

App No:

2018110585

Revised 1.7.18 - JR

Applicant Name	ADVANTAGE ENGINEERS			Antenna Compliance	Yes
Application Type	Minor Modificatio	Updated	11/8/2018	Compliance Desc	
Carrier	T-Mobile	6409?	No	Antenna Location	Yes
Solution Type	Macro	Ann. Plan?	No	Antenna Loc. Desc.	
Existing	Existing	Equipment Gvt Us	No	Env. Assessment	
Application Description		Gvt. Use Desc.		Routine Env. Evaluation	checked
Swap (6)air antennasd for CCI Split beam antennas; Add 5 RRUs/sector and swap existing L700 RRU for new l600/L700 449 RRU for a total of 6 per sector, 18 RRUs total. Remove (3) L700 antennas and replace with (3) new L600 antennas. Swap the 2106 for 6102					

Site Id	42.01	Zoning	R- 10
Structure Type	Building	Latitude	39.0412 90
Address	11235 Oak Leaf Dr, Silver Spring	Longitude	-76.993 299
County Site Name	Berkshire Towers	Ground Elevation	383
Carrier Site Name	7WAN003A	City	Silver Spring
Site Owner	Enclave Holdings LLC - JR	Lease Status	Leased
Structure Owner	Enclave Holdings LLC - JR	PROW	No
Structure Height	161		

Justification

Modification

NearbySites (New Apps Only):

Screeningconsiderations(New Apps Only):

App No:

2018110585

Antenna Model

BSA 33 R-U6A

Frequency

Tx: 1965-1975, 2135-2140 MHz Rx: 1735-1755, 1885-1895 MHz

RAD Center

174

Max ERP

300

Antenna Dimensions

75.9" x 12.9" x 6.2"

Quantity

6

App No: 2018110585

Antenna Model	APXVAAR	R24_43-U-NA20					
Frequency	Tx: 668-683, 728-734, 1965-1975, MHz Rx: 622-637, 698-704, 1885-1895 MHz						
RAD Center	174	Max ERP	36	Antenna Dimensions	95.9" x 24" x 8.7"	Quantity	3

Radio 4449 B71+B12



33.6 kg (= 74 lbs)

380 x 335 x 265 mm
(= 14.9"x13.2"x10.4")

RRUS 32 B2 Data Sheet

For Turf Vendors

2016-05-10 Rev C

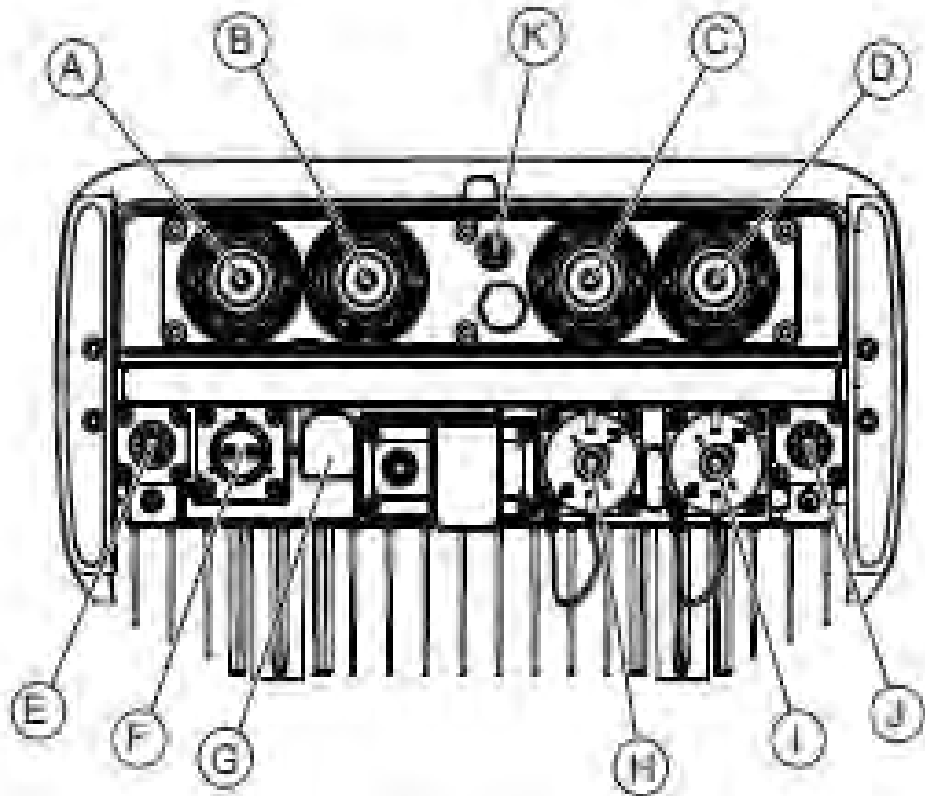
RRUS 32 B2



- › PCS
 - TX = 1930 – 1990 MHz
 - RX = 1850 – 1910 MHz
- › CPRI 2 ports x 10 Gbps. **Install 2 SFPs and connect 2 fiber pairs to the RRUS32 during initial install.**
- › Only use Ericsson supplied and approved SFPs, **RDH10247/3**
- › 6 external alarm inputs
- › Max wind load @ 50m/sec = 350N
- › Breaker size = **30A**, DC Power Consumption = **910W (for dimensioning)**
- › 200mm horizontal separation required for side by side mounting
- › 200mm separation required from antenna backplane to radio
- › 600mm/800mm vertical outdoor/indoor separation required
- › Min, Max DC cable size from squid to radio = **10, 8 AWG**,
- › Adapter is required for 2-wire connection
 - Shielded DC cable is required
- › Ground cable size = **2AWG**
- › Dimensions (incl. handles, feet and sunshield)
 - Height: 27.2" (690 mm)
 - Width: 12.1" (306 mm)
 - Depth: 7.0" (178 mm)
- › Weight, excl. mounting hardware = 53 lbs (24 kg)



RRUS 32 B2 Connection INter FACES



Position	Description	Marking
A	Antenna A	A
B	Antenna B	B
C	Antenna C	C
D	Antenna D	D
E	Antenna Line Device (ALD) ⁽¹⁾	ALD
F	48 V DC power supply	POWER
G	Grounding	
H	Optical cable 1	⊕1
I	Optical cable 2	⊕2
J	External alarm	
K	For future use	-

⁽¹⁾ Used for a Remote Electrical Tilt (RET) unit, for example.

CPRI, RET/AISG port, and ALD port caps have lanyards attached to the radio. DC and RF ports have protective caps to be removed when DC, RF connected to radio.



ERICSSON

RRUS 32 B6 6 Data Sheet

For Turf Vendors

2016-05-10 Rev E

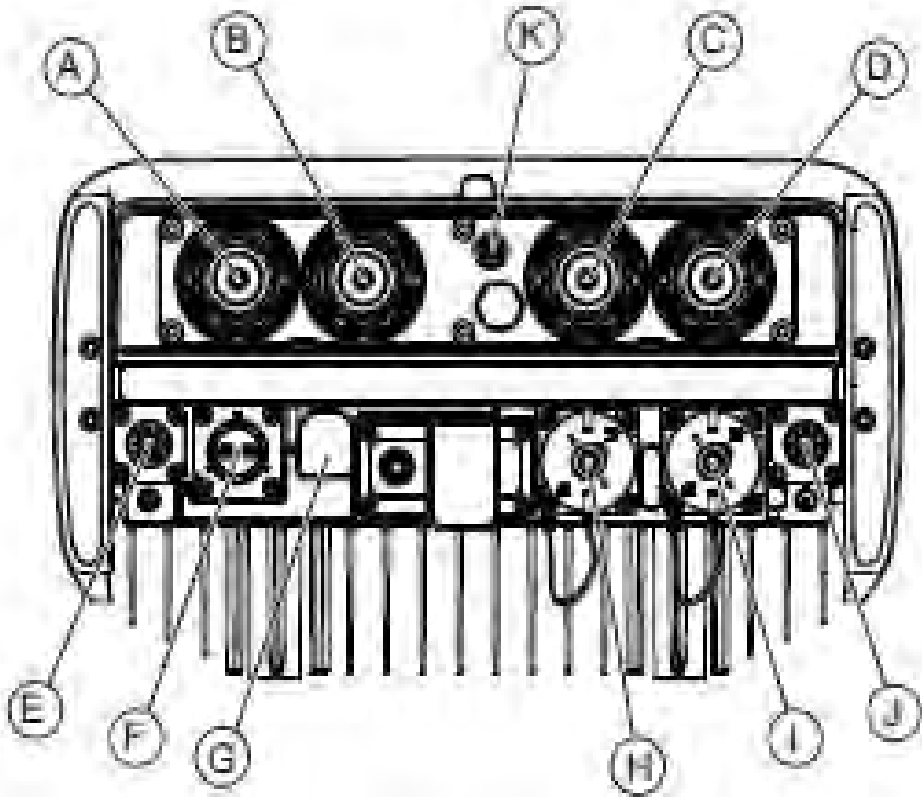
RRUS 32 B6 6



- › AWS
 - TX = 2110 – 2180 MHz
 - RX = 1710 – 1780 MHz
- › CPRI 2 ports x 10 Gbps. **Install 2 SFPs and connect 2 fiber pairs to the RRUS32 during initial install.**
- › Only use Ericsson supplied and approved SFPs **RDH10247/3**
- › 6 external alarm inputs
- › Max wind load @ 50m/sec = 350N
- › Breaker size = **30A**, DC Power Consumption = **880W (for dimensioning)**
- › 200mm horizontal separation required for side by side mounting
- › 200mm separation required from antenna backplane to radio
- › 600mm/800mm vertical outdoor/indoor separation required
- › Min, Max DC cable size from squid to radio = **10,8 AWG**
 - Adapter is required for 2-wire connection
 - Shielded DC cable is required
- › Ground cable size = **2AWG**
- › Dimensions (incl. handles, feet and sunshield)
 - Height: 27.2" (690 mm)
 - Width: 12.1" (306 mm)
 - Depth: 7.0" (178 mm)
- › Weight, excl. mounting hardware = 53 lbs (24 kg)



RRUS 32 B2 Connection INt er FACES



Position	Description	Marking
A	Antenna A	A
B	Antenna B	B
C	Antenna C	C
D	Antenna D	D
E	Antenna Line Device (ALD) ⁽¹⁾	ALD
F	-48 V DC power supply	POWER
G	Grounding	
H	Optical cable 1	⊕+1
I	Optical cable 2	⊕+2
J	External alarm	
K	For future use	-

⁽¹⁾ Used for a Remote Electrical Tilt (RET) unit, for example.

CPRI, RET/AISG port, and ALD port caps have lanyards attached to the radio. DC and RF ports have protective caps to be removed when DC, RF connected to radio.



ERICSSON



Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°/2-12°

FEATURES / BENEFITS

This antenna provides a 8 Port multi-band flexible platform for advanced use for flexible use in deployment scenarios for encompassing 600MHz, 700MHz, AWS & PCS applications.



- ➔ 24 Inch Width For Easier Zoning
- ➔ Field Replaceable (Integrated) AISG RET platform for reduced environmental exposure and long lasting quality
- ➔ Superior elevation pattern performance across the entire electrical down tilt range
- ➔ Includes three AISG RET motors - Includes 0.5m AISG jumper for optional diassy chain of two high band RET motors for one single AISG point of high band tilt control.
- ➔ Low band arrays driven by a single RET motor

Technical Features

LOW BAND LEFT ARRAY (617-746 MHZ) [R1]

Frequency Band	MHz	617-698	698-746
Gain	dBi	15.1	15.5
Horizontal Beamwidth @3dB	Deg	65	62
Vertical Beamwidth @3dB	Deg	11.4	10.4
Electrical Downtilt Range	Deg	0-12	0-12
Upper Side Lobe Suppression 0 to +20	dB	19	20
Front-to-Back, at +/-30°, Copolar	dB	25	24
Cross Polar Discrimination (XPD) @ Boresight	dB	19	19
Cross Polar Discrimination (XPD) @ +/-60	dB	5	3
3rd Order PIM 2 x 43dBm	dBc		-153
VSWR	-	1.5:1	1.5:1
Cross Polar Isolation	dB	25	25
Maximum Effective Power per Port	Watt	250	250

LOW BAND RIGHT ARRAY (617-746 MHZ) [R2]

Frequency Band	MHz	617-698	698-746
Gain	dBi	14.8	15.1
Horizontal Beamwidth @3dB	Deg	65	62
Vertical Beamwidth @3dB	Deg	11.4	10.3
Electrical Downtilt Range	Deg	0-12	0-12
Upper Side Lobe Suppression 0 to +20	dB	19	20
Front-to-Back, at +/-30°, Copolar	dB	25	23
Cross Polar Discrimination (XPD) @ Boresight	dB	19	19
Cross Polar Discrimination (XPD) @ +/-60	dB	5	3
3rd Order PIM 2 x 43dBm	dBc		-153
VSWR	-	1.5:1	1.5:1
Cross Polar Isolation	dB	25	25
Maximum Effective Power per Port	Watt	250	250



Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°/2-12°

HIGH BAND LEFT ARRAY (1695-2200 MHZ) [B1]

Frequency Band	MHz	1695-1880	1850-1990	1920-2200
Gain	dBi	17.3	17.8	18.5
Horizontal Beamwidth @3dB	Deg	66	59	59
Vertical Beamwidth @3dB	Deg	5.3	4.7	4.3
Electrical Downtilt Range	Deg	2-12	2-12	2-12
Upper Side Lobe Suppression 0 to +20	dB	15	15	15
Front-to-Back, at +/-30°, Copolar	dB	25	25	25
Cross Polar Discrimination (XPD) @ Boresight	dB	19	17	16
Cross Polar Discrimination (XPD) @ +/-60	dB	4	6	4
3rd Order PIM 2 x 43dBm	dBc	-153	-153	-153
VSWR	-	1.5:1	1.5:1	1.5:1
Cross Polar Isolation	dB	25	25	25
Maximum Effective Power per Port	Watt	250	250	250

HIGH BAND RIGHT ARRAY (1695-2200 MHZ) [B2]

Frequency Band	MHz	1695-1880	1850-1990	1920-2200
Gain	dBi	17.1	17.8	18.5
Horizontal Beamwidth @3dB	Deg	66	59	59
Vertical Beamwidth @3dB	Deg	5.2	4.7	4.3
Electrical Downtilt Range	Deg	2-12	2-12	2-12
Upper Side Lobe Suppression 0 to +20	dB	15	15	15
Front-to-Back, at +/-30°, Copolar	dB	25	24	25
Cross Polar Discrimination (XPD) @ Boresight	dB	20	17	16
Cross Polar Discrimination (XPD) @ +/-60	dB	4	6	5
3rd Order PIM 2 x 43dBm	dBc	-153	-153	-153
VSWR	-	1.5:1	1.5:1	1.5:1
Cross Polar Isolation	dB	25	25	25
Maximum Effective Power per Port	Watt	250	250	250



Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°/2-12°

ELECTRICAL SPECIFICATIONS

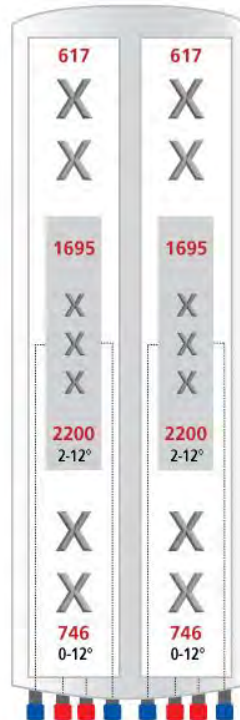
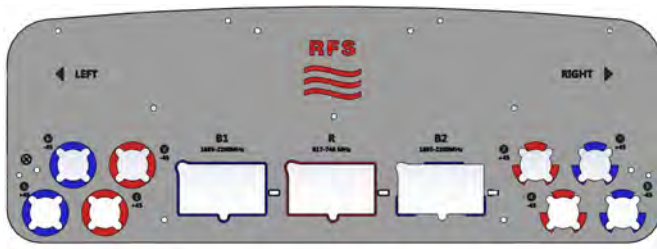
Impedance	Ohm	50.0
Polarization	Deg	±45°

MECHANICAL SPECIFICATIONS

Dimensions - H x W x D	mm (in)	2436 x 609 x 222 (95.9 x 24 x 8.7)
Weight (Antenna Only)	kg (lb)	58 (128)
Weight (Mounting Hardware only)	kg (lb)	11.5 (25.3)
Shipping Weight	kg (lb)	80 (176)
Connector type		8 x 4.3-10 female at bottom + 6 AISG connectors (3 male, 3 female)
Adjustment mechanism		Integrated RET solution AISG compliant (Field Replaceable) + Manual Override + External Tilt Indicator
Mounting Hardware Material		Galvanized steel
Radome Material / Color		Fiber Glass / Light Grey RAL7035

TESTING AND ENVIRONMENTAL

Temperature Range	°C (°F)	-40 to 60 (-40 to 140)
Lightning protection		IEC 61000-4-5
Survival/Rated Wind Velocity	km/h	241 (150)
Environmental		ETSI 300-019-2-4 Class 4.1E



ORDERING INFORMATION

Order No.	Configuration	Mounting Hardware	Mounting pipe Diameter	Shipping Weight
APXVAARR24_43-U-NA20	Field Replace RET included (3)	APM40-5E Beam tilt kit (included)	60-120mm	80 Kg

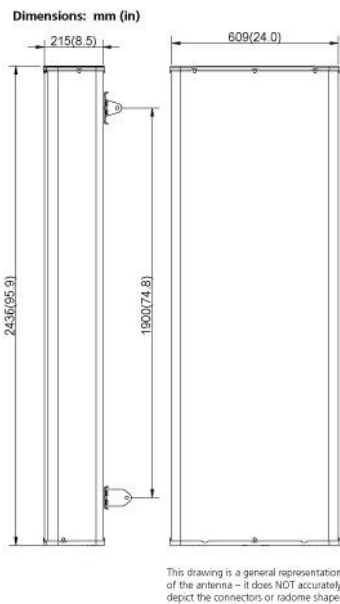


Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°/2-12°

External Document Links APM40_Series_Installation_Instructions Manual_Overdrive_Instructions Global RFS Website	Notes All electrical parameters are compliant with BASTA NGMN 9.6 requirements. Available Configurations APXVAARR24_43-U-NA20 -- External ACU is included -- shipping weight 80kg. For additional mounting information please click "External Document Links". This data is provisional and subject to changes.
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External Link Reference

Global RFS Website	http://www.rfsworld.com
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SPECIFICATIONS

4x4 MIMO Bi-Sector Array Antenna

BSA33R-U6A

Electrical

Ports	8 X High Band Ports for 1695-2400 MHz			
Frequency Range	1695-1880 MHz	1920-2180 MHz	1850-1990 MHz	2300-2400 MHz
Gain (Peak)	17.5 dBi	17.8 dBi	18.3 dBi	18.8 dBi
Gain (Average)*	16.4 dBi	17.2 dBi	17.6 dBi	18.2 dBi
Azimuth Beamwidth (-3dB)	37°	34°	32°	28°
Elevation Beamwidth (-3dB)	9.8°	9.0°	8.6°	7.6°
Electrical Downtilt	0° to 10°	0° to 10°	0° to 10°	0° to 10°
Elevation Sidelobes (1st Upper)	< -17 dB	< -18 dB	< -18 dB	< -18 dB
Front-to-Back Ratio @180°	> 35 dB	> 35 dB	> 35 dB	> 35 dB
Cross-Polar Discrimination (at Peak)	> 24 dB	> 24 dB	> 24 dB	> 24 dB
Cross-Polar Port-to-Port Isolation	> 25 dB	> 25 dB	> 25 dB	> 25 dB
Voltage Standing Wave Ratio (VSWR)	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1
Passive Intermodulation (2x20W)	≤ -150 dBc	≤ -150 dBc	≤ -150 dBc	≤ -150 dBc
Input Power Continuous Wave (CW)	300 watts	300 watts	300 watts	300 watts
Polarization	±45°	±45°	±45°	±45°
Input Impedance	50 Ohms	50 Ohms	50 Ohms	50 Ohms
Lightning Protection	DC Gnd	DC Gnd	DC Gnd	DC Gnd

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

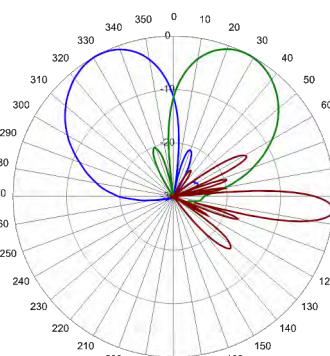
Rear Iso View



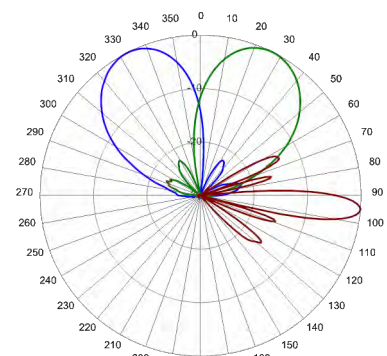
Mechanical

Dimensions (LxWxD)	75.9 x 12.9 x 6.2 inches (1929×327×158 mm)
Survival Wind Speed	> 150 mph (> 241 km/hr)
Front Wind Load	235 lbs (1045 N) @ 100 mph (161 kph)
Side Wind Load	132 lbs (588 N) @ 100 mph (161 kph)
Equivalent Flat Plate Area	9.2 ft² (0.9 m²)
Weight *	50.6 lbs (23 kg)
RET System Weight	3.3 lbs (1.5 kg)
Connector	8 × 7-16 DIN female long neck
Mounting Pole	2-5 in (5-12 cm)

*Weight excludes mounting and RET



1920 MHz



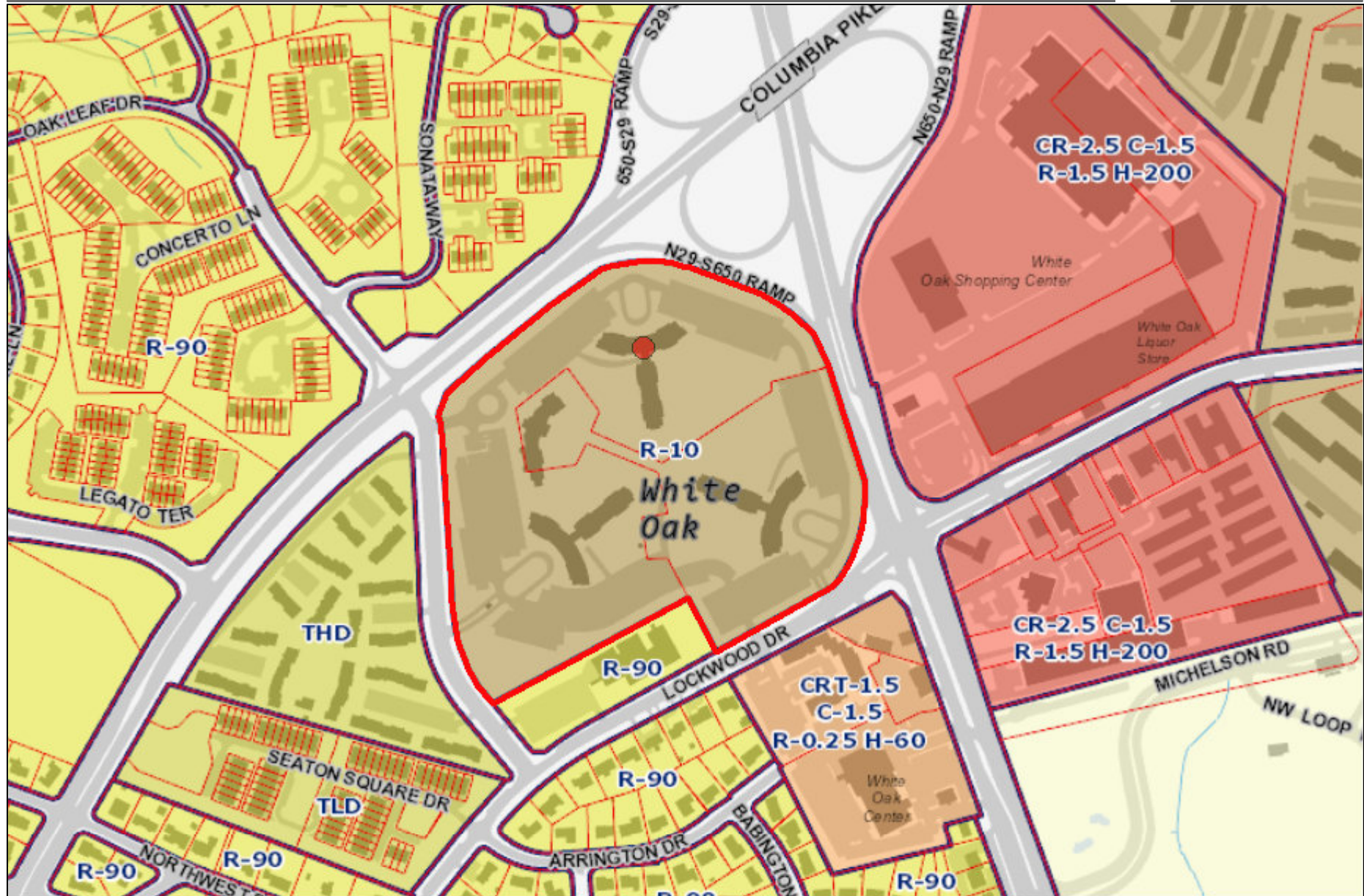
2110 MHz

Montgomery County Zoning

Date: 12/3/2018



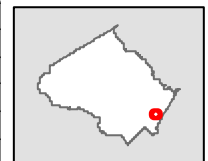
Montgomery County
Planning Department
ITI Division



Account #	00255115
Address	11215 OAK LEAF DR SILVER SPRING, 20901
Zone	R-10
Overlay Zone	N/A
TDR Overlay Zone	N/A
Landuse	Multi-Family
Parcel, Lot, Block	N390, N/A, N/A
WSSC Grid	214NE01
Map Amendments	G-746 G-956 G-966

Parking District	N/A
CBD	N/A
Special Protection Area	N/A
Urban District	N/A
Enterprise Zone	N/A
Arts & Ent. District	N/A
Special Tax District	N/A
Legal Description	WHITE OAK PT PAR B

Bike/Ped Priority Area	White Oak Science Gateway
Urban Renewal Area	N/A
Metro Station Policy Area	N/A
Priority Funding Area	Yes
Septic Tier	Tier 1: Sewer existing
Municipality	N/A
Master Plan	WHITE OAK SCIENCE GATEWAY
Historic Site/District	N/A
Water/Sewer Categories	W-1/ S-1



1 inch = 524 feet

T-Mobile NORTHEAST LLC

**SITE NAME:
THE ENCLAVE**

**SITE NUMBER:
7WAN003A
SITE ADDRESS:
11235 OAK LEAF DRIVE
SILVER SPRING, MARYLAND 20901**

SITE INFORMATION:

SITE NAME:	THE ENCLAVE
SITE NUMBER:	7WAN003A
SITE ADDRESS:	11235 OAK LEAF DRIVE SILVER SPRING, MARYLAND 20901
JURISDICTION:	MONTGOMERY COUNTY, MARYLAND
ZONING:	RH
PARCEL ID:	05-00255115
PARCEL SIZE:	17.19 ACRES
SITE COORDINATES:	N 39°2'27.6282" (39.041290) (NAD83) W 76°59'39.1302" (-76.993299) (NAD83)
GROUND ELEVATION:	393'± (NAVD 88)
STRUCTURE TYPE:	ROOFTOP
STRUCTURE HEIGHT:	161'-0"± AGL (TOP OF BUILDING)
ANTENNA RAD CENTER	174'-0"± AGL
BUILDING OWNER NAME:	ENCLAVE HOLDING LC/NONCONNAH HOLDINGS LLC
BUILDING OWNER ADDRESS:	2329 NOSTRAND AVENUE #500 BROOKLYN, NEW YORK 11210
GROUND OWNER NAME:	ENCLAVE HOLDING LC/NONCONNAH HOLDINGS LLC
GROUND OWNER ADDRESS:	2329 NOSTRAND AVENUE #500 BROOKLYN, NEW YORK 11210
APPLICANT:	T-MOBILE, NORTHEAST LLC 12050 BALTIMORE AVENUE BELTSVILLE, MARYLAND 20705
APPLICANT PHONE:	(240) 264-8600
APPLICANT FAX:	(240) 264-8610

ABBREVIATIONS:

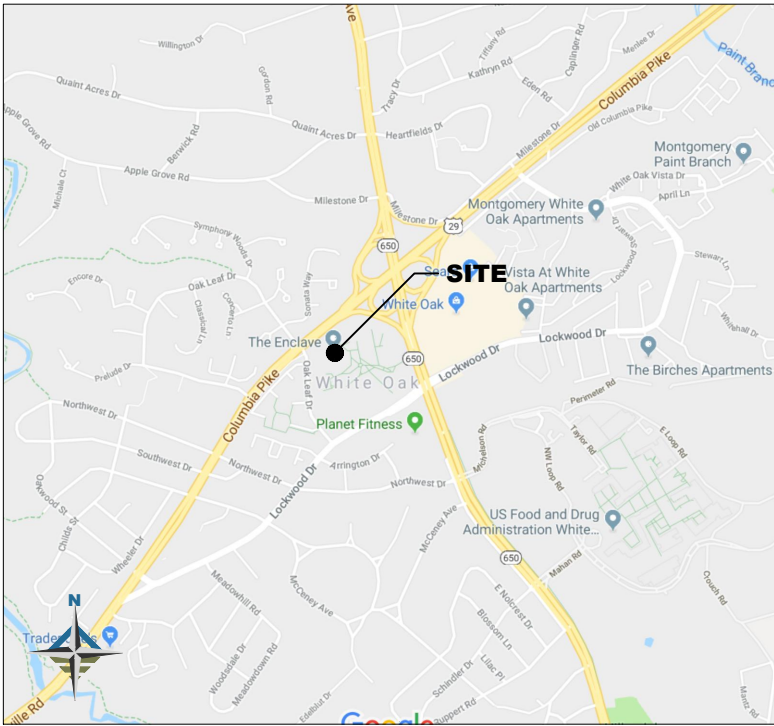
ATS	AUTOMATIC TRANSFER SWITCH	MAX	MAXIMUM
AWG	AMERICAN WIRE GAUGE	MGB	MASTER GROUND BAR
ATTN	ATTENTION	MIN	MINIMUM
BTS	BASE TRANSMISSION SYSTEM	MTS	MANUAL TRANSFER SWITCH
CONT	CONTINUED	NEC	NATIONAL ELECTRICAL CODE
CU	COPPER	POB	POINT OF BEGINNING
DWG	DRAWING	POC	POINT OF CONNECTION
EMT	ELECTRICAL METALLIC TUBING	POT	POINT OF TERMINATION
GEN	GENERATOR	PPC	POWER PROTECTION CABINET
GRD	GROUND	PVC	POLYMERIZING VINYL CHLORIDE
IBC	INTERNATIONAL BUILDING CODE	RGS	RIGID GALVANIZED STEEL
IFC	INTERNATIONAL FIRE CODE	RF	RADIO FREQUENCY
LOD	LIMIT OF DISTURBANCE	TYP	TYPICAL

MARYLAND 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:

BUILDING CODE:	INTERNATIONAL BUILDING CODE 2015
ELECTRICAL CODE:	NATIONAL ELECTRICAL CODE 2014
FIRE SAFETY CODE:	2012 NATIONAL FIRE PREVENTION ASSOCIATION 101
USE GROUP:	U (UTILITY)
CONSTRUCTION TYPE:	IIB

VICINITY MAP:



LOCATION MAP:



PROJECT DESCRIPTION:

- (6) SIX EXISTING T-MOBILE AIR ANTENNAS TO BE REMOVED AND REPLACED WITH (6) SIX NEW SPLIT BEAM ANTENNAS, (2) TWO PER SECTOR.
- (3) THREE EXISTING L700 ANTENNAS TO BE REMOVED AND REPLACE WITH (3) THREE NEW LTE 600/LTE 700 ANTENNAS.
- (3) THREE EXISTING L700 RRU'S TO BE REMOVED AND REPLACED WITH (3) THREE NEW LTE 600/LTE 700 RRU'S.
- (15) RRU'S TO BE INSTALLED, (5) FIVE PER SECTOR.
- (3) THREE NEW 6X12 HYBRIDS TO BE INSTALLED, 30M.

NOTE TO GENERAL CONTRACTOR:

NO WORK IS TO BE PERFORMED ON THIS SITE WITHOUT REVIEW OF THE APPROVED STRUCTURAL ANALYSIS. IF ANY DISCREPANCIES ARE FOUND THE GENERAL CONTRACTOR SHALL NOTIFY THE ENGINEER IN WRITING. AT NO TIME WILL ANY ADDITIONAL ANTENNAS BE INSTALLED WITHOUT WRITTEN CONSENT FROM A STRUCTURAL ENGINEER.

SHEET INDEX:

DRAWING SHEET:	DRAWING TITLE:
T-1	TITLE SHEET & PROJECT DATA
Z-1	SITE PLAN
C-1	ROOFTOP PLAN
C-2	ELEVATION
A-1	EXISTING & PROPOSED ANTENNA PLANS & SCHEDULE
A-2	ANTENNA & RRU DETAILS & PLUMBING DIAGRAMS
E-1	EXISTING ELECTRICAL DETAILS & NOTES
E-2	PROPOSED ELECTRICAL DETAILS & NOTES
G-1	GROUNDING DIAGRAM, DETAILS & NOTES

PLAN APPROVALS:

THE FOLLOWING PARTIES HEREBY APPROVE AND ACCEPT THESE DOCUMENTS AND AUTHORIZE THE CONTRACTOR TO PROCEED WITH THE CONSTRUCTION DESCRIBED HEREIN. ALL DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL BUILDING DEPARTMENT AND MAY IMPOSE CHANGES OR MODIFICATIONS.

R.F. ENGINEER: _____ DATE: _____

ZONING MGR: _____ DATE: _____

S.A. MGR: _____ DATE: _____

CONSTRUCTION MGR: _____ DATE: _____

A&E MGR: _____ DATE: _____

PROPERTY OWNER: _____ DATE: _____

DRAWING SCALE NOTES:

THESE DRAWINGS ARE FORMATTED TO BE FULL SIZE AT 22"x34". CONTRACTOR SHALL VERIFY ALL PLANS & EXISTING DIMENSIONS & CONDITIONS ON THE JOB SITE & SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

**T-Mobile
NORTHEAST LLC**

**T-MOBILE NORTHEAST LLC
12050 BALTIMORE AVENUE
BELTSVILLE, MARYLAND 20705
PHONE: (240) 264-8600
FAX: (240) 264-8610**



advantage engineers

7070 SAMUEL MORSE DRIVE, SUITE 150
COLUMBIA, MARYLAND 21046
PHONE: (443) 387-0003
www.advantageengineers.com

PLAN REVISIONS:

5			
4			
3			
2			
1	12-03-18	ERR	ISSUED FOR CONSTRUCTION
0	11-07-18	DF	ISSUED FOR CONSTRUCTION
A	03-01-18	ALM	ISSUED FOR 90% REVIEW (CDs)
REV No	DATE	DESIGNER	DESCRIPTION

AE DESIGN INFO:

DESIGNER: ALM
AE JOB No: 18E019A.001

DRAWING TITLE:

**TITLE SHEET &
PROJECT DATA**

DRAWING SHEET:

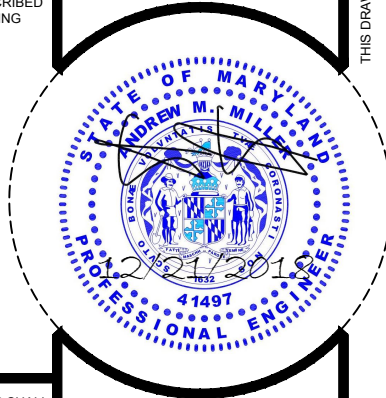
T-1

SITE INFORMATION:

**SITE NAME:
THE ENCLAVE
SITE NUMBER:
7WAN003A
SITE ADDRESS:
11235 OAK LEAF DRIVE
SILVER SPRING,
MARYLAND 20901
JURISDICTION:
MONTGOMERY COUNTY, MARYLAND**

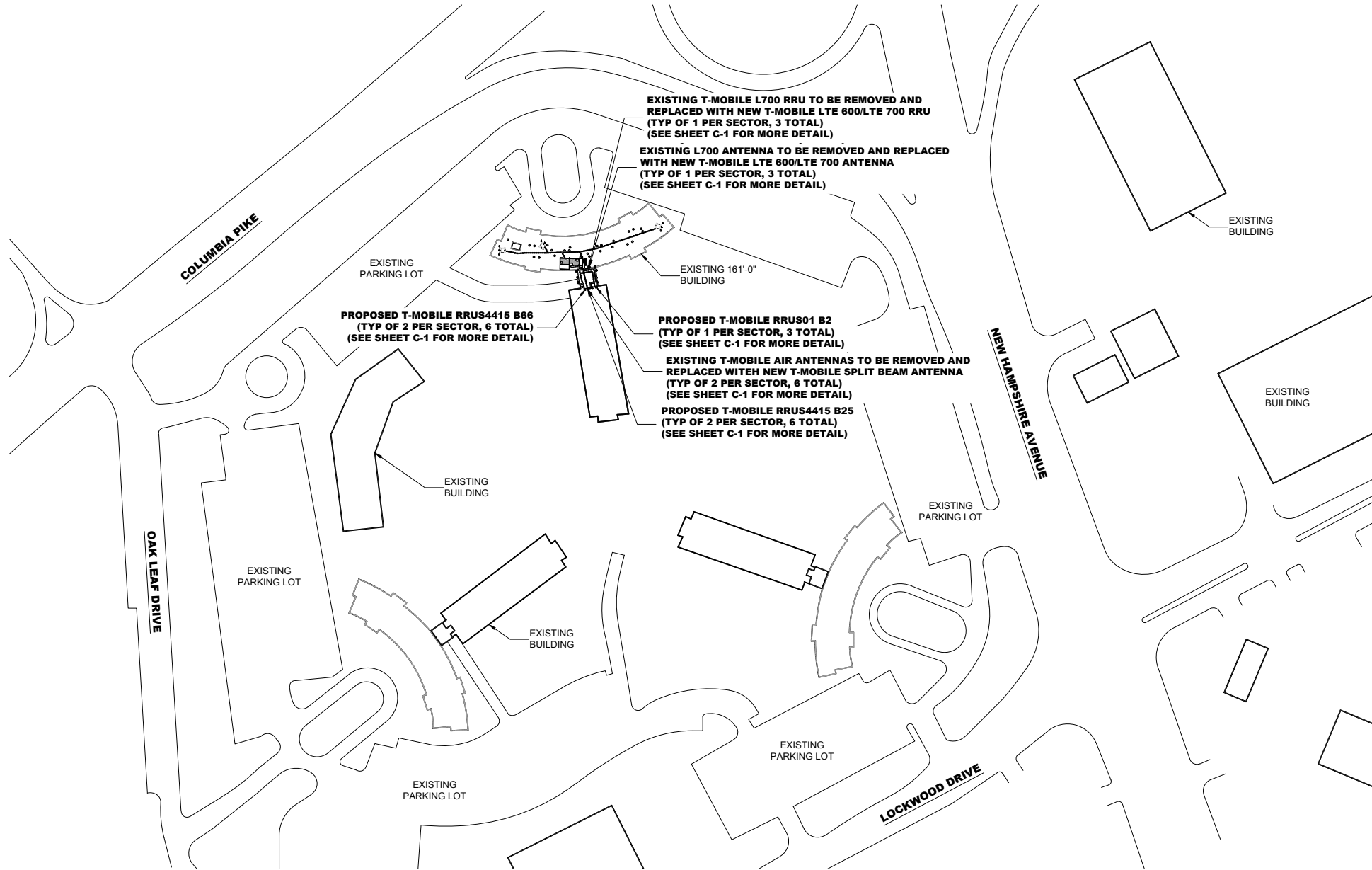
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1 OF 9

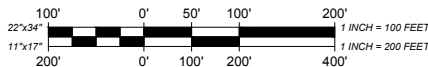


ANDREW M. MILLER, PE
"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND. LICENSE NO. 41497, EXPIRATION DATE: 01-06-2021"

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1 SITE PLAN
Z-1
SCALE = 1" = 100'-0"



GENERAL NOTES:

1. THIS PLAN WAS PREPARED USING AN APPROVED PLAN ENTITLED SITE PLAN BY ADVANTAGE ENGINEERS, DATED 03-02-17.
2. THE PROPOSED FACILITY WILL CAUSE "DE MINIMIS" INCREASE IN STORMWATER RUNOFF. THEREFORE, NO DRAINAGE STRUCTURES ARE PROPOSED.
3. NO NOISE, SMOKE, DUST, OR ODOR WILL RESULT FROM THIS FACILITY.
4. THE FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION. (THERE IS NO HANDICAP ACCESS REQUIRED.)
5. THE FACILITY IS UNMANNED AND DOES NOT REQUIRE POTABLE WATER OR SANITARY SERVICE.
6. ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 1988).
7. THE PROPOSED DEVELOPMENT DOES NOT INCLUDE STREET SIGNS OF ANY TYPE.
8. THE PROPOSED DEVELOPMENT DOES NOT INCLUDE OUTDOOR STORAGE OR ANY SOLID WASTE RECEPTACLES.
9. ACCORDING TO THE F.I.R.M. COMMUNITY PANEL # 24031C0390D, DATED 09/29/2006, THE PROPOSED SITE IS NOT IN A FLOODPLAIN.

T-Mobile
NORTHEAST LLC
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advantage engineers
7070 SAMUEL MORSE DRIVE, SUITE 150
COLUMBIA, MARYLAND 21046
PHONE: (443) 387-0003
www.advantageengineers.com

PLAN REVISIONS:

REV No	DATE	DESIGNER	DESCRIPTION
5			
4			
3			
2			
1	12-03-18	ERR	ISSUED FOR CONSTRUCTION
0	11-07-18	DF	ISSUED FOR CONSTRUCTION
A	03-01-18	ALM	ISSUED FOR 90% REVIEW (CDs)

AE DESIGN INFO:

DESIGNER: ALM
AE JOB No: 18E019A.001

DRAWING TITLE:

SITE PLAN

DRAWING SHEET:

Z-1

SITE INFORMATION:

SITE NAME:
THE ENCLAVE
SITE NUMBER:
7WAN003A
SITE ADDRESS:
11235 OAK LEAF DRIVE
SILVER SPRING,
MARYLAND 20901
JURISDICTION:
MONTGOMERY COUNTY, MARYLAND

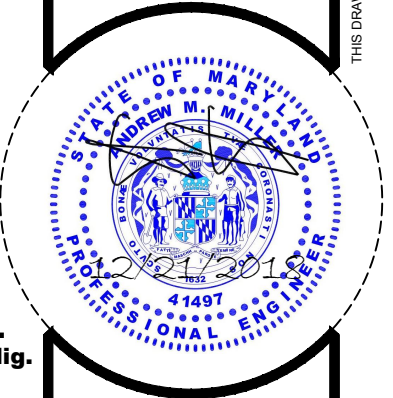
SHEET NUMBER:

2 OF 9



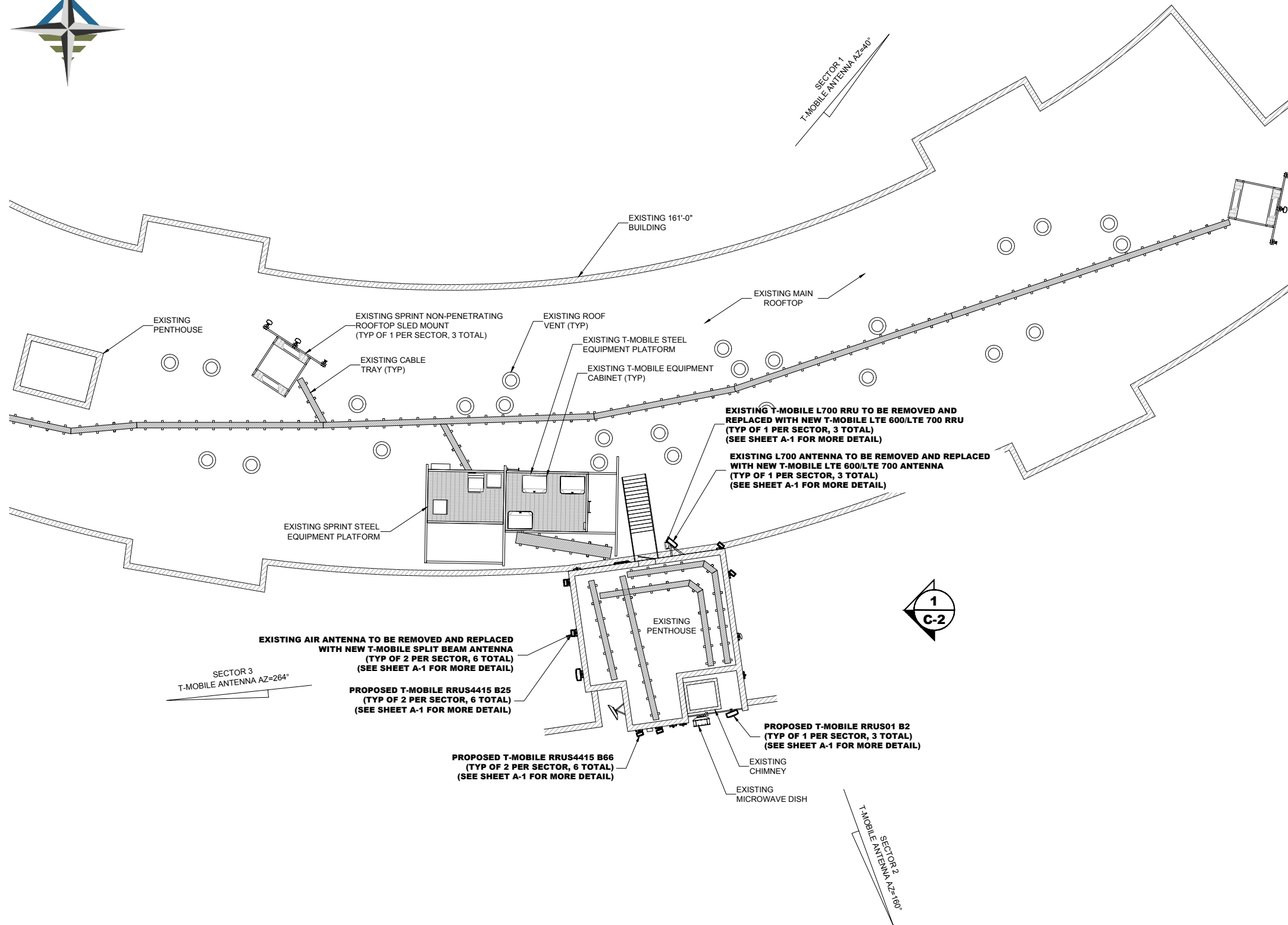
Know what's below.
Call before you dig.

PROTECT YOURSELF. GIVE THREE WORKING DAYS NOTICE.
THIS DRAWING DOES NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY. ALL CONSTRUCTION MUST BE DONE IN COMPLIANCE WITH THE OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970, AND ALL RULES AND REGULATIONS THERE TO APPURTENANT.

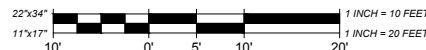


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1
C-1
ROOFTOP PLAN
SCALE = 1" = 10'-0"



GENERAL NOTES:

1. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE CODES, ORDINANCES, LAWS AND REGULATIONS OF ALL MUNICIPALITIES, UTILITY COMPANIES OR OTHER PUBLIC AUTHORITIES.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS THAT MAY BE REQUIRED BY ANY FEDERAL, STATE, COUNTY OR MUNICIPAL AUTHORITIES.
3. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER, IN WRITING, OF ANY CONFLICTS, ERRORS OR OMISSIONS PRIOR TO THE SUBMISSION OF BIDS OR PERFORMANCE OF WORK. MINOR OMISSIONS OR ERRORS IN THE BID DOCUMENTS SHALL NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY FOR THE OVERALL INTENT OF THESE DRAWINGS.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING SITE IMPROVEMENTS PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR SHALL REPAIR ANY DAMAGE CAUSED AS A RESULT OF CONSTRUCTION OF THIS FACILITY.
5. THE SCOPE OF WORK FOR THIS PROJECT SHALL INCLUDE PROVIDING ALL MATERIALS, EQUIPMENT AND LABOR REQUIRED TO COMPLETE THIS PROJECT. ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
6. THE CONTRACTOR SHALL VISIT THE PROJECT SITE PRIOR TO SUBMITTING A BID TO VERIFY THAT THE PROJECT CAN BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
7. THIS PLAN WAS PREPARED USING AN APPROVED PLAN ENTITLED ROOFTOP PLAN BY ADVANTAGE ENGINEERS, DATED 03-02-17.
8. THE PROPOSED FACILITY WILL CAUSE ONLY A "DE MINIMIS" INCREASE IN STORWATER RUNOFF. THEREFORE, NO DRAINAGE STRUCTURES ARE PROPOSED.
9. NO NOISE, SMOKE, DUST OR ODOR WILL RESULT FROM THIS FACILITY.
10. THE FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION (THERE IS NO HANDICAP ACCESS REQUIRED).
11. THE FACILITY IS UNMANNED AND DOES NOT REQUIRE POTABLE WATER OR SANITARY SERVICE.
12. POWER TO THE FACILITY WILL E MONITORED BY A SEPARATE METER.
13. CONTRACTOR SHALL VERIFY ANTENNA ELEVATION AND AZIMUTH WITH RF ENGINEER PRIOR TO INSTALLATION.
14. MOUNTS AND ANTENNAS ARE DESIGNED TO MEET ANSI/TIA-222-G-1 AS PER IBC 2015 REQUIREMENTS.
15. ALL STRUCTURAL ELEMENTS SHALL BE HOT DIPPED GALVANIZED STEEL.
16. CONTRACTOR SHALL MAKE A UTILITY "ONE CALL" TO LOCATE ALL UTILITIES PRIOR TO EXCAVATING.
17. IF ANY PIPING EXISTS BENEATH THE SITE AREA, CONTRACTOR MUST LOCATE IT AND CONTACT OWNERS REPRESENTATIVE.
18. CONSTRUCTION TO COMMENCE UPON COMPLETION OF A PASSING STRUCTURAL ANALYSIS. STRUCTURAL ANALYSIS TO BE PERFORMED BY ADVANTAGE ENGINEERS.

T-Mobile
NORTHEAST LLC

T-MOBILE NORTHEAST LLC
12050 BALTIMORE AVENUE
BELTSVILLE, MARYLAND 20705
PHONE: (240) 264-8600
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advantage engineers

7070 SAMUEL MORSE DRIVE, SUITE 150
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www.advantageengineers.com

PLAN REVISIONS:

REV No	DATE	DESIGNER	DESCRIPTION
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A	03-01-18	ALM	ISSUED FOR 90% REVIEW (CDs)

AE DESIGN INFO:

DESIGNER: ALM
AE JOB No: 18E019A.001

DRAWING TITLE:

ROOFTOP PLAN

DRAWING SHEET:

C-1

SITE INFORMATION:

SITE NAME:
THE ENCLAVE
SITE NUMBER:
7WAN003A
SITE ADDRESS:
11235 OAK LEAF DRIVE
SILVER SPRING,
MARYLAND 20901
JURISDICTION:
MONTGOMERY COUNTY, MARYLAND

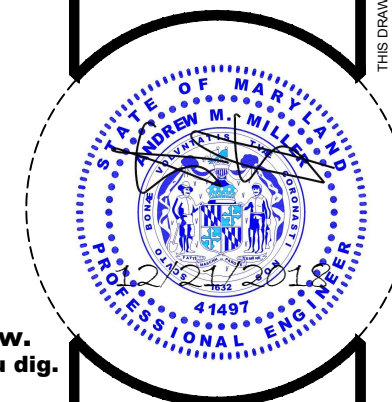
SHEET NUMBER:

3 OF 9



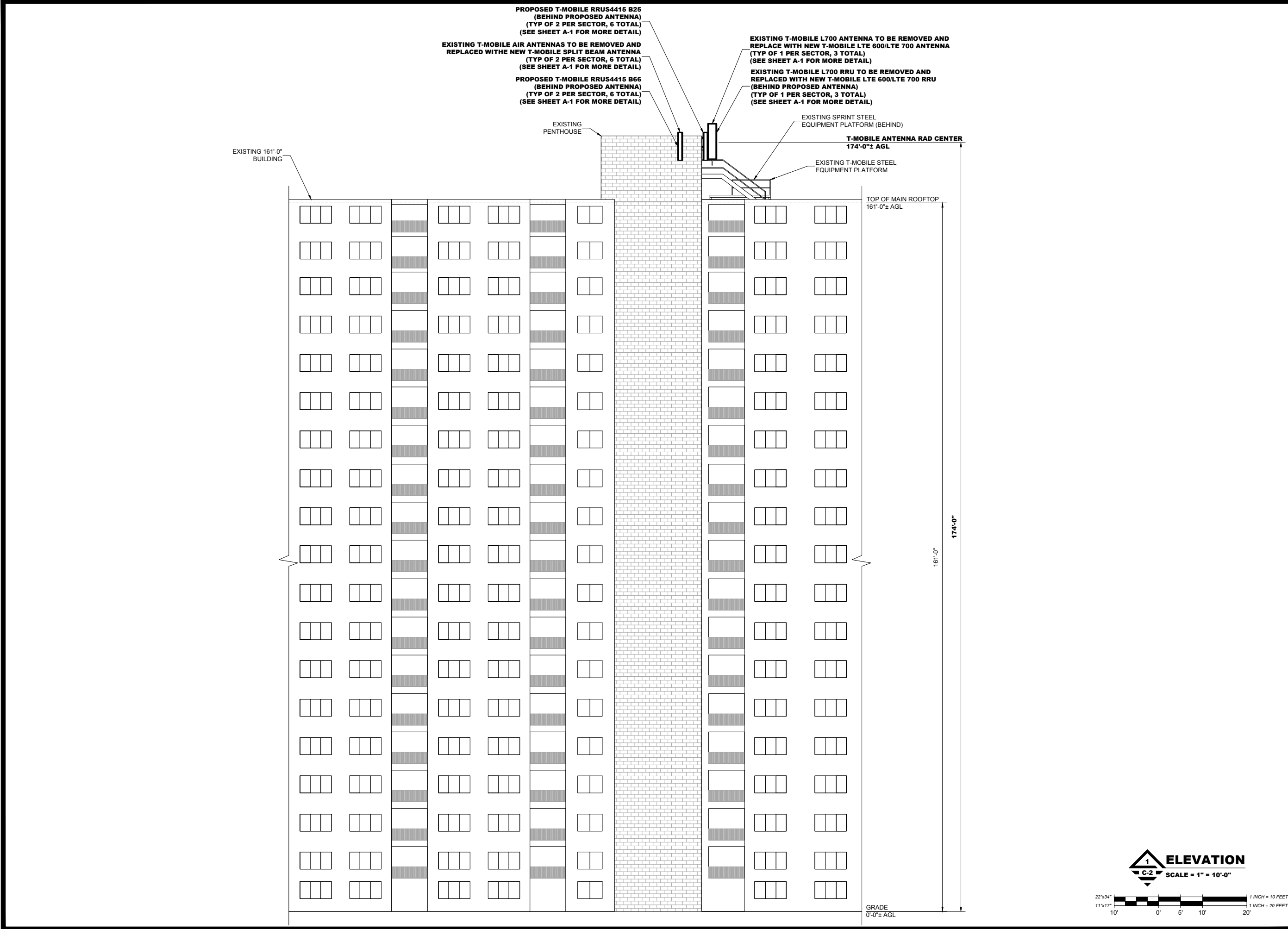
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REV No	DATE	DESIGNER	DESCRIPTION

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DESIGNER: ALM	AE JOB No: 18E019A.001

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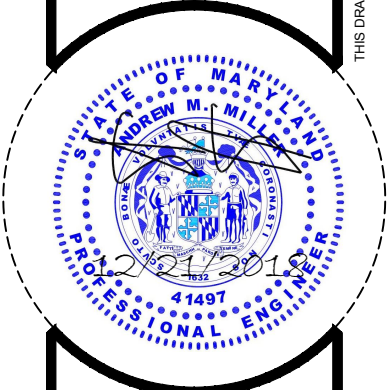
ELEVATION

DRAWING SHEET:

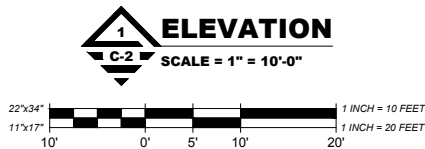
C-2

SITE INFORMATION:
SITE NAME:
THE ENCLAVE
SITE NUMBER:
7WAN003A
SITE ADDRESS:
11235 OAK LEAF DRIVE
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MARYLAND 20901
JURISDICTION:
MONTGOMERY COUNTY, MARYLAND

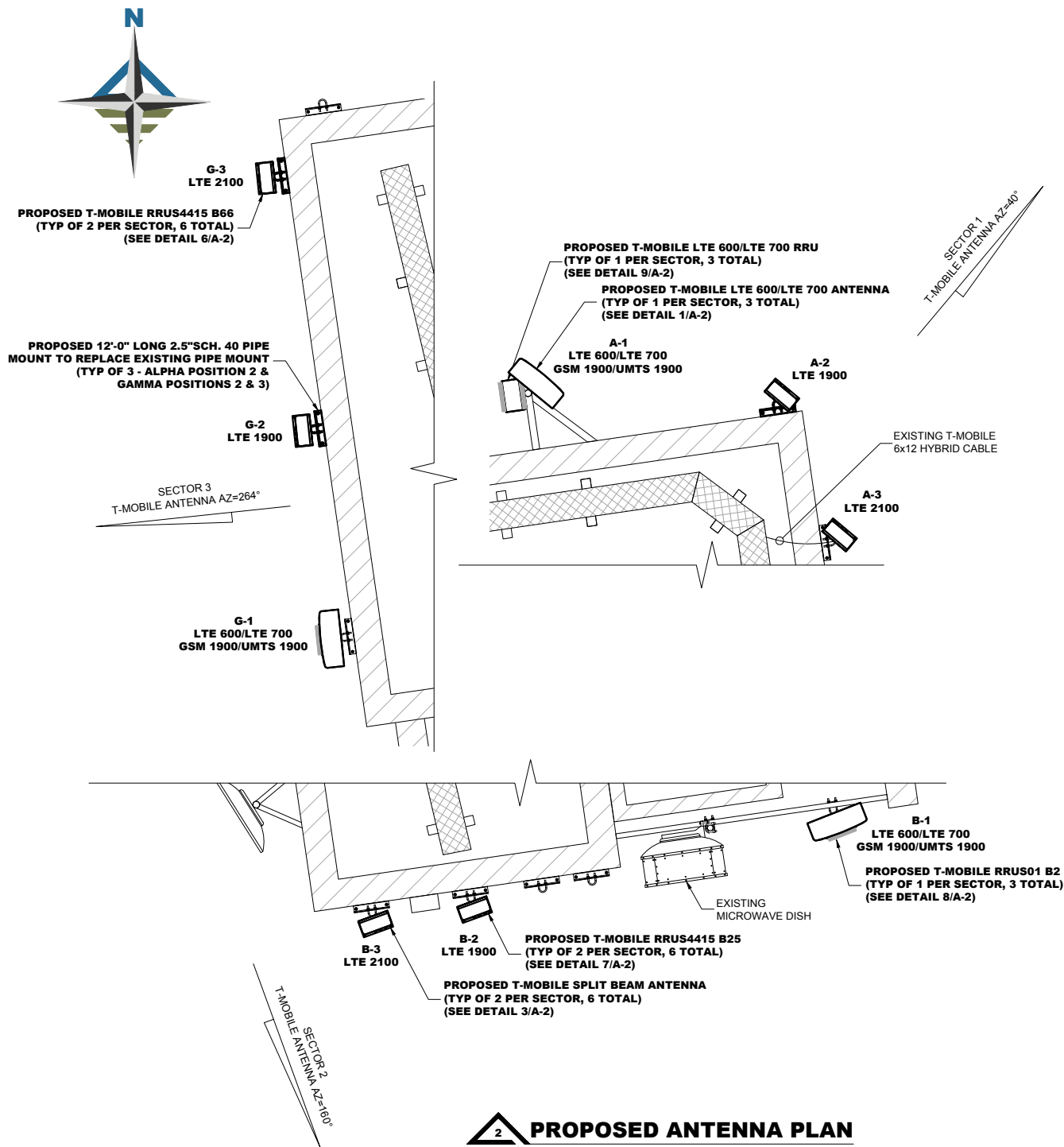
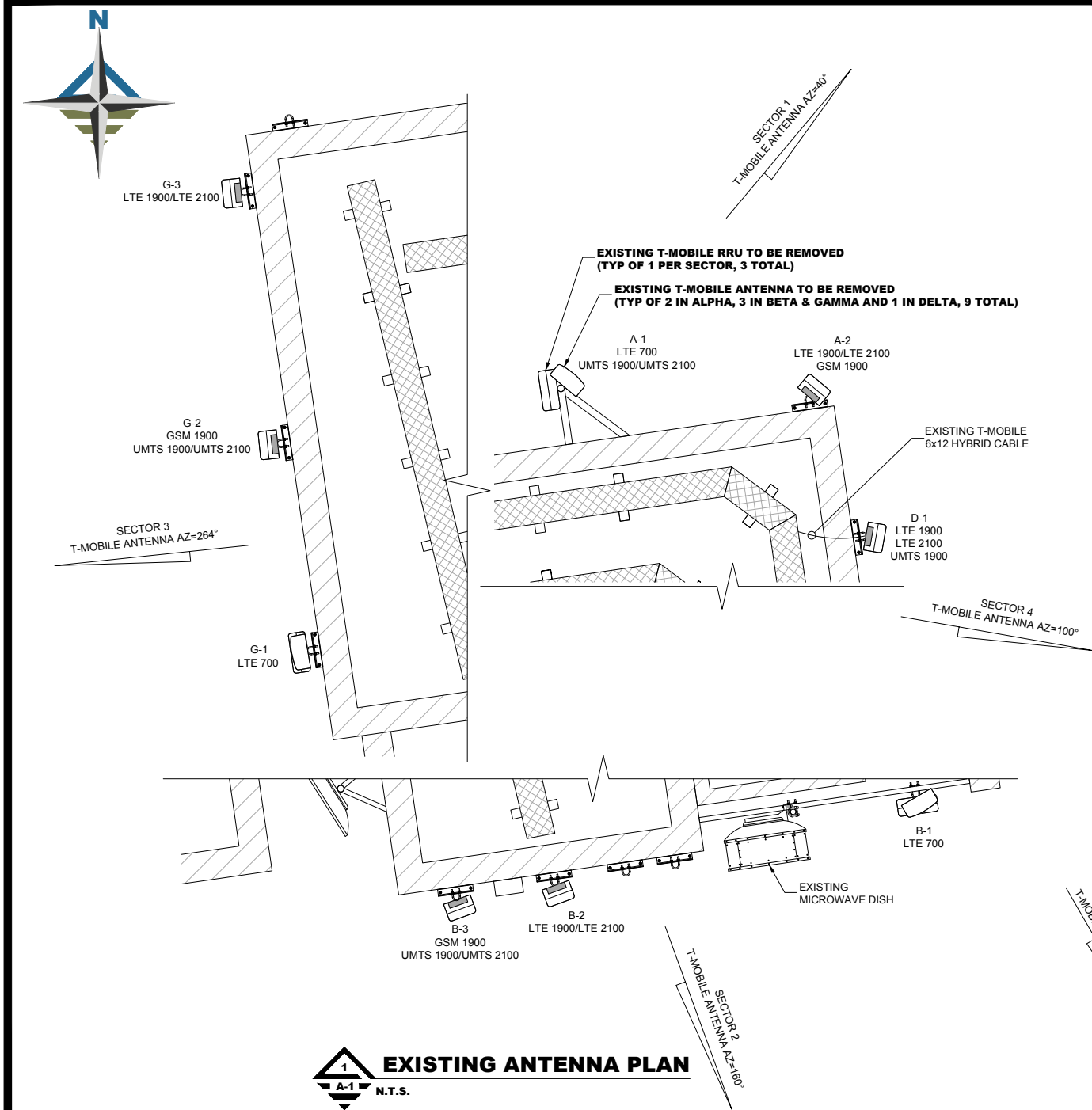
SHEET NUMBER:
4 OF 9



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ANTENNA & CABLE SCHEDULE:											
LOCATION		AZIMUTH	RAD CENTER	STATUS	TECHNOLOGY	ANTENNA MODEL NO.	MECH DOWNTILT	ELEC DOWNTILT	TMA/RRU	CABLE SIZE	CABLE LENGTH
ALPHA	A-1	40°	174°-0"	PROPOSED	LTE 600/LTE 700 GSM 1900/UMTS 1900	APXVAARR24	0°	5°/5°/5°/5°	4449 B71+B12 RRUS01 B2	6X12 HYBRID	100'-0"
	A-2	40°	174°-0"	PROPOSED	LTE 1900	BSA33R-U6A	0°	5°/5°	(2) RRUS4415 B25	SHARED	N/A
	A-3	40°	174°-0"	PROPOSED	LTE 2100	BSA33R-U6A	0°	5°/5°	(2) RRUS4415 B66	SHARED	N/A
BETA	B-1	160°	174°-0"	PROPOSED	LTE 600/LTE 700 GSM 1900/UMTS 1900	APXVAARR24	0°	6°/6°/8°/8°	4449 B71+B12 RRUS01 B2	6X12 HYBRID	100'-0"
	B-2	160°	174°-0"	PROPOSED	LTE 1900	BSA33R-U6A	0°	4°/4°	(2) RRUS4415 B25	SHARED	N/A
	B-3	160°	174°-0"	PROPOSED	LTE 2100	BSA33R-U6A	0°	4°/4°	(2) RRUS4415 B66	SHARED	N/A
GAMMA	G-1	264°	174°-0"	PROPOSED	LTE 600/LTE 700 GSM 1900/UMTS 1900	APXVAARR24	0°	7°/7°/6°/6°	4449 B71+B12 RRUS01 B2	6X12 HYBRID	100'-0"
	G-2	264°	174°-0"	PROPOSED	LTE 1900	BSA33R-U6A	0°	6°/6°	(2) RRUS4415 B25	SHARED	N/A
	G-3	264°	174°-0"	PROPOSED	LTE 2100	BSA33R-U6A	0°	6°/6°	(2) RRUS4415 B66	SHARED	N/A
									TOTAL 6X12 HYBRID CABLE		(1) 100'-0" (30M) (1) 100'-0" (30M) (1) 100'-0" (30M)



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PLAN REVISIONS:				
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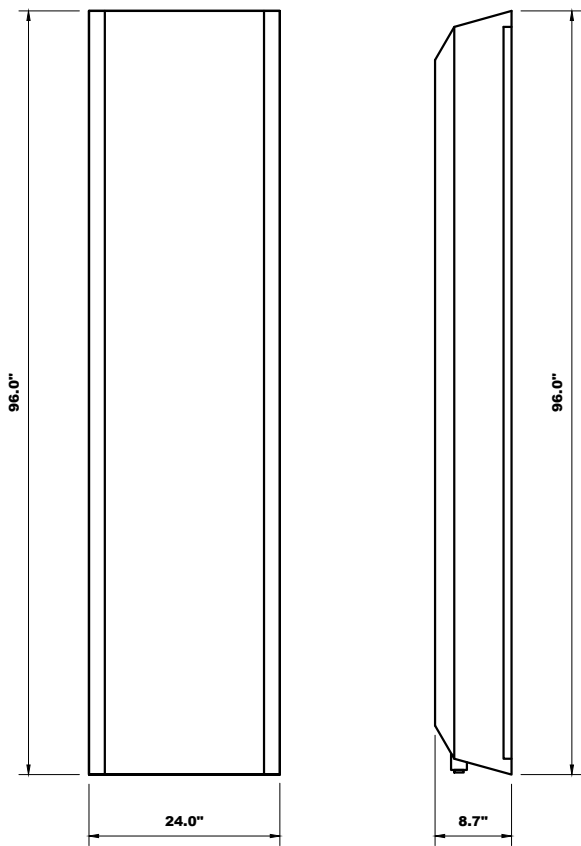
AE DESIGN INFO:
DESIGNER: ALM
AE JOB No: 18E019A.001

DRAWING TITLE:
EXISTING & PROPOSED
ANTENNA PLANS &
SCHEDULE
DRAWING SHEET:

A-1
SITE INFORMATION:
SITE NAME:
THE ENCLAVE
SITE NUMBER:
7WAN003A
SITE ADDRESS:
11235 OAK LEAF DRIVE
SILVER SPRING,
MARYLAND 20901
JURISDICTION:
MONTGOMERY COUNTY, MARYLAND
SHEET NUMBER:
5 OF 9

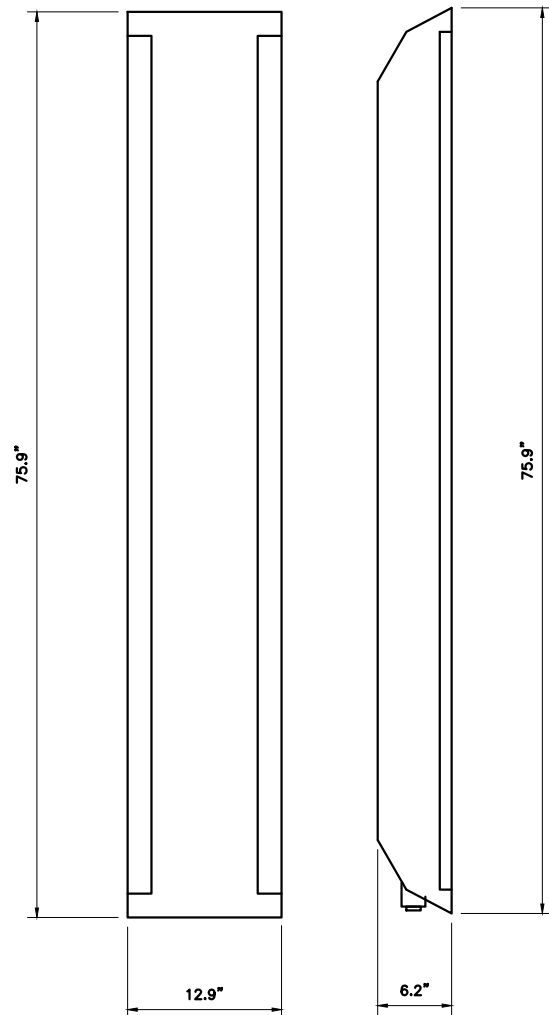


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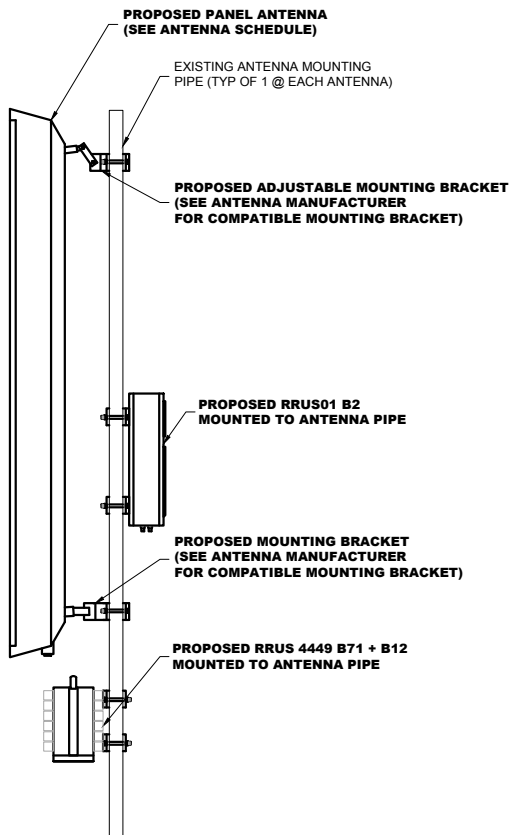
WEIGHT = 118.0 LBS

1 APXVAARR24 ANTENNA DETAIL
A-2 N.T.S.

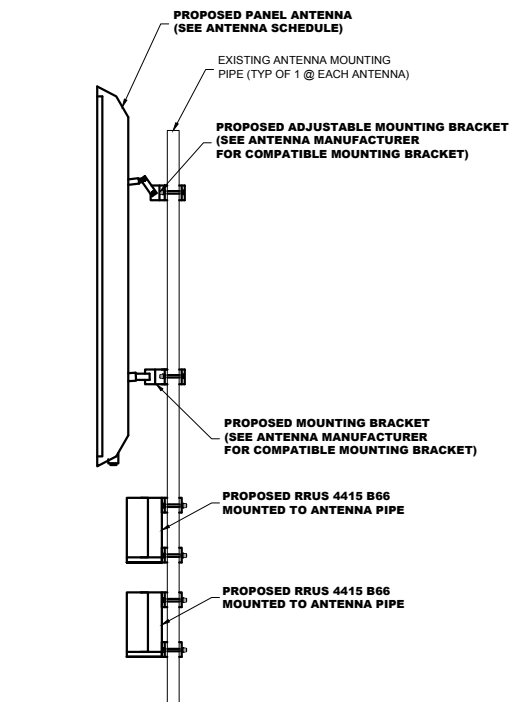


WEIGHT = 50.6 LBS

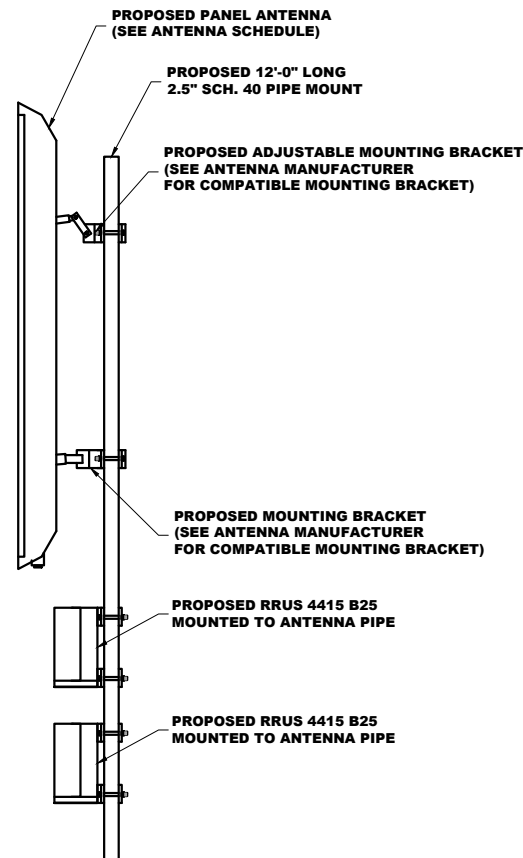
3 BSA33R-U6A ANTENNA DETAIL
A-2 N.T.S.



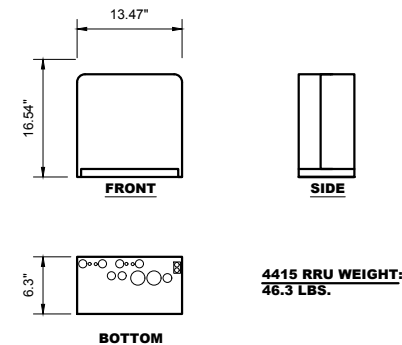
2 ANTENNA MOUNTING DETAIL
A-2 N.T.S.



4 ANTENNA MOUNTING DETAIL
A-2 N.T.S.

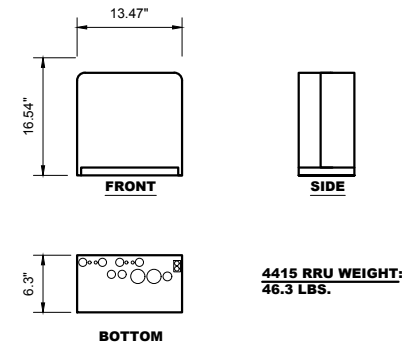


5 ANTENNA MOUNTING DETAIL
A-2 N.T.S.



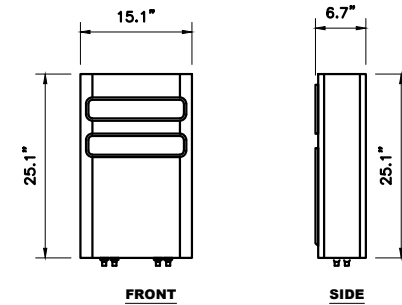
4415 RRU WEIGHT:
46.3 LBS.

7 ERICSSON 4415 B25 RRU DETAIL
A-2 N.T.S.



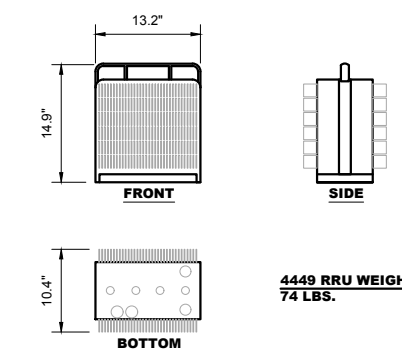
4415 RRU WEIGHT:
46.3 LBS.

6 ERICSSON 4415 B66 RRU DETAIL
A-2 N.T.S.



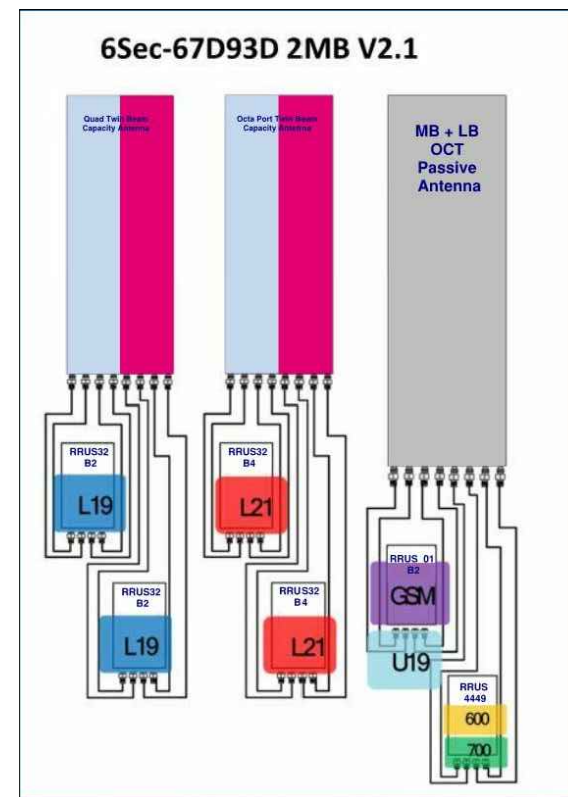
RRUS01 B2 WEIGHT:
44.1 LBS.

8 RRUS01 B2 DETAIL
A-2 N.T.S.



4449 RRU WEIGHT:
74 LBS.

9 ERICSSON 4449 B71 + B12 RRU DETAIL
A-2 N.T.S.



10 PLUMBING DIAGRAM
A-2 N.T.S.

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AE DESIGN INFO:

DESIGNER: ALM
AE JOB No: 18E019A.001

DRAWING TITLE:

ANTENNA & RRU DETAILS
& PLUMBING DIAGRAMS

DRAWING SHEET:

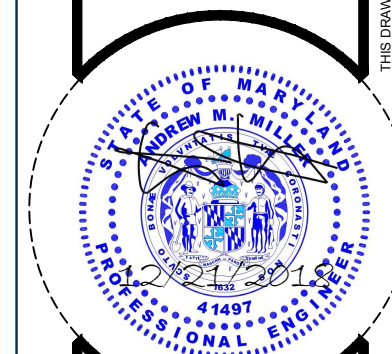
A-2

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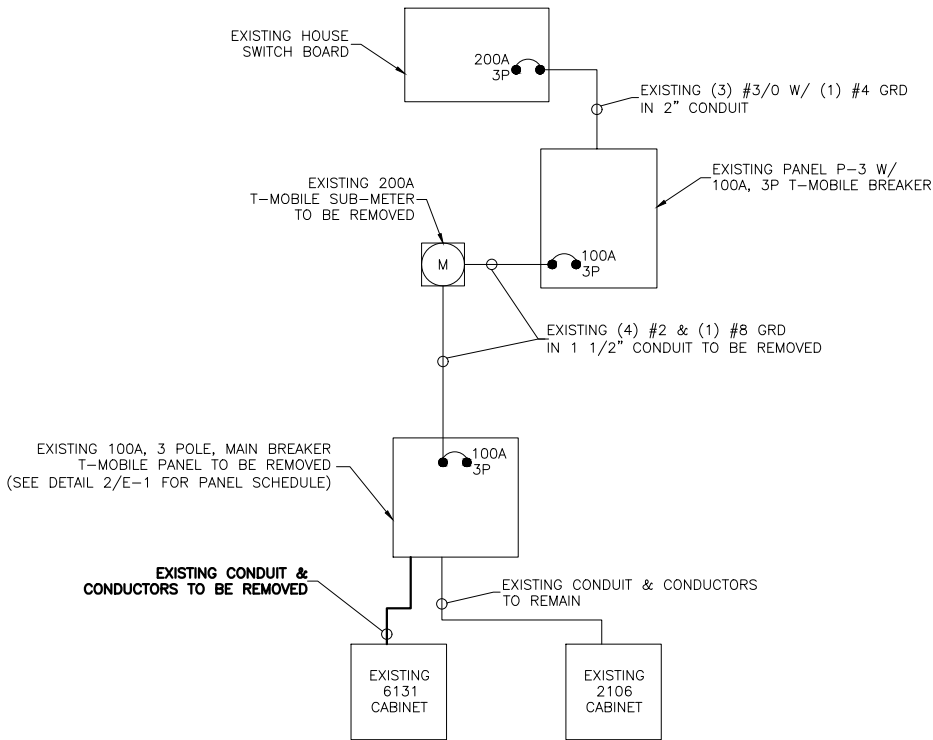
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ANDREW M. MILLER, PE
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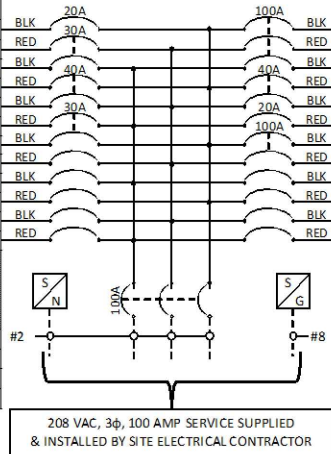


NOTES:

- ALL ELECTRICAL WORK SHALL BE DONE IN ACCORDANCE WITH CURRENT ADOPTED NATIONAL ELECTRIC CODES AND ALL LOCAL AND STATE CODES, LAWS, AND ORDINANCES. PROVIDE ALL COMPONENTS AND WIRING SIZES AS REQUIRED TO MEET NEC.
- UNDERGROUND POWER AND TELCO SERVICE LINES SHALL BE ROUTED IN A COMMON TRENCH. ALL UNDERGROUND CONDUIT SHALL BE PVC SCHEDULE 40 AND CONDUIT EXPOSED ABOVE GROUND SHALL BE RIGID GALVANIZED STEEL, INTERIOR CONDUIT SHALL BE EMT UNLESS OTHERWISE INDICATED. POWER CONDUIT LINES SHALL BE SIZED AS REQUIRED PER CABLE SIZING AND NEC REQUIREMENTS.
- CONDUITS INSTALLED AT BTS EQUIPMENT ENDS PRIOR TO THE EQUIPMENT INSTALLATION SHALL BE STUBBED AND CAPPED AT 6" ABOVE GRADE OR PLATFORM. IF SERVICE LINES CAN'T BE INSTALLED INITIALLY, PROVIDE NYLON PULL CORD IN CONDUITS.
- E.C. SHALL VERIFY THAT PANEL BOARD WILL ACCEPT A 150 AMP BRANCH BREAKER.

EXISTING ONE LINE DIAGRAM
E-1 N.T.S.

Panel Circuit and Load Schedule												
Load			Load per phase (VA)			Continuous	Non-Continuous	Trip	Poles	Wire size	A.I.C.	Wire Type
Description	QTY.	Unit V.A.	Phase									
			A	B	C							
1	LIGHT	2	150	300			X	20	1	12	10,000	THWN-2
3	SPARE		0		0			30	2		10,000	THWN-2
5			0		0						10,000	THWN-2
7	BTS 2	1	2,800	2,800		X		40	2	8	10,000	THWN-2
9		1	2,800		2,800	X				8	10,000	THWN-2
11	SPARE	1			0			30	2		10,000	THWN-2
13		1		0							10,000	THWN-2
15	SPACE				0						10,000	THWN-2
17	SPACE				0						10,000	THWN-2
19	SPACE			0							10,000	THWN-2
21	SPACE				0						10,000	THWN-2
23	SPACE				0						10,000	THWN-2



PANEL SCHEDULE
E-1 N.T.S.

GENERAL ELECTRICAL NOTES:

- CONTRACTOR SHALL INSPECT THE EXISTING CONDITIONS PRIOR TO SUBMITTING BID. ANY QUESTIONS ARISING DURING THE BID PERIOD IN REGARDS TO THE CONTRACTORS FUNCTIONS, THE SCOPE OF WORK, OR ANY OTHER ISSUE RELATED TO THIS PROJECT SHALL BE BROUGHT UP DURING THE BID PERIOD WITH THE PROJECT MANAGER FOR CLARIFICATION, NOT AFTER THE CONTRACT HAS BEEN AWARDED.
- LOCATION OF EQUIPMENT, CONDUIT AND DEVICES SHOWN ON THE DRAWINGS ARE APPROXIMATE AND SHALL BE COORDINATED WITH FIELD CONDITIONS PRIOR TO ROUGH-IN.
- THE CONDUIT RUNS SHOWN ON THE PLANS ARE APPROXIMATE. EXACT LOCATION AND ROUTING SHALL BE PER EXISTING FIELD CONDITIONS.
- PROVIDE PULL BOXES AND JUNCTION BOXES WHERE SHOWN OR REQUIRED BY NEC.
- ALL CONDUITS SHALL BE MET WITH BENDS MADE IN ACCORDANCE WITH NEC. NO RIGHT ANGLE DEVICE OTHER THAN STANDARD CONDUIT ELBOWS WITH 12 INCH MINIMUM INSIDE SWEEPS FOR ALL CONDUITS 2 INCH OR LARGER.
- ALL CONDUIT TERMINATIONS SHALL BE PROVIDED WITH PLASTIC THROAT INSULATING GROUND BUSHINGS.
- ALL WIRE SHALL BE TYPE THHN/THWN-2, SOLID, ANNEALED COPPER UP TO SIZE #10 AWG (#8 AND LARGER SHALL BE CONCENTRIC STRANDED) 75 DEGREES C, (167 DEGREES F), 98% CONDUCTIVITY, MINIMUM #12 AWG.
- ALL WIRES SHALL BE TAGGED AT ALL PULL BOXES, JUNCTION BOXES, EQUIPMENT BOXES AND CABINETS WITH APPROVED PLASTIC TAGS, ACTION CRAFT, BRADY, OR APPROVED EQUAL.
- ALL NEW MATERIAL SHALL HAVE A U.L. LABEL.
- ALL PANEL DIRECTORIES SHALL BE TYPEWRITTEN, NOT HAND WRITTEN.
- INSTALL AN EQUIPMENT GROUNDING CONDUCTOR IN ALL CONDUITS PER THE SPECIFICATIONS AND NEC. THE EQUIPMENT GROUNDING CONDUCTORS SHALL BE BONDED AT ALL PULL BOXES, JUNCTION BOXES, DISCONNECT SWITCHES, STARTERS, AND EQUIPMENT CABINETS.
- THE CONTRACTOR SHALL PREPARE AS-BUILT DRAWINGS, DOCUMENT ANY AND ALL WIRING AND EQUIPMENT CONDITIONS AND CHANGES WHILE COMPLETING THIS CONTRACT. SUBMIT AT SUBSTANTIAL COMPLETION.
- ALL DISCONNECT SWITCHES AND OTHER CONTROLLING DEVICES SHALL BE PROVIDED WITH ENGRAVED LAMICOID NAMEPLATES INDICATING EQUIPMENT CONTROLLED, BRANCH CIRCUITS INSTALLED ON, AND PANEL FIELD LOCATIONS FED FROM (NO EXCEPTIONS).
- ELECTRICAL CHARACTERISTICS OF ALL EQUIPMENT (NEW AND EXISTING) SHALL BE FIELD VERIFIED WITH THE OWNER'S REPRESENTATIVE AND EQUIPMENT SUPPLIER PRIOR TO ROUGH-IN OF CONDUIT AND WIRE. ALL EQUIPMENT SHALL BE PROPERLY CONNECTED ACCORDING TO THE NAMEPLATE DATA FURNISHED ON THE EQUIPMENT (THE DESIGN OF THESE PLANS ARE BASED UPON BEST AVAILABLE INFORMATION AT THE TIME OF THE DESIGN AND SOME EQUIPMENT CHARACTERISTICS MAY VARY FROM DESIGN AS SHOWN ON THESE DRAWINGS). LOCATION OF ALL OUTLETS, BOXES, ETC., AND THE TYPE OF CONNECTIONS (PLUG OR DIRECT) SHALL BE CONFIRMED WITH THE OWNER'S REPRESENTATIVE PRIOR TO ROUGH-IN.
- CONDUIT SCHEDULE: EXTERIOR BELOW GRADE SCHEDULE 40 PVC. EXTERIOR ABOVE GRADE RGS INTERIOR EMT.

ELECTRICAL NOTES:

PER NEC, THERE SHALL NOT BE MORE THAN THE EQUIVALENT OF FOUR QUARTER BENDS (360 DEGREES TOTAL) BETWEEN PULL BOXES, FOR EXAMPLE, CONDUIT BODIES AND BOXES. NOTE: CONTRACTOR SHALL PROVIDE AND INSTALL ANY/ALL JUNCTION BOXES SIZED IN ACCORDANCE WITH THE NEC GUIDELINES AS REQUIRED FOR THE INSTALLATION.

ELECTRICAL SYMBOLS:

- T TRANSFORMER
M METER
CIRCUIT BREAKER
DISCONNECT SWITCH

SERVICE: 120/208 VAC														
DESIGNATION: T-MOBILE PANEL														
LOCATION: T-MOBILE PLATFORM														
Wire Type	A.I.C.	Wire size	Poles	Trip	Non-Continuous	Continuous	Load per phase (VA)			Unit V.A.	QTY.	Load		
							Phase					Description		
							A	B	C					
THWN-2	10,000	2	3	100			0				1	MAIN	2	
THWN-2	10,000	2						0			1		4	
THWN-2	10,000	2							0				1	6
THWN-2	10,000		2	40			0					SPARE	8	
THWN-2	10,000								0					10
THWN-2	10,000		1	20	X				0			SPARE	12	
THWN-2	10,000	2	2	100		X	7,000			7,000	1	RBS 6131	14	
THWN-2	10,000	2					X		7,000		7,000		1	16
THWN-2	10,000									0				SPACE
THWN-2	10,000						0					SPACE	20	
THWN-2	10,000							0				SPACE	22	
THWN-2	10,000								0			SPACE	24	
							7,000	7,000	0	SubTotal Continuous		TOTAL CONTINUOUS x 1.25	24.5	
							0	0	0	SubTotal Non-Continuous				
Manufacturer: Square D												TOTAL NON-CONTINUOUS	0.3	
Model Number: QO Load Center														
APPROVED EQUAL												TOTAL KVA	24.80	
Mounting: SURFACE												TOTAL AMPS	68.84	

T-Mobile
NORTHEAST LLC
T-MOBILE NORTHEAST LLC
12050 BALTIMORE AVENUE
BELTSVILLE, MARYLAND 20705
PHONE: (240) 264-8600
FAX: (240) 264-8610

advantage engineers
7070 SAMUEL MORSE DRIVE, SUITE 150
COLUMBIA, MARYLAND 21046
PHONE: (443) 387-0003
www.advantageengineers.com

PLAN REVISIONS:

REV No	DATE	DESIGNER	DESCRIPTION
5			
4			
3			
2			
1	12-03-18	ERR	ISSUED FOR CONSTRUCTION
0	11-07-18	DF	ISSUED FOR CONSTRUCTION
A	03-01-18	ALM	ISSUED FOR 90% REVIEW (CDs)

AE DESIGN INFO:

DESIGNER: ALM
AE JOB No: 18E019A.001

DRAWING TITLE:

EXISTING ELECTRICAL
DETAILS & NOTES

DRAWING SHEET:

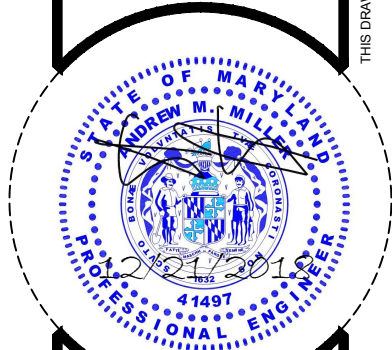
E-1

SITE INFORMATION:

SITE NAME:
THE ENCLAVE
SITE NUMBER:
7WAN003A
SITE ADDRESS:
11235 OAK LEAF DRIVE
SILVER SPRING,
MARYLAND 20901
JURISDICTION:
MONTGOMERY COUNTY, MARYLAND

SHEET NUMBER:

7 OF 9



ANDREW M. MILLER, PE
"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. 41497, EXPIRATION DATE: 01-08-2021"

A-3
LTE 2100

A-2
LTE 1900

A-1
LTE 600/LTE 700
GSM 1900/UMTS 1900

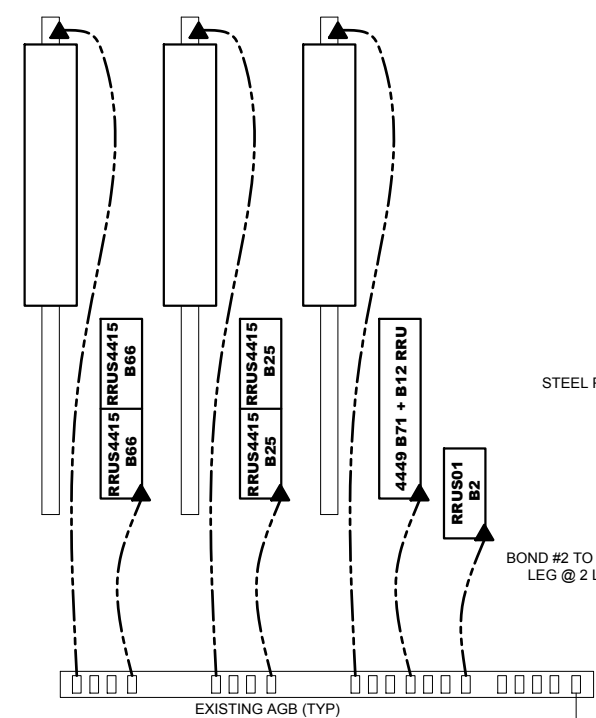


DIAGRAM NOTES:

- GROUND WIRES SHALL BE AS FOLLOWS:
 - GROUND KIT WIRES-#6 INSULATED, PROVIDED WITH KITS
 - WIRES BONDED TO ANTENNA PIPE MOUNTS AND AGB-#2 GREEN-INSULATED
 - GROUND WIRES FROM TMA GROUNDING KIT TO AGB-#6 GREEN-INSULATED
 - GROUND WIRES FROM CABINET TO EQUIPMENT GROUND BAR-#2 GREEN-INSULATED
 - GROUND WIRE FROM EQUIPMENT GROUND BAR TO MAIN GROUND BAR-#2 GREEN-INSULATED

EXISTING T-MOBILE EQUIPMENT
CABINET

EXISTING T-MOBILE EQUIPMENT
CABINET

STEEL PLATFORM

BOND #2 TO PLATFORM
LEG @ 2 LOCATIONS

NOTE:

GROUND WIRES SHALL
BE GREEN-INSULATED.

EXISTING #2/0 GROUND
WIRE

EXISTING #2/0 GROUND
WIRE

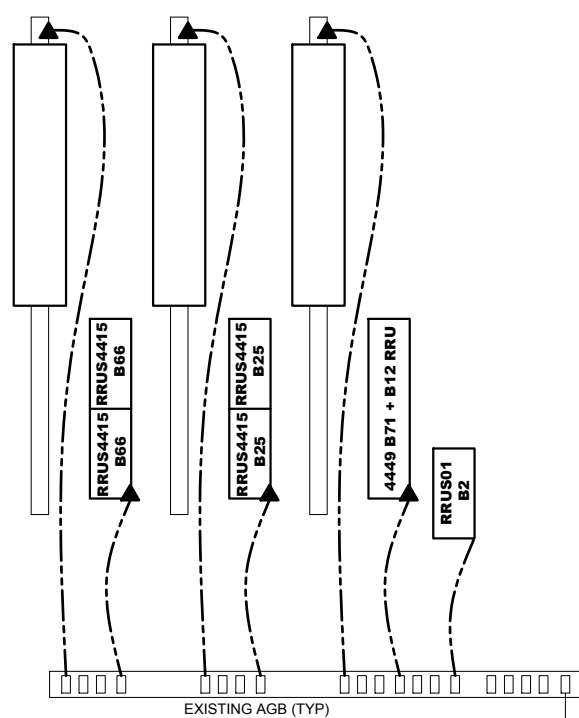
EXISTING MAIN GROUND
BAR

EXISTING #2/0 GREEN-INSULATED GROUND
WIRE TO MASTER GROUND BAR, INCOMING WATER
LINE OR BUILDING STEEL

B-3
LTE 2100

B-2
LTE 1900

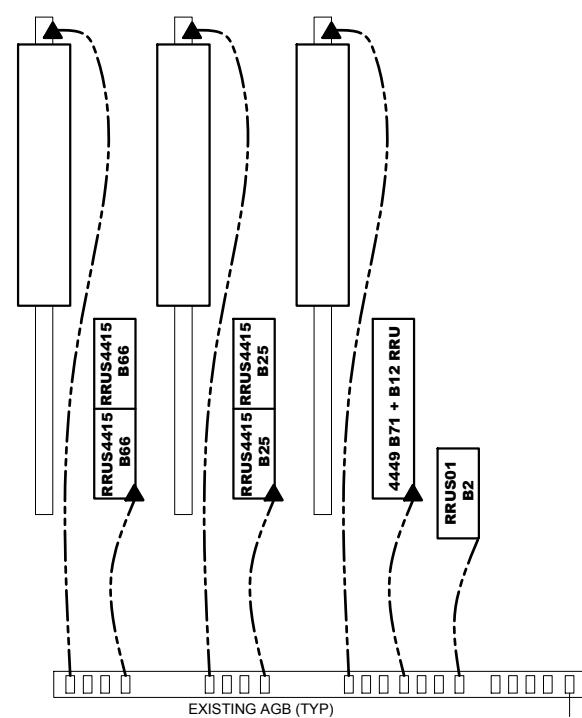
B-1
LTE 600/LTE 700
GSM 1900/UMTS 1900



G-3
LTE 2100

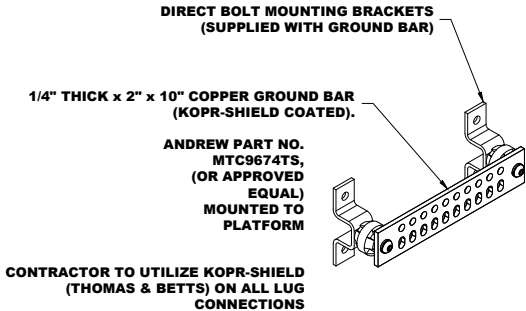
G-2
LTE 1900

G-1
LTE 600/LTE 700
GSM 1900/UMTS 1900



GROUNDING NOTES:

- ALL GROUNDING SYSTEM CONDUCTORS AND CONNECTIONS BELOW GRADE SHALL BE THERMAL WELDS AT GROUND RODS AND AT A MINIMUM OF 36" BELOW GRADE.
- ALL INSTALLATIONS SHALL BE FIELD VERIFIED.
- ALL GROUND WIRE SHALL BE #2 AWG BARE COPPER TINNED UNLESS NOTED OTHERWISE.
- ALL GROUND WIRES SHALL PROVIDE A STRAIGHT DOWNWARD PATH TO GROUND WITH GRADUAL BEND AS REQUIRED. GROUND WIRES SHALL NOT BE LOOPED OR SHARPLY BENT.
- THE CONTRACTOR SHALL COORDINATE INSTALLATION OF GROUND RODS AND GROUND RING WITH FOUNDATION AND UNDERGROUND CONDUIT.
- EACH EQUIPMENT CABINET SHALL BE CONNECTED WITH (2) #2 AWG INSULATED SOLID TINNED COPPER WIRE TO GROUND BAR. EQUIPMENT CABINETS SHALL EACH HAVE (2) CONNECTIONS.
- ANTENNA GROUND KITS SHALL BE FURNISHED BY T-MOBILE AND INSTALLED BY ELECTRICAL CONTRACTOR.
- KOPR-SHIELD ANTI-OXIDATION COMPOUND SHALL BE USED ON ALL GROUNDING CONNECTIONS.
- ALL EXOTHERMIC CONNECTS SHALL BE INSTALLED UTILIZING THE PROPER CONNECTION/MOLD AND MATERIALS FOR THE PARTICULAR APPLICATION.
- ALL BOLTED GROUNDING CONNECTIONS SHALL BE INSTALLED WITH A LOCK WASHER UNDER THE NUT. HARDWARE FOR BOLTED CONNECTIONS SHALL BE A MINIMUM OF 3/8" DIAMETER AND SHALL BE STAINLESS STEEL.
- GROUNDING WIRE SHALL NOT BE INSTALLED OR ROUTED THROUGH HOLES IN ANY METAL OBJECTS OR SUPPORTS TO PRECLUDE ESTABLISHING A "CHOKE" POINT.
- PLASTIC CLIPS OR METAL CLIPS WHICH DO NOT COMPLETELY SURROUND THE GROUNDING CONDUCTORS SHALL BE USED TO FASTEN AND SUPPORT GROUNDING CONDUCTORS. FERROUS METAL CLIPS WHICH COMPLETELY SURROUND THE GROUNDING CONDUCTOR SHALL NOT BE USED.
- STANDARD BUS BARS (CIGBE AND MIGB) SHALL BE FURNISHED AND INSTALLED. THEY SHALL NOT BE FABRICATED OR MODIFIED IN THE FIELD.
- THE GROUNDING CONNECTION TO THE POWER AND TELCO SECTIONS OF THE PPC CABINET SHALL BE MADE BY CONNECTING A CONDUCTOR FROM THE GROUND RING TO THE FACTORY FURNISHED BUS BAR IN EACH COMPARTMENT.
- THE CONTRACTOR SHALL SUPPLY T-MOBILE WITH RESULTS FROM PRE-CONSTRUCTION (CO-LO ONLY) AND POST-CONSTRUCTION OHM TESTING (GROUND) RESULTS.
- THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE A "FALL OF POTENTIAL" TEST ON THE NEW SUPPLEMENTAL GROUND FIELD PRIOR TO FINAL CONNECTION OF THE GROUNDING SYSTEM TO EQUIPMENT. THE TEST SHALL BE PERFORMED BY A QUALIFIED AND CERTIFIED TESTING AGENT. PROVIDE INDEPENDENT TEST RESULTS TO THE PROJECT MANAGER FOR REVIEW. THE GROUND SYSTEM RESISTANCE TO EARTH GROUND SHALL NOT EXCEED FIVE (5) OHMS. IF THE GROUND TEST EXCEEDS THE MAXIMUM OF 5 OHMS, THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE ADDITIONAL GROUND CONNECTIONS AS REQUIRED TO MEET THE 5 OHMS MAXIMUM.
- IF COAX ON ICE BRIDGE IS MORE THAT 6' FROM THE GROUND BAR AT THE BASE OF THE TOWER, A SECOND GROUND BAR WILL BE NEEDED AT THE END OF THE ICE BRIDGE RUN TO GROUND THE COAX GROUND KIT AND THE IN-LINE SURGE ARRESTORS.



GROUND BAR DETAIL

N.T.S.

ANTENNA AND GROUNDING DIAGRAM

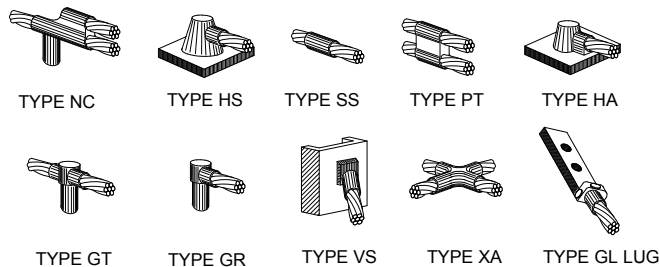
N.T.S.

GROUND LEADS

(4) CADWELDED #2 AWG BCW TO EQUIPMENT CABINETS

(2) TWO HOLE LUG TO BE USED WITH #2 AWG BCW TO GROUND RING

#6 AWG FROM ANTENNA CABLE GROUND KITS.



TYPICAL CADWELD TYPE CONNECTIONS

N.T.S.

T-Mobile
NORTHEAST LLC

T-MOBILE NORTHEAST LLC
12050 BALTIMORE AVENUE
BELTSVILLE, MARYLAND 20705
PHONE: (240) 264-5600
FAX: (240) 264-8610



advantage engineers

7070 SAMUEL MORSE DRIVE, SUITE 150
COLUMBIA, MARYLAND 21046
PHONE: (443) 367-0003
www.advantageengineers.com

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AE DESIGN INFO:

DESIGNER:
ALM

AE JOB No:
18E019A.001

DRAWING TITLE:

GROUNDING DIAGRAM,
DETAILS & NOTES

DRAWING SHEET:

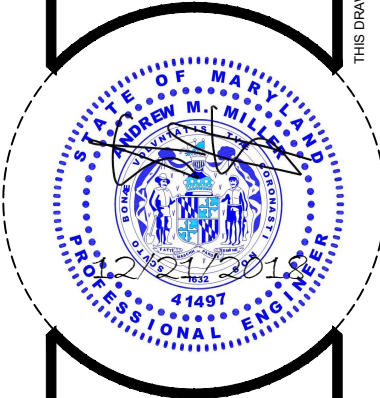
G-1

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App No:	2018110585				
Applicant Name	ADVANTAGE ENGINEERS		Antenna Compliance	Yes	
Application Type	Minor Modificatio	Updated	11/8/2018	Compliance Desc	
Carrier	T-Mobile	6409?	No	Antenna Location	Yes
Solution Type	Other	Ann. Plan?	No	Antenna Loc. Desc.	
Existing	Existing	Equipment Gvt Us	No	Env. Assessment	
Application Description		Gvt. Use Desc.		Routine Env. Evaluation	

Swap (6)air antennasd for CCI Split beam antennas; Add 5 RRUs/sector and swap existing L700 RRU for new l600/L700 449 RRU for a total of 6 per sector, 18 RRUs total. Remove (3) L700 antennas and replace with (3) new L600 antennas. Swap the 2106 for 6102

Site Id	42.01	Zoning	R-H
Structure Type	Building	Latitude	39.041264
Address	11215 Oak Leaf Dr, Silver Spring	Longitude	-76.993375
County Site Name	Berkshire Towers	Ground Elevation	383
Carrier Site Name	7WAN003A	City	Silver Spring
Site Owner	Berkshire Towers	Lease Status	Leased
Structure Owner	Berkshire Towers	PROW	No
Structure Height	161		

Justification

Modification

NearbySites (New Apps Only):

Screeningconsiderations(New Apps Only):

App No: 2018110585

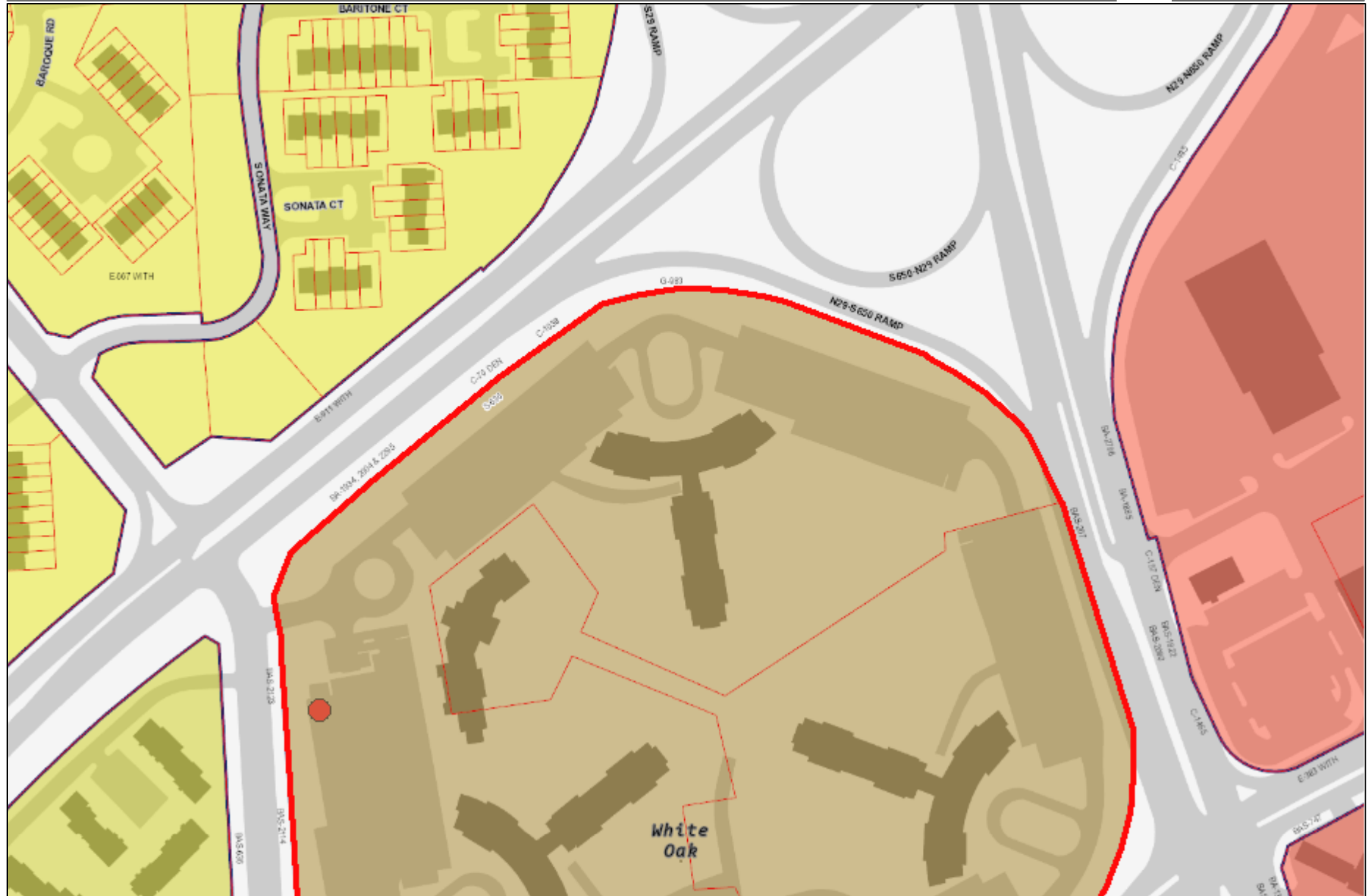
Antenna Model BSA 33-U6A

Frequency 1685-1880

RAD Center 174 Max ERP 300 Antenna Dimensions 75.9" x 12.9" x 6.2" Quantity 6

App No: 2018110585

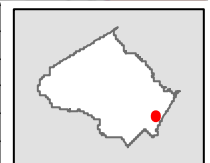
Antenna Model	APXVAAR24_43_U_NA20						
Frequency	Tx: 668-683, 728-734, 1965-1975, MHz Rx: 622-637, 698-704, 1885-1895 MHz						
RAD Center	174	Max ERP	36	Antenna Dimensions	95.9" x 24" x 8.7"	Quantity	3



Account #	00255115
Address	11215 OAK LEAF DR SILVER SPRING, 20901
Zone	R-10
Overlay Zone	N/A
TDR Overlay Zone	N/A
Landuse	Multi-Family
Parcel, Lot, Block	N390, N/A, N/A
WSSC Grid	214NE01
Map Amendments	G-746 G-956 G-966

Parking District	N/A
CBD	N/A
Special Protection Area	N/A
Urban District	N/A
Enterprise Zone	N/A
Arts & Ent. District	N/A
Special Tax District	N/A
Legal Description	WHITE OAK PT PAR B

Bike/Ped Priority Area	White Oak Science Gateway
Urban Renewal Area	N/A
Metro Station Policy Area	N/A
Priority Funding Area	Yes
Septic Tier	Tier 1: Sewer existing
Municipality	N/A
Master Plan	WHITE OAK SCIENCE GATEWAY
Historic Site/District	N/A
Water/Sewer Categories	W-1/ S-1



1 inch = 260 feet

Radio 4449

B71+B12



33.6 kg (= 74 lbs)

380 x 335 x 265 mm
(= 14.9"x13.2"x10.4")

Remote Radio Unit Description

RRUS 01

Description

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1 Introduction

This document describes the Remote Radio Unit multi-Standard (RRUS) 01.

Note: Remote Radio Unit (RRU) is often used as a generic expression for a remotely installed Radio Unit (RU). It is also the name of models prior to the RRUS versions described in this document, for example Remote Radio Unit Wideband (RRUW).

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 RRUS remotely extends the reach of the RBS by up to 40 km. The RRUS is designed to be located near the antenna. A fiber optic cable connects the RRUS to the RBS main unit or an expanded macro RBS. The RRUSs can be connected in a star configuration or in a cascade configuration with optical cable links.

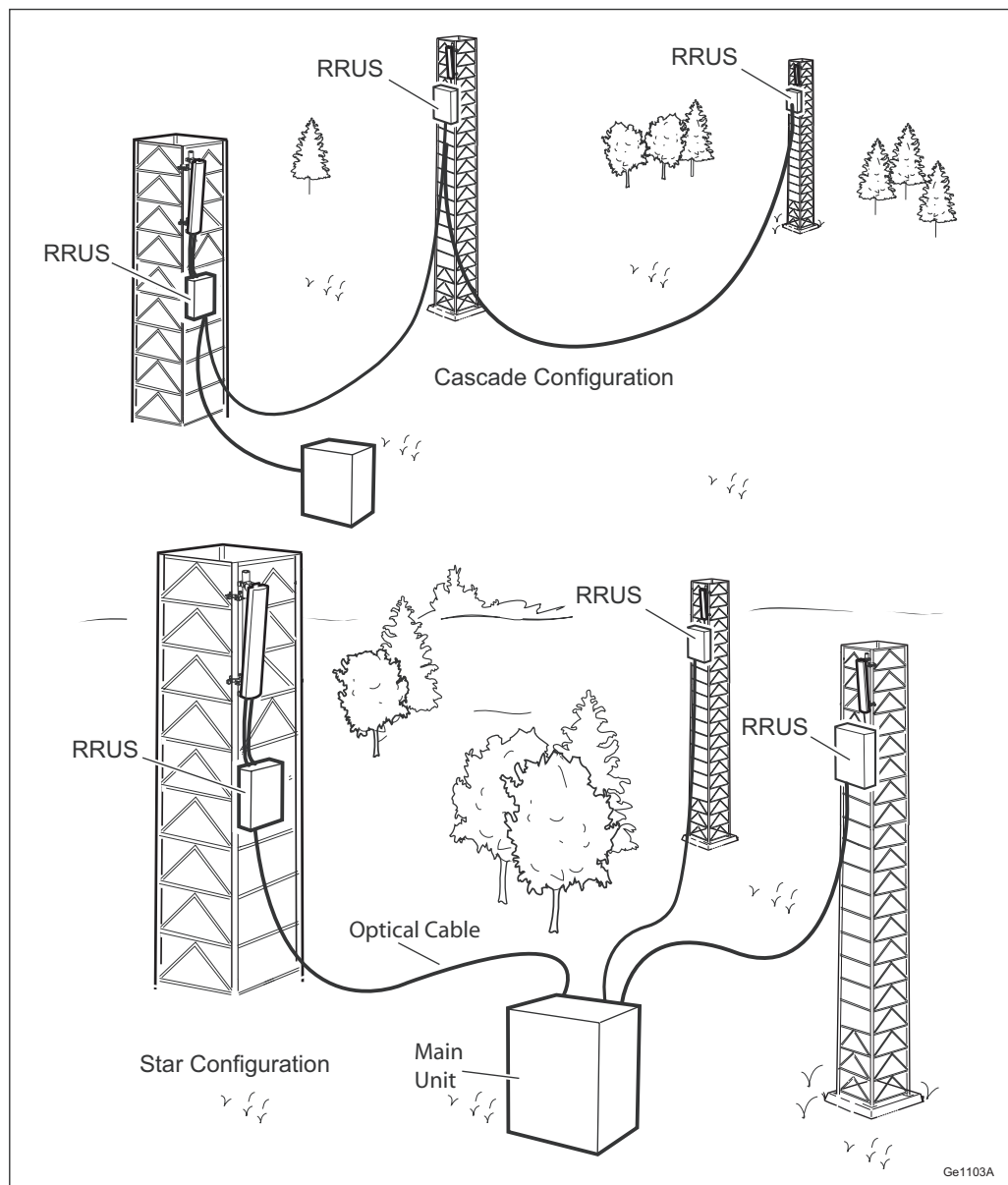


Figure 1 RRUSs in Star and Cascade Configurations



2.1 Main Features

Depending on the software application, the RRUS supports the Antenna System Controller (ASC), the Tower Mounted Amplifier (TMA), the Frequency Shifting Tower Mounted Amplifier (TMF), or the Remote Electrical Tilt Unit (RETU). The RETU can be connected either through the ASC or the RET Interface Unit (RIU) over the antenna interface or directly using the RRUS Antenna Line Device (ALD) or Remote Electrical Tilt (RET) control interface.

The RET interface on the RRUS is the link to the antenna communication system. See [Table 14](#) for information about the RRUS connection interface for ALD (RET).

RRUS 01 supports GSM, WCDMA, LTE FDD (depending on frequency band) and Massive IoT (MI).

RRUS 01 has one duplex transmitter/receiver branch and one receiver branch (1TX/2RX), and supports cross-connection of RX ports with other RRUs.

RRUS 01 can be used together with an RRUS A2, RRUS A3, or Radio 0208 to provide a four RX branch implementation for Main Remote applications. For more information, refer to *Remote Radio Unit Description* of RRUS A2, *Remote Radio Unit Description* of RRUS A3, or *Radio Description* of Radio 0208.

2.2 Optional Equipment

The optional equipment for the RRUS is the following:

- Wall installation equipment
- Pole installation equipment
- Power Supply Unit (PSU)
- Alternating Current Connection Unit (ACCU)
- Radio Frequency (RF) monitoring port



3 Technical Data

This section contains information about the physical characteristics, environmental data, and the power supply of the RRU.

3.1 Dimensions

Table 1 RRUS 01 Technical Data

Description	Value
Maximum nominal output power, subject to license handling. ^{(1) (2)}	B0, B9: 20 W, 40 W, and 60 W B1, B2, B3, B5, B8: 20 W, 40 W, 60 W, and 80 W Hardware Activation Code (HWAC) is required for total output power over 20 W.
Number of carriers, subject to license handling. ⁽¹⁾	GSM: 1 to 4 carriers WCDMA: 1 to 4 carriers LTE: 1 to 2 carriers MI NB-IoT In-band mode: 1 to 2 carriers ⁽³⁾ MI NB-IoT standalone mode: 1 NB-IoT carrier per RF port MI NB-IoT guardband: 1 NB-IoT carrier on either side of the LTE carrier Mixed mode: 2 to 4 carriers
Frequency ⁽⁴⁾	890 to 915 MHz uplink 935 to 960 MHz downlink B0 for GSM, WCDMA, LTE, and MI NB-IoT in-band mode, NB-IoT standalone mode
	1920 to 1980 MHz uplink 2110 to 2170 MHz downlink B1 for WCDMA, LTE, and MI NB-IoT in-band mode
	1850 to 1910 MHz uplink



Description	Value
	1930 to 1990 MHz downlink B2 for GSM, WCDMA, LTE, MI NB-IoT in-band mode, NB-IoT standalone mode, and NB-IoT guardband mode
	1710 to 1785 MHz uplink 1805 to 1880 MHz downlink B3 for GSM, WCDMA, LTE, and MI NB-IoT in-band mode
	824 to 849 MHz uplink 869 to 894 MHz downlink B5 for GSM, WCDMA, LTE, and MI NB-IoT in-band mode
	880 to 915 MHz uplink 925 to 960 MHz downlink B8 for GSM, WCDMA, LTE, and MI NB-IoT in-band mode
	1749.9 to 1784.9 MHz uplink 1844.9 to 1879.9 MHz downlink B9 for WCDMA, LTE, and MI NB-IoT in-band mode
Dimensions without Solar Shield	
Height	600 mm
Width	350 mm
Depth	112 mm
Dimensions with Solar Shield	
Height	636 mm
Width	383 mm
Depth	169 mm
Weight	
RRUS 01	20 kg
Color	
Gray	

(1) Detailed information about licenses and hardware activations codes (HWAC) can be found in:

GSM: User Description, RAN handling of software licenses and hardware activation codes in the WCDMA RAN CPI library. and MCPA Guideline in the GSM RAN CPI library.

WCDMA: Licenses and Hardware Activation Codes

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

(2) Detailed information about output power can be found in applicable Output Power Feature Description.

(3) 1 NB-IoT carrier per configured LTE carrier

(4) in the WCDMA Information about Instantaneous Bandwidth (IBW) can be found in RBS Configurations.

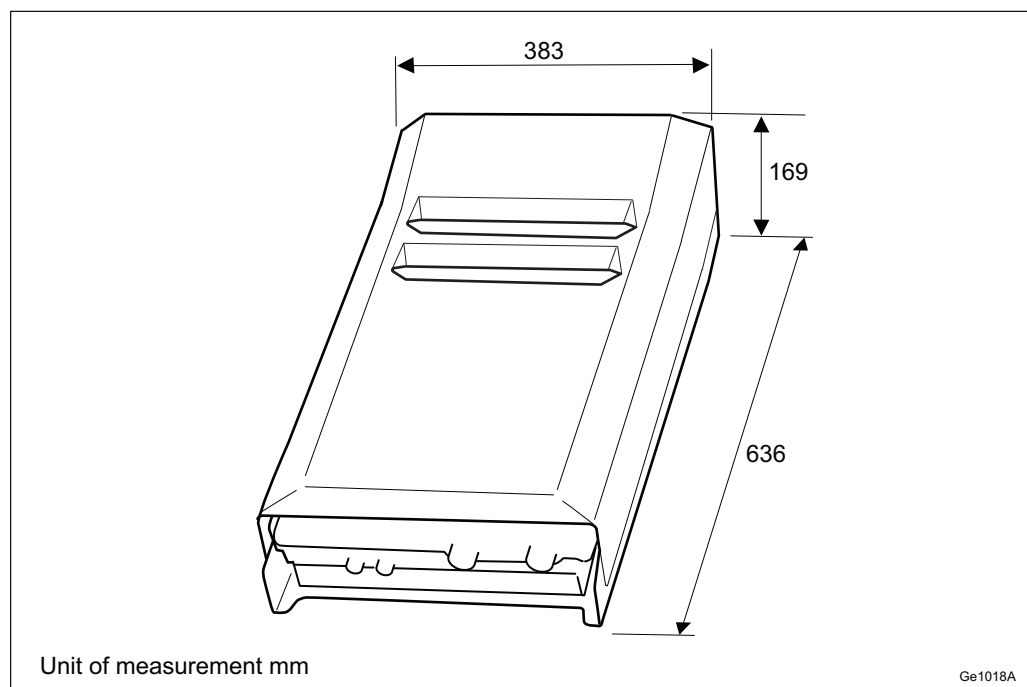


Figure 2 RRUS 01 Height, Width, and Depth with Solar Shield

3.2 Installation Recommendations

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

3.2.1 Indoor Installation Environments 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 300 019-1-3 class 3.1 and 3.3. This does not cover installation with heat traps or installation in lofts, where air ventilation does not exist. To ensure smooth performance of the product, it is recommended to ensure that the planned installation site for the unit is not a potential microclimate location. This



typically occurs in places such as unventilated lofts, sites with heat traps, or sites where the product is exposed to direct sunlight through windows. Avoid installing the equipment under glass covers or skylight windows without proper ventilation.

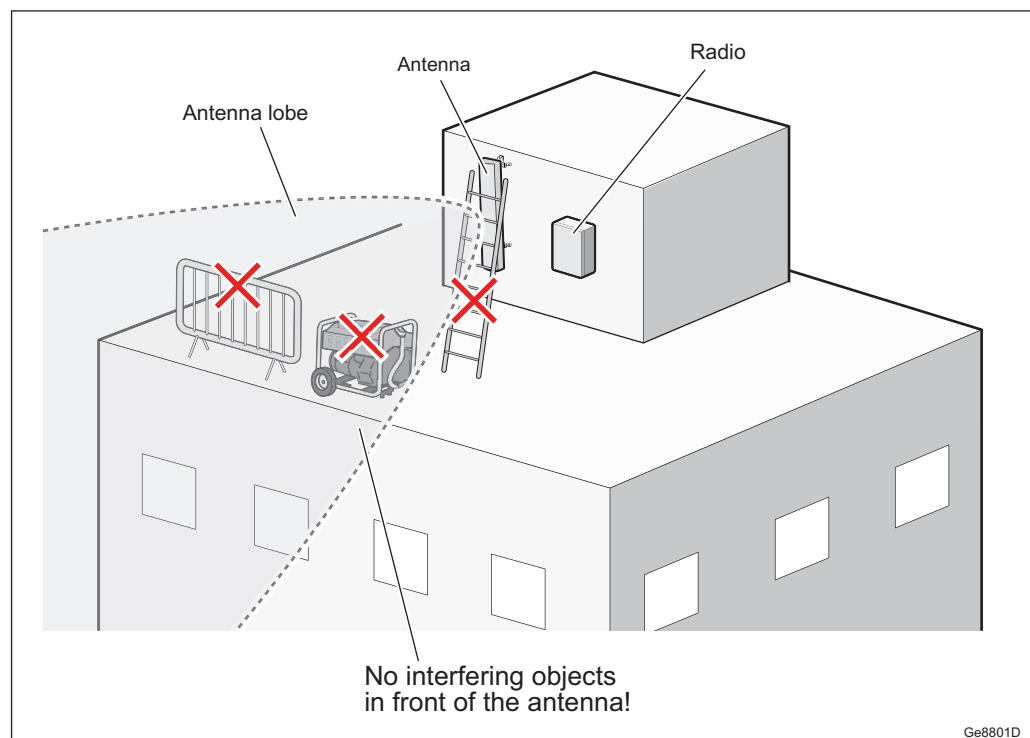
3.2.2 Outdoor Installation Environments to Avoid

The RRU is designed for outdoor use but to ensure optimal operation avoid the following:

- Hot microclimates caused, for example, by heat radiated or reflected from dark or metallic walls or floors
- Chimney mouths or ventilation system outlets
- Large glass or concrete surfaces

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





3.2.3 Painting Limitations

Ericsson does not recommend painting the RRU as it may affect radio performance of the unit.

Ericsson will apply limitations to the warranty and service contract if the RRU is painted.

3.2.3.1 Technical Limitations

If the RRU is painted, be aware of the technical limitations below:

- Sunlight on dark paint may increase the temperature of the RRU causing it to shut down.
- The plastic surfaces and the plastic covers are suited for painting with normal, commercially available one- or two-component paints.
- Never use metallic paint or paint containing metallic particles.
- Ensure that ventilation and drainage holes are free from paint.
- Ensure proper adhesion of the paint.

3.2.3.2 Commercial Limitations

If the RRU is painted, the commercial limitations below apply:

- Failure modes directly related to overheating due to 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 will be restored to the standard color before being returned to the market. It is not possible to guarantee the same unit being 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 will be charged the additional costs for replacing all painted parts of the unit or the complete unit.

3.3 Space Requirements

This section describes the space requirements for installing the RRUS.

The RRUS with cable connections running downwards can be installed as follows:



- On a wall
- On a pole

Both wall and pole installations can be indoors or outdoors.

Pole installations can be on monopoles, masts, or towers. [Figure 3](#) shows example pole installations (left to right: single unit on a monopole, two units on a tower on different struts, and three units on a monopole).

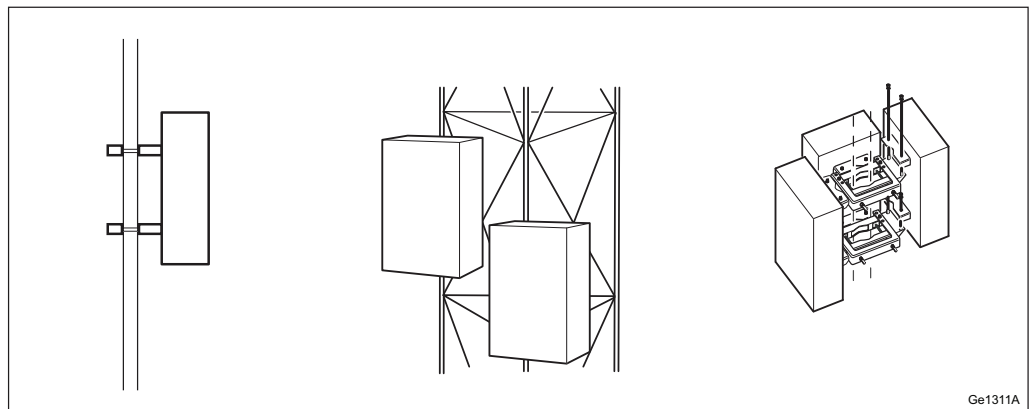


Figure 3 Sample Site Layout for Pole Installation

3.3.1 Generic Requirements

The RRUS is installed with the cable connections facing downwards.

Note: If no other possibilities are available, under exceptional conditions, the RRUS can be installed horizontally with the front downwards. This installation alternative limits the power supply options and the maximum output power. See *Install Remote Radio Units* for details regarding optional actions.

Allow a sufficient working space in front of the RRUS.

It is recommended that the RRUS is installed below the antenna. The minimum distance between the RRU and the antenna, and between two RRUs are shown in [Figure 4](#), [Figure 5](#), [Figure 6](#), and [Figure 7](#).

Note: The distance between the antenna and the RRU needs to be increased if the antenna azimuth is in the direction of the RRU.

3.3.2 Pole Installation

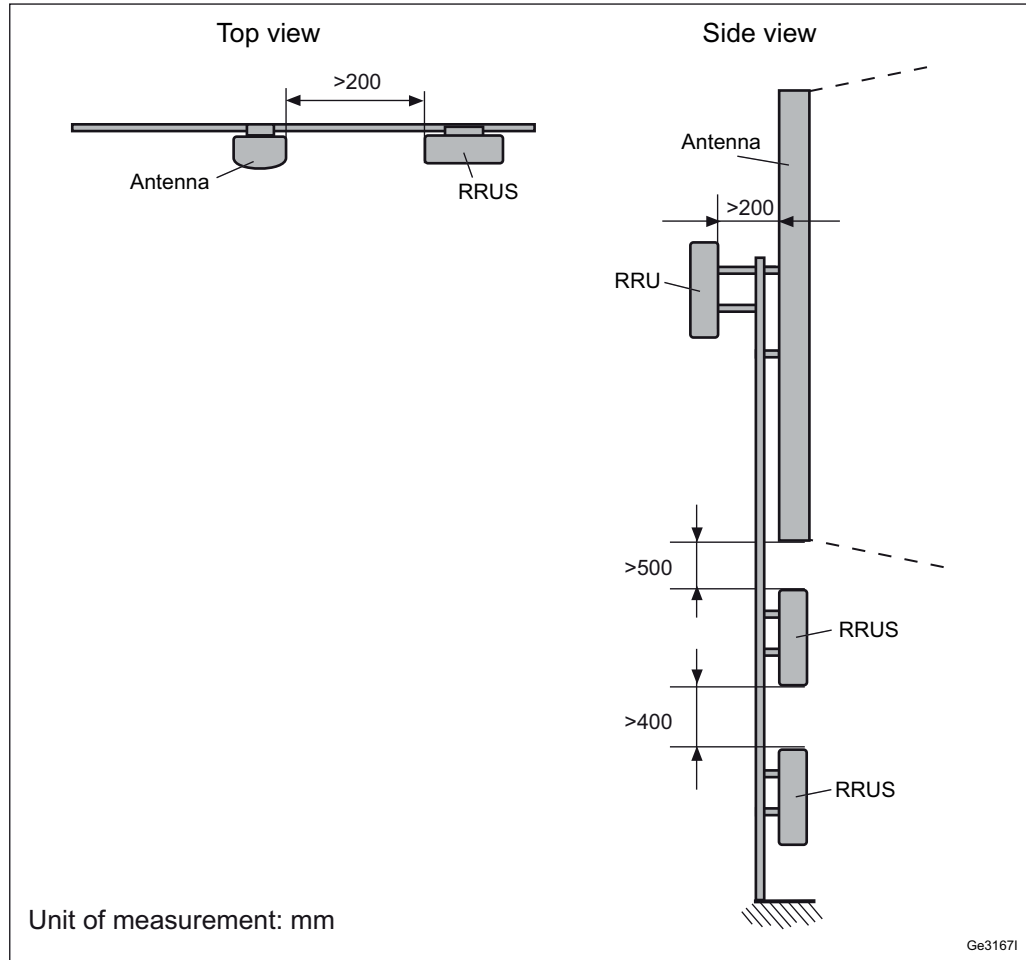


Figure 4 RRU Pole Installation Requirements

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between RRUSs installed vertically on a pole. Allow a minimum vertical distance of 500 mm between RRUS and antenna, if installed above or below an antenna. Allow a minimum of 200 mm free space between RRUSs installed side by side. The minimum distance from the bottom of the RRUS to the floor is 300 mm.

Note: An RRU can not be installed in the uppermost top position of a pole or mast.

For an RRUS with AC power supply, the mounting bracket supports only two RRUS units.



Table 2 Supported Pole Diameter

Mounting Equipment	Pole Diameter	Supported RRUSs
Single fixture	60 – 120 mm	All types
Mounting bracket	35 – 155 mm	All types

3.3.3 Wall Installation

This section describes the installation requirements when installing the RRU on a wall.

3.3.3.1

RRU Installation on Outdoor Wall

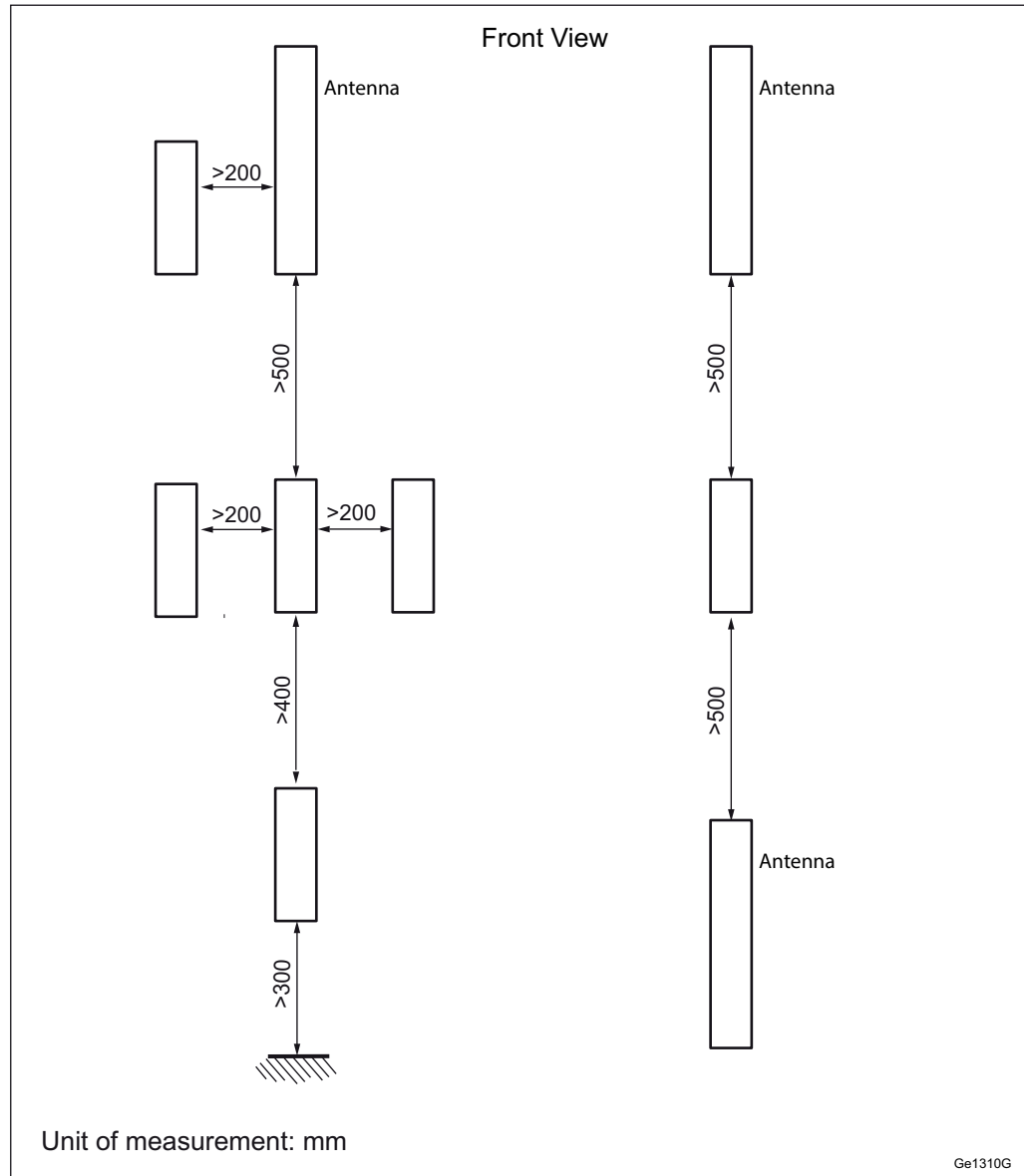


Figure 5 RRU Outdoor Wall Installation Requirements

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between RRUSs installed vertically on a wall. Allow a minimum vertical distance of 500 mm between RRUS and antenna, if installed above or below an antenna. Allow a minimum of 200 mm free space between RRUSs installed side by side. The minimum distance from the bottom of the RRUS to the floor is 300 mm.

Note: An RRUS cannot be installed in the uppermost top position on a wall.

3.3.3.2 RRU installation on Indoor Wall

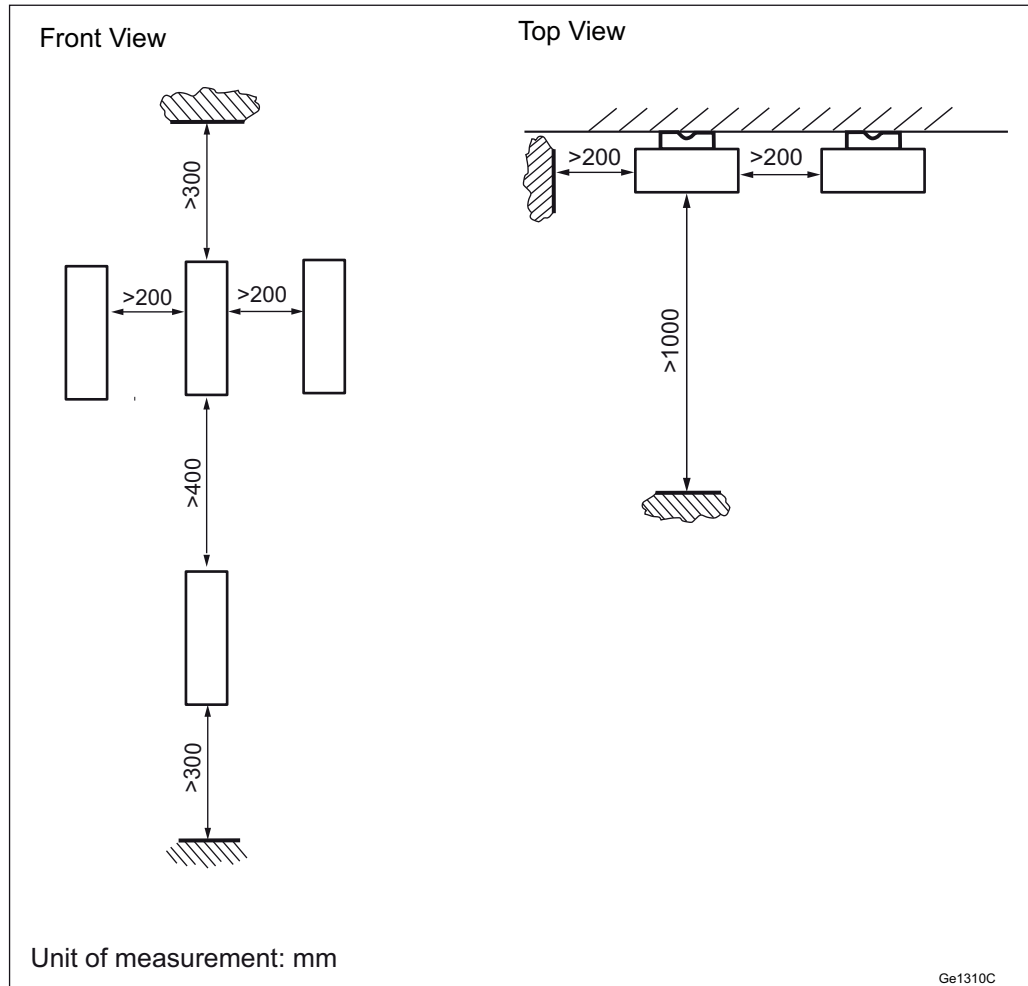


Figure 6 RRU Indoor Wall Installation Requirements

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between RRUSs installed vertically on a wall. Allow a minimum of 200 mm free space between RRUSs installed side by side. The minimum distance from the bottom of the RRUS to the floor is 300 mm.

3.3.4 RRU Back to Back Installation

In addition to the installation requirements mentioned above, allow a minimum of 200 mm free space to ensure adequate airflow between two pairs of dual mounted radios installed back to back. Recommended free space is 500 mm.

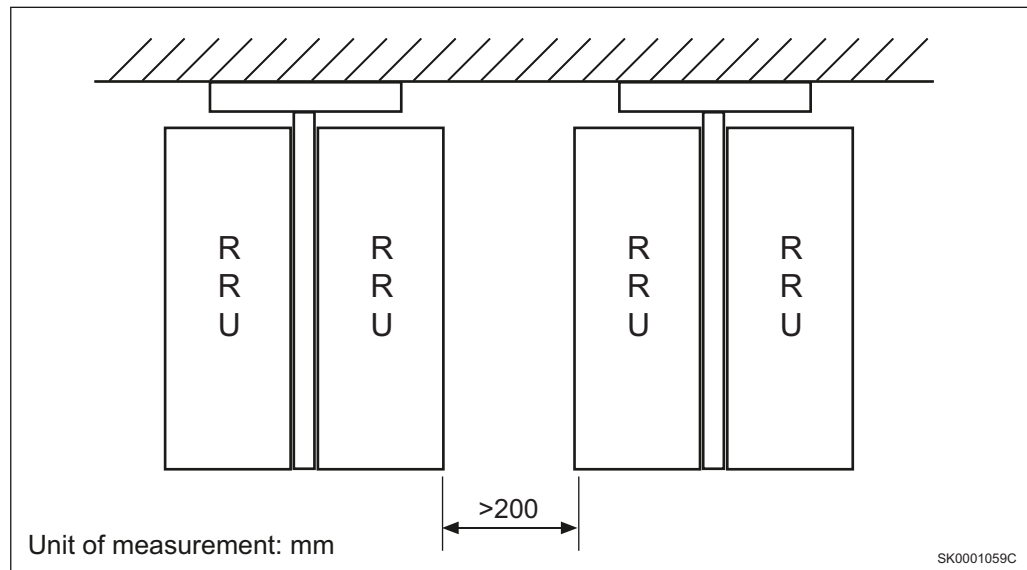


Figure 7 RRU Back to Back Installation Requirements

3.4 Acoustic Noise

The RRUS does not generate acoustic noise.

3.5 Environmental Characteristics

This section contains RRUS operating environment data.

3.5.1 Operating Environment

The following is a list of values for the RRUS normal operating environment:

Temperature	-40 to +55 °C -40 to +45 °C (RRUS 01 B2 and B3 in high load scenario: 80 W)
Solar radiation	$\leq 1,120 \text{ W/m}^2$
Relative humidity	5 to 100%
Absolute humidity	0.26 to 40 g/m^3
Maximum temperature change	1.0°C/min
Maximum wind load at 50 m/s (pole installed single case)	480 N (front)



3.5.2 Heat Dissipation

The RRUS is convection cooled and designed for outdoor installation. The values shown in [Table 3](#) are meant to give an idea of heat dissipation when the unit is installed indoor or around other RRUs. Indoor installation in a room without adequate ventilation and cooling must be avoided.

Table 3 RRUS Heat Dissipation

Unit	Output Power	Maximum Heat Dissipation
RRUS 01	60 W	0.32 kW
RRUS 01	80 W	0.35 kW

3.5.3 Vibration

This section describes the RRUS tolerance to vibrations. The RRUS operates reliably during seismic activity as specified by test method IEC 60 068-2-57 Ff.

Maximum level of Required Response Spectrum (RRS)	50 m/s ² within 2-5 Hz for DR=2%
Frequency range	1–35 Hz
Time history signal	Verteq II

The RRUS operates reliably during random vibration as specified by test method IEC 60 068-2-64 Fh method 1

Random vibration, normal operation	0.5 m ² /s ³
------------------------------------	------------------------------------

The RRUS operates reliably during shock as specified by test method IEC 60 068-2-27 Ea

Peak acceleration	40m/s ²
Duration	22 ms

3.5.4 Materials

All Ericsson products fulfill the legal and market requirements regarding:

- Material declaration
- Fire resistance, components, wires, and cables of materials
- Recycling



- Restricted and banned material use

3.6 Power Supply Characteristics

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

The power for multiple RRUSs can be supplied from different power systems if required.

3.6.1 DC Power Supply Characteristics

The power supply voltage for the RRUS is -48 V DC.

Table 4 RRUS DC Power Supply Requirements

Conditions	Values and Ranges
Nominal voltage	-48 V DC
Operating voltage range	-40.0 to -57.6 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 609 34.

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

Table 5 RRUS Fuse or Circuit Breaker Recommendations

Unit (DC Powered)	Output Power	Minimum Fuse Rating ⁽¹⁾	Fuse Rating Recommended for Reliable Operation ⁽²⁾	Maximum Allowed Fuse Rating ⁽³⁾
RRUS 01	80 W	14 A	25 A	32 A
	60 W	13 A		
	40 W	8 A		
	20 W	6 A		



- (1) These fuse ratings can only be used if it is acceptable that fuses trip due to lightning or network transients.
- (2) The recommended fuse rating takes into account the fact that external fuses are not to trip due to lightning or network transients.
- (3) The absolute maximum fuse class in accordance with RRUS design restrictions.

Note:

If a fuse or circuit breaker rating above minimum fuse rating is selected, cable dimensioning rules in [Position C, -48 V DC Power Supply Interface](#) on page 29 are to be reconsidered to make sure that the fuse or circuit breaker tripping criteria are met.

3.6.2 AC Power Supply Characteristics

The RRUS AC accepts 100 to 250 V AC if it is used together with the optional PSU.

Table 6 RRUS AC Power Supply Requirements

Normal Voltage Range	Tolerance Range
200 to 250 V	180 to 275 V AC ⁽¹⁾
100 to 127 V	108 to 130 V AC ⁽¹⁾
100 V	90 to 110 V AC ⁽¹⁾
Connection	Phase-neutral
Frequency range	50 to 60 Hz
Voltage harmonics	< 10% at full load ⁽²⁾
Shut-off allowance	At undervoltage or overvoltage ⁽³⁾
Inrush current peak	< 40 A
Inrush current duration	< 10 ms

(1) AC connected through ACCU optionally and PSU AC 02

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

(3) Alarm raised at 70 ± 5 V, ceased at 80 ± 5 V (phase voltage)

Fuse and Circuit Breaker Recommendations

The recommendations given in this section are based on peak power consumption and gives 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 609 34.

The ACCU and PSU AC 02 have 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 to trip the fuse or circuit breaker in case of most SPD operation. The minimum fuse rating could



be taken into account only if it is accepted that fuses or circuit breakers trip in such situations. The PSU and the ACCU are described in [AC/DC PSU \(Optional\)](#) on page 22 and [ACCU \(Optional\)](#) on page 23.

Table 7 RRUS Fuse/Circuit Breaker Recommendations

Unit (AC powered)	Minimum Fuse Rating ⁽¹⁾	Fuse Rating Recommended for Reliable Operation ⁽²⁾	Maximum Allowed Fuse Rating ⁽³⁾
RRUS 01 60 W and 80 W	• 7 A (100 to 127 V AC) • 4 A (200 to 250 V AC)	32 A	32 A

(1) These fuse ratings can only be used if it is acceptable that fuses trip due to lightning or network transients.

(2) The recommended fuse rating takes into account the fact that external fuses are not to trip due to lightning or network transients.

(3) The absolute maximum fuse class in accordance with RRUS design restrictions.

3.6.3 Power Consumption

For information on power consumption, refer to *Power Consumption Calculations*.

3.7 System Characteristics

This section describes the system characteristics of the RBS.

3.7.1 RF Electromagnetic Exposure for RBS 6000

General information on RF Electromagnetic Fields (EMF) for RRUSs connected to an RBS from the 6000 family can be found in *Radio Frequency Electromagnetic Fields*.

Information about radio access specific compliance boundaries for electromagnetic exposure can be found in *Radio Frequency Electromagnetic Exposure*.

3.7.2 Software

Information on software dependencies can be found in *Radio Software Support*.

3.7.3 Radio Configurations

Information about available radio configurations can be found in *RBS Configurations*.

4 Hardware Architecture

This section describes the RRUS hardware structure regardless of configuration or frequency.

Note: The supported configurations are described in *RBS Configurations*.

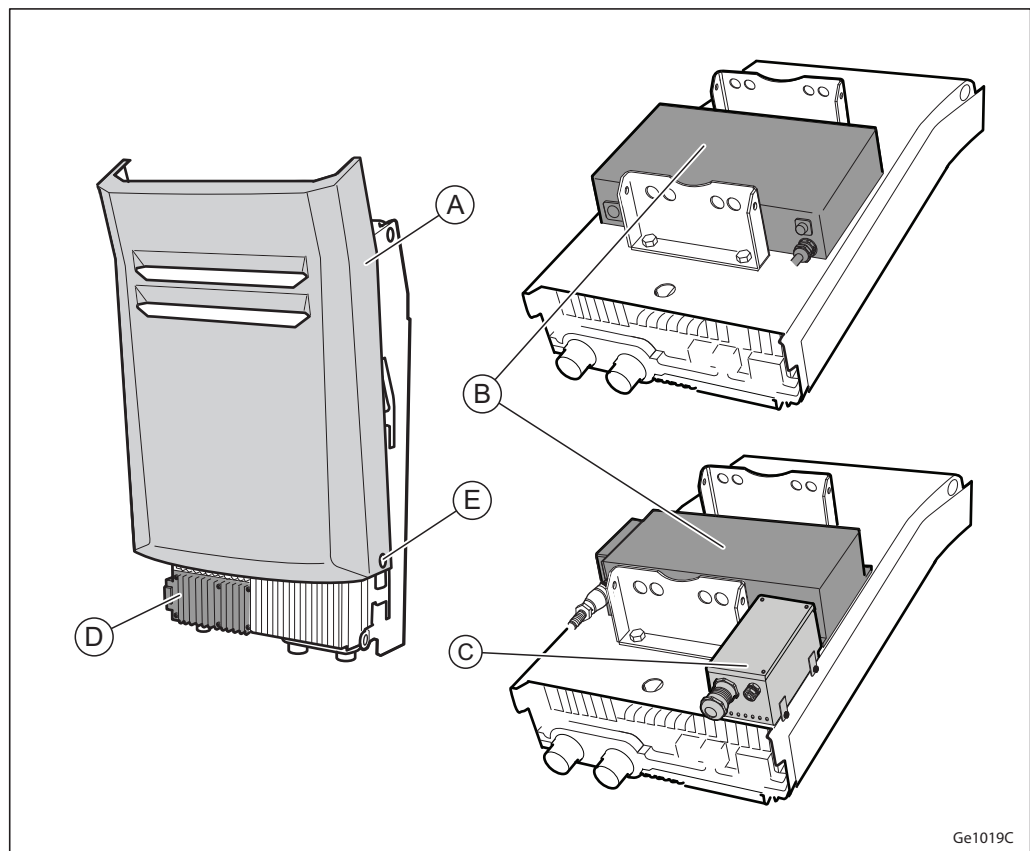


Figure 8 RRUS 01 Components

Table 8 Key to RRUS Components

Position	Component
A	Solar shield
B	PSU (optional)
C	ACCU (optional)
D	Installation cover
E	Hole for padlock



4.1 RRUS Overview

The RRUS contains most of the radio processing hardware. The following sections describe the component units inside the RRUS.

4.1.1 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
- Two receivers for RX diversity
- RET receiver (the antenna system communication link)

4.1.2 PA

The Power Amplifier (PA) is the linear power amplifier for the RF carrier. The RRUS has one PA.

4.1.3 FU

The Filter Unit (FU) consists of band-pass filters and low-noise amplifiers.

In the RRUS, the FU also provides the following:

- Power and supervision for the ASC, the TMA, the TMF, or the RIU
- Voltage Standing Wave Ratio (VSWR) supervision

4.1.4 DC SPD

The DC SPD board protects the DC power input from lightning currents.



4.1.5 ALD (RET) SPD

An SPD provides overvoltage/overcurrent protection for the ALD (RET) port.

4.1.6 External Alarm SPD

An SPD provides overvoltage/overcurrent protection for the external alarm ports.

4.2 Solar Shield

The solar shield protects the RRUS from solar radiation. The solar shield is also part of the cooling design. [Figure 8](#) shows the solar shield.

Note: Always attach the solar shield to the RRUS regardless of whether the RRUS is installed in a shady or in a sunny location.

4.3 Installation Cover

The installation cover hides, for example, the optical indicators.

More information can be found in [Connection Interfaces](#) on page 27.

4.4 Optical Indicators and Buttons

The RRUS is equipped with optical indicators that show system status. The optical indicators are located underneath the installation cover. [Table 9](#) describes how to interpret the optical indicators for RRUS when WCDMA and LTE controlled.

Table 9 RRUS Optical Indicators WCDMA or LTE Controlled

Marking	Indicator	Color	Mode	Indicates
!	Fault	Red	Off	No fault detected in RRUS
			On	Fault detected in RRUS
✓	Operational	Green	Off	RRUS not operational
			On	Power present
			Blink (2 Hz)	Load or testing in progress
			Blink (0.5 Hz)	Dependent resource missing
🔧	Maintenance	Blue ⁽¹⁾	Off	RRUS not in maintenance mode

Marking	Indicator	Color	Mode	Indicates
			On	RRUS in maintenance mode
			Blink (0.5 Hz)	Shutdown in progress
↻ 1, ↻ 2	Interface	Green	Off	Disconnected
			On	Connected
LMT	–	–	–	Not used
Button:				
	Maintenance	–	–	Switch RRUS mode between Remote and Maintenance

(1) The color can also be yellow. The yellow optical indicator can blink busy.

4.4.1 Maintenance Button Function

For WCDMA and LTE, the maintenance button can be used to lock, unlock, or restart an RU. More information about the functions can be found in *Indicators, Buttons, and Switches*.

4.5 Hole for Padlock

The solar shield can be locked by inserting a padlock through the hole.

4.6 AC/DC PSU (Optional)

The AC/DC PSU is required for the AC power input option. The AC/DC PSU converts RRUS input main power 100 - 250 V AC to -48 V DC and is installed on the back of the RRUS.

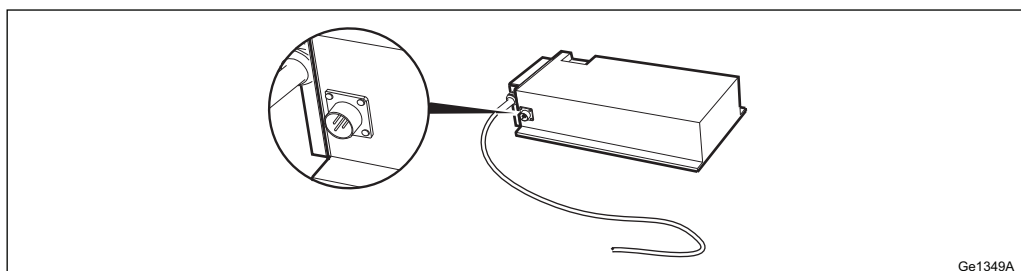


Figure 9 AC/DC PSU Showing AC Connector (Blowup) and DC Cable

4.6.1 **ACCU (Optional)**

The ACCU is required when the PSU is used and the RRUS is installed outdoors. The ACCU houses the SPD and is installed on the back of the RRUS.

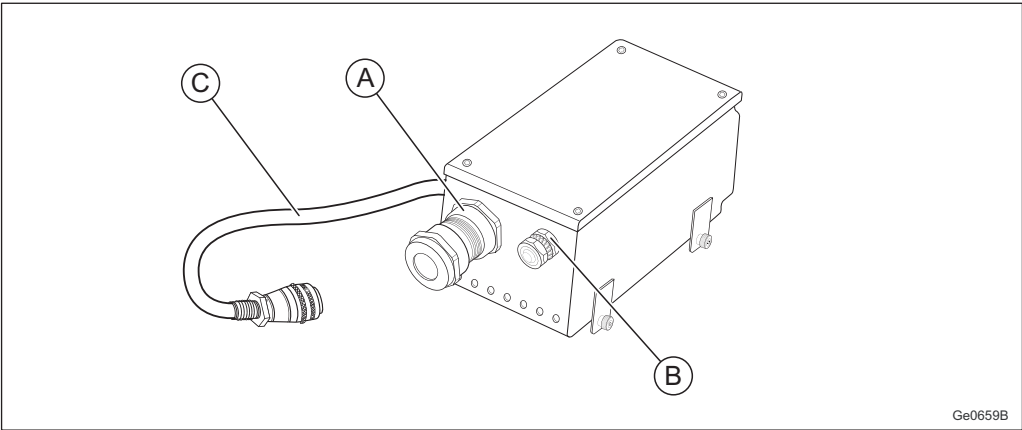


Figure 10 ACCU

Table 10 ACCU Overview

Position	Interface
A	AC power supply cable (input gland)
B	Grounding
C	AC power RF cable to AC/DC PSU

Note: The wire color code for the external AC power supply cable is market dependent.

4.7 **PSU AC 02 (Optional)**

The PSU AC 02 can replace the PSU AC described in [AC/DC PSU \(Optional\)](#) on page 22 and the PSU AC 02 has a built-in SPD which means that no ACCU is needed.

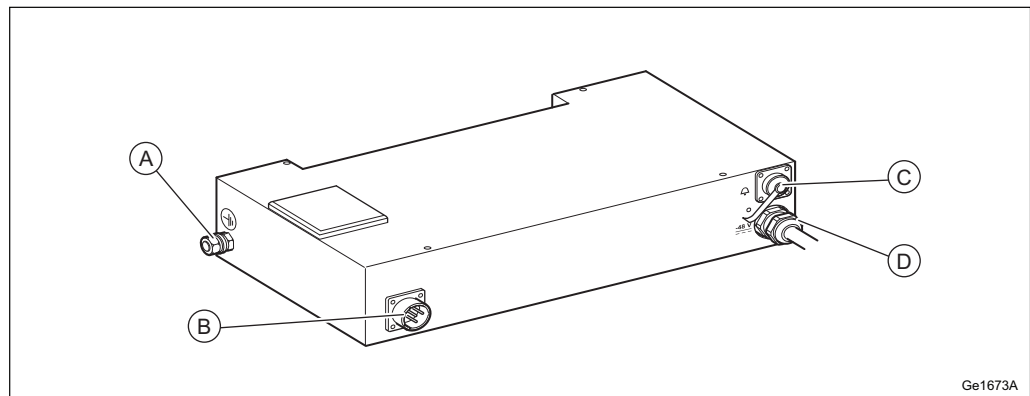


Figure 11 PSU AC 02

Table 11 PSU AC 02 Connection Interfaces

Position	Interface
A	Grounding interface
B	AC power interface
C	Interface for future use
D	DC power interface

For more information about PSU AC 02, see *PSU Description*.

4.8 PSU 48 02 (Optional)

The PSU 48 02 converts -48 V DC 3-wire to -48 V DC 2-wire.

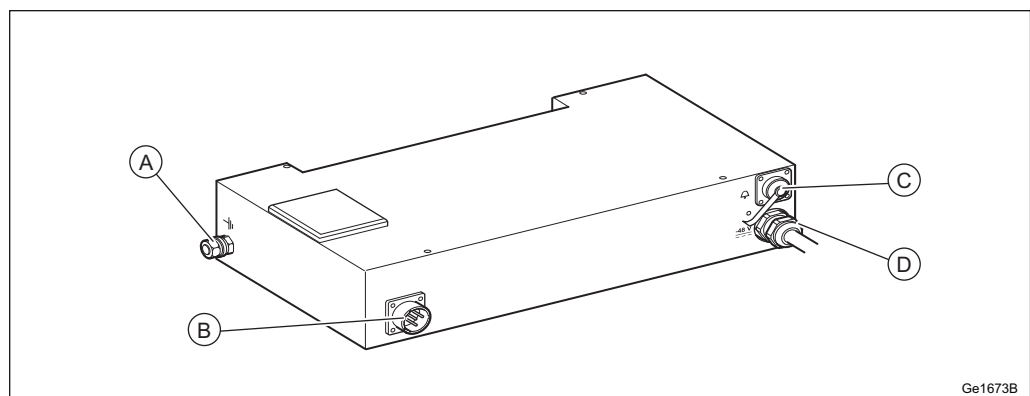


Figure 12 PSU 48 02



Table 12 PSU 48 02 Connection Interfaces

Position	Interface
A	Grounding interface
B	DC power interface (3-Wire)
C	Interface for future use
D	DC power interface (2-Wire)

For more information about PSU 48 02, see *PSU Description*.

4.9 RF Monitoring Port (Optional)

The RF monitoring port can be used to monitor the RRUS downlink RF output power without interrupting service.

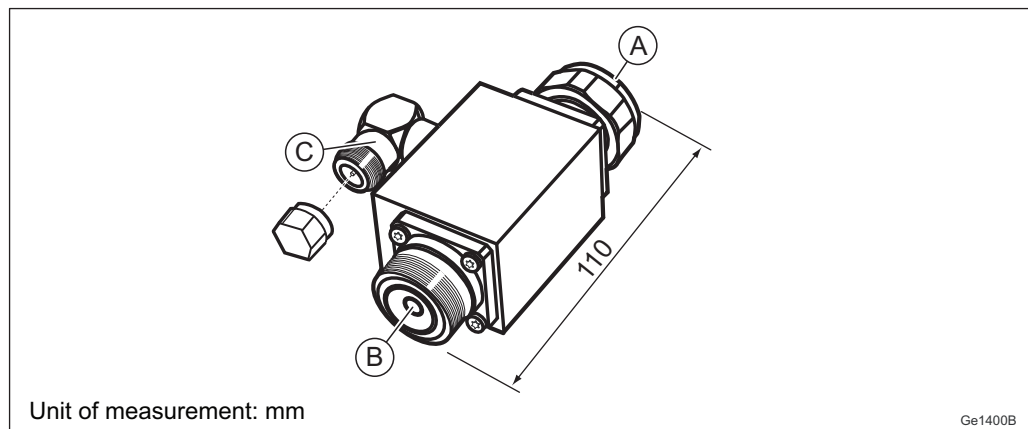


Figure 13 RF Monitoring Port

Table 13 RF Monitoring Port Overview

Position	Interface
A	7/16 RF connector used for connecting to A↔ antenna interface
B	7/16 RF connector for connecting the RF cable
C	N-type RF connector for pairing with connector on monitoring equipment (including metal protective cap to be used when the interface is not in use)

The RF monitoring port is connected to the A↔ antenna interface on the RRUS connection interface panel at the bottom of the RRUS. The A↔ interface supports bidirectional, RX/TX traffic, but only the TX direction can be monitored.



Using the RF monitoring port does not affect RRUS performance. RF leakage due to connecting the antenna cables through the monitoring port does not exceed that of a standard RF cable. Insertion loss between port A and port B is less than 0.2 dB.

5

Connection Interfaces

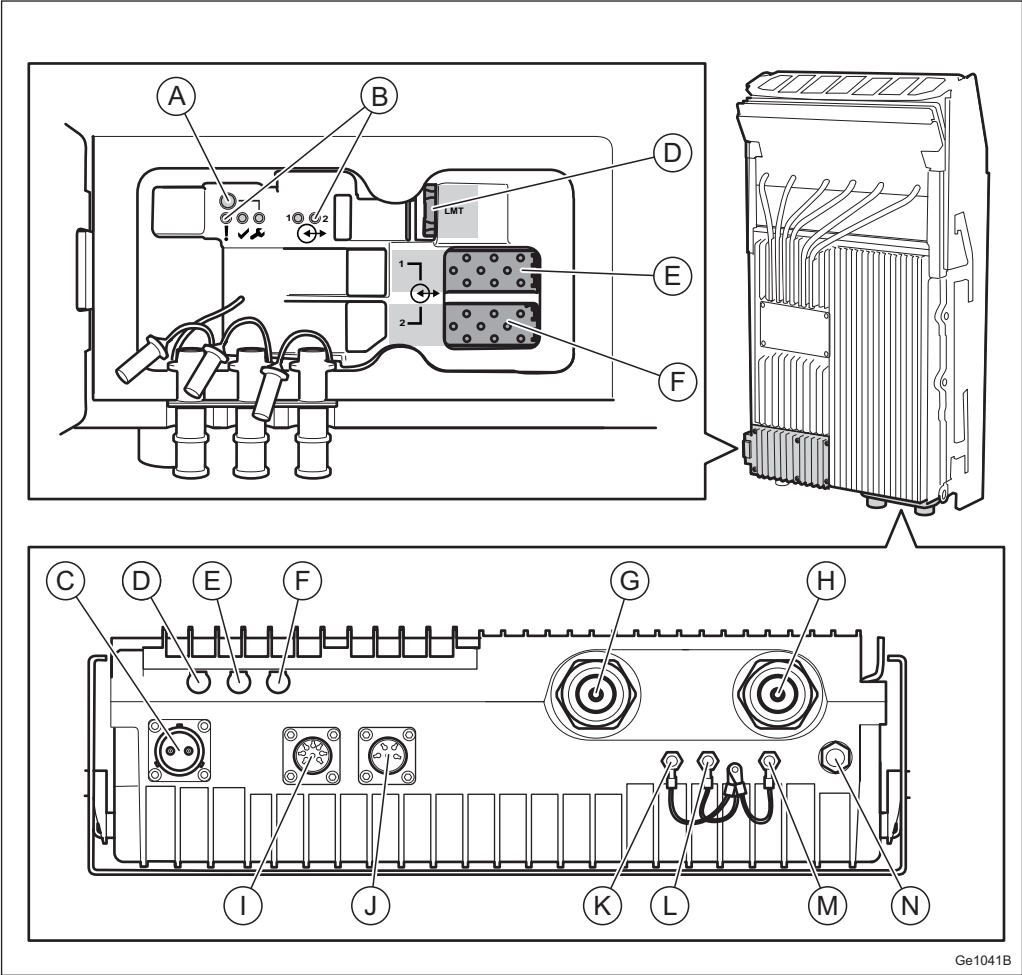
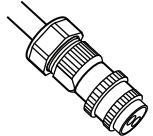
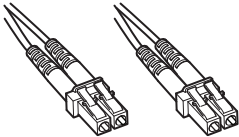
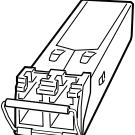
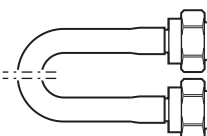
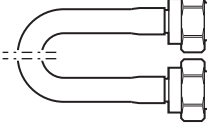
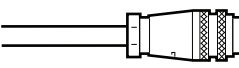
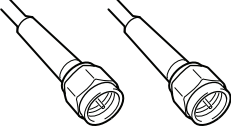


Figure 14 RRUS 01 Connection Interfaces

Table 14 RRUS Connection Interfaces

Position	Description	Marking	Connector Types	Cable Types
A	Maintenance button		-	-
B	Optical indicators	 ⊕ 1, ⊕ 2	-	-



Position	Description	Marking	Connector Types	Cable Types
C	-48 V DC power supply		Screw terminal connector	
D	–	LMT	-	-
E	Optical cable 1	↻ 1	LC (On SFP)	 
F	Optical cable 2	↻ 2		
G	Antenna 1	A ↻↻	7/16 connector	
H	Antenna 2	B ↻↻		
I	ALD (used for a RET unit for example)	ALD Ctrl	Mini-DIN connector, 8 pin	
J	External alarm	EXT Alarm	Alarm connector	
K	Cross connect RXA	RXA I/O	SMA connector	
L	RXA co-site	RXA Out		
M	Cross connect RXB	RXB I/O		



Position	Description	Marking	Connector Types	Cable Types
N	Grounding	⏏	M8 bolt	

5.1 Position A, Maintenance Button

See *Indicators, Buttons, and Switches* for information about maintenance button.

5.2 Position B, Optical Indicators

Optical indicators show the system status. More information about the optical indicators can be found in *Indicators, Buttons, and Switches* or in [Optical Indicators and Buttons](#) on page 21.

5.3 Position C, -48 V DC Power Supply Interface

The -48 V DC power connector for incoming power accepts cables with various cross-sectional areas, depending on the cable length and the RRU maximum power consumption. For more information on -48 V DC power cable dimensions, see *Main-Remote Installation Products Overview*.

The power cable conductor has a wire for the 0 V DC conductor, and a wire for the -48 V DC conductor. The color codes are market dependent for both wires.

All cables must be shielded. The shielding must be properly connected both to the power connector and to the grounding interface in the power supply equipment, otherwise the RRUS overvoltage and lightning protection do not function properly.

5.4 Position D, LMT

Not used.

5.5 Position E and F, Interface for Optical Cable to Main Unit

The ↻ 1 and ↻ 2 cables carry traffic and timing signals between the RRUS and the main unit. An Small Form-factor Pluggable (SFP) is used to connect the optical cable to the RRUS.



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

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 60950-1.
- Functional and performance verified to comply with RBS specifications.

Recommended SFP modules are obtained from the product packages for the RBS and the Main Remote Installation products. See *Spare Parts Catalog* and *Main-Remote Installation Products Overview* for more information.

5.6 Position G and H, Antenna Interface

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

Table 15 RRUS Antenna Connection Interface Characteristics

Connector Type	RF Cable Type	Cable Connector Type	Cable Product Number
7/16 IEC-169-4 insert-receiver type	50 Ω 1/2-inch coaxial	7/16 insert-type on both ends	TSR 951 70

The antenna cables must be connected as described in [Table 16](#).

Table 16 RRUS Antenna Cable Connectors

RRUS Connectors	Antenna Connectors
A  (Antenna 1)	TX/RX
B  (Antenna 2)	RX

5.7 Position I, ALD Ctrl Interface

The ALD control (ALD Ctrl) connects an ALD (RET) cable to the RRUS for antenna system communication.



5.8 Position J, Ext Alarm Interface

Two external alarms can be connected to the RRUS external alarm port. RRUS external alarms are currently supported in WCDMA and LTE.

5.9 Position K and M, RXA I/O and RXB I/O Interface

The RXA I/O and RXB I/O interface port is used to cross connect the RRUS for antenna diversity.

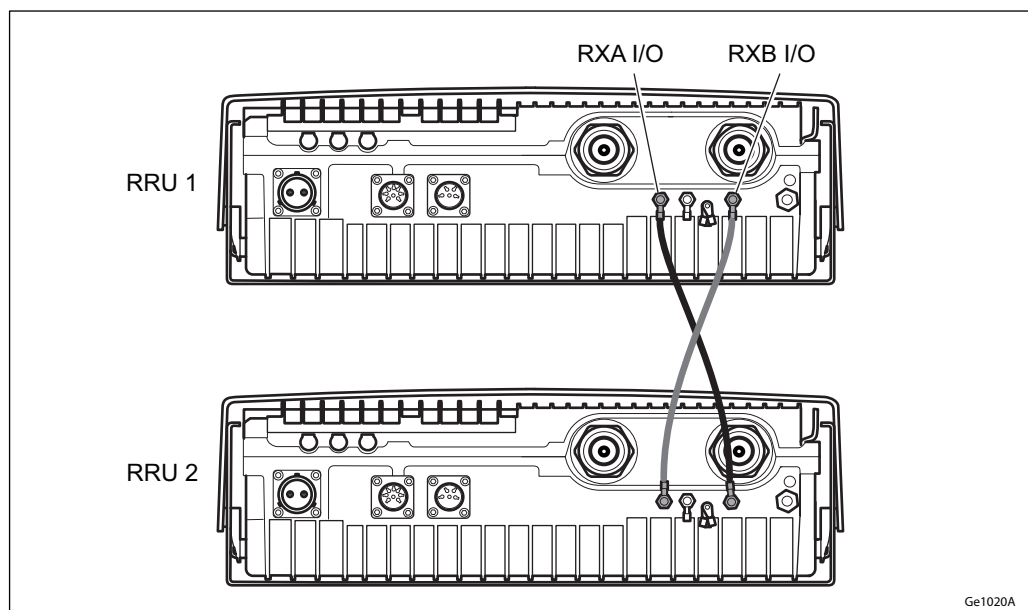


Figure 15 Cross Connecting RRUS

5.10 Position L, RXA Out Interface

The RXA Out interface port is used to co-site RRUSs.

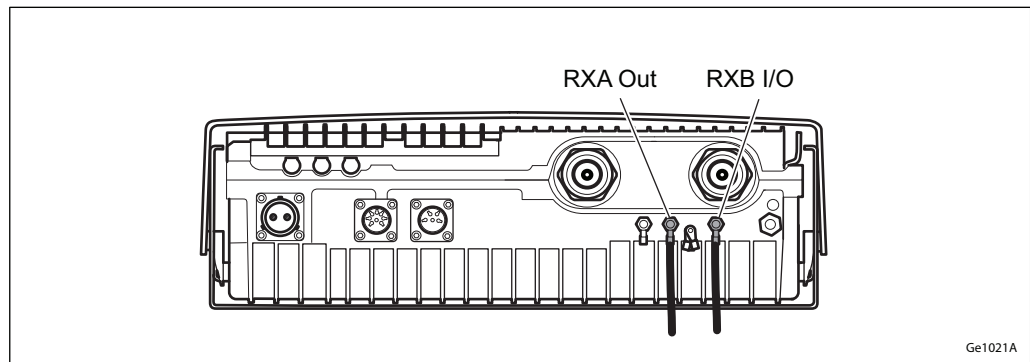


Figure 16 Co-siting RRUS

5.11 Position N, Grounding Interface

The RRUS must be grounded to protect it from overvoltage and lightning strikes. The grounding interface on the RRUS accepts a small cable lug on a short, coated cable. The cable and loop is then bolted into place with an M8 bolt as shown in [Figure 17](#).

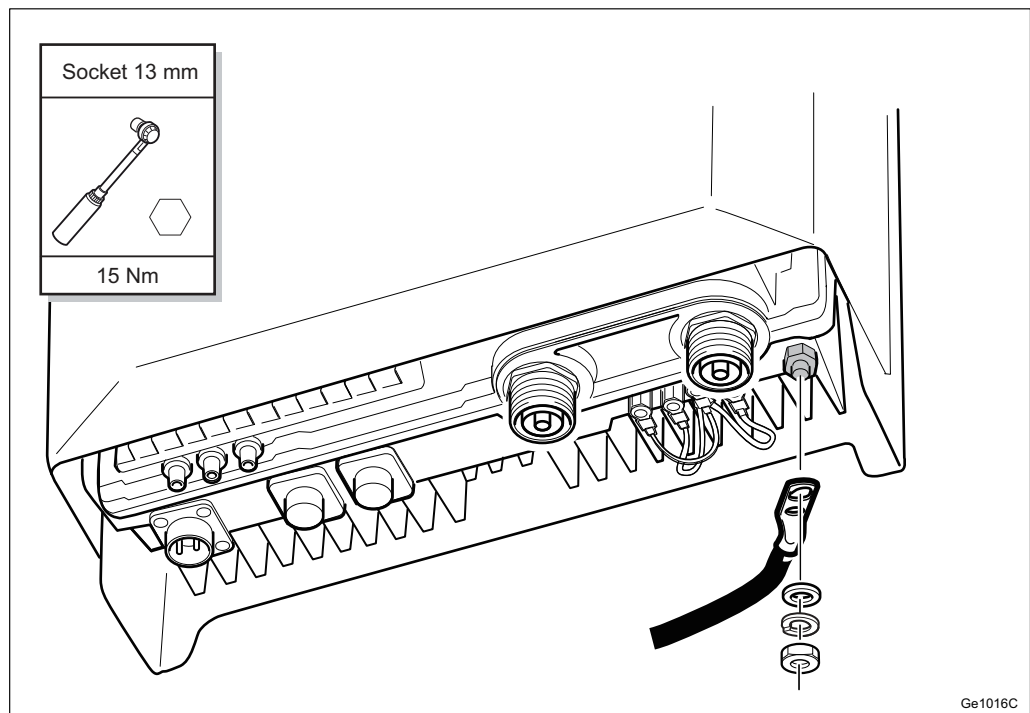


Figure 17 Grounding Interface



5.12 Optional Equipment Interfaces

The equipment presented in this section is optional and can be ordered separately.

5.12.1 ACCU (Optional)

The ACCU uses a screw plinth interface. All cables must be shielded. The shielding must be connected to the site MET on both ends. Each power cable conductor can have a 1.5–4 mm² cross-sectional area.

The ACCU must be grounded to protect it from overvoltage and lightning strikes.

The ACCU is shown in [Figure 10](#).

5.12.2 PSU AC (Optional)

The PSU AC uses an AC power interface available from Ericsson. The AC cable is connected to the PSU with a contact on the cable. Ericsson can supply a cable kit in different sizes where the AC contact is already attached.

All cables must be shielded. The shielding must be grounded on both the PSU and the power supply equipment side with the site Main Earth Terminal (MET). Each power cable conductor can have a 1.5–4 mm² cross-sectional area.

The PSU is shown in [Figure 9](#), [Figure 11](#).

Note: An ACCU is required with the AC/DC PSU when the RRUS is installed outdoors.

The wire color code in the external AC power supply cable is market dependent.

5.12.3 PSU 48 02(Optional)

The PSU 48 uses a DC power interface available from Ericsson.

All cables must be shielded. The shielding must be grounded on both the PSU and the power supply equipment side with the site Main Earth Terminal (MET). Each power cable conductor can have a 2.5–10 mm² cross-sectional area.

The PSU is shown in [Figure 12](#).

5.12.4 RF Monitoring Port (Optional)

The optional RF monitoring port allows either periodic or continuous downlink RF output power monitoring without interrupting RRUS service. The

monitoring interface can be found on the optional RF monitoring port. The RF monitoring port can be placed on each antenna interface that is a transmitter port.

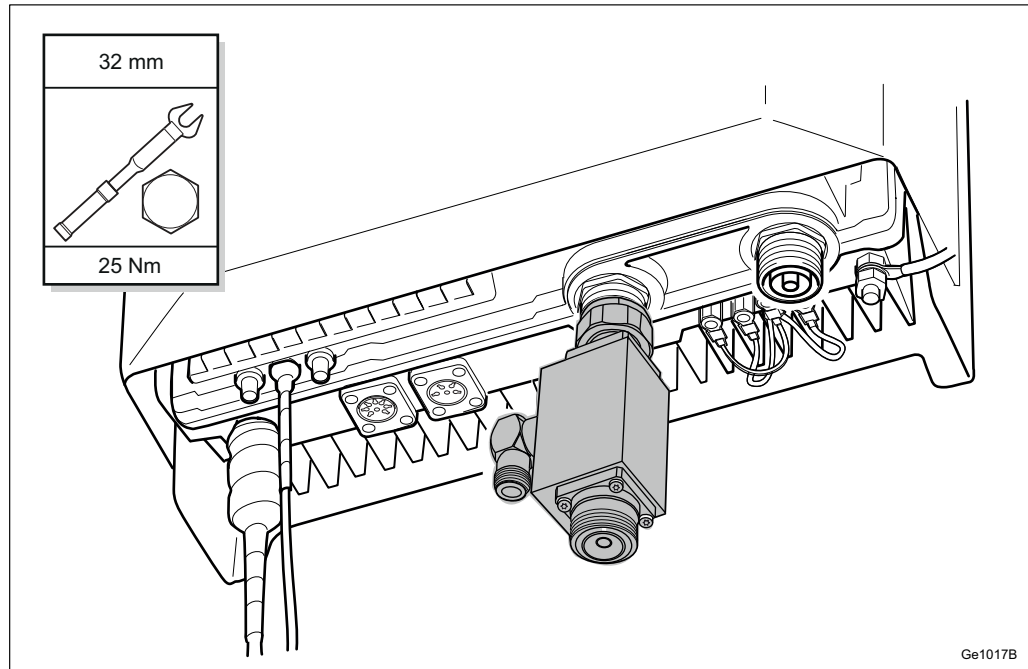


Figure 18 RF Monitoring Interface Connection



6 Standards and Regulations

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

Declaration of Conformity

"Hereby, Ericsson AB, declares that this Product is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU and 2011/65/EU."

6.1 Regulatory Approval

The RBS complies with the following market requirements:

- EC (European Community) market requirements, Radio Equipment Directive 2014/53/EU and Directive 2011/65/EU.
- The apparatus may include Radio Transceivers with support for frequency bands not allowed or not harmonized within the EC.
- Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive (2011/65/EU).
- 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

- EN 50581 (RoHS)

6.1.2 Safety Standards Compliance

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



International

- IEC 60 950-1 Ed2 with amendment A1

Europe

- EN 50 385
- EN 60 950-1 Ed2 with amendment A1

North America

- CSA-C22.2 No.60950-1-07 with amendment A1
- FCC CFR 47 Part 1.1310
- Health Canada Safety Code 6
- UL 60950-1

6.1.2.1 Outdoor Specific Requirements

The RBS complies with the following outdoor specific requirements:

International

- IEC 60 529 (IP55)
- IEC 60 950-22

Europe

- EN 60 529 (IP55)
- EN 60 950-22

North America

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



6.1.3 EMC Standards Compliance

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

International

- 3GPP TS25.113
- 3GPP TS36.113
- 3GPP TS37.113

Europe

- ETSI EN 301 489-1
- ETSI EN 301 489-8
- ETSI EN 301 489-23

North America

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

6.1.4 Radio Standards Compliance

The RBS complies with the following radio standards:

International

- 3GPP TS25.141
- 3GPP TS36.141
- 3GPP TS37.141
- 3GPP TS51.021

Europe

- ETSI EN 301 502
- ETSI EN 301 908-1



- ETSI EN 301 908-3
- ETSI EN 301 908-14
- ETSI EN 301 908-18

North America

- FCC CFR 47 Part 2 (USA)
- FCC CFR 47 Part 22, 24, and 27 (USA frequency dependent)
- IC RSS-132, 133, 139, and 199 (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:

Europe

- CE mark

North America

- usETL/cETL
- FCC CFR 47 Part 15 Statement
- IC ICES-003 Statement
- FCC ID (located on RRU)
- IC ID (located on RRU)

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 RRUS is in accordance with Ericsson standard class A3.

6.2.3 Vandal Resistance

Unauthorized access is not possible without damaging the unit.

RRUS 32 B2 Data Sheet

For Turf Vendors

2016-05-10 Rev C

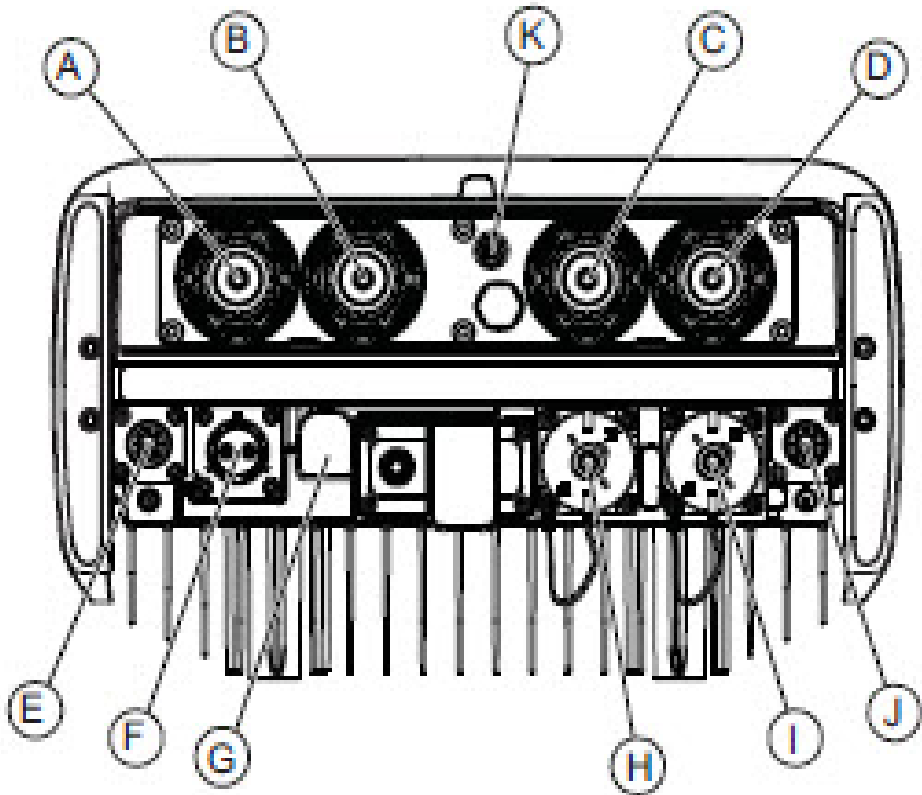
RRUS 32 B2



- › PCS
 - TX = 1930 – 1990 MHz
 - RX = 1850 – 1910 MHz
- › CPRI 2 ports x 10 Gbps. **Install 2 SFPs and connect 2 fiber pairs to the RRUS32 during initial install.**
- › Only use Ericsson supplied and approved SFPs, **RDH10247/3**
- › 6 external alarm inputs
- › Max wind load @ 50m/sec = 350N
- › Breaker size = **30A**, DC Power Consumption = **910W (for dimensioning)**
- › 200mm horizontal separation required for side by side mounting
- › 200mm separation required from antenna backplane to radio
- › 600mm/800mm vertical outdoor/indoor separation required
- › Min, Max DC cable size from squid to radio = **10, 8 AWG**,
- › Adapter is required for 2-wire connection
 - Shielded DC cable is required
- › Ground cable size = **2AWG**
- › Dimensions (incl. handles, feet and sunshield)
 - Height: 27.2" (690 mm)
 - Width: 12.1" (306 mm)
 - Depth: 7.0" (178 mm)
- › Weight, excl. mounting hardware = 53 lbs (24 kg)



RRUS 32 B2 Connection INter FACES



Position	Description	Marking
A	Antenna A	A
B	Antenna B	B
C	Antenna C	C
D	Antenna D	D
E	Antenna Line Device (ALD) ⁽¹⁾	ALD
F	- 48 V DC power supply	POWER
G	Grounding	
H	Optical cable 1	⊕1
I	Optical cable 2	⊕2
J	External alarm	
K	For future use	-

(1) Used for a Remote Electrical Tilt (RET) unit, for example.

CPRI, RET/AISG port, and ALD port caps have lanyards attached to the radio. DC and RF ports have protective caps to be removed when DC, RF connected to radio.



ERICSSON

RRUS 32 B6 6 Data Sheet

For Turf Vendors

2016-05-10 Rev E

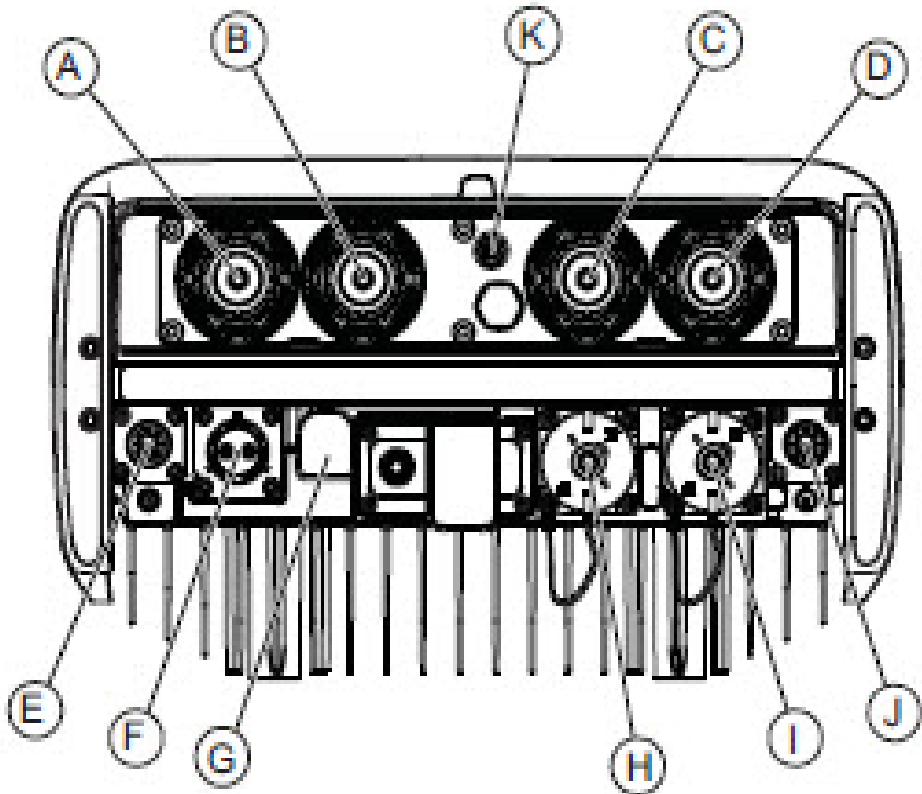
RRUS 32 B66



- › AWS
 - TX = 2110 – 2180 MHz
 - RX = 1710 – 1780 MHz
- › CPRI 2 ports x 10 Gbps. **Install 2 SFPs and connect 2 fiber pairs to the RRUS32 during initial install.**
- › Only use Ericsson supplied and approved SFPs **RDH10247/3**
- › 6 external alarm inputs
- › Max wind load @ 50m/sec = 350N
- › Breaker size = **30A**, DC Power Consumption = **880W (for dimensioning)**
- › 200mm horizontal separation required for side by side mounting
- › 200mm separation required from antenna backplane to radio
- › 600mm/800mm vertical outdoor/indoor separation required
- › Min, Max DC cable size from squid to radio = **10,8 AWG**
 - Adapter is required for 2-wire connection
 - Shielded DC cable is required
- › Ground cable size = **2AWG**
- › Dimensions (incl. handles, feet and sunshield)
 - Height: 27.2" (690 mm)
 - Width: 12.1" (306 mm)
 - Depth: 7.0" (178 mm)
- › Weight, excl. mounting hardware = 53 lbs (24 kg)



RRUS 32 B2 Connection INt er FACES



Position	Description	Marking
A	Antenna A	A ⚡
B	Antenna B	B ⚡
C	Antenna C	C ⚡
D	Antenna D	D ⚡
E	Antenna Line Device (ALD) ⁽¹⁾	ALD
F	- 48 V DC power supply	POWER
G	Grounding	⏏
H	Optical cable 1	⊕1
I	Optical cable 2	⊕2
J	External alarm	🔔
K	For future use	-

⁽¹⁾ Used for a Remote Electrical Tilt (RET) unit, for example.

CPRI, RET/AISG port, and ALD port caps have lanyards attached to the radio. DC and RF ports have protective caps to be removed when DC, RF connected to radio.



ERICSSON



Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°/2-12°

FEATURES / BENEFITS

This antenna provides a 8 Port multi-band flexible platform for advanced use for flexible use in deployment scenarios for encompassing 600MHz, 700MHz, AWS & PCS applications.



- ➔ 24 Inch Width For Easier Zoning
- ➔ Field Replaceable (Integrated) AISG RET platform for reduced environmental exposure and long lasting quality
- ➔ Superior elevation pattern performance across the entire electrical down tilt range
- ➔ Includes three AISG RET motors - Includes 0.5m AISG jumper for optional diasy chain of two high band RET motors for one single AISG point of high band tilt control.
- ➔ Low band arrays driven by a single RET motor

Technical Features

LOW BAND LEFT ARRAY (617-746 MHZ) [R1]

Frequency Band	MHz	617-698	698-746
Gain	dBi	15.1	15.5
Horizontal Beamwidth @3dB	Deg	65	62
Vertical Beamwidth @3dB	Deg	11.4	10.4
Electrical Downtilt Range	Deg	0-12	0-12
Upper Side Lobe Suppression 0 to +20	dB	19	20
Front-to-Back, at +/-30°, Copolar	dB	25	24
Cross Polar Discrimination (XPD) @ Boresight	dB	19	19
Cross Polar Discrimination (XPD) @ +/-60	dB	5	3
3rd Order PIM 2 x 43dBm	dBc		-153
VSWR	-	1.5:1	1.5:1
Cross Polar Isolation	dB	25	25
Maximum Effective Power per Port	Watt	250	250

LOW BAND RIGHT ARRAY (617-746 MHZ) [R2]

Frequency Band	MHz	617-698	698-746
Gain	dBi	14.8	15.1
Horizontal Beamwidth @3dB	Deg	65	62
Vertical Beamwidth @3dB	Deg	11.4	10.3
Electrical Downtilt Range	Deg	0-12	0-12
Upper Side Lobe Suppression 0 to +20	dB	19	20
Front-to-Back, at +/-30°, Copolar	dB	25	23
Cross Polar Discrimination (XPD) @ Boresight	dB	19	19
Cross Polar Discrimination (XPD) @ +/-60	dB	5	3
3rd Order PIM 2 x 43dBm	dBc		-153
VSWR	-	1.5:1	1.5:1
Cross Polar Isolation	dB	25	25
Maximum Effective Power per Port	Watt	250	250



Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°/2-12°

HIGH BAND LEFT ARRAY (1695-2200 MHZ) [B1]

Frequency Band	MHz	1695-1880	1850-1990	1920-2200
Gain	dBi	17.3	17.8	18.5
Horizontal Beamwidth @3dB	Deg	66	59	59
Vertical Beamwidth @3dB	Deg	5.3	4.7	4.3
Electrical Downtilt Range	Deg	2-12	2-12	2-12
Upper Side Lobe Suppression 0 to +20	dB	15	15	15
Front-to-Back, at +/-30°, Copolar	dB	25	25	25
Cross Polar Discrimination (XPD) @ Boresight	dB	19	17	16
Cross Polar Discrimination (XPD) @ +/-60	dB	4	6	4
3rd Order PIM 2 x 43dBm	dBc	-153	-153	-153
VSWR	-	1.5:1	1.5:1	1.5:1
Cross Polar Isolation	dB	25	25	25
Maximum Effective Power per Port	Watt	250	250	250

HIGH BAND RIGHT ARRAY (1695-2200 MHZ) [B2]

Frequency Band	MHz	1695-1880	1850-1990	1920-2200
Gain	dBi	17.1	17.8	18.5
Horizontal Beamwidth @3dB	Deg	66	59	59
Vertical Beamwidth @3dB	Deg	5.2	4.7	4.3
Electrical Downtilt Range	Deg	2-12	2-12	2-12
Upper Side Lobe Suppression 0 to +20	dB	15	15	15
Front-to-Back, at +/-30°, Copolar	dB	25	24	25
Cross Polar Discrimination (XPD) @ Boresight	dB	20	17	16
Cross Polar Discrimination (XPD) @ +/-60	dB	4	6	5
3rd Order PIM 2 x 43dBm	dBc	-153	-153	-153
VSWR	-	1.5:1	1.5:1	1.5:1
Cross Polar Isolation	dB	25	25	25
Maximum Effective Power per Port	Watt	250	250	250



Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°/2-12°

ELECTRICAL SPECIFICATIONS

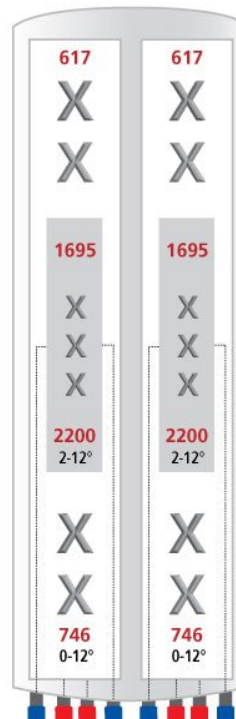
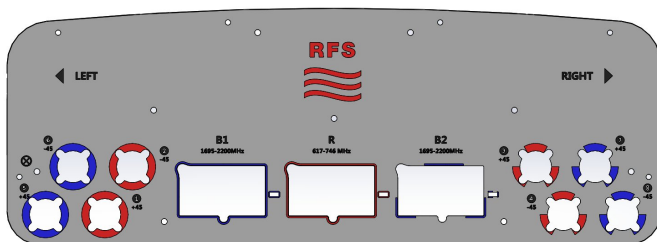
Impedance	Ohm	50.0
Polarization	Deg	±45°

MECHANICAL SPECIFICATIONS

Dimensions - H x W x D	mm (in)	2436 x 609 x 222 (95.9 x 24 x 8.7)
Weight (Antenna Only)	kg (lb)	58 (128)
Weight (Mounting Hardware only)	kg (lb)	11.5 (25.3)
Shipping Weight	kg (lb)	80 (176)
Connector type		8 x 4.3-10 female at bottom + 6 AISG connectors (3 male, 3 female)
Adjustment mechanism		Integrated RET solution AISG compliant (Field Replaceable) + Manual Override + External Tilt Indicator
Mounting Hardware Material		Galvanized steel
Radome Material / Color		Fiber Glass / Light Grey RAL7035

TESTING AND ENVIRONMENTAL

Temperature Range	°C (°F)	-40 to 60 (-40 to 140)
Lightning protection		IEC 61000-4-5
Survival/Rated Wind Velocity	km/h	241 (150)
Environmental		ETSI 300-019-2-4 Class 4.1E



ORDERING INFORMATION

Order No.	Configuration	Mounting Hardware	Mounting pipe Diameter	Shipping Weight
APXVAARR24_43-U-NA20	Field Replace RET included (3)	APM40-5E Beam tilt kit (included)	60-120mm	80 Kg



Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°/2-12°

External Document Links

APM40_Series_Installation_Instructions
Manual_Overdrive_Instructions
Global RFS Website

Notes

All electrical parameters are compliant with BASTA NGMN 9.6 requirements.

Available Configurations

APXVAARR24_43-U-NA20 -- External ACU is included -- shipping weight 80kg.

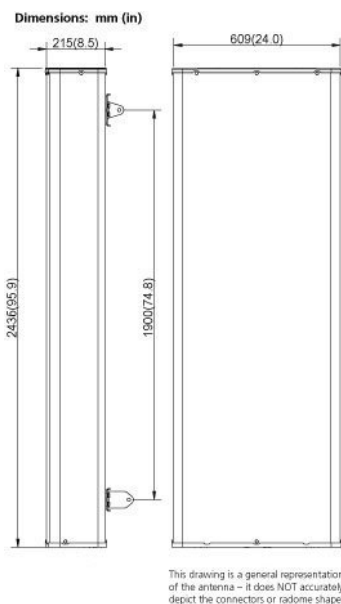
For additional mounting information please click "External Document Links".

This data is provisional and subject to changes.

External Link Reference

Global RFS Website

<http://www.rfsworld.com>





SPECIFICATIONS

4x4 MIMO Bi-Sector Array Antenna

BSA33R-U6A

Electrical

Ports	8 X High Band Ports for 1695-2400 MHz			
Frequency Range	1695-1880 MHz	1920-2180 MHz	1850-1990 MHz	2300-2400 MHz
Gain (Peak)	17.5 dBi	17.8 dBi	18.3 dBi	18.8 dBi
Gain (Average)*	16.4 dBi	17.2 dBi	17.6 dBi	18.2 dBi
Azimuth Beamwidth (-3dB)	37°	34°	32°	28°
Elevation Beamwidth (-3dB)	9.8°	9.0°	8.6°	7.6°
Electrical Downtilt	0° to 10°	0° to 10°	0° to 10°	0° to 10°
Elevation Sidelobes (1st Upper)	< -17 dB	< -18 dB	< -18 dB	< -18 dB
Front-to-Back Ratio @180°	> 35 dB	> 35 dB	> 35 dB	> 35 dB
Cross-Polar Discrimination (at Peak)	> 24 dB	> 24 dB	> 24 dB	> 24 dB
Cross-Polar Port-to-Port Isolation	> 25 dB	> 25 dB	> 25 dB	> 25 dB
Voltage Standing Wave Ratio (VSWR)	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1
Passive Intermodulation (2x20W)	≤ -150 dBc	≤ -150 dBc	≤ -150 dBc	≤ -150 dBc
Input Power Continuous Wave (CW)	300 watts	300 watts	300 watts	300 watts
Polarization	±45°	±45°	±45°	±45°
Input Impedance	50 Ohms	50 Ohms	50 Ohms	50 Ohms
Lightning Protection	DC Gnd	DC Gnd	DC Gnd	DC Gnd

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

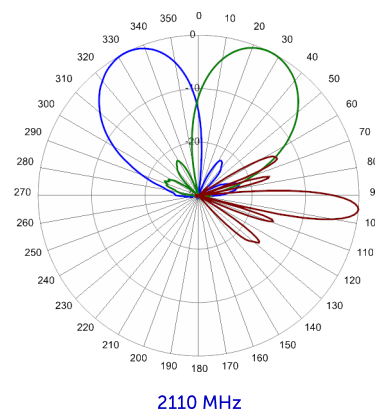
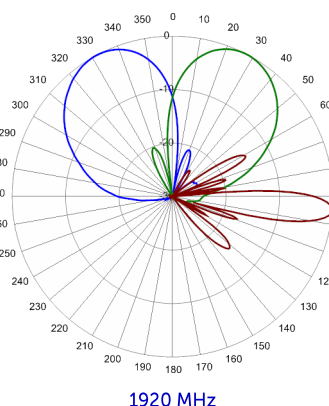
Rear Iso View



Mechanical

Dimensions (LxWxD)	75.9 x 12.9 x 6.2 inches (1929×327×158 mm)
Survival Wind Speed	> 150 mph (> 241 km/hr)
Front Wind Load	235 lbs (1045 N) @ 100 mph (161 kph)
Side Wind Load	132 lbs (588 N) @ 100 mph (161 kph)
Equivalent Flat Plate Area	9.2 ft² (0.9 m²)
Weight *	50.6 lbs (23 kg)
RET System Weight	3.3 lbs (1.5 kg)
Connector	8 × 7-16 DIN female long neck
Mounting Pole	2-5 in (5-12 cm)

*Weight excludes mounting and RET



1WAN003 - ALPHA

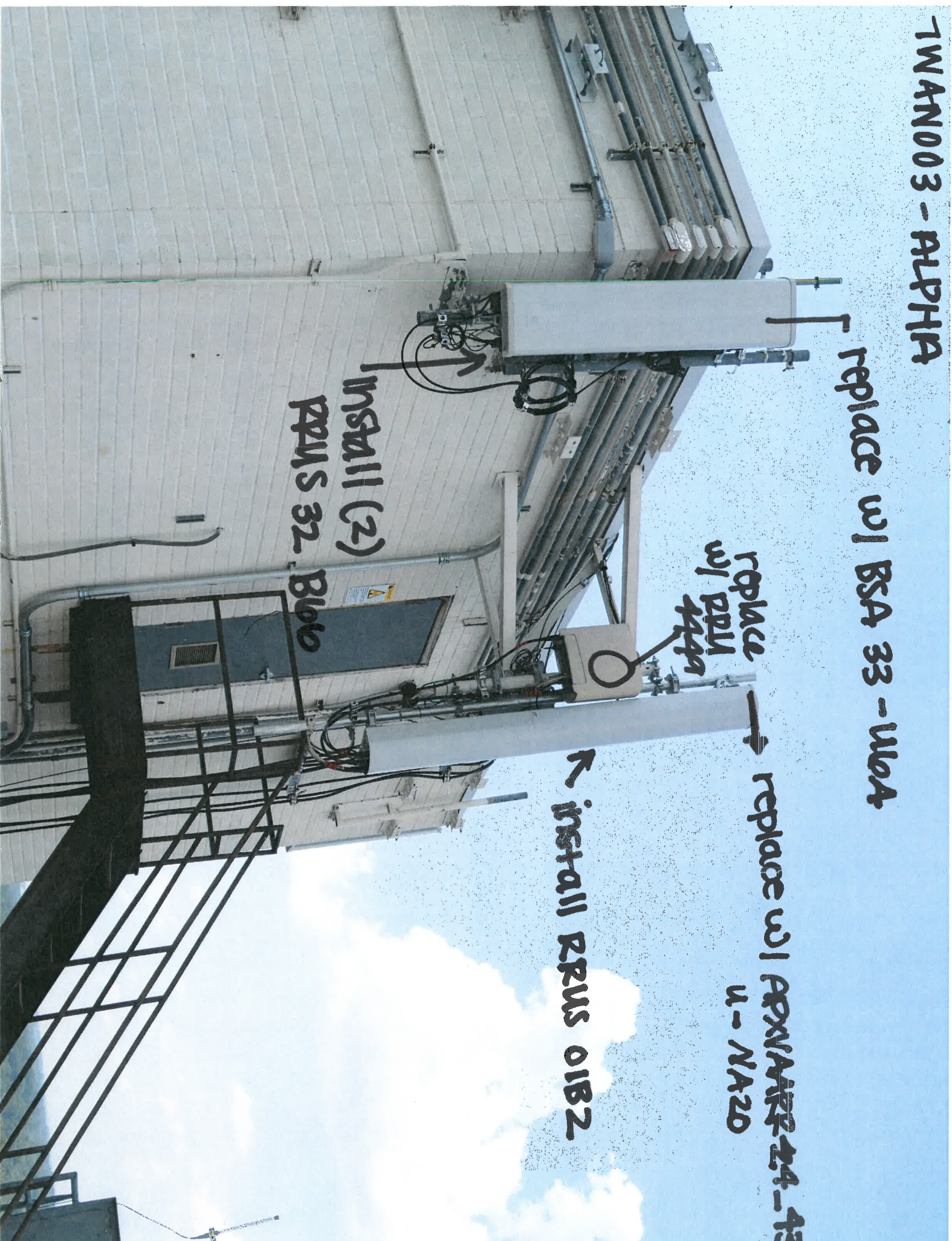
replace w/ BSA 33-464

replace
w/ PPM
444

replace w/ PPM 24-43
u - NA20

install RRU 01B2

install (2)
PPM 32 B66



1WAN003-BETA

replace w/

APXVARR 24-43-U-
NA20

replace w/
BSA 33 UGA

replace
w/
BSA 33 UGA

install
PRU
32 B66

install
PRU
32B2

replace
w/ PRU
4441

install
PRU
01B2

7W4N003- GPHMMH

remove & replace w/

A-PHYARR.24-43-

U-NA20

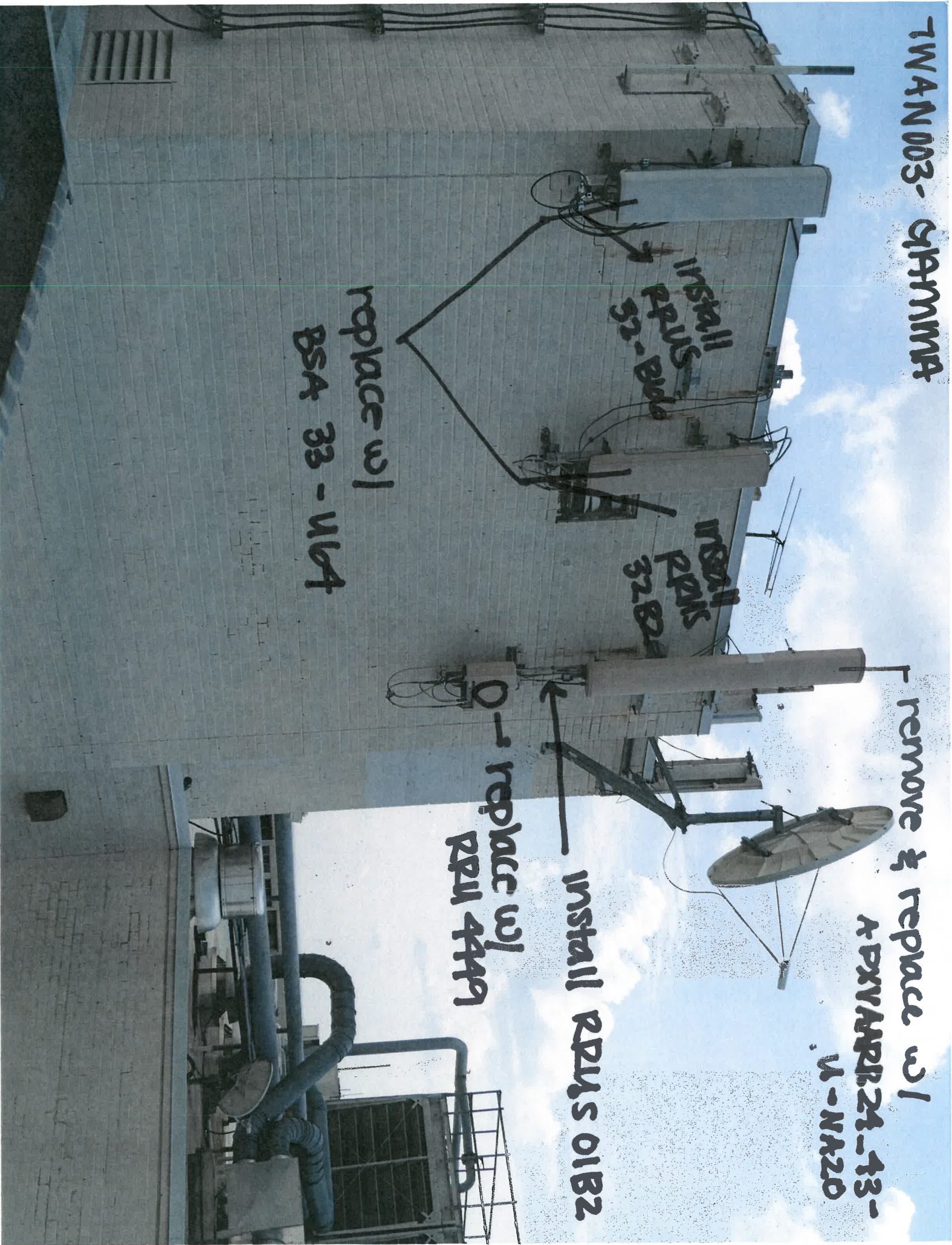
install
PDU 32-000

install
PDU 32-000

install PDU 01B2

replace w/
PDU 4449

replace w/
BSA 33-1164

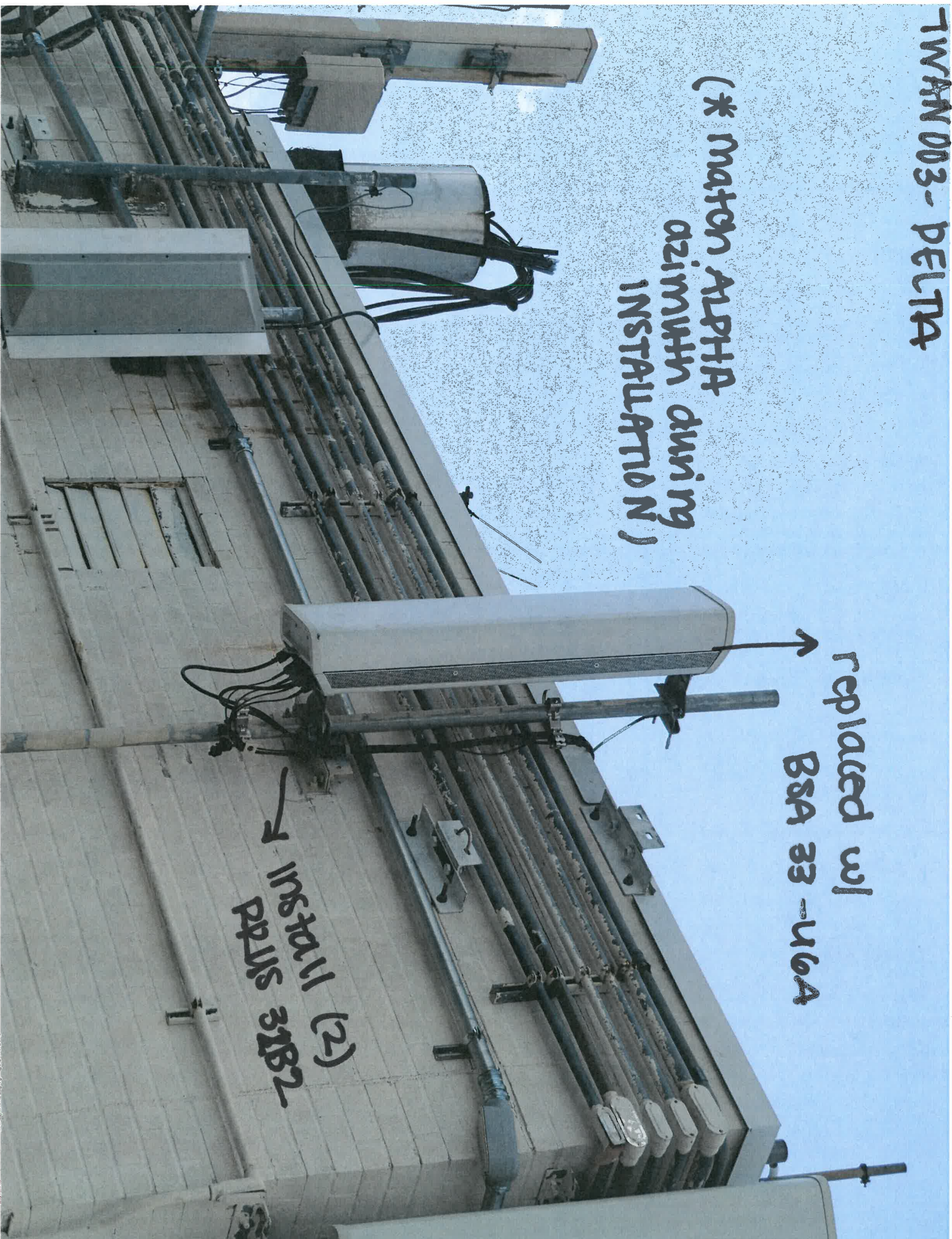


TWANN003- DELTA

(* MATCH ALPHA
azimuth during
INSTALLATION)

replaced w/
BSA 33-U6A

→ install (2)
PPHIS 31B2



T-Mobile
NORTHEAST LLC

**SITE NAME:
THE ENCLAVE**

SITE NUMBER:
7WAN003A

SITE ADDRESS:
11235 OAK LEAF DRIVE
SILVER SPRING, MARYLAND 20901

SITE INFORMATION:

SITE NAME:	THE ENCLAVE
SITE NUMBER:	7WAN003A
SITE ADDRESS:	11235 OAK LEAF DRIVE SILVER SPRING, MARYLAND 20901
JURISDICTION:	MONTGOMERY COUNTY, MARYLAND
ZONING:	RH
PARCEL ID:	05-00255115
PARCEL SIZE:	17.19 ACRES
SITE COORDINATES:	N 39°2'27.6282" (39.04100800) (NAD83) W 76°59'39.1302" (-76.99420300) (NAD83)
GROUND ELEVATION:	393± (NAVD 88)
STRUCTURE TYPE:	ROOFTOP
STRUCTURE HEIGHT:	161'-0"± AGL (TOP OF BUILDING)
ANTENNA RAD CENTER	174'-0"± AGL
BUILDING OWNER NAME:	ENCLAVE HOLDING LC/NONCONNAH HOLDINGS LLC
BUILDING OWNER ADDRESS:	2329 NOSTRAND AVENUE #500 BROOKLYN, NEW YORK 11210
GROUND OWNER NAME:	ENCLAVE HOLDING LC/NONCONNAH HOLDINGS LLC
GROUND OWNER ADDRESS:	2329 NOSTRAND AVENUE #500 BROOKLYN, NEW YORK 11210
APPLICANT:	T-MOBILE, NORTHEAST LLC 12050 BALTIMORE AVENUE BELTSVILLE, MARYLAND 20705
APPLICANT PHONE:	(240) 264-8600
APPLICANT FAX:	(240) 264-8610

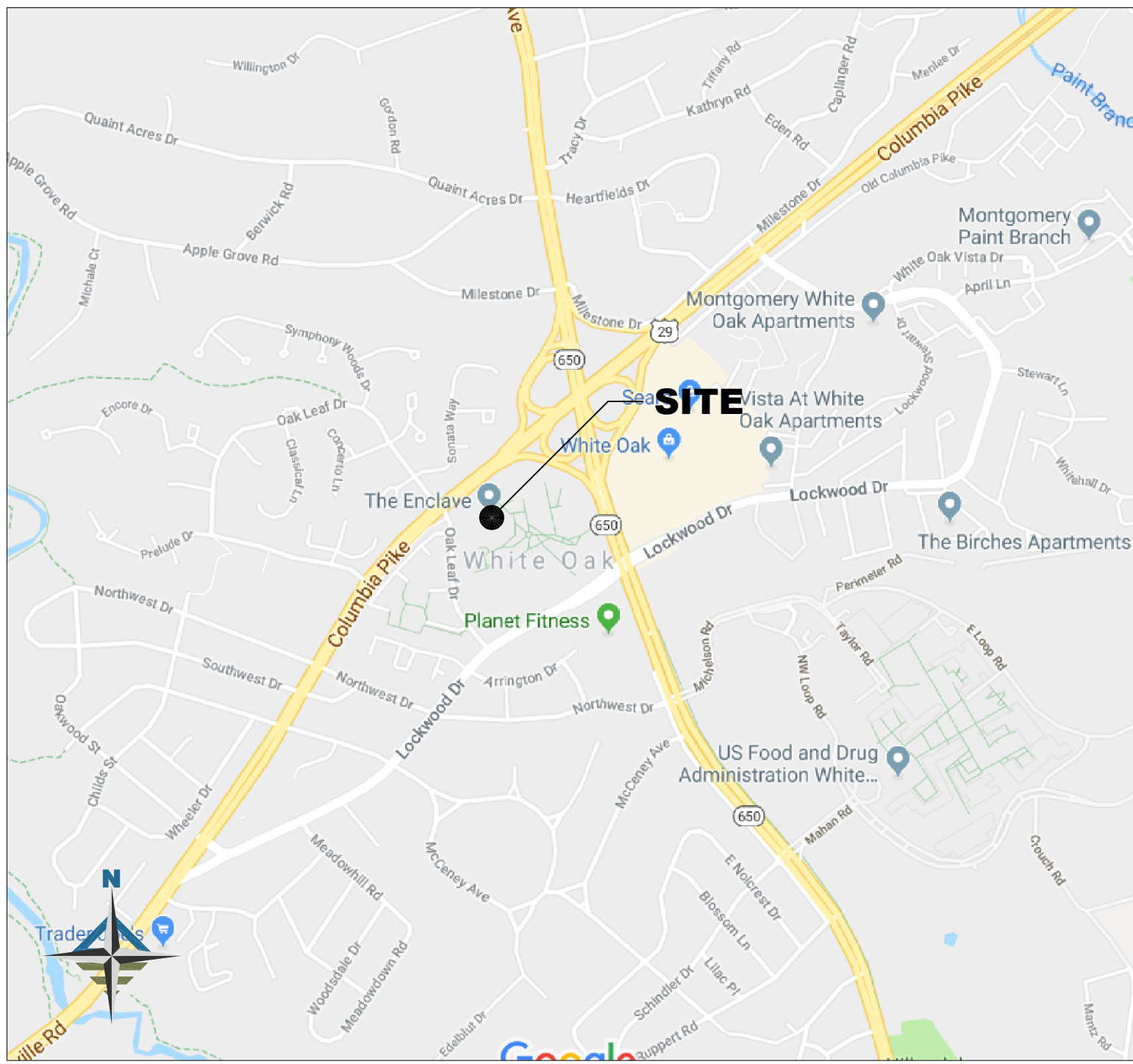
ABBREVIATIONS:

ATS	AUTOMATIC TRANSFER SWITCH	MAX	MAXIMUM
AWG	AMERICAN WIRE GAUGE	MBG	MASTER GROUND BAR
ATTN	ATTENTION	MIN	MINIMUM
BTS	BASE TRANSMISSION SYSTEM	MTS	MANUAL TRANSFER SWITCH
CONT	CONTINUED	NEC	NATIONAL ELECTRICAL CODE
CU	COPPER	POB	POINT OF BEGINNING
DWG	DRAWING	POC	POINT OF CONNECTION
EMT	ELECTRICAL METALLIC TUBING	POT	POINT OF TERMINATION
GEN	GENERATOR	PPC	POWER PROTECTION CABINET
GRD	GROUND	PVC	POLYMERIZING VINYL CHLORIDE
IBC	INTERNATIONAL BUILDING CODE	RGS	RIGID GALVANIZED STEEL
IFC	INTERNATIONAL FIRE CODE	RF	RADIO FREQUENCY
LOD	LIMIT OF DISTURBANCE	TYT	TYPICAL

■ MARYLAND 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:

BUILDING CODE:	INTERNATIONAL BUILDING CODE 2015
ELECTRICAL CODE:	NATIONAL ELECTRICAL CODE 2014
FIRE SAFETY CODE:	2012 NATIONAL FIRE PREVENTION ASSOCIATION 101
USE GROUP:	U (UTILITY)
CONSTRUCTION TYPE:	IIB

VICINITY MAP:

DRIVING DIRECTIONS:

HEADING FROM 12050 BALTIMORE AVENUE. HEAD SOUTHEAST TOWARD US-1 NORTH. TAKE MD-200 AND US-29/COLUMBIA PIKE TO MD-650 SOUTH/NEW HAMPSHIRE AVENUE IN WHITE OAK. TAKE THE MD-650 SOUTH/NEW HAMPSHIRE AVENUE EXIT FROM US-29/COLUMBIA PIKE. TURN LEFT ONTO US-1 NORTH. USE THE LEFT 2 LANES TO TURN LEFT ONTO MD-200. USE THE RIGHT 2 LANES TO TAKE EXIT 16 A-B FOR U.S. 29 SOUTH TOWARD SILVER SPRING. MERGE ONTO US-29/COLUMBIA PIKE. EXIT ONTO MD-650 SOUTH/NEW HAMPSHIRE AVENUE. CONTINUE ON MD-650 SOUTH/NEW HAMPSHIRE AVENUE TO YOUR DESTINATION. MERGE ONTO MD-650 SOUTH/NEW HAMPSHIRE AVENUE. TURN RIGHT ONTO LOCKWOOD DRIVE. TURN RIGHT ONTO OAK LEAF DRIVE. TURN RIGHT. ARRIVED AT SITE GATE.

■ LOCATION MAP:



PROJECT DESCRIPTION:

1. (6) SIX EXISTING T-MOBILE AIR ANTENNAS TO BE REMOVED AND REPLACED WITH (6) SIX NEW SPLIT BEAM ANTENNAS, (2) TWO PER SECTOR.
2. (3) THREE EXISTING L700 ANTENNAS TO BE REMOVED AND REPLACE WITH (3) THREE NEW LTE 600/LTE 700 ANTENNAS.
3. (3) THREE EXISTING L700 RRU'S TO BE REMOVED AND REPLACED WITH (3) THREE NEW LTE 600/LTE 700 RRU'S.
4. (15) RRU'S TO BE INSTALLED, (5) FIVE PER SECTOR.
5. (3) THREE NEW 6X12 HYBRIDS TO BE INSTALLED, 30M.

■ **STRUCTURAL NOTE:**

ADVANTAGE ENGINEERS IS NOT RESPONSIBLE FOR DESIGN OR STRUCTURAL CERTIFICATION OF NEW ANTENNA MOUNTS REQUIRED FOR THE INSTALLATION OF THE PROPOSED EQUIPMENT ASSOCIATED WITH THIS PROJECT. PLEASE REFER TO THE STRUCTURAL ANALYSIS COMPLETED BY OTHERS FOR ALL STRUCTURAL INFORMATION RELATED TO THE ANTENNA MOUNTS.

NOTE TO GENERAL CONTRACTOR:

NO WORK IS TO BE PERFORMED ON THIS SITE WITHOUT REVIEW OF THE APPROVED STRUCTURAL ANALYSIS. IF ANY DISCREPANCIES ARE FOUND THE GENERAL CONTRACTOR SHALL NOTIFY THE ENGINEER IN WRITING. AT NO TIME WILL ANY ADDITIONAL ANTENNAS BE INSTALLED WITHOUT WRITTEN CONSENT FROM A STRUCTURAL ENGINEER.

■ SHEET INDEX:

[illegible]

■ PLAN APPROVALS:

THE FOLLOWING PARTIES HEREBY APPROVE AND ACCEPT THESE DOCUMENTS AND
 AUTHORIZE THE CONTRACTOR TO PROCEED WITH THE CONSTRUCTION DESCRIBED
 HEREIN. ALL DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL BUILDING
 DEPARTMENT AND MAY IMPOSE CHANGES OR MODIFICATIONS.

R.F. ENGINEER: _____ DATE: _____

ZONING MGR: _____ DATE: _____

S.A. MGR: _____ DATE: _____

CONSTRUCTION MGR: _____ DATE: _____

A&E MGR: _____ DATE: _____

PROPERTY OWNER: _____ DATE: _____

■ DRAWING SCALE NOTES:

THESE DRAWINGS ARE FORMATTED TO BE FULL SIZE AT 22"x34". CONTRACTOR SHALL VERIFY ALL PLANS & EXISTING DIMENSIONS & CONDITIONS ON THE JOB SITE & SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

■ PLAN REVISIONS:

5			
4			
3			
2			
1			
0	11-07-18	DF	ISSUED FOR CONSTRUCTION
A	03-01-18	ALM	ISSUED FOR 90% REVIEW (CDs)
REV No	DATE	DESIGNER	DESCRIPTION

■ AE DESIGN INFO:

DESIGNER: ALM	AE JOB No: 18E019A.001
------------------	---------------------------

DRAWING TITLE:

TITLE SHEET & PROJECT DATA

■ DRAWING SHEET:

T-1

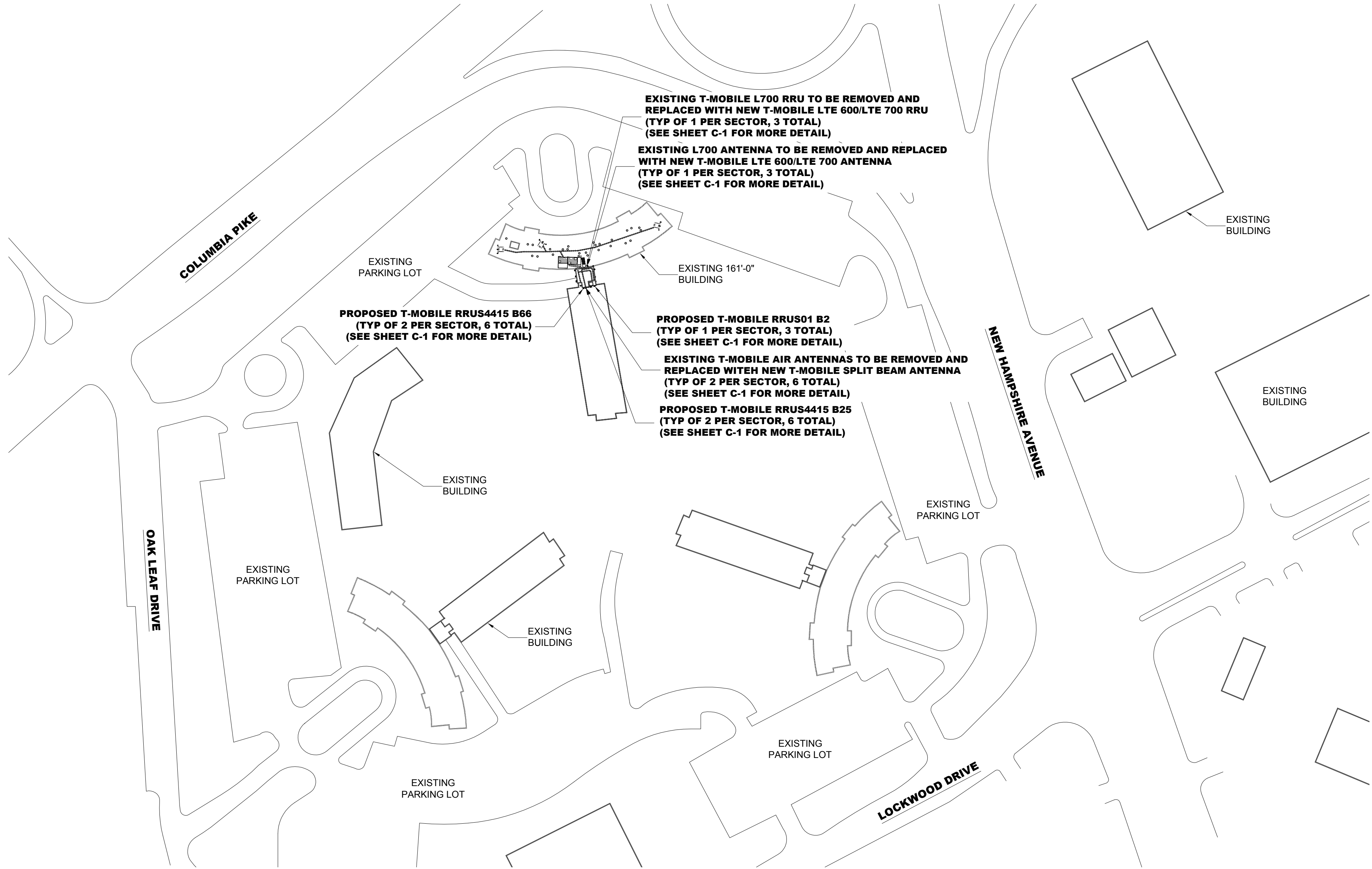
SITE INFORMATION:

SITE NAME:
THE ENCLAVE
SITE NUMBER:
7WAN003A
SITE ADDRESS:
11235 OAK LEAF DRIVE
SILVER SPRING,
MARYLAND 20901
JURISDICTION:
MONTGOMERY COUNTY, MARYLAND

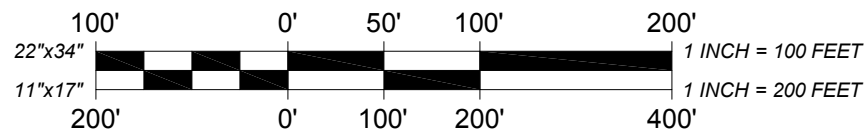
SHEET NUMBER:

1 OF 9

ANDREW M. MILLER, PE
 PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE
 DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A
 LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE
 STATE OF MARYLAND, LICENSE NO. 41497, EXPIRATION DATE: 01-05-20*



1 SITE PLAN
Z-1
SCALE = 1" = 100'-0"



**Know what's below.
Call before you dig.**

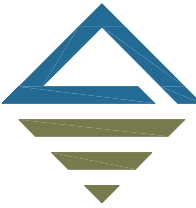
PROTECT YOURSELF, GIVE THREE
WORKING DAYS NOTICE
THIS DRAWING DOES NOT INCLUDE NECESSARY
COMPONENTS FOR CONSTRUCTION SAFETY. ALL
CONSTRUCTION MUST BE DONE IN COMPLIANCE
WITH THE OCCUPATIONAL SAFETY AND HEALTH
ACT OF 1970 AND ALL RULES AND REGULATIONS
THERE TO APPURTENANT.

GENERAL NOTES:

1. THIS PLAN WAS PREPARED USING AN APPROVED PLAN ENTITLED SITE PLAN BY ADVANTAGE ENGINEERS, DATED 03-02-17.
2. THE PROPOSED FACILITY WILL CAUSE "DE MINIMIS" INCREASE IN STORMWATER RUNOFF. THEREFORE, NO DRAINAGE STRUCTURES ARE PROPOSED.
3. NO NOISE, SMOKE, DUST, OR ODOR WILL RESULT FROM THIS FACILITY.
4. THE FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION. (THERE IS NO HANDICAP ACCESS REQUIRED.)
5. THE FACILITY IS UNMANNED AND DOES NOT REQUIRE POTABLE WATER OR SANITARY SERVICE.
6. ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 1988).
7. THE PROPOSED DEVELOPMENT DOES NOT INCLUDE STREET SIGNS OF ANY TYPE.
8. THE PROPOSED DEVELOPMENT DOES NOT INCLUDE OUTDOOR STORAGE OR ANY SOLID WASTE RECEPTACLES.
9. ACCORDING TO THE F.I.R.M. COMMUNITY PANEL # 24031C0390D, DATED 09/29/2006, THE PROPOSED SITE IS NOT IN A FLOODPLAIN.

T - Mobile
NORTHEAST LLC

T-MOBILE NORTHEAST LLC
12050 BALTIMORE AVENUE
BELTSVILLE, MARYLAND 20705
PHONE: (240) 264-8600
FAX: (240) 264-8610



advantage engineers

7070 SAMUEL MORSE DRIVE, SUITE 150
COLUMBIA, MARYLAND 21046
PHONE: (443) 367-0003
www.advantageengineers.com

PLAN REVISIONS:

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A	03-01-18	ALM	ISSUED FOR 90% REVIEW (CDs)
REV No	DATE	DESIGNER	DESCRIPTION

AE DESIGN INFO:

DESIGNER: ALM
AE JOB No: 18E019A.001

DRAWING TITLE:

SITE PLAN

DRAWING SHEET:

Z-1

SITE INFORMATION:

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THE ENCLAVE
SITE NUMBER:
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SILVER SPRING,
MARYLAND 20901
JURISDICTION:
MONTGOMERY COUNTY, MARYLAND

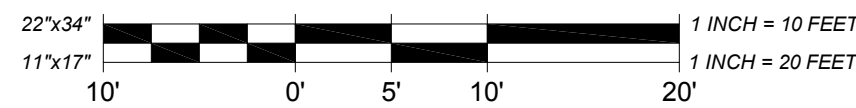
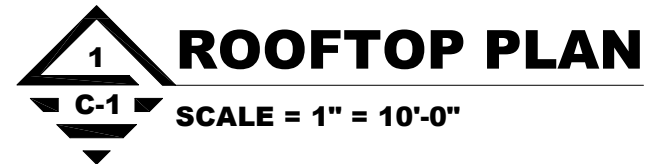
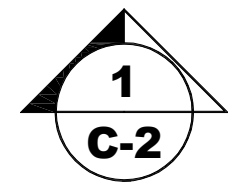
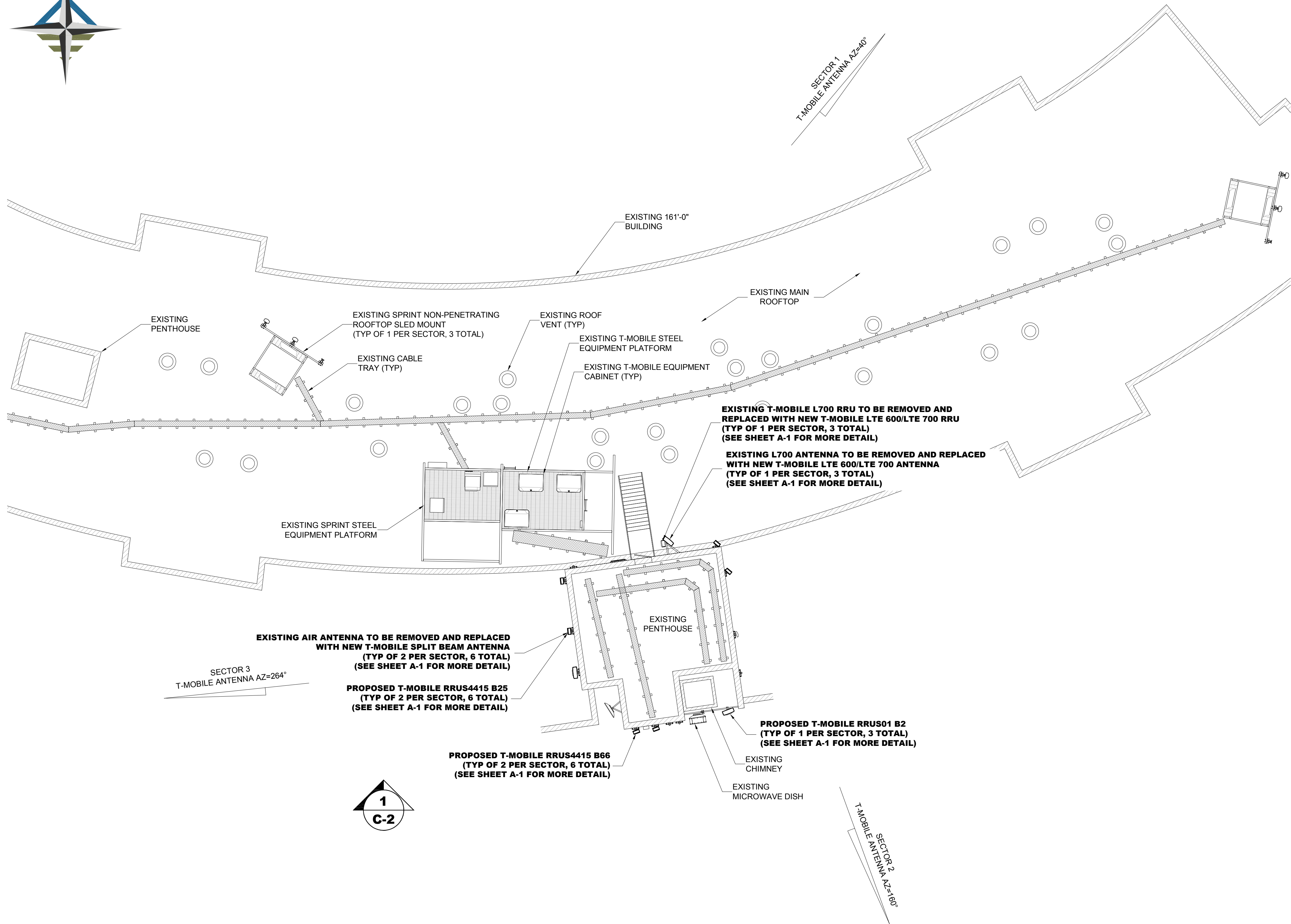
SHEET NUMBER:

2 OF 9

ANDREW M. MILLER, PE

"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. 41497, EXPIRATION DATE: 01-05-20"

THIS DRAWING IS PROPERTY OF ADVANTAGE ENGINEERS, LLC. IT IS FOR THE EXCLUSIVE USE OF THIS PROJECT. ANY RE-USE OF THIS DRAWING WITHOUT THE EXPRESSED WRITTEN CONSENT OF ADVANTAGE ENGINEERS, LLC IS PROHIBITED.



GENERAL NOTES:

1. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE CODES, ORDINANCES, LAWS AND REGULATIONS OF ALL MUNICIPALITIES, UTILITY COMPANIES OR OTHER PUBLIC AUTHORITIES.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS THAT MAY BE REQUIRED BY ANY FEDERAL, STATE, COUNTY OR MUNICIPAL AUTHORITIES.
3. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER, IN WRITING, OF ANY CONFLICTS, ERRORS OR OMISSIONS PRIOR TO THE SUBMISSION OF BIDS OR PERFORMANCE OF WORK. MINOR OMISSIONS OR ERRORS IN THE BID DOCUMENTS SHALL NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY FOR THE OVERALL INTENT OF THESE DRAWINGS.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING SITE IMPROVEMENTS PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR SHALL REPAIR ANY DAMAGE CAUSED AS A RESULT OF CONSTRUCTION OF THIS FACILITY.
5. THE SCOPE OF WORK FOR THIS PROJECT SHALL INCLUDE PROVIDING ALL MATERIALS, EQUIPMENT AND LABOR REQUIRED TO COMPLETE THIS PROJECT. ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
6. THE CONTRACTOR SHALL VISIT THE PROJECT SITE PRIOR TO SUBMITTING A BID TO VERIFY THAT THE PROJECT CAN BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
7. THIS PLAN WAS PREPARED USING AN APPROVED PLAN ENTITLED ROOFTOP PLAN BY ADVANTAGE ENGINEERS, DATED 03-02-17.
8. THE PROPOSED FACILITY WILL CAUSE ONLY A "DE MINIMIS" INCREASE IN STORWATER RUNOFF. THEREFORE, NO DRAINAGE STRUCTURES ARE PROPOSED.
9. NO NOISE, SMOKE, DUST OR ODOR WILL RESULT FROM THIS FACILITY.
10. THE FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION (THERE IS NO HANDICAP ACCESS REQUIRED).
11. THE FACILITY IS UNMANNED AND DOES NOT REQUIRE POTABLE WATER OR SANITARY SERVICE.
12. POWER TO THE FACILITY WILL E MONITORED BY A SEPARATE METER.
13. CONTRACTOR SHALL VERIFY ANTENNA ELEVATION AND AZIMUTH WITH RF ENGINEER PRIOR TO INSTALLATION.
14. MOUNTS AND ANTENNAS ARE DESIGNED TO MEET ANSI/TIA-222-G-1 AS PER IBC 2015 REQUIREMENTS.
15. ALL STRUCTURAL ELEMENTS SHALL BE HOT DIPPED GALVANIZED STEEL.
16. CONTRACTOR SHALL MAKE A UTILITY "ONE CALL" TO LOCATE ALL UTILITIES PRIOR TO EXCAVATING.
17. IF ANY PIPING EXISTS BENEATH THE SITE AREA, CONTRACTOR MUST LOCATE IT AND CONTACT OWNERS REPRESENTATIVE.
18. CONSTRUCTION TO COMMENCE UPON COMPLETION OF A PASSING STRUCTURAL ANALYSIS. STRUCTURAL ANALYSIS TO BE PERFORMED BY ADVANTAGE ENGINEERS.

T - Mobile
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PLAN REVISIONS:

5			
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3			
2			
1			
0	11-07-18	DF	ISSUED FOR CONSTRUCTION
A	03-01-18	ALM	ISSUED FOR 90% REVIEW (CDs)
REV No	DATE	DESIGNER	DESCRIPTION

AE DESIGN INFO:

DESIGNER: ALM
AE JOB No: 18E019A.001

DRAWING TITLE:

ROOFTOP PLAN

DRAWING SHEET:

C-1

SITE INFORMATION:

SITE NAME:
THE ENCLAVE
SITE NUMBER:
7WAN003A
SITE ADDRESS:
11235 OAK LEAF DRIVE
SILVER SPRING,
MARYLAND 20901
JURISDICTION:
MONTGOMERY COUNTY, MARYLAND

SHEET NUMBER:

3 OF 9

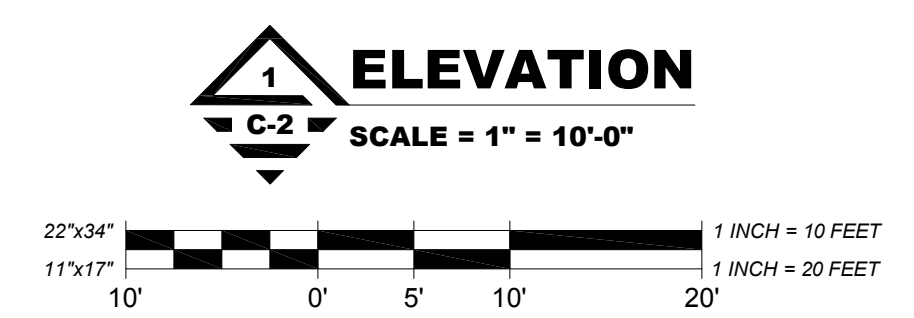
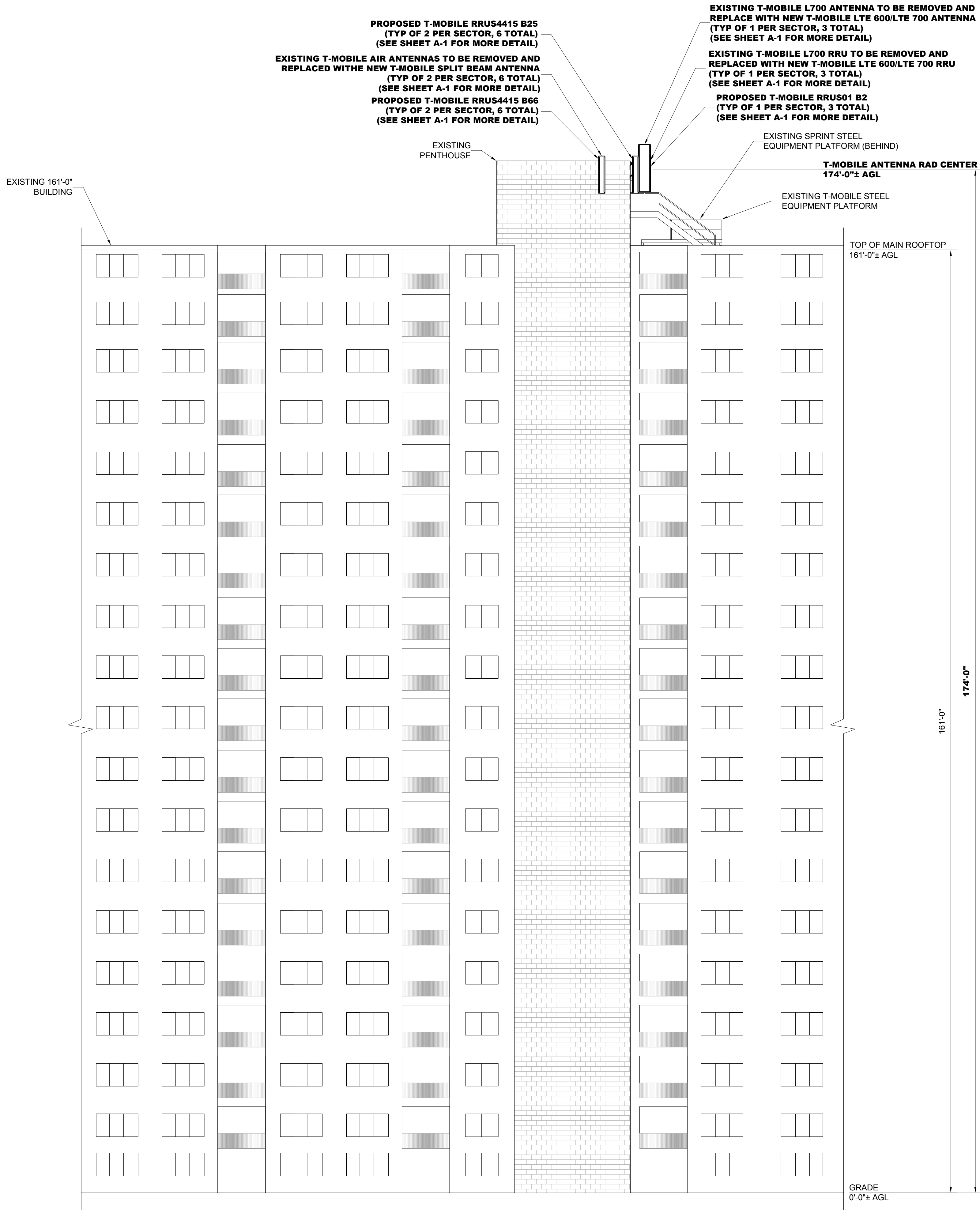


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ELEVATION
SCALE = 1" = 10'-0"

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AE DESIGN INFO:
DESIGNER: ALM
AE JOB No: 18E019A.001

DRAWING TITLE:

ELEVATION

DRAWING SHEET:

C-2

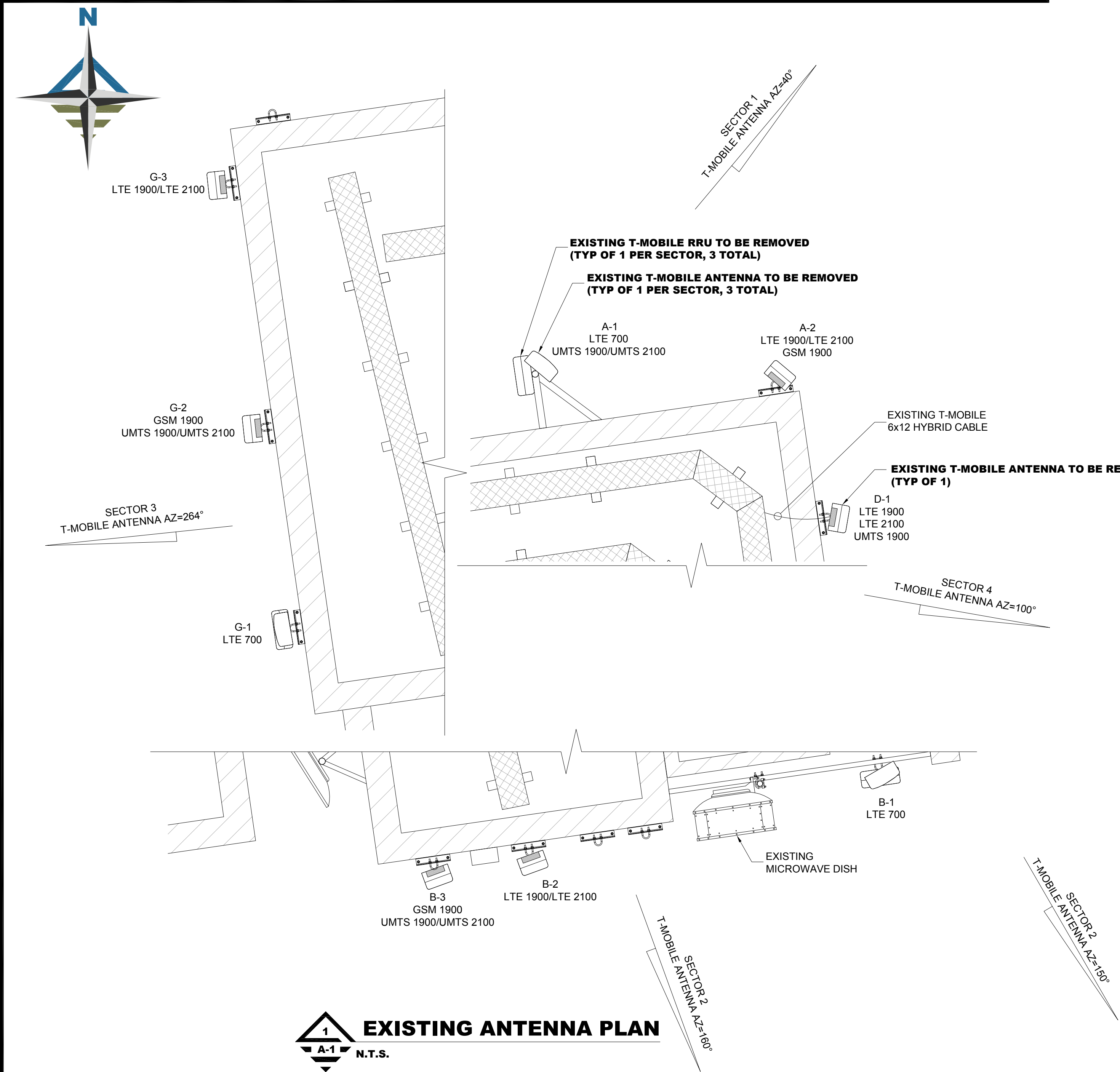
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4 OF 9

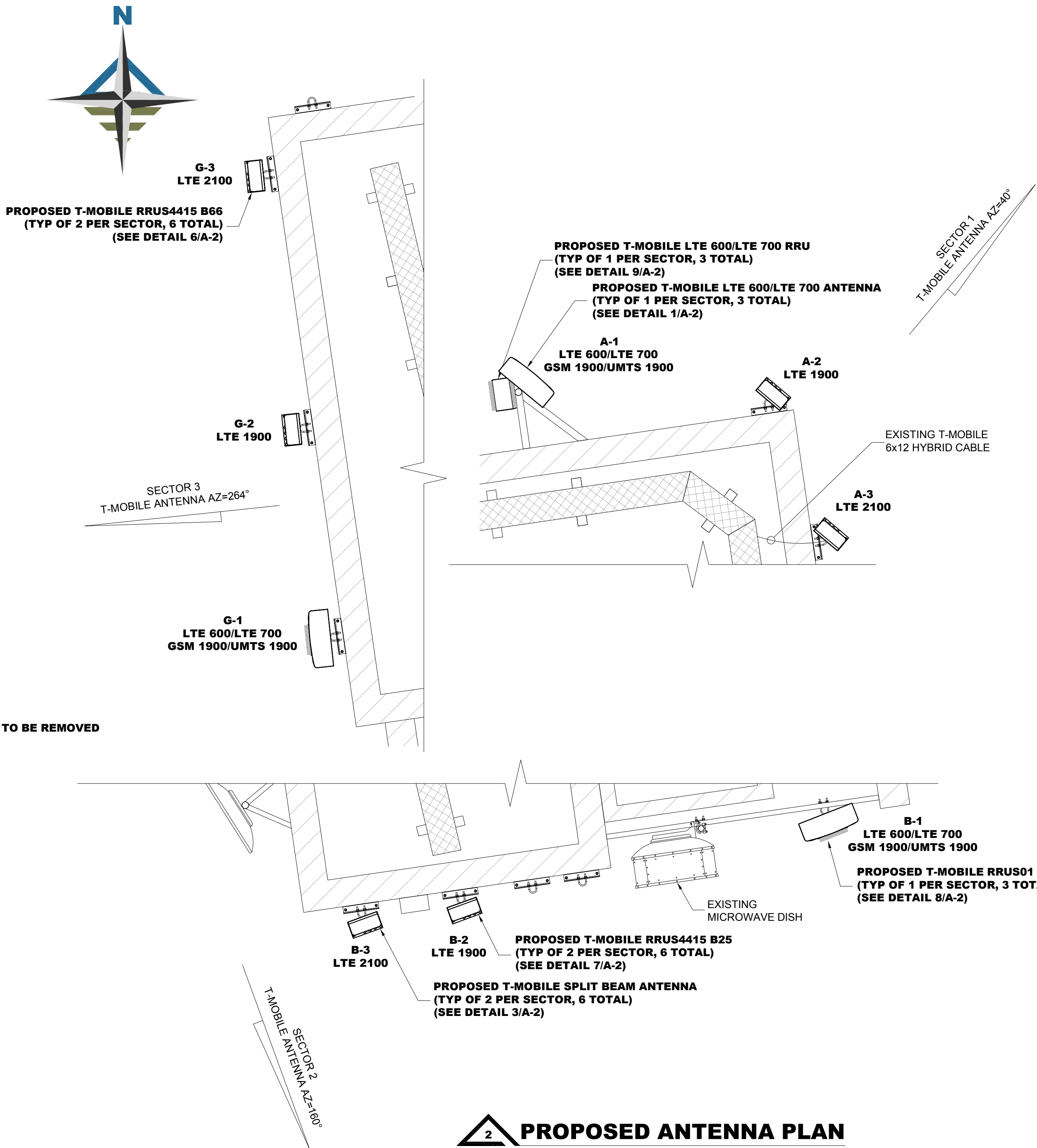
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ANTENNA & CABLE SCHEDULE											
LOCATION		AZIMUTH	RAD CENTER	STATUS	TECHNOLOGY	ANTENNA MODEL NO.	MECH DOWNTILT	ELEC DOWNTILT	TMA/RRU	CABLE SIZE	CABLE LENGTH
ALPHA	A-1	40°	174°-0"	PROPOSED	LTE 600/LTE 700 GSM 1900/UMTS 1900	APXVAARR24	0°	5°/5°/5°/5°	4449 B71+B12 RRUS01 B2	6X12 HYBRID	100'-0"
	A-2	40°	174°-0"	PROPOSED	LTE 1900	BSA33R-U6A	0°	5°/5°	(2) RRUS4415 B25	SHARED	N/A
	A-3	40°	174°-0"	PROPOSED	LTE 2100	BSA33R-U6A	0°	5°/5°	(2) RRUS4415 B66	SHARED	N/A
BETA	B-1	160°	174°-0"	PROPOSED	LTE 600/LTE 700 GSM 1900/UMTS 1900	APXVAARR24	0°	6°/6°/8°/8°	4449 B71+B12 RRUS01 B2	6X12 HYBRID	100'-0"
	B-2	160°	174°-0"	PROPOSED	LTE 1900	BSA33R-U6A	0°	4°/4°	(2) RRUS4415 B25	SHARED	N/A
	B-3	160°	174°-0"	PROPOSED	LTE 2100	BSA33R-U6A	0°	4°/4°	(2) RRUS4415 B66	SHARED	N/A
GAMMA	G-1	264°	174°-0"	PROPOSED	LTE 600/LTE 700 GSM 1900/UMTS 1900	APXVAARR24	0°	7°/7°/6°/6°	4449 B71+B12 RRUS01 B2	6X12 HYBRID	100'-0"
	G-2	264°	174°-0"	PROPOSED	LTE 1900	BSA33R-U6A	0°	6°/6°	(2) RRUS4415 B25	SHARED	N/A
	G-3	264°	174°-0"	PROPOSED	LTE 2100	BSA33R-U6A	0°	6°/6°	(2) RRUS4415 B66	SHARED	N/A
									TOTAL 6X12 HYBRID CABLE		(1) 100'-0" (30M) (1) 100'-0" (30M) (1) 100'-0" (30M)



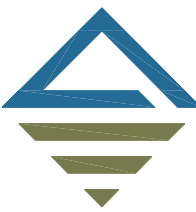
1
A-1
EXISTING ANTENNA PLAN
N.T.S.



2
A-1
PROPOSED ANTENNA PLAN
N.T.S.

T - Mobile
NORTHEAST LLC

T-MOBILE NORTHEAST LLC
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PLAN REVISIONS:

5			
4			
3			
2			
1			
0	11-07-18	DF	ISSUED FOR CONSTRUCTION
A	03-01-18	ALM	ISSUED FOR 90% REVIEW (CDs)
REV No	DATE	DESIGNER	DESCRIPTION

AE DESIGN INFO:

DESIGNER: ALM	AE JOB No: 18E019A.001
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DRAWING TITLE:

**EXISTING & PROPOSED
ANTENNA PLANS &
SCHEDULE**

DRAWING SHEET:

A-1

SITE INFORMATION:

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SITE ADDRESS:
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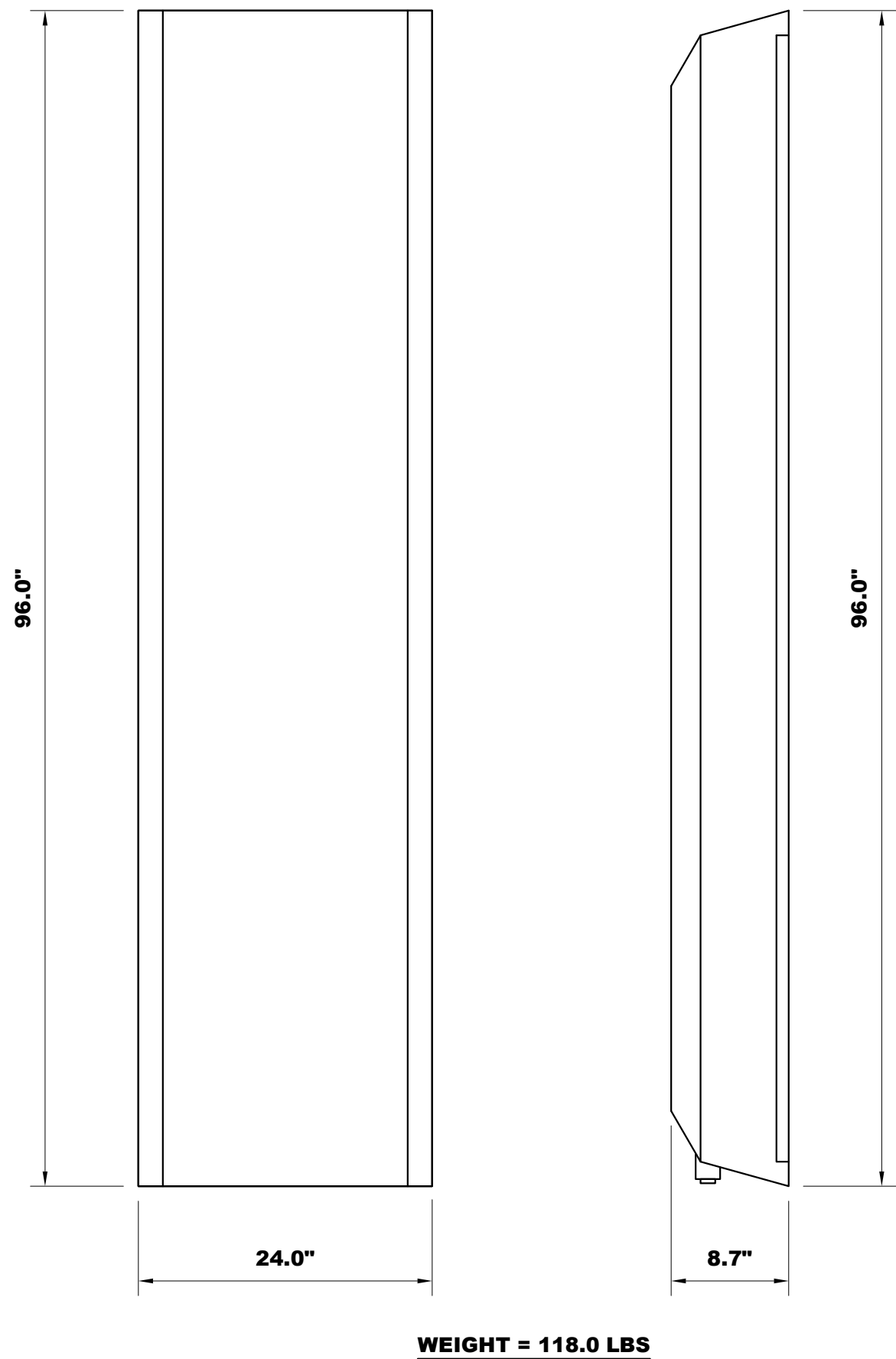
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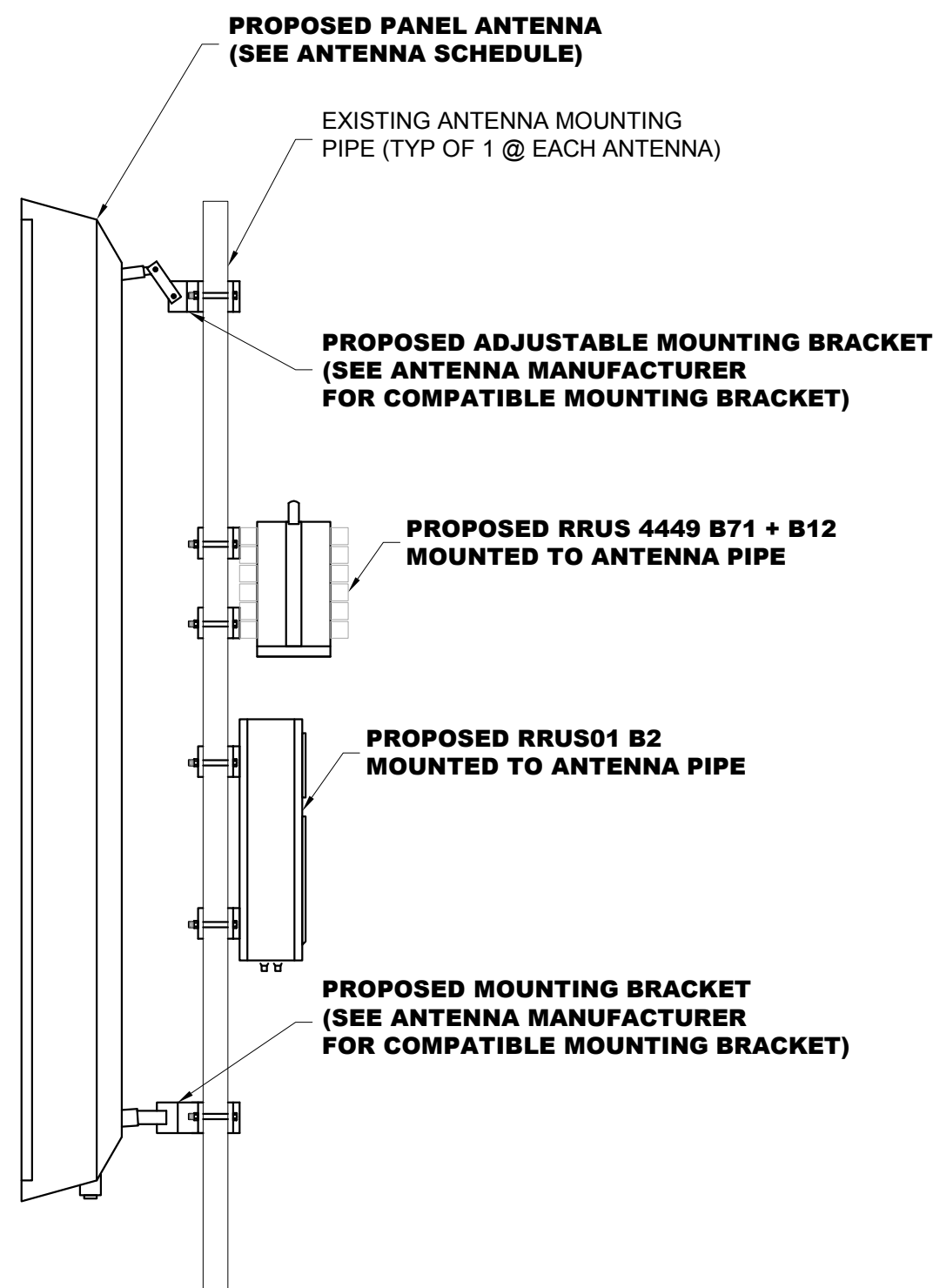
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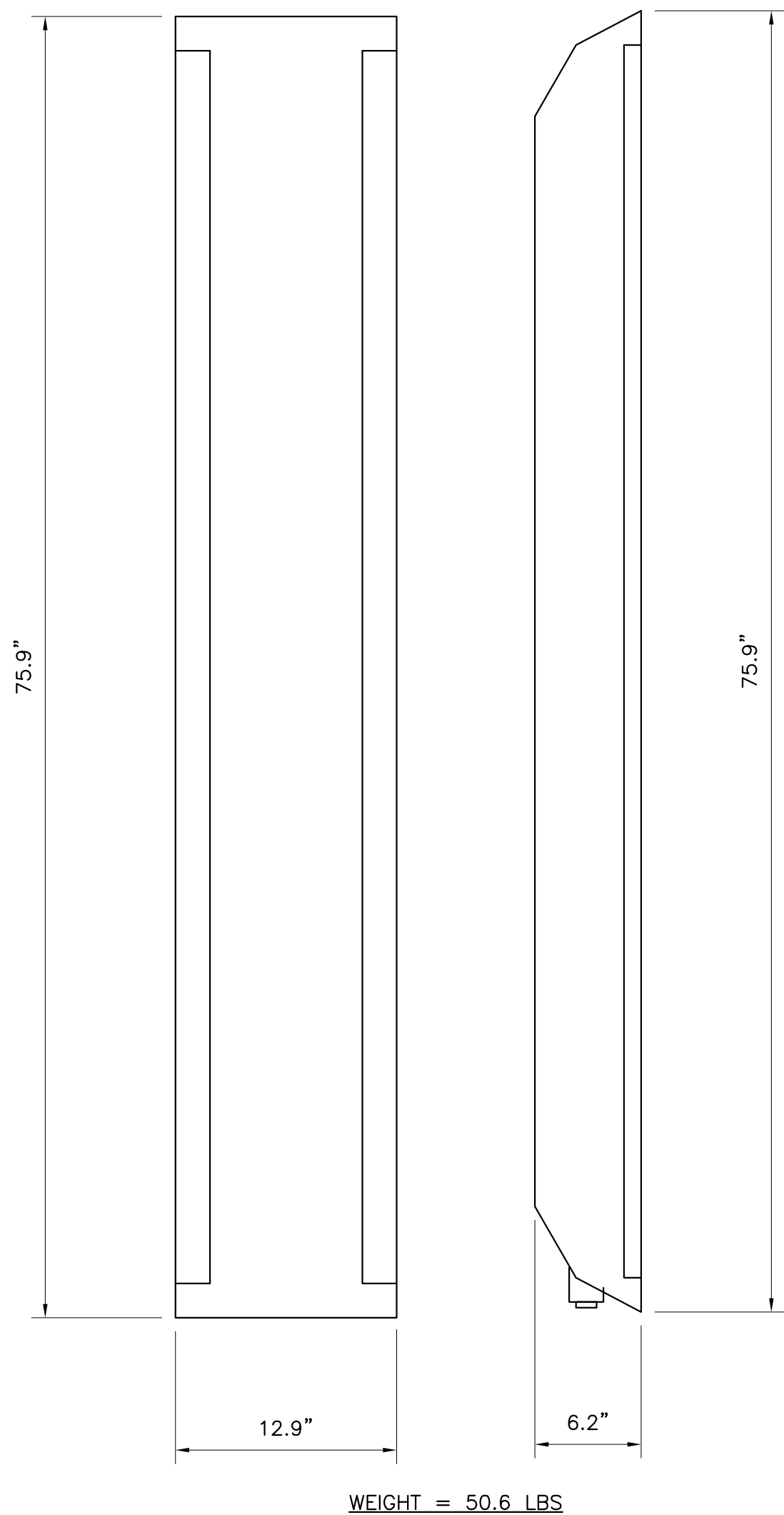
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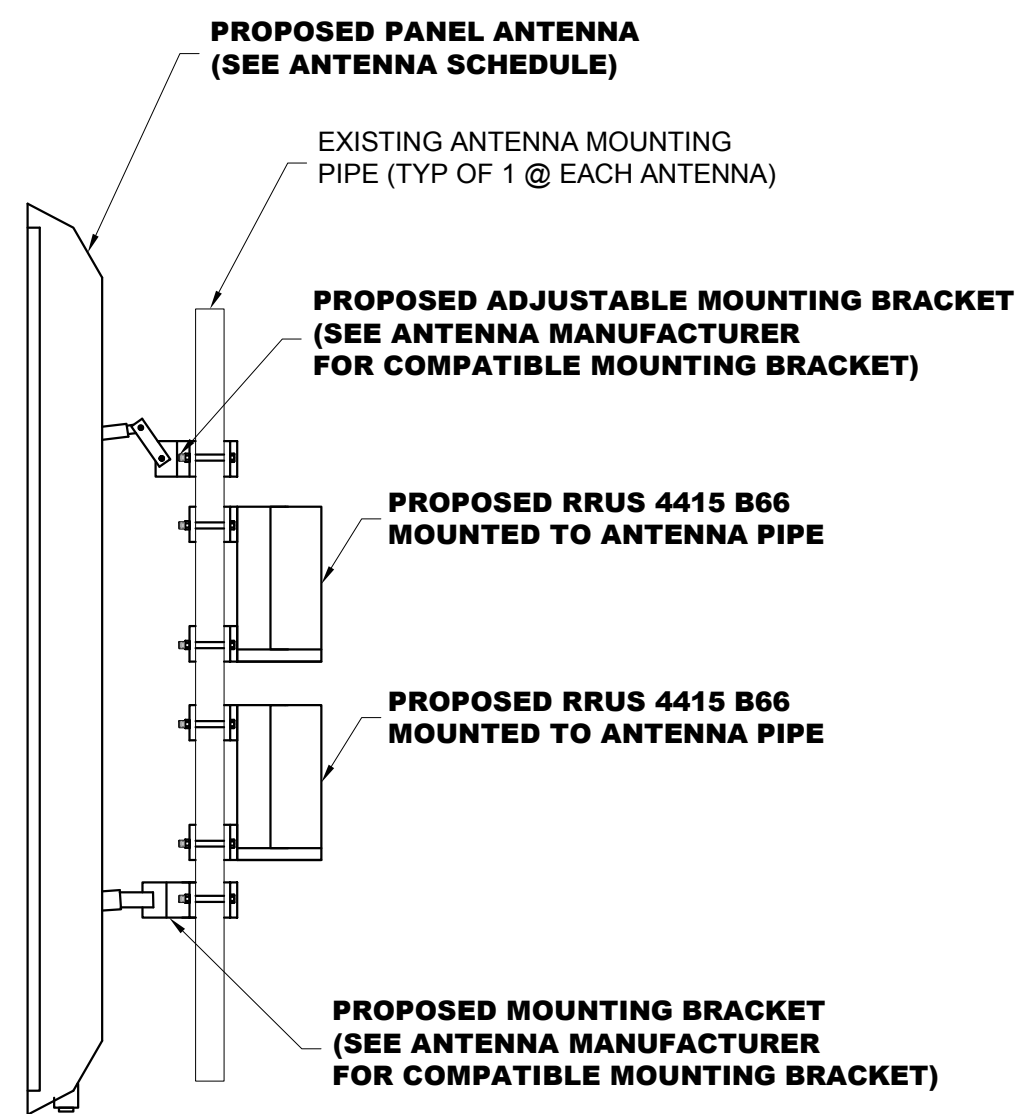
1
A-2
N.T.S.
APXVAARR24 ANTENNA DETAIL



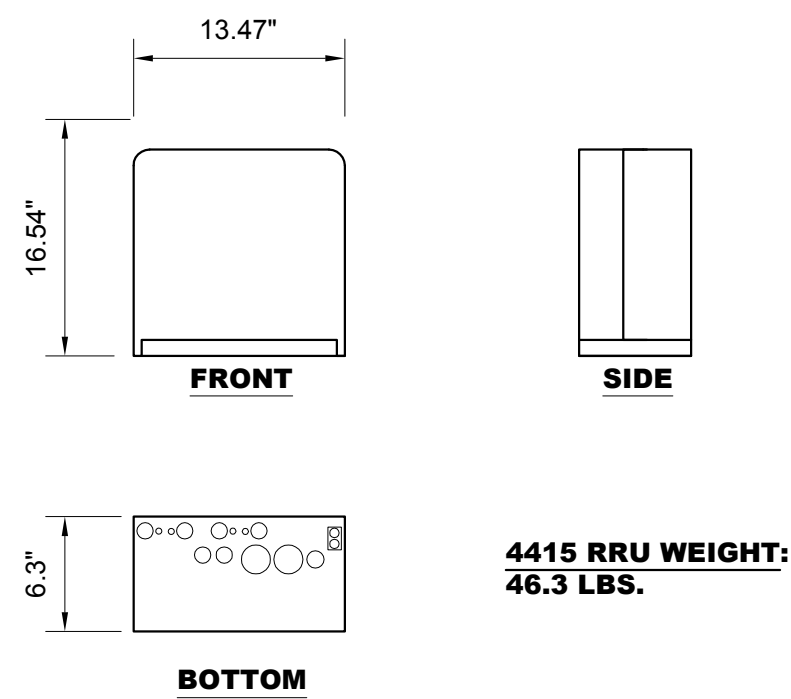
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A-2
N.T.S.
ANTENNA MOUNTING DETAIL



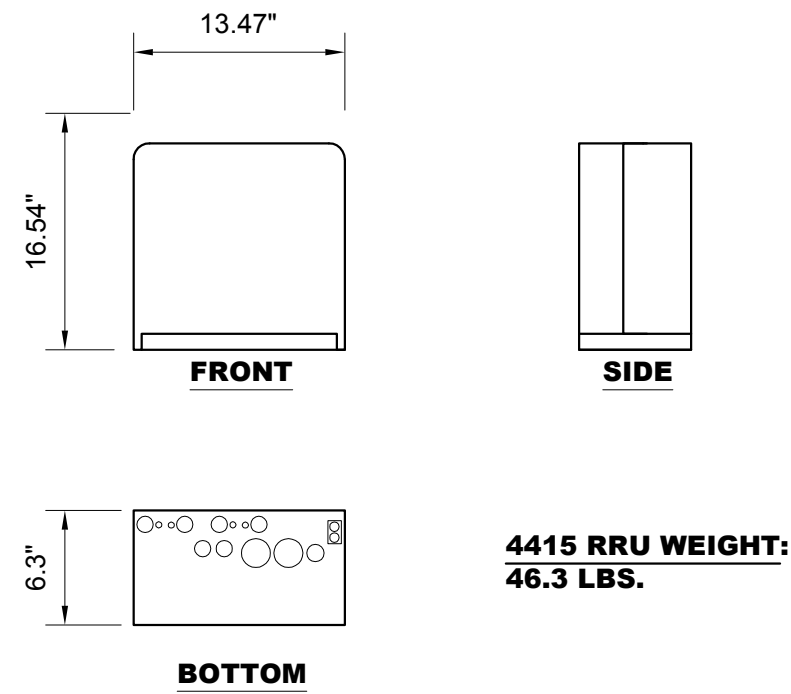
3
A-2
N.T.S.
BSA33R-U6A ANTENNA DETAIL



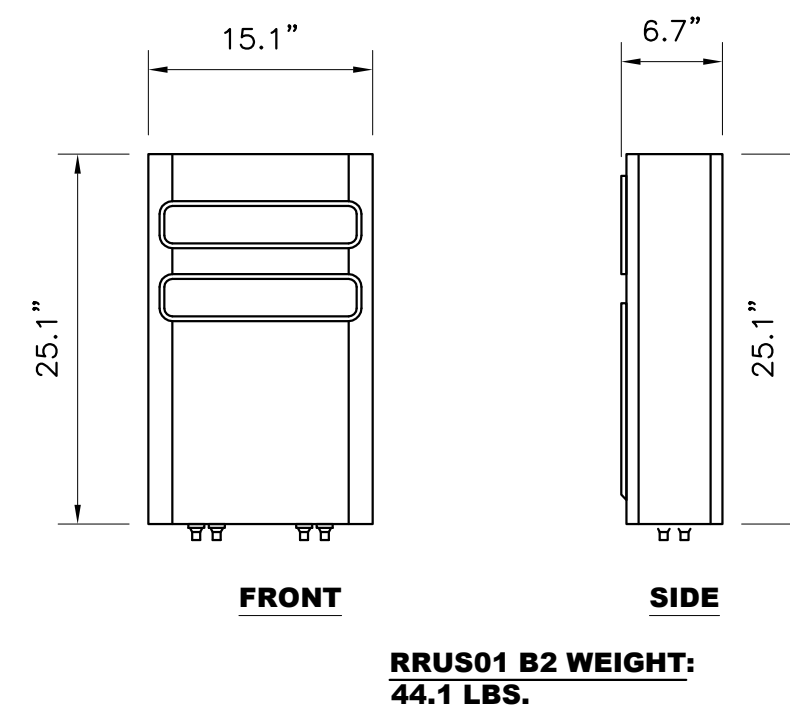
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A-2
N.T.S.
ANTENNA MOUNTING DETAIL



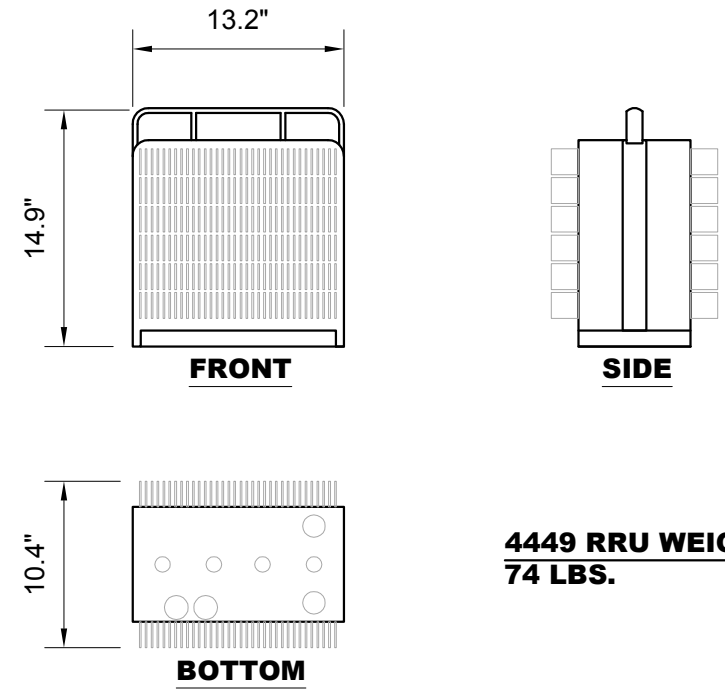
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A-2
N.T.S.
ERICSSON 4415 B25 RRU DETAIL



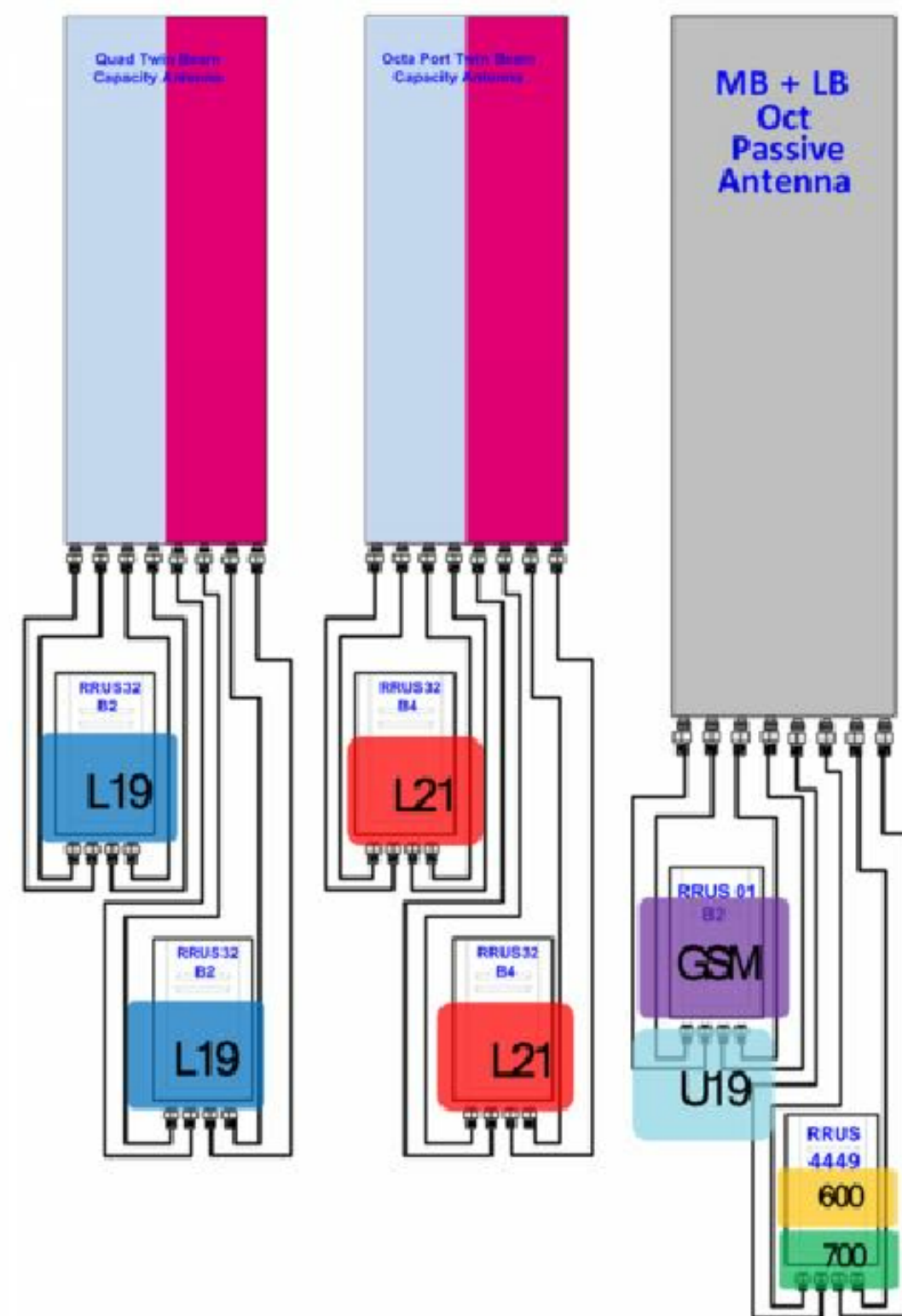
6
A-2
N.T.S.
ERICSSON 4415 B66 RRU DETAIL



8
A-2
N.T.S.
RRUS01 B2 DETAIL



9
A-2
N.T.S.
ERICSSON 4449 B71 + B12 RRU DETAIL



10
A-2
N.T.S.
PLUMBING DIAGRAM

T-Mobile
NORTHEAST LLC
T-MOBILE NORTHEAST LLC
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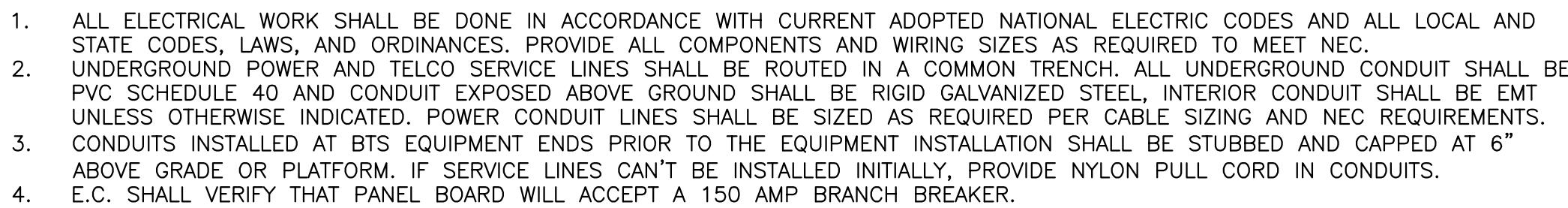
AE DESIGN INFO:
DESIGNER: ALM
AE JOB No: 18E019A.001

DRAWING TITLE:
ANTENNA & RRU DETAILS
& PLUMBING DIAGRAMS

DRAWING SHEET:
A-2
SITE INFORMATION:
SITE NAME:
THE ENCLAVE
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JURISDICTION:
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SHEET NUMBER:
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Panel Circuit and Load Schedule													
Load				Load per phase (VA)			Continuous	Non-Continuous	Trip	Poles	Wire size	A.I.C.	Wire Type
Description	QTY.	Unit V.A.	Phase										
			A	B	C								
1	LIGHT	2	150	300				X	20	1	12	10,000	THWN-2
3	SPARE		0		0				30	2		10,000	THWN-2
5			0			0						10,000	THWN-2
7	BTS 2	1	2,800	2,800			X		40	2	8	10,000	THWN-2
9		1	2,800	2,800			X				8	10,000	THWN-2
11	SPARE	1			0				30	2		10,000	THWN-2
13		1		0								10,000	THWN-2
15	SPACE				0							10,000	THWN-2
17	SPACE				0							10,000	THWN-2
19	SPACE			0								10,000	THWN-2
21	SPACE				0							10,000	THWN-2
23	SPACE				0							10,000	THWN-2
		SubTotal Continuous	2,800	2,800	0								
		SubTotal Non-Continuous	300	0	0								
Voltage: 120/208		Cycle: 60		Phase: 3					Wire: 4				
Neutral: 100 Amps													
Main Breaker: 100 Amp Frame				A.I.C. : 10,000					Trip: 100 Amps				
Main Lugs: 100 Amps				Main Copper Bus : 100 Amps									



- | | |
|---|-------------------|
|  | TRANSFORMER |
|  | METER |
|  | CIRCUIT BREAKER |
|  | DISCONNECT SWITCH |

SERVICE: 120/208 VAC														
DESIGNATION: T-MOBILE PANEL														
LOCATION: T-MOBILE PLATFORM														
Wire Type	A.I.C.	Wire size	Poles	Trip	Non-Continuous	Continuous	Load per phase (VA)			Unit V.A.	QTY.	Load		
							Phase					Description		
							A	B	C					
THWN-2	10,000	2	3	100			0				1	MAIN	2	
THWN-2	10,000	2						0					1	4
THWN-2	10,000	2							0				1	6
THWN-2	10,000		2	40			0					SPARE	8	
THWN-2	10,000							0						10
THWN-2	10,000								0					12
THWN-2	10,000	2	1	20	X		7,000			7,000	1	RBS 6131	14	
THWN-2	10,000	2	2	100		X	7,000		7,000	1	16			
THWN-2	10,000								0			SPACE	18	
THWN-2	10,000						0					SPACE	20	
THWN-2	10,000								0			SPACE	22	
THWN-2	10,000								0			SPACE	24	
							7,000	7,000	0	SubTotal Continuous	TOTAL CONTINUOUS x 1.25	24.5		
							0	0	0	SubTotal Non-Continuous				
Manufacturer: Square D											TOTAL NON-CONTINUOUS	0.3		
Model Number: QO Load Center														
APPROVED EQUAL											TOTAL KVA	24.80		
Mounting: SURFACE											TOTAL AMPS	68.84		

7 OF 9

*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. 41497, EXPIRATION DATE: 01-05-20

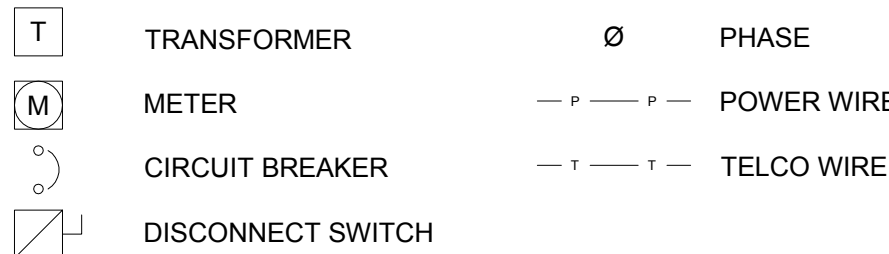


- 1**
E-2
PRO
N.T.S.



- CONTRACTOR SHALL INSPECT THE EXISTING CONDITIONS PRIOR TO SUBMITTING BID. ANY QUESTIONS ARISING DURING THE BID PERIOD IN REGARDS TO THE CONTRACTORS FUNCTIONS, THE SCOPE OF WORK, OR ANY OTHER ISSUE RELATED TO THIS PROJECT SHALL BE BROUGHT UP DURING THE BID PERIOD WITH THE PROJECT MANAGER FOR CLARIFICATION, NOT AFTER THE CONTRACT HAS BEEN AWARDED.
2. LOCATION OF EQUIPMENT, CONDUIT AND DEVICES SHOWN ON THE DRAWINGS ARE APPROXIMATE AND SHALL BE COORDINATED WITH FIELD CONDITIONS PRIOR TO ROUGH-IN.
3. THE CONDUIT RUNS SHOWN ON THE PLANS ARE APPROXIMATE. EXACT LOCATION AND ROUTING SHALL BE PER EXISTING FIELD CONDITIONS.
4. PROVIDE PULL BOXES AND JUNCTION BOXES WHERE SHOWN OR REQUIRED BY NEC.
5. ALL CONDUITS SHALL BE MET WITH BENDS MADE IN ACCORDANCE WITH NEC. NO RIGHT ANGLE DEVICE OTHER THAN STANDARD CONDUIT ELBOWS WITH 12 INCH MINIMUM INSIDE SWEEPS FOR ALL CONDUITS 2 INCH OR LARGER.
6. ALL CONDUIT TERMINATIONS SHALL BE PROVIDED WITH PLASTIC THROAT INSULATING GROUND BUSHINGS.
7. ALL WIRE SHALL BE TYPE THHN/THWN-2, SOLID, ANNEALED COPPER UP TO SIZE #10 AWG (#8 AND LARGER SHALL BE CONCENTRIC STRANDED) 75 DEGREES C, (167 DEGREES F), 98% CONDUCTIVITY, MINIMUM #12 AWG.
8. ALL WIRES SHALL BE TAGGED AT ALL PULL BOXES, JUNCTION BOXES, EQUIPMENT BOXES AND CABINETS WITH APPROVED PLASTIC TAGS, ACTION CRAFT, BRADY, OR APPROVED EQUAL.
9. ALL NEW MATERIAL SHALL HAVE A U.L. LABEL.
10. ALL PANEL DIRECTORIES SHALL BE TYPEWRITTEN, NOT HAND WRITTEN.
11. INSTALL AN EQUIPMENT GROUNDING CONDUCTOR IN ALL CONDUITS PER THE SPECIFICATIONS AND NEC. THE EQUIPMENT GROUNDING CONDUCTORS SHALL BE BONDED AT ALL PULL BOXES, JUNCTION BOXES, DISCONNECT SWITCHES, STARTERS, AND EQUIPMENT CABINETS.
12. THE CONTRACTOR SHALL PREPARE AS-BUILT DRAWINGS, DOCUMENT ANY AND ALL WIRING AND EQUIPMENT CONDITIONS AND CHANGES WHILE COMPLETING THIS CONTRACT. SUBMIT AT SUBSTANTIAL COMPLETION.
13. ALL DISCONNECT SWITCHES AND OTHER CONTROLLING DEVICES SHALL BE PROVIDED WITH ENGRAVED LAMICOID NAMEPLATES INDICATING EQUIPMENT CONTROLLED, BRANCH CIRCUITS INSTALLED ON, AND PANEL FIELD LOCATIONS FED FROM (NO EXCEPTIONS).
14. ELECTRICAL CHARACTERISTICS OF ALL EQUIPMENT (NEW AND EXISTING) SHALL BE FIELD VERIFIED WITH THE OWNER'S REPRESENTATIVE AND EQUIPMENT SUPPLIER PRIOR TO ROUGH-IN OF CONDUIT AND WIRE. ALL EQUIPMENT SHALL BE PROPERLY CONNECTED ACCORDING TO THE NAMEPLATE DATA FURNISHED ON THE EQUIPMENT (THE DESIGN OF THESE PLANS ARE BASED UPON BEST AVAILABLE INFORMATION AT THE TIME OF THE DESIGN AND SOME EQUIPMENT CHARACTERISTICS MAY VARY FROM DESIGN AS SHOWN ON THESE DRAWINGS). LOCATION OF ALL OUTLETS, BOXES, ETC., AND THE TYPE OF CONNECTIONS (PLUG OR DIRECT) SHALL BE CONFIRMED WITH THE OWNER'S REPRESENTATIVE PRIOR TO ROUGH-IN.
15. CONDUIT SCHEDULE: EXTERIOR BELOW GRADE SCHEDULE 40 PVC. EXTERIOR ABOVE GRADE RGS INTERIOR EMT.

ELECTRICAL SYMBOLS:



T - Mobile
NORTHEAST LLC
T-MOBILE NORTHEAST LLC
12050 BALTIMORE AVENUE
BELTSVILLE, MARYLAND 20705
PHONE: (240) 264-8600
FAX: (240) 264-8610



advantage engineers

7070 SAMUEL MORSE DRIVE, SUITE 150
COLUMBIA, MARYLAND 21046
PHONE: (443) 367-0003
www.advantageengineers.com

■ PLAN REVISIONS:

5			
4			
3			
2			
1			
0	11-07-18	DF	ISSUED FOR CONSTRUCTION
A	03-01-18	ALM	ISSUED FOR 90% REVIEW (CDs)
REV/No	DATE	DESIGNER	DESCRIPTION

■ AE DESIGN INFO: ■

DESIGNER:	AE JOB No:
ALM	18E019A.001

DRAWING TITLE:

PROPOSED ELECTRICAL DETAILS & NOTES

DRAWING SHEET:

E-2

SITE INFORMATION:

SITE NAME:
THE ENCLAVE

SITE NUMBER:
7WAN003A

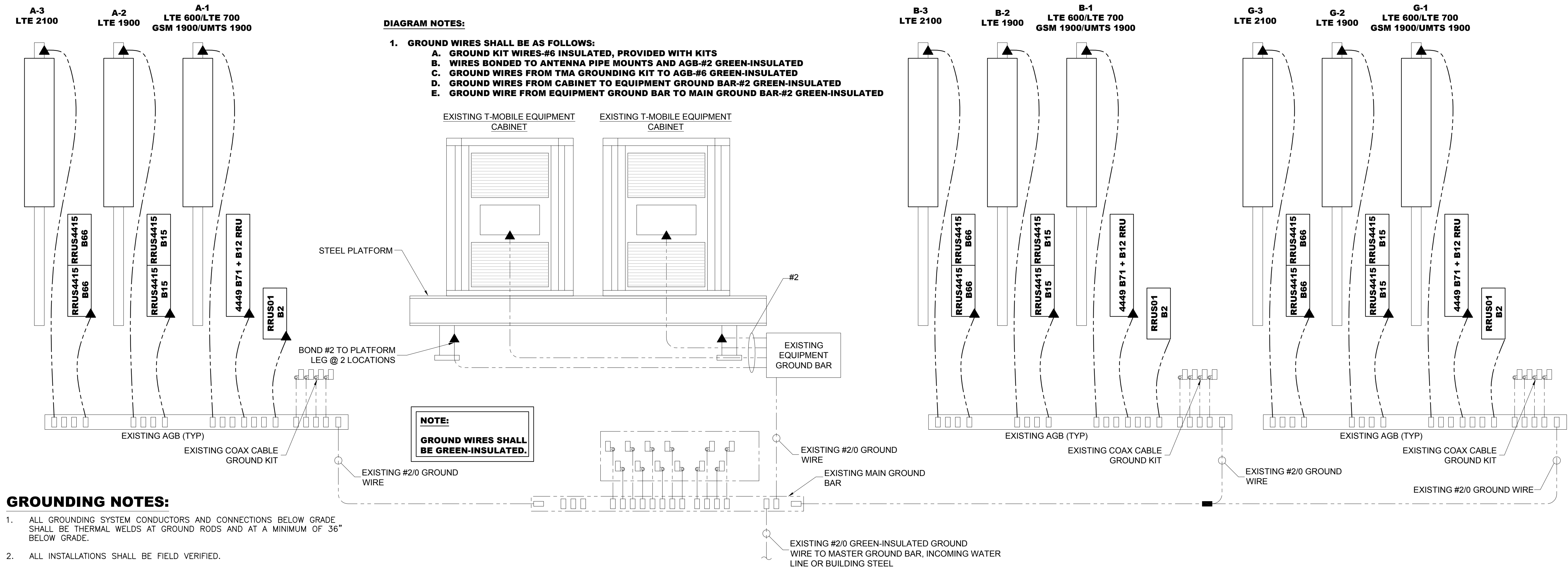
SITE ADDRESS:
**11235 OAK LEAF DRIVE
SILVER SPRING,
MARYLAND 20901**

JURISDICTION:
MONTGOMERY COUNTY, MARYLAND

■ SHEET NUMBER:

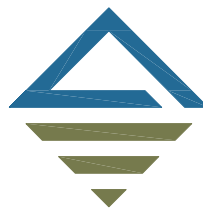
8 OF 9

ANDREW M. MILLER, PE
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PLAN REVISIONS:

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4			
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A	03-01-18	ALM	ISSUED FOR 90% REVIEW (CDs)
REV No	DATE	DESIGNER	DESCRIPTION

AE DESIGN INFO:

DESIGNER: ALM
AE JOB No: 18E019A.001

DRAWING TITLE:

GROUNDING DIAGRAM,
DETAILS & NOTES

DRAWING SHEET:

G-1

SITE INFORMATION:

SITE NAME:
THE ENCLAVE
SITE NUMBER:
7WAN003A
SITE ADDRESS:
11235 OAK LEAF DRIVE
SILVER SPRING,
MARYLAND 20901
JURISDICTION:
MONTGOMERY COUNTY, MARYLAND

SHEET NUMBER:

9 OF 9

ANDREW M. MILLER, PE

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