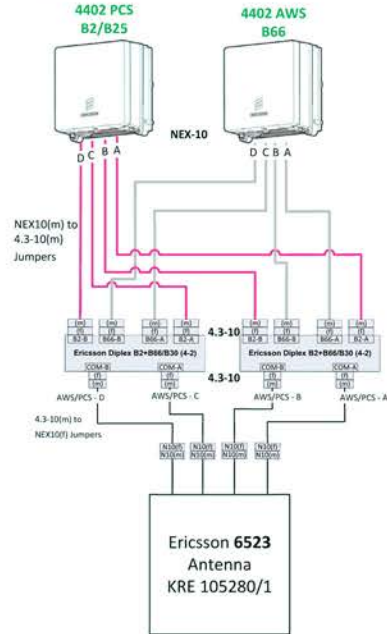


Maryland/DC/Virginia

04/19/2022

For TMO only Strand Nodes

TMO



Proprietary and Confidential

1 PLUMBING DIAGRAM
D-1 NTS

NODE: MNG-386 (474995)

ENGINEER:
NB+C
TOTALLY COMMITTED.
NB+C ENGINEERING SERVICES, LLC.
8000 MARSHALLS DRIVE, SUITE 200
BETHESDA, MD 20817
(301) 712-7500

OWNER/DEVELOPER:
CROWN CASTLE
CROWN CASTLE FIBER LLC
10060 GRANTCHESTER WAY, 4TH FLOOR
COLUMBIA, MD 21044

TITLE:
MNG-386
9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903
JURISDICTION: MONTGOMERY COUNTY
LATITUDE: 39.013263
LONGITUDE: -76.978298



PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND. LICENSE NO. 55491, EXPIRATION DATE 11/30/2028

ENGINEER OF RECORD

TRENT TRAVIS SNARR, P.E.
MARYLAND PROFESSIONAL ENGINEER
LICENSE #55491

REVISIONS

REV	DATE	DESCRIPTION	BY
2	05-30-24	REVISED STAMP	SDR
1	08-16-23	IKK UPDATE REVISION	JED
0	08-29-22	FINAL CD	SDR
A	07-29-22	PRELIMINARY CD	PEM

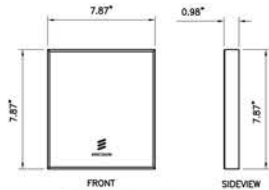
DRAWN BY:	CHECKED BY:	APPROVED BY:
PEM	SDR	TJA

PROJECT NUMBER:	100505
FILE NAME:	STRAND MOUNT DWG
DATE DRAWN:	07-29-22
SCALE:	AS SHOWN

SHEET: D-1

CROWN CASTLE FIBER LLC
EQUIPMENT & ANTENNA DETAILS

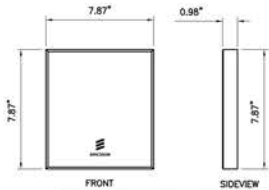
DPS BATCH STAMP



NUMBER OF REQUIRED ANTENNAS
1

ERICSSON 6523 ANTENNA	
WEIGHT	1.76 LBS.
DIMENSIONS (HxWxD)	7.87"x7.87"x0.98"
VOLUME	.035 Cu.Ft.

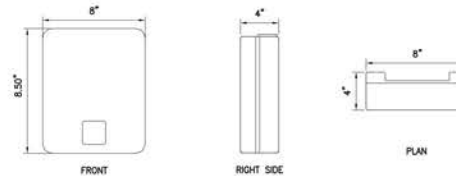
ANTENNA AZIMUTH SHALL BE SET TO 10°



NUMBER OF REQUIRED ANTENNAS
1

ERICSSON 6525 ANTENNA	
WEIGHT	1.76 LBS.
DIMENSIONS (HxWxD)	7.87"x7.87"x0.98"
VOLUME	.035 Cu.Ft.

ANTENNA AZIMUTH SHALL BE SET TO 10°



SIZE AND WEIGHT TABLE, INCLUDING MOUNTING BRACKET AND ESTHETIC FRONT COVER

RRU	LENGTH	WIDTH	DEPTH	WEIGHT W/O BRACKET
RADIO 4402	8.5"	8"	4"	~11.2 LBS.
NUMBER OF REQUIRED RADIOS	VOLUME			
2	.157 Cu.Ft.			

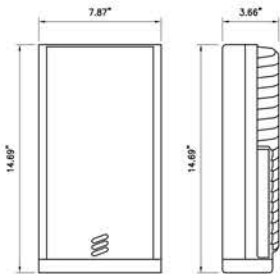
NOTES:

- DO NOT PAINT THE RRU. RRU SOLAR SHIELD CAN BE PAINTED PER MANUFACTURER'S METHOD OF PROCEDURE.

1 ANTENNA DETAIL
D-2 NTS

2 ANTENNA DETAIL
D-2 NTS

3 REMOTE EQUIPMENT HEAD DETAIL
D-2 NTS



ERICSSON 4435 RRH	
WEIGHT	2.2 LBS.
DIMENSIONS (HxWxD)	14.69"x7.87"x3.68"
VOLUME	.245 Cu.Ft.

NUMBER OF REQUIRED RADIOS
1

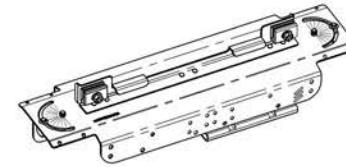


DIPLEXER	LENGTH	WIDTH	DEPTH	WEIGHT
DIPLEX B2+866/B30 (4-2)	8.27"	4.57"	1.71"	5.07 LBS.
NUMBER OF REQUIRED DIPLEXERS	VOLUME			
2	.037 Cu.Ft.			

BILL OF MATERIALS

ITEM	PART NUMBER	DESCRIPTION
1	NTB 101 0450	Material Kit
	SXK 125 3187/5	KIT/SMALL CELL STRAND MOUNT, 3x 2203
	TSR 899 277/31	4.3-10(M) PP-4.3-10(F), 24INCH
	TSR 899 277/32	R/A4.3-10(M)PP TO 4.3-10(M)PP, 30INCH
	KRF 102 409/3	DIPLEX B2+866/B30, 4.3-10
	130C-1X15FT	LINERLESS RUBBER TAPE 3/4"x15'
	T400-3/4x60FT	VINYL TAPE 3/4"x60FT
2		Panel Antenna
3		Equipment Kit

MECHANICAL PARTS (SXK 125 3187/6)



EQUIPMENT BRACKET ASSEMBLY (TOP VIEW)

4 REMOTE EQUIPMENT HEAD DETAIL
D-2 NTS

5 DIPLEXER DETAIL
D-2 NTS

6 DUAL ANTENNA STRAND BRACKET MOUNT DETAIL
D-2 NTS

NODE: MNG-386 (474995)

ENGINEER:
NB+C
TOTALLY COMMITTED.
NB+C ENGINEERING SERVICES, LLC.
6000 MARSHALLS DRIVE, SUITE 500
BETHESDA, MD 20817
(301) 712-7800

OWNER/DEVELOPER:
CROWN CASTLE
CROWN CASTLE FIBER LLC
10060 GRANTCHESTER WAY, 4TH FLOOR
COLUMBIA, MD 21044

TITLE: MNG-386
9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903
JURISDICTION: MONTGOMERY COUNTY
LATITUDE: 39.013263
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TRENT TRAVIS SNARR, P.E.
MARYLAND PROFESSIONAL ENGINEER
LICENSE #55491

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DRAWN BY:	CHECKED BY:	APPROVED BY:
PEM	SDR	TJA

PROJECT NUMBER: 100505
FILE NAME: STRAND MOUNT DWG
DATE DRAWN: 07-29-22
SCALE: AS SHOWN

SHEET: D-2

CROWN CASTLE FIBER LLC
POWER CONVERTER & DISCONNECT ASSEMBLY DETAILS

KIT CONTENTS

ITEM	PART NUMBER	Description	QTY.
1	5900717-001	Brkt,Strnd Mt,Vert,2xLPR300	1
2	5900719-001	Brkt,Strnd Clamp	2
3	0200248	Rotary 4-pole dc disconnect SW Lockable	1
4	630-242-12	Scrw,SEMS,#8-32x1/2",Tooth,PPH,SSt	2
5	6340029	Nut Assy,KEPS,#10-32,Hex,Ext Wshr,SSt	4
6	633-114-12	Wshr,Lock,Ext/Int Tooth,#10,SSt	4
7	630-272-12	Scrw,Mach,#10-32x7/8",Phn Phh,SSt	4
8	6330057	Wshr,Flat,5/16",SAE 0.687"OD,SSt	2
9	6330038	Wshr,Lock,Hlcl Spr,5/16",SSt	2
10	630-100-10	Scrw,Cap,5/16-18x1-1/2",Hexhd,SSt	2
11	5350005	TB,4Pean,Dbl,10mm Ctrs	3
12	8510051	Wire,#14AWG,PVC,300V 105C,FT1,Blk,Solid	36in
13	6500061	Ftg,Str-Thru,Ligt,0.115-0.250"Cbl,w/Nut	4

DPS BATCH STAMP

PROPOSED STRAND/MESSENGER CABLE

PROPOSED FIBER CABLE

KNOCK OUT CENTRAL
1/2" SECTION ONLY
4 PLACES

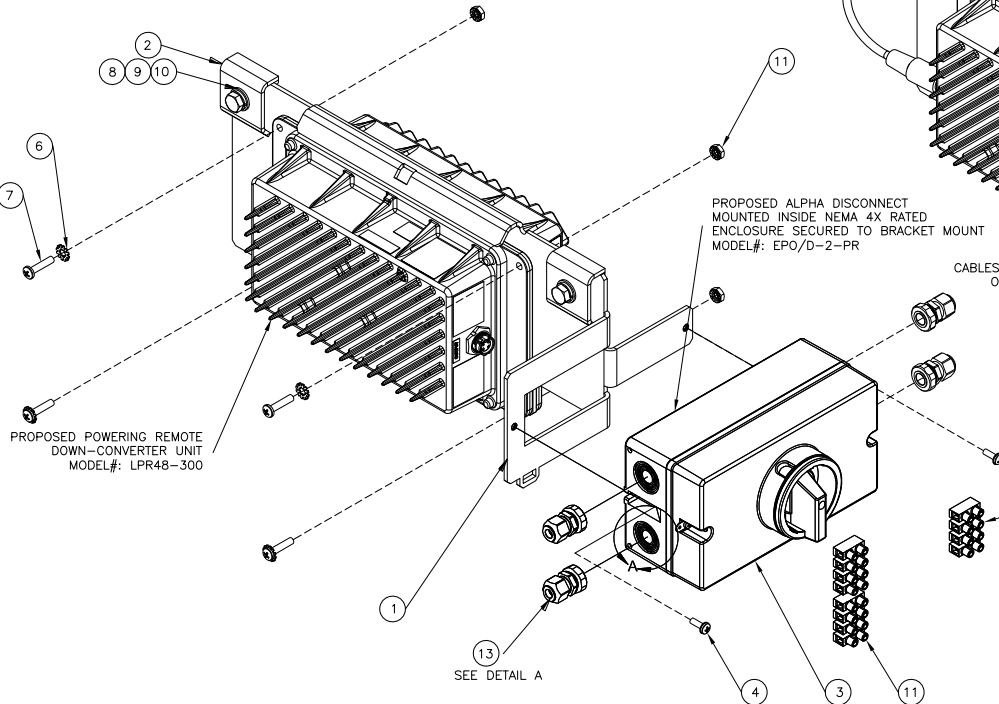
DETAIL A

CABLES TO EQUIPMENTS

CABLES FROM OUTPUTS
OF LPR300 UNITS

RECOMMENDED FINAL ASSEMBLY:
LPR300S AND CABLES NOT PROVIDED IN THIS KIT.

FOR THE ELECTRICAL CONNECTIONS INSIDE DC SWITCH HOUSING, CONNECT THE STRANDED WIRES FROM THE LPR CABLES TO THE PROVIDED TERMINAL BLOCKS AND USE THE PROVIDED WIRE TO CONNECT TO THE TERMINAL BLOCKS TO THE DC SWITCH
TERMINAL BLOCK TORQUE 4.5 lb-in.
DC SWITCH TERMINAL TORQUE 10.6 -15.9 lb-in.



1
D-3 NTS
POWER CONVERTER & DISCONNECT ASSEMBLY DETAILS

NODE: MNG-386 (474995)

ENGINEER:
NB+C
TOTALLY COMMITTED.
NB+C ENGINEERING SERVICES, LLC.
6065 MARSHALLE DRIVE, SUITE 300
ELKPOLE, MD 21724
(410) 712-7582

OWNER/DEVELOPER:
CROWN CASTLE
CROWN CASTLE FIBER LLC
10980 GRANTCHESTER WAY, 4TH FLOOR
COLUMBIA, MD 21044

TITLE:
MNG-386
9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903
JURISDICTION: MONTGOMERY COUNTY
LATITUDE: 39.013263
LONGITUDE: -76.978298



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LICENSE #55491

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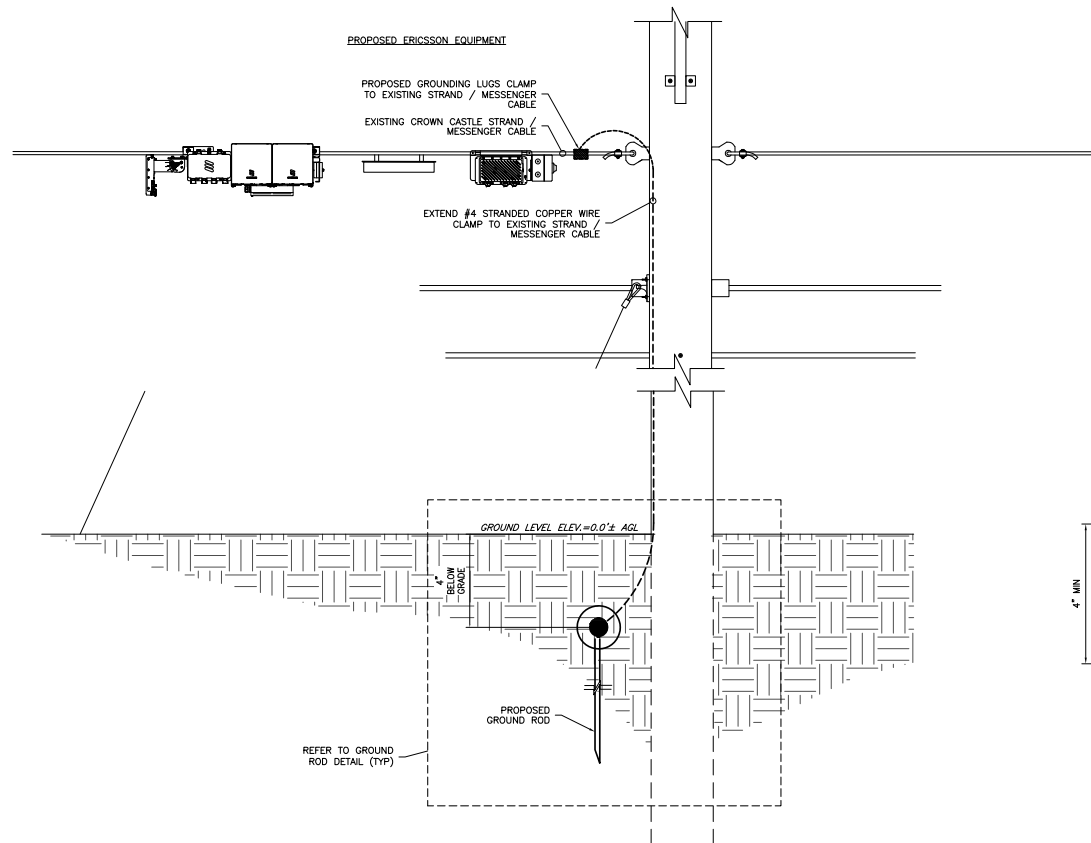
DRAWN BY: PEM	CHECKED BY: SDR	APPROVED BY: TJA
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PROJECT NUMBER:	100505
FILE NAME:	STRAND MOUNT DWG
DATE DRAWN:	07-29-22
SCALE:	AS SHOWN

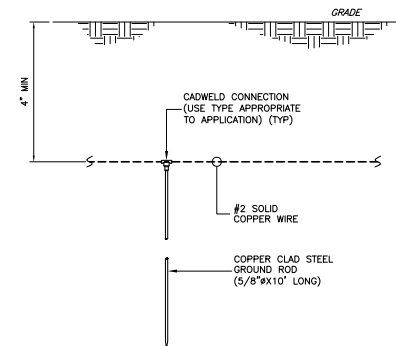
SHEET: D-3

CROWN CASTLE FIBER LLC
GROUNDING DETAILS

DPS BATCH STAMP



1
G-1
GROUNDING RISER DIAGRAM
NOT TO SCALE



2
G-1
TYPICAL GROUND ROD DETAIL
NTS

NODE: MNG-386 (474995)

ENGINEER:
NB+C
TOTALLY COMMITTED.
NB+C ENGINEERING SERVICES, LLC.
8085 MARSHALLE DRIVE, SUITE 300
ELKWOOD, MD 21751
(410) 712-7002

OWNER/DEVELOPER:
CROWN CASTLE
CROWN CASTLE FIBER LLC
10980 GRANTCHESTER WAY, 4TH FLOOR
COLUMBIA, MD 21044

TITLE:
MNG-386
9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903
JURISDICTION: MONTGOMERY COUNTY
LATITUDE: 39.013263
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MARYLAND PROFESSIONAL ENGINEER
LICENSE #55491

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DRAWN BY: PEM	CHECKED BY: SDR	APPROVED BY: TJA
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PROJECT NUMBER:	100505
FILE NAME:	STRAND MOUNT DWG
DATE DRAWN:	07-29-22
SCALE:	AS SHOWN

SHEET:
G-1

DPS BATCH STAMP

TEMPORARY TRAFFIC CONTROL TYPICAL APPLICATION

IMPORTANT:
THIS DRAWING SHALL BE USED IN COMBINATION WITH THE GENERAL NOTES WD 104.00-01 - WD 104.00-18 AND STANDARD DETAILS WD 104.01-01 - WD 104.01-08

NOTE:
THERE SHALL BE A MINIMUM OF SEVEN CHANNELIZING DEVICES IN THE SHOULDER TAPER.

THE ENGINEER SHOULD CONSIDER ADDITIONAL ADJACENT LANE CLOSURES WHEN THE POSSIBILITY OF UNPLANNED TRAVEL OR ENCROACHMENTS EXISTS.

KEY:

- ■ ■ CHANNELIZING DEVICES
- ■ ■ SIGN SUPPORT
- ■ ■ FACE OF SIGN
- ↑ DIRECTION OF TRAFFIC
- ■ ■ WORK SITE
- ○ ○ ARROW PANEL

OVER 12 HRS. OR NIGHTTIME USE

15 MIN.-12 HRS. OR DAYTIME USE ONLY

104

APPROVED

STATE HIGHWAY

APPROVAL • DIV. REVISIONS

APPROVAL • FEDERAL HIGHWAY ADMINISTRATION

APPROVAL 8-30-03

APPROVAL 8-23-03

REVISION 8-11-10

REVISION 7-9-10

Maryland Department of Transportation

STATE HIGHWAY ADMINISTRATION

STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

RIGHT LANE CLOSURE / DIVIDED UNCON.

EQ/LESS THAN 40 MPH

STANDARD NO.

MD 104.04-06

A diagram of a rectangular speed limit sign with a black border. Inside the sign, the words "SPEED" and "LIMIT" are stacked vertically in a bold, sans-serif font. Below them, the number "35" is displayed in a large, bold, sans-serif font.

SHEET: **TCP-1**

App No:

2024052263

Application General Information

Applicant Name	Crown Castle Fiber LLC	Received	5/10/2024
Application Type	Colocated	Ann. Plan?	Yes
Carrier	T-Mobile	Will site be used to support government telecommunications facilities or other equipment for government use?	No
Solution Type	Small Cell		
Existing	Existing		
		Gvt. Use Desc.	

Application Description

Install a strand mounted small cell with a RAD center of 26' 1" on an existing 49' 10" wood utility light pole, consisting of one (1) Ericsson 6523 antenna, one (1) Ericsson 6525 antenna, two (2) 4402 radio units, one (1) Ericsson 4435 RRH, two (2) diplexers and antenna strand bracket.

Site Information

Site Id	668	Zoning	R-60
Structure Type	Utility Pole	Latitude	39.013263
Street Address	9609 New Hampshire Ave	Longitude	-76.978298
County Site Name	Pepco 806428-080690	Ground Elevation	214
Carrier Site Name	MNG-386	City	Silver Spring
Site Owner	State Highway ROW	Lease Status	Leased
Structure Owner	PEPCO	Does the structure require an antenna structure registration under FCC Title 47	Yes
Existing Structure Height	49.8	Distance to Residential Property (New, Colocation Only)	70.6
Provide the proposed height of the replacement structure without any antenna (New Apps Only)		Distance to Commercial Property (New, Colocation Only)	278.5

Justification of why this site was selected:

Provides additional coverage to 9600 block of New Hampshire Avenue and vicinity.

NearbySites (New Apps Only):

Tuesday, May 14, 2024

7:53:02 PM

App No: 2024052263

Screening considerations(New, Colocation Apps Only):

N/A - Strand mounted facility

App No:

2024052263

6409 Questions

Does this qualify as a 6409 application? (Minor Mod, Colocations Only)

Yes

For towers outside the public ROW will the proposed installation increase the height of the structure by: (1) more than 10% or (2) more than 20 feet, whichever is greater?

No

Will the proposed installation increase the width by adding appurtenance to the body of the structure that would protrude from the edge of the structure by more than 6 feet?

No

For towers outside the public ROW will the proposed installation increase the width by adding appurtenance to the body of the structure that would protrude from the edge of the structure by more than 20 feet?

No

Will the proposed installation require more the standard number of new equipment cabinets for the technology involved, but not to exceed four cabinets?YN

No

Will the proposed installation increase the height of the structure by: (1) more than 10% or (2) more than 10 feet, whichever is greater?

No

Does the structure or current installation have concealment elements/measures?

No

Will the proposed installation require excavation or expansion outside the current boundaries of the site?

No

If yes, describe how the proposed installation does not defeat the existing concealment.

Small Wireless Facility Information

Small Wireless Facility Questions

Small Wireless Facility?

Yes

Is the structure 10% taller than adjacent structures?

Cumulative volume of the proposed wireless equipment(s) exclusive of antennas in cubic feet

0.633

Please list adjacent structure heights

Cumulative volume of the proposed antenna(s) exclusive of equipment in cubic feet

0.07

Tribal Lands?

No

ROW Information

PROW?

Yes

Pole Number

806429-080690

ROW owner

State Highway Administration

ROW width

130.1

Tuesday, May 14, 2024

7:53:02 PM

App No: 2024052263

Antenna Information

Antenna ComplianceYes

Compliance Desc

Antenna LocationNo

Antenna Loc. Desc.

Env. Assessment

Cat. Excluded?

Routine Env. Evaluationchecked

Antenna ModelEricsson 6523

Frequency1735-1755 1850-1865 1910-1915 1930-1945 1965-1975 1990-1995 2135-2155

RAD Center26Max ERP86Antenna Dimensions7.87x7.87x0.98Quantity1

CROWN CASTLE FIBER LLC TITLE SHEET

CODE COMPLIANCE

ALL WORK AND MATERIALS SHALL BE PERFORMED AND INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THE LATEST EDITIONS OF THE FOLLOWING CODES.

- COMAR 9.12.53, ADAAG & FHAG
- 2018 ICC INTERNATIONAL BUILDING CODE INCORPORATING MONTGOMERY COUNTY AMENDMENTS PUBLISHED PER ECR #31-19
- 2018 ICC INTERNATIONAL RESIDENTIAL CODE
- 2018 ICC INTERNATIONAL EXISTING BUILDING CODE
- MBRC MARYLAND BUILDING REHABILITATION CODE
- 2012 IGCC GREEN BUILDING CODE
- 2018 ICC INTERNATIONAL ENERGY CONSERVATION
- 2018 ICC INTERNATIONAL FUEL/GAS CODE
- 2018 ICC INTERNATIONAL MECHANICAL CODE
- 2017 NFPA 70 NATIONAL ELECTRICAL CODE
- 2013 NFPA 72
- 2013 COMAR NFPA 72
- 2015 NFPA 1 & 101
- WSSC PLUMBING CODE
- WSSC FUEL GAS CODE
- 2013 NFPA 13D
- 2013 COMAR NFPA 13D
- 2013 NFPA 13/13R
- 2013 COMAR NFPA 13/13R
- TIA-222-H-2016

SCOPE OF WORK

SCOPE OF WORK CONSISTS OF INSTALLING A NEW STRAND MOUNT AND AUXILIARY EQUIPMENT ON NEW STRAND / MESSENGER CABLE. STRAND / MESSENGER CABLE WILL BE ATTACHED TO EXISTING WOODEN UTILITY POLE. NEW ANTENNA, DIPLEXER, AND RADIO SHALL BE MOUNTED ON A PROPOSED BRACKET MOUNT AND THE BRACKET MOUNT, SPLICE BOX, AND POWER CONVERTER WILL ALL BE MOUNTED ON NEW STRAND / MESSENGER CABLE.



DPS BATCH STAMP

CROWN CASTLE FIBER LLC
SITE NAME: MNG-386
9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903

JURISDICTION: MONTGOMERY COUNTY/SHA(650)
PROPOSED STRAND MOUNT INSTALLATION

INDEX OF SHEETS

T-1	TITLE SHEET
GN-1	GENERAL NOTES
GN-2	GENERAL NOTES
C-1	SITE PLAN
C-2	ENLARGED SITE PLAN
C-3	EXISTING ELEVATIONS
C-4	PROPOSED ELEVATIONS
C-5	ENLARGED ELEVATION
D-1	PLUMBING DIAGRAM
D-2	EQUIPMENT & ANTENNA DETAILS
D-3	POWER CONVERTER & DISCONNECT ASSEMBLY DETAILS
G-1	GROUNDING DETAILS
TCP-1	TRAFFIC CONTROL PLANS

NODE:
MNG-386 (474995)

ENGINEER:
NB+C
TOTALLY COMMITTED.
NB+C ENGINEERING SERVICES, LLC.
6000 MARSHALLS DR., SUITE 300
KENSINGTON, MD 20705
(301) 713-7002

OWNER/DEVELOPER:
CROWN CASTLE
CROWN CASTLE FIBER LLC
10980 GRANTCHESTER WAY, 4TH FLOOR
COLUMBIA, MD 21044

TITLE:
MNG-386
9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903
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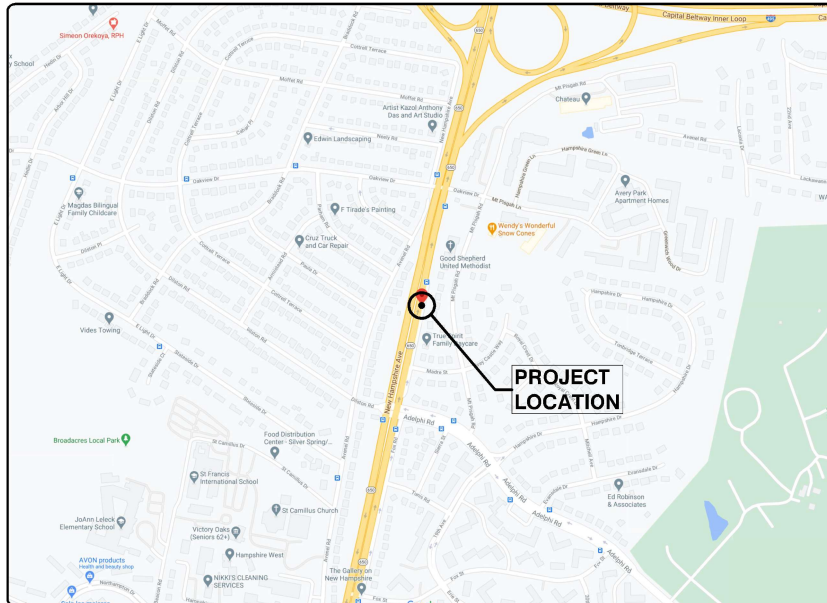
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DRAWN BY:	CHECKED BY:	APPROVED BY:
PEM	SDR	TJA

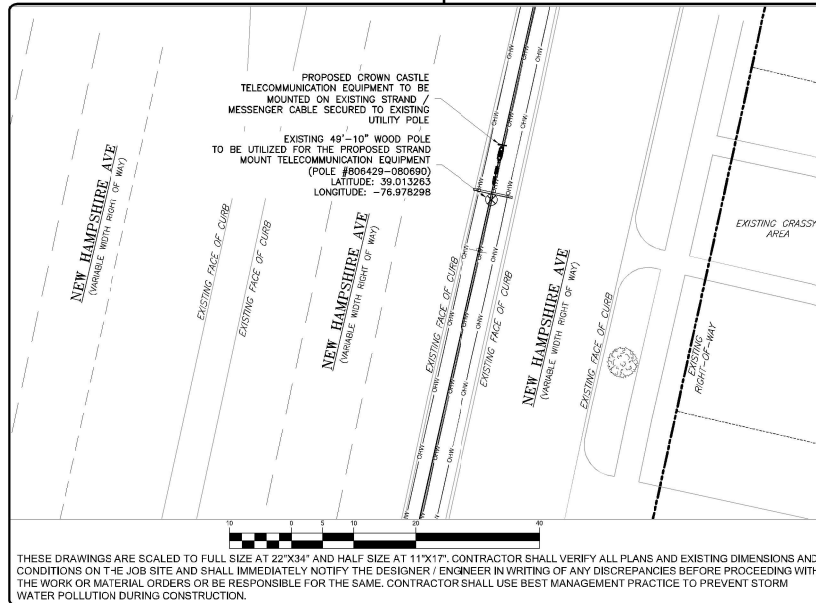
PROJECT NUMBER:	100505
FILE NAME:	STRAND MOUNT DWG
DATE DRAWN:	07-29-22
SCALE:	AS SHOWN

SHEET:
T-1



LOCATION MAP

NODE LOCATION:
LATITUDE: 39.013263° (N 39° 00' 47.8")
LONGITUDE: -76.978298° (W 76° 58' 41.9")



NODE PLACEMENT

9609 NEW HAMPSHIRE AVE
POLE TAG ID: 806429-080690
PEPCO FACILITY ID: 806429-080690
ZONING CLASSIFICATION = R90

SCALE: 1" = 10'-0"



ANTENNA 6523

Integrated Directional Antenna 6523

The modular Micro Radio 4402 supports installations with an integrated directional antenna or external antenna systems.

Antenna 6523 is the integrated directional antenna for Radio 4402 for the 3GPP Band B1, B2/B25, B3 and B66A for Licensed Assisted Access usage and is mounted on the front of Radio 4402 and when used replaces the cover.

The antenna pattern, with a broad horizontal beam, is beneficial for small cell coverage. The fixed electrical tilt is -8 degrees. An optional mechanical down tilt bracket is also available.

Antenna 6523 is designed for optimal performance in all Radio 4402 configurations and integrated for very low visual impact in urban installations.

Micro Radio 4402

The Micro Radio 4402 is part of the Ericsson Radio System portfolio. Radio 4402 has best in class design, superior radio performance and power efficiency when it comes to medium range 3GPP radio products.

Radio 4402 has, by use of its small and smart dimensions, support for a wide range of mounting scenarios and has a pioneering flexibility within its product segment. With the Radio 4402, Ericsson evolves the micro radio portfolio to become even more flexible thus making it easier than ever to make small and efficient single and multi-band micro radio installations.



Antenna 6525

Integrated Directional Antenna 6525

The modular Micro Radio 4402 and Radio 4408 support installations with an integrated directional antenna or external antenna systems.

Antenna 6525 is the integrated directional antenna for Radio 4402 and Radio 4408 for the 3GPP Bands B7 B38A B40 B41 (2300 – 2690 MHz) and is mounted on the front of Radio 4402 and Radio 4408 and when used replaces the cover.

The antenna pattern, with a broad horizontal beam, is beneficial for small cell coverage. The fixed electrical tilt is -8 degrees. An optional mechanical down tilt bracket is also available.

Antenna 6525 is designed for optimal performance in all Radio 4402 and Radio 4408 configurations and integrated for very low visual impact in urban installations.

Micro Radio 4402/Micro Radio 4408

The Micro Radio 4402/4408 is part of the Ericsson Radio System portfolio. Radio 4402/4408 has best in class design, superior radio performance and power efficiency when it comes to medium range 3GPP radio products.

Radio 4402/4408 has, by use of its small and smart dimensions, support for a wide range of mounting scenarios and has a pioneering flexibility within its product segment. With the Radio 4402/4408, Ericsson evolves the micro radio portfolio to become even more flexible thus making it easier than ever to make small and efficient single and multi-band micro radio installations.

Technical Specification Antenna 6525

PRODUCT NUMBER KRE 105283/1

3GPP Band: B7 B38A B40 B41

Frequency range: 2300 – 2690 MHz

Average gain: 9 dBi

Horizontal pattern

Beam width, 3 dB (0dBi) : 82° (120°)

Beam tracking error $\pm 60^\circ$: ≤ 3 dB

Beam pointing error 0° : $\leq 5^\circ$

Vertical pattern

Beam width, 3 dB: 43°

Fixed electrical down-tilt: 8°

Front-to-back $180 \pm 30^\circ$: > 20 dB

VSWR (Return loss): < 1.5 (> 14 dB)

Isolation > 20 dB

Cross Polarization Ratio > 15 dB(at boresight), > 10 dB(at sector)

Antenna pattern files: Contact local Ericsson sales representative

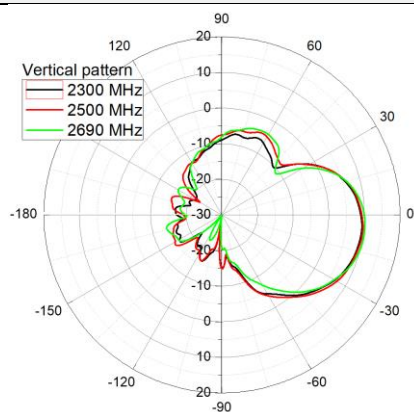
Mechanical specification

Main Dimensions, WxDxH: 200mm x 25mm x 200 mm

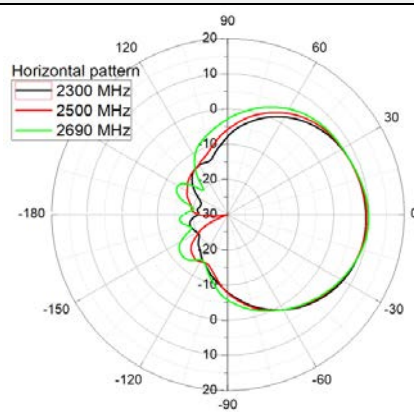
Weight: 800 g

Volume: 1,0 l

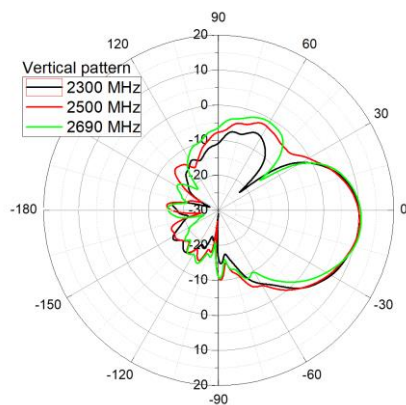
Environmental: IP55, Type 3R



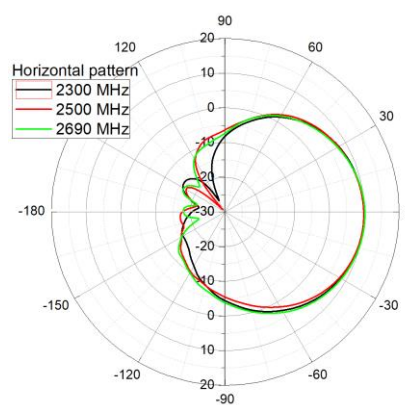
+45_V-Plane



+45_H-Plane



-45_V-Plane



-45_H-Plane

Technical Specification Antenna 6523

PRODUCT NUMBER KRE 105 280/1

3GPP Band: B1 B2/B25 B3 B66A

Frequency range: 1700 - 2200 MHz

Average gain: 8.5 dBi

Horizontal pattern

Beam width, 3 dB (0dBi) : 82° (120°)

Beam tracking error $\pm 60^\circ$: ≤ 5 dB

Beam pointing error 0° : $\leq 7^\circ$

Vertical pattern

Beam width, 3 dB: 43°

Fixed electrical tilt: -8°

Front-to-back $180 \pm 30^\circ$: > 15 dB

VSWR (Return loss): < 1.57 (> 13 dB)

Isolation > 20 dB

Cross Polarization Ratio > 10 dB(at boresight), > 5 dB(at sector)

Antenna pattern files: Contact local Ericsson sales representative

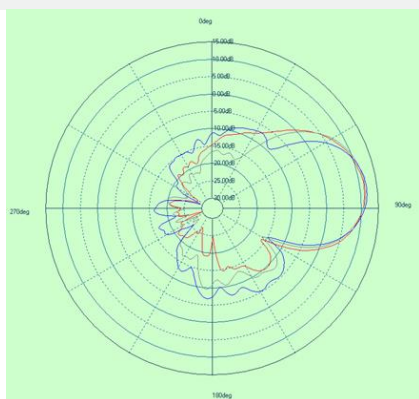
Mechanical specification

Main Dimensions, WxDxH: 200mm x 25mm x 200 mm

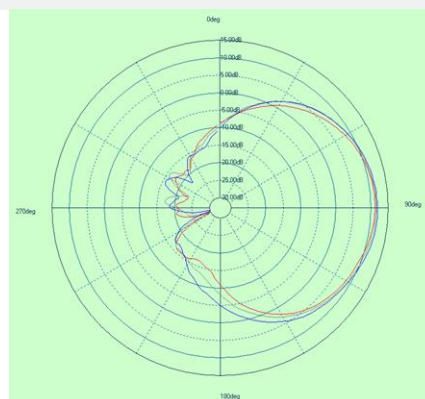
Weight: < 800 g

Volume: 1,0 l

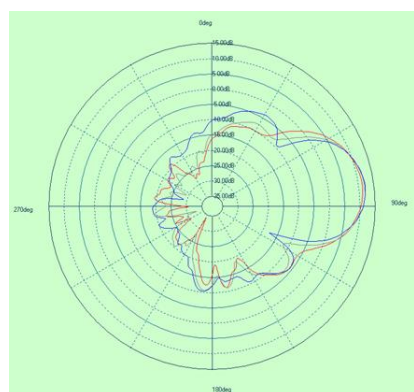
Environmental: IP55, Type 3R



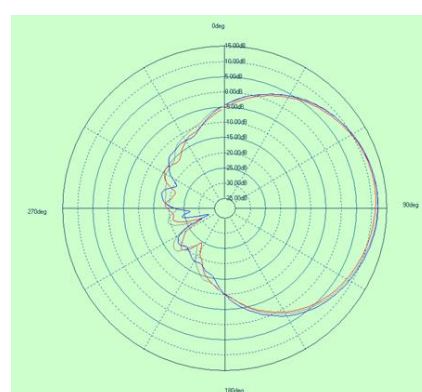
+45_V-Plane



+45_H-Plane



-45_V-Plane

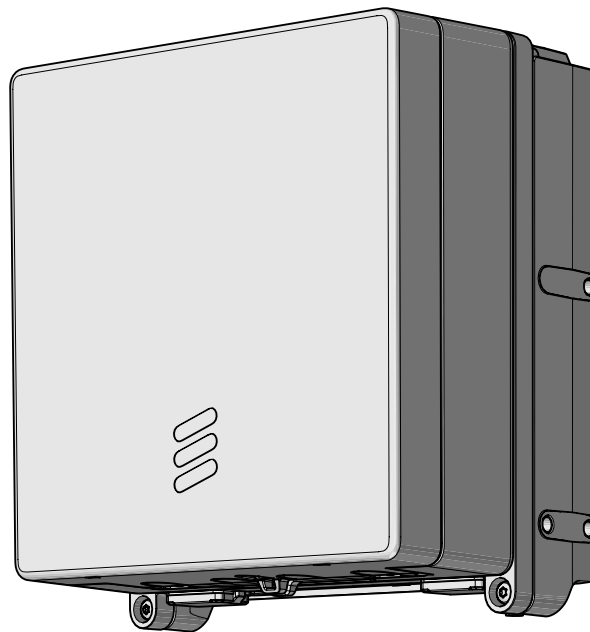


-45_H-Plane

Radio Description

Radio 4402

Description



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1 Introduction

1.1 Warranty Seal

The product is equipped with a warranty seal sticker.

Note: Seals that have been implemented by Ericsson must not be broken or removed, as it otherwise voids warranty.



2 Product Overview

The radio expands coverage and performance in denser urban areas, where the use of small handheld devices demand high capacity on the operators networks. It is designed to be located in cities and in demanding radio environments.

The radio is part of a modular radio building concept that enables a variety of installation alternatives that is also easy to expand. Flexible mounting solutions are provided using rails and pole clamps. The small size of the radio together with the flexible mounting solutions reduces the site volume. The lower weight also improves the handling of the radio.

The radio can be connected in a star or cascade configuration using optical cable links. An optic cable connects the radio to the main unit, or to an expanded Radio System.

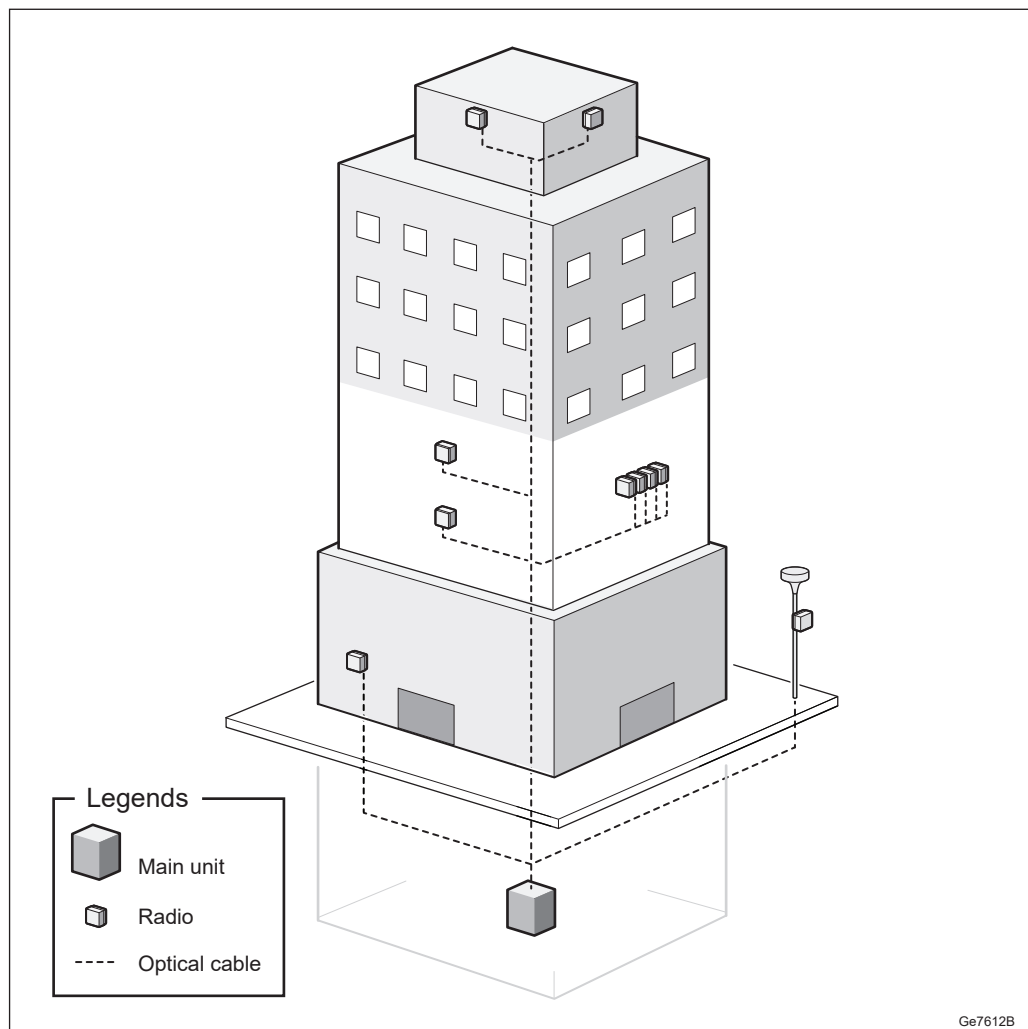


Figure 1 Radio Installations

2.1 Main Features

The following are the main features of the radio:

- WCDMA, LTE FDD, and NB-IoT
- Duplex transmitter/receiver (4TX/4RX) branches with 5 W per branch
- Up to 10.1 Gbps CPRI (optical)
- Complies with 3GPP base station classes Medium Range. For a list of relevant standards, see [Radio Standards Compliance](#) on page 33.



2.2 Optional Equipment

The optional equipment for the radio is the following:

- External antenna equipment
- Integrated directional antenna
- Rail installation equipment



3 Technical Data

Table 1 lists regulatory approved configurations. The listed standards on a specific frequency band may not be generally available on all markets. Contact the local Ericsson responsible for details.

Table 1 Radio 4402 Technical Data

Description	Value
Maximum nominal output power ⁽¹⁾	4 × 5 W
Number of carriers per branch	LTE: 6 downlink, 6 uplink WCDMA: 6 downlink, 6 uplink NB-IoT in-band mode: 1 NB-IoT carrier per configured LTE host carrier NB-IoT standalone mode: 1 carrier per RF port NB-IoT guard band mode: 1 NB-IoT carrier per configured LTE host carrier
Number of carriers per radio	LTE: 4 × 6 downlink, 4 × 6 uplink WCDMA: 4 × 6 downlink, 4 × 6 uplink NB-IoT in-band mode: 1 NB-IoT carrier per configured LTE host carrier NB-IoT standalone mode: 4 × 1 carriers per RF port NB-IoT guard band mode: 1 NB-IoT carrier per configured LTE host carrier
Frequency ⁽²⁾	B66A for WCDMA, LTE, NB-IoT in-band mode, NB-IoT standalone mode, and NB-IoT guard band mode 1710–1780 MHz uplink 2110–2180 MHz downlink
Dimensions with Cover, Single Radio	
Height (A)	213.5 mm
Width (B)	200 mm
Depth (C)	105 mm
Dimensions with Antenna, Single Radio	
Height (A)	213.5 mm
Width (B)	200 mm
Depth (C)	125 mm



Description	Value
Weight	
Radio 4402 with Cover, Single Radio	4.7 kg
Radio 4402 with Antenna, Single Radio	5.1 kg
Color	
Body	NCS S 1002-B

(1) For detailed information about licenses and HWAC, see the following:

WCDMA: Licenses and Hardware Activation Codes in Ericsson Software Model in the WCDMA RAN CPI library.

LTE: Manage Licenses and Hardware Activation Codes in the Radio Node libraries.

(2) For information about IBW, see RBS Configurations.

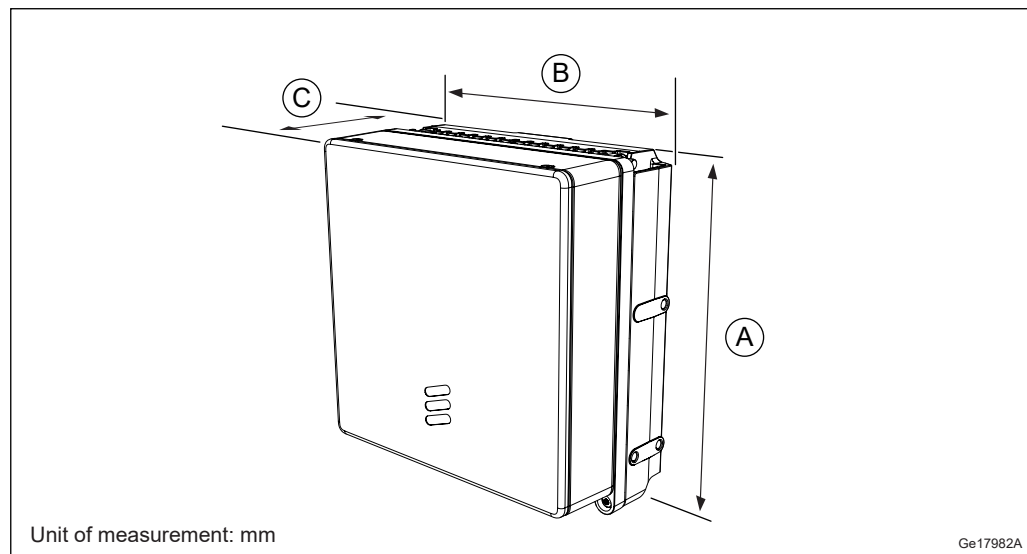


Figure 2 Radio 4402 Dimensions with Cover, Single Radio

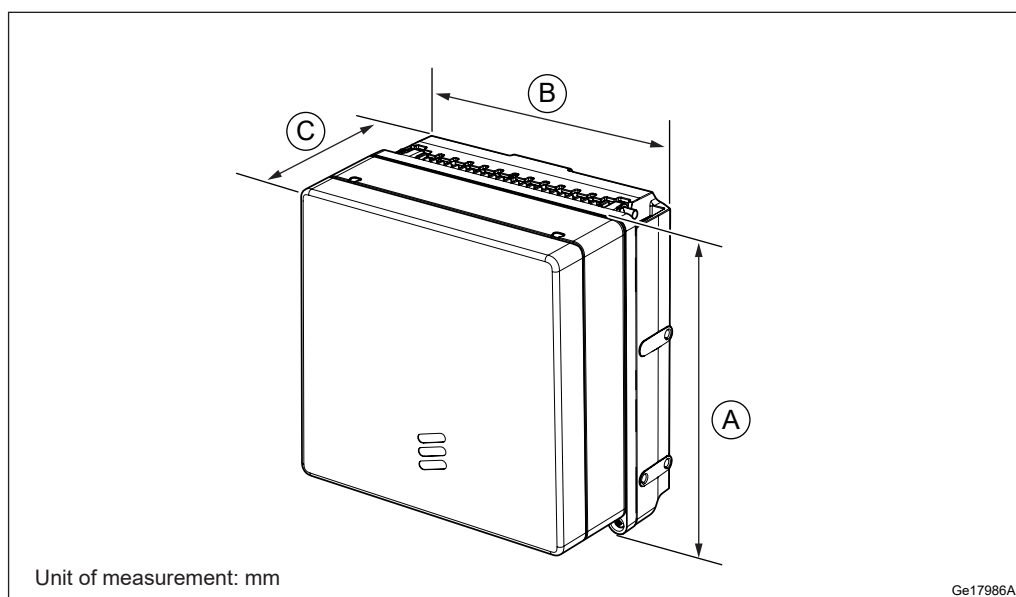


Figure 3 Radio 4402 Dimensions with Antenna, Single Radio

Table 2 Antenna Data

Antenna	Frequency Band	Frequency
6523 Directional	B1, B2/B25, B3, and B66A	1710–2200 MHz

3.1 Installation Recommendations

To ensure reliable operation and maximum performance, an appropriate installation location must be chosen.

When using the optional integrated directional antenna make sure the radio is not pointing at any elements that can disturb the radio signals.

3.1.1 Indoor Locations to Avoid

Although the unit is designed for outdoor use, it can be used indoors. For indoor locations Ericsson recommends to operate according to ETSI EN 300 019-1-3 class 3.1, 3.2, 3.3, and 3.6. This does not cover installation with heat traps or installation in lofts, where air ventilation does not exist. To ensure smooth performance, avoid installing the unit in a potential microclimate location, for example, places with unventilated lofts, with heat traps, or where the product is exposed to direct sunlight through windows. Avoid installing the equipment under glass covers or skylight windows without proper ventilation.



3.1.2 Outdoor Locations to Avoid

Although Ericsson declares this product suitable for outdoor environments, avoid installing the unit in a potential microclimate location. Typical examples of microclimate locations are sites where the product is not only exposed to the actual surrounding temperature, but additional temperature as heat coming from dark colored planes, for example, reflections from the floor or walls. The additional temperature can generate heat traps with temperatures up to 10°C higher than expected.

Avoid installing equipment in the following locations:

- Near the exhaust of building ventilation systems
- Near the exhaust of chimneys
- Opposite large surfaces made of glass or new concrete

If the unit is to be placed in an environment subjected to lightning strike, an external Surge Protection Device (SPD) is needed.

3.1.3 Other Considerations

Installing the radio close to other electronic equipment can cause interferences.

For sites with risk of ground fire, the recommended minimum installation height is 3 m.

3.1.4 Painting Disclaimer

Ericsson recommends to not paint the product as it can affect performance of the product.

Ericsson applies limitations to the warranty and service contract if the product is painted.

If the product is painted, the following commercial limitations apply:

- Failure modes directly related to overheating because of painting are not valid for repair within the scope of the warranty or standard service contract.
- Product failures related to paint contamination of components of the unit are not valid for repair within the scope of warranty or standard service contract.
- When a painted unit is repaired, it might be restored to the standard color before being returned to the market. It is not possible to guarantee that the same unit is sent back to the same place. This is also valid for units repaired under a service contract.



- For repairs within the warranty period or a standard service contract, the customer is charged the additional costs for replacing all painted parts of the unit or the complete unit.

If adaptations are required, contact Ericsson for information.

3.2 Installation Alternatives

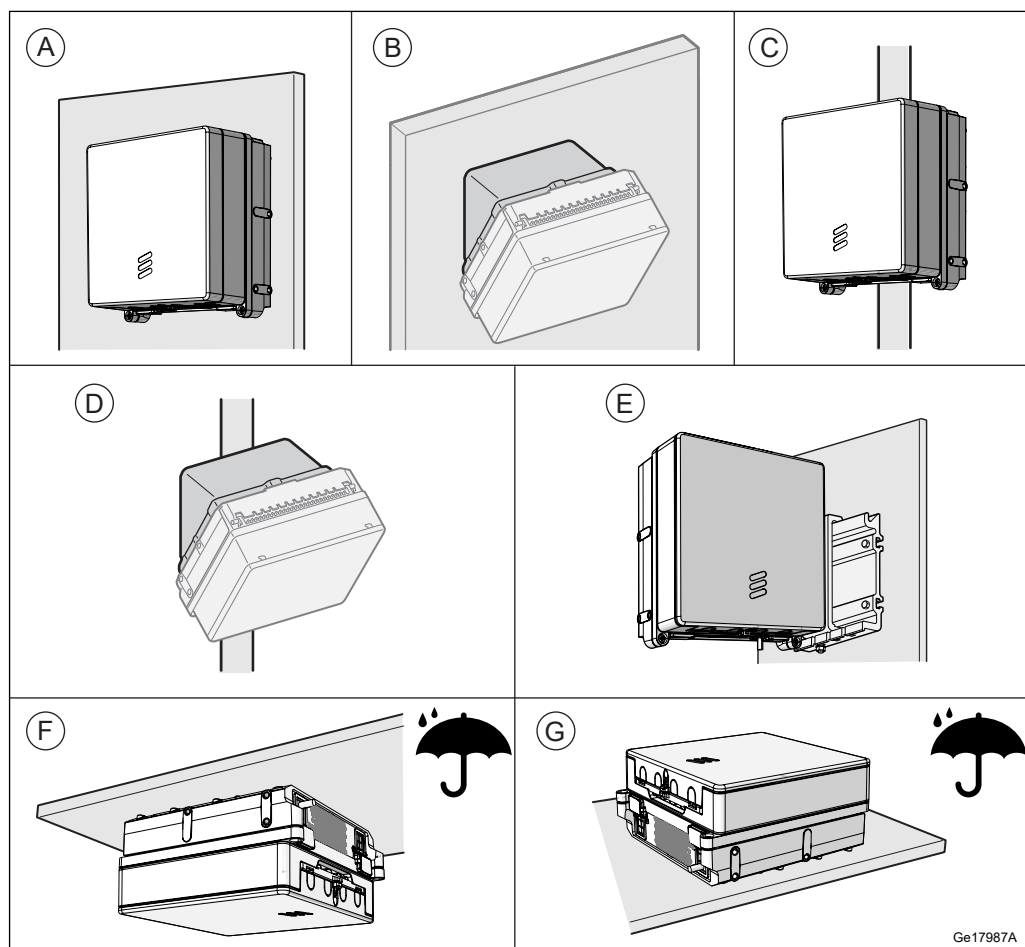


Figure 4 Alternative Installation Methods

Table 3 Key to Alternative Installation Methods

Installation Method	Description
A	Wall installation
B	Wall installation with tilt installation kit
C	Pole installation



Installation Method	Description
D	Pole installation with tilt installation kit
E	Rail installation (Single Radio only)
F	Ceiling installation
G	Horizontal installation

The integrated directional antenna is not applicable to installation alternatives E, F, and G.

For mounting direction F or G in an outdoor environment the Radio needs to be protected from direct rain.

3.3 Space Requirements

3.3.1 Generic Requirements

The radios can be placed directly against each other side by side. To ensure sufficient working space, allow adequate free space in front of the radio.

3.3.2 Wall Installation

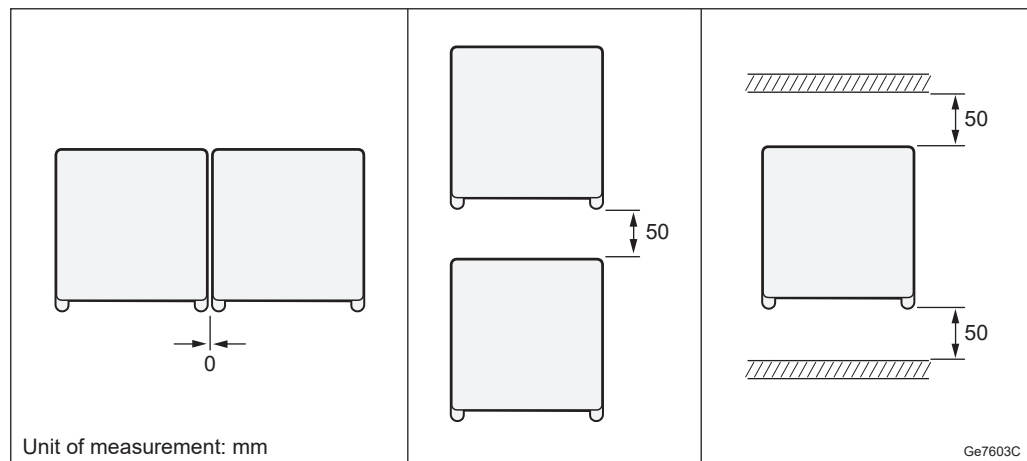


Figure 5 Wall Installation, Single Radio

To ensure adequate airflow between the units, allow a minimum of 50 mm free space between the radio and the roof, and between radios installed on a wall, on top of one another.



3.3.3

Wall or Pole Installation Using a Tilt Installation Kit

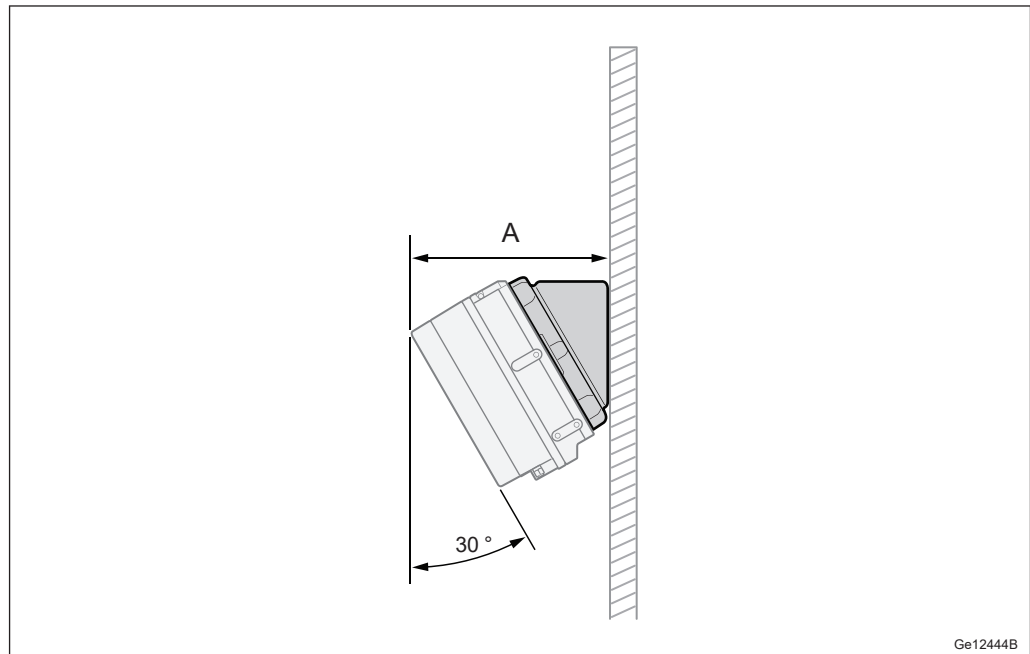


Figure 6 Tilt Installation Kit, Single Radio

Table 4 Tilt Installation Kit, Single Radio

Description	Value A (mm)
Distance with cover	198
Distance with high-band antenna	216
Distance with low-band antenna	224



3.3.4 Pole Installation

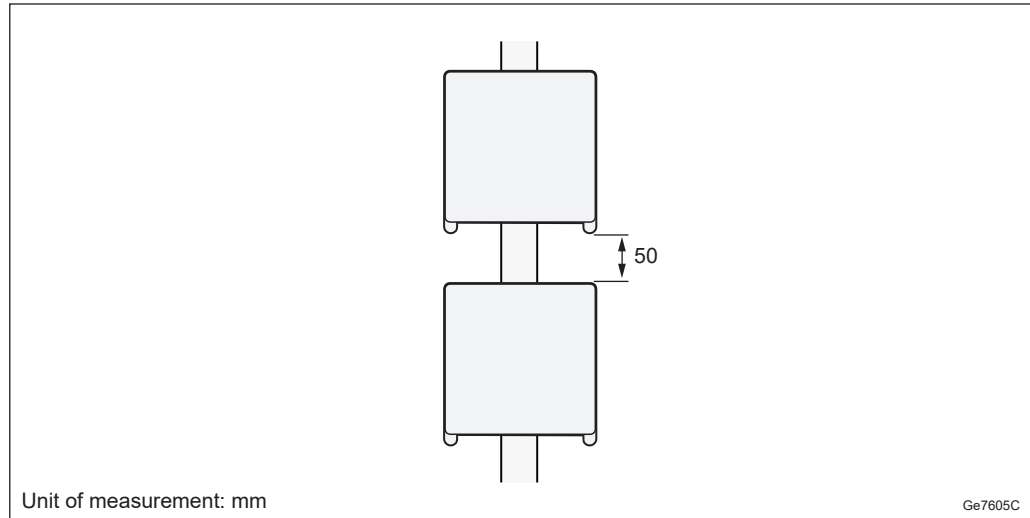


Figure 7 Pole Installation, Single Radio

To ensure adequate airflow between the units, allow a minimum of 50 mm free space above and below each radio.

Table 5 Pole Dimensions

Pole Clamp Type	Minimum Dimension (mm)	Maximum Dimension (mm)
Hose clamp steel, Range 40-150 mm	Ø40	Ø150
Hose clamp steel, Range 140-300 mm	Ø140	Ø300
Hose clamp steel, Range 250-500 mm	Ø250	Ø500



3.3.5

Rail Installation

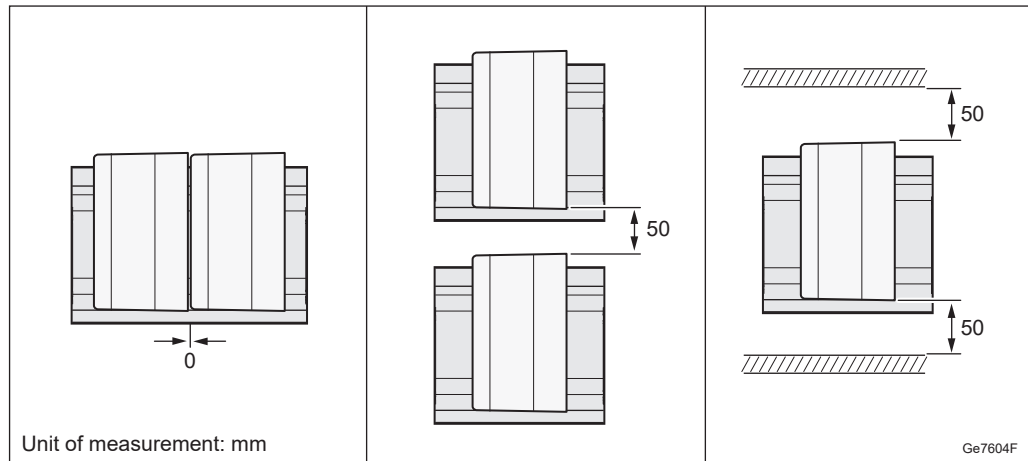


Figure 8 Rail Installation

To ensure adequate airflow between the units, allow a minimum of 50 mm free space above and below each radio, and between the radio and the wall.

3.3.6

Ceiling Installation

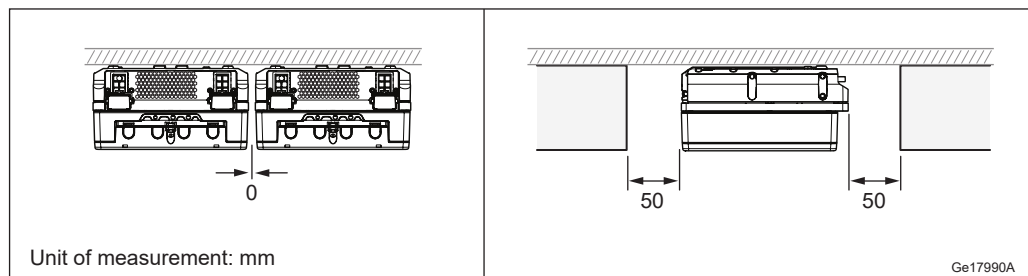


Figure 9 Ceiling Installation

To ensure adequate airflow between the units, allow a minimum of 50 mm free space between the radio and the wall, and 50 mm between radios installed on a roof beside one another.



3.3.7 Horizontal Installation

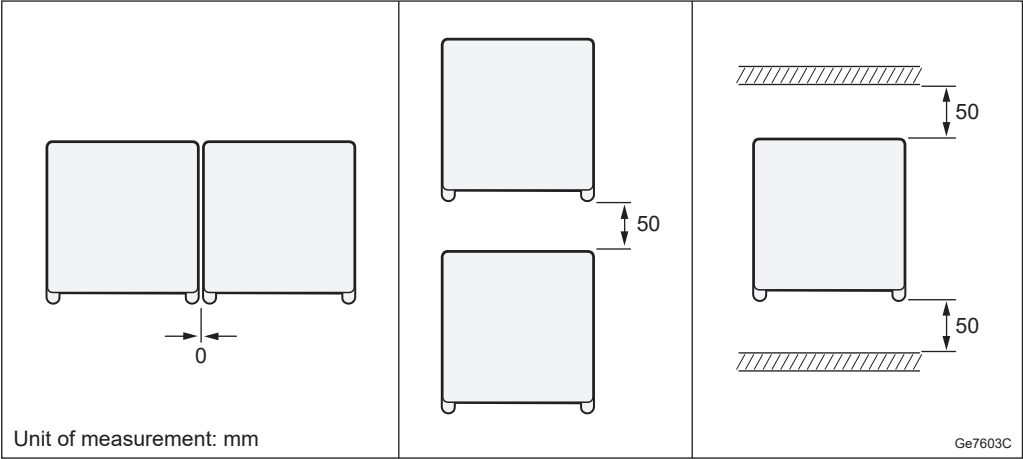


Figure 10 Horizontal Installation, Single Radio

To ensure adequate airflow between the units, allow a minimum of 50 mm free space between the radio and the roof, and between radios installed horizontally.

3.4 Acoustic Noise

With the fan, the acoustic noise is ambient temperature dependent, as listed below.

Table 6 Maximum Sound Pressure Level for Radio 4402 with Fan

Temperature (°C)	Radio 4402 Sound Pressure Level (dB)
+20	49
+30	52
+40	55
+55	60

3.5 Environmental Characteristics

This section contains operating environment data for the radio.

3.5.1 Operating Environment

The following are the values for the normal operating environment of the radio:

Temperature⁽¹⁾ -40°C to +55 °C



Solar radiation	$\leq 1120 \text{ W/m}^2$
Relative humidity	5 – 100%
Absolute humidity	$0.26 - 40 \text{ g/m}^3$
Maximum temperature change	$0.5 \text{ }^\circ\text{C/min}$
Maximum wind load at 150 km/h (pole installed single case)	Radio with cover: 55 N (front), 18 N (side) Radio with antenna: 56 N (front), 24 N (side)

- (1) Depending on product variant, installation scenario, traffic load, and configuration, the product can, in the highest $10 \text{ }^\circ\text{C}$ temperature range, temporarily reduce the output power. This depends on the durations of the high ambient temperature.

3.5.2 Heat Dissipation

The radio is designed for outdoor installation.

Avoid indoor installation in a room without adequate ventilation and cooling.

Table 7 Radio Heat Dissipation

Unit	Output Power (W)	Maximum Heat Dissipation (W)
Radio 4402 B66A	4×5	120

Table 8 Support Heat Dissipation

Unit	Heat Dissipation (W)
Support 6501	12
Support 6502	12

3.5.3 Vibration

The radio operates reliably during seismic activity as specified by test method IEC 60068-2-57 Ff.

Maximum level of Required Response Spectrum (RRS)	50 m/s^2 within 2–5 Hz for DR=2%
Frequency range	0.3–50 Hz
Time history signal	Verteq II

The radio operates reliably during random vibration as specified by test method IEC 60068-2-64 Fh method 1

Random vibration, normal operation	$+12 \text{ m}^2/\text{s}^3$	$0.3 \text{ m}^2/\text{s}^3$	$-12 \text{ m}^2/\text{s}^3$
Frequency range	5–10 Hz	10–50 Hz	50–150 Hz



3.5.4 Materials

All Ericsson products fulfill the legal and market requirements regarding the following:

- Material declaration
- Materials' fire resistance, components, wires, and cables
- Recycling
- Restricted and banned material use

3.6 Power Characteristics

This section describes the power supply requirements, power consumption, and fuse and circuit breaker recommendations for the radio.

The power for the radios can be provided from an AC or a DC power supply.

3.6.1 DC Power Characteristics

The power supply voltage for the radio is –48 V DC.

Table 9 Radio DC Power Supply Requirements

Conditions	Values and Ranges
Nominal voltage	–48 V DC
Normal voltage range at radio input connector	–36.0 to –58.5 V DC
Non-destructive range	0 to –60 V DC

Fuse and Circuit Breaker Recommendations

The recommendations given in this section are based on peak power consumption and do not provide information on power consumption during normal operation.

The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60934.

Table 10 Radio Fuse or Circuit Breaker Recommendations

Unit (DC powered)	Output Power (W)	Minimum Fuse Rating (A)	Maximum Allowed Fuse Rating ⁽¹⁾ (A)
Radio 4402 B66A	4 × 5	6	32



(1) The absolute maximum fuse class in accordance with radio design restrictions.

3.6.2 AC Power Characteristics

The normal voltage range for the radio is 100 to 250 V AC.

Table 11 Radio AC Power Supply Requirements

Conditions	Values and Ranges
100–250 V	85–275 V AC
Connection	Line-neutral, line-line
Frequency range	45–65 Hz
Voltage harmonics	≤ 10% at full load ⁽¹⁾
Shut-off allowance	At undervoltage or overvoltage
Inrush current peak	< 10 A
Inrush current duration	< 100 ms
AC system	TN, TT and IT

(1) Must comply with IEC 61000-3-2

Fuse and Circuit Breaker Recommendations

The recommendations given in this section are based on peak power consumption and do not provide information on power consumption during normal operation.

The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60934.

When the radio connected Line-Line a 2-pole circuit breaker or dual fuses are required for interruption of both lines. This is also valid when the radio is used in an IT system.

Table 12 Radio Fuse or Circuit Breaker Recommendations

Unit (AC powered)	Output Power (W)	Minimum Fuse Rating (A)	Maximum Allowed Fuse Rating ⁽¹⁾ (A)
Radio 4402 B66A	4 × 5	4	16

(1) The absolute maximum fuse class in accordance with radio design restrictions.

3.6.3 Power Consumption

For information on power consumption, see [Power Consumption Calculations](#).



3.7 System Characteristics

This section describes the system characteristics of the Radio System.

3.7.1 RF Electromagnetic Exposure

For general information on RF EMF exposure, see [Radio Frequency Electromagnetic Fields](#).

The following tables list the compliance boundaries (exclusion zones), outside of which the RF EMF exposure from Radio 4402 is below the limits applicable in:

- USA (47 CFR 1.1310)
- Canada (Health Canada Safety Code 6)

Table 13 Dimensions of the Box-Shaped Compliance Boundary for General Public (GP) and Occupational (O) Exposure Applicable in the USA and Markets Employing the FCC RF Exposure Limits (Including 0.6 dB Output Power Tolerance)

Mode and Output Power for Radio 4402				Dimensions of the Box-Shaped Compliance Boundary ⁽¹⁾ (m)							
				Distance in Front of Radio		Width		Height		Distance Behind Radio	
Band	Single/Dual Radio Version	Nominal Peak Output Power from the Radio	IEC 62232 Installation Class	GP	O	GP	O	GP	O	GP	O
B66A	Single	4 × 5 W	E+	1.9	0.9	1.6	0.8	1.3	0.6	0.2	0.2

(1) The compliance boundaries are determined for maximum output power with power tolerance.

Table 14 Dimensions of the Box-Shaped Compliance Boundary for General Public (GP) and Occupational (O) Exposure Applicable in Canada (Including 0.6 dB Output Power Tolerance)

Mode and Output Power for Radio 4402				Dimensions of the Box-Shaped Compliance Boundary ⁽¹⁾ (m)							
				Distance in Front of Radio		Width		Height		Distance Behind Radio	
Band	Single/Dual Radio version	Nominal Peak Output Power from the Radio	IEC 62232 Installation Class	GP	O	GP	O	GP	O	GP	O
B66A	Single	4 × 5 W	E+	2.7	1.1	2.3	1.0	1.8	0.8	0.2	0.2

(1) The compliance boundaries are determined for maximum output power with power tolerance.

3.7.2 Software

For information on software dependencies, see [Radio Software Support](#).



3.7.3 Radio Configurations

For information about available radio configurations, see RBS Configurations.



4 Hardware Architecture

For a description of the supported radio configurations, refer to [RBS Configurations](#).

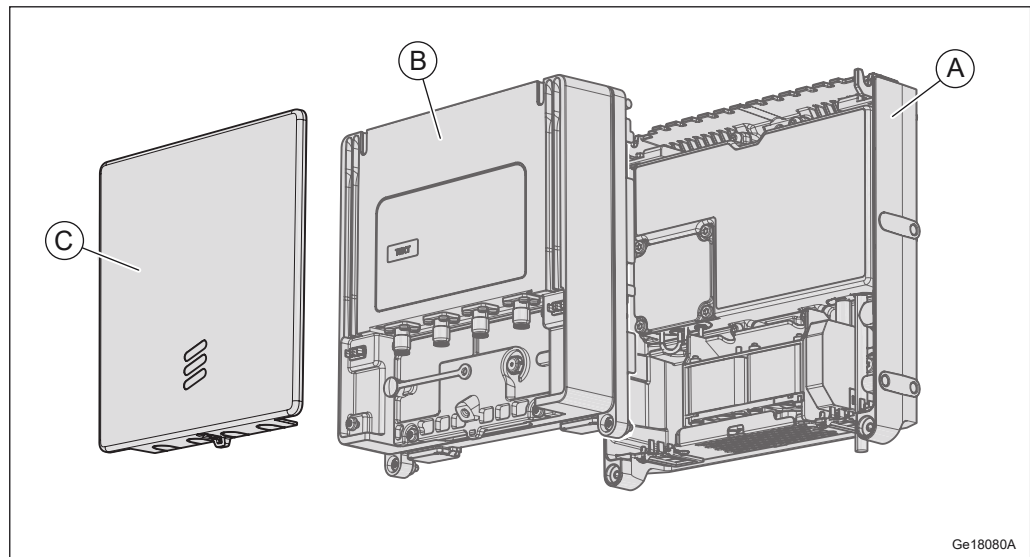


Figure 11 Radio Components, Single Radio

Table 15 Key to Radio Components, Single Radio

Position	Component
A	Support ⁽¹⁾
B	Radio Core
C	Antenna or Cover

(1) The Support has several variants. An example is shown in [Figure 11](#).

4.1 Support

The Support provides the Radio Core with integrated mechanical attachment, power conversion and cooling. It consists of a mounting bracket, a fan unit, and a PSU.

4.1.1 Mounting Bracket

The mounting bracket provides integrated mechanical attachment for wall and pole mounting, and attachment points for the rail bracket.



4.1.2 Fan Unit

The fan unit operates autonomous against ambient temperature to cool the Radio Core.

For Single Radio, the fan unit of the Support is integrated with the mounting bracket and cannot be removed.

4.1.3 PSU

The PSU provides power to the Radio Core and the fan unit.

The PSU is available in two variants to support AC input and DC -48 V input. The DC variant handles both 2-wire (DC-C) and 3-wire (DC-I) connections.

Included in the PSU is also the external alarm interface and communication between PSU and Radio Core.

4.2 Radio Core

The Radio Core handles the radio communication in the unit and consists of a thermal radiator, TRX, and the Filter Unit (FU).

The Antenna Supervision can detect the following disconnected antennas:

- Ericsson Integrated Directional Antenna
- External antenna with feeder loss < 0.5 dB

Use the LTE AILG feature to ensure enough transmitted power.

4.2.1 Thermal Radiator

The thermal radiator provides cooling to the radio.

4.2.2 TRX

The Transmitter and Receiver (TRX) provides the following:

- Analog/Digital (A/D), Digital/Analog (D/A) conversion
- Channel filtering
- Delay and gain adjustment
- RF modulation and demodulation



- Optical cable interface termination
- Control and surveillance

4.2.3 Filter Unit

The Filter Unit consists of band-pass filters.

4.3 Antenna

The optional integrated directional Antenna provides directional RF coverage for the radio, and protects the Radio Core.

4.4 Cover

The esthetic Cover protects the Radio Core when the radio is connected to an external antenna.

4.5 Optical Indicators

The radio is equipped with optical indicators that show system status.

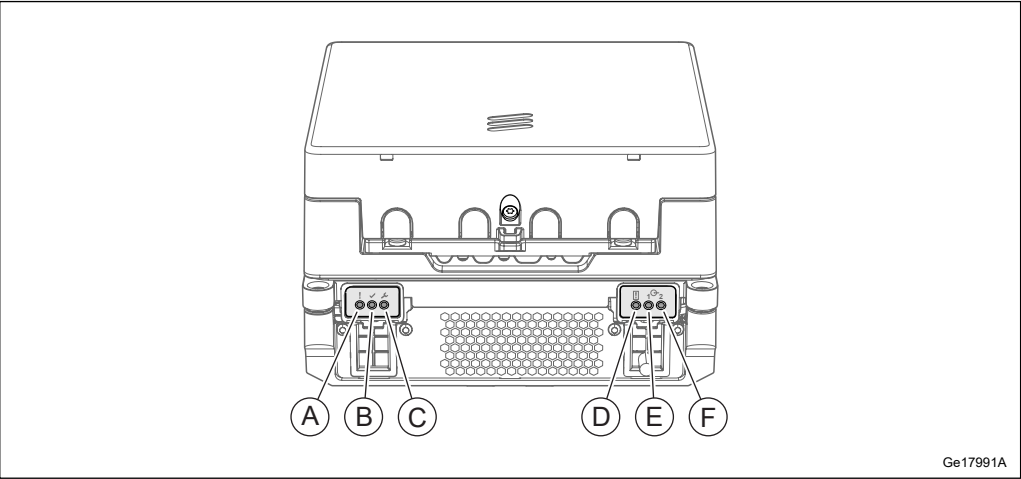


Figure 12 Optical Indicators for Single Radio

Table 16 Description of Optical Indicators for Single Radio

Position	Name	Marking
A	Fault	!



Position	Name	Marking
B	Operational	✓
C	Maintenance	🔧
D	Support System Status	⚠
E, F	Interface 1 Interface 2	↻

For more information about the behavior of the optical indicators and the maintenance button, refer to [Indicators, Buttons, and Switches](#).



5 Connection Interfaces

This section contains information about the radio connection interfaces.

5.1 Support

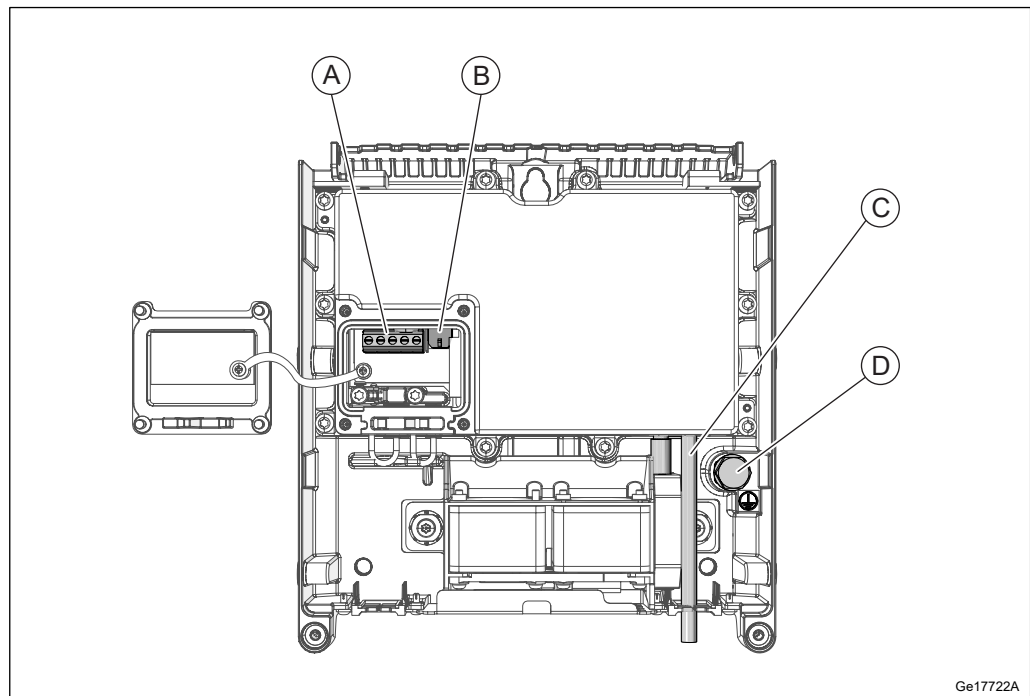
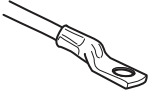


Figure 13 Connection Interfaces for Support, Single Radio

Table 17 Connection Interfaces for Support, Single Radio

Position	Description	Marking	Connector Types	Cable Illustration
A	-48 V DC power supply	-48V	Screw terminal block	—
A	AC power supply			
B	External alarm		PCB connector	
C	PSU DC output, cable preinstalled	36V	—	—



Position	Description	Marking	Connector Types	Cable Illustration
D	Grounding (With DC power supply)		M8 bolt	
D	Grounding (With AC power supply)			

Note: [Figure 13](#) shows an example of the Support for Single Radio. The actual product may differ.

For Single Radio, only 195 W Support can be used.

5.1.1 Fan Unit Interface

The fan unit provides cooling to the Radio Core.

5.1.2 External Alarm Interface

Two external alarms can be connected to the radio external alarm port.

5.1.3 AC/-48 V DC Power Interface

Depending on the version of the product, the power supply for the radio can be AC or DC.

5.1.3.1 AC Power Interface

The AC power connection is made through a screw terminal.

Table 18 AC Power Supply Cable Diameter Tolerances

Cable Length (m)	Cross-Sectional Area of Each Conductor (mm ²)	Outer Diameter over Sheath (mm)
0–100	2.5	8–9

The power cable has a wire for Line (L), a wire for Line/Neutral (L/N), and a wire for Protective Earth (PE) conductors. The wire color code for wires is market dependent.

All cables must be shielded. The shield must be folded back over the outer jacket of the cable and properly connected to the PSU chassis in the PSU strain relief, otherwise the radio overvoltage protection does not function properly.



The AC cable temperature rating must be at least 70 °C.

5.1.3.2 DC Power Interface

The -48 V DC power connection is made through a screw terminal.

Table 19 -48 V DC Power Supply Cable Diameter Tolerances

Cable Length (m)	Cross-Sectional Area of Each Conductor (mm ²)	Outer Diameter over Sheath (mm)
0–60	2.5	8–9

For 3-wire power system, the power cable screw terminal has a wire for -48 V conductors, a wire for 0 V, and one wire for FE (Functional Earth). For 2-wire power system, the power cable screw terminal has a wire for -48 V conductors, and a wire for 0 V. The wire color code is market dependent.

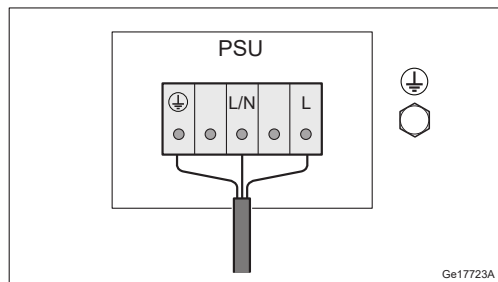
All cables must be shielded. The shield must be folded back over the outer jacket of the cable and properly connected to the PSU chassis in the PSU strain relief, otherwise the radio overvoltage protection does not function properly.

The DC cable temperature rating must be at least 70 °C.

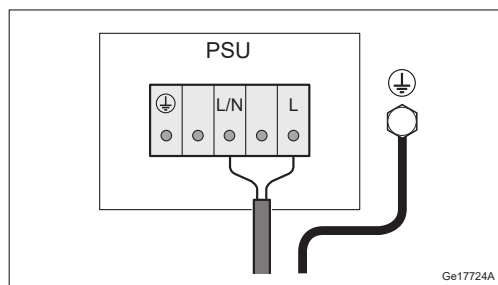
5.1.4 Grounding Interface

The possible grounding interface solutions for the radio are as follows:

AC Grounding, Single Radio

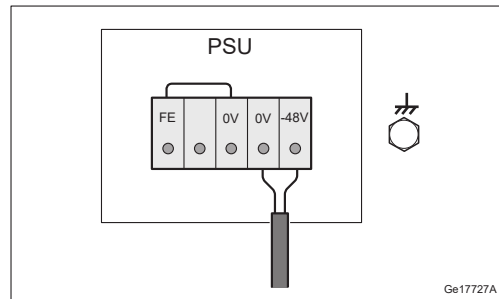


AC power with PE in PSU input terminal.

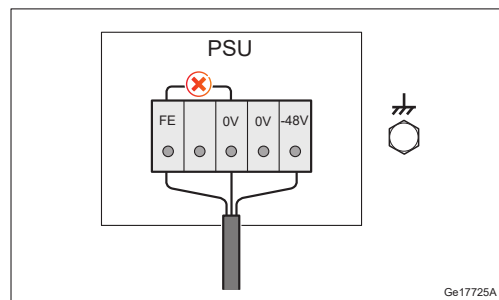


AC power with PE in the grounding interface on the mounting bracket.

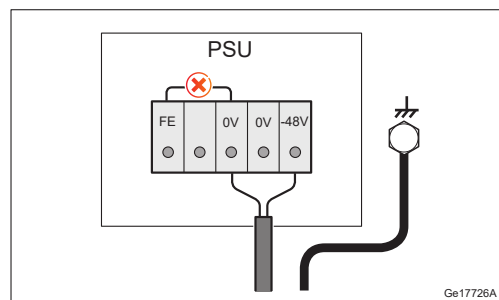
DC Grounding, Single Radio



Default 2-wire (DC-C) power system with FE in PSU input terminal.



3-wire (DC-I) power system with FE in PSU input terminal. Remove the jumper between 0V and FE.



3-wire (DC-I) power system with FE in the grounding interface on the mounting bracket. Remove the jumper between 0V and FE.

For more information about grounding principles, see [Grounding Guidelines for RBS Sites](#).

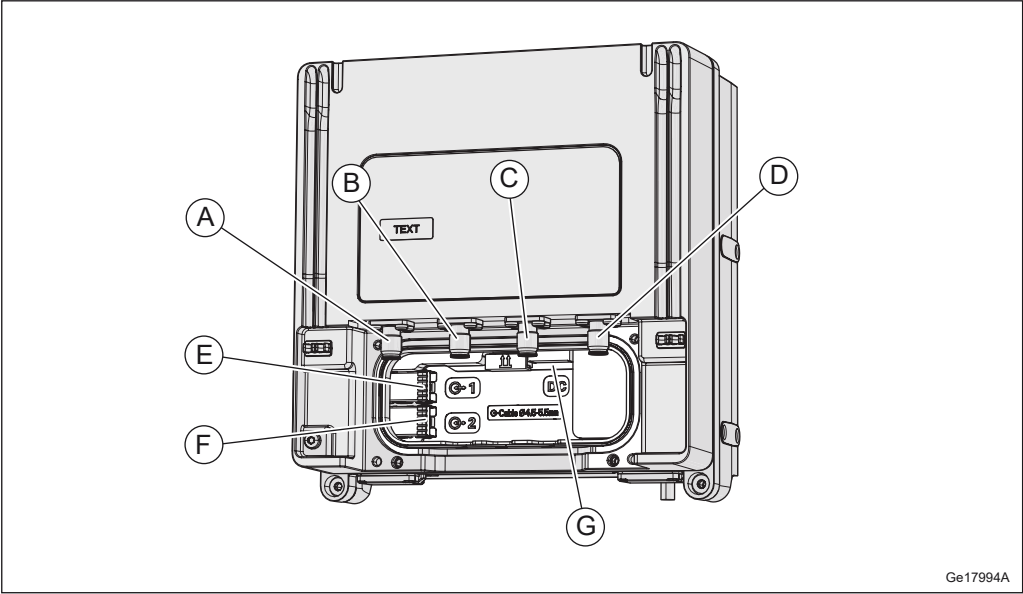
5.1.5

PSU DC Power Interface

The PSU DC power connector supplies the radio with +36 V DC and internal communication to the radio.



5.2 Radio Core



Ge17994A

Figure 14 Radio Core Connection Interfaces

Table 20 Connection Interfaces

Position	Description	Marking	Connector Types	Cable Illustration
A	Antenna A	A	NEX10	
B	Antenna B	B		
C	Antenna C	C		
D	Antenna D	D		
E	Optical cable 1	1	LC (On SFP)	
F	Optical cable 2	2		
G	DC power supply and internal communication	DC	—	—



5.2.1 Antenna Interface

The antenna interfaces provide connections for the radio to the antennas. RF cables connect the radio to the antenna.

Table 21 Radio Antenna Connection Interface Characteristics

Connector Type	Jumper Cable Type	RF Cable Type
NEX10 female	NEX10 male on one end and 4.3-10 female on the other end	50 Ω 1/2-inch coaxial, 4.3-10 male

Table 22 Radio Antenna Cable Connectors

Radio Connectors	Antenna Connectors
 A (Antenna A)	TX/RX
 B (Antenna B)	TX/RX
 C (Antenna C)	TX/RX
 D (Antenna D)	TX/RX

5.2.2 Interface for Optical Cable to Main Unit

The  1 and  2 interfaces provide connections to optical cables (with outer diameter 4.5–5.5 mm, and complies with standard G657A2) for traffic and timing signals between the radio and the main unit. An SFP+ is used to connect the optical cable to the radio.

Note: The radio uses SFP modules for optical transmission and optical radio interfaces on Data 1 and Data 2.

Only SFP+ modules approved and supplied by Ericsson are to be used. These modules fulfill the following:

- Compliance with Class 1 laser product safety requirements defined in standard IEC 60825-1
- Certification according to general safety requirements defined in standard IEC 60950-1
- Functional and performance verified to comply with Radio System specifications

Recommended SFP+ modules are obtained from the product packages for the Radio System and the Main Remote Installation products. For more information about SFP+ modules, see Spare Parts Catalog and Main-Remote Installation Products Overview.



5.2.3 DC Power Interface

The radio DC power connector supplies the radio with +36 V DC and internal communication from the PSU.



6 Standards and Regulations

This section presents a brief overview of standards, regulatory product approval, and declaration of conformity for the radio.

6.1 Regulatory Approval

The Radio System complies with the following market requirements:

- North American market requirements.
- Products containing radio equipment outside North America and in countries not recognizing the CE-mark may be labeled according to national requirements or standards.

6.1.1 Environmental Standards Compliance

The product complies with the following environmental standard:

Europe

- Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive (2011/65/EU)

6.1.2 Safety Standards Compliance

In accordance with market requirements, the Radio System complies with the following product safety standards and directives:

International

- IEC 62368-1

Europe

- EN 50385
- EN 62368-1

North America

- FCC CFR 47 Part 1.1310
- FCC CFR 47 Part 2.1091



- Health Canada Safety Code 6
- IC RSS-102
- UL 62368-1
- CSA-C22.2 No. 62368-1

6.1.2.1 Outdoor Specific Requirements

The Radio System complies with the following outdoor specific requirements:

International

- IEC 60529 (IP65, IP55 for Directional antenna)
- IEC 60950-22

Europe

- EN 60529 (IP65, IP55 for Directional antenna)
- EN 60950-22

North America

- CSA-C22.2 No. 60950-22
- UL 50E
- UL 60950-22

6.1.3 EMC Standards Compliance

The Radio System complies with the following Electromagnetic Compatibility (EMC) standards:

International

- 3GPP TS37.113

North America

- IC ICES-003 B
- FCC CFR 47 Part 15 B



FCC Compliance Statement

This device complies with Part 15 of the FCC CFR 47 rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

6.1.4 Radio Standards Compliance

The Radio System complies with the following radio standards:

International

- 3GPP TS37.141

North America

- FCC CFR 47 Part 27 (USA frequency dependent)
- FCC CFR 47 Part 2 (USA)
- IC RSS-139 (Canada frequency dependent)
- IC RSS-Gen (Canada)

6.1.5 Marking

To show compliance with legal requirements, the product is marked with the following labels:

North America

- usETL/cETL
- FCC CFR 47 Part 15 Statement
- IC ICES-003 Statement
- FCC ID
- IC ID



6.2 Other Standards and Regulations

The standards and regulations in this section are not regulatory approved.

6.2.1 Spare Parts

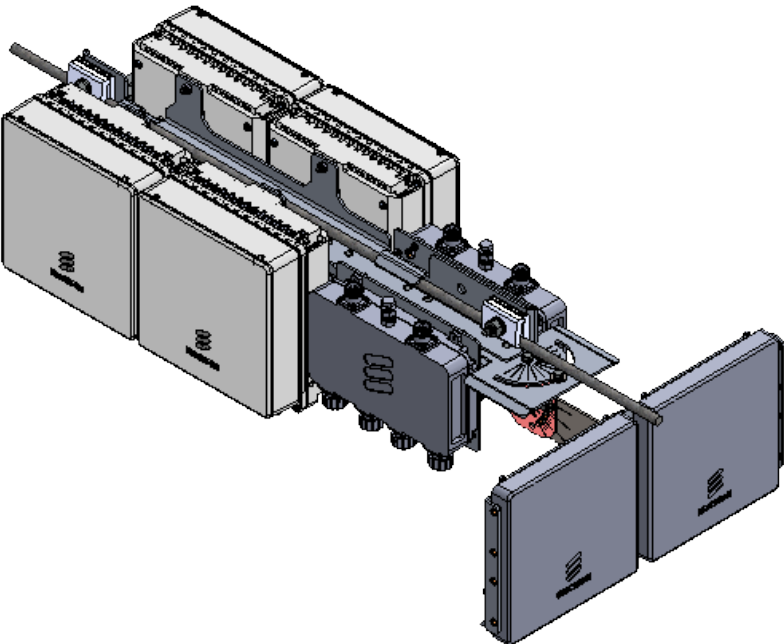
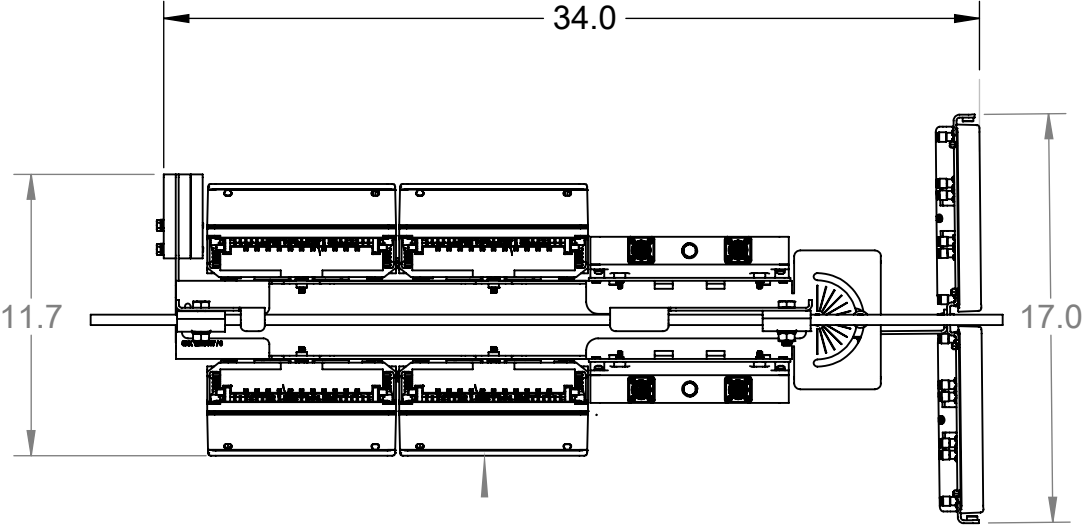
The product adheres to the Ericsson Serviceability and Spare Part Strategy.

6.2.2 Surface Quality

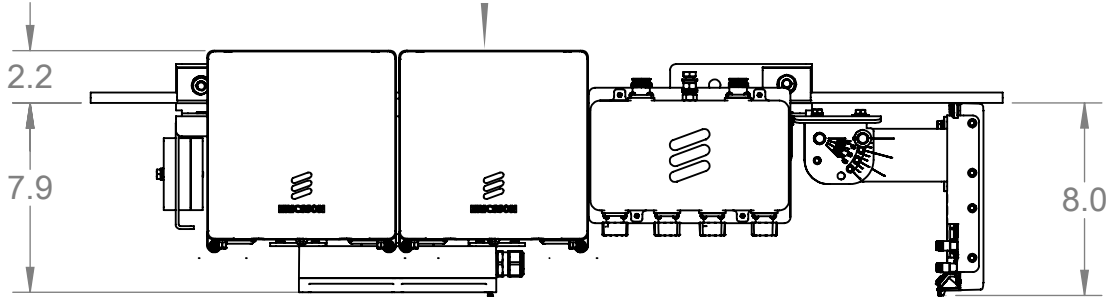
The surface quality of the radio is in accordance with Ericsson standard class A3.

6.2.3 Vandal Resistance

Unauthorized access is not possible without damaging the tamper proof warranty seal.



CONFIGURATION WILL ONLY UTILIZE (1) RADIO
ON EACH SIDE OF MOUNTING BRACKET



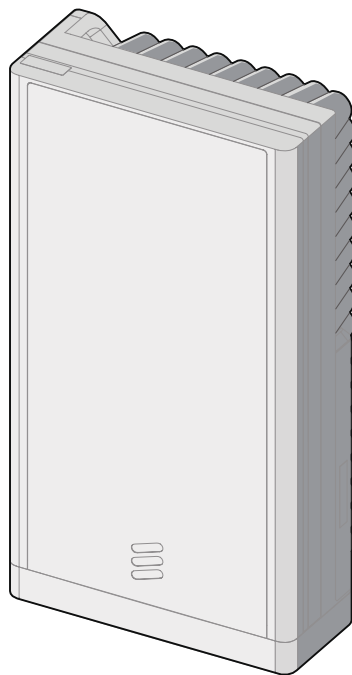
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		DIMENSIONS ARE IN INCHES	DRAWN	PN	9/7/18	TITLE: ASSY., HANGER, STRAND	
		TOLERANCES:	CHECKED				
		FRACTIONAL ±	ENG APPR.				
		ANGULAR: MACH ±0.5 °BEND ±1 °	MFG APPR.				
		TWO PLACE DECIMAL ±.03	Q.A.			SIZE DWG. NO. REV B SXX 125 3187-6- 1	
		THREE PLACE DECIMAL ±.010	COMMENTS:				
		INTERPRET GEOMETRIC TOLERANCING PER:					
		MATERIAL				SCALE: 1:8 WEIGHT: SHEET 1 OF 1	
		SEE BOM					
NEXT ASSY	USED ON	FINISH					
APPLICATION		DO NOT SCALE DRAWING					

Radio Description

Radio 4435

Description



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1 Introduction

1.1 Warranty Seal

The product is equipped with a warranty seal sticker.

Note: Seals that have been implemented by Ericsson must not be broken or removed, as it otherwise voids warranty.

2 Product Overview

The radio remotely extends the reach of the Radio System, and is designed to be located near the antenna. The radio is part of a modular radio building concept that enables a variety of installation alternatives that are also easy to expand. Flexible mounting solutions are provided using pole clamps and brackets.

An overview of different radio installations is shown in [Figure 1](#).

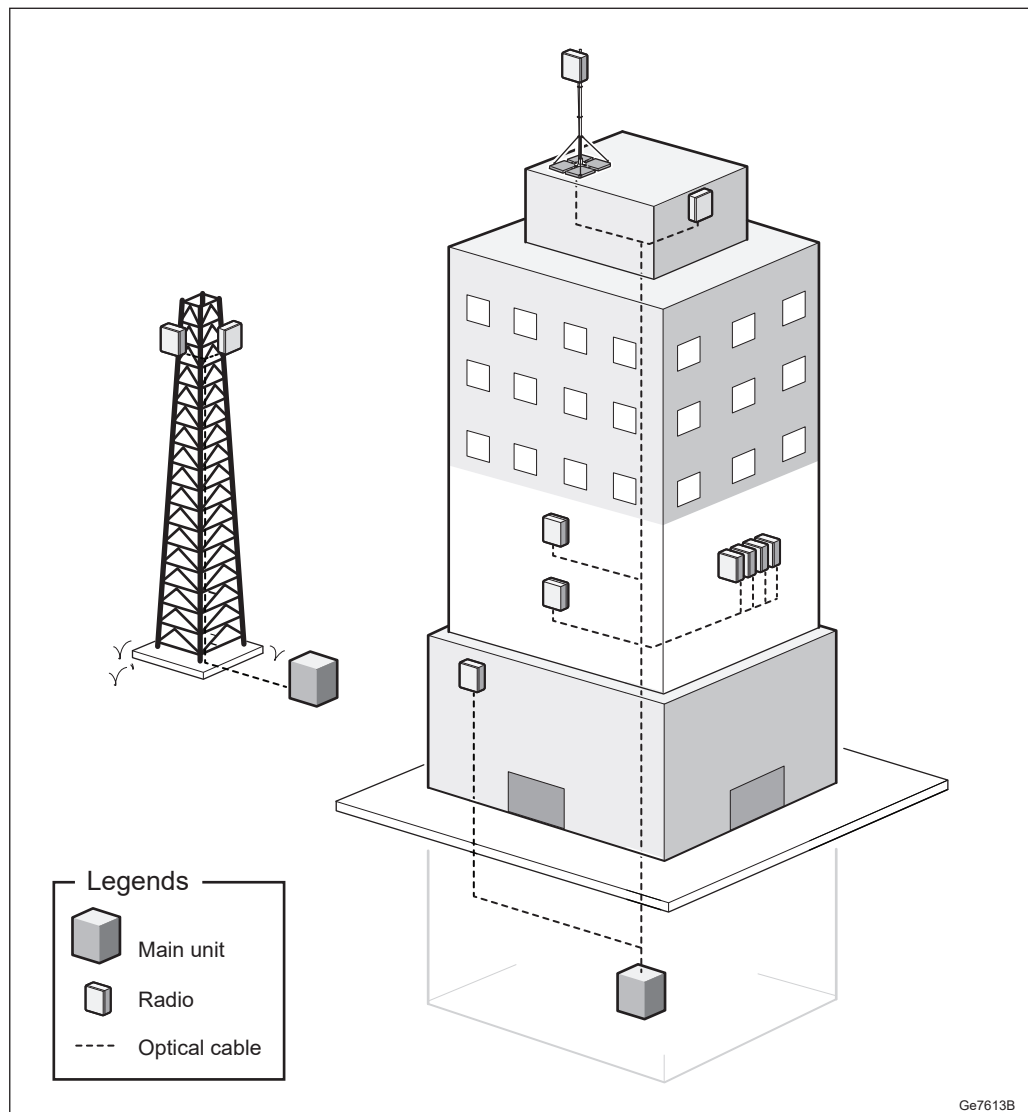


Figure 1 Radio Installations



2.1 Main Features

The following are the main features of the radio:

- LTE TDD, NR TDD
- Mixed mode, for supported mixed mode configurations, see [Supported Radio Capabilities](#).
- Duplex transmitter/receiver (4TX/4RX) branches
- DC version supports 2-wire (DC-C) and 3-wire (DC-I) power connections
- AC version supports AC power connection
- Up to 2×10.1 Gbps CPRI (optical)
- Complies with 3GPP base station class Wide Area. For a list of relevant standards, see [Radio Standards Compliance](#) on page 27.

2.2 Required Installation Equipment

Table 1 Mounting Kit

Mounting Kit	Product Name	Product Number
Tilt mounting kit	Streetmacro Wall & Pole Bracket with Tilt	SXK 109 2157/1
Bracket expansion kit for SXK 109 2157/4	Streetmacro Wall & Pole Bracket with tilt (Exp. kit)	SXK 109 2157/2
Mounting kit without tilt	Streetmacro Wall & Pole Bracket without Tilt	SXK 109 2157/3
Base bracket	Streetmacro Base Bracket	SXK 109 2157/4
Triple bracket	Streetmacro Triple Bracket	SXK 109 2157/5
Bracket for 140 mm pole diameter	Streetmacro 140mm pole dia bracket	SXK 109 2157/6



3 Technical Data

This section describes the physical characteristics, environmental data, and the power supply characteristics of the radio.

3.1 Bands, Carriers, and Output Power

For supported number of carriers, carrier bandwidth, operating bandwidth, IBW, maximum nominal output power, frequency range, RAT support, and mixed mode configurations, see [Supported Radio Capabilities](#).

Minimum configured output power per RF port without degradation in product performance is 2.5 W.

Hardware Activation Codes (HWAC) are required for total output power over 20 W.

For detailed information about output power hardware activation codes, see [Hardware-Related Capabilities](#) in the Radio Node libraries.

3.2 Physical Characteristics

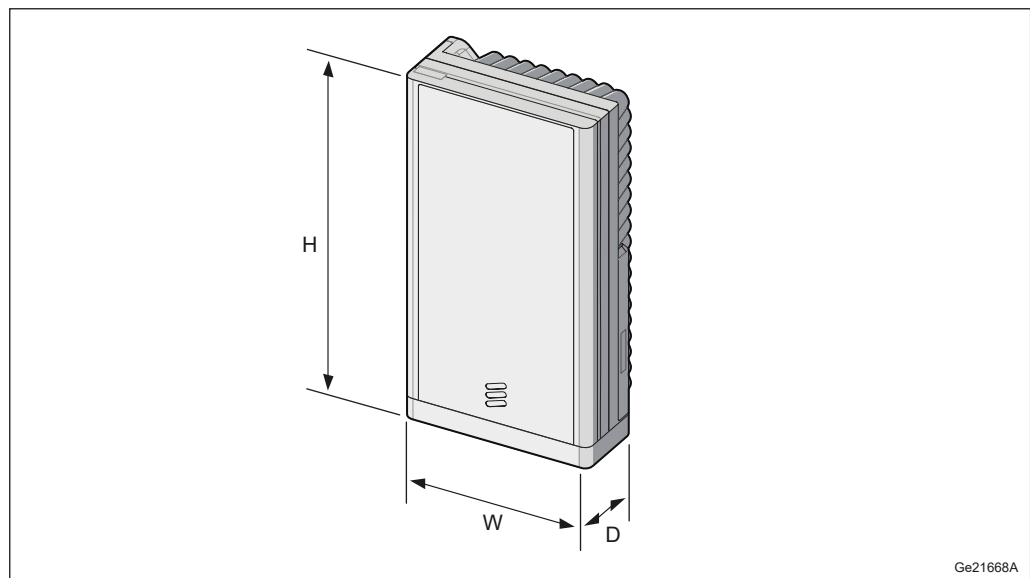


Figure 2 Radio Dimensions



Table 2 Radio Dimensions

Radio Type	Height (H) × Width (W) × Depth (D)
Radio 4435 B41	373 × 200 × 93 mm
Radio 4435 B77D	373 × 200 × 93 mm

Table 3 Radio Weight

Radio Type	Weight ⁽¹⁾
Radio 4435 B41	6.7 kg
Radio 4435 B77D	6.5 kg

(1) The weight is given with ±5% accuracy.

Table 4 Mounting Kit Weight

Mounting Kit	Weight
SXK 109 2157/1	3.2 kg
SXK 109 2157/2	2.3 kg
SXK 109 2157/3	2.0 kg
SXK 109 2157/4	0.9 kg
SXK 109 2157/5	7.9 kg
SXK 109 2157/6	2.5 kg

Table 5 Radio 4435 Color

Part	Color Code
Body	NCS S 1002-B

3.3 Installation Recommendations

To achieve reliable operation, and maximum performance, an appropriate installation location must be chosen.

3.3.1 Outdoor Locations to Avoid

Although Ericsson declares this product suitable for most outdoor environments, this does not cover installations where the planned installation site for the unit is a potential microclimate location. Typical examples of these microclimate locations are sites where the products are not only exposed to the actual temperature, but also additional temperature as heat coming from dark-colored planes, for example, reflections from the floor or walls. The additional



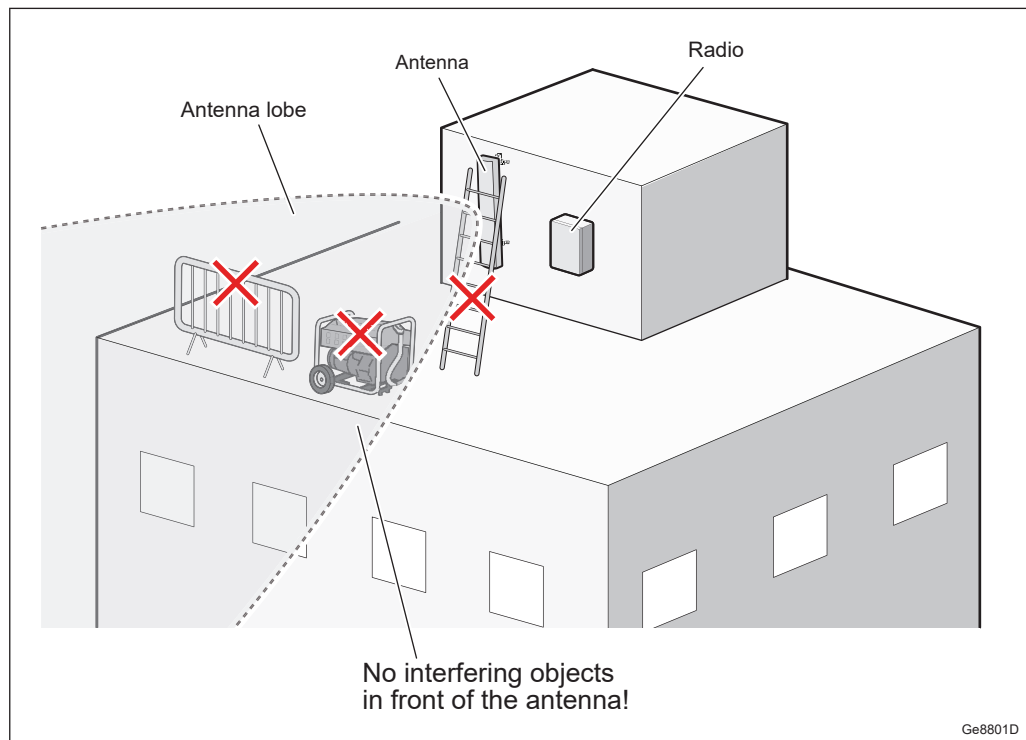
temperature can generate heat traps with temperatures up to 10°C higher than expected.

Avoid installing equipment in the following locations:

- Near the exhaust of the building ventilation system.
- Near the exhaust of the chimney.
- Opposite large surfaces made of glass or new concrete.
- Near overhanging structures such as roof overhangs.

Avoid radio interference by keeping the area directly in front of the antenna clear of the following:

- Metal surfaces or objects such as railings, ladders or chains
- Equipment generating electromagnetic fields, such as electric motors in air conditioners or diesel generators
- RBS equipment





3.3.2 Painting Disclaimer

Ericsson recommends to not paint the product as it can affect performance of the product.

Ericsson applies limitations to the warranty and service contract if the product is painted.

If the product is painted, the following commercial limitations apply:

- Failure modes directly related to overheating because of painting are not valid for repair within the scope of the warranty or standard service contract.
- Product failures related to paint contamination of components of the unit are not valid for repair within the scope of warranty or standard service contract.
- When a painted unit is repaired, it might be restored to the standard color before being returned to the market. It is not possible to guarantee that the same unit is sent back to the same place. This is also valid for units repaired under a service contract.
- For repairs within the warranty period or a standard service contract, the customer is charged the additional costs for replacing all painted parts of the unit or the complete unit.

If adaptations are required, contact Ericsson for information.



3.4 Installation Alternatives

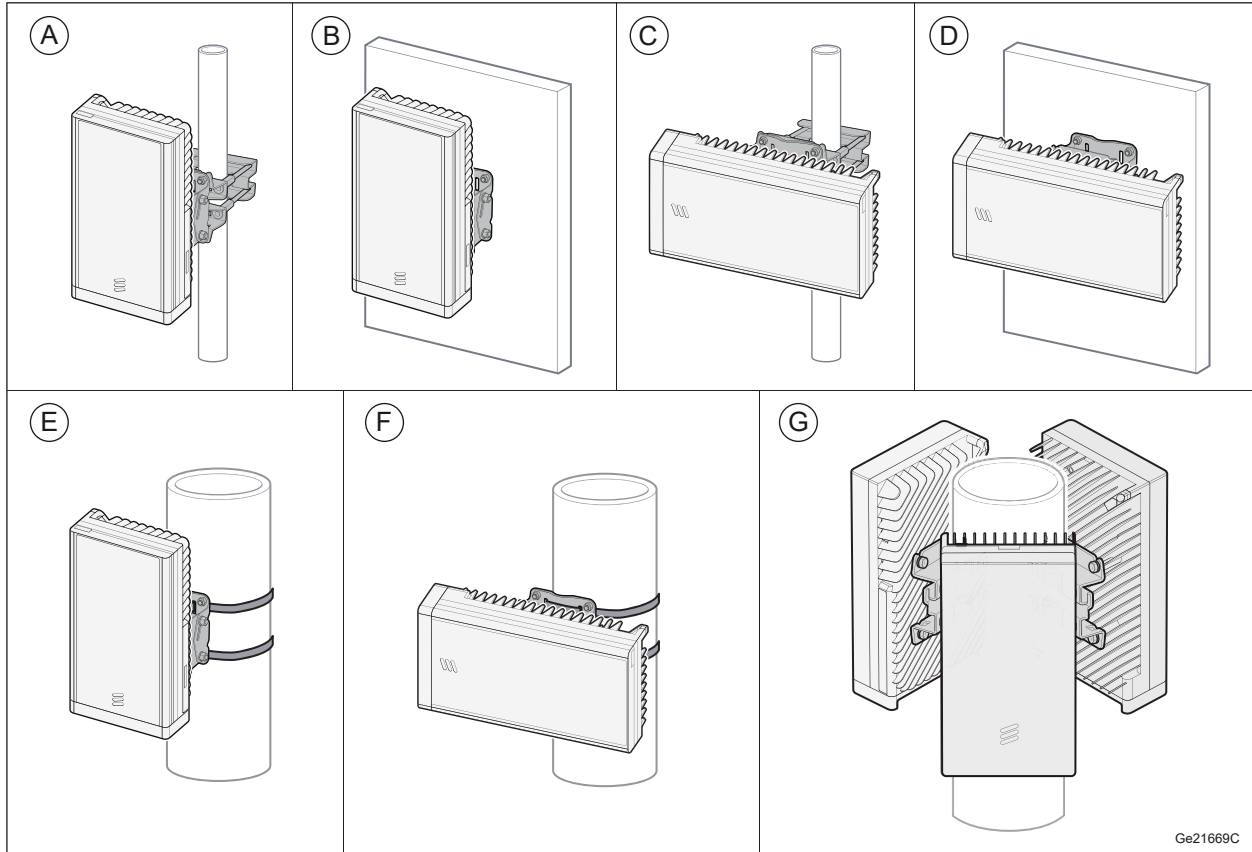


Figure 3 Installation Method Alternatives

Table 6 Key to Installation Alternatives

Installation Method	Description
A	Pole installation (pole with circular, square, or 90° angle cross section) with vertical placement
B	Wall installation with vertical placement
C	Pole installation (pole with circular, square, or 90° angle cross section) with horizontal placement ⁽¹⁾
D	Wall installation with horizontal placement ⁽¹⁾
E	Utility pole installation with vertical placement ⁽²⁾⁽³⁾⁽⁴⁾
F	Utility pole installation with horizontal placement ⁽¹⁾
G	Triple bracket pole installation

(1) See the label on the back of the radio for the correct installation direction.

(2) Steel bands for utility pole installations must be supplied locally.



- (3) The strength and size of the steel bands used must be based on local requirements and environmental factors.
- (4) For wooden utility poles, steel bands are not allowed. Use through bolt instead.

Table 7 Pole Mounting Range

Pole	Circular	Square	90° Angle
Minimum outer dimension ⁽¹⁾	Ø35 mm	30 x 30 mm	45 x 45 mm
Maximum outer dimension ⁽¹⁾	Ø300 mm	80 x 80 mm	80 x 80 mm

(1) Depends on mounting kit used. For detailed information, see [Site Installation Products Overview](#).

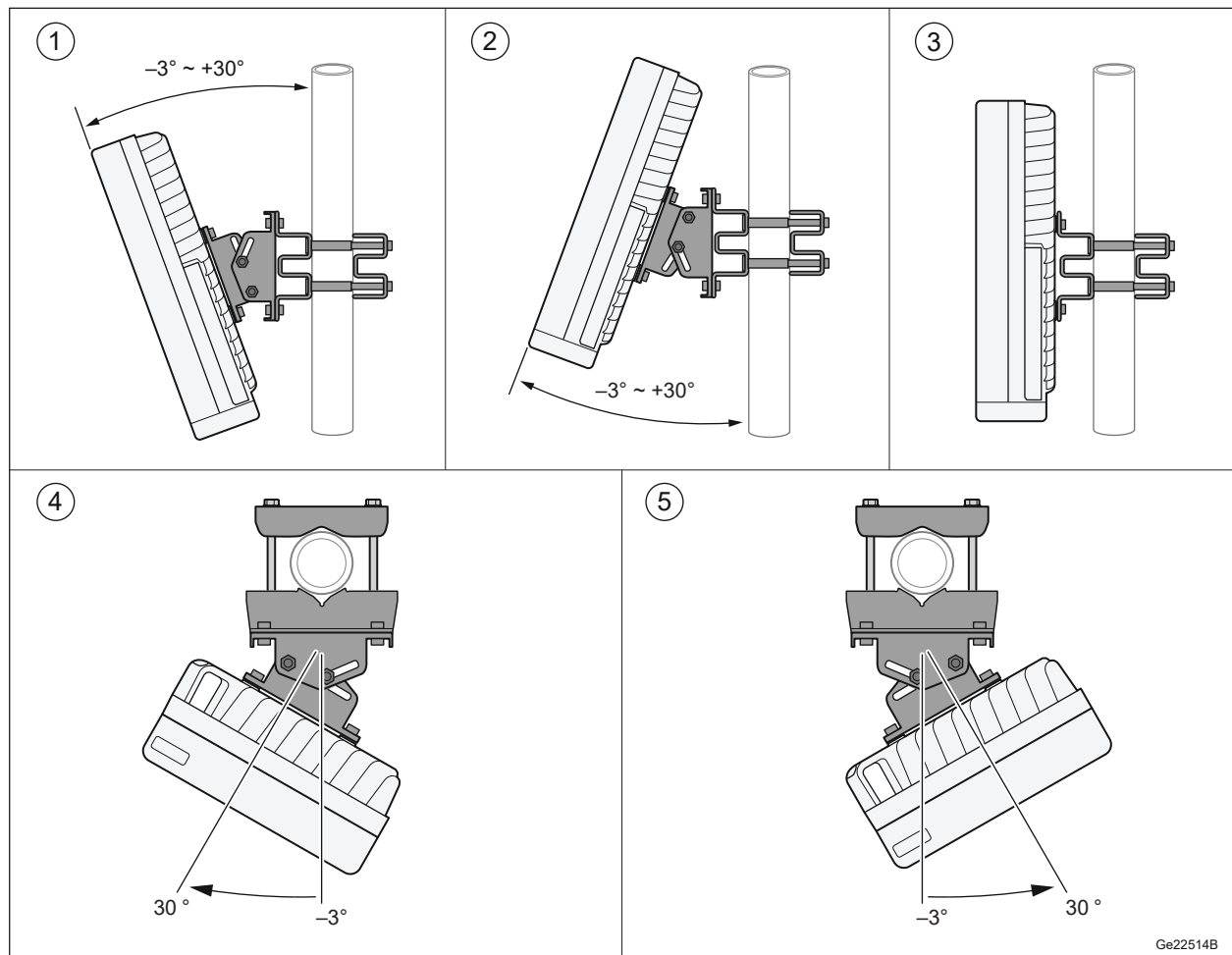


Figure 4 Tilt and Swivel Angle



3.5 Space Requirements

3.5.1 Generic Requirements

Parts of the radio can attain high temperatures during normal operation. Therefore the radio must be installed in a classified service access area. Exception applies when the radio is installed at a height that is not reachable from ground level.

Allow a sufficient working space in front of the radio.

It is recommended that the radio is installed below, or behind the antenna. Do not install the radio closer than 25 m from the main lobe of its own antenna, or antennas belonging to other services or operators using the same site.

3.5.2 Pole or Mast Installation

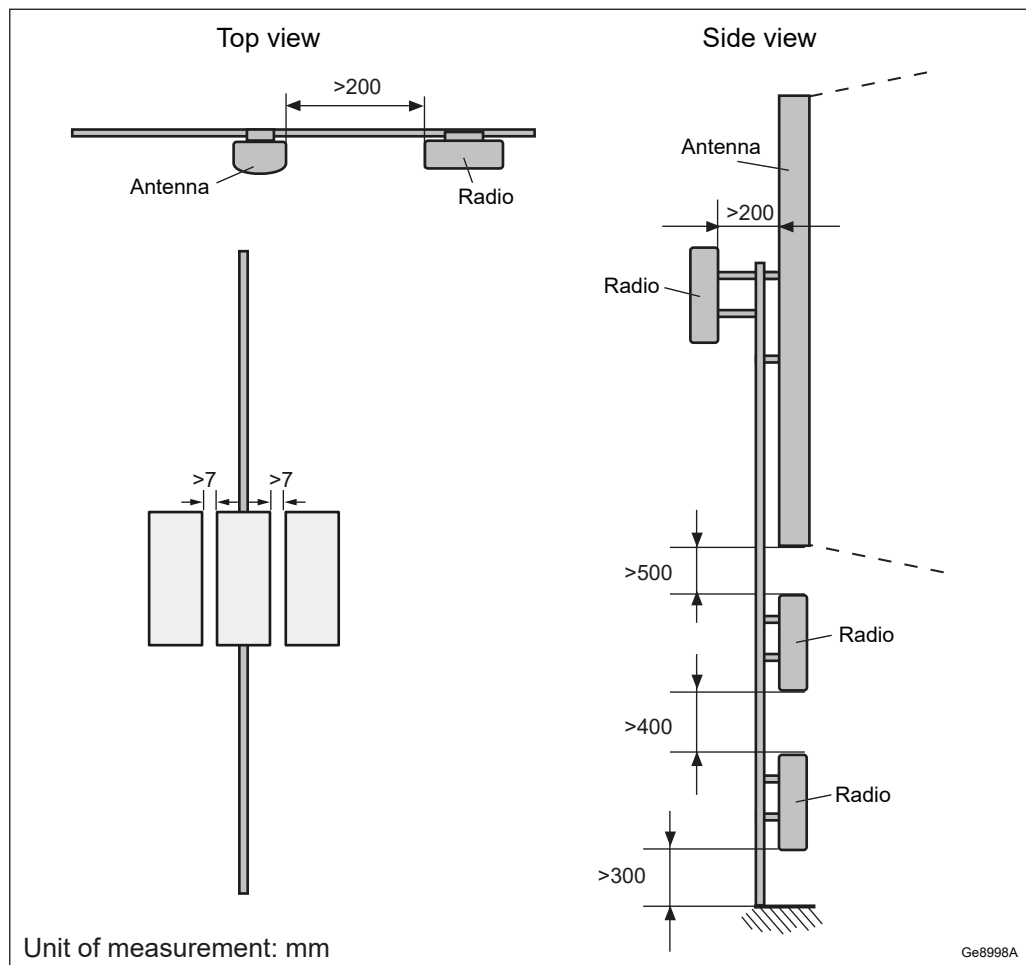


Figure 5 Radio Pole Installation Requirements



To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a single pole. Allow a minimum vertical distance of 500 mm between radio and antenna, if installed above or below an antenna. The minimum distance from the bottom of the radio to the floor is 300 mm for vertically installed radios.

Allow a minimum of 7 mm free space between radios installed side by side on the bracket when ambient temperature is expected to be below +42°C.

Allow a minimum of 100 mm free space between radios installed side by side on the bracket when ambient temperature is expected to be above +42°C and below +50°C. Only single radio installation on the bracket is supported when ambient temperature is expected to be above +50°C and below +55°C.

Note: A radio cannot be installed in the uppermost position of a pole or mast.



3.5.3 Radio Installation on Outdoor Wall

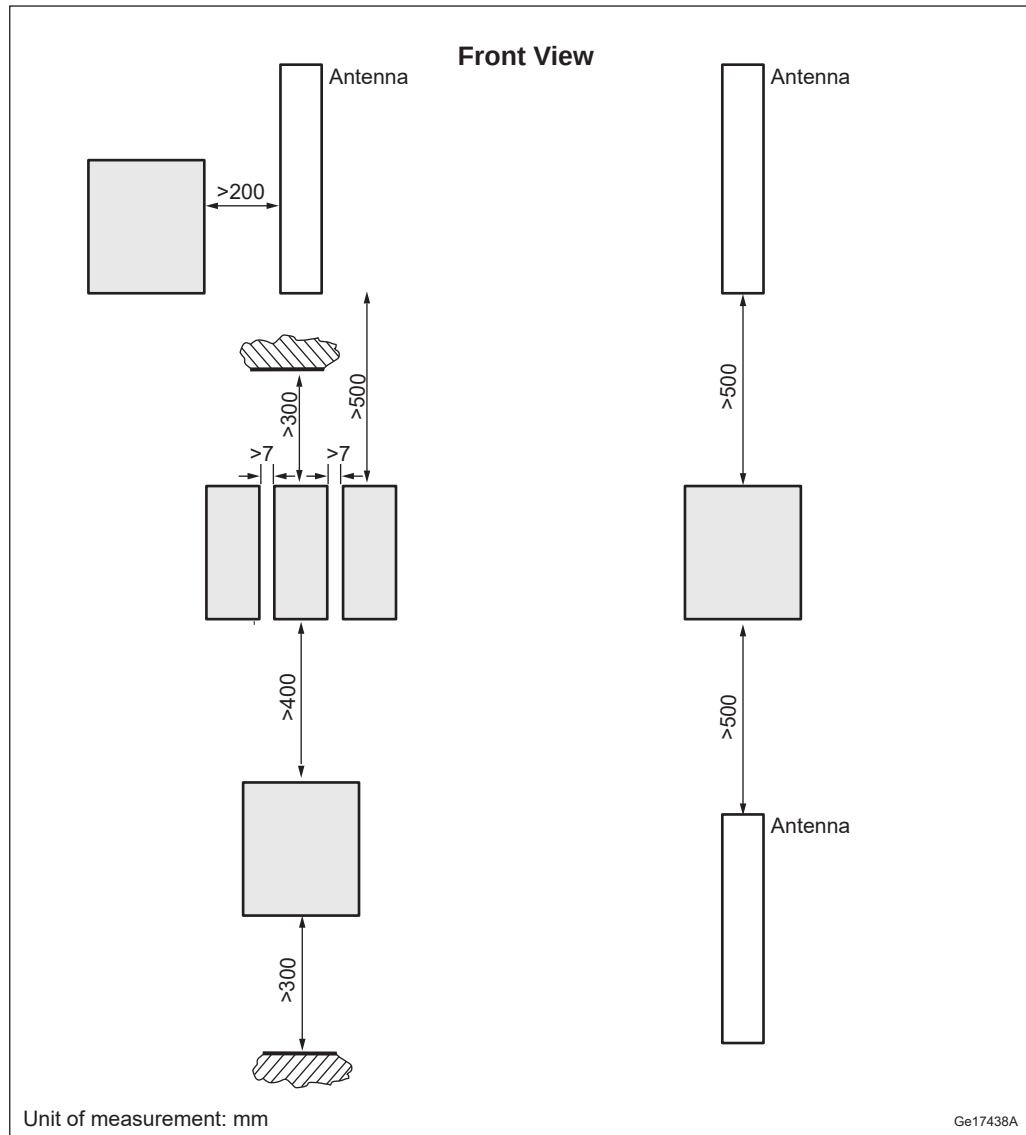


Figure 6 Radio Outdoor Wall Installation Requirements

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a wall. Allow a minimum vertical distance of 500 mm between radio and antenna, if installed above or below an antenna.

Allow a minimum of 300 mm to any overhanging roof or other structure that may obstruct airflow and create a heat trap.

The minimum distance from the bottom of the radio to the floor is 300 mm for vertically installed radios.



Allow a minimum of 7 mm free space between radios installed side by side on the bracket when ambient temperature is expected to be below +42°C.

Allow a minimum of 100 mm free space between radios installed side by side on the bracket when ambient temperature is expected to be above +42°C and below +50°C. Only single radio installation on the bracket is supported when ambient temperature is expected to be above +50°C and below +55°C.

3.6 Acoustic Noise

The radio does not have active cooling components. It can emit low levels of acoustic noise when operating on low capacity.

Radio 4435 sound pressure level is lower than 28 dBA at 1-meter distance for hemispherical distribution, based on ISO 9614-2 and ISO 11203.

3.7 Environmental Characteristics

This section contains operating environment data for the radio.

3.7.1 Operating Environment

The following are the values for the normal operating environment of the radio:

Table 8 Operating Environment

Description	Value
Temperature ⁽¹⁾	−40 to +55 °C
Solar radiation	≤ 1,120 W/m ²
Relative humidity	5–100%
Absolute humidity	0.26–40 g/m ³
Maximum temperature change	1.0 °C/min
Maximum wind load at 42 m/s (pole installed single case)	Radio 4435 B41: 121 N (front), 33 N (side) Radio 4435 B77D: 121 N (front), 33 N (side)

(1) Depending on installation scenario, traffic load, and configuration, the product can, in the highest 10 °C temperature range, temporarily reduce the output power. This depends on the durations of the high ambient temperature.

3.7.2 Heat Dissipation

The radio is convection cooled and designed for outdoor installation.



Avoid indoor installation in a room without adequate ventilation and cooling.

Max heat dissipation is calculated using the following formula:

Max Heat Dissipation = Max Power Consumption - Configured Output Power

Heat dissipation can be calculated for different traffic loads using values from Power Consumption Data. For more information, see Power Consumption Calculations.

3.7.3 Vibration

This section describes how the Radio tolerates vibrations. The Radio operates reliably during seismic activity as specified by test method IEC 60068-2-57 Ff.

Maximum level of RRS	50 m/s ² within 2–5 Hz for DR=2%
Frequency range	1–35 Hz
Time history signal	Verteq II from earthquake standard ATIS 0600329.2014

The Radio operates reliably during random vibration as specified by test method IEC 60068-2-64.

Random vibration, normal operation:

ASD-level	0.3 m ² /s ³ on horizontal axes X and Y 0.2 m ² /s ³ on vertical axis Z
Frequency range	2–200 Hz
Time per test direction	30 minutes

The Radio operates reliably during shock as specified by test method IEC 60068-2-27 Ea.

Peak acceleration	40 m/s ²
Duration	22 ms

3.7.4 Materials

All Ericsson products fulfill the legal and market requirements regarding the following:

- Material declaration
- Materials' fire resistance, components, wires, and cables
- Recycling



— Restricted and banned material use

3.8 Power Characteristics

This section describes the power supply requirements, power consumption, and fuse and circuit breaker recommendations for the radio.

Different power systems can supply power for multiple radios, if necessary.

3.8.1 DC Power Supply Characteristics

The power supply voltage for the radio is –48 V DC.

Table 9 Radio DC Power Supply Requirements

Conditions	Values and Ranges
Nominal voltage	–48 V DC
Operating voltage range	–36.0 to –58.5 V DC
Non-destructive range	0 to –60 V DC

Fuse and Circuit Breaker Recommendations

The recommendations given in this section are based on peak power consumption and give no information on power consumption during normal operation.

The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60934.

The radio has a built-in Class 1 (Type 1) SPD to protect the equipment in case of lightning and network transients. The recommended fuse or circuit breaker rating is therefore dimensioned not to trip the fuse or circuit breaker in case of most SPD operation. The minimum fuse rating can be taken into account only if it is accepted that fuses or circuit breakers trip in such situations.

Table 10 External Radio Fuse and Circuit Breaker Recommendations

Unit (DC Powered)	Output Power	Maximum Load Current at –36 V DC	Maximum Allowed Fuse Rating ⁽¹⁾
Radio 4435 B41	4 × 20 W	10 A	16 A
Radio 4435 B77D	4 × 15 W	10 A	16 A

(1) The maximum allowed fuse rating must (with a certain safety margin 10-20%) be larger than the maximum load current for reliable operation. However, it must not be larger than the next or nearest higher fuse or circuit breaker standard value in order to minimize the cable cross-section area and at the same time fully comply with relevant safety standards.



3.8.2 AC Power Supply Characteristics

The AC power source must provide protection for overcurrent, short circuit, and grounding fault.

Voltage values and ranges are listed in [Table 11](#).

Table 11 Radio AC Power Supply Requirements

Conditions	Values and Ranges
Nominal Voltage	100–250 V AC
Voltage Range including tolerance	90–275 V AC
Connection	Line-Neutral, Line-Line
Operating frequency	50/60 Hz
Voltage harmonics	< 10% at full load ⁽¹⁾
Shut-off allowance	At undervoltage or overvoltage
Inrush current peak	< 15 A
Inrush current duration	< 100 ms
AC system	TN, TT and IT

(1) Must comply with IEC 61000-3-2

Fuse and Circuit Breaker Recommendations

The recommendations given in this section are based on peak power consumption and give no information on power consumption during normal operation.

The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60947-2.

The PSU AC has a built-in Class 1 (Type 1) SPD to protect the equipment in case of lightning and network transients. The recommended fuse or circuit breaker rating is therefore dimensioned for not tripping the fuse or circuit breaker in case of SPD operation. The PSU AC is described in [Table 12](#).

Table 12 Radio 4435 Fuse and Circuit Breaker Recommendations

Unit (AC Powered)	Output Power	Nominal AC Input Voltage	Maximum AC Input Current ⁽¹⁾	Maximum Allowed Fuse Rating ⁽²⁾
Radio 4435 B41	4 × 20 W	100–127 V	5 A	10 A
		200–250 V	3 A	6 A
Radio 4435 B77D	4 × 15 W	100–127 V	5 A	10 A
		200–250 V	3 A	6 A



- (1) The Maximum AC Input Current is calculated at a total tolerance of -10% of the nominal value.
- (2) The Maximum Allowed Fuse Rating must be larger than the Maximum AC Input Current, yet still within a safety margin of 15%. This is to ensure reliable operation. However, it must not be larger than the standard value of the next or nearest higher fuse or circuit breaker. This is in order to minimize the cable cross-section area and comply with the relevant safety standard.

When the radio connected Line-Line a 2-pole circuit breaker or dual fuses are required for interruption of both lines. This is also valid when the radio is used in an IT system.

3.8.3 Power Consumption

For information on power consumption, see [Power Consumption Calculations](#) and [Power Consumption Data](#).

3.9 System Characteristics

This section describes the system characteristics of the Radio System.

3.9.1 RF Electromagnetic Field Exposure

For general information on RF EMF exposure, see [Radio Frequency Electromagnetic Fields](#).

[Table 13](#) and [Table 14](#) list the compliance boundaries (exclusion zones), outside of which the RF EMF exposure from Radio 4435 is below the limits specified by the ICNIRP, and the limits applicable in:

- EU (1999/519/EC, 2013/35/EU, EN 50385)
- USA (47 CFR 1.1310)

Table 13 Dimensions of the Box-Shaped Compliance Boundary for General Public (GP) and Occupational (O) Exposure Applicable in the EU and Markets Employing the ICNIRP RF Exposure Limits (Including 0.5 dB Transmission Loss and 0.6 dB Power Tolerance)

Mode and Output Power					Dimensions of the Box-shaped Compliance Boundary ⁽¹⁾ (m)							
					Distance in Front of Antenna		Width		Height		Distance Behind Antenna	
Product	Standard	Nominal Peak Output Power from the Radio	IEC 62232 Installation Class	TDD DL Duty Cycle	GP	O	GP	O	GP	O	GP	O
Radio 4435 B41	LTE/NR	4 × 20 W	E+	75%	8.2	3.0	5.2	1.7	2.5	1.5	<0.1	<0.1



(1) The compliance boundaries are determined for maximum output power with transmission loss, output power tolerance, and TDD downlink duty cycle included using the antenna 80020622 for an electrical tilt of 2°.

Table 14 Dimensions of the Box-Shaped Compliance Boundary for General Public (GP) and Occupational (O) Exposure Applicable in the USA and Markets Employing the FCC RF Exposure Limits (Including 0.5 dB Transmission Loss and 0.6 dB Power Tolerance)

Mode and Output Power					Dimensions of the Box-shaped Compliance Boundary ⁽¹⁾⁽²⁾ (m)							
					Distance in Front of Antenna		Width		Height		Distance Behind Antenna	
Product	Standard	Nominal Peak Output Power from the Radio	IEC 62232 Installation Class	TDD DL Duty Cycle	GP	O	GP	O	GP	O	GP	O
Radio 4435 B41	LTE/NR	4 × 20 W	E+	75%	8.7	3.9	6.2	2.8	2.5	1.9	0.3	0.2
Radio 4435 B77D	NR	4 × 15 W	E+	75%	6.4	2.9	5.0	2.3	1.8	1.5	0.3	0.2

(1) For Radio 4435 B41, the compliance boundaries are determined for maximum output power with transmission loss, output power tolerance, and TDD downlink duty cycle included using the antenna 80020622 for an electrical tilt of 2°.

(2) For Radio 4435 B77D, the compliance boundaries are determined for maximum output power with transmission loss, output power tolerance included using the antenna 80010922 for an electrical tilt of 2°.

3.9.2 Software

For information on software dependencies, see [Supported Radio Capabilities](#).

3.9.3 Radio Configurations

For information about available radio configurations, see [Radio Node Configurations](#).

3.9.4 VSWR Limitations

This unit supports return loss antenna supervision for LTE, NR and ESS carriers with 5 MHz bandwidth or higher.

For more information, see [Return Loss Antenna Supervision](#).



4 Hardware Architecture

This section describes the radio hardware structure regardless of configuration or frequency. For a description of the currently available radio configurations, see [RBS Configurations](#).

4.1 Radio Parts

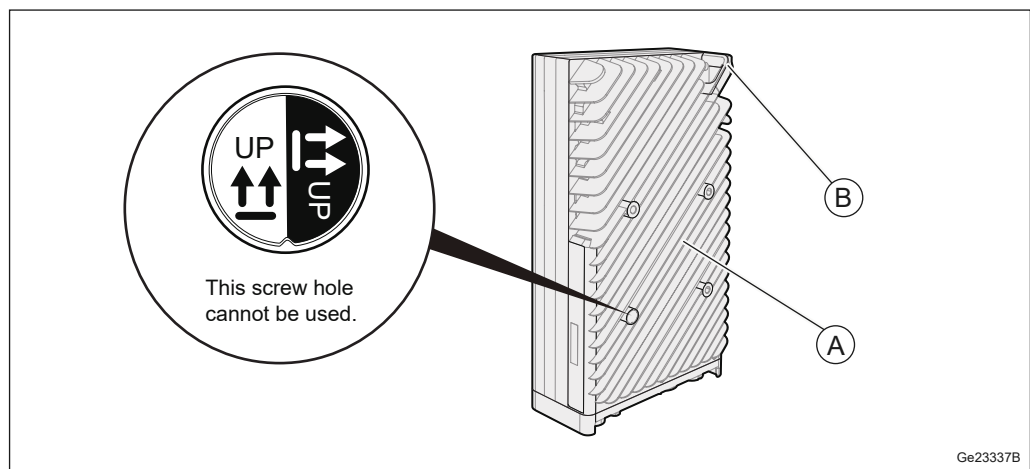


Figure 7 Radio Parts

Table 15 Key to Radio Parts

Position	Component
A	Cooling fins
B	Lifting eye

4.2 TRX

The Transmitter and Receiver (TRX) provides the following:

- Analog/Digital (A/D), Digital/Analog (D/A) conversion
- Channel filtering
- Delay and gain adjustment
- Digital predistortion



- RF modulation and demodulation
- Optical cable interface termination
- RX diversity

4.3 Optical Indicators and Maintenance Button

The radio unit is equipped with optical indicators and a maintenance button. The locations of the optical indicators and the maintenance button are shown in .

[Table 16](#) describes how to interpret the optical indicators and maintenance button on the radio unit. For detailed information, refer to [Indicators, Buttons, and Switches](#).

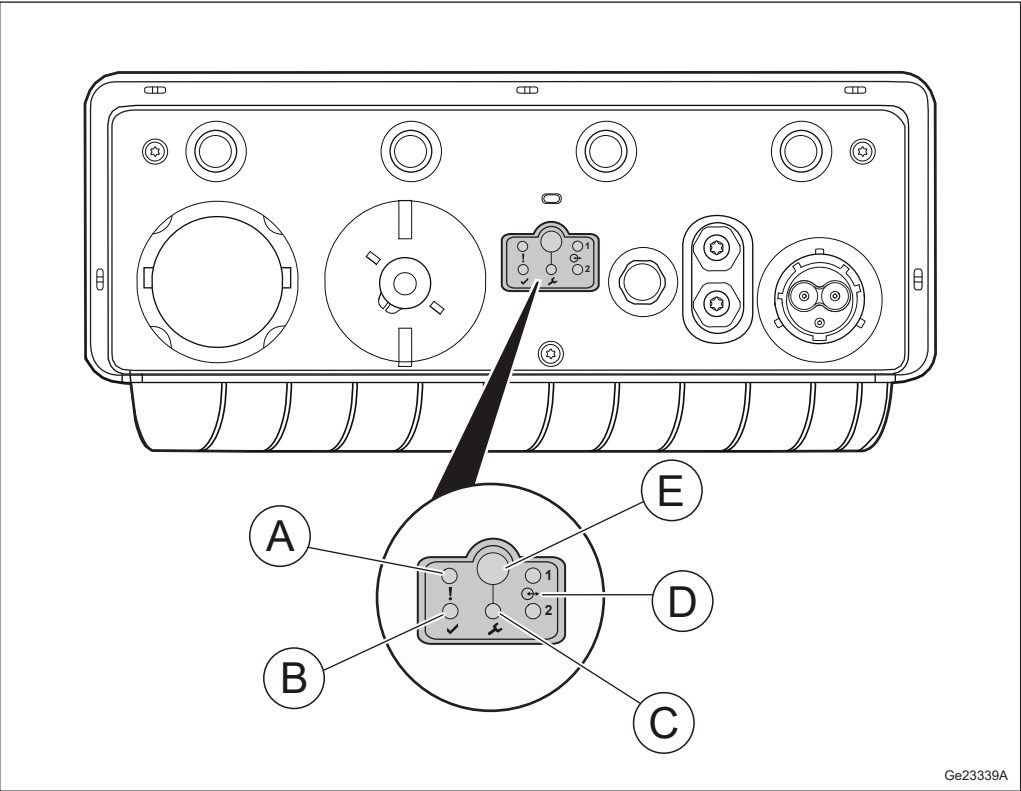
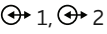


Figure 8 Optical Indicators and Maintenance Button

Table 16 Radio Unit Optical Indicators and Maintenance Button

Position	Marking	Indicator	Color	Mode	Interpretation
A	!	Fault	Red	Off	No fault detected in unit
				On	Fault detected in unit
B	✓	Operational	Green	Off	No power



Position	Marking	Indicator	Color	Mode	Interpretation
				On	Operational
				Flashing Slowly (0.5 Hz)	Missing dependent resource
				Flickering (16 Hz)	Transitory activity
				Double flashing Off	Loading in progress No ongoing traffic
				Double flashing On	Loading in progress Traffic is ongoing
C		Maintenance	Blue	Off	No ongoing maintenance activity Traffic is ongoing
				On	Maintenance mode All traffic and alarms are suppressed
				Flashing Slowly (0.5 Hz)	Maintenance mode is initiated When traffic and alarms are removed, the indicator switches to On
D		Interface	Green	Off	Disconnected
				On	Connected
E	—	Maintenance button	—	—	—



5 Connection Interfaces

This section contains information about the connection interfaces of the radio.

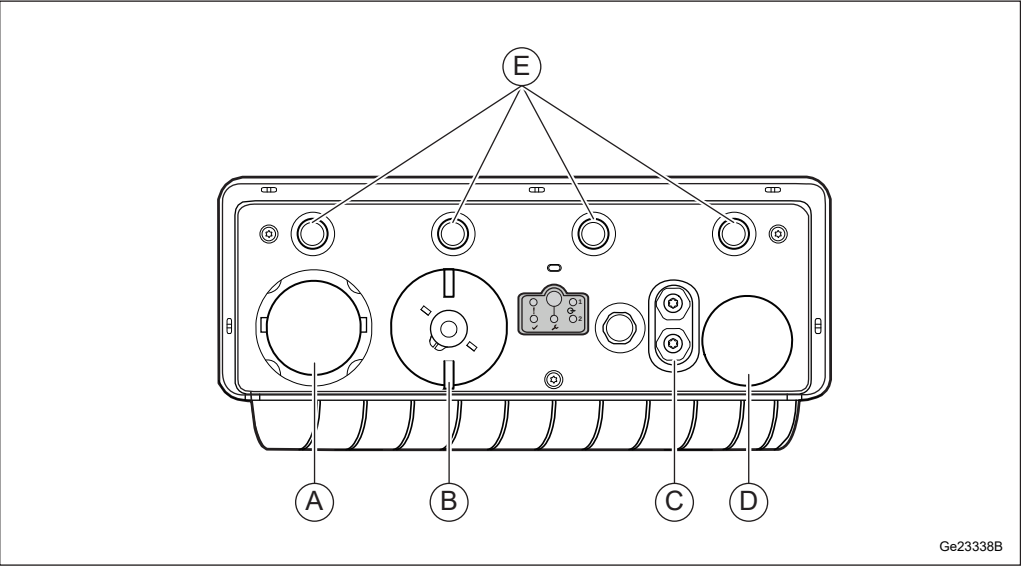
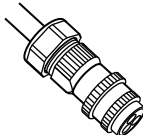
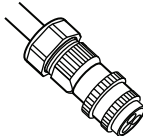
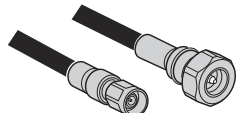


Figure 9 Connection Interfaces

Table 17 Connection Interfaces

Position	Description	Marking	Connector Types	Cable Illustration
A	Optical cable 1	↻ 1	LC (On SFP+) with support for FullAXS	
B	Optical cable 2	↻ 2		
C	Grounding point	⏏	2 × 6 mm dual lug	



Position	Description	Marking	Connector Types	Cable Illustration
D (AC version)	100–250 V AC power supply	100–250V 	Power connector	
D (DC version)	–48 V DC power supply	–48V 	Power connector	
E	Antenna A–D (from left to right)	   	NEX10	

5.1 Antenna Interface

The antenna interfaces provide connections for the radio to antennas. The jumper and RF cables connect the radio to the antenna.

Table 18 Radio Antenna Connection Interface Characteristics

Connector Type	Jumper Cable Type	RF Cable Type
NEX10 female	NEX10 male on one end and 4.3-10 female on the other end	50 Ω 1/2-inch coaxial, 4.3-10 male

Table 19 Antenna Cable Connectors

Radio Connectors	Antenna Connectors
(Antenna A–Antenna D)	TX/RX

5.2 Interface for Optical Cable to Main Unit

The  1 and  2 interfaces provide connections to optical cables for traffic and timing signals between the radio and the main unit. An SFP+ is used to connect the optical cable to the radio.

Note: The radio uses SFP+ modules for optical transmission and optical radio interfaces on Data 1 (optical cable 1) and Data 2 (optical cable 2).

Only use SFP+ modules approved and supplied by Ericsson. These modules fulfill the following:



- Compliance with Class 1 laser product safety requirements defined in standard IEC 60825-1.
- Certification according to general safety requirements defined in standard IEC 62368-1.
- Functional and performance verified to comply with Radio System specifications.

Recommended SFP+ modules are obtained from the product packages for the Radio System and the Main Remote Installation products. For more information about SFP modules, see [SFP Module Selector Guide and Site Installation Products Overview](#).

5.3 –48 V DC or 100–250 V AC Power Supply Interface

5.3.1 –48 V DC Power Supply Interface

The –48 V DC power connection is made through a connector with a 3-wire (DC-I) connection or a connector with a 2-wire (DC-C) connection.

For power cable dimensioning, see [Site Installation Products Overview](#).

For determining which connector or junction box to use, see [Table 20](#).

Table 20 –48 V DC Power Supply Connector or Junction Box

Cross-Sectional Area of Each Conductor (mm ²)	Connector or Junction Box
6–16	For 3-wire (DC-I), used with connector RNT 447 36/01. For 2-wire (DC-C), used with connector RNT 447 37/01.
25	Used with junction box NTB 101 75/1

The power cable conductor has a wire for both the 0 V conductor and a wire for the –48 V DC conductor.

All cables must be shielded. The shielding must be properly connected both to the power connector and to the grounding in the power supply equipment; otherwise, the unit over voltage and lightning protection does not function properly.

5.3.2 100–250 V AC Power Supply Interface

The AC power connection is made through a connector (RNT 447 31/03).



Table 21 AC Power Connector Capabilities

Conditions	Values and Ranges
Cable outer diameter	6 to 18 mm
Terminal size	1.5 to 4.0 mm ²

Table 22 Minimum AC Power Supply Cable

Cable Length	Cross-Sectional Area of Each Conductor
≤ 100 m	3 x 1.5 mm ²

The power cable has a wire for Line (L), a wire for Line/Neutral (L/N), and a wire for Protective Earth (PE) conductors. The wire color code for wires is market dependent.

All cables must be shielded. The shield must be folded back over the outer jacket of the cable and properly connected to the radio chassis, otherwise the radio overvoltage does not function properly.

The AC cable temperature rating must be at least 70 °C.

5.4 Grounding Interface

Radio 4435 must be grounded to protect it from overvoltage and lightning strikes.

For more information about grounding principles, see [Grounding Guidelines for RBS Sites](#).



6 Standards and Regulations

This section presents a brief overview of standards, regulatory product approval, and declaration of conformity for the radio.

FCC Compliance Statement

"This device complies with Part 15 of the FCC CFR 47 rules. Operation is subject to the following two conditions: This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation."

6.1 Regulatory Approval

6.1.1 Environmental Standards Compliance

The product complies with the following environmental standard:

Europe

- Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive (2011/65/EU) bands not allowed or not harmonized within the EU.

6.1.2 Safety Standards Compliance

In accordance with market requirements, the product complies with the following product safety standards and directives:

Europe

- EN 50385
- EN 62368-1

North America

- Health Canada Safety Code 6
- UL 62368-1
- CSA-C22.2 No. 62328-1



6.1.2.1 Outdoor Specific Requirements

The product complies with the following outdoor specific requirements:

Europe

- EN 60529 (IP65)
- EN 60950-22

North America

- UL 50E
- UL 60950-22
- CSA-C22.2 No. 60950-22-07

6.1.3 EMC Standards Compliance

The product complies with the following Electromagnetic Compatibility (EMC) standards:

North America

- FCC CFR 47 Part 15 B
- IC ICES-003 B

6.1.4 Radio Standards Compliance

The product complies with the following radio standards:

North America

- FCC CFR 47 Part: 2, 27 (US Band/Frequency Specific)

6.1.5 Marking

To show compliance with legal requirements, the product is marked with the following labels:

North America

- cETLus
- FCC CFR 47 Part 15 Statement



- IC ICES-003 Statement
- FCC ID Number

6.2 Other Standards and Regulations

The standards and regulations in this section are not regulatory approved.

6.2.1 Spare Parts

The product adheres to the Ericsson Serviceability and Spare Part Strategy.

6.2.2 Surface Quality

The surface quality of the radio is according to Ericsson standard class A5 for the top, front, and side covers, and A6 for the heat-sink.

6.2.3 Vandal Resistance

Unauthorized access is not possible without damaging the tamper proof warranty seal.

CROWN CASTLE FIBER LLC
SITE PLAN

NODE: MNG-386 (474995)

ENGINEER:



OWNER/DEVELOPER:



TITLE:

MNG-386

9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903
JURISDICTION: MONTGOMERY COUNTY

LATITUDE: 39.013263
LONGITUDE: -76.978298



PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS
WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED
PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND.
EXPIRATION DATE: 06/30/2004

ENGINEER OF RECORD

TRENT TRAVIS SNARR, P.E.
MARYLAND PROFESSIONAL ENGINEER
LICENSE #55491

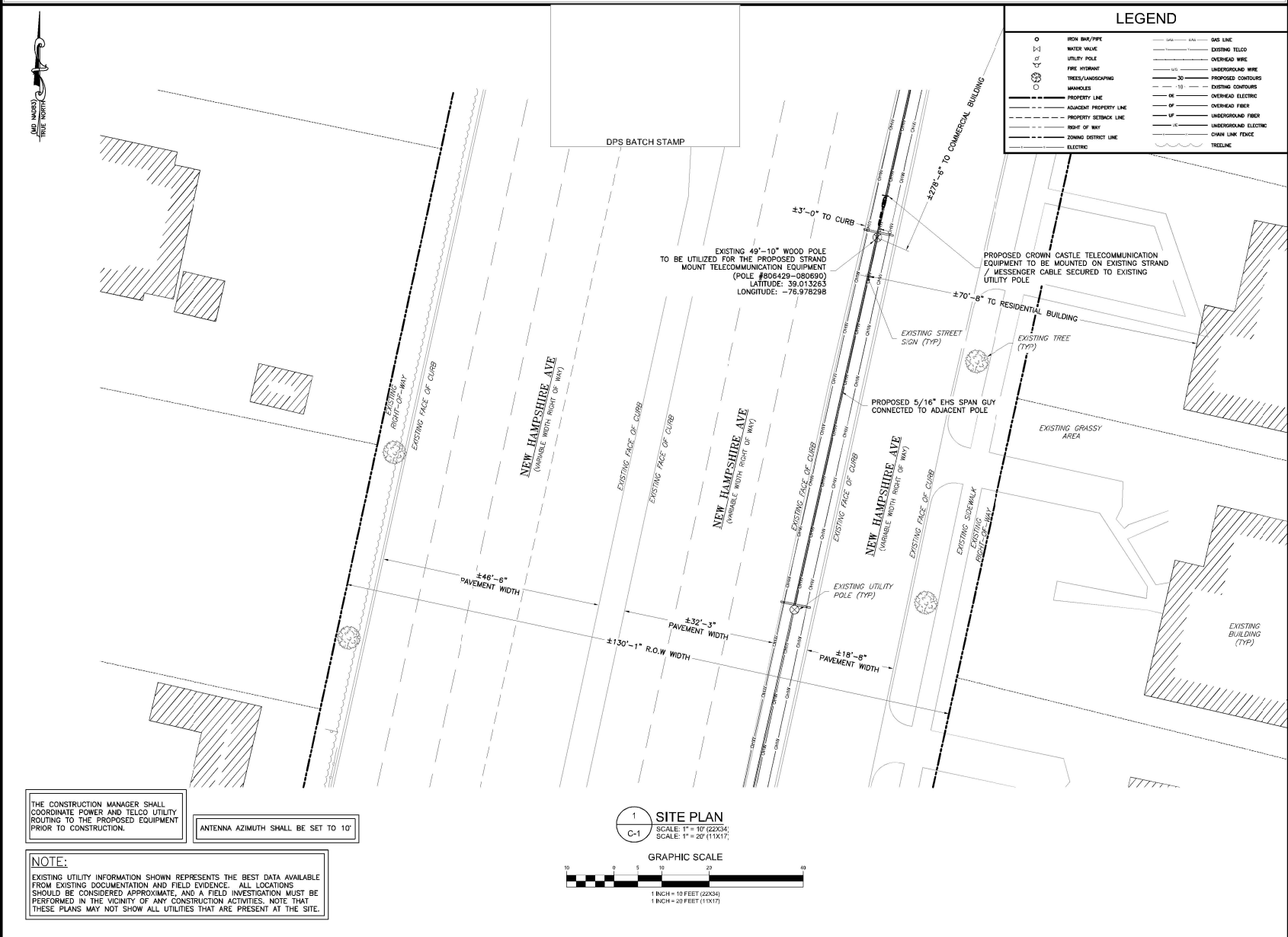
REVISIONS

REV	DATE	DESCRIPTION	BY
1	08-16-23	IKE UPDATE REVISION	JED
0	08-25-22	FINAL CDs	SDR
A	07-29-22	PRELIMINARY CDs	PEM

DRAWN BY:	CHECKED BY:	APPROVED BY:
PEM	SDB	TJA

PROJECT NUMBER:	100505
FILE NAME:	STRAND MOUNT DWG
DATE DRAWN:	07-29-22
SCALE:	AS SHOWN

SHEET: **C-1**





NB+C Engineering Services

Existing Utility Pole Node

Prepared for Crown Castle Mid-Atlantic

SITE INFORMATION

Address	9609 New Hampshire Avenue Silver Spring, MD 20903 Latitude: 39.013263°, Longitude: -76.978298°
Site Name	MNG-386
POLE TAG ID	806429-080690
PEPCO FACILITY ID	806429-080690
NB+C Project Number	100505
Date	August 18, 2023

August 18, 2023

Terrence L. Myers
Project Manager – MDV Market
Crown Castle
10980 Grantchester Way, Suite 4000
Columbia, MD 21044

Re: Utility Pole Structural Analysis Report

Dear Mr. Myers,

Per your request, NB+C Engineering Services is pleased to submit this “**Structural Analysis Report**” to determine the structural integrity of the existing utility pole listed on Table 1 of this report. Information we received for this analysis includes:

- Ike Office Report prepared by NB+C ES dated August 15, 2023
- Construction drawings prepared by NB+C ES dated August 16, 2023

Table 1 - Existing Utility Poles

Pole Length (Ft)	Pole Species	Pole Class	Pole Height above Grade (ft)	Embedment Depth (ft)	% Capacity (worst case loading)	Pass / Fail
55	SP	1	49.83	5.17	94%	Pass

APPLICABLE CODES AND STANDARDS

The existing structure was analyzed/designed per the provisions of following applicable codes and standards:

- *2018 International Building Code incorporating Montgomery County amendments published per ER #31-19*
- *Minimum Design Loads for Buildings and Other Structures ASCE/SEI 7-16*
- *2017 National Electric Safety Code*
- *TIA-222-H-2016*

ANALYSIS

Design Loads:

- NESC 250B Ice and Wind

CONCLUSION

Based on the performed analysis on the utility pole for applicable gravity and lateral loads, we have determined that the existing utility wood pole is adequate to support the proposed Wireless loading. The results of our analysis are included in the attached documentation. Please refer to construction drawings prepared by **NB+C ES** for additional information and structural details.

We at NB+C Engineering Services appreciate the opportunity of providing our continuing professional services to Crown Castle. If you have any questions or need further assistance on this or any other projects, please give us a call.

NB+C Engineering Services

Prepared by: Milan Paudel

Respectfully submitted by:

Trent T. Snarr, P.E.
Chief Engineer
MD License # 55491



I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND.

LICENSE NO. 55491 EXPIRATION DATE: 01/08/2024

PoleForeman - Pole Loading Analysis Report

License: NB+C

Database: progdata PEPCO.mdb

Version 7.4.37



POLE LOADING DATA

Pole: 55/1 (Wood-Cylindrical)

Soil: None

Pole Loading

Horizontal: 94% (250B)
Vertical: 9% (k=0.70)

NESC Edition: 2017

Loading District: Heavy

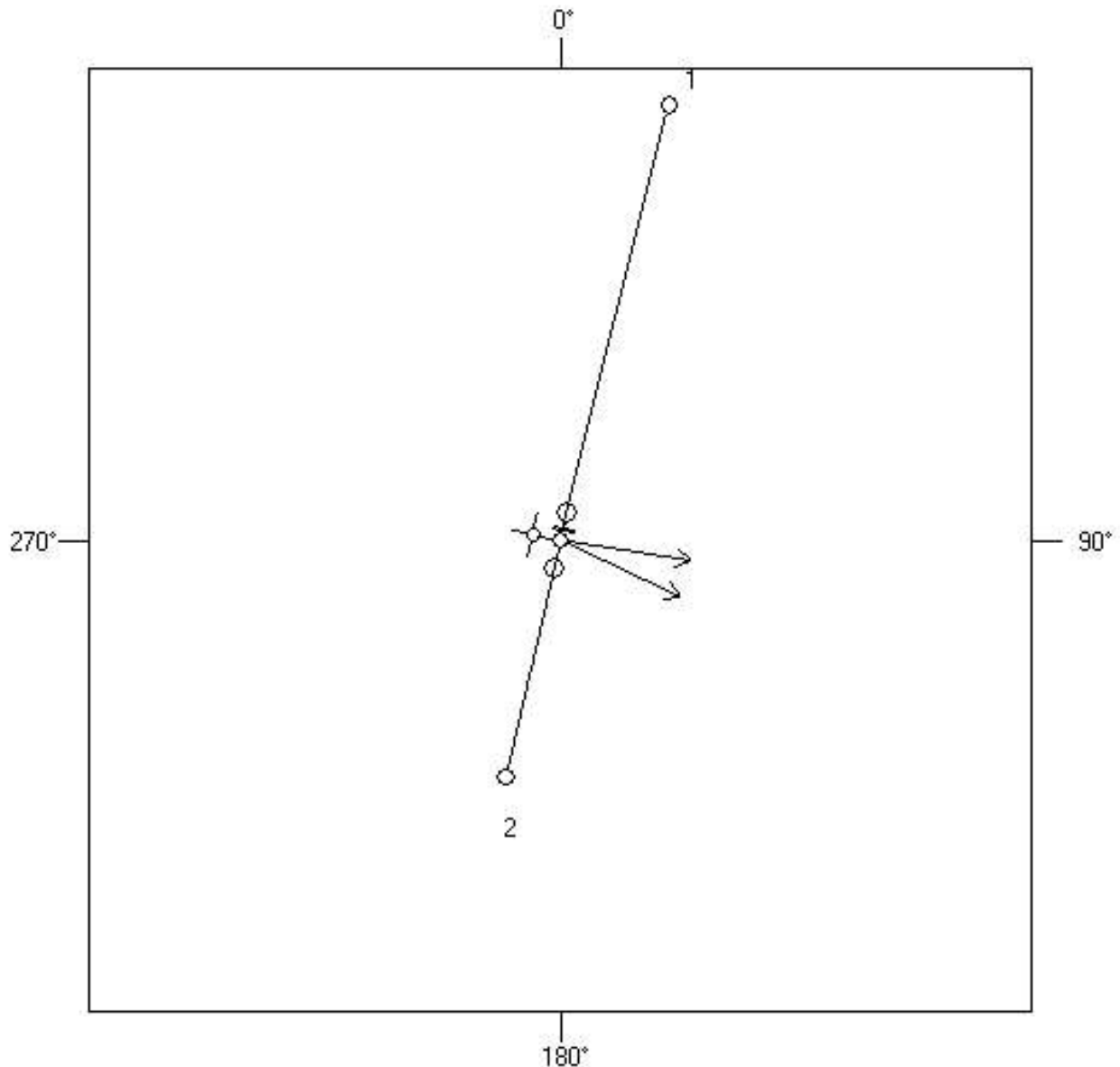
Construction: Grade C (Elsewhere)

Rule 250B: Temp=0F, Wind=4 psf, Ice=0.5 in

POLES

Pole #	Length (ft)	Depth (ft)	Elevation (ft)
0	55	5.17	0
1	50	7.08	0
2	55	6.75	0

POLE LINE TOPOLOGY



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Database: progdata PEPCO.mdb

Version 7.4.37

GUY STRAND DATA

Anchor	Strand	Attach (in)	Length (ft)	Direction	Tension (lbs)	Strength (lbs)	Loading
1	5/16" EHS	362"	6'	12°	7,308	10,080	73%
2	7/16" EHS	311"	7'	12°	10,625	18,000	59%

ANCHOR DATA

Anchor	Rod	Anchor	Soil	Tension (lbs)	Rod Strength (lbs)	Anchor Strength (lbs)
1	1-1/4" Rod	10" Helix	Class - 5	7,308	58,000	16,000
2	1-1/4" Rod	10" Helix	Class - 5	10,625	58,000	16,000

INSULATORS

Insulator	Attach (in)	Loading	Angle
15KV Pin	7"	25%	1°
15KV Xarm Pin	23"	40%	1°
15KV Xarm Pin	23"	40%	1°
15KV Xarm Pin	92"	40%	1°
15KV Xarm Pin	92"	40%	1°
15KV Xarm Pin	92"	40%	1°

ARM / BRACKET DATA

Arm/Bracket	Attach (in)	Vert Loading	Horz Loading
33" Single FG Pole Top Pin	7"	49%	15%
10' Single X-Arm (3.75x4.75)	23"	65%	10%
10' Single X-Arm (3.75x4.75)	92"	85%	14%

SPANS

Span: 1 **Span Length (ft): 254** **Direction: 14°**

Circuit: 1 *

	Ruling Span (ft)	Offset (in)	Attach A (in)	Attach B (in)	Tension (lbs)
Primary					
477 ACSR (30/7)	200	55	14"	18"	3900
477 ACSR (30/7)	200	0	-19"	12"	3900
477 ACSR (30/7)	200	-55	14"	18"	3900
Secondary					
4/0 AL QPX SECD	200	0	226"	197"	3776

Circuit: 2 *

	Ruling Span (ft)	Offset (in)	Attach A (in)	Attach B (in)	Tension (lbs)
Primary					
477 ACSR (30/7)	200	55	83"	76"	3900
477 ACSR (30/7)	200	20	83"	76"	3900
477 ACSR (30/7)	200	-55	83"	76"	3900

Joint Use

Joint Use Cable	Ruling Span (ft)	Diameter (in)	Weight (lbs/ft)	Attach A (in)	Offset (in)	Attach B (in)	Tension (lbs)	Description
10M-144CT-100PR w/ 4402 Strand	200	1.66	0.96	285"	1	245"	2231	
0.75" TELCO	200	0.75	0.33	311"	1	263"	2710	
1.00" TELCO	200	1.00	0.50	324"	1	275"	2905	
0.75" TELCO	200	0.75	0.33	337"	1	287"	2710	
0.50" TELCO	200	0.50	0.22	346"	1	299"	1480	

Span: 2 **Span Length (ft): 138** **Direction: 193°**

Circuit: 1 *

	Ruling Span (ft)	Offset (in)	Attach A (in)	Attach B (in)	Tension (lbs)
Primary					
477 ACSR (30/7)	200	55	14"	16"	3900
477 ACSR (30/7)	200	0	-19"	9"	3900
477 ACSR (30/7)	200	-55	14"	16"	3900
Secondary					
4/0 AL QPX SECD	200	0	226"	279"	3776

Circuit: 2 *

	Ruling Span (ft)	Offset (in)	Attach A (in)	Attach B (in)	Tension (lbs)
Primary					
477 ACSR (30/7)	200	55	83"	80"	3900
477 ACSR (30/7)	200	20	83"	80"	3900
477 ACSR (30/7)	200	-55	83"	80"	3900

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Database: progdata PEPCO.mdb

Version 7.4.37

Joint Use

Joint Use Cable	Ruling Span (ft)	Diameter (in)	Weight (lbs/ft)	Attach A (in)	Offset (in)	Attach B (in)	Tension (lbs)	Description
10M-144CT-100PR	200	1.66	0.96	285"	1	327"	2200	
0.75" TELCO	200	0.75	0.33	311"	1	345"	2710	
1.00" TELCO	200	1.00	0.50	324"	1	357"	2905	
0.75" TELCO	200	0.75	0.33	337"	1	369"	2710	
0.50" TELCO	200	0.50	0.22	346"	1	381"	1480	
0.75" TELCO	200	0.75	0.33	362"	1	393"	2710	

SERVICES

Service	Type	Length (ft)	Direction	Attach (in)	Tension (lbs)
1/0 AL TPX SERV	Power	76	99°	226"	400
1/0 AL TPX SERV	Power	76	115°	226"	400

EQUIPMENT

Equipment	Weight (lbs)	Attach (in)	Direction
Strand Mount Antenna - Ericsson 2204	65.0	285"	14°
User Defined Equipment	5.0	382"	193°
User Defined Equipment	5.0	502"	193°

LIGHTS

Light	Bracket	Weight (lbs)	EPA	Attach (in)	Direction
150-400W Cobra	14 FT Bracket	97	0.87	271"	281°

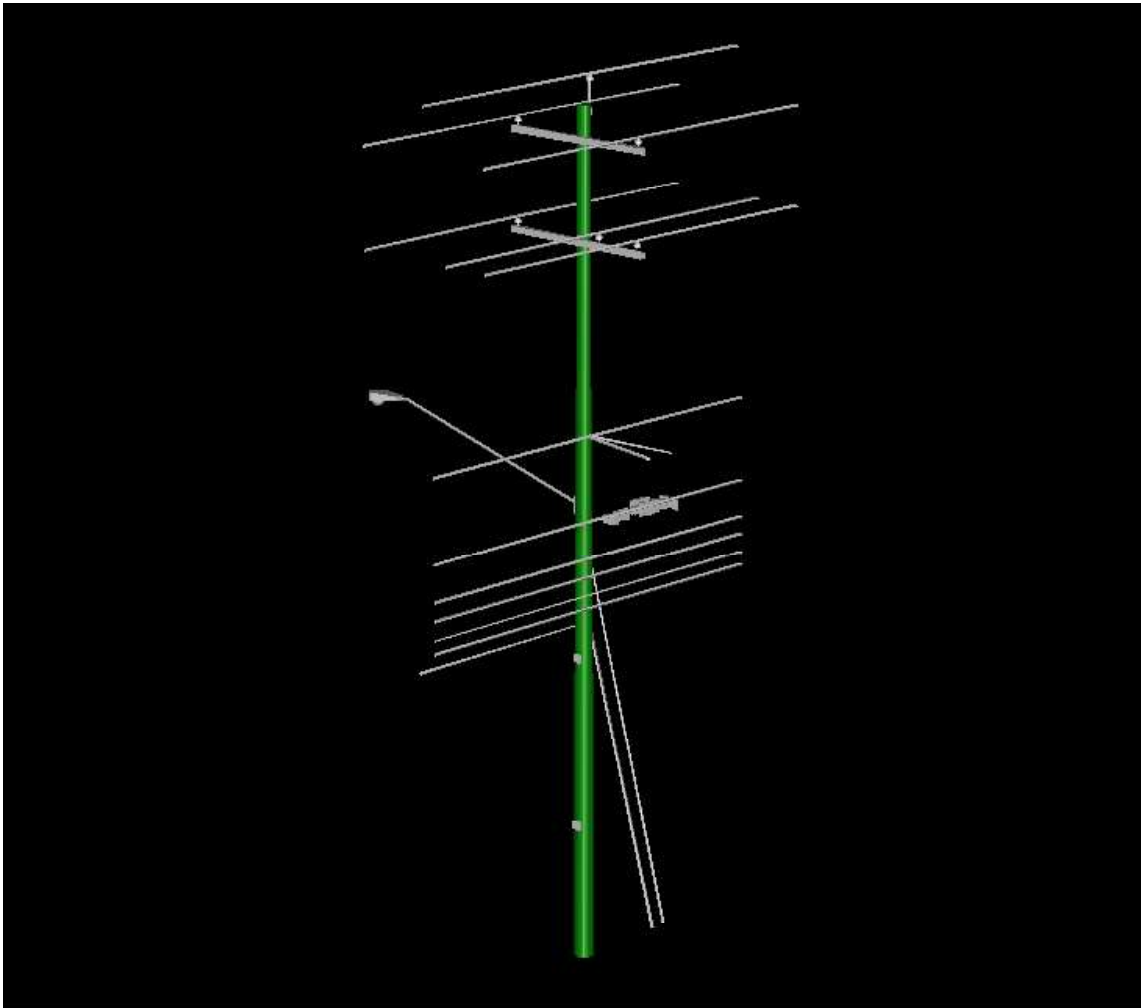
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License: NB+C

Database: progdata PEPCO.mdb

Version 7.4.37

Solid Model View



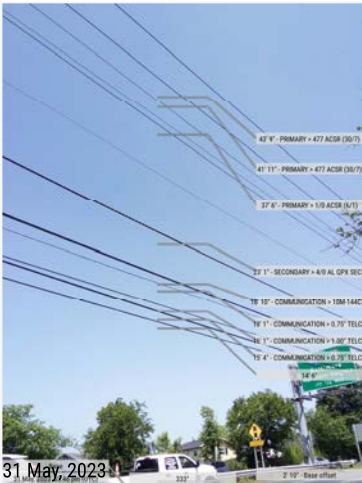
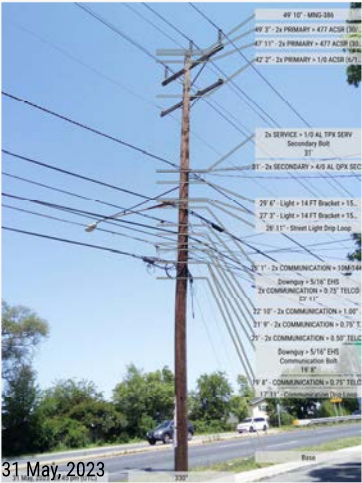
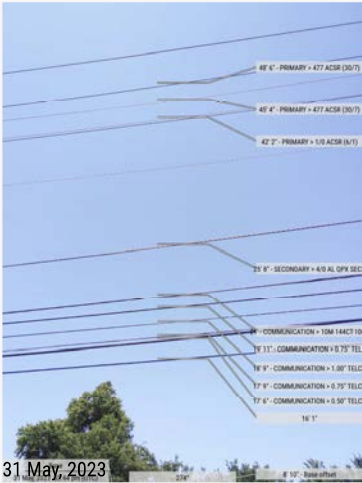
MNG-386

NB+C Node Survey 2 (1 of 3)

Pole Sequence Number: 806429-80690 SCU ID: 474995 Tip: 49' 10" Circumference (") : 44

Location: (lat: 39.01327, lng: -76.9783, alt: 195' 10") Ready for Crown Castle Upload: No

IKEphoto



Tag Photos



Directional Photos #1: Directional Photos #1

North



South



East



West



31 May, 2023

12 o'clock



31 May, 2023

9 o'clock



31 May, 2023

6 o'clock



31 May, 2023

3 o'clock



31 May, 2023

Anchor #1: Anchor #1

Lead Length: 6' at 12.00°

Guys #1: Downguy > 5/16" EHS		
Owner: COMMUNICATION > Telco	Attachment Height: 19' 8"	

Anchor #2: Anchor #2

Lead Length: 7' at 12.00°

Guys #1: Downguy > 5/16" EHS		
Owner: COMMUNICATION > Telco	Attachment Height: 23' 11"	

Equipment #1: Light > 14 FT Bracket > 150-400W Cobra

Orientation: 281	Owner: UTILITY > PEPCO	Attachment Height: 27' 3"	Bottom Height: 29' 6"
------------------	------------------------	---------------------------	-----------------------

Span #1: Fore Span

Span Length: 138' 4" at 192.62°

Wire #1: COMMUNICATION > 0.75" TELCO

Mid Span Height: 16' 1"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 19' 8"
Wire #2: COMMUNICATION > 0.50" TELCO			
Mid Span Height: 17' 6"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 21'
Wire #3: COMMUNICATION > 0.75" TELCO			
Mid Span Height: 17' 9"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 21' 9"
Wire #4: COMMUNICATION > 1.00" TELCO			
Mid Span Height: 18' 9"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 22' 10"
Wire #5: COMMUNICATION > 0.75" TELCO			
Mid Span Height: 19' 11"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 23' 11"
Wire #6: COMMUNICATION > 10M-144CT-100PR			
Mid Span Height: 21'	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 26' 1"
Wire #7: SECONDARY > 4/0 AL QPX SECD			
Mid Span Height: 25' 8"	Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 31'
Wire #8: PRIMARY > 1/0 ACSR (6/1)			
Mid Span Height: 42' 2"	Quantity: 3	Owner: UTILITY > PEPCO	Attachment A Height: 42' 2"
Wire #9: PRIMARY > 477 ACSR (30/7)			
Mid Span Height: 45' 4"	Quantity: 2	Owner: UTILITY > PEPCO	Attachment A Height: 47' 11"
Wire #10: PRIMARY > 477 ACSR (30/7)			
Mid Span Height: 48' 6"	Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 49' 3"
Span #2: Back Span			
Span Length: 253' 8" at 13.72°			
Wire #1: COMMUNICATION > 0.50" TELCO			
Mid Span Height: 14' 6"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 21'
Wire #2: COMMUNICATION > 0.75" TELCO			
Mid Span Height: 15' 4"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 21' 9"
Wire #3: COMMUNICATION > 1.00" TELCO			
Mid Span Height: 16' 1"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 22' 10"
Wire #4: COMMUNICATION > 0.75" TELCO			
Mid Span Height: 18' 1"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 23' 11"
Wire #5: COMMUNICATION > 10M-144CT-100PR			
Mid Span Height: 18' 10"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 26' 1"

Wire #6: SECONDARY > 4/0 AL QPX SECD

Mid Span Height: 23' 1"	Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 31'
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Wire #7: PRIMARY > 1/0 ACSR (6/1)

Mid Span Height: 37' 6"	Quantity: 3	Owner: UTILITY > PEPCO	Attachment A Height: 42' 2"
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Wire #8: PRIMARY > 477 ACSR (30/7)

Mid Span Height: 41' 11"	Quantity: 2	Owner: UTILITY > PEPCO	Attachment A Height: 47' 11"
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Wire #9: PRIMARY > 477 ACSR (30/7)

Mid Span Height: 43' 9"	Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 49' 3"
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Span #3: Building

Span Length: 76' at 99.00°

Wire #1: SERVICE > 1/0 AL TPX SERV

Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 31'
-------------	------------------------	--------------------------

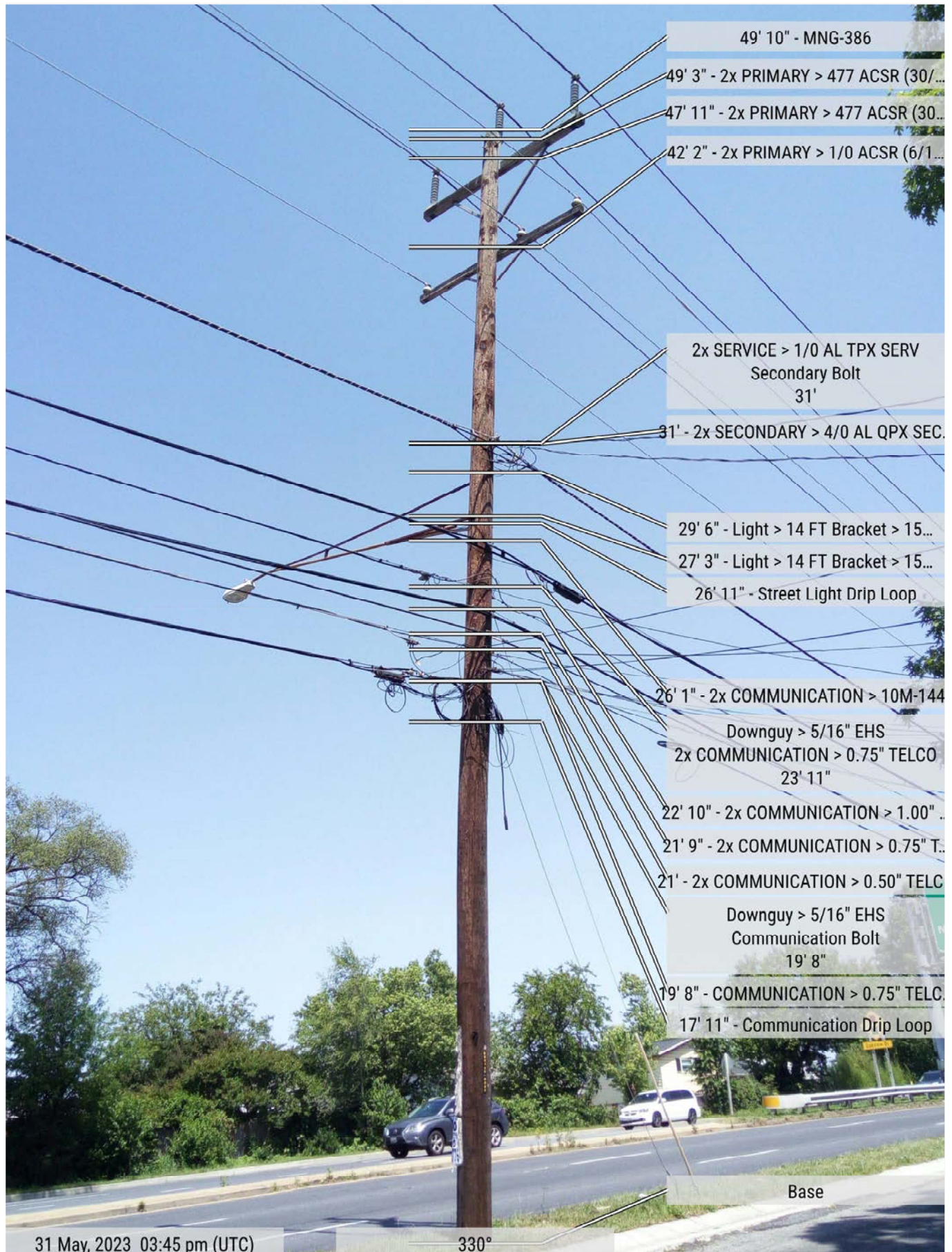
Span #4: Building

Span Length: 76' at 115.00°

Wire #1: SERVICE > 1/0 AL TPX SERV

Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 31'
-------------	------------------------	--------------------------

IKEphoto (2 of 6)



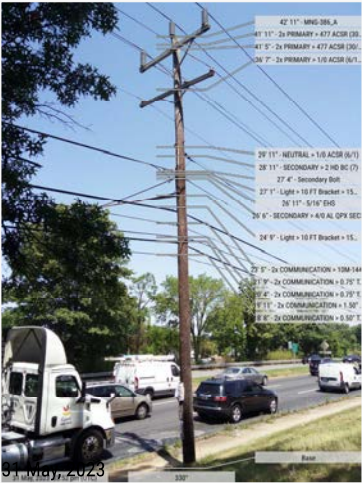
MNG-386_A

NB+C Node Survey 2 (2 of 3)

Pole Sequence Number: 806429-140950 Tip: 42' 11" Circumference ("): 44

Location: (lat: 39.01395, lng: -76.97809, alt: 203' 1") Ready for Crown Castle Upload: No

IKEphoto

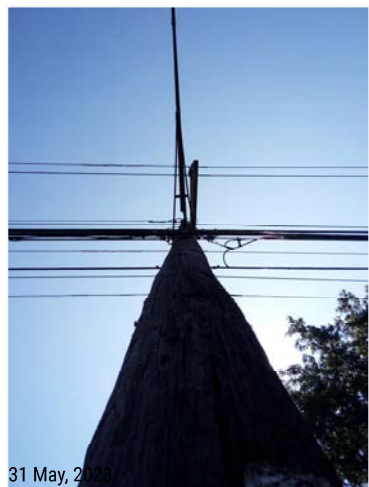


Tag Photos



Directional Photos #1: Directional Photos #1

12 o'clock



9 o'clock



6 o'clock



3 o'clock



Equipment #1: Light > 10 FT Bracket > 150-400W Cobra

Orientation: 285 Owner: UTILITY > PEPCO Attachment Height: 24' 9" Bottom Height: 27' 1"

Span #1: Back Span

Span Length: 257' at 13.00°

Wire #1: COMMUNICATION > 0.50" TELCO			
Mid Span Height: 10' 9"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 18' 8"
Wire #2: COMMUNICATION > 1.50" TELCO			
Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 19' 11"	
Wire #3: COMMUNICATION > 0.75" TELCO			
Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 20' 4"	
Wire #4: COMMUNICATION > 0.75" TELCO			
Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 21' 9"	
Wire #5: COMMUNICATION > 10M-144CT-100PR			
Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 23' 5"	
Wire #6: SECONDARY > 2 HD BC (7)			
Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 28' 11"	
Wire #7: NEUTRAL > 1/0 ACSR (6/1)			
Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 29' 11"	
Wire #8: PRIMARY > 1/0 ACSR (6/1)			
Quantity: 3	Owner: UTILITY > PEPCO	Attachment A Height: 36' 7"	
Wire #9: PRIMARY > 477 ACSR (30/7)			
Quantity: 2	Owner: UTILITY > PEPCO	Attachment A Height: 41' 5"	

Wire #10: PRIMARY > 477 ACSR (30/7)

Quantity: 1

Owner: UTILITY > PEPCO

Attachment A Height: 41' 11"

Span Guy #1: 5/16" EHS

Owner: UTILITY > PEPCO

Attachment Height: 26' 11"

Span #2: Fore Span

Span Length: 253' 8" at 193.72°

Wire #1: COMMUNICATION > 0.50" TELCO

Mid Span Height: 10' 9"

Quantity: 1

Owner: COMMUNICATION > Telco

Attachment A Height: 18' 8"

Wire #2: COMMUNICATION > 1.50" TELCO

Quantity: 1

Owner: COMMUNICATION > Telco

Attachment A Height: 19' 11"

Wire #3: COMMUNICATION > 0.75" TELCO

Quantity: 1

Owner: COMMUNICATION > Telco

Attachment A Height: 20' 4"

Wire #4: COMMUNICATION > 0.75" TELCO

Quantity: 1

Owner: COMMUNICATION > Telco

Attachment A Height: 21' 9"

Wire #5: COMMUNICATION > 10M-144CT-100PR

Quantity: 1

Owner: COMMUNICATION > Telco

Attachment A Height: 23' 5"

Wire #6: PRIMARY > 1/0 ACSR (6/1)

Quantity: 3

Owner: UTILITY > PEPCO

Attachment A Height: 36' 7"

Wire #7: PRIMARY > 477 ACSR (30/7)

Quantity: 2

Owner: UTILITY > PEPCO

Attachment A Height: 41' 5"

Wire #8: PRIMARY > 477 ACSR (30/7)

Quantity: 1

Owner: UTILITY > PEPCO

Attachment A Height: 41' 11"

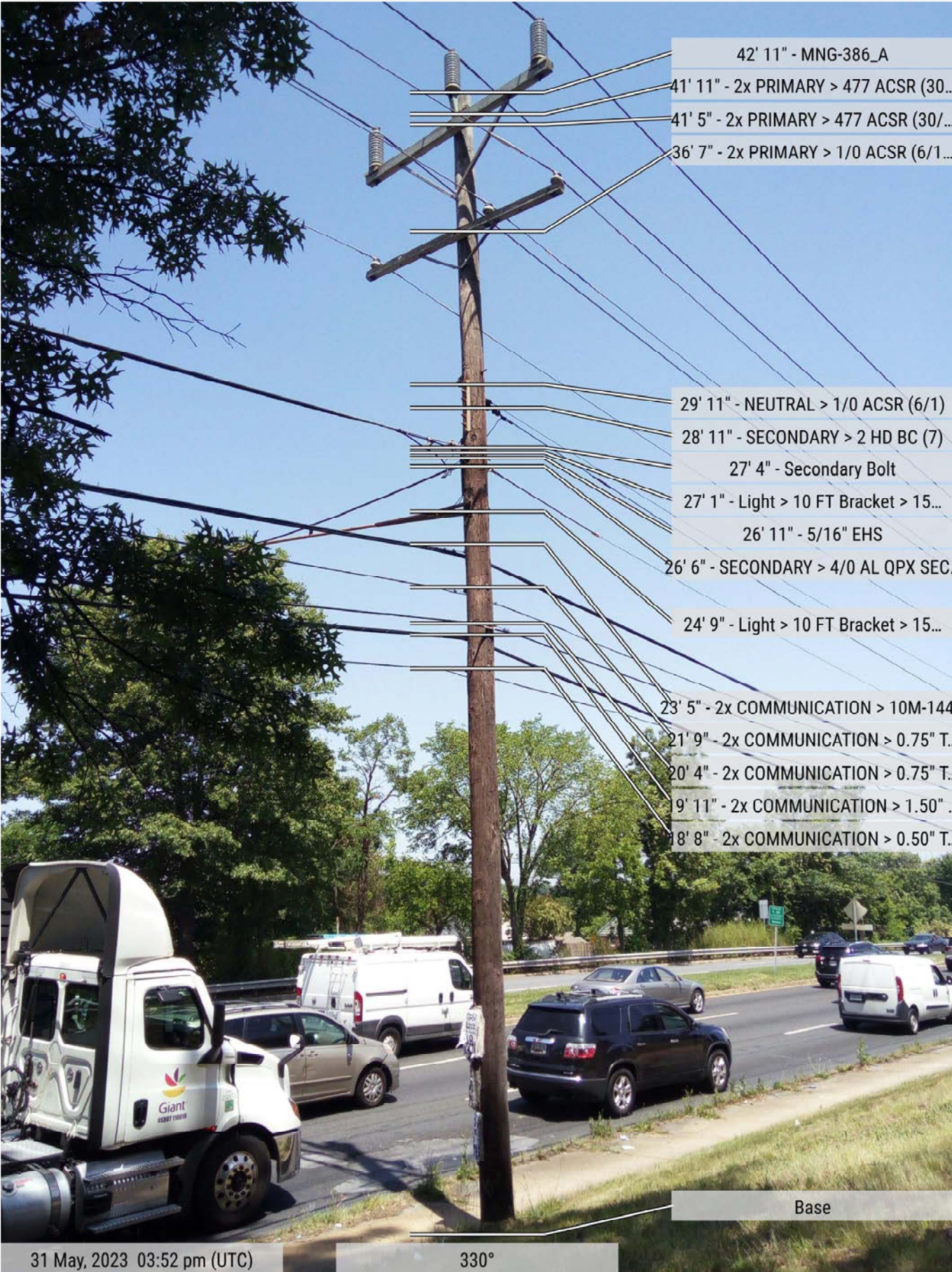
Wire #9: SECONDARY > 4/0 AL QPX SECD

Quantity: 1

Owner: UTILITY > PEPCO

Attachment A Height: 26' 6"

IKEphoto (2 of 5)



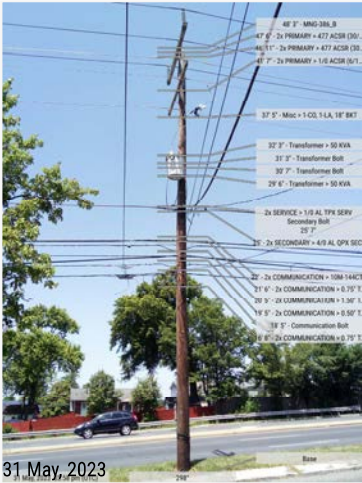
MNG-386_B

NB+C Node Survey 2 (3 of 3)

Pole Sequence Number: 806429-050550 Tip: 48' 3" Circumference ("): 44

Location: (lat: 39.0129, lng: -76.97841, alt: 185' 1") Ready for Crown Castle Upload: No

IKEphoto

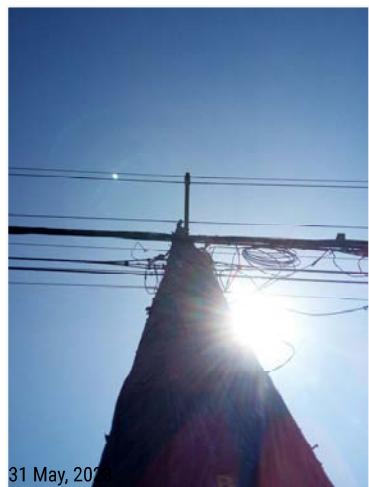


Tag Photos



Directional Photos #1: Directional Photos #1

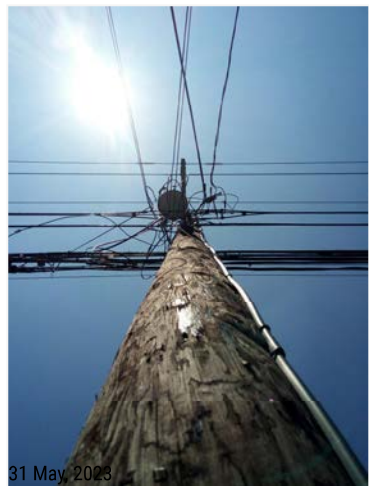
12 o'clock



9 o'clock



6 o'clock



3 o'clock



Equipment #1: Transformer > 50 KVA

Orientation: 138	Owner: UTILITY > PEPCO	Attachment Height: 32' 3"	Bottom Height: 29' 6"
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Equipment #2: Misc > 1-CO, 1-LA, 18" BKT

Orientation: 53	Owner: UTILITY > PEPCO	Attachment Height: 37' 5"
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Span #1: Fore Span

Span Length: 122' at 194.00°

Wire #1: COMMUNICATION > 0.75" TELCO

Mid Span Height: 16' 9"	Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 16' 8"
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Wire #2: COMMUNICATION > 0.50" TELCO

Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 19' 5"
-------------	------------------------------	-----------------------------

Wire #3: COMMUNICATION > 1.50" TELCO

Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 20' 5"
-------------	------------------------------	-----------------------------

Wire #4: COMMUNICATION > 0.75" TELCO

Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 21' 6"
-------------	------------------------------	-----------------------------

Wire #5: COMMUNICATION > 10M-144CT-100PR

Quantity: 1	Owner: COMMUNICATION > Telco	Attachment A Height: 22'
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Wire #6: SECONDARY > 4/0 AL QPX SECD

Quantity: 1	Owner: UTILITY > PEPCO	Attachment A Height: 25'
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Wire #7: PRIMARY > 1/0 ACSR (6/1)

Quantity: 3	Owner: UTILITY > PEPCO	Attachment A Height: 41' 7"
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Wire #8: PRIMARY > 477 ACSR (30/7)

Quantity: 2	Owner: UTILITY > PEPCO	Attachment A Height: 46' 11"
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Wire #9: PRIMARY > 477 ACSR (30/7)

Quantity: 1

Owner: UTILITY > PEPCO

Attachment A Height: 47' 6"

Span #2: Back Span

Span Length: 138' 4" at 12.62°

Wire #1: COMMUNICATION > 0.75" TELCO

Quantity: 1

Owner: COMMUNICATION > Telco

Attachment A Height: 16' 8"

Wire #2: COMMUNICATION > 0.50" TELCO

Quantity: 1

Owner: COMMUNICATION > Telco

Attachment A Height: 19' 5"

Wire #3: COMMUNICATION > 1.50" TELCO

Quantity: 1

Owner: COMMUNICATION > Telco

Attachment A Height: 20' 5"

Wire #4: COMMUNICATION > 0.75" TELCO

Quantity: 1

Owner: COMMUNICATION > Telco

Attachment A Height: 21' 6"

Wire #5: COMMUNICATION > 10M-144CT-100PR

Quantity: 1

Owner: COMMUNICATION > Telco

Attachment A Height: 22'

Wire #6: SECONDARY > 4/0 AL QPX SECD

Quantity: 1

Owner: UTILITY > PEPCO

Attachment A Height: 25'

Wire #7: PRIMARY > 1/0 ACSR (6/1)

Quantity: 3

Owner: UTILITY > PEPCO

Attachment A Height: 41' 7"

Wire #8: PRIMARY > 477 ACSR (30/7)

Quantity: 2

Owner: UTILITY > PEPCO

Attachment A Height: 46' 11"

Wire #9: PRIMARY > 477 ACSR (30/7)

Quantity: 1

Owner: UTILITY > PEPCO

Attachment A Height: 47' 6"

Span #3: Building

Span Length: 65' at 96.00°

Wire #1: SERVICE > 1/0 AL TPX SERV

Quantity: 1

Owner: UTILITY > PEPCO

Attachment A Height: 25' 7"

Span #4: Building

Span Length: 68' at 115.00°

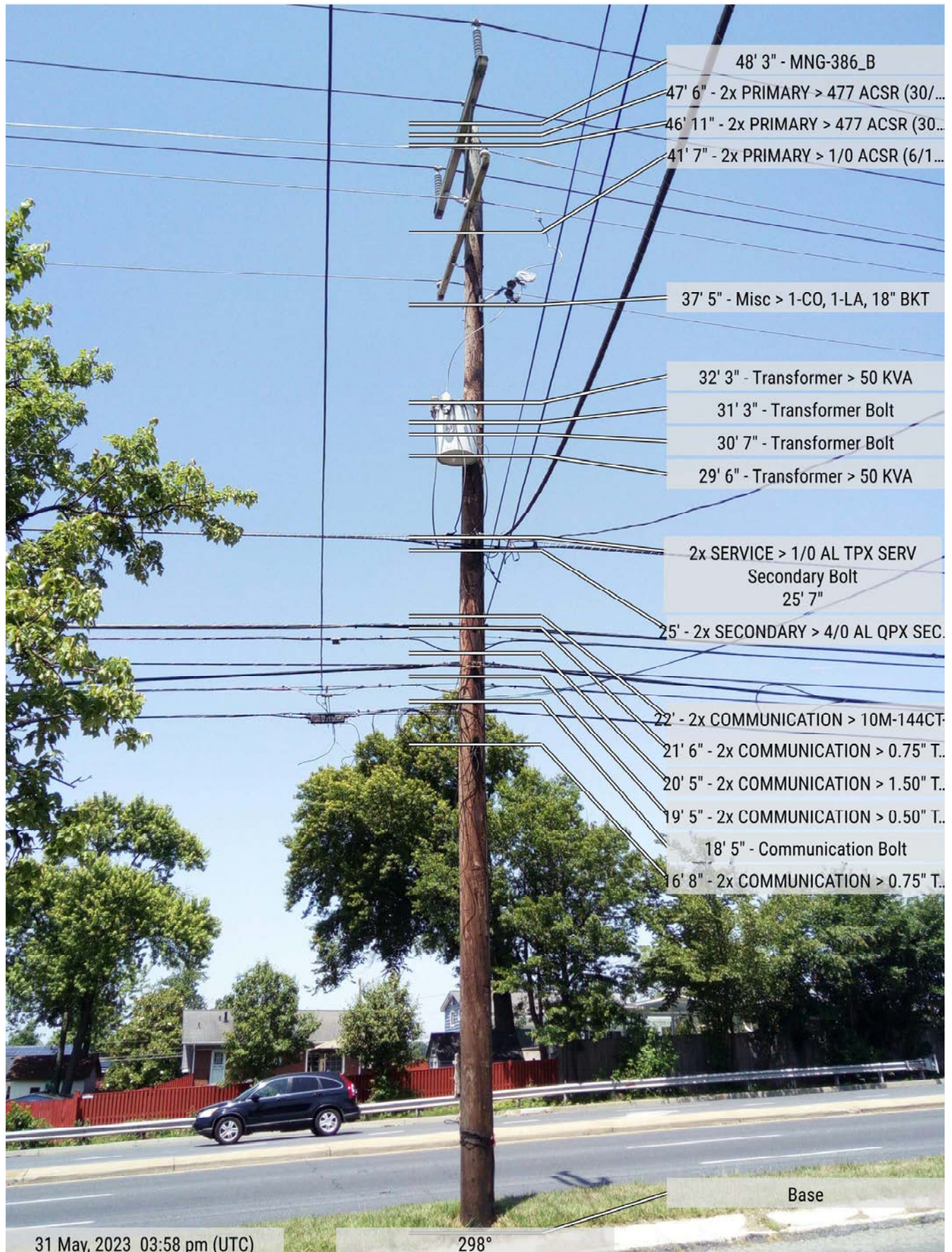
Wire #1: SERVICE > 1/0 AL TPX SERV

Quantity: 1

Owner: UTILITY > PEPCO

Attachment A Height: 25' 7"

IKEphoto (3 of 5)



ATLANTIC CITY ELECTRIC (ACE), DELMARVA POWER & LIGHT (DPL), and
POTOMAC ELECTRIC POWER (PEPCO)

STANDARD AGREEMENT
Notice to Proceed (NTP)

Notice to Proceed (NTP) expires 6 months from issue Date

Issue Date: 4/26/2024

Approval Date: 5/1/2024

[(CHECK ONE)]Licensor		
☐ ATLANTIC CITY ELECTRIC	☐ DELMARVA POWER & LIGHT	☒ POTOMAC ELECTRIC POWER COMPANY
LICENSEE NAME: CROWN CASTLE	SITE ID: MNG-386	LOCATION: Click here to enter text.
In regards to the site referenced above PHI give (Licensee) <u>CROWN CASTLE</u> Notice to proceed with the (Installation/Upgrade) of this site with the conditions outlines below.		
SCOPE OF WORK (SOW)		
PHI WORK REQUEST: 18688036	PHI APPROVED CONTRACTOR IF APPLICABLE:	
DESCRIPTION OF SOW: Specific node plan drawings are attached hereto and incorporated into this NTP by reference. Installation of the equipment set forth in these drawings is being permitted in this NTP.		
CONDITIONS:		
UTILITY POLE NUMBER: 806429-080690.	☐ This pole does not support any primary Circuits and an outage is NOT necessary to complete this work safely. ☐ All above ground work within the "power space" must be done by PHI or PHI approved contractor.	
This NTP must be presented to PHI field representative in order for work to commence. Each request installation workday may require confirmation and coordination at least 24 hours in advance with PHI field representative. Prior to Licensee installation, Licensee must obtain approval from local municipality /permitting entity to install wireless and/or strand mount equipment to any Pepco owned pole. All third-party make ready conditions must be met prior to Licensee's installation. A PHI representative must be present on site when the work is being performed. Licensee and its contractors must adhere to PHI construction protocol; Joint Use Department, Transmission Construction and Project Management PHI Standards Guidelines No. 1722 Rev D, PHI's Safety Manual.		
POST INSPECTION		
Upon completion of Installation/Upgrade work, please contact the Joint Use Project Coordinator to schedule a Post Construction Inspection. Failing Post Construction inspection locations will not have a meter placed until any and all deficiencies are corrected.		
LICENSEE SIGNATURE		
By Signing below Licensee authorized representative hereby acknowledges receipt of the documents listed herein. Name: <u>Ryan Fitzgerald</u> Date: <u>4.30.24</u>		

NODE: MNG-386 (474995)

ENGINEER

NBC+U

TOTALLY COMMITTED.

NBC+U ENGINEERING SERVICES, LLC.
A SUBSIDIARY OF NORTON GROUP, INC.
1150 17th STREET
ANN ARBOR, MI 48106

OWNER/DEVELOPER

 CROWN
CASTLE

CROWN CASTLE FIBER LLC
10980 GRANTCHESTER WAY, 4TH FLOOR
COLUMBIA, MD 21044

TITLE: MNG-386
9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903
JURISDICTION: MONTGOMERY COUNTY
LATITUDE: 39.013263
LONGITUDE: -76.978298



ENGINEER OF RECORD

TRENT TRAVIS SNARR, P.E.
MARYLAND PROFESSIONAL ENGINEER
LICENSE #653491

REV/	DATE	DESCRIPTION	BY
1	09-16-23	IME UPDATE REVISION	JED
0	08-25-22	FINAL CD#	SDR
A	07-28-22	PRELIMINARY CD#	PEM

DRAWN BY:	CHECKED BY:	APPROVED BY:
PEM	SDR	TJA

PROJECT NUMBER:	100505
FILE NAME:	STRAND MOUNT DWG

GN-1

GROUNDING AND BONDING NOTE:
GENERAL CONTRACTOR SHALL FOLLOW ALL
CONSTRUCTION GUIDELINES PER CROWN
CASTLE'S GROUNDING AND BONDING
REQUIREMENTS FOR STRAND MOUNT
NODES (GDAS) - DOCUMENT 337910.

1. THE CONTRACTOR SHALL GIVE ALL NOTICE AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LOCAL ORDERS OF ANY PUBLIC AUTHORITY, MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS, AND LOCAL AND STATE SPECIFICATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE WORK PERFORMED ON THE PROJECT AND THE MATERIALS INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES.
2. THE ARCHITECT/ENGINEER HAS MADE EVERY EFFORT TO SET FORTH IN THE CONSTRUCTION AND CONTRACT DOCUMENTS THE INTENT OF THE DESIGN. THE CONTRACTOR SHALL BE CAUTIONED THAT THE JOB IS NEVERTHELESS THE ARCHITECT'S/ENGINEER'S DESIGN. OMISSIONS OR ERRORS IN THE DRAWINGS AND SPECIFICATIONS SHALL NOT EXCUSE THE CONTRACTOR FROM THE OBLIGATION TO CONSTRUCT THE PROJECT IN STRICT ACCORDANCE WITH THE INTENT OF THOSE DOCUMENTS.

- GROUNDING NOTES:

- [illegible]

ALL EQUIPMENT THAT IS INSTALLED AND MAY CAUSE ANY KIND OF ELECTRICAL CHARGE OR BUILD UP MUST HAVE PROPER AND ADEQUATE GROUNDING IN PLACE TO PREVENT FROM EQUIPMENT DAMAGE AND SHOCK HAZARDS.

- [illegible]

IF IT HAS A PLACE FOR A GROUND - GROUND IT.

MAST PIPES

ALL MAST PIPES SHOULD BE GROUND WITH BEAR METAL ON THE PLACE THE GROUND IS ATTACHED AND THEN COIL THE PIPE AROUND THE GROUND FOR AT LEAST TWO FULL CIRCLES. THE GROUND CAN BE ATTACHED MECHANICALLY OR BY WELDING. THE PIPE SHOULD BE GROUND TO THE TALLEST POINT OF THE MAST. IF THE MAST IS AN EXOTHERMIC WELD (COLD WELD) MAY BE USED. IF THE PIPE IS THE TALLEST POINT ON A BUILDING IT SHOULD ALSO HAVE A LIGHTNING ROD ATTACHED TO IT AS WELL.

PIPE EXTERNS/JOINT EXTERNS/ASPHALTTERS/PASSIVE COMPONENTS

- IF IT HAS A PLACE FOR A GROUND TO BE INSTALLED -
INSTALL IT.

DPS BATCH STAMP

[illegible]

1. CHECK TO MAKE SURE ALL CONNECTORS ARE TIGHTENED TO PROPER SPECIFICATIONS BEFORE YOU BEGIN.
2. NOTE: THIS STEP DOES NOT NEED A CURTIS WRAP TIE. IF THE CONNECTOR IS NOT TIGHTENED TO THE PROPER CONNECTION IT WILL BECOME A WEAK LINK, ALSO KNOWN AS SELF-AMMUNATING TAPE.
3. WRAP CONNECTIONS FOR JON TYPE SEALANT WITH TWO LAYERS OF CURTIS WRAP TIE. MAKE SURE THE WRAP TIE OVER LAP AT LEAST 50% TO FORM A PROPER SEAL COVER ALL OF THE BASE METAL SHOWING (AT LEAST 1-1/2 INCH PAST END OF CONNECTOR).
4. IF THIS TAP IS NOT PULLED TIGHT WHILE WRAPPING

5. WRAP AT LEAST 2 LAYERS OF TAPE 3/4 INCH WIDE. EACH LAYER SHOULD COVER AT LEAST 50% OF PREVIOUS TAPE.
6. FINISH THE LAST WRAP OF TAPE USING A STRIP OF TAPE THAT CREATES A SHINGLING OF THE TAPE SO THAT THERE IS NOTHING THAT RUNS DOWN THE CABLE WILL NOT LEAK INTO THE SEALANT. CUT THE END OF THE TAPE AND LAY IT ONTO THE FINISH. DO NOT STRETCH THE END OF THE TAPE. THIS WILL CAUSE THE TAPE TO PULL OFF OVER THE CABLE.

1. PRE WRAP ALL CONNECTIONS WITH BLACK ELECTRICAL TAPE TO COVER ALL METAL SHOWING TO PREVENT DAMAGE TO CONNECTOR WHEN WEATHER SEAL IS TO BE REMOVED. 3/4 INCH OR 2 INCH TAPE CAN BE USED

- USE ONLY OUTDOOR RATED HEAT SHRINK TUBING THAT HAS THE SELF-ADHESIVE WHEN HEATED PROPERTY. THIS IS WHAT WILL CREATE THE SEAL TO THE CONNECTOR.
- MAKE SURE HEAT SHRINK COVERS ALL OF THE COMPLEES AND CONNECTIONS. THE HEAT SHRINK TUBING TIGHTLY TO THE CONNECTIONS AND CABLE TO THE TUBING. THE TUBING SHOULD BE TOP AND BOTTOM OF THE CONNECTIONS. ALSO CHECK TO MAKE SURE HEAT SHRINK WAS NOT OVER HEATED AND THERE ARE NO BREAKS IN SEAL THROUGH-OUT THE SHRINK TUBING.

1. PROPERLY TORQUE CONNECTOR TO SPECIFICATION.
2. APPLY ONE LAYER OF 3/4 INCH BLACK TAPE AROUND ENTIRE CONNECTOR ENDING AT LEAST 1-1/2 INCHES FAST TOP AND BOTTOM OF CONNECTOR TO PREVENT ANY MOISTURE FROM STICKING TO THE CONNECTOR.
3. INSPECT THE DEVICE TO MAKE SURE IT IS NOT CHIPPED, CRACKED OR ANY SIGNS OF NEGLIGENCE THAT WILL TAKE AWAY FROM MAKING A FULL SEAL AROUND THE CONNECTOR.

4. USE ONLY CORRECT SIZE PER CABLE AND CONNECTOR TYPE - I.E: 1/2 INCH FOR 1/2 INCH NOT 7/8TH FOR 1/2 INCH.
5. FOLLOW DIRECTIONS THAT COME WITH PRODUCT - MOST CLAM SHELL TYPE SEALANT DEVICES WRAP AROUND OR CLAMP AROUND A CONNECTION POINT.

CROWN CASTLE FIBER LLC
GENERAL NOTES

MNG-386 (474995)

ENGINEER

NB+C

TOTALLY COMMITTED

NB+C ENGINEERING SERVICES, LLC.
10000 WILSON ROAD, SUITE 100
CLARKSBURG, MD 21714
(301) 746-7400

**CROWN
CASTLE**
CROWN CASTLE FIBER LLC
10960 GRANTCHESTER WAY, 4TH FLOOR
COLUMBIA, MD 21044

TITLE: MNG-386
9609 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903
JURISDICTION: MONTGOMERY CO
LATITUDE: 39.013263
LONGITUDE: -76.978298



PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A QUALIFIED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND.

ENGINEER OF RECORD

TRENT TRAVIS SNARR, P.E.
MARYLAND PROFESSIONAL ENGINEER
LICENSE #55491

REVISIONS				
REV	DATE	DESCRIPTION	BY	
1	06-16-23	IME UPDATE REVISION	JED	
0	06-25-22	FINAL CD#	SUR	
0	06-25-22	PRELIMINARY CD#	SUR	
A	07-25-22		PEM	

DRIVEN BY:	CHECKED BY:	APPROVED BY:
PEM	SDR	TJA

FILE NAME:	STRAND MOUNT DWG
DATE DRAWN:	07-29-22
SCALE:	AS SHOWN

GN-2

GROUNDING AND BONDING NOTE:
GENERAL CONTRACTOR SHALL FOLLOW ALL
CONSTRUCTION GUIDELINES PER CROWN
CASTLE'S GROUNDING AND BONDING
REQUIREMENTS FOR STRAND MOUNT
NODES (gDAS) - DOCUMENT 337910.

DPS BATCH STAMP

[illegible]

PEPCO GUIDELINES:

[illegible]

- b. THE LOWEST GRADED POINT OF A DRAINER'S SHALL MAINTAIN THE FOLLOWING MINIMUM SLOPES:
 - 1. AT LEAST 4:1 FOR OVERHEAD SECONDARY FACILITIES.
 - 2. AT LEAST 6:1 FOR ALL OTHER SECONDARY FACILITIES.
 - 3. AT LEAST 8:1 FOR ALL OTHER FACILITIES.
- c. CLEARANCE SHALL BE INDICATED AS REQUIRED, FOR BUCKET ACCESS.
- d. POLE ANALYSES SHALL BE BASED ON FIELD MEASUREMENTS.
- e. LONG-TOOTH FLEXIBLE CABLE SHALL BE

[illegible]

NODE:

MNG-386 (474995)

ENGINEER



OWNER/DEVELOPER



CROWN CASTLE FIBER LLC
10950 GRANTCHESTER WAY, 4TH FLOOR
COLUMBIA, MD 21044

TITLE:

MING-386

9509 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903
JURISDICTION: MONTGOMERY COUNTY

LATITUDE: 39.013263
LONGITUDE: -76.978298



PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A duly licensed PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND.

ENGINEER OF RECORD

TRENT TRAVIS SNARR, P.E.
MARYLAND PROFESSIONAL ENGINEER
LICENSE #555491

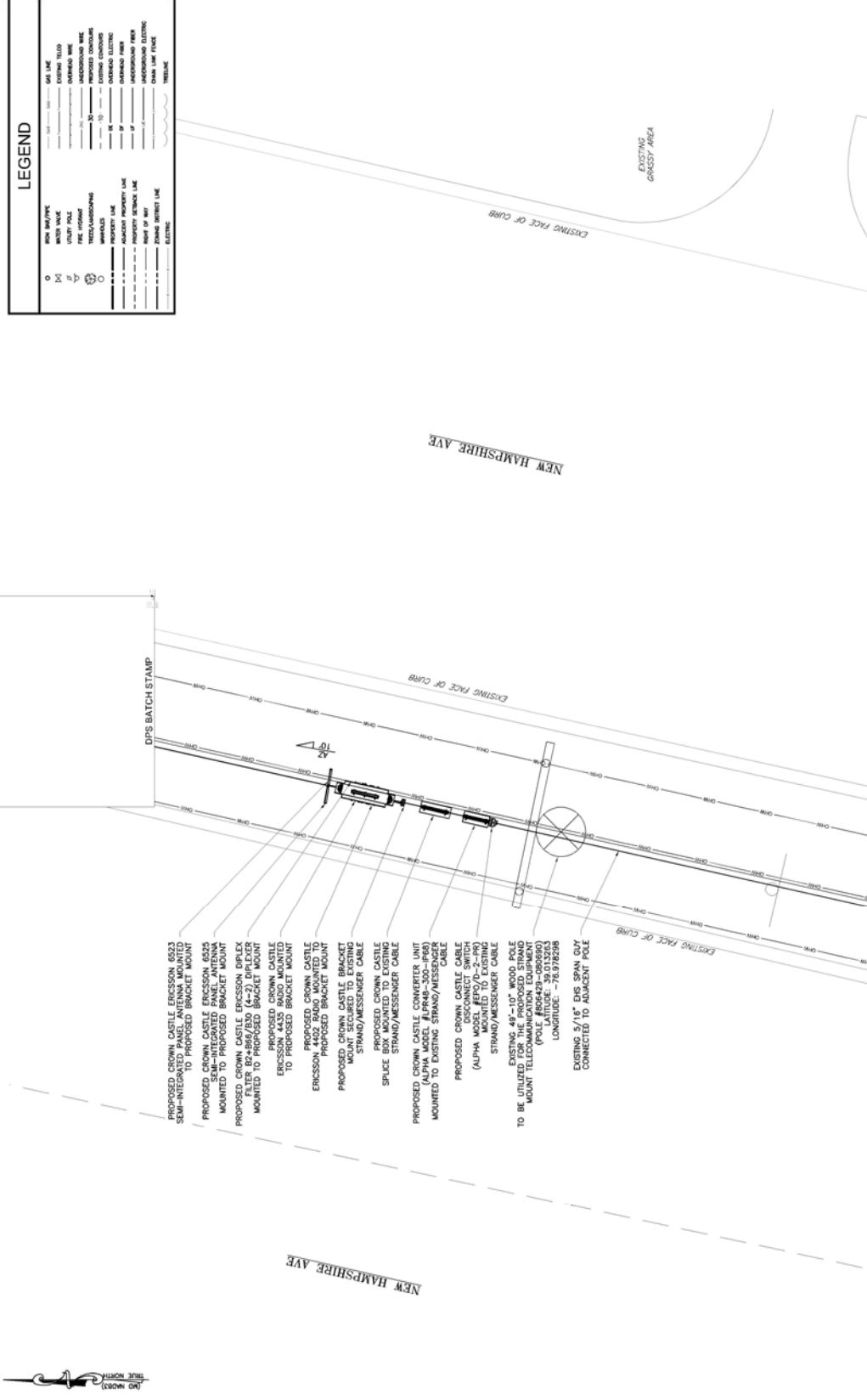
REVISIONS		
REV.	DATE	DESCRIPTION BY

		DATE	REVISION	JED
1	08-16-23		FINAL CDs	SOR
0	08-25-22		PRELIMINARY CDs	PSM
A	07-29-22			

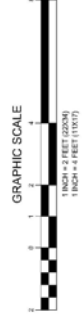
DRAWN BY:	CHECKED BY:	APPROVED BY:
PEM	SDR	TJA

PROJECT NUMBER	100505
FILE NAME	STRAND MOUNT DWG
DATE DRAWN	07-29-22
SCALE	AS SHOWN

C-2



1 EQUIPMENT SITE PLAN
SCALE: 1" = 2' (22X34)
SCALE: 1" = 4' (11X17)
C-2



THE CONSTRUCTION MANAGER SHALL COORDINATE POWER AND TELCO UTILITY ROUTING TO THE PROPOSED EQUIPMENT ROOMS TO CONSTRUCTION

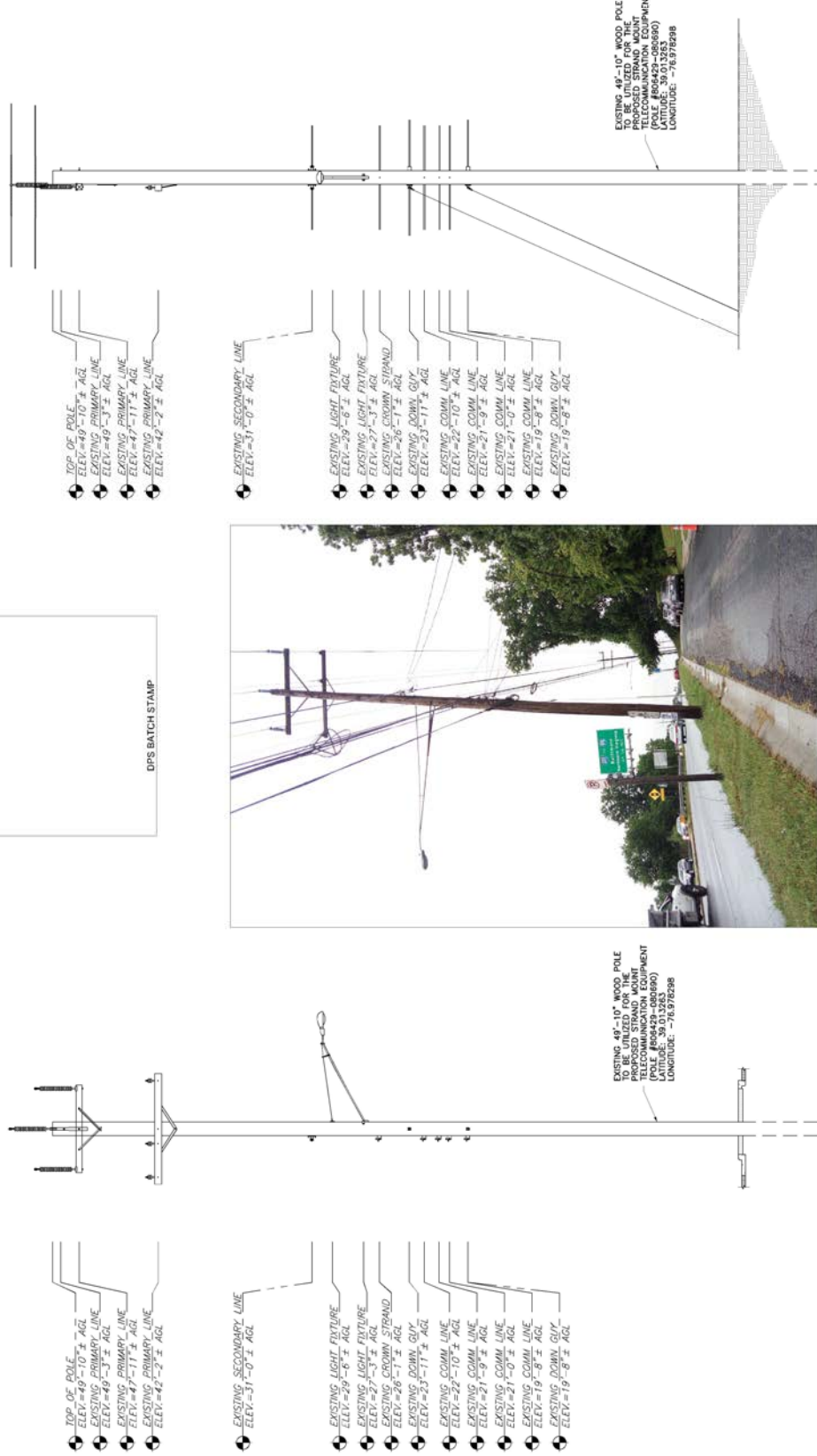
NOTE: EXISTING UTILITY INFORMATION SHOWN REPRESENTS THE BEST DATA AVAILABLE FROM EXISTING DOCUMENTATION AND FIELD EVIDENCE. ALL LOCATIONS SHOULD BE CONSIDERED APPROXIMATE, AND A FIELD INVESTIGATION MUST BE PERFORMED IN THE VICINITY OF ANY CONSTRUCTION ACTIVITIES. NOTE THAT THESE PLANS MAY NOT SHOW ALL UTILITIES THAT ARE PRESENT AT THE SITE.

**CROWN CASTLE FIBER LLC
EXISTING ELEVATIONS**

NODE:

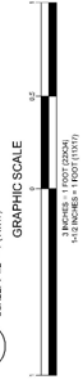
MNG-386 (474995)

DPS BATCH STAMP



1 EXISTING CONDITIONS
C-3 NOT TO SCALE

2 POLE ELEVATION (LOOKING SOUTHEAST)
SCALE: 3" = 1' (22X34)
C-3 SCALE: 1/4" = 1' (11X17)



MOUNTING NOTE:
IF FIELD CONDITIONS DO NOT ALLOW FOR
INSTALLATION AS DIRECTED, CONTRACTOR IS TO
CONTACT ENGINEER FOR FURTHER INSTRUCTION.

3 POLE ELEVATION (LOOKING EAST)
SCALE: 3" = 1' (22X34)
SCALE: 1-1/2" = 1' (11X17)
C-3



REVISIONS				BY
REV/	DATE	DESCRIPTION		
1	09-16-23	IME UPDATE NERSON		JED
0	06-25-22	FINAL CDN		SDR
0	07-28-22	PRELIMINARY CDN		PDM

DRAPIN BYC	CHECKED BYC	APPROVED BYC
PEM	SDR	TJA

PROJECT NUMBER	100505
FILE NAME	STRAND MOUNT DWG
DATE DRAWN	07-29-22
SCALE	AS SHOWN

C-3

CROWN CASTLE FIBER LLC
PROPOSED ELEVATIONS

NODE:

MNG-386 (474995)

ENGINEER

NE+C
TOTALLY COMMITTED
NE+C ENGINEERING SERVICES, LLC.
8000 WASHINGTONS CORSE, SUITE 300
FARMINGTON, CT 06030
(860) 671-2500

QUARTER INVEILED OPER

**CROWN
CASTLE**

CROWN CASTLE FIBER LLC
10950 GRANTCHESTER WAY, 4TH FLOOR
COLUMBIA, MD 21044

TITLE

MING-386
 9609 NEW HAMPSHIRE AVE
 SILVER SPRING, MD 20903
 JURISDICTION: MONTGOMERY COUNTY
 LATITUDE: 39.013263
 LONGITUDE: -76.978298



PROFESSIONAL CERTIFICATION, WHETHER CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND.

ENGINEER OF RECORD

TRENT TRAVIS SNARR, P.E.
MARYLAND PROFESSIONAL ENGINEER
LICENSE #55491

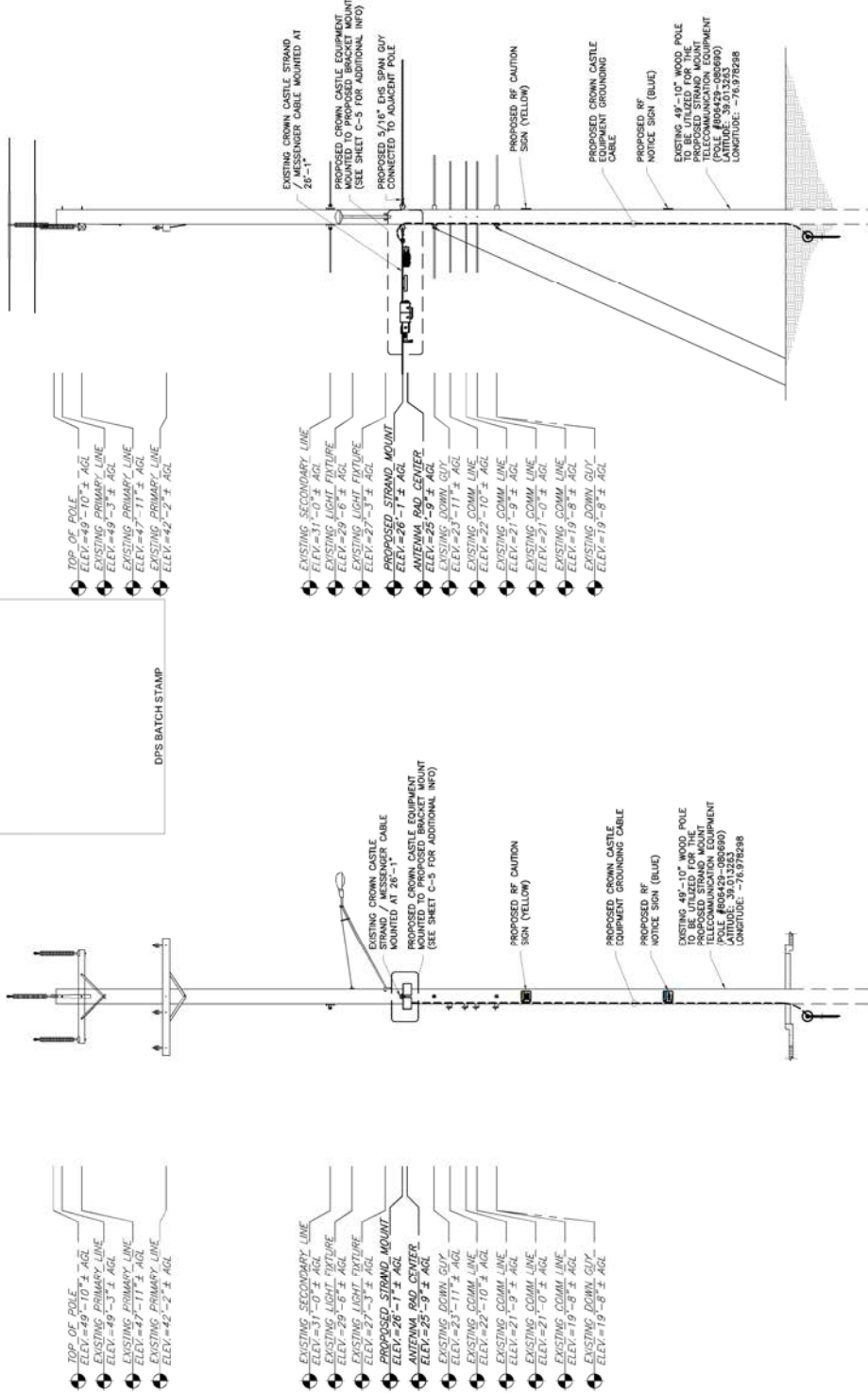
REVISIONS		
REV	DATE	DESCRIPTION
BY		

		KE UPDATE REVISION	JED
1	06-18-23		SOR
0	08-25-22	FINAL CDs	PEM
A	07-29-22	PRELIMINARY CDs	

DRAWN BY:	CHECKED BY:	APPROVED BY:
PEM	SDR	TJA

PROJECT NUMBER:	100505
FILE NAME	STRAND MOUNT DWG
DATE DRAWING	07-29-22
SCALE	AS SHOWN

C-4



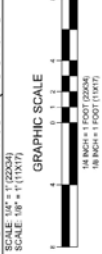
1. **CAUTION**

2. **POLE WORKING**

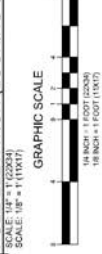
3. **POLE WORKING**

4. **POLE WORKING**

2 POLE ELEVATION (LOOKING EAST)



1 POLE ELEVATION (LOOKING SOUTHEAST)



MOUNTING NOTE:

NODE:

ENGINEER

CROWN
CASTLE

CROWN CASTLE FIBER LLC
10950 GRANTCHESTER WAY, 4TH FLOOR
COLUMBIA, MD 21044

MNG-386

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ENGINEER OF RECORD

TRENT TRAVIS SNARR, P.E.
MARYLAND PROFESSIONAL ENGINEER
LICENSE #552491

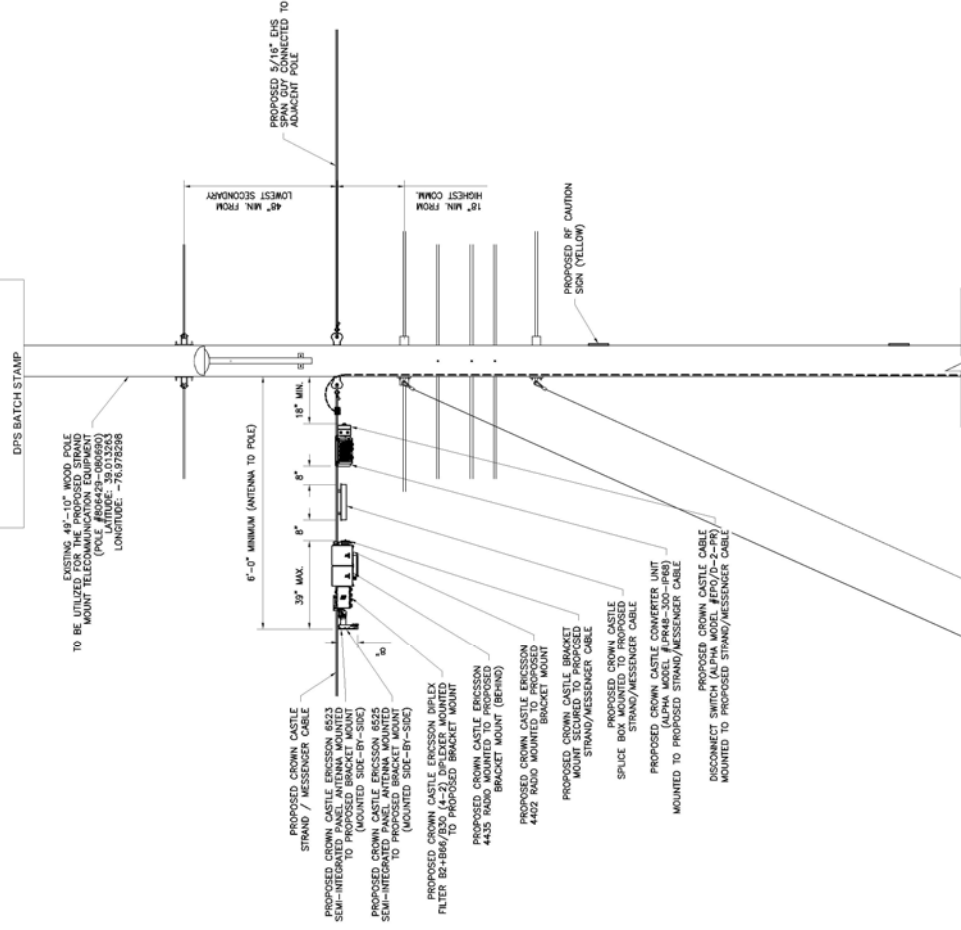
REVISIONS		
REV	DATE	DESCRIPTION
BY		

[illegible]

APPROVED BY:	CHECKED BY:	DRAWN BY:
TJA	SDR	PEM

PROJECT NUMBER	100505
FILE NAME	STRAND MOUNT DWG
DATE DRAWN	07-29-22
SCALE	AS SHOWN

C-5



MOUNTING NOTE:

IF FIELD CONDITIONS DO NOT ALLOW FOR INSTALLATION AS DIRECTED, CONTRACTOR IS TO CONTACT ENGINEER FOR FURTHER INSTRUCTION

CROWN CASTLE FIBER LLC
POWER CONVERTER & DISCONNECT ASSEMBLY DETAILS

NOTE: MNG-386 (474995)

ENGINEER



OWNER/DEVELOPER



TITLE

MNG-386
9509 NEW HAMPSHIRE AVE
SILVER SPRING, MD 20903
JURISDICTION: MONTGOMERY COUNTY
LATITUDE: 39.013263
LONGITUDE: -76.976298



ENGINEER OF RECORD

TRENT TRAVIS SMARR, P.E.
MARYLAND PROFESSIONAL ENGINEER
LICENSE #55491

REVISIONS

REV	DATE	DESCRIPTION	BY
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1	08-16-23	REVISE PER DESIGN	JED
2	08-16-23	REVISE PER DESIGN	JED
3	08-16-23	REVISE PER DESIGN	JED
4	08-16-23	REVISE PER DESIGN	JED
5	08-16-23	REVISE PER DESIGN	JED
6	08-16-23	REVISE PER DESIGN	JED
7	08-16-23	REVISE PER DESIGN	JED
8	08-16-23	REVISE PER DESIGN	JED
9	08-16-23	REVISE PER DESIGN	JED
10	08-16-23	REVISE PER DESIGN	JED
11	08-16-23	REVISE PER DESIGN	JED
12	08-16-23	REVISE PER DESIGN	JED
13	08-16-23	REVISE PER DESIGN	JED

DESIGNED BY: TJS
CHECKED BY: TJS
APPROVED BY: TJS

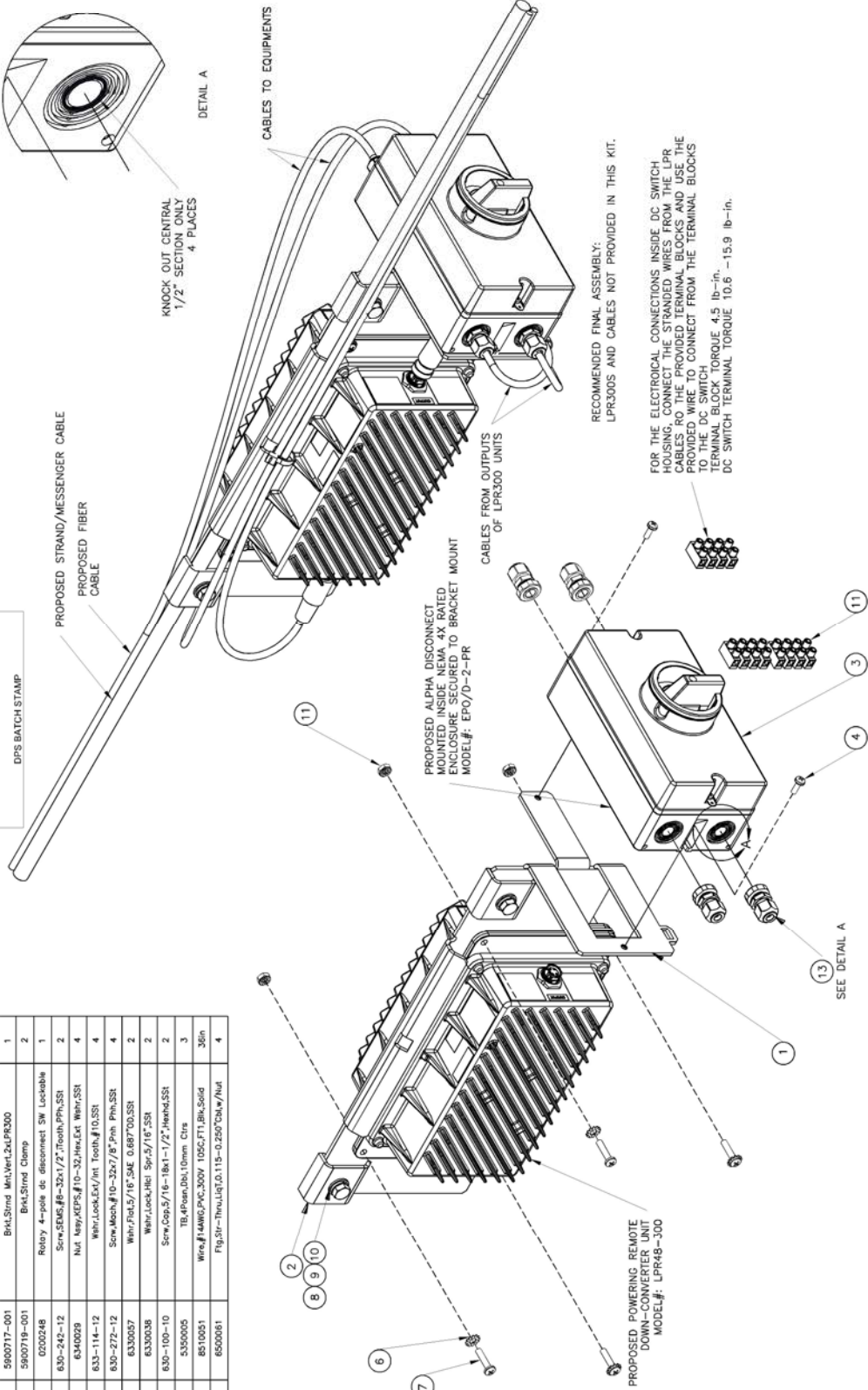
DATE: 08-16-23
SCALE: AS SHOWN

PROJECT NUMBER: 1005005
FILE NAME: STRAND MOUNT DWG
DATE DRAWN: 07-29-22
SCALE: AS SHOWN

D-3

KIT CONTENTS

ITEM	PART NUMBER	Description	QTY.
1	5900717-001	Bk4Strnd MtVrtZxLP3000	1
2	5900719-001	Bk4Strnd Clamp	2
3	0200248	Relay 4-pole dc disconnect SW Lockable	1
4	630-242-12	ScrewS65-#8-32x1/2" Tooth PPH, SS1	2
5	6340029	Nut NnyxXEPS-#10-32/HexExt Wthr/SS1	4
6	633-114-12	Wthr/Lock,Ex/Int Tooth#10,SS1	4
7	630-272-12	ScrewMach-#10-32x2/8" Pph Pph,SS1	4
8	6330057	Wthr/Prot,5/16" SAE 0.687"OD,SS1	2
9	6330038	Wthr/Lock-Hel Spr,5/16" S50	2
10	630-100-10	Screw,Coop,5/16-18x1-1/2" Hexrd,SS1	2
11	5350005	TB,4Pam,Dbl,10mm Cts	3
12	6510051	Wire, #14AWG,PVC,300V, 105C,FTL,BK,Solid	36in
13	6500061	Fig,Str-Thru,Liq,T.O.115-0.250"Cda w/Nut	4



RECOMMENDED FINAL ASSEMBLY:
LPR3000S AND CABLES NOT PROVIDED IN THIS KIT.

FOR THE ELECTRICAL CONNECTIONS INSIDE DC SWITCH HOUSING, CONNECT THE STRANDED WIRES FROM THE LPR CABLES TO THE PROVIDED TERMINAL BLOCKS AND USE THE PROVIDED WIRE TO CONNECT FROM THE TERMINAL BLOCKS TO THE DC SWITCH. TERMINAL BLOCK TORQUE: 4.5 lb-in. DC SWITCH TERMINAL TORQUE: 10.6 -15.9 lb-in.

1 POWER CONVERTER & DISCONNECT ASSEMBLY DETAILS
D-3

CROWN CASTLE FIBER LLC
GROUNDING DETAILS

NOTE:

MNG-386 (474995)

ENGINEER



OWNER/DEVELOPER



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MARYLAND PROFESSIONAL ENGINEER
LICENSE #55491

REVISIONS

REV	DATE	DESCRIPTION	BY
1	08-16-23	ISSUE FOR PERMIT	JED
2	08-16-23	REVISE PERMIT REQUIREMENTS	JED
3	08-16-23	REVISE PERMIT REQUIREMENTS	JED
4	07-28-22	PRELIMINARY CD	PEM

DESIGNED BY:	PEM	SDR	TJA
CHECKED BY:			

PROJECT NUMBER: 1005005

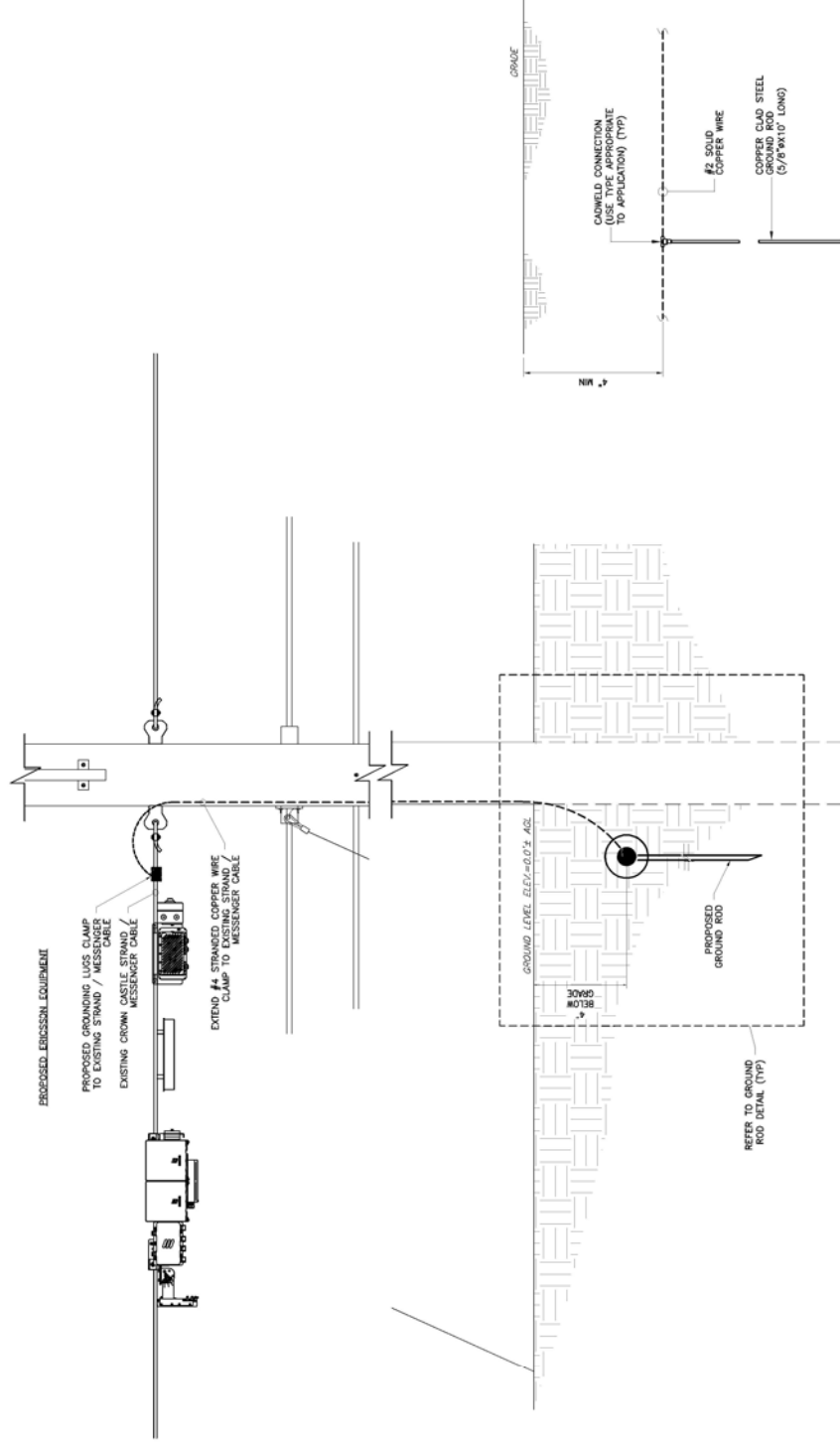
FILE NAME: STRAND MOUNT DWG

DATE DRAWN: 07-29-22

SCALE: AS SHOWN

SHEET:

G-1



1 GROUNDING RISER DIAGRAM
G-1 NOT TO SCALE

2 TYPICAL GROUND ROD DETAIL
G-1 NTS

