Telecommunications Transmission Facility Committee
Tower Coordinator Recommendation

Application Number: 2021071515 ***Type:*** Colocation ***Received (date):*** 7/19/2021
Revised: 8/3/2021
Revised: 9/28/2021

Applicant: Jacobs Telecommunications on behalf of Dish Wireless
Site Name/Location: Wheaton High School/ 12501 Dalewood Road, Silver Spring
Zoning Standard: R-60 ***Property Owner:*** MCPS
Description: Install (3) Panel Antennas (1 per sector) on (1) Antenna Mount. Install (6) Radio Units (2 per sector), (1) OVP Device, (1) Hybrid Cable and associated jumpers on existing telecommunications tower. Install (1) metal platform for (2) cabinets, (1) ice bridge, (1) telco-fiber box, (1) GPS unit, (1) safety switch, (1) ciena box, and (1) meter socket on the ground beneath the tower.
Tower Coordinator Recommendation: Recommended on the condition the applicant attend a future PTA meeting to discuss the proposed collocation, and on the condition the applicant provides written approval from MCPS Staff of the attachments at the time of permitting.

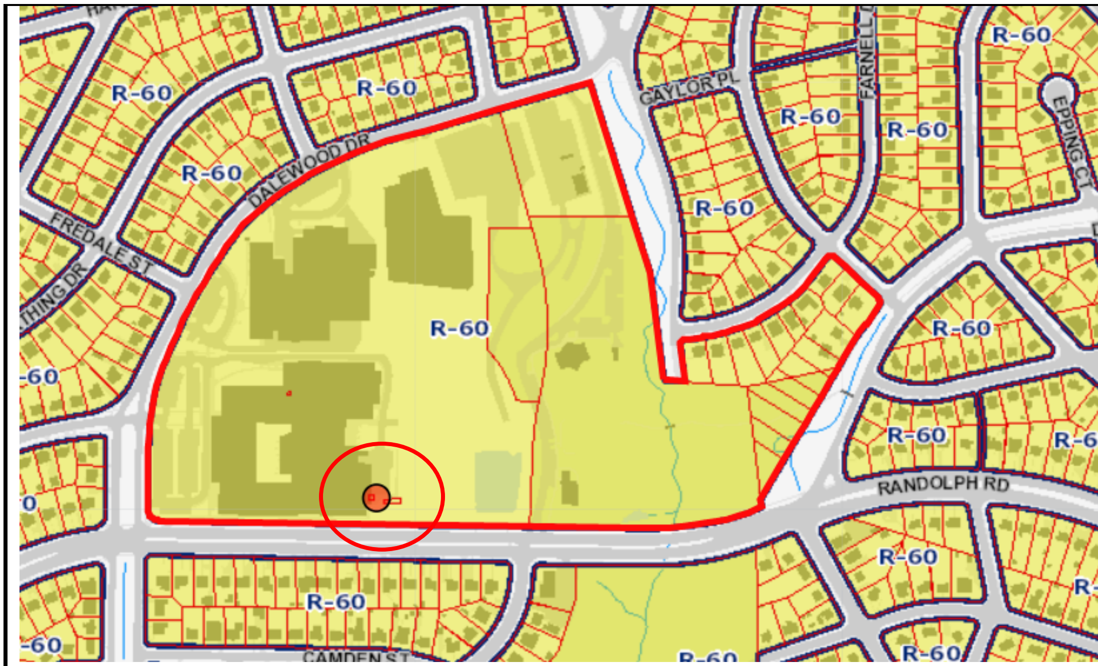
Signature: *Date*: 9/28/2021

Impact on land-owning agency: N/A

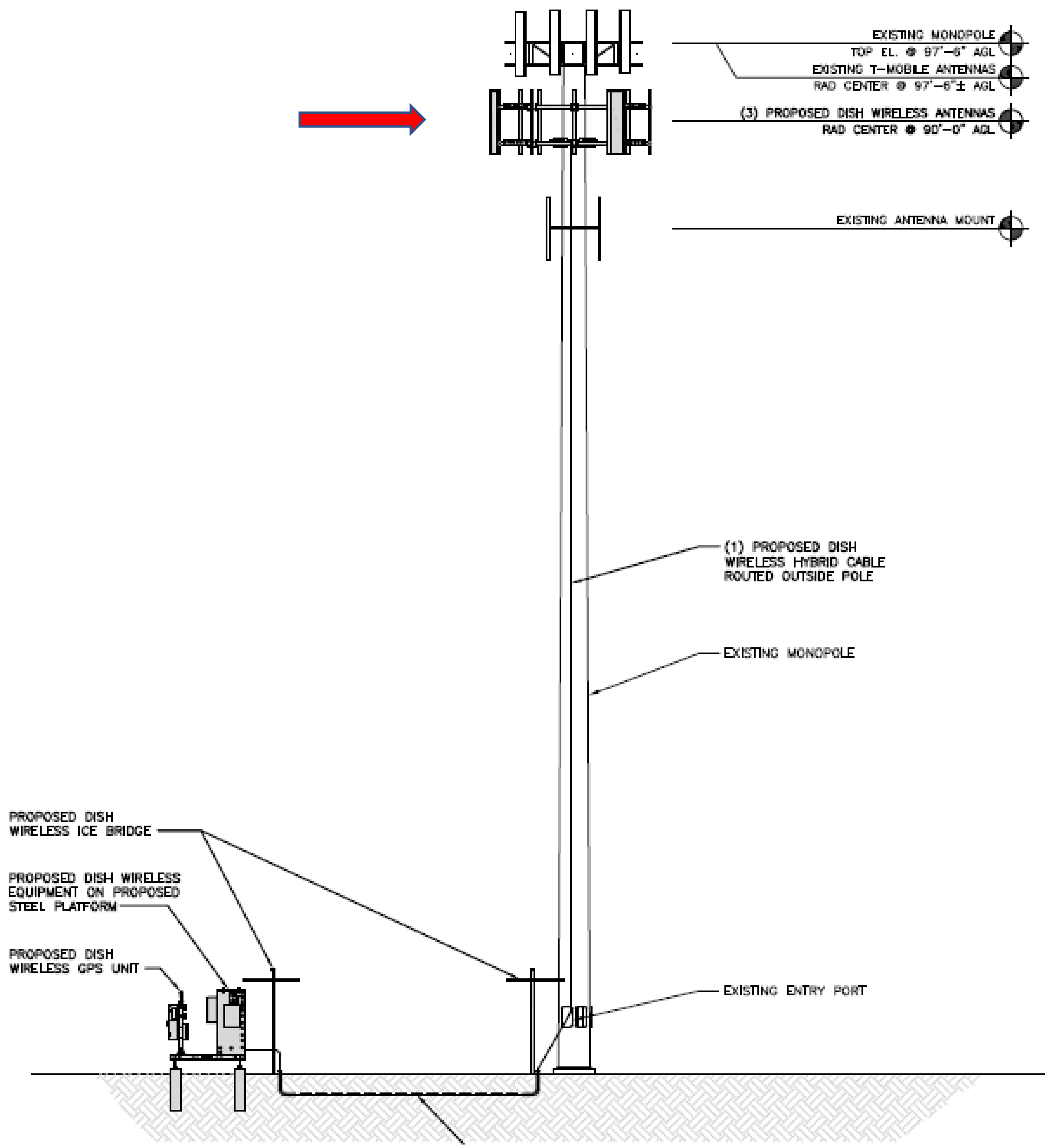
Existing or future public safety telecommunications facilities and plans: N/A

Colocation options: T-Mobile is also located on this existing monopole.

Implications to surrounding area: The MCAtlas zoning map (below) shows the site (circled) and the vicinity.



The photo design image below provided by the applicant details 97.5' monopole, the existing T-Mobile antennas on the monopole and the proposed Dish Wireless antennas indicated with a red arrow.



Attachments: Application

Comments: The proposed antennas will be mounted at the RAD Center of 90' on the existing monopole. The equipment cabinet will be placed on a new 5'x7' metal platform to be installed within the existing equipment compound. All proposed antennas meet the length and volume requirements set forth in the Montgomery County Ordinance, with the maximum length of the proposed antenna being 72" for a total volume of 6.67 ft^3.

The application states that the maximum effective radiated power (Max ERP) for this installation will be greater than the permissible exposure limits set forth by the FCC and thus a routine environmental evaluation was required. CTC verified that the submitted radio frequency electromagnetic energy (RF EME) report concluded that the site would be compliant with FCC standards for limiting human exposure to radio frequency electromagnetic energy fields upon implementation of mitigation measures that include appropriate signage.

A structural analysis provided by SGS Towers, dated February 23, 2021, was submitted with the application, and considered the proposed attachments. It concluded that the existing structure would have adequate structural capacity to support the new attachments.

We recommend this application.

App No: 2021071515

Revisions received 9.28.21 - JE
Revisions received 8.3.21 - JE

Application General Infomation

Applicant Name	Jacobs Telecommunications
Application Type	Colocated
Carrier	Other
Solution Type	Other
Existing	Existing
Updated	7/19/2021
Ann. Plan?	Yes
Will site be used to support government telecommunications facilities or other equipment for government use?	No
Gvt. Use Desc.	

Application Description

Install (3) Panel Antennas (1 per sector) on (1) Antenna Mount. Install (6) Radio Units (2 per sector), (1) OVP Device, (1) Hybrid Cable and associated jumpers on existing telecommunications tower. Install (1) metal platform for (2) cabinets, (1) ice bridge, (1) telco-fiber box, (1) GPS unit, (1) safety switch, (1) ciena box, and (1) meter socket on the ground beneath the tower.

Site Infomation

Site Id	299
Structure Type	Monopole
Street Address	12501 Dalewood Rd
County Site Name	Wheaton High School
Carrier Site Name	DCWDC00428A
Site Owner	MCPS
Structure Owner	Board of Education
Existing Structure Height	97.5
Provide the proposed height of the replacement structure without any antenna (New, Replacement Apps Only)	
Zoning	R-60
Latitude	39.059453
Longitude	-77.066497
Ground Elevation	371.97
City	Silver Spring
Lease Status	Leased
Does the structure require an antenna structure registration under FCC Title 47	No
Distance to Residential Property (New, Replacement, Colocation Only)	187
Distance to Commercial Property (New, Replacement, Colocation Only)	495

Justification of why this site was selected:

Existing tower that would provide desired coverage

NearbySites (New, Replacement Apps Only):

App No: 2021071515

Screening considerations(New, Colocations, Replacement Apps Only):

This is an existing communications tower without concealment. It is the Applicant's impression that concealment was not required when the tower was zoned.

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6409 Questions

Does this qualify as a 6409 application? (Minor Mod, Colocations Only) No

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

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

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

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

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

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

Does the structure or current installation have concealment elements/measures? No

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

Small Wireless Facility Informatio

Small Wireless Facility Questions

Is the structure 10% taller than adjacent structures?

Please list adjacent structure heights

Tribal Lands? No

Small Wireless Facility? No

Cumulative volume of the proposed wireless equipment(s) exclusive of antennas in cubic feet 43.85

Cumulative volume of the proposed antenna antenna(s) exclusive of equipment

ROW Information

PROW? No

ROW owner

ROW width

Pole Number US-MD-5072

Tuesday, July 20, 2021

11:23:05 AM

App No: 2021071515

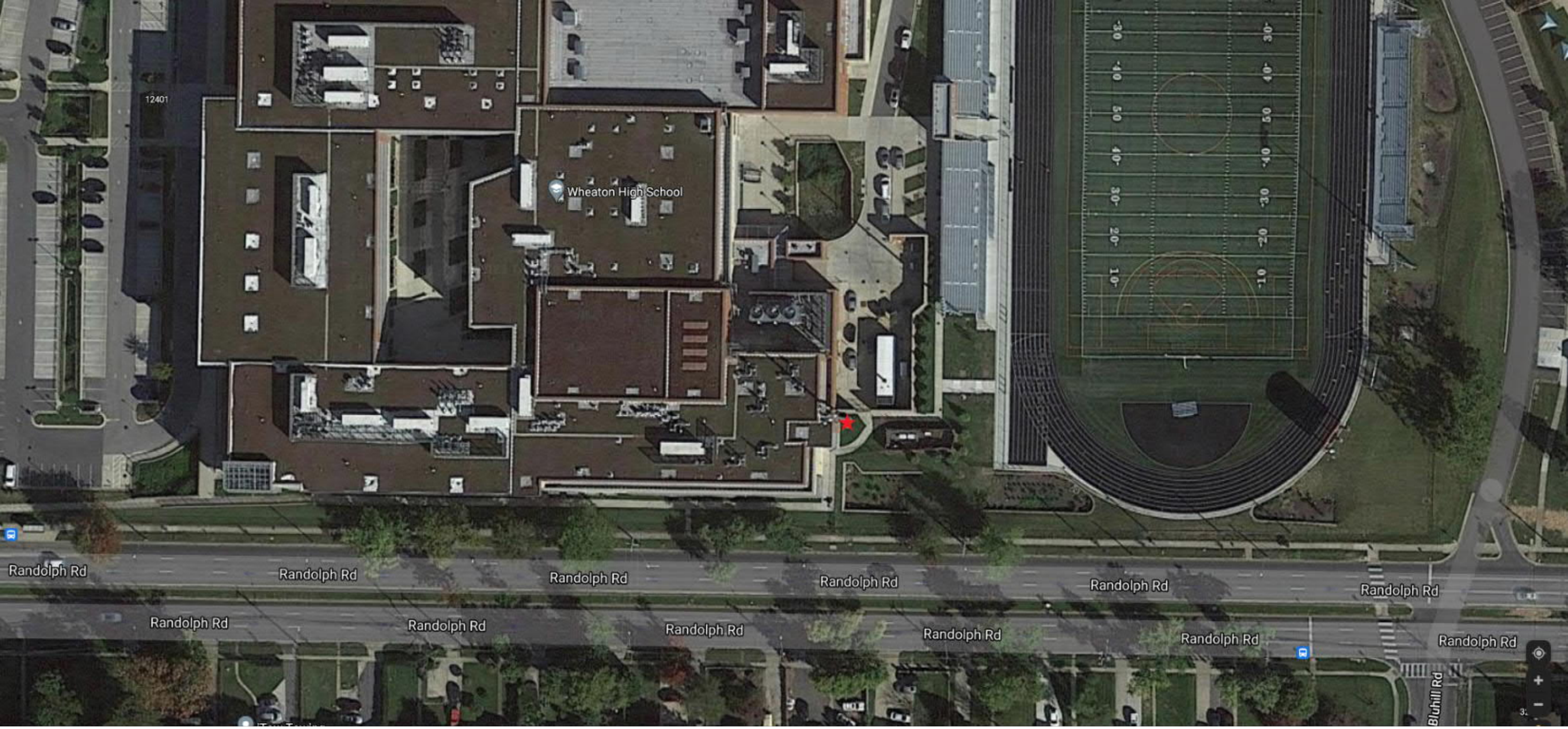
Antenna Infomatio

Antenna Compliance	Yes
Compliance Desc	
Antenna Location	No
Antenna Loc. Desc.	
Env. Assessment	
Cat. Excluded?	
Routine Env. Evaluation	checked

Antenna Model JMA MX08FRO665-20_V0F

Frequency 642-647; 688-693; 722-728; 1915-1920; 1995-2000; 2000-2020; 2180-2200

RAD Center	Max ERP	Antenna Dimensions	Quantity
90	9064	72" x 20" x 8"	3



12401
Wheaton High School
Randolph Rd
Bluhill Rd

MX08FRO665-20

NWAV™ X-Pol 8-Port Antenna

X-Pol 8-Port 6 ft 65° Fast Roll Off with Smart Bias-Ts:

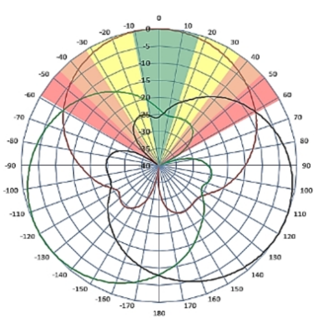
4 ports 617-894 MHz and 4 ports 1695-2200 MHz

- Fast Roll Off (FRO™) azimuth beam pattern improves Intra- and Inter-cell SINR
- Excellent passive intermodulation (PIM) performance reduces harmful interference.
- Fully integrated (iRETs) with Smart Bias-Ts & independent RET control for low and mid bands for ease of network optimization
- SON-Ready array spacing supports beamforming capabilities.
- High total power handling to maximize network efficiency
- Reduced tower loading for ease of site deployment

Fast Roll-Off antennas increase data throughput without compromising coverage

The horizontal beam produced by Fast Roll-Off (FRO) technology increases the Signal to Interference & Noise Ratio (SINR) by eliminating overlap between sectors .

Non-FRO antenna



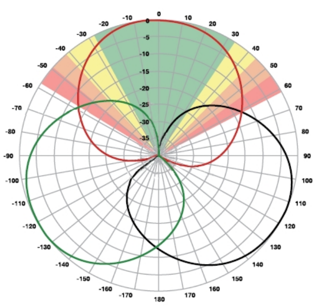
Large traditional antenna pattern overlap creates harmful interference.

JMA's FRO antenna pattern minimizes overlap, thereby minimizing interference.

LTE throughput	SINR	Speed (bps/Hz)	Speed increase	CQI
Excellent	>18	>4.5	333+%	8-10
Good	15-18	3.3-4.5	277%	6-7
Fair	10-15	2-3.3	160%	4-6
Poor	<10	<2	0%	1-3

The LTE radio automatically selects the best throughput based on measured SINR.

JMA FRO antenna



Electrical specification (minimum/maximum)	Ports 1, 2, 3, 4		Ports 5, 6, 7, 8		
Frequency bands, MHz	617-698	698-894	1695-1880	1850-1990	1920-2200
Polarization	± 45°		± 45°		
Gain over all tilts, max, dBi	13.9	15.0	17.9	18.0	18.8
Horizontal beamwidth (HBW), degrees[1]	68	62	64	61	62
Front-to-back ratio, co-polar power @180°, dB	>27	>29	>32	>35	>32
Vertical beamwidth (VBW), degrees[1]	14.2	12.5	5.4	5.2	4.9
Electrical downtilt (EDT) range, degrees	2-14		2-12		
First upper side lobe (USLS) suppression, dB[1]	≤-16.0	≤-16.5	≤-18.0	≤-18.0	≤-18.0
Minimum cross-polar isolation, port-to-port, dB[1]	25	25	25	25	25
Max VSWR / return loss, dB	1.5:1 / -14.0		1.5:1 / -14.0		
Max passive intermodulation (PIM), 2x20W carrier, dBc	-153		-153		
Max input power per any port, watts	300		250		
Total composite power all ports (1-8), watts[2]	1500				

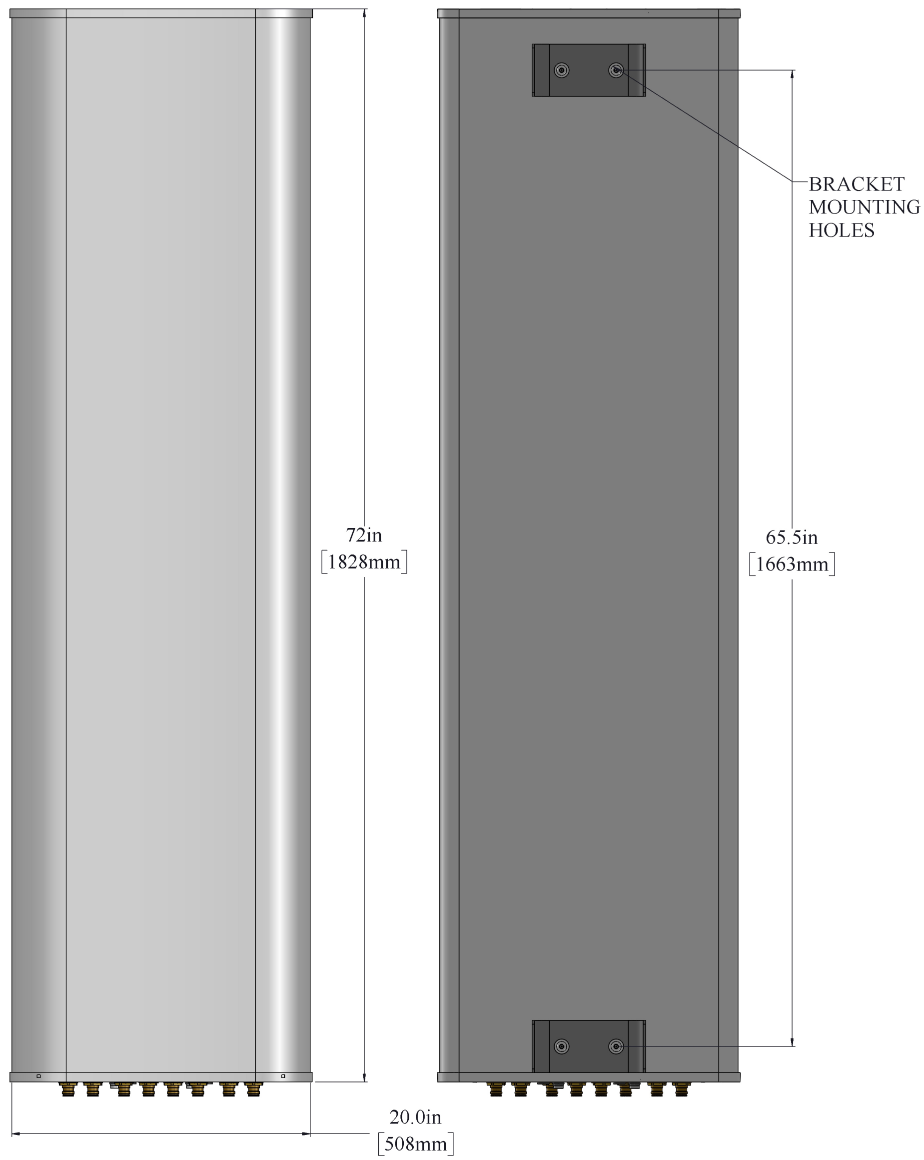
[1] Typical value over frequency and tilt

2 Power rated up to +55 °C

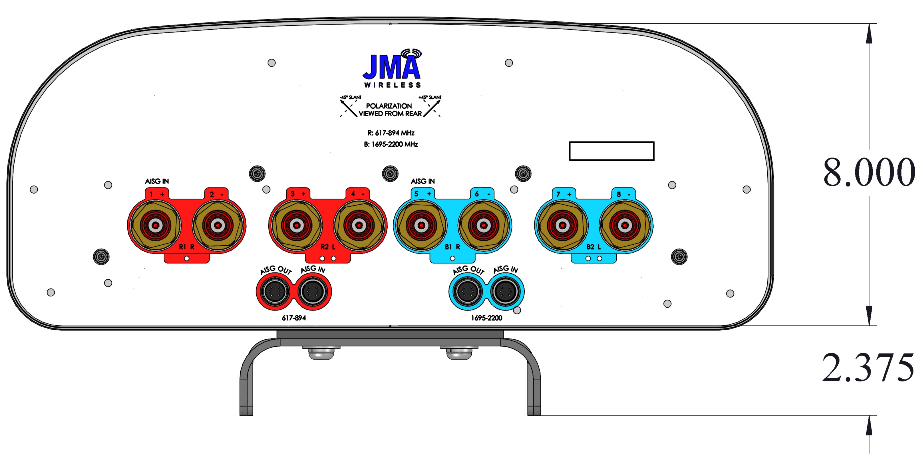
Electrical specification (minimum/maximum)	Ports 1, 2, 3, 4		Ports 5, 6, 7, 8		
Frequency bands, MHz	617-698	698-894	1695-1880	1850-1990	1920-2200
Average gain over all tilts, dBi (Gain Tolerance)	13.2±0.7	14.4±0.6	17.5±0.4	17.4±0.4	18.3±0.5
Horizontal beamwidth tolerance (HBW), degrees[1]	±5	±6.5	±5.5	±3.5	±5.0
Vertical beamwidth tolerance (VBW), degrees	±0.3	±0.3	±0.3	±0.3	±0.3
Front-to-back ratio, co-polar power @180°± 30°, dB	>27	>25	>25	>26	>24
X-Pol discrimination (CPR) at boresight, dB	>20	>19	17.5	>19	>20
First upper side lobe (USLS) suppression boresight to 20°, dB[1]	≤-16	≤-15	≤-16	≤-16	≤-16

Mechanical specifications	
Dimensions height/width/depth, inches (mm)	72.0/ 20.0/ 8.0 (1828.8/ 508.0/ 203.2)
Shipping dimensions length/width/height, inches (mm)	77.3/ 23.8/ 14.5 (1963.42/ 605/ 368)
No. of RF input ports, connector type, and location	8 x 4.3-10 female, bottom
RF connector torque	96 lbf·in (10.85 N·m or 8 lbf·ft)
Net antenna weight, lb (kg)	54 (24.5)
Shipping weight, lb (kg)	94 (42.6)
Antenna mounting and downtilt kit included with antenna	91900318
Net weight of the mounting and downtilt kit, lb (kg)	18 (8.2)
Range of mechanical up/down tilt	-2° to 12°
Rated wind survival speed, mph (km/h)	150 (241)
Frontal and lateral wind loading @ 150 km/h, lbf (N)	108.1 (480.9), 20.5 (91.2)
Effective projected area @ 150 km/h (EPA), frontal, sq ft	4.9

Front view	Back view



Bottom view



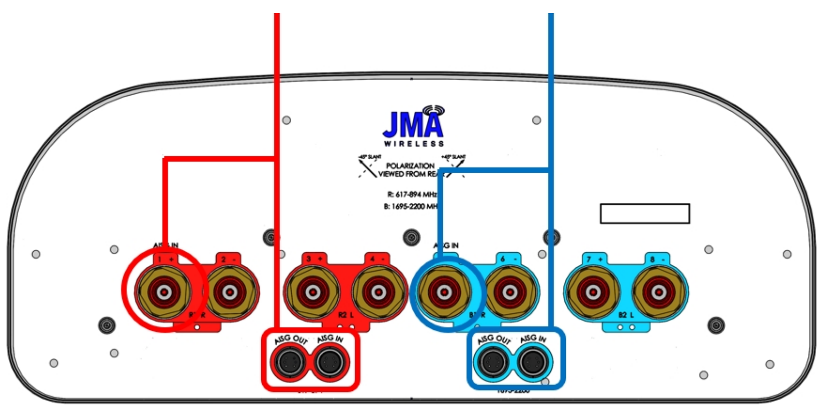
Remote electrical tilt (RET 1000) information	
RET location	Integrated into antenna
RET interface connector type	8-pin AISG connector per IEC 60130-9 or RF port Bias-T
RET connector torque	Min 0.5 N·m to max 1.0 N·m (hand pressure & finger tight)
RET interface connector quantity	2 pairs of AISG male/female connectors and 2 RF port Bias-Ts, ports 1 & 5
RET interface connector location	Bottom of the antenna
Total no. of internal RETs 617-894 MHz	1
Total no. of internal RETs 1695-2200 MHz	1
RET input operating voltage, vdc	10-30
RET max power consumption, idle state, W	≤ 2.0
RET max power consumption, normal operating conditions, W	≤ 10.0
RET communication protocol	Hardware AISG 3.0; firmware AISG 2.0, field-upgradable to AISG 3.0

RET and RF connector topology

Each RET device can be controlled either via the designated external AISG connector or RF port as shown below:

Band	RF port
617-894	1-4

Band	RF port
1695-2200	5-8



Array topology

4 sets of radiating arrays

R1: 617-894 MHz
R2: 617-894 MHz
B1: 1695-2200 MHz
B2: 1695-2200 MHz

Band	RF port
617-894	1-2
617-894	3-4
1695-2200	5-6
1695-2200	7-8

Fujitsu – DiSH Triple-band RU Technical Specifications

RU General Specification	
Part number	TA08025-B605
TRX Configuration	4T4R
Operating Frequency	n71 & n29 & n26 Frequencies (Triple-Band)
Instantaneous Bandwidth	n71: 35MHz n29: 11MHz n26: 7MHz
Operation Bandwidth (3GPP)	n71: 35MHz n29: 10MHz n26: 5MHz
CC BW	5/10/20 MHz
Capacity	n71:2Cr(5/10/20MHz)/NB-IOT n26:1Cr(5MHz)/NB-IOT n29:2Cr(5/10MHz)
Interface to DU	ORAN 7.2x / 10G optical IF
TX Specification	
Output Power per TX	n71: 30W per port n29: 40W per port n26: 10 W per port
ACLR	Compliant with 3GPP TS 38.104
Transmitter Spurious Emissions	Compliant with 3GPP TS 38.104
EVM	Compliant with 3GPP TS 38.104
RX Specification	
Noise Figure	2.5dB (normal condition 2.2dB)
Blocking Features	Compliant with 3GPP TS 38.104
Receiver spurious emissions	Compliant with 3GPP TS 38.104
Mechanical Specification	
Volume	35 L
Dimension	W:400mm, H: 380mm, D: 230mm
Antenna Connector Type	4.3-10 RF connector
Antenna Control Interface	AISG
Power Supply	DC -58~-36V
Power Consumption	<1300W
Weight	34 kg
Environmental	
Humidity (Absolute humidity)	0.03 g/m3 ~30 g/m3
Atmospheric Pressure	Between 70 kPa and 106 kPa
Operating Temperature	-40°C ~+55°C
IP Rating	IP65
Cooling	Passive

Mounting Options	
Pole	TBD
Wall	TBD

DATA SHEET

Base/Tower/Rooftop Solution for RRH Applications

RDIDC-9181-PF-48

The deployment of Remote Radio Head (RRH) architecture poses unique challenges to the mobile telecom industry. Raycap's innovative RRH protection solutions mitigate the risk of damage due to lightning and provide high levels of availability and reliability to radio equipment.

Features

- Employs the Strikesorb® 30-V1-2CFV Surge Protective Device (SPD) specifically designed for the Remote Radio Head (RRH) installation environment and certified for use in DC applications and at low DC operating voltages (48V)
- The Strikesorb 30-V1-2CFV is a Class I SPD, certified by VDE per the IEC 61643-11 standard as suitable for installation in areas where direct lightning exposure is expected. Strikesorb 30-V1-2CFV is able to withstand direct lightning currents of up to 12.5kA (10/350) and induced surge currents of up to 60kA (8/20).
- Provides very low let through / clamping voltage - unique for a Class I product - as it does not employ spark gaps or other switching elements. Strikesorb offers unique protection levels to the RRH equipment as well as the Base Band Units
- For individual circuit per radio architecture
- Configurable cable ports are designed to accommodate varying diameters of hybrid (combined power and fiber optic) or standard cables
- Fully recognized to the UL 1449 4th Edition Safety Standard
- Patent pending design

Benefits

- Offers unique maintenance-free protection against direct lightning currents
- Protects up to 9 Remote Radio Heads and connects up to 18 fiber pairs
- Utilizes a NEMA 4X rated enclosure, allowing for indoor or outdoor installation at the base, on a roof or tower top

Strikesorb 30-V1-2CFV

G02-01-946 200414

SPECIFICATIONS

Base/Tower Solution for RRH Applications

RDIDC-9181-PF-48

Electrical

Model Number	**RDIDC-9181-PF-48**
Nominal Operating Voltage	48 VDC
Nominal Discharge Current [I_n]	20 kA 8/20 µs
Maximum Surge Current [I_{max}]	60 kA 8/20 µs
Maximum Impulse (Lightning) Current per IEC 61643-11	12.5 kA 10/350 µs
Maximum Continuous Operationg Voltage [U_c]	75 VDC
Response Time [t_A]	<1 ns
Voltage Protection Rating (VPR) per UL 1449 4th Edition	400 V
Let-through Voltage @ 20kA (8/20)	<410 V
Let-through Voltage @ 10kA (8/20)	<330 V
Voltage Protection Level (VPL) per IEC 61643-11	<200 V @ 12.5 kA 10/350 µs
Fault Monitoring	Local status indicator - dry contact alarm
Circuit Configuration	Parallel; -48VDC suppy-return, return-ground
Protection Class as per IEC 61643-1	Class I
Incoming Power/Fiber	Power: #10/8/6/4/2 AWG (6 mm² - 33.6 mm²) power trunk Fiber: LC/LC
Strikesorb Module Type	30-V1-2CFV

Mechanical

Suppression Connection Method	Compression lug, #14 - #2 AWG (2.1 mm² - 33.6 mm²) Copper; #12 - #2 AWG (3.3 mm² - 33.6 mm²) Aluminum
Fiber Connection Method	24 LC-LC Single mode
Environmental Rating	NEMA 4X
Operating Temperature	-40° C to +80° C
UV Resistant	Yes
Combined Wind Load	150 mph (sustained): 110.5 lbs (491.5N) 195 mph (gust): 186 lbs (827.4N)
Dimensions	14" x 16" x 8"
Estimated Weight	21.85 lbs

Optional Product Configurations

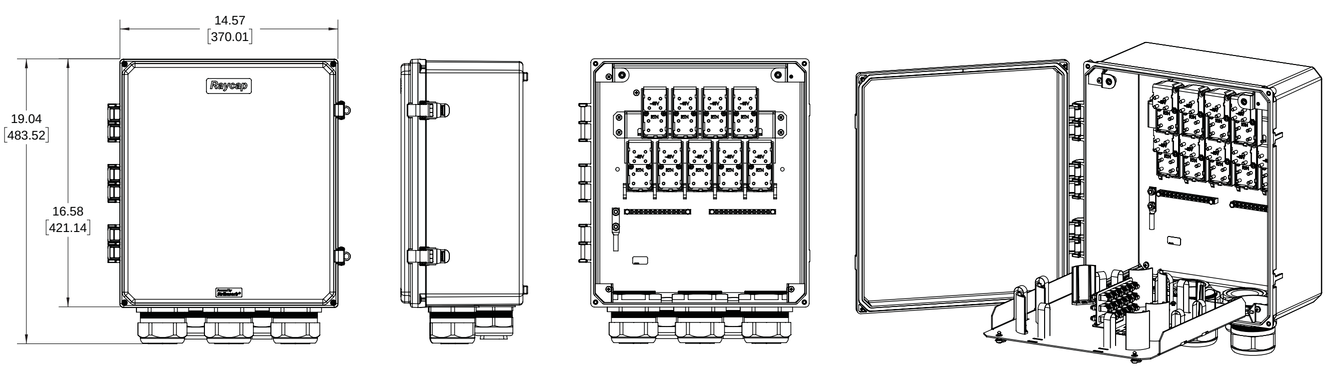
Bridge Kit (required for base unit when pairing with HCS 1.0 legacy cable)   Order Part #: RTMDC-5634-WB-KIT

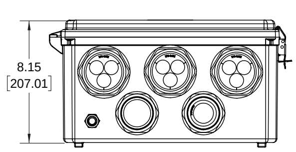
Standards Compliance & Certifications

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

Standards   ANSI/UL 1449 4th Edition, IEEE C62.41, NEMA LS-1, IEC 61643-11 (Class I Protection), IEC 61643-12, EN 61643-11:2002 (including A11:2007)

Product Diagram





AWG=American Wire Gauge

Prepared by:
SGS Towers
Sinnott Gering and Schmitt Towers, Inc.
10834 Old Mill Rd Suite 8 Omaha, NE 68154
(402)-575-8885
Engineering@sgstowers.com

Structural Analysis Report

Structure	: 97.5 Foot Monopole
VB Site Name	: BOE- Richard D Riddle School
VB Site ID	: US-MD-5072
Proposed Carrier	: DISH Wireless L.L.C.
Carrier Site Name	: DCWDC00428A
Carrier Site Number	: DCWDC00428A
Site Location	: 12501-A Dalewood Drive Silver Spring, MD 20906 (Montgomery County) 39.05946, -77.06649
Date	: February 23, 2021
Max Member Stress Level	: 98.7% (Tower) 86.8% (Base Plate) 78.0% (Anchor Rods) 62.5% (Foundation – Drilled Pier)
Result	: **PASS**

STATE OF MARYLAND
NICHOLAS J. SCHMITT
LIC. 43419
PROFESSIONAL ENGINEER

2/24/21

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. 43419

SGS Job No.: 2101548

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Collocation Application ....Attached

Design Criteria

The tower was analyzed using tnxTower (Version 8.0.7.5) software to find the internal loads using the following design criteria.

State	Maryland
City / County Building Code	Montgomery County (IBC 2018)
Standard Codes	TIA-222-H
Basic Wind Speed	113 MPH (V_{ult})
Basic Wind Speed w/ Ice	40 MPH w/ 1.0” Ice
Grades	65 ksi Tower Pole (0-150’) / 60 ksi Base Plate / A615-75 (75 ksi) Anchor Bolts
Exposure Category	C
Topographic Category (height)	1 (0 ft)
Structure Class	II
S_s	0.134
S_1	0.043

Note: A seismic analysis has been performed and is not controlling.

Analysis Results

Based on the foregoing information, our structural analysis determined that **the existing tower is structurally capable of supporting the proposed equipment loads without modification.** The base plate and anchor bolts have also been evaluated and are **found to be structurally capable of supporting the proposed equipment loads without modification**. The structural design report (EEI, Project No. 13160, Drawing No. D13160-98.1) analyzed for drilled pier foundation. An analysis for drilled pier foundation was performed and it was determined **to be structurally capable of supporting the proposed equipment loads without modifications.**

Assumptions

1. The existing tower has been maintained to manufacturer’s specifications and is in good condition.
2. All member connections are considered to have been designed to meet the load carrying capacity of the connected members.
3. Antenna mount loads have been estimated based on generally accepted industry standards.
4. The mounts for the proposed antennas have been analyzed and designed by others.
5. Ultimate Bearing value and blow count for soil has been taken from TIA-222-H, ANNEX F Table F-1:Presumptive Soil Parameters to perform foundation analysis.

Introduction

We have completed our structural analysis of the proposed equipment installation on the foregoing **Monopole** to determine its ability to support the new loads proposed by **DISH Wireless L.L.C.** The objective of the analysis is to determine if the **Monopole** meets the current structural codes and standards with the proposed equipment installation.

Existing Structural Information

The following documents for the existing structure were made available for our structural analysis.

Tower Information	Engineered Endeavors Incorporated, Structural Design Report / Project No: 13160, Drawing No. GS55637, dated August 9, 2005
Foundation Information	Engineered Endeavors Incorporated, Structural Design Report / Project No: 13160, Drawing No. D13160-98.1, dated August 9, 2005
Equipment Information	DISH Wireless - Vertical Bridge Collocation Application No. C-103052 Version 2, dated February 12, 2021. T-Mobile – Loading provided by Vertical Bridge on February 18, 2021
Tower Reinforcement Information	Tower has not been previously reinforced

Final Proposed Equipment Loading for DISH Wireless L.L.C.

The following proposed loading was obtained from the Vertical Bridge Collocation Application:

Antenna/Equipment					Coax	
Mount (ft.)	RAD (ft.)	Qty.	Antenna	Type	Qty.	Size/Type
90.0	-	**1**	**Platform Mount w/ Handrails**	**Mount**	**1**	**1.6” Hybrid**
	90.0	**6***	**JMA MX08FRO665-20_V0F**	**Panel**		
		6*	**Fujitsu TA08025-B604**	**RRU**		
		6*	**Fujitsu TA08025-B605**	**RRU**		
		1	**Raycap RDIDC-9181-PF-48**	**Junction Box**		

Note: Proposed equipment shown in bold.
Note: Proposed feed lines to be placed on the outside of the pole.
Note: Remainder of T-Mobile reserved rights are considered in the analysis
Note: Remainder of Dish reserved rights are considered in the analysis.
Note: *Designates that half of the quantity is reserved loading.
Note: For all other existing equipment please refer to the tower profile and attached tnxTower output.

Conclusions

The existing tower described above **has sufficient capacity** to support the proposed loading based on the two governing codes referenced above. The base plate, anchor bolts and foundation have also been evaluated and have sufficient capacity to support the proposed loads.

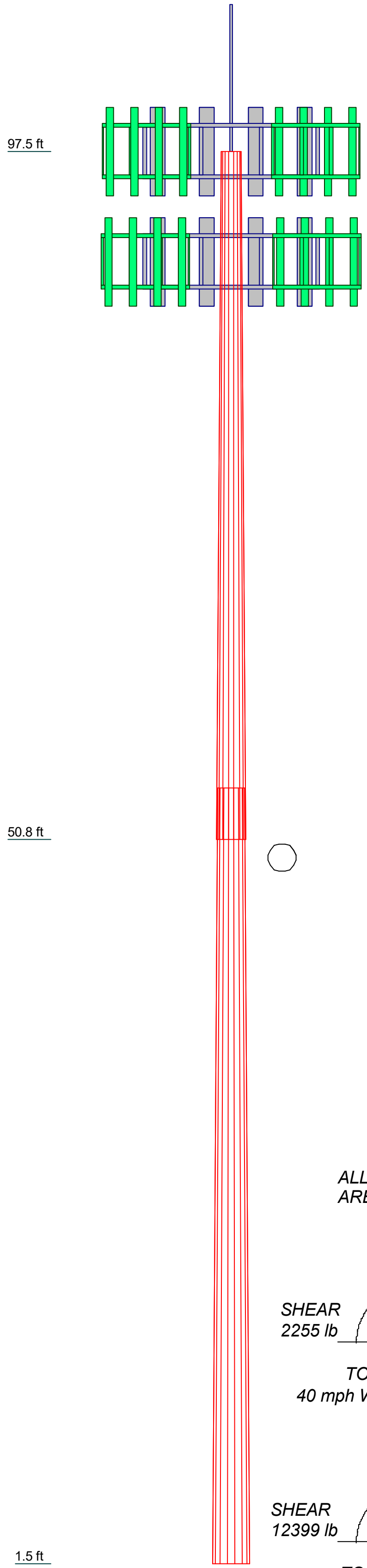
We appreciate the opportunity of providing our continuing professional services to you. If you have any questions or need further assistance, please call us anytime at 402-575-8885.

Sincerely,

Analysis by:	Reviewed by:
Ravi Siddharth Raja, EI Project Engineer	Nicholas J. Schmitt, P.E., S.E. Vice President

Attachment 1: Calculations

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (lb)
1	46.71	18	0.1875	3.42	16.0000	23.0500	A572-65	1920.6
2	52.71	18	0.2500		22.1588	30.0000	A572-65	3859.9
								5780.6



DESIGNED APPURTENANCE LOADING

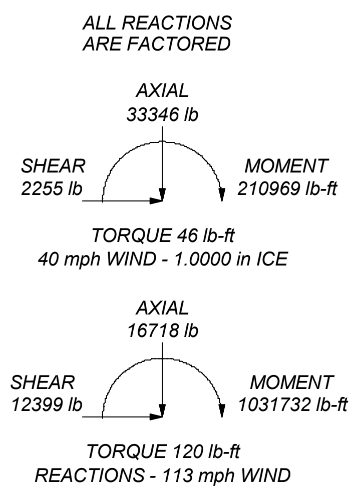
TYPE	ELEVATION
Lighting Rod 5/8" x 7'	97.5
(2) APX15PV-15PVL (T-Mobile)	97.5
(2) APX15PV-15PVL (T-Mobile)	97.5
(2) APX15PV-15PVL (T-Mobile)	97.5
Platfrom Mount (T-Mobile)	97.5
T-Mobile 1/3 of Remainder Reserved (T-Mobile)	97.5
T-Mobile 1/3 of Remainder Reserved (T-Mobile)	97.5
T-Mobile 1/3 of Remainder Reserved (T-Mobile)	97.5
TA08025-B605 (Dish Wireless)	90
TA08025-B605 (Dish Wireless)	90
TA08025-B605 (Dish Wireless)	90
Platform Mount (Dish Wireless)	90
RDIDC-9181-PF-48 (Dish Wireless)	90
TA08025-B604 (Dish Wireless)	90
TA08025-B604 (Dish Wireless)	90
TA08025-B604 (Dish Wireless)	90
MX08FRO665-20_V0F (Dish Wireless)	90
MX08FRO665-20_V0F (Dish Wireless)	90
MX08FRO665-20_V0F (Dish Wireless)	90
TA08025-B604 (Dish Wireless)	90
TA08025-B604 (Dish Wireless)	90
TA08025-B604 (Dish Wireless)	90
MX08FRO665-20_V0F (Dish Wireless)	90
MX08FRO665-20_V0F (Dish Wireless)	90
MX08FRO665-20_V0F (Dish Wireless)	90
TA08025-B605 (Dish Wireless)	90
TA08025-B605 (Dish Wireless)	90
TA08025-B605 (Dish Wireless)	90
Dish 1/3 of Remainder Reserved (Dish Wireless)	90
Dish 1/3 of Remainder Reserved (Dish Wireless)	90
Dish 1/3 of Remainder Reserved (Dish Wireless)	90

MATERIAL STRENGTH

GRADE	Fy	Fu
A572-65	65 ksi	80 ksi

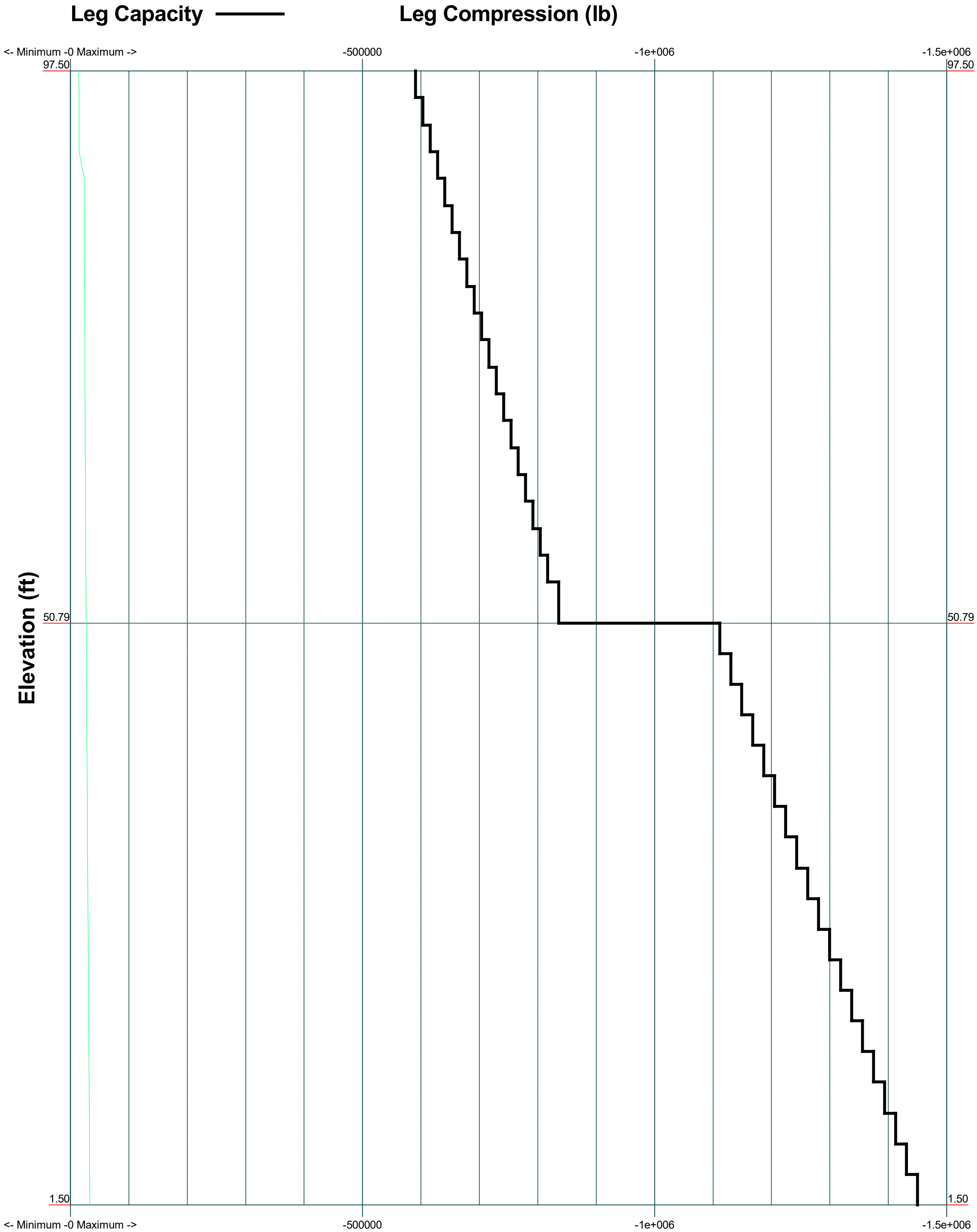
TOWER DESIGN NOTES

1. Tower is located in Montgomery County, Maryland.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 113 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 40 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 98.7%



SGS Towers Chapell Hill, NC Phone: engineering@sgstowers.com FAX:	Job: **SGS# 2101548**		
	Project: **BOE - Richard D Riddle School (US-MD-5072)**		
	Client: Vertical Bridge	Drawn by: Ravi Siddharth Raja	App'd:
	Code: TIA-222-H	Date: 02/23/21	Scale: NTS
	Path: C:\Users\Ravi Raja\Downloads\2101548 - BOE - Richard D Riddle School\Tnx\SGS_2101548_VB Site_US-MD-5072_02-18-2021.eri		Dwg No. E-1

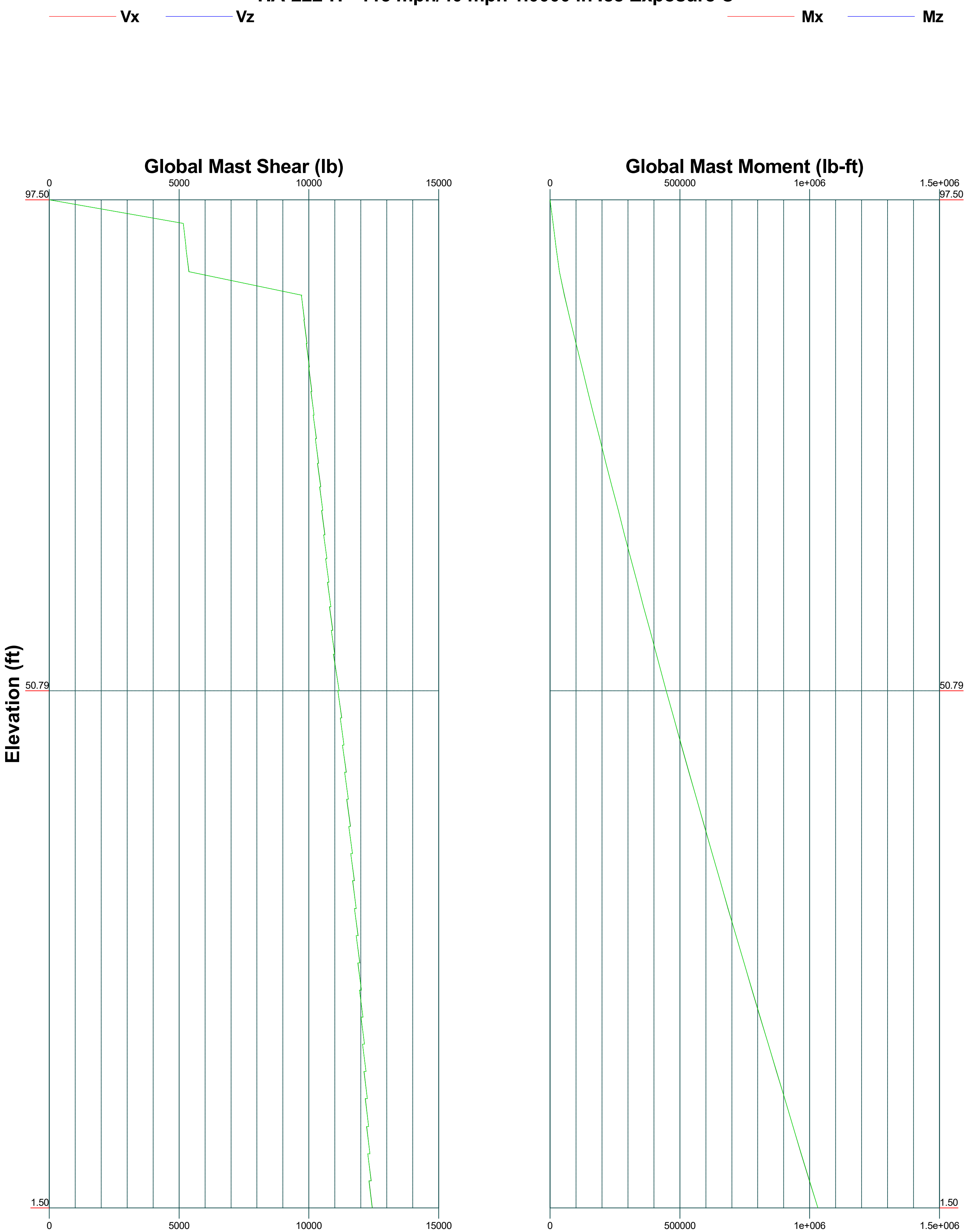
TIA-222-H - 113 mph/40 mph 1.0000 in Ice Exposure C



SGS Towers Chapell Hill, NC Phone: engineering@sgstowers.com FAX:	Job: ***SGS# 2101548***		
	Project: ***BOE - Richard D Riddle School (US-MD-5072)***		
	Client: Vertical Bridge	Drawn by: Ravi Siddharth Raja	App'd:
	Code: TIA-222-H	Date: 02/23/21	Scale: NTS
	Path: C:\Users\Ravi Raja\Downloads\2101548 - BOE - Richard D Riddle School\Tnx\SGS 2101548 VB Site US-MD-5072 02-18-2021.eri		Dwg No. E-3

TIA-222-H - 113 mph/40 mph 1.0000 in Ice Exposure C

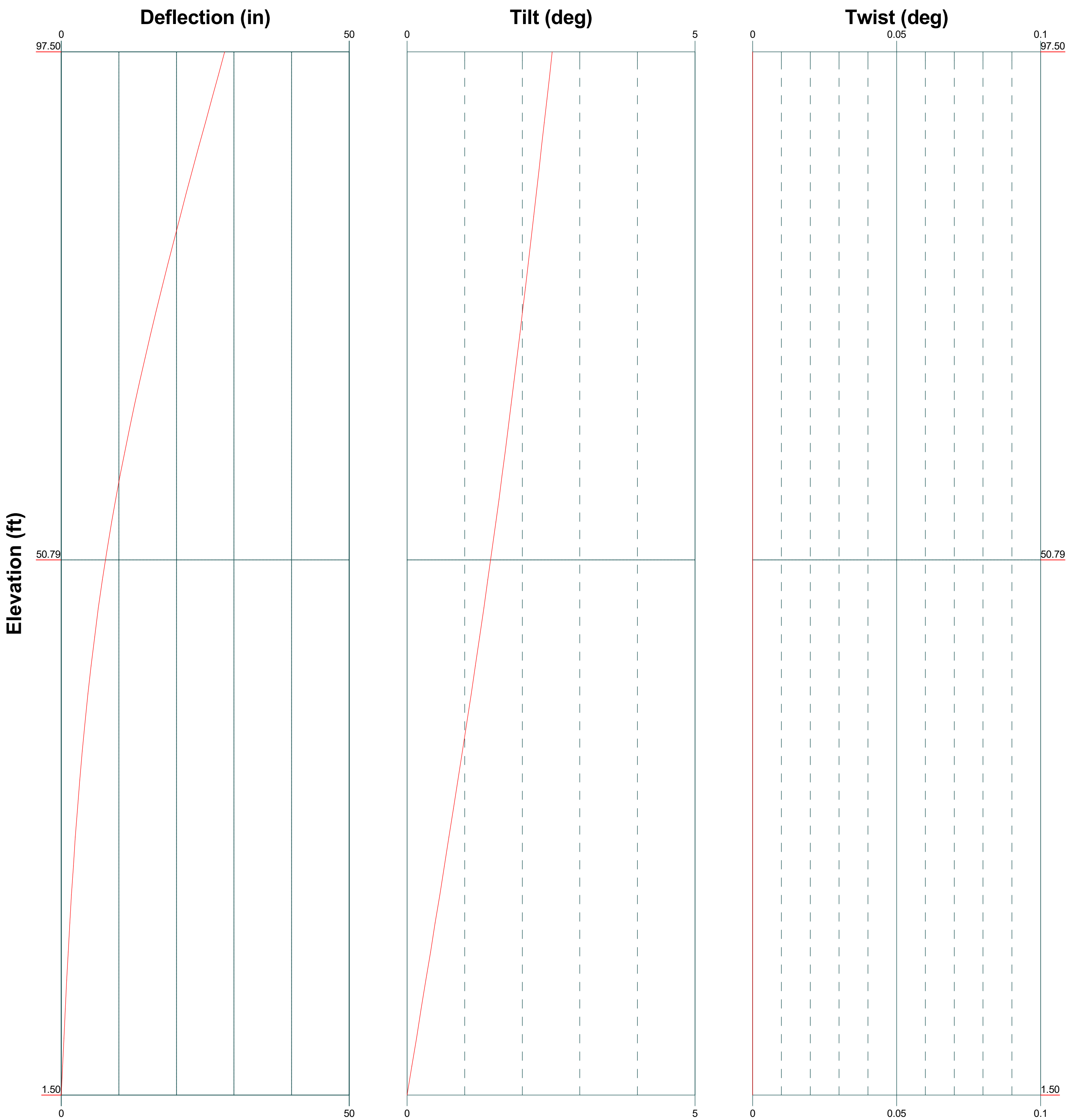
Maximum Values



SGS Towers Chapell Hill, NC Phone: engineering@sgstowers.com FAX:	Job: ***SGS# 2101548***		
	Project: ***BOE - Richard D Riddle School (US-MD-5072)***		
	Client: Vertical Bridge	Drawn by: Ravi Siddharth Raja	App'd:
	Code: TIA-222-H	Date: 02/23/21	Scale: NTS
	Path: C:\Users\Ravi Raja\Downloads\2101548 - BOE - Richard D Riddle School\Tnx\SGS 2101548 VB Site US-MD-5072 02-18-2021.eri		Dwg No. E-4

TIA-222-H - Service - 60 mph

Maximum Values



SGS Towers Chapell Hill, NC Phone: engineering@sgstowers.com FAX:	Job: **SGS# 2101548**		
	Project: **BOE - Richard D Riddle School (US-MD-5072)**		
	Client: Vertical Bridge	Drawn by: Ravi Siddharth Raja	App'd:
	Code: TIA-222-H	Date: 02/23/21	Scale: NTS
	Path: C:\Users\Ravi Raja\Downloads\2101548 - BOE - Richard D Riddle School\Tnx\SGS_2101548_VB Site_US-MD-5072_02-18-2021.eri		Dwg No. E-5

Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

- Tower is located in Montgomery County, Maryland.
- Tower base elevation above sea level: 371.97 ft.
- Basic wind speed of 113 mph.
- Risk Category II.
- Exposure Category C.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height: 0.00 ft.
- Nominal ice thickness of 1.0000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 40 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole design is 1.05.
- Tower analysis based on target reliabilities in accordance with Annex S.
- Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
Use Code Stress Ratios
√ Use Code Safety Factors - Guys
Escalate Ice
Always Use Max Kz
Use Special Wind Profile
Include Bolts In Member Capacity
Leg Bolts Are At Top Of Section
√ Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
SR Members Have Cut Ends
SR Members Are Concentric

Distribute Leg Loads As Uniform
Assume Legs Pinned
√ Assume Rigid Index Plate
√ Use Clear Spans For Wind Area
Use Clear Spans For KL/r
Retension Guys To Initial Tension
√ Bypass Mast Stability Checks
√ Use Azimuth Dish Coefficients
√ Project Wind Area of Appurt.
Autocalc Torque Arm Areas
Add IBC .6D+W Combination
Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing
Treat Feed Line Bundles As Cylinder
Ignore KL/ry For 60 Deg. Angle Legs

Use ASCE 10 X-Brace Ly Rules
Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
SR Leg Bolts Resist Compression
All Leg Panels Have Same Allowable
Offset Girt At Foundation
√ Consider Feed Line Torque
Include Angle Block Shear Check
Use TIA-222-H Bracing Resist. Exemption
Use TIA-222-H Tension Splice Exemption

Poles

Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets
Pole Without Linear Attachments
Pole With Shroud Or No Appurtenances
Outside and Inside Corner Radii Are Known

Tapered Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Splice Length* *ft*	*Number of Sides*	*Top Diameter* *in*	*Bottom Diameter* *in*	*Wall Thickness* *in*	*Bend Radius* *in*	*Pole Grade*
L1	97.50-50.79	46.71	3.42	18	16.0000	23.0500	0.1875	0.7500	A572-65 (65 ksi)
L2	50.79-1.50	52.71		18	22.1588	30.0000	0.2500	1.0000	A572-65 (65 ksi)

Tapered Pole Properties

Section	*Tip Dia.* *in*	*Area* in^2	*I* in^4	*r* *in*	*C* *in*	*I/C* in^3	*J* in^4	*It/Q* in^2	*w* *in*	*w/t*
L1	16.2179	9.4104	297.2674	5.6134	8.1280	36.5733	594.9259	4.7061	2.4860	13.259
	23.3767	13.6060	898.4973	8.1162	11.7094	76.7330	1798.1770	6.8043	3.7268	19.876
L2	22.9787	17.3846	1054.2438	7.7776	11.2567	93.6550	2109.8748	8.6940	3.4600	13.84
	30.4242	23.6066	2639.6436	10.5612	15.2400	173.2050	5282.7605	11.8056	4.8400	19.36

Tower Elevation *ft*	*Gusset Area (per face)* ft^2	*Gusset Thickness* *in*	*Gusset Grade*	*Adjust. Factor* A_f	*Adjust. Factor* A_r	*Weight Mult.*	*Double Angle Stitch Bolt Spacing Diagonals* *in*	*Double Angle Stitch Bolt Spacing Horizontals* *in*	*Double Angle Stitch Bolt Spacing Redundants* *in*
L1 97.50-50.79				1	1	1.05			
L2 50.79-1.50				1	1	1.05			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	*Sector*	*Exclude From Torque Calculation*	*Component Type*	*Placement* *ft*	*Total Number*	*Number Per Row*	*Start/End Position*	*Width or Diameter* *in*	*Perimeter* *in*	*Weight* *plf*
Safety Line 3/8	A	No	Surface Ar (CaAa)	97.50 - 1.50	1	1	0.000 0.000	0.3750		0.22
***										
Step Bolts	A	No	Surface Ar (CaAa)	97.50 - 1.50	1	1	0.000 0.000	0.6250		0.51
***										
***										
1.6" (Dish Wireless)	C	No	Surface Ar (CaAa)	90.00 - 3.00	1	1	0.000 0.000	1.6000		1.35
***										

Feed Line/Linear Appurtenances - Entered As Area

Description	*Face or Leg*	*Allow Shield*	*Exclude From Torque Calculation*	*Component Type*	*Placement* *ft*	*Total Number*		C_AA_A ft^2/ft	*Weight* *plf*
***									
***									
7/8" Coax	C	No	No	Inside Pole	97.50 - 3.00	1	No Ice	0.00	1.54

Description	*Face or Leg*	*Allow Shield*	*Exclude From Torque Calculation*	*Component Type*	*Placement* *ft*	*Total Number*		*C_AA_A* *ft^2/ft*	*Weight* *plf*
(T-Mobile)							1/2" Ice	0.00	1.54
							1" Ice	0.00	1.54
***									
1-1/4" Coax	C	No	No	Inside Pole	97.50 - 3.00	1	No Ice	0.00	0.50
(T-Mobile)							1/2" Ice	0.00	0.50
							1" Ice	0.00	0.50
***									
1-5/8" Coax	C	No	No	Inside Pole	97.50 - 3.00	1	No Ice	0.00	0.82
(T-Mobile)							1/2" Ice	0.00	0.82
							1" Ice	0.00	0.82
***									

Feed Line/Linear Appurtenances Section Areas

Tower Section	*Tower Elevation* *ft*	*Face*	*A_R* *ft^2*	*A_F* *ft^2*	*C_AA_A In Face* *ft^2*	*C_AA_A Out Face* *ft^2*	*Weight* *lb*
L1	97.50-50.79	A	0.000	0.000	4.671	0.000	34.19
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	6.274	0.000	186.52
L2	50.79-1.50	A	0.000	0.000	4.929	0.000	36.08
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	7.646	0.000	201.20

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	*Tower Elevation* *ft*	*Face or Leg*	*Ice Thickness* *in*	*A_R* *ft^2*	*A_F* *ft^2*	*C_AA_A In Face* *ft^2*	*C_AA_A Out Face* *ft^2*	*Weight* *lb*
L1	97.50-50.79	A	0.920	0.000	0.000	21.868	0.000	183.40
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	13.491	0.000	297.65
L2	50.79-1.50	A	0.831	0.000	0.000	23.076	0.000	193.53
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	16.444	0.000	336.64

Feed Line Center of Pressure

Section	*Elevation* *ft*	*CP_X* *in*	*CP_Z* *in*	*CP_X Ice* *in*	*CP_Z Ice* *in*
L1	97.50-50.79	-0.6037	0.6640	-1.3903	0.2698
L2	50.79-1.50	-0.6189	0.7909	-1.4956	0.4122

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Shielding Factor Ka

Tower Section	*Feed Line Record No.*	*Description*	*Feed Line Segment Elev.*	*K_a No Ice*	*K_a Ice*
L1	1	Safety Line 3/8	50.79 - 97.50	1.0000	1.0000
L1	3	Step Bolts	50.79 - 97.50	1.0000	1.0000
L1	6	1.6"	50.79 - 90.00	1.0000	1.0000
L2	1	Safety Line 3/8	1.50 - 50.79	1.0000	1.0000
L2	3	Step Bolts	1.50 - 50.79	1.0000	1.0000
L2	6	1.6"	3.00 - 50.79	1.0000	1.0000

Discrete Tower Loads

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		*C_AA_A Front* ft^2	*C_AA_A Side* ft^2	*Weight* lb
****									
Lighting Rod 5/8" x 7'	A	From Leg	3.00	0.0000	97.50	No Ice	0.53	0.53	30.00
			0.00			1/2" Ice	1.24	1.24	35.42
			5.00			1" Ice	1.97	1.97	45.35
***									
RDIDC-9181-PF-48 (Dish Wireless)	A	From Leg	0.00	0.0000	90.00	No Ice	0.93	1.07	21.85
			0.00			1/2" Ice	1.06	1.20	38.15
			0.00			1" Ice	1.19	1.35	57.11
***									
TA08025-B604 (Dish Wireless)	A	From Leg	2.50	0.0000	90.00	No Ice	1.96	1.03	63.93
			0.00			1/2" Ice	2.14	1.17	80.68
			0.00			1" Ice	2.32	1.31	100.13
***									
TA08025-B604 (Dish Wireless)	B	From Leg	2.50	0.0000	90.00	No Ice	1.96	1.03	63.93
			0.00			1/2" Ice	2.14	1.17	80.68
			0.00			1" Ice	2.32	1.31	100.13
***									
TA08025-B604 (Dish Wireless)	C	From Leg	2.50	0.0000	90.00	No Ice	1.96	1.03	63.93
			0.00			1/2" Ice	2.14	1.17	80.68
			0.00			1" Ice	2.32	1.31	100.13
***									
MX08FRO665-20_V0F (Dish Wireless)	A	From Leg	3.00	0.0000	90.00	No Ice	12.49	5.87	54.00
			0.00			1/2" Ice	12.99	6.32	127.79
			0.00			1" Ice	13.49	6.79	208.26
***									
MX08FRO665-20_V0F (Dish Wireless)	B	From Leg	3.00	0.0000	90.00	No Ice	12.49	5.87	54.00
			0.00			1/2" Ice	12.99	6.32	127.79
			0.00			1" Ice	13.49	6.79	208.26
***									
MX08FRO665-20_V0F (Dish Wireless)	C	From Leg	3.00	0.0000	90.00	No Ice	12.49	5.87	54.00
			0.00			1/2" Ice	12.99	6.32	127.79

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00			1" Ice	13.49	6.79	208.26
***									
TA08025-B605 (Dish Wireless)	A	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.96 2.14 2.32	1.19 1.33 1.48	74.95 92.92 113.67
***									
TA08025-B605 (Dish Wireless)	B	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.96 2.14 2.32	1.19 1.33 1.48	74.95 92.92 113.67
***									
TA08025-B605 (Dish Wireless)	C	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.96 2.14 2.32	1.19 1.33 1.48	74.95 92.92 113.67
***									
Platform Mount (Dish Wireless)	A	None		0.0000	90.00	No Ice 1/2" Ice 1" Ice	27.78 30.50 31.00	27.78 30.50 31.00	1400.00 2800.00 4200.00
***									
***									
(2) APX15PV-15PVL (T-Mobile)	A	From Leg	3.00 0.00 0.00	0.0000	97.50	No Ice 1/2" Ice 1" Ice	6.11 6.47 6.84	2.03 2.35 2.69	39.86 71.29 107.43
***									
(2) APX15PV-15PVL (T-Mobile)	B	From Leg	3.00 0.00 0.00	0.0000	97.50	No Ice 1/2" Ice 1" Ice	6.11 6.47 6.84	2.03 2.35 2.69	39.86 71.29 107.43
***									
(2) APX15PV-15PVL (T-Mobile)	C	From Leg	3.00 0.00 0.00	0.0000	97.50	No Ice 1/2" Ice 1" Ice	6.11 6.47 6.84	2.03 2.35 2.69	39.86 71.29 107.43
***									
Platfrom Mount (T-Mobile)	A	None		0.0000	97.50	No Ice 1/2" Ice 1" Ice	30.00 30.50 31.00	30.00 30.50 31.00	1425.00 2850.00 4275.00
***									
T-Mobile Reserved Loading									
T-Mobile 1/3 of Remainder Reserved (T-Mobile)	A	From Leg	0.00 0.00 0.00	0.0000	97.50	No Ice 1/2" Ice 1" Ice	30.00 40.00 50.00	15.00 20.00 25.00	1000.00 2000.00 3000.00
***									
T-Mobile 1/3 of Remainder Reserved (T-Mobile)	B	From Leg	0.00 0.00 0.00	0.0000	97.50	No Ice 1/2" Ice 1" Ice	30.00 40.00 50.00	15.00 20.00 25.00	1000.00 2000.00 3000.00
***									
T-Mobile 1/3 of Remainder Reserved (T-Mobile)	C	From Leg	0.00 0.00 0.00	0.0000	97.50	No Ice 1/2" Ice 1" Ice	30.00 40.00 50.00	15.00 20.00 25.00	1000.00 2000.00 3000.00
***									
***									
TA08025-B604 (Dish Wireless)	A	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.96 2.14 2.32	1.03 1.17 1.31	63.93 80.68 100.13
***									
TA08025-B604 (Dish Wireless)	B	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.96 2.14 2.32	1.03 1.17 1.31	63.93 80.68 100.13

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
***									
TA08025-B604 (Dish Wireless)	C	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.96 2.14 2.32	1.03 1.17 1.31	63.93 80.68 100.13
***									
MX08FRO665-20_V0F (Dish Wireless)	A	From Leg	3.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	12.49 12.99 13.49	5.87 6.32 6.79	54.00 127.79 208.26
***									
MX08FRO665-20_V0F (Dish Wireless)	B	From Leg	3.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	12.49 12.99 13.49	5.87 6.32 6.79	54.00 127.79 208.26
***									
MX08FRO665-20_V0F (Dish Wireless)	C	From Leg	3.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	12.49 12.99 13.49	5.87 6.32 6.79	54.00 127.79 208.26
***									
TA08025-B605 (Dish Wireless)	A	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.96 2.14 2.32	1.19 1.33 1.48	74.95 92.92 113.67
***									
TA08025-B605 (Dish Wireless)	B	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.96 2.14 2.32	1.19 1.33 1.48	74.95 92.92 113.67
***									
TA08025-B605 (Dish Wireless)	C	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.96 2.14 2.32	1.19 1.33 1.48	74.95 92.92 113.67
***									
****Dish Reserved Loading***									
Dish 1/3 of Remainder Reserved (Dish Wireless)	A	From Leg	0.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	6.40 7.00 7.60	3.20 3.80 4.40	140.00 280.00 420.00
***									
Dish 1/3 of Remainder Reserved (Dish Wireless)	B	From Leg	0.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	6.40 7.00 7.60	3.20 3.80 4.40	140.00 280.00 420.00
***									
Dish 1/3 of Remainder Reserved (Dish Wireless)	C	From Leg	0.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	6.40 7.00 7.60	3.20 3.80 4.40	140.00 280.00 420.00

Tower Pressures - No Ice

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 97.50-50.79	73.13	1.185	34	77.061	A	0.000	77.061	77.061	100.00	4.671	0.000
					B	0.000	77.061		100.00	0.000	0.000
					C	0.000	77.061		100.00	6.274	0.000
L2 50.79-1.50	26.20	0.955	27	109.676	A	0.000	109.676	109.676	100.00	4.929	0.000
					B	0.000	109.676		100.00	0.000	0.000
					C	0.000	109.676		100.00	7.646	0.000

Tower Pressure - With Ice

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 97.50-50.79	73.13	1.185	4	0.9204	84.226	A	0.000	84.226	84.226	100.00	21.868	0.000
						B	0.000	84.226		100.00	0.000	0.000
						C	0.000	84.226		100.00	13.491	0.000
L2 50.79-1.50	26.20	0.955	3	0.8306	117.237	A	0.000	117.237	117.237	100.00	23.076	0.000
						B	0.000	117.237		100.00	0.000	0.000
						C	0.000	117.237		100.00	16.444	0.000

Tower Pressure - Service

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 97.50-50.79	73.13	1.185	9	77.061	A	0.000	77.061	77.061	100.00	4.671	0.000
					B	0.000	77.061		100.00	0.000	0.000
					C	0.000	77.061		100.00	6.274	0.000
L2 50.79-1.50	26.20	0.955	7	109.676	A	0.000	109.676	109.676	100.00	4.929	0.000
					B	0.000	109.676		100.00	0.000	0.000
					C	0.000	109.676		100.00	7.646	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 97.50-50.79	220.72	1920.63	A	1	0.73	34	1	1	77.061	2127.44	45.55	C
			B	1	0.73		1	1	77.061			
			C	1	0.73		1	1	77.061			
L2 50.79-1.50	237.28	3859.93	A	1	0.73	27	1	1	109.676	2397.60	48.64	C
			B	1	0.73		1	1	109.676			
			C	1	0.73		1	1	109.676			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
Sum Weight:	457.99	5780.55						OTM	211597.60 lb-ft	4525.04		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 97.50-50.79	220.72	1920.63	A	1	0.73	34	1	1	77.061	2127.44	45.55	C
			B	1	0.73		1	1	77.061			
			C	1	0.73		1	1	77.061			
L2 50.79-1.50	237.28	3859.93	A	1	0.73	27	1	1	109.676	2397.60	48.64	C
			B	1	0.73		1	1	109.676			
			C	1	0.73		1	1	109.676			
Sum Weight:	457.99	5780.55						OTM	211597.60 lb-ft	4525.04		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 97.50-50.79	220.72	1920.63	A	1	0.73	34	1	1	77.061	2127.44	45.55	C
			B	1	0.73		1	1	77.061			
			C	1	0.73		1	1	77.061			
L2 50.79-1.50	237.28	3859.93	A	1	0.73	27	1	1	109.676	2397.60	48.64	C
			B	1	0.73		1	1	109.676			
			C	1	0.73		1	1	109.676			
Sum Weight:	457.99	5780.55						OTM	211597.60 lb-ft	4525.04		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 97.50-50.79	481.05	3005.58	A	1	1.2	4	1	1	84.226	478.95	10.25	C
			B	1	1.2		1	1	84.226			
			C	1	1.2		1	1	84.226			
L2 50.79-1.50	530.17	5232.67	A	1	1.2	3	1	1	116.500	524.58	10.64	C
			B	1	1.2		1	1	116.500			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
			C	1	1.2		1	1	116.500			
Sum Weight:	1011.22	8238.25						OTM	47261.79 lb-ft	1003.53		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 97.50-50.79	481.05	3005.58	A	1	1.2	4	1	1	84.226	478.95	10.25	C
			B	1	1.2		1	1	84.226			
			C	1	1.2		1	1	84.226			
L2 50.79-1.50	530.17	5232.67	A	1	1.2	3	1	1	116.500	524.58	10.64	C
			B	1	1.2		1	1	116.500			
			C	1	1.2		1	1	116.500			
Sum Weight:	1011.22	8238.25						OTM	47261.79 lb-ft	1003.53		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 97.50-50.79	481.05	3005.58	A	1	1.2	4	1	1	84.226	478.95	10.25	C
			B	1	1.2		1	1	84.226			
			C	1	1.2		1	1	84.226			
L2 50.79-1.50	530.17	5232.67	A	1	1.2	3	1	1	116.500	524.58	10.64	C
			B	1	1.2		1	1	116.500			
			C	1	1.2		1	1	116.500			
Sum Weight:	1011.22	8238.25						OTM	47261.79 lb-ft	1003.53		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 97.50-50.79	220.72	1920.63	A	1	0.73	9	1	1	77.061	564.90	12.09	C
			B	1	0.73		1	1	77.061			
			C	1	0.73		1	1	77.061			
L2 50.79-1.50	237.28	3859.93	A	1	0.73	7	1	1	109.676	636.64	12.92	C

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
			B	1	0.73		1	1	109.676			
			C	1	0.73		1	1	109.676			
Sum Weight:	457.99	5780.55						OTM	56185.99 lb-ft	1201.54		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 97.50-50.79	220.72	1920.63	A	1	0.73	9	1	1	77.061	564.90	12.09	C
			B	1	0.73		1	1	77.061			
			C	1	0.73		1	1	77.061			
L2 50.79-1.50	237.28	3859.93	A	1	0.73	7	1	1	109.676	636.64	12.92	C
			B	1	0.73		1	1	109.676			
			C	1	0.73		1	1	109.676			
Sum Weight:	457.99	5780.55						OTM	56185.99 lb-ft	1201.54		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 97.50-50.79	220.72	1920.63	A	1	0.73	9	1	1	77.061	564.90	12.09	C
			B	1	0.73		1	1	77.061			
			C	1	0.73		1	1	77.061			
L2 50.79-1.50	237.28	3859.93	A	1	0.73	7	1	1	109.676	636.64	12.92	C
			B	1	0.73		1	1	109.676			
			C	1	0.73		1	1	109.676			
Sum Weight:	457.99	5780.55						OTM	56185.99 lb-ft	1201.54		

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	5780.55					
Bracing Weight	0.00					
Total Member Self-Weight	5780.55			-37.47	59.77	

Load Case	*Vertical Forces* *lb*	*Sum of Forces X* *lb*	*Sum of Forces Z* *lb*	*Sum of Overturning Moments, M_x* *lb-ft*	*Sum of Overturning Moments, M_z* *lb-ft*	*Sum of Torques* *lb-ft*
Total Weight	13931.84			-37.47	59.77	
Wind 0 deg - No Ice		0.00	-12394.63	-939487.16	59.77	0.00
Wind 30 deg - No Ice		6199.43	-10734.06	-813624.77	-469852.15	-51.28
Wind 60 deg - No Ice		10737.72	-6197.31	-469762.32	-813851.56	-88.82
Wind 90 deg - No Ice		12398.85	0.00	-37.47	-939764.08	-102.56
Wind 120 deg - No Ice		10737.72	6197.31	469687.37	-813851.56	-88.82
Wind 150 deg - No Ice		6199.43	10734.06	813549.82	-469852.15	-51.28
Wind 180 deg - No Ice		0.00	12394.63	939412.21	59.77	0.00
Wind 210 deg - No Ice		-6199.43	10734.06	813549.82	469971.69	51.28
Wind 240 deg - No Ice		-10737.72	6197.31	469687.37	813971.09	88.82
Wind 270 deg - No Ice		-12398.85	0.00	-37.47	939883.61	102.56
Wind 300 deg - No Ice		-10737.72	-6197.31	-469762.32	813971.09	88.82
Wind 330 deg - No Ice		-6199.43	-10734.06	-813624.77	469971.69	51.28
Member Ice	2457.69					
Total Weight Ice	30464.17			-6.70	320.17	
Wind 0 deg - Ice		0.00	-2253.92	-163408.26	320.17	0.00
Wind 30 deg - Ice		1127.27	-1951.95	-141516.60	-81407.73	-19.67
Wind 60 deg - Ice		1952.49	-1126.96	-81707.48	-141236.70	-34.07
Wind 90 deg - Ice		2254.54	0.00	-6.70	-163135.63	-39.35
Wind 120 deg - Ice		1952.49	1126.96	81694.09	-141236.70	-34.07
Wind 150 deg - Ice		1127.27	1951.95	141503.21	-81407.73	-19.67
Wind 180 deg - Ice		0.00	2253.92	163394.87	320.17	0.00
Wind 210 deg - Ice		-1127.27	1951.95	141503.21	82048.06	19.67
Wind 240 deg - Ice		-1952.49	1126.96	81694.09	141877.04	34.07
Wind 270 deg - Ice		-2254.54	0.00	-6.70	163775.96	39.35
Wind 300 deg - Ice		-1952.49	-1126.96	-81707.48	141877.04	34.07
Wind 330 deg - Ice		-1127.27	-1951.95	-141516.60	82048.06	19.67
Total Weight	13931.84			-37.47	59.77	
Wind 0 deg - Service		0.00	-3291.17	-249579.82	0.00	0.00
Wind 30 deg - Service		1646.15	-2850.24	-216159.29	-124776.79	-13.62
Wind 60 deg - Service		2851.21	-1645.59	-124852.71	-216119.73	-23.58
Wind 90 deg - Service		3292.30	0.00	-125.60	-249553.57	-27.23
Wind 120 deg - Service		2851.21	1645.59	124601.51	-216119.73	-23.58
Wind 150 deg - Service		1646.15	2850.24	215908.09	-124776.79	-13.62
Wind 180 deg - Service		0.00	3291.17	249328.62	0.00	0.00
Wind 210 deg - Service		-1646.15	2850.24	215908.09	124776.79	13.62
Wind 240 deg - Service		-2851.21	1645.59	124601.51	216119.73	23.58
Wind 270 deg - Service		-3292.30	0.00	-125.60	249553.57	27.23
Wind 300 deg - Service		-2851.21	-1645.59	-124852.71	216119.73	23.58
Wind 330 deg - Service		-1646.15	-2850.24	-216159.29	124776.79	13.62

Load Combinations

Comb. No.	*Description*
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice

Comb. No.	*Description*
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	*Elevation ft*	*Component Type*	*Condition*	*Gov. Load Comb.*	*Axial lb*	*Major Axis Moment lb-ft*	*Minor Axis Moment lb-ft*
L1	97.5 - 50.79	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-26353.11	133.40	163.46
			Max. Mx	20	-10483.11	409666.71	122.53
			Max. My	2	-10483.94	31.98	409591.46
			Max. Vy	20	-10994.49	409666.71	122.53
			Max. Vx	2	-10989.92	31.98	409591.46
			Max. Torque	20			-122.49
L2	50.79 - 1.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-33345.79	337.99	23.26
			Max. Mx	20	-16686.66	1031731.55	59.90
			Max. My	2	-16686.68	78.95	1031308.50
			Max. Vy	20	-12441.28	1031731.55	59.90
			Max. Vx	2	-12437.04	78.95	1031308.50
			Max. Torque	20			-120.95

Section No.	*Elevation ft*	*Component Type*	*Condition*	*Gov. Load Comb.*	*Axial lb*	*Major Axis Moment lb-ft*	*Minor Axis Moment lb-ft*

Maximum Reactions

Location	*Condition*	*Gov. Load Comb.*	*Vertical lb*	*Horizontal, X lb*	*Horizontal, Z lb*
Pole	Max. Vert	36	33345.79	2254.74	0.00
	Max. H_x	20	16718.21	12398.86	0.00
	Max. H_z	2	16718.21	0.00	12394.63
	Max. M_x	2	1031308.50	0.00	12394.63
	Max. M_z	8	1031575.43	-12398.86	0.00
	Max. Torsion	8	119.76	-12398.86	0.00
	Min. Vert	25	12538.65	6199.43	10734.06
	Min. H_x	8	16718.21	-12398.86	0.00
	Min. H_z	14	16718.21	0.00	-12394.63
	Min. M_x	14	-1031183.63	0.00	-12394.63
	Min. M_z	20	-1031731.55	12398.86	0.00
	Min. Torsion	20	-119.76	12398.86	0.00

Tower Mast Reaction Summary

Load Combination	*Vertical lb*	*$Shear_x$ lb*	*$Shear_z$ lb*	*Overturning Moment, M_x lb-ft*	*Overturning Moment, M_z lb-ft*	*Torque lb-ft*
Dead Only	13931.84	0.00	0.00	-37.47	59.77	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	16718.21	-0.00	-12394.63	-1031308.50	78.95	-0.01
0.9 Dead+1.0 Wind 0 deg - No Ice	12538.65	-0.00	-12394.63	-1005100.56	57.66	-0.01
1.2 Dead+1.0 Wind 30 deg - No Ice	16718.20	6199.43	-10734.06	-893158.95	-515758.14	-59.90
0.9 Dead+1.0 Wind 30 deg - No Ice	12538.65	6199.43	-10734.06	-870449.61	-502673.60	-57.10
1.2 Dead+1.0 Wind 60 deg - No Ice	16718.20	10737.72	-6197.31	-515689.39	-893374.49	-103.77
0.9 Dead+1.0 Wind 60 deg - No Ice	12538.65	10737.72	-6197.31	-502570.48	-870696.19	-98.99
1.2 Dead+1.0 Wind 90 deg - No Ice	16718.21	12398.86	-0.00	-59.81	-1031575.43	-119.76
0.9 Dead+1.0 Wind 90 deg - No Ice	12538.65	12398.85	-0.00	-41.08	-1005397.75	-114.21
1.2 Dead+1.0 Wind 120 deg - No Ice	16718.20	10737.72	6197.31	515568.48	-893372.20	-103.64
0.9 Dead+1.0 Wind 120 deg - No Ice	12538.65	10737.72	6197.31	502487.43	-870694.63	-98.82
1.2 Dead+1.0 Wind 150 deg - No Ice	16718.20	6199.43	10734.06	893035.39	-515755.85	-59.85
0.9 Dead+1.0 Wind 150 deg - No Ice	12538.65	6199.43	10734.06	870364.76	-502672.04	-57.10
1.2 Dead+1.0 Wind 180 deg - No Ice	16718.21	-0.00	12394.63	1031183.63	78.95	0.01
0.9 Dead+1.0 Wind 180 deg - No Ice	12538.65	-0.00	12394.63	1005014.80	57.66	0.01

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
1.2 Dead+1.0 Wind 210 deg - No Ice	16718.20	-6199.43	10734.06	893034.63	515913.30	59.87
0.9 Dead+1.0 Wind 210 deg - No Ice	12538.65	-6199.43	10734.06	870364.25	502787.07	57.12
1.2 Dead+1.0 Wind 240 deg - No Ice	16718.20	-10737.72	6197.31	515567.72	893528.76	103.65
0.9 Dead+1.0 Wind 240 deg - No Ice	12538.65	-10737.72	6197.31	502486.92	870809.07	98.83
1.2 Dead+1.0 Wind 270 deg - No Ice	16718.21	-12398.86	-0.00	-59.81	1031731.55	119.76
0.9 Dead+1.0 Wind 270 deg - No Ice	12538.65	-12398.85	-0.00	-41.08	1005511.90	114.21
1.2 Dead+1.0 Wind 300 deg - No Ice	16718.20	-10737.72	-6197.31	-515688.62	893531.05	103.76
0.9 Dead+1.0 Wind 300 deg - No Ice	12538.65	-10737.72	-6197.31	-502569.97	870810.63	98.99
1.2 Dead+1.0 Wind 330 deg - No Ice	16718.20	-6199.43	-10734.06	-893158.18	515915.59	59.88
0.9 Dead+1.0 Wind 330 deg - No Ice	12538.65	-6199.43	-10734.06	-870449.10	502788.63	57.09
1.2 Dead+1.0 Ice+1.0 Temp	33345.79	-0.00	-0.00	-23.26	337.99	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	33345.79	-0.00	-2254.12	-210555.67	432.90	0.01
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	33345.79	1127.37	-1952.13	-182358.57	-104836.37	-22.81
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	33345.79	1952.66	-1127.06	-105322.21	-181898.19	-39.54
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	33345.79	2254.74	-0.00	-88.47	-210104.19	-45.64
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	33345.79	1952.66	1127.06	105144.73	-181897.26	-39.51
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	33345.79	1127.37	1952.13	182180.03	-104835.44	-22.82
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	33345.79	-0.00	2254.12	210376.60	432.90	0.02
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	33345.79	-1127.37	1952.13	182179.81	105701.10	22.85
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	33345.79	-1952.66	1127.06	105144.52	182762.66	39.54
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	33345.79	-2254.74	-0.00	-88.47	210969.46	45.67
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	33345.79	-1952.66	-1127.06	-105321.98	182763.59	39.56
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	33345.79	-1127.37	-1952.13	-182358.34	105702.03	22.83
Dead+Wind 0 deg - Service	13931.84	-0.00	-3291.17	-270479.09	64.95	-0.00
Dead+Wind 30 deg - Service	13931.84	1646.15	-2850.24	-234248.56	-135203.26	-15.92
Dead+Wind 60 deg - Service	13931.84	2851.21	-1645.59	-135264.89	-234226.36	-27.58
Dead+Wind 90 deg - Service	13931.84	3292.30	-0.00	-50.72	-270471.24	-31.84
Dead+Wind 120 deg - Service	13931.84	2851.21	1645.59	135163.37	-234226.23	-27.56
Dead+Wind 150 deg - Service	13931.84	1646.15	2850.24	234146.89	-135203.13	-15.92
Dead+Wind 180 deg - Service	13931.84	-0.00	3291.17	270377.34	64.95	0.00
Dead+Wind 210 deg - Service	13931.84	-1646.15	2850.24	234146.85	135333.01	15.92
Dead+Wind 240 deg - Service	13931.84	-2851.21	1645.59	135163.33	234356.06	27.57
Dead+Wind 270 deg - Service	13931.84	-3292.30	-0.00	-50.72	270601.04	31.84
Dead+Wind 300 deg - Service	13931.84	-2851.21	-1645.59	-135264.85	234356.19	27.58
Dead+Wind 330 deg - Service	13931.84	-1646.15	-2850.24	-234248.52	135333.14	15.92

Solution Summary

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
1	0.00	-13931.84	0.00	0.00	13931.84	0.00	0.000%
2	0.00	-16718.20	-12394.63	0.00	16718.21	12394.63	0.000%
3	0.00	-12538.65	-12394.63	0.00	12538.65	12394.63	0.000%
4	6199.43	-16718.20	-10734.06	-6199.43	16718.20	10734.06	0.000%
5	6199.43	-12538.65	-10734.06	-6199.43	12538.65	10734.06	0.000%
6	10737.72	-16718.20	-6197.31	-10737.72	16718.20	6197.31	0.000%
7	10737.72	-12538.65	-6197.31	-10737.72	12538.65	6197.31	0.000%
8	12398.85	-16718.20	0.00	-12398.86	16718.21	0.00	0.000%
9	12398.85	-12538.65	0.00	-12398.85	12538.65	0.00	0.000%
10	10737.72	-16718.20	6197.31	-10737.72	16718.20	-6197.31	0.000%
11	10737.72	-12538.65	6197.31	-10737.72	12538.65	-6197.31	0.000%
12	6199.43	-16718.20	10734.06	-6199.43	16718.20	-10734.06	0.000%
13	6199.43	-12538.65	10734.06	-6199.43	12538.65	-10734.06	0.000%
14	0.00	-16718.20	12394.63	0.00	16718.21	-12394.63	0.000%
15	0.00	-12538.65	12394.63	0.00	12538.65	-12394.63	0.000%
16	-6199.43	-16718.20	10734.06	6199.43	16718.20	-10734.06	0.000%
17	-6199.43	-12538.65	10734.06	6199.43	12538.65	-10734.06	0.000%
18	-10737.72	-16718.20	6197.31	10737.72	16718.20	-6197.31	0.000%
19	-10737.72	-12538.65	6197.31	10737.72	12538.65	-6197.31	0.000%
20	-12398.85	-16718.20	0.00	12398.86	16718.21	0.00	0.000%
21	-12398.85	-12538.65	0.00	12398.85	12538.65	0.00	0.000%
22	-10737.72	-16718.20	-6197.31	10737.72	16718.20	6197.31	0.000%
23	-10737.72	-12538.65	-6197.31	10737.72	12538.65	6197.31	0.000%
24	-6199.43	-16718.20	-10734.06	6199.43	16718.20	10734.06	0.000%
25	-6199.43	-12538.65	-10734.06	6199.43	12538.65	10734.06	0.000%
26	0.00	-33345.79	0.00	0.00	33345.79	0.00	0.000%
27	0.00	-33345.79	-2253.92	0.00	33345.79	2254.12	0.001%
28	1127.27	-33345.79	-1951.95	-1127.37	33345.79	1952.13	0.001%
29	1952.49	-33345.79	-1126.96	-1952.66	33345.79	1127.06	0.001%
30	2254.54	-33345.79	0.00	-2254.74	33345.79	0.00	0.001%
31	1952.49	-33345.79	1126.96	-1952.66	33345.79	-1127.06	0.001%
32	1127.27	-33345.79	1951.95	-1127.37	33345.79	-1952.13	0.001%
33	0.00	-33345.79	2253.92	0.00	33345.79	-2254.12	0.001%
34	-1127.27	-33345.79	1951.95	1127.37	33345.79	-1952.13	0.001%
35	-1952.49	-33345.79	1126.96	1952.66	33345.79	-1127.06	0.001%
36	-2254.54	-33345.79	0.00	2254.74	33345.79	0.00	0.001%
37	-1952.49	-33345.79	-1126.96	1952.66	33345.79	1127.06	0.001%
38	-1127.27	-33345.79	-1951.95	1127.37	33345.79	1952.13	0.001%
39	0.00	-13931.84	-3291.17	0.00	13931.84	3291.17	0.000%
40	1646.15	-13931.84	-2850.24	-1646.15	13931.84	2850.24	0.000%
41	2851.21	-13931.84	-1645.59	-2851.21	13931.84	1645.59	0.000%
42	3292.30	-13931.84	0.00	-3292.30	13931.84	0.00	0.000%
43	2851.21	-13931.84	1645.59	-2851.21	13931.84	-1645.59	0.000%
44	1646.15	-13931.84	2850.24	-1646.15	13931.84	-2850.24	0.000%
45	0.00	-13931.84	3291.17	0.00	13931.84	-3291.17	0.000%
46	-1646.15	-13931.84	2850.24	1646.15	13931.84	-2850.24	0.000%
47	-2851.21	-13931.84	1645.59	2851.21	13931.84	-1645.59	0.000%
48	-3292.30	-13931.84	0.00	3292.30	13931.84	0.00	0.000%
49	-2851.21	-13931.84	-1645.59	2851.21	13931.84	1645.59	0.000%
50	-1646.15	-13931.84	-2850.24	1646.15	13931.84	2850.24	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00024884
3	Yes	5	0.00000001	0.00002553
4	Yes	7	0.00000001	0.00018304
5	Yes	6	0.00000001	0.00051416
6	Yes	7	0.00000001	0.00018415
7	Yes	6	0.00000001	0.00051743
8	Yes	5	0.00000001	0.00027112
9	Yes	5	0.00000001	0.00005397
10	Yes	7	0.00000001	0.00018261
11	Yes	6	0.00000001	0.00051301
12	Yes	7	0.00000001	0.00018370
13	Yes	6	0.00000001	0.00051623
14	Yes	5	0.00000001	0.00024864
15	Yes	5	0.00000001	0.00002551
16	Yes	7	0.00000001	0.00018373
17	Yes	6	0.00000001	0.00051630
18	Yes	7	0.00000001	0.00018264
19	Yes	6	0.00000001	0.00051307
20	Yes	5	0.00000001	0.00027115
21	Yes	5	0.00000001	0.00005397
22	Yes	7	0.00000001	0.00018418
23	Yes	6	0.00000001	0.00051749
24	Yes	7	0.00000001	0.00018307
25	Yes	6	0.00000001	0.00051423
26	Yes	4	0.00000001	0.00000001
27	Yes	6	0.00047952	0.00029723
28	Yes	6	0.00047793	0.00056802
29	Yes	6	0.00047783	0.00057495
30	Yes	6	0.00047930	0.00029639
31	Yes	6	0.00047761	0.00056350
32	Yes	6	0.00047752	0.00056921
33	Yes	6	0.00047906	0.00029589
34	Yes	6	0.00047750	0.00057356
35	Yes	6	0.00047759	0.00056690
36	Yes	6	0.00047928	0.00029789
37	Yes	6	0.00047781	0.00057849
38	Yes	6	0.00047790	0.00057242
39	Yes	5	0.00000001	0.00001513
40	Yes	5	0.00000001	0.00035775
41	Yes	5	0.00000001	0.00036339
42	Yes	5	0.00000001	0.00001729
43	Yes	5	0.00000001	0.00035509
44	Yes	5	0.00000001	0.00036045
45	Yes	5	0.00000001	0.00001509
46	Yes	5	0.00000001	0.00036089
47	Yes	5	0.00000001	0.00035545
48	Yes	5	0.00000001	0.00001730
49	Yes	5	0.00000001	0.00036376
50	Yes	5	0.00000001	0.00035819

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	97.5 - 50.79	28.384	49	2.5211	0.0012

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L2	54.21 - 1.5	8.739	48	1.5431	0.0004

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
97.50	Lighting Rod 5/8" x 7'	49	28.384	2.5211	0.0012	11573
90.00	RDIDC-9181-PF-48	49	24.508	2.3626	0.0011	7715

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	97.5 - 50.79	108.284	20	9.6467	0.0047
L2	54.21 - 1.5	33.365	20	5.9004	0.0013

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
97.50	Lighting Rod 5/8" x 7'	20	108.284	9.6467	0.0047	3152
90.00	RDIDC-9181-PF-48	20	93.504	9.0392	0.0040	2100

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
L1	97.5 - 95.2216	TP23.05x16x0.1875	46.71	0.00	0.0	9.6151	-4944.00	562482.00	0.009
	95.2216 - 92.9432					9.8197	-5037.11	574454.00	0.009
	92.9432 - 90.6647					10.0244	-5134.05	586426.00	0.009
	90.6647 - 88.3863					10.2290	-8173.79	598398.00	0.014
	88.3863 - 86.1079					10.4337	-8286.25	610371.00	0.014

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
	86.1079 - 83.8295					10.6383	-8405.51	622343.00	0.014
	83.8295 - 81.5511					10.8430	-8532.18	634315.00	0.013
	81.5511 - 79.2726					11.0477	-8665.40	646288.00	0.013
	79.2726 - 76.9942					11.2523	-8804.83	658260.00	0.013
	76.9942 - 74.7158					11.4570	-8950.15	670232.00	0.013
	74.7158 - 72.4374					11.6616	-9100.56	682204.00	0.013
	72.4374 - 70.1589					11.8663	-9256.85	694177.00	0.013
	70.1589 - 67.8805					12.0709	-9418.26	706149.00	0.013
	67.8805 - 65.6021					12.2756	-9584.56	718121.00	0.013
	65.6021 - 63.3237					12.4802	-9755.56	730094.00	0.013
	63.3237 - 61.0453					12.6849	-9931.07	742066.00	0.013
	61.0453 - 58.7668					12.8895	-10110.90	754038.00	0.013
	58.7668 - 56.4884					13.0942	-10295.00	766011.00	0.013
	56.4884 - 54.21					13.2989	-10483.10	777983.00	0.013
	54.21 - 50.79					13.6060	-4762.73	795954.00	0.006
L2	54.21 - 50.79	TP30x22.1588x0.25	52.71	0.00	0.0	17.7883	-6225.30	1040620.00	0.006
	50.79 - 48.1958					18.0946	-11238.60	1058530.00	0.011
	48.1958 - 45.6016					18.4008	-11502.00	1076450.00	0.011
	45.6016 - 43.0074					18.7070	-11770.60	1094360.00	0.011
	43.0074 - 40.4132					19.0132	-12044.20	1112280.00	0.011
	40.4132 - 37.8189					19.3195	-12322.80	1130190.00	0.011
	37.8189 - 35.2247					19.6257	-12606.10	1148100.00	0.011
	35.2247 - 32.6305					19.9319	-12894.10	1166020.00	0.011
	32.6305 - 30.0363					20.2381	-13186.80	1183930.00	0.011
	30.0363 - 27.4421					20.5444	-13483.90	1201850.00	0.011
	27.4421 - 24.8479					20.8506	-13785.50	1219760.00	0.011
	24.8479 - 22.2537					21.1568	-14091.40	1237670.00	0.011
	22.2537 - 19.6595					21.4630	-14401.60	1255590.00	0.011
	19.6595 - 17.0653					21.7693	-14716.00	1273500.00	0.012
	17.0653 - 14.4711					22.0755	-15034.50	1291420.00	0.012
	14.4711 - 11.8768					22.3817	-15357.00	1309330.00	0.012

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
	11.8768 - 9.28263					22.6880	-15683.60	1327250.00	0.012
	9.28263 - 6.68842					22.9942	-16014.10	1345160.00	0.012
	6.68842 - 4.09421					23.3004	-16348.50	1363070.00	0.012
	4.09421 - 1.5					23.6066	-16686.70	1380990.00	0.012

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	97.5 - 95.2216	TP23.05x16x0.1875	11878.33	236449.17	0.050	0.00	236449.17	0.000
	95.2216 - 92.9432		23759.17	246680.83	0.096	0.00	246680.83	0.000
	92.9432 - 90.6647		35880.83	257129.17	0.140	0.00	257129.17	0.000
	90.6647 - 88.3863		55095.42	267794.17	0.206	0.00	267794.17	0.000
	88.3863 - 86.1079		77347.58	278675.83	0.278	0.00	278675.83	0.000
	86.1079 - 83.8295		99815.83	289574.17	0.345	0.00	289574.17	0.000
	83.8295 - 81.5511		122504.17	299496.67	0.409	0.00	299496.67	0.000
	81.5511 - 79.2726		145400.00	309530.00	0.470	0.00	309530.00	0.000
	79.2726 - 76.9942		168497.50	319670.83	0.527	0.00	319670.83	0.000
	76.9942 - 74.7158		191792.50	329915.83	0.581	0.00	329915.83	0.000
	74.7158 - 72.4374		215277.50	340262.50	0.633	0.00	340262.50	0.000
	72.4374 - 70.1589		238958.33	350708.33	0.681	0.00	350708.33	0.000
	70.1589 - 67.8805		262824.17	361249.17	0.728	0.00	361249.17	0.000
	67.8805 - 65.6021		286870.00	371882.50	0.771	0.00	371882.50	0.000
	65.6021 - 63.3237		311092.50	382605.83	0.813	0.00	382605.83	0.000
	63.3237 - 61.0453		335489.17	393415.00	0.853	0.00	393415.00	0.000
	61.0453 - 58.7668		360056.67	404308.33	0.891	0.00	404308.33	0.000
	58.7668 - 56.4884		384791.67	415282.50	0.927	0.00	415282.50	0.000
	56.4884 - 54.21		409692.50	426334.17	0.961	0.00	426334.17	0.000
	54.21 - 50.79		198320.83	443061.67	0.448	0.00	443061.67	0.000
L2	54.21 - 50.79	TP30x22.1588x0.25	249182.50	607239.17	0.410	0.00	607239.17	0.000
	50.79 - 48.1958		476536.67	628444.17	0.758	0.00	628444.17	0.000
	48.1958 - 45.6016		505800.00	650012.50	0.778	0.00	650012.50	0.000

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
	45.6016 - 43.0074		535285.83	671944.17	0.797	0.00	671944.17	0.000
	43.0074 - 40.4132		564986.67	692877.50	0.815	0.00	692877.50	0.000
	40.4132 - 37.8189		594898.33	712718.33	0.835	0.00	712718.33	0.000
	37.8189 - 35.2247		625013.33	732743.33	0.853	0.00	732743.33	0.000
	35.2247 - 32.6305		655323.33	752950.00	0.870	0.00	752950.00	0.000
	32.6305 - 30.0363		685820.83	773332.50	0.887	0.00	773332.50	0.000
	30.0363 - 27.4421		716499.17	793888.33	0.903	0.00	793888.33	0.000
	27.4421 - 24.8479		747351.67	814610.83	0.917	0.00	814610.83	0.000
	24.8479 - 22.2537		778370.83	835500.00	0.932	0.00	835500.00	0.000
	22.2537 - 19.6595		809550.00	856541.67	0.945	0.00	856541.67	0.000
	19.6595 - 17.0653		840883.33	877750.00	0.958	0.00	877750.00	0.000
	17.0653 - 14.4711		872366.67	899100.00	0.970	0.00	899100.00	0.000
	14.4711 - 11.8768		903983.33	920600.00	0.982	0.00	920600.00	0.000
	11.8768 - 9.28263		935733.33	942241.67	0.993	0.00	942241.67	0.000
	9.28263 - 6.68842		967616.67	964025.00	1.004	0.00	964025.00	0.000
	6.68842 - 4.09421		999616.67	985941.67	1.014	0.00	985941.67	0.000
	4.09421 - 1.5		1031733.33	1007983.33	1.024	0.00	1007983.33	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	97.5 - 95.2216	TP23.05x16x0.1875	5163.21	168744.00	0.031	0.00	238755.83	0.000
	95.2216 - 92.9432		5270.03	172336.00	0.031	0.00	249027.50	0.000
	92.9432 - 90.6647		5376.49	175928.00	0.031	0.00	259515.83	0.000
	90.6647 - 88.3863		9724.18	179520.00	0.054	0.01	270220.00	0.000
	88.3863 - 86.1079		9824.31	183111.00	0.054	0.01	281140.83	0.000
	86.1079 - 83.8295		9923.03	186703.00	0.053	61.24	292278.33	0.000
	83.8295 - 81.5511		10017.20	190295.00	0.053	61.22	303631.67	0.000
	81.5511 - 79.2726		10108.80	193886.00	0.052	61.19	315201.67	0.000
	79.2726 - 76.9942		10197.90	197478.00	0.052	61.15	326988.33	0.000

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
	76.9942 - 74.7158		10284.90	201070.00	0.051	61.11	338990.83	0.000
	74.7158 - 72.4374		10372.20	204661.00	0.051	105.76	351209.17	0.000
	72.4374 - 70.1589		10455.20	208253.00	0.050	105.67	363645.00	0.000
	70.1589 - 67.8805		10536.60	211845.00	0.050	105.58	376296.67	0.000
	67.8805 - 65.6021		10616.30	215436.00	0.049	105.48	389164.17	0.000
	65.6021 - 63.3237		10694.50	219028.00	0.049	105.38	402248.33	0.000
	63.3237 - 61.0453		10771.20	222620.00	0.048	105.27	415549.17	0.000
	61.0453 - 58.7668		10846.60	226211.00	0.048	105.17	429065.83	0.000
	58.7668 - 56.4884		10920.70	229803.00	0.048	105.06	442799.17	0.000
	56.4884 - 54.21		10993.60	233395.00	0.047	104.96	456748.33	0.000
	54.21 - 50.79		4997.02	238786.00	0.021	46.47	478093.33	0.000
L2	54.21 - 50.79	TP30x22.1588x0.25	6169.99	312186.00	0.020	58.40	612888.33	0.000
	50.79 - 48.1958		11265.40	317560.00	0.035	104.79	634171.67	0.000
	48.1958 - 45.6016		11353.50	322934.00	0.035	104.69	655818.33	0.000
	45.6016 - 43.0074		11438.80	328308.00	0.035	104.60	677828.33	0.000
	43.0074 - 40.4132		11521.30	333683.00	0.035	104.51	700200.83	0.000
	40.4132 - 37.8189		11602.10	339057.00	0.034	120.53	722937.50	0.000
	37.8189 - 35.2247		11679.30	344431.00	0.034	120.43	746037.50	0.000
	35.2247 - 32.6305		11753.70	349805.00	0.034	120.34	769500.00	0.000
	32.6305 - 30.0363		11825.50	355180.00	0.033	120.25	793325.83	0.000
	30.0363 - 27.4421		11894.60	360554.00	0.033	120.17	817515.83	0.000
	27.4421 - 24.8479		11961.00	365928.00	0.033	120.10	842066.67	0.000
	24.8479 - 22.2537		12024.80	371302.00	0.032	120.03	866983.33	0.000
	22.2537 - 19.6595		12086.00	376677.00	0.032	119.97	892266.67	0.000
	19.6595 - 17.0653		12144.50	382051.00	0.032	119.92	917908.33	0.000
	17.0653 - 14.4711		12200.50	387425.00	0.031	119.87	943908.33	0.000
	14.4711 - 11.8768		12253.80	392799.00	0.031	119.84	970283.33	0.000
	11.8768 - 9.28263		12304.50	398174.00	0.031	119.81	997016.67	0.000
	9.28263 - 6.68842		12352.70	403548.00	0.031	119.78	1024108.33	0.000
	6.68842 - 4.09421		12398.30	408922.00	0.030	119.77	1051566.67	0.000
	4.09421 - 1.5		12441.30	414296.00	0.030	119.76	1079391.67	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	97.5 - 95.2216	0.009	0.050	0.000	0.031	0.000	0.060 ✔	1.050	4.8.2 ✔
	95.2216 - 92.9432	0.009	0.096	0.000	0.031	0.000	0.106 ✔	1.050	4.8.2 ✔
	92.9432 - 90.6647	0.009	0.140	0.000	0.031	0.000	0.149 ✔	1.050	4.8.2 ✔
	90.6647 - 88.3863	0.014	0.206	0.000	0.054	0.000	0.222 ✔	1.050	4.8.2 ✔
	88.3863 - 86.1079	0.014	0.278	0.000	0.054	0.000	0.294 ✔	1.050	4.8.2 ✔
	86.1079 - 83.8295	0.014	0.345	0.000	0.053	0.000	0.361 ✔	1.050	4.8.2 ✔
	83.8295 - 81.5511	0.013	0.409	0.000	0.053	0.000	0.425 ✔	1.050	4.8.2 ✔
	81.5511 - 79.2726	0.013	0.470	0.000	0.052	0.000	0.486 ✔	1.050	4.8.2 ✔
	79.2726 - 76.9942	0.013	0.527	0.000	0.052	0.000	0.543 ✔	1.050	4.8.2 ✔
	76.9942 - 74.7158	0.013	0.581	0.000	0.051	0.000	0.597 ✔	1.050	4.8.2 ✔
	74.7158 - 72.4374	0.013	0.633	0.000	0.051	0.000	0.649 ✔	1.050	4.8.2 ✔
	72.4374 - 70.1589	0.013	0.681	0.000	0.050	0.000	0.697 ✔	1.050	4.8.2 ✔
	70.1589 - 67.8805	0.013	0.728	0.000	0.050	0.000	0.743 ✔	1.050	4.8.2 ✔
	67.8805 - 65.6021	0.013	0.771	0.000	0.049	0.000	0.787 ✔	1.050	4.8.2 ✔
	65.6021 - 63.3237	0.013	0.813	0.000	0.049	0.000	0.829 ✔	1.050	4.8.2 ✔
	63.3237 - 61.0453	0.013	0.853	0.000	0.048	0.000	0.869 ✔	1.050	4.8.2 ✔
	61.0453 - 58.7668	0.013	0.891	0.000	0.048	0.000	0.906 ✔	1.050	4.8.2 ✔
	58.7668 - 56.4884	0.013	0.927	0.000	0.048	0.000	0.942 ✔	1.050	4.8.2 ✔
	56.4884 - 54.21	0.013	0.961	0.000	0.047	0.000	0.977 ✔	1.050	4.8.2 ✔
	54.21 - 50.79	0.006	0.448	0.000	0.021	0.000	0.454 ✔	1.050	4.8.2 ✔
L2	54.21 - 50.79	0.006	0.410	0.000	0.020	0.000	0.417 ✔	1.050	4.8.2 ✔
	50.79 - 48.1958	0.011	0.758	0.000	0.035	0.000	0.770 ✔	1.050	4.8.2 ✔
	48.1958 - 45.6016	0.011	0.778	0.000	0.035	0.000	0.790 ✔	1.050	4.8.2 ✔

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	45.6016 - 43.0074	0.011	0.797	0.000	0.035	0.000	0.809 ✔	1.050	4.8.2 ✔
	43.0074 - 40.4132	0.011	0.815	0.000	0.035	0.000	0.827 ✔	1.050	4.8.2 ✔
	40.4132 - 37.8189	0.011	0.835	0.000	0.034	0.000	0.847 ✔	1.050	4.8.2 ✔
	37.8189 - 35.2247	0.011	0.853	0.000	0.034	0.000	0.865 ✔	1.050	4.8.2 ✔
	35.2247 - 32.6305	0.011	0.870	0.000	0.034	0.000	0.883 ✔	1.050	4.8.2 ✔
	32.6305 - 30.0363	0.011	0.887	0.000	0.033	0.000	0.899 ✔	1.050	4.8.2 ✔
	30.0363 - 27.4421	0.011	0.903	0.000	0.033	0.000	0.915 ✔	1.050	4.8.2 ✔
	27.4421 - 24.8479	0.011	0.917	0.000	0.033	0.000	0.930 ✔	1.050	4.8.2 ✔
	24.8479 - 22.2537	0.011	0.932	0.000	0.032	0.000	0.944 ✔	1.050	4.8.2 ✔
	22.2537 - 19.6595	0.011	0.945	0.000	0.032	0.000	0.958 ✔	1.050	4.8.2 ✔
	19.6595 - 17.0653	0.012	0.958	0.000	0.032	0.000	0.971 ✔	1.050	4.8.2 ✔
	17.0653 - 14.4711	0.012	0.970	0.000	0.031	0.000	0.983 ✔	1.050	4.8.2 ✔
	14.4711 - 11.8768	0.012	0.982	0.000	0.031	0.000	0.995 ✔	1.050	4.8.2 ✔
	11.8768 - 9.28263	0.012	0.993	0.000	0.031	0.000	1.006 ✔	1.050	4.8.2 ✔
	9.28263 - 6.68842	0.012	1.004	0.000	0.031	0.000	1.017 ✔	1.050	4.8.2 ✔
	6.68842 - 4.09421	0.012	1.014	0.000	0.030	0.000	1.027 ✔	1.050	4.8.2 ✔
	4.09421 - 1.5	0.012	1.024	0.000	0.030	0.000	1.037 ✔	1.050	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$øP_{allow}$ lb	% Capacity	Pass Fail
L1	97.5 - 50.79	Pole	TP23.05x16x0.1875	1	-10483.10	816882.11	93.0	Pass
L2	50.79 - 1.5	Pole	TP30x22.1588x0.25	2	-16686.70	1450039.43	98.7	Pass
							Summary	
						Pole (L2)	98.7	Pass
						RATING =	**98.7**	**Pass**

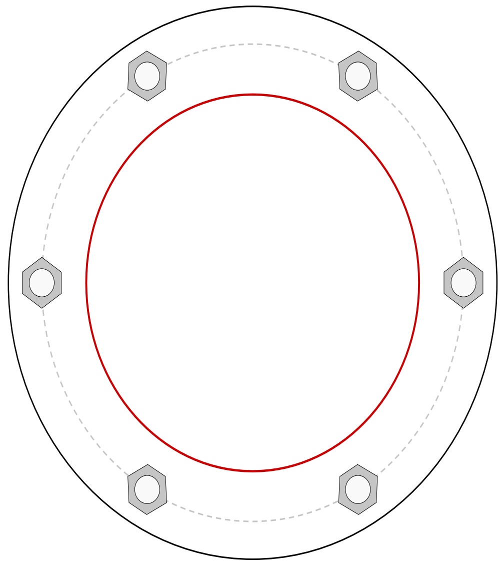
Monopole Base Plate Connection

Site Info	
SGS #	2101548
Site Name	: - Richard D Riddle Sch
Order #	

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	2

Applied Loads	
Moment (kip-ft)	1031.73
Axial Force (kips)	16.69
Shear Force (kips)	12.44

**TIA-222-H Section 15.5 Applied*



Connection Properties

Anchor Rod Data

(6) 2-1/4" ø bolts (A615-75 N; Fy=75 ksi, Fu=100 ksi) on 38" BC

Base Plate Data

44" OD x 1.75" Plate (A572-60; Fy=60 ksi, Fu=75 ksi)

Stiffener Data

N/A

Pole Data

30" x 0.25" 18-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

Anchor Rod Summary *(units of kips, kip-in)*

Pu_c = 219.68	ϕPn_c = 268.39	**Stress Rating**
Vu = 2.07	ϕVn = 120.77	**78.0%**
Mu = n/a	ϕMn = n/a	**Pass**

Base Plate Summary

Max Stress (ksi):	49.21	(Flexural)
Allowable Stress (ksi):	54	
Stress Rating:	**86.8%**	**Pass**

Drilled Pier Foundation

SGS # :	2101548
Site Name:	BOE - Richard D Riddl
Order Number:	
TIA-222 Revison:	H
Tower Type:	Monopole

Applied Loads		
	Comp.	Uplift
Moment (kip-ft)	1031.73	
Axial Force (kips)	16.69	
Shear Force (kips)	12.44	

Material Properties		
Concrete Strength, f'c:	4	ksi
Rebar Strength, Fy:	60	ksi
Tie Yield Strength, Fyt:	40	ksi

Pier Design Data		
Depth	21	ft
Ext. Above Grade	1	ft
Pier Section 1		
From 1' above grade to 21' below grade		
Pier Diameter	5	ft
Rebar Quantity	18	
Rebar Size	8	
Clear Cover to Ties	3	in
Tie Size	5	
Tie Spacing	12	in

Rebar & Pier Options
Embedded Pole Inputs
Belled Pier Inputs

Analysis Results		
Soil Lateral Check	*Compression*	*Uplift*
$D_{v=0}$ (ft from TOC)	6.36	-
Soil Safety Factor	3.23	-
Max Moment (kip-ft)	1097.57	-
Rating*	*39.2%*	-
Soil Vertical Check	*Compression*	*Uplift*
Skin Friction (kips)	190.25	-
End Bearing (kips)	132.54	-
Weight of Concrete (kips)	74.81	-
Total Capacity (kips)	322.79	-
Axial (kips)	91.50	-
Rating*	*27.0%*	-
Reinforced Concrete Flexure	*Compression*	*Uplift*
Critical Depth (ft from TOC)	6.18	-
Critical Moment (kip-ft)	1097.46	-
Critical Moment Capacity	1671.42	-
Rating*	*62.5%*	-
Reinforced Concrete Shear	*Compression*	*Uplift*
Critical Depth (ft from TOC)	16.43	-
Critical Shear (kip)	157.32	-
Critical Shear Capacity	334.56	-
Rating*	*44.8%*	-

Soil Interaction Rating*	**39.2%**
Structural Foundation Rating*	**62.5%**

*Rating per TIA-222-H Section 15.5

Check Limitation	
Apply TIA-222-H Section 15.5:	☑
N/A	☐
Shear Design Options	
Check Shear along Depth of Pier:	☑
Utilize Shear-Friction Methodology:	☐
Override Critical Depth:	☐

Go to Soil Calculations

Soil Profile

Groundwater Depth	19	# of Layers	4

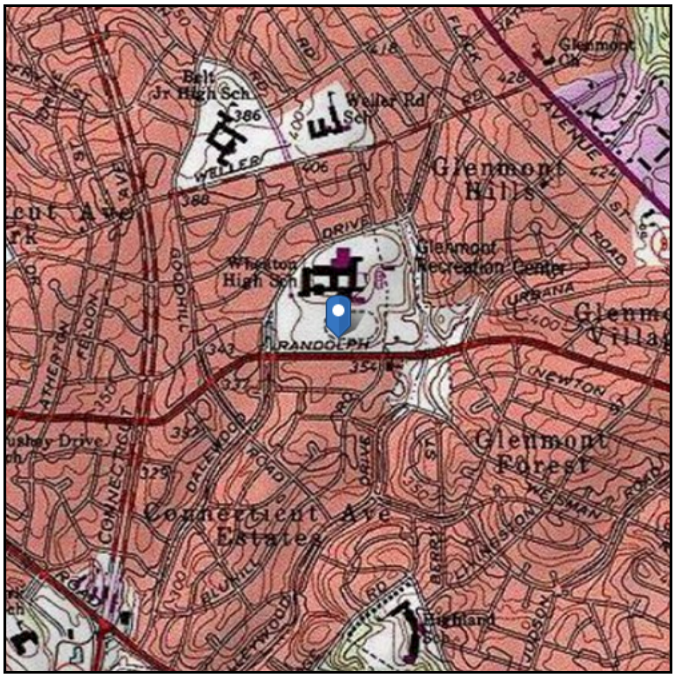
Layer	Top (ft)	Bottom (ft)	Thickness (ft)	γ_{soil} (pcf)	$\gamma_{concrete}$ (pcf)	Cohesion (ksf)	Angle of Friction (degrees)	Calculated Ultimate Skin Friction Comp (ksf)	Calculated Ultimate Skin Friction Uplift (ksf)	Ultimate Skin Friction Comp Override (ksf)	Ultimate Skin Friction Uplift Override (ksf)	Ult. Gross Bearing Capacity (ksf)	SPT Blow Count	Soil Type
1	0	3	3	110	150		0	0.000	0.000					Cohesionless
2	3	8	5	110	150		25	0.477	0.477				10	Cohesionless
3	8	19	11	115	150		30	1.012	1.012				10	Cohesionless
4	19	21	2	53	87.6		30	1.313	1.313			9	10	Cohesionless

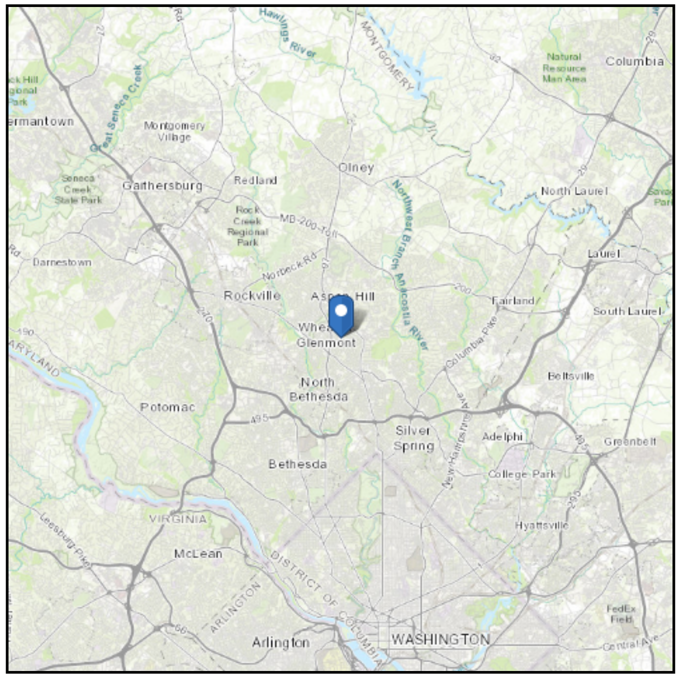
ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 370.47 ft (NAVD 88)
Latitude: 39.059461
Longitude: -77.066492





Wind

Results:

Wind Speed:	113 Vmph
10-year MRI	75 Vmph
25-year MRI	84 Vmph
50-year MRI	89 Vmph
100-year MRI	95 Vmph

Data Source:	ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed:	Thu Feb 18 2021

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

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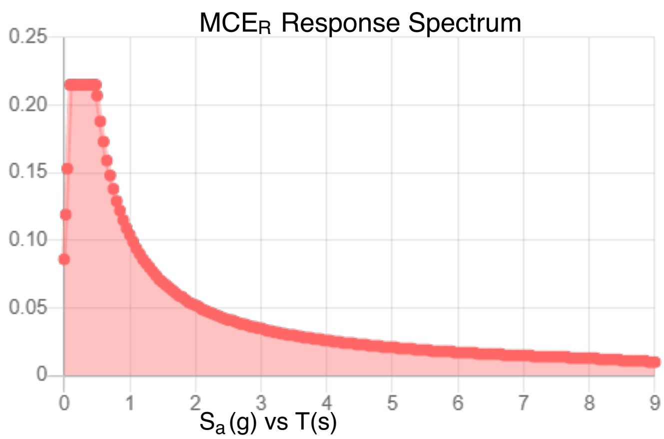
Seismic

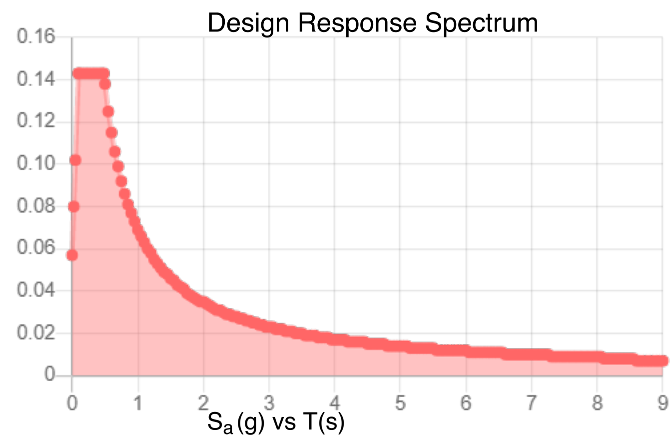
Site Soil Class: D - Stiff Soil

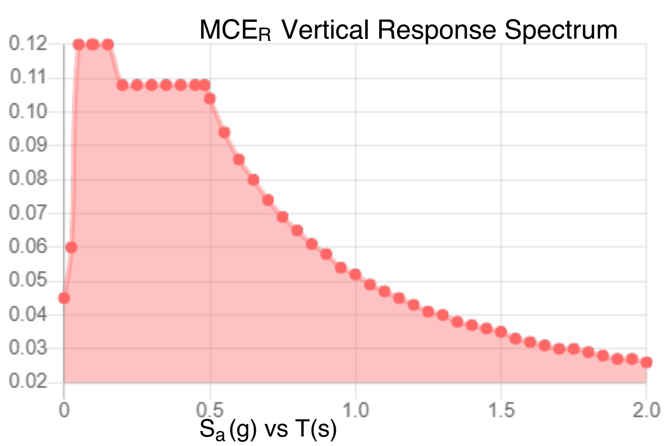
Results:

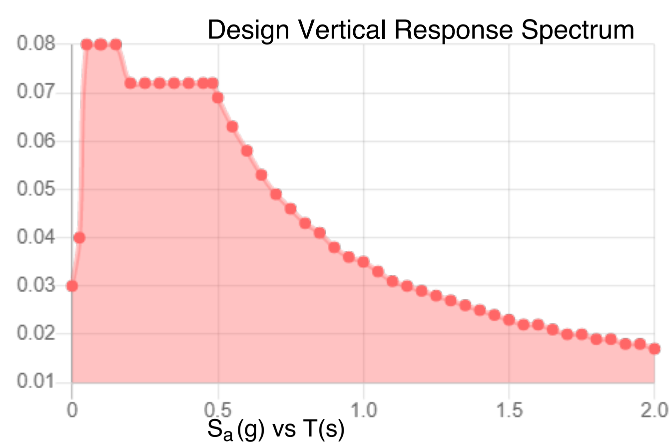
S_S :	0.134	S_{D1} :	0.069
S_1 :	0.043	T_L :	8
F_a :	1.6	PGA :	0.07
F_v :	2.4	PGA_M :	0.111
S_{MS} :	0.215	F_{PGA} :	1.6
S_{M1} :	0.104	I_e :	1
S_{DS} :	0.143	C_v :	0.7

Seismic Design Category B









Data Accessed: Thu Feb 18 2021

Date Source: USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

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Ice

Results:

Ice Thickness:	1.00 in.
Concurrent Temperature:	15 F
Gust Speed:	40 mph
Data Source:	Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8
Date Accessed:	Thu Feb 18 2021

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 500-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Attachment 2:
Collocation Application

COLOCATION APPLICATION
US-MD-5072
Version 2
DISH Wireless L.L.C.

Vertical Bridge REIT, LLC.
750 Park of Commerce Drive
Suite 200
Boca Raton, FL 33487

SUMMARY

PRIMARY INFO

Application #: C-103052
Application Version: 2 (Submitted: 2/12/2021 12:11:00 PM)

Application Type: Broadband
Application Name: DCWDC00428A
Lease Type: New Lease
Description:
Installing (6) new antennas, (12) RRUs (1) OVP, and (1) Hybrid Cable - 10x15 ground space needed for platform and shelter

VERTICAL BRIDGE SITE INFO

VB Site #: US-MD-5072
VB Site Name: BOE - Richard D Riddle School

Latitude: 39.05946111
Longitude: -77.06649167
Structure Type: Monopole
Structure Height: 100.0000
Site Address: 12501-A Dalewood Drive -
Silver Spring, MD 20906

VERTICAL BRIDGE DEAL TEAM

RLM: Floyd Jenkins
FJenkins@verticalbridge.com
(301) 667-0069

RLS: Sam Bowden
SBowden@verticalbridge.com

ROM: Jeremy Potts
JPotts@verticalbridge.com
(502) 295-7552

TENANT LEGAL INFO

Tenant Legal Name: DISH Wireless L.L.C.
State of Registration: Colorado
Type of Entity: LLC
Carrier NOC #: 8666246874
Tenant Site #: DCWDC00428A
Tenant Site Name: DCWDC00428A

APPLICANT

Name: Cherisa Small
Address 6700 Alexander Bell Drive
Suite 200
Columbia, MD 21046
Phone Number:: (301) 801-9035
Email Address: cherisa.small@dish.com

FINAL LEASED RIGHTS CONFIGURATION TOTALS

This is a summary of your remaining existing equipment plus the new equipment.

FINAL EQUIPMENT

Qty	Equipment Type
1	Junction Box
6	Panel
12	RRU

FINAL LINES

Qty	Line Type
1	Hybrid

verticalbridge	COLOCATION APPLICATION US-MD-5072 Version 2 DISH Wireless L.L.C.	Vertical Bridge REIT, LLC. 750 Park of Commerce Drive Suite 200 Boca Raton, FL 33487

FREQUENCY & TECHNOLOGY INFO

Type of Technology: Broadband Wireless

Is TX Frequency Licensed: Yes

TX Frequency: 722 - 728 l 642 - 652 l 2180 - 2200 l 1995 - 2020

Is RX Frequency Licensed: Yes

RX Frequency:

MOUNT & STRUCTURAL ANALYSIS

MOUNT ANALYSIS

Provided by Tenant: No

To Be Run by VB: No

Include Mount Mapping: No

STRUCTURAL HARD COPIES

Required: No

Number of Hard Copies

CONTACTS

INVOICE CONTACT

Attention To	Name	Address	Phone Number 1	Phone Number 2	Email 1	Email 2
	Accounts Payable	P.O. Box 6649 Englewood, CO 80112	(555) 555-5555		WirelessAPInvoices@dish.com	

PO CONTACT

Name	Phone	Email
Accounts Payable	(555) 555-5555	WirelessAPInvoices@dish.com

LEASING CONTACT

Name	Phone Number	Email
Cherisa Small	(301) 801-9035	cherisa.small@dish.com

NOTICE CONTACT

Notice To	Attention To	Address	
DISH Wireless L.L.C.		Lease Administration	9601 South Meridian Blvd Englewood, CO 80112

COPY NOTICE CONTACT

Notice To	Attention To	Address	
DISH Wireless, L.L.C		Attn: Office of the General Counsel	9601 South Meridian Blvd. Englewood, CO 80112

Vertical Bridge REIT, LLC.
750 Park of Commerce Drive
Suite 200
Boca Raton, FL 33487

RF CONTACT		
Name	**Phone Number**	**Email**
Morrie Kebbeh	(813) 704-7429	morrie.kebbeh@dish.com

TENANT CONSTRUCTION MANAGER CONTACT		
Name	**Phone Number**	**Email**
Troy James	(443) 752-7427	troy.james@dish.com

EMERGENCY CONTACT		
Name	**Phone Number**	**Email**
DISH WIRELESS NOC	(866) 624-6874	noc.alerts@dish.com

LINE & EQUIPMENT

NEW LINE(S)				
Qty	**Line Type**	**Line Size(in.)**	**Line Location**	**Comments**
1	Hybrid	1.6	Exterior	

NEW EQUIPMENT										
Qty	**Equipment Type**	**RAD Height**	**Mount (H')**	**Mount Type**	**Manufacturer**	**Model Number**	**Dimensions (H"xW"xD")**	**Weight (Lbs.)**	**Azimuth**	**Comments**
1	Junction Box	90.00	90.00	Platform	Raycap	RDIDC-9181-PF-48	8.00 x 14.00 x 16.00	21.85	0	
2	RRU	90.00	90.00	Platform	Fujitsu	TA08025-B604	7.87 x 14.96 x 15.75	63.93	120	(1) Installed RRU; (1) Reserved RRU
2	RRU	90.00	90.00	Platform	Fujitsu	TA08025-B604	7.87 x 14.96 x 15.75	63.93	240	(1) Installed RRU; (1) Reserved RRU
2	RRU	90.00	90.00	Platform	Fujitsu	TA08025-B605	15.75 x 14.96 x 9.06	74.95	0	(1) Installed RRU; (1) Reserved RRU
2	Panel	90.00	90.00	Platform	JMA	MX08FRO665-20_V0F	72.00 x 20.00 x 8.00	54.00	240	(1) Antenna Installed; (1) Antenna Reserved
2	Panel	90.00	90.00	Platform	JMA	MX08FRO665-20_V0F	72.00 x 20.00 x 8.00	54.00	0	(1) Antenna Installed; (1) Antenna Reserved

2	RRU	90.00	90.00	Platform	Fujitsu	TA08025-B605	15.75 x 14.96 x 9.06	74.95	240	(1) Installed RRU; (1) Reserved RRU
2	RRU	90.00	90.00	Platform	Fujitsu	TA08025-B605	15.75 x 14.96 x 9.06	74.95	120	(1) Installed RRU; (1) Reserved RRU
2	RRU	90.00	90.00	Platform	Fujitsu	TA08025-B604	7.87 x 14.96 x 15.75	63.93	0	(1) Installed RRU; (1) Reserved RRU
2	Panel	90.00	90.00	Platform	JMA	MX08FRO665-20_V0F	72.00 x 20.00 x 8.00	54.00	120	(1) Antenna Installed; (1) Antenna Reserved

NEW EQUIPMENT CABINET(S)

Quantity of Cabinets	Cabinet Dimensions (H x W x D)	Manufacturer	Comments
1	74.00 x 32.00 x 32.10	Charles	

ADDITIONAL SITE REQUIREMENTS

GROUND & INTERIOR SPACE REQUIREMENTS

Requirement Type	Total Lease Area (L x W)	Cabinet Required	Cabinet Area (L x W)	Shelter Required	Shelter Pad (L x W)	Comments
New	10.00 x 15.00	Yes	3.00 x 3.00		x	

GENERATOR REQUIREMENTS

Requirement Type	Fuel Type	Kilowatt Size	Pad Dimensions (L x D)	Generator Manufacturer	Fuel Tank Manufacturer	Comments
No Changes			x			

AC POWER REQUIREMENTS

Meter Type	Additional Details	Comments
New Tenant Meter		

BACKHAUL REQUIREMENTS

Requirement Type	Cable Type	Number Of Points Of Entry	Riser Size (Inches)	Comments
Not Required				

SUPPLEMENT TO THE MASTER LEASE AGREEMENT
(Pursuant and subject to the MLA)

THIS SUPPLEMENT TO THE MASTER LEASE AGREEMENT ("**SLA**") is entered into as of 7/15/2021 ("**Effective Date**"), by and between VB-S1 Assets, LLC, a Delaware limited liability company ("**Lessor**"), whose address is 750 Park of Commerce Drive, Suite 200, Boca Raton, Florida 33487, and DISH Wireless L.L.C., a Colorado limited liability company ("**Lessee**"), whose address is 9601 South Meridian Blvd., Englewood, Colorado, 80112.

BACKGROUND

WHEREAS, Lessor's Affiliate, Vertical Bridge REIT, LLC, and Lessee have entered into that certain MLA dated January 29, 2021 (the "**MLA**"). Such MLA provides that Lessor or its Affiliates and Lessee will enter into separate SLAs on a Site-by-Site basis as mutually agreed upon by the Parties, pursuant to which Lessor or its Affiliates will lease to Lessee certain available space at a Site.

AGREEMENT

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, and intending to be legally bound hereby, the Parties agree as follows:

1. Site Information. The Leased Property, as more particularly described in Section 6 hereof, means:
    a. Lessee Site ID: DCWDC00428A
    b. Lessor Site ID: US-MD-5072 / BOE- Richard D Riddle School
    c. Address and/or location of the Site: 12501-A Dalewood Drive, Silver Spring, MD 20906
    d. Site coordinates (NAD 83):
        i. Latitude: 39.05946111
        ii. Longitude: -77.06649167
    e. Antenna Space centerline height: 90'
    f. Ground Space dimensions: 10' x 15'

2. Rent; Term.
    a. Rent.
        i. Commencing on the SLA Rent Commencement Date, the Basic Rent for this SLA shall be One Thousand Two Hundred Fifty and 00/100 dollars ($1,250.00) per month, to be paid in accordance with the terms set forth in Section 4 of the MLA.
        ii. Additional Rent, if any, shall be paid in accordance with the terms set forth in Section 4 of the MLA, unless otherwise set forth below, in the amount of: Not Applicable
        iii. Rent shall be paid to the following address (or via electronic funds transfer as agreed to by the Parties in Section 4.4 of the MLA):

VB-S1 Issuer, LLC P.O. Box 743906 Atlanta, GA 30374-3906	For Overnight mail: Bank of America Lockbox Services Lockbox # 743906 6000 Feldwood Road College Park, GA 30349

CWH

b. Term. The term of this SLA shall be as set forth in Section 3 of the MLA, unless set forth herein as follows: Not Applicable.

3. Non-Standard Terms. The Parties acknowledge and agree that the following conditions exist at the Site: (Check all that apply)

- ☐ There are no electrical utilities installed at the Site as of the Effective Date (i.e., neither Lessor nor any Co-User at the Site have electrical utilities installed).
- ■ The Leased Property is located, in whole or in part, on land which is owned, operated or controlled by a Governmental Authority (e.g. Bureau of Land Management or Bureau of Indian Affairs).
- ☐ The Structure on the Site is AM Detuned.
- ☐ Tower Modifications are required prior to the commencement of Lessee's initial Installation at the Site.
- ☐ Ground Space at the Site is not included in the legal interest conveyed to Lessee pursuant to this SLA.

4. Key Prime Agreement Terms.

a. Current term expiration date of the Prime Agreement / final term expiration date of the Prime Agreement: 08/22/2025 / 08/22/2025.
b. Does the Prime Lessor have the right to not renew or terminate the Prime Agreement at the end of the current term or any remaining renewal terms: Not Applicable.
c. Special access rules under the Prime Agreement: See Sections 8, 10, and 17 of the Prime Agreement. Additionally, Prime Lessor approval of Lessee's schedule for performing work at the Site must be provided prior to entry onto the Site.

5. Special Provisions. N/A

6. Site Address and Legal Description of Site. Lessor hereby leases to Lessee, and Lessee leases from Lessor, as applicable, the Site, as more particularly described in Section 1 hereof, and which is comprised of the space on the Structure, Easements and Ground Space on the Parcel at heights and locations as more particularly set forth on **Schedule A-1** (Collocation Application), **Schedule A-2** (Structure Elevation and Site Plan), and **Schedule A-4** (Legal Description of Parcel and/or Survey) (together, as applicable, the "**Leased Property**"), each of which are attached hereto and incorporated herein.

7. Frequencies. As of the Effective Date, Lessee's initial Installation will use those certain frequencies, in pre-approved transmit power, as set forth on **Schedule A-1** (Collocation Application), which is attached hereto and incorporated herein by this reference.

8. MLA; Defined Terms; Incorporation of Background; Prime Agreement. This SLA is entered into pursuant to the MLA. All terms and conditions of the MLA are incorporated herein by this reference and made a part hereof without the necessity of repeating such terms and conditions or attaching the MLA. By executing and delivering this SLA, the Parties hereby agree to be bound by all terms and conditions of the MLA applicable to such Party, and to perform all covenants and agreements of such Party therein. Capitalized terms used in this SLA shall have the same meaning ascribed to them in the MLA unless otherwise indicated herein. The background section set forth above is hereby incorporated into this SLA by this reference in its entirety. A true and correct copy of the Prime Agreement(s) (subject to redaction in accordance with the MLA) is set forth in **Schedule A-3** (Redacted Prime Agreement), which is attached hereto and incorporated herein by this reference.

9. Order of Precedence; Conflict. In the event of an inconsistency, conflict or discrepancy between, or among, (a) Section 1 of this SLA, (b) **Schedule A-1** (Collocation Application), and/or (c) **Schedule**

CWH

A-2 (Structure Elevation and Site Plan), **Schedule A-1** of this SLA shall govern. In the event of an inconsistency, conflict or discrepancy between (x) the MLA, and (y) this SLA, the terms set forth in this SLA shall control.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK. SIGNATURE PAGE FOLLOWS.]

CWH

IN WITNESS WHEREOF, the Parties have executed this SLA as of the Effective Date.

LESSOR:

VB-S1 Assets, LLC

DocuSigned by:

By: ______________________________

DFDF739A85644A1...

Name: Alexander Gellman

Title: CEO

DS MA

DS CF

DS MB

LESSEE:

DISH Wireless L.L.C.

DocuSigned by:

By: Thomas Fuchs

81F461505C614FB...

Name: Thomas Fuchs

Title: Market General Manager

CWH

Radio Frequency - Electromagnetic Energy (RF-EME) Jurisdictional Report

Site No. DCWDC00428A
12501-A Dalewood Dr
Silver Spring, Maryland 20906
39° 3' 34.20" N, -77° 3' 59.40" W NAD83

EBI Project No. 6221001331
September 27, 2021

Prepared for:

Dish Wireless

Prepared by:

EBI Consulting
environmental | engineering | due diligence

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APPENDIX B **RADIO FREQUENCY ELECTROMAGNETIC ENERGY SAFETY / SIGNAGE PLANS**
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EXECUTIVE SUMMARY

Purpose of Report

EnviroBusiness Inc. (dba EBI Consulting) has been contracted by Dish Wireless to conduct radio frequency electromagnetic (RF-EME) modeling for Dish Wireless Site DCWDC00428A located at 12501-A Dalewood Dr in Silver Spring, Maryland to determine RF-EME exposure levels from proposed Dish Wireless communications equipment at this site. As described in greater detail in Appendix C of this report, the Federal Communications Commission (FCC) has developed Maximum Permissible Exposure (MPE) Limits for the general public and for occupational activities. This report summarizes the results of RF-EME modeling in relation to relevant FCC RF-EME compliance standards for limiting human exposure to RF-EME fields.

Statement of Compliance

A site is considered out of compliance with FCC regulations if there are areas that exceed the FCC exposure limits and there are no RF hazard mitigation measures in place. Any carrier which has an installation that contributes more than 5% of the applicable MPE must participate in mitigating these RF hazards.

As presented in the sections below, based on worst-case predictive modeling, there are no modeled areas on any accessible rooftop or ground-level walking/working surface related to the proposed antennas that exceed the FCC's occupational or general public exposure limits at this site.

At the nearest walking/working surfaces to the Dish Wireless antennas, the maximum power density generated by the DISH antennas is approximately **0.55** percent of the FCC's general public limit (**0.11** percent of the FCC's occupational limit).

The composite exposure level from all carriers on this site is approximately **0.71** percent of the FCC's general public limit (**0.14** percent of the FCC's occupational limit) at the nearest walking/working surface to each antenna.

Recommended control measures are outlined in Section 4.0 and within the Site Safety Plan (attached); Dish Wireless should also provide procedures to shut down and lockout/tagout this wireless equipment in accordance with their own standard operating protocol. Non-telecom workers who will be working in areas of exceedance are required to contact Dish Wireless since only DISH has the ability to lockout/tagout the facility, or to authorize others to do so.

1.0 INTRODUCTION

Radio frequency waves are electromagnetic waves from the portion of the electromagnetic spectrum at frequencies lower than visible light and microwaves. The wavelengths of radio waves range from thousands of meters to around 30 centimeters. These wavelengths correspond to frequencies as low as 3 cycles per second (or hertz [Hz]) to as high as one gigahertz (one billion cycles per second).

Personal Communication (PCS) facilities used by Dish Wireless in this area will potentially operate within a frequency range of 600 to 5000 MHz. Facilities typically consist of: 1) electronic transceivers (the radios or cabinets) connected to wired telephone lines; and 2) antennas that send the wireless signals created by the transceivers to be received by individual subscriber units (PCS telephones). Transceivers are typically connected to antennas by coaxial cables.

Because of the short wavelength of PCS services, the antennas require line-of-site paths for good propagation, and are typically installed a distance above ground level. Antennas are constructed to concentrate energy towards the horizon, with as little energy as possible scattered towards the ground or the sky. This design, combined with the low power of PCS facilities, generally results in no possibility for exposure to approach Maximum Permissible Exposure (MPE) levels, with the exception of in areas in the immediate vicinity of the antennas.

MPE limits do not represent levels where a health risk exists, since they are designed to provide a substantial margin of safety. These limits apply for continuous exposures and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size or health.

2.0 SITE DESCRIPTION

This project site includes the following proposed wireless telecommunication antennas on a monopole located at 12501-A Dalewood Dr in Silver Spring, Maryland.

Ant #	Operator	Antenna Make	Antenna Model	Frequency (MHz)	Azimuth (deg.)	Mechanical Downtilt (deg.)	Horizontal Beamwidth (Degrees)	Aperture (feet)	Total Power Input (Watts)	Antenna Gain (dBd)	Total ERP (Watts)	Total EIRP (Watts)
1	Dish	JMA	MX08FRO665-20 02DT 600	600	0	0	62	6.1	134.4077226	11.35	1456.88	2389.29
1	Dish	JMA	MX08FRO665-20 02DT 700	700	0	0	52	6.1	134.4077226	12.05	1711.69	2807.17
1	Dish	JMA	MX08FRO665-20 02DT 2007	2007	0	0	62	6.1	134.4077226	15.75	4012.58	6580.64
1	Dish	JMA	MX08FRO665-20 02DT 2100	2100	0	0	65	6.1	134.4077226	16.75	5051.54	8284.53
2	Dish	JMA	MX08FRO665-20 02DT 600	600	120	0	62	6.1	134.4077226	11.35	1456.88	2389.29
2	Dish	JMA	MX08FRO665-20 02DT 700	700	120	0	52	6.1	134.4077226	12.05	1711.69	2807.17
2	Dish	JMA	MX08FRO665-20 02DT 2007	2007	120	0	62	6.1	134.4077226	15.75	4012.58	6580.64
2	Dish	JMA	MX08FRO665-20 02DT 2100	2100	120	0	65	6.1	134.4077226	16.75	5051.54	8284.53
3	Dish	JMA	MX08FRO665-20 02DT 600	600	240	0	62	6.1	134.4077226	11.35	1456.88	2389.29
3	Dish	JMA	MX08FRO665-20 02DT 700	700	240	0	52	6.1	134.4077226	12.05	1711.69	2807.17
3	Dish	JMA	MX08FRO665-20 02DT 2007	2007	240	0	62	6.1	134.4077226	15.75	4012.58	6580.64
3	Dish	JMA	MX08FRO665-20 02DT 2100	2100	240	0	65	6.1	134.4077226	16.75	5051.54	8284.53
4	T-Mobile	GENERIC	PANEL 6FT 00DT 600	600	0	0	68	6.0	60	12.33	1026.01	1682.66
5	T-Mobile	GENERIC	PANEL 6FT 00DT 700	700	0	0	68	6.0	60	12.33	1026.01	1682.66
6	T-Mobile	GENERIC	PANEL 6FT 00DT 1900	1900	0	0	66	6.0	120	15.84	4604.49	7551.36
7	T-Mobile	GENERIC	PANEL 6FT 00DT 2100	2100	0	0	63	6.0	120	16.39	5226.14	8570.87

8	T-Mobile	GENERIC	PANEL 6FT 00DT 600	600	120	0	68	6.0	60	12.33	1026.01	1682.66
9	T-Mobile	GENERIC	PANEL 6FT 00DT 700	700	120	0	68	6.0	60	12.33	1026.01	1682.66
10	T-Mobile	GENERIC	PANEL 6FT 00DT 1900	1900	120	0	66	6.0	120	15.84	4604.49	7551.36
11	T-Mobile	GENERIC	PANEL 6FT 00DT 2100	2100	120	0	63	6.0	120	16.39	5226.14	8570.87
12	T-Mobile	GENERIC	PANEL 6FT 00DT 600	600	240	0	68	6.0	60	12.33	1026.01	1682.66
13	T-Mobile	GENERIC	PANEL 6FT 00DT 700	700	240	0	68	6.0	60	12.33	1026.01	1682.66
14	T-Mobile	GENERIC	PANEL 6FT 00DT 1900	1900	240	0	66	6.0	120	15.84	4604.49	7551.36
15	T-Mobile	GENERIC	PANEL 6FT 00DT 2100	2100	240	0	63	6.0	120	16.39	5226.14	8570.87

• Note there is 1 Dish Wireless antenna per sector at this site. For clarity, the different frequencies for each antenna are entered on separate lines.

Ant #	NAME	X	Y	Antenna Radiation Centerline	Z-Height Adj. Main Roof	Z-Height Ground
1	Dish	0.9	0.7	90.0	45.0	90.0
2	Dish	16.4	7.8	90.0	45.0	90.0
3	Dish	1.6	16.4	90.0	45.0	90.0
4	T-Mobile	0.9	0.7	97.5	52.5	97.5
5	T-Mobile	4.0	1.1	97.5	52.5	97.5
6	T-Mobile	7.8	1.3	97.5	52.5	97.5
7	T-Mobile	11.1	1.1	97.5	52.5	97.5
8	T-Mobile	16.4	7.8	97.5	52.5	97.5
9	T-Mobile	14.4	10.9	97.5	52.5	97.5
10	T-Mobile	12.7	14.0	97.5	52.5	97.5
11	T-Mobile	10.9	16.4	97.5	52.5	97.5
12	T-Mobile	1.6	16.4	97.5	52.5	97.5
13	T-Mobile	1.1	14.0	97.5	52.5	97.5
14	T-Mobile	2.9	10.9	97.5	52.5	97.5
15	T-Mobile	4.4	8.2	97.5	52.5	97.5

• Note the Z-Height represents the distance from the antenna centerline.

The above tables contain an inventory of proposed Dish Wireless antennas and other carrier antennas if sufficient information was available to model them. Note that EBI uses an assumed set of antenna specifications and powers for unknown and other carrier antennas for modeling purposes. The FCC guidelines incorporate two separate tiers of exposure limits that are based upon occupational/controlled exposure limits (for workers) and general population/uncontrolled exposure limits for members of the general public that may be exposed to antenna fields. While access to this site is considered uncontrolled, the analysis has considered exposures with respect to both controlled and uncontrolled limits as an untrained worker may access adjacent rooftop locations. Additional information regarding controlled/uncontrolled exposure limits is provided in Appendix C. Appendix B presents a site safety plan that provides a plan view of the monopole with antenna locations.

3.0 WORST-CASE PREDICTIVE MODELING

EBI has performed theoretical MPE modeling using RoofMaster™ software to estimate the worst-case power density at the site's nearby broadcast levels resulting from operation of the antennas. RoofMaster™ is a widely-used predictive modeling program that has been developed by Waterford Consultants to predict RF power density values for rooftop and tower telecommunications sites produced by vertical collinear antennas that are typically used in the cellular, PCS, paging and other communications services. Using the computational methods set forth in Federal Communications Commission (FCC) Office of

Engineering & Technology (OET) Bulletin 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields" (OET-65), RoofMaster™ calculates predicted power density in a scalable grid based on the contributions of all RF sources characterized in the study scenario. At each grid location, the cumulative power density is expressed as a percentage of the FCC limits. Manufacturer antenna pattern data is utilized in these calculations. RoofMaster™ models consist of the Far Field model as specified in OET-65 and an implementation of the OET-65 Cylindrical Model (Sula9). The models utilize several operational specifications for different types of antennas to produce a plot of spatially-averaged power densities that can be expressed as a percentage of the applicable exposure limit.

For this report, EBI utilized antenna and power data provided by Dish Wireless and compared the resultant worst-case MPE levels to the FCC's occupational/controlled exposure limits outlined in OET Bulletin 65. The assumptions used in the modeling are based upon information provided by Dish Wireless and information gathered from other sources. Elevations of walking/working surfaces were estimated based on elevations provided and available aerial imagery. Sector orientation assignments were made assuming coverage is directed to areas of site. Changes to antenna mount heights or placement will impact site compliance. The parameters used for modeling are summarized in the Site Description antenna inventory table in Section 2.0.

One other unknown carrier also has antennas on the monopole. Information about these antennas was included in the modeling analysis.

Based on worst-case predictive modeling, there are no modeled areas on any accessible rooftop or ground-level walking/working surface related to the proposed Dish Wireless antennas that exceed the FCC's occupational or general public exposure limits at this site. At the nearest walking/working surfaces to the Dish Wireless antennas, the maximum power density generated by the Dish Wireless antennas is approximately 0.55 percent of the FCC's general public limit (0.11 percent of the FCC's occupational limit). The composite exposure level from all carriers on this site is approximately 0.71 percent of the FCC's general public limit (0.14 percent of the FCC's occupational limit) at the nearest walking/working surface to each antenna.

The Site Safety Plan also presents areas where Dish Wireless antennas contribute greater than 5% of the applicable MPE limit for a site. A site is considered out of compliance with FCC regulations if there are areas that exceed the FCC exposure limits and there are no RF hazard mitigation measures in place. Any carrier which has an installation that contributes more than 5% of the applicable MPE must participate in mitigating these RF hazards.

There are no modeled areas on the rooftop and ground that exceed the FCC's limits for general public or occupational exposure in front of the other carrier antennas.

The inputs used in the modeling are summarized in the Site Description antenna inventory table in Section 2.0. A graphical representation of the RoofMaster™ modeling results is presented in Appendix B. Microwave dish antennas are designed for point-to-point operations at the elevations of the installed equipment rather than ground level coverage. The maximum power density generated by all carrier antennas, including microwaves and panel antennas, is included in the modeling results presented within this report.

4.0 MITIGATION/SITE CONTROL OPTIONS

EBI's modeling indicates that there are no areas in front of the Dish Wireless antennas that exceed the FCC standards for occupational or general public exposure. All exposures above the FCC's safe limits require that individuals be elevated above the rooftop and ground. In order to alert people accessing the monopole, a CAUTION sign and an NOC Information sign are recommended for installation 10 feet above ground level at the base of the monopole.

There are no barriers recommended on this site.

These protocols and recommended control measures have been summarized and included with a graphic representation of the antennas and associated signage and control areas in a RF-EME Site Safety Plan, which is included as Appendix B. Individuals and workers accessing the monopole should be provided with a copy of the attached Site Safety Plan, made aware of the posted signage and barriers, and signify their understanding of the Site Safety Plan.

To reduce the risk of exposure, EBI recommends that access to areas associated with the active antenna installation be restricted and secured where possible.

Implementation of the signage and barriers recommended in the Site Safety Plan and in this report will bring this site into compliance with the FCC's rules and regulations.

5.0 SUMMARY AND CONCLUSIONS

EBI has prepared a Radiofrequency – Electromagnetic Energy (RF-EME) Compliance Report for telecommunications equipment installed by Dish Wireless Site Number DCWDC00428A located at 12501-A Dalewood Dr in Silver Spring, Maryland to determine worst-case predicted RF-EME exposure levels from wireless communications equipment installed at this site. This report summarizes the results of RF-EME modeling in relation to relevant Federal Communications Commission (FCC) RF-EME compliance standards for limiting human exposure to RF-EME fields.

As presented in the sections above, based on the FCC criteria, there are no modeled areas on any accessible rooftop or ground-level walking/working surface related to the proposed antennas that exceed the FCC's occupational or general public exposure limits at this site.

Workers should be informed about the presence and locations of antennas and their associated fields. Recommended control measures are outlined in Section 4.0 and within the Site Safety Plan (attached); Dish Wireless should also provide procedures to shut down and lockout/tagout this wireless equipment in accordance with their own standard operating protocol. Non-telecom workers who will be working in areas of exceedance are required to contact Dish Wireless since only Dish Wireless has the ability to lockout/tagout the facility, or to authorize others to do so.

6.0 LIMITATIONS

This report was prepared for the use of Dish Wireless. It was performed in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same locale under like circumstances. The conclusions provided by EBI are based solely on the information provided by the client. The observations in this report are valid on the date of the investigation. Any additional information that becomes available concerning the site should be provided to EBI so that our conclusions may be revised and modified, if necessary. This report has been prepared in accordance with Standard Conditions for Engagement and authorized proposal, both of which are integral parts of this report. No other warranty, expressed or implied, is made.

Appendix A

Certifications

Preparer Certification

I, Rebecca Sinisgalli, state that:

- I am an employee of EnviroBusiness Inc. (d/b/a EBI Consulting), which provides RF-EME safety and compliance services to the wireless communications industry.

- I have successfully completed RF-EME safety training, and I am aware of the potential hazards from RF-EME and would be classified "occupational" under the FCC regulations.

- I am fully aware of and familiar with the Rules and Regulations of both the Federal Communications Commissions (FCC) and the Occupational Safety and Health Administration (OSHA) with regard to Human Exposure to Radio Frequency Radiation.

- I have reviewed the data provided by the client and incorporated it into this Site Compliance Report such that the information contained in this report is true and accurate to the best of my knowledge.

Rebecca Sinisgalli

Reviewed and Approved by:

sealed 27sep2021 mike@h2dc.com
H2DC PLLC MD CoA#: 50517

Michael McGuire
Electrical Engineer
mike@h2dc.com

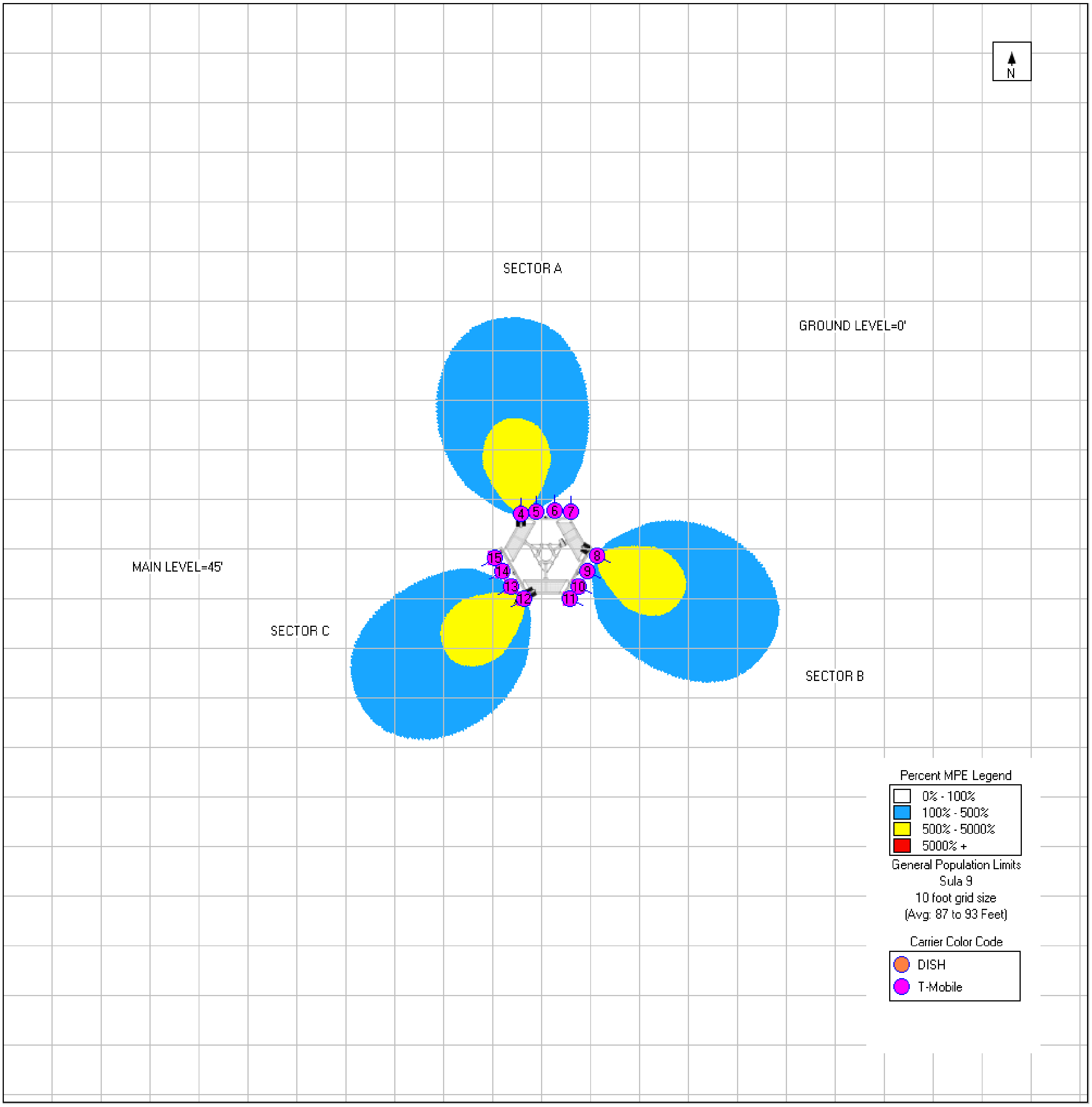
Note that EBI's scope of work is limited to an evaluation of the Radio Frequency – Electromagnetic Energy (RF-EME) field generated by the antennas and broadcast equipment noted in this report. The engineering and design of the building and related structures, as well as the impact of the antennas and broadcast equipment on the structural integrity of the building, are specifically excluded from EBI's scope of work.

Appendix B

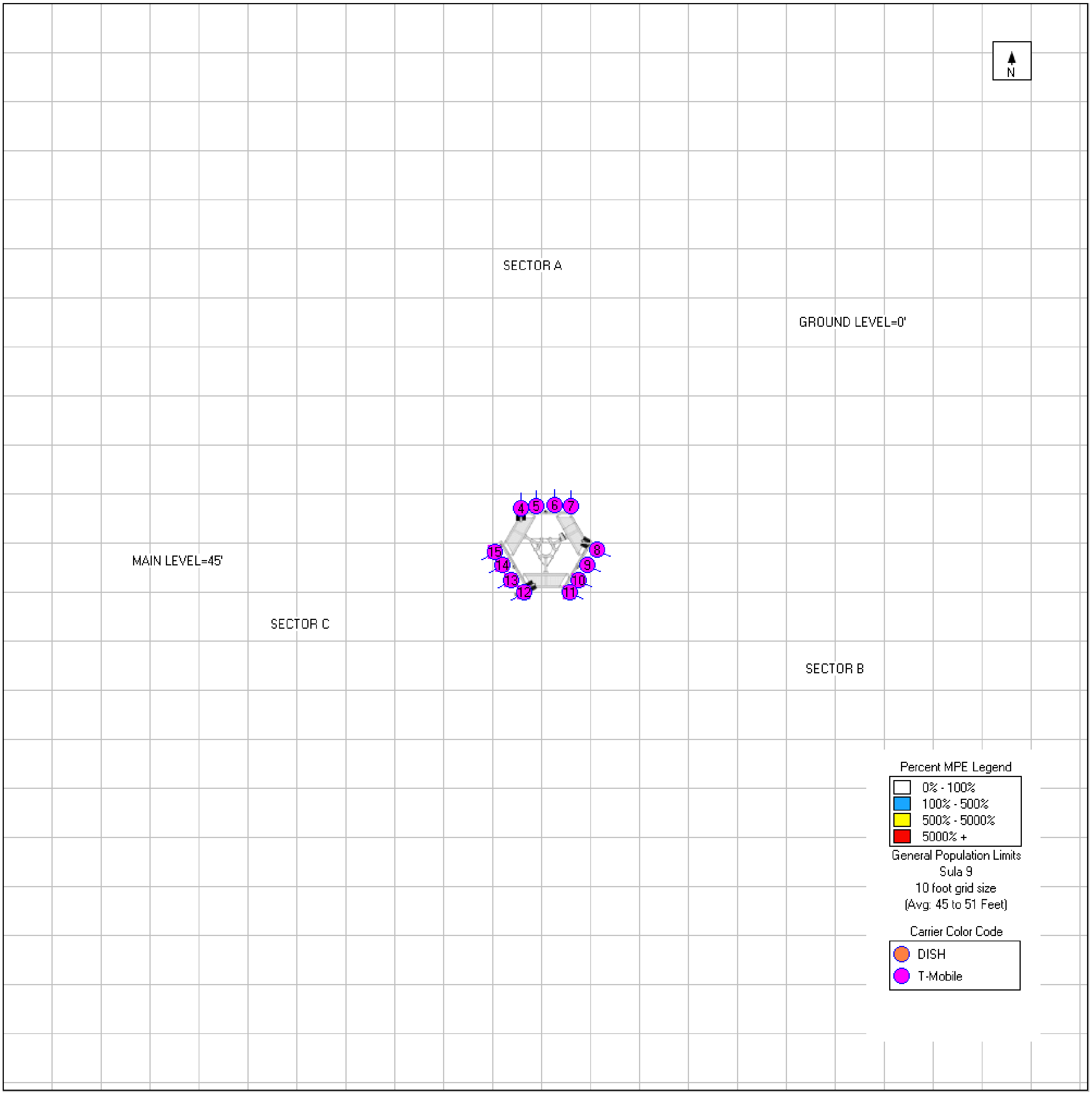
Radio Frequency Electromagnetic Energy

Safety Information and Signage Plans

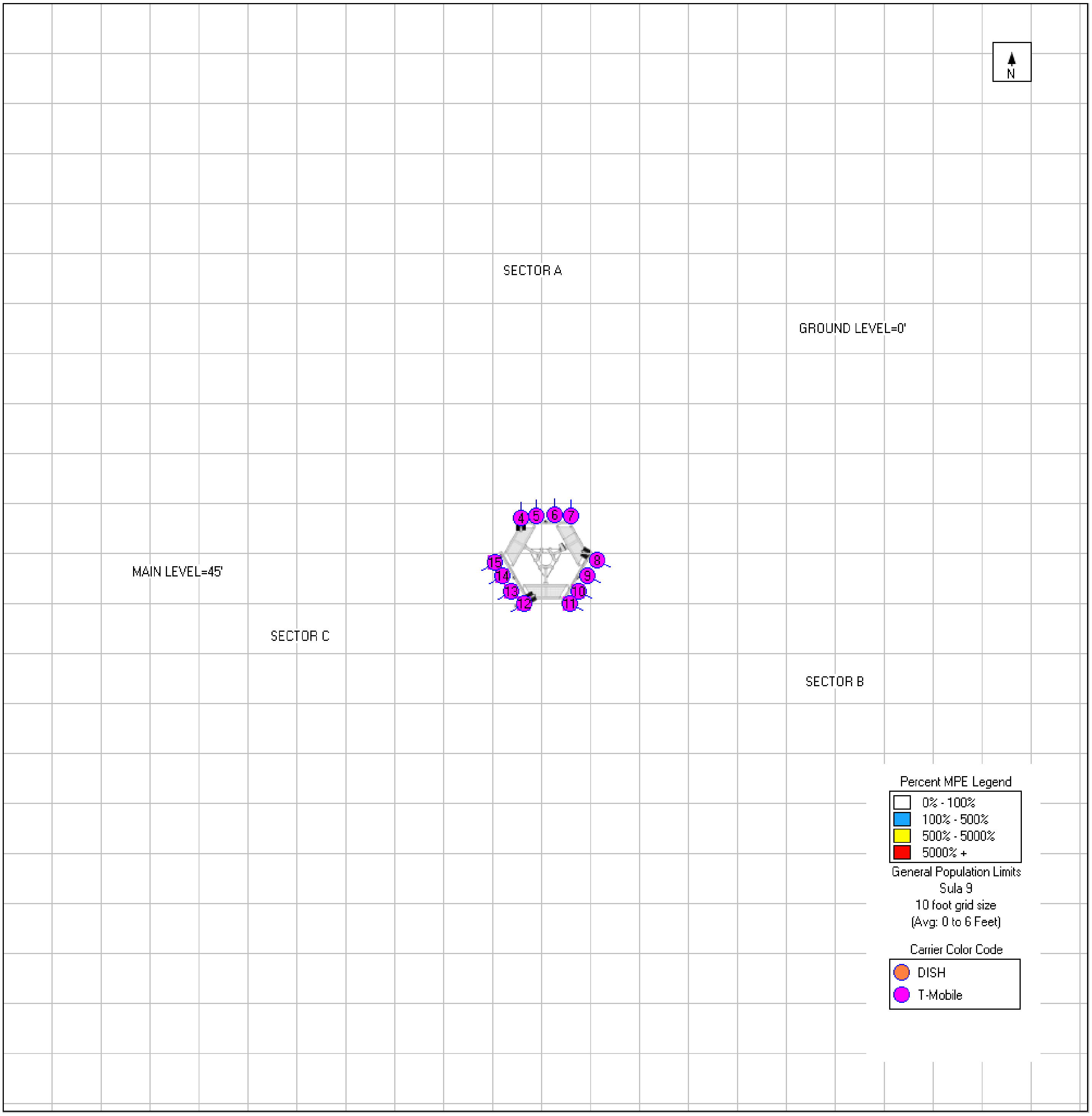
Antenna Face Level Simulation



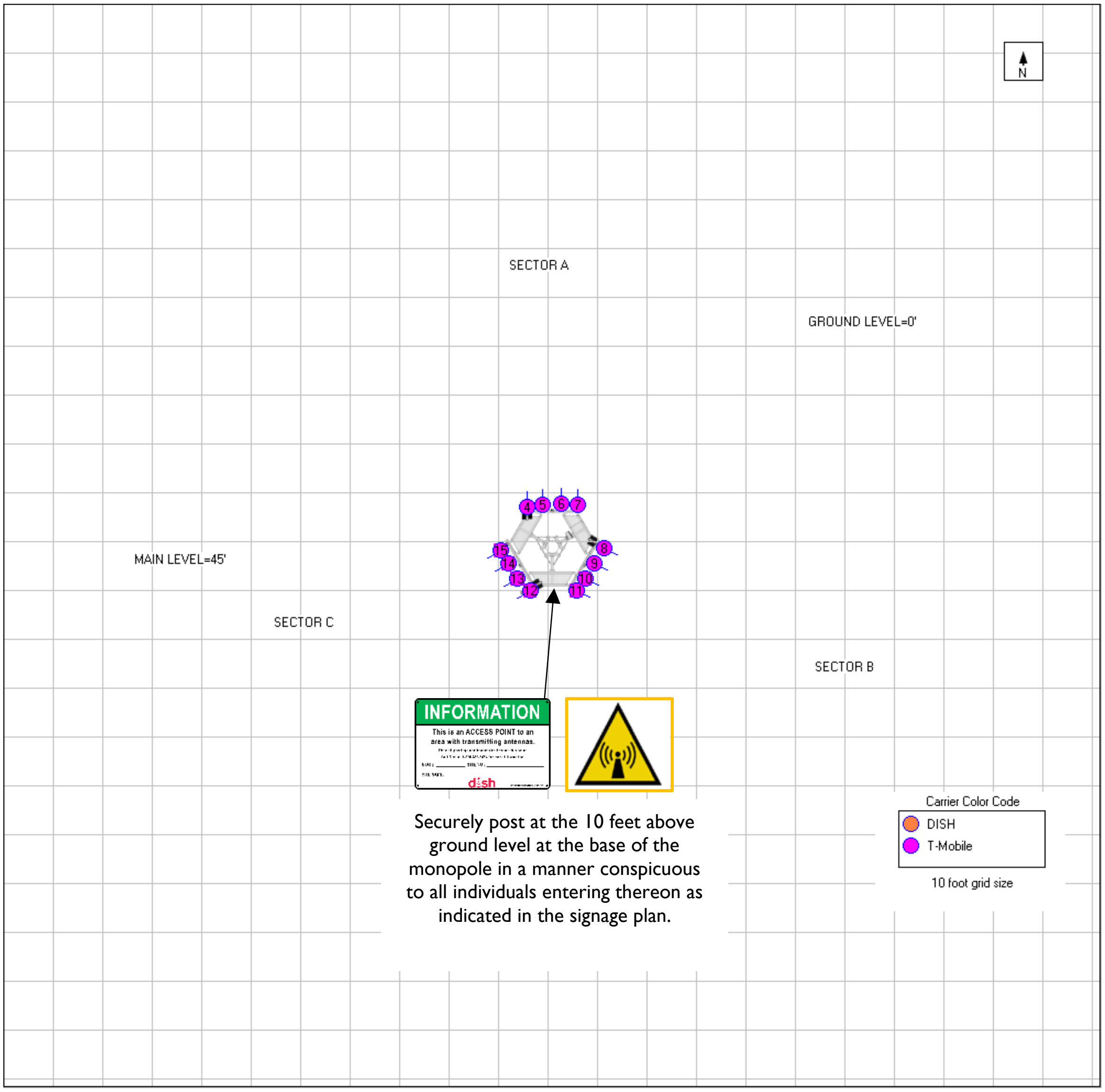
Adjacent Main Roof Level Simulation



Ground Level Simulation



Dish Wireless Signage Plan



Sign	Posting Instructions	Required Signage / Mitigation
	**NOC Information** Information signs are used to provide contact information for any questions or concerns for personnel accessing the site.	Securely post at the 10 feet above ground level at the base of the monopole in a manner conspicuous to all individuals entering thereon as indicated in the signage plan.
	**Guidelines** Informational sign used to notify workers that there are active antennas installed and provide guidelines for working in RF environments.	No action required.
	**Notice** Used to notify individuals they are entering an area where the power density emitted from transmitting antennas may exceed the FCC's MPE limit for the general public or occupational exposures.	No action required.
	**Caution** Used to notify individuals that they are entering a hot spot where either the general public or occupational FCC's MPE limit is or could be exceeded.	Securely post at the 10 feet above ground level at the base of the monopole in a manner conspicuous to all individuals entering thereon as indicated in the signage plan.
	**Warning** Used to notify individuals that they are entering a hot zone where the occupational FCC's MPE limit has been exceeded by 10x.	No action required.

Appendix C

Federal Communications Commission (FCC) Requirements

The FCC has established Maximum Permissible Exposure (MPE) limits for human exposure to Radiofrequency Electromagnetic (RF-EME) energy fields, based on exposure limits recommended by the National Council on Radiation Protection and Measurements (NCRP) and, over a wide range of frequencies, the exposure limits developed by the Institute of Electrical and Electronics Engineers, Inc. (IEEE) and adopted by the American National Standards Institute (ANSI) to replace the 1982 ANSI guidelines. Limits for localized absorption are based on recommendations of both ANSI/IEEE and NCRP.

The FCC guidelines incorporate two separate tiers of exposure limits that are based upon occupational/controlled exposure limits (for workers) and general public/uncontrolled exposure limits for members of the general public.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/ controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general public/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

General public/uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment-related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Table 1 and Figure 1 (below), which are included within the FCC's OET Bulletin 65, summarize the MPE limits for RF emissions. These limits are designed to provide a substantial margin of safety. They vary by frequency to take into account the different types of equipment that may be in operation at a particular facility and are "time-averaged" limits to reflect different durations resulting from controlled and uncontrolled exposures.

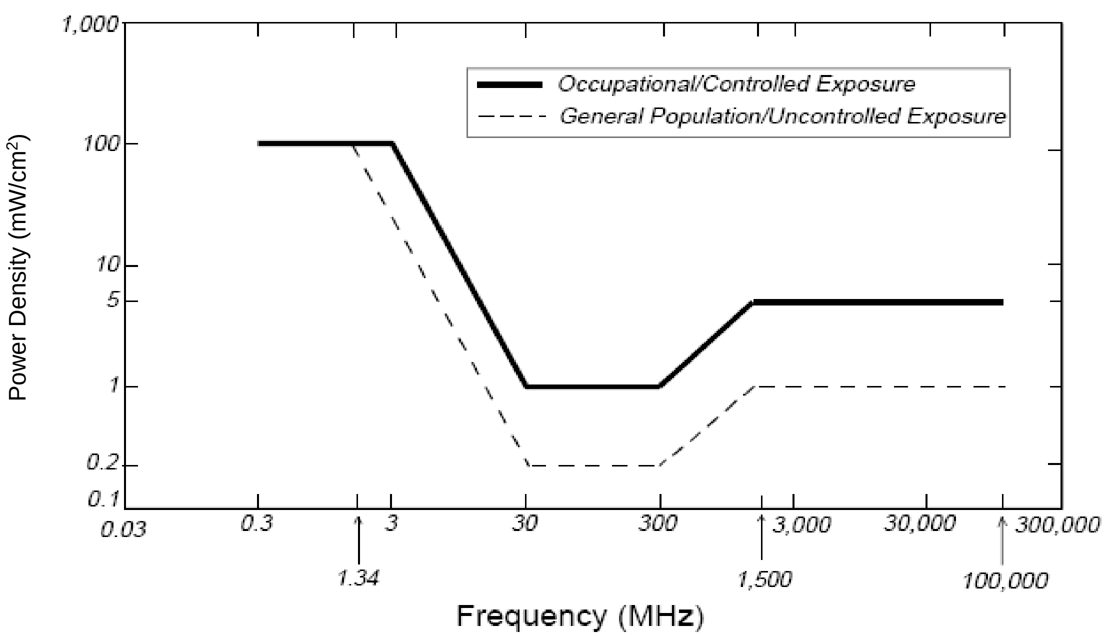
The FCC's MPEs are measured in terms of power (mW) over a unit surface area (cm^2). Known as the power density, the FCC has established an occupational MPE of 5 milliwatts per square centimeter (mW/cm^2) and an uncontrolled MPE of 1 mW/cm^2 for equipment operating in the 1900 MHz frequency range. For the Dish Wireless equipment operating at 600 MHz or 850 MHz, the FCC's occupational MPE is 2.83 mW/cm^2 and an uncontrolled MPE of 0.57 mW/cm^2. For the Dish Wireless equipment operating at 1900 MHz, the FCC's occupational MPE is 5.0 mW/cm^2 and an uncontrolled MPE limit of 1.0 mW/cm^2. These limits are considered protective of these populations.

Table 1: Limits for Maximum Permissible Exposure (MPE)				
(A) Limits for Occupational/Controlled Exposure				
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (A/m)**	**Power Density (S) (mW/cm²)**	**Averaging Time $[E]^2$, $[H]^2$, or S (minutes)**
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	$(900/f^2)$*	6
30-300	61.4	0.163	1.0	6
300-1,500	--	--	f/300	6
1,500-100,000	--	--	5	6
(B) Limits for General Public/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (A/m)**	**Power Density (S) (mW/cm²)**	**Averaging Time $[E]^2$, $[H]^2$, or S (minutes)**
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	$(180/f^2)$*	30
30-300	27.5	0.073	0.2	30
300-1,500	--	--	f/1,500	30
1,500-100,000	--	--	1.0	30

f = Frequency in (MHz)
* Plane-wave equivalent power density

Figure 1. FCC Limits for Maximum Permissible Exposure (MPE)

Plane-wave Equivalent Power Density



Based on the above, the most restrictive thresholds for exposures of unlimited duration to RF energy for several personal wireless services are summarized below:

Personal Wireless Service	Approximate Frequency	Occupational MPE	Public MPE
Microwave (Point-to-Point)	5,000 - 80,000 MHz	5.00 mW/cm^2	1.00 mW/cm^2
Broadband Radio (BRS)	2,600 MHz	5.00 mW/cm^2	1.00 mW/cm^2
Wireless Communication (WCS)	2,300 MHz	5.00 mW/cm^2	1.00 mW/cm^2
Advanced Wireless (AWS)	2,100 MHz	5.00 mW/cm^2	1.00 mW/cm^2
Personal Communication (PCS)	1,950 MHz	5.00 mW/cm^2	1.00 mW/cm^2
Cellular Telephone	870 MHz	2.90 mW/cm^2	0.58 mW/cm^2
Specialized Mobile Radio (SMR)	855 MHz	2.85 mW/cm^2	0.57 mW/cm^2
Long Term Evolution (LTE)	700 MHz	2.33 mW/cm^2	0.47 mW/cm^2
Most Restrictive Frequency Range	30-300 MHz	1.00 mW/cm^2	0.20 mW/cm^2

MPE limits are designed to provide a substantial margin of safety. These limits apply for continuous exposures and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health.

Personal Communication (PCS) facilities used by Dish Wireless in this area will potentially operate within a frequency range of 600 to 2100 MHz. Facilities typically consist of: 1) electronic transceivers (the radios or cabinets) connected to wired telephone lines; and 2) antennas that send the wireless signals created by the transceivers to be received by individual subscriber units (PCS telephones). Transceivers are typically connected to antennas by coaxial cables.

Because of the short wavelength of PCS services, the antennas require line-of-site paths for good propagation, and are typically installed above ground level. Antennas are constructed to concentrate energy towards the horizon, with as little energy as possible scattered towards the ground or the sky. This design, combined with the low power of PCS facilities, generally results in no possibility for exposure to approach Maximum Permissible Exposure (MPE) levels, with the exception of areas directly in front of the antennas.

FCC Compliance Requirement

A site is considered out of compliance with FCC regulations if there are areas that exceed the FCC exposure limits and there are no RF hazard mitigation measures in place. Any carrier which has an installation that contributes more than 5% of the applicable MPE must participate in mitigating these RF hazards.

dish wireless

DISH WIRELESS SITE ID:

DCWDC00428A

DISH WIRELESS SITE ADDRESS:

12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SCOPE OF WORK

THIS IS NOT AN ALL INCLUSIVE LIST. CONTRACTOR SHALL UTILIZE SPECIFIED EQUIPMENT PART OR ENGINEER APPROVED EQUIVALENT. CONTRACTOR SHALL VERIFY ALL NEEDED EQUIPMENT TO PROVIDE A FUNCTIONAL SITE. THE PROJECT GENERALLY CONSISTS OF THE FOLLOWING:

TOWER SCOPE OF WORK:
- INSTALL (3) PROPOSED PANEL ANTENNAS (1 PER SECTOR)
- INSTALL (1) PROPOSED ANTENNA MOUNT
- INSTALL PROPOSED JUMPERS
- INSTALL (6) PROPOSED RRUs (2 PER SECTOR)
- INSTALL (1) PROPOSED OVP DEVICE
- INSTALL (1) PROPOSED HYBRID CABLE

GROUND SCOPE OF WORK:
- INSTALL (1) PROPOSED METAL PLATFORM
- INSTALL (1) PROPOSED ICE BRIDGE
- INSTALL (1) PROPOSED PPC CABINET
- INSTALL (1) PROPOSED EQUIPMENT CABINET
- INSTALL (1) PROPOSED POWER CONDUIT
- INSTALL (1) PROPOSED TELCO CONDUIT
- INSTALL (1) PROPOSED TELCO-FIBER BOX
- INSTALL (1) PROPOSED GPS UNIT
- INSTALL (1) PROPOSED SAFETY SWITCH (IF REQUIRED)
- INSTALL (1) PROPOSED CIENA BOX (IF REQUIRED)
- INSTALL (1) PROPOSED METER SOCKET

SITE INFORMATION

PROPERTY OWNER:	BOARD OF EDUCATION
ADDRESS:	200 WEST BALTIMORE ST. BALTIMORE, MD 21201
TOWER TYPE:	MONOPOLE
TOWER CO SITE ID:	US-MD-5072
TOWER APP NUMBER:	C-103052
COUNTY:	MONTGOMERY
LATITUDE (NAD 83):	39° 3' 34.20" N 39.0595 N
LONGITUDE (NAD 83):	77° 3' 59.40" W 77.0665 W
ZONING JURISDICTION:	MONTGOMERY COUNTY
ZONING DISTRICT:	-
PARCEL NUMBER:	03696625
OCCUPANCY GROUP:	U
CONSTRUCTION TYPE:	V-B
POWER COMPANY:	PEPCO
TELEPHONE COMPANY:	VERIZON/COMCAST

PROJECT DIRECTORY

APPLICANT:	DISH WIRELESS 6700 ALEXANDER BELL DRIVE SUITE 221 COLUMBIA, MD 21046 (XXX) XXX-XXXX
TOWER OWNER:	VERTICAL BRIDGE 750 PARK OF COMMERCE DR. BOCA RATON, FLORIDA 33487 (561) 948-6367
SITE DESIGNER:	BC ARCHITECTS ENGINEERS, PLC 5661 COMLUMBIA PIKE, SUITE 200 FALLS CHURCH, VA 22041 (703) 671-6000
SITE ACQUISITION:	CHERISA SMALL (301) 801-9035
CONSTRUCTION MANAGER:	TROY JAMES (443) 752-7427
RF ENGINEER:	MORRIE KEBBEH (813) 704-7429

MARYLAND CODE COMPLIANCE

ALL WORK SHALL BE PERFORMED AND MATERIALS 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 THESE CODES:

CODE TYPE	CODE
BUILDING	2018 IBC
MECHANICAL	2018 IMC
ELECTRICAL	2017 NEC

SITE PHOTO

DIRECTIONS

DIRECTIONS FROM DISH WIRELESS OFFICE/AIRPORT/DOWNTOWN:

FROM 6700 ALEXANDER BELL DR #221, COLUMBIA, MD 21046, GET ON I-95 S FROM MD-175 E 1.7 MI. HEAD NORTHEAST TOWARD ALEXANDER BELL DR. 141 FT. TURN RIGHT 157 FT. TURN RIGHT TOWARD ALEXANDER BELL DR. 0.1 MI. TURN LEFT ONTO ALEXANDER BELL DR. 315 FT. TURN LEFT AT THE 1ST CROSS STREET ONTO COLUMBIA GATEWAY DR. 0.1 MI. KEEP RIGHT AT THE FORK, FOLLOW SIGNS FOR MD-175 E AND MERGE ONTO MD-175 E 1.1 MI. USE THE RIGHT LANE TO MERGE ONTO I-95 S VIA THE RAMP TO WASHINGTON 0.3 MI. FOLLOW I-95 S AND MD-200 W TO MD-650/NEW HAMPSHIRE AVE IN COLESVILLE. TAKE EXIT 13 FROM MD-200 W 14.7 MI. MERGE ONTO I-95 S 9.1 MI. USE THE RIGHT 2 LANES TO TAKE EXIT 31 B TO MERGE ONTO MD-200 W TOWARD I-270, TOLL ROAD 5.3 MI. TAKE EXIT 13 FOR MD-650 S TOWARD WHITE OAK, TOLL ROAD 0.4 MI. DRIVE TO RANDOLPH RD IN WHEATON-GLENMONT 4.8 MI. USE ANY LANE TO TURN LEFT ONTO MD-650/NEW HAMPSHIRE AVE. 0.9 MI. TURN RIGHT ONTO RANDOLPH RD., PASS BY SHERWIN-WILLIAMS PAINT STORE (ON THE RIGHT) 2.8 MI. KEEP LEFT TO STAY ON RANDOLPH RD. 1.2 MI. TURN RIGHT ONTO DALEWOOD DR. 0.1 MI. TURN RIGHT ONO EXISTING DRIVEWAY. TOWER COMPOUND WILL BE LOCATED AT SOUTH EAST CORNER OF SCHOOL NEAR RANDOLPH RD.

SHEET INDEX

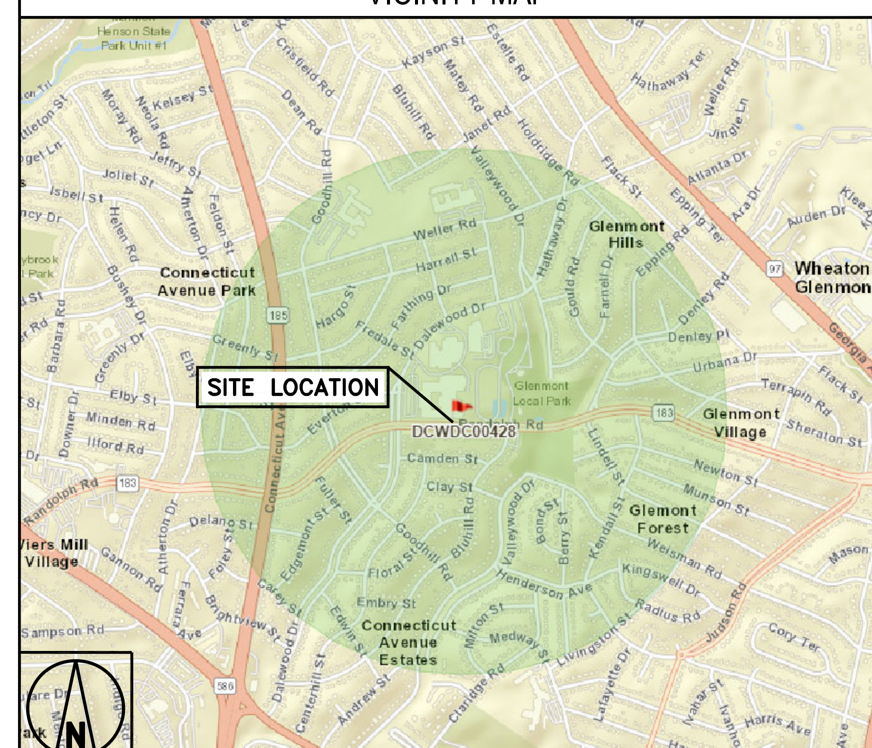
SHEET NO.	SHEET TITLE
T-1	TITLE SHEET
A-1	PROPOSED SITE PLAN AND EQUIPMENT LAYOUTS
A-2	PROPOSED EQUIPMENT LAYOUT AND DETAILS
A-3	EQUIPMENT PLATFORM AND H-FRAME DETAILS
A-4	EQUIPMENT DETAILS
A-5	EQUIPMENT DETAILS
A-6	EQUIPMENT DETAILS
E-1	ELECTRICAL ROUTE PLAN AND NOTES
E-2	ELECTRICAL DETAILS
E-3	ELECTRICAL ONE-LINE, FAULT CALCS & PANEL SCHEDULE
G-1	GROUNDING PLANS AND NOTES
G-2	GROUNDING DETAILS
G-3	GROUNDING DETAILS
RF-1	RF CABLE COLOR CODE
RF-2	RF PLUMBING DIAGRAM
RF-3	RF DATA SHEET
GN-1	LEGEND AND ABBREVIATIONS
GN-2	GENERAL NOTES
GN-3	GENERAL NOTES
GN-4	GENERAL NOTES

MISS UTILITY OF MARYLAND
UTILITY NOTIFICATION CENTER OF MARYLAND
(800) 257-7777
WWW.MISSUTILITY.NET/

CALL 2 WORKING DAYS UTILITY NOTIFICATION PRIOR TO CONSTRUCTION

811

VICINITY MAP



NO SCALE

GENERAL NOTES

THE FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION. A TECHNICIAN WILL VISIT THE SITE AS REQUIRED FOR ROUTINE MAINTENANCE. THE PROJECT WILL NOT RESULT IN ANY SIGNIFICANT DISTURBANCE OR EFFECT ON DRAINAGE. NO SANITARY SEWER SERVICE, POTABLE WATER, OR TRASH DISPOSAL IS REQUIRED AND NO COMMERCIAL SIGNAGE IS PROPOSED.

11"x17" PLOT WILL BE HALF SCALE UNLESS OTHERWISE NOTED

CONTRACTOR SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS, AND CONDITIONS ON THE JOB SITE, AND SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK.

dish wireless

6700 ALEXANDER BELL DRIVE
SUITE 221
COLUMBIA, MD 21046

BC architects engineers

5661 COLUMBIA PIKE, SUITE 200
FALLS CHURCH, VA 22041-2868

STATE OF MARYLAND
CHRISTOPHER D. MORIN
No. 24552
9.28.21
PROFESSIONAL ENGINEER

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 NUMBER 24552, EXPIRATION DATE 11/17/21.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

DRAWN BY:	CHECKED BY:	APPROVED BY:
GMW	NP	CDM

RFDS REV #: 0

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
A	3/2/21	ISSUED FOR REVIEW
0	4/6/21	ISSUED FOR CONSTRUCTION
1	5/3/21	ISSUED FOR CONSTRUCTION
2	7/19/21	ISSUED FOR CONSTRUCTION
3	9/28/21	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER
-

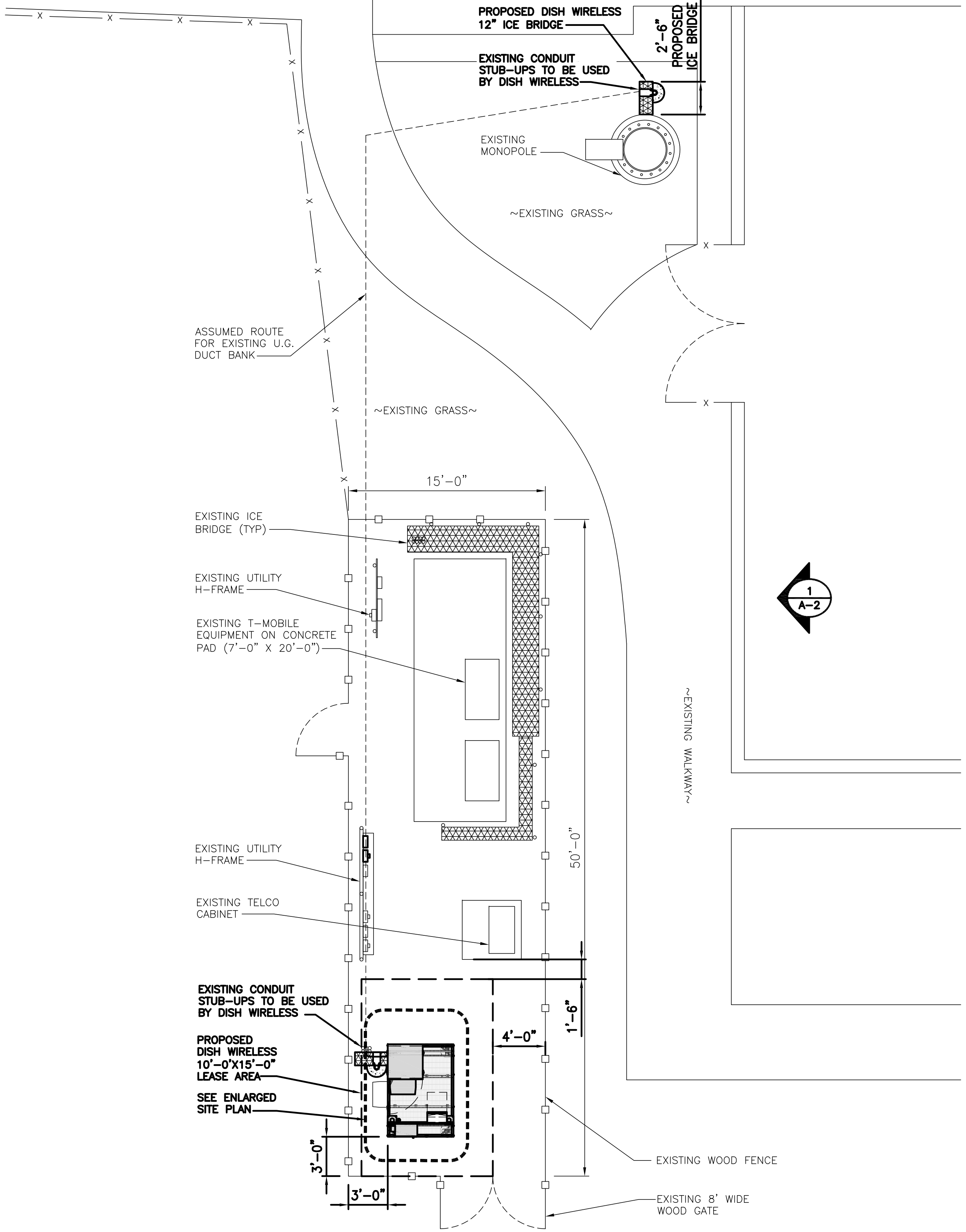
DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
-
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1

NOTES

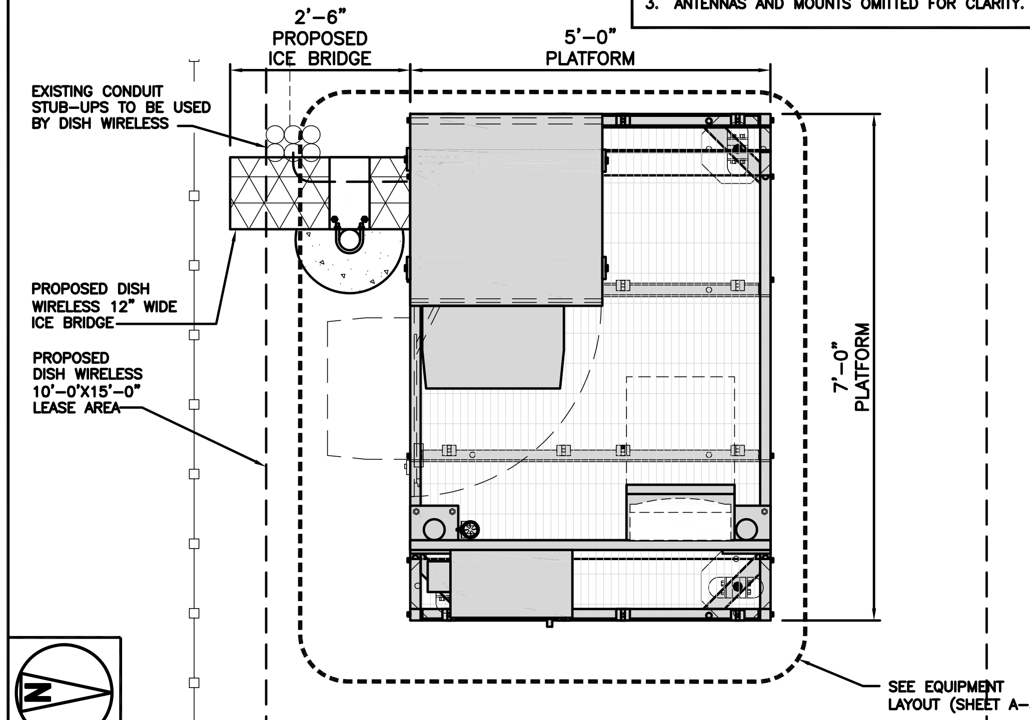
1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.
2. ANTENNAS AND MOUNTS OMITTED FOR CLARITY.



OVERALL SITE PLAN — 6' 4' 2' 0 5' 10' — 3/16"=1'-0" — 1

NOTES

1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.
2. CONTRACTOR SHALL MAINTAIN A 10'-0" MINIMUM SEPARATION BETWEEN THE PROPOSED GPS UNIT, TRANSMITTING ANTENNAS AND EXISTING GPS UNITS.
3. ANTENNAS AND MOUNTS OMITTED FOR CLARITY.



ENLARGED SITE PLAN — 12" 6" 0 1' 2' 3' — 3/4"=1'-0" — 2

NOT USED — 3

dish wireless.

6700 ALEXANDER BELL DRIVE
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A&E PROJECT NUMBER

-

DISH WIRELESS PROJECT INFORMATION

DCWDC00428A

-

12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE

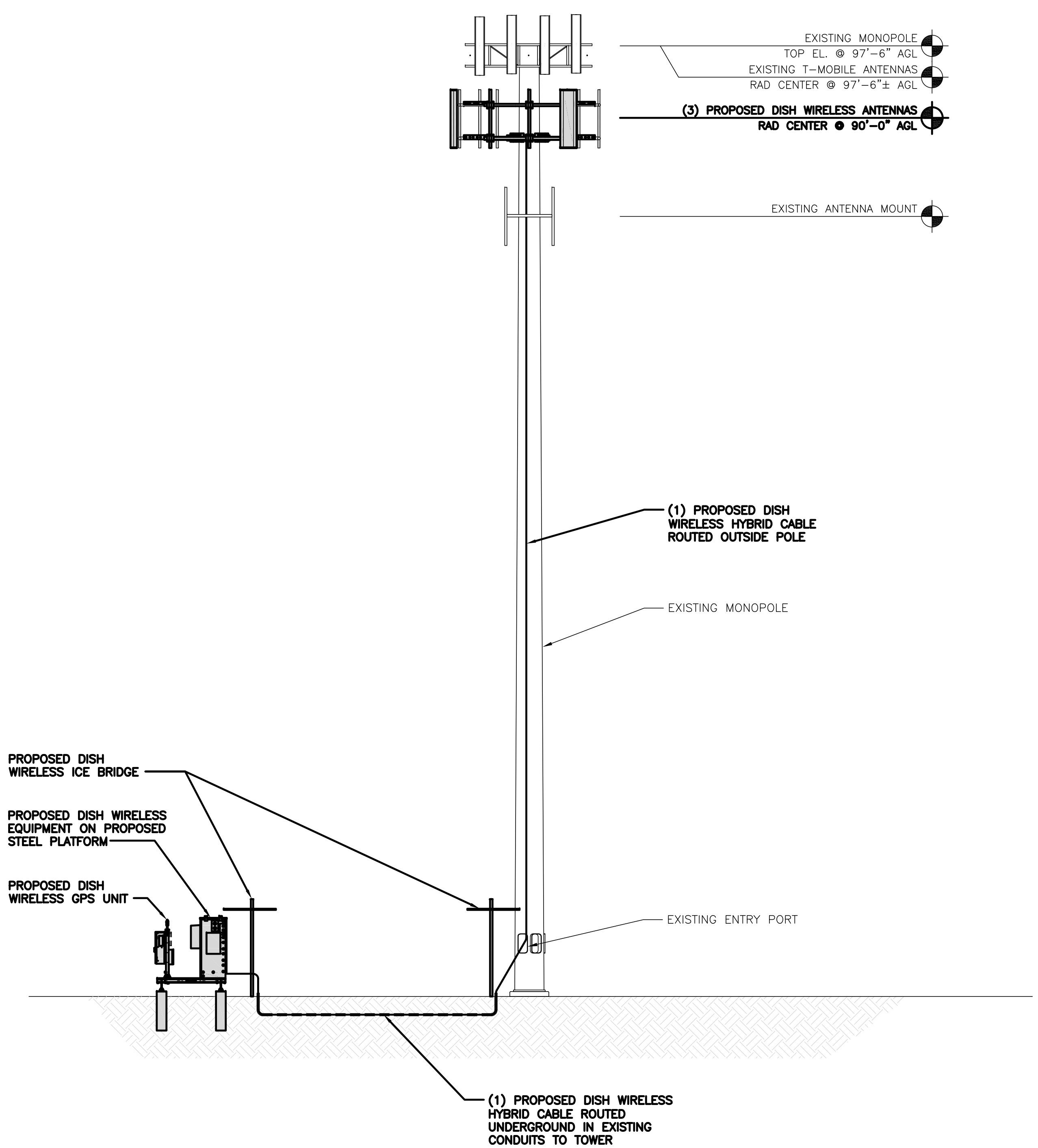
OVERALL AND ENLARGED SITE PLAN

SHEET NUMBER

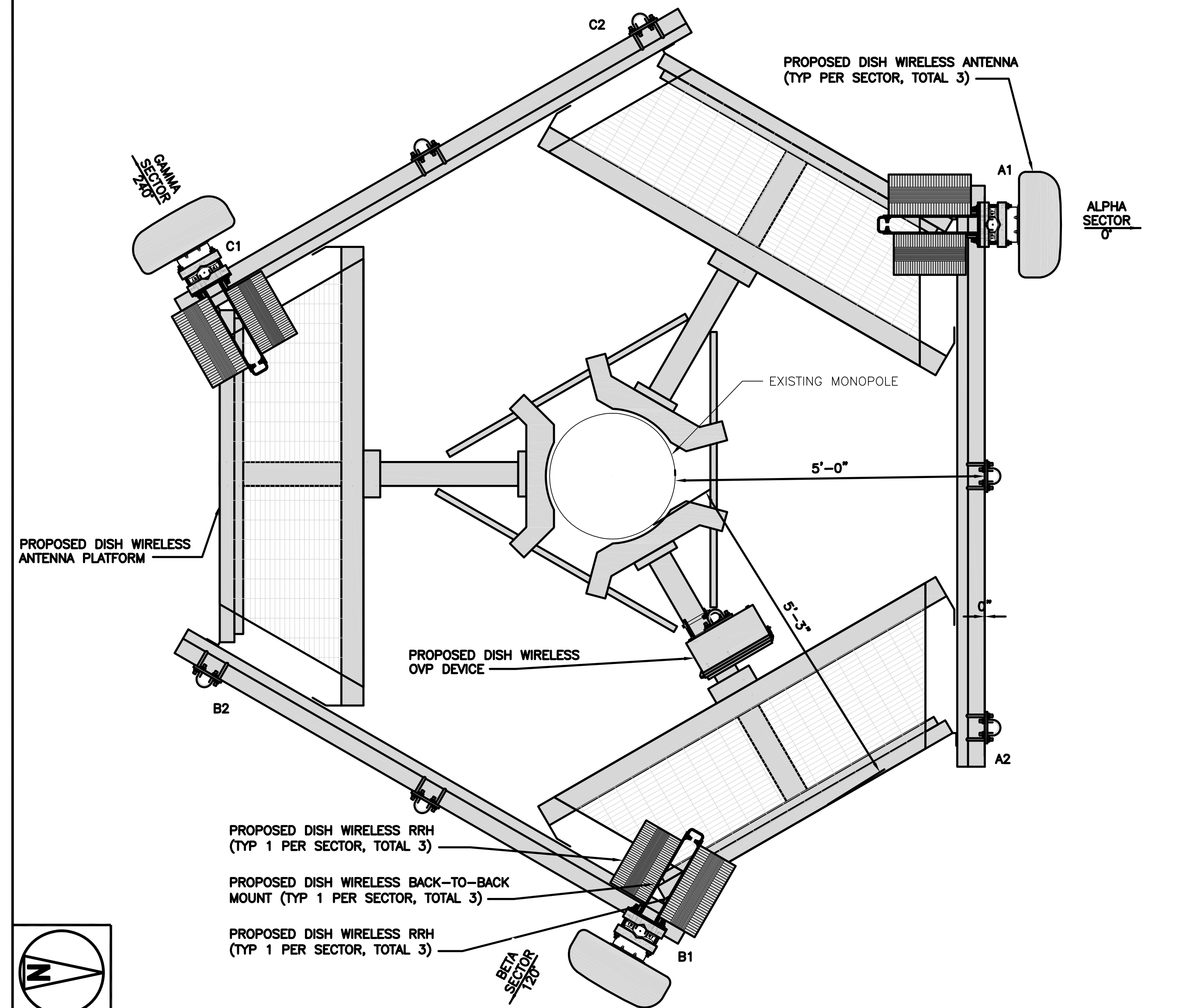
A-1

NOTES

1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.
2. ANTENNA AND MW DISH SPECIFICATIONS REFER TO ANTENNA SCHEDULE AND TO FINAL CONSTRUCTION RFDS FOR ALL RF DETAILS
3. ANTENNAS SHALL BE PAINTED TO MATCH.



PROPOSED ELEVATION — 8' 4' 0 8' 16' — 1/8"=1'-0" — 1



ANTENNA LAYOUT — 12" 6" 0 1' 2' 3' — 3/4"=1'-0" — 2

SECTOR	POSITION	ANTENNA						TRANSMISSION CABLE
		EXISTING OR PROPOSED	MANUFACTURER – MODEL NUMBER	TECHNOLOGY	SIZE (HxW)	AZIMUTH	RAD CENTER	FEED LINE TYPE AND LENGTH
ALPHA	A1	PROPOSED	JMA – MX08FRO665-20_V0F	5G	72.0" x 20.0"	0°	90'-0"	(1) HIGH-CAPACITY HYBRID CABLE (232' LONG)
BETA	B1	PROPOSED	JMA – MX08FRO665-20_V0F	5G	72.0" x 20.0"	120°	90'-0"	
GAMMA	C1	PROPOSED	JMA – MX08FRO665-20_V0F	5G	72.0" x 20.0"	240°	90'-0"	

SECTOR	POSITION	RRH	
		MANUFACTURER – MODEL NUMBER	TECHNOLOGY
ALPHA	A1	FUJITSU – TA08025-B605	N71/N29
	A1	FUJITSU – TA08025-B604	N70/N66
BETA	B1	FUJITSU – TA08025-B605	N71/N29
	B1	FUJITSU – TA08025-B604	N70/N66
GAMMA	C1	FUJITSU – TA08025-B605	N71/N29
	C1	FUJITSU – TA08025-B604	N70/N66

NOTES

1. CONTRACTOR TO REFER TO FINAL CONSTRUCTION RFDS FOR ALL RF DETAILS.
2. ANTENNA AND RRH MODELS MAY CHANGE DUE TO EQUIPMENT AVAILABILITY. ALL EQUIPMENT CHANGES MUST BE APPROVED AND REMAIN IN COMPLIANCE WITH THE PROPOSED DESIGN AND STRUCTURAL ANALYSES.

OVP		
EXISTING OR PROPOSED	MANUFACTURER – MODEL NUMBER	SIZE (HxWxD)
PROPOSED	RAYCAP – RDIDC-9181-PF-48	18.98"x14.39"x8.15"

ANTENNA SCHEDULE — NO SCALE — 3

dish wireless.
6700 ALEXANDER BELL DRIVE
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COLUMBIA, MD 21046

BC architects engineers
5661 COLUMBIA PIKE, SUITE 200
FALLS CHURCH, VA 22041-2868

STATE OF MARYLAND — CHRISTOPHER D. MORIN — No. 24552 — PROFESSIONAL ENGINEER

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DRAWN BY:	CHECKED BY:	APPROVED BY:
GMW	NP	CDM

RFDS REV #: 0

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3	9/28/21	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER

–

DISH WIRELESS PROJECT INFORMATION

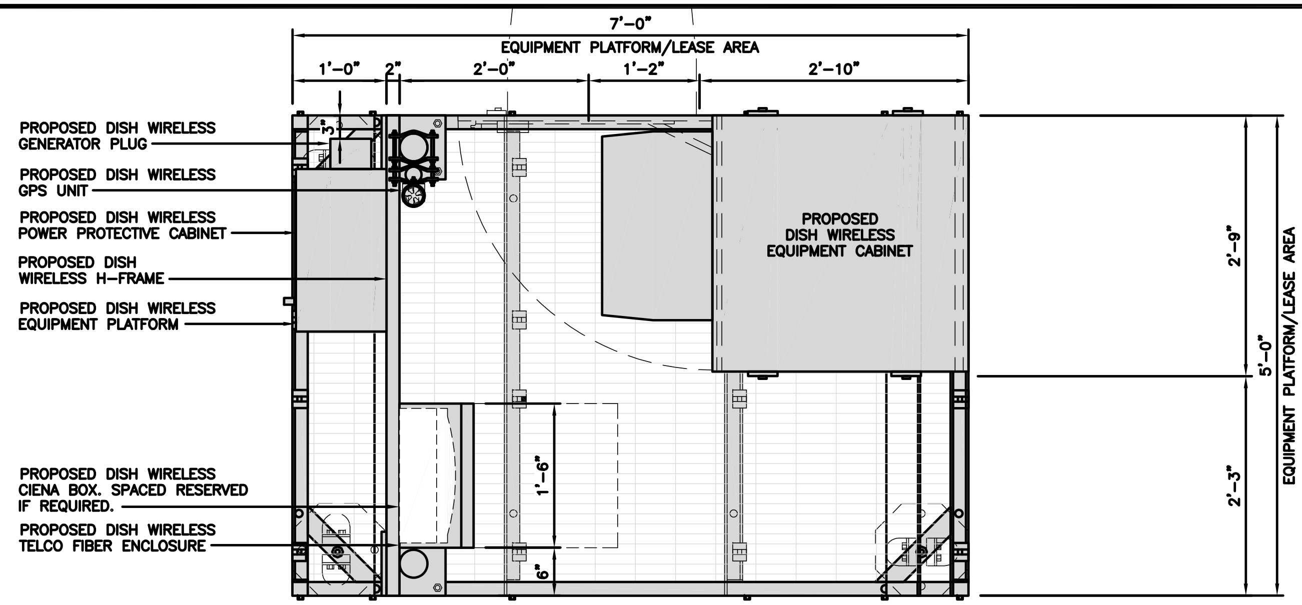
DCWDC00428A
–
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE

ELEVATION, ANTENNA LAYOUT AND SCHEDULE

SHEET NUMBER

A-2

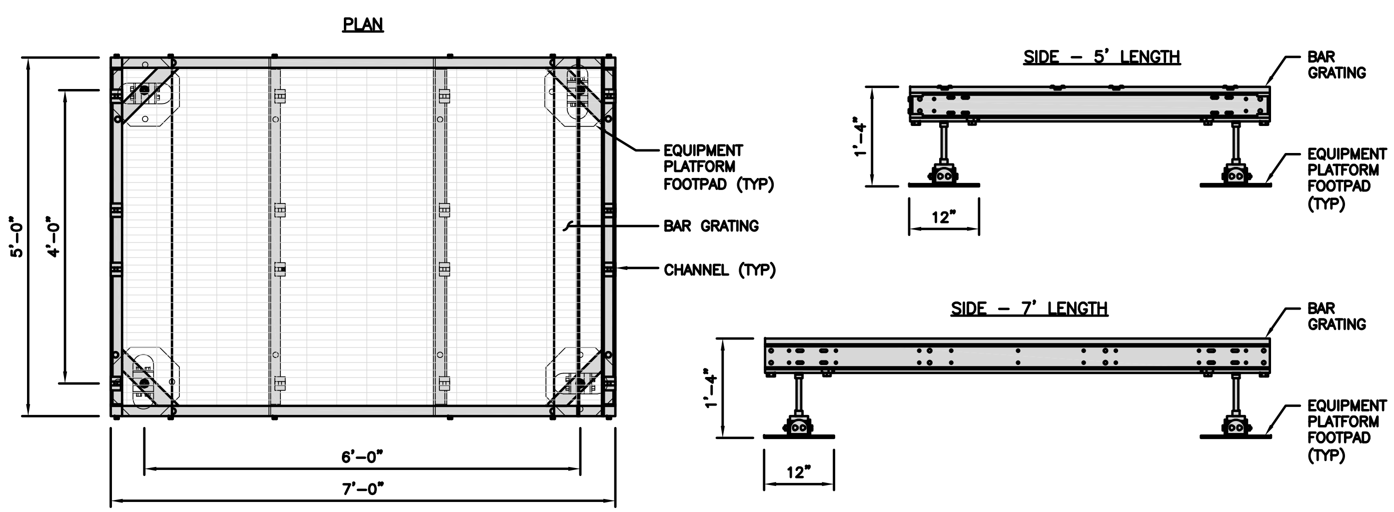


PLATFORM EQUIPMENT PLAN

12" 9" 6" 3" 0 1' 2'
1"=1'-0"

1

COMMSCOPE MTC4045LP 5X7 PLATFORM	
DIMENSIONS (HxWxD)	16"x84"x60"
TOTAL WEIGHT	423 LBS

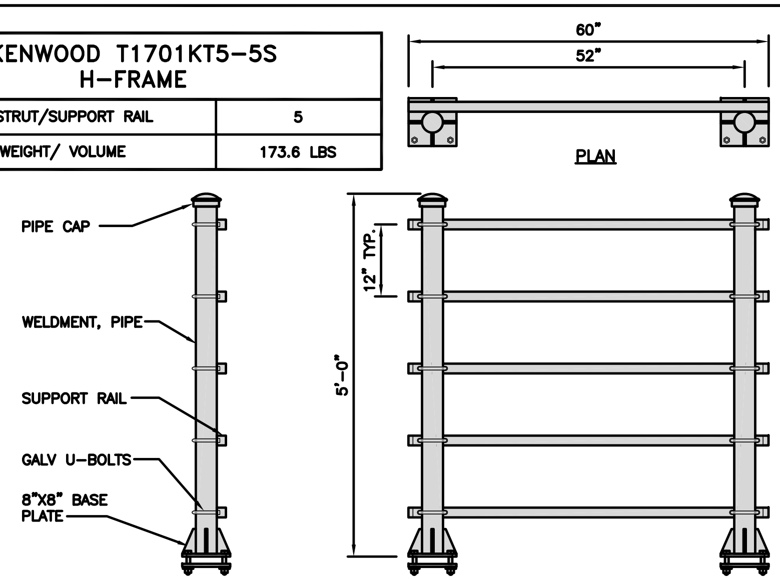


PLATFORM DETAIL

NO SCALE

2

KENWOOD T1701KT5-5S H-FRAME	
UNISTRUT/SUPPORT RAIL	5
WEIGHT/ VOLUME	173.6 LBS



H-FRAME DETAIL

NO SCALE

3

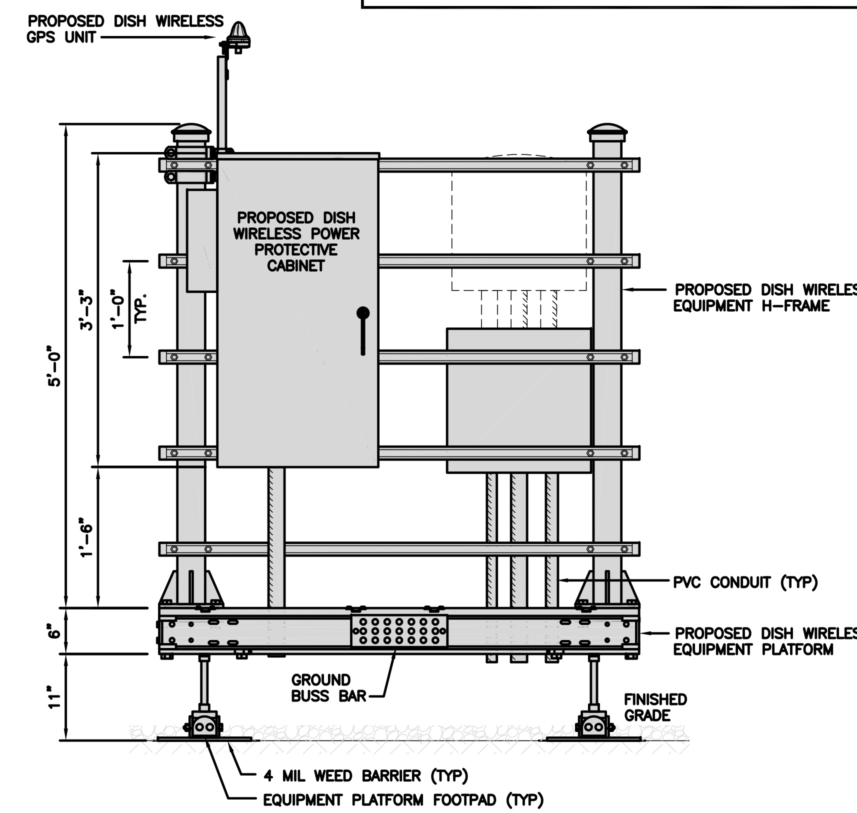
NOT USED

NO SCALE

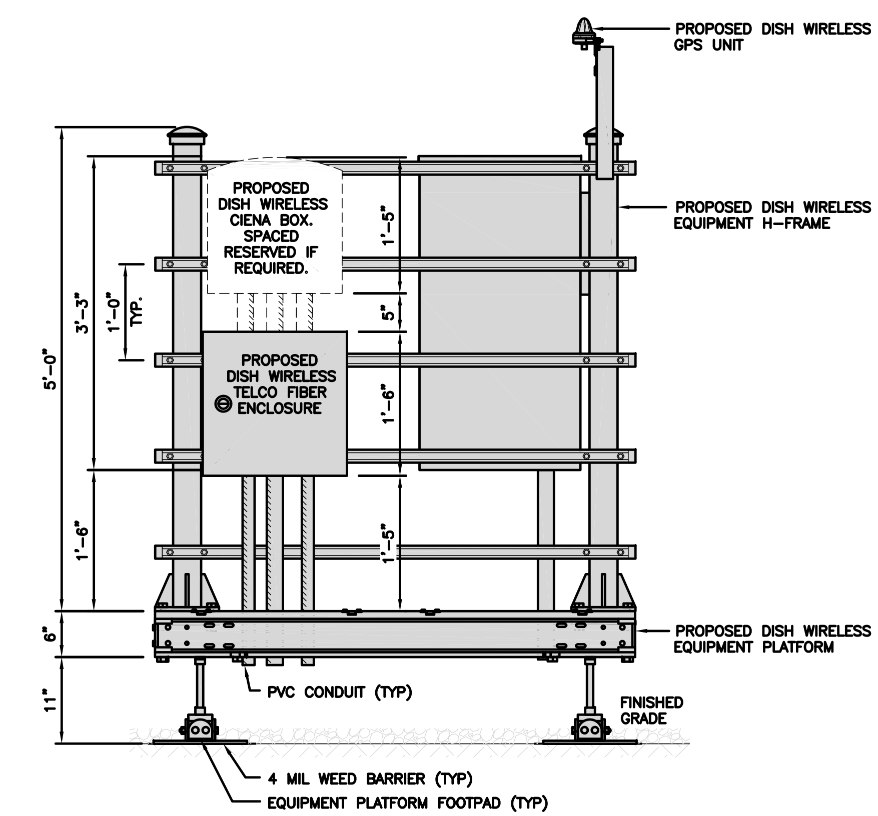
4

NOTES

1. CONTRACTOR TO BURY PLATFORM FEET WITH A MINIMUM OF 2" OF FILL PER EXISTING SITE SURFACE
2. WEED BARRIER FABRIC TO BE ADDED AT DISCRETION OF DISH WIRELESS CONSTRUCTION MANAGER AT TIME OF CONSTRUCTION. ONE SHEET 8'x8' INSTALLED UNDER ALL FOUR FEET OF THE PLATFORM (4 MIL BLACK PLASTIC)
3. EQUIPMENT CABINET OMITTED FOR CLARITY



FRONT ELEVATION



BACK ELEVATION

H-FRAME EQUIPMENT ELEVATION

12" 9" 6" 3" 0 1' 2'
1"=1'-0"

5

dish wireless.

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FALLS CHURCH, VA 22041-2868

STATE OF MARYLAND CHRISTOPHER D. MORIN No. 24552 PROFESSIONAL ENGINEER

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 NUMBER 24552, EXPIRATION DATE 11/17/21.

DRAWN BY:	CHECKED BY:	APPROVED BY:
GMW	NP	CDM

RFDS REV #: 0

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
A	3/2/21	ISSUED FOR REVIEW
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2	7/19/21	ISSUED FOR CONSTRUCTION
3	9/28/21	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER
–

DISH WIRELESS PROJECT INFORMATION

DCWDC00428A
–
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

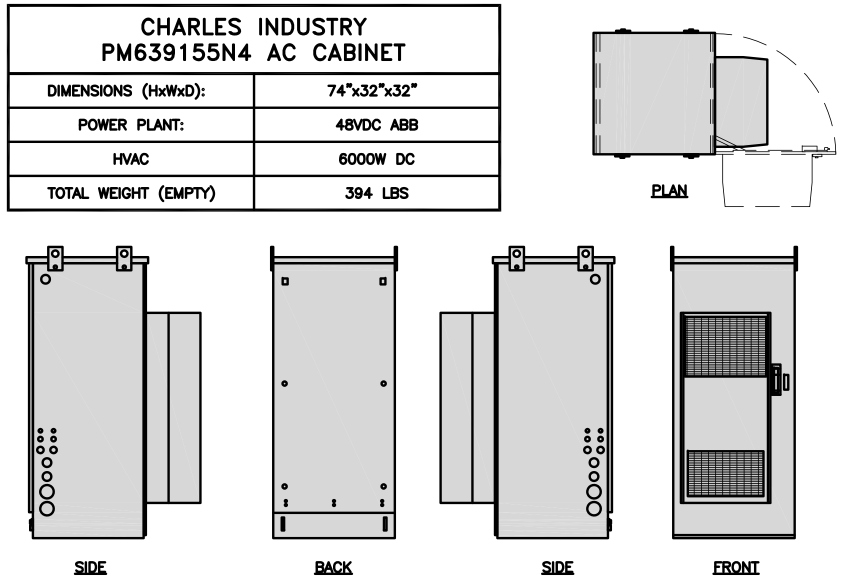
SHEET TITLE

EQUIPMENT PLATFORM AND H-FRAME DETAILS

SHEET NUMBER

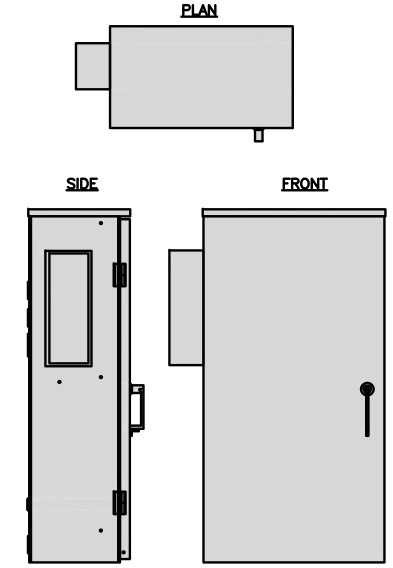
A-3

CHARLES INDUSTRY PM639155N4 AC CABINET	
DIMENSIONS (HxWxD):	74"x32"x32"
POWER PLANT:	48VDC ABB
HVAC	6000W DC
TOTAL WEIGHT (EMPTY)	394 LBS



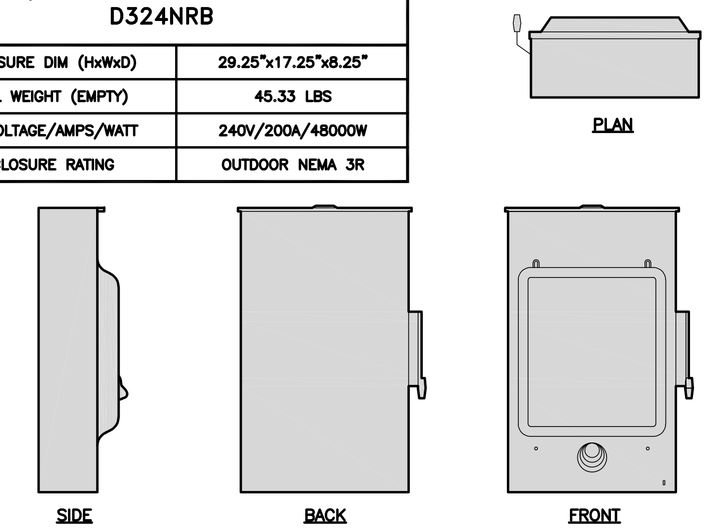
CABINET DETAIL | NO SCALE | 1

RAYCAP RDIAC-6512-P-240-MTS POWER & TELCO PROTECTION CABINET	
DIMENSIONS (HxWxD)	40"x20"x10"
WEIGHT/ VOLUME	124 LBS
MANUAL TRANSFER SWITCH	200A
LOAD CENTER	30 POSITION
MAIN BREAKER	200A, 65kA AIC
GENERATOR RECEPTACLE	CAMLOCK
NEMA RATING	3R POWDER COATED ALUMINUM
SURGE PROTECTION DEVICE	UL 1449 4TH EDITION LISTED



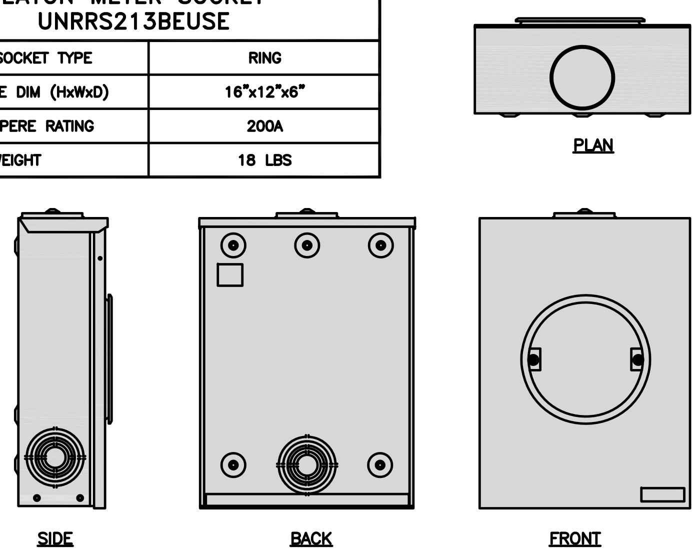
POWER PROTECTION CABINET (PPC) DETAIL | NO SCALE | 2

SQUARE D SAFETY SWITCH D324NRB	
ENCLOSURE DIM (HxWxD)	29.25"x17.25"x8.25"
TOTAL WEIGHT (EMPTY)	45.33 LBS
MAX VOLTAGE/AMPS/WATT	240V/200A/48000W
ENCLOSURE RATING	OUTDOOR NEMA 3R



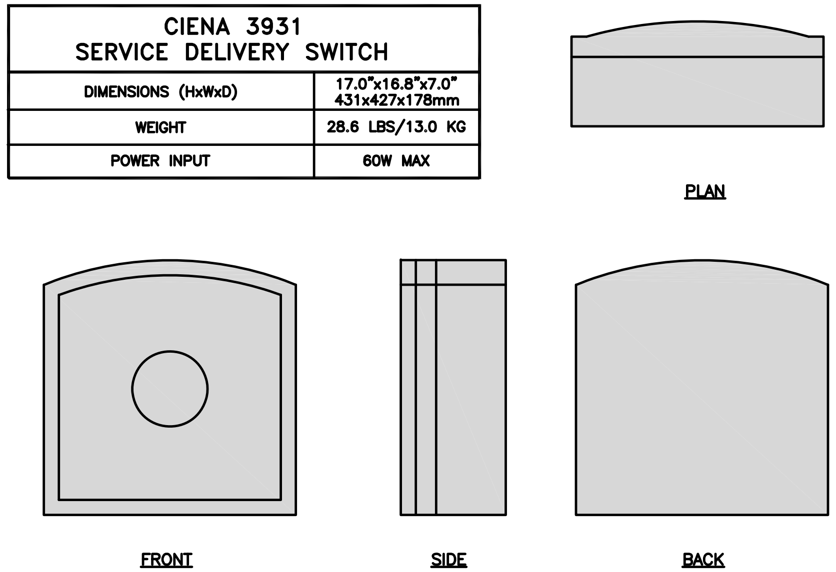
SAFETY SWITCH | NO SCALE | 3

EATON METER SOCKET UNRRS213BEUSE	
METER SOCKET TYPE	RING
ENCLOSURE DIM (HxWxD)	16"x12"x6"
MAIN AMPERE RATING	200A
WEIGHT	18 LBS



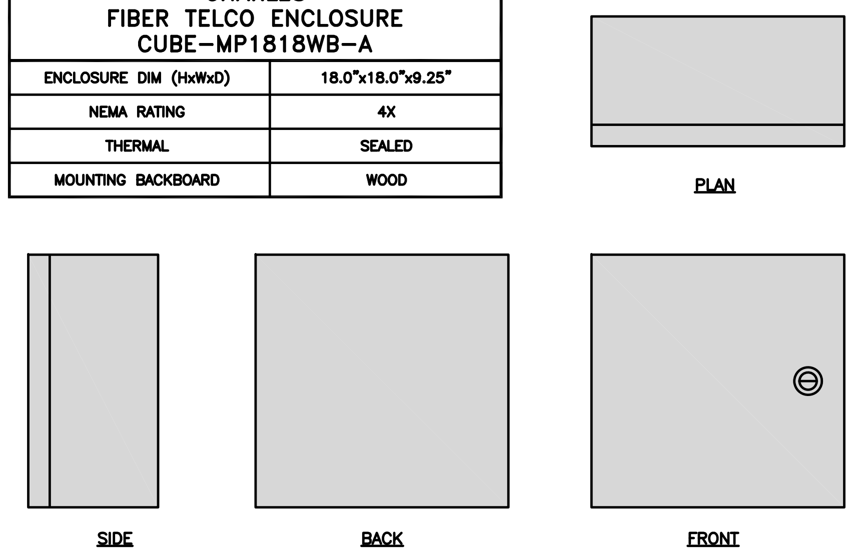
METER SOCKET DETAIL | NO SCALE | 4

CIENA 3931 SERVICE DELIVERY SWITCH	
DIMENSIONS (HxWxD)	17.0"x16.8"x7.0" 431x427x178mm
WEIGHT	28.6 LBS/13.0 KG
POWER INPUT	60W MAX



CIENA DETAIL | NO SCALE | 5

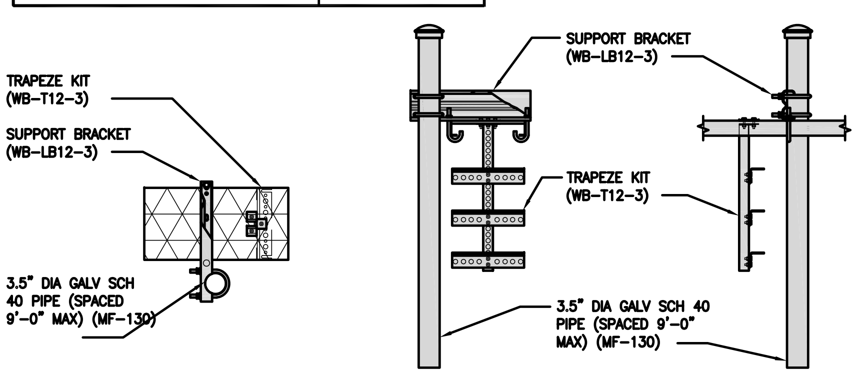
CHARLES FIBER TELCO ENCLOSURE CUBE-MP1818WB-A	
ENCLOSURE DIM (HxWxD)	18.0"x18.0"x9.25"
NEMA RATING	4X
THERMAL	SEALED
MOUNTING BACKBOARD	WOOD



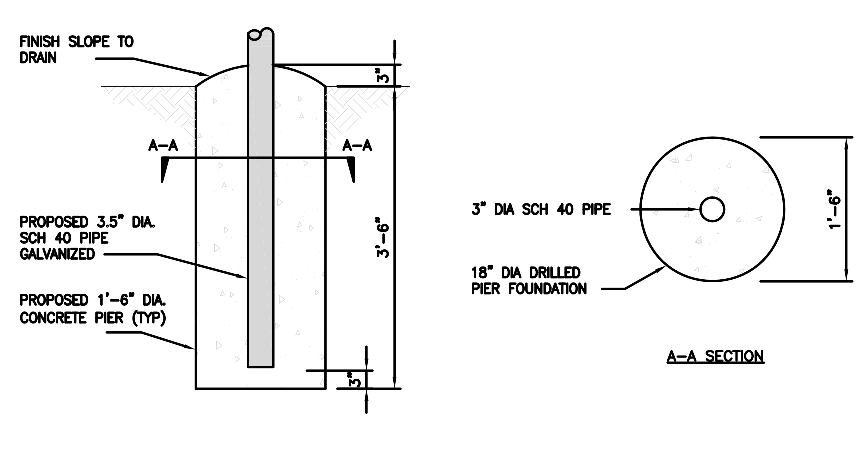
FIBER TELCO ENCLOSURE DETAIL | NO SCALE | 6

COMMSCOPE WB-K110-B WAVEGUIDE BRIDGE KIT	
DIMENSIONS (HxL)	160"x10'
WEIGHT/ VOLUME	325.0 LBS
CABLE RUN (QTY)	12

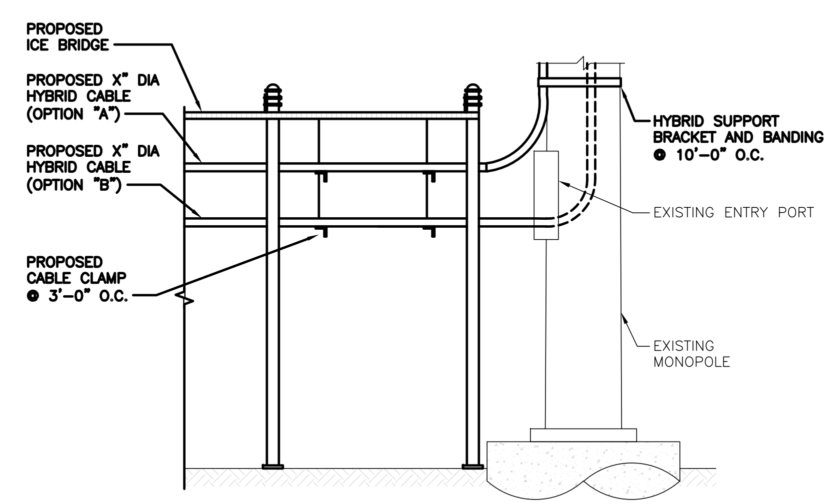
INCLUDED PRODUCTS:	
	WB-T12-3 TRAPEZE KIT, 3 RUNGS
	WB-LB12-3 SUPPORT BRACKET
	MF-130 DIRECT BURIAL PIPE COLUMN, 13'-4"



ICE BRIDGE DETAIL | NO SCALE | 7



TYPICAL ICE BRIDGE CONCRETE PIER DETAIL | NO SCALE | 8



HYBRID CABLE RUN | NO SCALE | 9

dish wireless.
6700 ALEXANDER BELL DRIVE
SUITE 221
COLUMBIA, MD 21046

BC architects engineers
5661 COLUMBIA PIKE, SUITE 200
FALLS CHURCH, VA 22041-2868

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DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
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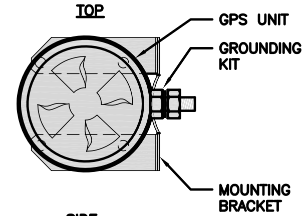
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
EQUIPMENT DETAILS

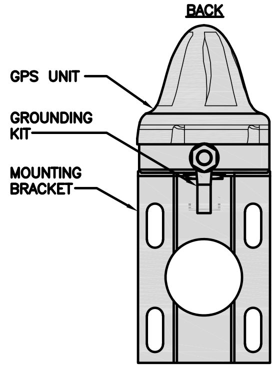
SHEET NUMBER
A-4

ROSENBERGER GPSGLONASS-36-N-S	
DIMENSION (DIA x H)	69mm x 98.5mm
WEIGHT (WITH ACCESSORIES)	515.74g
CONNECTOR	N-FEMALE
FREQUENCY RANGE	1559 MHz ~ 1610.5MHz

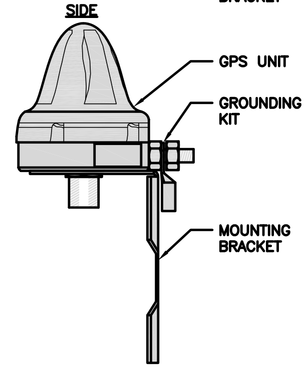
TOP



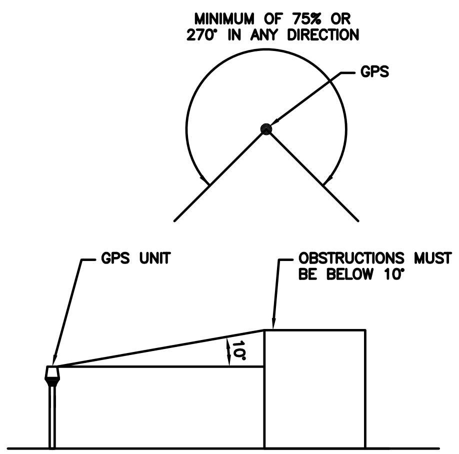
BACK



SIDE



GPS ANTENNA DETAIL — NO SCALE — 1



GPS MINIMUM SKY VIEW REQUIREMENTS — NO SCALE — 2

NOT USED — NO SCALE — 3

5G HYBRID CALCULATOR

The preparer inputs values into the yellow cells.

DESC	QTY	
SITE ID #:	DCWDC00428A	
TWR TYPE:	Monopole	
HYBRID BEND RADIUS	30"	The preparer must determine the lengths below.
RAD CENTER (ft)	90.0	This is the RAD center for the antennas on towers. For a rooftop, this is the total length of all vertical sections of the hybrid.
ICE BRIDGE HEIGHT (ft)	10.0	This is the height of the bridge coverings.
ICE BRIDGE LENGTH (ft)	10.0	This is the length of the total ice bridge coverings, if more than one ice bridge is used or total horizontal lengths of hybrid if this is inside a building.
LENGTH ACROSS PLATFORM (ft)	10.0	This is the length from the cabinet to the first bend up the ice bridge or inside a radio room.
LENGTH FROM TOWER TOP TO OVP (ft)	5.0	This is the horizontal length from the tower to the OVP at the antenna level or the total horizontal lengths of hybrid on a building or large self supporting tower.
VERTICAL LENGTH OF HYBRID INTO TOWER TOP OVP (ft)	1.0	This is the vertical length of hybrid that comes out to the tower top OVP to the beginning of the first bend that is going into the monopole port.
	LENGTH (ft)	
Additional Excess Hybrid to be added (To be determined by preparer)	100	
Total Hybrid Length to Order (Rounded up to nearest whole number)	232	

CUI12PSM6P4-232	Hybrid Part Number

Notes:

Reference Information

Cables Unlimited Inc. PART NUMBER PREFIX (ADD CALCULATED LENGTH TO THE END OF THE PART NUMBER)	SERVICE LENGTH	CABLE DIAMETER	CONDUCTOR SIZE
CUI12PSM9P8-	< 120'	1.41"	8 AWG
CUI12PSM9P6-	120' to 180'	1.60"	6 AWG
CUI12PSM6P4-	> 180'	1.75"	4 AWG

5G HYBRID CALCULATOR — NO SCALE — 4

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DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
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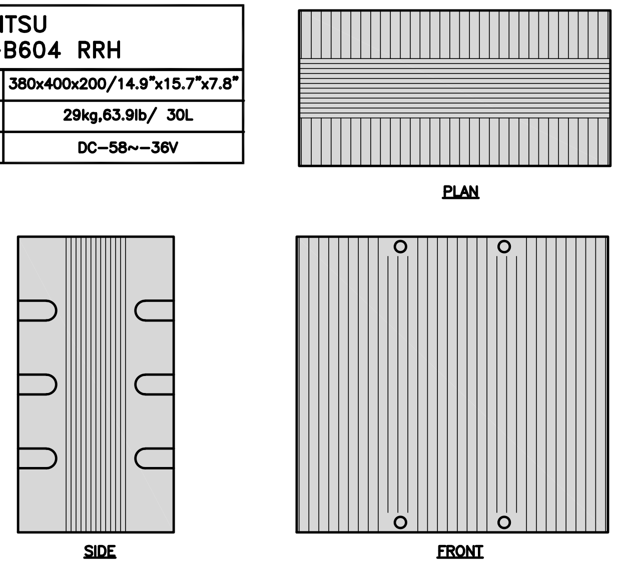
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
EQUIPMENT DETAILS

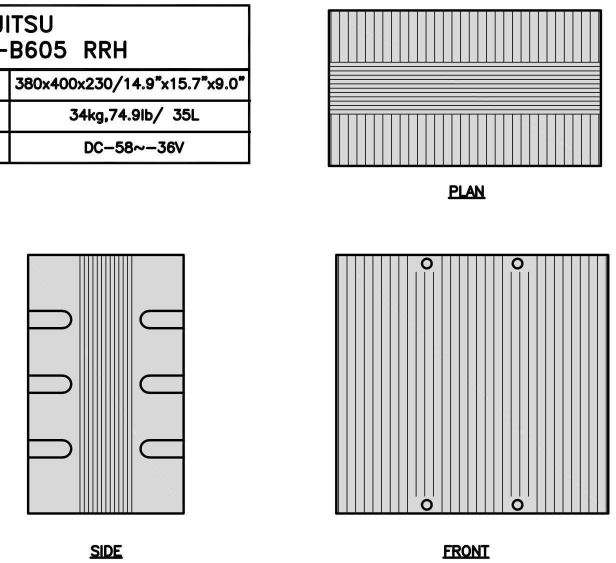
SHEET NUMBER
A-5

FUJITSU TA08025-B604 RRH	
DIMENSIONS (HxWxD) (KG/IN)	380x400x200/14.9"x15.7"x7.8"
WEIGHT(KG,LB)/ VOLUME	29kg,63.9lb/ 30L
POWER SUPPLY	DC-58~-36V



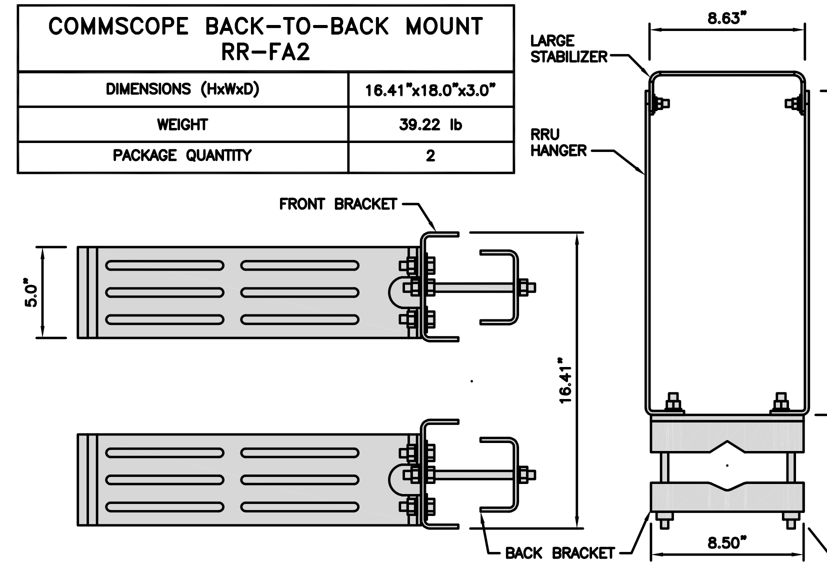
REMOTE RADIO HEAD DETAIL — NO SCALE — 1

FUJITSU TA08025-B605 RRH	
DIMENSIONS (HxWxD) (KG/IN)	380x400x230/14.9"x15.7"x9.0"
WEIGHT(KG,LB)/ VOLUME	34kg,74.9lb/ 35L
POWER SUPPLY	DC-58~-36V



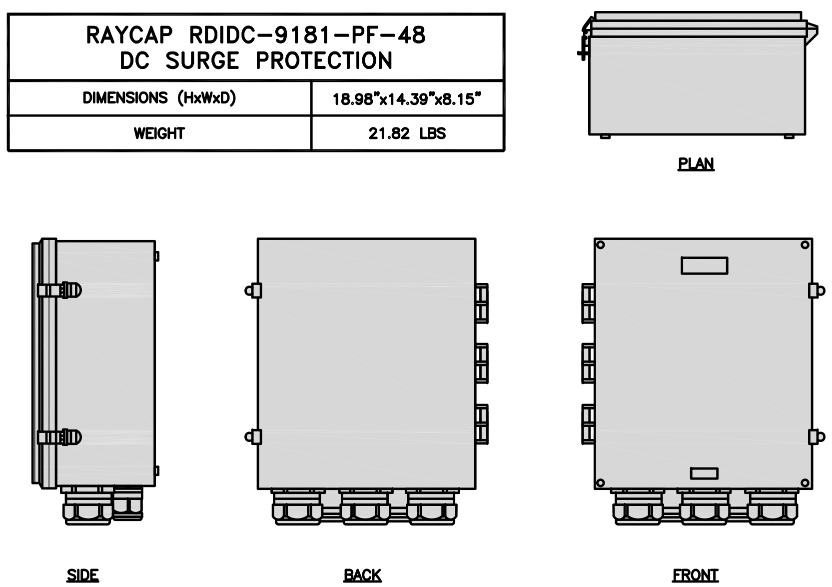
REMOTE RADIO HEAD DETAIL — NO SCALE — 2

COMMSCOPE BACK-TO-BACK MOUNT RR-FA2	
DIMENSIONS (HxWxD)	16.41"x18.0"x3.0"
WEIGHT	39.22 lb
PACKAGE QUANTITY	2



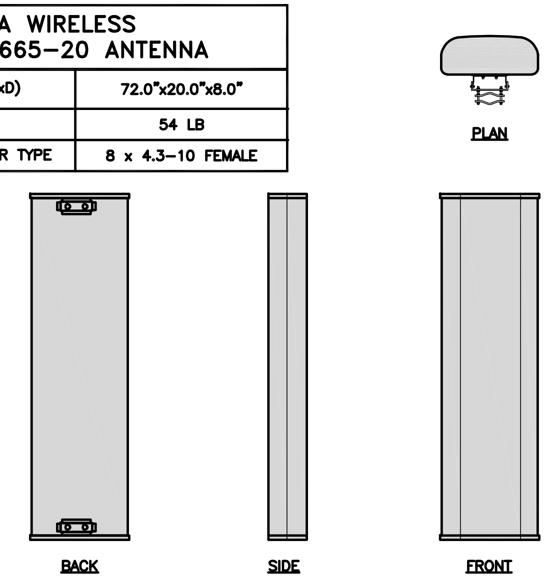
REMOTE RADIO MOUNT DETAIL — NO SCALE — 3

RAYCAP RDIDC-9181-PF-48 DC SURGE PROTECTION	
DIMENSIONS (HxWxD)	18.98"x14.39"x8.15"
WEIGHT	21.82 LBS



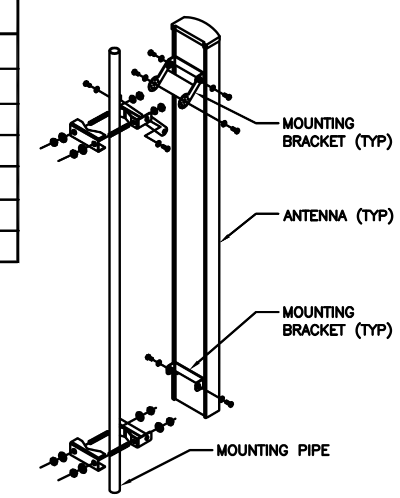
SURGE SUPPRESSION DETAIL — NO SCALE — 4

JMA WIRELESS MX08FRO665-20 ANTENNA	
DIMENSIONS (HxWxD)	72.0"x20.0"x8.0"
TOTAL WEIGHT	54 LB
RF PORTS, CONNECTOR TYPE	8 x 4.3-10 FEMALE



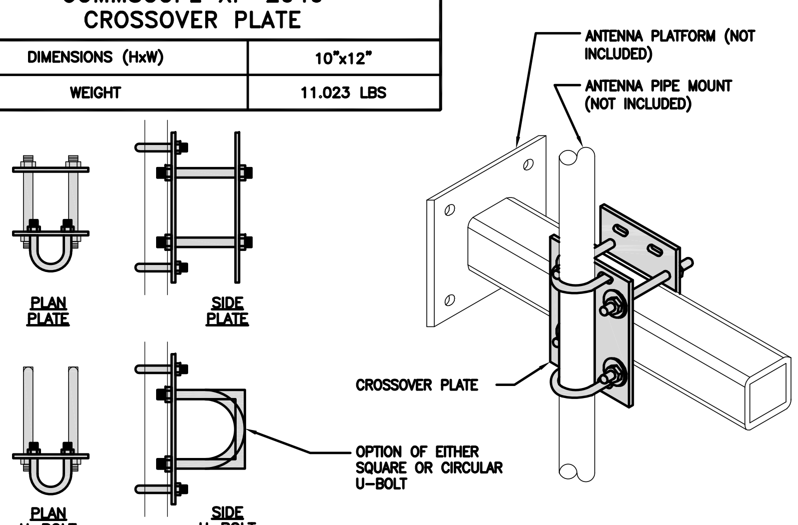
ANTENNA DETAIL — NO SCALE — 5

M04 MOUNTING BRACKET HPA-33R-BUU-H4-K	
WIDTH	5" (135mm)
DEPTH	2" (51mm)
HEIGHT	8" (213mm)
TOTAL WEIGHT (WITH BRACKETS)	1.5 LBS (15.50 Kg)
HOUSING MATERIAL	ASA/ABS/ALUMINUM
RADOME COLOR	LIGHT GRAY
CONNECTOR	1X8-PIN DAISY CHAIN



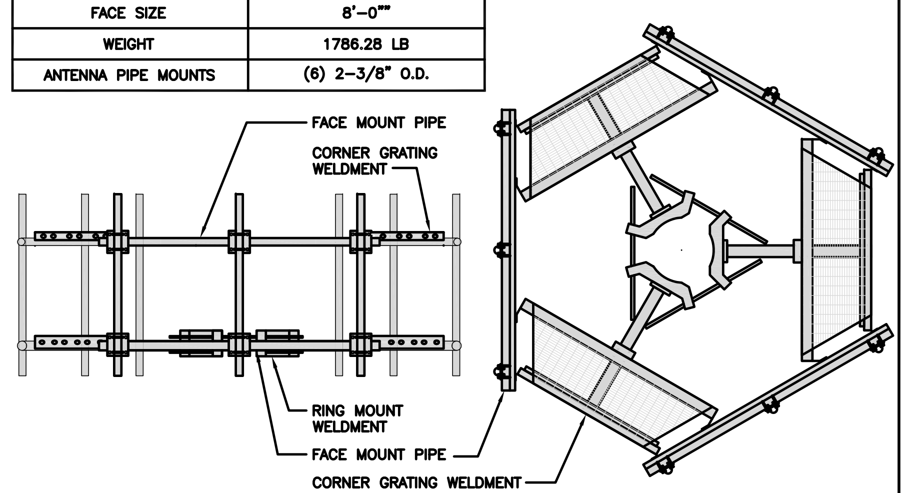
ANTENNA MOUNTING DETAIL — NO SCALE — 6

COMMSCOPE XP-2040 CROSSOVER PLATE	
DIMENSIONS (HxW)	10"x12"
WEIGHT	11.023 LBS



RRH/OVP MOUNT DETAIL — NO SCALE — 7

SITEPRO1 SNP8HR-396 SNUB-NOSE PLATFORM	
FACE SIZE	8'-0""
WEIGHT	1786.28 LB
ANTENNA PIPE MOUNTS	(6) 2-3/8" O.D.



ANTENNA PLATFORM DETAIL — NO SCALE — 8

NO SCALE — 9

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A&E PROJECT NUMBER

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DISH WIRELESS PROJECT INFORMATION

DCWDC00428A

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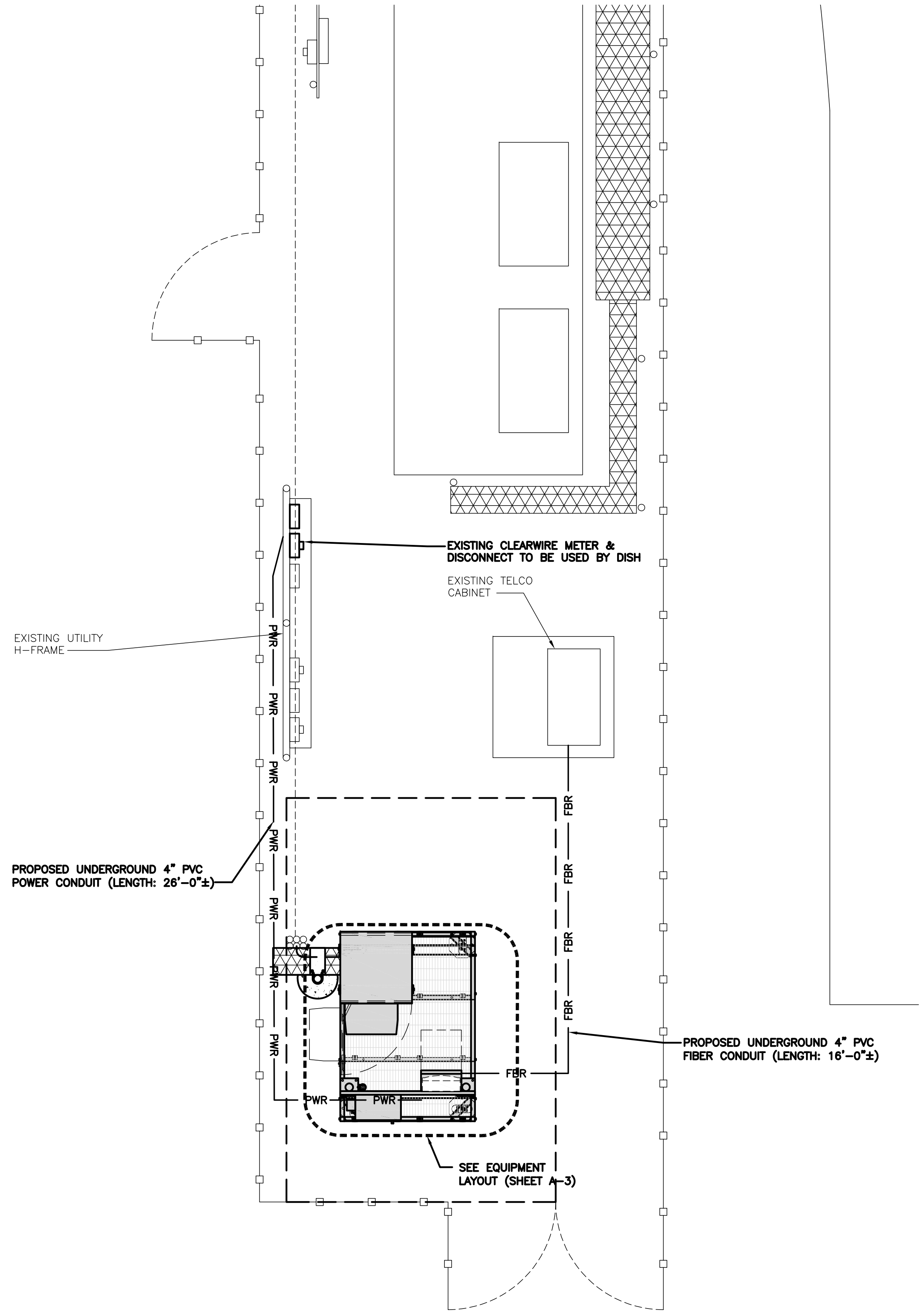
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE

EQUIPMENT DETAILS

SHEET NUMBER

A-6



NOTES

1. CONTRACTOR SHALL FIELD VERIFY ALL PROPOSED UNDERGROUND UTILITY CONDUIT ROUTE.
2. ANTENNAS AND MOUNTS OMITTED FOR CLARITY.

UTILITY ROUTE PLAN — 12" 6" 0 1' 2' 3' 4' 5' 6' 7' — 3/8"=1'-0" — 1

DC POWER WIRING SHALL BE COLOR CODED AT EACH END FOR IDENTIFYING +24V AND −48V CONDUCTORS. RED MARKINGS SHALL IDENTIFY +24V AND BLUE MARKINGS SHALL IDENTIFY −48V.

1. CONTRACTOR SHALL INSPECT THE EXISTING CONDITIONS PRIOR TO SUBMITTING A BID. ANY QUESTIONS ARISING DURING THE BID PERIOD IN REGARDS TO THE CONTRACTOR'S 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. ALL ELECTRICAL WORK SHALL BE DONE IN ACCORDANCE WITH CURRENT NATIONAL ELECTRICAL CODES AND ALL STATE AND LOCAL CODES, LAWS, AND ORDINANCES. PROVIDE ALL COMPONENTS AND WIRING SIZES AS REQUIRED TO MEET NEC STANDARDS.
3. LOCATION OF EQUIPMENT, CONDUIT AND DEVICES SHOWN ON THE DRAWINGS ARE APPROXIMATE AND SHALL BE COORDINATED WITH FIELD CONDITIONS PRIOR TO CONSTRUCTION.
4. CONDUIT ROUGH-IN SHALL BE COORDINATED WITH THE MECHANICAL EQUIPMENT TO AVOID LOCATION CONFLICTS. VERIFY WITH THE MECHANICAL EQUIPMENT CONTRACTOR AND COMPLY AS REQUIRED.
5. CONTRACTOR SHALL PROVIDE ALL BREAKERS, CONDUITS AND CIRCUITS AS REQUIRED FOR A COMPLETE SYSTEM.
6. CONTRACTOR SHALL PROVIDE PULL BOXES AND JUNCTION BOXES AS REQUIRED BY THE NEC ARTICLE 314.
7. CONTRACTOR SHALL PROVIDE ALL STRAIN RELIEF AND CABLE SUPPORTS FOR ALL CABLE ASSEMBLIES. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS.
8. ALL DISCONNECTS AND CONTROLLING DEVICES SHALL BE PROVIDED WITH ENGRAVED PHENOLIC NAMEPLATES INDICATING EQUIPMENT CONTROLLED, BRANCH CIRCUITS INSTALLED ON, AND PANEL FIELD LOCATIONS FED FROM.
9. INSTALL AN EQUIPMENT GROUNDING CONDUCTOR IN ALL CONDUITS PER THE SPECIFICATIONS AND NEC 250. THE EQUIPMENT GROUNDING CONDUCTORS SHALL BE BONDED AT ALL JUNCTION BOXES, PULL BOXES, AND ALL DISCONNECT SWITCHES, AND EQUIPMENT CABINETS.
10. ALL NEW MATERIAL SHALL HAVE A U.L. LABEL.
11. PANEL SCHEDULE LOADING AND CIRCUIT ARRANGEMENTS REFLECT POST-CONSTRUCTION EQUIPMENT.
12. CONTRACTOR SHALL BE RESPONSIBLE FOR AS-BUILT PANEL SCHEDULE AND SITE DRAWINGS.

ELECTRICAL NOTES — NO SCALE — 2

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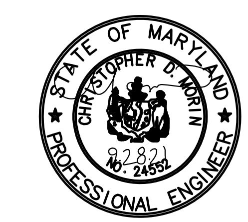

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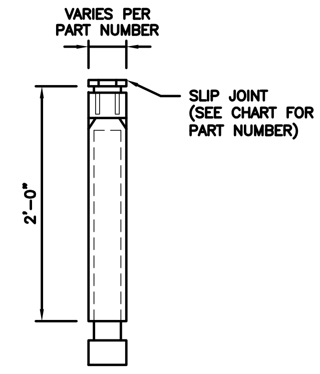
SILVER SPRING, MD 20906

SHEET TITLE
ELECTRICAL/FIBER ROUTE PLAN AND NOTES

SHEET NUMBER
E-1

CARLON EXPANSION FITTINGS

COUPLING END PART#	MALE TERMINAL ADAPTER END PART#	SIZE	STD CTN QTY.	TRAVEL LENGTH
E945D	E945DX	1/2"	20	4"
E945E	E945EX	3/4"	15	4"
E945F	E945FX	1"	10	4"
E945G	E945GX	1 1/4"	5	4"
E945H	E945HX	1 1/2"	5	4"
E945J	E945JX	2"	15	8"
E945K	E945KX	2 1/2"	10	8"
E945L	E945LX	3"	10	8"
E945M	E945MX	3 1/2"	5	8"
E945N	E945NX	4"	5	8"
E945P	E945PX	5"	1	8"
E945R	E945RX	6"	1	8"

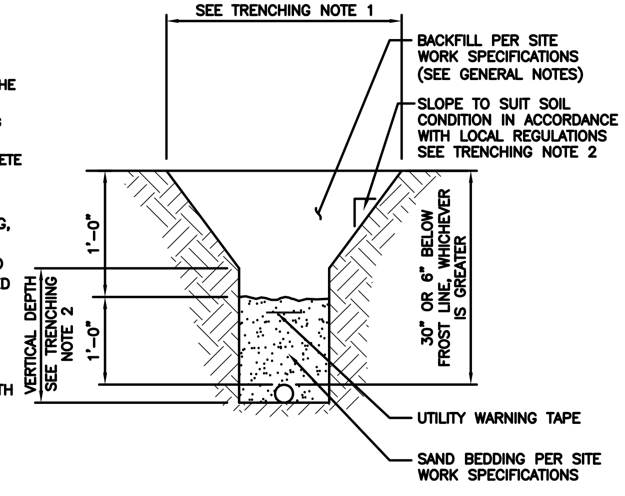


NOTE:
CONTRACTOR TO INSTALL EXPANSION FITTING SLIP JOINT AT METER CENTER CONDUIT TERMINATION, AS PER LOCAL UTILITY POLICY, ORDINANCE AND/OR SPECIFIED REQUIREMENT.

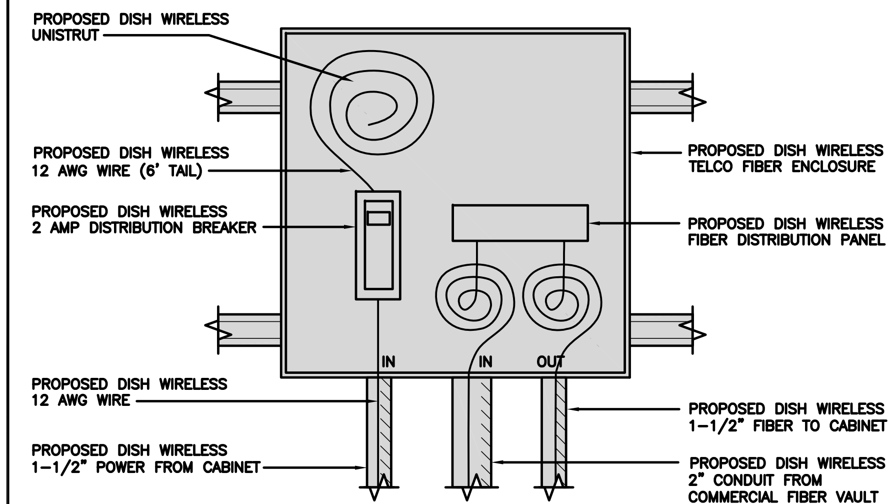
EXPANSION JOINT DETAIL | NO SCALE | 1

TRENCHING NOTES

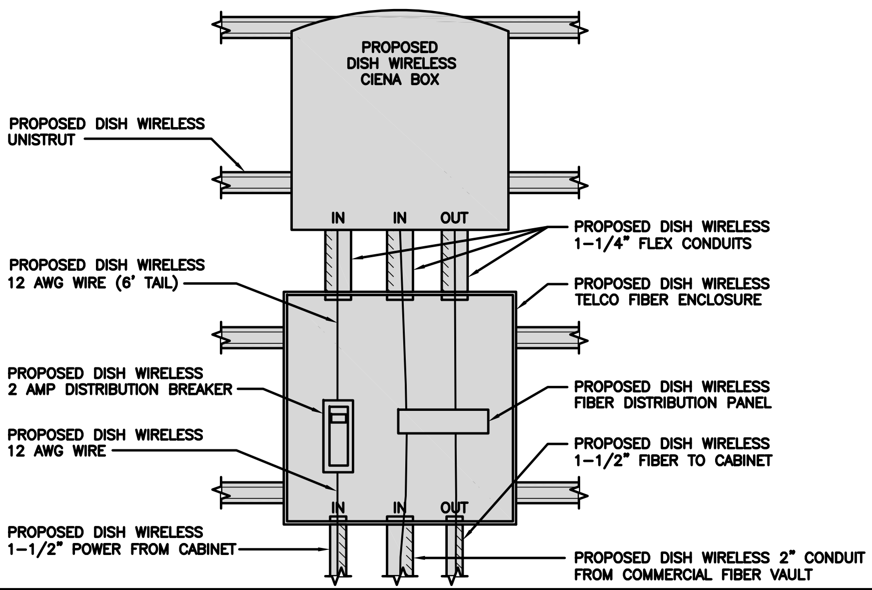
1. CONTRACTOR SHALL RESTORE THE TRENCH TO ITS ORIGINAL CONDITIONS BY EITHER SEEDING OR SODDING GRASS AREAS, OR REPLACING ASPHALT OR CONCRETE AREAS TO ITS ORIGINAL CROSS SECTION.
2. TRENCHING SAFETY; INCLUDING, BUT NOT LIMITED TO SOIL CLASSIFICATION, SLOPING, AND SHORING, SHALL BE GOVERNED BY THE CURRENT OSHA TRENCHING AND EXCAVATION SAFETY STANDARDS.
3. ALL CONDUITS SHALL BE INSTALLED IN COMPLIANCE WITH THE CURRENT NATIONAL ELECTRIC CODE (NEC) OR AS REQUIRED BY THE LOCAL JURISDICTION, WHICHEVER IS THE MOST STRINGENT.



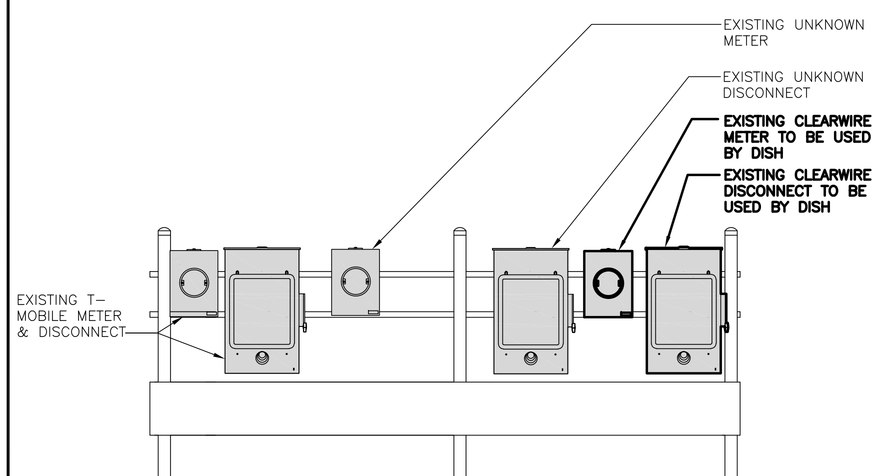
TYPICAL UNDERGROUND TRENCH DETAIL | NO SCALE | 2



DARK TELCO BOX – INTERIOR WIRING LAYOUT | NO SCALE | 3



LIT TELCO BOX – INTERIOR WIRING LAYOUT (OPTIONAL) | NO SCALE | 4



EXISTING BACKBOARD | NO SCALE | 5

NOT USED | NO SCALE | 6

NOT USED | NO SCALE | 7

NOT USED | NO SCALE | 8

NOT USED | NO SCALE | 9

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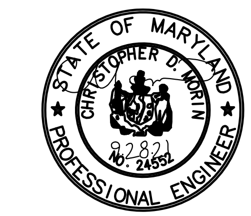

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RFDS REV #: 0

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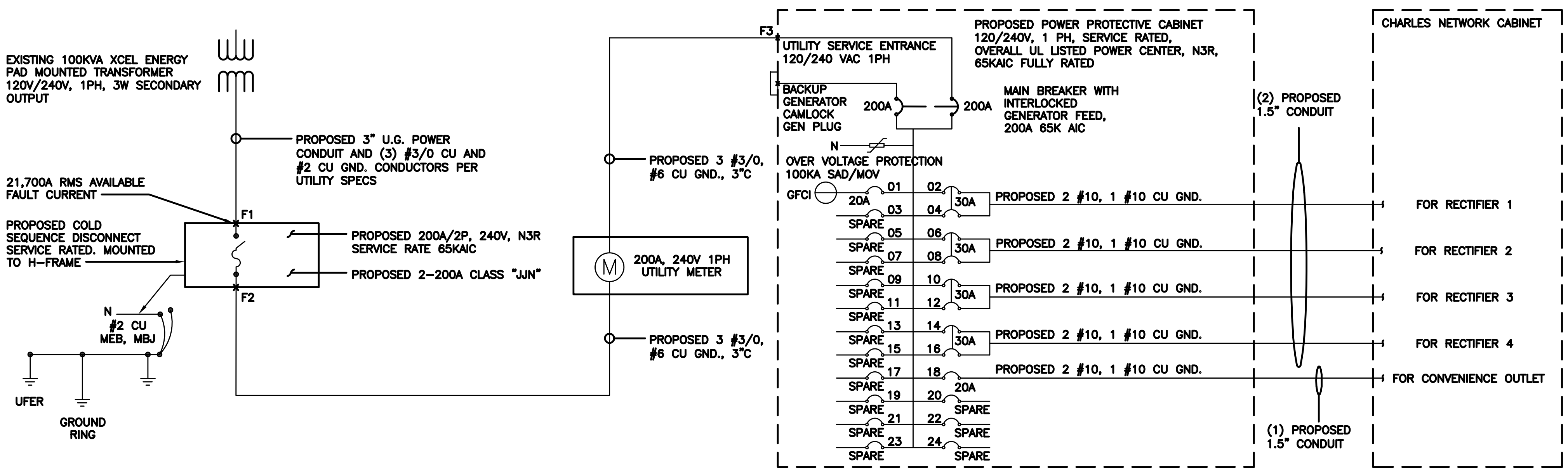
A&E PROJECT NUMBER
-

DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
-
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
ELECTRICAL DETAILS

SHEET NUMBER
E-2

ONE-LIINE RISER DIAGRAM



NOTES

THERE ARE A TOTAL OF (10) CURRENT CARRYING CONDUCTORS IN A SINGLE CONDUIT. ADJUSTABLE FACTOR OF 50% PER NEC TABLE 310.15(B)(3)(a) SHALL APPLY.

#10 FOR 15A/1P BREAKER: 0.5 x 40A = 15.0A
#8 FOR 20A-25A/2P BREAKER: 0.5 x 55A = 27.5A
#6 FOR 30A-35A/2P BREAKER: 0.5 x 75A = 37.5A
#4 FOR 40A-45A/2P BREAKER: 0.5 x 95A = 47.5A

CONDUIT SIZING: ASSUME 1.5" EMT
AT 40% FILL PER NEC 358, TABLE 4 – 0.814A SQ. IN AREA

WIRES: USING THWN-2, CU. (INCLUDING 3 GROUND WIRES)
#6 – 0.0507 SQ. IN X 8 = 0.4056 SQ. IN
#8 – 0.0366 SQ. IN X 2 = 0.0732 SQ. IN
#10 – 0.0211 SQ. IN X 4 = 0.0844 SQ. IN <GROUND
#12 – 0.0133 SQ. IN X 1 = 0.0133 SQ. IN <GROUND
TOTAL = 0.5765 SQ. IN

1.5" EMT CONDUIT IS ADEQUATE TO HANDLE THE TOTAL OR (15) WIRES, INCLUDING GROUND WIRE, AS INDICATED ABOVE.

CONDUIT SIZING: ASSUME 3.0" SCH 40 PVC
AT 40% FILL PER NEC 352,TABLE 4 – 1.216A SQ. IN AREA

WIRES: USING THHN, CU. (INCLUDING 2 GROUND WIRES)
#3/0 – 0.1318 SQ. IN X 3 = 0.3954 SQ. IN
#2 – 0.0521 SQ. IN X 1 = 0.0521 SQ. IN
TOTAL = 0.4475 SQ. IN

3.0" EMT CONDUIT IS ADEQUATE TO HANDLE THE TOTAL OR (3) WIRES, INCLUDING GROUND WIRE, AS INDICATED ABOVE.

(CHARLES ABB GE INFINITY DC PLANT) WITH SINGLE-METER 120V240V 1PH SOURCE — NO SCALE — 1

PROPOSED PANEL SCHEDULE

LOAD SERVED	VOLT AMPS (WATTS) L1	VOLT AMPS (WATTS) L2	TRIP	CKT #	PHASE	CKT #	TRIP	VOLT AMPS (WATTS) L1	VOLT AMPS (WATTS) L2	LOAD SERVED
SPARE				1	A	2	30A	2880		ABB/GE INFINITY
SPARE				3	B	4			2880	RECTIFIER 1
SPARE				5	A	6	30A	2880		ABB/GE INFINITY
SPARE				7	B	8			2880	RECTIFIER 2
SPARE				9	A	10	30A	2880		ABB/GE INFINITY
SPARE				11	B	12			2880	RECTIFIER 3
SPARE				13	A	14	30A	2880		ABB/GE INFINITY
SPARE				15	B	16			2880	RECTIFIER 4
SPARE				17	A	18	20A	1920		CHARLES GFCI
SPARE				19	B	20				SPARE
SPARE				21	A	22				SPARE
SPARE				23	B	24				SPARE
VOLT AMPS								13440	11520	
200A MCB, 1ϕ, 3W, 120/240V			L1		L2					
MB RATING: 65,000 AIC			13440		11520	VOLT AMPS				
			75.3		64.7	AMPS				
			140			MAX AMPS				
			175			MAX 125%				

PANEL SCHEDULE — NO SCALE — 2

NOT USED — NO SCALE — 3

NOT USED — NO SCALE — 4

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STATE OF MARYLAND — CHRISTOPHER D. MORIN — No. 24552 — PROFESSIONAL ENGINEER

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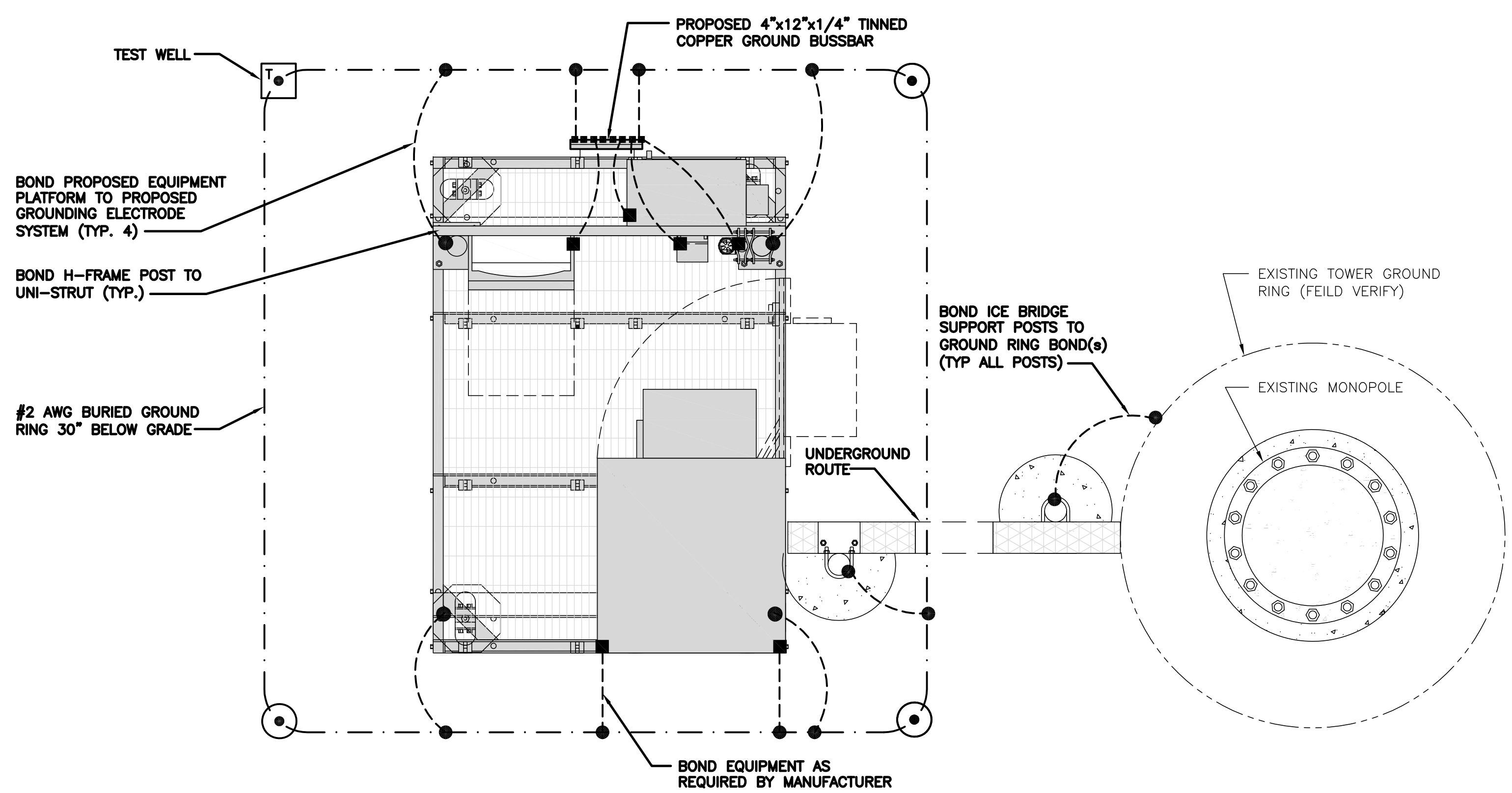
A&E PROJECT NUMBER
–

DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
–
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
ELECTRICAL ONE-LINE, FAULT CALCS & PANEL SCHEDULE

SHEET NUMBER
E-3

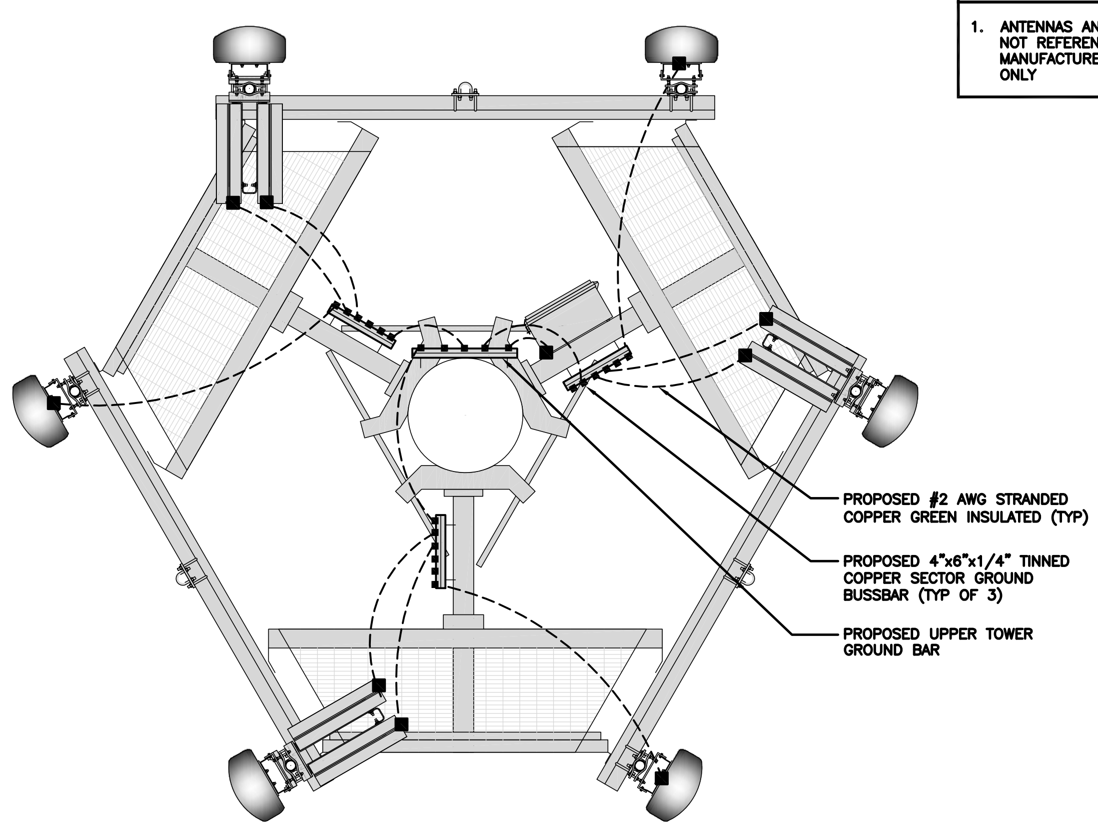


TYPICAL EQUIPMENT GROUNDING PLAN

NO SCALE | 1

NOTES

1. ANTENNAS AND OVP SHOWN ARE GENERIC AND NOT REFERENCING TO A SPECIFIC MANUFACTURER. THIS LAYOUT IS FOR REFERENCE ONLY



TYPICAL ANTENNA GROUNDING PLAN

NO SCALE | 2

●	EXOTHERMIC CONNECTION
■	MECHANICAL CONNECTION
▭	GROUND BUS BAR
⊙	GROUND ROD
T	TEST GROUND ROD WITH INSPECTION SLEEVE
- - - - - -	#2 AWG STRANDED & INSULATED
— · — · —	#2 AWG SOLID COPPER TINNED

GROUNDING LEGEND

1. GROUNDING IS SHOWN DIAGRAMMATICALLY ONLY.
2. CONTRACTOR SHALL GROUND ALL EQUIPMENT AS A COMPLETE SYSTEM. GROUNDING SHALL BE IN COMPLIANCE WITH NEC SECTION 250 AND DISH WIRELESS GROUNDING AND BONDING REQUIREMENTS AND MANUFACTURER'S SPECIFICATIONS.
3. ALL GROUND CONDUCTORS SHALL BE COPPER; NO ALUMINUM CONDUCTORS SHALL BE USED.

GROUNDING KEY NOTES

A. EXTERIOR GROUND RING: #2 AWG SOLID COPPER, BURIED AT A DEPTH OF AT LEAST 30 INCHES BELOW GRADE, OR 6 INCHES BELOW THE FROST LINE AND APPROXIMATELY 24 INCHES FROM THE EXTERIOR WALL OR FOOTING.

B. TOWER GROUND RING: THE GROUND RING SYSTEM SHALL BE INSTALLED AROUND AN ANTENNA TOWER'S LEGS, AND/OR GUY ANCHORS. WHERE SEPARATE SYSTEMS HAVE BEEN PROVIDED FOR THE TOWER AND THE BUILDING, AT LEAST TWO BONDS SHALL BE MADE BETWEEN THE TOWER RING GROUND SYSTEM AND THE BUILDING RING GROUND SYSTEM USING MINIMUM #2 AWG SOLID COPPER CONDUCTORS.

C. INTERIOR GROUND RING: #2 AWG STRANDED GREEN INSULATED COPPER CONDUCTOR EXTENDED AROUND THE PERIMETER OF THE EQUIPMENT AREA. ALL NON-TELECOMMUNICATIONS RELATED METALLIC OBJECTS FOUND WITHIN A SITE SHALL BE GROUNDED TO THE INTERIOR GROUND RING WITH #6 AWG STRANDED GREEN INSULATED CONDUCTOR.

D. BOND TO INTERIOR GROUND RING: #2 AWG SOLID TINNED COPPER WIRE PRIMARY BONDS SHALL BE PROVIDED AT LEAST AT FOUR POINTS ON THE INTERIOR GROUND RING, LOCATED AT THE CORNERS OF THE BUILDING.

E. GROUND ROD: UL LISTED COPPER CLAD STEEL. MINIMUM 1/2" DIAMETER BY EIGHT FEET LONG. GROUND RODS SHALL BE INSTALLED WITH INSPECTION SLEEVES. GROUND RODS SHALL BE DRIVEN TO THE DEPTH OF GROUND RING CONDUCTOR.

F. CELL REFERENCE GROUND BAR: POINT OF GROUND REFERENCE FOR ALL COMMUNICATIONS EQUIPMENT FRAMES. ALL BONDS ARE MADE WITH #2 AWG UNLESS NOTED OTHERWISE STRANDED GREEN INSULATED COPPER CONDUCTORS. BOND TO GROUND RING WITH (2) #2 SOLID TINNED COPPER CONDUCTORS.

G. HATCH PLATE GROUND BAR: BOND TO THE INTERIOR GROUND RING WITH TWO #2 AWG STRANDED GREEN INSULATED COPPER CONDUCTORS. WHEN A HATCH-PLATE AND A CELL REFERENCE GROUND BAR ARE BOTH PRESENT, THE CRGB MUST BE CONNECTED TO THE HATCH-PLATE AND TO THE INTERIOR GROUND RING USING (2) TWO #2 AWG STRANDED GREEN INSULATED COPPER CONDUCTORS EACH.

H. EXTERIOR CABLE ENTRY PORT GROUND BARS: LOCATED AT THE ENTRANCE TO THE CELL SITE BUILDING. BOND TO GROUND RING WITH A #2 AWG SOLID TINNED COPPER CONDUCTORS WITH AN EXOTHERMIC WELD AND INSPECTION SLEEVE.

J. TELCO GROUND BAR: BOND TO BOTH CELL REFERENCE GROUND BAR AND EXTERIOR GROUND RING.

K. FRAME BONDING: THE BONDING POINT FOR TELECOM EQUIPMENT FRAMES SHALL BE THE GROUND BUS THAT IS NOT ISOLATED FROM THE EQUIPMENTS METAL FRAMEWORK. BOND THE FRAME GROUND TO THE "I" SECTION OF THE CELL REFERENCE GROUND BAR OR SUPPLEMENTARY CONDUCTOR. (SHEET G3 DETAIL1)

L. INTERIOR UNIT BONDS: METAL FRAMES, CABINETS AND INDIVIDUAL METALLIC UNITS LOCATED WITH THE AREA OF THE INTERIOR GROUND RING REQUIRE A #6 AWG STRANDED GREEN INSULATED COPPER BOND TO THE INTERIOR GROUND RING.

M. FENCE AND GATE GROUNDING: METAL FENCES WITHIN 7 FEET OF THE EXTERIOR GROUND RING OR OBJECTS BONDED TO THE EXTERIOR GROUND RING SHALL BE BONDED TO THE GROUND RING WITH A #2 AWG SOLID TINNED COPPER CONDUCTOR AT AN INTERVAL NOT EXCEEDING 25 FEET. BONDS SHALL BE MADE AT EACH GATE POST AND ACROSS GATE OPENINGS.

N. EXTERIOR UNIT BONDS: METALLIC OBJECTS, EXTERNAL TO OR MOUNTED TO THE BUILDING, SHALL BE BONDED TO THE EXTERIOR GROUND RING. USING #2 TINNED SOLID COPPER WIRE

P. ICE BRIDGE SUPPORTS: EACH ICE BRIDGE LEG SHALL BE BONDED TO THE GROUND RING WITH #2 AWG BARE TINNED COPPER CONDUCTOR. PROVIDE EXOTHERMIC WELDS AT BOTH THE ICE BRIDGE LEG AND BURIED GROUND RING.

Q. DURING ALL DC POWER SYSTEM CHANGES INCLUDING DC SYSTEM CHANGE OUTS, RECTIFIER REPLACEMENTS OR ADDITIONS, BREAKER DISTRIBUTION CHANGES, BATTERY ADDITIONS, BATTERY REPLACEMENTS AND INSTALLATIONS OR CHANGES TO DC CONVERTER SYSTEMS IT SHALL BE REQUIRED THAT SERVICE CONTRACTORS VERIFY ALL DC POWER SYSTEMS ARE EQUIPPED WITH A MASTER DC SYSTEM RETURN GROUND CONDUCTOR FROM THE DC POWER SYSTEM COMMON RETURN BUS DIRECTLY CONNECTED TO THE CELL SITE REFERENCE GROUND BAR

R. TOWER TOP COLLECTOR BUSS BAR IS TO BE MECHANICALLY BONDED TO PROPOSED ANTENNA MOUNT.

REFER TO DISH WIRELESS GROUNDING NOTES.

GROUNDING KEY NOTES

NO SCALE | 3

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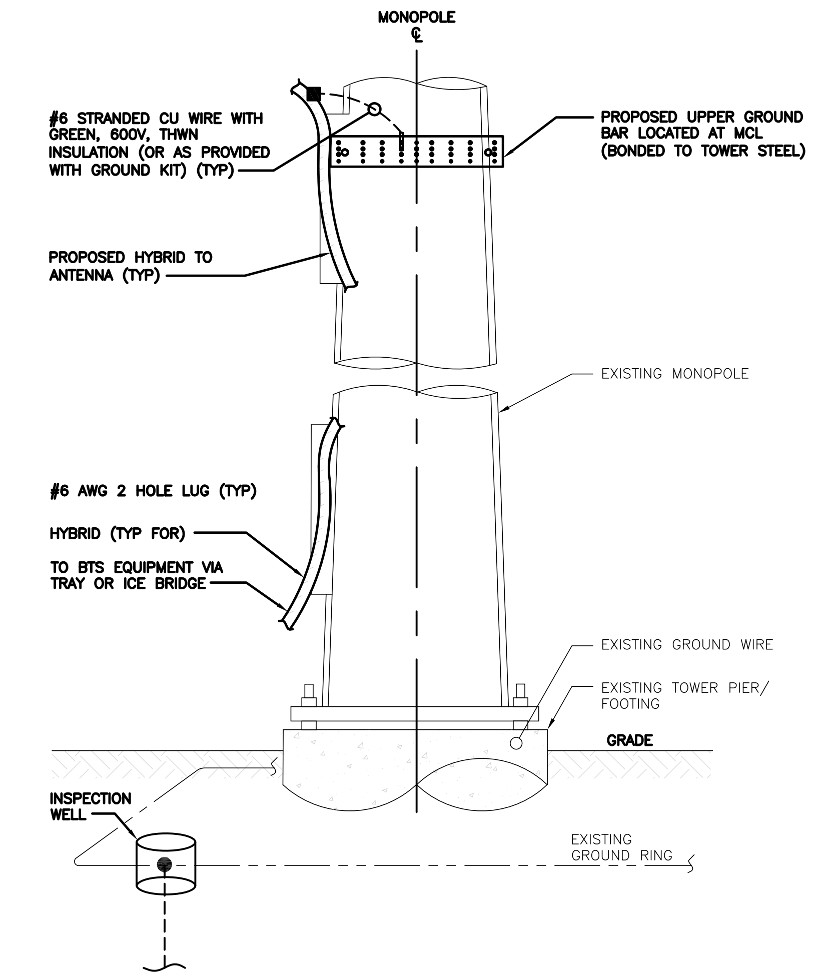
A&E PROJECT NUMBER
—

DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
—
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
GROUNDING PLANS AND NOTES

SHEET NUMBER
G-1



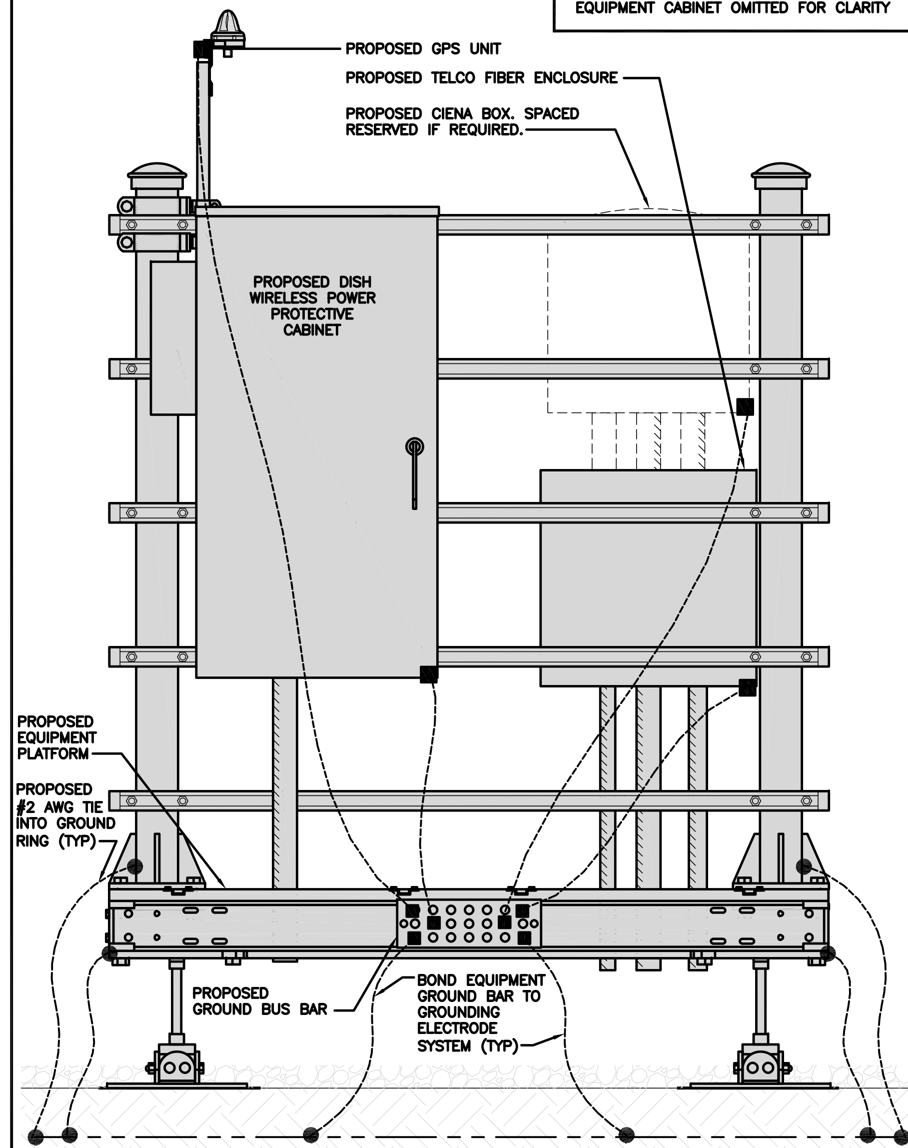
NOTES:

1. ONLY MECHANICAL CONNECTIONS ARE ALLOWED TO BE MADE TO TOWERS. ALL MECHANICAL CONNECTIONS SHALL BE TREATED WITH AN ANTI–OXIDANT COATING.
2. ALL TOWER GROUNDING SYSTEMS SHALL COMPLY WITH THE REQUIREMENTS OF THE RECOGNIZED EDITION OF ANSI/TIA 222 AND NFPA 780.

TYPICAL ANTENNA CABLE GROUNDING — NO SCALE — 1

NOTES

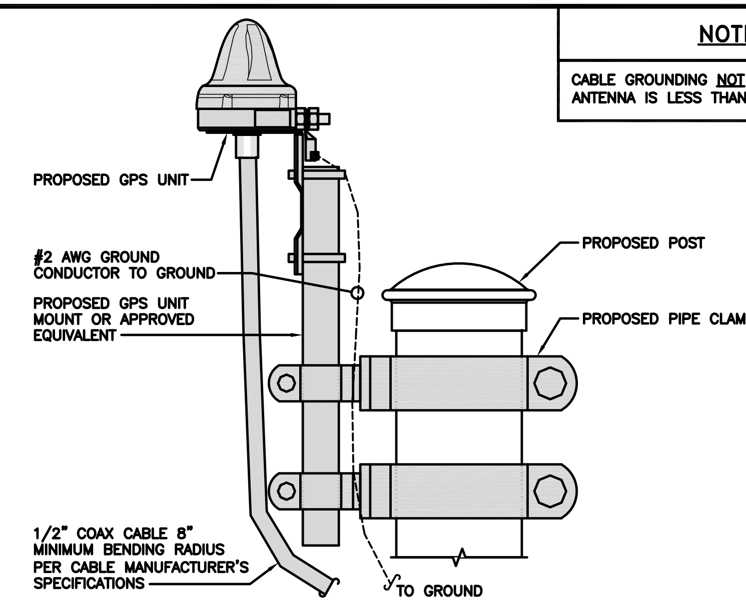
EQUIPMENT CABINET OMITTED FOR CLARITY



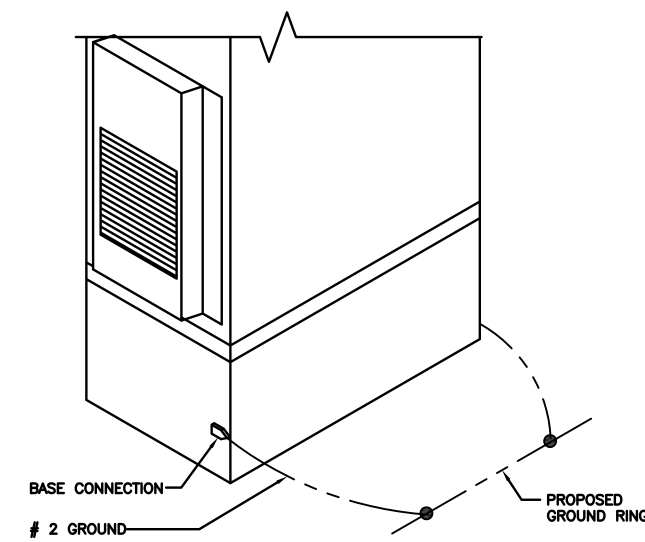
H–FRAME GROUNDING DETAIL — NO SCALE — 2

NOTES

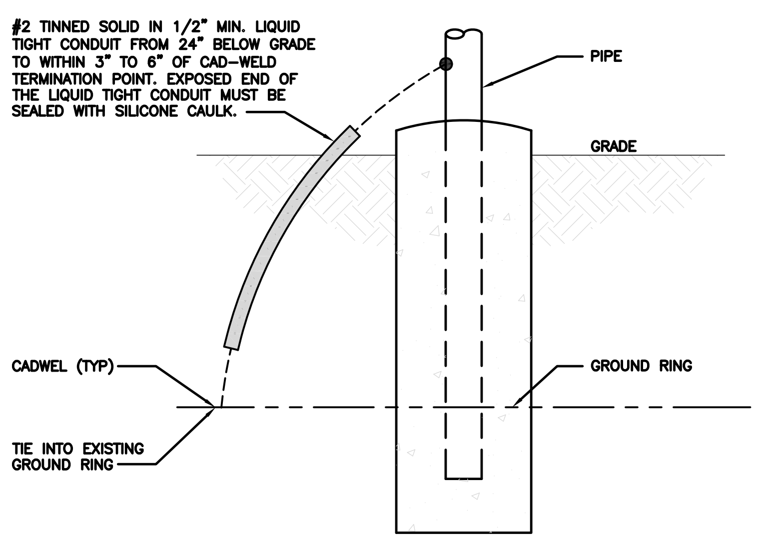
CABLE GROUNDING NOT REQUIRED WHEN ANTENNA IS LESS THAN 10' FROM CABINET



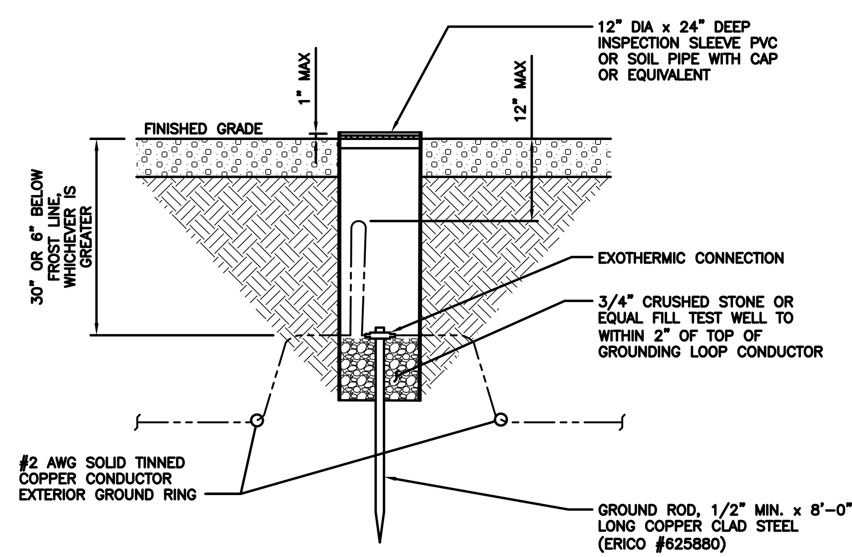
TYPICAL GPS UNIT GROUNDING — NO SCALE — 3



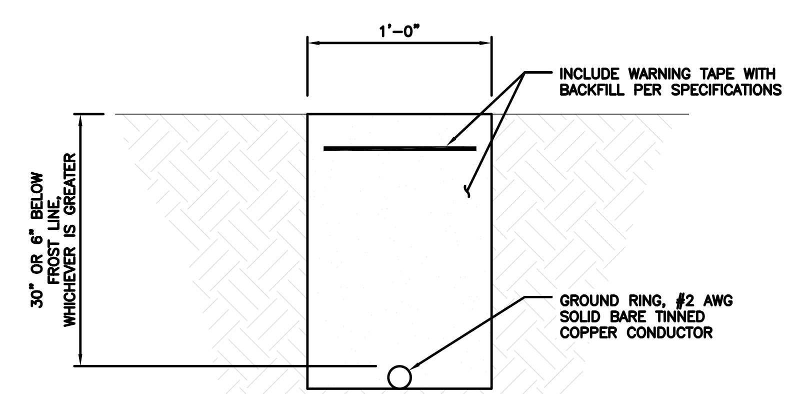
OUTDOOR CABINET GROUNDING — NO SCALE — 4



TRANSITIONING GROUND DETAIL — NO SCALE — 5



TYPICAL TEST GROUND ROD WITH INSPECTION SLEEVE — NO SCALE — 6



TYPICAL GROUND RING TRENCH — NO SCALE — 7

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A&E PROJECT NUMBER

–

DISH WIRELESS PROJECT INFORMATION

DCWDC00428A

–

12501–A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE

GROUNDING DETAILS

SHEET NUMBER

G-2

1. EXOTHERMIC WELD (2) TWO, #2 AWG BARE TINNED SOLID COPPER CONDUCTORS TO GROUND BAR. ROUTE CONDUCTORS TO BURIED GROUND RING AND PROVIDE PARALLEL EXOTHERMIC WELD.

2. ALL EXTERIOR GROUNDING HARDWARE SHALL BE STAINLESS STEEL 3/8" DIAMETER OR LARGER. ALL HARDWARE 18-8 STAINLESS STEEL INCLUDING LOCK WASHERS, COAT ALL SURFACES WITH AN ANTI-OXIDANT COMPOUND BEFORE MATING.

3. FOR GROUND BOND TO STEEL ONLY: COAT ALL SURFACES WITH AN ANTI-OXIDANT COMPOUND BEFORE MATING.

4. DO NOT INSTALL CABLE GROUNDING KIT AT A BEND AND ALWAYS DIRECT GROUND CONDUCTOR DOWN TO GROUNDING BUS.

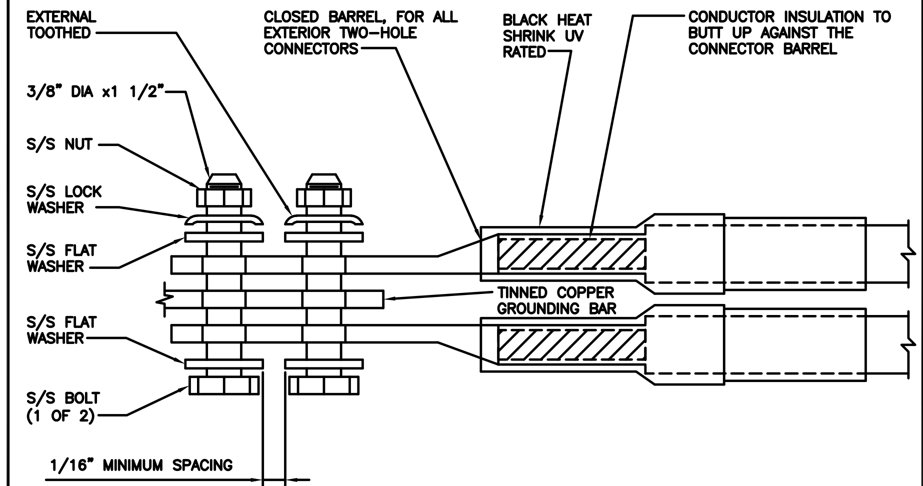
5. NUT & WASHER SHALL BE PLACED ON THE FRONT SIDE OF THE GROUND BAR AND BOLTED ON THE BACK SIDE.

6. ALL GROUNDING PARTS AND EQUIPMENT TO BE SUPPLIED AND INSTALLED BY CONTRACTOR.

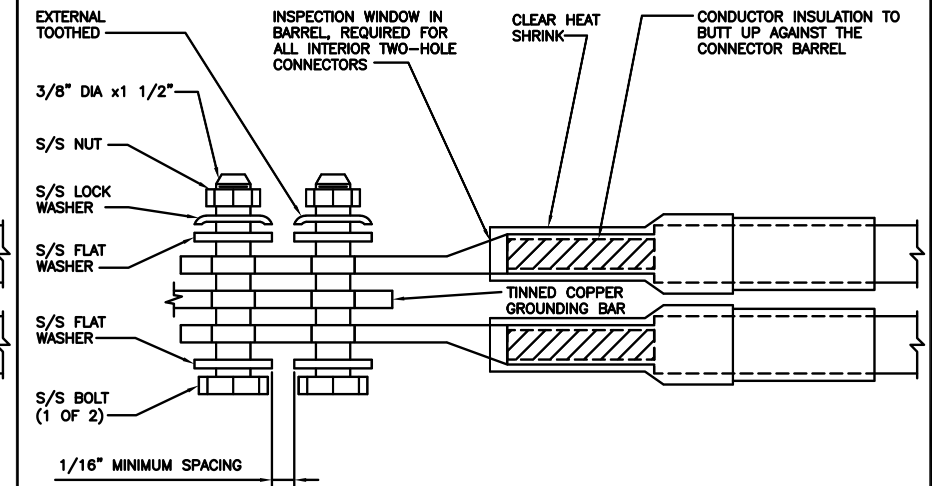
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING ADDITIONAL GROUND BAR AS REQUIRED.

9. ENSURE THE WIRE INSULATION TERMINATION IS WITHIN 1/8" OF THE BARREL (NO SHINERS).

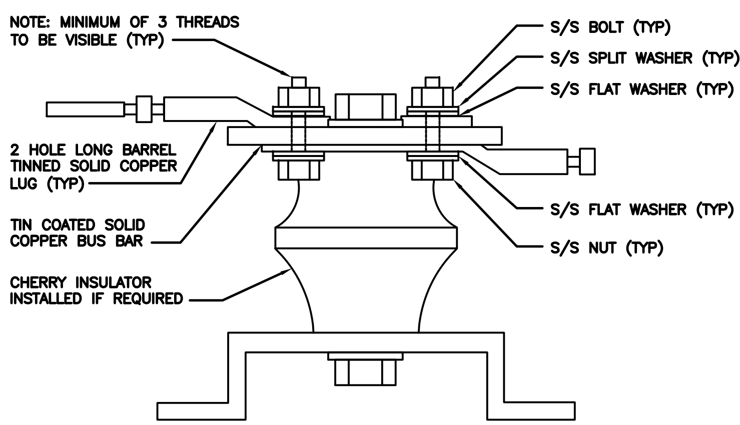
TYPICAL GROUNDING NOTES | NO SCALE | 1



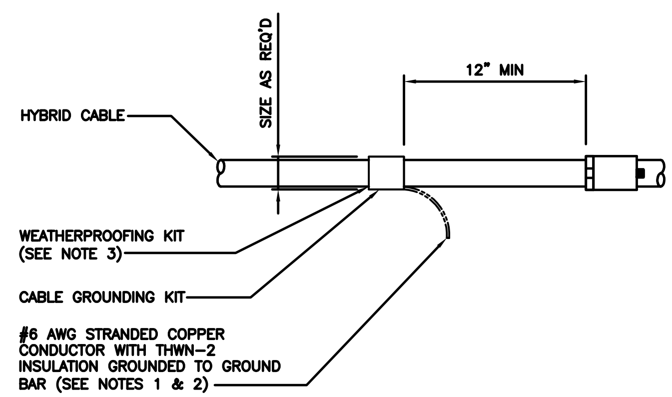
TYPICAL EXTERIOR TWO HOLE LUG | NO SCALE | 2



TYPICAL INTERIOR TWO HOLE LUG | NO SCALE | 3



LUG DETAIL | NO SCALE | 4



CONNECTION OF HYBRID CABLE GROUNDING KIT TO HYBRID TRUNK | NO SCALE | 5

NOT USED | NO SCALE | 6

NOT USED | NO SCALE | 7

NOT USED | NO SCALE | 8

NOT USED | NO SCALE | 9

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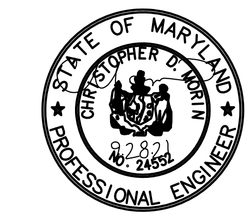

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DCWDC00428A

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12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE

GROUNDING DETAILS

SHEET NUMBER

G-3

RF JUMPER COLOR CODING

3/4" TAPE WIDTHS WITH 3/4" SPACING

LOW-BAND RRH –
(600MHz N71 BASEBAND) +
(850MHz N26 BAND) +
(700MHz N29 BAND) – OPTIONAL PER MARKET

ADD FREQUENCY COLOR TO SECTOR BAND
(CBRS WILL USE YELLOW BANDS)

ALPHA RRH				BETA RRH				GAMMA RRH			
PORT 1 + SLANT	PORT 2 + SLANT	PORT 3 + SLANT	PORT 4 + SLANT	PORT 1 + SLANT	PORT 2 + SLANT	PORT 3 + SLANT	PORT 4 + SLANT	PORT 1 + SLANT	PORT 2 + SLANT	PORT 3 + SLANT	PORT 4 + SLANT
RED	RED	RED	RED	BLUE	BLUE	BLUE	BLUE	GREEN	GREEN	GREEN	GREEN
ORANGE	ORANGE	RED	RED	ORANGE	ORANGE	BLUE	BLUE	ORANGE	ORANGE	GREEN	GREEN
	WHITE (1) PORT	ORANGE	ORANGE		WHITE (1) PORT	ORANGE	ORANGE		WHITE (1) PORT	ORANGE	ORANGE
			WHITE (1) PORT				WHITE (1) PORT				WHITE (1) PORT

MID-BAND RRH –
(AWS BANDS N66+N70)

ADD FREQUENCY COLOR TO SECTOR BAND
(CBRS WILL USE YELLOW BANDS)

RED	RED	RED	RED	BLUE	BLUE	BLUE	BLUE	GREEN	GREEN	GREEN	GREEN
PURPLE	PURPLE	RED	RED	PURPLE	PURPLE	BLUE	BLUE	PURPLE	PURPLE	GREEN	GREEN
	WHITE (1) PORT	PURPLE	PURPLE		WHITE (1) PORT	PURPLE	PURPLE		WHITE (1) PORT	PURPLE	PURPLE
			WHITE (1) PORT				WHITE (1) PORT				WHITE (1) PORT

HYBRID/DISCREET CABLES

INCLUDE SECTOR BANDS BEING SUPPORTED AM LONG WITH FREQUENCY BANDS

EXAMPLE 1 – HYBRID, OR DISCREET, SUPPORTS ALL SECTORS, BOTH LOW-BANDS AND MID-BANDS

EXAMPLE 2 – HYBRID, OR DISCREET, SUPPORTS CBRS ONLY, ALL SECTORS

EXAMPLE 1	EXAMPLE 2
RED	RED
BLUE	BLUE
GREEN	GREEN
ORANGE	YELLOW
PURPLE	

HYBRID/DISCREET CABLES

LOW-BAND RRH FIBER CABLES HAVE SECTOR STRIPE ONLY

LOW BAND RRH	HIGH BAND RRH	LOW BAND RRH	LOW BAND RRH	LOW BAND RRH	LOW BAND RRH
RED	RED	BLUE	BLUE	GREEN	GREEN
	PURPLE		PURPLE		PURPLE

POWER CABLES TO RRHs

LOW-BAND RRH POWER CABLES HAVE SECTOR STRIPE ONLY

LOW BAND RRH	HIGH BAND RRH	LOW BAND RRH	LOW BAND RRH	LOW BAND RRH	LOW BAND RRH
RED	RED	BLUE	BLUE	GREEN	GREEN
	PURPLE		PURPLE		PURPLE

RET MOTORS AT ANTENNAS

PORT 1/ ANTENNA 1 "IN"	PORT 1/ ANTENNA 1 "IN"	PORT 1/ ANTENNA 1 "IN"
RED	BLUE	GREEN

MICROWAVE RADIO LINKS

LINKS WILL HAVE A 1.5-2 INCH WHITE WRAP WITH THE AZIMUTH COLOR OVERLAPPING IN THE MIDDLE. ADD ADDITIONAL SECTOR COLOR BANDS FOR EACH ADDITIONAL MW RADIO.

MICROWAVE CABINETS WILL REQUIRE P-TOUCH LABELS INSIDE THE CABINET TO IDENTIFY THE LOCAL AND REMOTE SITE ID'S.

PRIMARY	SECONDARY
WHITE	WHITE
RED	RED
WHITE	WHITE
	RED
	WHITE

RF CABLE COLOR CODES — NO SCALE — 1

LOW BANDS (N71–N28) OPTIONAL – (N29): ORANGE

AWS (N65+N70+H–BLOCK): PURPLE

CBRS TECH (3 GHz): YELLOW

NEGATIVE SLANT PORT ON ANTRRH: WHITE

ALPHA SECTOR: RED

BETA SECTOR: BLUE

GAMMA SECTOR: GREEN

COLOR IDENTIFIER — NO SCALE — 2

NOT USED — NO SCALE — 3

NOT USED — NO SCALE — 4

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STATE OF MARYLAND CHRISTOPHER D. MORIN 9.28.21 No. 24552 PROFESSIONAL ENGINEER

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 NUMBER 24552, EXPIRATION DATE 11/17/21.

DRAWN BY:	CHECKED BY:	APPROVED BY:
GMW	NP	CDM

RFDS REV #: 0

CONSTRUCTION DOCUMENTS

SUBMITTALS

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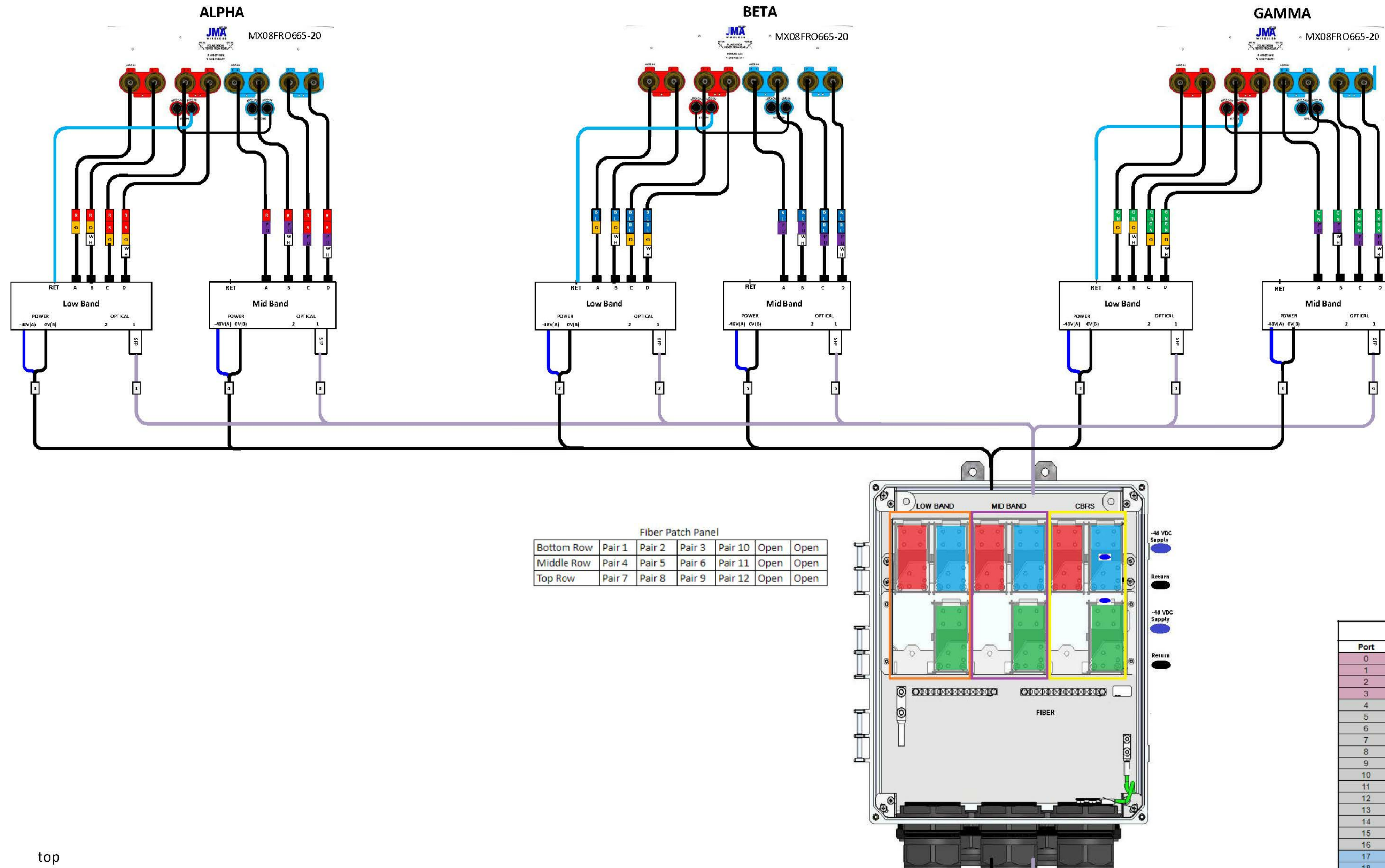
A&E PROJECT NUMBER
–

DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
–
12501–A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
RF
CABLE COLOR CODES

SHEET NUMBER
RF-1



Fiber Patch Panel

Bottom Row	Pair 1	Pair 2	Pair 3	Pair 10	Open	Open
Middle Row	Pair 4	Pair 5	Pair 6	Pair 11	Open	Open
Top Row	Pair 7	Pair 8	Pair 9	Pair 12	Open	Open

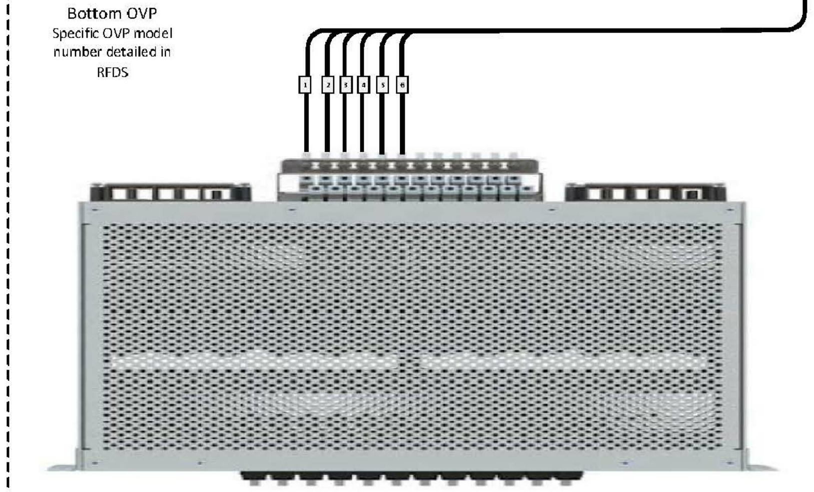
CSR NCS540		
Port	Interface	Description
0	Gi0/0/0/0	SiteBoss
1	Gi0/0/0/1	CBRS - Alpha
2	Gi0/0/0/2	CBRS - Beta
3	Gi0/0/0/3	CBRS - Gamma
4	Te0/0/0/4	Fujitsu Low-Band RU - Alpha
5	Te0/0/0/5	Fujitsu Mid-Band RU - Alpha
6	Te0/0/0/6	Fujitsu Low-Band RU - Beta
7	Te0/0/0/7	Fujitsu Mid-Band RU - Beta
8	Te0/0/0/8	Fujitsu Low-Band RU - Gamma
9	Te0/0/0/9	Fujitsu Mid-Band RU - Gamma
10	Te0/0/0/10	Fixed Wifi
11	Te0/0/0/11	Fixed Wifi
12	Te0/0/0/12	Fixed Wifi
13	Te0/0/0/13	Fixed Wifi
14	Te0/0/0/14	CBRS1
15	Te0/0/0/15	CBRS2
16	Te0/0/0/16	CBRS3
17	Gi0/0/0/17	SM1 - BMC
18	Gi0/0/0/18	SM2 - BMC
19	Te0/0/019	SM1 - Data 1
20	Te0/0/020	SM1 - Data 2
21	Te0/0/021	SM2 - Data 1
22	Te0/0/022	SM2 - Data 2
23	Te0/0/023	Reserved Uplink (EDC, LDC)
24	Te0/0/024	Blank/Future
25	Te0/0/0/25	Blank/Future
26	Te0/0/0/26	Fiber NIU
27	Te0/0/0/27	Fiber NIU
28	Te0/0/0/28	Blank/Future
29	Te0/0/0/29	Blank/Future

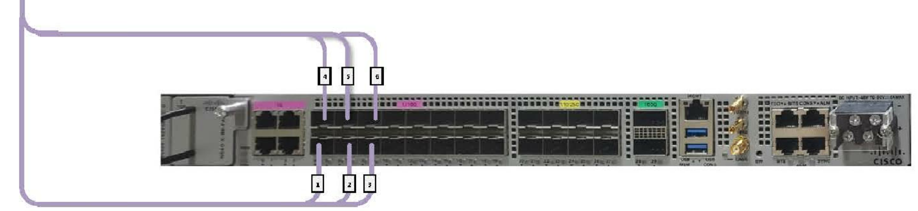
bottom

Bottom OVP Layout

Circuit 1	Alpha Low Band
Circuit 2	Beta Low Band
Circuit 3	Gamma Low Band
Circuit 4	Alpha Mid Band
Circuit 5	Beta Mid Band
Circuit 6	Gamma Mid Band
Circuit 7	Alpha CBRS
Circuit 8	Beta CBRS
Circuit 9	Gamma CBRS
Circuit 10	Open
Circuit 11	Open
Circuit 12	Open

Bottom OVP
Specific OVP model number detailed in RFDS





5G plumbing diagram JMA MX08FRO665-20
2-2-2(LB+MB)

Quan Liu
5-Jan-2021

SIZE	FSCM NO	DWG NO	REV
			3

SCALE None | SHEET

PLUMBING DIAGRAM

NO SCALE | 1

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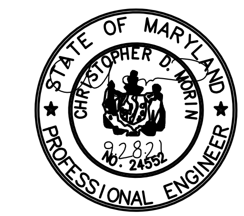

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A&E PROJECT NUMBER
–

DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
–
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
RF PLUMBING DIAGRAM

SHEET NUMBER
RF-2

RF EQUIPMENT INFORMATION

dish wireless

Issue Date/Revision	2/19/2021	**Revision:** 0	**Latitude**	39.0595	**Longitude** -77.0665
Site ID	DCWDC00428A		**Prequal Asset ID**	MD-VER-T-USMD5072	
Site Address	12501-A Dalewood Drive, Silver Spring MD 20906		**SOW / RF Comments**	Dish proposes to place 3 antennas, 6 RRUs, 1 junction box(s), and 1 cable(s) at the 90 foot RAD. Dish will require a 5' x 7' lease area for ground equipment.	
Structure Type	Monopole				
sectors >20' apart?	No	*Confirmed RAD?* Confirmed	90		

	Sector 1 (alpha)			Sector 2 (beta)			Sector 3 (gamma)		
ANTENNA									
Antenna #	1	4	7	2	5	8	3	6	9
Manufacturer	JMA			JMA			JMA		
Model Number	MX08FRO665-20_V0F			MX08FRO665-20_V0F			MX08FRO665-20_V0F		
Dimensions H x W x D (in)	72.0" x 20.0" x 8.0"			72.0" x 20.0" x 8.0"			72.0" x 20.0" x 8.0"		
Weight (lbs.)	54			54			54		
TX Power Output (watts)	134.4077226			134.4077226			134.4077226		
ERP (watts)	15827.05411			15827.05411			15827.05411		
RAD Centerline Height (ft.)	90			90			90		
Azimuths	0			120			240		
Mech Down Tilt	0			0			0		
Elec Down Tilt	2			2			2		
Default Mount	Valmont SNP8HR-396								
LOW BAND/RADIO #1									
Manufacturer	Fujitsu			Fujitsu			Fujitsu		
Model Number	TA08025-B605			TA08025-B605			TA08025-B605		
Dimensions H x W x D (in.)	15.75 x 14.96 x 9.06			15.75 x 14.96 x 9.06			15.75 x 14.96 x 9.06		
Weight (lbs.)	74.95			74.95			74.95		
Location	Antenna			Antenna			Antenna		
Technology	n71 |n29 |			n71 |n29 |			n71 |n29 |		
Quantity	1			1			1		
Port Assignment	Port 1-4			Port 1-4			Port 1-4		
MID BAND/RADIO #2									
Manufacturer	Fujitsu			Fujitsu			Fujitsu		
Model Number	TA08025-B604			TA08025-B604			TA08025-B604		
Dimensions H x W x D (in)	15.75 x 14.96 x 7.87			15.75 x 14.96 x 7.87			15.75 x 14.96 x 7.87		
Weight (lbs.)	63.93			63.93			63.93		
Location	Antenna			Antenna			Antenna		
Quantity	1			1			1		
Technology	n70 | n66			n70 | n66			n70 | n66		
Port Assignment	Port 5-8			Port 5-8			Port 5-8		
OVP (Junction Box)									
Manufacturer	Raycap								
Model Number	RDIDC-9181-PF-48								
Dimensions H x W x D (in.)	16" x 14" x 8"								
Weight (lbs.)	21.85								
Quantity	1								
LINE DETAILS									
Line Type	Hybrid								
Manufacturer	Cables Unlimited								
Model Number	CU12PSM9P6XXX_6AWG								
Diameter (O.D. in.)	1.60"								
Weight (lbs. per ft.)	2.346 lbs/ft								
Quantity	1								
Approx. Cable Length	120								
OTHER EQUIPMENT									
Type of Equipment									
Manufacturer									
Model Number									
Dimensions H x W x D (in)									
Weight (lbs.)									
Equipment Location									
Quantity									

Frequencies	
TX - Low Band (Mhz)	722 - 728 | 642 - 652
TX - Mid Band (Mhz)	1995 - 2020 | 2180 - 2200

RF DATA SHEET

NO SCALE

1

dish wireless.

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A&E PROJECT NUMBER

–

DISH WIRELESS PROJECT INFORMATION

DCWDC00428A

–

12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE

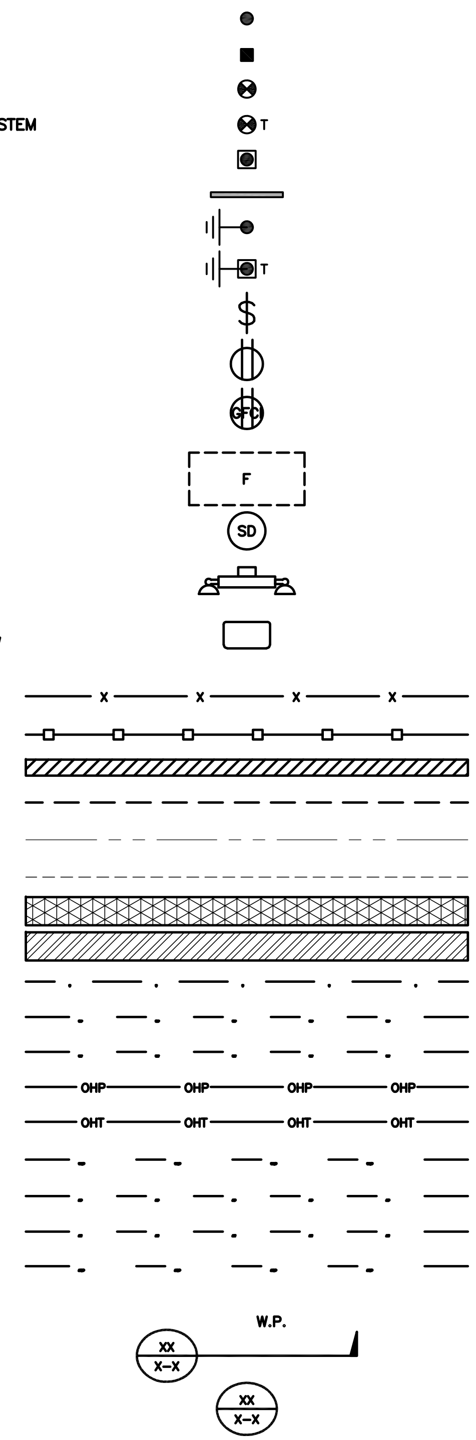
RF DATA SHEET

SHEET NUMBER

RF-3

LEGEND

- EXOTHERMIC CONNECTION
- MECHANICAL CONNECTION
- CHEMICAL ELECTROLYTIC GROUNDING SYSTEM
- TEST CHEMICAL ELECTROLYTIC GROUNDING SYSTEM
- EXOTHERMIC WITH INSPECTION SLEEVE
- GROUNDING BAR
- GROUND ROD
- TEST GROUND ROD WITH INSPECTION SLEEVE
- SINGLE POLE SWITCH
- DUPLEX RECEPTACLE
- DUPLEX GFCI RECEPTACLE
- FLUORESCENT LIGHTING FIXTURE (2) TWO LAMPS 48–T8
- SMOKE DETECTION (DC)
- EMERGENCY LIGHTING (DC)
- SECURITY LIGHT W/PHOTOCELL LITHONIA ALXW LED–1–25A400/51K–SR4–120–PE–DDBTXD
- CHAIN LINK FENCE
- WOOD/WROUGHT IRON FENCE
- WALL STRUCTURE
- LEASE AREA
- PROPERTY LINE (PL)
- SETBACKS
- ICE BRIDGE
- CABLE TRAY
- WATER LINE
- UNDERGROUND POWER
- UNDERGROUND TELCO
- OVERHEAD POWER
- OVERHEAD TELCO
- UNDERGROUND TELCO/POWER
- ABOVE GROUND POWER
- ABOVE GROUND TELCO
- ABOVE GROUND TELCO/POWER
- WORKPOINT
- SECTION REFERENCE
- DETAIL REFERENCE



ABBREVIATIONS

AB	ANCHOR BOLT
ABV	ABOVE
AC	ALTERNATING CURRENT
ADDL	ADDITIONAL
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AGL	ABOVE GROUND LEVEL
AIC	AMPERAGE INTERRUPTION CAPACITY
ALUM	ALUMINUM
ALT	ALTERNATE
ANT	ANTENNA
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BATT	BATTERY
BLDG	BUILDING
BLK	BLOCK
BLKG	BLOCKING
BM	BEAM
BTC	BARE TINNED COPPER CONDUCTOR
BOF	BOTTOM OF FOOTING
CAB	CABINET
CANT	CANTILEVERED
CHG	CHARGING
CLG	CEILING
CLR	CLEAR
COL	COLUMN
COMM	COMMON
CONC	CONCRETE
CONSTR	CONSTRUCTION
DBL	DOUBLE
DC	DIRECT CURRENT
DEPT	DEPARTMENT
DF	DOUGLAS FIR
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DWG	DRAWING
DWL	DOWEL
EA	EACH
EC	ELECTRICAL CONDUCTOR
EL.	ELEVATION
ELEC	ELECTRICAL
EMT	ELECTRICAL METALLIC TUBING
ENG	ENGINEER
EQ	EQUAL
EXP	EXPANSION
EXT	EXTERIOR
EW	EACH WAY
FAB	FABRICATION
FF	FINISH FLOOR
FG	FINISH GRADE
FIF	FACILITY INTERFACE FRAME
FIN	FINISH(ED)
FLR	FLOOR
FDN	FOUNDATION
FOC	FACE OF CONCRETE
FOM	FACE OF MASONRY
FOS	FACE OF STUD
FOW	FACE OF WALL
FS	FINISH SURFACE
FT	FOOT
FTG	FOOTING
GA	GAUGE
GEN	GENERATOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GLB	GLUE LAMINATED BEAM
GLV	GALVANIZED
GPS	GLOBAL POSITIONING SYSTEM
GND	GROUND
GSM	GLOBAL SYSTEM FOR MOBILE
HDG	HOT DIPPED GALVANIZED
HDR	HEADER
HGR	HANGER
HVAC	HEAT/VENTILATION/AIR CONDITIONING
HT	HEIGHT
IGR	INTERIOR GROUND RING
IN	INCH
INT	INTERIOR
LB(S)	POUND(S)
LF	LINEAR FEET
LTE	LONG TERM EVOLUTION
MAS	MASONRY
MAX	MAXIMUM
MB	MACHINE BOLT
MECH	MECHANICAL
MFR	MANUFACTURER
MGB	MASTER GROUND BAR
MIN	MINIMUM
MISC	MISCELLANEOUS
MTL	METAL
MTS	MANUAL TRANSFER SWITCH
MW	MICROWAVE
NEC	NATIONAL ELECTRIC CODE
NM	NEWTON METERS
NO.	NUMBER
#	NUMBER
NTS	NOT TO SCALE
OC	ON–CENTER
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
OPNG	OPENING
P/C	PRECAST CONCRETE
PCS	PERSONAL COMMUNICATION SERVICES
PCU	PRIMARY CONTROL UNIT
PRC	PRIMARY RADIO CABINET
PP	POLARIZING PRESERVING
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PT	PRESSURE TREATED
PWR	POWER CABINET
QTY	QUANTITY
RAD	RADIUS
RECT	RECTIFIER
REF	REFERENCE
REINF	REINFORCEMENT
REQ'D	REQUIRED
RET	REMOTE ELECTRIC TILT
RF	RADIO FREQUENCY
RMC	RIGID METALLIC CONDUIT
RRH	REMOTE RADIO HEAD
RRU	REMOTE RADIO UNIT
RWY	RACEWAY
SCH	SCHEDULE
SHT	SHEET
SIAD	SMART INTEGRATED ACCESS DEVICE
SIM	SIMILAR
SPEC	SPECIFICATION
SQ	SQUARE
SS	STAINLESS STEEL
STD	STANDARD
STL	STEEL
TEMP	TEMPORARY
THK	THICKNESS
TMA	TOWER MOUNTED AMPLIFIER
TN	TOE NAIL
TOA	TOP OF ANTENNA
TOC	TOP OF CURB
TOF	TOP OF FOUNDATION
TOP	TOP OF PLATE (PARAPET)
TOS	TOP OF STEEL
TOW	TOP OF WALL
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSION
TYP	TYPICAL
UG	UNDERGROUND
UL	UNDERWRITERS LABORATORY
UNO	UNLESS NOTED OTHERWISE
UMTS	UNIVERSAL MOBILE TELECOMMUNICATIONS SYSTEM
UPS	UNITERRUPTIBLE POWER SYSTEM (DC POWER PLANT)
VIF	VERIFIED IN FIELD
W	WIDE
W/	WITH
WD	WOOD
WP	WEATHERPROOF
WT	WEIGHT

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DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
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12501–A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
LEGEND AND ABBREVIATIONS

SHEET NUMBER
GN-1

SITE ACTIVITY REQUIREMENTS:

1. NOTICE TO PROCEED – NO WORK SHALL COMMENCE PRIOR TO CONTRACTOR RECEIVING A WRITTEN NOTICE TO PROCEED (NTP) AND THE ISSUANCE OF A PURCHASE ORDER. PRIOR TO ACCESSING/ENTERING THE SITE YOU MUST CONTACT THE DISH WIRELESS AND TOWER OWNER NOC & THE DISH WIRELESS AND TOWER OWNER CONSTRUCTION MANAGER.

2. "LOOK UP" – DISH WIRELESS AND TOWER OWNER SAFETY CLIMB REQUIREMENT:

THE INTEGRITY OF THE SAFETY CLIMB AND ALL COMPONENTS OF THE CLIMBING FACILITY SHALL BE CONSIDERED DURING ALL STAGES OF DESIGN, INSTALLATION, AND INSPECTION. TOWER MODIFICATION, MOUNT REINFORCEMENTS, AND/OR EQUIPMENT INSTALLATIONS SHALL NOT COMPROMISE THE INTEGRITY OR FUNCTIONAL USE OF THE SAFETY CLIMB OR ANY COMPONENTS OF THE CLIMBING FACILITY ON THE STRUCTURE. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO: PINCHING OF THE WIRE ROPE, BENDING OF THE WIRE ROPE FROM ITS SUPPORTS, DIRECT CONTACT OR CLOSE PROXIMITY TO THE WIRE ROPE WHICH MAY CAUSE FRICTIONAL WEAR, IMPACT TO THE ANCHORAGE POINTS IN ANY WAY, OR TO IMPEDE/BLOCK ITS INTENDED USE. ANY COMPROMISED SAFETY CLIMB, INCLUDING EXISTING CONDITIONS MUST BE TAGGED OUT AND REPORTED TO YOUR DISH WIRELESS AND DISH WIRELESS AND TOWER OWNER POC OR CALL THE NOC TO GENERATE A SAFETY CLIMB MAINTENANCE AND CONTRACTOR NOTICE TICKET.

3. PRIOR TO THE START OF CONSTRUCTION, ALL REQUIRED JURISDICTIONAL PERMITS SHALL BE OBTAINED. THIS INCLUDES, BUT IS NOT LIMITED TO, BUILDING, ELECTRICAL, MECHANICAL, FIRE, FLOOD ZONE, ENVIRONMENTAL, AND ZONING. AFTER ONSITE ACTIVITIES AND CONSTRUCTION ARE COMPLETED, ALL REQUIRED PERMITS SHALL BE SATISFIED AND CLOSED OUT ACCORDING TO LOCAL JURISDICTIONAL REQUIREMENTS.

4. ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS, AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN, AND SHALL MEET ANSI/ASSE A10.48 (LATEST EDITION); FEDERAL, STATE, AND LOCAL REGULATIONS; AND ANY APPLICABLE INDUSTRY CONSENSUS STANDARDS RELATED TO THE CONSTRUCTION ACTIVITIES BEING PERFORMED. ALL RIGGING PLANS SHALL ADHERE TO ANSI/ASSE A10.48 (LATEST EDITION) AND DISH WIRELESS AND TOWER OWNER STANDARDS, INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION, TO CERTIFY THE SUPPORTING STRUCTURE(S) IN ACCORDANCE WITH ANSI/TIA-322 (LATEST EDITION).

5. ALL SITE WORK TO COMPLY WITH DISH WIRELESS AND TOWER OWNER INSTALLATION STANDARDS FOR CONSTRUCTION ACTIVITIES ON DISH WIRELESS AND TOWER OWNER TOWER SITE AND LATEST VERSION OF ANSI/TIA-1019-A-2012 "STANDARD FOR INSTALLATION, ALTERATION, AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS."

6. IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY DISH WIRELESS AND TOWER OWNER PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.

7. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.

8. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.

9. THE CONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES INCLUDING PRIVATE LOCATES SERVICES PRIOR TO THE START OF CONSTRUCTION.

10. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY CONTRACTOR. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING AND EXCAVATION E) CONSTRUCTION SAFETY PROCEDURES.

11. ALL SITE WORK SHALL BE AS INDICATED ON THE STAMPED CONSTRUCTION DRAWINGS AND DISH PROJECT SPECIFICATIONS, LATEST APPROVED REVISION.

12. CONTRACTOR SHALL KEEP THE SITE FREE FROM ACCUMULATING WASTE MATERIAL, DEBRIS, AND TRASH AT THE COMPLETION OF THE WORK. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.

13. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF DISH WIRELESS AND TOWER OWNER, AND/OR LOCAL UTILITIES.

14. THE CONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION FOR SITE SIGNAGE REQUIRED BY LOCAL JURISDICTION AND SIGNAGE REQUIRED ON INDIVIDUAL PIECES OF EQUIPMENT, ROOMS, AND SHELTERS.

15. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE CARRIER'S EQUIPMENT AND TOWER AREAS.

16. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.

17. THE AREAS OF THE OWNERS PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, AND STABILIZED TO PREVENT EROSION AS SPECIFIED ON THE CONSTRUCTION DRAWINGS AND/OR PROJECT SPECIFICATIONS.

18. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.

19. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.

20. CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS AND RADIOS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.

21. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.

22. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

GENERAL NOTES:

1.FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:

CONTRACTOR:GENERAL CONTRACTOR RESPONSIBLE FOR CONSTRUCTION

CARRIER:DISH WIRELESS

TOWER OWNER:TOWER OWNER

2. THESE DRAWINGS HAVE BEEN PREPARED USING STANDARDS OF PROFESSIONAL CARE AND COMPLETENESS NORMALLY EXERCISED UNDER SIMILAR CIRCUMSTANCES BY REPUTABLE ENGINEERS IN THIS OR SIMILAR LOCALITIES. IT IS ASSUMED THAT THE WORK DEPICTED WILL BE PERFORMED BY AN EXPERIENCED CONTRACTOR AND/OR WORKPEOPLE WHO HAVE A WORKING KNOWLEDGE OF THE APPLICABLE CODE STANDARDS AND REQUIREMENTS AND OF INDUSTRY ACCEPTED STANDARD GOOD PRACTICE. AS NOT EVERY CONDITION OR ELEMENT IS (OR CAN BE) EXPLICITLY SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL USE INDUSTRY ACCEPTED STANDARD GOOD PRACTICE FOR MISCELLANEOUS WORK NOT EXPLICITLY SHOWN.

3. THESE DRAWINGS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE MEANS OR METHODS OF CONSTRUCTION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY FOR PROTECTION OF LIFE AND PROPERTY DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, BRACING, FORMWORK, SHORING, ETC. SITE VISITS BY THE ENGINEER OR HIS REPRESENTATIVE WILL NOT INCLUDE INSPECTION OF THESE ITEMS AND IS FOR STRUCTURAL OBSERVATION OF THE FINISHED STRUCTURE ONLY.

4. NOTES AND DETAILS IN THE CONSTRUCTION DRAWINGS SHALL TAKE PRECEDENCE OVER GENERAL NOTES AND TYPICAL DETAILS. WHERE NO DETAILS ARE SHOWN, CONSTRUCTION SHALL CONFORM TO SIMILAR WORK ON THE PROJECT, AND/OR AS PROVIDED FOR IN THE CONTRACT DOCUMENTS. WHERE DISCREPANCIES OCCUR BETWEEN PLANS, DETAILS, GENERAL NOTES, AND SPECIFICATIONS, THE GREATER, MORE STRICT REQUIREMENTS, SHALL GOVERN. IF FURTHER CLARIFICATION IS REQUIRED CONTACT THE ENGINEER OF RECORD.

5. SUBSTANTIAL EFFORT HAS BEEN MADE TO PROVIDE ACCURATE DIMENSIONS AND MEASUREMENTS ON THE DRAWINGS TO ASSIST IN THE FABRICATION AND/OR PLACEMENT OF CONSTRUCTION ELEMENTS BUT IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY THE DIMENSIONS, MEASUREMENTS, AND/OR CLEARANCES SHOWN IN THE CONSTRUCTION DRAWINGS PRIOR TO FABRICATION OR CUTTING OF ANY NEW OR EXISTING CONSTRUCTION ELEMENTS. IF IT IS DETERMINED THAT THERE ARE DISCREPANCIES AND/OR CONFLICTS WITH THE CONSTRUCTION DRAWINGS THE ENGINEER OF RECORD IS TO BE NOTIFIED AS SOON AS POSSIBLE.

6. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING CONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CARRIER POC AND TOWER OWNER.

7. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.

8. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.

9. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.

10. IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY THE CARRIER AND TOWER OWNER PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.

11. CONTRACTOR IS TO PERFORM A SITE INVESTIGATION, BEFORE SUBMITTING BIDS, TO DETERMINE THE BEST ROUTING OF ALL CONDUITS FOR POWER, AND TELCO AND FOR GROUNDING CABLES AS SHOWN IN THE POWER, TELCO, AND GROUNDING PLAN DRAWINGS.

12. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF DISH WIRELESS AND TOWER OWNER

13. CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.

14. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.

dish wireless.

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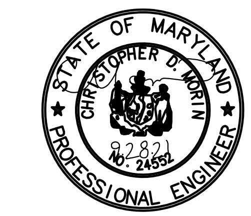

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 24552, EXPIRATION DATE 11/17/21.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

DRAWN BY:	CHECKED BY:	APPROVED BY:
GMW	NP	CDM

RFDS REV #: 0

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
A	3/2/21	ISSUED FOR REVIEW
0	4/6/21	ISSUED FOR CONSTRUCTION
1	5/3/21	ISSUED FOR CONSTRUCTION
2	7/19/21	ISSUED FOR CONSTRUCTION
3	9/28/21	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER

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DISH WIRELESS PROJECT INFORMATION

DCWDC00428A

–

12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE

GENERAL NOTES

SHEET NUMBER

GN-2

CONCRETE, FOUNDATIONS, AND REINFORCING STEEL:

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318, ACI 336, ASTM A184, ASTM A185 AND THE DESIGN AND CONSTRUCTION SPECIFICATION FOR CAST-IN-PLACE CONCRETE.

2. UNLESS NOTED OTHERWISE, SOIL BEARING PRESSURE USED FOR DESIGN OF SLABS AND FOUNDATIONS IS ASSUMED TO BE 1000 psf.

3. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (f'c) OF 3000 psi AT 28 DAYS, UNLESS NOTED OTHERWISE. NO MORE THAN 90 MINUTES SHALL ELAPSE FROM BATCH TIME TO TIME OF PLACEMENT UNLESS APPROVED BY THE ENGINEER OF RECORD. TEMPERATURE OF CONCRETE SHALL NOT EXCEED 90°f AT TIME OF PLACEMENT.

4. CONCRETE EXPOSED TO FREEZE-THAW CYCLES SHALL CONTAIN AIR ENTRAINING ADMIXTURES. AMOUNT OF AIR ENTRAINMENT TO BE BASED ON SIZE OF AGGREGATE AND F3 CLASS EXPOSURE (VERY SEVERE). CEMENT USED TO BE TYPE II PORTLAND CEMENT WITH A MAXIMUM WATER-TO-CEMENT RATIO (W/C) OF 0.45.

5. ALL STEEL REINFORCING SHALL CONFORM TO ASTM A615. ALL WELDED WIRE FABRIC (WWF) SHALL CONFORM TO ASTM A185. ALL SPLICES SHALL BE CLASS "B" TENSION SPLICES, UNLESS NOTED OTHERWISE. ALL HOOKS SHALL BE STANDARD 90 DEGREE HOOKS, UNLESS NOTED OTHERWISE. YIELD STRENGTH (Fy) OF STANDARD DEFORMED BARS ARE AS FOLLOWS:

#4 BARS AND SMALLER 40 ksi

#5 BARS AND LARGER 60 ksi

6. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:

- CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH 3"
- CONCRETE EXPOSED TO EARTH OR WEATHER:
- #6 BARS AND LARGER 2"
- #5 BARS AND SMALLER 1-1/2"
- CONCRETE NOT EXPOSED TO EARTH OR WEATHER:
- SLAB AND WALLS 3/4"
- BEAMS AND COLUMNS 1-1/2"

7. A TOOLED EDGE OR A 3/4" CHAMFER SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNLESS NOTED OTHERWISE, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.

ELECTRICAL INSTALLATION NOTES:

1. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES/ORDINANCES.

2. CONDUIT ROUTINGS ARE SCHEMATIC. CONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED AND TRIP HAZARDS ARE ELIMINATED.

3. WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC.

4. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC.

4.1. ALL EQUIPMENT SHALL BEAR THE UNDERWRITERS LABORATORIES LABEL OF APPROVAL, AND SHALL CONFORM TO REQUIREMENT OF THE NATIONAL ELECTRICAL CODE.

4.2. ALL OVERCURRENT DEVICES SHALL HAVE AN INTERRUPTING CURRENT RATING THAT SHALL BE GREATER THAN THE SHORT CIRCUIT CURRENT TO WHICH THEY ARE SUBJECTED, 22,000 AIC MINIMUM. VERIFY AVAILABLE SHORT CIRCUIT CURRENT DOES NOT EXCEED THE RATING OF ELECTRICAL EQUIPMENT IN ACCORDANCE WITH ARTICLE 110.24 NEC OR THE MOST CURRENT ADOPTED CODE PRE THE GOVERNING JURISDICTION.

5. EACH END OF EVERY POWER PHASE CONDUCTOR, GROUNDING CONDUCTOR, AND TELCO CONDUCTOR OR CABLE SHALL BE LABELED WITH COLOR-CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2" PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC AND OSHA.

6. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH LAMICOID TAGS SHOWING THEIR RATED VOLTAGE, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING AND BRANCH CIRCUIT ID NUMBERS (i.e. PANEL BOARD AND CIRCUIT ID'S).

7. PANEL BOARDS (ID NUMBERS) SHALL BE CLEARLY LABELED WITH PLASTIC LABELS.

8. TIE WRAPS ARE NOT ALLOWED.

9. ALL POWER AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE COPPER CONDUCTOR (#14 OR LARGER) WITH TYPE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.

10. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE COPPER CONDUCTOR (#6 OR LARGER) WITH TYPE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.

11. POWER AND CONTROL WIRING IN FLEXIBLE CORD SHALL BE MULTI-CONDUCTOR, TYPE SOOW CORD (#14 OR LARGER) UNLESS OTHERWISE SPECIFIED.

12. POWER AND CONTROL WIRING FOR USE IN CABLE TRAY SHALL BE MULTI-CONDUCTOR, TYPE TC CABLE (#14 OR LARGER), WITH TYPE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.

13. ALL POWER AND GROUNDING CONNECTIONS SHALL BE CRIMP-STYLE, COMPRESSION WIRE LUGS AND WIRE NUTS BY THOMAS AND BETTS (OR EQUAL). LUGS AND WIRE NUTS SHALL BE RATED FOR OPERATION NOT LESS THAN 75° C (90° C IF AVAILABLE).

14. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND NEC.

15. ELECTRICAL METALLIC TUBING (EMT), INTERMEDIATE METAL CONDUIT (IMC), OR RIGID METAL CONDUIT (RMC) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.

16. ELECTRICAL METALLIC TUBING (EMT) OR METAL-CLAD CABLE (MC) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.

17. SCHEDULE 40 PVC UNDERGROUND ON STRAIGHTS AND SCHEDULE 80 PVC FOR ALL ELBOWS/90s AND ALL APPROVED ABOVE GRADE PVC CONDUIT.

18. LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID-TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.

19. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION-TYPE AND APPROVED FOR THE LOCATION USED. SET SCREW FITTINGS ARE NOT ACCEPTABLE.

20. CABINETS, BOXES AND WIRE WAYS SHALL BE LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND THE NEC.

21. WIREWAYS SHALL BE METAL WITH AN ENAMEL FINISH AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARDS (WIREMOLD SPECMATE WIREWAY).

22. SLOTTED WIRING DUCT SHALL BE PVC AND INCLUDE COVER (PANDUIT TYPE E OR EQUAL).

23. CONDUITS SHALL BE FASTENED SECURELY IN PLACE WITH APPROVED NON-PERFORATED STRAPS AND HANGERS. EXPLOSIVE DEVICES (i.e. POWDER-ACTUATED) FOR ATTACHING HANGERS TO STRUCTURE WILL NOT BE PERMITTED. CLOSELY FOLLOW THE LINES OF THE STRUCTURE, MAINTAIN CLOSE PROXIMITY TO THE STRUCTURE AND KEEP CONDUITS IN TIGHT ENVELOPES. CHANGES IN DIRECTION TO ROUTE AROUND OBSTACLES SHALL BE MADE WITH CONDUIT OUTLET BODIES. CONDUIT SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. PARALLEL AND PERPENDICULAR TO STRUCTURE WALL AND CEILING LINES. ALL CONDUIT SHALL BE FISHED TO CLEAR OBSTRUCTIONS. ENDS OF CONDUITS SHALL BE TEMPORARILY CAPPED FLUSH TO FINISH GRADE TO PREVENT CONCRETE, PLASTER OR DIRT FROM ENTERING. CONDUITS SHALL BE RIGIDLY CLAMPED TO BOXES BY GALVANIZED MALLEABLE IRON BUSHING ON INSIDE AND GALVANIZED MALLEABLE IRON LOCKNUT ON OUTSIDE AND INSIDE.

24. EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES AND PULL BOXES SHALL BE GALVANIZED OR EPOXY-COATED SHEET STEEL. SHALL MEET OR EXCEED UL 50 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND NEMA 3 (OR BETTER) FOR EXTERIOR LOCATIONS.

25. METAL RECEPTACLE, SWITCH AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY-COATED OR NON-CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.

26. NONMETALLIC RECEPTACLE, SWITCH AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2 (NEWEST REVISION) AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.

27. THE CONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CARRIER AND/OR DISH WIRELESS AND TOWER OWNER BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.

28. THE CONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD LIFE AND PROPERTY.

29. INSTALL LAMICOID LABEL ON THE METER CENTER TO SHOW "DISH WIRELESS".

30. ALL EMPTY/SPARE CONDUITS THAT ARE INSTALLED ARE TO HAVE A METERED MULE TAPE PULL CORD INSTALLED.

dish wireless.

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STATE OF MARYLAND
CHRISTOPHER D. MORIN
9.28.21
No. 24552
PROFESSIONAL ENGINEER

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 NUMBER 24552, EXPIRATION DATE 11/17/21.

DRAWN BY:	CHECKED BY:	APPROVED BY:
GMW	NP	CDM

RFDS REV #: 0

CONSTRUCTION DOCUMENTS

SUBMITTALS

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A&E PROJECT NUMBER

-

DISH WIRELESS PROJECT INFORMATION

DCWDC00428A

-

12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE

GENERAL NOTES

SHEET NUMBER

GN-3

GROUNDING NOTES:

1. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION AND AC POWER GES'S) SHALL BE BONDED TOGETHER AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.

2. THE CONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR GROUND ELECTRODE SYSTEMS, THE CONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS.

3. THE CONTRACTOR IS RESPONSIBLE FOR PROPERLY SEQUENCING GROUNDING AND UNDERGROUND CONDUIT INSTALLATION AS TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM OR DAMAGE TO THE CONDUIT AND PROVIDE TESTING RESULTS.

4. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH #6 COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.

5. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.

6. EACH CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, #6 STRANDED COPPER OR LARGER FOR INDOOR BTS; #2 BARE SOLID TINNED COPPER FOR OUTDOOR BTS.

7. CONNECTIONS TO THE GROUND BUS SHALL NOT BE DOUBLED UP OR STACKED BACK TO BACK CONNECTIONS ON OPPOSITE SIDE OF THE GROUND BUS ARE PERMITTED.

8. ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT/GROUND BARS AND THE GROUND RING SHALL BE #2 SOLID TINNED COPPER UNLESS OTHERWISE INDICATED.

9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.

10. USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED.

11. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.

12. ALL GROUND CONNECTIONS ABOVE GRADE (INTERIOR AND EXTERIOR) SHALL BE FORMED USING HIGH PRESS CRIMPS.

13. COMPRESSION GROUND CONNECTIONS MAY BE REPLACED BY EXOTHERMIC WELD CONNECTIONS.

14. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO THE BRIDGE AND THE TOWER GROUND BAR.

15. APPROVED ANTIOXIDANT COATINGS (i.e. CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.

16. ALL EXTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.

17. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.

18. BOND ALL METALLIC OBJECTS WITHIN 6 ft OF MAIN GROUND RING WITH (1) #2 BARE SOLID TINNED COPPER GROUND CONDUCTOR.

19. GROUND CONDUCTORS USED FOR THE FACILITY GROUNDING AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (i.e., NONMETALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.

20. ALL GROUNDS THAT TRANSITION FROM BELOW GRADE TO ABOVE GRADE MUST BE #2 BARE SOLID TINNED COPPER IN 3/4" NON-METALLIC, FLEXIBLE CONDUIT FROM 24" BELOW GRADE TO WITHIN 3" TO 6" OF CAD-WELD TERMINATION POINT. THE EXPOSED END OF THE CONDUIT MUST BE SEALED WITH SILICONE CAULK. (ADD TRANSITIONING GROUND STANDARD DETAIL AS WELL).

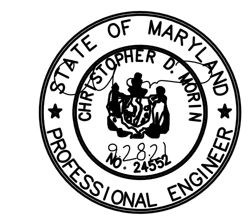
21. BUILDINGS WHERE THE MAIN GROUNDING CONDUCTORS ARE REQUIRED TO BE ROUTED TO GRADE, THE CONTRACTOR SHALL ROUTE TWO GROUNDING CONDUCTORS FROM THE ROOFTOP, TOWERS, AND WATER TOWERS GROUNDING RING, TO THE EXISTING GROUNDING SYSTEM, THE GROUNDING CONDUCTORS SHALL NOT BE SMALLER THAN 2/0 COPPER. ROOFTOP GROUNDING RING SHALL BE BONDED TO THE EXISTING GROUNDING SYSTEM, THE BUILDING STEEL COLUMNS, LIGHTNING PROTECTION SYSTEM, AND BUILDING MAIN WATER LINE (FERROUS OR NONFERROUS METAL PIPING ONLY). DO NOT ATTACH GROUNDING TO FIRE SPRINKLER SYSTEM PIPES.

dish wireless.

6700 ALEXANDER BELL DRIVE
SUITE 221
COLUMBIA, MD 21046

BC architects engineers

5661 COLUMBIA PIKE, SUITE 200
FALLS CHURCH, VA 22041-2868



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 NUMBER 24552, EXPIRATION DATE 11/17/21.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

DRAWN BY:	CHECKED BY:	APPROVED BY:
GMW	NP	CDM

RFDS REV #: 0

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
A	3/2/21	ISSUED FOR REVIEW
0	4/6/21	ISSUED FOR CONSTRUCTION
1	5/3/21	ISSUED FOR CONSTRUCTION
2	7/19/21	ISSUED FOR CONSTRUCTION
3	9/28/21	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER
-

DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
-
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
GENERAL NOTES

SHEET NUMBER
GN-4

App No: 2021071515

Revisions received 8.3.21 - JE

Application General Infomation

Applicant Name	Jacobs Telecommunications	Updated	7/19/2021
Application Type	Colocated	Ann. Plan?	Yes
Carrier	Other	Will site be used to support government telecommunications facilities or other equipment for government use?	No
Solution Type	Other		
Existing	Existing	Gvt. Use Desc.	

Application Description

Install (3) Panel Antennas (1 per sector) on (1) Antenna Mount. Install (6) Radio Units (2 per sector), (1) OVP Device, (1) Hybrid Cable and associated jumpers on existing telecommunications tower. Install (1) metal platform for (2) cabinets, (1) ice bridge, (1) telco-fiber box, (1) GPS unit, (1) safety switch, (1) ciena box, and (1) meter socket on the ground beneath the tower.

Site Infomation

Site Id	299	Zoning	R-60
Structure Type	Monopole	Latitude	39.059453
Street Address	12501 Dalewood Rd	Longitude	-77.066497
County Site Name	Wheaton High School	Ground Elevation	371.97
Carrier Site Name	DCWDC00428A	City	Silver Spring
Site Owner	MCPS	Lease Status	Leased
Structure Owner	Board of Education	Does the structure require an antenna structure registration under FCC Title 47	No
Existing Structure Height	97.5	Distance to Residential Property (New, Replacement, Colocation Only)	187
Provide the proposed height of the replacement structure without any antenna (New, Replacement Apps Only)		Distance to Commercial Property (New, Replacement, Colocation Only)	495

Justification of why this site was selected:

Existing tower that would provide desired coverage

NearbySites (New, Replacement Apps Only):

Tuesday, July 20, 2021

11:23:05 AM

App No: 2021071515

Screening considerations(New, Colocations, Replacement Apps Only):

This is an existing communications tower without concealment. It is the Applicant's impression that concealment was not required when the tower was zoned.

App No: 2021071515

6409 Questions

Does this qualify as a 6409 application? (Minor Mod, Colocations Only) No

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

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

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

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

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

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

Does the structure or current installation have concealment elements/measures? No

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

Small Wireless Facility Informatio

Small Wireless Facility Questions

Is the structure 10% taller than adjacent structures?

Please list adjacent structure heights

Tribal Lands? No

Small Wireless Facility? No

Cumulative volume of the proposed wireless equipment(s) exclusive of antennas in cubic feet 43.85

Cumulative volume of the proposed antenna antenna(s) exclusive of equipment

ROW Information

PROW? No

ROW owner

ROW width

Pole Number US-MD-5072

Tuesday, July 20, 2021

11:23:05 AM

App No: 2021071515

Antenna Infomatio

Antenna Compliance	Yes
Compliance Desc	
Antenna Location	No
Antenna Loc. Desc.	
Env. Assessment	
Cat. Excluded?	
Routine Env. Evaluation	checked

Antenna Model JMA MX08FRO665-20_V0F

Frequency 642-647; 688-693; 722-728; 1915-1920; 1995-2000; 2000-2020; 2180-2200

RAD Center	Max ERP	Antenna Dimensions	Quantity
90	9064	72" x 20" x 8"	3

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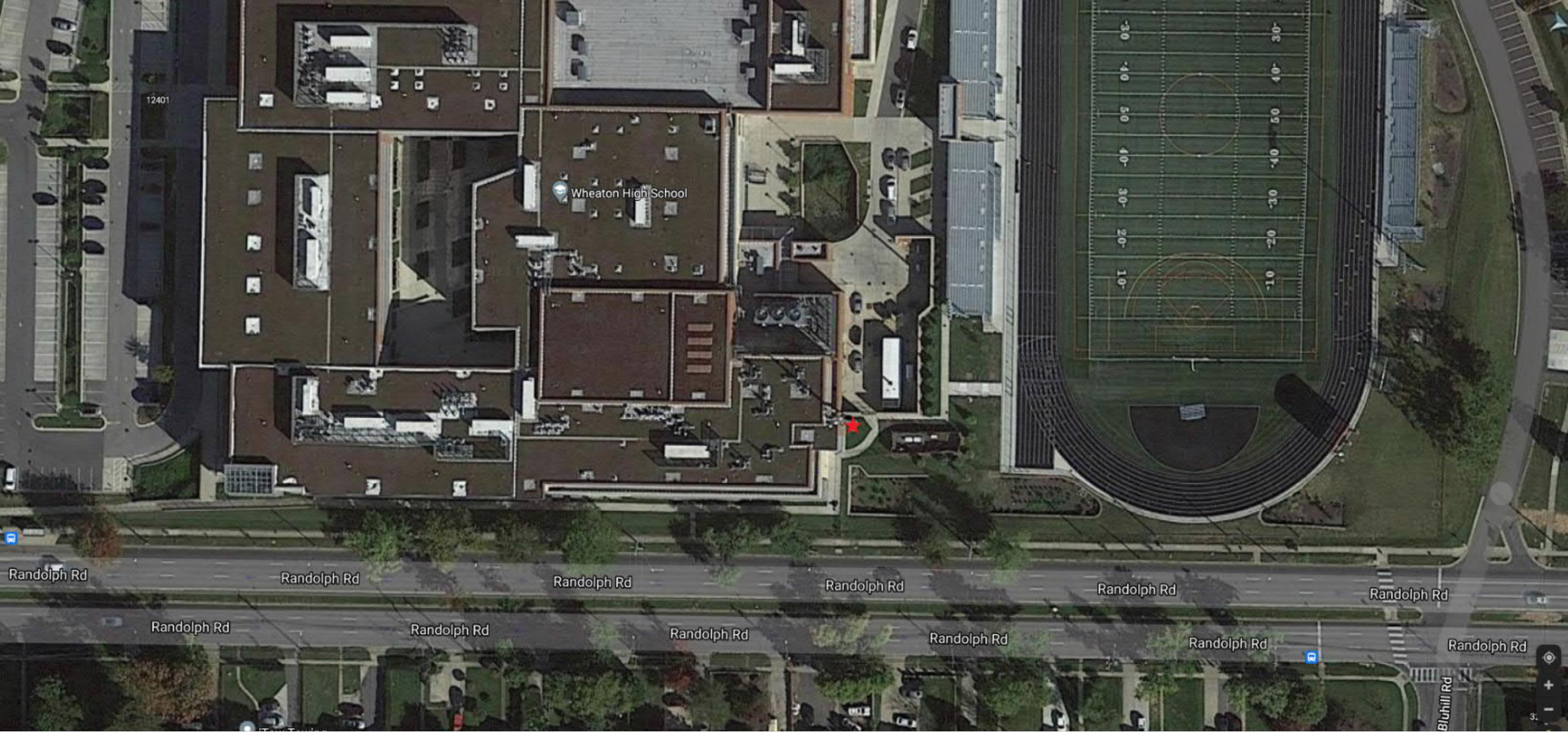

12401
Wheaton High School
Randolph Rd
Randolph Rd
Randolph Rd
Randolph Rd
Randolph Rd
Randolph Rd
Randolph Rd
Randolph Rd
Randolph Rd
Randolph Rd
Randolph Rd
Randolph Rd
Bluhill Rd

MX08FRO665-20

NWAV™ X-Pol 8-Port Antenna

X-Pol 8-Port 6 ft 65° Fast Roll Off with Smart Bias-Ts:

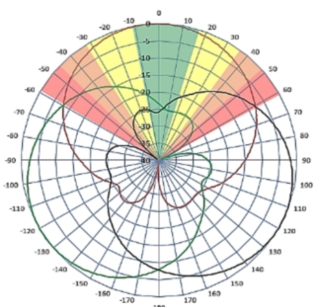
4 ports 617-894 MHz and 4 ports 1695-2200 MHz

- Fast Roll Off (FRO™) azimuth beam pattern improves Intra- and Inter-cell SINR
- Excellent passive intermodulation (PIM) performance reduces harmful interference.
- Fully integrated (iRETs) with Smart Bias-Ts & independent RET control for low and mid bands for ease of network optimization
- SON-Ready array spacing supports beamforming capabilities.
- High total power handling to maximize network efficiency
- Reduced tower loading for ease of site deployment

Fast Roll-Off antennas increase data throughput without compromising coverage

The horizontal beam produced by Fast Roll-Off (FRO) technology increases the Signal to Interference & Noise Ratio (SINR) by eliminating overlap between sectors .

Non-FRO antenna



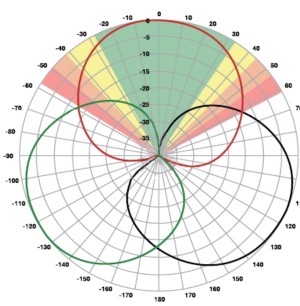
Large traditional antenna pattern overlap creates harmful interference.

JMA's FRO antenna pattern minimizes overlap, thereby minimizing interference.

LTE throughput	SINR	Speed (bps/Hz)	Speed increase	CQI
Excellent	>18	>4.5	333+%	8-10
Good	15-18	3.3-4.5	277%	6-7
Fair	10-15	2-3.3	160%	4-6
Poor	<10	<2	0%	1-3

The LTE radio automatically selects the best throughput based on measured SINR.

JMA FRO antenna



Electrical specification (minimum/maximum)	Ports 1, 2, 3, 4		Ports 5, 6, 7, 8		
Frequency bands, MHz	617-698	698-894	1695-1880	1850-1990	1920-2200
Polarization	± 45°		± 45°		
Gain over all tilts, max, dBi	13.9	15.0	17.9	18.0	18.8
Horizontal beamwidth (HBW), degrees[1]	68	62	64	61	62
Front-to-back ratio, co-polar power @180°, dB	>27	>29	>32	>35	>32
Vertical beamwidth (VBW), degrees[1]	14.2	12.5	5.4	5.2	4.9
Electrical downtilt (EDT) range, degrees	2-14		2-12		
First upper side lobe (USLS) suppression, dB[1]	≤-16.0	≤-16.5	≤-18.0	≤-18.0	≤-18.0
Minimum cross-polar isolation, port-to-port, dB[1]	25	25	25	25	25
Max VSWR / return loss, dB	1.5:1 / -14.0		1.5:1 / -14.0		
Max passive intermodulation (PIM), 2x20W carrier, dBc	-153		-153		
Max input power per any port, watts	300		250		
Total composite power all ports (1-8), watts[2]	1500				

[1] Typical value over frequency and tilt

2 Power rated up to +55 °C

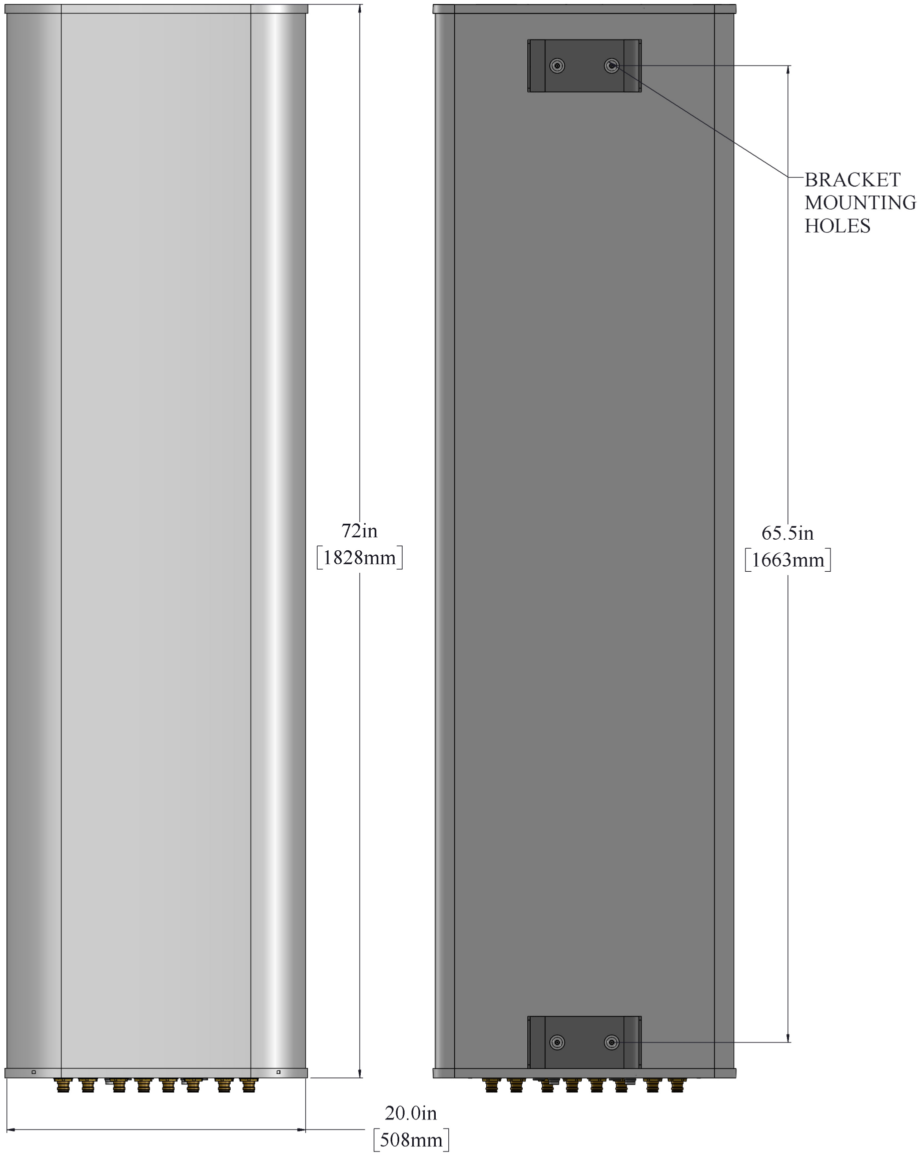
Electrical specification (minimum/maximum)	Ports 1, 2, 3, 4		Ports 5, 6, 7, 8		
Frequency bands, MHz	617-698	698-894	1695-1880	1850-1990	1920-2200
Average gain over all tilts, dBi (Gain Tolerance)	13.2±0.7	14.4±0.6	17.5±0.4	17.4±0.4	18.3±0.5
Horizontal beamwidth tolerance (HBW), degrees[1]	±5	±6.5	±5.5	±3.5	±5.0
Vertical beamwidth tolerance (VBW), degrees	±0.3	±0.3	±0.3	±0.3	±0.3
Front-to-back ratio, co-polar power @180°± 30°, dB	>27	>25	>25	>26	>24
X-Pol discrimination (CPR) at boresight, dB	>20	>19	17.5	>19	>20
First upper side lobe (USLS) suppression boresight to 20°, dB[1]	≤-16	≤-15	≤-16	≤-16	≤-16

Mechanical specifications	
Dimensions height/width/depth, inches (mm)	72.0/ 20.0/ 8.0 (1828.8/ 508.0/ 203.2)
Shipping dimensions length/width/height, inches (mm)	77.3/ 23.8/ 14.5 (1963.42/ 605/ 368)
No. of RF input ports, connector type, and location	8 x 4.3-10 female, bottom
RF connector torque	96 lbf·in (10.85 N·m or 8 lbf·ft)
Net antenna weight, lb (kg)	54 (24.5)
Shipping weight, lb (kg)	94 (42.6)
Antenna mounting and downtilt kit included with antenna	91900318
Net weight of the mounting and downtilt kit, lb (kg)	18 (8.2)
Range of mechanical up/down tilt	-2° to 12°
Rated wind survival speed, mph (km/h)	150 (241)
Frontal and lateral wind loading @ 150 km/h, lbf (N)	108.1 (480.9), 20.5 (91.2)
Effective projected area @ 150 km/h (EPA), frontal, sq ft	4.9

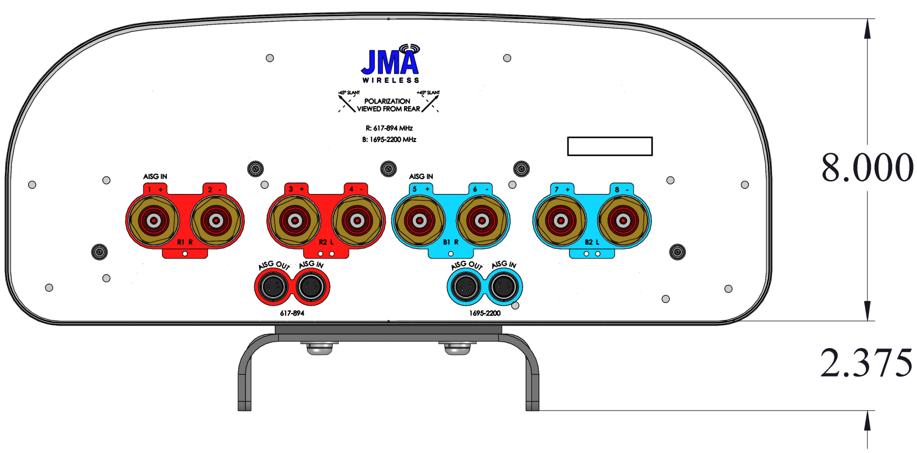
MX08FRO665-20

NWAV™ X-Pol 8-Port Antenna

Front view	Back view



Bottom view



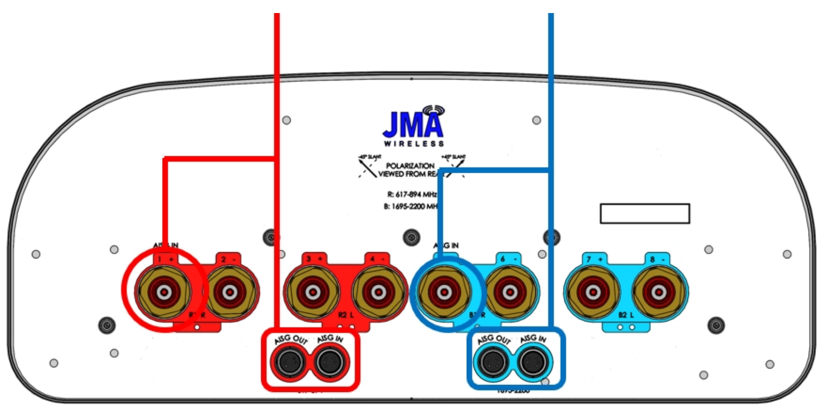
Remote electrical tilt (RET 1000) information	
RET location	Integrated into antenna
RET interface connector type	8-pin AISG connector per IEC 60130-9 or RF port Bias-T
RET connector torque	Min 0.5 N·m to max 1.0 N·m (hand pressure & finger tight)
RET interface connector quantity	2 pairs of AISG male/female connectors and 2 RF port Bias-Ts, ports 1 & 5
RET interface connector location	Bottom of the antenna
Total no. of internal RETs 617-894 MHz	1
Total no. of internal RETs 1695-2200 MHz	1
RET input operating voltage, vdc	10-30
RET max power consumption, idle state, W	≤ 2.0
RET max power consumption, normal operating conditions, W	≤ 10.0
RET communication protocol	Hardware AISG 3.0; firmware AISG 2.0, field-upgradable to AISG 3.0

RET and RF connector topology

Each RET device can be controlled either via the designated external AISG connector or RF port as shown below:

Band	RF port
617-894	1-4

Band	RF port
1695-2200	5-8



Array topology

4 sets of radiating arrays

R1: 617-894 MHz
R2: 617-894 MHz
B1: 1695-2200 MHz
B2: 1695-2200 MHz

Band	RF port
617-894	1-2
617-894	3-4
1695-2200	5-6
1695-2200	7-8

Fujitsu – DiSH Triple-band RU Technical Specifications

RU General Specification	
Part number	TA08025-B605
TRX Configuration	4T4R
Operating Frequency	n71 & n29 & n26 Frequencies (Triple-Band)
Instantaneous Bandwidth	n71: 35MHz n29: 11MHz n26: 7MHz
Operation Bandwidth (3GPP)	n71: 35MHz n29: 10MHz n26: 5MHz
CC BW	5/10/20 MHz
Capacity	n71:2Cr(5/10/20MHz)/NB-IOT n26:1Cr(5MHz)/NB-IOT n29:2Cr(5/10MHz)
Interface to DU	ORAN 7.2x / 10G optical IF
TX Specification	
Output Power per TX	n71: 30W per port n29: 40W per port n26: 10 W per port
ACLR	Compliant with 3GPP TS 38.104
Transmitter Spurious Emissions	Compliant with 3GPP TS 38.104
EVM	Compliant with 3GPP TS 38.104
RX Specification	
Noise Figure	2.5dB (normal condition 2.2dB)
Blocking Features	Compliant with 3GPP TS 38.104
Receiver spurious emissions	Compliant with 3GPP TS 38.104
Mechanical Specification	
Volume	35 L
Dimension	W:400mm, H: 380mm, D: 230mm
Antenna Connector Type	4.3-10 RF connector
Antenna Control Interface	AISG
Power Supply	DC -58~-36V
Power Consumption	<1300W
Weight	34 kg
Environmental	
Humidity (Absolute humidity)	0.03 g/m3 ～30 g/m3
Atmospheric Pressure	Between 70 kPa and 106 kPa
Operating Temperature	-40°C ～+55°C
IP Rating	IP65
Cooling	Passive

Mounting Options	
Pole	TBD
Wall	TBD

DATA SHEET

Base/Tower/Rooftop Solution for RRH Applications

RDIDC-9181-PF-48

The deployment of Remote Radio Head (RRH) architecture poses unique challenges to the mobile telecom industry. Raycap's innovative RRH protection solutions mitigate the risk of damage due to lightning and provide high levels of availability and reliability to radio equipment.

Features

- Employs the Strikesorb® 30-V1-2CFV Surge Protective Device (SPD) specifically designed for the Remote Radio Head (RRH) installation environment and certified for use in DC applications and at low DC operating voltages (48V)
- The Strikesorb 30-V1-2CFV is a Class I SPD, certified by VDE per the IEC 61643-11 standard as suitable for installation in areas where direct lightning exposure is expected. Strikesorb 30-V1-2CFV is able to withstand direct lightning currents of up to 12.5kA (10/350) and induced surge currents of up to 60kA (8/20).
- Provides very low let through / clamping voltage - unique for a Class I product - as it does not employ spark gaps or other switching elements. Strikesorb offers unique protection levels to the RRH equipment as well as the Base Band Units
- For individual circuit per radio architecture
- Configurable cable ports are designed to accommodate varying diameters of hybrid (combined power and fiber optic) or standard cables
- Fully recognized to the UL 1449 4th Edition Safety Standard
- Patent pending design

Benefits

- Offers unique maintenance-free protection against direct lightning currents
- Protects up to 9 Remote Radio Heads and connects up to 18 fiber pairs
- Utilizes a NEMA 4X rated enclosure, allowing for indoor or outdoor installation at the base, on a roof or tower top

Strikesorb 30-V1-2CFV

SPECIFICATIONS

Base/Tower Solution for RRH Applications

RDIDC-9181-PF-48

Electrical

Model Number	RDIDC-9181-PF-48
Nominal Operating Voltage	48 VDC
Nominal Discharge Current [I_n]	20 kA 8/20 µs
Maximum Surge Current [I_{max}]	60 kA 8/20 µs
Maximum Impulse (Lightning) Current per IEC 61643-11	12.5 kA 10/350 µs
Maximum Continuous Operationg Voltage [U_c]	75 VDC
Response Time [t_A]	<1 ns
Voltage Protection Rating (VPR) per UL 1449 4th Edition	400 V
Let-through Voltage @ 20kA (8/20)	<410 V
Let-through Voltage @ 10kA (8/20)	<330 V
Voltage Protection Level (VPL) per IEC 61643-11	<200 V @12.5 kA 10/350 µs
Fault Monitoring	Local status indicator - dry contact alarm
Circuit Configuration	Parallel; -48VDC suppy-return, return-ground
Protection Class as per IEC 61643-1	Class I
Incoming Power/Fiber	Power: #10/8/6/4/2 AWG (6 mm² - 33.6 mm²) power trunk Fiber: LC/LC
Strikesorb Module Type	30-V1-2CFV

Mechanical

Suppression Connection Method	Compression lug, #14 - #2 AWG (2.1 mm² - 33.6 mm²) Copper; #12 - #2 AWG (3.3 mm² - 33.6 mm²) Aluminum
Fiber Connection Method	24 LC-LC Single mode
Environmental Rating	NEMA 4X
Operating Temperature	-40° C to +80° C
UV Resistant	Yes
Combined Wind Load	150 mph (sustained): 110.5 lbs (491.5N) 195 mph (gust): 186 lbs (827.4N)
Dimensions	14" x 16" x 8"
Estimated Weight	21.85 lbs

Optional Product Configurations

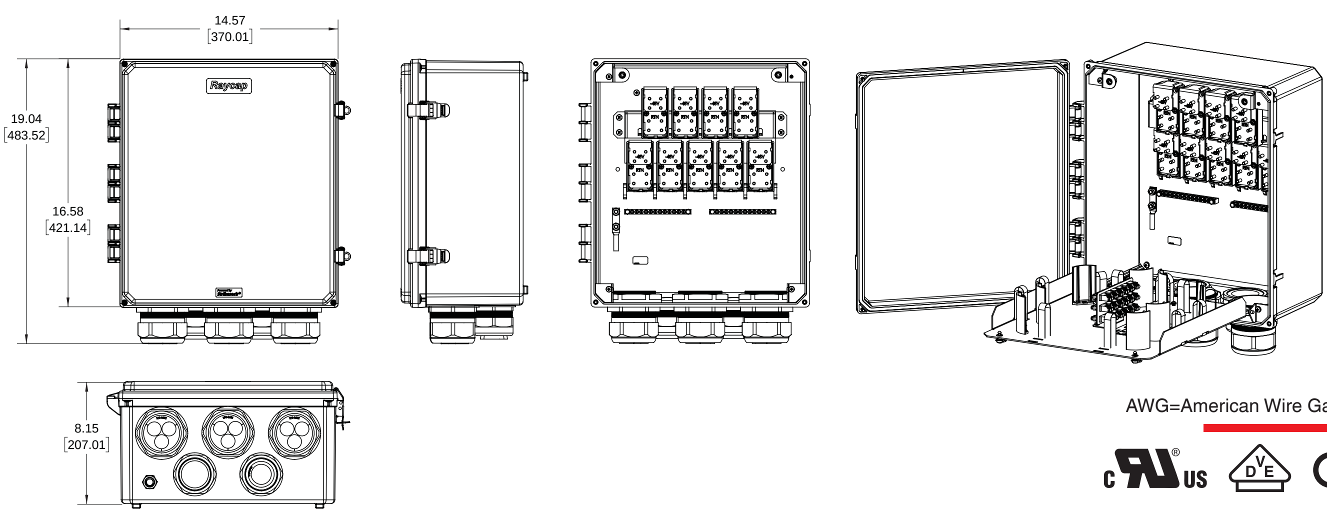
Bridge Kit (required for base unit when pairing with HCS 1.0 legacy cable) Order Part #: RTMDC-5634-WB-KIT

Standards Compliance & Certifications

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

Standards ANSI/UL 1449 4th Edition, IEEE C62.41, NEMA LS-1, IEC 61643-11 (Class I Protection), IEC 61643-12, EN 61643-11:2002 (including A11:2007)

Product Diagram



AWG=American Wire Gauge

Prepared by:
SGS Towers
Sinnott Gering and Schmitt Towers, Inc.
10834 Old Mill Rd Suite 8 Omaha, NE 68154
(402)-575-8885
Engineering@sgstowers.com

Structural Analysis Report

Structure	: 97.5 Foot Monopole
VB Site Name	: BOE- Richard D Riddle School
VB Site ID	: US-MD-5072
Proposed Carrier	: DISH Wireless L.L.C.
Carrier Site Name	: DCWDC00428A
Carrier Site Number	: DCWDC00428A
Site Location	: 12501-A Dalewood Drive
	Silver Spring, MD 20906 (Montgomery County)
	39.05946, -77.06649
Date	: February 23, 2021
Max Member Stress Level	: 98.7% (Tower)
	86.8% (Base Plate)
	78.0% (Anchor Rods)
	62.5% (Foundation – Drilled Pier)
Result	: **PASS**

STATE OF MARYLAND
NICHOLAS J. SCHMITT
LIC. 43419
PROFESSIONAL ENGINEER

2/24/21

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. 43419

SGS Job No.: 2101548

Table of Contents

Introduction 1
Existing Structural Information 1
Final Proposed Equipment Loading for DISH Wireless L.L.C. 1
Design Criteria 2
Analysis Results 2
Assumptions 2
Conclusions 3
Calculations .... Attached
Collocation Application .... Attached

Design Criteria

The tower was analyzed using tnxTower (Version 8.0.7.5) software to find the internal loads using the following design criteria.

State	Maryland
City / County Building Code	Montgomery County (IBC 2018)
Standard Codes	TIA-222-H
Basic Wind Speed	113 MPH (V_{ult})
Basic Wind Speed w/ Ice	40 MPH w/ 1.0” Ice
Grades	65 ksi Tower Pole (0-150’) / 60 ksi Base Plate / A615-75 (75 ksi) Anchor Bolts
Exposure Category	C
Topographic Category (height)	1 (0 ft)
Structure Class	II
S_s	0.134
S_1	0.043

Note: A seismic analysis has been performed and is not controlling.

Analysis Results

Based on the foregoing information, our structural analysis determined that **the existing tower is structurally capable of supporting the proposed equipment loads without modification.** The base plate and anchor bolts have also been evaluated and are **found to be structurally capable of supporting the proposed equipment loads without modification**. The structural design report (EEI, Project No. 13160, Drawing No. D13160-98.1) analyzed for drilled pier foundation. An analysis for drilled pier foundation was performed and it was determined **to be structurally capable of supporting the proposed equipment loads without modifications.**

Assumptions

1. The existing tower has been maintained to manufacturer’s specifications and is in good condition.
2. All member connections are considered to have been designed to meet the load carrying capacity of the connected members.
3. Antenna mount loads have been estimated based on generally accepted industry standards.
4. The mounts for the proposed antennas have been analyzed and designed by others.
5. Ultimate Bearing value and blow count for soil has been taken from TIA-222-H, ANNEX F Table F-1:Presumptive Soil Parameters to perform foundation analysis.

Introduction

We have completed our structural analysis of the proposed equipment installation on the foregoing **Monopole** to determine its ability to support the new loads proposed by **DISH Wireless L.L.C.** The objective of the analysis is to determine if the **Monopole** meets the current structural codes and standards with the proposed equipment installation.

Existing Structural Information

The following documents for the existing structure were made available for our structural analysis.

Tower Information	Engineered Endeavors Incorporated, Structural Design Report / Project No: 13160, Drawing No. GS55637, dated August 9, 2005
Foundation Information	Engineered Endeavors Incorporated, Structural Design Report / Project No: 13160, Drawing No. D13160-98.1, dated August 9, 2005
Equipment Information	DISH Wireless - Vertical Bridge Collocation Application No. C-103052 Version 2, dated February 12, 2021. T-Mobile – Loading provided by Vertical Bridge on February 18, 2021
Tower Reinforcement Information	Tower has not been previously reinforced

Final Proposed Equipment Loading for DISH Wireless L.L.C.

The following proposed loading was obtained from the Vertical Bridge Collocation Application:

Antenna/Equipment					Coax	
Mount (ft.)	RAD (ft.)	Qty.	Antenna	Type	Qty.	Size/Type
90.0	-	**1**	**Platform Mount w/ Handrails**	**Mount**	**1**	**1.6” Hybrid**
	90.0	**6***	**JMA MX08FRO665-20_V0F**	**Panel**		
		6*	**Fujitsu TA08025-B604**	**RRU**		
		6*	**Fujitsu TA08025-B605**	**RRU**		
		1	**Raycap RDIDC-9181-PF-48**	**Junction Box**		

Note: Proposed equipment shown in bold.
Note: Proposed feed lines to be placed on the outside of the pole.
Note: Remainder of T-Mobile reserved rights are considered in the analysis
Note: Remainder of Dish reserved rights are considered in the analysis.
Note: *Designates that half of the quantity is reserved loading.
Note: For all other existing equipment please refer to the tower profile and attached tnxTower output.

Conclusions

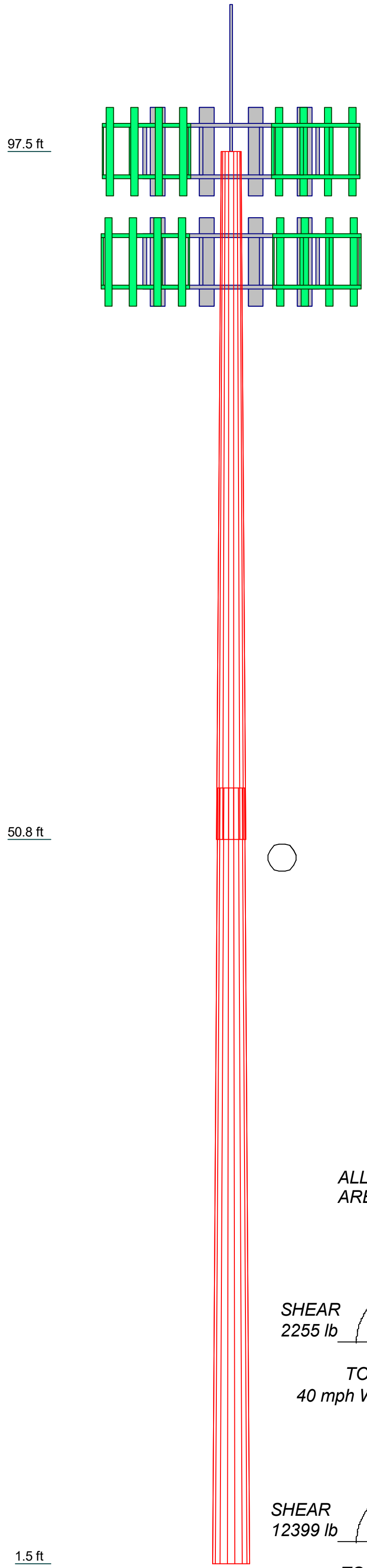
The existing tower described above **has sufficient capacity** to support the proposed loading based on the two governing codes referenced above. The base plate, anchor bolts and foundation have also been evaluated and have sufficient capacity to support the proposed loads.

We appreciate the opportunity of providing our continuing professional services to you. If you have any questions or need further assistance, please call us anytime at 402-575-8885.

Sincerely,

Analysis by:	Reviewed by:
Ravi Siddharth Raja, EI Project Engineer	Nicholas J. Schmitt, P.E., S.E. Vice President

Attachment 1:
Calculations



Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (lb)
1	46.71	18	0.1875	3.42	16.0000	23.0500	A572-65	1920.6
2	52.71	18	0.2500		22.1588	30.0000	A572-65	3859.9
								5780.6

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lighting Rod 5/8" x 7'	97.5	MX08FRO665-20_V0F (Dish Wireless)	90
(2) APX15PV-15PVL (T-Mobile)	97.5	MX08FRO665-20_V0F (Dish Wireless)	90
(2) APX15PV-15PVL (T-Mobile)	97.5	MX08FRO665-20_V0F (Dish Wireless)	90
(2) APX15PV-15PVL (T-Mobile)	97.5	TA08025-B604 (Dish Wireless)	90
Platfrom Mount (T-Mobile)	97.5	TA08025-B604 (Dish Wireless)	90
T-Mobile 1/3 of Remainder Reserved (T-Mobile)	97.5	TA08025-B604 (Dish Wireless)	90
T-Mobile 1/3 of Remainder Reserved (T-Mobile)	97.5	MX08FRO665-20_V0F (Dish Wireless)	90
T-Mobile 1/3 of Remainder Reserved (T-Mobile)	97.5	MX08FRO665-20_V0F (Dish Wireless)	90
TA08025-B605 (Dish Wireless)	90	MX08FRO665-20_V0F (Dish Wireless)	90
TA08025-B605 (Dish Wireless)	90	TA08025-B605 (Dish Wireless)	90
TA08025-B605 (Dish Wireless)	90	TA08025-B605 (Dish Wireless)	90
Platform Mount (Dish Wireless)	90	TA08025-B605 (Dish Wireless)	90
RDIDC-9181-PF-48 (Dish Wireless)	90	Dish 1/3 of Remainder Reserved (Dish Wireless)	90
TA08025-B604 (Dish Wireless)	90	Dish 1/3 of Remainder Reserved (Dish Wireless)	90
TA08025-B604 (Dish Wireless)	90	Dish 1/3 of Remainder Reserved (Dish Wireless)	90
TA08025-B604 (Dish Wireless)	90		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

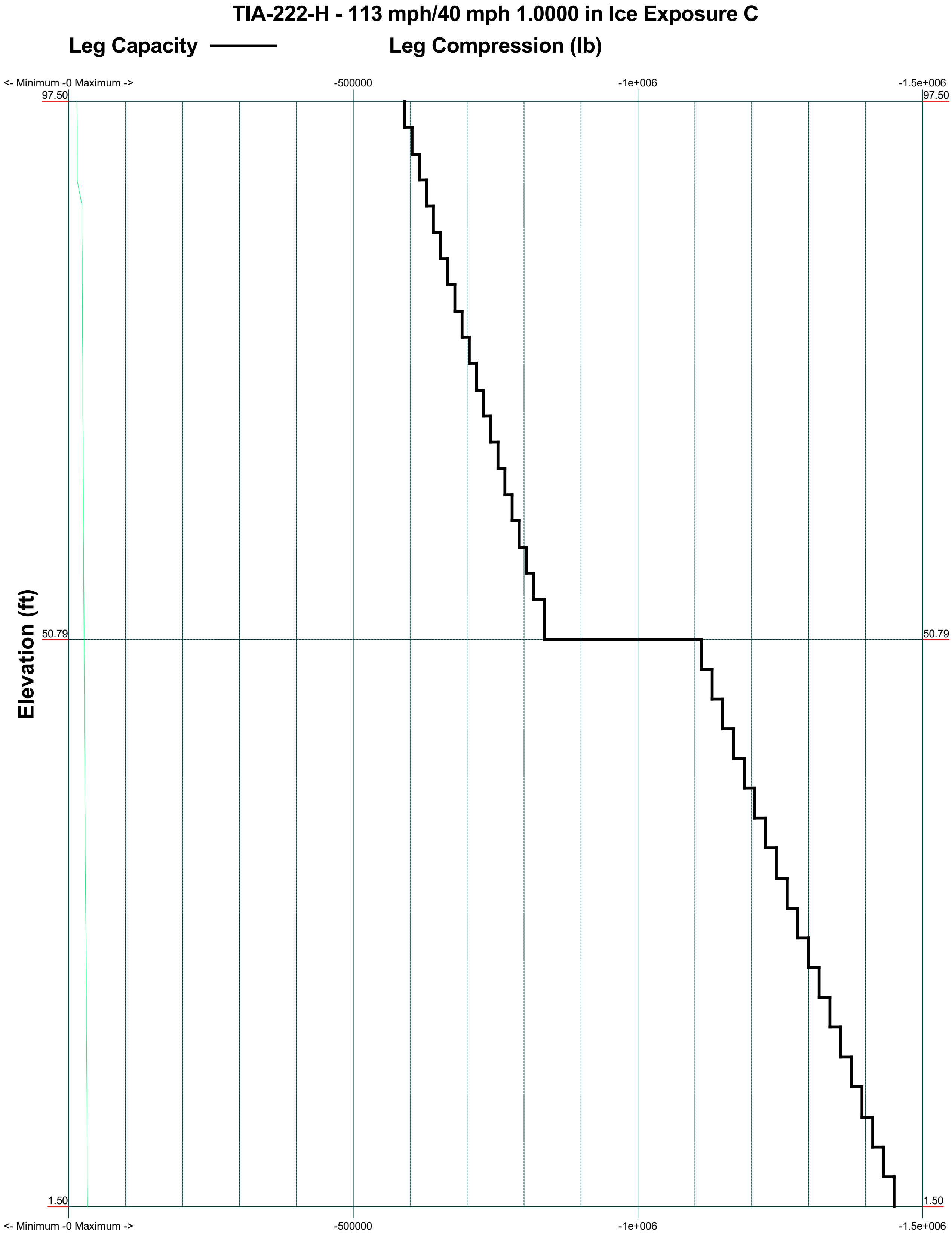
1. Tower is located in Montgomery County, Maryland.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 113 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 40 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 98.7%

ALL REACTIONS ARE FACTORED

AXIAL 33346 lb
SHEAR 2255 lb
MOMENT 210969 lb-ft
TORQUE 46 lb-ft
40 mph WIND - 1.0000 in ICE

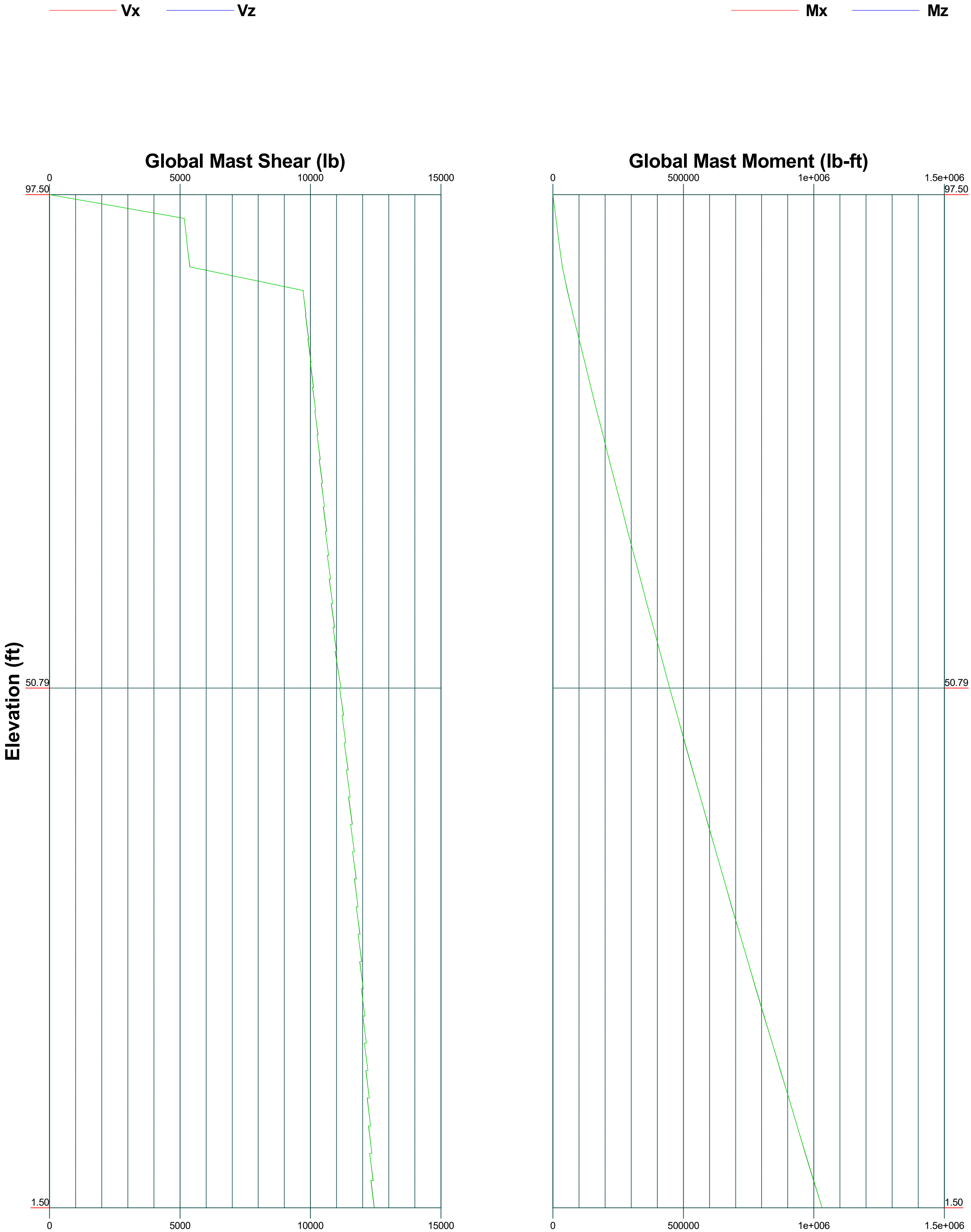
AXIAL 16718 lb
SHEAR 12399 lb
MOMENT 1031732 lb-ft
TORQUE 120 lb-ft
REACTIONS - 113 mph WIND

SGS Towers Chapell Hill, NC Phone: engineering@sgstowers.com FAX:	Job: **SGS# 2101548**		
	Project: **BOE - Richard D Riddle School (US-MD-5072)**		
	Client: Vertical Bridge	Drawn by: Ravi Siddharth Raja	App'd:
	Code: TIA-222-H	Date: 02/23/21	Scale: NTS
	Path: C:\Users\Ravi Raja\Downloads\2101548 - BOE - Richard D Riddle School\Tnx\SGS_2101548_VB Site_US-MD-5072_02-18-2021.er		Dwg No. E-1



SGS Towers Chapell Hill, NC Phone: engineering@sgstowers.com FAX:	Job: ***SGS# 2101548***		
	Project: ***BOE - Richard D Riddle School (US-MD-5072)***		
	Client: Vertical Bridge	Drawn by: Ravi Siddharth Raja	App'd:
	Code: TIA-222-H	Date: 02/23/21	Scale: NTS
	Path: C:\Users\Ravi Raja\Downloads\2101548 - BOE - Richard D Riddle School\Tnx\SGS_2101548_VB Site_US-MD-5072_02-18-2021.eri		Dwg No. E-3

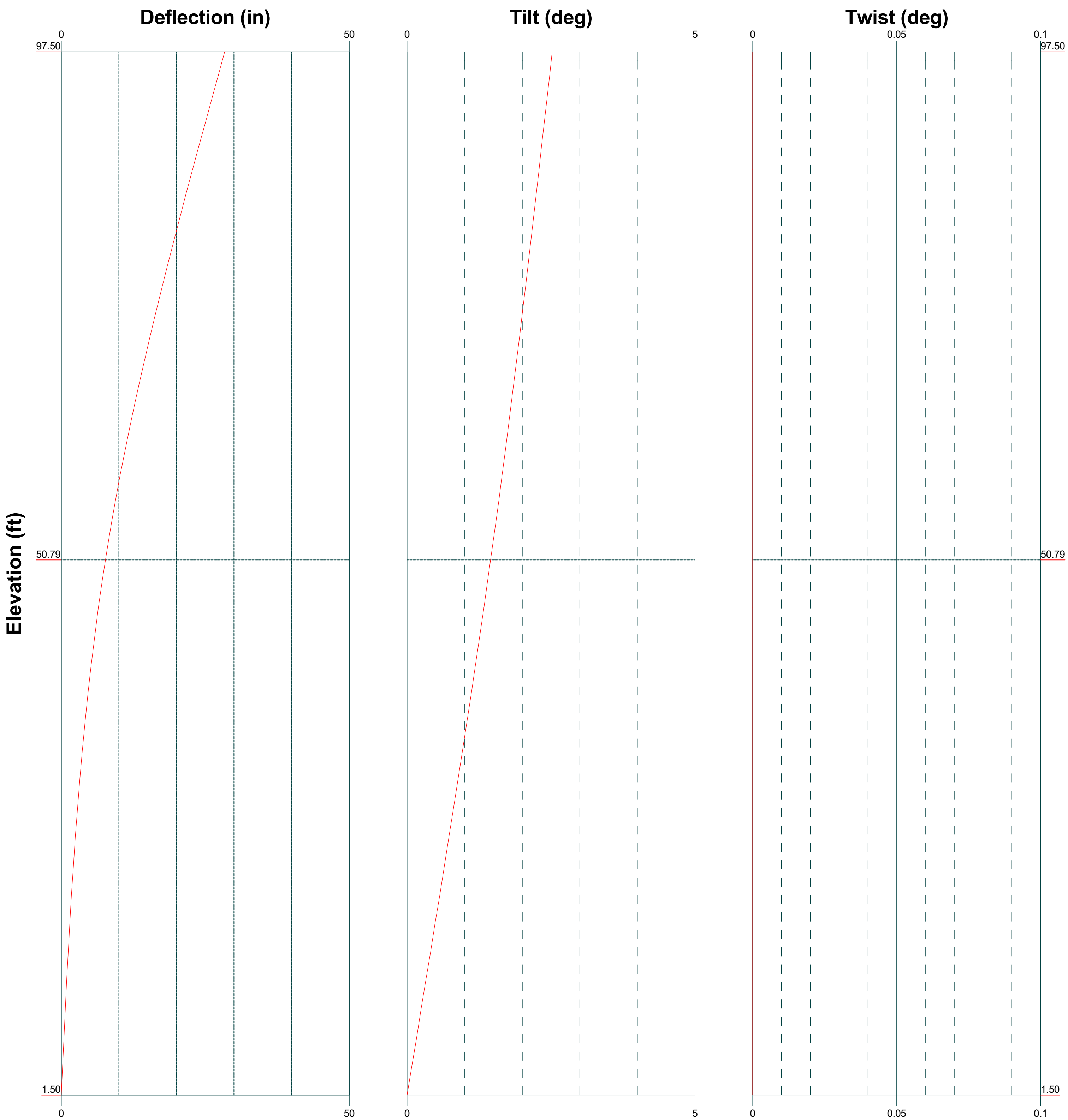
TIA-222-H - 113 mph/40 mph 1.0000 in Ice Exposure C



SGS Towers	Job: ***SGS# 2101548***		
Chapell Hill, NC	Project: ***BOE - Richard D Riddle School (US-MD-5072)***		
Phone: engineering@sgstowers.com	Client: Vertical Bridge	Drawn by: Ravi Siddharth Raja	App'd:
FAX:	Code: TIA-222-H	Date: 02/23/21	Scale: NTS
	Path: C:\Users\Ravi Raja\Downloads\2101548 - BOE - Richard D Riddle School\Tnx\SGS 2101548 VB Site US-MD-5072 02-18-2021.eri		Dwg No. E-4

TIA-222-H - Service - 60 mph

Maximum Values



SGS Towers Chapell Hill, NC Phone: engineering@sgstowers.com FAX:	Job: **SGS# 2101548**		
	Project: ***BOE - Richard D Riddle School (US-MD-5072)***		
	Client: Vertical Bridge	Drawn by: Ravi Siddharth Raja	App'd:
	Code: TIA-222-H	Date: 02/23/21	Scale: NTS
	Path: C:\Users\Ravi Raja\Downloads\2101548 - BOE - Richard D Riddle School\Tnx\SGS 2101548 VB Site US-MD-5072 02-18-2021.eri		Dwg No. E-5

Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

Tower is located in Montgomery County, Maryland.
Tower base elevation above sea level: 371.97 ft.
Basic wind speed of 113 mph.
Risk Category II.
Exposure Category C.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 40 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.05.
Tower analysis based on target reliabilities in accordance with Annex S.
Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
Use Code Stress Ratios
√ Use Code Safety Factors - Guys
Escalate Ice
Always Use Max Kz
Use Special Wind Profile
Include Bolts In Member Capacity
Leg Bolts Are At Top Of Section
√ Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
SR Members Have Cut Ends
SR Members Are Concentric

Distribute Leg Loads As Uniform
Assume Legs Pinned
√ Assume Rigid Index Plate
√ Use Clear Spans For Wind Area
Use Clear Spans For KL/r
Retension Guys To Initial Tension
√ Bypass Mast Stability Checks
√ Use Azimuth Dish Coefficients
√ Project Wind Area of Appurt.
Autocalc Torque Arm Areas
Add IBC .6D+W Combination
Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing
Treat Feed Line Bundles As Cylinder
Ignore KL/ry For 60 Deg. Angle Legs

Use ASCE 10 X-Brace Ly Rules
Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
SR Leg Bolts Resist Compression
All Leg Panels Have Same Allowable
Offset Girt At Foundation
√ Consider Feed Line Torque
Include Angle Block Shear Check
Use TIA-222-H Bracing Resist. Exemption
Use TIA-222-H Tension Splice Exemption

Poles

Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets
Pole Without Linear Attachments
Pole With Shroud Or No Appurtenances
Outside and Inside Corner Radii Are Known

Tapered Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Splice Length* *ft*	*Number of Sides*	*Top Diameter* *in*	*Bottom Diameter* *in*	*Wall Thickness* *in*	*Bend Radius* *in*	*Pole Grade*
L1	97.50-50.79	46.71	3.42	18	16.0000	23.0500	0.1875	0.7500	A572-65 (65 ksi)
L2	50.79-1.50	52.71		18	22.1588	30.0000	0.2500	1.0000	A572-65 (65 ksi)

Tapered Pole Properties

Section	*Tip Dia.* *in*	*Area* in^2	*I* in^4	*r* *in*	*C* *in*	*I/C* in^3	*J* in^4	*It/Q* in^2	*w* *in*	*w/t*
L1	16.2179	9.4104	297.2674	5.6134	8.1280	36.5733	594.9259	4.7061	2.4860	13.259
	23.3767	13.6060	898.4973	8.1162	11.7094	76.7330	1798.1770	6.8043	3.7268	19.876
L2	22.9787	17.3846	1054.2438	7.7776	11.2567	93.6550	2109.8748	8.6940	3.4600	13.84
	30.4242	23.6066	2639.6436	10.5612	15.2400	173.2050	5282.7605	11.8056	4.8400	19.36

Tower Elevation *ft*	*Gusset Area (per face)* ft^2	*Gusset Thickness* *in*	*Gusset Grade*	*Adjust. Factor* A_f	*Adjust. Factor* A_r	*Weight Mult.*	*Double Angle Stitch Bolt Spacing Diagonals* *in*	*Double Angle Stitch Bolt Spacing Horizontals* *in*	*Double Angle Stitch Bolt Spacing Redundants* *in*
L1 97.50-50.79				1	1	1.05			
L2 50.79-1.50				1	1	1.05			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	*Sector*	*Exclude From Torque Calculation*	*Component Type*	*Placement* *ft*	*Total Number*	*Number Per Row*	*Start/End Position*	*Width or Diameter* *in*	*Perimeter* *in*	*Weight* *plf*
Safety Line 3/8	A	No	Surface Ar (CaAa)	97.50 - 1.50	1	1	0.000 0.000	0.3750		0.22
***										
Step Bolts	A	No	Surface Ar (CaAa)	97.50 - 1.50	1	1	0.000 0.000	0.6250		0.51
***										
***										
1.6" (Dish Wireless)	C	No	Surface Ar (CaAa)	90.00 - 3.00	1	1	0.000 0.000	1.6000		1.35
***										

Feed Line/Linear Appurtenances - Entered As Area

Description	*Face or Leg*	*Allow Shield*	*Exclude From Torque Calculation*	*Component Type*	*Placement* *ft*	*Total Number*		C_AA_A ft^2/ft	*Weight* *plf*
***									
***									
7/8" Coax	C	No	No	Inside Pole	97.50 - 3.00	1	No Ice	0.00	1.54

Description	*Face or Leg*	*Allow Shield*	*Exclude From Torque Calculation*	*Component Type*	*Placement* *ft*	*Total Number*		C_AA_A ft^2/ft	*Weight* *plf*
(T-Mobile)							1/2" Ice	0.00	1.54
							1" Ice	0.00	1.54
***									
1-1/4" Coax	C	No	No	Inside Pole	97.50 - 3.00	1	No Ice	0.00	0.50
(T-Mobile)							1/2" Ice	0.00	0.50
							1" Ice	0.00	0.50
***									
1-5/8" Coax	C	No	No	Inside Pole	97.50 - 3.00	1	No Ice	0.00	0.82
(T-Mobile)							1/2" Ice	0.00	0.82
							1" Ice	0.00	0.82
***									

Feed Line/Linear Appurtenances Section Areas

Tower Section	*Tower Elevation* *ft*	*Face*	A_R ft^2	A_F ft^2	C_AA_A *In Face* ft^2	C_AA_A *Out Face* ft^2	*Weight* *lb*
L1	97.50-50.79	A	0.000	0.000	4.671	0.000	34.19
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	6.274	0.000	186.52
L2	50.79-1.50	A	0.000	0.000	4.929	0.000	36.08
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	7.646	0.000	201.20

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	*Tower Elevation* *ft*	*Face or Leg*	*Ice Thickness* *in*	A_R ft^2	A_F ft^2	C_AA_A *In Face* ft^2	C_AA_A *Out Face* ft^2	*Weight* *lb*
L1	97.50-50.79	A	0.920	0.000	0.000	21.868	0.000	183.40
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	13.491	0.000	297.65
L2	50.79-1.50	A	0.831	0.000	0.000	23.076	0.000	193.53
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	16.444	0.000	336.64

Feed Line Center of Pressure

Section	*Elevation* *ft*	CP_X *in*	CP_Z *in*	CP_X *Ice* *in*	CP_Z *Ice* *in*
L1	97.50-50.79	-0.6037	0.6640	-1.3903	0.2698
L2	50.79-1.50	-0.6189	0.7909	-1.4956	0.4122

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	1	Safety Line 3/8	50.79 - 97.50	1.0000	1.0000
L1	3	Step Bolts	50.79 - 97.50	1.0000	1.0000
L1	6	1.6"	50.79 - 90.00	1.0000	1.0000
L2	1	Safety Line 3/8	1.50 - 50.79	1.0000	1.0000
L2	3	Step Bolts	1.50 - 50.79	1.0000	1.0000
L2	6	1.6"	3.00 - 50.79	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
****									
Lighting Rod 5/8" x 7'	A	From Leg	3.00	0.0000	97.50	No Ice	0.53	0.53	30.00
			0.00			1/2" Ice	1.24	1.24	35.42
			5.00			1" Ice	1.97	1.97	45.35
***									
RDIDC-9181-PF-48	A	From Leg	0.00	0.0000	90.00	No Ice	0.93	1.07	21.85
(Dish Wireless)			0.00			1/2" Ice	1.06	1.20	38.15
			0.00			1" Ice	1.19	1.35	57.11
***									
TA08025-B604	A	From Leg	2.50	0.0000	90.00	No Ice	1.96	1.03	63.93
(Dish Wireless)			0.00			1/2" Ice	2.14	1.17	80.68
			0.00			1" Ice	2.32	1.31	100.13
***									
TA08025-B604	B	From Leg	2.50	0.0000	90.00	No Ice	1.96	1.03	63.93
(Dish Wireless)			0.00			1/2" Ice	2.14	1.17	80.68
			0.00			1" Ice	2.32	1.31	100.13
***									
TA08025-B604	C	From Leg	2.50	0.0000	90.00	No Ice	1.96	1.03	63.93
(Dish Wireless)			0.00			1/2" Ice	2.14	1.17	80.68
			0.00			1" Ice	2.32	1.31	100.13
***									
MX08FRO665-20_V0F	A	From Leg	3.00	0.0000	90.00	No Ice	12.49	5.87	54.00
(Dish Wireless)			0.00			1/2" Ice	12.99	6.32	127.79
			0.00			1" Ice	13.49	6.79	208.26
***									
MX08FRO665-20_V0F	B	From Leg	3.00	0.0000	90.00	No Ice	12.49	5.87	54.00
(Dish Wireless)			0.00			1/2" Ice	12.99	6.32	127.79
			0.00			1" Ice	13.49	6.79	208.26
***									
MX08FRO665-20_V0F	C	From Leg	3.00	0.0000	90.00	No Ice	12.49	5.87	54.00
(Dish Wireless)			0.00			1/2" Ice	12.99	6.32	127.79

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft ft ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		C_AA_A *Front* *ft²*	C_AA_A *Side* *ft²*	*Weight* *lb*
			0.00			1" Ice	13.49	6.79	208.26
***									
TA08025-B605	A	From Leg	2.50	0.0000	90.00	No Ice	1.96	1.19	74.95
(Dish Wireless)			0.00			1/2" Ice	2.14	1.33	92.92
			0.00			1" Ice	2.32	1.48	113.67
***									
TA08025-B605	B	From Leg	2.50	0.0000	90.00	No Ice	1.96	1.19	74.95
(Dish Wireless)			0.00			1/2" Ice	2.14	1.33	92.92
			0.00			1" Ice	2.32	1.48	113.67
***									
TA08025-B605	C	From Leg	2.50	0.0000	90.00	No Ice	1.96	1.19	74.95
(Dish Wireless)			0.00			1/2" Ice	2.14	1.33	92.92
			0.00			1" Ice	2.32	1.48	113.67
***									
Platform Mount	A	None		0.0000	90.00	No Ice	27.78	27.78	1400.00
(Dish Wireless)						1/2" Ice	30.50	30.50	2800.00
						1" Ice	31.00	31.00	4200.00
***									
***									
(2) APX15PV-15PVL	A	From Leg	3.00	0.0000	97.50	No Ice	6.11	2.03	39.86
(T-Mobile)			0.00			1/2" Ice	6.47	2.35	71.29
			0.00			1" Ice	6.84	2.69	107.43
***									
(2) APX15PV-15PVL	B	From Leg	3.00	0.0000	97.50	No Ice	6.11	2.03	39.86
(T-Mobile)			0.00			1/2" Ice	6.47	2.35	71.29
			0.00			1" Ice	6.84	2.69	107.43
***									
(2) APX15PV-15PVL	C	From Leg	3.00	0.0000	97.50	No Ice	6.11	2.03	39.86
(T-Mobile)			0.00			1/2" Ice	6.47	2.35	71.29
			0.00			1" Ice	6.84	2.69	107.43
***									
Platfrom Mount	A	None		0.0000	97.50	No Ice	30.00	30.00	1425.00
(T-Mobile)						1/2" Ice	30.50	30.50	2850.00
						1" Ice	31.00	31.00	4275.00
***									
T-Mobile Reserved Loading									
T-Mobile 1/3 of Remainder	A	From Leg	0.00	0.0000	97.50	No Ice	30.00	15.00	1000.00
Reserved			0.00			1/2" Ice	40.00	20.00	2000.00
(T-Mobile)			0.00			1" Ice	50.00	25.00	3000.00
***									
T-Mobile 1/3 of Remainder	B	From Leg	0.00	0.0000	97.50	No Ice	30.00	15.00	1000.00
Reserved			0.00			1/2" Ice	40.00	20.00	2000.00
(T-Mobile)			0.00			1" Ice	50.00	25.00	3000.00
***									
T-Mobile 1/3 of Remainder	C	From Leg	0.00	0.0000	97.50	No Ice	30.00	15.00	1000.00
Reserved			0.00			1/2" Ice	40.00	20.00	2000.00
(T-Mobile)			0.00			1" Ice	50.00	25.00	3000.00
***									
***									
TA08025-B604	A	From Leg	2.50	0.0000	90.00	No Ice	1.96	1.03	63.93
(Dish Wireless)			0.00			1/2" Ice	2.14	1.17	80.68
			0.00			1" Ice	2.32	1.31	100.13
***									
TA08025-B604	B	From Leg	2.50	0.0000	90.00	No Ice	1.96	1.03	63.93
(Dish Wireless)			0.00			1/2" Ice	2.14	1.17	80.68
			0.00			1" Ice	2.32	1.31	100.13

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
***									
TA08025-B604	C	From Leg	2.50	0.0000	90.00	No Ice	1.96	1.03	63.93
(Dish Wireless)			0.00			1/2" Ice	2.14	1.17	80.68
			0.00			1" Ice	2.32	1.31	100.13
***									
MX08FRO665-20_V0F	A	From Leg	3.00	0.0000	90.00	No Ice	12.49	5.87	54.00
(Dish Wireless)			0.00			1/2" Ice	12.99	6.32	127.79
			0.00			1" Ice	13.49	6.79	208.26
***									
MX08FRO665-20_V0F	B	From Leg	3.00	0.0000	90.00	No Ice	12.49	5.87	54.00
(Dish Wireless)			0.00			1/2" Ice	12.99	6.32	127.79
			0.00			1" Ice	13.49	6.79	208.26
***									
MX08FRO665-20_V0F	C	From Leg	3.00	0.0000	90.00	No Ice	12.49	5.87	54.00
(Dish Wireless)			0.00			1/2" Ice	12.99	6.32	127.79
			0.00			1" Ice	13.49	6.79	208.26
***									
TA08025-B605	A	From Leg	2.50	0.0000	90.00	No Ice	1.96	1.19	74.95
(Dish Wireless)			0.00			1/2" Ice	2.14	1.33	92.92
			0.00			1" Ice	2.32	1.48	113.67
***									
TA08025-B605	B	From Leg	2.50	0.0000	90.00	No Ice	1.96	1.19	74.95
(Dish Wireless)			0.00			1/2" Ice	2.14	1.33	92.92
			0.00			1" Ice	2.32	1.48	113.67
***									
TA08025-B605	C	From Leg	2.50	0.0000	90.00	No Ice	1.96	1.19	74.95
(Dish Wireless)			0.00			1/2" Ice	2.14	1.33	92.92
			0.00			1" Ice	2.32	1.48	113.67
***									
****Dish Reserved Loading***									
Dish 1/3 of Remainder	A	From Leg	0.00	0.0000	90.00	No Ice	6.40	3.20	140.00
Reserved			0.00			1/2" Ice	7.00	3.80	280.00
(Dish Wireless)			0.00			1" Ice	7.60	4.40	420.00
***									
Dish 1/3 of Remainder	B	From Leg	0.00	0.0000	90.00	No Ice	6.40	3.20	140.00
Reserved			0.00			1/2" Ice	7.00	3.80	280.00
(Dish Wireless)			0.00			1" Ice	7.60	4.40	420.00
***									
Dish 1/3 of Remainder	C	From Leg	0.00	0.0000	90.00	No Ice	6.40	3.20	140.00
Reserved			0.00			1/2" Ice	7.00	3.80	280.00
(Dish Wireless)			0.00			1" Ice	7.60	4.40	420.00

Tower Pressures - No Ice

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 97.50-50.79	73.13	1.185	34	77.061	A	0.000	77.061	77.061	100.00	4.671	0.000
					B	0.000	77.061		100.00	0.000	0.000
					C	0.000	77.061		100.00	6.274	0.000
L2 50.79-1.50	26.20	0.955	27	109.676	A	0.000	109.676	109.676	100.00	4.929	0.000
					B	0.000	109.676		100.00	0.000	0.000
					C	0.000	109.676		100.00	7.646	0.000

Tower Pressure - With Ice

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 97.50-50.79	73.13	1.185	4	0.9204	84.226	A	0.000	84.226	84.226	100.00	21.868	0.000
						B	0.000	84.226		100.00	0.000	0.000
						C	0.000	84.226		100.00	13.491	0.000
L2 50.79-1.50	26.20	0.955	3	0.8306	117.237	A	0.000	117.237	117.237	100.00	23.076	0.000
						B	0.000	117.237		100.00	0.000	0.000
						C	0.000	117.237		100.00	16.444	0.000

Tower Pressure - Service

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 97.50-50.79	73.13	1.185	9	77.061	A	0.000	77.061	77.061	100.00	4.671	0.000
					B	0.000	77.061		100.00	0.000	0.000
					C	0.000	77.061		100.00	6.274	0.000
L2 50.79-1.50	26.20	0.955	7	109.676	A	0.000	109.676	109.676	100.00	4.929	0.000
					B	0.000	109.676		100.00	0.000	0.000
					C	0.000	109.676		100.00	7.646	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 97.50-50.79	220.72	1920.63	A	1	0.73	34	1	1	77.061	2127.44	45.55	C
			B	1	0.73		1	1	77.061			
			C	1	0.73		1	1	77.061			
L2 50.79-1.50	237.28	3859.93	A	1	0.73	27	1	1	109.676	2397.60	48.64	C
			B	1	0.73		1	1	109.676			
			C	1	0.73		1	1	109.676			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
Sum Weight:	457.99	5780.55						OTM	211597.60 lb-ft	4525.04		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 97.50-50.79	220.72	1920.63	A	1	0.73	34	1	1	77.061	2127.44	45.55	C
			B	1	0.73		1	1	77.061			
			C	1	0.73		1	1	77.061			
L2 50.79-1.50	237.28	3859.93	A	1	0.73	27	1	1	109.676	2397.60	48.64	C
			B	1	0.73		1	1	109.676			
			C	1	0.73		1	1	109.676			
Sum Weight:	457.99	5780.55						OTM	211597.60 lb-ft	4525.04		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 97.50-50.79	220.72	1920.63	A	1	0.73	34	1	1	77.061	2127.44	45.55	C
			B	1	0.73		1	1	77.061			
			C	1	0.73		1	1	77.061			
L2 50.79-1.50	237.28	3859.93	A	1	0.73	27	1	1	109.676	2397.60	48.64	C
			B	1	0.73		1	1	109.676			
			C	1	0.73		1	1	109.676			
Sum Weight:	457.99	5780.55						OTM	211597.60 lb-ft	4525.04		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 97.50-50.79	481.05	3005.58	A	1	1.2	4	1	1	84.226	478.95	10.25	C
			B	1	1.2		1	1	84.226			
			C	1	1.2		1	1	84.226			
L2 50.79-1.50	530.17	5232.67	A	1	1.2	3	1	1	116.500	524.58	10.64	C
			B	1	1.2		1	1	116.500			

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Section Elevation *ft*	*Add Weight* *lb*	*Self Weight* *lb*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E ft^2	*F* *lb*	*w* *plf*	*Ctrl. Face*
			C	1	1.2		1	1	116.500			
Sum Weight:	1011.22	8238.25						OTM	47261.79 lb-ft	1003.53		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation *ft*	*Add Weight* *lb*	*Self Weight* *lb*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E ft^2	*F* *lb*	*w* *plf*	*Ctrl. Face*
L1 97.50-50.79	481.05	3005.58	A	1	1.2	4	1	1	84.226	478.95	10.25	C
			B	1	1.2		1	1	84.226			
			C	1	1.2		1	1	84.226			
L2 50.79-1.50	530.17	5232.67	A	1	1.2	3	1	1	116.500	524.58	10.64	C
			B	1	1.2		1	1	116.500			
			C	1	1.2		1	1	116.500			
Sum Weight:	1011.22	8238.25						OTM	47261.79 lb-ft	1003.53		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation *ft*	*Add Weight* *lb*	*Self Weight* *lb*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E ft^2	*F* *lb*	*w* *plf*	*Ctrl. Face*
L1 97.50-50.79	481.05	3005.58	A	1	1.2	4	1	1	84.226	478.95	10.25	C
			B	1	1.2		1	1	84.226			
			C	1	1.2		1	1	84.226			
L2 50.79-1.50	530.17	5232.67	A	1	1.2	3	1	1	116.500	524.58	10.64	C
			B	1	1.2		1	1	116.500			
			C	1	1.2		1	1	116.500			
Sum Weight:	1011.22	8238.25						OTM	47261.79 lb-ft	1003.53		

Tower Forces - Service - Wind Normal To Face

Section Elevation *ft*	*Add Weight* *lb*	*Self Weight* *lb*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E ft^2	*F* *lb*	*w* *plf*	*Ctrl. Face*
L1 97.50-50.79	220.72	1920.63	A	1	0.73	9	1	1	77.061	564.90	12.09	C
			B	1	0.73		1	1	77.061			
			C	1	0.73		1	1	77.061			
L2 50.79-1.50	237.28	3859.93	A	1	0.73	7	1	1	109.676	636.64	12.92	C

Section Elevation *ft*	*Add Weight* *lb*	*Self Weight* *lb*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E ft^2	*F* *lb*	*w* *plf*	*Ctrl. Face*
			B	1	0.73		1	1	109.676			
			C	1	0.73		1	1	109.676			
Sum Weight:	457.99	5780.55						OTM	56185.99 lb-ft	1201.54		

Tower Forces - Service - Wind 60 To Face

Section Elevation *ft*	*Add Weight* *lb*	*Self Weight* *lb*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E ft^2	*F* *lb*	*w* *plf*	*Ctrl. Face*
L1 97.50-50.79	220.72	1920.63	A	1	0.73	9	1	1	77.061	564.90	12.09	C
			B	1	0.73		1	1	77.061			
			C	1	0.73		1	1	77.061			
L2 50.79-1.50	237.28	3859.93	A	1	0.73	7	1	1	109.676	636.64	12.92	C
			B	1	0.73		1	1	109.676			
			C	1	0.73		1	1	109.676			
Sum Weight:	457.99	5780.55						OTM	56185.99 lb-ft	1201.54		

Tower Forces - Service - Wind 90 To Face

Section Elevation *ft*	*Add Weight* *lb*	*Self Weight* *lb*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E ft^2	*F* *lb*	*w* *plf*	*Ctrl. Face*
L1 97.50-50.79	220.72	1920.63	A	1	0.73	9	1	1	77.061	564.90	12.09	C
			B	1	0.73		1	1	77.061			
			C	1	0.73		1	1	77.061			
L2 50.79-1.50	237.28	3859.93	A	1	0.73	7	1	1	109.676	636.64	12.92	C
			B	1	0.73		1	1	109.676			
			C	1	0.73		1	1	109.676			
Sum Weight:	457.99	5780.55						OTM	56185.99 lb-ft	1201.54		

Force Totals

Load Case	*Vertical Forces* *lb*	*Sum of Forces X* *lb*	*Sum of Forces Z* *lb*	*Sum of Overturning Moments,* M_x *lb-ft*	*Sum of Overturning Moments,* M_z *lb-ft*	*Sum of Torques* *lb-ft*
Leg Weight	5780.55					
Bracing Weight	0.00					
Total Member Self-Weight	5780.55			-37.47	59.77	

Load Case	*Vertical Forces* *lb*	*Sum of Forces X* *lb*	*Sum of Forces Z* *lb*	*Sum of Overturning Moments, M_x* *lb-ft*	*Sum of Overturning Moments, M_z* *lb-ft*	*Sum of Torques* *lb-ft*
Total Weight	13931.84			-37.47	59.77	
Wind 0 deg - No Ice		0.00	-12394.63	-939487.16	59.77	0.00
Wind 30 deg - No Ice		6199.43	-10734.06	-813624.77	-469852.15	-51.28
Wind 60 deg - No Ice		10737.72	-6197.31	-469762.32	-813851.56	-88.82
Wind 90 deg - No Ice		12398.85	0.00	-37.47	-939764.08	-102.56
Wind 120 deg - No Ice		10737.72	6197.31	469687.37	-813851.56	-88.82
Wind 150 deg - No Ice		6199.43	10734.06	813549.82	-469852.15	-51.28
Wind 180 deg - No Ice		0.00	12394.63	939412.21	59.77	0.00
Wind 210 deg - No Ice		-6199.43	10734.06	813549.82	469971.69	51.28
Wind 240 deg - No Ice		-10737.72	6197.31	469687.37	813971.09	88.82
Wind 270 deg - No Ice		-12398.85	0.00	-37.47	939883.61	102.56
Wind 300 deg - No Ice		-10737.72	-6197.31	-469762.32	813971.09	88.82
Wind 330 deg - No Ice		-6199.43	-10734.06	-813624.77	469971.69	51.28
Member Ice	2457.69					
Total Weight Ice	30464.17			-6.70	320.17	
Wind 0 deg - Ice		0.00	-2253.92	-163408.26	320.17	0.00
Wind 30 deg - Ice		1127.27	-1951.95	-141516.60	-81407.73	-19.67
Wind 60 deg - Ice		1952.49	-1126.96	-81707.48	-141236.70	-34.07
Wind 90 deg - Ice		2254.54	0.00	-6.70	-163135.63	-39.35
Wind 120 deg - Ice		1952.49	1126.96	81694.09	-141236.70	-34.07
Wind 150 deg - Ice		1127.27	1951.95	141503.21	-81407.73	-19.67
Wind 180 deg - Ice		0.00	2253.92	163394.87	320.17	0.00
Wind 210 deg - Ice		-1127.27	1951.95	141503.21	82048.06	19.67
Wind 240 deg - Ice		-1952.49	1126.96	81694.09	141877.04	34.07
Wind 270 deg - Ice		-2254.54	0.00	-6.70	163775.96	39.35
Wind 300 deg - Ice		-1952.49	-1126.96	-81707.48	141877.04	34.07
Wind 330 deg - Ice		-1127.27	-1951.95	-141516.60	82048.06	19.67
Total Weight	13931.84			-37.47	59.77	
Wind 0 deg - Service		0.00	-3291.17	-249579.82	0.00	0.00
Wind 30 deg - Service		1646.15	-2850.24	-216159.29	-124776.79	-13.62
Wind 60 deg - Service		2851.21	-1645.59	-124852.71	-216119.73	-23.58
Wind 90 deg - Service		3292.30	0.00	-125.60	-249553.57	-27.23
Wind 120 deg - Service		2851.21	1645.59	124601.51	-216119.73	-23.58
Wind 150 deg - Service		1646.15	2850.24	215908.09	-124776.79	-13.62
Wind 180 deg - Service		0.00	3291.17	249328.62	0.00	0.00
Wind 210 deg - Service		-1646.15	2850.24	215908.09	124776.79	13.62
Wind 240 deg - Service		-2851.21	1645.59	124601.51	216119.73	23.58
Wind 270 deg - Service		-3292.30	0.00	-125.60	249553.57	27.23
Wind 300 deg - Service		-2851.21	-1645.59	-124852.71	216119.73	23.58
Wind 330 deg - Service		-1646.15	-2850.24	-216159.29	124776.79	13.62

Load Combinations

Comb. No.	*Description*
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice

Comb. No.	Description
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L1	97.5 - 50.79	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-26353.11	133.40	163.46
			Max. Mx	20	-10483.11	409666.71	122.53
			Max. My	2	-10483.94	31.98	409591.46
			Max. Vy	20	-10994.49	409666.71	122.53
			Max. Vx	2	-10989.92	31.98	409591.46
			Max. Torque	20			-122.49
L2	50.79 - 1.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-33345.79	337.99	23.26
			Max. Mx	20	-16686.66	1031731.55	59.90
			Max. My	2	-16686.68	78.95	1031308.50
			Max. Vy	20	-12441.28	1031731.55	59.90
			Max. Vx	2	-12437.04	78.95	1031308.50
			Max. Torque	20			-120.95

Section No.	*Elevation ft*	*Component Type*	*Condition*	*Gov. Load Comb.*	*Axial lb*	*Major Axis Moment lb-ft*	*Minor Axis Moment lb-ft*

Maximum Reactions

Location	*Condition*	*Gov. Load Comb.*	*Vertical lb*	*Horizontal, X lb*	*Horizontal, Z lb*
Pole	Max. Vert	36	33345.79	2254.74	0.00
	Max. H_x	20	16718.21	12398.86	0.00
	Max. H_z	2	16718.21	0.00	12394.63
	Max. M_x	2	1031308.50	0.00	12394.63
	Max. M_z	8	1031575.43	-12398.86	0.00
	Max. Torsion	8	119.76	-12398.86	0.00
	Min. Vert	25	12538.65	6199.43	10734.06
	Min. H_x	8	16718.21	-12398.86	0.00
	Min. H_z	14	16718.21	0.00	-12394.63
	Min. M_x	14	-1031183.63	0.00	-12394.63
	Min. M_z	20	-1031731.55	12398.86	0.00
	Min. Torsion	20	-119.76	12398.86	0.00

Tower Mast Reaction Summary

Load Combination	*Vertical lb*	*Shear$_x$ lb*	*Shear$_z$ lb*	*Overturning Moment, M_x lb-ft*	*Overturning Moment, M_z lb-ft*	*Torque lb-ft*
Dead Only	13931.84	0.00	0.00	-37.47	59.77	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	16718.21	-0.00	-12394.63	-1031308.50	78.95	-0.01
0.9 Dead+1.0 Wind 0 deg - No Ice	12538.65	-0.00	-12394.63	-1005100.56	57.66	-0.01
1.2 Dead+1.0 Wind 30 deg - No Ice	16718.20	6199.43	-10734.06	-893158.95	-515758.14	-59.90
0.9 Dead+1.0 Wind 30 deg - No Ice	12538.65	6199.43	-10734.06	-870449.61	-502673.60	-57.10
1.2 Dead+1.0 Wind 60 deg - No Ice	16718.20	10737.72	-6197.31	-515689.39	-893374.49	-103.77
0.9 Dead+1.0 Wind 60 deg - No Ice	12538.65	10737.72	-6197.31	-502570.48	-870696.19	-98.99
1.2 Dead+1.0 Wind 90 deg - No Ice	16718.21	12398.86	-0.00	-59.81	-1031575.43	-119.76
0.9 Dead+1.0 Wind 90 deg - No Ice	12538.65	12398.85	-0.00	-41.08	-1005397.75	-114.21
1.2 Dead+1.0 Wind 120 deg - No Ice	16718.20	10737.72	6197.31	515568.48	-893372.20	-103.64
0.9 Dead+1.0 Wind 120 deg - No Ice	12538.65	10737.72	6197.31	502487.43	-870694.63	-98.82
1.2 Dead+1.0 Wind 150 deg - No Ice	16718.20	6199.43	10734.06	893035.39	-515755.85	-59.85
0.9 Dead+1.0 Wind 150 deg - No Ice	12538.65	6199.43	10734.06	870364.76	-502672.04	-57.10
1.2 Dead+1.0 Wind 180 deg - No Ice	16718.21	-0.00	12394.63	1031183.63	78.95	0.01
0.9 Dead+1.0 Wind 180 deg - No Ice	12538.65	-0.00	12394.63	1005014.80	57.66	0.01

Load Combination	*Vertical* *lb*	*Shear$_x$* *lb*	*Shear$_z$* *lb*	*Overturning Moment, M_x* *lb-ft*	*Overturning Moment, M_z* *lb-ft*	*Torque* *lb-ft*
1.2 Dead+1.0 Wind 210 deg - No Ice	16718.20	-6199.43	10734.06	893034.63	515913.30	59.87
0.9 Dead+1.0 Wind 210 deg - No Ice	12538.65	-6199.43	10734.06	870364.25	502787.07	57.12
1.2 Dead+1.0 Wind 240 deg - No Ice	16718.20	-10737.72	6197.31	515567.72	893528.76	103.65
0.9 Dead+1.0 Wind 240 deg - No Ice	12538.65	-10737.72	6197.31	502486.92	870809.07	98.83
1.2 Dead+1.0 Wind 270 deg - No Ice	16718.21	-12398.86	-0.00	-59.81	1031731.55	119.76
0.9 Dead+1.0 Wind 270 deg - No Ice	12538.65	-12398.85	-0.00	-41.08	1005511.90	114.21
1.2 Dead+1.0 Wind 300 deg - No Ice	16718.20	-10737.72	-6197.31	-515688.62	893531.05	103.76
0.9 Dead+1.0 Wind 300 deg - No Ice	12538.65	-10737.72	-6197.31	-502569.97	870810.63	98.99
1.2 Dead+1.0 Wind 330 deg - No Ice	16718.20	-6199.43	-10734.06	-893158.18	515915.59	59.88
0.9 Dead+1.0 Wind 330 deg - No Ice	12538.65	-6199.43	-10734.06	-870449.10	502788.63	57.09
1.2 Dead+1.0 Ice+1.0 Temp	33345.79	-0.00	-0.00	-23.26	337.99	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	33345.79	-0.00	-2254.12	-210555.67	432.90	0.01
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	33345.79	1127.37	-1952.13	-182358.57	-104836.37	-22.81
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	33345.79	1952.66	-1127.06	-105322.21	-181898.19	-39.54
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	33345.79	2254.74	-0.00	-88.47	-210104.19	-45.64
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	33345.79	1952.66	1127.06	105144.73	-181897.26	-39.51
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	33345.79	1127.37	1952.13	182180.03	-104835.44	-22.82
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	33345.79	-0.00	2254.12	210376.60	432.90	0.02
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	33345.79	-1127.37	1952.13	182179.81	105701.10	22.85
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	33345.79	-1952.66	1127.06	105144.52	182762.66	39.54
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	33345.79	-2254.74	-0.00	-88.47	210969.46	45.67
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	33345.79	-1952.66	-1127.06	-105321.98	182763.59	39.56
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	33345.79	-1127.37	-1952.13	-182358.34	105702.03	22.83
Dead+Wind 0 deg - Service	13931.84	-0.00	-3291.17	-270479.09	64.95	-0.00
Dead+Wind 30 deg - Service	13931.84	1646.15	-2850.24	-234248.56	-135203.26	-15.92
Dead+Wind 60 deg - Service	13931.84	2851.21	-1645.59	-135264.89	-234226.36	-27.58
Dead+Wind 90 deg - Service	13931.84	3292.30	-0.00	-50.72	-270471.24	-31.84
Dead+Wind 120 deg - Service	13931.84	2851.21	1645.59	135163.37	-234226.23	-27.56
Dead+Wind 150 deg - Service	13931.84	1646.15	2850.24	234146.89	-135203.13	-15.92
Dead+Wind 180 deg - Service	13931.84	-0.00	3291.17	270377.34	64.95	0.00
Dead+Wind 210 deg - Service	13931.84	-1646.15	2850.24	234146.85	135333.01	15.92
Dead+Wind 240 deg - Service	13931.84	-2851.21	1645.59	135163.33	234356.06	27.57
Dead+Wind 270 deg - Service	13931.84	-3292.30	-0.00	-50.72	270601.04	31.84
Dead+Wind 300 deg - Service	13931.84	-2851.21	-1645.59	-135264.85	234356.19	27.58
Dead+Wind 330 deg - Service	13931.84	-1646.15	-2850.24	-234248.52	135333.14	15.92

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
1	0.00	-13931.84	0.00	0.00	13931.84	0.00	0.000%
2	0.00	-16718.20	-12394.63	0.00	16718.21	12394.63	0.000%
3	0.00	-12538.65	-12394.63	0.00	12538.65	12394.63	0.000%
4	6199.43	-16718.20	-10734.06	-6199.43	16718.20	10734.06	0.000%
5	6199.43	-12538.65	-10734.06	-6199.43	12538.65	10734.06	0.000%
6	10737.72	-16718.20	-6197.31	-10737.72	16718.20	6197.31	0.000%
7	10737.72	-12538.65	-6197.31	-10737.72	12538.65	6197.31	0.000%
8	12398.85	-16718.20	0.00	-12398.86	16718.21	0.00	0.000%
9	12398.85	-12538.65	0.00	-12398.85	12538.65	0.00	0.000%
10	10737.72	-16718.20	6197.31	-10737.72	16718.20	-6197.31	0.000%
11	10737.72	-12538.65	6197.31	-10737.72	12538.65	-6197.31	0.000%
12	6199.43	-16718.20	10734.06	-6199.43	16718.20	-10734.06	0.000%
13	6199.43	-12538.65	10734.06	-6199.43	12538.65	-10734.06	0.000%
14	0.00	-16718.20	12394.63	0.00	16718.21	-12394.63	0.000%
15	0.00	-12538.65	12394.63	0.00	12538.65	-12394.63	0.000%
16	-6199.43	-16718.20	10734.06	6199.43	16718.20	-10734.06	0.000%
17	-6199.43	-12538.65	10734.06	6199.43	12538.65	-10734.06	0.000%
18	-10737.72	-16718.20	6197.31	10737.72	16718.20	-6197.31	0.000%
19	-10737.72	-12538.65	6197.31	10737.72	12538.65	-6197.31	0.000%
20	-12398.85	-16718.20	0.00	12398.86	16718.21	0.00	0.000%
21	-12398.85	-12538.65	0.00	12398.85	12538.65	0.00	0.000%
22	-10737.72	-16718.20	-6197.31	10737.72	16718.20	6197.31	0.000%
23	-10737.72	-12538.65	-6197.31	10737.72	12538.65	6197.31	0.000%
24	-6199.43	-16718.20	-10734.06	6199.43	16718.20	10734.06	0.000%
25	-6199.43	-12538.65	-10734.06	6199.43	12538.65	10734.06	0.000%
26	0.00	-33345.79	0.00	0.00	33345.79	0.00	0.000%
27	0.00	-33345.79	-2253.92	0.00	33345.79	2254.12	0.001%
28	1127.27	-33345.79	-1951.95	-1127.37	33345.79	1952.13	0.001%
29	1952.49	-33345.79	-1126.96	-1952.66	33345.79	1127.06	0.001%
30	2254.54	-33345.79	0.00	-2254.74	33345.79	0.00	0.001%
31	1952.49	-33345.79	1126.96	-1952.66	33345.79	-1127.06	0.001%
32	1127.27	-33345.79	1951.95	-1127.37	33345.79	-1952.13	0.001%
33	0.00	-33345.79	2253.92	0.00	33345.79	-2254.12	0.001%
34	-1127.27	-33345.79	1951.95	1127.37	33345.79	-1952.13	0.001%
35	-1952.49	-33345.79	1126.96	1952.66	33345.79	-1127.06	0.001%
36	-2254.54	-33345.79	0.00	2254.74	33345.79	0.00	0.001%
37	-1952.49	-33345.79	-1126.96	1952.66	33345.79	1127.06	0.001%
38	-1127.27	-33345.79	-1951.95	1127.37	33345.79	1952.13	0.001%
39	0.00	-13931.84	-3291.17	0.00	13931.84	3291.17	0.000%
40	1646.15	-13931.84	-2850.24	-1646.15	13931.84	2850.24	0.000%
41	2851.21	-13931.84	-1645.59	-2851.21	13931.84	1645.59	0.000%
42	3292.30	-13931.84	0.00	-3292.30	13931.84	0.00	0.000%
43	2851.21	-13931.84	1645.59	-2851.21	13931.84	-1645.59	0.000%
44	1646.15	-13931.84	2850.24	-1646.15	13931.84	-2850.24	0.000%
45	0.00	-13931.84	3291.17	0.00	13931.84	-3291.17	0.000%
46	-1646.15	-13931.84	2850.24	1646.15	13931.84	-2850.24	0.000%
47	-2851.21	-13931.84	1645.59	2851.21	13931.84	-1645.59	0.000%
48	-3292.30	-13931.84	0.00	3292.30	13931.84	0.00	0.000%
49	-2851.21	-13931.84	-1645.59	2851.21	13931.84	1645.59	0.000%
50	-1646.15	-13931.84	-2850.24	1646.15	13931.84	2850.24	0.000%

Non-Linear Convergence Results

Load Combination	*Converged?*	*Number of Cycles*	*Displacement Tolerance*	*Force Tolerance*
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00024884
3	Yes	5	0.00000001	0.00002553
4	Yes	7	0.00000001	0.00018304
5	Yes	6	0.00000001	0.00051416
6	Yes	7	0.00000001	0.00018415
7	Yes	6	0.00000001	0.00051743
8	Yes	5	0.00000001	0.00027112
9	Yes	5	0.00000001	0.00005397
10	Yes	7	0.00000001	0.00018261
11	Yes	6	0.00000001	0.00051301
12	Yes	7	0.00000001	0.00018370
13	Yes	6	0.00000001	0.00051623
14	Yes	5	0.00000001	0.00024864
15	Yes	5	0.00000001	0.00002551
16	Yes	7	0.00000001	0.00018373
17	Yes	6	0.00000001	0.00051630
18	Yes	7	0.00000001	0.00018264
19	Yes	6	0.00000001	0.00051307
20	Yes	5	0.00000001	0.00027115
21	Yes	5	0.00000001	0.00005397
22	Yes	7	0.00000001	0.00018418
23	Yes	6	0.00000001	0.00051749
24	Yes	7	0.00000001	0.00018307
25	Yes	6	0.00000001	0.00051423
26	Yes	4	0.00000001	0.00000001
27	Yes	6	0.00047952	0.00029723
28	Yes	6	0.00047793	0.00056802
29	Yes	6	0.00047783	0.00057495
30	Yes	6	0.00047930	0.00029639
31	Yes	6	0.00047761	0.00056350
32	Yes	6	0.00047752	0.00056921
33	Yes	6	0.00047906	0.00029589
34	Yes	6	0.00047750	0.00057356
35	Yes	6	0.00047759	0.00056690
36	Yes	6	0.00047928	0.00029789
37	Yes	6	0.00047781	0.00057849
38	Yes	6	0.00047790	0.00057242
39	Yes	5	0.00000001	0.00001513
40	Yes	5	0.00000001	0.00035775
41	Yes	5	0.00000001	0.00036339
42	Yes	5	0.00000001	0.00001729
43	Yes	5	0.00000001	0.00035509
44	Yes	5	0.00000001	0.00036045
45	Yes	5	0.00000001	0.00001509
46	Yes	5	0.00000001	0.00036089
47	Yes	5	0.00000001	0.00035545
48	Yes	5	0.00000001	0.00001730
49	Yes	5	0.00000001	0.00036376
50	Yes	5	0.00000001	0.00035819

Maximum Tower Deflections - Service Wind

Section No.	*Elevation ft*	*Horz. Deflection in*	*Gov. Load Comb.*	*Tilt °*	*Twist °*
L1	97.5 - 50.79	28.384	49	2.5211	0.0012

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L2	54.21 - 1.5	8.739	48	1.5431	0.0004

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
97.50	Lighting Rod 5/8" x 7'	49	28.384	2.5211	0.0012	11573
90.00	RDIDC-9181-PF-48	49	24.508	2.3626	0.0011	7715

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	97.5 - 50.79	108.284	20	9.6467	0.0047
L2	54.21 - 1.5	33.365	20	5.9004	0.0013

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
97.50	Lighting Rod 5/8" x 7'	20	108.284	9.6467	0.0047	3152
90.00	RDIDC-9181-PF-48	20	93.504	9.0392	0.0040	2100

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
L1	97.5 - 95.2216	TP23.05x16x0.1875	46.71	0.00	0.0	9.6151	-4944.00	562482.00	0.009
	95.2216 - 92.9432					9.8197	-5037.11	574454.00	0.009
	92.9432 - 90.6647					10.0244	-5134.05	586426.00	0.009
	90.6647 - 88.3863					10.2290	-8173.79	598398.00	0.014
	88.3863 - 86.1079					10.4337	-8286.25	610371.00	0.014

Section No.	*Elevation* *ft*	*Size*	*L* *ft*	L_u *ft*	*Kl/r*	*A* in^2	P_u *lb*	ϕP_n *lb*	*Ratio* $\frac{P_u}{\phi P_n}$
	86.1079 - 83.8295					10.6383	-8405.51	622343.00	0.014
	83.8295 - 81.5511					10.8430	-8532.18	634315.00	0.013
	81.5511 - 79.2726					11.0477	-8665.40	646288.00	0.013
	79.2726 - 76.9942					11.2523	-8804.83	658260.00	0.013
	76.9942 - 74.7158					11.4570	-8950.15	670232.00	0.013
	74.7158 - 72.4374					11.6616	-9100.56	682204.00	0.013
	72.4374 - 70.1589					11.8663	-9256.85	694177.00	0.013
	70.1589 - 67.8805					12.0709	-9418.26	706149.00	0.013
	67.8805 - 65.6021					12.2756	-9584.56	718121.00	0.013
	65.6021 - 63.3237					12.4802	-9755.56	730094.00	0.013
	63.3237 - 61.0453					12.6849	-9931.07	742066.00	0.013
	61.0453 - 58.7668					12.8895	-10110.90	754038.00	0.013
	58.7668 - 56.4884					13.0942	-10295.00	766011.00	0.013
	56.4884 - 54.21					13.2989	-10483.10	777983.00	0.013
	54.21 - 50.79					13.6060	-4762.73	795954.00	0.006
L2	54.21 - 50.79	TP30x22.1588x0.25	52.71	0.00	0.0	17.7883	-6225.30	1040620.00	0.006
	50.79 - 48.1958					18.0946	-11238.60	1058530.00	0.011
	48.1958 - 45.6016					18.4008	-11502.00	1076450.00	0.011
	45.6016 - 43.0074					18.7070	-11770.60	1094360.00	0.011
	43.0074 - 40.4132					19.0132	-12044.20	1112280.00	0.011
	40.4132 - 37.8189					19.3195	-12322.80	1130190.00	0.011
	37.8189 - 35.2247					19.6257	-12606.10	1148100.00	0.011
	35.2247 - 32.6305					19.9319	-12894.10	1166020.00	0.011
	32.6305 - 30.0363					20.2381	-13186.80	1183930.00	0.011
	30.0363 - 27.4421					20.5444	-13483.90	1201850.00	0.011
	27.4421 - 24.8479					20.8506	-13785.50	1219760.00	0.011
	24.8479 - 22.2537					21.1568	-14091.40	1237670.00	0.011
	22.2537 - 19.6595					21.4630	-14401.60	1255590.00	0.011
	19.6595 - 17.0653					21.7693	-14716.00	1273500.00	0.012
	17.0653 - 14.4711					22.0755	-15034.50	1291420.00	0.012
	14.4711 - 11.8768					22.3817	-15357.00	1309330.00	0.012

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
	11.8768 - 9.28263					22.6880	-15683.60	1327250.00	0.012
	9.28263 - 6.68842					22.9942	-16014.10	1345160.00	0.012
	6.68842 - 4.09421					23.3004	-16348.50	1363070.00	0.012
	4.09421 - 1.5					23.6066	-16686.70	1380990.00	0.012

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	97.5 - 95.2216	TP23.05x16x0.1875	11878.33	236449.17	0.050	0.00	236449.17	0.000
	95.2216 - 92.9432		23759.17	246680.83	0.096	0.00	246680.83	0.000
	92.9432 - 90.6647		35880.83	257129.17	0.140	0.00	257129.17	0.000
	90.6647 - 88.3863		55095.42	267794.17	0.206	0.00	267794.17	0.000
	88.3863 - 86.1079		77347.58	278675.83	0.278	0.00	278675.83	0.000
	86.1079 - 83.8295		99815.83	289574.17	0.345	0.00	289574.17	0.000
	83.8295 - 81.5511		122504.17	299496.67	0.409	0.00	299496.67	0.000
	81.5511 - 79.2726		145400.00	309530.00	0.470	0.00	309530.00	0.000
	79.2726 - 76.9942		168497.50	319670.83	0.527	0.00	319670.83	0.000
	76.9942 - 74.7158		191792.50	329915.83	0.581	0.00	329915.83	0.000
	74.7158 - 72.4374		215277.50	340262.50	0.633	0.00	340262.50	0.000
	72.4374 - 70.1589		238958.33	350708.33	0.681	0.00	350708.33	0.000
	70.1589 - 67.8805		262824.17	361249.17	0.728	0.00	361249.17	0.000
	67.8805 - 65.6021		286870.00	371882.50	0.771	0.00	371882.50	0.000
	65.6021 - 63.3237		311092.50	382605.83	0.813	0.00	382605.83	0.000
	63.3237 - 61.0453		335489.17	393415.00	0.853	0.00	393415.00	0.000
	61.0453 - 58.7668		360056.67	404308.33	0.891	0.00	404308.33	0.000
	58.7668 - 56.4884		384791.67	415282.50	0.927	0.00	415282.50	0.000
	56.4884 - 54.21		409692.50	426334.17	0.961	0.00	426334.17	0.000
	54.21 - 50.79		198320.83	443061.67	0.448	0.00	443061.67	0.000
L2	54.21 - 50.79	TP30x22.1588x0.25	249182.50	607239.17	0.410	0.00	607239.17	0.000
	50.79 - 48.1958		476536.67	628444.17	0.758	0.00	628444.17	0.000
	48.1958 - 45.6016		505800.00	650012.50	0.778	0.00	650012.50	0.000

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Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
	45.6016 - 43.0074		535285.83	671944.17	0.797	0.00	671944.17	0.000
	43.0074 - 40.4132		564986.67	692877.50	0.815	0.00	692877.50	0.000
	40.4132 - 37.8189		594898.33	712718.33	0.835	0.00	712718.33	0.000
	37.8189 - 35.2247		625013.33	732743.33	0.853	0.00	732743.33	0.000
	35.2247 - 32.6305		655323.33	752950.00	0.870	0.00	752950.00	0.000
	32.6305 - 30.0363		685820.83	773332.50	0.887	0.00	773332.50	0.000
	30.0363 - 27.4421		716499.17	793888.33	0.903	0.00	793888.33	0.000
	27.4421 - 24.8479		747351.67	814610.83	0.917	0.00	814610.83	0.000
	24.8479 - 22.2537		778370.83	835500.00	0.932	0.00	835500.00	0.000
	22.2537 - 19.6595		809550.00	856541.67	0.945	0.00	856541.67	0.000
	19.6595 - 17.0653		840883.33	877750.00	0.958	0.00	877750.00	0.000
	17.0653 - 14.4711		872366.67	899100.00	0.970	0.00	899100.00	0.000
	14.4711 - 11.8768		903983.33	920600.00	0.982	0.00	920600.00	0.000
	11.8768 - 9.28263		935733.33	942241.67	0.993	0.00	942241.67	0.000
	9.28263 - 6.68842		967616.67	964025.00	1.004	0.00	964025.00	0.000
	6.68842 - 4.09421		999616.67	985941.67	1.014	0.00	985941.67	0.000
	4.09421 - 1.5		1031733.33	1007983.33	1.024	0.00	1007983.33	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	97.5 - 95.2216	TP23.05x16x0.1875	5163.21	168744.00	0.031	0.00	238755.83	0.000
	95.2216 - 92.9432		5270.03	172336.00	0.031	0.00	249027.50	0.000
	92.9432 - 90.6647		5376.49	175928.00	0.031	0.00	259515.83	0.000
	90.6647 - 88.3863		9724.18	179520.00	0.054	0.01	270220.00	0.000
	88.3863 - 86.1079		9824.31	183111.00	0.054	0.01	281140.83	0.000
	86.1079 - 83.8295		9923.03	186703.00	0.053	61.24	292278.33	0.000
	83.8295 - 81.5511		10017.20	190295.00	0.053	61.22	303631.67	0.000
	81.5511 - 79.2726		10108.80	193886.00	0.052	61.19	315201.67	0.000
	79.2726 - 76.9942		10197.90	197478.00	0.052	61.15	326988.33	0.000

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
	76.9942 - 74.7158		10284.90	201070.00	0.051	61.11	338990.83	0.000
	74.7158 - 72.4374		10372.20	204661.00	0.051	105.76	351209.17	0.000
	72.4374 - 70.1589		10455.20	208253.00	0.050	105.67	363645.00	0.000
	70.1589 - 67.8805		10536.60	211845.00	0.050	105.58	376296.67	0.000
	67.8805 - 65.6021		10616.30	215436.00	0.049	105.48	389164.17	0.000
	65.6021 - 63.3237		10694.50	219028.00	0.049	105.38	402248.33	0.000
	63.3237 - 61.0453		10771.20	222620.00	0.048	105.27	415549.17	0.000
	61.0453 - 58.7668		10846.60	226211.00	0.048	105.17	429065.83	0.000
	58.7668 - 56.4884		10920.70	229803.00	0.048	105.06	442799.17	0.000
	56.4884 - 54.21		10993.60	233395.00	0.047	104.96	456748.33	0.000
	54.21 - 50.79		4997.02	238786.00	0.021	46.47	478093.33	0.000
L2	54.21 - 50.79	TP30x22.1588x0.25	6169.99	312186.00	0.020	58.40	612888.33	0.000
	50.79 - 48.1958		11265.40	317560.00	0.035	104.79	634171.67	0.000
	48.1958 - 45.6016		11353.50	322934.00	0.035	104.69	655818.33	0.000
	45.6016 - 43.0074		11438.80	328308.00	0.035	104.60	677828.33	0.000
	43.0074 - 40.4132		11521.30	333683.00	0.035	104.51	700200.83	0.000
	40.4132 - 37.8189		11602.10	339057.00	0.034	120.53	722937.50	0.000
	37.8189 - 35.2247		11679.30	344431.00	0.034	120.43	746037.50	0.000
	35.2247 - 32.6305		11753.70	349805.00	0.034	120.34	769500.00	0.000
	32.6305 - 30.0363		11825.50	355180.00	0.033	120.25	793325.83	0.000
	30.0363 - 27.4421		11894.60	360554.00	0.033	120.17	817515.83	0.000
	27.4421 - 24.8479		11961.00	365928.00	0.033	120.10	842066.67	0.000
	24.8479 - 22.2537		12024.80	371302.00	0.032	120.03	866983.33	0.000
	22.2537 - 19.6595		12086.00	376677.00	0.032	119.97	892266.67	0.000
	19.6595 - 17.0653		12144.50	382051.00	0.032	119.92	917908.33	0.000
	17.0653 - 14.4711		12200.50	387425.00	0.031	119.87	943908.33	0.000
	14.4711 - 11.8768		12253.80	392799.00	0.031	119.84	970283.33	0.000
	11.8768 - 9.28263		12304.50	398174.00	0.031	119.81	997016.67	0.000
	9.28263 - 6.68842		12352.70	403548.00	0.031	119.78	1024108.33	0.000
	6.68842 - 4.09421		12398.30	408922.00	0.030	119.77	1051566.67	0.000
	4.09421 - 1.5		12441.30	414296.00	0.030	119.76	1079391.67	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	97.5 - 95.2216	0.009	0.050	0.000	0.031	0.000	0.060 ✔	1.050	4.8.2 ✔
	95.2216 - 92.9432	0.009	0.096	0.000	0.031	0.000	0.106 ✔	1.050	4.8.2 ✔
	92.9432 - 90.6647	0.009	0.140	0.000	0.031	0.000	0.149 ✔	1.050	4.8.2 ✔
	90.6647 - 88.3863	0.014	0.206	0.000	0.054	0.000	0.222 ✔	1.050	4.8.2 ✔
	88.3863 - 86.1079	0.014	0.278	0.000	0.054	0.000	0.294 ✔	1.050	4.8.2 ✔
	86.1079 - 83.8295	0.014	0.345	0.000	0.053	0.000	0.361 ✔	1.050	4.8.2 ✔
	83.8295 - 81.5511	0.013	0.409	0.000	0.053	0.000	0.425 ✔	1.050	4.8.2 ✔
	81.5511 - 79.2726	0.013	0.470	0.000	0.052	0.000	0.486 ✔	1.050	4.8.2 ✔
	79.2726 - 76.9942	0.013	0.527	0.000	0.052	0.000	0.543 ✔	1.050	4.8.2 ✔
	76.9942 - 74.7158	0.013	0.581	0.000	0.051	0.000	0.597 ✔	1.050	4.8.2 ✔
	74.7158 - 72.4374	0.013	0.633	0.000	0.051	0.000	0.649 ✔	1.050	4.8.2 ✔
	72.4374 - 70.1589	0.013	0.681	0.000	0.050	0.000	0.697 ✔	1.050	4.8.2 ✔
	70.1589 - 67.8805	0.013	0.728	0.000	0.050	0.000	0.743 ✔	1.050	4.8.2 ✔
	67.8805 - 65.6021	0.013	0.771	0.000	0.049	0.000	0.787 ✔	1.050	4.8.2 ✔
	65.6021 - 63.3237	0.013	0.813	0.000	0.049	0.000	0.829 ✔	1.050	4.8.2 ✔
	63.3237 - 61.0453	0.013	0.853	0.000	0.048	0.000	0.869 ✔	1.050	4.8.2 ✔
	61.0453 - 58.7668	0.013	0.891	0.000	0.048	0.000	0.906 ✔	1.050	4.8.2 ✔
	58.7668 - 56.4884	0.013	0.927	0.000	0.048	0.000	0.942 ✔	1.050	4.8.2 ✔
	56.4884 - 54.21	0.013	0.961	0.000	0.047	0.000	0.977 ✔	1.050	4.8.2 ✔
	54.21 - 50.79	0.006	0.448	0.000	0.021	0.000	0.454 ✔	1.050	4.8.2 ✔
L2	54.21 - 50.79	0.006	0.410	0.000	0.020	0.000	0.417 ✔	1.050	4.8.2 ✔
	50.79 - 48.1958	0.011	0.758	0.000	0.035	0.000	0.770 ✔	1.050	4.8.2 ✔
	48.1958 - 45.6016	0.011	0.778	0.000	0.035	0.000	0.790 ✔	1.050	4.8.2 ✔

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	45.6016 - 43.0074	0.011	0.797	0.000	0.035	0.000	0.809 ✔	1.050	4.8.2 ✔
	43.0074 - 40.4132	0.011	0.815	0.000	0.035	0.000	0.827 ✔	1.050	4.8.2 ✔
	40.4132 - 37.8189	0.011	0.835	0.000	0.034	0.000	0.847 ✔	1.050	4.8.2 ✔
	37.8189 - 35.2247	0.011	0.853	0.000	0.034	0.000	0.865 ✔	1.050	4.8.2 ✔
	35.2247 - 32.6305	0.011	0.870	0.000	0.034	0.000	0.883 ✔	1.050	4.8.2 ✔
	32.6305 - 30.0363	0.011	0.887	0.000	0.033	0.000	0.899 ✔	1.050	4.8.2 ✔
	30.0363 - 27.4421	0.011	0.903	0.000	0.033	0.000	0.915 ✔	1.050	4.8.2 ✔
	27.4421 - 24.8479	0.011	0.917	0.000	0.033	0.000	0.930 ✔	1.050	4.8.2 ✔
	24.8479 - 22.2537	0.011	0.932	0.000	0.032	0.000	0.944 ✔	1.050	4.8.2 ✔
	22.2537 - 19.6595	0.011	0.945	0.000	0.032	0.000	0.958 ✔	1.050	4.8.2 ✔
	19.6595 - 17.0653	0.012	0.958	0.000	0.032	0.000	0.971 ✔	1.050	4.8.2 ✔
	17.0653 - 14.4711	0.012	0.970	0.000	0.031	0.000	0.983 ✔	1.050	4.8.2 ✔
	14.4711 - 11.8768	0.012	0.982	0.000	0.031	0.000	0.995 ✔	1.050	4.8.2 ✔
	11.8768 - 9.28263	0.012	0.993	0.000	0.031	0.000	1.006 ✔	1.050	4.8.2 ✔
	9.28263 - 6.68842	0.012	1.004	0.000	0.031	0.000	1.017 ✔	1.050	4.8.2 ✔
	6.68842 - 4.09421	0.012	1.014	0.000	0.030	0.000	1.027 ✔	1.050	4.8.2 ✔
	4.09421 - 1.5	0.012	1.024	0.000	0.030	0.000	1.037 ✔	1.050	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
L1	97.5 - 50.79	Pole	TP23.05x16x0.1875	1	-10483.10	816882.11	93.0	Pass
L2	50.79 - 1.5	Pole	TP30x22.1588x0.25	2	-16686.70	1450039.43	98.7	Pass
							Summary	
						Pole (L2)	98.7	Pass
						RATING =	**98.7**	**Pass**

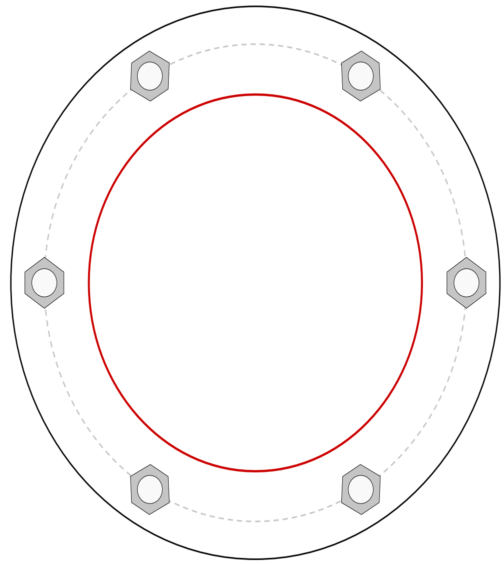
Monopole Base Plate Connection

Site Info	
SGS #	2101548
Site Name	E - Richard D Riddle Sch
Order #	

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	2

Applied Loads	
Moment (kip-ft)	1031.73
Axial Force (kips)	16.69
Shear Force (kips)	12.44

**TIA-222-H Section 15.5 Applied*



Connection Properties

Anchor Rod Data

(6) 2-1/4" ø bolts (A615-75 N; Fy=75 ksi, Fu=100 ksi) on 38" BC

Base Plate Data

44" OD x 1.75" Plate (A572-60; Fy=60 ksi, Fu=75 ksi)

Stiffener Data

N/A

Pole Data

30" x 0.25" 18-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

Anchor Rod Summary *(units of kips, kip-in)*

Pu_c = 219.68	ϕPn_c = 268.39	**Stress Rating**
Vu = 2.07	ϕVn = 120.77	**78.0%**
Mu = n/a	ϕMn = n/a	**Pass**

Base Plate Summary

Max Stress (ksi):	49.21	(Flexural)
Allowable Stress (ksi):	54	
Stress Rating:	**86.8%**	**Pass**

Drilled Pier Foundation

SGS # :	2101548
Site Name:	BOE - Richard D Riddl
Order Number:	
TIA-222 Revison:	H
Tower Type:	Monopole

Applied Loads		
	Comp.	**Uplift**
Moment (kip-ft)	1031.73	
Axial Force (kips)	16.69	
Shear Force (kips)	12.44	

Material Properties		
Concrete Strength, f'c:	4	ksi
Rebar Strength, Fy:	60	ksi
Tie Yield Strength, Fyt:	40	ksi

Pier Design Data		
Depth	21	ft
Ext. Above Grade	1	ft
Pier Section 1		
From 1' above grade to 21' below grade		
Pier Diameter	5	ft
Rebar Quantity	18	
Rebar Size	8	
Clear Cover to Ties	3	in
Tie Size	5	
Tie Spacing	12	in

Rebar & Pier Options

Embedded Pole Inputs

Belled Pier Inputs

Analysis Results		
Soil Lateral Check	*Compression*	*Uplift*
$D_{v=0}$ (ft from TOC)	6.36	-
Soil Safety Factor	3.23	-
Max Moment (kip-ft)	1097.57	-
Rating*	*39.2%*	-
Soil Vertical Check	*Compression*	*Uplift*
Skin Friction (kips)	190.25	-
End Bearing (kips)	132.54	-
Weight of Concrete (kips)	74.81	-
Total Capacity (kips)	322.79	-
Axial (kips)	91.50	-
Rating*	*27.0%*	-
Reinforced Concrete Flexure	*Compression*	*Uplift*
Critical Depth (ft from TOC)	6.18	-
Critical Moment (kip-ft)	1097.46	-
Critical Moment Capacity	1671.42	-
Rating*	*62.5%*	-
Reinforced Concrete Shear	*Compression*	*Uplift*
Critical Depth (ft from TOC)	16.43	-
Critical Shear (kip)	157.32	-
Critical Shear Capacity	334.56	-
Rating*	*44.8%*	-

Soil Interaction Rating*	**39.2%**
Structural Foundation Rating*	**62.5%**

*Rating per TIA-222-H Section 15.5

Check Limitation	
Apply TIA-222-H Section 15.5:	☑
N/A	☐
Shear Design Options	
Check Shear along Depth of Pier:	☑
Utilize Shear-Friction Methodology:	☐
Override Critical Depth:	☐

Go to Soil Calculations

Soil Profile

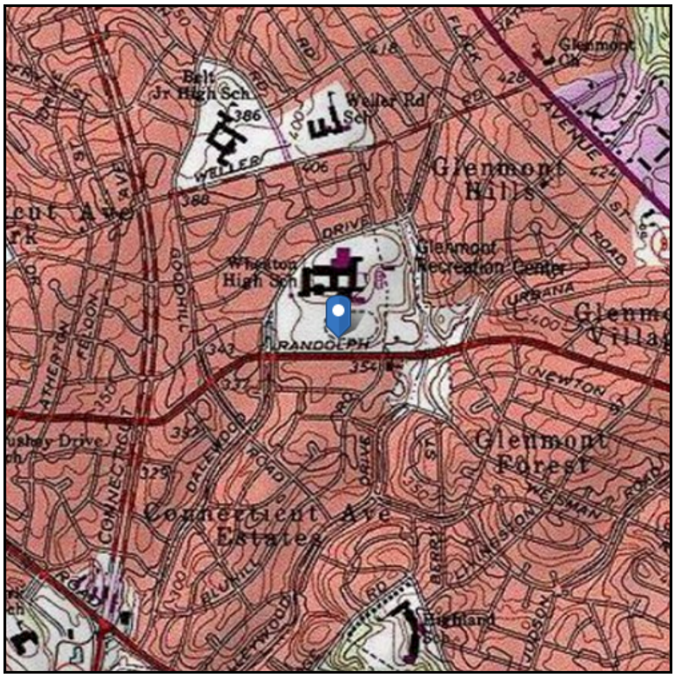
Groundwater Depth	19	# of Layers	4

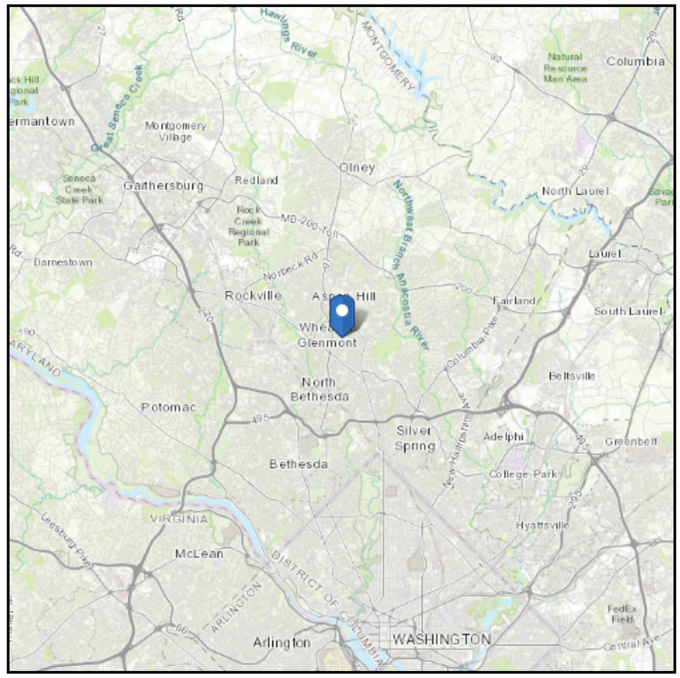
Layer	Top (ft)	Bottom (ft)	Thickness (ft)	γ_{soil} (pcf)	$\gamma_{concrete}$ (pcf)	Cohesion (ksf)	Angle of Friction (degrees)	Calculated Ultimate Skin Friction Comp (ksf)	Calculated Ultimate Skin Friction Uplift (ksf)	Ultimate Skin Friction Comp Override (ksf)	Ultimate Skin Friction Uplift Override (ksf)	Ult. Gross Bearing Capacity (ksf)	SPT Blow Count	Soil Type
1	0	3	3	110	150		0	0.000	0.000					Cohesionless
2	3	8	5	110	150		25	0.477	0.477				10	Cohesionless
3	8	19	11	115	150		30	1.012	1.012				10	Cohesionless
4	19	21	2	53	87.6		30	1.313	1.313			9	10	Cohesionless

AMERICAN SOCIETY OF CIVIL ENGINEERS

ASCE 7 Hazards Report

Address:		**Standard:**	ASCE/SEI 7-16	**Elevation:**	370.47 ft (NAVD 88)
No Address at This Location		**Risk Category:**	II	**Latitude:**	39.059461
		Soil Class:	D - Stiff Soil	**Longitude:**	-77.066492





Wind

Results:

Wind Speed:	113 Vmph
10-year MRI	75 Vmph
25-year MRI	84 Vmph
50-year MRI	89 Vmph
100-year MRI	95 Vmph

Data Source:	ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed:	Thu Feb 18 2021

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

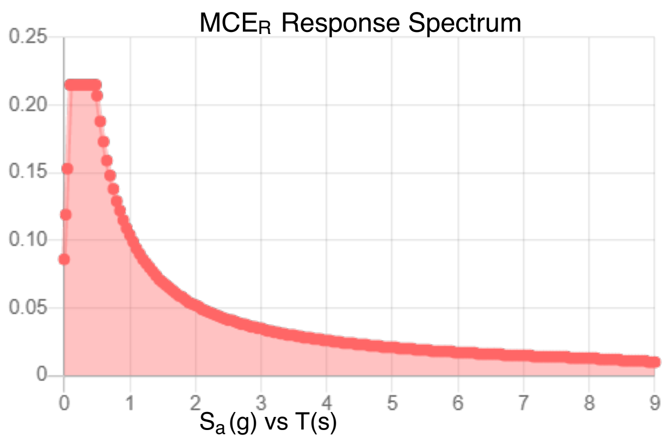
Seismic

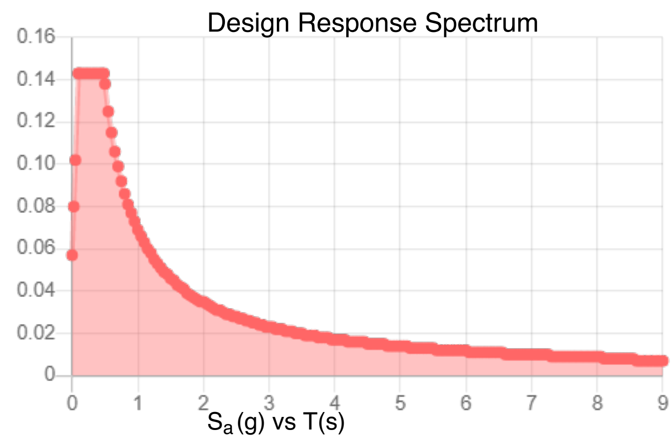
Site Soil Class: D - Stiff Soil

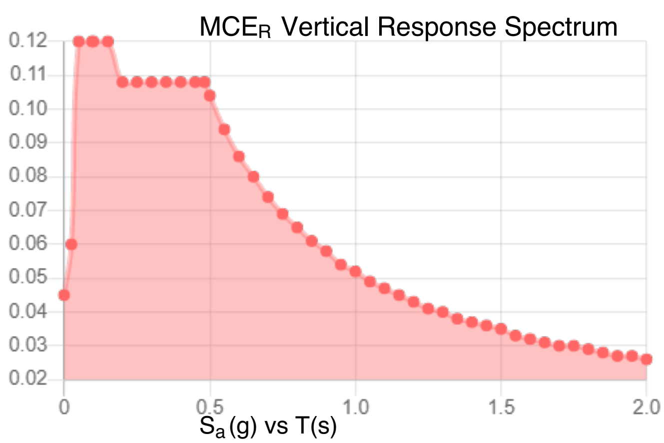
Results:

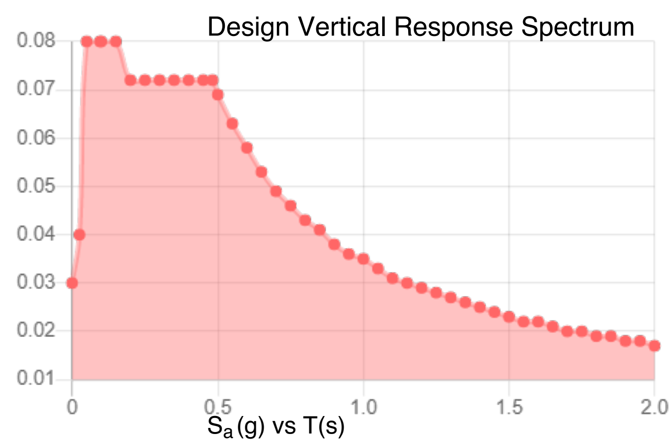
S_S :	0.134	S_{D1} :	0.069
S_1 :	0.043	T_L :	8
F_a :	1.6	PGA :	0.07
F_v :	2.4	PGA_M :	0.111
S_{MS} :	0.215	F_{PGA} :	1.6
S_{M1} :	0.104	I_e :	1
S_{DS} :	0.143	C_v :	0.7

Seismic Design Category B









Data Accessed: Thu Feb 18 2021

Date Source: USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness:	1.00 in.
Concurrent Temperature:	15 F
Gust Speed:	40 mph

Data Source: Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8

Date Accessed: Thu Feb 18 2021

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 500-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Attachment 2:
Collocation Application

COLOCATION APPLICATION
US-MD-5072
Version 2
DISH Wireless L.L.C.

Vertical Bridge REIT, LLC.
750 Park of Commerce Drive
Suite 200
Boca Raton, FL 33487

SUMMARY

PRIMARY INFO

Application #: C-103052
Application Version: 2 (Submitted: 2/12/2021 12:11:00 PM)

Application Type: Broadband
Application Name: DCWDC00428A
Lease Type: New Lease
Description:
Installing (6) new antennas, (12) RRUs (1) OVP, and (1) Hybrid Cable - 10x15 ground space needed for platform and shelter

VERTICAL BRIDGE SITE INFO

VB Site #: US-MD-5072
VB Site Name: BOE - Richard D Riddle School

Latitude: 39.05946111
Longitude: -77.06649167
Structure Type: Monopole
Structure Height: 100.0000
Site Address: 12501-A Dalewood Drive -
Silver Spring, MD 20906

VERTICAL BRIDGE DEAL TEAM

RLM: Floyd Jenkins
FJenkins@verticalbridge.com
(301) 667-0069

RLS: Sam Bowden
SBowden@verticalbridge.com

ROM: Jeremy Potts
JPotts@verticalbridge.com
(502) 295-7552

TENANT LEGAL INFO

Tenant Legal Name: DISH Wireless L.L.C.
State of Registration: Colorado
Type of Entity: LLC
Carrier NOC #: 8666246874
Tenant Site #: DCWDC00428A
Tenant Site Name: DCWDC00428A

APPLICANT

Name: Cherisa Small
Address 6700 Alexander Bell Drive
Suite 200
Columbia, MD 21046
Phone Number:: (301) 801-9035
Email Address: cherisa.small@dish.com

FINAL LEASED RIGHTS CONFIGURATION TOTALS

This is a summary of your remaining existing equipment plus the new equipment.

FINAL EQUIPMENT

Qty	Equipment Type
1	Junction Box
6	Panel
12	RRU

FINAL LINES

Qty	Line Type
1	Hybrid

COLOCATION APPLICATION
US-MD-5072
Version 2
DISH Wireless L.L.C.

Vertical Bridge REIT, LLC.
750 Park of Commerce Drive
Suite 200
Boca Raton, FL 33487

FREQUENCY & TECHNOLOGY INFO

Type of Technology: Broadband Wireless
Is TX Frequency Licensed: Yes
TX Frequency: 722 - 728 l 642 - 652 l 2180 - 2200 l 1995 - 2020
Is RX Frequency Licensed: Yes
RX Frequency:

MOUNT & STRUCTURAL ANALYSIS

MOUNT ANALYSIS

Provided by Tenant: No
To Be Run by VB: No
Include Mount Mapping: No

STRUCTURAL HARD COPIES

Required: No
Number of Hard Copies

CONTACTS

INVOICE CONTACT

Attention To	Name	Address	Phone Number 1	Phone Number 2	Email 1	Email 2
	Accounts Payable	P.O. Box 6649 Englewood, CO 80112	(555) 555-5555		WirelessAPInvoices@dish.com	

PO CONTACT

Name	Phone	Email
Accounts Payable	(555) 555-5555	WirelessAPInvoices@dish.com

LEASING CONTACT

Name	Phone Number	Email
Cherisa Small	(301) 801-9035	cherisa.small@dish.com

NOTICE CONTACT

Notice To	Attention To	Address	
DISH Wireless L.L.C.		Lease Administration	9601 South Meridian Blvd Englewood, CO 80112

COPY NOTICE CONTACT

Notice To	Attention To	Address	
DISH Wireless, L.L.C		Attn: Office of the General Counsel	9601 South Meridian Blvd. Englewood, CO 80112

	COLOCATION APPLICATION US-MD-5072 Version 2 DISH Wireless L.L.C.	Vertical Bridge REIT, LLC. 750 Park of Commerce Drive Suite 200 Boca Raton, FL 33487

RF CONTACT

Name	Phone Number	Email
Morrie Kebbeh	(813) 704-7429	morrie.kebbeh@dish.com

TENANT CONSTRUCTION MANAGER CONTACT

Name	Phone Number	Email
Troy James	(443) 752-7427	troy.james@dish.com

EMERGENCY CONTACT

Name	Phone Number	Email
DISH WIRELESS NOC	(866) 624-6874	noc.alerts@dish.com

LINE & EQUIPMENT

NEW LINE(S)

Qty	Line Type	Line Size(in.)	Line Location	Comments
1	Hybrid	1.6	Exterior	

NEW EQUIPMENT

Qty	Equipment Type	RAD Height	Mount (H')	Mount Type	Manufacturer	Model Number	Dimensions (H"xW"xD")	Weight (Lbs.)	Azimuth	Comments
1	Junction Box	90.00	90.00	Platform	Raycap	RDIDC-9181-PF-48	8.00 x 14.00 x 16.00	21.85	0	
2	RRU	90.00	90.00	Platform	Fujitsu	TA08025-B604	7.87 x 14.96 x 15.75	63.93	120	(1) Installed RRU; (1) Reserved RRU
2	RRU	90.00	90.00	Platform	Fujitsu	TA08025-B604	7.87 x 14.96 x 15.75	63.93	240	(1) Installed RRU; (1) Reserved RRU
2	RRU	90.00	90.00	Platform	Fujitsu	TA08025-B605	15.75 x 14.96 x 9.06	74.95	0	(1) Installed RRU; (1) Reserved RRU
2	Panel	90.00	90.00	Platform	JMA	MX08FRO665-20_V0F	72.00 x 20.00 x 8.00	54.00	240	(1) Antenna Installed; (1) Antenna Reserved
2	Panel	90.00	90.00	Platform	JMA	MX08FRO665-20_V0F	72.00 x 20.00 x 8.00	54.00	0	(1) Antenna Installed; (1) Antenna Reserved

2	RRU	90.00	90.00	Platform	Fujitsu	TA08025-B605	15.75 x 14.96 x 9.06	74.95	240	(1) Installed RRU; (1) Reserved RRU
2	RRU	90.00	90.00	Platform	Fujitsu	TA08025-B605	15.75 x 14.96 x 9.06	74.95	120	(1) Installed RRU; (1) Reserved RRU
2	RRU	90.00	90.00	Platform	Fujitsu	TA08025-B604	7.87 x 14.96 x 15.75	63.93	0	(1) Installed RRU; (1) Reserved RRU
2	Panel	90.00	90.00	Platform	JMA	MX08FRO665-20_V0F	72.00 x 20.00 x 8.00	54.00	120	(1) Antenna Installed; (1) Antenna Reserved

NEW EQUIPMENT CABINET(S)

Quantity of Cabinets	Cabinet Dimensions (H x W x D)	Manufacturer	Comments
1	74.00 x 32.00 x 32.10	Charles	

ADDITIONAL SITE REQUIREMENTS

GROUND & INTERIOR SPACE REQUIREMENTS

Requirement Type	Total Lease Area (L x W)	Cabinet Required	Cabinet Area (L x W)	Shelter Required	Shelter Pad (L x W)	Comments
New	10.00 x 15.00	Yes	3.00 x 3.00		x	

GENERATOR REQUIREMENTS

Requirement Type	Fuel Type	Kilowatt Size	Pad Dimensions (L x D)	Generator Manufacturer	Fuel Tank Manufacturer	Comments
No Changes			x			

AC POWER REQUIREMENTS

Meter Type	Additional Details	Comments
New Tenant Meter		

BACKHAUL REQUIREMENTS

Requirement Type	Cable Type	Number Of Points Of Entry	Riser Size (Inches)	Comments
Not Required				

SUPPLEMENT TO THE MASTER LEASE AGREEMENT
(Pursuant and subject to the MLA)

THIS SUPPLEMENT TO THE MASTER LEASE AGREEMENT ("**SLA**") is entered into as of 7/15/2021 ("**Effective Date**"), by and between VB-S1 Assets, LLC, a Delaware limited liability company ("**Lessor**"), whose address is 750 Park of Commerce Drive, Suite 200, Boca Raton, Florida 33487, and DISH Wireless L.L.C., a Colorado limited liability company ("**Lessee**"), whose address is 9601 South Meridian Blvd., Englewood, Colorado, 80112.

BACKGROUND

WHEREAS, Lessor's Affiliate, Vertical Bridge REIT, LLC, and Lessee have entered into that certain MLA dated January 29, 2021 (the "**MLA**"). Such MLA provides that Lessor or its Affiliates and Lessee will enter into separate SLAs on a Site-by-Site basis as mutually agreed upon by the Parties, pursuant to which Lessor or its Affiliates will lease to Lessee certain available space at a Site.

AGREEMENT

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, and intending to be legally bound hereby, the Parties agree as follows:

1. Site Information. The Leased Property, as more particularly described in Section 6 hereof, means:
   a. Lessee Site ID: DCWDC00428A
   b. Lessor Site ID: US-MD-5072 / BOE- Richard D Riddle School
   c. Address and/or location of the Site: 12501-A Dalewood Drive, Silver Spring, MD 20906
   d. Site coordinates (NAD 83):
      i. Latitude: 39.05946111
      ii. Longitude: -77.06649167
   e. Antenna Space centerline height: 90'
   f. Ground Space dimensions: 10' x 15'

2. Rent; Term.
   a. Rent.
      i. Commencing on the SLA Rent Commencement Date, the Basic Rent for this SLA shall be One Thousand Two Hundred Fifty and 00/100 dollars ($1,250.00) per month, to be paid in accordance with the terms set forth in Section 4 of the MLA.
      ii. Additional Rent, if any, shall be paid in accordance with the terms set forth in Section 4 of the MLA, unless otherwise set forth below, in the amount of: Not Applicable
      iii. Rent shall be paid to the following address (or via electronic funds transfer as agreed to by the Parties in Section 4.4 of the MLA):

VB-S1 Issuer, LLC P.O. Box 743906 Atlanta, GA 30374-3906	For Overnight mail: Bank of America Lockbox Services Lockbox # 743906 6000 Feldwood Road College Park, GA 30349

CWH

b. Term. The term of this SLA shall be as set forth in Section 3 of the MLA, unless set forth herein as follows: Not Applicable.

3. Non-Standard Terms. The Parties acknowledge and agree that the following conditions exist at the Site: (Check all that apply)

- ☐ There are no electrical utilities installed at the Site as of the Effective Date (i.e., neither Lessor nor any Co-User at the Site have electrical utilities installed).
- ■ The Leased Property is located, in whole or in part, on land which is owned, operated or controlled by a Governmental Authority (e.g. Bureau of Land Management or Bureau of Indian Affairs).
- ☐ The Structure on the Site is AM Detuned.
- ☐ Tower Modifications are required prior to the commencement of Lessee's initial Installation at the Site.
- ☐ Ground Space at the Site is not included in the legal interest conveyed to Lessee pursuant to this SLA.

4. Key Prime Agreement Terms.

a. Current term expiration date of the Prime Agreement / final term expiration date of the Prime Agreement: 08/22/2025 / 08/22/2025.
b. Does the Prime Lessor have the right to not renew or terminate the Prime Agreement at the end of the current term or any remaining renewal terms: Not Applicable.
c. Special access rules under the Prime Agreement: See Sections 8, 10, and 17 of the Prime Agreement. Additionally, Prime Lessor approval of Lessee's schedule for performing work at the Site must be provided prior to entry onto the Site.

5. Special Provisions. N/A

6. Site Address and Legal Description of Site. Lessor hereby leases to Lessee, and Lessee leases from Lessor, as applicable, the Site, as more particularly described in Section 1 hereof, and which is comprised of the space on the Structure, Easements and Ground Space on the Parcel at heights and locations as more particularly set forth on **Schedule A-1** (Collocation Application), **Schedule A-2** (Structure Elevation and Site Plan), and **Schedule A-4** (Legal Description of Parcel and/or Survey) (together, as applicable, the "**Leased Property**"), each of which are attached hereto and incorporated herein.

7. Frequencies. As of the Effective Date, Lessee's initial Installation will use those certain frequencies, in pre-approved transmit power, as set forth on **Schedule A-1** (Collocation Application), which is attached hereto and incorporated herein by this reference.

8. MLA; Defined Terms; Incorporation of Background; Prime Agreement. This SLA is entered into pursuant to the MLA. All terms and conditions of the MLA are incorporated herein by this reference and made a part hereof without the necessity of repeating such terms and conditions or attaching the MLA. By executing and delivering this SLA, the Parties hereby agree to be bound by all terms and conditions of the MLA applicable to such Party, and to perform all covenants and agreements of such Party therein. Capitalized terms used in this SLA shall have the same meaning ascribed to them in the MLA unless otherwise indicated herein. The background section set forth above is hereby incorporated into this SLA by this reference in its entirety. A true and correct copy of the Prime Agreement(s) (subject to redaction in accordance with the MLA) is set forth in **Schedule A-3** (Redacted Prime Agreement), which is attached hereto and incorporated herein by this reference.

9. Order of Precedence; Conflict. In the event of an inconsistency, conflict or discrepancy between, or among, (a) Section 1 of this SLA, (b) **Schedule A-1** (Collocation Application), and/or (c) **Schedule**

CWH

A-2 (Structure Elevation and Site Plan), **Schedule A-1** of this SLA shall govern. In the event of an inconsistency, conflict or discrepancy between (x) the MLA, and (y) this SLA, the terms set forth in this SLA shall control.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK. SIGNATURE PAGE FOLLOWS.]

CWH

IN WITNESS WHEREOF, the Parties have executed this SLA as of the Effective Date.

LESSOR:

VB-S1 Assets, LLC

DocuSigned by:
By: ______________________
DFDF739A85644A1...

Name: Alexander Gellman

Title: CEO

DS MA

DS CF

DS MB

LESSEE:

DISH Wireless L.L.C.

DocuSigned by:
By: Thomas Fuchs
81F461505C614FB...

Name: Thomas Fuchs

Title: Market General Manager

CWH

DISH WIRELESS SITE ID:

DCWDC00428A

DISH WIRELESS SITE ADDRESS:

12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SCOPE OF WORK

THIS IS NOT AN ALL INCLUSIVE LIST. CONTRACTOR SHALL UTILIZE SPECIFIED EQUIPMENT PART OR ENGINEER APPROVED EQUIVALENT. CONTRACTOR SHALL VERIFY ALL NEEDED EQUIPMENT TO PROVIDE A FUNCTIONAL SITE. THE PROJECT GENERALLY CONSISTS OF THE FOLLOWING:

TOWER SCOPE OF WORK:
- INSTALL (3) PROPOSED PANEL ANTENNAS (1 PER SECTOR)
- INSTALL (1) PROPOSED ANTENNA MOUNT
- INSTALL PROPOSED JUMPERS
- INSTALL (6) PROPOSED RRUs (2 PER SECTOR)
- INSTALL (1) PROPOSED OVP DEVICE
- INSTALL (1) PROPOSED HYBRID CABLE

GROUND SCOPE OF WORK:
- INSTALL (1) PROPOSED METAL PLATFORM
- INSTALL (1) PROPOSED ICE BRIDGE
- INSTALL (1) PROPOSED PPC CABINET
- INSTALL (1) PROPOSED EQUIPMENT CABINET
- INSTALL (1) PROPOSED POWER CONDUIT
- INSTALL (1) PROPOSED TELCO CONDUIT
- INSTALL (1) PROPOSED TELCO-FIBER BOX
- INSTALL (1) PROPOSED GPS UNIT
- INSTALL (1) PROPOSED SAFETY SWITCH (IF REQUIRED)
- INSTALL (1) PROPOSED CIENA BOX (IF REQUIRED)
- INSTALL (1) PROPOSED METER SOCKET

SITE INFORMATION

PROPERTY OWNER:	BOARD OF EDUCATION
ADDRESS:	200 WEST BALTIMORE ST. BALTIMORE, MD 21201
TOWER TYPE:	MONOPOLE
TOWER CO SITE ID:	US-MD-5072
TOWER APP NUMBER:	C-103052
COUNTY:	MONTGOMERY
LATITUDE (NAD 83):	39° 3' 34.20" N 39.0595 N
LONGITUDE (NAD 83):	77° 3' 59.40" W 77.0665 W
ZONING JURISDICTION:	MONTGOMERY COUNTY
ZONING DISTRICT:	–
PARCEL NUMBER:	03696625
OCCUPANCY GROUP:	U
CONSTRUCTION TYPE:	V-B
POWER COMPANY:	PEPCO
TELEPHONE COMPANY:	VERIZON/COMCAST

PROJECT DIRECTORY

APPLICANT:	DISH WIRELESS 6700 ALEXANDER BELL DRIVE SUITE 221 COLUMBIA, MD 21046 (XXX) XXX-XXXX
TOWER OWNER:	VERTICAL BRIDGE 750 PARK OF COMMERCE DR. BOCA RATON, FLORIDA 33487 (561) 948-6367
SITE DESIGNER:	BC ARCHITECTS ENGINEERS, PLC 5661 COMLUMBIA PIKE, SUITE 200 FALLS CHURCH, VA 22041 (703) 671-6000
SITE ACQUISITION:	CHERISA SMALL (301) 801-9035
CONSTRUCTION MANAGER:	TROY JAMES (443) 752-7427
RF ENGINEER:	MORRIE KEBBEH (813) 704-7429

MARYLAND CODE COMPLIANCE

ALL WORK SHALL BE PERFORMED AND MATERIALS 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 THESE CODES:

CODE TYPE	CODE
BUILDING	2018 IBC
MECHANICAL	2018 IMC
ELECTRICAL	2017 NEC

SITE PHOTO

DIRECTIONS

DIRECTIONS FROM DISH WIRELESS OFFICE/AIRPORT/DOWNTOWN:

FROM 6700 ALEXANDER BELL DR #221, COLUMBIA, MD 21046, GET ON I-95 S FROM MD-175 E 1.7 MI. HEAD NORTHEAST TOWARD ALEXANDER BELL DR. 141 FT. TURN RIGHT 157 FT. TURN RIGHT TOWARD ALEXANDER BELL DR. 0.1 MI. TURN LEFT ONTO ALEXANDER BELL DR. 315 FT. TURN LEFT AT THE 1ST CROSS STREET ONTO COLUMBIA GATEWAY DR. 0.1 MI. KEEP RIGHT AT THE FORK, FOLLOW SIGNS FOR MD-175 E AND MERGE ONTO MD-175 E 1.1 MI. USE THE RIGHT LANE TO MERGE ONTO I-95 S VIA THE RAMP TO WASHINGTON 0.3 MI. FOLLOW I-95 S AND MD-200 W TO MD-650/NEW HAMPSHIRE AVE IN COLESVILLE. TAKE EXIT 13 FROM MD-200 W 14.7 MI. MERGE ONTO I-95 S 9.1 MI. USE THE RIGHT 2 LANES TO TAKE EXIT 31 B TO MERGE ONTO MD-200 W TOWARD I-270, TOLL ROAD 5.3 MI. TAKE EXIT 13 FOR MD-650 S TOWARD WHITE OAK, TOLL ROAD 0.4 MI. DRIVE TO RANDOLPH RD IN WHEATON-GLENMONT 4.8 MI. USE ANY LANE TO TURN LEFT ONTO MD-650/NEW HAMPSHIRE AVE. 0.9 MI. TURN RIGHT ONTO RANDOLPH RD., PASS BY SHERWIN-WILLIAMS PAINT STORE (ON THE RIGHT) 2.8 MI. KEEP LEFT TO STAY ON RANDOLPH RD. 1.2 MI. TURN RIGHT ONTO DALEWOOD DR. 0.1 MI. TURN RIGHT ONO EXISTING DRIVEWAY. TOWER COMPOUND WILL BE LOCATED AT SOUTH EAST CORNER OF SCHOOL NEAR RANDOLPH RD.

SHEET INDEX

SHEET NO.	SHEET TITLE
T-1	TITLE SHEET
A-1	PROPOSED SITE PLAN AND EQUIPMENT LAYOUTS
A-2	PROPOSED EQUIPMENT LAYOUT AND DETAILS
A-3	EQUIPMENT PLATFORM AND H-FRAME DETAILS
A-4	EQUIPMENT DETAILS
A-5	EQUIPMENT DETAILS
A-6	EQUIPMENT DETAILS
E-1	ELECTRICAL ROUTE PLAN AND NOTES
E-2	ELECTRICAL DETAILS
E-3	ELECTRICAL ONE-LINE, FAULT CALCS & PANEL SCHEDULE
G-1	GROUNDING PLANS AND NOTES
G-2	GROUNDING DETAILS
G-3	GROUNDING DETAILS
RF-1	RF CABLE COLOR CODE
RF-2	RF PLUMBING DIAGRAM
RF-3	RF DATA SHEET
GN-1	LEGEND AND ABBREVIATIONS
GN-2	GENERAL NOTES
GN-3	GENERAL NOTES
GN-4	GENERAL NOTES

MISS UTILITY OF MARYLAND
UTILITY NOTIFICATION CENTER OF MARYLAND
(800) 257-7777
WWW.MISSUTILITY.NET/

CALL 2 WORKING DAYS UTILITY NOTIFICATION PRIOR TO CONSTRUCTION

811

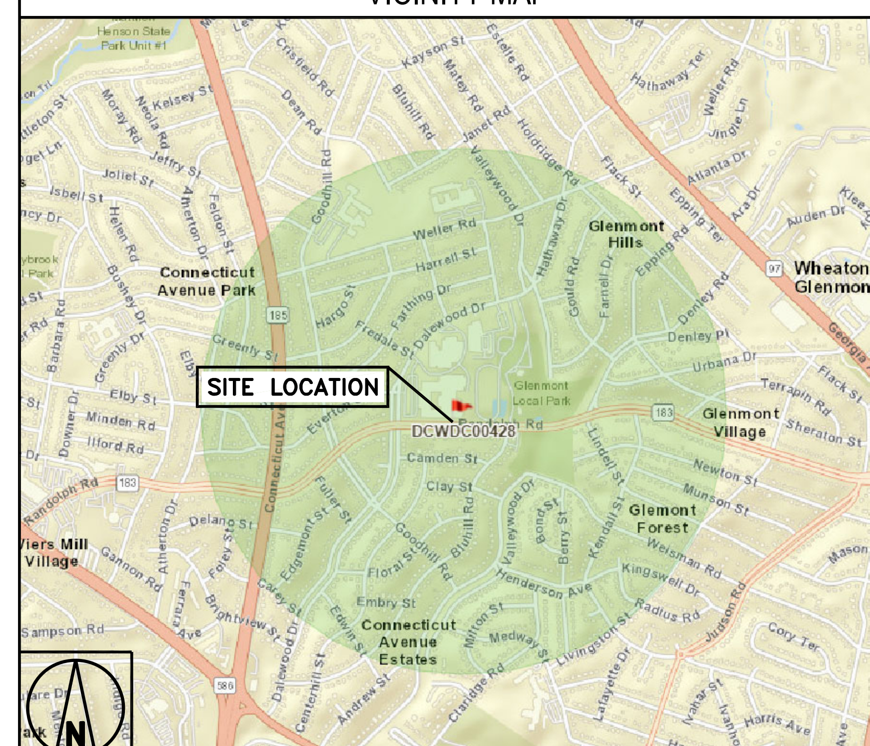
GENERAL NOTES

THE FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION. A TECHNICIAN WILL VISIT THE SITE AS REQUIRED FOR ROUTINE MAINTENANCE. THE PROJECT WILL NOT RESULT IN ANY SIGNIFICANT DISTURBANCE OR EFFECT ON DRAINAGE. NO SANITARY SEWER SERVICE, POTABLE WATER, OR TRASH DISPOSAL IS REQUIRED AND NO COMMERCIAL SIGNAGE IS PROPOSED.

11"x17" PLOT WILL BE HALF SCALE UNLESS OTHERWISE NOTED

CONTRACTOR SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS, AND CONDITIONS ON THE JOB SITE, AND SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK.

VICINITY MAP



NO SCALE

6700 ALEXANDER BELL DRIVE
SUITE 221
COLUMBIA, MD 21046

BC architects engineers

5661 COLUMBIA PIKE, SUITE 200
FALLS CHURCH, VA 22041-2868

STATE OF MARYLAND
CHRISTOPHER D. MORIN
No. 24552
PROFESSIONAL ENGINEER
7.19.21

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 NUMBER 24552, EXPIRATION DATE 11/17/21.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

DRAWN BY:	CHECKED BY:	APPROVED BY:
GMW	NP	CDM

RFDS REV #: 0

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
A	3/2/21	ISSUED FOR REVIEW
0	4/6/21	ISSUED FOR CONSTRUCTION
1	5/3/21	ISSUED FOR CONSTRUCTION
2	7/19/21	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER

–

DISH WIRELESS PROJECT INFORMATION

DCWDC00428A
–
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE

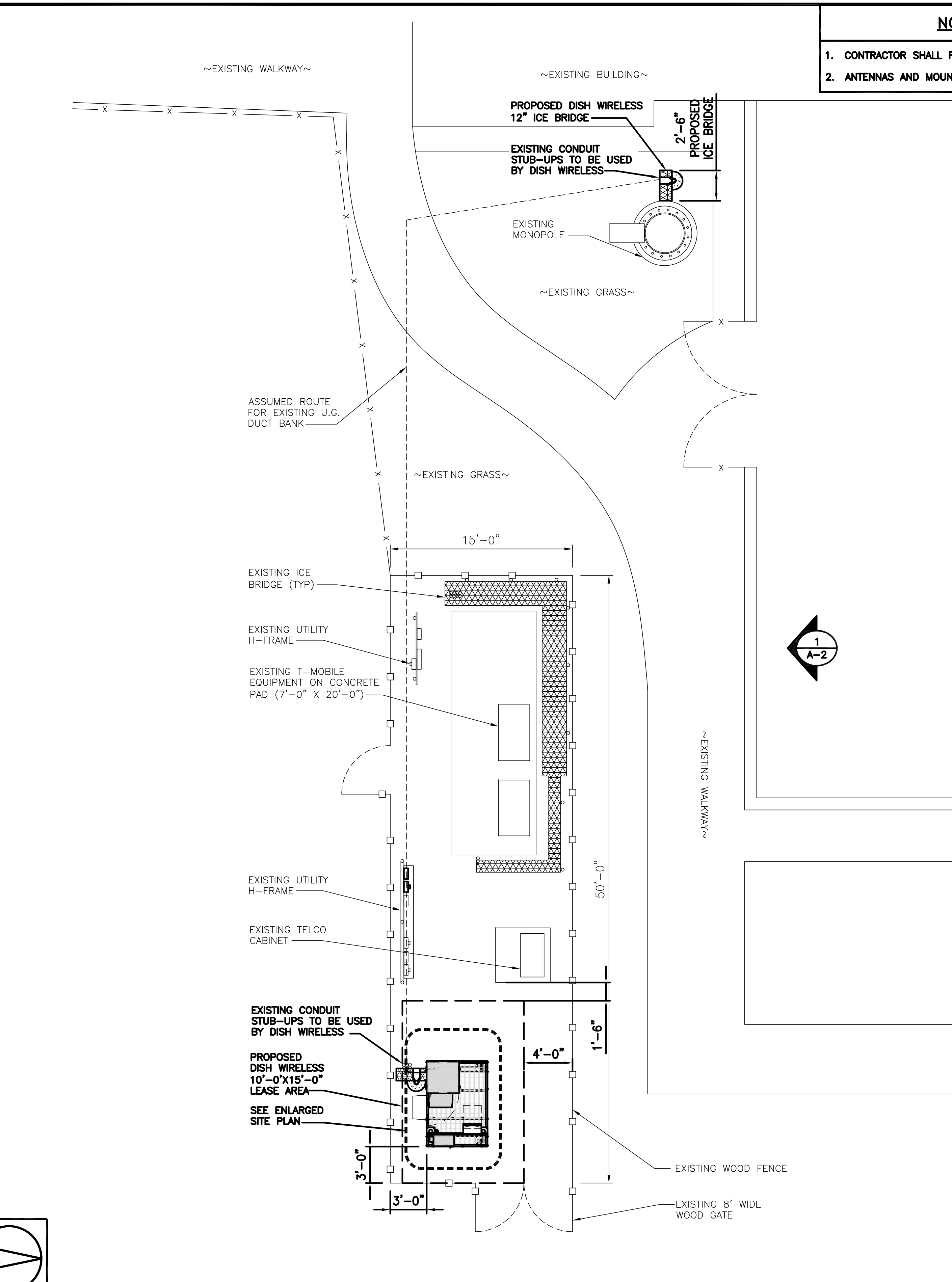
TITLE SHEET

SHEET NUMBER

T-1

NOTES

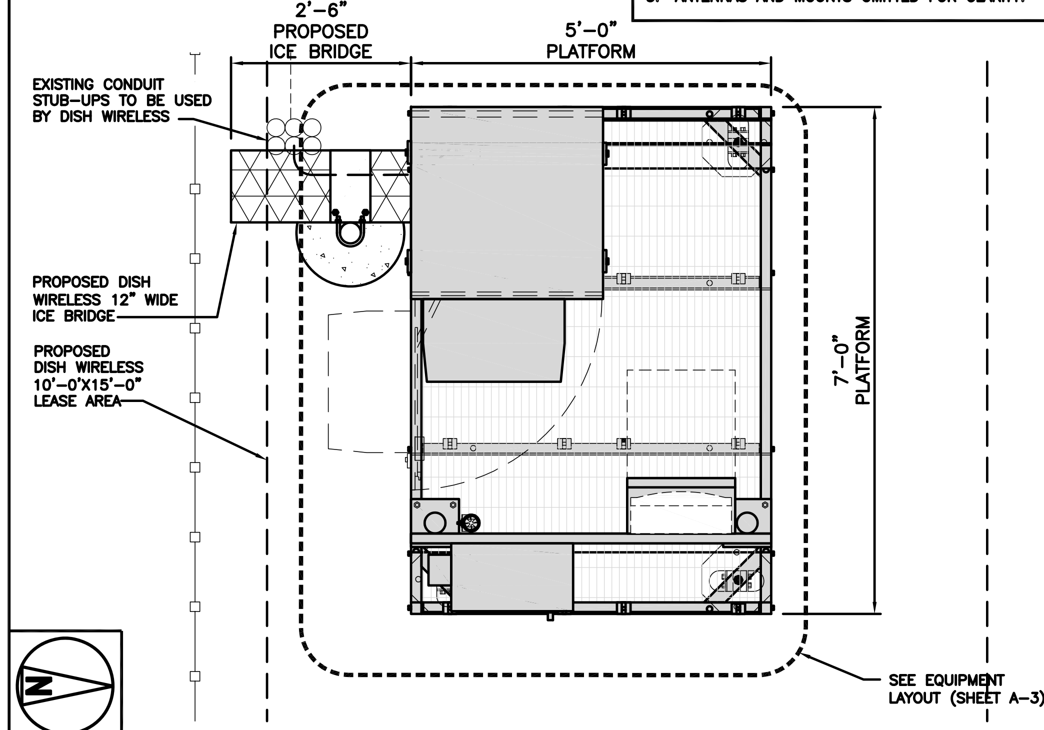
1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.
2. ANTENNAS AND MOUNTS OMITTED FOR CLARITY.



OVERALL SITE PLAN	6' 4' 2' 0 5' 10' 3/16"=1'-0"	1

NOTES

1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.
2. CONTRACTOR SHALL MAINTAIN A 10'-0" MINIMUM SEPARATION BETWEEN THE PROPOSED GPS UNIT, TRANSMITTING ANTENNAS AND EXISTING GPS UNITS.
3. ANTENNAS AND MOUNTS OMITTED FOR CLARITY.



ENLARGED SITE PLAN	12" 6" 0 1' 2' 3' 3/4"=1'-0"	2

NOT USED		3

dish wireless.

6700 ALEXANDER BELL DRIVE
SUITE 221
COLUMBIA, MD 21046

BC architects engineers

5661 COLUMBIA PIKE, SUITE 200
FALLS CHURCH, VA 22041-2868

STATE OF MARYLAND CHRISTOPHER D. MORIN No. 24552 PROFESSIONAL ENGINEER

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DRAWN BY:	CHECKED BY:	APPROVED BY:
GMW	NP	CDM

RFDS REV #: 0

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
A	3/2/21	ISSUED FOR REVIEW
0	4/6/21	ISSUED FOR CONSTRUCTION
1	5/3/21	ISSUED FOR CONSTRUCTION
2	7/19/21	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER

-

DISH WIRELESS PROJECT INFORMATION

DCWDC00428A
-
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE

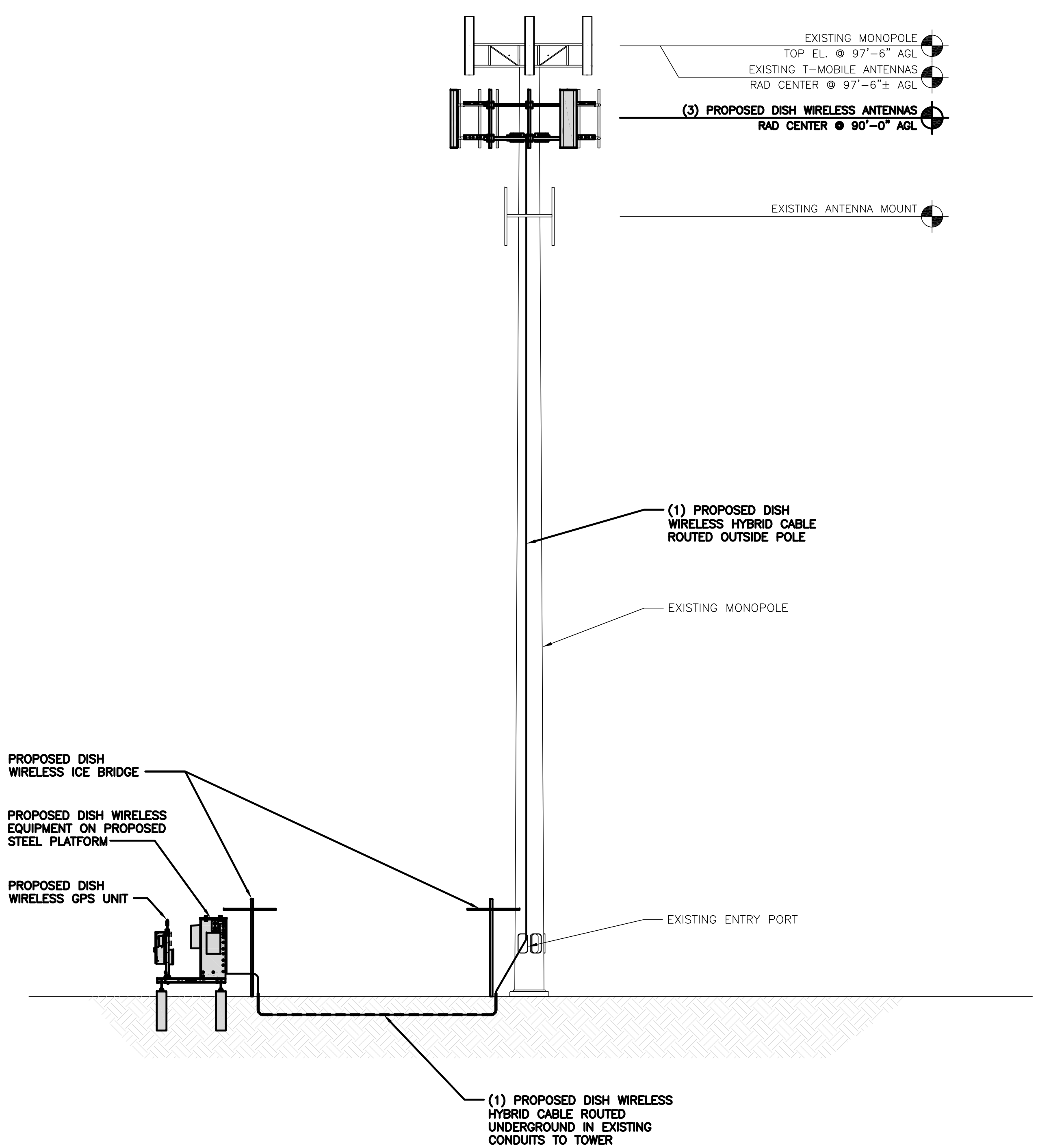
OVERALL AND ENLARGED SITE PLAN

SHEET NUMBER

A-1

NOTES

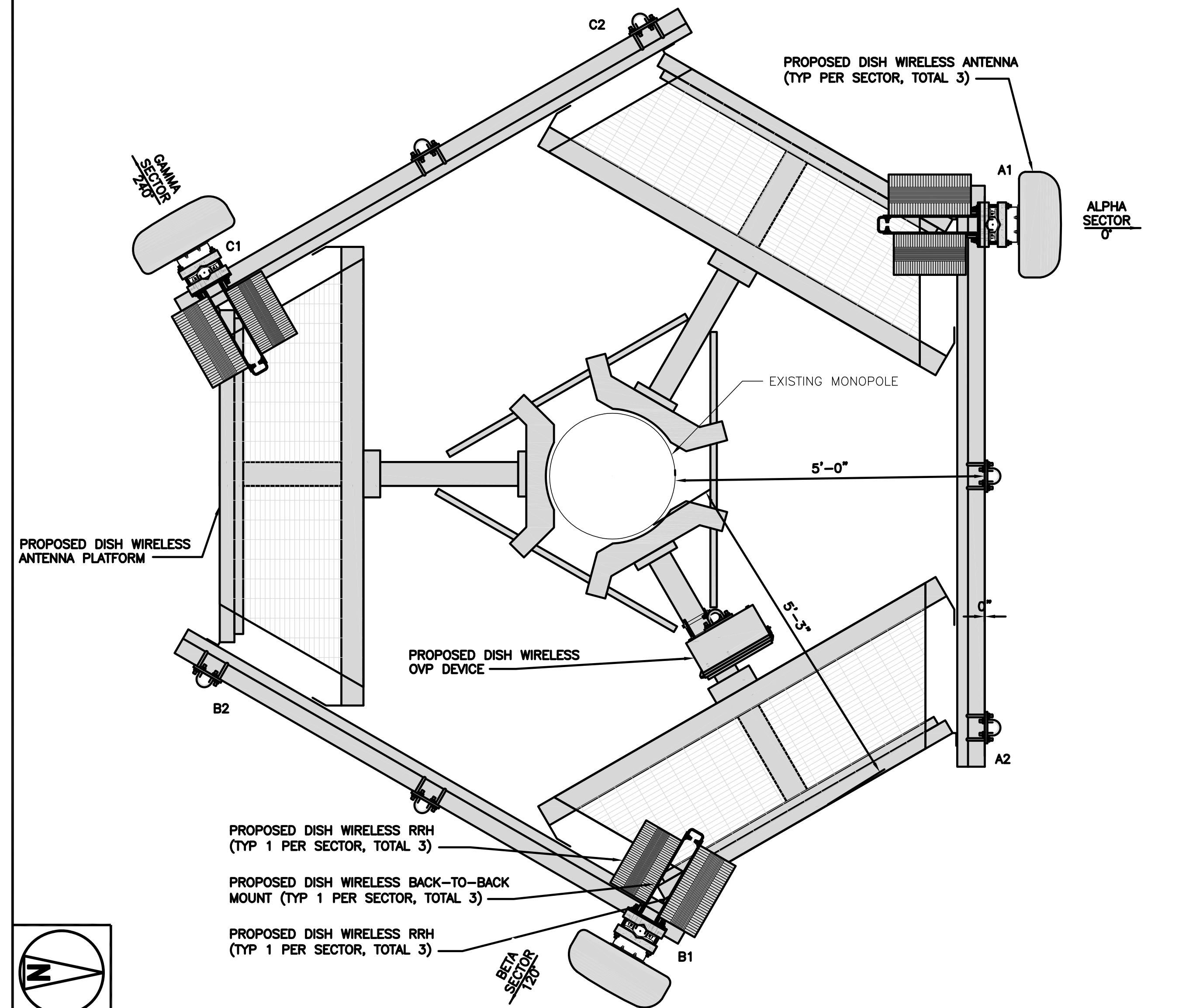
1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.
2. ANTENNA AND MW DISH SPECIFICATIONS REFER TO ANTENNA SCHEDULE AND TO FINAL CONSTRUCTION RFDS FOR ALL RF DETAILS
3. ANTENNAS SHALL BE PAINTED TO MATCH.



PROPOSED ELEVATION

8' 4' 0 8' 16'
1/8"=1'-0"

1



ANTENNA LAYOUT

12" 6" 0 1' 2' 3'
3/4"=1'-0"

2

SECTOR	POSITION	ANTENNA: EXISTING OR PROPOSED	ANTENNA: MANUFACTURER – MODEL NUMBER	ANTENNA: TECHNOLOGY	ANTENNA: SIZE (HxW)	ANTENNA: AZIMUTH	ANTENNA: RAD CENTER	TRANSMISSION CABLE: FEED LINE TYPE AND LENGTH
ALPHA	A1	PROPOSED	JMA – MX08FRO665-20_V0F	5G	72.0" x 20.0"	0°	90'-0"	(1) HIGH-CAPACITY HYBRID CABLE (232' LONG)
BETA	B1	PROPOSED	JMA – MX08FRO665-20_V0F	5G	72.0" x 20.0"	120°	90'-0"	
GAMMA	C1	PROPOSED	JMA – MX08FRO665-20_V0F	5G	72.0" x 20.0"	240°	90'-0"	

SECTOR	POSITION	RRH: MANUFACTURER – MODEL NUMBER	RRH: TECHNOLOGY
ALPHA	A1	FUJITSU – TA08025-B605	N71/N29
	A1	FUJITSU – TA08025-B604	N70/N66
BETA	B1	FUJITSU – TA08025-B605	N71/N29
	B1	FUJITSU – TA08025-B604	N70/N66
GAMMA	C1	FUJITSU – TA08025-B605	N71/N29
	C1	FUJITSU – TA08025-B604	N70/N66

NOTES

1. CONTRACTOR TO REFER TO FINAL CONSTRUCTION RFDS FOR ALL RF DETAILS.
2. ANTENNA AND RRH MODELS MAY CHANGE DUE TO EQUIPMENT AVAILABILITY. ALL EQUIPMENT CHANGES MUST BE APPROVED AND REMAIN IN COMPLIANCE WITH THE PROPOSED DESIGN AND STRUCTURAL ANALYSES.

OVP: EXISTING OR PROPOSED	OVP: MANUFACTURER – MODEL NUMBER	OVP: SIZE (HxWxD)
PROPOSED	RAYCAP – RDIDC-9181-PF-48	18.98"x14.39"x8.15"

ANTENNA SCHEDULE

NO SCALE

3

dish wireless.

6700 ALEXANDER BELL DRIVE
SUITE 221
COLUMBIA, MD 21046

BC architects engineers

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FALLS CHURCH, VA 22041-2868

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No. 24552
PROFESSIONAL ENGINEER

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GMW	NP	CDM

RFDS REV #: 0

CONSTRUCTION DOCUMENTS

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REV	DATE	DESCRIPTION
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2	7/19/21	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER

–

DISH WIRELESS PROJECT INFORMATION

DCWDC00428A

–

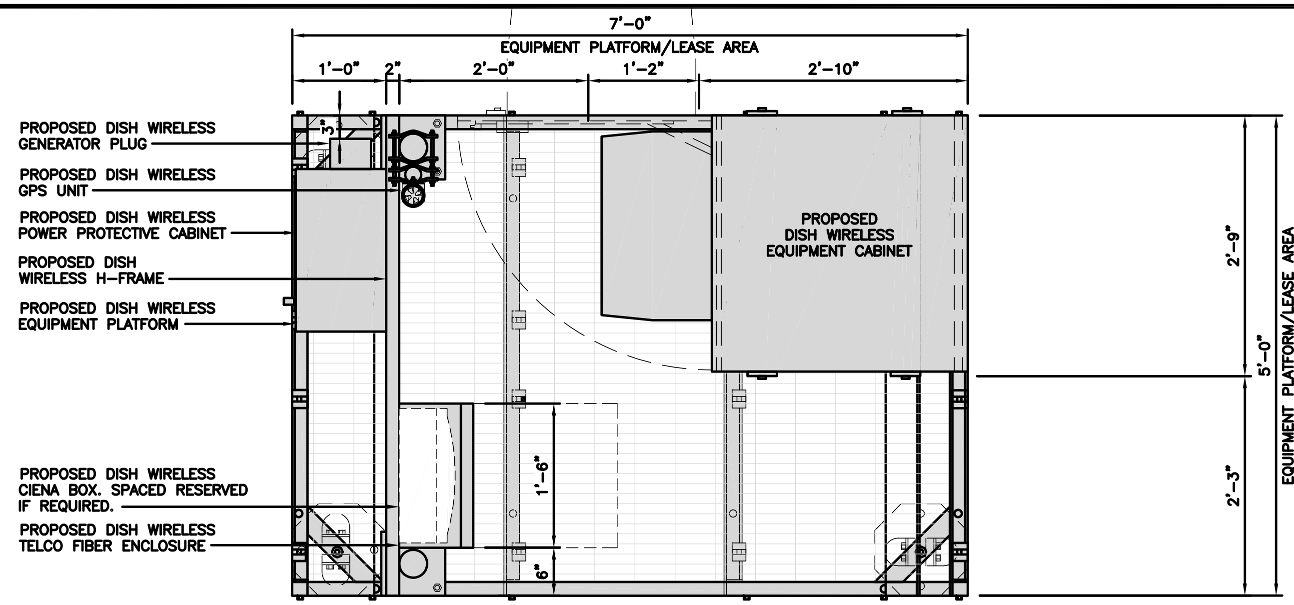
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE

ELEVATION, ANTENNA LAYOUT AND SCHEDULE

SHEET NUMBER

A-2

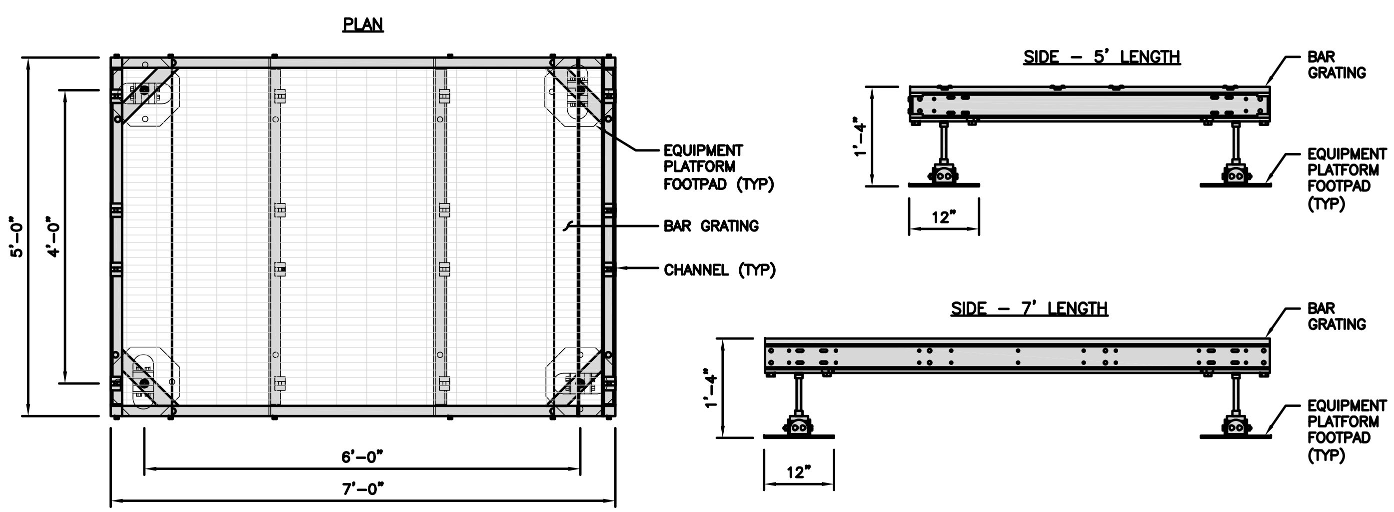


PLATFORM EQUIPMENT PLAN

12" 9" 6" 3" 0 1' 2'
1"=1'-0"

1

COMMSCOPE MTC4045LP 5X7 PLATFORM	
DIMENSIONS (HxWxD)	16"x84"x60"
TOTAL WEIGHT	423 LBS

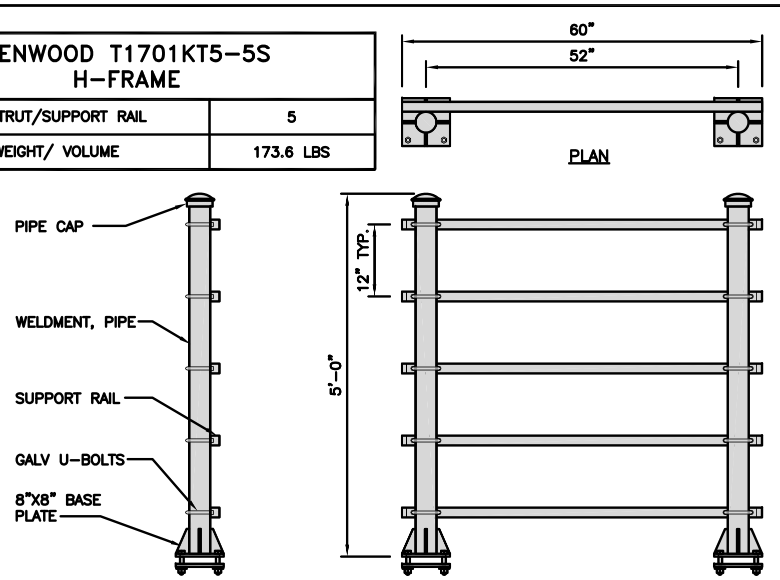


PLATFORM DETAIL

NO SCALE

2

KENWOOD T1701KT5-5S H-FRAME	
UNISTRUT/SUPPORT RAIL	5
WEIGHT/ VOLUME	173.6 LBS



H-FRAME DETAIL

NO SCALE

3

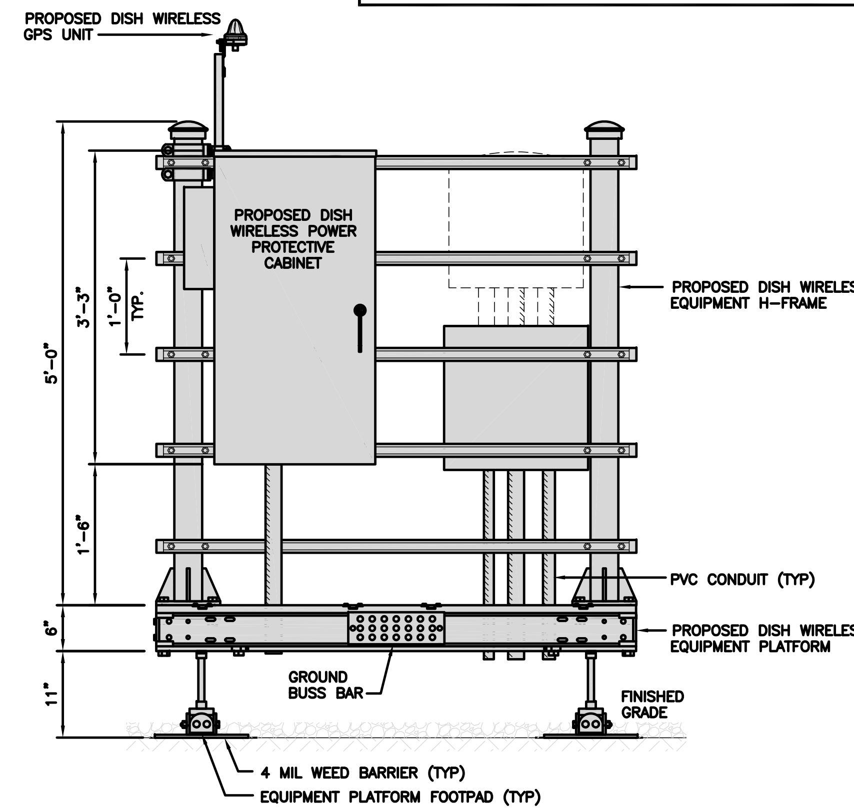
NOT USED

NO SCALE

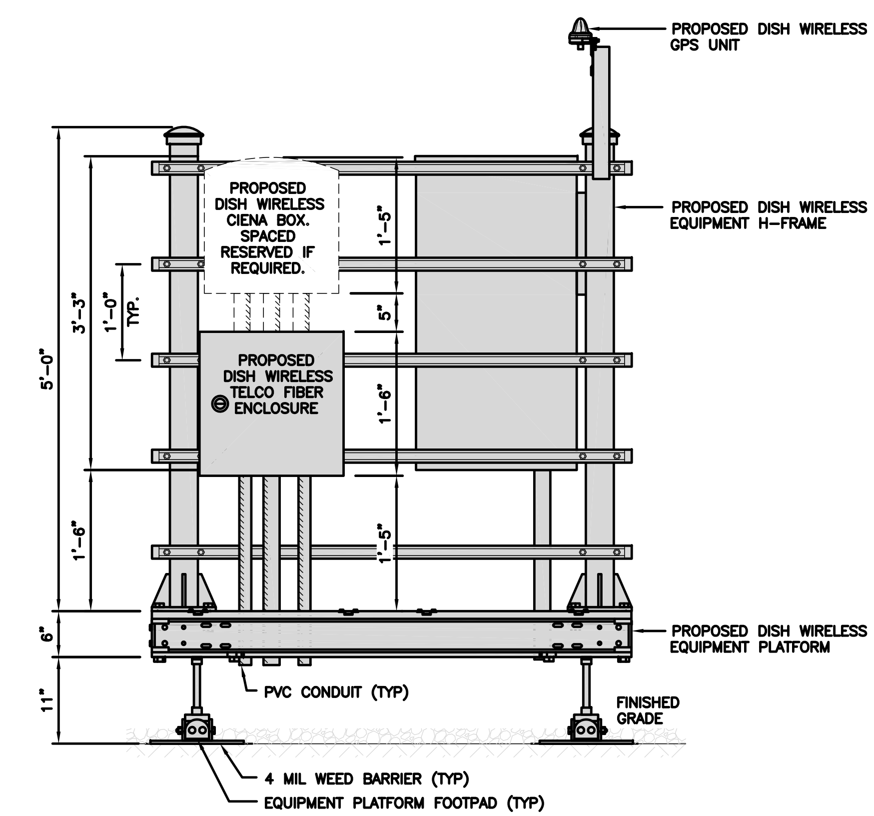
4

NOTES

1. CONTRACTOR TO BURY PLATFORM FEET WITH A MINIMUM OF 2" OF FILL PER EXISTING SITE SURFACE
2. WEED BARRIER FABRIC TO BE ADDED AT DISCRETION OF DISH WIRELESS CONSTRUCTION MANAGER AT TIME OF CONSTRUCTION. ONE SHEET 8'x8' INSTALLED UNDER ALL FOUR FEET OF THE PLATFORM (4 MIL BLACK PLASTIC)
3. EQUIPMENT CABINET OMITTED FOR CLARITY



FRONT ELEVATION



BACK ELEVATION

H-FRAME EQUIPMENT ELEVATION

12" 9" 6" 3" 0 1' 2'
1"=1'-0"

5

dish wireless.

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BC architects engineers

5661 COLUMBIA PIKE, SUITE 200
FALLS CHURCH, VA 22041-2868

STATE OF MARYLAND CHRISTOPHER D. MORIN No. 24552 PROFESSIONAL ENGINEER 7/19/21

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DISH WIRELESS PROJECT INFORMATION

DCWDC00428A

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12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

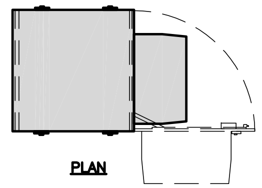
SHEET TITLE

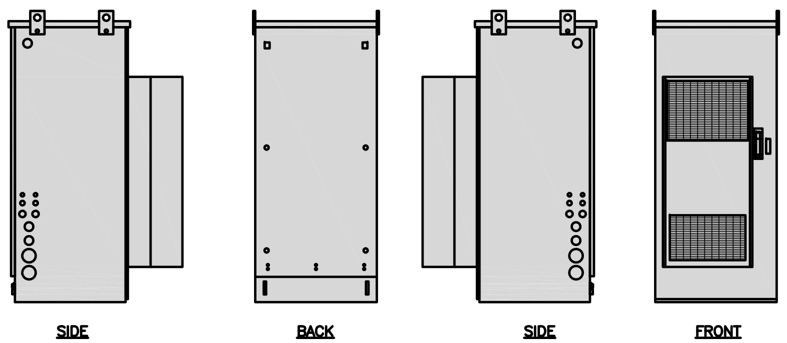
EQUIPMENT PLATFORM AND H-FRAME DETAILS

SHEET NUMBER

A-3

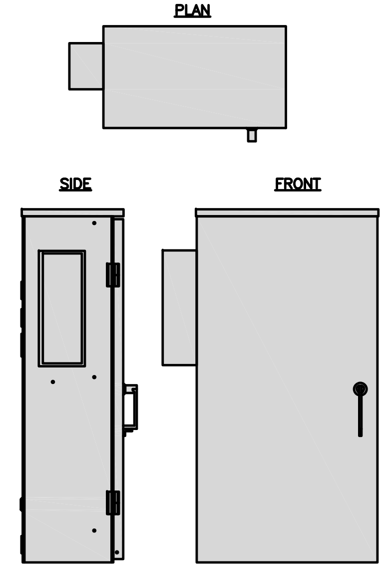
CHARLES INDUSTRY PM639155N4 AC CABINET	
DIMENSIONS (HxWxD):	74"x32"x32"
POWER PLANT:	48VDC ABB
HVAC	6000W DC
TOTAL WEIGHT (EMPTY)	394 LBS





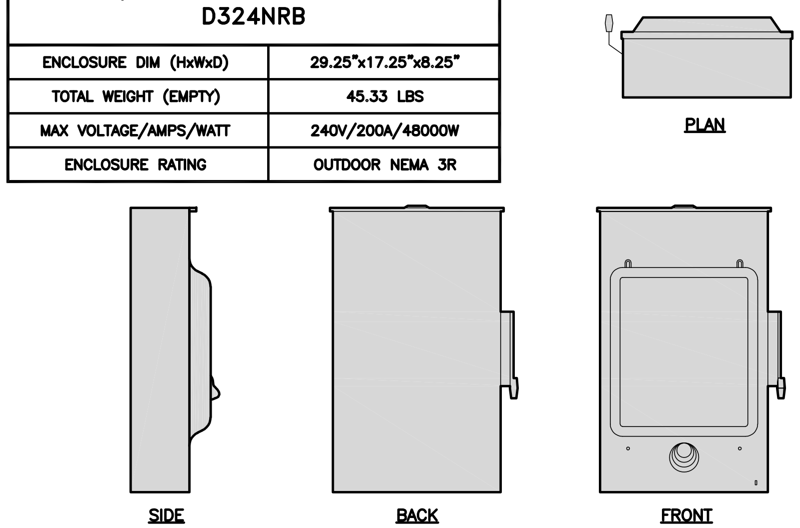
CABINET DETAIL — NO SCALE — 1

RAYCAP RDIAC-6512-P-240-MTS POWER & TELCO PROTECTION CABINET	
DIMENSIONS (HxWxD)	40"x20"x10"
WEIGHT/ VOLUME	124 LBS
MANUAL TRANSFER SWITCH	200A
LOAD CENTER	30 POSITION
MAIN BREAKER	200A, 65kA AIC
GENERATOR RECEPTACLE	CAMLOCK
NEMA RATING	3R POWDER COATED ALUMINUM
SURGE PROTECTION DEVICE	UL 1449 4TH EDITION LISTED



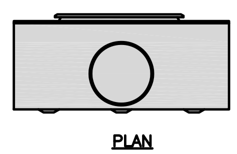
POWER PROTECTION CABINET (PPC) DETAIL — NO SCALE — 2

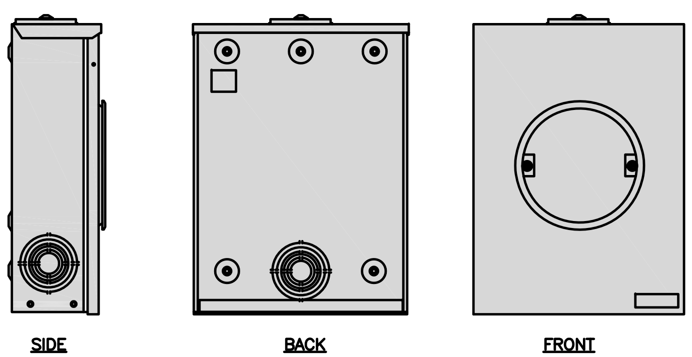
SQUARE D SAFETY SWITCH D324NRB	
ENCLOSURE DIM (HxWxD)	29.25"x17.25"x8.25"
TOTAL WEIGHT (EMPTY)	45.33 LBS
MAX VOLTAGE/AMPS/WATT	240V/200A/48000W
ENCLOSURE RATING	OUTDOOR NEMA 3R



SAFETY SWITCH — NO SCALE — 3

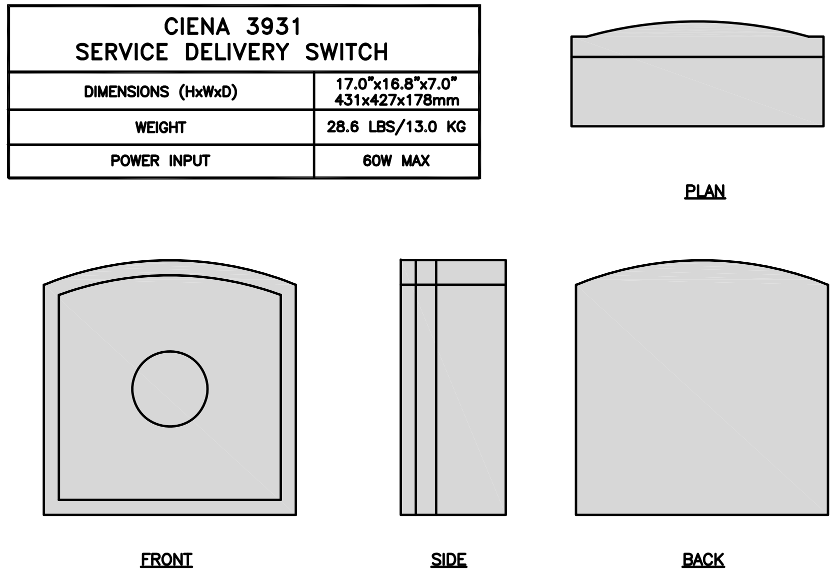
EATON METER SOCKET UNRRS213BEUSE	
METER SOCKET TYPE	RING
ENCLOSURE DIM (HxWxD)	16"x12"x6"
MAIN AMPERE RATING	200A
WEIGHT	18 LBS





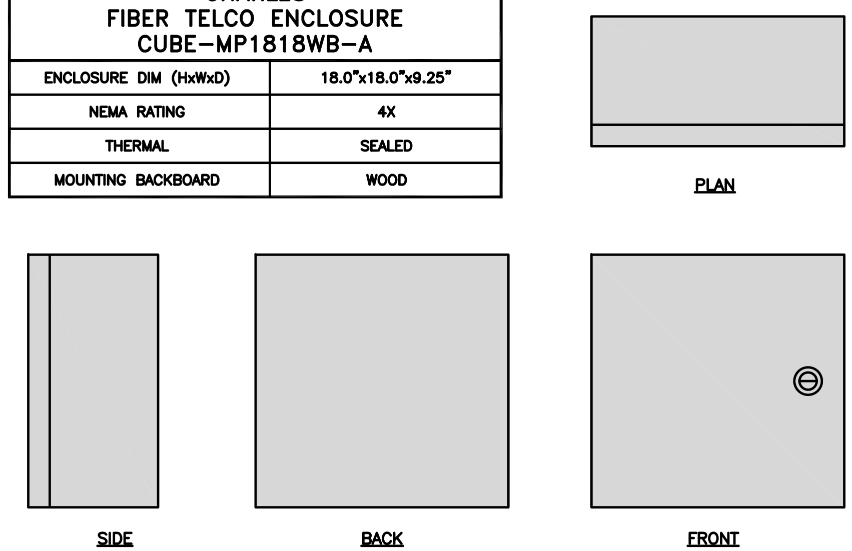
METER SOCKET DETAIL — NO SCALE — 4

CIENA 3931 SERVICE DELIVERY SWITCH	
DIMENSIONS (HxWxD)	17.0"x16.8"x7.0" 431x427x178mm
WEIGHT	28.6 LBS/13.0 KG
POWER INPUT	60W MAX



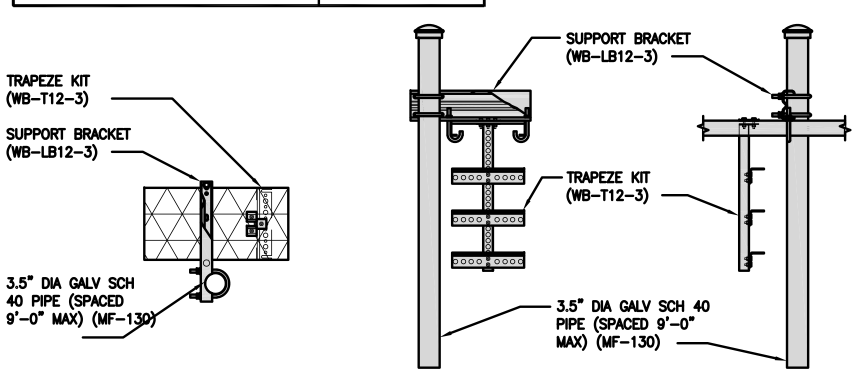
CIENA DETAIL — NO SCALE — 5

CHARLES FIBER TELCO ENCLOSURE CUBE-MP1818WB-A	
ENCLOSURE DIM (HxWxD)	18.0"x18.0"x9.25"
NEMA RATING	4X
THERMAL	SEALED
MOUNTING BACKBOARD	WOOD

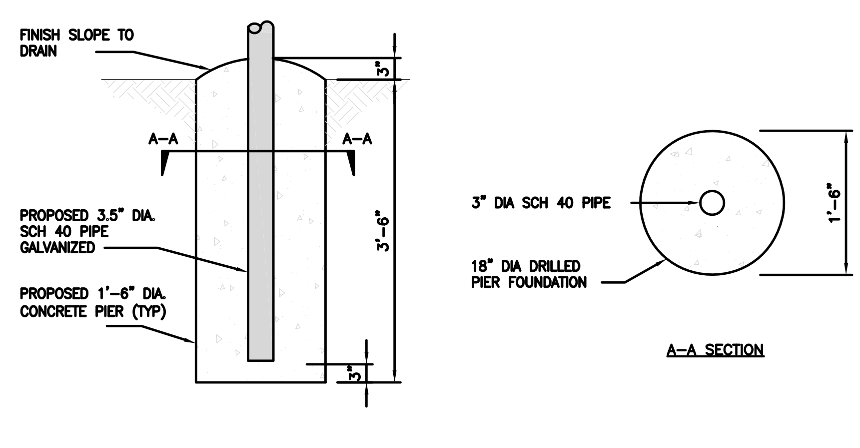


FIBER TELCO ENCLOSURE DETAIL — NO SCALE — 6

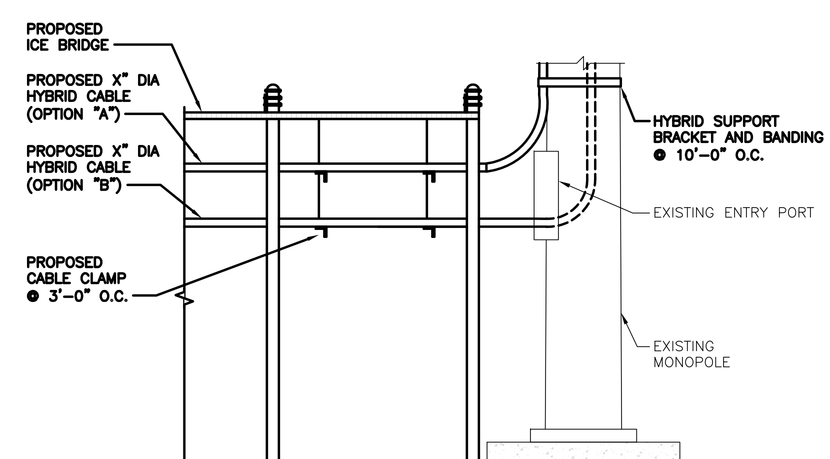
COMMSCOPE WB-K110-B WAVEGUIDE BRIDGE KIT		INCLUDED PRODUCTS:	WB-T12-3 TRAPEZE KIT, 3 RUNGS WB-LB12-3 SUPPORT BRACKET MF-130 DIRECT BURIAL PIPE COLUMN, 13'-4"
DIMENSIONS (HxL)	160"x10'		
WEIGHT/ VOLUME	325.0 LBS		
CABLE RUN (QTY)	12		



ICE BRIDGE DETAIL — NO SCALE — 7



TYPICAL ICE BRIDGE CONCRETE PIER DETAIL — NO SCALE — 8



HYBRID CABLE RUN — NO SCALE — 9

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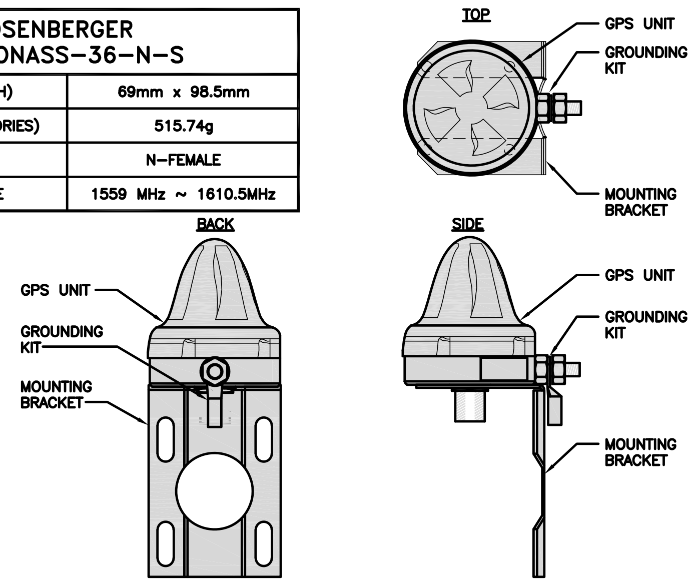
DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
-
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

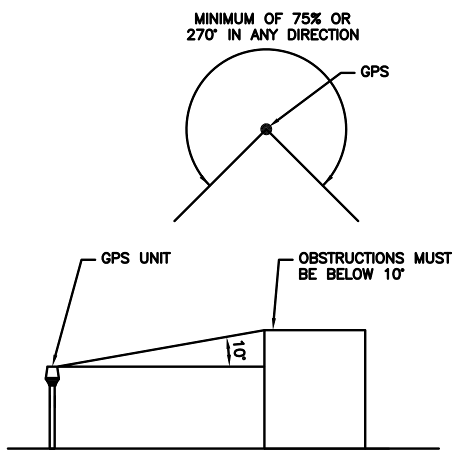
SHEET TITLE
EQUIPMENT DETAILS

SHEET NUMBER
A-4

ROSENBERGER GPSGLONASS-36-N-S	
DIMENSION (DIA x H)	69mm x 98.5mm
WEIGHT (WITH ACCESSORIES)	515.74g
CONNECTOR	N-FEMALE
FREQUENCY RANGE	1559 MHz ~ 1610.5MHz



GPS ANTENNA DETAIL — NO SCALE — 1



GPS MINIMUM SKY VIEW REQUIREMENTS — NO SCALE — 2

NOT USED — NO SCALE — 3

5G HYBRID CALCULATOR

The preparer inputs values into the yellow cells.

DESC	QTY	The preparer must determine the lengths below.
SITE ID #:	DCWDC00428A	
TWR TYPE:	Monopole	
HYBRID BEND RADIUS	30"	
RAD CENTER (ft)	90.0	This is the RAD center for the antennas on towers. For a rooftop, this is the total length of all vertical sections of the hybrid.
ICE BRIDGE HEIGHT (ft)	10.0	This is the height of the bridge coverings.
ICE BRIDGE LENGTH (ft)	10.0	This is the length of the total ice bridge coverings, if more than one ice bridge is used or total horizontal lengths of hybrid if this is inside a building.
LENGTH ACROSS PLATFORM (ft)	10.0	This is the length from the cabinet to the first bend up the ice bridge or inside a radio room.
LENGTH FROM TOWER TOP TO OVP (ft)	5.0	This is the horizontal length from the tower to the OVP at the antenna level or the total horizontal lengths of hybrid on a building or large self supporting tower.
VERTICAL LENGTH OF HYBRID INTO TOWER TOP OVP (ft)	1.0	This is the vertical length of hybrid that comes out to the tower top OVP to the beginning of the first bend that is going into the monopole port.
	LENGTH (ft)	
Additional Excess Hybrid to be added (To be determined by preparer)	100	
Total Hybrid Length to Order (Rounded up to nearest whole number)	232	

CUI12PSM6P4-232	Hybrid Part Number

Notes:

Reference Information

Cables Unlimited Inc. PART NUMBER PREFIX (ADD CALCULATED LENGTH TO THE END OF THE PART NUMBER)	SERVICE LENGTH	CABLE DIAMETER	CONDUCTOR SIZE
CUI12PSM9P8-	< 120'	1.41"	8 AWG
CUI12PSM9P6-	120' to 180'	1.60"	6 AWG
CUI12PSM6P4-	> 180'	1.75"	4 AWG

5G HYBRID CALCULATOR — NO SCALE — 4

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DCWDC00428A
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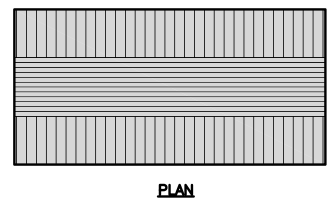
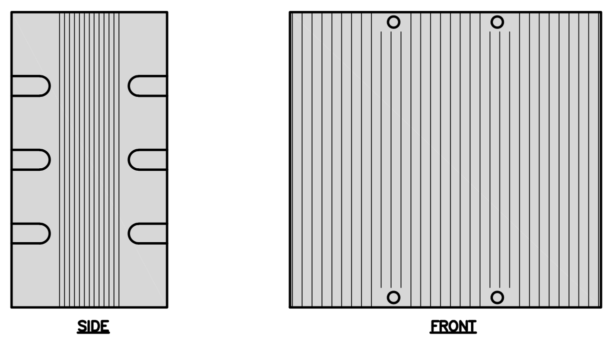
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
EQUIPMENT DETAILS

SHEET NUMBER
A-5

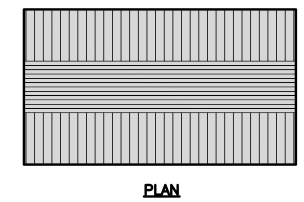
FUJITSU TA08025-B604 RRH	
DIMENSIONS (HxWxD) (KG/IN)	380x400x200/14.9"x15.7"x7.8"
WEIGHT(KG,LB)/ VOLUME	29kg,63.9lb/ 30L
POWER SUPPLY	DC-58~-36V

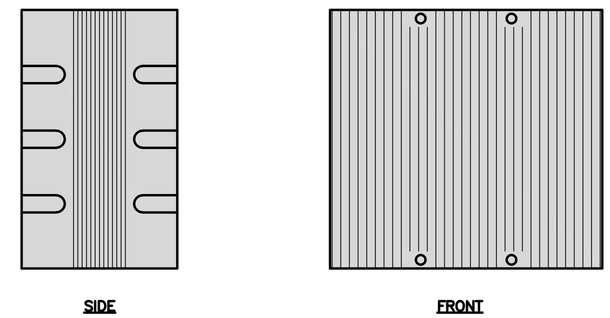




REMOTE RADIO HEAD DETAIL | NO SCALE | 1

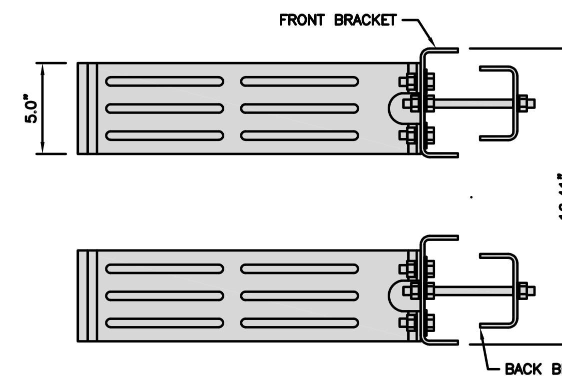
FUJITSU TA08025-B605 RRH	
DIMENSIONS (HxWxD) (KG/IN)	380x400x230/14.9"x15.7"x9.0"
WEIGHT(KG,LB)/ VOLUME	34kg,74.9lb/ 35L
POWER SUPPLY	DC-58~-36V

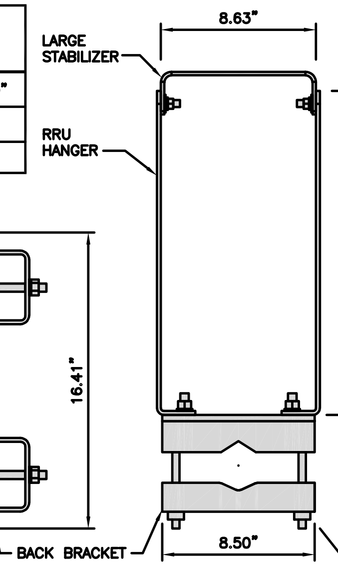




REMOTE RADIO HEAD DETAIL | NO SCALE | 2

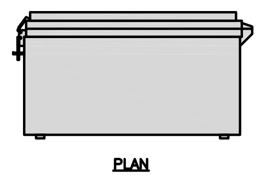
COMMSCOPE BACK-TO-BACK MOUNT RR-FA2	
DIMENSIONS (HxWxD)	16.41"x18.0"x3.0"
WEIGHT	39.22 lb
PACKAGE QUANTITY	2

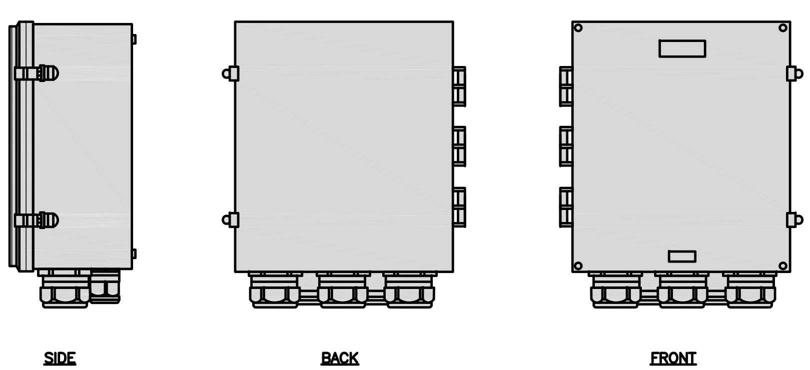




REMOTE RADIO MOUNT DETAIL | NO SCALE | 3

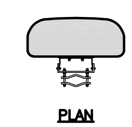
RAYCAP RDIDC-9181-PF-48 DC SURGE PROTECTION	
DIMENSIONS (HxWxD)	18.98"x14.39"x8.15"
WEIGHT	21.82 LBS

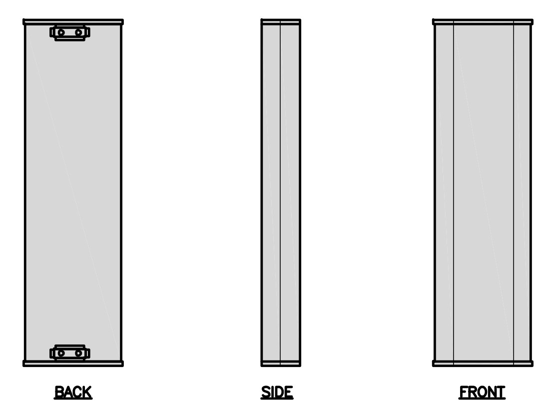




SURGE SUPPRESSION DETAIL | NO SCALE | 4

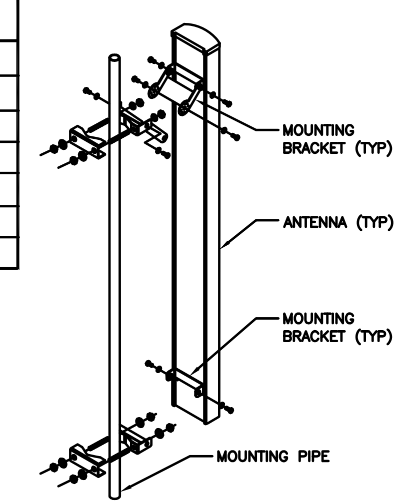
JMA WIRELESS MX08FRO665-20 ANTENNA	
DIMENSIONS (HxWxD)	72.0"x20.0"x8.0"
TOTAL WEIGHT	54 LB
RF PORTS, CONNECTOR TYPE	8 x 4.3-10 FEMALE





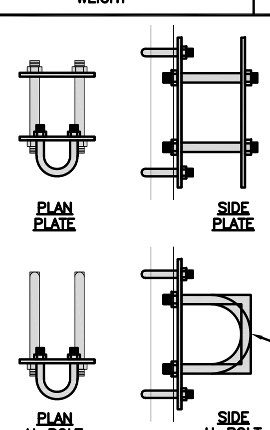
ANTENNA DETAIL | NO SCALE | 5

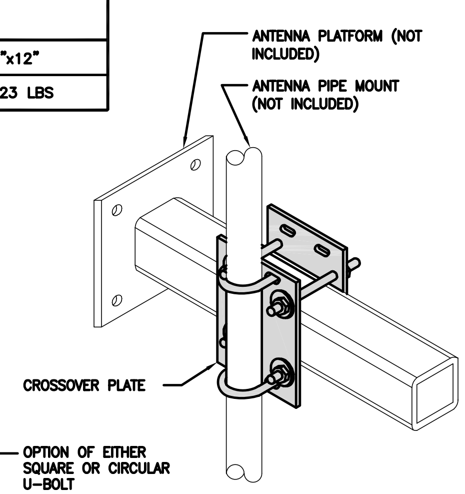
M04 MOUNTING BRACKET HPA-33R-BUU-H4-K	
WIDTH	5" (135mm)
DEPTH	2" (51mm)
HEIGHT	8" (213mm)
TOTAL WEIGHT (WITH BRACKETS)	1.5 LBS (15.50 Kg)
HOUSING MATERIAL	ASA/ABS/ALUMINUM
RADOME COLOR	LIGHT GRAY
CONNECTOR	1X8-PIN DAISY CHAIN



ANTENNA MOUNTING DETAIL | NO SCALE | 6

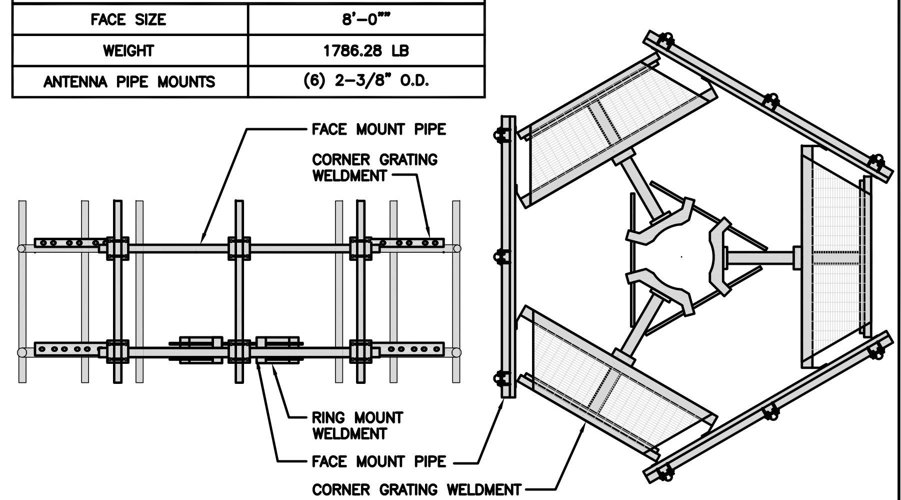
COMMSCOPE XP-2040 CROSSOVER PLATE	
DIMENSIONS (HxW)	10"x12"
WEIGHT	11.023 LBS





RRH/OVP MOUNT DETAIL | NO SCALE | 7

SITEPRO1 SNP8HR-396 SNUB-NOSE PLATFORM	
FACE SIZE	8'-0""
WEIGHT	1786.28 LB
ANTENNA PIPE MOUNTS	(6) 2-3/8" O.D.



ANTENNA PLATFORM DETAIL | NO SCALE | 8

NO SCALE | 9

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SHEET TITLE
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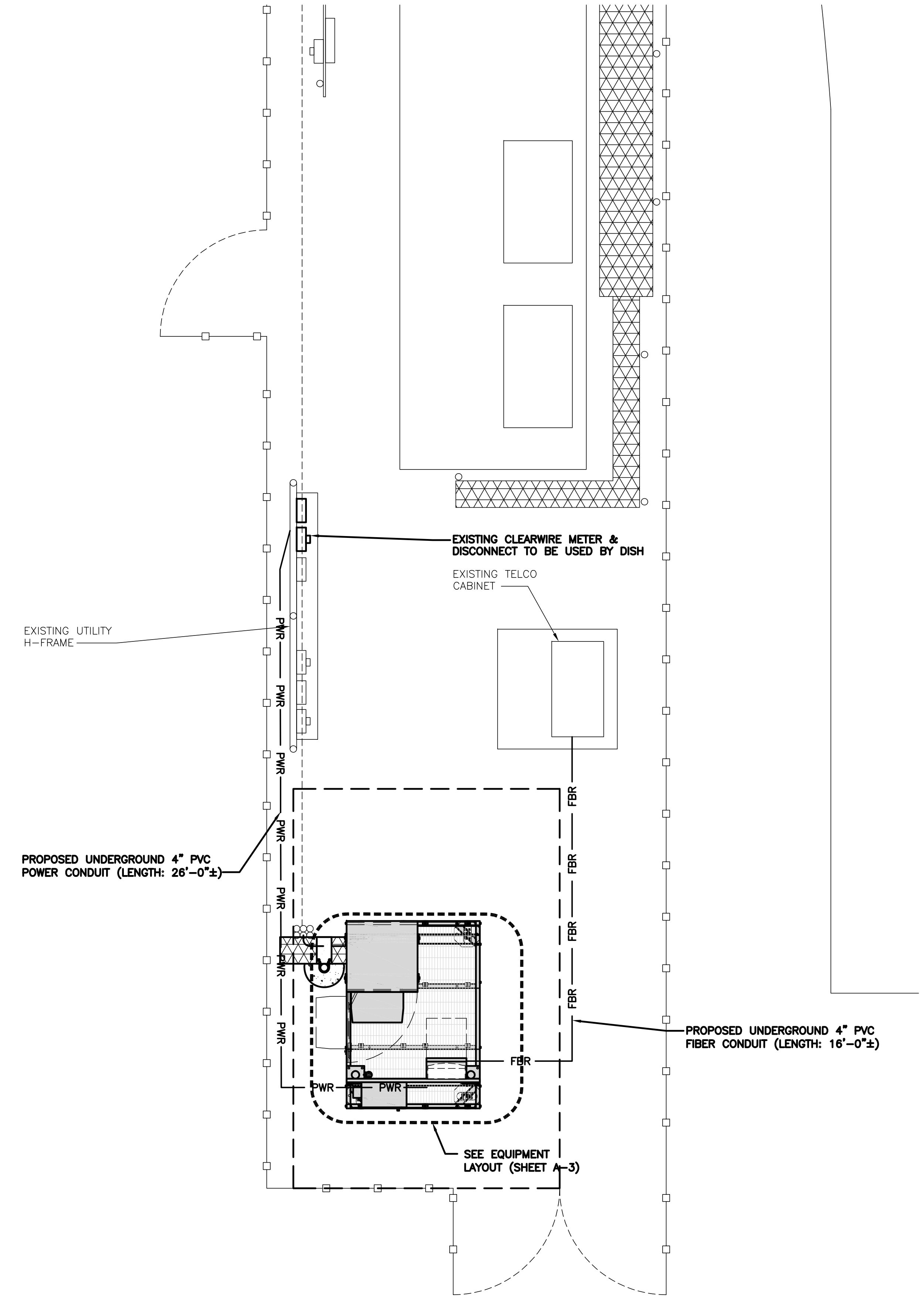

NOTES

1. CONTRACTOR SHALL FIELD VERIFY ALL PROPOSED UNDERGROUND UTILITY CONDUIT ROUTE.
2. ANTENNAS AND MOUNTS OMITTED FOR CLARITY.

UTILITY ROUTE PLAN

3/8"=1'-0"

1

DC POWER WIRING SHALL BE COLOR CODED AT EACH END FOR IDENTIFYING +24V AND −48V CONDUCTORS. RED MARKINGS SHALL IDENTIFY +24V AND BLUE MARKINGS SHALL IDENTIFY −48V.

1. CONTRACTOR SHALL INSPECT THE EXISTING CONDITIONS PRIOR TO SUBMITTING A BID. ANY QUESTIONS ARISING DURING THE BID PERIOD IN REGARDS TO THE CONTRACTOR'S 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. ALL ELECTRICAL WORK SHALL BE DONE IN ACCORDANCE WITH CURRENT NATIONAL ELECTRICAL CODES AND ALL STATE AND LOCAL CODES, LAWS, AND ORDINANCES. PROVIDE ALL COMPONENTS AND WIRING SIZES AS REQUIRED TO MEET NEC STANDARDS.
3. LOCATION OF EQUIPMENT, CONDUIT AND DEVICES SHOWN ON THE DRAWINGS ARE APPROXIMATE AND SHALL BE COORDINATED WITH FIELD CONDITIONS PRIOR TO CONSTRUCTION.
4. CONDUIT ROUGH-IN SHALL BE COORDINATED WITH THE MECHANICAL EQUIPMENT TO AVOID LOCATION CONFLICTS. VERIFY WITH THE MECHANICAL EQUIPMENT CONTRACTOR AND COMPLY AS REQUIRED.
5. CONTRACTOR SHALL PROVIDE ALL BREAKERS, CONDUITS AND CIRCUITS AS REQUIRED FOR A COMPLETE SYSTEM.
6. CONTRACTOR SHALL PROVIDE PULL BOXES AND JUNCTION BOXES AS REQUIRED BY THE NEC ARTICLE 314.
7. CONTRACTOR SHALL PROVIDE ALL STRAIN RELIEF AND CABLE SUPPORTS FOR ALL CABLE ASSEMBLIES. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS.
8. ALL DISCONNECTS AND CONTROLLING DEVICES SHALL BE PROVIDED WITH ENGRAVED PHENOLIC NAMEPLATES INDICATING EQUIPMENT CONTROLLED, BRANCH CIRCUITS INSTALLED ON, AND PANEL FIELD LOCATIONS FED FROM.
9. INSTALL AN EQUIPMENT GROUNDING CONDUCTOR IN ALL CONDUITS PER THE SPECIFICATIONS AND NEC 250. THE EQUIPMENT GROUNDING CONDUCTORS SHALL BE BONDED AT ALL JUNCTION BOXES, PULL BOXES, AND ALL DISCONNECT SWITCHES, AND EQUIPMENT CABINETS.
10. ALL NEW MATERIAL SHALL HAVE A U.L. LABEL.
11. PANEL SCHEDULE LOADING AND CIRCUIT ARRANGEMENTS REFLECT POST-CONSTRUCTION EQUIPMENT.
12. CONTRACTOR SHALL BE RESPONSIBLE FOR AS-BUILT PANEL SCHEDULE AND SITE DRAWINGS.

ELECTRICAL NOTES

NO SCALE

2

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STATE OF MARYLAND
CHRISTOPHER D. MORIN
No. 24552
PROFESSIONAL ENGINEER
7/19/21

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 NUMBER 24552, EXPIRATION DATE 11/17/21.

DRAWN BY:	CHECKED BY:	APPROVED BY:
GMW	NP	CDM

RFDS REV #: 0

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A&E PROJECT NUMBER

-

DISH WIRELESS PROJECT INFORMATION

DCWDC00428A

-

12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

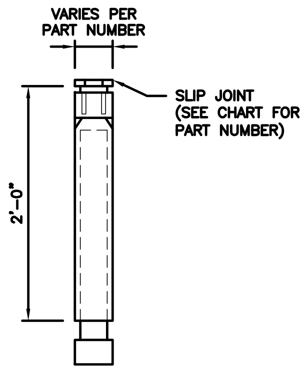
SHEET TITLE

ELECTRICAL/FIBER ROUTE PLAN AND NOTES

SHEET NUMBER

E-1

CARLON EXPANSION FITTINGS				
COUPLING END PART#	MALE TERMINAL ADAPTER END PART#	SIZE	STD CTN QTY.	TRAVEL LENGTH
E945D	E945DX	1/2"	20	4"
E945E	E945EX	3/4"	15	4"
E945F	E945FX	1"	10	4"
E945G	E945GX	1 1/4"	5	4"
E945H	E945HX	1 1/2"	5	4"
E945J	E945JX	2"	15	8"
E945K	E945KX	2 1/2"	10	8"
E945L	E945LX	3"	10	8"
E945M	E945MX	3 1/2"	5	8"
E945N	E945NX	4"	5	8"
E945P	E945PX	5"	1	8"
E945R	E945RX	6"	1	8"

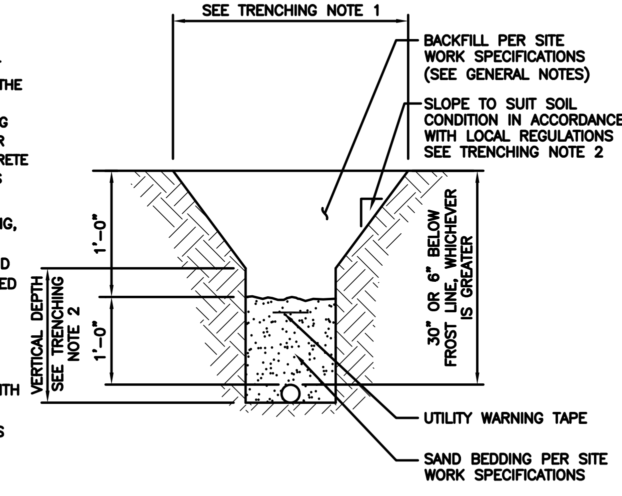


NOTE:
CONTRACTOR TO INSTALL EXPANSION FITTING SLIP JOINT AT METER CENTER CONDUIT TERMINATION, AS PER LOCAL UTILITY POLICY, ORDINANCE AND/OR SPECIFIED REQUIREMENT.

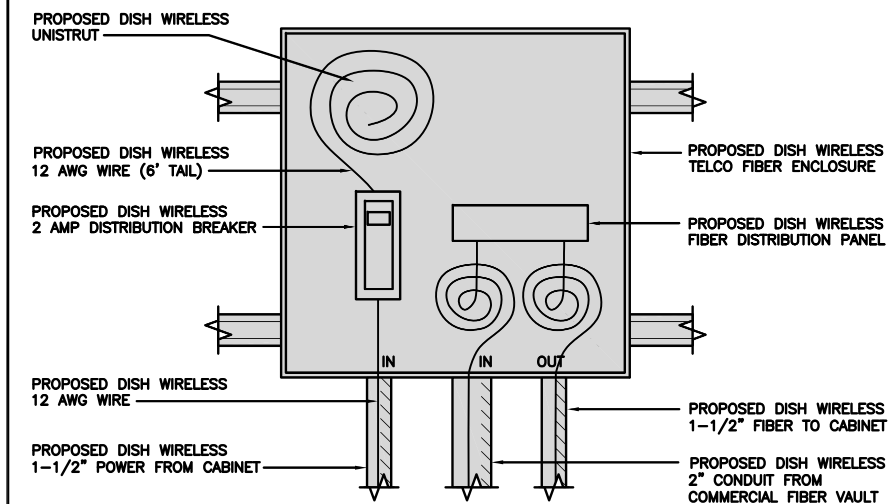
EXPANSION JOINT DETAIL | NO SCALE | 1

TRENCHING NOTES

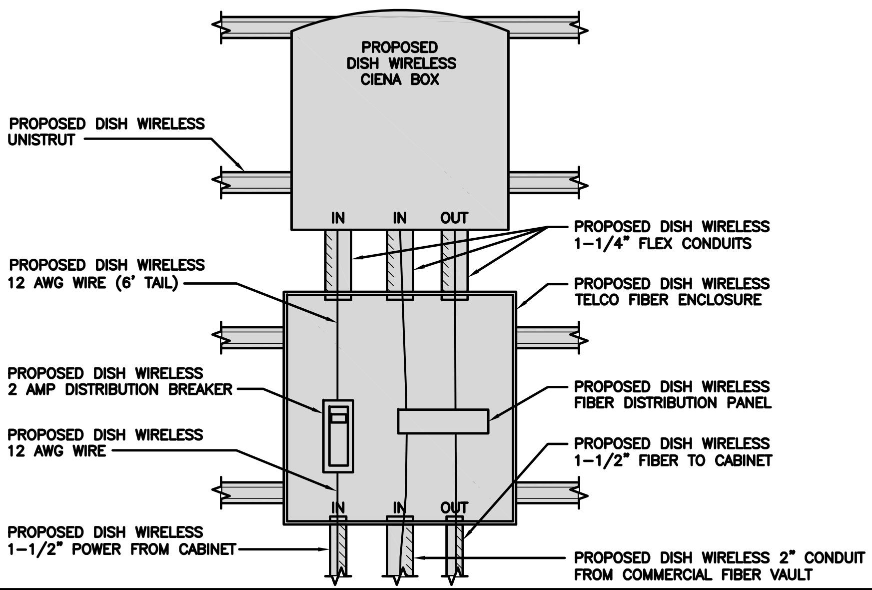
1. CONTRACTOR SHALL RESTORE THE TRENCH TO ITS ORIGINAL CONDITIONS BY EITHER SEEDING OR SODDING GRASS AREAS, OR REPLACING ASPHALT OR CONCRETE AREAS TO ITS ORIGINAL CROSS SECTION.
2. TRENCHING SAFETY; INCLUDING, BUT NOT LIMITED TO SOIL CLASSIFICATION, SLOPING, AND SHORING, SHALL BE GOVERNED BY THE CURRENT OSHA TRENCHING AND EXCAVATION SAFETY STANDARDS.
3. ALL CONDUITS SHALL BE INSTALLED IN COMPLIANCE WITH THE CURRENT NATIONAL ELECTRIC CODE (NEC) OR AS REQUIRED BY THE LOCAL JURISDICTION, WHICHEVER IS THE MOST STRINGENT.



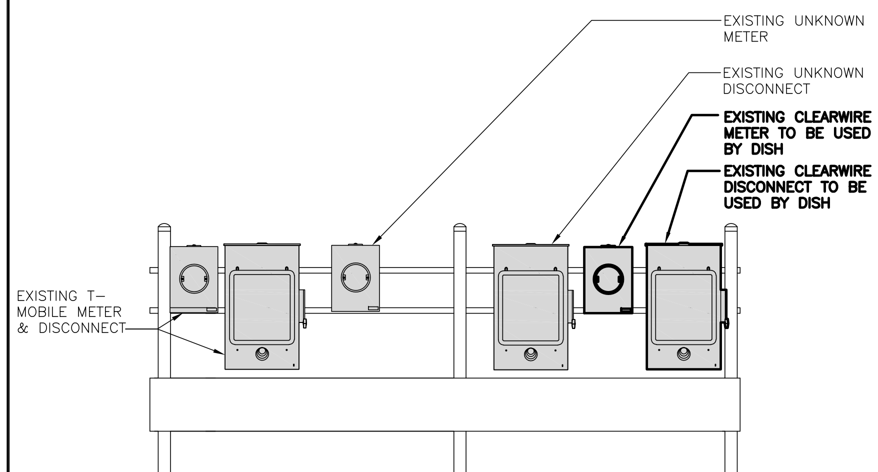
TYPICAL UNDERGROUND TRENCH DETAIL | NO SCALE | 2



DARK TELCO BOX – INTERIOR WIRING LAYOUT | NO SCALE | 3



LIT TELCO BOX – INTERIOR WIRING LAYOUT (OPTIONAL) | NO SCALE | 4



EXISTING BACKBOARD | NO SCALE | 5

NOT USED | NO SCALE | 6

NOT USED | NO SCALE | 7

NOT USED | NO SCALE | 8

NOT USED | NO SCALE | 9

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A&E PROJECT NUMBER
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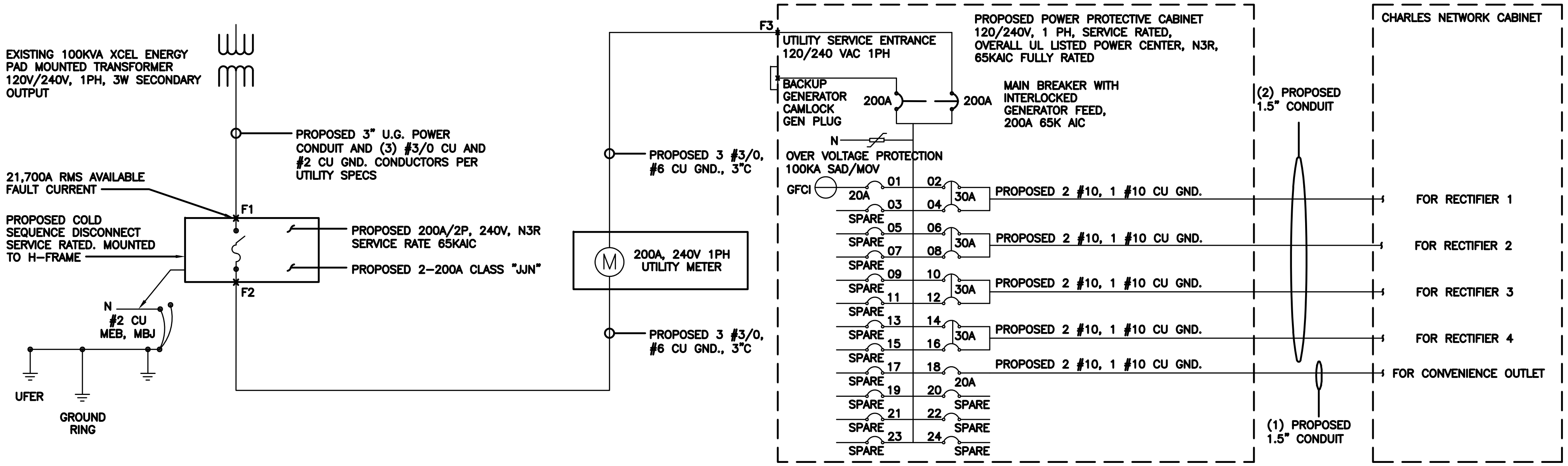
DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
–
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
ELECTRICAL DETAILS

SHEET NUMBER
E-2

ONE-LIINE RISER DIAGRAM



NOTES

THERE ARE A TOTAL OF (10) CURRENT CARRYING CONDUCTORS IN A SINGLE CONDUIT. ADJUSTABLE FACTOR OF 50% PER NEC TABLE 310.15(B)(3)(a) SHALL APPLY.

#10 FOR 15A/1P BREAKER: 0.5 x 40A = 15.0A
#8 FOR 20A-25A/2P BREAKER: 0.5 x 55A = 27.5A
#6 FOR 30A-35A/2P BREAKER: 0.5 x 75A = 37.5A
#4 FOR 40A-45A/2P BREAKER: 0.5 x 95A = 47.5A

CONDUIT SIZING: ASSUME 1.5" EMT
AT 40% FILL PER NEC 358, TABLE 4 – 0.814A SQ. IN AREA

WIRES: USING THWN-2, CU. (INCLUDING 3 GROUND WIRES)
#6 – 0.0507 SQ. IN X 8 = 0.4056 SQ. IN
#8 – 0.0366 SQ. IN X 2 = 0.0732 SQ. IN
#10 – 0.0211 SQ. IN X 4 = 0.0844 SQ. IN <GROUND
#12 – 0.0133 SQ. IN X 1 = 0.0133 SQ. IN <GROUND
TOTAL = 0.5765 SQ. IN

1.5" EMT CONDUIT IS ADEQUATE TO HANDLE THE TOTAL OF (15) WIRES, INCLUDING GROUND WIRE, AS INDICATED ABOVE.

CONDUIT SIZING: ASSUME 3.0" SCH 40 PVC
AT 40% FILL PER NEC 352,TABLE 4 – 1.216A SQ. IN AREA

WIRES: USING THHN, CU. (INCLUDING 2 GROUND WIRES)
#3/0 – 0.1318 SQ. IN X 3 = 0.3954 SQ. IN
#2 – 0.0521 SQ. IN X 1 = 0.0521 SQ. IN
TOTAL = 0.4475 SQ. IN

3.0" EMT CONDUIT IS ADEQUATE TO HANDLE THE TOTAL OF (3) WIRES, INCLUDING GROUND WIRE, AS INDICATED ABOVE.

(CHARLES ABB GE INFINITY DC PLANT) WITH SINGLE-METER 120V240V 1PH SOURCE | NO SCALE | 1

PROPOSED PANEL SCHEDULE

LOAD SERVED	VOLT AMPS (WATTS) L1	VOLT AMPS (WATTS) L2	TRIP	CKT #	PHASE	CKT #	TRIP	VOLT AMPS (WATTS) L1	VOLT AMPS (WATTS) L2	LOAD SERVED
SPARE				1	A	2	30A	2880		ABB/GE INFINITY RECTIFIER 1
SPARE				3	B	4			2880	
SPARE				5	A	6	30A	2880		ABB/GE INFINITY RECTIFIER 2
SPARE				7	B	8			2880	
SPARE				9	A	10	30A	2880		ABB/GE INFINITY RECTIFIER 3
SPARE				11	B	12			2880	
SPARE				13	A	14	30A	2880		ABB/GE INFINITY RECTIFIER 4
SPARE				15	B	16			2880	
SPARE				17	A	18	20A	1920		CHARLES GFCI
SPARE				19	B	20				SPARE
SPARE				21	A	22				SPARE
SPARE				23	B	24				SPARE
VOLT AMPS								13440	11520	
200A MCB, 1ϕ, 3W, 120/240V			L1		L2					
MB RATING: 65,000 AIC			13440		11520	VOLT AMPS				
			75.3		64.7	AMPS				
			140			MAX AMPS				
			175			MAX 125%				

PANEL SCHEDULE | NO SCALE | 2

NOT USED | NO SCALE | 3

NOT USED | NO SCALE | 4

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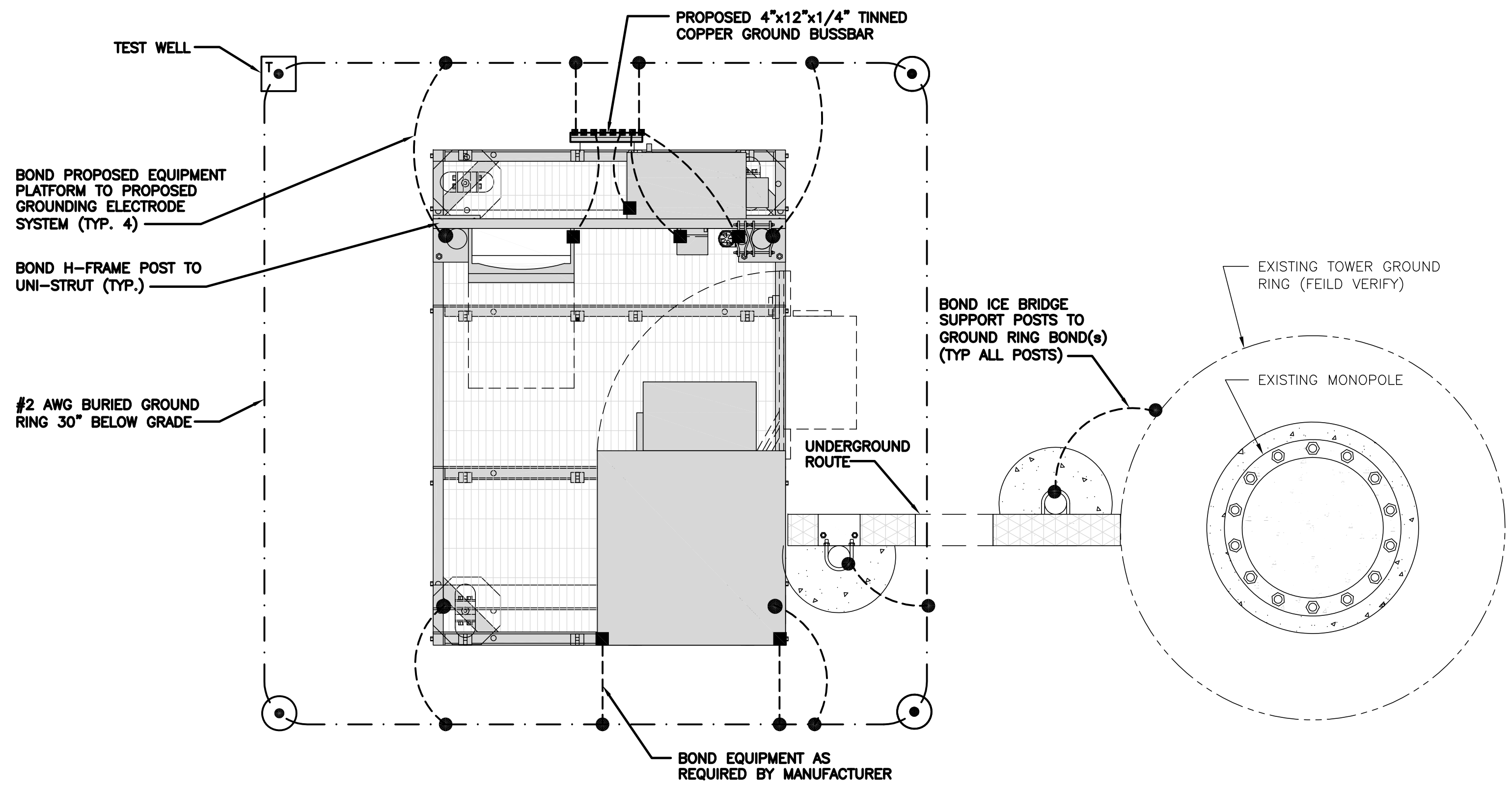
A&E PROJECT NUMBER
–

DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
–
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
ELECTRICAL ONE-LINE, FAULT CALCS & PANEL SCHEDULE

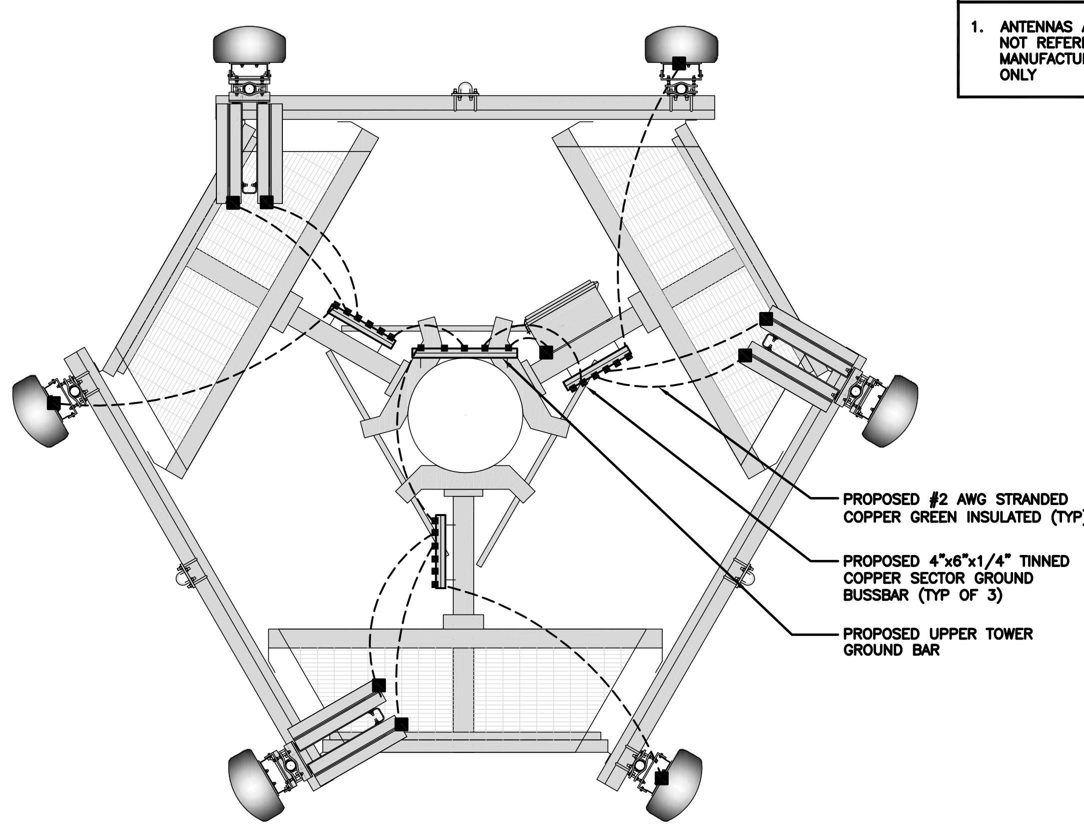
SHEET NUMBER
E-3



TYPICAL EQUIPMENT GROUNDING PLAN — NO SCALE — 1

NOTES

1. ANTENNAS AND OVP SHOWN ARE GENERIC AND NOT REFERENCING TO A SPECIFIC MANUFACTURER. THIS LAYOUT IS FOR REFERENCE ONLY



TYPICAL ANTENNA GROUNDING PLAN — NO SCALE — 2

- EXOTHERMIC CONNECTION
- MECHANICAL CONNECTION
- GROUND BUS BAR
- GROUND ROD
- TEST GROUND ROD WITH INSPECTION SLEEVE
- #2 AWG STRANDED & INSULATED
- #2 AWG SOLID COPPER TINNED

GROUNDING LEGEND

1. GROUNDING IS SHOWN DIAGRAMMATICALLY ONLY.
2. CONTRACTOR SHALL GROUND ALL EQUIPMENT AS A COMPLETE SYSTEM. GROUNDING SHALL BE IN COMPLIANCE WITH NEC SECTION 250 AND DISH WIRELESS GROUNDING AND BONDING REQUIREMENTS AND MANUFACTURER'S SPECIFICATIONS.
3. ALL GROUND CONDUCTORS SHALL BE COPPER; NO ALUMINUM CONDUCTORS SHALL BE USED.

GROUNDING KEY NOTES

A. EXTERIOR GROUND RING: #2 AWG SOLID COPPER, BURIED AT A DEPTH OF AT LEAST 30 INCHES BELOW GRADE, OR 6 INCHES BELOW THE FROST LINE AND APPROXIMATELY 24 INCHES FROM THE EXTERIOR WALL OR FOOTING.

B. TOWER GROUND RING: THE GROUND RING SYSTEM SHALL BE INSTALLED AROUND AN ANTENNA TOWER'S LEGS, AND/OR GUY ANCHORS. WHERE SEPARATE SYSTEMS HAVE BEEN PROVIDED FOR THE TOWER AND THE BUILDING, AT LEAST TWO BONDS SHALL BE MADE BETWEEN THE TOWER RING GROUND SYSTEM AND THE BUILDING RING GROUND SYSTEM USING MINIMUM #2 AWG SOLID COPPER CONDUCTORS.

C. INTERIOR GROUND RING: #2 AWG STRANDED GREEN INSULATED COPPER CONDUCTOR EXTENDED AROUND THE PERIMETER OF THE EQUIPMENT AREA. ALL NON-TELECOMMUNICATIONS RELATED METALLIC OBJECTS FOUND WITHIN A SITE SHALL BE GROUNDED TO THE INTERIOR GROUND RING WITH #6 AWG STRANDED GREEN INSULATED CONDUCTOR.

D. BOND TO INTERIOR GROUND RING: #2 AWG SOLID TINNED COPPER WIRE PRIMARY BONDS SHALL BE PROVIDED AT LEAST AT FOUR POINTS ON THE INTERIOR GROUND RING, LOCATED AT THE CORNERS OF THE BUILDING.

E. GROUND ROD: UL LISTED COPPER CLAD STEEL. MINIMUM 1/2" DIAMETER BY EIGHT FEET LONG. GROUND RODS SHALL BE INSTALLED WITH INSPECTION SLEEVES. GROUND RODS SHALL BE DRIVEN TO THE DEPTH OF GROUND RING CONDUCTOR.

F. CELL REFERENCE GROUND BAR: POINT OF GROUND REFERENCE FOR ALL COMMUNICATIONS EQUIPMENT FRAMES. ALL BONDS ARE MADE WITH #2 AWG UNLESS NOTED OTHERWISE STRANDED GREEN INSULATED COPPER CONDUCTORS. BOND TO GROUND RING WITH (2) #2 SOLID TINNED COPPER CONDUCTORS.

G. HATCH PLATE GROUND BAR: BOND TO THE INTERIOR GROUND RING WITH TWO #2 AWG STRANDED GREEN INSULATED COPPER CONDUCTORS. WHEN A HATCH-PLATE AND A CELL REFERENCE GROUND BAR ARE BOTH PRESENT, THE CRGB MUST BE CONNECTED TO THE HATCH-PLATE AND TO THE INTERIOR GROUND RING USING (2) TWO #2 AWG STRANDED GREEN INSULATED COPPER CONDUCTORS EACH.

H. EXTERIOR CABLE ENTRY PORT GROUND BARS: LOCATED AT THE ENTRANCE TO THE CELL SITE BUILDING. BOND TO GROUND RING WITH A #2 AWG SOLID TINNED COPPER CONDUCTORS WITH AN EXOTHERMIC WELD AND INSPECTION SLEEVE.

J. TELCO GROUND BAR: BOND TO BOTH CELL REFERENCE GROUND BAR AND EXTERIOR GROUND RING.

K. FRAME BONDING: THE BONDING POINT FOR TELECOM EQUIPMENT FRAMES SHALL BE THE GROUND BUS THAT IS NOT ISOLATED FROM THE EQUIPMENTS METAL FRAMEWORK. BOND THE FRAME GROUND TO THE "I" SECTION OF THE CELL REFERENCE GROUND BAR OR SUPPLEMENTARY CONDUCTOR. (SHEET G3 DETAIL1)

L. INTERIOR UNIT BONDS: METAL FRAMES, CABINETS AND INDIVIDUAL METALLIC UNITS LOCATED WITH THE AREA OF THE INTERIOR GROUND RING REQUIRE A #6 AWG STRANDED GREEN INSULATED COPPER BOND TO THE INTERIOR GROUND RING.

M. FENCE AND GATE GROUNDING: METAL FENCES WITHIN 7 FEET OF THE EXTERIOR GROUND RING OR OBJECTS BONDED TO THE EXTERIOR GROUND RING SHALL BE BONDED TO THE GROUND RING WITH A #2 AWG SOLID TINNED COPPER CONDUCTOR AT AN INTERVAL NOT EXCEEDING 25 FEET. BONDS SHALL BE MADE AT EACH GATE POST AND ACROSS GATE OPENINGS.

N. EXTERIOR UNIT BONDS: METALLIC OBJECTS, EXTERNAL TO OR MOUNTED TO THE BUILDING, SHALL BE BONDED TO THE EXTERIOR GROUND RING. USING #2 TINNED SOLID COPPER WIRE

P. ICE BRIDGE SUPPORTS: EACH ICE BRIDGE LEG SHALL BE BONDED TO THE GROUND RING WITH #2 AWG BARE TINNED COPPER CONDUCTOR. PROVIDE EXOTHERMIC WELDS AT BOTH THE ICE BRIDGE LEG AND BURIED GROUND RING.

Q. DURING ALL DC POWER SYSTEM CHANGES INCLUDING DC SYSTEM CHANGE OUTS, RECTIFIER REPLACEMENTS OR ADDITIONS, BREAKER DISTRIBUTION CHANGES, BATTERY ADDITIONS, BATTERY REPLACEMENTS AND INSTALLATIONS OR CHANGES TO DC CONVERTER SYSTEMS IT SHALL BE REQUIRED THAT SERVICE CONTRACTORS VERIFY ALL DC POWER SYSTEMS ARE EQUIPPED WITH A MASTER DC SYSTEM RETURN GROUND CONDUCTOR FROM THE DC POWER SYSTEM COMMON RETURN BUS DIRECTLY CONNECTED TO THE CELL SITE REFERENCE GROUND BAR

R. TOWER TOP COLLECTOR BUSS BAR IS TO BE MECHANICALLY BONDED TO PROPOSED ANTENNA MOUNT.

REFER TO DISH WIRELESS GROUNDING NOTES.

GROUNDING KEY NOTES — NO SCALE — 3

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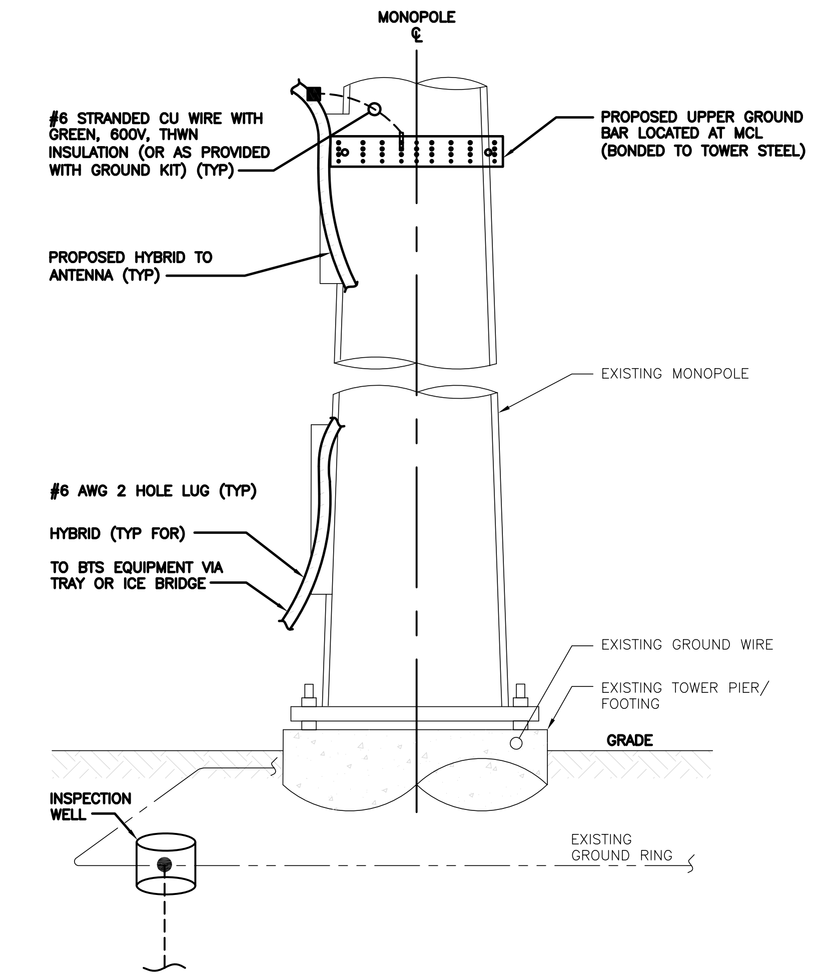
DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
-
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
GROUNDING PLANS AND NOTES

SHEET NUMBER
G-1



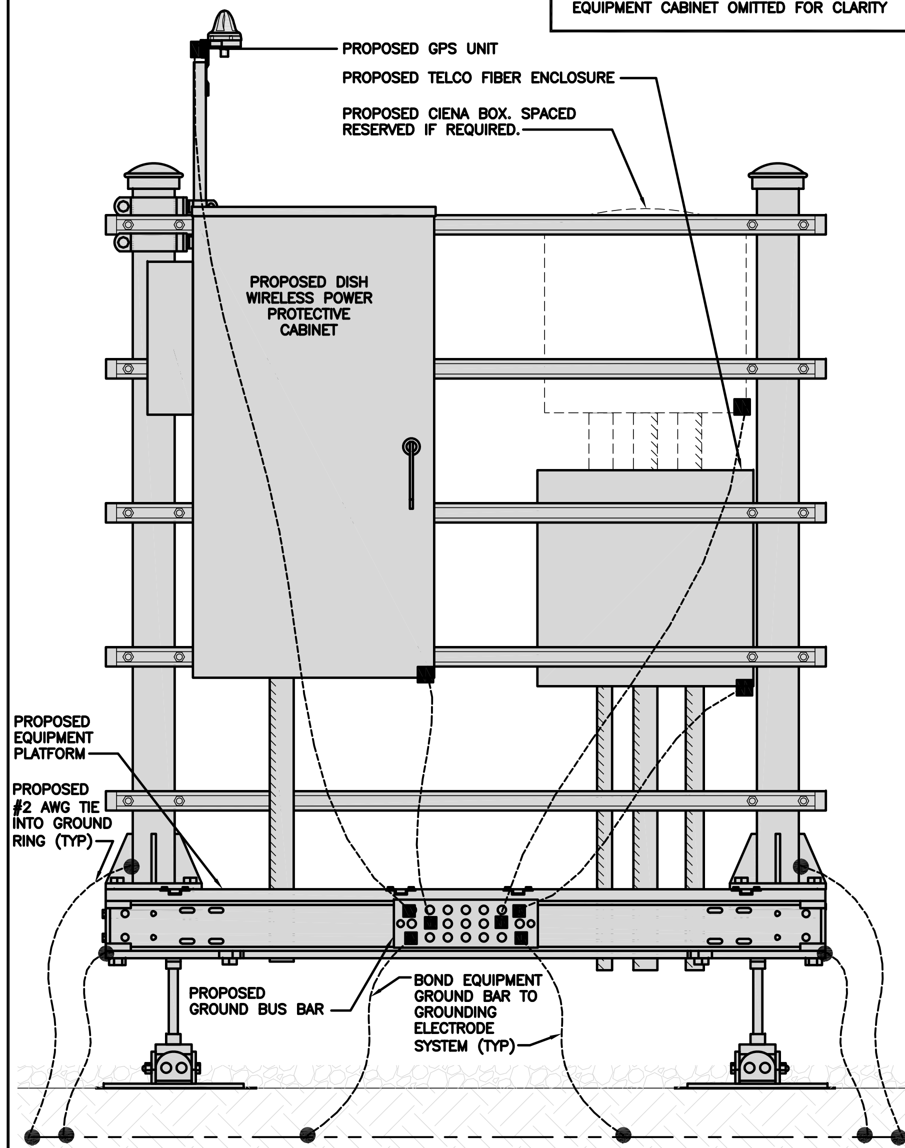
NOTES:

1. ONLY MECHANICAL CONNECTIONS ARE ALLOWED TO BE MADE TO TOWERS. ALL MECHANICAL CONNECTIONS SHALL BE TREATED WITH AN ANTI-OXIDANT COATING.
2. ALL TOWER GROUNDING SYSTEMS SHALL COMPLY WITH THE REQUIREMENTS OF THE RECOGNIZED EDITION OF ANSI/TIA 222 AND NFPA 780.

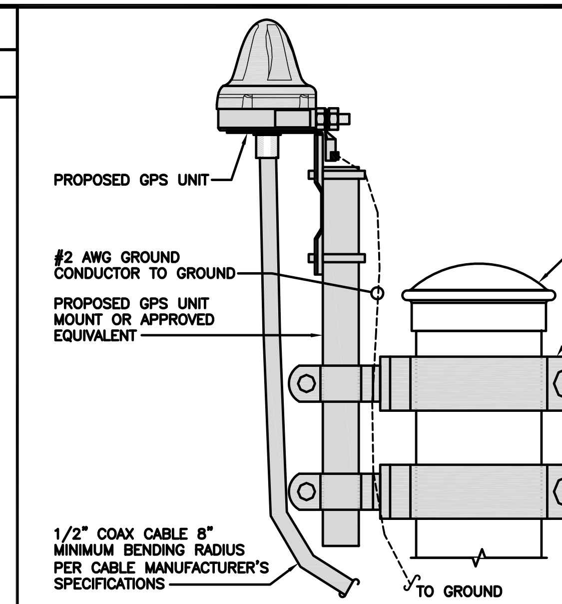
TYPICAL ANTENNA CABLE GROUNDING — NO SCALE — 1

NOTES

EQUIPMENT CABINET OMITTED FOR CLARITY



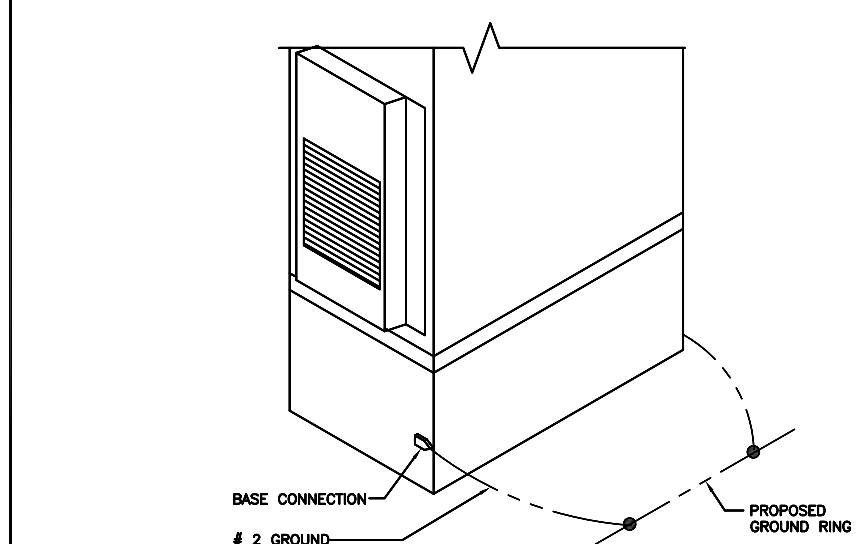
H-FRAME GROUNDING DETAIL — NO SCALE — 2



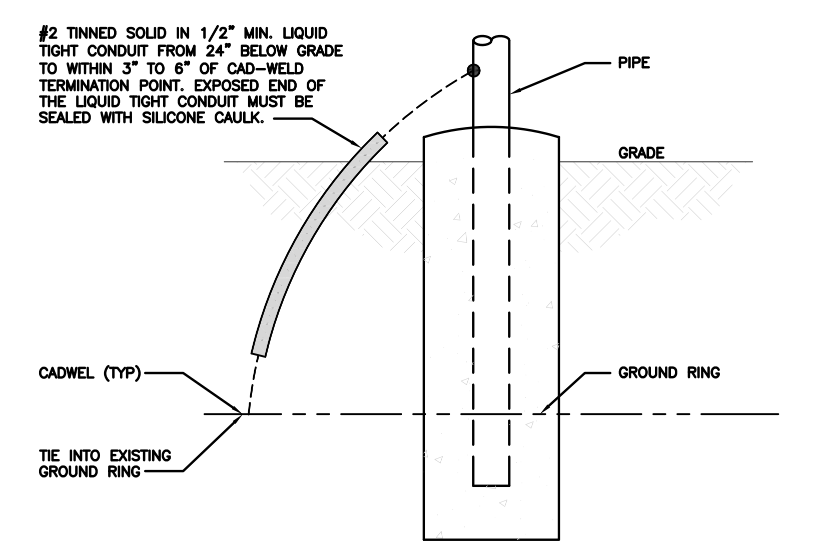
NOTES

CABLE GROUNDING NOT REQUIRED WHEN ANTENNA IS LESS THAN 10' FROM CABINET

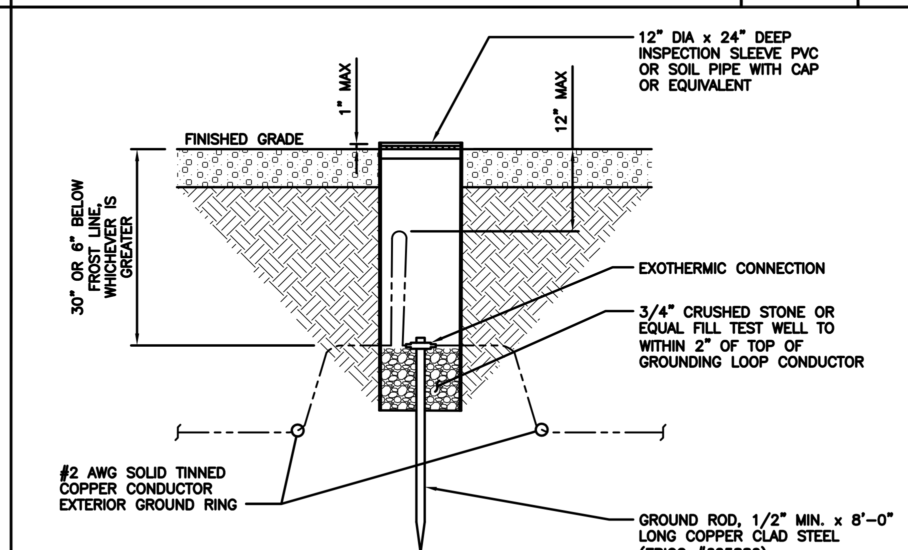
TYPICAL GPS UNIT GROUNDING — NO SCALE — 3



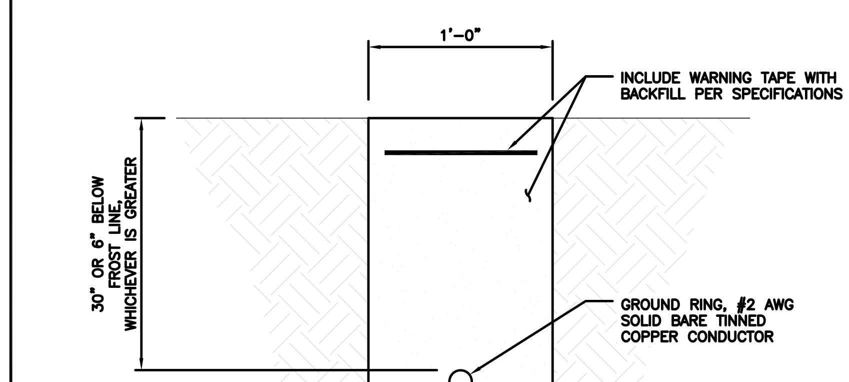
OUTDOOR CABINET GROUNDING — NO SCALE — 4



TRANSITIONING GROUND DETAIL — NO SCALE — 5



TYPICAL TEST GROUND ROD WITH INSPECTION SLEEVE — NO SCALE — 6



TYPICAL GROUND RING TRENCH — NO SCALE — 7

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DCWDC00428A

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12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE

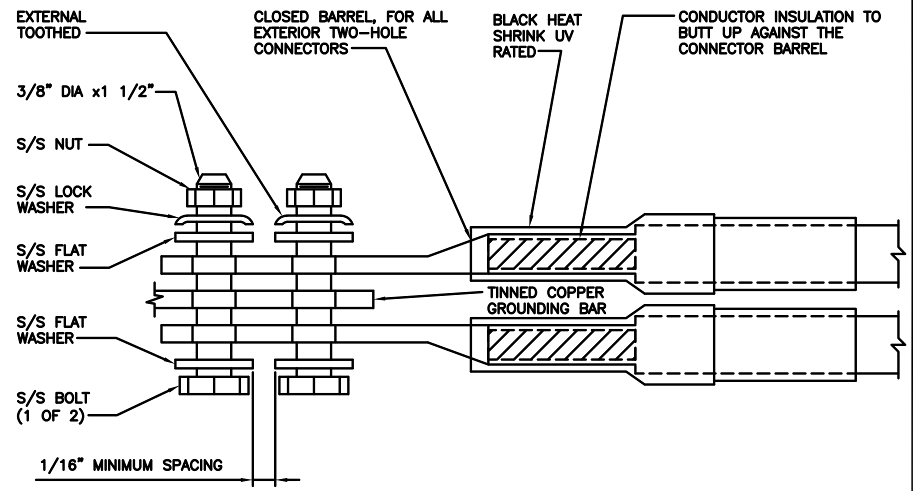
GROUNDING DETAILS

SHEET NUMBER

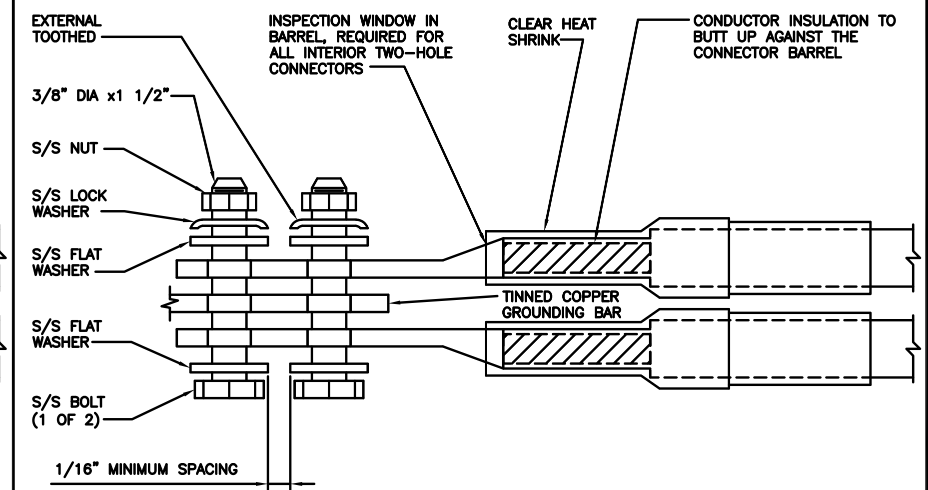
G-2

1. EXOTHERMIC WELD (2) TWO, #2 AWG BARE TINNED SOLID COPPER CONDUCTORS TO GROUND BAR. ROUTE CONDUCTORS TO BURIED GROUND RING AND PROVIDE PARALLEL EXOTHERMIC WELD.
2. ALL EXTERIOR GROUNDING HARDWARE SHALL BE STAINLESS STEEL 3/8" DIAMETER OR LARGER. ALL HARDWARE 18-8 STAINLESS STEEL INCLUDING LOCK WASHERS, COAT ALL SURFACES WITH AN ANTI-OXIDANT COMPOUND BEFORE MATING.
3. FOR GROUND BOND TO STEEL ONLY: COAT ALL SURFACES WITH AN ANTI-OXIDANT COMPOUND BEFORE MATING.
4. DO NOT INSTALL CABLE GROUNDING KIT AT A BEND AND ALWAYS DIRECT GROUND CONDUCTOR DOWN TO GROUNDING BUS.
5. NUT & WASHER SHALL BE PLACED ON THE FRONT SIDE OF THE GROUND BAR AND BOLTED ON THE BACK SIDE.
6. ALL GROUNDING PARTS AND EQUIPMENT TO BE SUPPLIED AND INSTALLED BY CONTRACTOR.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING ADDITIONAL GROUND BAR AS REQUIRED.
9. ENSURE THE WIRE INSULATION TERMINATION IS WITHIN 1/8" OF THE BARREL (NO SHINERS).

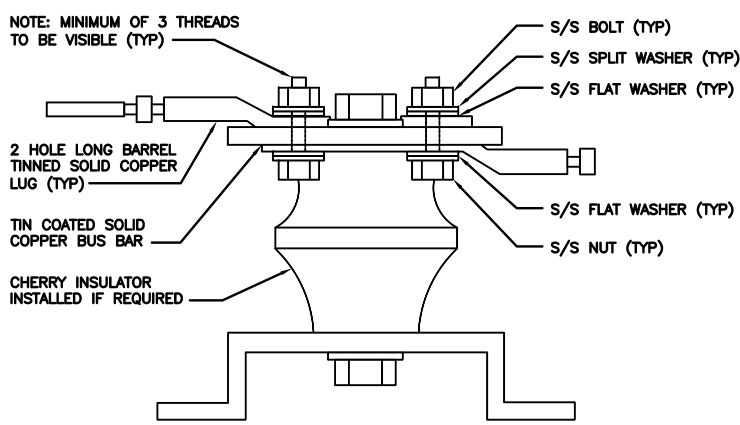
TYPICAL GROUNDING NOTES | NO SCALE | 1



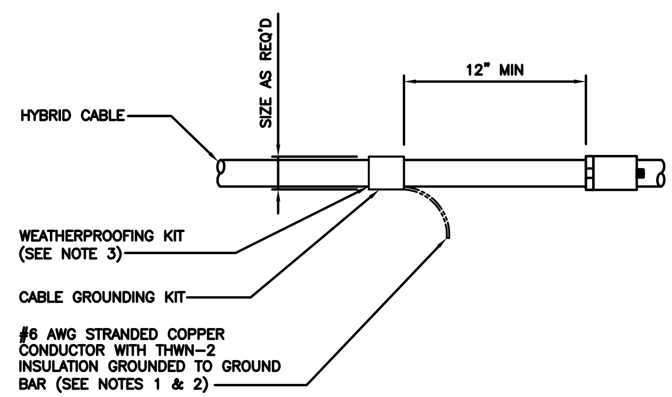
TYPICAL EXTERIOR TWO HOLE LUG | NO SCALE | 2



TYPICAL INTERIOR TWO HOLE LUG | NO SCALE | 3



LUG DETAIL | NO SCALE | 4



CONNECTION OF HYBRID CABLE GROUNDING KIT TO HYBRID TRUNK | NO SCALE | 5

NOT USED | NO SCALE | 6

NOT USED | NO SCALE | 7

NOT USED | NO SCALE | 8

NOT USED | NO SCALE | 9

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STATE OF MARYLAND
CHRISTOPHER D. MORIN
7.19.21
NO. 24552
PROFESSIONAL ENGINEER

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 NUMBER 24552, EXPIRATION DATE 11/17/21.

DRAWN BY:	CHECKED BY:	APPROVED BY:
GMW	NP	CDM

RFDS REV #: 0

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
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0	4/6/21	ISSUED FOR CONSTRUCTION
1	5/3/21	ISSUED FOR CONSTRUCTION
2	7/19/21	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER
-

DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
-
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
GROUNDING DETAILS

SHEET NUMBER
G-3

RF JUMPER COLOR CODING

3/4" TAPE WIDTHS WITH 3/4" SPACING

LOW-BAND RRH – (600MHz N71 BASEBAND) + (850MHz N26 BAND) + (700MHz N29 BAND) – OPTIONAL PER MARKET

ADD FREQUENCY COLOR TO SECTOR BAND (CBRS WILL USE YELLOW BANDS)

ALPHA RRH PORT 1 + SLANT	ALPHA RRH PORT 2 + SLANT	ALPHA RRH PORT 3 + SLANT	ALPHA RRH PORT 4 + SLANT	BETA RRH PORT 1 + SLANT	BETA RRH PORT 2 + SLANT	BETA RRH PORT 3 + SLANT	BETA RRH PORT 4 + SLANT	GAMMA RRH PORT 1 + SLANT	GAMMA RRH PORT 2 + SLANT	GAMMA RRH PORT 3 + SLANT	GAMMA RRH PORT 4 + SLANT
RED	RED	RED	RED	BLUE	BLUE	BLUE	BLUE	GREEN	GREEN	GREEN	GREEN
ORANGE	ORANGE	RED	RED	ORANGE	ORANGE	BLUE	BLUE	ORANGE	ORANGE	GREEN	GREEN
	WHITE (1) PORT	ORANGE	ORANGE		WHITE (1) PORT	ORANGE	ORANGE		WHITE (1) PORT	ORANGE	ORANGE
			WHITE (1) PORT				WHITE (1) PORT				WHITE (1) PORT

MID-BAND RRH – (AWS BANDS N66+N70)

ADD FREQUENCY COLOR TO SECTOR BAND (CBRS WILL USE YELLOW BANDS)

RED	RED	RED	RED	BLUE	BLUE	BLUE	BLUE	GREEN	GREEN	GREEN	GREEN
PURPLE	PURPLE	RED	RED	PURPLE	PURPLE	BLUE	BLUE	PURPLE	PURPLE	GREEN	GREEN
	WHITE (1) PORT	PURPLE	PURPLE		WHITE (1) PORT	PURPLE	PURPLE		WHITE (1) PORT	PURPLE	PURPLE
			WHITE (1) PORT				WHITE (1) PORT				WHITE (1) PORT

HYBRID/DISCREET CABLES

INCLUDE SECTOR BANDS BEING SUPPORTED AM LONG WITH FREQUENCY BANDS

EXAMPLE 1 – HYBRID, OR DISCREET, SUPPORTS ALL SECTORS, BOTH LOW–BANDS AND MID–BANDS

EXAMPLE 2 – HYBRID, OR DISCREET, SUPPORTS CBRS ONLY, ALL SECTORS

EXAMPLE 1	EXAMPLE 2
RED	RED
BLUE	BLUE
GREEN	GREEN
ORANGE	YELLOW
PURPLE	

HYBRID/DISCREET CABLES

LOW–BAND RRH FIBER CABLES HAVE SECTOR STRIPE ONLY

LOW BAND RRH	HIGH BAND RRH	LOW BAND RRH	LOW BAND RRH	LOW BAND RRH	LOW BAND RRH
RED	RED	BLUE	BLUE	GREEN	GREEN
	PURPLE		PURPLE		PURPLE

POWER CABLES TO RRHs

LOW–BAND RRH POWER CABLES HAVE SECTOR STRIPE ONLY

LOW BAND RRH	HIGH BAND RRH	LOW BAND RRH	LOW BAND RRH	LOW BAND RRH	LOW BAND RRH
RED	RED	BLUE	BLUE	GREEN	GREEN
	PURPLE		PURPLE		PURPLE

RET MOTORS AT ANTENNAS

PORT 1/ ANTENNA 1 "IN"	PORT 1/ ANTENNA 1 "IN"	PORT 1/ ANTENNA 1 "IN"
RED	BLUE	GREEN

MICROWAVE RADIO LINKS

LINKS WILL HAVE A 1.5–2 INCH WHITE WRAP WITH THE AZIMUTH COLOR OVERLAPPING IN THE MIDDLE. ADD ADDITIONAL SECTOR COLOR BANDS FOR EACH ADDITIONAL MW RADIO.

MICROWAVE CABINETS WILL REQUIRE P–TOUCH LABELS INSIDE THE CABINET TO IDENTIFY THE LOCAL AND REMOTE SITE ID'S.

PRIMARY	SECONDARY
WHITE	WHITE
RED	RED
WHITE	WHITE
	RED
	WHITE

RF CABLE COLOR CODES — NO SCALE — 1

LOW BANDS (N71–N28) OPTIONAL – (N29)	AWS (N65+N70+H–BLOCK)
ORANGE	PURPLE

CBRS TECH (3 GHz)	NEGATIVE SLANT PORT ON ANTRRH
YELLOW	WHITE

ALPHA SECTOR	BETA SECTOR	GAMMA SECTOR
RED	BLUE	GREEN

COLOR IDENTIFIER — NO SCALE — 2

NOT USED — NO SCALE — 3

NOT USED — NO SCALE — 4

dish wireless.

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STATE OF MARYLAND — CHRISTOPHER D. MORIN — No. 24552 — PROFESSIONAL ENGINEER — 7/19/21

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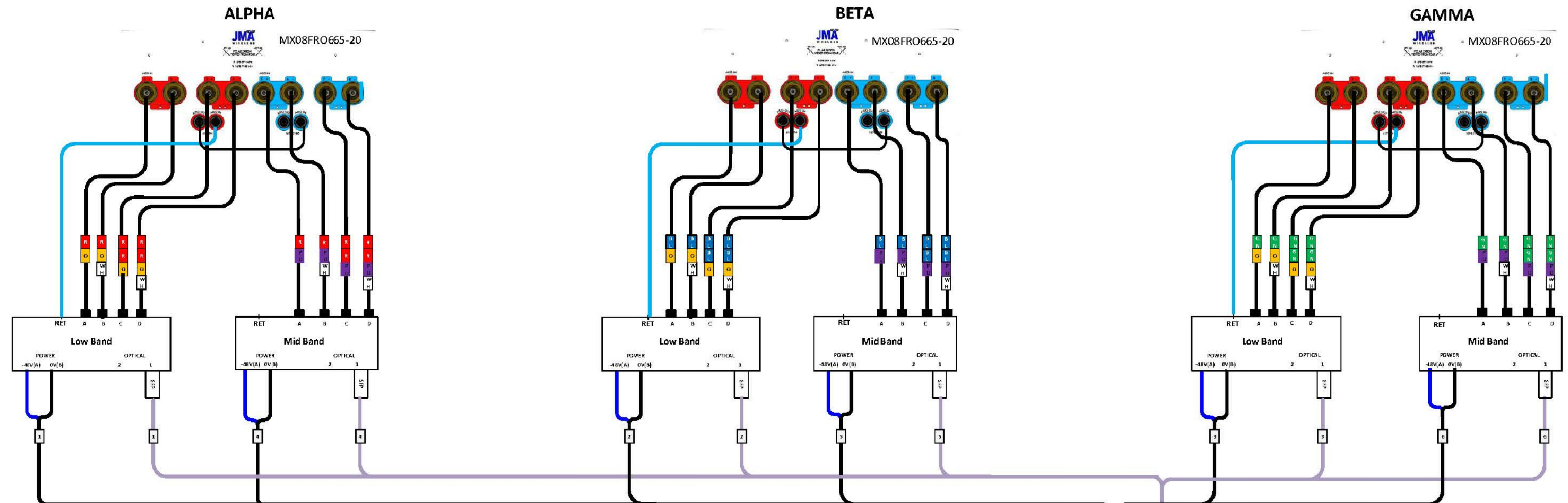
A&E PROJECT NUMBER
–

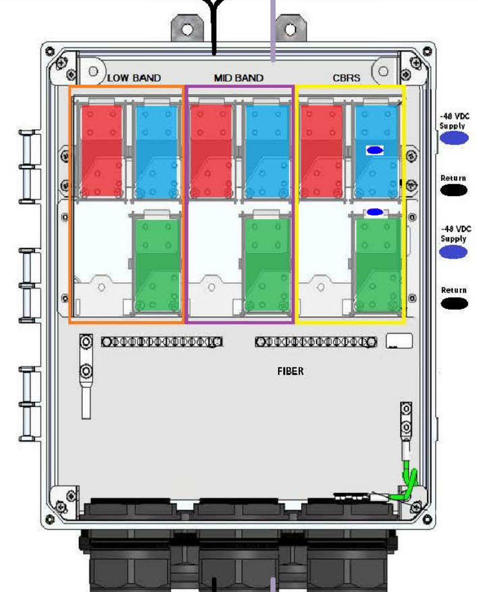
DISH WIRELESS PROJECT INFORMATION

DCWDC00428A
–
12501–A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
RF
CABLE COLOR CODES

SHEET NUMBER
RF-1





Fiber Patch Panel

Bottom Row	Pair 1	Pair 2	Pair 3	Pair 10	Open	Open
Middle Row	Pair 4	Pair 5	Pair 6	Pair 11	Open	Open
Top Row	Pair 7	Pair 8	Pair 9	Pair 12	Open	Open

CSR NCS540

Port	Interface	Description
0	Gi0/0/0/0	SiteBoss
1	Gi0/0/0/1	CBRS - Alpha
2	Gi0/0/0/2	CBRS - Beta
3	Gi0/0/0/3	CBRS - Gamma
4	Te0/0/0/4	Fujitsu Low-Band RU - Alpha
5	Te0/0/0/5	Fujitsu Mid-Band RU - Alpha
6	Te0/0/0/6	Fujitsu Low-Band RU - Beta
7	Te0/0/0/7	Fujitsu Mid-Band RU - Beta
8	Te0/0/0/8	Fujitsu Low-Band RU - Gamma
9	Te0/0/0/9	Fujitsu Mid-Band RU - Gamma
10	Te0/0/0/10	Fixed Wifi
11	Te0/0/0/11	Fixed Wifi
12	Te0/0/0/12	Fixed Wifi
13	Te0/0/0/13	Fixed Wifi
14	Te0/0/0/14	CBRS1
15	Te0/0/0/15	CBRS2
16	Te0/0/0/16	CBRS3
17	Gi0/0/0/17	SM1 - BMC
18	Gi0/0/0/18	SM2 - BMC
19	Te0/0/019	SM1 - Data 1
20	Te0/0/020	SM1 - Data 2
21	Te0/0/021	SM2 - Data 1
22	Te0/0/022	SM2 - Data 2
23	Te0/0/023	Reserved Uplink (EDC, LDC)
24	Te0/0/024	Blank/Future
25	Te0/0/0/25	Blank/Future
26	Te0/0/0/26	Fiber NIU
27	Te0/0/0/27	Fiber NIU
28	Te0/0/0/28	Blank/Future
29	Te0/0/0/29	Blank/Future

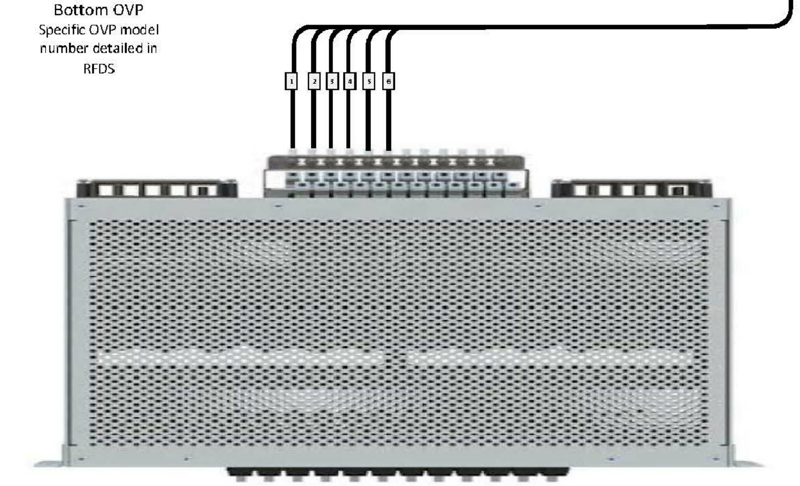
top

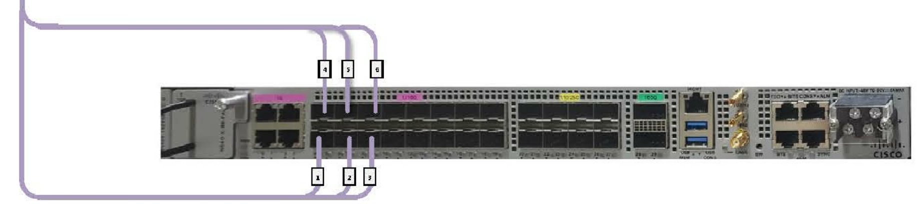
bottom

Bottom OVP Layout

Circuit 1	Alpha Low Band
Circuit 2	Beta Low Band
Circuit 3	Gamma Low Band
Circuit 4	Alpha Mid Band
Circuit 5	Beta Mid Band
Circuit 6	Gamma Mid Band
Circuit 7	Alpha CBRS
Circuit 8	Beta CBRS
Circuit 9	Gamma CBRS
Circuit 10	Open
Circuit 11	Open
Circuit 12	Open

Bottom OVP
Specific OVP model number detailed in RFDS





5G plumbing diagram JMA MX08FRO665-20 2-2-2(LB+MB)

Quan Liu
5-Jan-2021
SCALE None

PLUMBING DIAGRAM

NO SCALE 1

dish wireless.

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RFDS REV #: 0

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A&E PROJECT NUMBER
–

DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
–
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
RF
PLUMBING DIAGRAM

SHEET NUMBER
RF-2

RF EQUIPMENT INFORMATION

Issue Date/Revision	2/19/2021	**Revision:**	0
Site ID	DCWDC00428A		
Site Address	12501-A Dalewood Drive, Silver Spring MD 20906		
Structure Type	Monopole		
sectors >20' apart?	No	*Confirmed RAD?* Confirmed	90

Latitude	39.0595	**Longitude**	-77.0665
Prequal Asset ID	MD-VER-T-USMD5072		
SOW / RF Comments	Dish proposes to place 3 antennas, 6 RRUs, 1 junction box(s), and 1 cable(s) at the 90 foot RAD. Dish will require a 5' x 7' lease area for ground equipment.		

	Sector 1 (alpha)			Sector 2 (beta)			Sector 3 (gamma)		
ANTENNA									
Antenna #	1	4	7	2	5	8	3	6	9
Manufacturer	JMA			JMA			JMA		
Model Number	MX08FRO665-20_V0F			MX08FRO665-20_V0F			MX08FRO665-20_V0F		
Dimensions H x W x D (in)	72.0" x 20.0" x 8.0"			72.0" x 20.0" x 8.0"			72.0" x 20.0" x 8.0"		
Weight (lbs.)	54			54			54		
TX Power Output (watts)	134.4077226			134.4077226			134.4077226		
ERP (watts)	15827.05411			15827.05411			15827.05411		
RAD Centerline Height (ft.)	90			90			90		
Azimuths	0			120			240		
Mech Down Tilt	0			0			0		
Elec Down Tilt	2			2			2		
Default Mount	Valmont SNP8HR-396								
LOW BAND/RADIO #1									
Manufacturer	Fujitsu			Fujitsu			Fujitsu		
Model Number	TA08025-B605			TA08025-B605			TA08025-B605		
Dimensions H x W x D (in.)	15.75 x 14.96 x 9.06			15.75 x 14.96 x 9.06			15.75 x 14.96 x 9.06		
Weight (lbs.)	74.95			74.95			74.95		
Location	Antenna			Antenna			Antenna		
Technology	n71 |n29 |			n71 |n29 |			n71 |n29 |		
Quantity	1			1			1		
Port Assignment	Port 1-4			Port 1-4			Port 1-4		
MID BAND/RADIO #2									
Manufacturer	Fujitsu			Fujitsu			Fujitsu		
Model Number	TA08025-B604			TA08025-B604			TA08025-B604		
Dimensions H x W x D (in)	15.75 x 14.96 x 7.87			15.75 x 14.96 x 7.87			15.75 x 14.96 x 7.87		
Weight (lbs.)	63.93			63.93			63.93		
Location	Antenna			Antenna			Antenna		
Quantity	1			1			1		
Technology	n70 |n66			n70 |n66			n70 |n66		
Port Assignment	Port 5-8			Port 5-8			Port 5-8		
OVP (Junction Box)									
Manufacturer	Raycap								
Model Number	RDIDC-9181-PF-48								
Dimensions H x W x D (in.)	16" x 14" x 8"								
Weight (lbs.)	21.85								
Quantity	1								
LINE DETAILS									
Line Type	Hybrid								
Manufacturer	Cables Unlimited								
Model Number	CU12PSM9P6XXX_6AWG								
Diameter (O.D. in.)	1.60"								
Weight (lbs. per ft.)	2.346 lbs/ft								
Quantity	1								
Approx. Cable Length	120								
OTHER EQUIPMENT									
Type of Equipment									
Manufacturer									
Model Number									
Dimensions H x W x D (in)									
Weight (lbs.)									
Equipment Location									
Quantity									

Frequencies	
TX - Low Band (Mhz)	722 - 728 | 642 - 652
TX - Mid Band (Mhz)	1995 - 2020 | 2180 - 2200

dish wireless.

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RFDS REV #: 0

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A&E PROJECT NUMBER

–

DISH WIRELESS PROJECT INFORMATION

DCWDC00428A

–

12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE

RF DATA SHEET

SHEET NUMBER

RF-3

RF DATA SHEET

NO SCALE

1

LEGEND

- EXOTHERMIC CONNECTION
- MECHANICAL CONNECTION
- CHEMICAL ELECTROLYTIC GROUNDING SYSTEM
- TEST CHEMICAL ELECTROLYTIC GROUNDING SYSTEM
- EXOTHERMIC WITH INSPECTION SLEEVE
- GROUNDING BAR
- GROUND ROD
- TEST GROUND ROD WITH INSPECTION SLEEVE
- SINGLE POLE SWITCH
- DUPLEX RECEPTACLE
- DUPLEX GFCI RECEPTACLE
- FLUORESCENT LIGHTING FIXTURE (2) TWO LAMPS 48–T8
- SMOKE DETECTION (DC)
- EMERGENCY LIGHTING (DC)
- SECURITY LIGHT W/PHOTOCELL LITHONIA ALXW LED–1–25A400/51K–SR4–120–PE–DDBTXD
- CHAIN LINK FENCE
- WOOD/WROUGHT IRON FENCE
- WALL STRUCTURE
- LEASE AREA
- PROPERTY LINE (PL)
- SETBACKS
- ICE BRIDGE
- CABLE TRAY
- WATER LINE
- UNDERGROUND POWER
- UNDERGROUND TELCO
- OVERHEAD POWER (OHP)
- OVERHEAD TELCO (OHT)
- UNDERGROUND TELCO/POWER
- ABOVE GROUND POWER
- ABOVE GROUND TELCO
- ABOVE GROUND TELCO/POWER
- WORKPOINT (W.P.)
- SECTION REFERENCE (XX / X–X)
- DETAIL REFERENCE (XX / X–X)

ABBREVIATIONS

AB	ANCHOR BOLT
ABV	ABOVE
AC	ALTERNATING CURRENT
ADDL	ADDITIONAL
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AGL	ABOVE GROUND LEVEL
AIC	AMPERAGE INTERRUPTION CAPACITY
ALUM	ALUMINUM
ALT	ALTERNATE
ANT	ANTENNA
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BATT	BATTERY
BLDG	BUILDING
BLK	BLOCK
BLKG	BLOCKING
BM	BEAM
BTC	BARE TINNED COPPER CONDUCTOR
BOF	BOTTOM OF FOOTING
CAB	CABINET
CANT	CANTILEVERED
CHG	CHARGING
CLG	CEILING
CLR	CLEAR
COL	COLUMN
COMM	COMMON
CONC	CONCRETE
CONSTR	CONSTRUCTION
DBL	DOUBLE
DC	DIRECT CURRENT
DEPT	DEPARTMENT
DF	DOUGLAS FIR
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DWG	DRAWING
DWL	DOWEL
EA	EACH
EC	ELECTRICAL CONDUCTOR
EL.	ELEVATION
ELEC	ELECTRICAL
EMT	ELECTRICAL METALLIC TUBING
ENG	ENGINEER
EQ	EQUAL
EXP	EXPANSION
EXT	EXTERIOR
EW	EACH WAY
FAB	FABRICATION
FF	FINISH FLOOR
FG	FINISH GRADE
FIF	FACILITY INTERFACE FRAME
FIN	FINISH(ED)
FLR	FLOOR
FDN	FOUNDATION
FOC	FACE OF CONCRETE
FOM	FACE OF MASONRY
FOS	FACE OF STUD
FOW	FACE OF WALL
FS	FINISH SURFACE
FT	FOOT
FTG	FOOTING
GA	GAUGE
GEN	GENERATOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GLB	GLUE LAMINATED BEAM
GLV	GALVANIZED
GPS	GLOBAL POSITIONING SYSTEM
GND	GROUND
GSM	GLOBAL SYSTEM FOR MOBILE
HDG	HOT DIPPED GALVANIZED
HDR	HEADER
HGR	HANGER
HVAC	HEAT/VENTILATION/AIR CONDITIONING
HT	HEIGHT
IGR	INTERIOR GROUND RING
IN	INCH
INT	INTERIOR
LB(S)	POUND(S)
LF	LINEAR FEET
LTE	LONG TERM EVOLUTION
MAS	MASONRY
MAX	MAXIMUM
MB	MACHINE BOLT
MECH	MECHANICAL
MFR	MANUFACTURER
MGB	MASTER GROUND BAR
MIN	MINIMUM
MISC	MISCELLANEOUS
MTL	METAL
MTS	MANUAL TRANSFER SWITCH
MW	MICROWAVE
NEC	NATIONAL ELECTRIC CODE
NM	NEWTON METERS
NO.	NUMBER
#	NUMBER
NTS	NOT TO SCALE
OC	ON–CENTER
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
OPNG	OPENING
P/C	PRECAST CONCRETE
PCS	PERSONAL COMMUNICATION SERVICES
PCU	PRIMARY CONTROL UNIT
PRC	PRIMARY RADIO CABINET
PP	POLARIZING PRESERVING
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PT	PRESSURE TREATED
PWR	POWER CABINET
QTY	QUANTITY
RAD	RADIUS
RECT	RECTIFIER
REF	REFERENCE
REINF	REINFORCEMENT
REQ'D	REQUIRED
RET	REMOTE ELECTRIC TILT
RF	RADIO FREQUENCY
RMC	RIGID METALLIC CONDUIT
RRH	REMOTE RADIO HEAD
RRU	REMOTE RADIO UNIT
RWY	RACEWAY
SCH	SCHEDULE
SHT	SHEET
SIAD	SMART INTEGRATED ACCESS DEVICE
SIM	SIMILAR
SPEC	SPECIFICATION
SQ	SQUARE
SS	STAINLESS STEEL
STD	STANDARD
STL	STEEL
TEMP	TEMPORARY
THK	THICKNESS
TMA	TOWER MOUNTED AMPLIFIER
TN	TOE NAIL
TOA	TOP OF ANTENNA
TOC	TOP OF CURB
TOF	TOP OF FOUNDATION
TOP	TOP OF PLATE (PARAPET)
TOS	TOP OF STEEL
TOW	TOP OF WALL
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSION
TYP	TYPICAL
UG	UNDERGROUND
UL	UNDERWRITERS LABORATORY
UNO	UNLESS NOTED OTHERWISE
UMTS	UNIVERSAL MOBILE TELECOMMUNICATIONS SYSTEM
UPS	UNITERRUPTIBLE POWER SYSTEM (DC POWER PLANT)
VIF	VERIFIED IN FIELD
W	WIDE
W/	WITH
WD	WOOD
WP	WEATHERPROOF
WT	WEIGHT

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FALLS CHURCH, VA 22041–2868

STATE OF MARYLAND
CHRISTOPHER D. MORIN
No. 24552
PROFESSIONAL ENGINEER
7/19/21

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 NUMBER 24552, EXPIRATION DATE 11/17/21.

DRAWN BY:	CHECKED BY:	APPROVED BY:
GMW	NP	CDM

RFDS REV #: 0

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
A	3/2/21	ISSUED FOR REVIEW
0	4/6/21	ISSUED FOR CONSTRUCTION
1	5/3/21	ISSUED FOR CONSTRUCTION
2	7/19/21	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER
–

DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
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12501–A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
LEGEND AND ABBREVIATIONS

SHEET NUMBER
GN-1

SITE ACTIVITY REQUIREMENTS:

1. NOTICE TO PROCEED – NO WORK SHALL COMMENCE PRIOR TO CONTRACTOR RECEIVING A WRITTEN NOTICE TO PROCEED (NTP) AND THE ISSUANCE OF A PURCHASE ORDER. PRIOR TO ACCESSING/ENTERING THE SITE YOU MUST CONTACT THE DISH WIRELESS AND TOWER OWNER NOC & THE DISH WIRELESS AND TOWER OWNER CONSTRUCTION MANAGER.

2. "LOOK UP" – DISH WIRELESS AND TOWER OWNER SAFETY CLIMB REQUIREMENT:

THE INTEGRITY OF THE SAFETY CLIMB AND ALL COMPONENTS OF THE CLIMBING FACILITY SHALL BE CONSIDERED DURING ALL STAGES OF DESIGN, INSTALLATION, AND INSPECTION. TOWER MODIFICATION, MOUNT REINFORCEMENTS, AND/OR EQUIPMENT INSTALLATIONS SHALL NOT COMPROMISE THE INTEGRITY OR FUNCTIONAL USE OF THE SAFETY CLIMB OR ANY COMPONENTS OF THE CLIMBING FACILITY ON THE STRUCTURE. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO: PINCHING OF THE WIRE ROPE, BENDING OF THE WIRE ROPE FROM ITS SUPPORTS, DIRECT CONTACT OR CLOSE PROXIMITY TO THE WIRE ROPE WHICH MAY CAUSE FRICTIONAL WEAR, IMPACT TO THE ANCHORAGE POINTS IN ANY WAY, OR TO IMPEDE/BLOCK ITS INTENDED USE. ANY COMPROMISED SAFETY CLIMB, INCLUDING EXISTING CONDITIONS MUST BE TAGGED OUT AND REPORTED TO YOUR DISH WIRELESS AND DISH WIRELESS AND TOWER OWNER POC OR CALL THE NOC TO GENERATE A SAFETY CLIMB MAINTENANCE AND CONTRACTOR NOTICE TICKET.

3. PRIOR TO THE START OF CONSTRUCTION, ALL REQUIRED JURISDICTIONAL PERMITS SHALL BE OBTAINED. THIS INCLUDES, BUT IS NOT LIMITED TO, BUILDING, ELECTRICAL, MECHANICAL, FIRE, FLOOD ZONE, ENVIRONMENTAL, AND ZONING. AFTER ONSITE ACTIVITIES AND CONSTRUCTION ARE COMPLETED, ALL REQUIRED PERMITS SHALL BE SATISFIED AND CLOSED OUT ACCORDING TO LOCAL JURISDICTIONAL REQUIREMENTS.

4. ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS, AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN, AND SHALL MEET ANSI/ASSE A10.48 (LATEST EDITION); FEDERAL, STATE, AND LOCAL REGULATIONS; AND ANY APPLICABLE INDUSTRY CONSENSUS STANDARDS RELATED TO THE CONSTRUCTION ACTIVITIES BEING PERFORMED. ALL RIGGING PLANS SHALL ADHERE TO ANSI/ASSE A10.48 (LATEST EDITION) AND DISH WIRELESS AND TOWER OWNER STANDARDS, INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION, TO CERTIFY THE SUPPORTING STRUCTURE(S) IN ACCORDANCE WITH ANSI/TIA-322 (LATEST EDITION).

5. ALL SITE WORK TO COMPLY WITH DISH WIRELESS AND TOWER OWNER INSTALLATION STANDARDS FOR CONSTRUCTION ACTIVITIES ON DISH WIRELESS AND TOWER OWNER TOWER SITE AND LATEST VERSION OF ANSI/TIA-1019-A-2012 "STANDARD FOR INSTALLATION, ALTERATION, AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS."

6. IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY DISH WIRELESS AND TOWER OWNER PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.

7. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.

8. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.

9. THE CONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES INCLUDING PRIVATE LOCATES SERVICES PRIOR TO THE START OF CONSTRUCTION.

10. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY CONTRACTOR. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING AND EXCAVATION E) CONSTRUCTION SAFETY PROCEDURES.

11. ALL SITE WORK SHALL BE AS INDICATED ON THE STAMPED CONSTRUCTION DRAWINGS AND DISH PROJECT SPECIFICATIONS, LATEST APPROVED REVISION.

12. CONTRACTOR SHALL KEEP THE SITE FREE FROM ACCUMULATING WASTE MATERIAL, DEBRIS, AND TRASH AT THE COMPLETION OF THE WORK. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.

13. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF DISH WIRELESS AND TOWER OWNER, AND/OR LOCAL UTILITIES.

14. THE CONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION FOR SITE SIGNAGE REQUIRED BY LOCAL JURISDICTION AND SIGNAGE REQUIRED ON INDIVIDUAL PIECES OF EQUIPMENT, ROOMS, AND SHELTERS.

15. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE CARRIER'S EQUIPMENT AND TOWER AREAS.

16. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.

17. THE AREAS OF THE OWNERS PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, AND STABILIZED TO PREVENT EROSION AS SPECIFIED ON THE CONSTRUCTION DRAWINGS AND/OR PROJECT SPECIFICATIONS.

18. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.

19. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.

20. CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS AND RADIOS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.

21. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.

22. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

GENERAL NOTES:

1.FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:

CONTRACTOR:GENERAL CONTRACTOR RESPONSIBLE FOR CONSTRUCTION

CARRIER:DISH WIRELESS

TOWER OWNER:TOWER OWNER

2. THESE DRAWINGS HAVE BEEN PREPARED USING STANDARDS OF PROFESSIONAL CARE AND COMPLETENESS NORMALLY EXERCISED UNDER SIMILAR CIRCUMSTANCES BY REPUTABLE ENGINEERS IN THIS OR SIMILAR LOCALITIES. IT IS ASSUMED THAT THE WORK DEPICTED WILL BE PERFORMED BY AN EXPERIENCED CONTRACTOR AND/OR WORKPEOPLE WHO HAVE A WORKING KNOWLEDGE OF THE APPLICABLE CODE STANDARDS AND REQUIREMENTS AND OF INDUSTRY ACCEPTED STANDARD GOOD PRACTICE. AS NOT EVERY CONDITION OR ELEMENT IS (OR CAN BE) EXPLICITLY SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL USE INDUSTRY ACCEPTED STANDARD GOOD PRACTICE FOR MISCELLANEOUS WORK NOT EXPLICITLY SHOWN.

3. THESE DRAWINGS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE MEANS OR METHODS OF CONSTRUCTION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY FOR PROTECTION OF LIFE AND PROPERTY DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, BRACING, FORMWORK, SHORING, ETC. SITE VISITS BY THE ENGINEER OR HIS REPRESENTATIVE WILL NOT INCLUDE INSPECTION OF THESE ITEMS AND IS FOR STRUCTURAL OBSERVATION OF THE FINISHED STRUCTURE ONLY.

4. NOTES AND DETAILS IN THE CONSTRUCTION DRAWINGS SHALL TAKE PRECEDENCE OVER GENERAL NOTES AND TYPICAL DETAILS. WHERE NO DETAILS ARE SHOWN, CONSTRUCTION SHALL CONFORM TO SIMILAR WORK ON THE PROJECT, AND/OR AS PROVIDED FOR IN THE CONTRACT DOCUMENTS. WHERE DISCREPANCIES OCCUR BETWEEN PLANS, DETAILS, GENERAL NOTES, AND SPECIFICATIONS, THE GREATER, MORE STRICT REQUIREMENTS, SHALL GOVERN. IF FURTHER CLARIFICATION IS REQUIRED CONTACT THE ENGINEER OF RECORD.

5. SUBSTANTIAL EFFORT HAS BEEN MADE TO PROVIDE ACCURATE DIMENSIONS AND MEASUREMENTS ON THE DRAWINGS TO ASSIST IN THE FABRICATION AND/OR PLACEMENT OF CONSTRUCTION ELEMENTS BUT IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY THE DIMENSIONS, MEASUREMENTS, AND/OR CLEARANCES SHOWN IN THE CONSTRUCTION DRAWINGS PRIOR TO FABRICATION OR CUTTING OF ANY NEW OR EXISTING CONSTRUCTION ELEMENTS. IF IT IS DETERMINED THAT THERE ARE DISCREPANCIES AND/OR CONFLICTS WITH THE CONSTRUCTION DRAWINGS THE ENGINEER OF RECORD IS TO BE NOTIFIED AS SOON AS POSSIBLE.

6. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING CONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CARRIER POC AND TOWER OWNER.

7. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.

8. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.

9. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.

10. IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY THE CARRIER AND TOWER OWNER PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.

11. CONTRACTOR IS TO PERFORM A SITE INVESTIGATION, BEFORE SUBMITTING BIDS, TO DETERMINE THE BEST ROUTING OF ALL CONDUITS FOR POWER, AND TELCO AND FOR GROUNDING CABLES AS SHOWN IN THE POWER, TELCO, AND GROUNDING PLAN DRAWINGS.

12. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF DISH WIRELESS AND TOWER OWNER

13. CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.

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DISH WIRELESS PROJECT INFORMATION

DCWDC00428A

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12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE

GENERAL NOTES

SHEET NUMBER

GN-2

CONCRETE, FOUNDATIONS, AND REINFORCING STEEL:

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318, ACI 336, ASTM A184, ASTM A185 AND THE DESIGN AND CONSTRUCTION SPECIFICATION FOR CAST-IN-PLACE CONCRETE.

2. UNLESS NOTED OTHERWISE, SOIL BEARING PRESSURE USED FOR DESIGN OF SLABS AND FOUNDATIONS IS ASSUMED TO BE 1000 psf.

3. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (f'c) OF 3000 psi AT 28 DAYS, UNLESS NOTED OTHERWISE. NO MORE THAN 90 MINUTES SHALL ELAPSE FROM BATCH TIME TO TIME OF PLACEMENT UNLESS APPROVED BY THE ENGINEER OF RECORD. TEMPERATURE OF CONCRETE SHALL NOT EXCEED 90°f AT TIME OF PLACEMENT.

4. CONCRETE EXPOSED TO FREEZE-THAW CYCLES SHALL CONTAIN AIR ENTRAINING ADMIXTURES. AMOUNT OF AIR ENTRAINMENT TO BE BASED ON SIZE OF AGGREGATE AND F3 CLASS EXPOSURE (VERY SEVERE). CEMENT USED TO BE TYPE II PORTLAND CEMENT WITH A MAXIMUM WATER-TO-CEMENT RATIO (W/C) OF 0.45.

5. ALL STEEL REINFORCING SHALL CONFORM TO ASTM A615. ALL WELDED WIRE FABRIC (WWF) SHALL CONFORM TO ASTM A185. ALL SPLICES SHALL BE CLASS "B" TENSION SPLICES, UNLESS NOTED OTHERWISE. ALL HOOKS SHALL BE STANDARD 90 DEGREE HOOKS, UNLESS NOTED OTHERWISE. YIELD STRENGTH (Fy) OF STANDARD DEFORMED BARS ARE AS FOLLOWS:

#4 BARS AND SMALLER 40 ksi

#5 BARS AND LARGER 60 ksi

6. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:

- CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH 3"
- CONCRETE EXPOSED TO EARTH OR WEATHER:
- #6 BARS AND LARGER 2"
- #5 BARS AND SMALLER 1-1/2"
- CONCRETE NOT EXPOSED TO EARTH OR WEATHER:
- SLAB AND WALLS 3/4"
- BEAMS AND COLUMNS 1-1/2"

7. A TOOLED EDGE OR A 3/4" CHAMFER SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNLESS NOTED OTHERWISE, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.

ELECTRICAL INSTALLATION NOTES:

1. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES/ORDINANCES.

2. CONDUIT ROUTINGS ARE SCHEMATIC. CONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED AND TRIP HAZARDS ARE ELIMINATED.

3. WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC.

4. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC.

4.1. ALL EQUIPMENT SHALL BEAR THE UNDERWRITERS LABORATORIES LABEL OF APPROVAL, AND SHALL CONFORM TO REQUIREMENT OF THE NATIONAL ELECTRICAL CODE.

4.2. ALL OVERCURRENT DEVICES SHALL HAVE AN INTERRUPTING CURRENT RATING THAT SHALL BE GREATER THAN THE SHORT CIRCUIT CURRENT TO WHICH THEY ARE SUBJECTED, 22,000 AIC MINIMUM. VERIFY AVAILABLE SHORT CIRCUIT CURRENT DOES NOT EXCEED THE RATING OF ELECTRICAL EQUIPMENT IN ACCORDANCE WITH ARTICLE 110.24 NEC OR THE MOST CURRENT ADOPTED CODE PRE THE GOVERNING JURISDICTION.

5. EACH END OF EVERY POWER PHASE CONDUCTOR, GROUNDING CONDUCTOR, AND TELCO CONDUCTOR OR CABLE SHALL BE LABELED WITH COLOR-CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2" PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC AND OSHA.

6. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH LAMICOID TAGS SHOWING THEIR RATED VOLTAGE, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING AND BRANCH CIRCUIT ID NUMBERS (i.e. PANEL BOARD AND CIRCUIT ID'S).

7. PANEL BOARDS (ID NUMBERS) SHALL BE CLEARLY LABELED WITH PLASTIC LABELS.

8. TIE WRAPS ARE NOT ALLOWED.

9. ALL POWER AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE COPPER CONDUCTOR (#14 OR LARGER) WITH TYPE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.

10. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE COPPER CONDUCTOR (#6 OR LARGER) WITH TYPE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.

11. POWER AND CONTROL WIRING IN FLEXIBLE CORD SHALL BE MULTI-CONDUCTOR, TYPE SOOW CORD (#14 OR LARGER) UNLESS OTHERWISE SPECIFIED.

12. POWER AND CONTROL WIRING FOR USE IN CABLE TRAY SHALL BE MULTI-CONDUCTOR, TYPE TC CABLE (#14 OR LARGER), WITH TYPE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.

13. ALL POWER AND GROUNDING CONNECTIONS SHALL BE CRIMP-STYLE, COMPRESSION WIRE LUGS AND WIRE NUTS BY THOMAS AND BETTS (OR EQUAL). LUGS AND WIRE NUTS SHALL BE RATED FOR OPERATION NOT LESS THAN 75° C (90° C IF AVAILABLE).

14. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND NEC.

15. ELECTRICAL METALLIC TUBING (EMT), INTERMEDIATE METAL CONDUIT (IMC), OR RIGID METAL CONDUIT (RMC) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.

16. ELECTRICAL METALLIC TUBING (EMT) OR METAL-CLAD CABLE (MC) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.

17. SCHEDULE 40 PVC UNDERGROUND ON STRAIGHTS AND SCHEDULE 80 PVC FOR ALL ELBOWS/90s AND ALL APPROVED ABOVE GRADE PVC CONDUIT.

18. LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID-TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.

19. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION-TYPE AND APPROVED FOR THE LOCATION USED. SET SCREW FITTINGS ARE NOT ACCEPTABLE.

20. CABINETS, BOXES AND WIRE WAYS SHALL BE LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND THE NEC.

21. WIREWAYS SHALL BE METAL WITH AN ENAMEL FINISH AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARDS (WIREMOLD SPECMATE WIREWAY).

22. SLOTTED WIRING DUCT SHALL BE PVC AND INCLUDE COVER (PANDUIT TYPE E OR EQUAL).

23. CONDUITS SHALL BE FASTENED SECURELY IN PLACE WITH APPROVED NON-PERFORATED STRAPS AND HANGERS. EXPLOSIVE DEVICES (i.e. POWDER-ACTUATED) FOR ATTACHING HANGERS TO STRUCTURE WILL NOT BE PERMITTED. CLOSELY FOLLOW THE LINES OF THE STRUCTURE, MAINTAIN CLOSE PROXIMITY TO THE STRUCTURE AND KEEP CONDUITS IN TIGHT ENVELOPES. CHANGES IN DIRECTION TO ROUTE AROUND OBSTACLES SHALL BE MADE WITH CONDUIT OUTLET BODIES. CONDUIT SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. PARALLEL AND PERPENDICULAR TO STRUCTURE WALL AND CEILING LINES. ALL CONDUIT SHALL BE FISHED TO CLEAR OBSTRUCTIONS. ENDS OF CONDUITS SHALL BE TEMPORARILY CAPPED FLUSH TO FINISH GRADE TO PREVENT CONCRETE, PLASTER OR DIRT FROM ENTERING. CONDUITS SHALL BE RIGIDLY CLAMPED TO BOXES BY GALVANIZED MALLEABLE IRON BUSHING ON INSIDE AND GALVANIZED MALLEABLE IRON LOCKNUT ON OUTSIDE AND INSIDE.

24. EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES AND PULL BOXES SHALL BE GALVANIZED OR EPOXY-COATED SHEET STEEL. SHALL MEET OR EXCEED UL 50 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND NEMA 3 (OR BETTER) FOR EXTERIOR LOCATIONS.

25. METAL RECEPTACLE, SWITCH AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY-COATED OR NON-CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.

26. NONMETALLIC RECEPTACLE, SWITCH AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2 (NEWEST REVISION) AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.

27. THE CONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CARRIER AND/OR DISH WIRELESS AND TOWER OWNER BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.

28. THE CONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD LIFE AND PROPERTY.

29. INSTALL LAMICOID LABEL ON THE METER CENTER TO SHOW "DISH WIRELESS".

30. ALL EMPTY/SPARE CONDUITS THAT ARE INSTALLED ARE TO HAVE A METERED MULE TAPE PULL CORD INSTALLED.

dish wireless.

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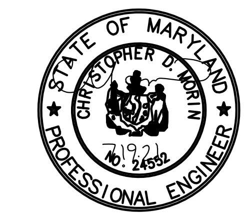

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12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE

GENERAL NOTES

SHEET NUMBER

GN-3

GROUNDING NOTES:

1. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION AND AC POWER GES'S) SHALL BE BONDED TOGETHER AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.

2. THE CONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR GROUND ELECTRODE SYSTEMS, THE CONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS.

3. THE CONTRACTOR IS RESPONSIBLE FOR PROPERLY SEQUENCING GROUNDING AND UNDERGROUND CONDUIT INSTALLATION AS TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM OR DAMAGE TO THE CONDUIT AND PROVIDE TESTING RESULTS.

4. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH #6 COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.

5. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.

6. EACH CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, #6 STRANDED COPPER OR LARGER FOR INDOOR BTS; #2 BARE SOLID TINNED COPPER FOR OUTDOOR BTS.

7. CONNECTIONS TO THE GROUND BUS SHALL NOT BE DOUBLED UP OR STACKED BACK TO BACK CONNECTIONS ON OPPOSITE SIDE OF THE GROUND BUS ARE PERMITTED.

8. ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT/GROUND BARS AND THE GROUND RING SHALL BE #2 SOLID TINNED COPPER UNLESS OTHERWISE INDICATED.

9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.

10. USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED.

11. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.

12. ALL GROUND CONNECTIONS ABOVE GRADE (INTERIOR AND EXTERIOR) SHALL BE FORMED USING HIGH PRESS CRIMPS.

13. COMPRESSION GROUND CONNECTIONS MAY BE REPLACED BY EXOTHERMIC WELD CONNECTIONS.

14. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO THE BRIDGE AND THE TOWER GROUND BAR.

15. APPROVED ANTIOXIDANT COATINGS (i.e. CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.

16. ALL EXTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.

17. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.

18. BOND ALL METALLIC OBJECTS WITHIN 6 ft OF MAIN GROUND RING WITH (1) #2 BARE SOLID TINNED COPPER GROUND CONDUCTOR.

19. GROUND CONDUCTORS USED FOR THE FACILITY GROUNDING AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (i.e., NONMETALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.

20. ALL GROUNDS THAT TRANSITION FROM BELOW GRADE TO ABOVE GRADE MUST BE #2 BARE SOLID TINNED COPPER IN 3/4" NON-METALLIC, FLEXIBLE CONDUIT FROM 24" BELOW GRADE TO WITHIN 3" TO 6" OF CAD-WELD TERMINATION POINT. THE EXPOSED END OF THE CONDUIT MUST BE SEALED WITH SILICONE CAULK. (ADD TRANSITIONING GROUND STANDARD DETAIL AS WELL).

21. BUILDINGS WHERE THE MAIN GROUNDING CONDUCTORS ARE REQUIRED TO BE ROUTED TO GRADE, THE CONTRACTOR SHALL ROUTE TWO GROUNDING CONDUCTORS FROM THE ROOFTOP, TOWERS, AND WATER TOWERS GROUNDING RING, TO THE EXISTING GROUNDING SYSTEM, THE GROUNDING CONDUCTORS SHALL NOT BE SMALLER THAN 2/0 COPPER. ROOFTOP GROUNDING RING SHALL BE BONDED TO THE EXISTING GROUNDING SYSTEM, THE BUILDING STEEL COLUMNS, LIGHTNING PROTECTION SYSTEM, AND BUILDING MAIN WATER LINE (FERROUS OR NONFERROUS METAL PIPING ONLY). DO NOT ATTACH GROUNDING TO FIRE SPRINKLER SYSTEM PIPES.

dish wireless.

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STATE OF MARYLAND CHRISTOPHER D. MORIN No. 24552 PROFESSIONAL ENGINEER 7/19/21

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 NUMBER 24552, EXPIRATION DATE 11/17/21.

DRAWN BY:	CHECKED BY:	APPROVED BY:
GMW	NP	CDM

RFDS REV #: 0

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
A	3/2/21	ISSUED FOR REVIEW
0	4/6/21	ISSUED FOR CONSTRUCTION
1	5/3/21	ISSUED FOR CONSTRUCTION
2	7/19/21	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER
-

DISH WIRELESS PROJECT INFORMATION

DCWDC00428A
-
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

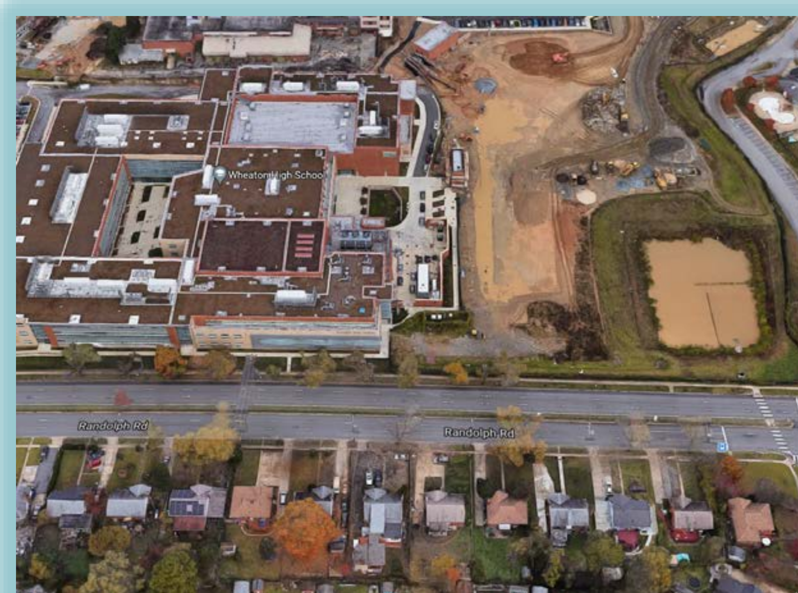
SHEET TITLE
GENERAL NOTES

SHEET NUMBER
GN-4

Radio Frequency - Electromagnetic Energy (RF-EME) Jurisdictional Report

Site No. DCWDC00428A
12501-A Dalewood Dr
Silver Spring, Maryland 20906
39° 3' 34.20" N, -77° 3' 59.40" W NAD83

EBI Project No. 6221001331
March 24, 2021



Prepared for:

Dish Wireless

Prepared by:

EBI Consulting
environmental | engineering | due diligence

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EXECUTIVE SUMMARY

Purpose of Report

EnviroBusiness Inc. (dba EBI Consulting) has been contracted by Dish Wireless to conduct radio frequency electromagnetic (RF-EME) modeling for Dish Wireless Site DCWDC00428A located at 12501-A Dalewood Dr in Silver Spring, Maryland to determine RF-EME exposure levels from proposed Dish Wireless communications equipment at this site. As described in greater detail in Appendix C of this report, the Federal Communications Commission (FCC) has developed Maximum Permissible Exposure (MPE) Limits for the general public and for occupational activities. This report summarizes the results of RF-EME modeling in relation to relevant FCC RF-EME compliance standards for limiting human exposure to RF-EME fields.

Statement of Compliance

A site is considered out of compliance with FCC regulations if there are areas that exceed the FCC exposure limits <u>and</u> there are no RF hazard mitigation measures in place. Any carrier which has an installation that contributes more than 5% of the applicable MPE must participate in mitigating these RF hazards.

As presented in the sections below, based on worst-case predictive modeling, there are no modeled areas on any accessible rooftop or ground-level walking/working surface related to the proposed antennas that exceed the FCC's occupational or general public exposure limits at this site.

At the nearest walking/working surfaces to the Dish Wireless antennas, the maximum power density generated by the DISH antennas is approximately **0.55** percent of the FCC's general public limit (**0.11** percent of the FCC's occupational limit).

The composite exposure level from all carriers on this site is approximately **0.70** percent of the FCC's general public limit (**0.14** percent of the FCC's occupational limit) at the nearest walking/working surface to each antenna.

Recommended control measures are outlined in Section 4.0 and within the Site Safety Plan (attached); Dish Wireless should also provide procedures to shut down and lockout/tagout this wireless equipment in accordance with their own standard operating protocol. Non-telecom workers who will be working in areas of exceedance are required to contact Dish Wireless since only DISH has the ability to lockout/tagout the facility, or to authorize others to do so.

1.0 INTRODUCTION

Radio frequency waves are electromagnetic waves from the portion of the electromagnetic spectrum at frequencies lower than visible light and microwaves. The wavelengths of radio waves range from thousands of meters to around 30 centimeters. These wavelengths correspond to frequencies as low as 3 cycles per second (or hertz [Hz]) to as high as one gigahertz (one billion cycles per second).

Personal Communication (PCS) facilities used by Dish Wireless in this area will potentially operate within a frequency range of 600 to 5000 MHz. Facilities typically consist of: 1) electronic transceivers (the radios or cabinets) connected to wired telephone lines; and 2) antennas that send the wireless signals created by the transceivers to be received by individual subscriber units (PCS telephones). Transceivers are typically connected to antennas by coaxial cables.

Because of the short wavelength of PCS services, the antennas require line-of-site paths for good propagation, and are typically installed a distance above ground level. Antennas are constructed to concentrate energy towards the horizon, with as little energy as possible scattered towards the ground or the sky. This design, combined with the low power of PCS facilities, generally results in no possibility for exposure to approach Maximum Permissible Exposure (MPE) levels, with the exception of in areas in the immediate vicinity of the antennas.

MPE limits do not represent levels where a health risk exists, since they are designed to provide a substantial margin of safety. These limits apply for continuous exposures and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size or health.

2.0 SITE DESCRIPTION

This project site includes the following proposed wireless telecommunication antennas on a monopole located at 12501-A Dalewood Dr in Silver Spring, Maryland.

Ant #	Operator	Antenna Make	Antenna Model	Frequency (MHz)	Azimuth (deg.)	Mechanical Downtilt (deg.)	Horizontal Beamwidth (Degrees)	Aperture (feet)	Total Power Input (Watts)	Antenna Gain (dBd)	Total ERP (Watts)	Total EIRP (Watts)
1	Dish	JMA	MX08FRO665-20 02DT 600	600	0	0	62	6.1	134.40772	11.35	1456.88	2389.29
1	Dish	JMA	MX08FRO665-20 02DT 700	700	0	0	52	6.1	134.40772	12.05	1711.69	2807.17
1	Dish	JMA	MX08FRO665-20 02DT 2007	2007	0	0	62	6.1	134.40772	15.75	4012.58	6580.64
1	Dish	JMA	MX08FRO665-20 02DT 2100	2100	0	0	65	6.1	134.40772	16.75	5051.54	8284.53
2	Dish	JMA	MX08FRO665-20 02DT 600	600	120	0	62	6.1	134.40772	11.35	1456.88	2389.29
2	Dish	JMA	MX08FRO665-20 02DT 700	700	120	0	52	6.1	134.40772	12.05	1711.69	2807.17
2	Dish	JMA	MX08FRO665-20 02DT 2007	2007	120	0	62	6.1	134.40772	15.75	4012.58	6580.64
2	Dish	JMA	MX08FRO665-20 02DT 2100	2100	120	0	65	6.1	134.40772	16.75	5051.54	8284.53
3	Dish	JMA	MX08FRO665-20 02DT 600	600	240	0	62	6.1	134.40772	11.35	1456.88	2389.29
3	Dish	JMA	MX08FRO665-20 02DT 700	700	240	0	52	6.1	134.40772	12.05	1711.69	2807.17
3	Dish	JMA	MX08FRO665-20 02DT 2007	2007	240	0	62	6.1	134.40772	15.75	4012.58	6580.64
3	Dish	JMA	MX08FRO665-20 02DT 2100	2100	240	0	65	6.1	134.40772	16.75	5051.54	8284.53
4	T-Mobile	GENERIC	PANEL 4FT 00DT 850	850	0	0	61	4.0	100	11.52	1419.06	2327.25
5	T-Mobile	GENERIC	PANEL 4FT 00DT 1900	1900	0	0	65	4.0	100	14.65	2917.43	4784.58
6	T-Mobile	GENERIC	PANEL 4FT 00DT 850	850	0	0	61	4.0	100	11.52	1419.06	2327.25
7	T-Mobile	GENERIC	PANEL 4FT 00DT 850	850	120	0	61	4.0	100	11.52	1419.06	2327.25

8	T-Mobile	GENERIC	PANEL 4FT 00DT 1900	1900	120	0	65	4.0	100	14.65	2917.43	4784.58
9	T-Mobile	GENERIC	PANEL 4FT 00DT 850	850	120	0	61	4.0	100	11.52	1419.06	2327.25
10	T-Mobile	GENERIC	PANEL 4FT 00DT 850	850	240	0	61	4.0	100	11.52	1419.06	2327.25
11	T-Mobile	GENERIC	PANEL 4FT 00DT 1900	1900	240	0	65	4.0	100	14.65	2917.43	4784.58
12	T-Mobile	GENERIC	PANEL 4FT 00DT 850	850	240	0	61	4.0	100	11.52	1419.06	2327.25

• Note there is 1 Dish Wireless antenna per sector at this site. For clarity, the different frequencies for each antenna are entered on separate lines.

Ant #	NAME	X	Y	Antenna Radiation Centerline	Z-Height Adj. Main Roof	Z-Height Ground
1	Dish	0.6	1.0	90.0	45.0	90.0
2	Dish	5.5	1.0	90.0	45.0	90.0
3	Dish	10.2	1.0	90.0	45.0	90.0
4	T-Mobile	14.7	6.8	97.5	52.5	97.5
5	T-Mobile	13.1	11.1	97.5	52.5	97.5
6	T-Mobile	10.4	15.2	97.5	52.5	97.5
7	T-Mobile	1.0	15.0	97.5	52.5	97.5
8	T-Mobile	1.8	11.3	97.5	52.5	97.5
9	T-Mobile	4.3	7.2	97.5	52.5	97.5
10	T-Mobile	0.6	1.0	97.5	52.5	97.5
11	T-Mobile	14.7	6.8	97.5	52.5	97.5
12	T-Mobile	1.0	15.0	97.5	52.5	97.5

• Note the Z-Height represents the distance from the antenna centerline.

The above tables contain an inventory of proposed Dish Wireless antennas and other carrier antennas if sufficient information was available to model them. Note that EBI uses an assumed set of antenna specifications and powers for unknown and other carrier antennas for modeling purposes. The FCC guidelines incorporate two separate tiers of exposure limits that are based upon occupational/controlled exposure limits (for workers) and general population/uncontrolled exposure limits for members of the general public that may be exposed to antenna fields. While access to this site is considered uncontrolled, the analysis has considered exposures with respect to both controlled and uncontrolled limits as an untrained worker may access adjacent rooftop locations. Additional information regarding controlled/uncontrolled exposure limits is provided in Appendix C. Appendix B presents a site safety plan that provides a plan view of the monopole with antenna locations.

3.0 WORST-CASE PREDICTIVE MODELING

EBI has performed theoretical MPE modeling using RoofMaster™ software to estimate the worst-case power density at the site's nearby broadcast levels resulting from operation of the antennas. RoofMaster™ is a widely-used predictive modeling program that has been developed by Waterford Consultants to predict RF power density values for rooftop and tower telecommunications sites produced by vertical collinear antennas that are typically used in the cellular, PCS, paging and other communications services. Using the computational methods set forth in Federal Communications Commission (FCC) Office of Engineering & Technology (OET) Bulletin 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields" (OET-65), RoofMaster™ calculates predicted power density in a scalable grid based on the contributions of all RF sources characterized in the study scenario. At each grid location, the cumulative power density is expressed as a percentage of the FCC limits. Manufacturer antenna pattern data is utilized in these calculations. RoofMaster™ models consist of the Far Field model as specified in OET-65 and an implementation of the OET-65 Cylindrical Model (Sula9).

The models utilize several operational specifications for different types of antennas to produce a plot of spatially-averaged power densities that can be expressed as a percentage of the applicable exposure limit.

For this report, EBI utilized antenna and power data provided by Dish Wireless and compared the resultant worst-case MPE levels to the FCC's occupational/controlled exposure limits outlined in OET Bulletin 65. The assumptions used in the modeling are based upon information provided by Dish Wireless and information gathered from other sources. Elevations of walking/working surfaces were estimated based on elevations provided and available aerial imagery. Sector orientation assignments were made assuming coverage is directed to areas of site. Changes to antenna mount heights or placement will impact site compliance. The parameters used for modeling are summarized in the Site Description antenna inventory table in Section 2.0.

One other unknown carrier also has antennas on the monopole. Information about these antennas was included in the modeling analysis.

Based on worst-case predictive modeling, there are no modeled areas on any accessible rooftop or ground-level walking/working surface related to the proposed Dish Wireless antennas that exceed the FCC's occupational or general public exposure limits at this site. At the nearest walking/working surfaces to the Dish Wireless antennas, the maximum power density generated by the Dish Wireless antennas is approximately 0.55 percent of the FCC's general public limit (0.11 percent of the FCC's occupational limit). The composite exposure level from all carriers on this site is approximately 0.70 percent of the FCC's general public limit (0.14 percent of the FCC's occupational limit) at the nearest walking/working surface to each antenna.

The Site Safety Plan also presents areas where Dish Wireless antennas contribute greater than 5% of the applicable MPE limit for a site. A site is considered out of compliance with FCC regulations if there are areas that exceed the FCC exposure limits and there are no RF hazard mitigation measures in place. Any carrier which has an installation that contributes more than 5% of the applicable MPE must participate in mitigating these RF hazards.

There are no modeled areas on the rooftop and ground that exceed the FCC's limits for general public or occupational exposure in front of the other carrier antennas.

The inputs used in the modeling are summarized in the Site Description antenna inventory table in Section 2.0. A graphical representation of the RoofMaster™ modeling results is presented in Appendix B. Microwave dish antennas are designed for point-to-point operations at the elevations of the installed equipment rather than ground level coverage. The maximum power density generated by all carrier antennas, including microwaves and panel antennas, is included in the modeling results presented within this report.

4.0 MITIGATION/SITE CONTROL OPTIONS

EBI's modeling indicates that there are no areas in front of the Dish Wireless antennas that exceed the FCC standards for occupational or general public exposure. All exposures above the FCC's safe limits require that individuals be elevated above the rooftop and ground. In order to alert people accessing the monopole, a Guidelines sign is recommended for installation at each access point to the monopole.

There are no barriers recommended on this site.

These protocols and recommended control measures have been summarized and included with a graphic representation of the antennas and associated signage and control areas in a RF-EME Site Safety Plan, which is included as Appendix B. Individuals and workers accessing the monopole should be provided with a copy of the attached Site Safety Plan, made aware of the posted signage and barriers, and signify their understanding of the Site Safety Plan.

To reduce the risk of exposure, EBI recommends that access to areas associated with the active antenna installation be restricted and secured where possible.

Implementation of the signage and barriers recommended in the Site Safety Plan and in this report will bring this site into compliance with the FCC's rules and regulations.

5.0 SUMMARY AND CONCLUSIONS

EBI has prepared a Radiofrequency – Electromagnetic Energy (RF-EME) Compliance Report for telecommunications equipment installed by Dish Wireless Site Number DCWDC00428A located at 12501-A Dalewood Dr in Silver Spring, Maryland to determine worst-case predicted RF-EME exposure levels from wireless communications equipment installed at this site. This report summarizes the results of RF-EME modeling in relation to relevant Federal Communications Commission (FCC) RF-EME compliance standards for limiting human exposure to RF-EME fields.

As presented in the sections above, based on the FCC criteria, there are no modeled areas on any accessible rooftop or ground-level walking/working surface related to the proposed antennas that exceed the FCC's occupational or general public exposure limits at this site.

Workers should be informed about the presence and locations of antennas and their associated fields. Recommended control measures are outlined in Section 4.0 and within the Site Safety Plan (attached); Dish Wireless should also provide procedures to shut down and lockout/tagout this wireless equipment in accordance with their own standard operating protocol. Non-telecom workers who will be working in areas of exceedance are required to contact Dish Wireless since only Dish Wireless has the ability to lockout/tagout the facility, or to authorize others to do so.

6.0 LIMITATIONS

This report was prepared for the use of Dish Wireless. It was performed in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same locale under like circumstances. The conclusions provided by EBI are based solely on the information provided by the client. The observations in this report are valid on the date of the investigation. Any additional information that becomes available concerning the site should be provided to EBI so that our conclusions may be revised and modified, if necessary. This report has been prepared in accordance with Standard Conditions for Engagement and authorized proposal, both of which are integral parts of this report. No other warranty, expressed or implied, is made.

Appendix A

Certifications

Preparer Certification

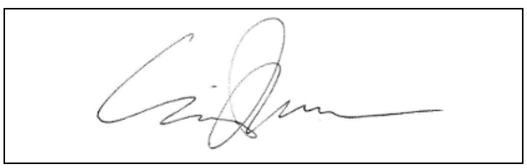
I, Erik Johnson, state that:

- I am an employee of EnviroBusiness Inc. (d/b/a EBI Consulting), which provides RF-EME safety and compliance services to the wireless communications industry.

- I have successfully completed RF-EME safety training, and I am aware of the potential hazards from RF-EME and would be classified "occupational" under the FCC regulations.

- I am fully aware of and familiar with the Rules and Regulations of both the Federal Communications Commissions (FCC) and the Occupational Safety and Health Administration (OSHA) with regard to Human Exposure to Radio Frequency Radiation.

- I have reviewed the data provided by the client and incorporated it into this Site Compliance Report such that the information contained in this report is true and accurate to the best of my knowledge.



Reviewed and Approved by:

sealed 24mar2021 mike@h2dc.com
H2DC PLLC MD CoA#: 50517

Michael McGuire
Electrical Engineer
mike@h2dc.com

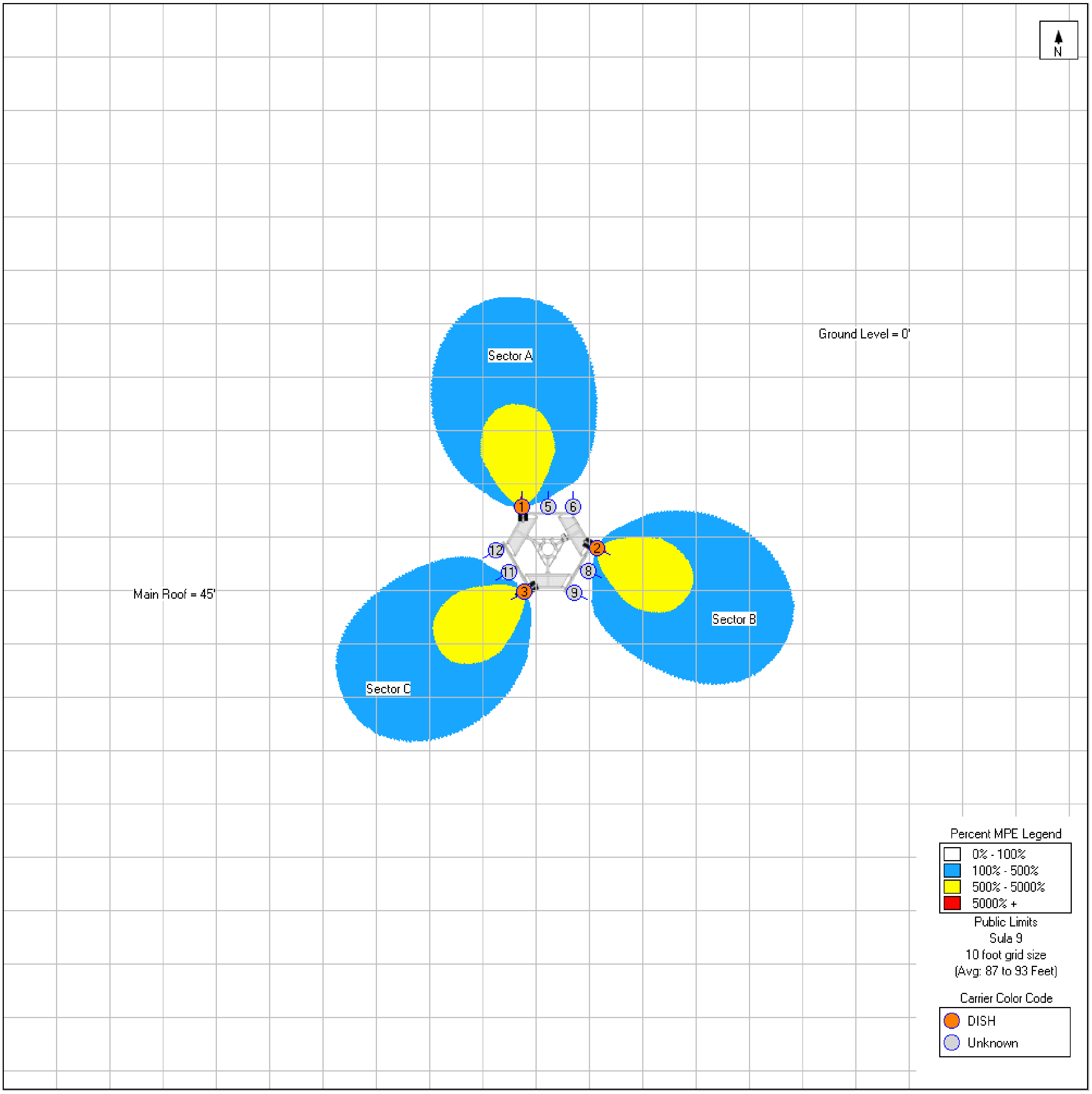
Note that EBI's scope of work is limited to an evaluation of the Radio Frequency – Electromagnetic Energy (RF-EME) field generated by the antennas and broadcast equipment noted in this report. The engineering and design of the building and related structures, as well as the impact of the antennas and broadcast equipment on the structural integrity of the building, are specifically excluded from EBI's scope of work.

Appendix B

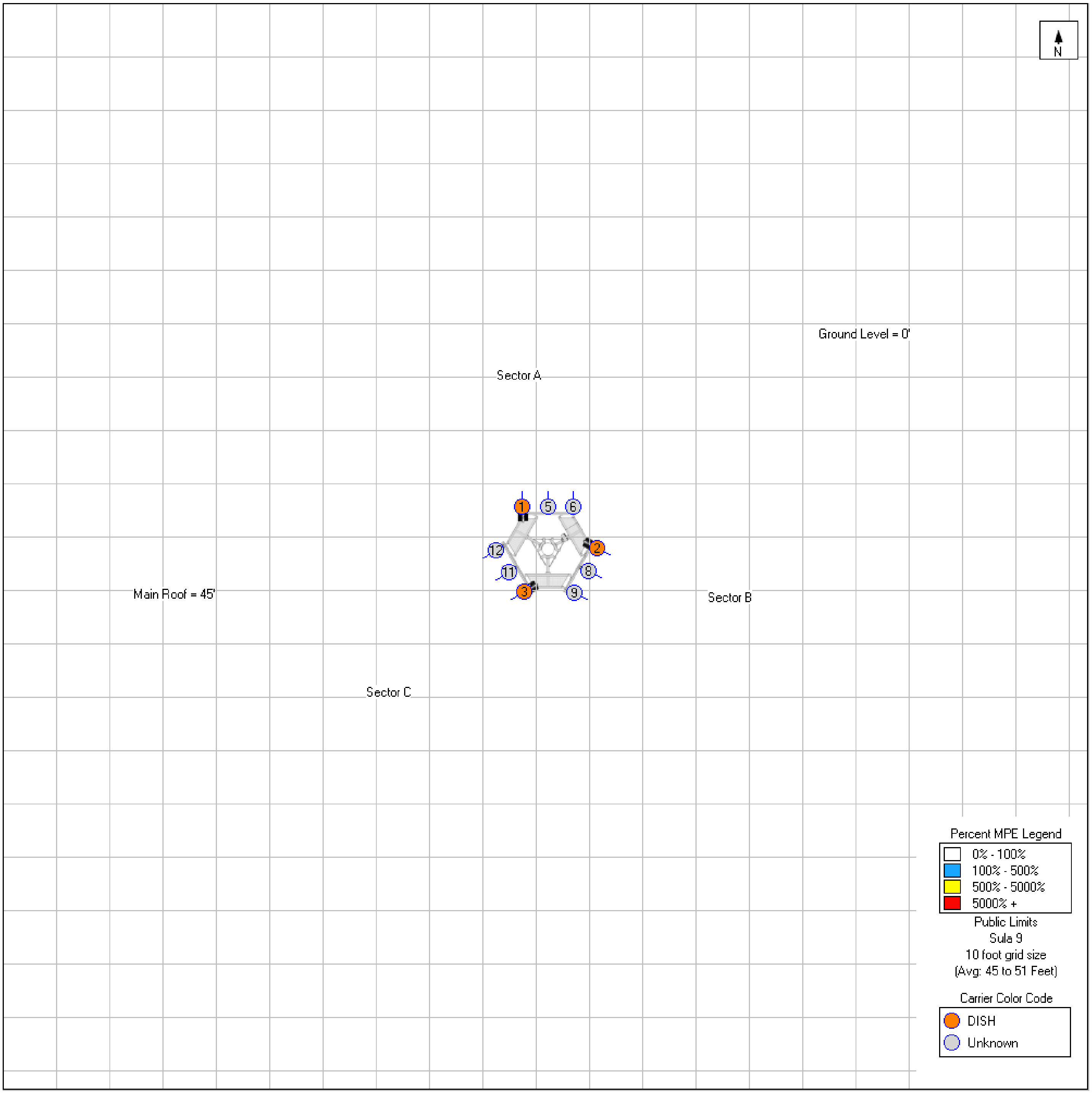
Radio Frequency Electromagnetic Energy

Safety Information and Signage Plans

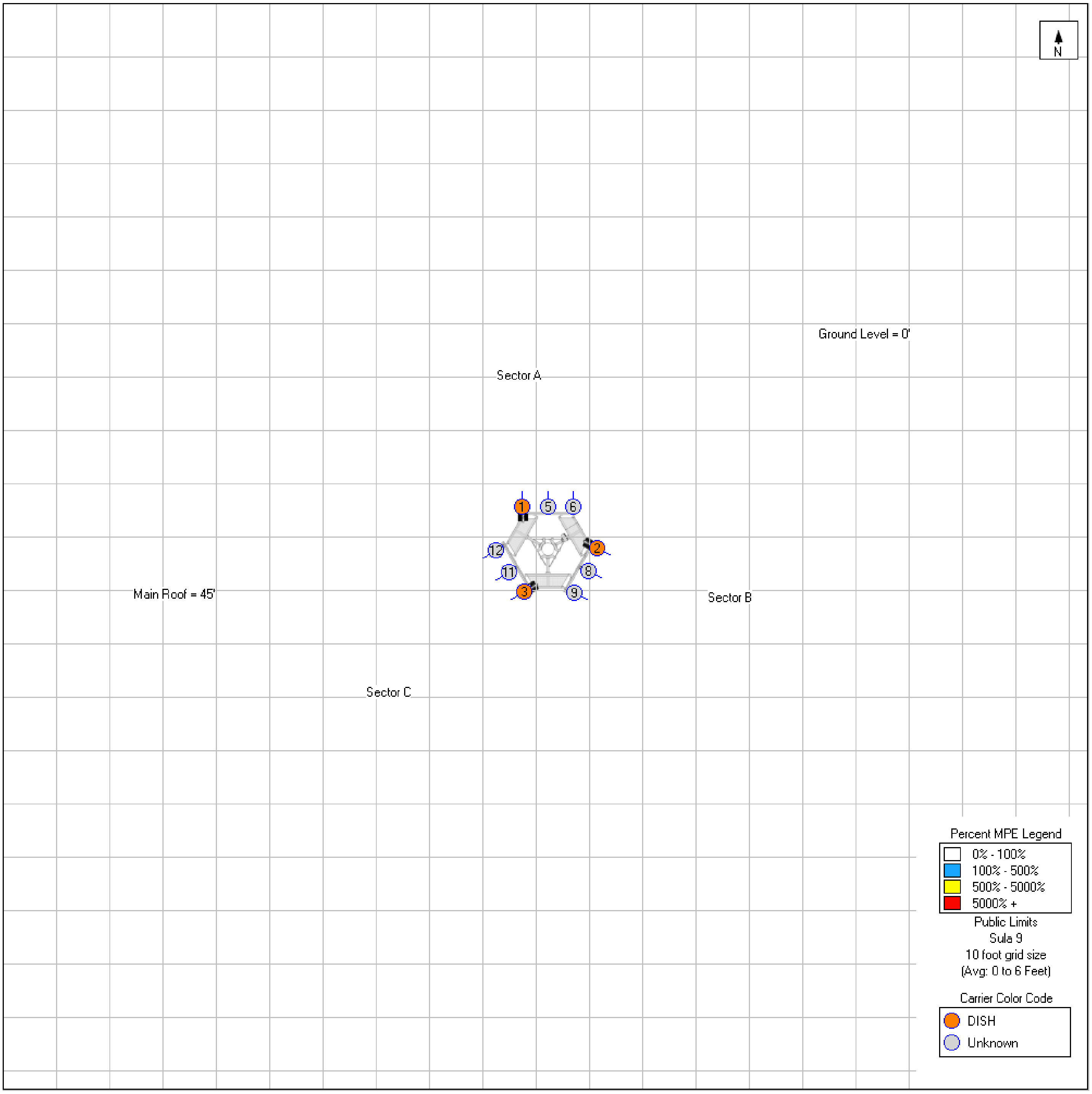
Antenna Face Level Simulation



Adjacent Main Roof Level Simulation



Ground Level Simulation



Dish Wireless Signage Plan

Sign	Posting Instructions	Required Signage / Mitigation
	**Guidelines** Informational sign used to notify workers that there are active antennas installed and provide guidelines for working in RF environments.	Securely post Guidelines sign at the main rooftop access door and every point of access to the site in a manner conspicuous to all individuals entering thereon as indicated in the signage plan.
	**Notice** Used to notify individuals they are entering an area where the power density emitted from transmitting antennas may exceed the FCC's MPE limit for the general public or occupational exposures.	No Notice sign required.
	**Caution** Used to notify individuals that they are entering a hot spot where either the general public or occupational FCC's MPE limit is or could be exceeded.	No Caution sign required.
	**Warning** Used to notify individuals that they are entering a hot zone where either the general public or occupational FCC's MPE limit has been exceeded.	No Warning sign required.

Appendix C

Federal Communications Commission (FCC) Requirements

The FCC has established Maximum Permissible Exposure (MPE) limits for human exposure to Radiofrequency Electromagnetic (RF-EME) energy fields, based on exposure limits recommended by the National Council on Radiation Protection and Measurements (NCRP) and, over a wide range of frequencies, the exposure limits developed by the Institute of Electrical and Electronics Engineers, Inc. (IEEE) and adopted by the American National Standards Institute (ANSI) to replace the 1982 ANSI guidelines. Limits for localized absorption are based on recommendations of both ANSI/IEEE and NCRP.

The FCC guidelines incorporate two separate tiers of exposure limits that are based upon occupational/controlled exposure limits (for workers) and general public/uncontrolled exposure limits for members of the general public.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/ controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general public/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

General public/uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment-related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Table 1 and Figure 1 (below), which are included within the FCC's OET Bulletin 65, summarize the MPE limits for RF emissions. These limits are designed to provide a substantial margin of safety. They vary by frequency to take into account the different types of equipment that may be in operation at a particular facility and are "time-averaged" limits to reflect different durations resulting from controlled and uncontrolled exposures.

The FCC's MPEs are measured in terms of power (mW) over a unit surface area (cm^2). Known as the power density, the FCC has established an occupational MPE of 5 milliwatts per square centimeter (mW/cm^2) and an uncontrolled MPE of 1 mW/cm^2 for equipment operating in the 1900 MHz frequency range. For the Dish Wireless equipment operating at 600 MHz or 850 MHz, the FCC's occupational MPE is 2.83 mW/cm^2 and an uncontrolled MPE of 0.57 mW/cm^2. For the Dish Wireless equipment operating at 1900 MHz, the FCC's occupational MPE is 5.0 mW/cm^2 and an uncontrolled MPE limit of 1.0 mW/cm^2. These limits are considered protective of these populations.

Table 1: Limits for Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $[E]^2$, $[H]^2$, or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	$(900/f^2)$*	6
30-300	61.4	0.163	1.0	6
300-1,500	--	--	f/300	6
1,500-100,000	--	--	5	6

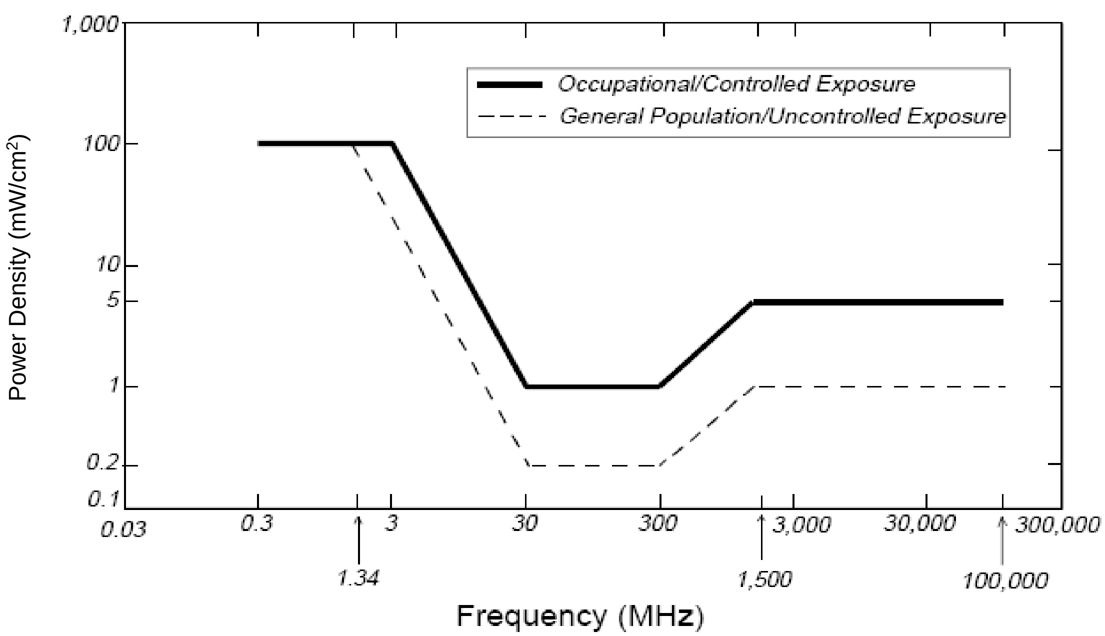
(B) Limits for General Public/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $[E]^2$, $[H]^2$, or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	$(180/f^2)$*	30
30-300	27.5	0.073	0.2	30
300-1,500	--	--	f/1,500	30
1,500-100,000	--	--	1.0	30

f = Frequency in (MHz)
* Plane-wave equivalent power density

Figure 1. FCC Limits for Maximum Permissible Exposure (MPE)

Plane-wave Equivalent Power Density



Based on the above, the most restrictive thresholds for exposures of unlimited duration to RF energy for several personal wireless services are summarized below:

Personal Wireless Service	Approximate Frequency	Occupational MPE	Public MPE
Microwave (Point-to-Point)	5,000 - 80,000 MHz	5.00 mW/cm^2	1.00 mW/cm^2
Broadband Radio (BRS)	2,600 MHz	5.00 mW/cm^2	1.00 mW/cm^2
Wireless Communication (WCS)	2,300 MHz	5.00 mW/cm^2	1.00 mW/cm^2
Advanced Wireless (AWS)	2,100 MHz	5.00 mW/cm^2	1.00 mW/cm^2
Personal Communication (PCS)	1,950 MHz	5.00 mW/cm^2	1.00 mW/cm^2
Cellular Telephone	870 MHz	2.90 mW/cm^2	0.58 mW/cm^2
Specialized Mobile Radio (SMR)	855 MHz	2.85 mW/cm^2	0.57 mW/cm^2
Long Term Evolution (LTE)	700 MHz	2.33 mW/cm^2	0.47 mW/cm^2
Most Restrictive Frequency Range	30-300 MHz	1.00 mW/cm^2	0.20 mW/cm^2

MPE limits are designed to provide a substantial margin of safety. These limits apply for continuous exposures and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health.

Personal Communication (PCS) facilities used by Dish Wireless in this area will potentially operate within a frequency range of 600 to 2100 MHz. Facilities typically consist of: 1) electronic transceivers (the radios or cabinets) connected to wired telephone lines; and 2) antennas that send the wireless signals created by the transceivers to be received by individual subscriber units (PCS telephones). Transceivers are typically connected to antennas by coaxial cables.

Because of the short wavelength of PCS services, the antennas require line-of-site paths for good propagation, and are typically installed above ground level. Antennas are constructed to concentrate energy towards the horizon, with as little energy as possible scattered towards the ground or the sky. This design, combined with the low power of PCS facilities, generally results in no possibility for exposure to approach Maximum Permissible Exposure (MPE) levels, with the exception of areas directly in front of the antennas.

FCC Compliance Requirement

A site is considered out of compliance with FCC regulations if there are areas that exceed the FCC exposure limits and there are no RF hazard mitigation measures in place. Any carrier which has an installation that contributes more than 5% of the applicable MPE must participate in mitigating these RF hazards.

App No: 2021071515

Application General Infomation

Applicant Name	Jacobs Telecommunications
Application Type	Colocated
Carrier	Other
Solution Type	Other
Existing	Existing
Updated	7/19/2021
Ann. Plan?	Yes
Will site be used to support government telecommunications facilities or other equipment for government use?	No
Gvt. Use Desc.	

Application Description

Install (3) Panel Antennas (1 per sector) on (1) Antenna Mount. Install (6) Radio Units (2 per sector), (1) OVP Device, (1) Hybrid Cable and associated jumpers on existing telecommunications tower. Install (1) metal platform for (2) cabinets, (1) ice bridge, (1) telco-fiber box, (1) GPS unit, (1) safety switch, (1) ciena box, and (1) meter socket on the ground beneath the tower.

Site Infomation

Site Id	299
Structure Type	Monopole
Street Address	12501 Dalewood Rd
County Site Name	Wheaton High School
Carrier Site Name	DCWDC00428A
Site Owner	MCPS
Structure Owner	Board of Education
Existing Structure Height	97.5
Provide the proposed height of the replacement structure without any antenna (New, Replacement Apps Only)	
Zoning	R-60
Latitude	39.059453
Longitude	-77.066497
Ground Elevation	371.97
City	Silver Spring
Lease Status	Leased
Does the structure require an antenna structure registration under FCC Title 47	Yes
Distance to Residential Property (New, Replacement, Colocation Only)	187
Distance to Commercial Property (New, Replacement, Colocation Only)	495

Justification of why this site was selected:

Existing tower that would provide desired coverage

NearbySites (New, Replacement Apps Only):

App No: 2021071515

Screening considerations(New, Colocations, Replacement Apps Only):

This is an existing communications tower without concealment. It is the Applicant's impression that concealment was not required when the tower was zoned.

App No: 2021071515

6409 Questions

Does this qualify as a 6409 application? (Minor Mod, Colocations Only): No

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

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

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

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

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

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

Does the structure or current installation have concealment elements/measures? No

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

Small Wireless Facility Informatio

Small Wireless Facility Questions

Is the structure 10% taller than adjacent structures?

Please list adjacent structure heights

Tribal Lands? No

Small Wireless Facility? No

Cumulative volume of the proposed wireless equipment(s) exclusive of antennas in cubic feet: 3.62

Cumulative volume of the proposed antenna antenna(s) exclusive of equipment

ROW Information

PROW? No

ROW owner

ROW width

Pole Number: US-MD-5072

Tuesday, July 20, 2021

11:23:05 AM

App No: 2021071515

Antenna Infomatio

Antenna Compliance: Yes

Compliance Desc:

Antenna Location: No

Antenna Loc. Desc.:

Env. Assessment:

Cat. Excluded?:

Routine Env. Evaluation: checked

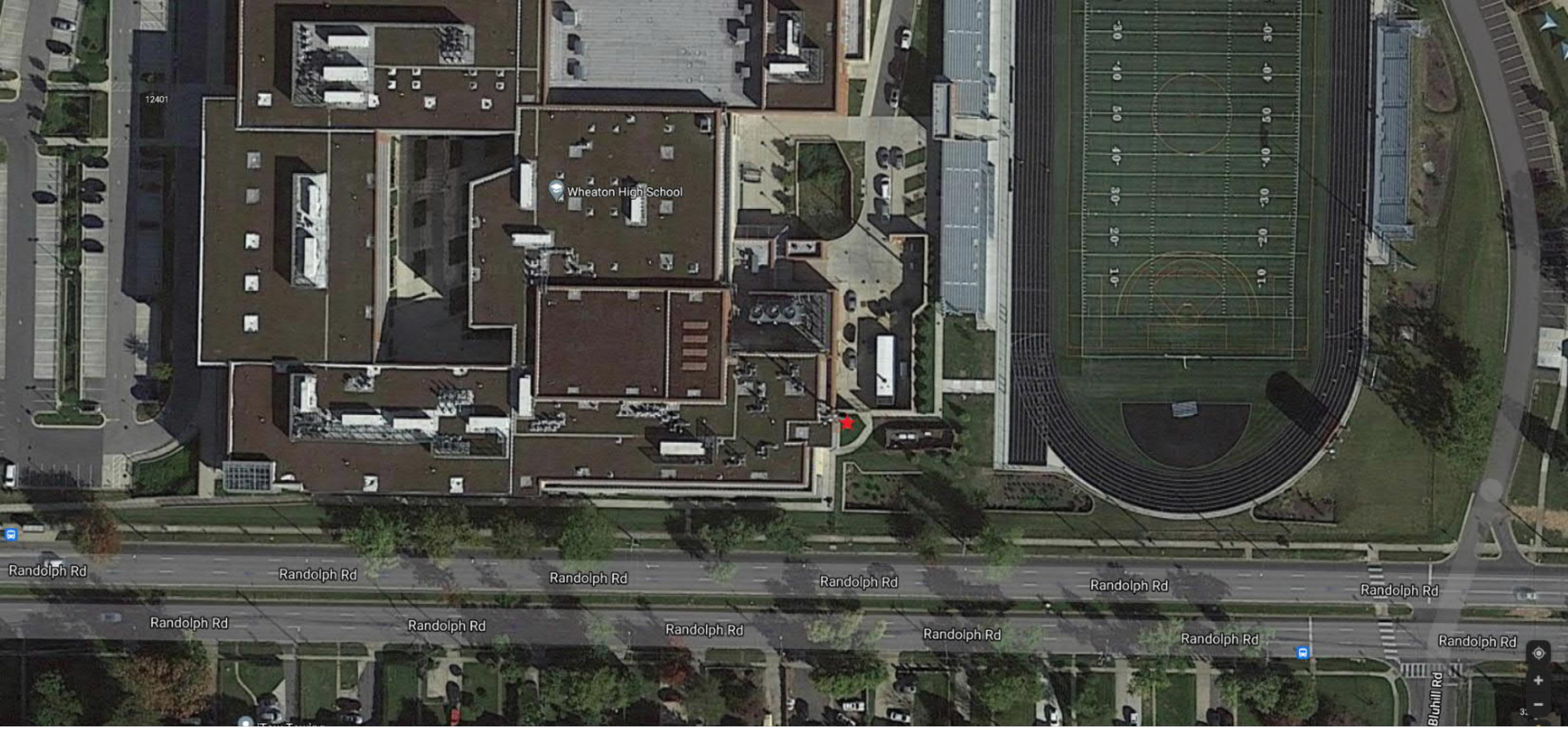
Antenna Model: JMA MX08FRO665-20_V0F

Frequency: 642-647; 688-693; 722-728; 1915-1920; 1995-2000; 2000-2020; 2180-2200

RAD Center: 90 | Max ERP: 5051 | Antenna Dimensions: 72" x 20" x 8" | Quantity: 3

Tuesday, July 20, 2021

11:23:06 AM


12401
Wheaton High School
Randolph Rd
Randolph Rd
Randolph Rd
Randolph Rd
Randolph Rd
Randolph Rd
Randolph Rd
Randolph Rd
Randolph Rd
Randolph Rd
Randolph Rd
Randolph Rd
Bluhill Rd

MX08FRO665-20

NWAV™ X-Pol 8-Port Antenna

X-Pol 8-Port 6 ft 65° Fast Roll Off with Smart Bias-Ts:

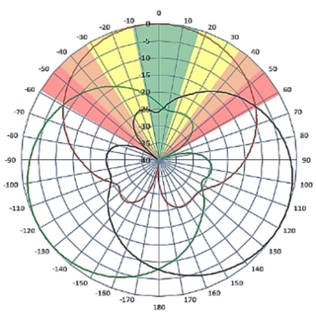
4 ports 617-894 MHz and 4 ports 1695-2200 MHz

- Fast Roll Off (FRO™) azimuth beam pattern improves Intra- and Inter-cell SINR
- Excellent passive intermodulation (PIM) performance reduces harmful interference.
- Fully integrated (iRETs) with Smart Bias-Ts & independent RET control for low and mid bands for ease of network optimization
- SON-Ready array spacing supports beamforming capabilities.
- High total power handling to maximize network efficiency
- Reduced tower loading for ease of site deployment

Fast Roll-Off antennas increase data throughput without compromising coverage

The horizontal beam produced by Fast Roll-Off (FRO) technology increases the Signal to Interference & Noise Ratio (SINR) by eliminating overlap between sectors .

Non-FRO antenna



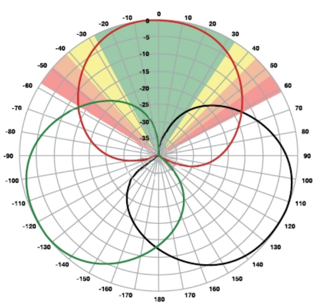
Large traditional antenna pattern overlap creates harmful interference.

JMA's FRO antenna pattern minimizes overlap, thereby minimizing interference.

LTE throughput	SINR	Speed (bps/Hz)	Speed increase	CQI
Excellent	>18	>4.5	333+%	8-10
Good	15-18	3.3-4.5	277%	6-7
Fair	10-15	2-3.3	160%	4-6
Poor	<10	<2	0%	1-3

The LTE radio automatically selects the best throughput based on measured SINR.

JMA FRO antenna



Electrical specification (minimum/maximum)	Ports 1, 2, 3, 4		Ports 5, 6, 7, 8		
Frequency bands, MHz	617-698	698-894	1695-1880	1850-1990	1920-2200
Polarization	± 45°		± 45°		
Gain over all tilts, max, dBi	13.9	15.0	17.9	18.0	18.8
Horizontal beamwidth (HBW), degrees[1]	68	62	64	61	62
Front-to-back ratio, co-polar power @180°, dB	>27	>29	>32	>35	>32
Vertical beamwidth (VBW), degrees[1]	14.2	12.5	5.4	5.2	4.9
Electrical downtilt (EDT) range, degrees	2-14		2-12		
First upper side lobe (USLS) suppression, dB[1]	≤-16.0	≤-16.5	≤-18.0	≤-18.0	≤-18.0
Minimum cross-polar isolation, port-to-port, dB[1]	25	25	25	25	25
Max VSWR / return loss, dB	1.5:1 / -14.0		1.5:1 / -14.0		
Max passive intermodulation (PIM), 2x20W carrier, dBc	-153		-153		
Max input power per any port, watts	300		250		
Total composite power all ports (1-8), watts[2]	1500				

[1] Typical value over frequency and tilt

2 Power rated up to +55 °C

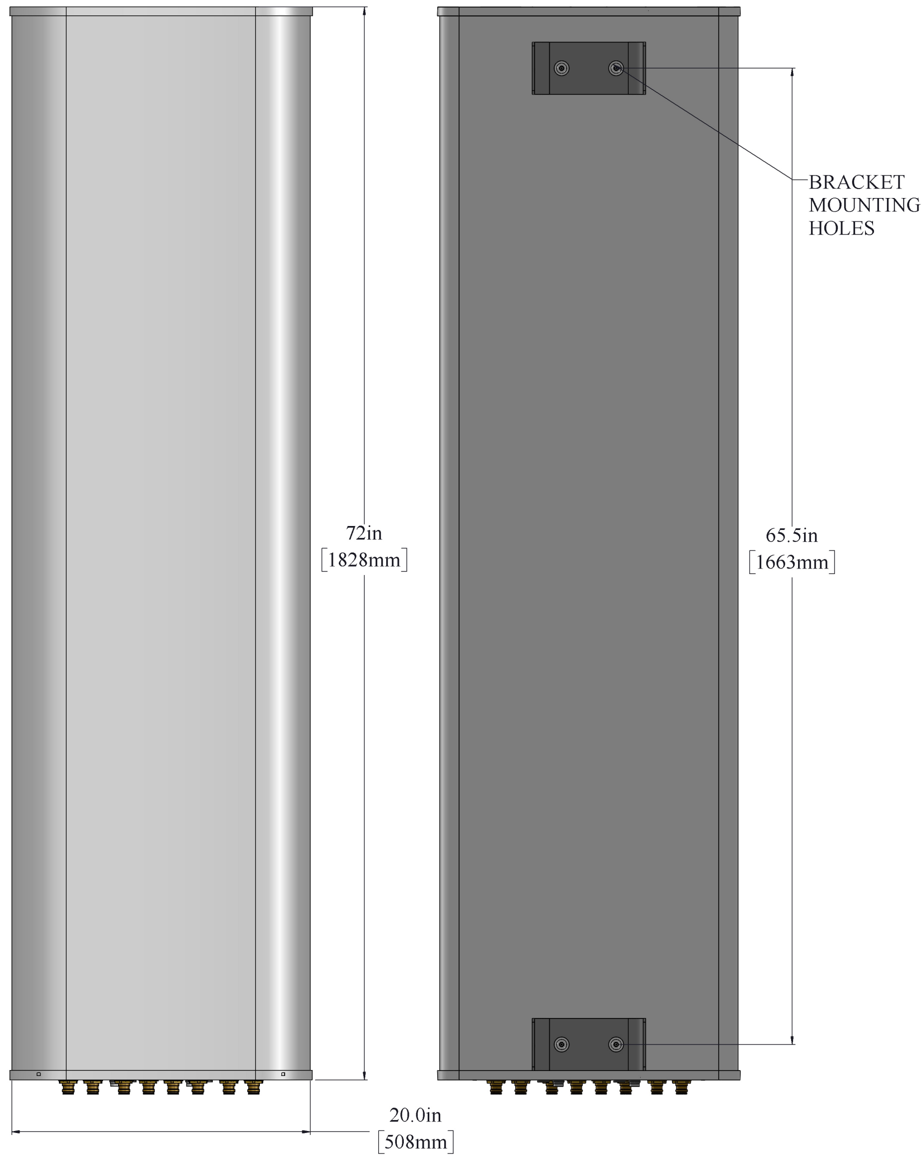
Electrical specification (minimum/maximum)	Ports 1, 2, 3, 4		Ports 5, 6, 7, 8		
Frequency bands, MHz	617-698	698-894	1695-1880	1850-1990	1920-2200
Average gain over all tilts, dBi (Gain Tolerance)	13.2±0.7	14.4±0.6	17.5±0.4	17.4±0.4	18.3±0.5
Horizontal beamwidth tolerance (HBW), degrees[1]	±5	±6.5	±5.5	±3.5	±5.0
Vertical beamwidth tolerance (VBW), degrees	±0.3	±0.3	±0.3	±0.3	±0.3
Front-to-back ratio, co-polar power @180°± 30°, dB	>27	>25	>25	>26	>24
X-Pol discrimination (CPR) at boresight, dB	>20	>19	17.5	>19	>20
First upper side lobe (USLS) suppression boresight to 20°, dB[1]	≤-16	≤-15	≤-16	≤-16	≤-16

Mechanical specifications	
Dimensions height/width/depth, inches (mm)	72.0/ 20.0/ 8.0 (1828.8/ 508.0/ 203.2)
Shipping dimensions length/width/height, inches (mm)	77.3/ 23.8/ 14.5 (1963.42/ 605/ 368)
No. of RF input ports, connector type, and location	8 x 4.3-10 female, bottom
RF connector torque	96 lbf·in (10.85 N·m or 8 lbf·ft)
Net antenna weight, lb (kg)	54 (24.5)
Shipping weight, lb (kg)	94 (42.6)
Antenna mounting and downtilt kit included with antenna	91900318
Net weight of the mounting and downtilt kit, lb (kg)	18 (8.2)
Range of mechanical up/down tilt	-2° to 12°
Rated wind survival speed, mph (km/h)	150 (241)
Frontal and lateral wind loading @ 150 km/h, lbf (N)	108.1 (480.9), 20.5 (91.2)
Effective projected area @ 150 km/h (EPA), frontal, sq ft	4.9

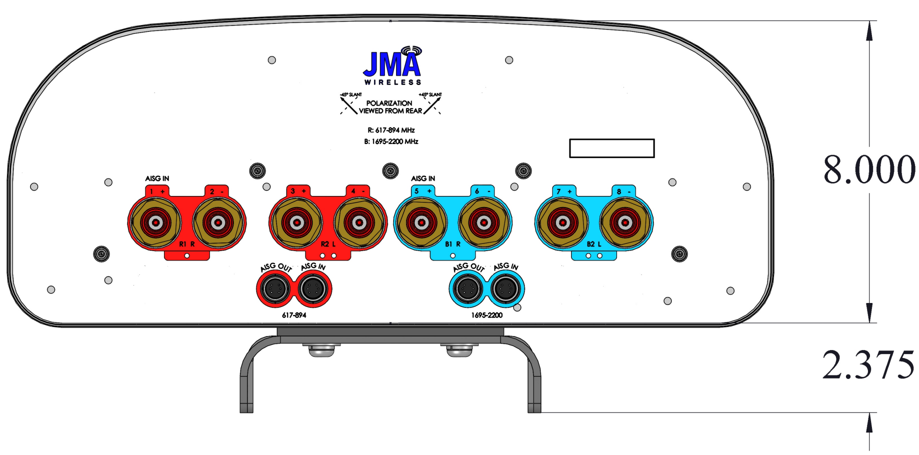
MX08FRO665-20

NWAV™ X-Pol 8-Port Antenna

Front view	Back view



Bottom view



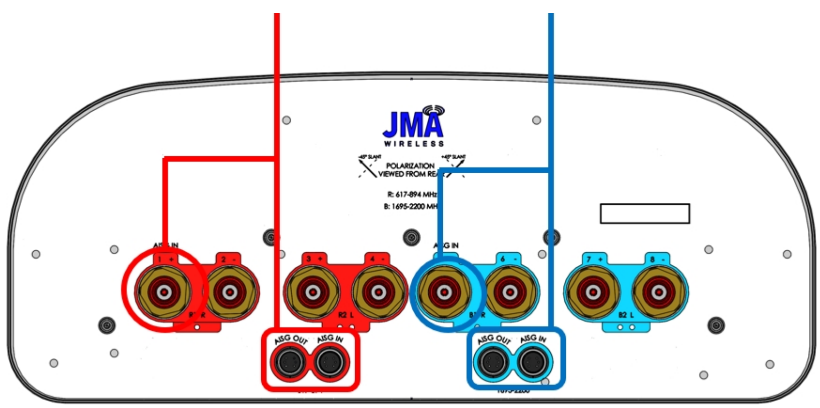
Remote electrical tilt (RET 1000) information	
RET location	Integrated into antenna
RET interface connector type	8-pin AISG connector per IEC 60130-9 or RF port Bias-T
RET connector torque	Min 0.5 N·m to max 1.0 N·m (hand pressure & finger tight)
RET interface connector quantity	2 pairs of AISG male/female connectors and 2 RF port Bias-Ts, ports 1 & 5
RET interface connector location	Bottom of the antenna
Total no. of internal RETs 617-894 MHz	1
Total no. of internal RETs 1695-2200 MHz	1
RET input operating voltage, vdc	10-30
RET max power consumption, idle state, W	≤ 2.0
RET max power consumption, normal operating conditions, W	≤ 10.0
RET communication protocol	Hardware AISG 3.0; firmware AISG 2.0, field-upgradable to AISG 3.0

RET and RF connector topology

Each RET device can be controlled either via the designated external AISG connector or RF port as shown below:

Band	RF port
617-894	1-4

Band	RF port
1695-2200	5-8

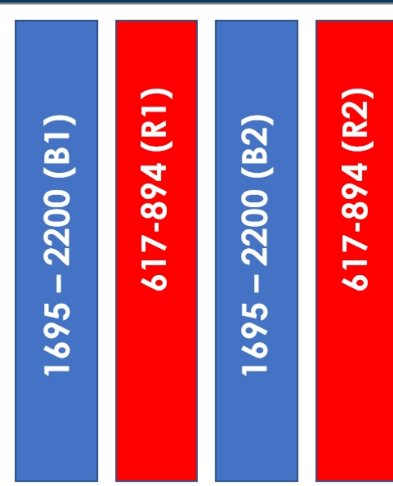


Array topology

4 sets of radiating arrays

R1: 617-894 MHz
R2: 617-894 MHz
B1: 1695-2200 MHz
B2: 1695-2200 MHz

Band	RF port
617-894	1-2
617-894	3-4
1695-2200	5-6
1695-2200	7-8



Fujitsu – DiSH Triple-band RU Technical Specifications

RU General Specification	
Part number	TA08025-B605
TRX Configuration	4T4R
Operating Frequency	n71 & n29 & n26 Frequencies (Triple-Band)
Instantaneous Bandwidth	n71: 35MHz n29: 11MHz n26: 7MHz
Operation Bandwidth (3GPP)	n71: 35MHz n29: 10MHz n26: 5MHz
CC BW	5/10/20 MHz
Capacity	n71:2Cr(5/10/20MHz)/NB-IOT n26:1Cr(5MHz)/NB-IOT n29:2Cr(5/10MHz)
Interface to DU	ORAN 7.2x / 10G optical IF
TX Specification	
Output Power per TX	n71: 30W per port n29: 40W per port n26: 10 W per port
ACLR	Compliant with 3GPP TS 38.104
Transmitter Spurious Emissions	Compliant with 3GPP TS 38.104
EVM	Compliant with 3GPP TS 38.104
RX Specification	
Noise Figure	2.5dB (normal condition 2.2dB)
Blocking Features	Compliant with 3GPP TS 38.104
Receiver spurious emissions	Compliant with 3GPP TS 38.104
Mechanical Specification	
Volume	35 L
Dimension	W:400mm, H: 380mm, D: 230mm
Antenna Connector Type	4.3-10 RF connector
Antenna Control Interface	AISG
Power Supply	DC -58~-36V
Power Consumption	<1300W
Weight	34 kg
Environmental	
Humidity (Absolute humidity)	0.03 g/m3 ~30 g/m3
Atmospheric Pressure	Between 70 kPa and 106 kPa
Operating Temperature	-40°C ~+55°C
IP Rating	IP65
Cooling	Passive

Mounting Options	
Pole	TBD
Wall	TBD

DATA SHEET

Base/Tower/Rooftop Solution for RRH Applications

RDIDC-9181-PF-48

The deployment of Remote Radio Head (RRH) architecture poses unique challenges to the mobile telecom industry. Raycap's innovative RRH protection solutions mitigate the risk of damage due to lightning and provide high levels of availability and reliability to radio equipment.

Features

- Employs the Strikesorb® 30-V1-2CFV Surge Protective Device (SPD) specifically designed for the Remote Radio Head (RRH) installation environment and certified for use in DC applications and at low DC operating voltages (48V)
- The Strikesorb 30-V1-2CFV is a Class I SPD, certified by VDE per the IEC 61643-11 standard as suitable for installation in areas where direct lightning exposure is expected. Strikesorb 30-V1-2CFV is able to withstand direct lightning currents of up to 12.5kA (10/350) and induced surge currents of up to 60kA (8/20).
- Provides very low let through / clamping voltage - unique for a Class I product - as it does not employ spark gaps or other switching elements. Strikesorb offers unique protection levels to the RRH equipment as well as the Base Band Units
- For individual circuit per radio architecture
- Configurable cable ports are designed to accommodate varying diameters of hybrid (combined power and fiber optic) or standard cables
- Fully recognized to the UL 1449 4th Edition Safety Standard
- Patent pending design

Benefits

- Offers unique maintenance-free protection against direct lightning currents
- Protects up to 9 Remote Radio Heads and connects up to 18 fiber pairs
- Utilizes a NEMA 4X rated enclosure, allowing for indoor or outdoor installation at the base, on a roof or tower top

Strikesorb 30-V1-2CFV

G02-01-946 200414

SPECIFICATIONS

Base/Tower Solution for RRH Applications

RDIDC-9181-PF-48

Electrical

Model Number	RDIDC-9181-PF-48
Nominal Operating Voltage	48 VDC
Nominal Discharge Current [I_n]	20 kA 8/20 µs
Maximum Surge Current [I_{max}]	60 kA 8/20 µs
Maximum Impulse (Lightning) Current per IEC 61643-11	12.5 kA 10/350 µs
Maximum Continuous Operationg Voltage [U_c]	75 VDC
Response Time [t_A]	<1 ns
Voltage Protection Rating (VPR) per UL 1449 4th Edition	400 V
Let-through Voltage @ 20kA (8/20)	<410 V
Let-through Voltage @ 10kA (8/20)	<330 V
Voltage Protection Level (VPL) per IEC 61643-11	<200 V @12.5 kA 10/350 µs
Fault Monitoring	Local status indicator - dry contact alarm
Circuit Configuration	Parallel; -48VDC suppy-return, return-ground
Protection Class as per IEC 61643-1	Class I
Incoming Power/Fiber	Power: #10/8/6/4/2 AWG (6 mm² - 33.6 mm²) power trunk Fiber: LC/LC
Strikesorb Module Type	30-V1-2CFV

Mechanical

Suppression Connection Method	Compression lug, #14 - #2 AWG (2.1 mm² - 33.6 mm²) Copper; #12 - #2 AWG (3.3 mm² - 33.6 mm²) Aluminum
Fiber Connection Method	24 LC-LC Single mode
Environmental Rating	NEMA 4X
Operating Temperature	-40° C to +80° C
UV Resistant	Yes
Combined Wind Load	150 mph (sustained): 110.5 lbs (491.5N) 195 mph (gust): 186 lbs (827.4N)
Dimensions	14" x 16" x 8"
Estimated Weight	21.85 lbs

Optional Product Configurations

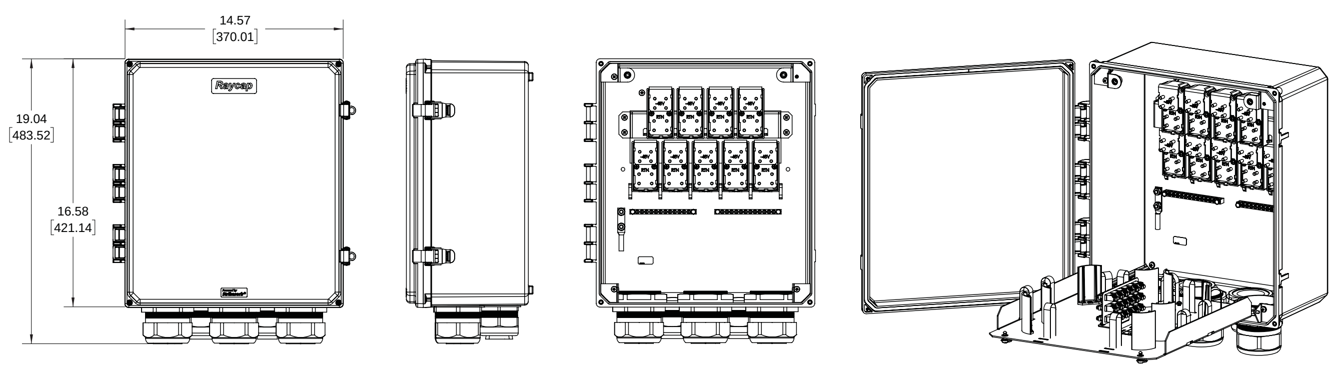
Bridge Kit (required for base unit when pairing with HCS 1.0 legacy cable) Order Part #: RTMDC-5634-WB-KIT

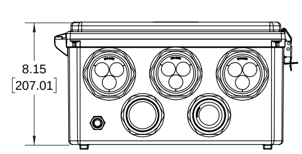
Standards Compliance & Certifications

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

Standards ANSI/UL 1449 4th Edition, IEEE C62.41, NEMA LS-1, IEC 61643-11 (Class I Protection), IEC 61643-12, EN 61643-11:2002 (including A11:2007)

Product Diagram





AWG=American Wire Gauge

Radio Frequency - Electromagnetic Energy (RF-EME) Jurisdictional Report

Site No. DCWDC00428A
12501-A Dalewood Dr
Silver Spring, Maryland 20906
39° 3' 34.20" N, -77° 3' 59.40" W NAD83

EBI Project No. 6221001331
March 24, 2021

Prepared for:

Dish Wireless

Prepared by:

EBI Consulting
environmental | engineering | due diligence

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APPENDIX B RADIO FREQUENCY ELECTROMAGNETIC ENERGY SAFETY / SIGNAGE PLANS
APPENDIX C FEDERAL COMMUNICATIONS COMMISSION (FCC) REQUIREMENTS

EXECUTIVE SUMMARY

Purpose of Report

EnviroBusiness Inc. (dba EBI Consulting) has been contracted by Dish Wireless to conduct radio frequency electromagnetic (RF-EME) modeling for Dish Wireless Site DCWDC00428A located at 12501-A Dalewood Dr in Silver Spring, Maryland to determine RF-EME exposure levels from proposed Dish Wireless communications equipment at this site. As described in greater detail in Appendix C of this report, the Federal Communications Commission (FCC) has developed Maximum Permissible Exposure (MPE) Limits for the general public and for occupational activities. This report summarizes the results of RF-EME modeling in relation to relevant FCC RF-EME compliance standards for limiting human exposure to RF-EME fields.

Statement of Compliance

A site is considered out of compliance with FCC regulations if there are areas that exceed the FCC exposure limits and there are no RF hazard mitigation measures in place. Any carrier which has an installation that contributes more than 5% of the applicable MPE must participate in mitigating these RF hazards.

As presented in the sections below, based on worst-case predictive modeling, there are no modeled areas on any accessible rooftop or ground-level walking/working surface related to the proposed antennas that exceed the FCC's occupational or general public exposure limits at this site.

At the nearest walking/working surfaces to the Dish Wireless antennas, the maximum power density generated by the DISH antennas is approximately **0.55** percent of the FCC's general public limit (**0.11** percent of the FCC's occupational limit).

The composite exposure level from all carriers on this site is approximately **0.70** percent of the FCC's general public limit (**0.14** percent of the FCC's occupational limit) at the nearest walking/working surface to each antenna.

Recommended control measures are outlined in Section 4.0 and within the Site Safety Plan (attached); Dish Wireless should also provide procedures to shut down and lockout/tagout this wireless equipment in accordance with their own standard operating protocol. Non-telecom workers who will be working in areas of exceedance are required to contact Dish Wireless since only DISH has the ability to lockout/tagout the facility, or to authorize others to do so.

1.0 INTRODUCTION

Radio frequency waves are electromagnetic waves from the portion of the electromagnetic spectrum at frequencies lower than visible light and microwaves. The wavelengths of radio waves range from thousands of meters to around 30 centimeters. These wavelengths correspond to frequencies as low as 3 cycles per second (or hertz [Hz]) to as high as one gigahertz (one billion cycles per second).

Personal Communication (PCS) facilities used by Dish Wireless in this area will potentially operate within a frequency range of 600 to 5000 MHz. Facilities typically consist of: 1) electronic transceivers (the radios or cabinets) connected to wired telephone lines; and 2) antennas that send the wireless signals created by the transceivers to be received by individual subscriber units (PCS telephones). Transceivers are typically connected to antennas by coaxial cables.

Because of the short wavelength of PCS services, the antennas require line-of-site paths for good propagation, and are typically installed a distance above ground level. Antennas are constructed to concentrate energy towards the horizon, with as little energy as possible scattered towards the ground or the sky. This design, combined with the low power of PCS facilities, generally results in no possibility for exposure to approach Maximum Permissible Exposure (MPE) levels, with the exception of in areas in the immediate vicinity of the antennas.

MPE limits do not represent levels where a health risk exists, since they are designed to provide a substantial margin of safety. These limits apply for continuous exposures and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size or health.

2.0 SITE DESCRIPTION

This project site includes the following proposed wireless telecommunication antennas on a monopole located at 12501-A Dalewood Dr in Silver Spring, Maryland.

Ant #	Operator	Antenna Make	Antenna Model	Frequency (MHz)	Azimuth (deg.)	Mechanical Downtilt (deg.)	Horizontal Beamwidth (Degrees)	Aperture (feet)	Total Power Input (Watts)	Antenna Gain (dBd)	Total ERP (Watts)	Total EIRP (Watts)
1	Dish	JMA	MX08FRO665-20 02DT 600	600	0	0	62	6.1	134.40772	11.35	1456.88	2389.29
1	Dish	JMA	MX08FRO665-20 02DT 700	700	0	0	52	6.1	134.40772	12.05	1711.69	2807.17
1	Dish	JMA	MX08FRO665-20 02DT 2007	2007	0	0	62	6.1	134.40772	15.75	4012.58	6580.64
1	Dish	JMA	MX08FRO665-20 02DT 2100	2100	0	0	65	6.1	134.40772	16.75	5051.54	8284.53
2	Dish	JMA	MX08FRO665-20 02DT 600	600	120	0	62	6.1	134.40772	11.35	1456.88	2389.29
2	Dish	JMA	MX08FRO665-20 02DT 700	700	120	0	52	6.1	134.40772	12.05	1711.69	2807.17
2	Dish	JMA	MX08FRO665-20 02DT 2007	2007	120	0	62	6.1	134.40772	15.75	4012.58	6580.64
2	Dish	JMA	MX08FRO665-20 02DT 2100	2100	120	0	65	6.1	134.40772	16.75	5051.54	8284.53
3	Dish	JMA	MX08FRO665-20 02DT 600	600	240	0	62	6.1	134.40772	11.35	1456.88	2389.29
3	Dish	JMA	MX08FRO665-20 02DT 700	700	240	0	52	6.1	134.40772	12.05	1711.69	2807.17
3	Dish	JMA	MX08FRO665-20 02DT 2007	2007	240	0	62	6.1	134.40772	15.75	4012.58	6580.64
3	Dish	JMA	MX08FRO665-20 02DT 2100	2100	240	0	65	6.1	134.40772	16.75	5051.54	8284.53
4	Unknown	GENERIC	PANEL 4FT 00DT 850	850	0	0	61	4.0	100	11.52	1419.06	2327.25
5	Unknown	GENERIC	PANEL 4FT 00DT 1900	1900	0	0	65	4.0	100	14.65	2917.43	4784.58
6	Unknown	GENERIC	PANEL 4FT 00DT 850	850	0	0	61	4.0	100	11.52	1419.06	2327.25
7	Unknown	GENERIC	PANEL 4FT 00DT 850	850	120	0	61	4.0	100	11.52	1419.06	2327.25

8	Unknown	GENERIC	PANEL 4FT 00DT 1900	1900	120	0	65	4.0	100	14.65	2917.43	4784.58
9	Unknown	GENERIC	PANEL 4FT 00DT 850	850	120	0	61	4.0	100	11.52	1419.06	2327.25
10	Unknown	GENERIC	PANEL 4FT 00DT 850	850	240	0	61	4.0	100	11.52	1419.06	2327.25
11	Unknown	GENERIC	PANEL 4FT 00DT 1900	1900	240	0	65	4.0	100	14.65	2917.43	4784.58
12	Unknown	GENERIC	PANEL 4FT 00DT 850	850	240	0	61	4.0	100	11.52	1419.06	2327.25

• Note there is 1 Dish Wireless antenna per sector at this site. For clarity, the different frequencies for each antenna are entered on separate lines.

Ant #	NAME	X	Y	Antenna Radiation Centerline	Z-Height Adj. Main Roof	Z-Height Ground
1	Dish	0.6	1.0	90.0	45.0	90.0
2	Dish	5.5	1.0	90.0	45.0	90.0
3	Dish	10.2	1.0	90.0	45.0	90.0
4	Unknown	14.7	6.8	97.5	52.5	97.5
5	Unknown	13.1	11.1	97.5	52.5	97.5
6	Unknown	10.4	15.2	97.5	52.5	97.5
7	Unknown	1.0	15.0	97.5	52.5	97.5
8	Unknown	1.8	11.3	97.5	52.5	97.5
9	Unknown	4.3	7.2	97.5	52.5	97.5
10	Unknown	0.6	1.0	97.5	52.5	97.5
11	Unknown	14.7	6.8	97.5	52.5	97.5
12	Unknown	1.0	15.0	97.5	52.5	97.5

• Note the Z-Height represents the distance from the antenna centerline.

The above tables contain an inventory of proposed Dish Wireless antennas and other carrier antennas if sufficient information was available to model them. Note that EBI uses an assumed set of antenna specifications and powers for unknown and other carrier antennas for modeling purposes. The FCC guidelines incorporate two separate tiers of exposure limits that are based upon occupational/controlled exposure limits (for workers) and general population/uncontrolled exposure limits for members of the general public that may be exposed to antenna fields. While access to this site is considered uncontrolled, the analysis has considered exposures with respect to both controlled and uncontrolled limits as an untrained worker may access adjacent rooftop locations. Additional information regarding controlled/uncontrolled exposure limits is provided in Appendix C. Appendix B presents a site safety plan that provides a plan view of the monopole with antenna locations.

3.0 WORST-CASE PREDICTIVE MODELING

EBI has performed theoretical MPE modeling using RoofMaster™ software to estimate the worst-case power density at the site's nearby broadcast levels resulting from operation of the antennas. RoofMaster™ is a widely-used predictive modeling program that has been developed by Waterford Consultants to predict RF power density values for rooftop and tower telecommunications sites produced by vertical collinear antennas that are typically used in the cellular, PCS, paging and other communications services. Using the computational methods set forth in Federal Communications Commission (FCC) Office of Engineering & Technology (OET) Bulletin 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields" (OET-65), RoofMaster™ calculates predicted power density in a scalable grid based on the contributions of all RF sources characterized in the study scenario. At each grid location, the cumulative power density is expressed as a percentage of the FCC limits. Manufacturer antenna pattern data is utilized in these calculations. RoofMaster™ models consist of the Far Field model as specified in OET-65 and an implementation of the OET-65 Cylindrical Model (Sula9).

The models utilize several operational specifications for different types of antennas to produce a plot of spatially-averaged power densities that can be expressed as a percentage of the applicable exposure limit.

For this report, EBI utilized antenna and power data provided by Dish Wireless and compared the resultant worst-case MPE levels to the FCC's occupational/controlled exposure limits outlined in OET Bulletin 65. The assumptions used in the modeling are based upon information provided by Dish Wireless and information gathered from other sources. Elevations of walking/working surfaces were estimated based on elevations provided and available aerial imagery. Sector orientation assignments were made assuming coverage is directed to areas of site. Changes to antenna mount heights or placement will impact site compliance. The parameters used for modeling are summarized in the Site Description antenna inventory table in Section 2.0.

One other unknown carrier also has antennas on the monopole. Information about these antennas was included in the modeling analysis.

Based on worst-case predictive modeling, there are no modeled areas on any accessible rooftop or ground-level walking/working surface related to the proposed Dish Wireless antennas that exceed the FCC's occupational or general public exposure limits at this site. At the nearest walking/working surfaces to the Dish Wireless antennas, the maximum power density generated by the Dish Wireless antennas is approximately 0.55 percent of the FCC's general public limit (0.11 percent of the FCC's occupational limit). The composite exposure level from all carriers on this site is approximately 0.70 percent of the FCC's general public limit (0.14 percent of the FCC's occupational limit) at the nearest walking/working surface to each antenna.

The Site Safety Plan also presents areas where Dish Wireless antennas contribute greater than 5% of the applicable MPE limit for a site. A site is considered out of compliance with FCC regulations if there are areas that exceed the FCC exposure limits and there are no RF hazard mitigation measures in place. Any carrier which has an installation that contributes more than 5% of the applicable MPE must participate in mitigating these RF hazards.

There are no modeled areas on the rooftop and ground that exceed the FCC's limits for general public or occupational exposure in front of the other carrier antennas.

The inputs used in the modeling are summarized in the Site Description antenna inventory table in Section 2.0. A graphical representation of the RoofMaster™ modeling results is presented in Appendix B. Microwave dish antennas are designed for point-to-point operations at the elevations of the installed equipment rather than ground level coverage. The maximum power density generated by all carrier antennas, including microwaves and panel antennas, is included in the modeling results presented within this report.

4.0 MITIGATION/SITE CONTROL OPTIONS

EBI's modeling indicates that there are no areas in front of the Dish Wireless antennas that exceed the FCC standards for occupational or general public exposure. All exposures above the FCC's safe limits require that individuals be elevated above the rooftop and ground. In order to alert people accessing the monopole, a Guidelines sign is recommended for installation at each access point to the monopole.

There are no barriers recommended on this site.

These protocols and recommended control measures have been summarized and included with a graphic representation of the antennas and associated signage and control areas in a RF-EME Site Safety Plan, which is included as Appendix B. Individuals and workers accessing the monopole should be provided with a copy of the attached Site Safety Plan, made aware of the posted signage and barriers, and signify their understanding of the Site Safety Plan.

To reduce the risk of exposure, EBI recommends that access to areas associated with the active antenna installation be restricted and secured where possible.

Implementation of the signage and barriers recommended in the Site Safety Plan and in this report will bring this site into compliance with the FCC's rules and regulations.

5.0 SUMMARY AND CONCLUSIONS

EBI has prepared a Radiofrequency – Electromagnetic Energy (RF-EME) Compliance Report for telecommunications equipment installed by Dish Wireless Site Number DCWDC00428A located at 12501-A Dalewood Dr in Silver Spring, Maryland to determine worst-case predicted RF-EME exposure levels from wireless communications equipment installed at this site. This report summarizes the results of RF-EME modeling in relation to relevant Federal Communications Commission (FCC) RF-EME compliance standards for limiting human exposure to RF-EME fields.

As presented in the sections above, based on the FCC criteria, there are no modeled areas on any accessible rooftop or ground-level walking/working surface related to the proposed antennas that exceed the FCC's occupational or general public exposure limits at this site.

Workers should be informed about the presence and locations of antennas and their associated fields. Recommended control measures are outlined in Section 4.0 and within the Site Safety Plan (attached); Dish Wireless should also provide procedures to shut down and lockout/tagout this wireless equipment in accordance with their own standard operating protocol. Non-telecom workers who will be working in areas of exceedance are required to contact Dish Wireless since only Dish Wireless has the ability to lockout/tagout the facility, or to authorize others to do so.

6.0 LIMITATIONS

This report was prepared for the use of Dish Wireless. It was performed in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same locale under like circumstances. The conclusions provided by EBI are based solely on the information provided by the client. The observations in this report are valid on the date of the investigation. Any additional information that becomes available concerning the site should be provided to EBI so that our conclusions may be revised and modified, if necessary. This report has been prepared in accordance with Standard Conditions for Engagement and authorized proposal, both of which are integral parts of this report. No other warranty, expressed or implied, is made.

Appendix A

Certifications

Preparer Certification

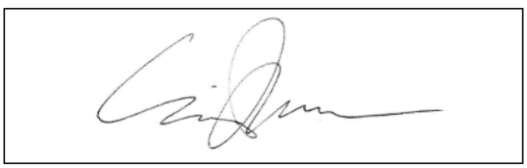
I, Erik Johnson, state that:

- I am an employee of EnviroBusiness Inc. (d/b/a EBI Consulting), which provides RF-EME safety and compliance services to the wireless communications industry.

- I have successfully completed RF-EME safety training, and I am aware of the potential hazards from RF-EME and would be classified "occupational" under the FCC regulations.

- I am fully aware of and familiar with the Rules and Regulations of both the Federal Communications Commissions (FCC) and the Occupational Safety and Health Administration (OSHA) with regard to Human Exposure to Radio Frequency Radiation.

- I have reviewed the data provided by the client and incorporated it into this Site Compliance Report such that the information contained in this report is true and accurate to the best of my knowledge.



Reviewed and Approved by:

sealed 24mar2021 mike@h2dc.com
H2DC PLLC MD CoA#: 50517

Michael McGuire
Electrical Engineer
mike@h2dc.com

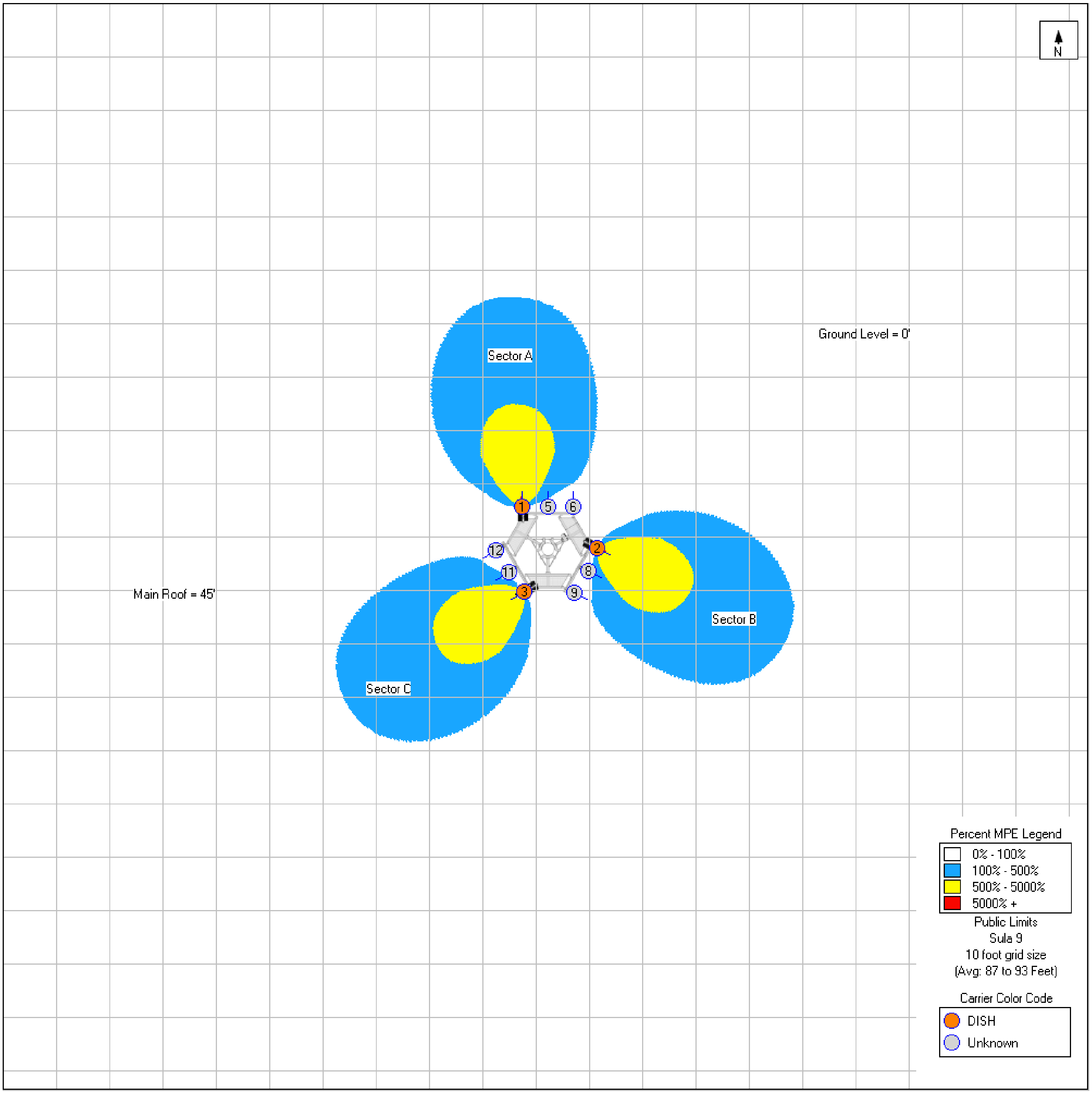
Note that EBI's scope of work is limited to an evaluation of the Radio Frequency – Electromagnetic Energy (RF-EME) field generated by the antennas and broadcast equipment noted in this report. The engineering and design of the building and related structures, as well as the impact of the antennas and broadcast equipment on the structural integrity of the building, are specifically excluded from EBI's scope of work.

Appendix B

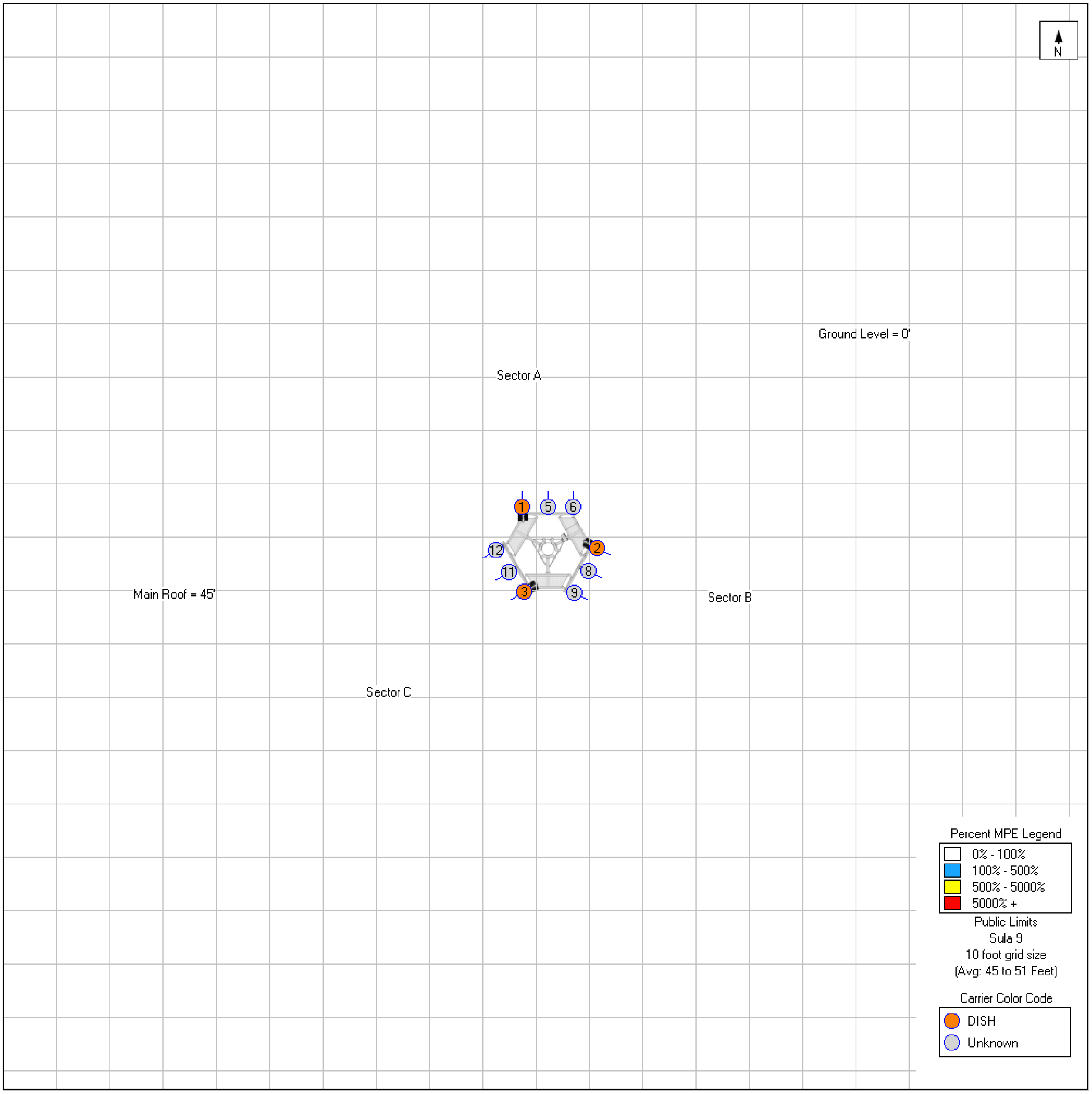
Radio Frequency Electromagnetic Energy

Safety Information and Signage Plans

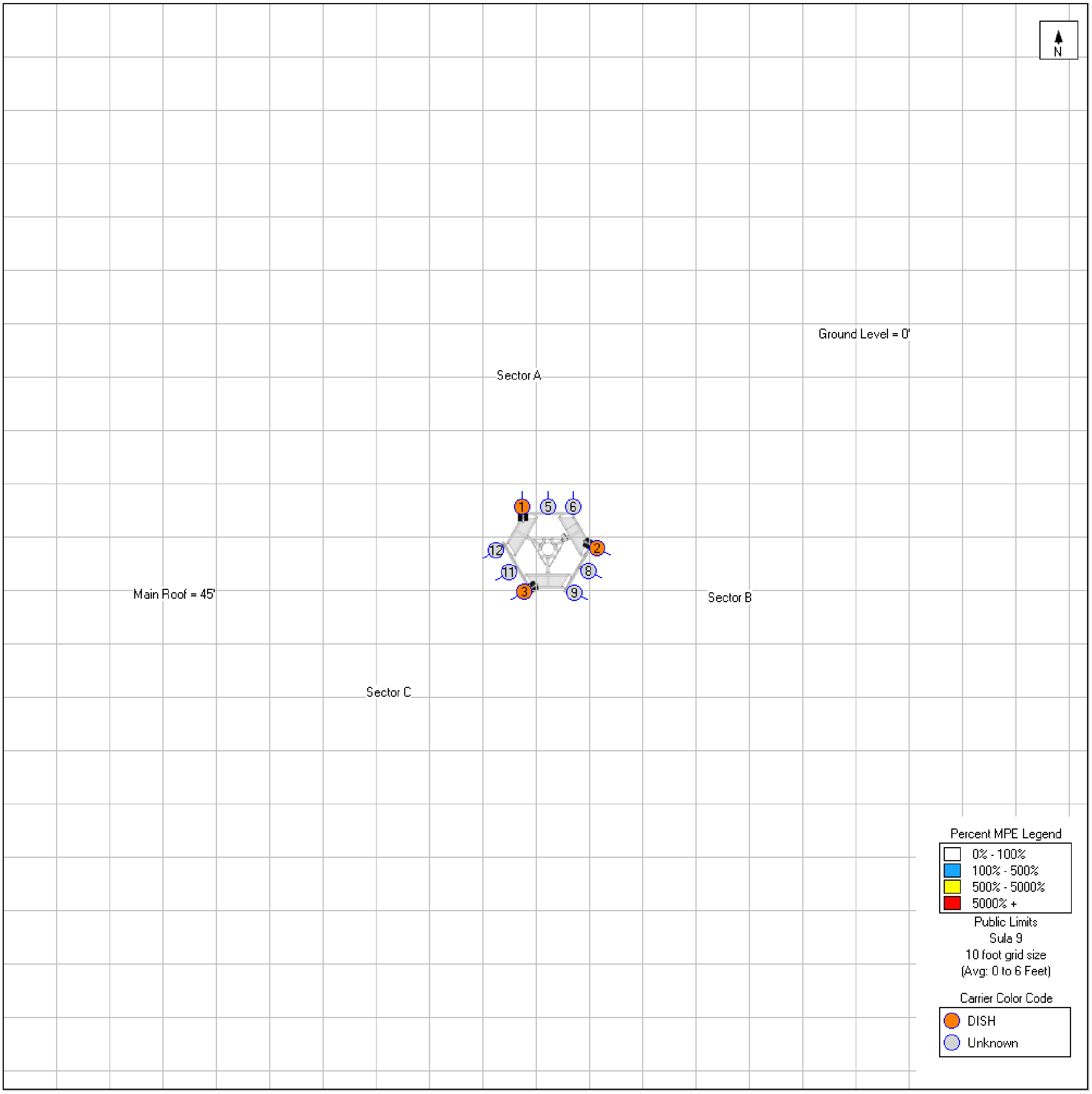
Antenna Face Level Simulation



Adjacent Main Roof Level Simulation



Ground Level Simulation



Dish Wireless Signage Plan

Sign	Posting Instructions	Required Signage / Mitigation
	**Guidelines** Informational sign used to notify workers that there are active antennas installed and provide guidelines for working in RF environments.	Securely post Guidelines sign at the main rooftop access door and every point of access to the site in a manner conspicuous to all individuals entering thereon as indicated in the signage plan.
	**Notice** Used to notify individuals they are entering an area where the power density emitted from transmitting antennas may exceed the FCC's MPE limit for the general public or occupational exposures.	No Notice sign required.
	**Caution** Used to notify individuals that they are entering a hot spot where either the general public or occupational FCC's MPE limit is or could be exceeded.	No Caution sign required.
	**Warning** Used to notify individuals that they are entering a hot zone where either the general public or occupational FCC's MPE limit has been exceeded.	No Warning sign required.

Appendix C

Federal Communications Commission (FCC) Requirements

The FCC has established Maximum Permissible Exposure (MPE) limits for human exposure to Radiofrequency Electromagnetic (RF-EME) energy fields, based on exposure limits recommended by the National Council on Radiation Protection and Measurements (NCRP) and, over a wide range of frequencies, the exposure limits developed by the Institute of Electrical and Electronics Engineers, Inc. (IEEE) and adopted by the American National Standards Institute (ANSI) to replace the 1982 ANSI guidelines. Limits for localized absorption are based on recommendations of both ANSI/IEEE and NCRP.

The FCC guidelines incorporate two separate tiers of exposure limits that are based upon occupational/controlled exposure limits (for workers) and general public/uncontrolled exposure limits for members of the general public.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/ controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general public/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

General public/uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment-related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

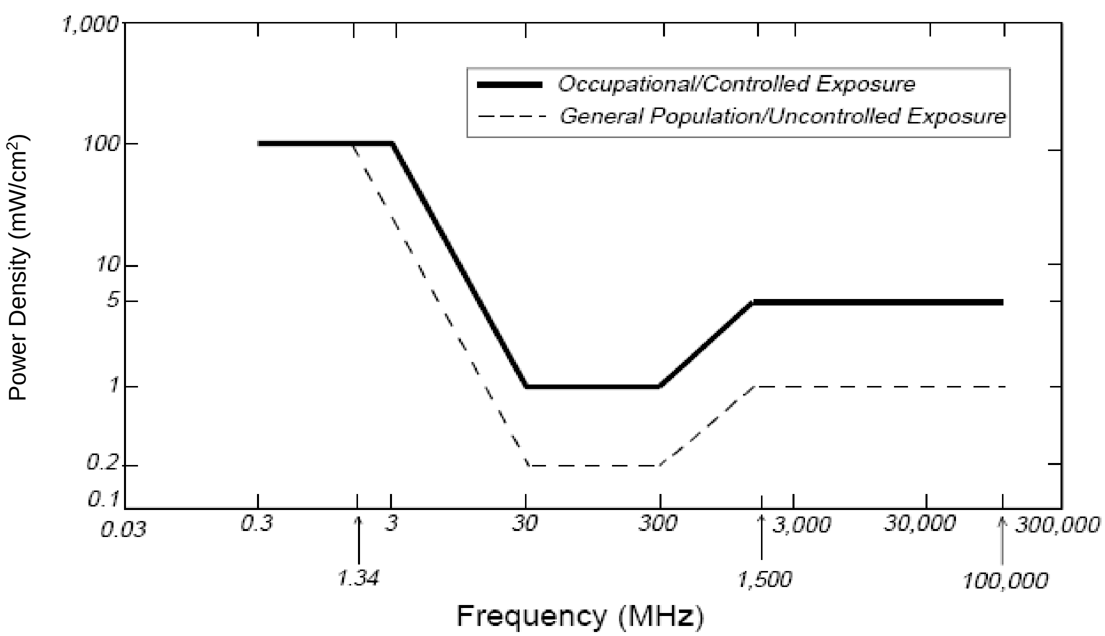
Table 1 and Figure 1 (below), which are included within the FCC's OET Bulletin 65, summarize the MPE limits for RF emissions. These limits are designed to provide a substantial margin of safety. They vary by frequency to take into account the different types of equipment that may be in operation at a particular facility and are "time-averaged" limits to reflect different durations resulting from controlled and uncontrolled exposures.

The FCC's MPEs are measured in terms of power (mW) over a unit surface area (cm^2). Known as the power density, the FCC has established an occupational MPE of 5 milliwatts per square centimeter (mW/cm^2) and an uncontrolled MPE of 1 mW/cm^2 for equipment operating in the 1900 MHz frequency range. For the Dish Wireless equipment operating at 600 MHz or 850 MHz, the FCC's occupational MPE is 2.83 mW/cm^2 and an uncontrolled MPE of 0.57 mW/cm^2. For the Dish Wireless equipment operating at 1900 MHz, the FCC's occupational MPE is 5.0 mW/cm^2 and an uncontrolled MPE limit of 1.0 mW/cm^2. These limits are considered protective of these populations.

Table 1: Limits for Maximum Permissible Exposure (MPE)				
(A) Limits for Occupational/Controlled Exposure				
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (A/m)**	**Power Density (S) (mW/cm^2)**	**Averaging Time $[E]^2$, $[H]^2$, or S (minutes)**
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	($900/f^2$)*	6
30-300	61.4	0.163	1.0	6
300-1,500	--	--	f/300	6
1,500-100,000	--	--	5	6
(B) Limits for General Public/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (A/m)**	**Power Density (S) (mW/cm^2)**	**Averaging Time $[E]^2$, $[H]^2$, or S (minutes)**
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f^2$)*	30
30-300	27.5	0.073	0.2	30
300-1,500	--	--	f/1,500	30
1,500-100,000	--	--	1.0	30

f = Frequency in (MHz)
* Plane-wave equivalent power density

Figure 1. FCC Limits for Maximum Permissible Exposure (MPE)
Plane-wave Equivalent Power Density



Based on the above, the most restrictive thresholds for exposures of unlimited duration to RF energy for several personal wireless services are summarized below:

Personal Wireless Service	Approximate Frequency	Occupational MPE	Public MPE
Microwave (Point-to-Point)	5,000 - 80,000 MHz	5.00 mW/cm^2	1.00 mW/cm^2
Broadband Radio (BRS)	2,600 MHz	5.00 mW/cm^2	1.00 mW/cm^2
Wireless Communication (WCS)	2,300 MHz	5.00 mW/cm^2	1.00 mW/cm^2
Advanced Wireless (AWS)	2,100 MHz	5.00 mW/cm^2	1.00 mW/cm^2
Personal Communication (PCS)	1,950 MHz	5.00 mW/cm^2	1.00 mW/cm^2
Cellular Telephone	870 MHz	2.90 mW/cm^2	0.58 mW/cm^2
Specialized Mobile Radio (SMR)	855 MHz	2.85 mW/cm^2	0.57 mW/cm^2
Long Term Evolution (LTE)	700 MHz	2.33 mW/cm^2	0.47 mW/cm^2
Most Restrictive Frequency Range	30-300 MHz	1.00 mW/cm^2	0.20 mW/cm^2

MPE limits are designed to provide a substantial margin of safety. These limits apply for continuous exposures and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health.

Personal Communication (PCS) facilities used by Dish Wireless in this area will potentially operate within a frequency range of 600 to 2100 MHz. Facilities typically consist of: 1) electronic transceivers (the radios or cabinets) connected to wired telephone lines; and 2) antennas that send the wireless signals created by the transceivers to be received by individual subscriber units (PCS telephones). Transceivers are typically connected to antennas by coaxial cables.

Because of the short wavelength of PCS services, the antennas require line-of-site paths for good propagation, and are typically installed above ground level. Antennas are constructed to concentrate energy towards the horizon, with as little energy as possible scattered towards the ground or the sky. This design, combined with the low power of PCS facilities, generally results in no possibility for exposure to approach Maximum Permissible Exposure (MPE) levels, with the exception of areas directly in front of the antennas.

FCC Compliance Requirement

A site is considered out of compliance with FCC regulations if there are areas that exceed the FCC exposure limits and there are no RF hazard mitigation measures in place. Any carrier which has an installation that contributes more than 5% of the applicable MPE must participate in mitigating these RF hazards.

Prepared by:
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(402)-575-8885
Engineering@sgstowers.com

Structural Analysis Report

Structure	: 97.5 Foot Monopole
VB Site Name	: BOE- Richard D Riddle School
VB Site ID	: US-MD-5072
Proposed Carrier	: DISH Wireless L.L.C.
Carrier Site Name	: DCWDC00428A
Carrier Site Number	: DCWDC00428A
Site Location	: 12501-A Dalewood Drive
	Silver Spring, MD 20906 (Montgomery County)
	39.05946, -77.06649
Date	: February 23, 2021
Max Member Stress Level	: 98.7% (Tower)
	86.8% (Base Plate)
	78.0% (Anchor Rods)
	62.5% (Foundation – Drilled Pier)
Result	: **PASS**

STATE OF MARYLAND
NICHOLAS J. SCHMITT
LIC. 43419
PROFESSIONAL ENGINEER

2/24/21

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. 43419

SGS Job No.: 2101548

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Final Proposed Equipment Loading for DISH Wireless L.L.C. **1**

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Conclusions **3**

Calculations .... **Attached**

Collocation Application .... **Attached**

Design Criteria

The tower was analyzed using tnxTower (Version 8.0.7.5) software to find the internal loads using the following design criteria.

State	Maryland
City / County Building Code	Montgomery County (IBC 2018)
Standard Codes	TIA-222-H
Basic Wind Speed	113 MPH (V_{ult})
Basic Wind Speed w/ Ice	40 MPH w/ 1.0" Ice
Grades	65 ksi Tower Pole (0-150') / 60 ksi Base Plate / A615-75 (75 ksi) Anchor Bolts
Exposure Category	C
Topographic Category (height)	1 (0 ft)
Structure Class	II
S_s	0.134
S_1	0.043

Note: A seismic analysis has been performed and is not controlling.

Analysis Results

Based on the foregoing information, our structural analysis determined that **the existing tower is structurally capable of supporting the proposed equipment loads without modification.** The base plate and anchor bolts have also been evaluated and are **found to be structurally capable of supporting the proposed equipment loads without modification**. The structural design report (EEI, Project No. 13160, Drawing No. D13160-98.1) analyzed for drilled pier foundation. An analysis for drilled pier foundation was performed and it was determined **to be structurally capable of supporting the proposed equipment loads without modifications.**

Assumptions

1. The existing tower has been maintained to manufacturer's specifications and is in good condition.
2. All member connections are considered to have been designed to meet the load carrying capacity of the connected members.
3. Antenna mount loads have been estimated based on generally accepted industry standards.
4. The mounts for the proposed antennas have been analyzed and designed by others.
5. Ultimate Bearing value and blow count for soil has been taken from TIA-222-H, ANNEX F Table F-1:Presumptive Soil Parameters to perform foundation analysis.

Introduction

We have completed our structural analysis of the proposed equipment installation on the foregoing **Monopole** to determine its ability to support the new loads proposed by **DISH Wireless L.L.C.** The objective of the analysis is to determine if the **Monopole** meets the current structural codes and standards with the proposed equipment installation.

Existing Structural Information

The following documents for the existing structure were made available for our structural analysis.

Tower Information	Engineered Endeavors Incorporated, Structural Design Report / Project No: 13160, Drawing No. GS55637, dated August 9, 2005
Foundation Information	Engineered Endeavors Incorporated, Structural Design Report / Project No: 13160, Drawing No. D13160-98.1, dated August 9, 2005
Equipment Information	DISH Wireless - Vertical Bridge Collocation Application No. C-103052 Version 2, dated February 12, 2021. T-Mobile – Loading provided by Vertical Bridge on February 18, 2021
Tower Reinforcement Information	Tower has not been previously reinforced

Final Proposed Equipment Loading for DISH Wireless L.L.C.

The following proposed loading was obtained from the Vertical Bridge Collocation Application:

Antenna/Equipment					Coax	
Mount (ft.)	RAD (ft.)	Qty.	Antenna	Type	Qty.	Size/Type
90.0	-	**1**	**Platform Mount w/ Handrails**	**Mount**	**1**	**1.6” Hybrid**
	90.0	**6***	**JMA MX08FRO665-20_V0F**	**Panel**		
		6*	**Fujitsu TA08025-B604**	**RRU**		
		6*	**Fujitsu TA08025-B605**	**RRU**		
		1	**Raycap RDIDC-9181-PF-48**	**Junction Box**		

Note: Proposed equipment shown in bold.
Note: Proposed feed lines to be placed on the outside of the pole.
Note: Remainder of T-Mobile reserved rights are considered in the analysis
Note: Remainder of Dish reserved rights are considered in the analysis.
Note: *Designates that half of the quantity is reserved loading.
Note: For all other existing equipment please refer to the tower profile and attached tnxTower output.

Conclusions

The existing tower described above **has sufficient capacity** to support the proposed loading based on the two governing codes referenced above. The base plate, anchor bolts and foundation have also been evaluated and have sufficient capacity to support the proposed loads.

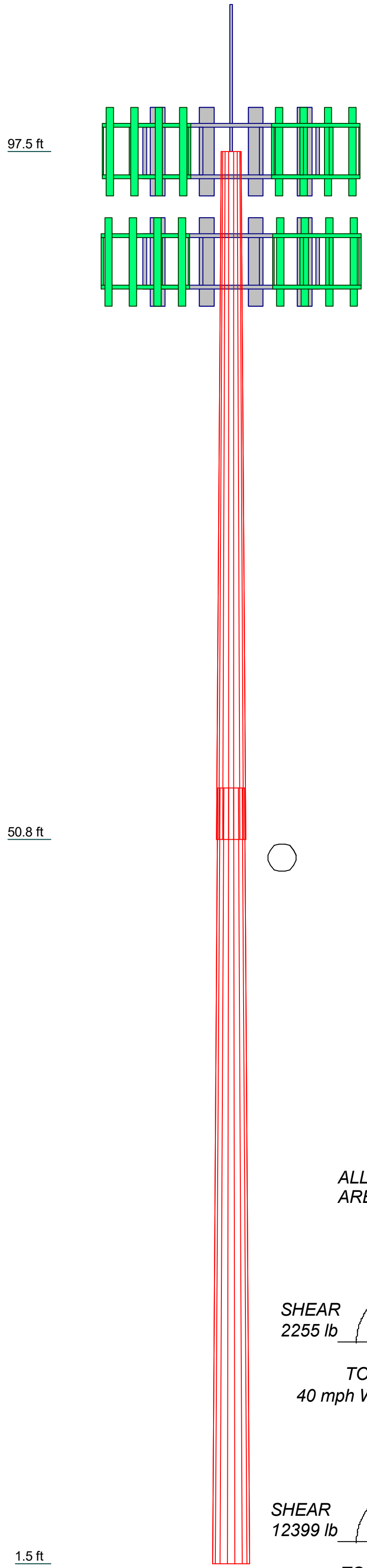
We appreciate the opportunity of providing our continuing professional services to you. If you have any questions or need further assistance, please call us anytime at 402-575-8885.

Sincerely,

Analysis by:	Reviewed by:
Ravi Siddharth Raja, EI Project Engineer	Nicholas J. Schmitt, P.E., S.E. Vice President

Attachment 1:
Calculations

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (lb)
1	46.71	18	0.1875	3.42	16.0000	23.0500	A572-65	1920.6
2	52.71	18	0.2500		22.1588	30.0000		3859.9
								5780.6



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lighting Rod 5/8" x 7'	97.5	MX08FRO665-20_V0F (Dish Wireless)	90
(2) APX15PV-15PVL (T-Mobile)	97.5	MX08FRO665-20_V0F (Dish Wireless)	90
(2) APX15PV-15PVL (T-Mobile)	97.5	MX08FRO665-20_V0F (Dish Wireless)	90
(2) APX15PV-15PVL (T-Mobile)	97.5	TA08025-B604 (Dish Wireless)	90
Platfrom Mount (T-Mobile)	97.5	TA08025-B604 (Dish Wireless)	90
T-Mobile 1/3 of Remainder Reserved (T-Mobile)	97.5	TA08025-B604 (Dish Wireless)	90
		MX08FRO665-20_V0F (Dish Wireless)	90
T-Mobile 1/3 of Remainder Reserved (T-Mobile)	97.5	MX08FRO665-20_V0F (Dish Wireless)	90
		MX08FRO665-20_V0F (Dish Wireless)	90
T-Mobile 1/3 of Remainder Reserved (T-Mobile)	97.5	TA08025-B605 (Dish Wireless)	90
		TA08025-B605 (Dish Wireless)	90
TA08025-B605 (Dish Wireless)	90	TA08025-B605 (Dish Wireless)	90
TA08025-B605 (Dish Wireless)	90	Dish 1/3 of Remainder Reserved (Dish Wireless)	90
TA08025-B605 (Dish Wireless)	90		
Platform Mount (Dish Wireless)	90	Dish 1/3 of Remainder Reserved (Dish Wireless)	90
RDIDC-9181-PF-48 (Dish Wireless)	90		
TA08025-B604 (Dish Wireless)	90	Dish 1/3 of Remainder Reserved (Dish Wireless)	90
TA08025-B604 (Dish Wireless)	90		
TA08025-B604 (Dish Wireless)	90		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Montgomery County, Maryland.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 113 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 40 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 98.7%

ALL REACTIONS ARE FACTORED

AXIAL 33346 lb

SHEAR 2255 lb

MOMENT 210969 lb-ft

TORQUE 46 lb-ft
40 mph WIND - 1.0000 in ICE

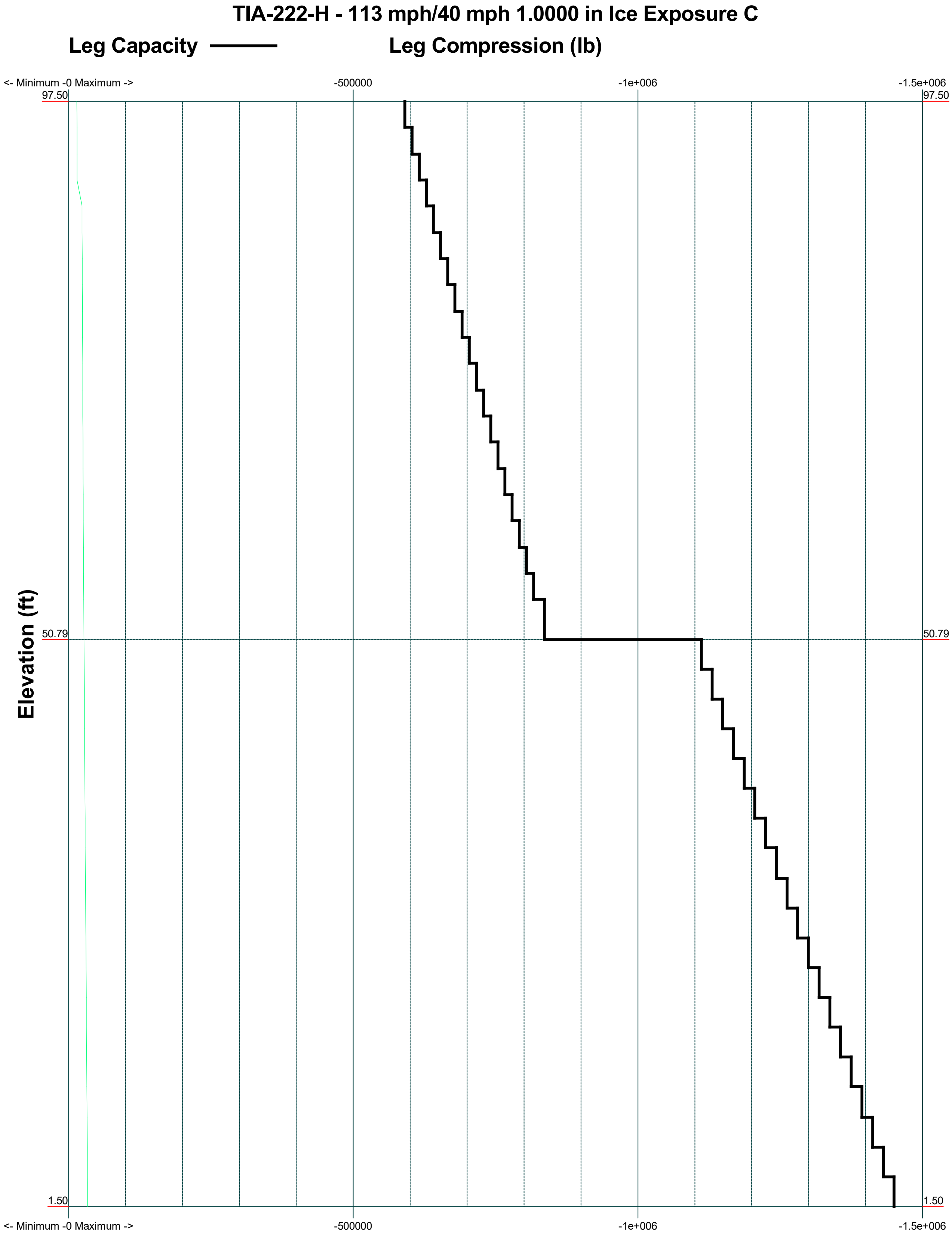
AXIAL 16718 lb

SHEAR 12399 lb

MOMENT 1031732 lb-ft

TORQUE 120 lb-ft
REACTIONS - 113 mph WIND

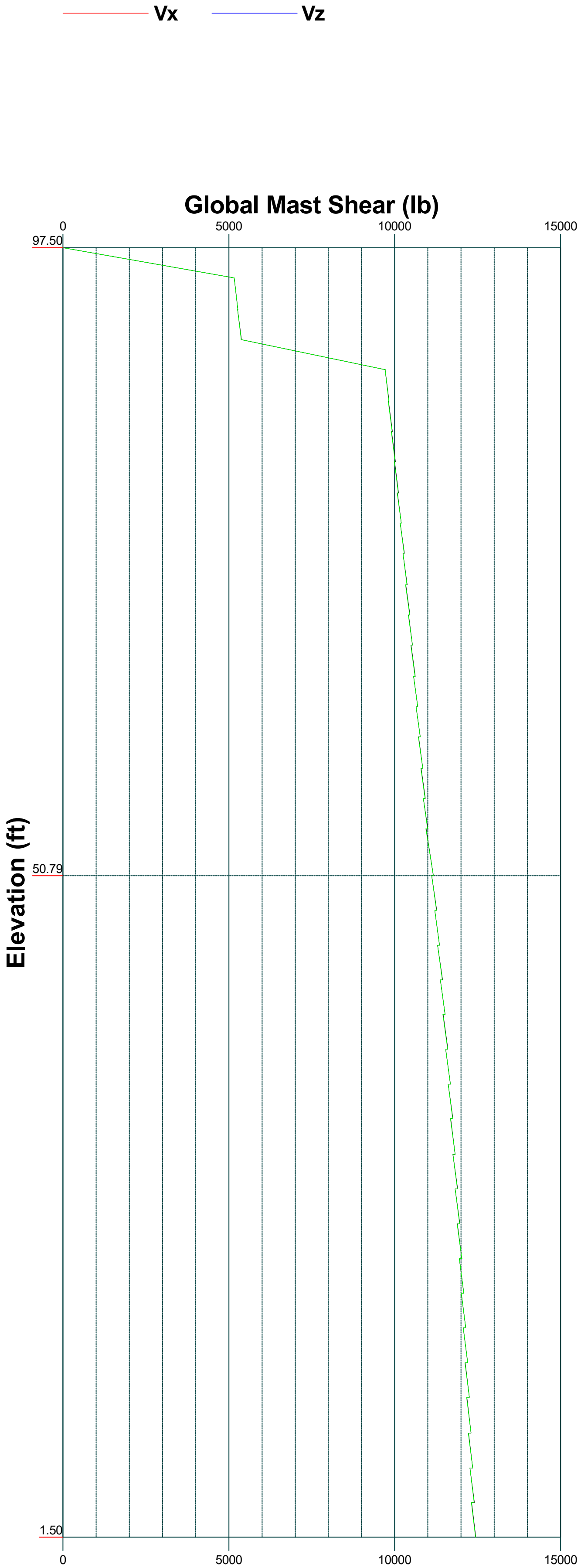
SGS Towers Chapell Hill, NC Phone: engineering@sgstowers.com FAX:	Job: ***SGS# 2101548***			
	Project: ***BOE - Richard D Riddle School (US-MD-5072)***			
	Client: Vertical Bridge	Drawn by: Ravi Siddharth Raja	App'd:	
	Code: TIA-222-H	Date: 02/23/21	Scale: NTS	
	Path: C:\Users\Ravi Raja\Downloads\2101548 - BOE - Richard D Riddle School\Tnx\SGS_2101548_VB Site_US-MD-5072_02-18-2021.eri		Dwg No. E-1	

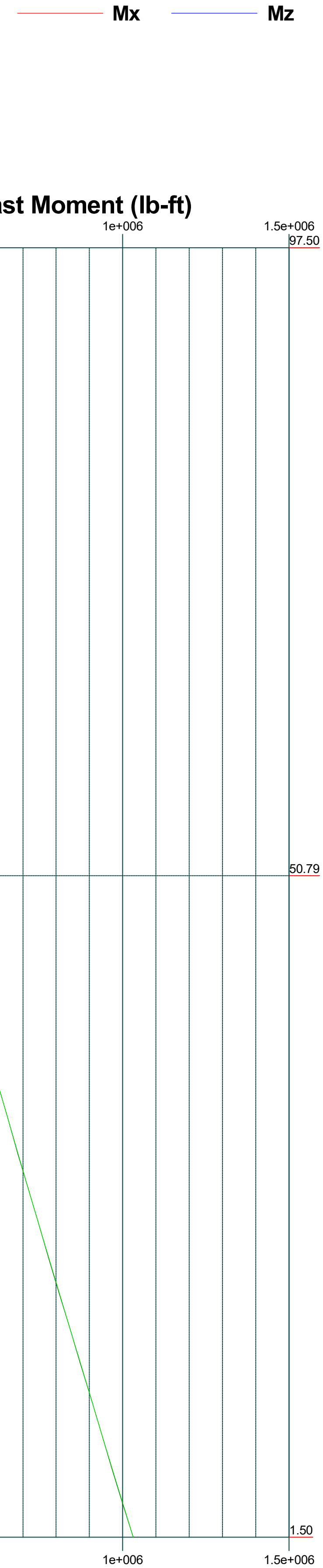


SGS Towers	Job: SGS# 2101548		
Chapell Hill, NC	Project: BOE - Richard D Riddle School (US-MD-5072)		
	Client: Vertical Bridge	Drawn by: Ravi Siddharth Raja	App'd:
Phone: engineering@sgstowers.com	Code: TIA-222-H	Date: 02/23/21	Scale: NTS
FAX:	Path: C:\Users\Ravi Raja\Downloads\2101548 - BOE - Richard D Riddle School\Tnx\SGS_2101548_VB Site_US-MD-5072_02-18-2021.eri		Dwg No. E-3

TIA-222-H - 113 mph/40 mph 1.0000 in Ice Exposure C

Maximum Values

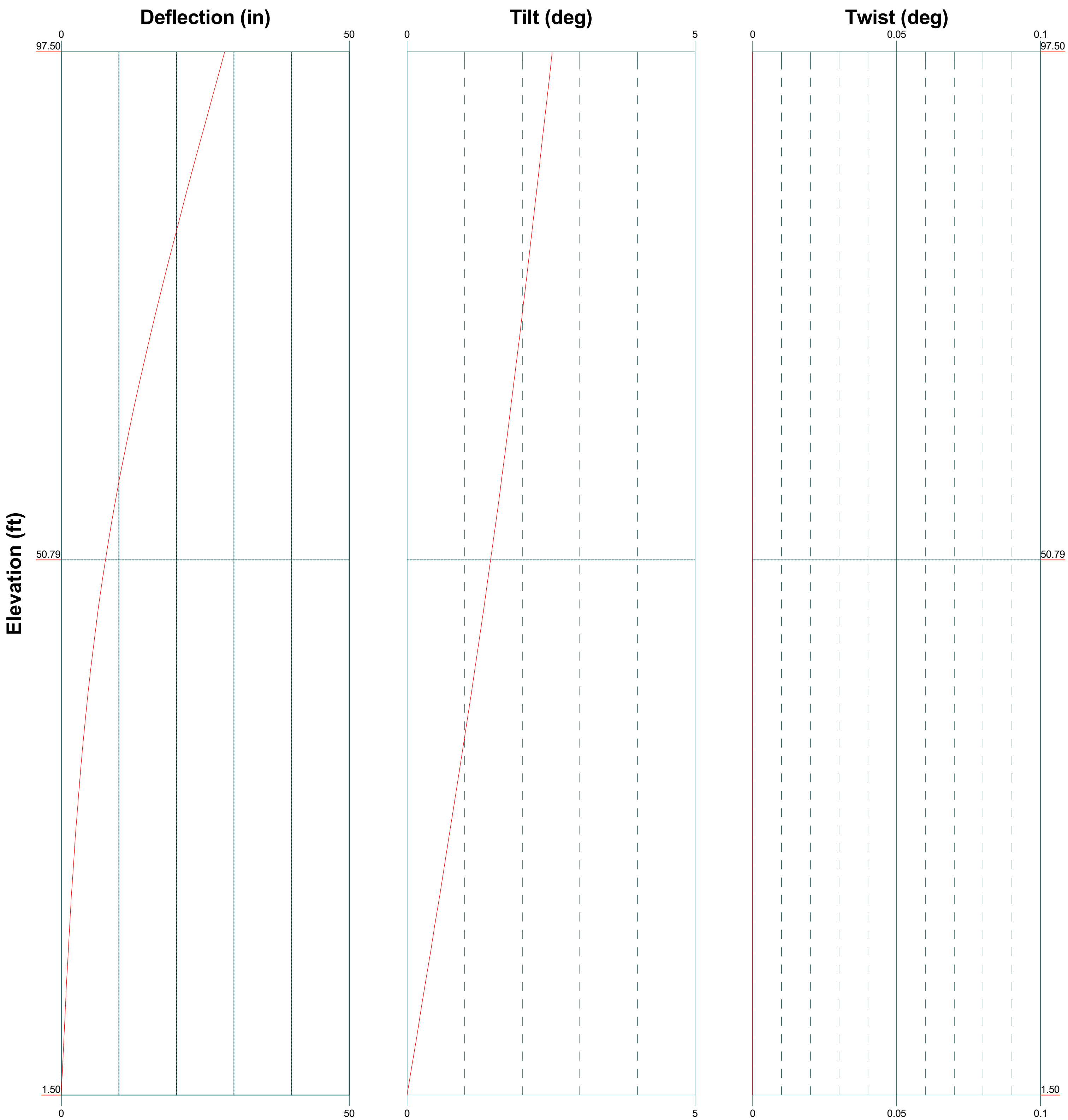




SGS Towers Chapell Hill, NC Phone: engineering@sgstowers.com FAX:	Job: ***SGS# 2101548***		
	Project: ***BOE - Richard D Riddle School (US-MD-5072)***		
	Client: Vertical Bridge	Drawn by: Ravi Siddharth Raja	App'd:
	Code: TIA-222-H	Date: 02/23/21	Scale: NTS
	Path: C:\Users\Ravi Raja\Downloads\2101548 - BOE - Richard D Riddle School\Tnx\SGS 2101548 VB Site US-MD-5072 02-18-2021.eri		Dwg No. E-4

TIA-222-H - Service - 60 mph

Maximum Values



SGS Towers	Job: ***SGS# 2101548***		
Chapell Hill, NC	Project: ***BOE - Richard D Riddle School (US-MD-5072)***		
Phone: engineering@sgstowers.com	Client: Vertical Bridge	Drawn by: Ravi Siddharth Raja	App'd:
FAX:	Code: TIA-222-H	Date: 02/23/21	Scale: NTS
	Path: C:\Users\Ravi Raja\Downloads\2101548 - BOE - Richard D Riddle School\Tnx\SGS_2101548_VB Site_US-MD-5072_02-18-2021.er		Dwg No. E-5

Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

- Tower is located in Montgomery County, Maryland.
- Tower base elevation above sea level: 371.97 ft.
- Basic wind speed of 113 mph.
- Risk Category II.
- Exposure Category C.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height: 0.00 ft.
- Nominal ice thickness of 1.0000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 40 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole design is 1.05.
- Tower analysis based on target reliabilities in accordance with Annex S.
- Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Horizontals	Assume Legs Pinned	Calculate Redundant Bracing Forces
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Ignore Redundant Members in FEA
Use Moment Magnification	√ Use Clear Spans For Wind Area	SR Leg Bolts Resist Compression
Use Code Stress Ratios	Use Clear Spans For KL/r	All Leg Panels Have Same Allowable
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	Offset Girt At Foundation
Escalate Ice	√ Bypass Mast Stability Checks	√ Consider Feed Line Torque
Always Use Max Kz	√ Use Azimuth Dish Coefficients	Include Angle Block Shear Check
Use Special Wind Profile	√ Project Wind Area of Appurt.	Use TIA-222-H Bracing Resist. Exemption
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Use TIA-222-H Tension Splice Exemption
Leg Bolts Are At Top Of Section	Add IBC .6D+W Combination	**Poles**
√ Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	Include Shear-Torsion Interaction
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Always Use Sub-Critical Flow
SR Members Have Cut Ends	Treat Feed Line Bundles As Cylinder	Use Top Mounted Sockets
SR Members Are Concentric	Ignore KL/ry For 60 Deg. Angle Legs	Pole Without Linear Attachments
		Pole With Shroud Or No Appurtenances
		Outside and Inside Corner Radii Are Known

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	97.50-50.79	46.71	3.42	18	16.0000	23.0500	0.1875	0.7500	A572-65 (65 ksi)
L2	50.79-1.50	52.71		18	22.1588	30.0000	0.2500	1.0000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	16.2179	9.4104	297.2674	5.6134	8.1280	36.5733	594.9259	4.7061	2.4860	13.259
	23.3767	13.6060	898.4973	8.1162	11.7094	76.7330	1798.1770	6.8043	3.7268	19.876
L2	22.9787	17.3846	1054.2438	7.7776	11.2567	93.6550	2109.8748	8.6940	3.4600	13.84
	30.4242	23.6066	2639.6436	10.5612	15.2400	173.2050	5282.7605	11.8056	4.8400	19.36

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 97.50-50.79				1	1	1.05			
L2 50.79-1.50				1	1	1.05			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
Safety Line 3/8	A	No	Surface Ar (CaAa)	97.50 - 1.50	1	1	0.000 0.000	0.3750		0.22
***										
Step Bolts	A	No	Surface Ar (CaAa)	97.50 - 1.50	1	1	0.000 0.000	0.6250		0.51
***										
***										
1.6" (Dish Wireless)	C	No	Surface Ar (CaAa)	90.00 - 3.00	1	1	0.000 0.000	1.6000		1.35
***										

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
***									
***									
7/8" Coax	C	No	No	Inside Pole	97.50 - 3.00	1	No Ice	0.00	1.54

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
(T-Mobile)							1/2" Ice	0.00	1.54
							1" Ice	0.00	1.54
***									
1-1/4" Coax	C	No	No	Inside Pole	97.50 - 3.00	1	No Ice	0.00	0.50
(T-Mobile)							1/2" Ice	0.00	0.50
							1" Ice	0.00	0.50
***									
1-5/8" Coax	C	No	No	Inside Pole	97.50 - 3.00	1	No Ice	0.00	0.82
(T-Mobile)							1/2" Ice	0.00	0.82
							1" Ice	0.00	0.82
***									

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	97.50-50.79	A	0.000	0.000	4.671	0.000	34.19
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	6.274	0.000	186.52
L2	50.79-1.50	A	0.000	0.000	4.929	0.000	36.08
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	7.646	0.000	201.20

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	97.50-50.79	A	0.920	0.000	0.000	21.868	0.000	183.40
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	13.491	0.000	297.65
L2	50.79-1.50	A	0.831	0.000	0.000	23.076	0.000	193.53
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	16.444	0.000	336.64

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	97.50-50.79	-0.6037	0.6640	-1.3903	0.2698
L2	50.79-1.50	-0.6189	0.7909	-1.4956	0.4122

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Shielding Factor Ka

Tower Section	*Feed Line Record No.*	*Description*	*Feed Line Segment Elev.*	K_a *No Ice*	K_a *Ice*
L1	1	Safety Line 3/8	50.79 - 97.50	1.0000	1.0000
L1	3	Step Bolts	50.79 - 97.50	1.0000	1.0000
L1	6	1.6"	50.79 - 90.00	1.0000	1.0000
L2	1	Safety Line 3/8	1.50 - 50.79	1.0000	1.0000
L2	3	Step Bolts	1.50 - 50.79	1.0000	1.0000
L2	6	1.6"	3.00 - 50.79	1.0000	1.0000

Discrete Tower Loads

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		C_AA_A *Front* ft²	C_AA_A *Side* ft²	*Weight* lb
****									
Lighting Rod 5/8" x 7'	A	From Leg	3.00	0.0000	97.50	No Ice	0.53	0.53	30.00
			0.00			1/2" Ice	1.24	1.24	35.42
			5.00			1" Ice	1.97	1.97	45.35
***									
RDIDC-9181-PF-48	A	From Leg	0.00	0.0000	90.00	No Ice	0.93	1.07	21.85
(Dish Wireless)			0.00			1/2" Ice	1.06	1.20	38.15
			0.00			1" Ice	1.19	1.35	57.11
***									
TA08025-B604	A	From Leg	2.50	0.0000	90.00	No Ice	1.96	1.03	63.93
(Dish Wireless)			0.00			1/2" Ice	2.14	1.17	80.68
			0.00			1" Ice	2.32	1.31	100.13
***									
TA08025-B604	B	From Leg	2.50	0.0000	90.00	No Ice	1.96	1.03	63.93
(Dish Wireless)			0.00			1/2" Ice	2.14	1.17	80.68
			0.00			1" Ice	2.32	1.31	100.13
***									
TA08025-B604	C	From Leg	2.50	0.0000	90.00	No Ice	1.96	1.03	63.93
(Dish Wireless)			0.00			1/2" Ice	2.14	1.17	80.68
			0.00			1" Ice	2.32	1.31	100.13
***									
MX08FRO665-20_V0F	A	From Leg	3.00	0.0000	90.00	No Ice	12.49	5.87	54.00
(Dish Wireless)			0.00			1/2" Ice	12.99	6.32	127.79
			0.00			1" Ice	13.49	6.79	208.26
***									
MX08FRO665-20_V0F	B	From Leg	3.00	0.0000	90.00	No Ice	12.49	5.87	54.00
(Dish Wireless)			0.00			1/2" Ice	12.99	6.32	127.79
			0.00			1" Ice	13.49	6.79	208.26
***									
MX08FRO665-20_V0F	C	From Leg	3.00	0.0000	90.00	No Ice	12.49	5.87	54.00
(Dish Wireless)			0.00			1/2" Ice	12.99	6.32	127.79

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00			1" Ice	13.49	6.79	208.26
***									
TA08025-B605 (Dish Wireless)	A	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.96 2.14 2.32	1.19 1.33 1.48	74.95 92.92 113.67
***									
TA08025-B605 (Dish Wireless)	B	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.96 2.14 2.32	1.19 1.33 1.48	74.95 92.92 113.67
***									
TA08025-B605 (Dish Wireless)	C	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.96 2.14 2.32	1.19 1.33 1.48	74.95 92.92 113.67
***									
Platform Mount (Dish Wireless)	A	None		0.0000	90.00	No Ice 1/2" Ice 1" Ice	27.78 30.50 31.00	27.78 30.50 31.00	1400.00 2800.00 4200.00
***									
***									
(2) APX15PV-15PVL (T-Mobile)	A	From Leg	3.00 0.00 0.00	0.0000	97.50	No Ice 1/2" Ice 1" Ice	6.11 6.47 6.84	2.03 2.35 2.69	39.86 71.29 107.43
***									
(2) APX15PV-15PVL (T-Mobile)	B	From Leg	3.00 0.00 0.00	0.0000	97.50	No Ice 1/2" Ice 1" Ice	6.11 6.47 6.84	2.03 2.35 2.69	39.86 71.29 107.43
***									
(2) APX15PV-15PVL (T-Mobile)	C	From Leg	3.00 0.00 0.00	0.0000	97.50	No Ice 1/2" Ice 1" Ice	6.11 6.47 6.84	2.03 2.35 2.69	39.86 71.29 107.43
***									
Platfrom Mount (T-Mobile)	A	None		0.0000	97.50	No Ice 1/2" Ice 1" Ice	30.00 30.50 31.00	30.00 30.50 31.00	1425.00 2850.00 4275.00
***									
T-Mobile Reserved Loading									
T-Mobile 1/3 of Remainder Reserved (T-Mobile)	A	From Leg	0.00 0.00 0.00	0.0000	97.50	No Ice 1/2" Ice 1" Ice	30.00 40.00 50.00	15.00 20.00 25.00	1000.00 2000.00 3000.00
***									
T-Mobile 1/3 of Remainder Reserved (T-Mobile)	B	From Leg	0.00 0.00 0.00	0.0000	97.50	No Ice 1/2" Ice 1" Ice	30.00 40.00 50.00	15.00 20.00 25.00	1000.00 2000.00 3000.00
***									
T-Mobile 1/3 of Remainder Reserved (T-Mobile)	C	From Leg	0.00 0.00 0.00	0.0000	97.50	No Ice 1/2" Ice 1" Ice	30.00 40.00 50.00	15.00 20.00 25.00	1000.00 2000.00 3000.00
***									
***									
TA08025-B604 (Dish Wireless)	A	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.96 2.14 2.32	1.03 1.17 1.31	63.93 80.68 100.13
***									
TA08025-B604 (Dish Wireless)	B	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.96 2.14 2.32	1.03 1.17 1.31	63.93 80.68 100.13

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
***									
TA08025-B604 (Dish Wireless)	C	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.96 2.14 2.32	1.03 1.17 1.31	63.93 80.68 100.13
***									
MX08FRO665-20_V0F (Dish Wireless)	A	From Leg	3.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	12.49 12.99 13.49	5.87 6.32 6.79	54.00 127.79 208.26
***									
MX08FRO665-20_V0F (Dish Wireless)	B	From Leg	3.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	12.49 12.99 13.49	5.87 6.32 6.79	54.00 127.79 208.26
***									
MX08FRO665-20_V0F (Dish Wireless)	C	From Leg	3.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	12.49 12.99 13.49	5.87 6.32 6.79	54.00 127.79 208.26
***									
TA08025-B605 (Dish Wireless)	A	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.96 2.14 2.32	1.19 1.33 1.48	74.95 92.92 113.67
***									
TA08025-B605 (Dish Wireless)	B	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.96 2.14 2.32	1.19 1.33 1.48	74.95 92.92 113.67
***									
TA08025-B605 (Dish Wireless)	C	From Leg	2.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	1.96 2.14 2.32	1.19 1.33 1.48	74.95 92.92 113.67
***									
****Dish Reserved Loading***									
Dish 1/3 of Remainder Reserved (Dish Wireless)	A	From Leg	0.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	6.40 7.00 7.60	3.20 3.80 4.40	140.00 280.00 420.00
***									
Dish 1/3 of Remainder Reserved (Dish Wireless)	B	From Leg	0.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	6.40 7.00 7.60	3.20 3.80 4.40	140.00 280.00 420.00
***									
Dish 1/3 of Remainder Reserved (Dish Wireless)	C	From Leg	0.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 1" Ice	6.40 7.00 7.60	3.20 3.80 4.40	140.00 280.00 420.00

Tower Pressures - No Ice

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 97.50-50.79	73.13	1.185	34	77.061	A	0.000	77.061	77.061	100.00	4.671	0.000
					B	0.000	77.061		100.00	0.000	0.000
					C	0.000	77.061		100.00	6.274	0.000
L2 50.79-1.50	26.20	0.955	27	109.676	A	0.000	109.676	109.676	100.00	4.929	0.000
					B	0.000	109.676		100.00	0.000	0.000
					C	0.000	109.676		100.00	7.646	0.000

Tower Pressure - With Ice

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 97.50-50.79	73.13	1.185	4	0.9204	84.226	A	0.000	84.226	84.226	100.00	21.868	0.000
						B	0.000	84.226		100.00	0.000	0.000
						C	0.000	84.226		100.00	13.491	0.000
L2 50.79-1.50	26.20	0.955	3	0.8306	117.237	A	0.000	117.237	117.237	100.00	23.076	0.000
						B	0.000	117.237		100.00	0.000	0.000
						C	0.000	117.237		100.00	16.444	0.000

Tower Pressure - Service

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 97.50-50.79	73.13	1.185	9	77.061	A	0.000	77.061	77.061	100.00	4.671	0.000
					B	0.000	77.061		100.00	0.000	0.000
					C	0.000	77.061		100.00	6.274	0.000
L2 50.79-1.50	26.20	0.955	7	109.676	A	0.000	109.676	109.676	100.00	4.929	0.000
					B	0.000	109.676		100.00	0.000	0.000
					C	0.000	109.676		100.00	7.646	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 97.50-50.79	220.72	1920.63	A	1	0.73	34	1	1	77.061	2127.44	45.55	C
			B	1	0.73		1	1	77.061			
			C	1	0.73		1	1	77.061			
L2 50.79-1.50	237.28	3859.93	A	1	0.73	27	1	1	109.676	2397.60	48.64	C
			B	1	0.73		1	1	109.676			
			C	1	0.73		1	1	109.676			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
Sum Weight:	457.99	5780.55						OTM	211597.60 lb-ft	4525.04		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 97.50-50.79	220.72	1920.63	A	1	0.73	34	1	1	77.061	2127.44	45.55	C
			B	1	0.73		1	1	77.061			
			C	1	0.73		1	1	77.061			
L2 50.79-1.50	237.28	3859.93	A	1	0.73	27	1	1	109.676	2397.60	48.64	C
			B	1	0.73		1	1	109.676			
			C	1	0.73		1	1	109.676			
Sum Weight:	457.99	5780.55						OTM	211597.60 lb-ft	4525.04		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 97.50-50.79	220.72	1920.63	A	1	0.73	34	1	1	77.061	2127.44	45.55	C
			B	1	0.73		1	1	77.061			
			C	1	0.73		1	1	77.061			
L2 50.79-1.50	237.28	3859.93	A	1	0.73	27	1	1	109.676	2397.60	48.64	C
			B	1	0.73		1	1	109.676			
			C	1	0.73		1	1	109.676			
Sum Weight:	457.99	5780.55						OTM	211597.60 lb-ft	4525.04		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 97.50-50.79	481.05	3005.58	A	1	1.2	4	1	1	84.226	478.95	10.25	C
			B	1	1.2		1	1	84.226			
			C	1	1.2		1	1	84.226			
L2 50.79-1.50	530.17	5232.67	A	1	1.2	3	1	1	116.500	524.58	10.64	C
			B	1	1.2		1	1	116.500			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
			C	1	1.2		1	1	116.500			
Sum Weight:	1011.22	8238.25						OTM	47261.79 lb-ft	1003.53		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 97.50-50.79	481.05	3005.58	A	1	1.2	4	1	1	84.226	478.95	10.25	C
			B	1	1.2		1	1	84.226			
			C	1	1.2		1	1	84.226			
L2 50.79-1.50	530.17	5232.67	A	1	1.2	3	1	1	116.500	524.58	10.64	C
			B	1	1.2		1	1	116.500			
			C	1	1.2		1	1	116.500			
Sum Weight:	1011.22	8238.25						OTM	47261.79 lb-ft	1003.53		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 97.50-50.79	481.05	3005.58	A	1	1.2	4	1	1	84.226	478.95	10.25	C
			B	1	1.2		1	1	84.226			
			C	1	1.2		1	1	84.226			
L2 50.79-1.50	530.17	5232.67	A	1	1.2	3	1	1	116.500	524.58	10.64	C
			B	1	1.2		1	1	116.500			
			C	1	1.2		1	1	116.500			
Sum Weight:	1011.22	8238.25						OTM	47261.79 lb-ft	1003.53		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 97.50-50.79	220.72	1920.63	A	1	0.73	9	1	1	77.061	564.90	12.09	C
			B	1	0.73		1	1	77.061			
			C	1	0.73		1	1	77.061			
L2 50.79-1.50	237.28	3859.93	A	1	0.73	7	1	1	109.676	636.64	12.92	C

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
			B	1	0.73		1	1	109.676			
			C	1	0.73		1	1	109.676			
Sum Weight:	457.99	5780.55						OTM	56185.99 lb-ft	1201.54		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 97.50-50.79	220.72	1920.63	A	1	0.73	9	1	1	77.061	564.90	12.09	C
			B	1	0.73		1	1	77.061			
			C	1	0.73		1	1	77.061			
L2 50.79-1.50	237.28	3859.93	A	1	0.73	7	1	1	109.676	636.64	12.92	C
			B	1	0.73		1	1	109.676			
			C	1	0.73		1	1	109.676			
Sum Weight:	457.99	5780.55						OTM	56185.99 lb-ft	1201.54		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 97.50-50.79	220.72	1920.63	A	1	0.73	9	1	1	77.061	564.90	12.09	C
			B	1	0.73		1	1	77.061			
			C	1	0.73		1	1	77.061			
L2 50.79-1.50	237.28	3859.93	A	1	0.73	7	1	1	109.676	636.64	12.92	C
			B	1	0.73		1	1	109.676			
			C	1	0.73		1	1	109.676			
Sum Weight:	457.99	5780.55						OTM	56185.99 lb-ft	1201.54		

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	5780.55					
Bracing Weight	0.00					
Total Member Self-Weight	5780.55			-37.47	59.77	

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Total Weight	13931.84			-37.47	59.77	
Wind 0 deg - No Ice		0.00	-12394.63	-939487.16	59.77	0.00
Wind 30 deg - No Ice		6199.43	-10734.06	-813624.77	-469852.15	-51.28
Wind 60 deg - No Ice		10737.72	-6197.31	-469762.32	-813851.56	-88.82
Wind 90 deg - No Ice		12398.85	0.00	-37.47	-939764.08	-102.56
Wind 120 deg - No Ice		10737.72	6197.31	469687.37	-813851.56	-88.82
Wind 150 deg - No Ice		6199.43	10734.06	813549.82	-469852.15	-51.28
Wind 180 deg - No Ice		0.00	12394.63	939412.21	59.77	0.00
Wind 210 deg - No Ice		-6199.43	10734.06	813549.82	469971.69	51.28
Wind 240 deg - No Ice		-10737.72	6197.31	469687.37	813971.09	88.82
Wind 270 deg - No Ice		-12398.85	0.00	-37.47	939883.61	102.56
Wind 300 deg - No Ice		-10737.72	-6197.31	-469762.32	813971.09	88.82
Wind 330 deg - No Ice		-6199.43	-10734.06	-813624.77	469971.69	51.28
Member Ice	2457.69					
Total Weight Ice	30464.17			-6.70	320.17	
Wind 0 deg - Ice		0.00	-2253.92	-163408.26	320.17	0.00
Wind 30 deg - Ice		1127.27	-1951.95	-141516.60	-81407.73	-19.67
Wind 60 deg - Ice		1952.49	-1126.96	-81707.48	-141236.70	-34.07
Wind 90 deg - Ice		2254.54	0.00	-6.70	-163135.63	-39.35
Wind 120 deg - Ice		1952.49	1126.96	81694.09	-141236.70	-34.07
Wind 150 deg - Ice		1127.27	1951.95	141503.21	-81407.73	-19.67
Wind 180 deg - Ice		0.00	2253.92	163394.87	320.17	0.00
Wind 210 deg - Ice		-1127.27	1951.95	141503.21	82048.06	19.67
Wind 240 deg - Ice		-1952.49	1126.96	81694.09	141877.04	34.07
Wind 270 deg - Ice		-2254.54	0.00	-6.70	163775.96	39.35
Wind 300 deg - Ice		-1952.49	-1126.96	-81707.48	141877.04	34.07
Wind 330 deg - Ice		-1127.27	-1951.95	-141516.60	82048.06	19.67
Total Weight	13931.84			-37.47	59.77	
Wind 0 deg - Service		0.00	-3291.17	-249579.82	0.00	0.00
Wind 30 deg - Service		1646.15	-2850.24	-216159.29	-124776.79	-13.62
Wind 60 deg - Service		2851.21	-1645.59	-124852.71	-216119.73	-23.58
Wind 90 deg - Service		3292.30	0.00	-125.60	-249553.57	-27.23
Wind 120 deg - Service		2851.21	1645.59	124601.51	-216119.73	-23.58
Wind 150 deg - Service		1646.15	2850.24	215908.09	-124776.79	-13.62
Wind 180 deg - Service		0.00	3291.17	249328.62	0.00	0.00
Wind 210 deg - Service		-1646.15	2850.24	215908.09	124776.79	13.62
Wind 240 deg - Service		-2851.21	1645.59	124601.51	216119.73	23.58
Wind 270 deg - Service		-3292.30	0.00	-125.60	249553.57	27.23
Wind 300 deg - Service		-2851.21	-1645.59	-124852.71	216119.73	23.58
Wind 330 deg - Service		-1646.15	-2850.24	-216159.29	124776.79	13.62

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice

Comb. No.	Description
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L1	97.5 - 50.79	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-26353.11	133.40	163.46
			Max. Mx	20	-10483.11	409666.71	122.53
			Max. My	2	-10483.94	31.98	409591.46
			Max. Vy	20	-10994.49	409666.71	122.53
			Max. Vx	2	-10989.92	31.98	409591.46
			Max. Torque	20			-122.49
L2	50.79 - 1.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-33345.79	337.99	23.26
			Max. Mx	20	-16686.66	1031731.55	59.90
			Max. My	2	-16686.68	78.95	1031308.50
			Max. Vy	20	-12441.28	1031731.55	59.90
			Max. Vx	2	-12437.04	78.95	1031308.50
			Max. Torque	20			-120.95

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	36	33345.79	2254.74	0.00
	Max. H_x	20	16718.21	12398.86	0.00
	Max. H_z	2	16718.21	0.00	12394.63
	Max. M_x	2	1031308.50	0.00	12394.63
	Max. M_z	8	1031575.43	-12398.86	0.00
	Max. Torsion	8	119.76	-12398.86	0.00
	Min. Vert	25	12538.65	6199.43	10734.06
	Min. H_x	8	16718.21	-12398.86	0.00
	Min. H_z	14	16718.21	0.00	-12394.63
	Min. M_x	14	-1031183.63	0.00	-12394.63
	Min. M_z	20	-1031731.55	12398.86	0.00
	Min. Torsion	20	-119.76	12398.86	0.00

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	13931.84	0.00	0.00	-37.47	59.77	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	16718.21	-0.00	-12394.63	-1031308.50	78.95	-0.01
0.9 Dead+1.0 Wind 0 deg - No Ice	12538.65	-0.00	-12394.63	-1005100.56	57.66	-0.01
1.2 Dead+1.0 Wind 30 deg - No Ice	16718.20	6199.43	-10734.06	-893158.95	-515758.14	-59.90
0.9 Dead+1.0 Wind 30 deg - No Ice	12538.65	6199.43	-10734.06	-870449.61	-502673.60	-57.10
1.2 Dead+1.0 Wind 60 deg - No Ice	16718.20	10737.72	-6197.31	-515689.39	-893374.49	-103.77
0.9 Dead+1.0 Wind 60 deg - No Ice	12538.65	10737.72	-6197.31	-502570.48	-870696.19	-98.99
1.2 Dead+1.0 Wind 90 deg - No Ice	16718.21	12398.86	-0.00	-59.81	-1031575.43	-119.76
0.9 Dead+1.0 Wind 90 deg - No Ice	12538.65	12398.85	-0.00	-41.08	-1005397.75	-114.21
1.2 Dead+1.0 Wind 120 deg - No Ice	16718.20	10737.72	6197.31	515568.48	-893372.20	-103.64
0.9 Dead+1.0 Wind 120 deg - No Ice	12538.65	10737.72	6197.31	502487.43	-870694.63	-98.82
1.2 Dead+1.0 Wind 150 deg - No Ice	16718.20	6199.43	10734.06	893035.39	-515755.85	-59.85
0.9 Dead+1.0 Wind 150 deg - No Ice	12538.65	6199.43	10734.06	870364.76	-502672.04	-57.10
1.2 Dead+1.0 Wind 180 deg - No Ice	16718.21	-0.00	12394.63	1031183.63	78.95	0.01
0.9 Dead+1.0 Wind 180 deg - No Ice	12538.65	-0.00	12394.63	1005014.80	57.66	0.01

Load Combination	*Vertical* *lb*	*Shear$_x$* *lb*	*Shear$_z$* *lb*	*Overturning Moment, M_x* *lb-ft*	*Overturning Moment, M_z* *lb-ft*	*Torque* *lb-ft*
1.2 Dead+1.0 Wind 210 deg - No Ice	16718.20	-6199.43	10734.06	893034.63	515913.30	59.87
0.9 Dead+1.0 Wind 210 deg - No Ice	12538.65	-6199.43	10734.06	870364.25	502787.07	57.12
1.2 Dead+1.0 Wind 240 deg - No Ice	16718.20	-10737.72	6197.31	515567.72	893528.76	103.65
0.9 Dead+1.0 Wind 240 deg - No Ice	12538.65	-10737.72	6197.31	502486.92	870809.07	98.83
1.2 Dead+1.0 Wind 270 deg - No Ice	16718.21	-12398.86	-0.00	-59.81	1031731.55	119.76
0.9 Dead+1.0 Wind 270 deg - No Ice	12538.65	-12398.85	-0.00	-41.08	1005511.90	114.21
1.2 Dead+1.0 Wind 300 deg - No Ice	16718.20	-10737.72	-6197.31	-515688.62	893531.05	103.76
0.9 Dead+1.0 Wind 300 deg - No Ice	12538.65	-10737.72	-6197.31	-502569.97	870810.63	98.99
1.2 Dead+1.0 Wind 330 deg - No Ice	16718.20	-6199.43	-10734.06	-893158.18	515915.59	59.88
0.9 Dead+1.0 Wind 330 deg - No Ice	12538.65	-6199.43	-10734.06	-870449.10	502788.63	57.09
1.2 Dead+1.0 Ice+1.0 Temp	33345.79	-0.00	-0.00	-23.26	337.99	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	33345.79	-0.00	-2254.12	-210555.67	432.90	0.01
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	33345.79	1127.37	-1952.13	-182358.57	-104836.37	-22.81
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	33345.79	1952.66	-1127.06	-105322.21	-181898.19	-39.54
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	33345.79	2254.74	-0.00	-88.47	-210104.19	-45.64
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	33345.79	1952.66	1127.06	105144.73	-181897.26	-39.51
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	33345.79	1127.37	1952.13	182180.03	-104835.44	-22.82
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	33345.79	-0.00	2254.12	210376.60	432.90	0.02
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	33345.79	-1127.37	1952.13	182179.81	105701.10	22.85
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	33345.79	-1952.66	1127.06	105144.52	182762.66	39.54
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	33345.79	-2254.74	-0.00	-88.47	210969.46	45.67
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	33345.79	-1952.66	-1127.06	-105321.98	182763.59	39.56
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	33345.79	-1127.37	-1952.13	-182358.34	105702.03	22.83
Dead+Wind 0 deg - Service	13931.84	-0.00	-3291.17	-270479.09	64.95	-0.00
Dead+Wind 30 deg - Service	13931.84	1646.15	-2850.24	-234248.56	-135203.26	-15.92
Dead+Wind 60 deg - Service	13931.84	2851.21	-1645.59	-135264.89	-234226.36	-27.58
Dead+Wind 90 deg - Service	13931.84	3292.30	-0.00	-50.72	-270471.24	-31.84
Dead+Wind 120 deg - Service	13931.84	2851.21	1645.59	135163.37	-234226.23	-27.56
Dead+Wind 150 deg - Service	13931.84	1646.15	2850.24	234146.89	-135203.13	-15.92
Dead+Wind 180 deg - Service	13931.84	-0.00	3291.17	270377.34	64.95	0.00
Dead+Wind 210 deg - Service	13931.84	-1646.15	2850.24	234146.85	135333.01	15.92
Dead+Wind 240 deg - Service	13931.84	-2851.21	1645.59	135163.33	234356.06	27.57
Dead+Wind 270 deg - Service	13931.84	-3292.30	-0.00	-50.72	270601.04	31.84
Dead+Wind 300 deg - Service	13931.84	-2851.21	-1645.59	-135264.85	234356.19	27.58
Dead+Wind 330 deg - Service	13931.84	-1646.15	-2850.24	-234248.52	135333.14	15.92

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
1	0.00	-13931.84	0.00	0.00	13931.84	0.00	0.000%
2	0.00	-16718.20	-12394.63	0.00	16718.21	12394.63	0.000%
3	0.00	-12538.65	-12394.63	0.00	12538.65	12394.63	0.000%
4	6199.43	-16718.20	-10734.06	-6199.43	16718.20	10734.06	0.000%
5	6199.43	-12538.65	-10734.06	-6199.43	12538.65	10734.06	0.000%
6	10737.72	-16718.20	-6197.31	-10737.72	16718.20	6197.31	0.000%
7	10737.72	-12538.65	-6197.31	-10737.72	12538.65	6197.31	0.000%
8	12398.85	-16718.20	0.00	-12398.86	16718.21	0.00	0.000%
9	12398.85	-12538.65	0.00	-12398.85	12538.65	0.00	0.000%
10	10737.72	-16718.20	6197.31	-10737.72	16718.20	-6197.31	0.000%
11	10737.72	-12538.65	6197.31	-10737.72	12538.65	-6197.31	0.000%
12	6199.43	-16718.20	10734.06	-6199.43	16718.20	-10734.06	0.000%
13	6199.43	-12538.65	10734.06	-6199.43	12538.65	-10734.06	0.000%
14	0.00	-16718.20	12394.63	0.00	16718.21	-12394.63	0.000%
15	0.00	-12538.65	12394.63	0.00	12538.65	-12394.63	0.000%
16	-6199.43	-16718.20	10734.06	6199.43	16718.20	-10734.06	0.000%
17	-6199.43	-12538.65	10734.06	6199.43	12538.65	-10734.06	0.000%
18	-10737.72	-16718.20	6197.31	10737.72	16718.20	-6197.31	0.000%
19	-10737.72	-12538.65	6197.31	10737.72	12538.65	-6197.31	0.000%
20	-12398.85	-16718.20	0.00	12398.86	16718.21	0.00	0.000%
21	-12398.85	-12538.65	0.00	12398.85	12538.65	0.00	0.000%
22	-10737.72	-16718.20	-6197.31	10737.72	16718.20	6197.31	0.000%
23	-10737.72	-12538.65	-6197.31	10737.72	12538.65	6197.31	0.000%
24	-6199.43	-16718.20	-10734.06	6199.43	16718.20	10734.06	0.000%
25	-6199.43	-12538.65	-10734.06	6199.43	12538.65	10734.06	0.000%
26	0.00	-33345.79	0.00	0.00	33345.79	0.00	0.000%
27	0.00	-33345.79	-2253.92	0.00	33345.79	2254.12	0.001%
28	1127.27	-33345.79	-1951.95	-1127.37	33345.79	1952.13	0.001%
29	1952.49	-33345.79	-1126.96	-1952.66	33345.79	1127.06	0.001%
30	2254.54	-33345.79	0.00	-2254.74	33345.79	0.00	0.001%
31	1952.49	-33345.79	1126.96	-1952.66	33345.79	-1127.06	0.001%
32	1127.27	-33345.79	1951.95	-1127.37	33345.79	-1952.13	0.001%
33	0.00	-33345.79	2253.92	0.00	33345.79	-2254.12	0.001%
34	-1127.27	-33345.79	1951.95	1127.37	33345.79	-1952.13	0.001%
35	-1952.49	-33345.79	1126.96	1952.66	33345.79	-1127.06	0.001%
36	-2254.54	-33345.79	0.00	2254.74	33345.79	0.00	0.001%
37	-1952.49	-33345.79	-1126.96	1952.66	33345.79	1127.06	0.001%
38	-1127.27	-33345.79	-1951.95	1127.37	33345.79	1952.13	0.001%
39	0.00	-13931.84	-3291.17	0.00	13931.84	3291.17	0.000%
40	1646.15	-13931.84	-2850.24	-1646.15	13931.84	2850.24	0.000%
41	2851.21	-13931.84	-1645.59	-2851.21	13931.84	1645.59	0.000%
42	3292.30	-13931.84	0.00	-3292.30	13931.84	0.00	0.000%
43	2851.21	-13931.84	1645.59	-2851.21	13931.84	-1645.59	0.000%
44	1646.15	-13931.84	2850.24	-1646.15	13931.84	-2850.24	0.000%
45	0.00	-13931.84	3291.17	0.00	13931.84	-3291.17	0.000%
46	-1646.15	-13931.84	2850.24	1646.15	13931.84	-2850.24	0.000%
47	-2851.21	-13931.84	1645.59	2851.21	13931.84	-1645.59	0.000%
48	-3292.30	-13931.84	0.00	3292.30	13931.84	0.00	0.000%
49	-2851.21	-13931.84	-1645.59	2851.21	13931.84	1645.59	0.000%
50	-1646.15	-13931.84	-2850.24	1646.15	13931.84	2850.24	0.000%

Non-Linear Convergence Results

Load Combination	*Converged?*	*Number of Cycles*	*Displacement Tolerance*	*Force Tolerance*
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00024884
3	Yes	5	0.00000001	0.00002553
4	Yes	7	0.00000001	0.00018304
5	Yes	6	0.00000001	0.00051416
6	Yes	7	0.00000001	0.00018415
7	Yes	6	0.00000001	0.00051743
8	Yes	5	0.00000001	0.00027112
9	Yes	5	0.00000001	0.00005397
10	Yes	7	0.00000001	0.00018261
11	Yes	6	0.00000001	0.00051301
12	Yes	7	0.00000001	0.00018370
13	Yes	6	0.00000001	0.00051623
14	Yes	5	0.00000001	0.00024864
15	Yes	5	0.00000001	0.00002551
16	Yes	7	0.00000001	0.00018373
17	Yes	6	0.00000001	0.00051630
18	Yes	7	0.00000001	0.00018264
19	Yes	6	0.00000001	0.00051307
20	Yes	5	0.00000001	0.00027115
21	Yes	5	0.00000001	0.00005397
22	Yes	7	0.00000001	0.00018418
23	Yes	6	0.00000001	0.00051749
24	Yes	7	0.00000001	0.00018307
25	Yes	6	0.00000001	0.00051423
26	Yes	4	0.00000001	0.00000001
27	Yes	6	0.00047952	0.00029723
28	Yes	6	0.00047793	0.00056802
29	Yes	6	0.00047783	0.00057495
30	Yes	6	0.00047930	0.00029639
31	Yes	6	0.00047761	0.00056350
32	Yes	6	0.00047752	0.00056921
33	Yes	6	0.00047906	0.00029589
34	Yes	6	0.00047750	0.00057356
35	Yes	6	0.00047759	0.00056690
36	Yes	6	0.00047928	0.00029789
37	Yes	6	0.00047781	0.00057849
38	Yes	6	0.00047790	0.00057242
39	Yes	5	0.00000001	0.00001513
40	Yes	5	0.00000001	0.00035775
41	Yes	5	0.00000001	0.00036339
42	Yes	5	0.00000001	0.00001729
43	Yes	5	0.00000001	0.00035509
44	Yes	5	0.00000001	0.00036045
45	Yes	5	0.00000001	0.00001509
46	Yes	5	0.00000001	0.00036089
47	Yes	5	0.00000001	0.00035545
48	Yes	5	0.00000001	0.00001730
49	Yes	5	0.00000001	0.00036376
50	Yes	5	0.00000001	0.00035819

Maximum Tower Deflections - Service Wind

Section No.	*Elevation* *ft*	*Horz. Deflection* *in*	*Gov. Load Comb.*	*Tilt* °	*Twist* °
L1	97.5 - 50.79	28.384	49	2.5211	0.0012

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L2	54.21 - 1.5	8.739	48	1.5431	0.0004

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
97.50	Lighting Rod 5/8" x 7'	49	28.384	2.5211	0.0012	11573
90.00	RDIDC-9181-PF-48	49	24.508	2.3626	0.0011	7715

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	97.5 - 50.79	108.284	20	9.6467	0.0047
L2	54.21 - 1.5	33.365	20	5.9004	0.0013

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
97.50	Lighting Rod 5/8" x 7'	20	108.284	9.6467	0.0047	3152
90.00	RDIDC-9181-PF-48	20	93.504	9.0392	0.0040	2100

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
L1	97.5 - 95.2216	TP23.05x16x0.1875	46.71	0.00	0.0	9.6151	-4944.00	562482.00	0.009
	95.2216 - 92.9432					9.8197	-5037.11	574454.00	0.009
	92.9432 - 90.6647					10.0244	-5134.05	586426.00	0.009
	90.6647 - 88.3863					10.2290	-8173.79	598398.00	0.014
	88.3863 - 86.1079					10.4337	-8286.25	610371.00	0.014

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	lb	lb	
	86.1079 - 83.8295					10.6383	-8405.51	622343.00	0.014
	83.8295 - 81.5511					10.8430	-8532.18	634315.00	0.013
	81.5511 - 79.2726					11.0477	-8665.40	646288.00	0.013
	79.2726 - 76.9942					11.2523	-8804.83	658260.00	0.013
	76.9942 - 74.7158					11.4570	-8950.15	670232.00	0.013
	74.7158 - 72.4374					11.6616	-9100.56	682204.00	0.013
	72.4374 - 70.1589					11.8663	-9256.85	694177.00	0.013
	70.1589 - 67.8805					12.0709	-9418.26	706149.00	0.013
	67.8805 - 65.6021					12.2756	-9584.56	718121.00	0.013
	65.6021 - 63.3237					12.4802	-9755.56	730094.00	0.013
	63.3237 - 61.0453					12.6849	-9931.07	742066.00	0.013
	61.0453 - 58.7668					12.8895	-10110.90	754038.00	0.013
	58.7668 - 56.4884					13.0942	-10295.00	766011.00	0.013
	56.4884 - 54.21					13.2989	-10483.10	777983.00	0.013
	54.21 - 50.79					13.6060	-4762.73	795954.00	0.006
L2	54.21 - 50.79	TP30x22.1588x0.25	52.71	0.00	0.0	17.7883	-6225.30	1040620.00	0.006
	50.79 - 48.1958					18.0946	-11238.60	1058530.00	0.011
	48.1958 - 45.6016					18.4008	-11502.00	1076450.00	0.011
	45.6016 - 43.0074					18.7070	-11770.60	1094360.00	0.011
	43.0074 - 40.4132					19.0132	-12044.20	1112280.00	0.011
	40.4132 - 37.8189					19.3195	-12322.80	1130190.00	0.011
	37.8189 - 35.2247					19.6257	-12606.10	1148100.00	0.011
	35.2247 - 32.6305					19.9319	-12894.10	1166020.00	0.011
	32.6305 - 30.0363					20.2381	-13186.80	1183930.00	0.011
	30.0363 - 27.4421					20.5444	-13483.90	1201850.00	0.011
	27.4421 - 24.8479					20.8506	-13785.50	1219760.00	0.011
	24.8479 - 22.2537					21.1568	-14091.40	1237670.00	0.011
	22.2537 - 19.6595					21.4630	-14401.60	1255590.00	0.011
	19.6595 - 17.0653					21.7693	-14716.00	1273500.00	0.012
	17.0653 - 14.4711					22.0755	-15034.50	1291420.00	0.012
	14.4711 - 11.8768					22.3817	-15357.00	1309330.00	0.012

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
	11.8768 - 9.28263					22.6880	-15683.60	1327250.00	0.012
	9.28263 - 6.68842					22.9942	-16014.10	1345160.00	0.012
	6.68842 - 4.09421					23.3004	-16348.50	1363070.00	0.012
	4.09421 - 1.5					23.6066	-16686.70	1380990.00	0.012

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	97.5 - 95.2216	TP23.05x16x0.1875	11878.33	236449.17	0.050	0.00	236449.17	0.000
	95.2216 - 92.9432		23759.17	246680.83	0.096	0.00	246680.83	0.000
	92.9432 - 90.6647		35880.83	257129.17	0.140	0.00	257129.17	0.000
	90.6647 - 88.3863		55095.42	267794.17	0.206	0.00	267794.17	0.000
	88.3863 - 86.1079		77347.58	278675.83	0.278	0.00	278675.83	0.000
	86.1079 - 83.8295		99815.83	289574.17	0.345	0.00	289574.17	0.000
	83.8295 - 81.5511		122504.17	299496.67	0.409	0.00	299496.67	0.000
	81.5511 - 79.2726		145400.00	309530.00	0.470	0.00	309530.00	0.000
	79.2726 - 76.9942		168497.50	319670.83	0.527	0.00	319670.83	0.000
	76.9942 - 74.7158		191792.50	329915.83	0.581	0.00	329915.83	0.000
	74.7158 - 72.4374		215277.50	340262.50	0.633	0.00	340262.50	0.000
	72.4374 - 70.1589		238958.33	350708.33	0.681	0.00	350708.33	0.000
	70.1589 - 67.8805		262824.17	361249.17	0.728	0.00	361249.17	0.000
	67.8805 - 65.6021		286870.00	371882.50	0.771	0.00	371882.50	0.000
	65.6021 - 63.3237		311092.50	382605.83	0.813	0.00	382605.83	0.000
	63.3237 - 61.0453		335489.17	393415.00	0.853	0.00	393415.00	0.000
	61.0453 - 58.7668		360056.67	404308.33	0.891	0.00	404308.33	0.000
	58.7668 - 56.4884		384791.67	415282.50	0.927	0.00	415282.50	0.000
	56.4884 - 54.21		409692.50	426334.17	0.961	0.00	426334.17	0.000
	54.21 - 50.79		198320.83	443061.67	0.448	0.00	443061.67	0.000
L2	54.21 - 50.79	TP30x22.1588x0.25	249182.50	607239.17	0.410	0.00	607239.17	0.000
	50.79 - 48.1958		476536.67	628444.17	0.758	0.00	628444.17	0.000
	48.1958 - 45.6016		505800.00	650012.50	0.778	0.00	650012.50	0.000

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
	45.6016 - 43.0074		535285.83	671944.17	0.797	0.00	671944.17	0.000
	43.0074 - 40.4132		564986.67	692877.50	0.815	0.00	692877.50	0.000
	40.4132 - 37.8189		594898.33	712718.33	0.835	0.00	712718.33	0.000
	37.8189 - 35.2247		625013.33	732743.33	0.853	0.00	732743.33	0.000
	35.2247 - 32.6305		655323.33	752950.00	0.870	0.00	752950.00	0.000
	32.6305 - 30.0363		685820.83	773332.50	0.887	0.00	773332.50	0.000
	30.0363 - 27.4421		716499.17	793888.33	0.903	0.00	793888.33	0.000
	27.4421 - 24.8479		747351.67	814610.83	0.917	0.00	814610.83	0.000
	24.8479 - 22.2537		778370.83	835500.00	0.932	0.00	835500.00	0.000
	22.2537 - 19.6595		809550.00	856541.67	0.945	0.00	856541.67	0.000
	19.6595 - 17.0653		840883.33	877750.00	0.958	0.00	877750.00	0.000
	17.0653 - 14.4711		872366.67	899100.00	0.970	0.00	899100.00	0.000
	14.4711 - 11.8768		903983.33	920600.00	0.982	0.00	920600.00	0.000
	11.8768 - 9.28263		935733.33	942241.67	0.993	0.00	942241.67	0.000
	9.28263 - 6.68842		967616.67	964025.00	1.004	0.00	964025.00	0.000
	6.68842 - 4.09421		999616.67	985941.67	1.014	0.00	985941.67	0.000
	4.09421 - 1.5		1031733.33	1007983.33	1.024	0.00	1007983.33	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	97.5 - 95.2216	TP23.05x16x0.1875	5163.21	168744.00	0.031	0.00	238755.83	0.000
	95.2216 - 92.9432		5270.03	172336.00	0.031	0.00	249027.50	0.000
	92.9432 - 90.6647		5376.49	175928.00	0.031	0.00	259515.83	0.000
	90.6647 - 88.3863		9724.18	179520.00	0.054	0.01	270220.00	0.000
	88.3863 - 86.1079		9824.31	183111.00	0.054	0.01	281140.83	0.000
	86.1079 - 83.8295		9923.03	186703.00	0.053	61.24	292278.33	0.000
	83.8295 - 81.5511		10017.20	190295.00	0.053	61.22	303631.67	0.000
	81.5511 - 79.2726		10108.80	193886.00	0.052	61.19	315201.67	0.000
	79.2726 - 76.9942		10197.90	197478.00	0.052	61.15	326988.33	0.000

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
	76.9942 - 74.7158		10284.90	201070.00	0.051	61.11	338990.83	0.000
	74.7158 - 72.4374		10372.20	204661.00	0.051	105.76	351209.17	0.000
	72.4374 - 70.1589		10455.20	208253.00	0.050	105.67	363645.00	0.000
	70.1589 - 67.8805		10536.60	211845.00	0.050	105.58	376296.67	0.000
	67.8805 - 65.6021		10616.30	215436.00	0.049	105.48	389164.17	0.000
	65.6021 - 63.3237		10694.50	219028.00	0.049	105.38	402248.33	0.000
	63.3237 - 61.0453		10771.20	222620.00	0.048	105.27	415549.17	0.000
	61.0453 - 58.7668		10846.60	226211.00	0.048	105.17	429065.83	0.000
	58.7668 - 56.4884		10920.70	229803.00	0.048	105.06	442799.17	0.000
	56.4884 - 54.21		10993.60	233395.00	0.047	104.96	456748.33	0.000
	54.21 - 50.79		4997.02	238786.00	0.021	46.47	478093.33	0.000
L2	54.21 - 50.79	TP30x22.1588x0.25	6169.99	312186.00	0.020	58.40	612888.33	0.000
	50.79 - 48.1958		11265.40	317560.00	0.035	104.79	634171.67	0.000
	48.1958 - 45.6016		11353.50	322934.00	0.035	104.69	655818.33	0.000
	45.6016 - 43.0074		11438.80	328308.00	0.035	104.60	677828.33	0.000
	43.0074 - 40.4132		11521.30	333683.00	0.035	104.51	700200.83	0.000
	40.4132 - 37.8189		11602.10	339057.00	0.034	120.53	722937.50	0.000
	37.8189 - 35.2247		11679.30	344431.00	0.034	120.43	746037.50	0.000
	35.2247 - 32.6305		11753.70	349805.00	0.034	120.34	769500.00	0.000
	32.6305 - 30.0363		11825.50	355180.00	0.033	120.25	793325.83	0.000
	30.0363 - 27.4421		11894.60	360554.00	0.033	120.17	817515.83	0.000
	27.4421 - 24.8479		11961.00	365928.00	0.033	120.10	842066.67	0.000
	24.8479 - 22.2537		12024.80	371302.00	0.032	120.03	866983.33	0.000
	22.2537 - 19.6595		12086.00	376677.00	0.032	119.97	892266.67	0.000
	19.6595 - 17.0653		12144.50	382051.00	0.032	119.92	917908.33	0.000
	17.0653 - 14.4711		12200.50	387425.00	0.031	119.87	943908.33	0.000
	14.4711 - 11.8768		12253.80	392799.00	0.031	119.84	970283.33	0.000
	11.8768 - 9.28263		12304.50	398174.00	0.031	119.81	997016.67	0.000
	9.28263 - 6.68842		12352.70	403548.00	0.031	119.78	1024108.33	0.000
	6.68842 - 4.09421		12398.30	408922.00	0.030	119.77	1051566.67	0.000
	4.09421 - 1.5		12441.30	414296.00	0.030	119.76	1079391.67	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Ratio V_u / ϕV_n	Ratio T_u / ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	97.5 - 95.2216	0.009	0.050	0.000	0.031	0.000	0.060 ✔	1.050	4.8.2 ✔
	95.2216 - 92.9432	0.009	0.096	0.000	0.031	0.000	0.106 ✔	1.050	4.8.2 ✔
	92.9432 - 90.6647	0.009	0.140	0.000	0.031	0.000	0.149 ✔	1.050	4.8.2 ✔
	90.6647 - 88.3863	0.014	0.206	0.000	0.054	0.000	0.222 ✔	1.050	4.8.2 ✔
	88.3863 - 86.1079	0.014	0.278	0.000	0.054	0.000	0.294 ✔	1.050	4.8.2 ✔
	86.1079 - 83.8295	0.014	0.345	0.000	0.053	0.000	0.361 ✔	1.050	4.8.2 ✔
	83.8295 - 81.5511	0.013	0.409	0.000	0.053	0.000	0.425 ✔	1.050	4.8.2 ✔
	81.5511 - 79.2726	0.013	0.470	0.000	0.052	0.000	0.486 ✔	1.050	4.8.2 ✔
	79.2726 - 76.9942	0.013	0.527	0.000	0.052	0.000	0.543 ✔	1.050	4.8.2 ✔
	76.9942 - 74.7158	0.013	0.581	0.000	0.051	0.000	0.597 ✔	1.050	4.8.2 ✔
	74.7158 - 72.4374	0.013	0.633	0.000	0.051	0.000	0.649 ✔	1.050	4.8.2 ✔
	72.4374 - 70.1589	0.013	0.681	0.000	0.050	0.000	0.697 ✔	1.050	4.8.2 ✔
	70.1589 - 67.8805	0.013	0.728	0.000	0.050	0.000	0.743 ✔	1.050	4.8.2 ✔
	67.8805 - 65.6021	0.013	0.771	0.000	0.049	0.000	0.787 ✔	1.050	4.8.2 ✔
	65.6021 - 63.3237	0.013	0.813	0.000	0.049	0.000	0.829 ✔	1.050	4.8.2 ✔
	63.3237 - 61.0453	0.013	0.853	0.000	0.048	0.000	0.869 ✔	1.050	4.8.2 ✔
	61.0453 - 58.7668	0.013	0.891	0.000	0.048	0.000	0.906 ✔	1.050	4.8.2 ✔
	58.7668 - 56.4884	0.013	0.927	0.000	0.048	0.000	0.942 ✔	1.050	4.8.2 ✔
	56.4884 - 54.21	0.013	0.961	0.000	0.047	0.000	0.977 ✔	1.050	4.8.2 ✔
	54.21 - 50.79	0.006	0.448	0.000	0.021	0.000	0.454 ✔	1.050	4.8.2 ✔
L2	54.21 - 50.79	0.006	0.410	0.000	0.020	0.000	0.417 ✔	1.050	4.8.2 ✔
	50.79 - 48.1958	0.011	0.758	0.000	0.035	0.000	0.770 ✔	1.050	4.8.2 ✔
	48.1958 - 45.6016	0.011	0.778	0.000	0.035	0.000	0.790 ✔	1.050	4.8.2 ✔

Section No.	*Elevation* *ft*	*Ratio* $\frac{P_u}{\phi P_n}$	*Ratio* $\frac{M_{ux}}{\phi M_{nx}}$	*Ratio* $\frac{M_{uy}}{\phi M_{ny}}$	*Ratio* $\frac{V_u}{\phi V_n}$	*Ratio* $\frac{T_u}{\phi T_n}$	*Comb. Stress Ratio*	*Allow. Stress Ratio*	*Criteria*
	45.6016 - 43.0074	0.011	0.797	0.000	0.035	0.000	0.809	1.050	4.8.2
	43.0074 - 40.4132	0.011	0.815	0.000	0.035	0.000	0.827	1.050	4.8.2
	40.4132 - 37.8189	0.011	0.835	0.000	0.034	0.000	0.847	1.050	4.8.2
	37.8189 - 35.2247	0.011	0.853	0.000	0.034	0.000	0.865	1.050	4.8.2
	35.2247 - 32.6305	0.011	0.870	0.000	0.034	0.000	0.883	1.050	4.8.2
	32.6305 - 30.0363	0.011	0.887	0.000	0.033	0.000	0.899	1.050	4.8.2
	30.0363 - 27.4421	0.011	0.903	0.000	0.033	0.000	0.915	1.050	4.8.2
	27.4421 - 24.8479	0.011	0.917	0.000	0.033	0.000	0.930	1.050	4.8.2
	24.8479 - 22.2537	0.011	0.932	0.000	0.032	0.000	0.944	1.050	4.8.2
	22.2537 - 19.6595	0.011	0.945	0.000	0.032	0.000	0.958	1.050	4.8.2
	19.6595 - 17.0653	0.012	0.958	0.000	0.032	0.000	0.971	1.050	4.8.2
	17.0653 - 14.4711	0.012	0.970	0.000	0.031	0.000	0.983	1.050	4.8.2
	14.4711 - 11.8768	0.012	0.982	0.000	0.031	0.000	0.995	1.050	4.8.2
	11.8768 - 9.28263	0.012	0.993	0.000	0.031	0.000	1.006	1.050	4.8.2
	9.28263 - 6.68842	0.012	1.004	0.000	0.031	0.000	1.017	1.050	4.8.2
	6.68842 - 4.09421	0.012	1.014	0.000	0.030	0.000	1.027	1.050	4.8.2
	4.09421 - 1.5	0.012	1.024	0.000	0.030	0.000	1.037	1.050	4.8.2

Section Capacity Table

Section No.	*Elevation ft*	*Component Type*	*Size*	*Critical Element*	*P lb*	*$øP_{allow}$ lb*	*% Capacity*	*Pass Fail*
L1	97.5 - 50.79	Pole	TP23.05x16x0.1875	1	-10483.10	816882.11	93.0	Pass
L2	50.79 - 1.5	Pole	TP30x22.1588x0.25	2	-16686.70	1450039.43	98.7	Pass
							Summary	
						Pole (L2)	98.7	Pass
						RATING =	**98.7**	**Pass**

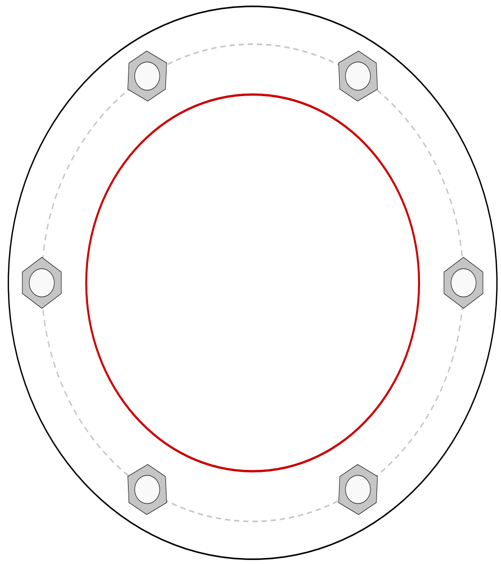
Monopole Base Plate Connection

Site Info	
SGS #	2101548
Site Name	E - Richard D Riddle Sch
Order #	

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
I_{ar} (in)	2

Applied Loads	
Moment (kip-ft)	1031.73
Axial Force (kips)	16.69
Shear Force (kips)	12.44

**TIA-222-H Section 15.5 Applied*



Connection Properties

Anchor Rod Data

(6) 2-1/4" ø bolts (A615-75 N; Fy=75 ksi, Fu=100 ksi) on 38" BC

Base Plate Data

44" OD x 1.75" Plate (A572-60; Fy=60 ksi, Fu=75 ksi)

Stiffener Data

N/A

Pole Data

30" x 0.25" 18-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

Anchor Rod Summary *(units of kips, kip-in)*

Pu_c = 219.68	ϕPn_c = 268.39	**Stress Rating**
Vu = 2.07	ϕVn = 120.77	**78.0%**
Mu = n/a	ϕMn = n/a	**Pass**

Base Plate Summary

Max Stress (ksi):	49.21	(Flexural)
Allowable Stress (ksi):	54	
Stress Rating:	**86.8%**	**Pass**

Drilled Pier Foundation

SGS # :	2101548
Site Name:	BOE - Richard D Riddl
Order Number:	
TIA-222 Revison:	H
Tower Type:	Monopole

Applied Loads		
	Comp.	**Uplift**
Moment (kip-ft)	1031.73	
Axial Force (kips)	16.69	
Shear Force (kips)	12.44	

Material Properties		
Concrete Strength, f'c:	4	ksi
Rebar Strength, Fy:	60	ksi
Tie Yield Strength, Fyt:	40	ksi

Pier Design Data		
Depth	21	ft
Ext. Above Grade	1	ft
Pier Section 1		
From 1' above grade to 21' below grade		
Pier Diameter	5	ft
Rebar Quantity	18	
Rebar Size	8	
Clear Cover to Ties	3	in
Tie Size	5	
Tie Spacing	12	in

Rebar & Pier Options

Embedded Pole Inputs

Belled Pier Inputs

Analysis Results		
Soil Lateral Check	*Compression*	*Uplift*
$D_{v=0}$ (ft from TOC)	6.36	-
Soil Safety Factor	3.23	-
Max Moment (kip-ft)	1097.57	-
Rating*	*39.2%*	-
Soil Vertical Check	*Compression*	*Uplift*
Skin Friction (kips)	190.25	-
End Bearing (kips)	132.54	-
Weight of Concrete (kips)	74.81	-
Total Capacity (kips)	322.79	-
Axial (kips)	91.50	-
Rating*	*27.0%*	-
Reinforced Concrete Flexure	*Compression*	*Uplift*
Critical Depth (ft from TOC)	6.18	-
Critical Moment (kip-ft)	1097.46	-
Critical Moment Capacity	1671.42	-
Rating*	*62.5%*	-
Reinforced Concrete Shear	*Compression*	*Uplift*
Critical Depth (ft from TOC)	16.43	-
Critical Shear (kip)	157.32	-
Critical Shear Capacity	334.56	-
Rating*	*44.8%*	-

Soil Interaction Rating*	**39.2%**
Structural Foundation Rating*	**62.5%**

*Rating per TIA-222-H Section 15.5

Check Limitation	
Apply TIA-222-H Section 15.5:	☑
N/A	☐
Shear Design Options	
Check Shear along Depth of Pier:	☑
Utilize Shear-Friction Methodology:	☐
Override Critical Depth:	☐

Go to Soil Calculations

Soil Profile

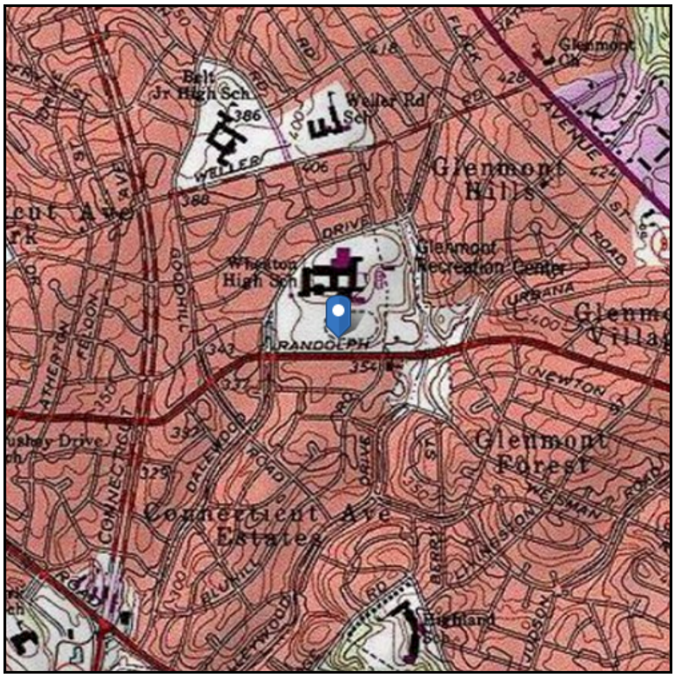
Groundwater Depth	19	# of Layers	4

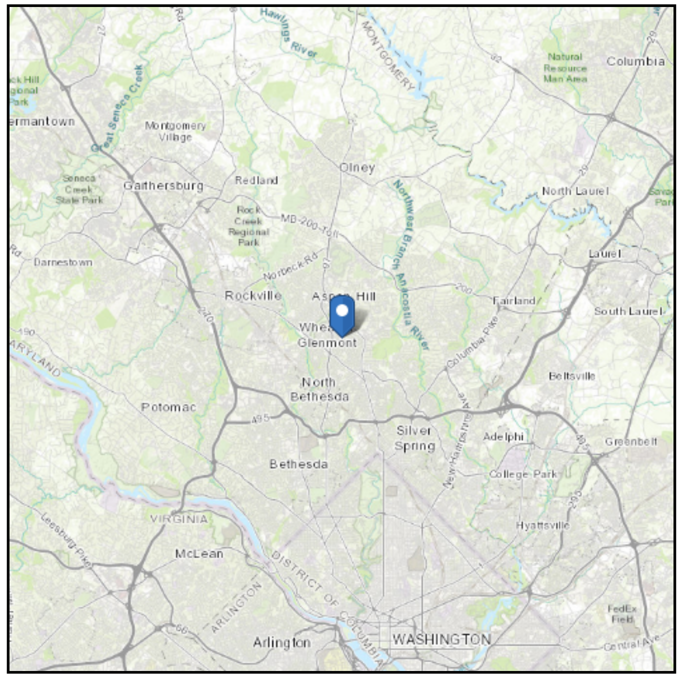
Layer	Top (ft)	Bottom (ft)	Thickness (ft)	γ_{soil} (pcf)	$\gamma_{concrete}$ (pcf)	Cohesion (ksf)	Angle of Friction (degrees)	Calculated Ultimate Skin Friction Comp (ksf)	Calculated Ultimate Skin Friction Uplift (ksf)	Ultimate Skin Friction Comp Override (ksf)	Ultimate Skin Friction Uplift Override (ksf)	Ult. Gross Bearing Capacity (ksf)	SPT Blow Count	Soil Type
1	0	3	3	110	150		0	0.000	0.000					Cohesionless
2	3	8	5	110	150		25	0.477	0.477				10	Cohesionless
3	8	19	11	115	150		30	1.012	1.012				10	Cohesionless
4	19	21	2	53	87.6		30	1.313	1.313			9	10	Cohesionless

Version 4.2.0

ASCE 7 Hazards Report

Address:	**Standard:**	ASCE/SEI 7-16	**Elevation:**	370.47 ft (NAVD 88)
No Address at This Location	**Risk Category:**	II	**Latitude:**	39.059461
	Soil Class:	D - Stiff Soil	**Longitude:**	-77.066492





Wind

Results:

Wind Speed:	113 Vmph
10-year MRI	75 Vmph
25-year MRI	84 Vmph
50-year MRI	89 Vmph
100-year MRI	95 Vmph

Data Source:	ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed:	Thu Feb 18 2021

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

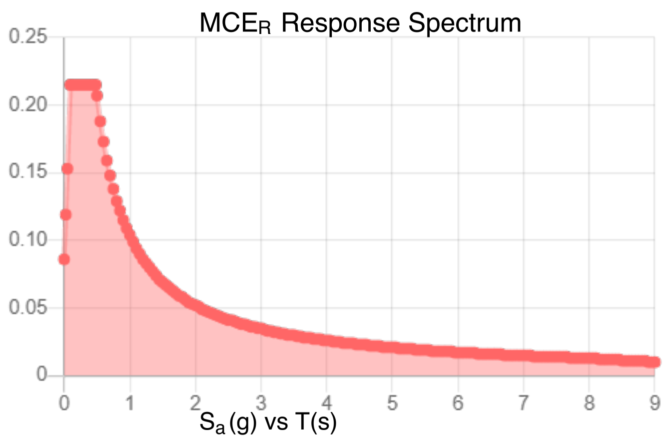
Seismic

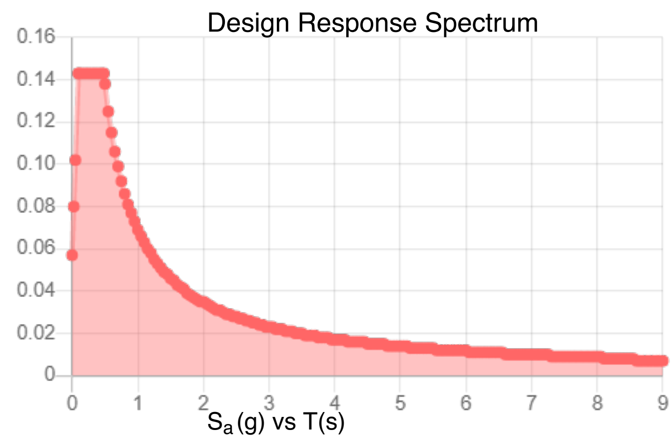
Site Soil Class: D - Stiff Soil

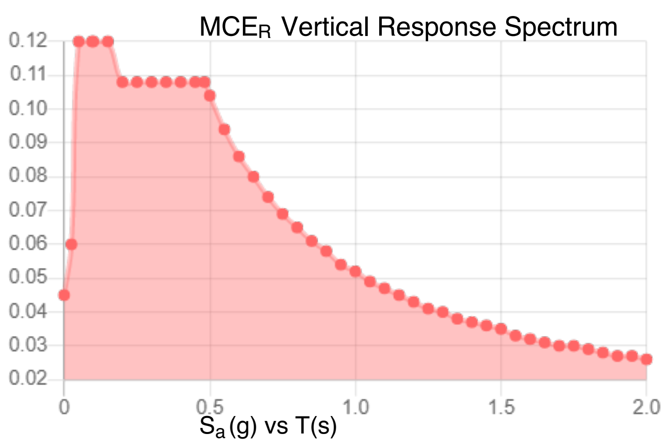
Results:

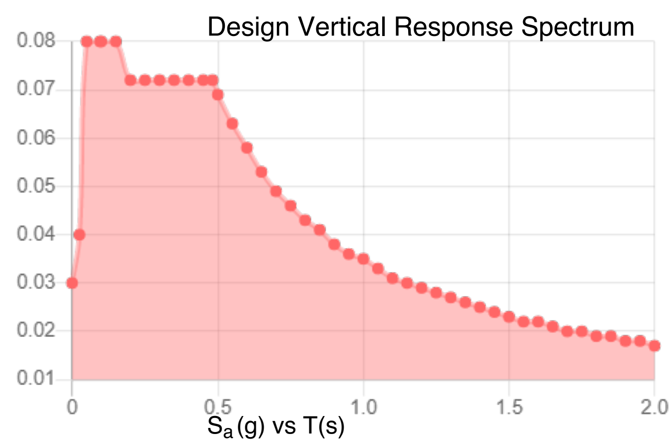
S_S :	0.134	S_{D1} :	0.069
S_1 :	0.043	T_L :	8
F_a :	1.6	PGA :	0.07
F_v :	2.4	PGA_M :	0.111
S_{MS} :	0.215	F_{PGA} :	1.6
S_{M1} :	0.104	I_e :	1
S_{DS} :	0.143	C_v :	0.7

Seismic Design Category B









Data Accessed: Thu Feb 18 2021

Date Source: USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness:	1.00 in.
Concurrent Temperature:	15 F
Gust Speed:	40 mph
Data Source:	Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8
Date Accessed:	Thu Feb 18 2021

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 500-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Attachment 2:
Collocation Application

COLOCATION APPLICATION
US-MD-5072
Version 2
DISH Wireless L.L.C.

Vertical Bridge REIT, LLC.
750 Park of Commerce Drive
Suite 200
Boca Raton, FL 33487

SUMMARY

PRIMARY INFO

Application #: C-103052

Application Version: 2 (Submitted: 2/12/2021 12:11:00 PM)

Application Type: Broadband

Application Name: DCWDC00428A

Lease Type: New Lease

Description:
Installing (6) new antennas, (12) RRUs (1) OVP, and (1) Hybrid Cable - 10x15 ground space needed for platform and shelter

VERTICAL BRIDGE SITE INFO

VB Site #: US-MD-5072

VB Site Name: BOE - Richard D Riddle School

Latitude: 39.05946111

Longitude: -77.06649167

Structure Type: Monopole

Structure Height: 100.0000

Site Address: 12501-A Dalewood Drive -
Silver Spring, MD 20906

VERTICAL BRIDGE DEAL TEAM

RLM: Floyd Jenkins
FJenkins@verticalbridge.com
(301) 667-0069

RLS: Sam Bowden
SBowden@verticalbridge.com

ROM: Jeremy Potts
JPotts@verticalbridge.com
(502) 295-7552

TENANT LEGAL INFO

Tenant Legal Name: DISH Wireless L.L.C.

State of Registration: Colorado

Type of Entity: LLC

Carrier NOC #: 8666246874

Tenant Site #: DCWDC00428A

Tenant Site Name: DCWDC00428A

APPLICANT

Name: Cherisa Small

Address 6700 Alexander Bell Drive
Suite 200
Columbia, MD 21046

Phone Number:: (301) 801-9035

Email Address: cherisa.small@dish.com

FINAL LEASED RIGHTS CONFIGURATION TOTALS

This is a summary of your remaining existing equipment plus the new equipment.

FINAL EQUIPMENT

Qty	Equipment Type
1	Junction Box
6	Panel
12	RRU

FINAL LINES

Qty	Line Type
1	Hybrid

COLOCATION APPLICATION
US-MD-5072
Version 2
DISH Wireless L.L.C.

Vertical Bridge REIT, LLC.
750 Park of Commerce Drive
Suite 200
Boca Raton, FL 33487

FREQUENCY & TECHNOLOGY INFO

Type of Technology: Broadband Wireless
Is TX Frequency Licensed: Yes
TX Frequency: 722 - 728 l 642 - 652 l 2180 - 2200 l 1995 - 2020
Is RX Frequency Licensed: Yes
RX Frequency:

MOUNT & STRUCTURAL ANALYSIS

MOUNT ANALYSIS

Provided by Tenant: No
To Be Run by VB: No
Include Mount Mapping: No

STRUCTURAL HARD COPIES

Required: No
Number of Hard Copies

CONTACTS

INVOICE CONTACT

Attention To	Name	Address	Phone Number 1	Phone Number 2	Email 1	Email 2
	Accounts Payable	P.O. Box 6649 Englewood, CO 80112	(555) 555-5555		WirelessAPInvoices@dish.com	

PO CONTACT

Name	Phone	Email
Accounts Payable	(555) 555-5555	WirelessAPInvoices@dish.com

LEASING CONTACT

Name	Phone Number	Email
Cherisa Small	(301) 801-9035	cherisa.small@dish.com

NOTICE CONTACT

Notice To	Attention To	Address	
DISH Wireless L.L.C.		Lease Administration	9601 South Meridian Blvd Englewood, CO 80112

COPY NOTICE CONTACT

Notice To	Attention To	Address	
DISH Wireless, L.L.C		Attn: Office of the General Counsel	9601 South Meridian Blvd. Englewood, CO 80112

RF CONTACT

Name	Phone Number	Email
Morrie Kebbeh	(813) 704-7429	morrie.kebbeh@dish.com

TENANT CONSTRUCTION MANAGER CONTACT

Name	Phone Number	Email
Troy James	(443) 752-7427	troy.james@dish.com

EMERGENCY CONTACT

Name	Phone Number	Email
DISH WIRELESS NOC	(866) 624-6874	noc.alerts@dish.com

LINE & EQUIPMENT

NEW LINE(S)

Qty	Line Type	Line Size(in.)	Line Location	Comments
1	Hybrid	1.6	Exterior	

NEW EQUIPMENT

Qty	Equipment Type	RAD Height	Mount (H')	Mount Type	Manufacturer	Model Number	Dimensions (H"xW"xD")	Weight (Lbs.)	Azimuth	Comments
1	Junction Box	90.00	90.00	Platform	Raycap	RDIDC-9181-PF-48	8.00 x 14.00 x 16.00	21.85	0	
2	RRU	90.00	90.00	Platform	Fujitsu	TA08025-B604	7.87 x 14.96 x 15.75	63.93	120	(1) Installed RRU; (1) Reserved RRU
2	RRU	90.00	90.00	Platform	Fujitsu	TA08025-B604	7.87 x 14.96 x 15.75	63.93	240	(1) Installed RRU; (1) Reserved RRU
2	RRU	90.00	90.00	Platform	Fujitsu	TA08025-B605	15.75 x 14.96 x 9.06	74.95	0	(1) Installed RRU; (1) Reserved RRU
2	Panel	90.00	90.00	Platform	JMA	MX08FRO665-20_V0F	72.00 x 20.00 x 8.00	54.00	240	(1) Antenna Installed; (1) Antenna Reserved
2	Panel	90.00	90.00	Platform	JMA	MX08FRO665-20_V0F	72.00 x 20.00 x 8.00	54.00	0	(1) Antenna Installed; (1) Antenna Reserved

2	RRU	90.00	90.00	Platform	Fujitsu	TA08025-B605	15.75 x 14.96 x 9.06	74.95	240	(1) Installed RRU; (1) Reserved RRU
2	RRU	90.00	90.00	Platform	Fujitsu	TA08025-B605	15.75 x 14.96 x 9.06	74.95	120	(1) Installed RRU; (1) Reserved RRU
2	RRU	90.00	90.00	Platform	Fujitsu	TA08025-B604	7.87 x 14.96 x 15.75	63.93	0	(1) Installed RRU; (1) Reserved RRU
2	Panel	90.00	90.00	Platform	JMA	MX08FRO665-20_V0F	72.00 x 20.00 x 8.00	54.00	120	(1) Antenna Installed; (1) Antenna Reserved

NEW EQUIPMENT CABINET(S)

Quantity of Cabinets	Cabinet Dimensions (H x W x D)	Manufacturer	Comments
1	74.00 x 32.00 x 32.10	Charles	

ADDITIONAL SITE REQUIREMENTS

GROUND & INTERIOR SPACE REQUIREMENTS

Requirement Type	Total Lease Area (L x W)	Cabinet Required	Cabinet Area (L x W)	Shelter Required	Shelter Pad (L x W)	Comments
New	10.00 x 15.00	Yes	3.00 x 3.00		x	

GENERATOR REQUIREMENTS

Requirement Type	Fuel Type	Kilowatt Size	Pad Dimensions (L x D)	Generator Manufacturer	Fuel Tank Manufacturer	Comments
No Changes			x			

AC POWER REQUIREMENTS

Meter Type	Additional Details	Comments
New Tenant Meter		

BACKHAUL REQUIREMENTS

Requirement Type	Cable Type	Number Of Points Of Entry	Riser Size (Inches)	Comments
Not Required				

SUPPLEMENT TO THE MASTER LEASE AGREEMENT
(Pursuant and subject to the MLA)

THIS SUPPLEMENT TO THE MASTER LEASE AGREEMENT ("**SLA**") is entered into as of 7/15/2021 ("**Effective Date**"), by and between VB-S1 Assets, LLC, a Delaware limited liability company ("**Lessor**"), whose address is 750 Park of Commerce Drive, Suite 200, Boca Raton, Florida 33487, and DISH Wireless L.L.C., a Colorado limited liability company ("**Lessee**"), whose address is 9601 South Meridian Blvd., Englewood, Colorado, 80112.

BACKGROUND

WHEREAS, Lessor's Affiliate, Vertical Bridge REIT, LLC, and Lessee have entered into that certain MLA dated January 29, 2021 (the "**MLA**"). Such MLA provides that Lessor or its Affiliates and Lessee will enter into separate SLAs on a Site-by-Site basis as mutually agreed upon by the Parties, pursuant to which Lessor or its Affiliates will lease to Lessee certain available space at a Site.

AGREEMENT

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, and intending to be legally bound hereby, the Parties agree as follows:

1. Site Information. The Leased Property, as more particularly described in Section 6 hereof, means:
   a. Lessee Site ID: DCWDC00428A
   b. Lessor Site ID: US-MD-5072 / BOE- Richard D Riddle School
   c. Address and/or location of the Site: 12501-A Dalewood Drive, Silver Spring, MD 20906
   d. Site coordinates (NAD 83):
      i. Latitude: 39.05946111
      ii. Longitude: -77.06649167
   e. Antenna Space centerline height: 90'
   f. Ground Space dimensions: 10' x 15'

2. Rent; Term.
   a. Rent.
      i. Commencing on the SLA Rent Commencement Date, the Basic Rent for this SLA shall be One Thousand Two Hundred Fifty and 00/100 dollars ($1,250.00) per month, to be paid in accordance with the terms set forth in Section 4 of the MLA.
      ii. Additional Rent, if any, shall be paid in accordance with the terms set forth in Section 4 of the MLA, unless otherwise set forth below, in the amount of: Not Applicable
      iii. Rent shall be paid to the following address (or via electronic funds transfer as agreed to by the Parties in Section 4.4 of the MLA):

VB-S1 Issuer, LLC P.O. Box 743906 Atlanta, GA 30374-3906	For Overnight mail: Bank of America Lockbox Services Lockbox # 743906 6000 Feldwood Road College Park, GA 30349

CWH

b. Term. The term of this SLA shall be as set forth in Section 3 of the MLA, unless set forth herein as follows: Not Applicable.

3. Non-Standard Terms. The Parties acknowledge and agree that the following conditions exist at the Site: (Check all that apply)

- ☐ There are no electrical utilities installed at the Site as of the Effective Date (i.e., neither Lessor nor any Co-User at the Site have electrical utilities installed).
- ■ The Leased Property is located, in whole or in part, on land which is owned, operated or controlled by a Governmental Authority (e.g. Bureau of Land Management or Bureau of Indian Affairs).
- ☐ The Structure on the Site is AM Detuned.
- ☐ Tower Modifications are required prior to the commencement of Lessee's initial Installation at the Site.
- ☐ Ground Space at the Site is not included in the legal interest conveyed to Lessee pursuant to this SLA.

4. Key Prime Agreement Terms.

a. Current term expiration date of the Prime Agreement / final term expiration date of the Prime Agreement: 08/22/2025 / 08/22/2025.
b. Does the Prime Lessor have the right to not renew or terminate the Prime Agreement at the end of the current term or any remaining renewal terms: Not Applicable.
c. Special access rules under the Prime Agreement: See Sections 8, 10, and 17 of the Prime Agreement. Additionally, Prime Lessor approval of Lessee's schedule for performing work at the Site must be provided prior to entry onto the Site.

5. Special Provisions. N/A

6. Site Address and Legal Description of Site. Lessor hereby leases to Lessee, and Lessee leases from Lessor, as applicable, the Site, as more particularly described in Section 1 hereof, and which is comprised of the space on the Structure, Easements and Ground Space on the Parcel at heights and locations as more particularly set forth on **Schedule A-1** (Collocation Application), **Schedule A-2** (Structure Elevation and Site Plan), and **Schedule A-4** (Legal Description of Parcel and/or Survey) (together, as applicable, the "**Leased Property**"), each of which are attached hereto and incorporated herein.

7. Frequencies. As of the Effective Date, Lessee's initial Installation will use those certain frequencies, in pre-approved transmit power, as set forth on **Schedule A-1** (Collocation Application), which is attached hereto and incorporated herein by this reference.

8. MLA; Defined Terms; Incorporation of Background; Prime Agreement. This SLA is entered into pursuant to the MLA. All terms and conditions of the MLA are incorporated herein by this reference and made a part hereof without the necessity of repeating such terms and conditions or attaching the MLA. By executing and delivering this SLA, the Parties hereby agree to be bound by all terms and conditions of the MLA applicable to such Party, and to perform all covenants and agreements of such Party therein. Capitalized terms used in this SLA shall have the same meaning ascribed to them in the MLA unless otherwise indicated herein. The background section set forth above is hereby incorporated into this SLA by this reference in its entirety. A true and correct copy of the Prime Agreement(s) (subject to redaction in accordance with the MLA) is set forth in **Schedule A-3** (Redacted Prime Agreement), which is attached hereto and incorporated herein by this reference.

9. Order of Precedence; Conflict. In the event of an inconsistency, conflict or discrepancy between, or among, (a) Section 1 of this SLA, (b) **Schedule A-1** (Collocation Application), and/or (c) **Schedule**

CWH

A-2 (Structure Elevation and Site Plan), **Schedule A-1** of this SLA shall govern. In the event of an inconsistency, conflict or discrepancy between (x) the MLA, and (y) this SLA, the terms set forth in this SLA shall control.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK. SIGNATURE PAGE FOLLOWS.]

CWH

IN WITNESS WHEREOF, the Parties have executed this SLA as of the Effective Date.

LESSOR:

VB-S1 Assets, LLC

DocuSigned by:

By: ______________________

DFDF739A85644A1...

Name: Alexander Gellman

Title: CEO

DS MA DS CF DS MB

LESSEE:

DISH Wireless L.L.C.

DocuSigned by:

By: Thomas Fuchs

81F461505C614FB...

Name: Thomas Fuchs

Title: Market General Manager

CWH

DISH WIRELESS SITE ID:

DCWDC00428A

DISH WIRELESS SITE ADDRESS:

12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

MARYLAND CODE COMPLIANCE

ALL WORK SHALL BE PERFORMED AND MATERIALS 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 THESE CODES:

CODE TYPE	CODE
BUILDING	2018 IBC
MECHANICAL	2018 IMC
ELECTRICAL	2017 NEC

SHEET INDEX

SHEET NO.	SHEET TITLE
T-1	TITLE SHEET
A-1	PROPOSED SITE PLAN AND EQUIPMENT LAYOUTS
A-2	PROPOSED EQUIPMENT LAYOUT AND DETAILS
A-3	EQUIPMENT PLATFORM AND H-FRAME DETAILS
A-4	EQUIPMENT DETAILS
A-5	EQUIPMENT DETAILS
A-6	EQUIPMENT DETAILS
E-1	ELECTRICAL ROUTE PLAN AND NOTES
E-2	ELECTRICAL DETAILS
E-3	ELECTRICAL ONE-LINE, FAULT CALCS & PANEL SCHEDULE
G-1	GROUNDING PLANS AND NOTES
G-2	GROUNDING DETAILS
G-3	GROUNDING DETAILS
RF-1	RF CABLE COLOR CODE
RF-2	RF PLUMBING DIAGRAM
RF-3	RF DATA SHEET
GN-1	LEGEND AND ABBREVIATIONS
GN-2	GENERAL NOTES
GN-3	GENERAL NOTES
GN-4	GENERAL NOTES

SCOPE OF WORK

THIS IS NOT AN ALL INCLUSIVE LIST. CONTRACTOR SHALL UTILIZE SPECIFIED EQUIPMENT PART OR ENGINEER APPROVED EQUIVALENT. CONTRACTOR SHALL VERIFY ALL NEEDED EQUIPMENT TO PROVIDE A FUNCTIONAL SITE. THE PROJECT GENERALLY CONSISTS OF THE FOLLOWING:

TOWER SCOPE OF WORK:
- INSTALL (3) PROPOSED PANEL ANTENNAS (1 PER SECTOR)
- INSTALL (1) PROPOSED ANTENNA MOUNT
- INSTALL PROPOSED JUMPERS
- INSTALL (6) PROPOSED RRUs (2 PER SECTOR)
- INSTALL (1) PROPOSED OVP DEVICE
- INSTALL (1) PROPOSED HYBRID CABLE

GROUND SCOPE OF WORK:
- INSTALL (1) PROPOSED METAL PLATFORM
- INSTALL (1) PROPOSED ICE BRIDGE
- INSTALL (1) PROPOSED PPC CABINET
- INSTALL (1) PROPOSED EQUIPMENT CABINET
- INSTALL (1) PROPOSED POWER CONDUIT
- INSTALL (1) PROPOSED TELCO CONDUIT
- INSTALL (1) PROPOSED TELCO-FIBER BOX
- INSTALL (1) PROPOSED GPS UNIT
- INSTALL (1) PROPOSED SAFETY SWITCH (IF REQUIRED)
- INSTALL (1) PROPOSED CIENA BOX (IF REQUIRED)
- INSTALL (1) PROPOSED METER SOCKET

SITE PHOTO

MISS UTILITY OF MARYLAND
UTILITY NOTIFICATION CENTER OF MARYLAND
(800) 257-7777
WWW.MISSUTILITY.NET/

CALL 2 WORKING DAYS UTILITY NOTIFICATION PRIOR TO CONSTRUCTION

811

GENERAL NOTES

THE FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION. A TECHNICIAN WILL VISIT THE SITE AS REQUIRED FOR ROUTINE MAINTENANCE. THE PROJECT WILL NOT RESULT IN ANY SIGNIFICANT DISTURBANCE OR EFFECT ON DRAINAGE. NO SANITARY SEWER SERVICE, POTABLE WATER, OR TRASH DISPOSAL IS REQUIRED AND NO COMMERCIAL SIGNAGE IS PROPOSED.

11"x17" PLOT WILL BE HALF SCALE UNLESS OTHERWISE NOTED

CONTRACTOR SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS, AND CONDITIONS ON THE JOB SITE, AND SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK.

SITE INFORMATION

PROPERTY OWNER:	BOARD OF EDUCATION
ADDRESS:	200 WEST BALTIMORE ST. BALTIMORE, MD 21201
TOWER TYPE:	MONOPOLE
TOWER CO SITE ID:	US-MD-5072
TOWER APP NUMBER:	C-103052
COUNTY:	MONTGOMERY
LATITUDE (NAD 83):	39° 3' 34.20" N 39.0595 N
LONGITUDE (NAD 83):	77° 3' 59.40" W 77.0665 W
ZONING JURISDICTION:	MONTGOMERY COUNTY
ZONING DISTRICT:	–
PARCEL NUMBER:	03696625
OCCUPANCY GROUP:	U
CONSTRUCTION TYPE:	V-B
POWER COMPANY:	PEPCO
TELEPHONE COMPANY:	VERIZON/COMCAST

PROJECT DIRECTORY

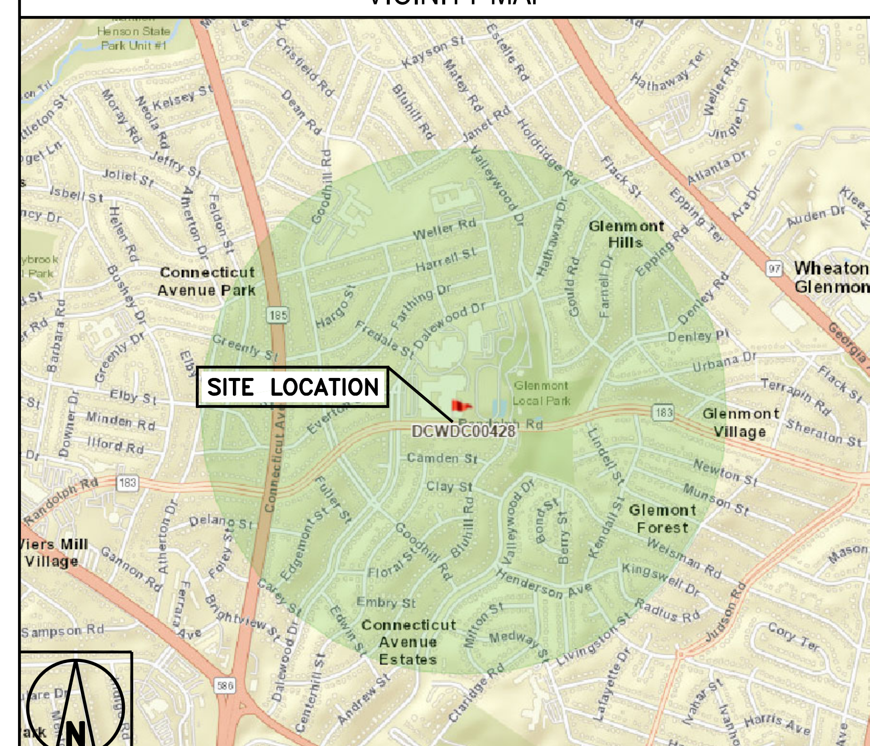
APPLICANT:	DISH WIRELESS 6700 ALEXANDER BELL DRIVE SUITE 221 COLUMBIA, MD 21046 (XXX) XXX-XXXX
TOWER OWNER:	VERTICAL BRIDGE 750 PARK OF COMMERCE DR. BOCA RATON, FLORIDA 33487 (561) 948-6367
SITE DESIGNER:	BC ARCHITECTS ENGINEERS, PLC 5661 COMLUMBIA PIKE, SUITE 200 FALLS CHURCH, VA 22041 (703) 671-6000
SITE ACQUISITION:	CHERISA SMALL (301) 801-9035
CONSTRUCTION MANAGER:	TROY JAMES (443) 752-7427
RF ENGINEER:	MORRIE KEBBEH (813) 704-7429

DIRECTIONS

DIRECTIONS FROM DISH WIRELESS OFFICE/AIRPORT/DOWNTOWN:

FROM 6700 ALEXANDER BELL DR #221, COLUMBIA, MD 21046, GET ON I-95 S FROM MD-175 E 1.7 MI. HEAD NORTHEAST TOWARD ALEXANDER BELL DR. 141 FT. TURN RIGHT 157 FT. TURN RIGHT TOWARD ALEXANDER BELL DR. 0.1 MI. TURN LEFT ONTO ALEXANDER BELL DR. 315 FT. TURN LEFT AT THE 1ST CROSS STREET ONTO COLUMBIA GATEWAY DR. 0.1 MI. KEEP RIGHT AT THE FORK, FOLLOW SIGNS FOR MD-175 E AND MERGE ONTO MD-175 E 1.1 MI. USE THE RIGHT LANE TO MERGE ONTO I-95 S VIA THE RAMP TO WASHINGTON 0.3 MI. FOLLOW I-95 S AND MD-200 W TO MD-650/NEW HAMPSHIRE AVE IN COLESVILLE. TAKE EXIT 13 FROM MD-200 W 14.7 MI. MERGE ONTO I-95 S 9.1 MI. USE THE RIGHT 2 LANES TO TAKE EXIT 31 B TO MERGE ONTO MD-200 W TOWARD I-270, TOLL ROAD 5.3 MI. TAKE EXIT 13 FOR MD-650 S TOWARD WHITE OAK, TOLL ROAD 0.4 MI. DRIVE TO RANDOLPH RD IN WHEATON-GLENMONT 4.8 MI. USE ANY LANE TO TURN LEFT ONTO MD-650/NEW HAMPSHIRE AVE. 0.9 MI. TURN RIGHT ONTO RANDOLPH RD., PASS BY SHERWIN-WILLIAMS PAINT STORE (ON THE RIGHT) 2.8 MI. KEEP LEFT TO STAY ON RANDOLPH RD. 1.2 MI. TURN RIGHT ONTO DALEWOOD DR. 0.1 MI. TURN RIGHT ONO EXISTING DRIVEWAY. TOWER COMPOUND WILL BE LOCATED AT SOUTH EAST CORNER OF SCHOOL NEAR RANDOLPH RD.

VICINITY MAP



NO SCALE

6700 ALEXANDER BELL DRIVE
SUITE 221
COLUMBIA, MD 21046

BC architects engineers
5661 COLUMBIA PIKE, SUITE 200
FALLS CHURCH, VA 22041-2868

STATE OF MARYLAND
CHRISTOPHER D. MORIN
No. 24552
PROFESSIONAL ENGINEER
7.19.21

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 NUMBER 24552, EXPIRATION DATE 11/17/21.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

DRAWN BY:	CHECKED BY:	APPROVED BY:
GMW	NP	CDM

RFDS REV #: 0

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
A	3/2/21	ISSUED FOR REVIEW
0	4/6/21	ISSUED FOR CONSTRUCTION
1	5/3/21	ISSUED FOR CONSTRUCTION
2	7/19/21	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER
–

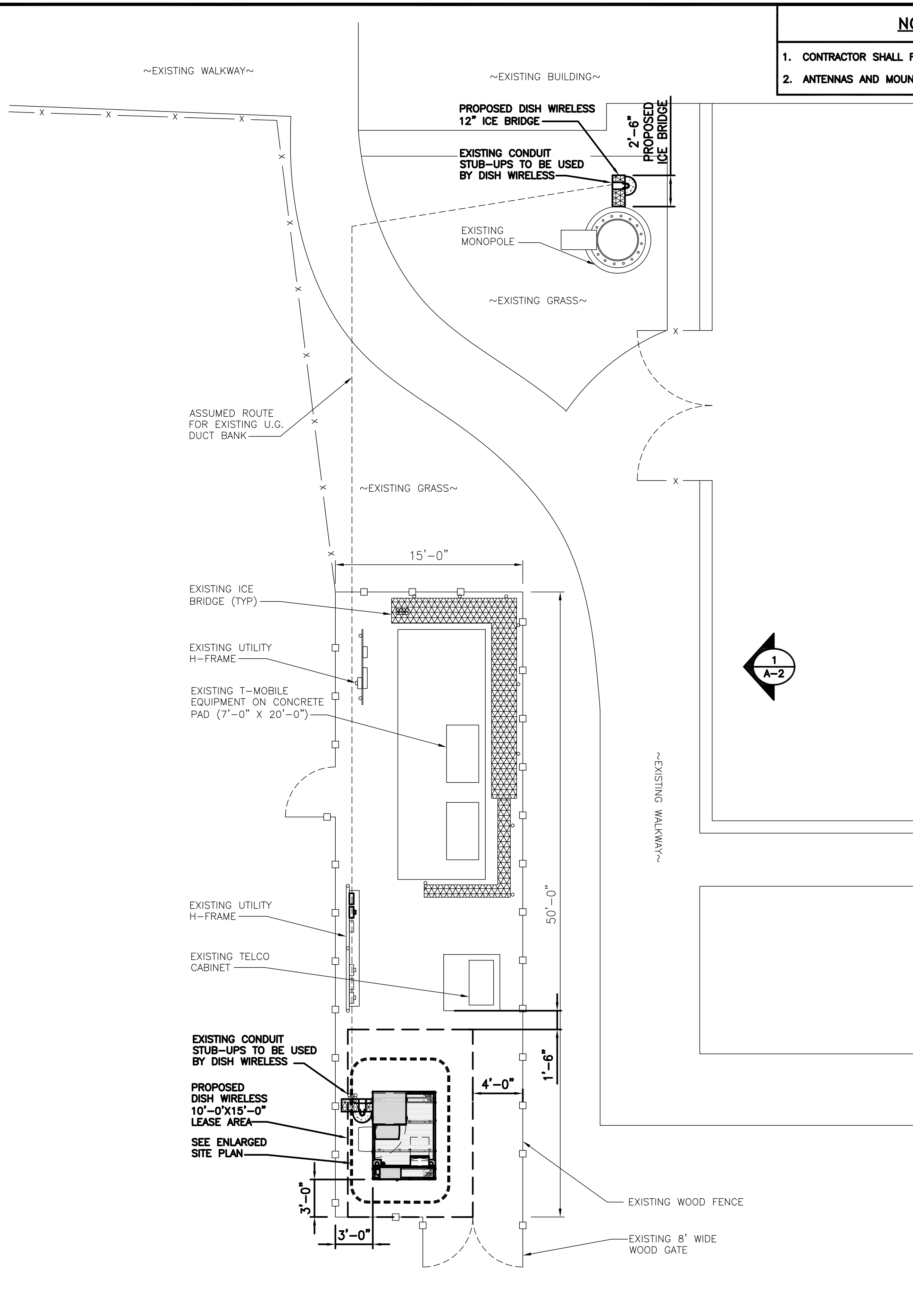
DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
–
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1

NOTES

1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.
2. ANTENNAS AND MOUNTS OMITTED FOR CLARITY.



OVERALL SITE PLAN

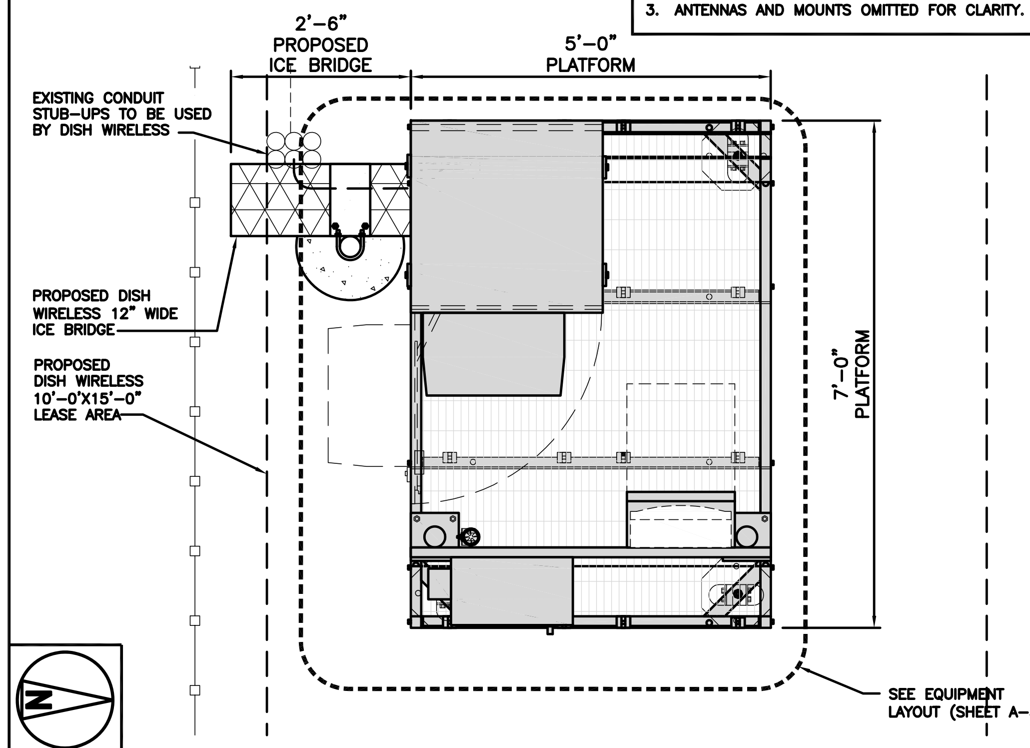
6' 4' 2' 0 5' 10'

3/16"=1'-0"

1

NOTES

1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.
2. CONTRACTOR SHALL MAINTAIN A 10'-0" MINIMUM SEPARATION BETWEEN THE PROPOSED GPS UNIT, TRANSMITTING ANTENNAS AND EXISTING GPS UNITS.
3. ANTENNAS AND MOUNTS OMITTED FOR CLARITY.



ENLARGED SITE PLAN

12" 6" 0 1' 2' 3'

3/4"=1'-0"

2

NOT USED

3

dish wireless.

6700 ALEXANDER BELL DRIVE
SUITE 221
COLUMBIA, MD 21046

BC architects engineers

5661 COLUMBIA PIKE, SUITE 200
FALLS CHURCH, VA 22041-2868

STATE OF MARYLAND · CHRISTOPHER D. MORIN · No. 24552 · PROFESSIONAL ENGINEER · 7/19/21

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DISH WIRELESS PROJECT INFORMATION

DCWDC00428A

–

12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE

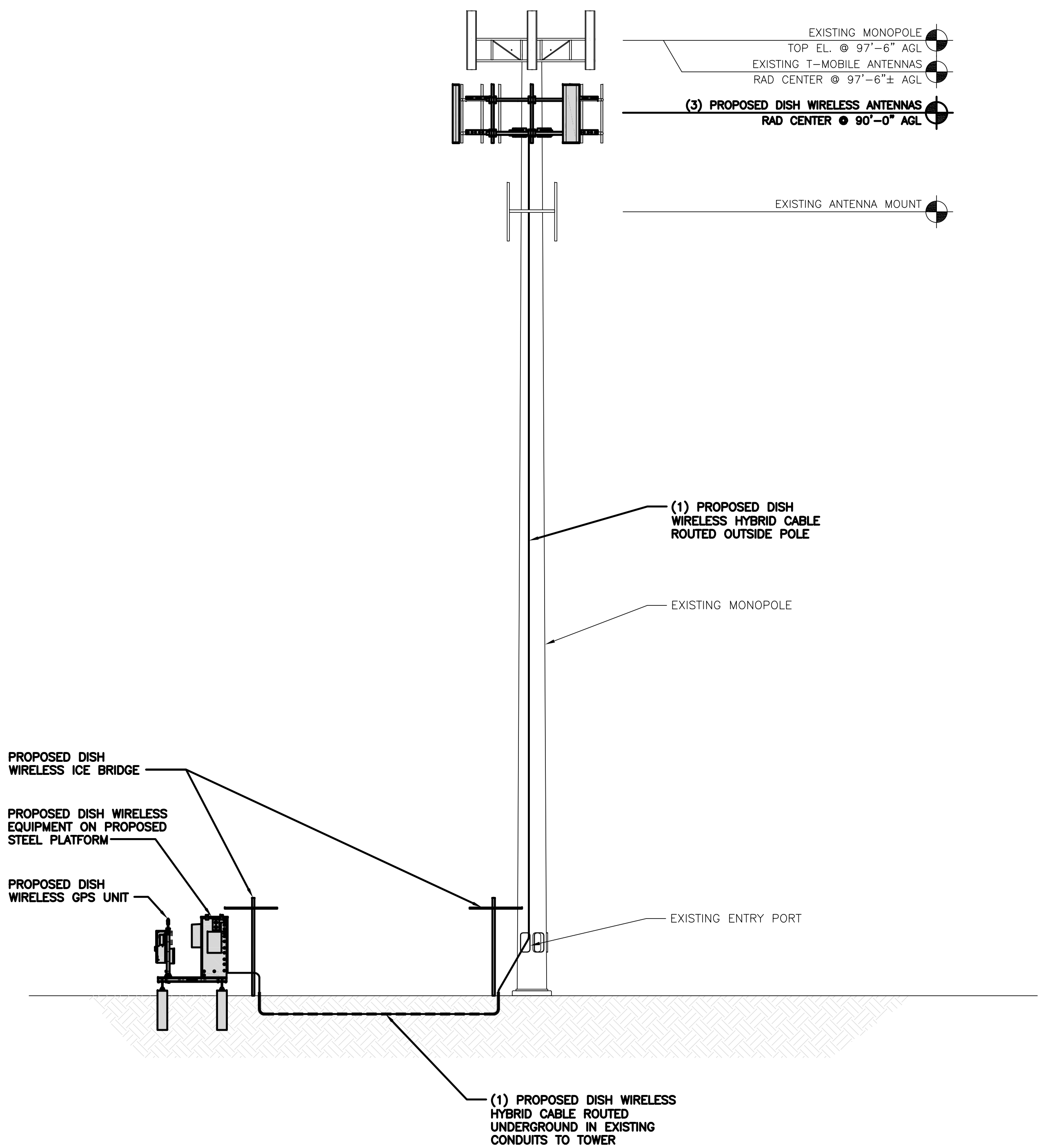
OVERALL AND ENLARGED SITE PLAN

SHEET NUMBER

A-1

NOTES

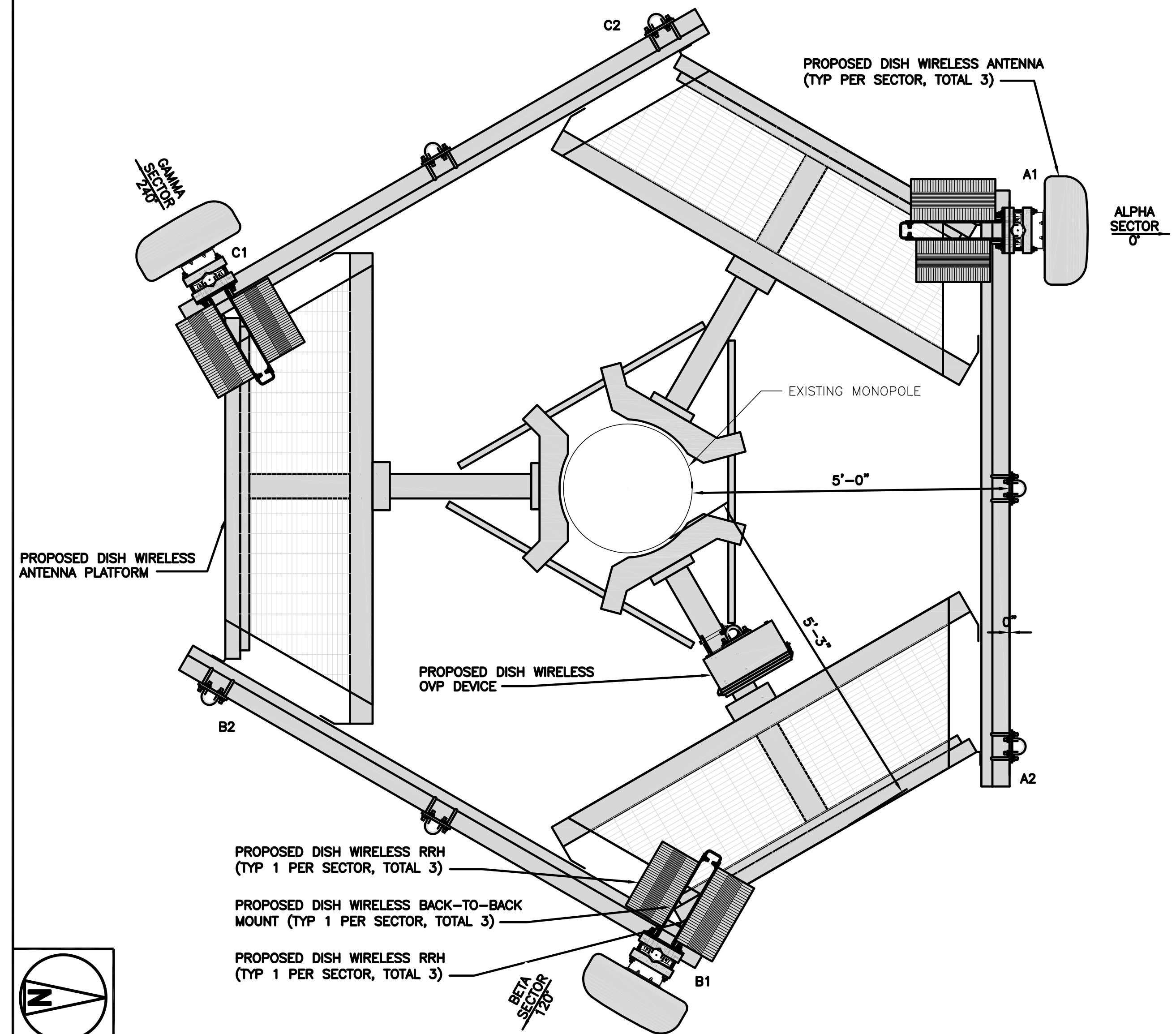
1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.
2. ANTENNA AND MW DISH SPECIFICATIONS REFER TO ANTENNA SCHEDULE AND TO FINAL CONSTRUCTION RFDS FOR ALL RF DETAILS
3. ANTENNAS SHALL BE PAINTED TO MATCH.



PROPOSED ELEVATION

8' 4' 0 8' 16'
1/8"=1'-0"

1



ANTENNA LAYOUT

12" 6" 0 1' 2' 3'
3/4"=1'-0"

2

SECTOR	POSITION	ANTENNA						TRANSMISSION CABLE
		EXISTING OR PROPOSED	MANUFACTURER – MODEL NUMBER	TECHNOLOGY	SIZE (HxW)	AZIMUTH	RAD CENTER	FEED LINE TYPE AND LENGTH
ALPHA	A1	PROPOSED	JMA – MX08FRO665-20_V0F	5G	72.0" x 20.0"	0°	90'-0"	(1) HIGH-CAPACITY HYBRID CABLE (232' LONG)
BETA	B1	PROPOSED	JMA – MX08FRO665-20_V0F	5G	72.0" x 20.0"	120°	90'-0"	
GAMMA	C1	PROPOSED	JMA – MX08FRO665-20_V0F	5G	72.0" x 20.0"	240°	90'-0"	

SECTOR	POSITION	RRH	
		MANUFACTURER – MODEL NUMBER	TECHNOLOGY
ALPHA	A1	FUJITSU – TA08025-B605	N71/N29
	A1	FUJITSU – TA08025-B604	N70/N66
BETA	B1	FUJITSU – TA08025-B605	N71/N29
	B1	FUJITSU – TA08025-B604	N70/N66
GAMMA	C1	FUJITSU – TA08025-B605	N71/N29
	C1	FUJITSU – TA08025-B604	N70/N66

NOTES

1. CONTRACTOR TO REFER TO FINAL CONSTRUCTION RFDS FOR ALL RF DETAILS.
2. ANTENNA AND RRH MODELS MAY CHANGE DUE TO EQUIPMENT AVAILABILITY. ALL EQUIPMENT CHANGES MUST BE APPROVED AND REMAIN IN COMPLIANCE WITH THE PROPOSED DESIGN AND STRUCTURAL ANALYSES.

OVP		
EXISTING OR PROPOSED	MANUFACTURER – MODEL NUMBER	SIZE (HxWxD)
PROPOSED	RAYCAP – RDIDC-9181-PF-48	18.98"x14.39"x8.15"

ANTENNA SCHEDULE

NO SCALE

3

dish wireless.

6700 ALEXANDER BELL DRIVE
SUITE 221
COLUMBIA, MD 21046

BC architects engineers

5661 COLUMBIA PIKE, SUITE 200
FALLS CHURCH, VA 22041-2868

STATE OF MARYLAND
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7/19/21

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A&E PROJECT NUMBER

–

DISH WIRELESS PROJECT INFORMATION

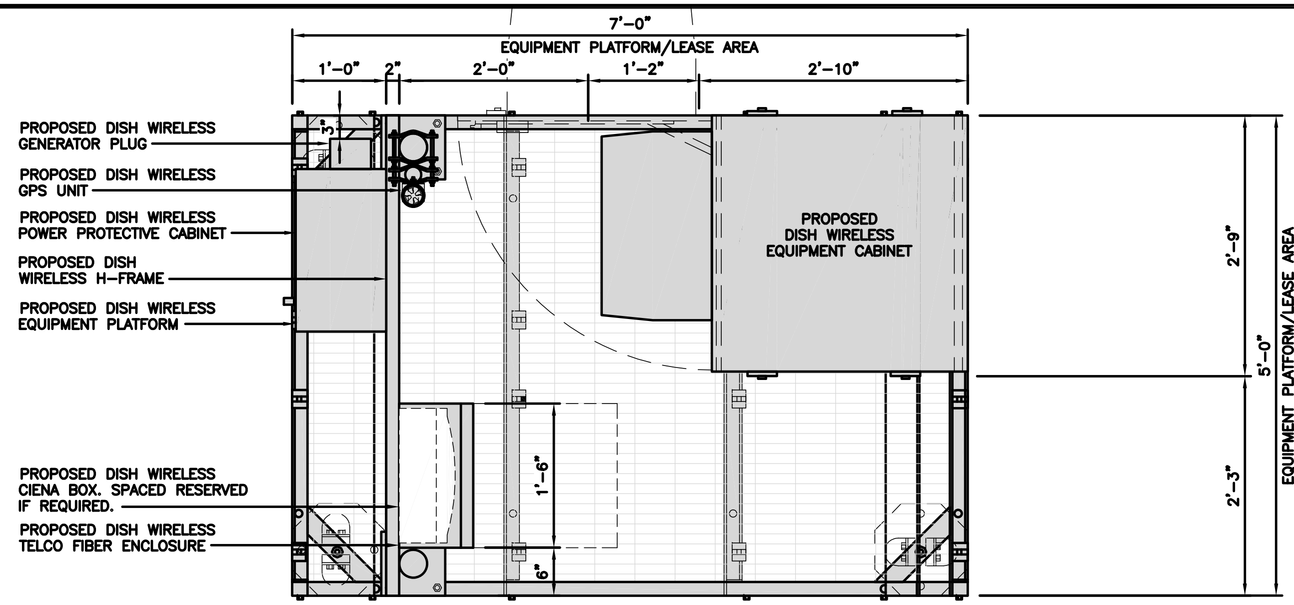
DCWDC00428A
–
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE

ELEVATION, ANTENNA LAYOUT AND SCHEDULE

SHEET NUMBER

A-2



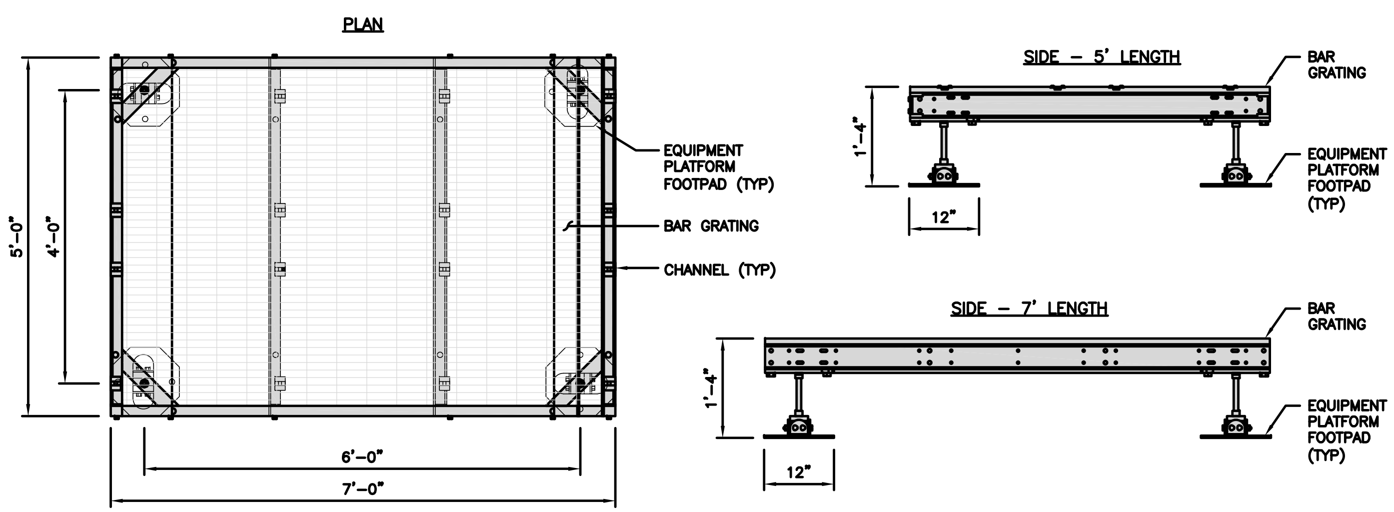
PLATFORM EQUIPMENT PLAN

12" 9" 6" 3" 0 1' 2'

1"=1'-0"

1

COMMSCOPE MTC4045LP 5X7 PLATFORM	
DIMENSIONS (HxWxD)	16"x84"x60"
TOTAL WEIGHT	423 LBS

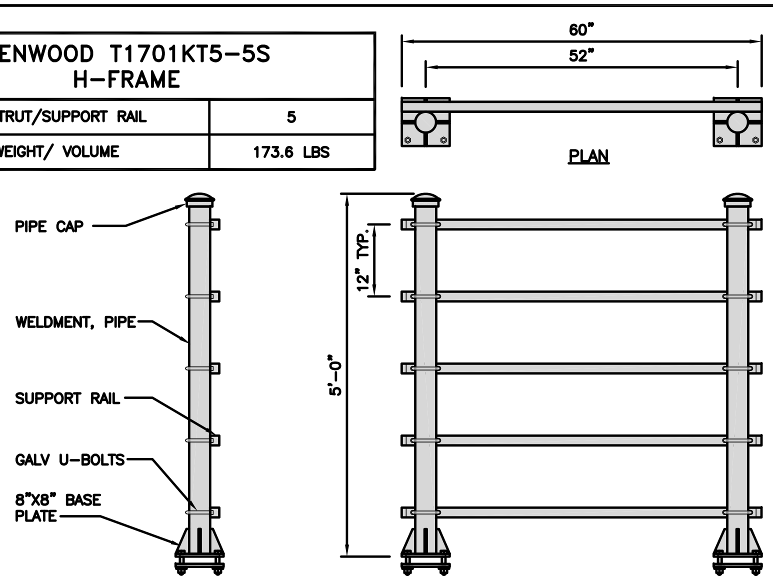


PLATFORM DETAIL

NO SCALE

2

KENWOOD T1701KT5-5S H-FRAME	
UNISTRUT/SUPPORT RAIL	5
WEIGHT/ VOLUME	173.6 LBS



H-FRAME DETAIL

NO SCALE

3

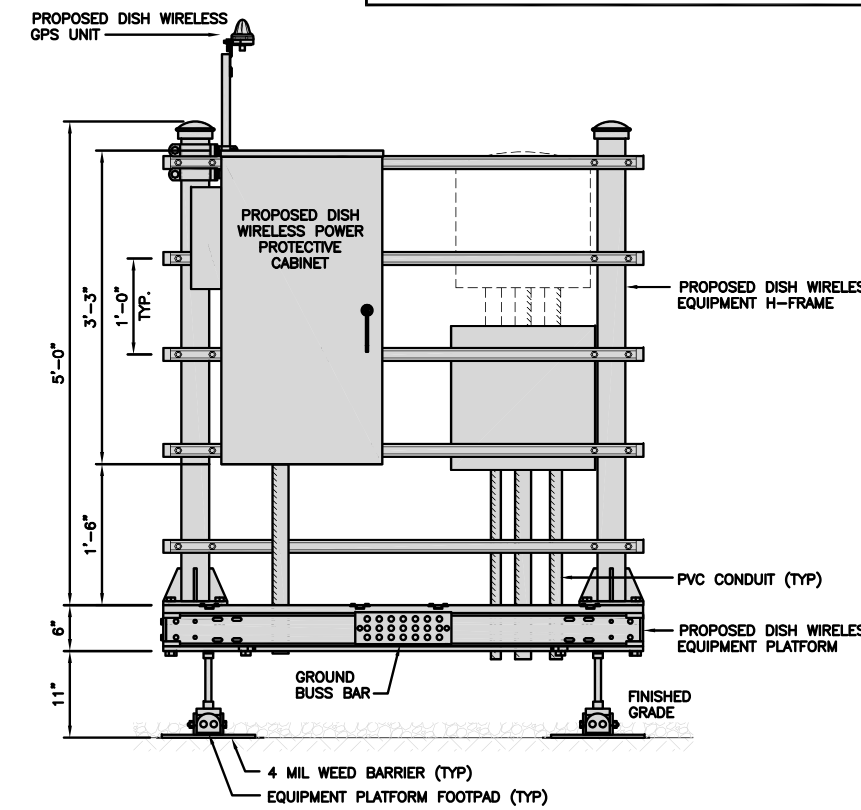
NOT USED

NO SCALE

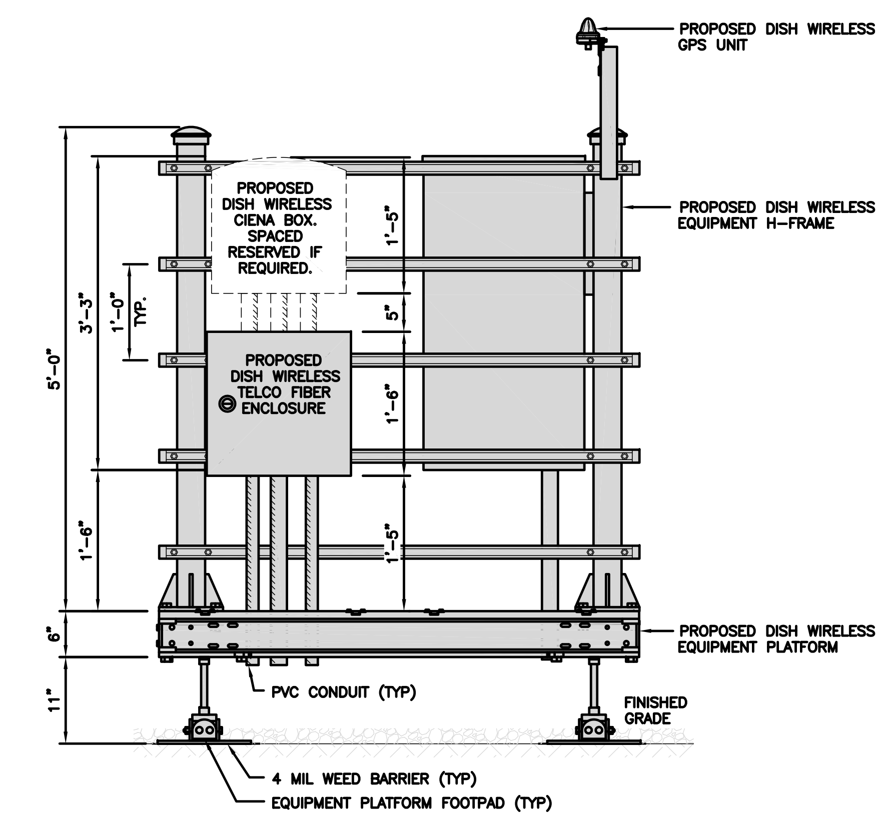
4

NOTES

1. CONTRACTOR TO BURY PLATFORM FEET WITH A MINIMUM OF 2" OF FILL PER EXISTING SITE SURFACE
2. WEED BARRIER FABRIC TO BE ADDED AT DISCRETION OF DISH WIRELESS CONSTRUCTION MANAGER AT TIME OF CONSTRUCTION. ONE SHEET 8'x8' INSTALLED UNDER ALL FOUR FEET OF THE PLATFORM (4 MIL BLACK PLASTIC)
3. EQUIPMENT CABINET OMITTED FOR CLARITY



FRONT ELEVATION



BACK ELEVATION

H-FRAME EQUIPMENT ELEVATION

12" 9" 6" 3" 0 1' 2'

1"=1'-0"

5

dish wireless.

6700 ALEXANDER BELL DRIVE
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DISH WIRELESS PROJECT INFORMATION

DCWDC00428A

–

12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

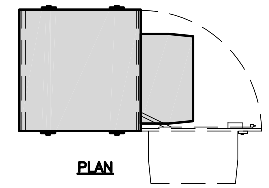
SHEET TITLE

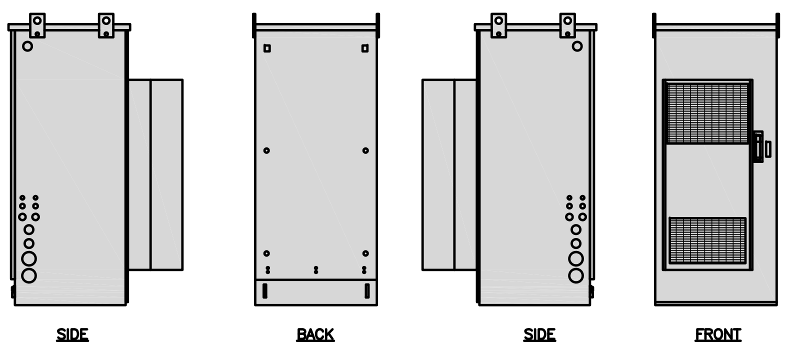
EQUIPMENT PLATFORM AND H-FRAME DETAILS

SHEET NUMBER

A-3

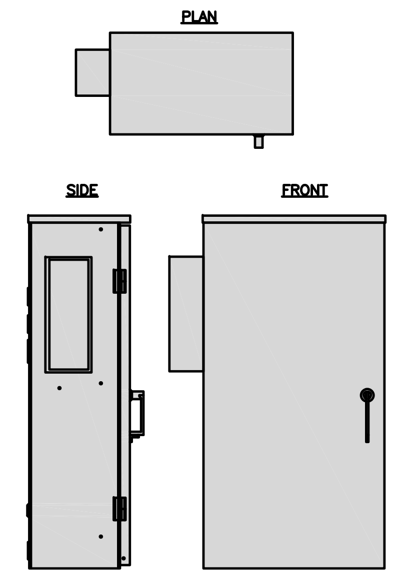
CHARLES INDUSTRY PM639155N4 AC CABINET	
DIMENSIONS (HxWxD):	74"x32"x32"
POWER PLANT:	48VDC ABB
HVAC	6000W DC
TOTAL WEIGHT (EMPTY)	394 LBS





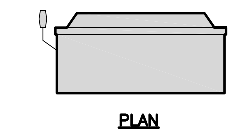
CABINET DETAIL — NO SCALE — 1

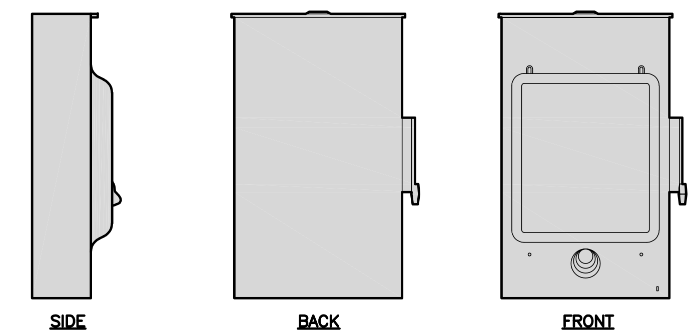
RAYCAP RDIAC-6512-P-240-MTS POWER & TELCO PROTECTION CABINET	
DIMENSIONS (HxWxD)	40"x20"x10"
WEIGHT/ VOLUME	124 LBS
MANUAL TRANSFER SWITCH	200A
LOAD CENTER	30 POSITION
MAIN BREAKER	200A, 65kA AIC
GENERATOR RECEPTACLE	CAMLOCK
NEMA RATING	3R POWDER COATED ALUMINUM
SURGE PROTECTION DEVICE	UL 1449 4TH EDITION LISTED



POWER PROTECTION CABINET (PPC) DETAIL — NO SCALE — 2

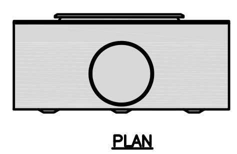
SQUARE D SAFETY SWITCH D324NRB	
ENCLOSURE DIM (HxWxD)	29.25"x17.25"x8.25"
TOTAL WEIGHT (EMPTY)	45.33 LBS
MAX VOLTAGE/AMPS/WATT	240V/200A/48000W
ENCLOSURE RATING	OUTDOOR NEMA 3R

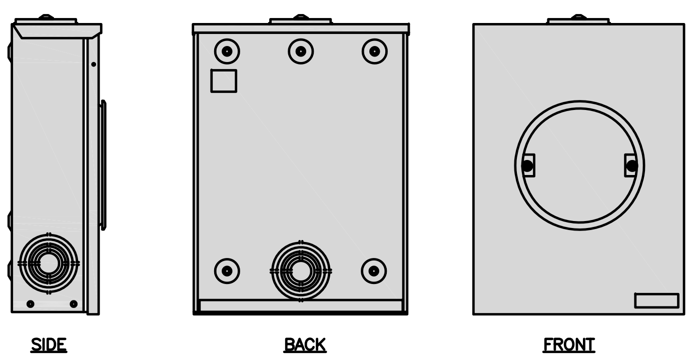




SAFETY SWITCH — NO SCALE — 3

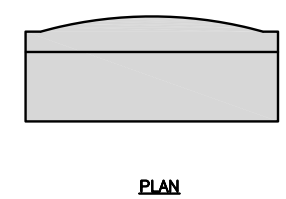
EATON METER SOCKET UNRRS213BEUSE	
METER SOCKET TYPE	RING
ENCLOSURE DIM (HxWxD)	16"x12"x6"
MAIN AMPERE RATING	200A
WEIGHT	18 LBS

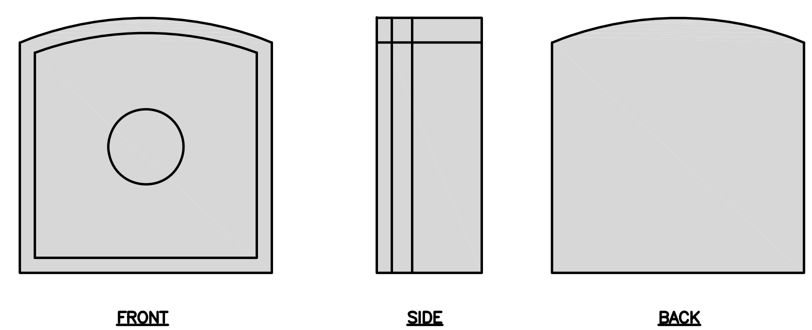




METER SOCKET DETAIL — NO SCALE — 4

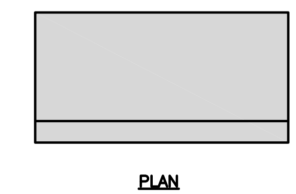
CIENA 3931 SERVICE DELIVERY SWITCH	
DIMENSIONS (HxWxD)	17.0"x16.8"x7.0" 431x427x178mm
WEIGHT	28.6 LBS/13.0 KG
POWER INPUT	60W MAX

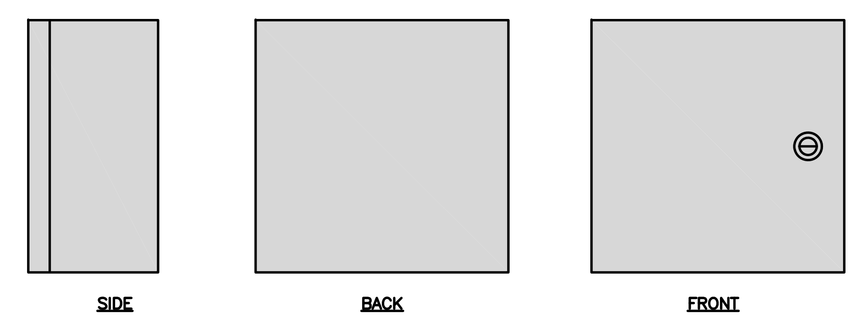




CIENA DETAIL — NO SCALE — 5

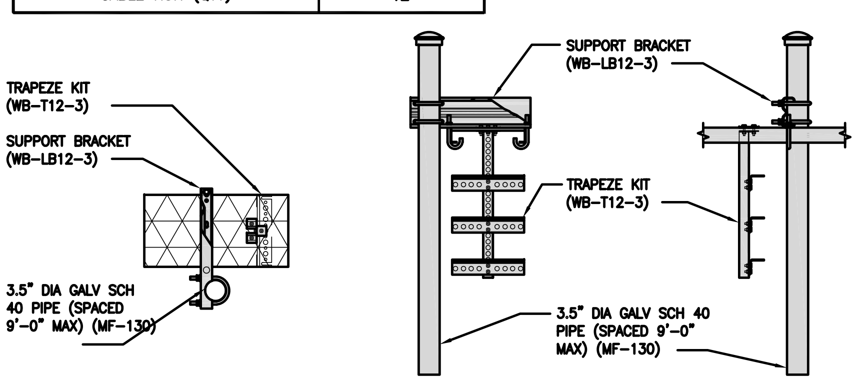
CHARLES FIBER TELCO ENCLOSURE CUBE-MP1818WB-A	
ENCLOSURE DIM (HxWxD)	18.0"x18.0"x9.25"
NEMA RATING	4X
THERMAL	SEALED
MOUNTING BACKBOARD	WOOD



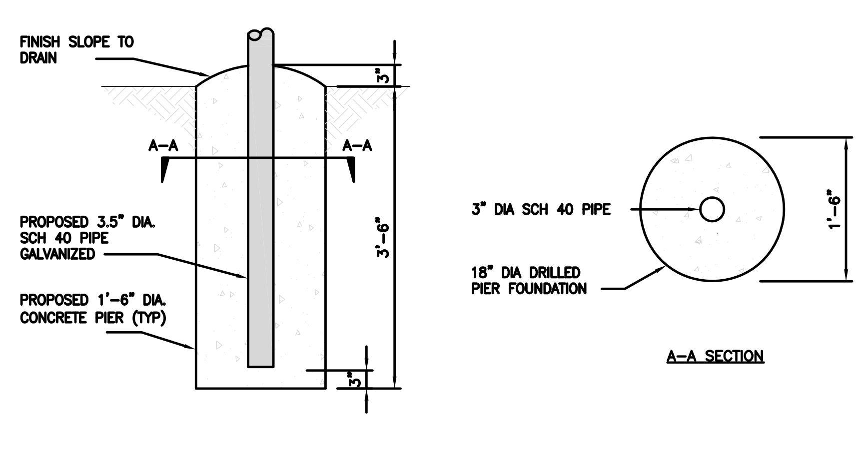


FIBER TELCO ENCLOSURE DETAIL — NO SCALE — 6

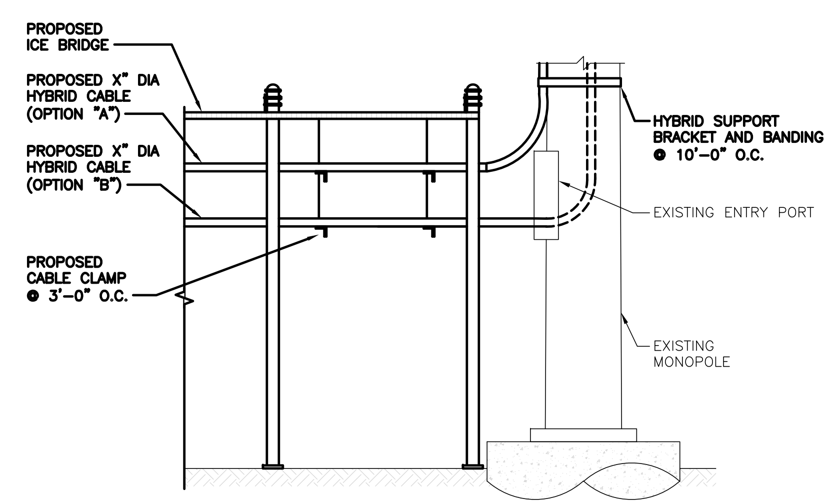
COMMSCOPE WB-K110-B WAVEGUIDE BRIDGE KIT		INCLUDED PRODUCTS:	WB-T12-3 TRAPEZE KIT, 3 RUNGS WB-LB12-3 SUPPORT BRACKET MF-130 DIRECT BURIAL PIPE COLUMN, 13'-4"
DIMENSIONS (HxL)	160"x10'		
WEIGHT/ VOLUME	325.0 LBS		
CABLE RUN (QTY)	12		



ICE BRIDGE DETAIL — NO SCALE — 7



TYPICAL ICE BRIDGE CONCRETE PIER DETAIL — NO SCALE — 8



HYBRID CABLE RUN — NO SCALE — 9

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FALLS CHURCH, VA 22041-2868

STATE OF MARYLAND CHRISTOPHER D. MORIN No. 24552 PROFESSIONAL ENGINEER 7/19/21

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 NUMBER 24552, EXPIRATION DATE 11/17/21.

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DRAWN BY:	CHECKED BY:	APPROVED BY:
GMW	NP	CDM

RFDS REV #: 0

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2	7/19/21	ISSUED FOR CONSTRUCTION

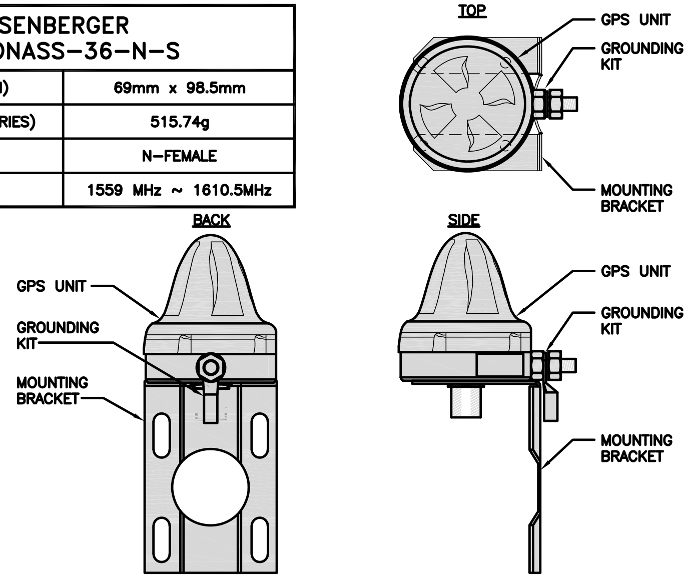
A&E PROJECT NUMBER
-

DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
-
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

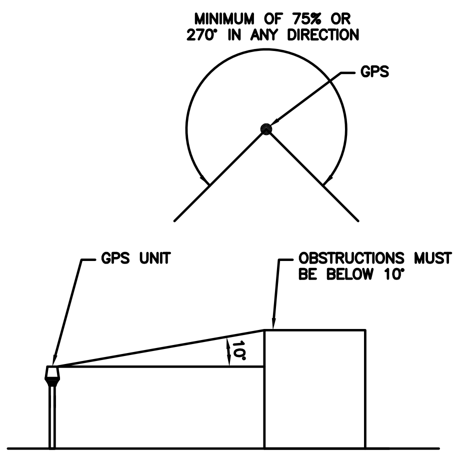
SHEET TITLE
EQUIPMENT DETAILS

SHEET NUMBER
A-4

ROSENBERGER GPSGLONASS-36-N-S	
DIMENSION (DIA x H)	69mm x 98.5mm
WEIGHT (WITH ACCESSORIES)	515.74g
CONNECTOR	N-FEMALE
FREQUENCY RANGE	1559 MHz ~ 1610.5MHz



GPS ANTENNA DETAIL — NO SCALE — 1



GPS MINIMUM SKY VIEW REQUIREMENTS — NO SCALE — 2

NOT USED — NO SCALE — 3

5G HYBRID CALCULATOR

The preparer inputs values into the yellow cells.

DESC	QTY	The preparer must determine the lengths below.
SITE ID #:	DCWDC00428A	
TWR TYPE:	Monopole	
HYBRID BEND RADIUS	30"	
RAD CENTER (ft)	90.0	This is the RAD center for the antennas on towers. For a rooftop, this is the total length of all vertical sections of the hybrid.
ICE BRIDGE HEIGHT (ft)	10.0	This is the height of the bridge coverings.
ICE BRIDGE LENGTH (ft)	10.0	This is the length of the total ice bridge coverings, if more than one ice bridge is used or total horizontal lengths of hybrid if this is inside a building.
LENGTH ACROSS PLATFORM (ft)	10.0	This is the length from the cabinet to the first bend up the ice bridge or inside a radio room.
LENGTH FROM TOWER TOP TO OVP (ft)	5.0	This is the horizontal length from the tower to the OVP at the antenna level or the total horizontal lengths of hybrid on a building or large self supporting tower.
VERTICAL LENGTH OF HYBRID INTO TOWER TOP OVP (ft)	1.0	This is the vertical length of hybrid that comes out to the tower top OVP to the beginning of the first bend that is going into the monopole port.
	LENGTH (ft)	
Additional Excess Hybrid to be added (To be determined by preparer)	100	
Total Hybrid Length to Order (Rounded up to nearest whole number)	232	

CUI12PSM6P4-232	Hybrid Part Number

Notes:

Reference Information

Cables Unlimited Inc. PART NUMBER PREFIX (ADD CALCULATED LENGTH TO THE END OF THE PART NUMBER)	SERVICE LENGTH	CABLE DIAMETER	CONDUCTOR SIZE
CUI12PSM9P8-	< 120'	1.41"	8 AWG
CUI12PSM9P6-	120' to 180'	1.60"	6 AWG
CUI12PSM6P4-	> 180'	1.75"	4 AWG

5G HYBRID CALCULATOR — NO SCALE — 4

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A&E PROJECT NUMBER
–

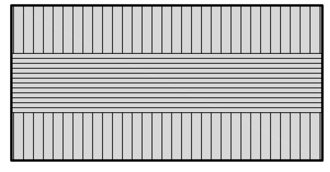
DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
–
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

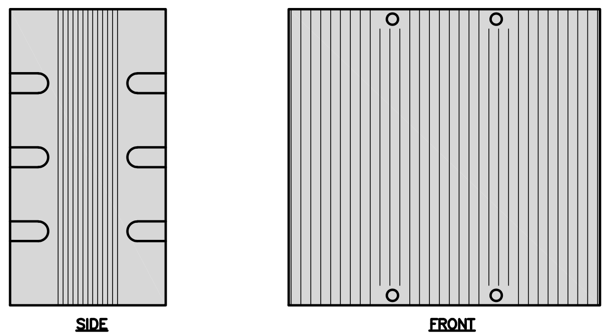
SHEET TITLE
EQUIPMENT DETAILS

SHEET NUMBER
A-5

FUJITSU TA08025-B604 RRH

DIMENSIONS (HxWxD) (KG/IN)	380x400x200/14.9"x15.7"x7.8"
WEIGHT(KG,LB)/ VOLUME	29kg,63.9lb/ 30L
POWER SUPPLY	DC-58~-36V

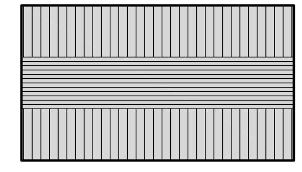


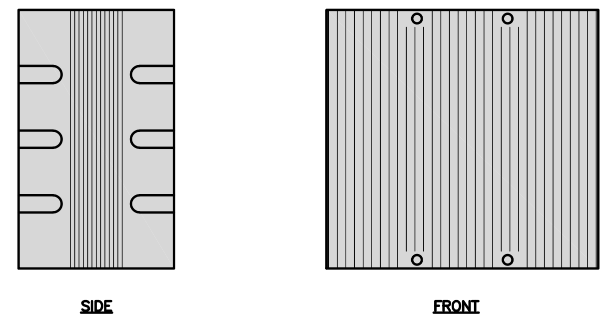


REMOTE RADIO HEAD DETAIL | NO SCALE | 1

FUJITSU TA08025-B605 RRH

DIMENSIONS (HxWxD) (KG/IN)	380x400x230/14.9"x15.7"x9.0"
WEIGHT(KG,LB)/ VOLUME	34kg,74.9lb/ 35L
POWER SUPPLY	DC-58~-36V

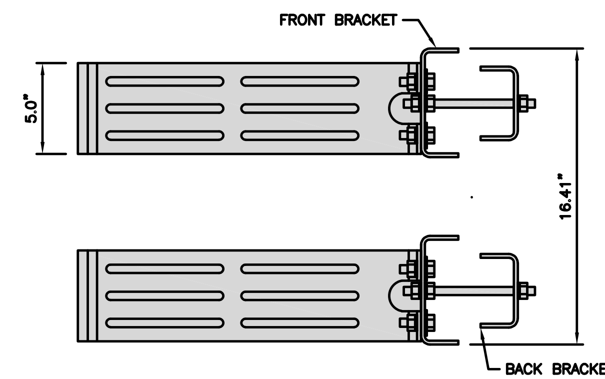


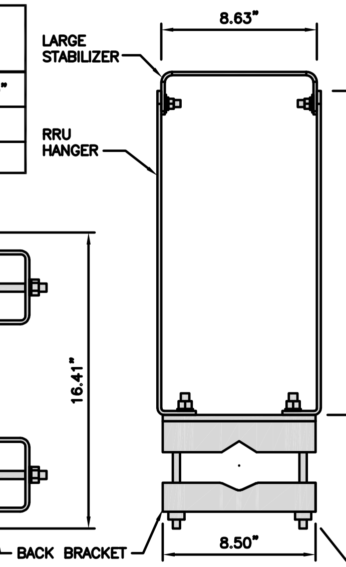


REMOTE RADIO HEAD DETAIL | NO SCALE | 2

COMMSCOPE BACK-TO-BACK MOUNT RR-FA2

DIMENSIONS (HxWxD)	16.41"x18.0"x3.0"
WEIGHT	39.22 lb
PACKAGE QUANTITY	2

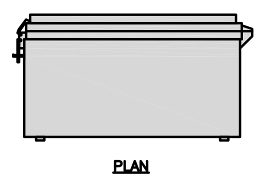


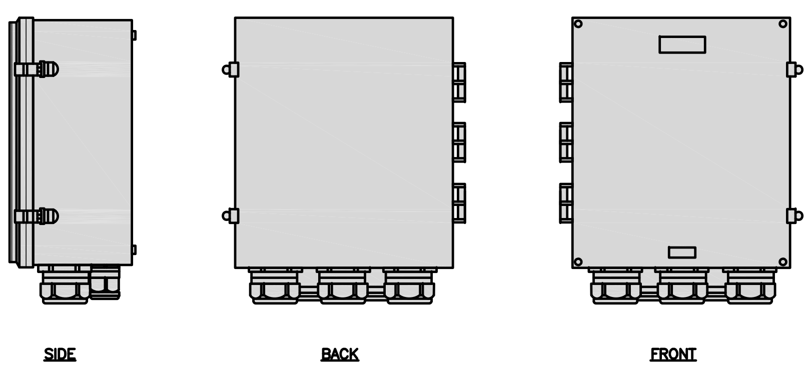


REMOTE RADIO MOUNT DETAIL | NO SCALE | 3

RAYCAP RDIDC-9181-PF-48 DC SURGE PROTECTION

DIMENSIONS (HxWxD)	18.98"x14.39"x8.15"
WEIGHT	21.82 LBS

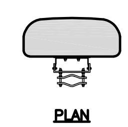


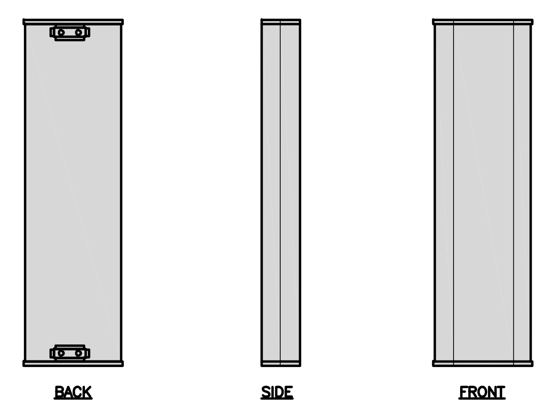


SURGE SUPPRESSION DETAIL | NO SCALE | 4

JMA WIRELESS MX08FRO665-20 ANTENNA

DIMENSIONS (HxWxD)	72.0"x20.0"x8.0"
TOTAL WEIGHT	54 LB
RF PORTS, CONNECTOR TYPE	8 x 4.3-10 FEMALE

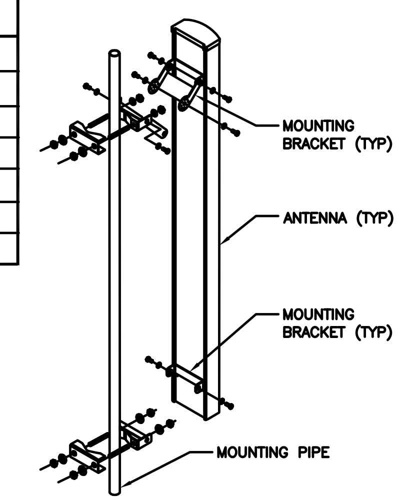




ANTENNA DETAIL | NO SCALE | 5

M04 MOUNTING BRACKET HPA-33R-BUU-H4-K

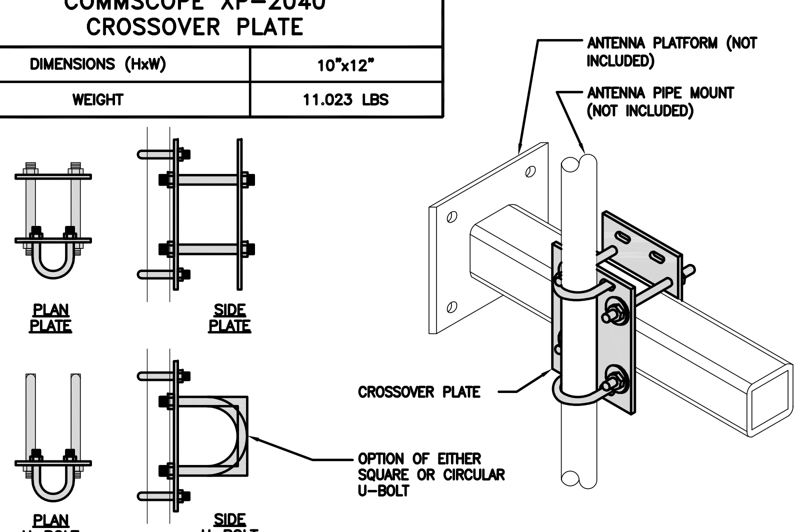
WIDTH	5" (135mm)
DEPTH	2" (51mm)
HEIGHT	8" (213mm)
TOTAL WEIGHT (WITH BRACKETS)	1.5 LBS (15.50 Kg)
HOUSING MATERIAL	ASA/ABS/ALUMINUM
RADOME COLOR	LIGHT GRAY
CONNECTOR	1X8-PIN DAISY CHAIN



ANTENNA MOUNTING DETAIL | NO SCALE | 6

COMMSCOPE XP-2040 CROSSOVER PLATE

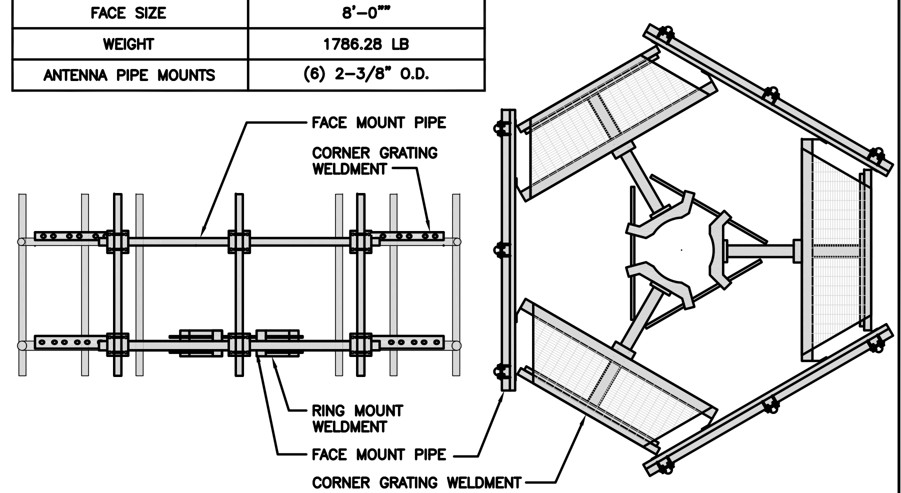
DIMENSIONS (HxW)	10"x12"
WEIGHT	11.023 LBS



RRH/OVP MOUNT DETAIL | NO SCALE | 7

SITEPRO1 SNP8HR-396 SNUB-NOSE PLATFORM

FACE SIZE	8'-0""
WEIGHT	1786.28 LB
ANTENNA PIPE MOUNTS	(6) 2-3/8" O.D.



ANTENNA PLATFORM DETAIL | NO SCALE | 8

NO SCALE | 9

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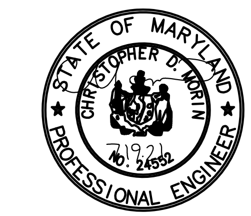

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DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
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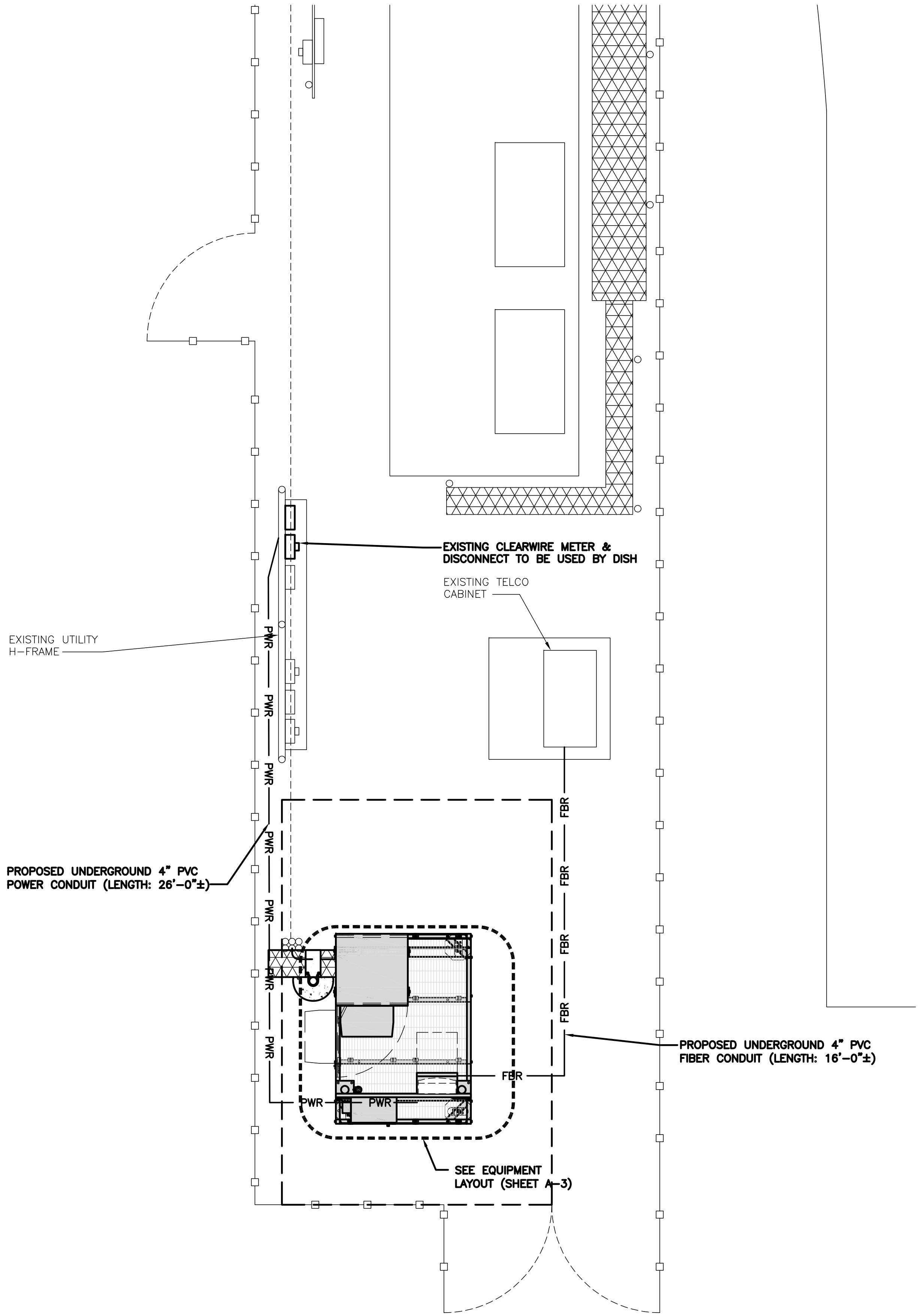
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
EQUIPMENT DETAILS

SHEET NUMBER
A-6



NOTES

1. CONTRACTOR SHALL FIELD VERIFY ALL PROPOSED UNDERGROUND UTILITY CONDUIT ROUTE.
2. ANTENNAS AND MOUNTS OMITTED FOR CLARITY.

UTILITY ROUTE PLAN — 3/8"=1'-0" — 1

DC POWER WIRING SHALL BE COLOR CODED AT EACH END FOR IDENTIFYING +24V AND −48V CONDUCTORS. RED MARKINGS SHALL IDENTIFY +24V AND BLUE MARKINGS SHALL IDENTIFY −48V.

1. CONTRACTOR SHALL INSPECT THE EXISTING CONDITIONS PRIOR TO SUBMITTING A BID. ANY QUESTIONS ARISING DURING THE BID PERIOD IN REGARDS TO THE CONTRACTOR'S 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. ALL ELECTRICAL WORK SHALL BE DONE IN ACCORDANCE WITH CURRENT NATIONAL ELECTRICAL CODES AND ALL STATE AND LOCAL CODES, LAWS, AND ORDINANCES. PROVIDE ALL COMPONENTS AND WIRING SIZES AS REQUIRED TO MEET NEC STANDARDS.
3. LOCATION OF EQUIPMENT, CONDUIT AND DEVICES SHOWN ON THE DRAWINGS ARE APPROXIMATE AND SHALL BE COORDINATED WITH FIELD CONDITIONS PRIOR TO CONSTRUCTION.
4. CONDUIT ROUGH-IN SHALL BE COORDINATED WITH THE MECHANICAL EQUIPMENT TO AVOID LOCATION CONFLICTS. VERIFY WITH THE MECHANICAL EQUIPMENT CONTRACTOR AND COMPLY AS REQUIRED.
5. CONTRACTOR SHALL PROVIDE ALL BREAKERS, CONDUITS AND CIRCUITS AS REQUIRED FOR A COMPLETE SYSTEM.
6. CONTRACTOR SHALL PROVIDE PULL BOXES AND JUNCTION BOXES AS REQUIRED BY THE NEC ARTICLE 314.
7. CONTRACTOR SHALL PROVIDE ALL STRAIN RELIEF AND CABLE SUPPORTS FOR ALL CABLE ASSEMBLIES. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS.
8. ALL DISCONNECTS AND CONTROLLING DEVICES SHALL BE PROVIDED WITH ENGRAVED PHENOLIC NAMEPLATES INDICATING EQUIPMENT CONTROLLED, BRANCH CIRCUITS INSTALLED ON, AND PANEL FIELD LOCATIONS FED FROM.
9. INSTALL AN EQUIPMENT GROUNDING CONDUCTOR IN ALL CONDUITS PER THE SPECIFICATIONS AND NEC 250. THE EQUIPMENT GROUNDING CONDUCTORS SHALL BE BONDED AT ALL JUNCTION BOXES, PULL BOXES, AND ALL DISCONNECT SWITCHES, AND EQUIPMENT CABINETS.
10. ALL NEW MATERIAL SHALL HAVE A U.L. LABEL.
11. PANEL SCHEDULE LOADING AND CIRCUIT ARRANGEMENTS REFLECT POST-CONSTRUCTION EQUIPMENT.
12. CONTRACTOR SHALL BE RESPONSIBLE FOR AS-BUILT PANEL SCHEDULE AND SITE DRAWINGS.

ELECTRICAL NOTES — NO SCALE — 2

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DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
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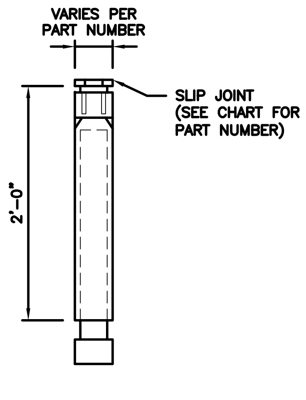
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
ELECTRICAL/FIBER ROUTE PLAN AND NOTES

SHEET NUMBER
E-1

CARLON EXPANSION FITTINGS

COUPLING END PART#	MALE TERMINAL ADAPTER END PART#	SIZE	STD CTN QTY.	TRAVEL LENGTH
E945D	E945DX	1/2"	20	4"
E945E	E945EX	3/4"	15	4"
E945F	E945FX	1"	10	4"
E945G	E945GX	1 1/4"	5	4"
E945H	E945HX	1 1/2"	5	4"
E945J	E945JX	2"	15	8"
E945K	E945KX	2 1/2"	10	8"
E945L	E945LX	3"	10	8"
E945M	E945MX	3 1/2"	5	8"
E945N	E945NX	4"	5	8"
E945P	E945PX	5"	1	8"
E945R	E945RX	6"	1	8"

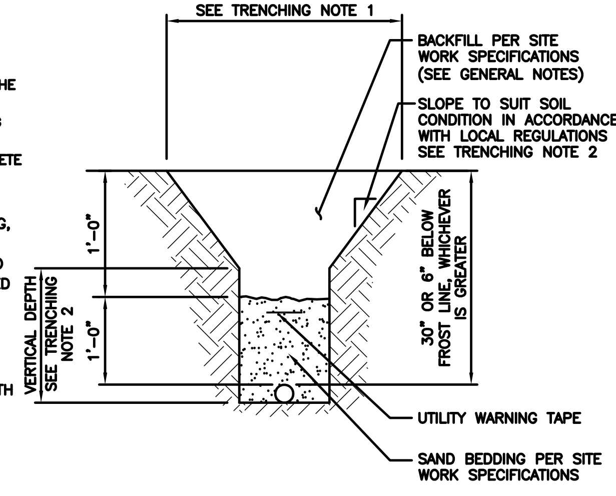


NOTE:
CONTRACTOR TO INSTALL EXPANSION FITTING SLIP JOINT AT METER CENTER CONDUIT TERMINATION, AS PER LOCAL UTILITY POLICY, ORDINANCE AND/OR SPECIFIED REQUIREMENT.

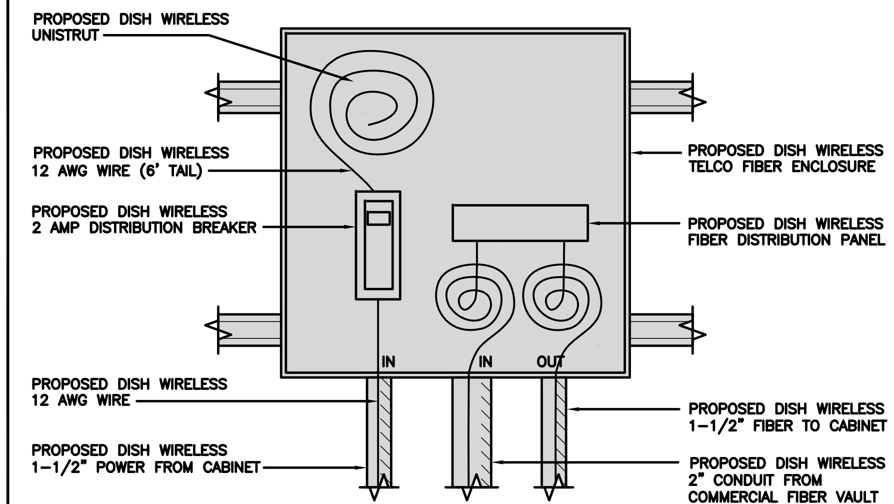
EXPANSION JOINT DETAIL | NO SCALE | 1

TRENCHING NOTES

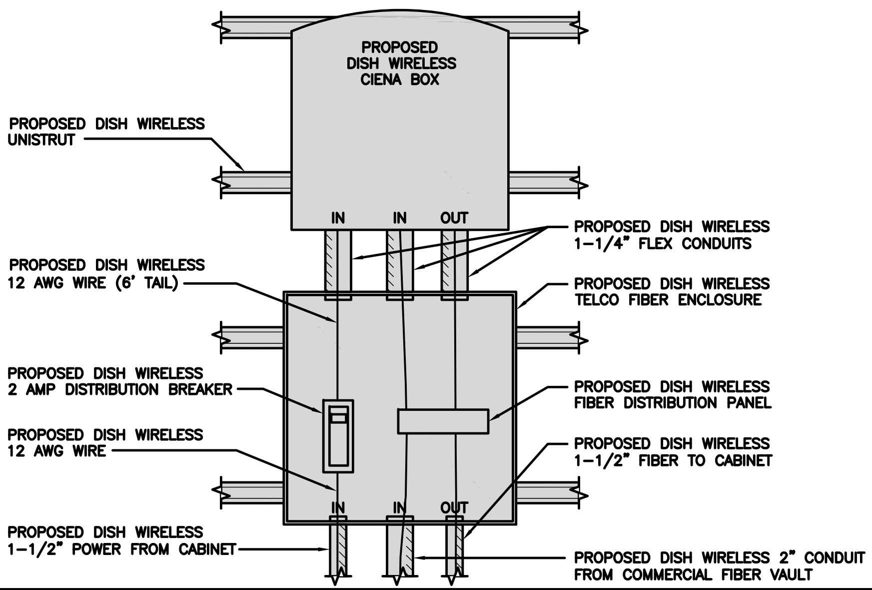
1. CONTRACTOR SHALL RESTORE THE TRENCH TO ITS ORIGINAL CONDITIONS BY EITHER SEEDING OR SODDING GRASS AREAS, OR REPLACING ASPHALT OR CONCRETE AREAS TO ITS ORIGINAL CROSS SECTION.
2. TRENCHING SAFETY; INCLUDING, BUT NOT LIMITED TO SOIL CLASSIFICATION, SLOPING, AND SHORING, SHALL BE GOVERNED BY THE CURRENT OSHA TRENCHING AND EXCAVATION SAFETY STANDARDS.
3. ALL CONDUITS SHALL BE INSTALLED IN COMPLIANCE WITH THE CURRENT NATIONAL ELECTRIC CODE (NEC) OR AS REQUIRED BY THE LOCAL JURISDICTION, WHICHEVER IS THE MOST STRINGENT.



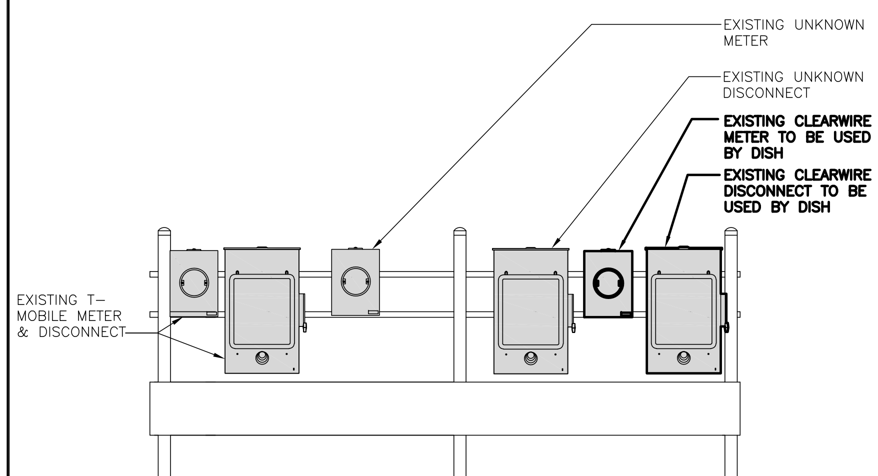
TYPICAL UNDERGROUND TRENCH DETAIL | NO SCALE | 2



DARK TELCO BOX – INTERIOR WIRING LAYOUT | NO SCALE | 3



LIT TELCO BOX – INTERIOR WIRING LAYOUT (OPTIONAL) | NO SCALE | 4



EXISTING BACKBOARD | NO SCALE | 5

NOT USED | NO SCALE | 6

NOT USED | NO SCALE | 7

NOT USED | NO SCALE | 8

NOT USED | NO SCALE | 9

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STATE OF MARYLAND
CHRISTOPHER D. MORIN
No. 24552
PROFESSIONAL ENGINEER
7/19/21

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 NUMBER 24552, EXPIRATION DATE 11/17/21.

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DRAWN BY:	CHECKED BY:	APPROVED BY:
GMW	NP	CDM

RFDS REV #: 0

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2	7/19/21	ISSUED FOR CONSTRUCTION

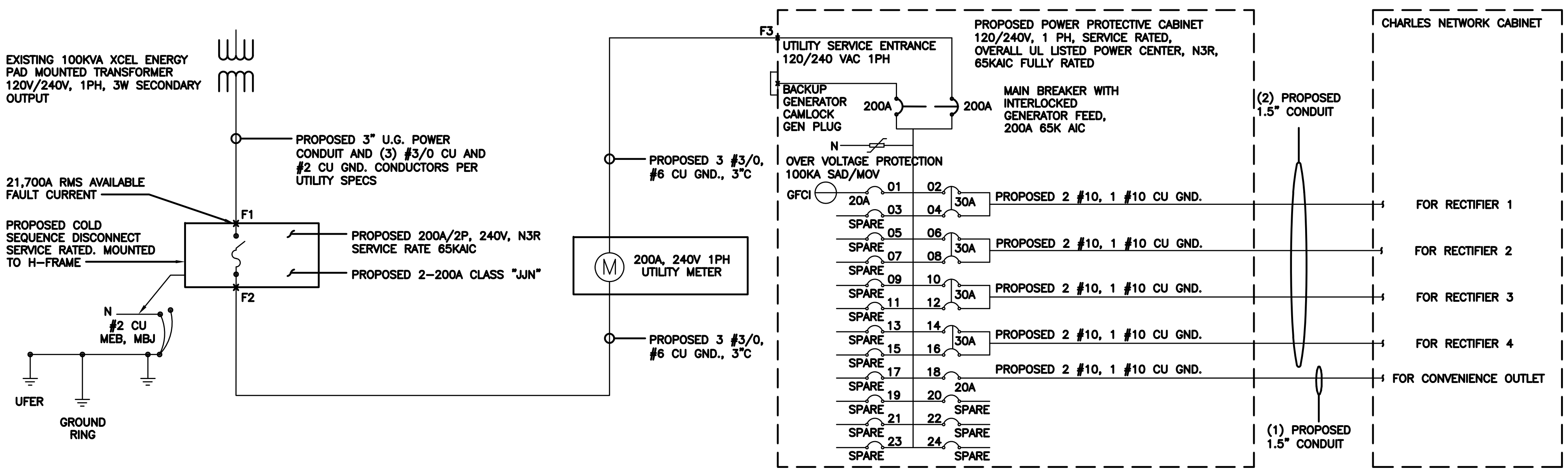
A&E PROJECT NUMBER
–

DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
–
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
ELECTRICAL DETAILS

SHEET NUMBER
E-2

ONE-LIINE RISER DIAGRAM



NOTES

THERE ARE A TOTAL OF (10) CURRENT CARRYING CONDUCTORS IN A SINGLE CONDUIT. ADJUSTABLE FACTOR OF 50% PER NEC TABLE 310.15(B)(3)(a) SHALL APPLY.

#10 FOR 15A/1P BREAKER: 0.5 x 40A = 15.0A
#8 FOR 20A-25A/2P BREAKER: 0.5 x 55A = 27.5A
#6 FOR 30A-35A/2P BREAKER: 0.5 x 75A = 37.5A
#4 FOR 40A-45A/2P BREAKER: 0.5 x 95A = 47.5A

CONDUIT SIZING: ASSUME 1.5" EMT
AT 40% FILL PER NEC 358, TABLE 4 – 0.814A SQ. IN AREA

WIRES: USING THWN-2, CU. (INCLUDING 3 GROUND WIRES)
#6 – 0.0507 SQ. IN X 8 = 0.4056 SQ. IN
#8 – 0.0366 SQ. IN X 2 = 0.0732 SQ. IN
#10 – 0.0211 SQ. IN X 4 = 0.0844 SQ. IN <GROUND
#12 – 0.0133 SQ. IN X 1 = 0.0133 SQ. IN <GROUND
TOTAL = 0.5765 SQ. IN

1.5" EMT CONDUIT IS ADEQUATE TO HANDLE THE TOTAL OF (15) WIRES, INCLUDING GROUND WIRE, AS INDICATED ABOVE.

CONDUIT SIZING: ASSUME 3.0" SCH 40 PVC
AT 40% FILL PER NEC 352,TABLE 4 – 1.216A SQ. IN AREA

WIRES: USING THHN, CU. (INCLUDING 2 GROUND WIRES)
#3/0 – 0.1318 SQ. IN X 3 = 0.3954 SQ. IN
#2 – 0.0521 SQ. IN X 1 = 0.0521 SQ. IN
TOTAL = 0.4475 SQ. IN

3.0" EMT CONDUIT IS ADEQUATE TO HANDLE THE TOTAL OF (3) WIRES, INCLUDING GROUND WIRE, AS INDICATED ABOVE.

(CHARLES ABB GE INFINITY DC PLANT) WITH SINGLE-METER 120V240V 1PH SOURCE | NO SCALE | 1

PROPOSED PANEL SCHEDULE

LOAD SERVED	VOLT AMPS (WATTS) L1	VOLT AMPS (WATTS) L2	TRIP	CKT #	PHASE	CKT #	TRIP	VOLT AMPS (WATTS) L1	VOLT AMPS (WATTS) L2	LOAD SERVED
SPARE				1	A	2	30A	2880		ABB/GE INFINITY RECTIFIER 1
SPARE				3	B	4			2880	
SPARE				5	A	6	30A	2880		ABB/GE INFINITY RECTIFIER 2
SPARE				7	B	8			2880	
SPARE				9	A	10	30A	2880		ABB/GE INFINITY RECTIFIER 3
SPARE				11	B	12			2880	
SPARE				13	A	14	30A	2880		ABB/GE INFINITY RECTIFIER 4
SPARE				15	B	16			2880	
SPARE				17	A	18	20A	1920		CHARLES GFCI
SPARE				19	B	20				SPARE
SPARE				21	A	22				SPARE
SPARE				23	B	24				SPARE
VOLT AMPS								13440	11520	

	L1	L2	
200A MCB, 1ϕ, 3W, 120/240V	L1	L2	
MB RATING: 65,000 AIC	13440	11520	VOLT AMPS
	75.3	64.7	AMPS
	140		MAX AMPS
	175		MAX 125%

PANEL SCHEDULE | NO SCALE | 2

NOT USED | NO SCALE | 3

NOT USED | NO SCALE | 4

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STATE OF MARYLAND CHRISTOPHER D. MORIN No. 24552 PROFESSIONAL ENGINEER 7/19/21

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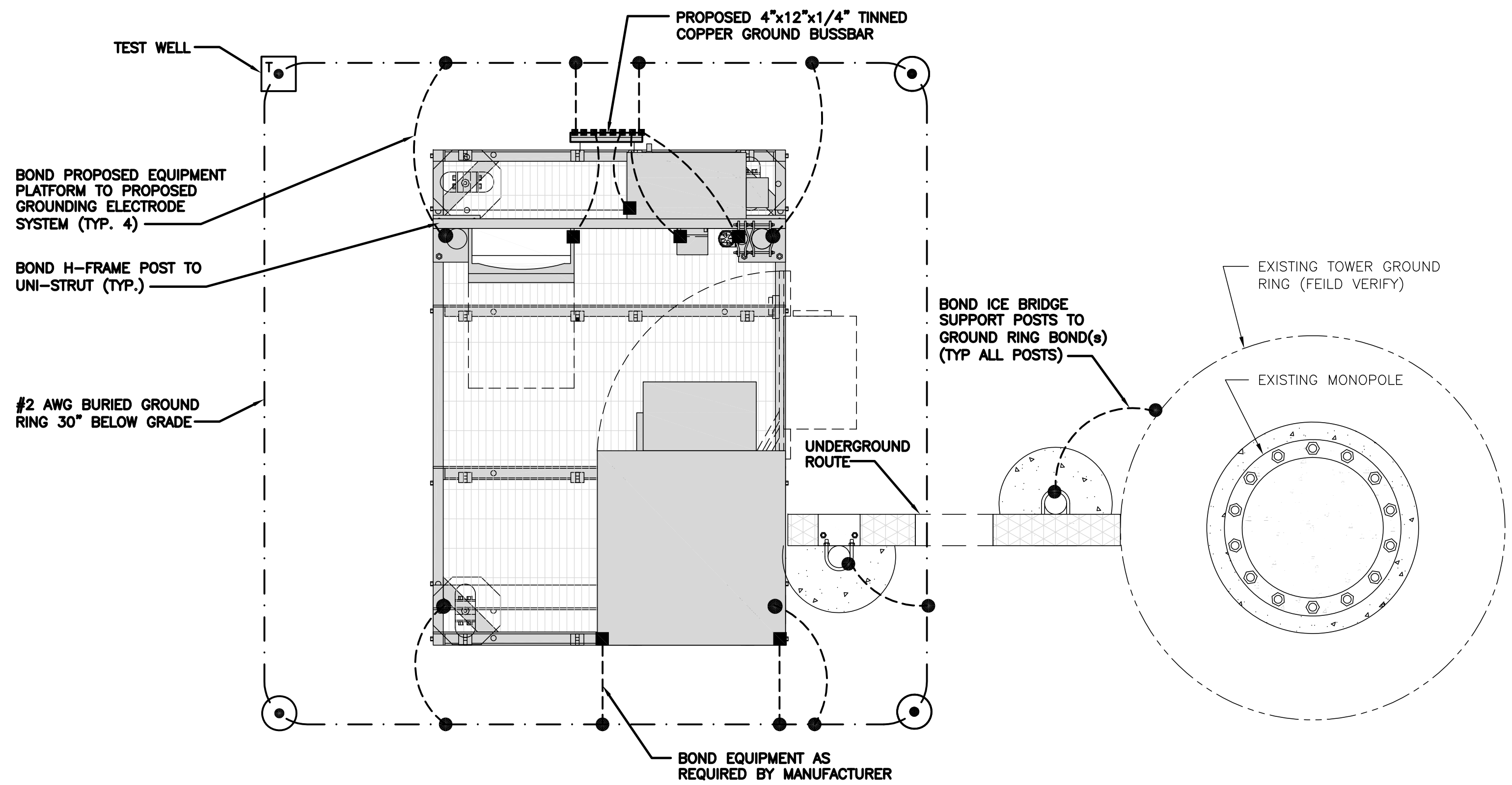
A&E PROJECT NUMBER
–

DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
–
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
ELECTRICAL ONE-LINE, FAULT CALCS & PANEL SCHEDULE

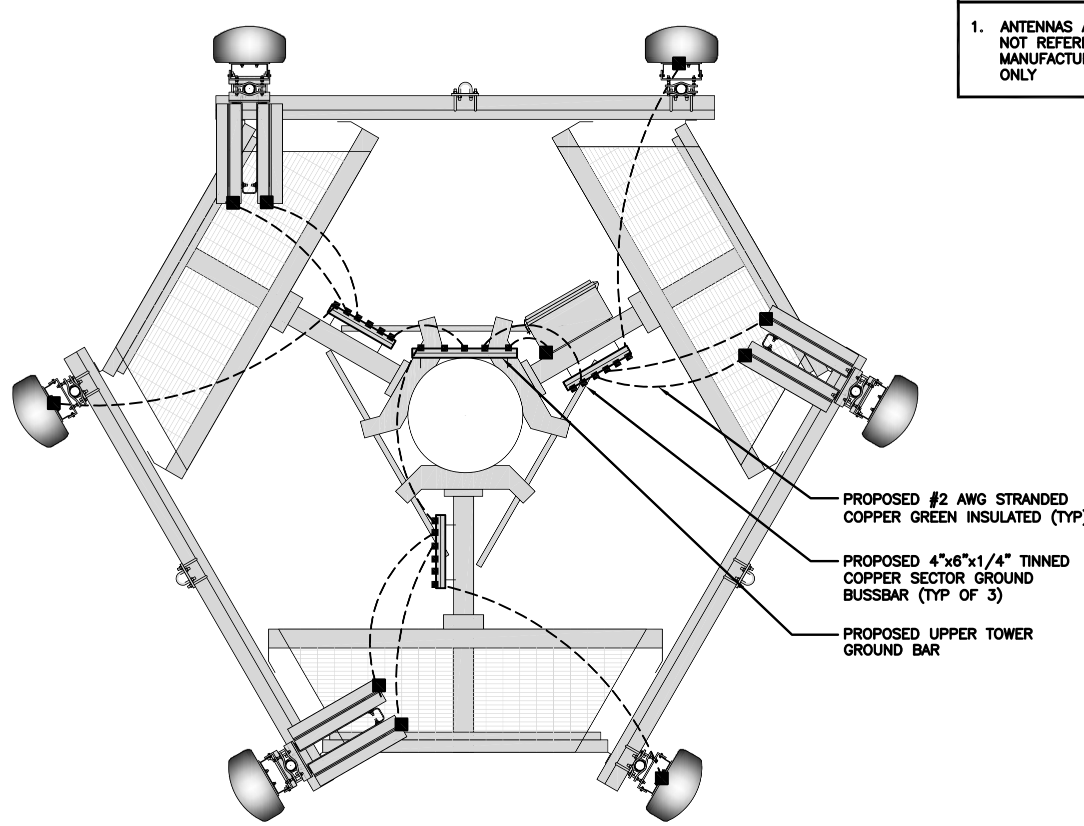
SHEET NUMBER
E-3



TYPICAL EQUIPMENT GROUNDING PLAN	NO SCALE	1

NOTES

1. ANTENNAS AND OVP SHOWN ARE GENERIC AND NOT REFERENCING TO A SPECIFIC MANUFACTURER. THIS LAYOUT IS FOR REFERENCE ONLY



TYPICAL ANTENNA GROUNDING PLAN	NO SCALE	2

EXOTHERMIC CONNECTION
MECHANICAL CONNECTION
GROUND BUS BAR
GROUND ROD
TEST GROUND ROD WITH INSPECTION SLEEVE
#2 AWG STRANDED & INSULATED
#2 AWG SOLID COPPER TINNED

GROUNDING LEGEND

1. GROUNDING IS SHOWN DIAGRAMMATICALLY ONLY.
2. CONTRACTOR SHALL GROUND ALL EQUIPMENT AS A COMPLETE SYSTEM. GROUNDING SHALL BE IN COMPLIANCE WITH NEC SECTION 250 AND DISH WIRELESS GROUNDING AND BONDING REQUIREMENTS AND MANUFACTURER'S SPECIFICATIONS.
3. ALL GROUND CONDUCTORS SHALL BE COPPER; NO ALUMINUM CONDUCTORS SHALL BE USED.

GROUNDING KEY NOTES

(A) EXTERIOR GROUND RING: #2 AWG SOLID COPPER, BURIED AT A DEPTH OF AT LEAST 30 INCHES BELOW GRADE, OR 6 INCHES BELOW THE FROST LINE AND APPROXIMATELY 24 INCHES FROM THE EXTERIOR WALL OR FOOTING.

(B) TOWER GROUND RING: THE GROUND RING SYSTEM SHALL BE INSTALLED AROUND AN ANTENNA TOWER'S LEGS, AND/OR GUY ANCHORS. WHERE SEPARATE SYSTEMS HAVE BEEN PROVIDED FOR THE TOWER AND THE BUILDING, AT LEAST TWO BONDS SHALL BE MADE BETWEEN THE TOWER RING GROUND SYSTEM AND THE BUILDING RING GROUND SYSTEM USING MINIMUM #2 AWG SOLID COPPER CONDUCTORS.

(C) INTERIOR GROUND RING: #2 AWG STRANDED GREEN INSULATED COPPER CONDUCTOR EXTENDED AROUND THE PERIMETER OF THE EQUIPMENT AREA. ALL NON-TELECOMMUNICATIONS RELATED METALLIC OBJECTS FOUND WITHIN A SITE SHALL BE GROUNDED TO THE INTERIOR GROUND RING WITH #6 AWG STRANDED GREEN INSULATED CONDUCTOR.

(D) BOND TO INTERIOR GROUND RING: #2 AWG SOLID TINNED COPPER WIRE PRIMARY BONDS SHALL BE PROVIDED AT LEAST AT FOUR POINTS ON THE INTERIOR GROUND RING, LOCATED AT THE CORNERS OF THE BUILDING.

(E) GROUND ROD: UL LISTED COPPER CLAD STEEL. MINIMUM 1/2" DIAMETER BY EIGHT FEET LONG. GROUND RODS SHALL BE INSTALLED WITH INSPECTION SLEEVES. GROUND RODS SHALL BE DRIVEN TO THE DEPTH OF GROUND RING CONDUCTOR.

(F) CELL REFERENCE GROUND BAR: POINT OF GROUND REFERENCE FOR ALL COMMUNICATIONS EQUIPMENT FRAMES. ALL BONDS ARE MADE WITH #2 AWG UNLESS NOTED OTHERWISE STRANDED GREEN INSULATED COPPER CONDUCTORS. BOND TO GROUND RING WITH (2) #2 SOLID TINNED COPPER CONDUCTORS.

(G) HATCH PLATE GROUND BAR: BOND TO THE INTERIOR GROUND RING WITH TWO #2 AWG STRANDED GREEN INSULATED COPPER CONDUCTORS. WHEN A HATCH-PLATE AND A CELL REFERENCE GROUND BAR ARE BOTH PRESENT, THE CRGB MUST BE CONNECTED TO THE HATCH-PLATE AND TO THE INTERIOR GROUND RING USING (2) TWO #2 AWG STRANDED GREEN INSULATED COPPER CONDUCTORS EACH.

(H) EXTERIOR CABLE ENTRY PORT GROUND BARS: LOCATED AT THE ENTRANCE TO THE CELL SITE BUILDING. BOND TO GROUND RING WITH A #2 AWG SOLID TINNED COPPER CONDUCTORS WITH AN EXOTHERMIC WELD AND INSPECTION SLEEVE.

(J) TELCO GROUND BAR: BOND TO BOTH CELL REFERENCE GROUND BAR AND EXTERIOR GROUND RING.

(K) FRAME BONDING: THE BONDING POINT FOR TELECOM EQUIPMENT FRAMES SHALL BE THE GROUND BUS THAT IS NOT ISOLATED FROM THE EQUIPMENTS METAL FRAMEWORK. BOND THE FRAME GROUND TO THE "I" SECTION OF THE CELL REFERENCE GROUND BAR OR SUPPLEMENTARY CONDUCTOR. (SHEET G3 DETAIL1)

(L) INTERIOR UNIT BONDS: METAL FRAMES, CABINETS AND INDIVIDUAL METALLIC UNITS LOCATED WITH THE AREA OF THE INTERIOR GROUND RING REQUIRE A #6 AWG STRANDED GREEN INSULATED COPPER BOND TO THE INTERIOR GROUND RING.

(M) FENCE AND GATE GROUNDING: METAL FENCES WITHIN 7 FEET OF THE EXTERIOR GROUND RING OR OBJECTS BONDED TO THE EXTERIOR GROUND RING SHALL BE BONDED TO THE GROUND RING WITH A #2 AWG SOLID TINNED COPPER CONDUCTOR AT AN INTERVAL NOT EXCEEDING 25 FEET. BONDS SHALL BE MADE AT EACH GATE POST AND ACROSS GATE OPENINGS.

(N) EXTERIOR UNIT BONDS: METALLIC OBJECTS, EXTERNAL TO OR MOUNTED TO THE BUILDING, SHALL BE BONDED TO THE EXTERIOR GROUND RING. USING #2 TINNED SOLID COPPER WIRE

(P) ICE BRIDGE SUPPORTS: EACH ICE BRIDGE LEG SHALL BE BONDED TO THE GROUND RING WITH #2 AWG BARE TINNED COPPER CONDUCTOR. PROVIDE EXOTHERMIC WELDS AT BOTH THE ICE BRIDGE LEG AND BURIED GROUND RING.

(Q) DURING ALL DC POWER SYSTEM CHANGES INCLUDING DC SYSTEM CHANGE OUTS, RECTIFIER REPLACEMENTS OR ADDITIONS, BREAKER DISTRIBUTION CHANGES, BATTERY ADDITIONS, BATTERY REPLACEMENTS AND INSTALLATIONS OR CHANGES TO DC CONVERTER SYSTEMS IT SHALL BE REQUIRED THAT SERVICE CONTRACTORS VERIFY ALL DC POWER SYSTEMS ARE EQUIPPED WITH A MASTER DC SYSTEM RETURN GROUND CONDUCTOR FROM THE DC POWER SYSTEM COMMON RETURN BUS DIRECTLY CONNECTED TO THE CELL SITE REFERENCE GROUND BAR

(R) TOWER TOP COLLECTOR BUSS BAR IS TO BE MECHANICALLY BONDED TO PROPOSED ANTENNA MOUNT.

REFER TO DISH WIRELESS GROUNDING NOTES.

GROUNDING KEY NOTES	NO SCALE	3

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STATE OF MARYLAND CHRISTOPHER D. MORIN No. 24552 PROFESSIONAL ENGINEER 7/19/21

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RFDS REV #: 0

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A&E PROJECT NUMBER

-

DISH WIRELESS PROJECT INFORMATION

DCWDC00428A

-

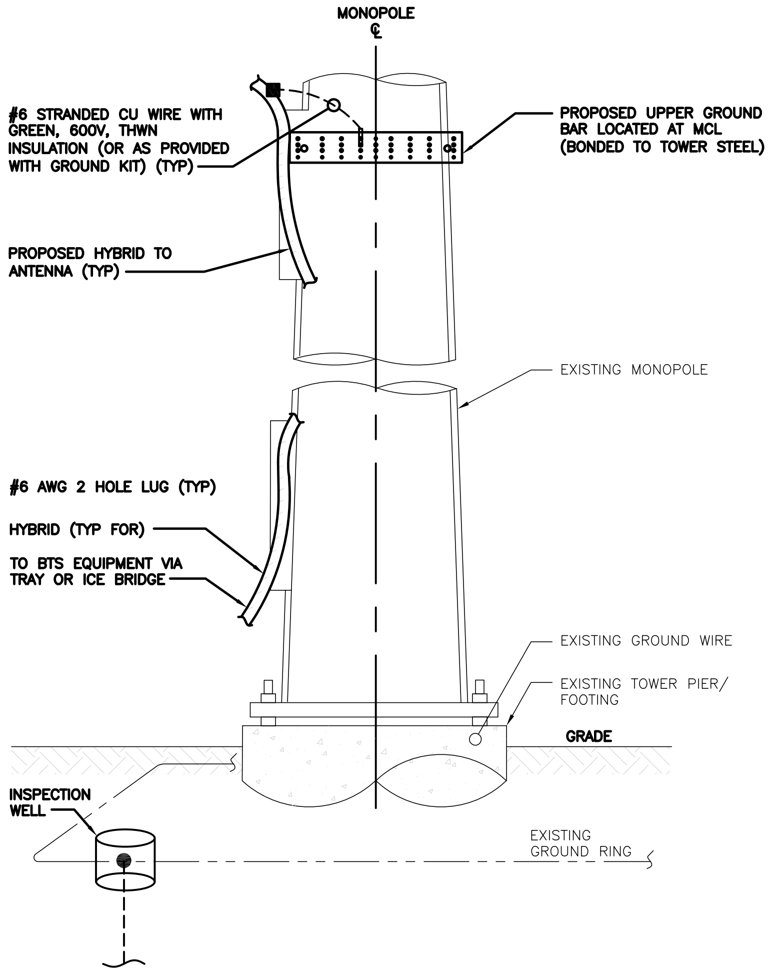
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE

GROUNDING PLANS AND NOTES

SHEET NUMBER

G-1



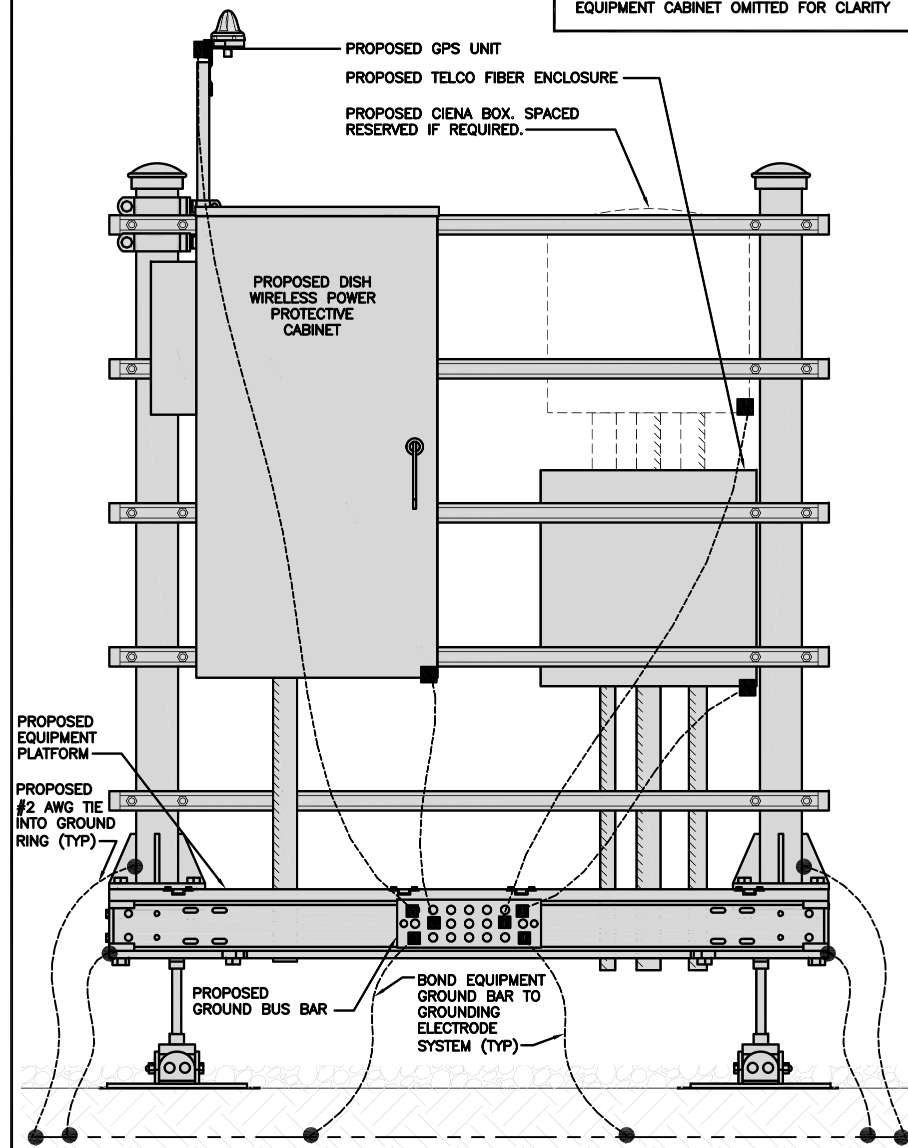
NOTES:

1. ONLY MECHANICAL CONNECTIONS ARE ALLOWED TO BE MADE TO TOWERS. ALL MECHANICAL CONNECTIONS SHALL BE TREATED WITH AN ANTI-OXIDANT COATING.
2. ALL TOWER GROUNDING SYSTEMS SHALL COMPLY WITH THE REQUIREMENTS OF THE RECOGNIZED EDITION OF ANSI/TIA 222 AND NFPA 780.

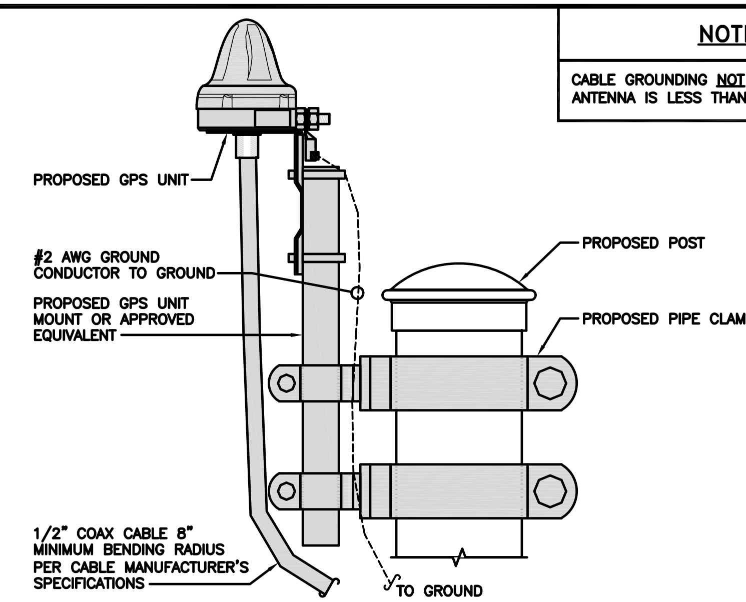
TYPICAL ANTENNA CABLE GROUNDING | NO SCALE | 1

NOTES

EQUIPMENT CABINET OMITTED FOR CLARITY



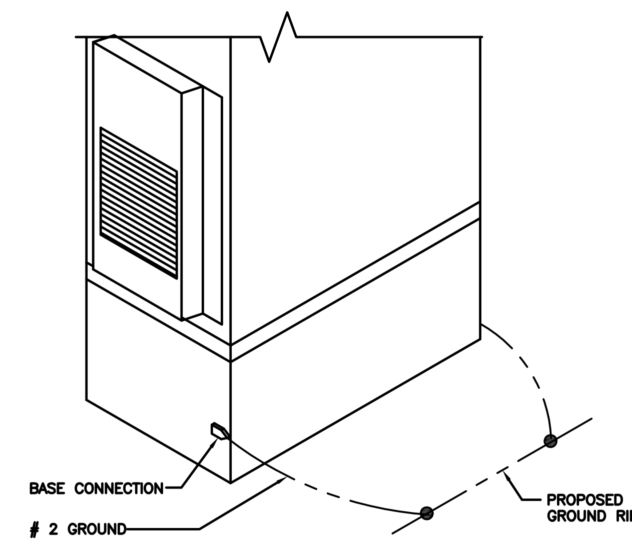
H-FRAME GROUNDING DETAIL | NO SCALE | 2



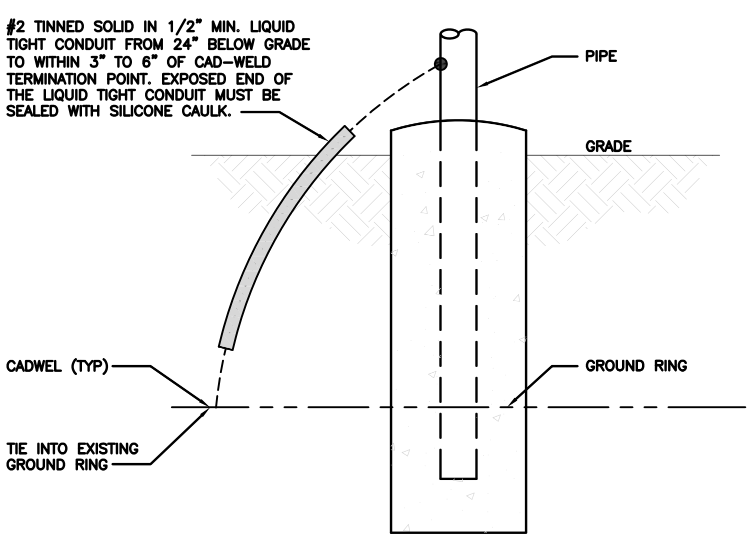
NOTES

CABLE GROUNDING NOT REQUIRED WHEN ANTENNA IS LESS THAN 10' FROM CABINET

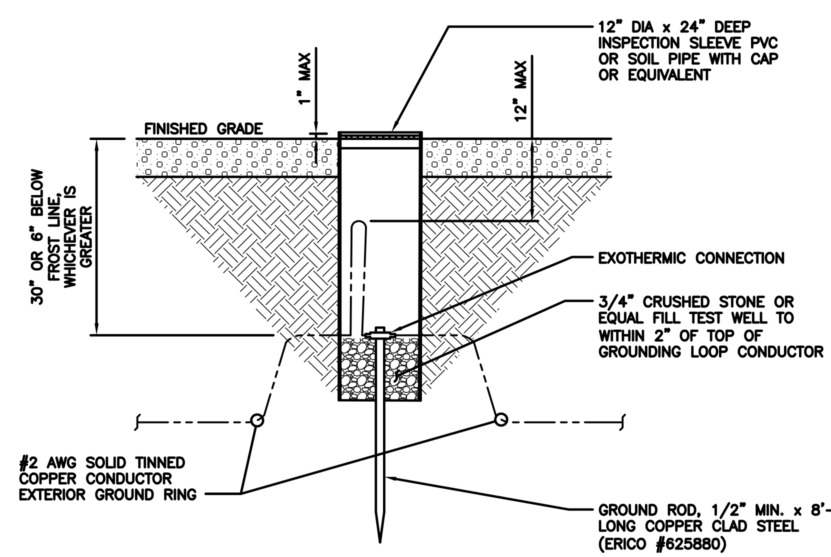
TYPICAL GPS UNIT GROUNDING | NO SCALE | 3



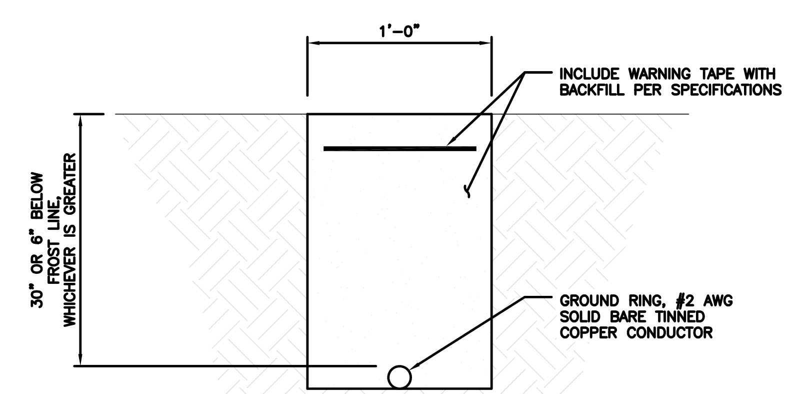
OUTDOOR CABINET GROUNDING | NO SCALE | 4



TRANSITIONING GROUND DETAIL | NO SCALE | 5



TYPICAL TEST GROUND ROD WITH INSPECTION SLEEVE | NO SCALE | 6



TYPICAL GROUND RING TRENCH | NO SCALE | 7

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DISH WIRELESS PROJECT INFORMATION

DCWDC00428A
-
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE

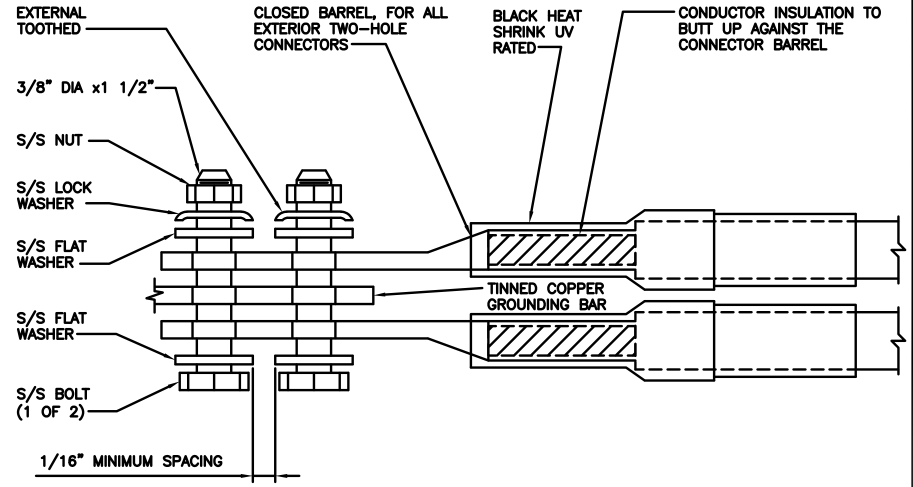
GROUNDING DETAILS

SHEET NUMBER

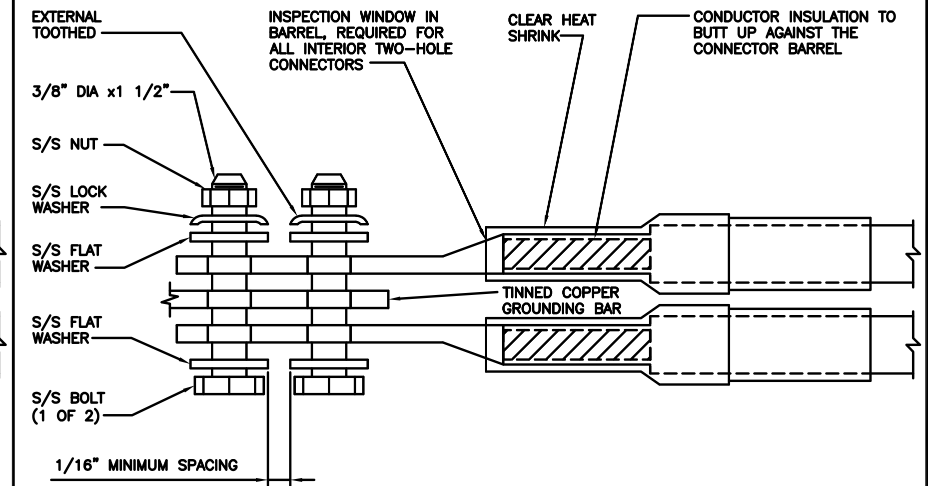
G-2

1. EXOTHERMIC WELD (2) TWO, #2 AWG BARE TINNED SOLID COPPER CONDUCTORS TO GROUND BAR. ROUTE CONDUCTORS TO BURIED GROUND RING AND PROVIDE PARALLEL EXOTHERMIC WELD.
2. ALL EXTERIOR GROUNDING HARDWARE SHALL BE STAINLESS STEEL 3/8" DIAMETER OR LARGER. ALL HARDWARE 18-8 STAINLESS STEEL INCLUDING LOCK WASHERS, COAT ALL SURFACES WITH AN ANTI-OXIDANT COMPOUND BEFORE MATING.
3. FOR GROUND BOND TO STEEL ONLY: COAT ALL SURFACES WITH AN ANTI-OXIDANT COMPOUND BEFORE MATING.
4. DO NOT INSTALL CABLE GROUNDING KIT AT A BEND AND ALWAYS DIRECT GROUND CONDUCTOR DOWN TO GROUNDING BUS.
5. NUT & WASHER SHALL BE PLACED ON THE FRONT SIDE OF THE GROUND BAR AND BOLTED ON THE BACK SIDE.
6. ALL GROUNDING PARTS AND EQUIPMENT TO BE SUPPLIED AND INSTALLED BY CONTRACTOR.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING ADDITIONAL GROUND BAR AS REQUIRED.
9. ENSURE THE WIRE INSULATION TERMINATION IS WITHIN 1/8" OF THE BARREL (NO SHINERS).

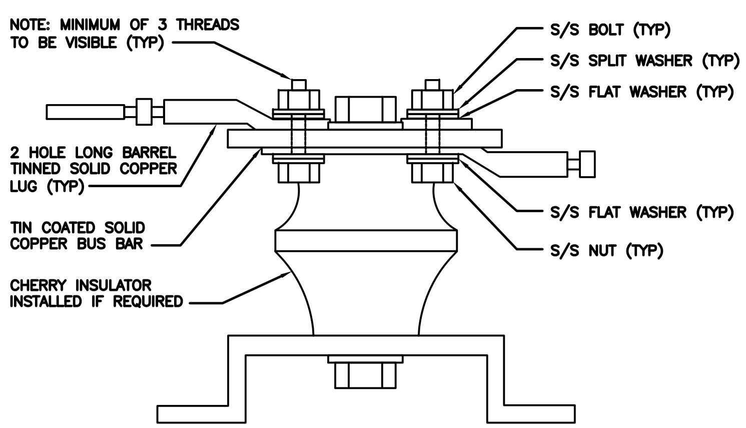
TYPICAL GROUNDING NOTES | NO SCALE | 1



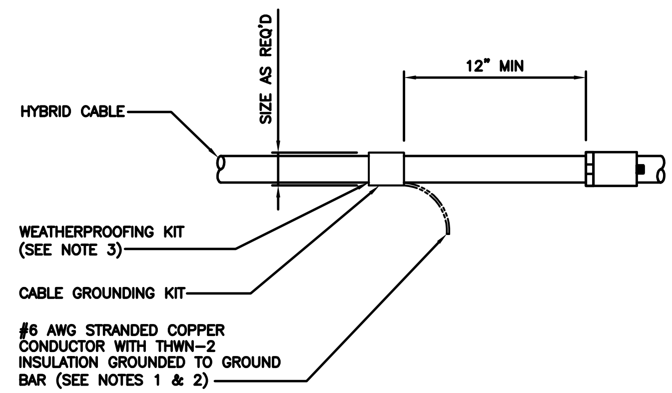
TYPICAL EXTERIOR TWO HOLE LUG | NO SCALE | 2



TYPICAL INTERIOR TWO HOLE LUG | NO SCALE | 3



LUG DETAIL | NO SCALE | 4



CONNECTION OF HYBRID CABLE GROUNDING KIT TO HYBRID TRUNK | NO SCALE | 5

NOT USED | NO SCALE | 6

NOT USED | NO SCALE | 7

NOT USED | NO SCALE | 8

NOT USED | NO SCALE | 9

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12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
GROUNDING DETAILS

SHEET NUMBER
G-3

RF JUMPER COLOR CODING

3/4" TAPE WIDTHS WITH 3/4" SPACING

LOW-BAND RRH – (600MHz N71 BASEBAND) + (850MHz N26 BAND) + (700MHz N29 BAND) – OPTIONAL PER MARKET

ADD FREQUENCY COLOR TO SECTOR BAND (CBRS WILL USE YELLOW BANDS)

	ALPHA RRH				BETA RRH				GAMMA RRH			
	PORT 1 + SLANT	PORT 2 + SLANT	PORT 3 + SLANT	PORT 4 + SLANT	PORT 1 + SLANT	PORT 2 + SLANT	PORT 3 + SLANT	PORT 4 + SLANT	PORT 1 + SLANT	PORT 2 + SLANT	PORT 3 + SLANT	PORT 4 + SLANT
LOW-BAND	RED, ORANGE	RED, ORANGE, WHITE (1) PORT	RED, RED, ORANGE	RED, RED, ORANGE, WHITE (1) PORT	BLUE, ORANGE	BLUE, ORANGE, WHITE (1) PORT	BLUE, BLUE, ORANGE	BLUE, BLUE, ORANGE, WHITE (1) PORT	GREEN, ORANGE	GREEN, ORANGE, WHITE (1) PORT	GREEN, GREEN, ORANGE	GREEN, GREEN, ORANGE, WHITE (1) PORT
MID-BAND	RED, PURPLE	RED, PURPLE, WHITE (1) PORT	RED, RED, PURPLE	RED, RED, PURPLE, WHITE (1) PORT	BLUE, PURPLE	BLUE, PURPLE, WHITE (1) PORT	BLUE, BLUE, PURPLE	BLUE, BLUE, PURPLE, WHITE (1) PORT	GREEN, PURPLE	GREEN, PURPLE, WHITE (1) PORT	GREEN, GREEN, PURPLE	GREEN, GREEN, PURPLE, WHITE (1) PORT

MID-BAND RRH – (AWS BANDS N66+N70)

ADD FREQUENCY COLOR TO SECTOR BAND (CBRS WILL USE YELLOW BANDS)

HYBRID/DISCREET CABLES

INCLUDE SECTOR BANDS BEING SUPPORTED AM LONG WITH FREQUENCY BANDS

EXAMPLE 1 – HYBRID, OR DISCREET, SUPPORTS ALL SECTORS, BOTH LOW-BANDS AND MID-BANDS

EXAMPLE 2 – HYBRID, OR DISCREET, SUPPORTS CBRS ONLY, ALL SECTORS

EXAMPLE 1	EXAMPLE 2
RED, BLUE, GREEN, ORANGE, PURPLE	RED, BLUE, GREEN, YELLOW

HYBRID/DISCREET CABLES

LOW-BAND RRH FIBER CABLES HAVE SECTOR STRIPE ONLY

LOW BAND RRH	HIGH BAND RRH	LOW BAND RRH	LOW BAND RRH	LOW BAND RRH	LOW BAND RRH
RED	RED, PURPLE	BLUE	BLUE, PURPLE	GREEN	GREEN, PURPLE

POWER CABLES TO RRHs

LOW-BAND RRH POWER CABLES HAVE SECTOR STRIPE ONLY

LOW BAND RRH	HIGH BAND RRH	LOW BAND RRH	LOW BAND RRH	LOW BAND RRH	LOW BAND RRH
RED	RED, PURPLE	BLUE	BLUE, PURPLE	GREEN	GREEN, PURPLE

RET MOTORS AT ANTENNAS

PORT 1/ ANTENNA 1 "IN"	PORT 1/ ANTENNA 1 "IN"	PORT 1/ ANTENNA 1 "IN"
RED	BLUE	GREEN

MICROWAVE RADIO LINKS

LINKS WILL HAVE A 1.5-2 INCH WHITE WRAP WITH THE AZIMUTH COLOR OVERLAPPING IN THE MIDDLE. ADD ADDITIONAL SECTOR COLOR BANDS FOR EACH ADDITIONAL MW RADIO.

MICROWAVE CABINETS WILL REQUIRE P-TOUCH LABELS INSIDE THE CABINET TO IDENTIFY THE LOCAL AND REMOTE SITE ID'S.

PRIMARY	SECONDARY
WHITE, RED, WHITE	WHITE, RED, WHITE, RED, WHITE

RF CABLE COLOR CODES — NO SCALE — 1

LOW BANDS (N71–N28) OPTIONAL – (N29)	AWS (N65+N70+H–BLOCK)
ORANGE	PURPLE

CBRS TECH (3 GHz)	NEGATIVE SLANT PORT ON ANTRRH
YELLOW	WHITE

ALPHA SECTOR	BETA SECTOR	GAMMA SECTOR
RED	BLUE	GREEN

COLOR IDENTIFIER — NO SCALE — 2

NOT USED — NO SCALE — 3

NOT USED — NO SCALE — 4

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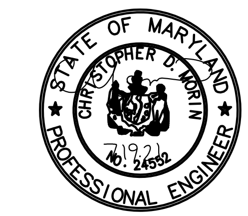

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GMW	NP	CDM

RFDS REV #: 0

CONSTRUCTION DOCUMENTS

SUBMITTALS

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A&E PROJECT NUMBER

–

DISH WIRELESS PROJECT INFORMATION

DCWDC00428A

–

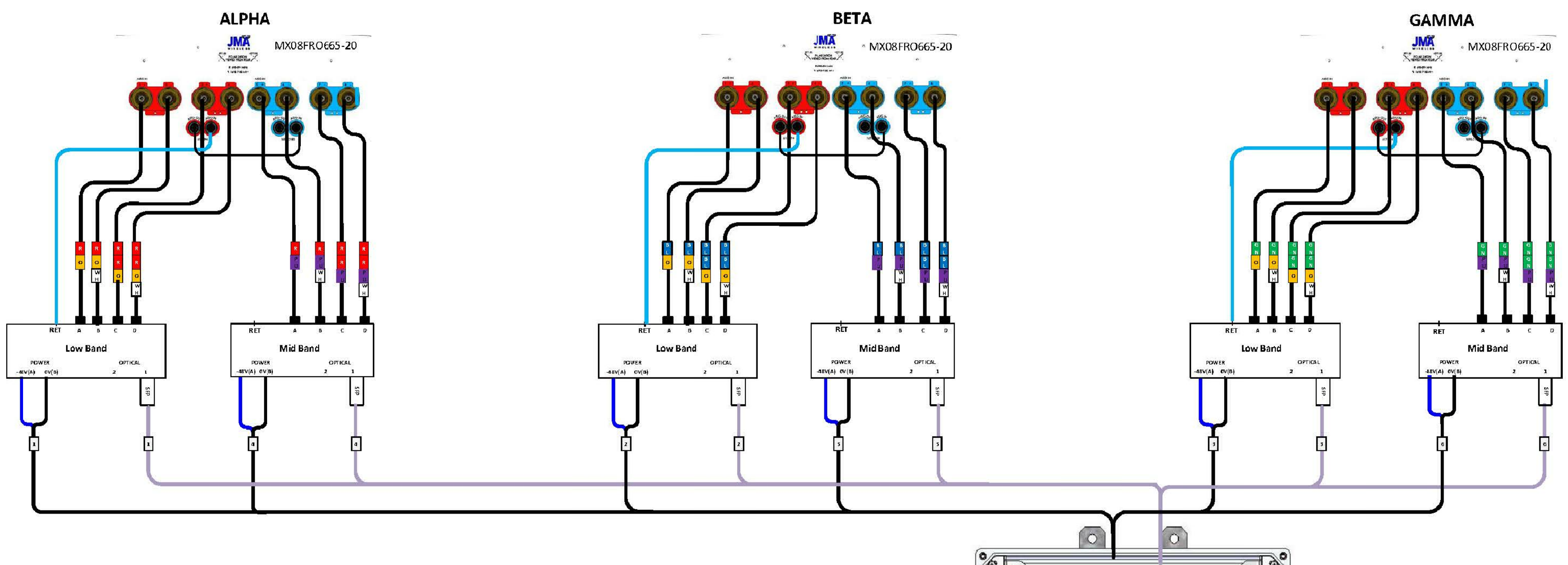
12501–A DALEWOOD DR.
SILVER SPRING, MD 20906

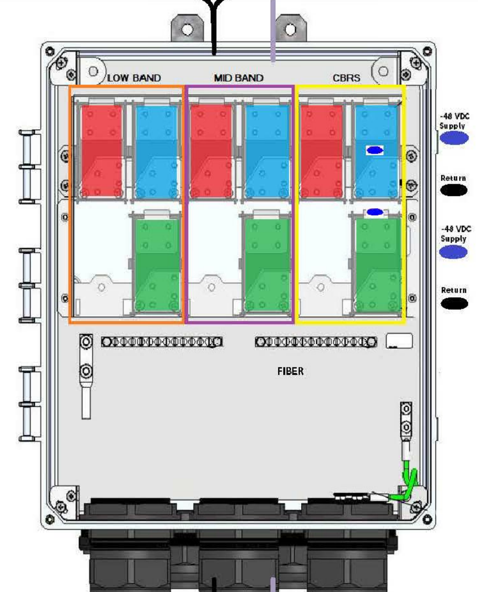
SHEET TITLE

RF
CABLE COLOR CODES

SHEET NUMBER

RF-1





Fiber Patch Panel

Bottom Row	Pair 1	Pair 2	Pair 3	Pair 10	Open	Open
Middle Row	Pair 4	Pair 5	Pair 6	Pair 11	Open	Open
Top Row	Pair 7	Pair 8	Pair 9	Pair 12	Open	Open

CSR NCS540

Port	Interface	Description
0	Gi0/0/0/0	SiteBoss
1	Gi0/0/0/1	CBRS - Alpha
2	Gi0/0/0/2	CBRS - Beta
3	Gi0/0/0/3	CBRS - Gamma
4	Te0/0/0/4	Fujitsu Low-Band RU - Alpha
5	Te0/0/0/5	Fujitsu Mid-Band RU - Alpha
6	Te0/0/0/6	Fujitsu Low-Band RU - Beta
7	Te0/0/0/7	Fujitsu Mid-Band RU - Beta
8	Te0/0/0/8	Fujitsu Low-Band RU - Gamma
9	Te0/0/0/9	Fujitsu Mid-Band RU - Gamma
10	Te0/0/0/10	Fixed Wifi
11	Te0/0/0/11	Fixed Wifi
12	Te0/0/0/12	Fixed Wifi
13	Te0/0/0/13	Fixed Wifi
14	Te0/0/0/14	CBRS1
15	Te0/0/0/15	CBRS2
16	Te0/0/0/16	CBRS3
17	Gi0/0/0/17	SM1 - BMC
18	Gi0/0/0/18	SM2 - BMC
19	Te0/0/019	SM1 - Data 1
20	Te0/0/020	SM1 - Data 2
21	Te0/0/021	SM2 - Data 1
22	Te0/0/022	SM2 - Data 2
23	Te0/0/023	Reserved Uplink (EDC, LDC)
24	Te0/0/024	Blank/Future
25	Te0/0/0/25	Blank/Future
26	Te0/0/0/26	Fiber NIU
27	Te0/0/0/27	Fiber NIU
28	Te0/0/0/28	Blank/Future
29	Te0/0/0/29	Blank/Future

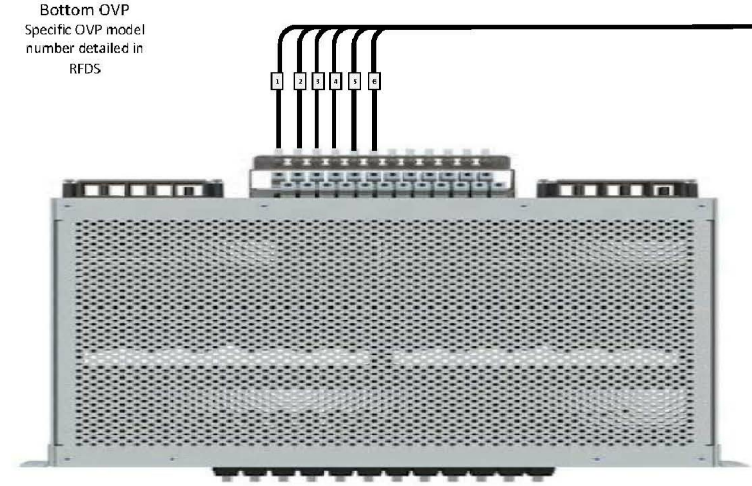
top

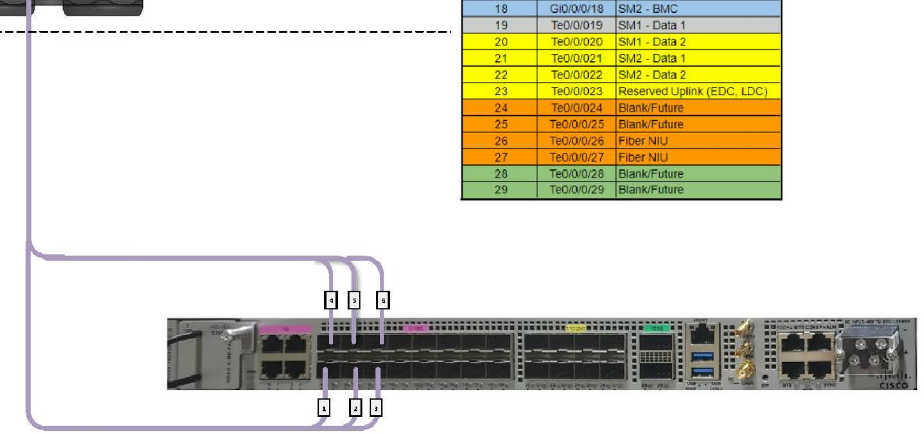
bottom

Bottom OVP Layout

Circuit 1	Alpha Low Band
Circuit 2	Beta Low Band
Circuit 3	Gamma Low Band
Circuit 4	Alpha Mid Band
Circuit 5	Beta Mid Band
Circuit 6	Gamma Mid Band
Circuit 7	Alpha CBRS
Circuit 8	Beta CBRS
Circuit 9	Gamma CBRS
Circuit 10	Open
Circuit 11	Open
Circuit 12	Open

Bottom OVP
Specific OVP model number detailed in RFDS





5G plumbing diagram JMA MX08FRO665-20 2-2-2(LB+MB)

Quan Liu

5-Jan-2021

SCALE None

PLUMBING DIAGRAM

NO SCALE 1

dish wireless.

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STATE OF MARYLAND · CHRISTOPHER D. MORIN · No. 24552 · PROFESSIONAL ENGINEER

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RFDS REV #: 0

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DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
–
12501–A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
RF
PLUMBING DIAGRAM

SHEET NUMBER
RF-2

dish wireless

RF EQUIPMENT INFORMATION

Issue Date/Revision	2/19/2021	Revision: 0	Latitude	39.0595	Longitude -77.0665
Site ID	DCWDC00428A		Prequal Asset ID	MD-VER-T-USMD5072	
Site Address	12501-A Dalewood Drive, Silver Spring MD 20906		SOW / RF Comments	Dish proposes to place 3 antennas, 6 RRUs, 1 junction box(s), and 1 cable(s) at the 90 foot RAD. Dish will require a 5' x 7' lease area for ground equipment.	
Structure Type	Monopole				
sectors >20' apart?	No	*Confirmed RAD?* Confirmed 90			

	Sector 1 (alpha)			Sector 2 (beta)			Sector 3 (gamma)		
ANTENNA									
Antenna #	1	4	7	2	5	8	3	6	9
Manufacturer	JMA			JMA			JMA		
Model Number	MX08FRO665-20_V0F			MX08FRO665-20_V0F			MX08FRO665-20_V0F		
Dimensions H x W x D (in)	72.0" x 20.0" x 8.0"			72.0" x 20.0" x 8.0"			72.0" x 20.0" x 8.0"		
Weight (lbs.)	54			54			54		
TX Power Output (watts)	134.4077226			134.4077226			134.4077226		
ERP (watts)	15827.05411			15827.05411			15827.05411		
RAD Centerline Height (ft.)	90			90			90		
Azimuths	0			120			240		
Mech Down Tilt	0			0			0		
Elec Down Tilt	2			2			2		
Default Mount	Valmont SNP8HR-396								
LOW BAND/RADIO #1									
Manufacturer	Fujitsu			Fujitsu			Fujitsu		
Model Number	TA08025-B605			TA08025-B605			TA08025-B605		
Dimensions H x W x D (in.)	15.75 x 14.96 x 9.06			15.75 x 14.96 x 9.06			15.75 x 14.96 x 9.06		
Weight (lbs.)	74.95			74.95			74.95		
Location	Antenna			Antenna			Antenna		
Technology	n71 | n29 |			n71 | n29 |			n71 | n29 |		
Quantity	1			1			1		
Port Assignment	Port 1-4			Port 1-4			Port 1-4		
MID BAND/RADIO #2									
Manufacturer	Fujitsu			Fujitsu			Fujitsu		
Model Number	TA08025-B604			TA08025-B604			TA08025-B604		
Dimensions H x W x D (in)	15.75 x 14.96 x 7.87			15.75 x 14.96 x 7.87			15.75 x 14.96 x 7.87		
Weight (lbs.)	63.93			63.93			63.93		
Location	Antenna			Antenna			Antenna		
Quantity	1			1			1		
Technology	n70 | n66			n70 | n66			n70 | n66		
Port Assignment	Port 5-8			Port 5-8			Port 5-8		
OVP (Junction Box)									
Manufacturer	Raycap								
Model Number	RDIDC-9181-PF-48								
Dimensions H x W x D (in.)	16" x 14" x 8"								
Weight (lbs.)	21.85								
Quantity	1								
LINE DETAILS									
Line Type	Hybrid								
Manufacturer	Cables Unlimited								
Model Number	CU12PSM9P6XXX_6AWG								
Diameter (O.D. in.)	1.60"								
Weight (lbs. per ft.)	2.346 lbs/ft								
Quantity	1								
Approx. Cable Length	120								
OTHER EQUIPMENT									
Type of Equipment									
Manufacturer									
Model Number									
Dimensions H x W x D (in)									
Weight (lbs.)									
Equipment Location									
Quantity									

Frequencies	
TX - Low Band (Mhz)	722 - 728 | 642 - 652
TX - Mid Band (Mhz)	1995 - 2020 | 2180 - 2200

RF DATA SHEET

NO SCALE 1

dish wireless.

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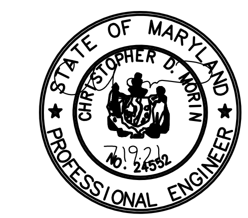

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A&E PROJECT NUMBER

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DISH WIRELESS PROJECT INFORMATION

DCWDC00428A

–

12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

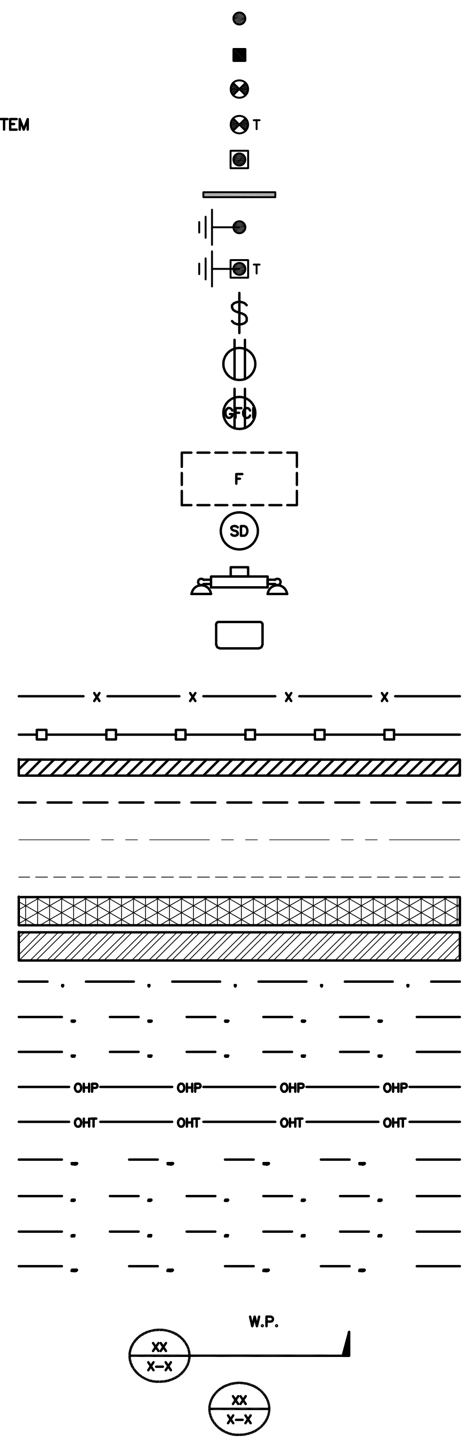
SHEET TITLE

RF DATA SHEET

SHEET NUMBER

RF-3

LEGEND



- EXOTHERMIC CONNECTION
- MECHANICAL CONNECTION
- CHEMICAL ELECTROLYTIC GROUNDING SYSTEM
- TEST CHEMICAL ELECTROLYTIC GROUNDING SYSTEM
- EXOTHERMIC WITH INSPECTION SLEEVE
- GROUNDING BAR
- GROUND ROD
- TEST GROUND ROD WITH INSPECTION SLEEVE
- SINGLE POLE SWITCH
- DUPLEX RECEPTACLE
- DUPLEX GFCI RECEPTACLE
- FLUORESCENT LIGHTING FIXTURE (2) TWO LAMPS 48-T8
- SMOKE DETECTION (DC)
- EMERGENCY LIGHTING (DC)
- SECURITY LIGHT W/PHOTOCELL LITHONIA ALXW LED-1-25A400/51K-SR4-120-PE-DDBTXD
- CHAIN LINK FENCE
- WOOD/WROUGHT IRON FENCE
- WALL STRUCTURE
- LEASE AREA
- PROPERTY LINE (PL)
- SETBACKS
- ICE BRIDGE
- CABLE TRAY
- WATER LINE
- UNDERGROUND POWER
- UNDERGROUND TELCO
- OVERHEAD POWER
- OVERHEAD TELCO
- UNDERGROUND TELCO/POWER
- ABOVE GROUND POWER
- ABOVE GROUND TELCO
- ABOVE GROUND TELCO/POWER
- WORKPOINT
- SECTION REFERENCE
- DETAIL REFERENCE

ABBREVIATIONS

AB	ANCHOR BOLT
ABV	ABOVE
AC	ALTERNATING CURRENT
ADDL	ADDITIONAL
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AGL	ABOVE GROUND LEVEL
AIC	AMPERAGE INTERRUPTION CAPACITY
ALUM	ALUMINUM
ALT	ALTERNATE
ANT	ANTENNA
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BATT	BATTERY
BLDG	BUILDING
BLK	BLOCK
BLKG	BLOCKING
BM	BEAM
BTC	BARE TINNED COPPER CONDUCTOR
BOF	BOTTOM OF FOOTING
CAB	CABINET
CANT	CANTILEVERED
CHG	CHARGING
CLG	CEILING
CLR	CLEAR
COL	COLUMN
COMM	COMMON
CONC	CONCRETE
CONSTR	CONSTRUCTION
DBL	DOUBLE
DC	DIRECT CURRENT
DEPT	DEPARTMENT
DF	DOUGLAS FIR
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DWG	DRAWING
DWL	DOWEL
EA	EACH
EC	ELECTRICAL CONDUCTOR
EL.	ELEVATION
ELEC	ELECTRICAL
EMT	ELECTRICAL METALLIC TUBING
ENG	ENGINEER
EQ	EQUAL
EXP	EXPANSION
EXT	EXTERIOR
EW	EACH WAY
FAB	FABRICATION
FF	FINISH FLOOR
FG	FINISH GRADE
FIF	FACILITY INTERFACE FRAME
FIN	FINISH(ED)
FLR	FLOOR
FDN	FOUNDATION
FOC	FACE OF CONCRETE
FOM	FACE OF MASONRY
FOS	FACE OF STUD
FOW	FACE OF WALL
FS	FINISH SURFACE
FT	FOOT
FTG	FOOTING
GA	GAUGE
GEN	GENERATOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GLB	GLUE LAMINATED BEAM
GLV	GALVANIZED
GPS	GLOBAL POSITIONING SYSTEM
GND	GROUND
GSM	GLOBAL SYSTEM FOR MOBILE
HDG	HOT DIPPED GALVANIZED
HDR	HEADER
HGR	HANGER
HVAC	HEAT/VENTILATION/AIR CONDITIONING
HT	HEIGHT
IGR	INTERIOR GROUND RING
IN	INCH
INT	INTERIOR
LB(S)	POUND(S)
LF	LINEAR FEET
LTE	LONG TERM EVOLUTION
MAS	MASONRY
MAX	MAXIMUM
MB	MACHINE BOLT
MECH	MECHANICAL
MFR	MANUFACTURER
MGB	MASTER GROUND BAR
MIN	MINIMUM
MISC	MISCELLANEOUS
MTL	METAL
MTS	MANUAL TRANSFER SWITCH
MW	MICROWAVE
NEC	NATIONAL ELECTRIC CODE
NM	NEWTON METERS
NO.	NUMBER
#	NUMBER
NTS	NOT TO SCALE
OC	ON-CENTER
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
OPNG	OPENING
P/C	PRECAST CONCRETE
PCS	PERSONAL COMMUNICATION SERVICES
PCU	PRIMARY CONTROL UNIT
PRC	PRIMARY RADIO CABINET
PP	POLARIZING PRESERVING
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PT	PRESSURE TREATED
PWR	POWER CABINET
QTY	QUANTITY
RAD	RADIUS
RECT	RECTIFIER
REF	REFERENCE
REINF	REINFORCEMENT
REQ'D	REQUIRED
RET	REMOTE ELECTRIC TILT
RF	RADIO FREQUENCY
RMC	RIGID METALLIC CONDUIT
RRH	REMOTE RADIO HEAD
RRU	REMOTE RADIO UNIT
RWY	RACEWAY
SCH	SCHEDULE
SHT	SHEET
SIAD	SMART INTEGRATED ACCESS DEVICE
SIM	SIMILAR
SPEC	SPECIFICATION
SQ	SQUARE
SS	STAINLESS STEEL
STD	STANDARD
STL	STEEL
TEMP	TEMPORARY
THK	THICKNESS
TMA	TOWER MOUNTED AMPLIFIER
TN	TOE NAIL
TOA	TOP OF ANTENNA
TOC	TOP OF CURB
TOF	TOP OF FOUNDATION
TOP	TOP OF PLATE (PARAPET)
TOS	TOP OF STEEL
TOW	TOP OF WALL
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSION
TYP	TYPICAL
UG	UNDERGROUND
UL	UNDERWRITERS LABORATORY
UNO	UNLESS NOTED OTHERWISE
UMTS	UNIVERSAL MOBILE TELECOMMUNICATIONS SYSTEM
UPS	UNITERRUPTIBLE POWER SYSTEM (DC POWER PLANT)
VIF	VERIFIED IN FIELD
W	WIDE
W/	WITH
WD	WOOD
WP	WEATHERPROOF
WT	WEIGHT

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7/19/21

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DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
-
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
LEGEND AND ABBREVIATIONS

SHEET NUMBER
GN-1

SITE ACTIVITY REQUIREMENTS:

1. NOTICE TO PROCEED – NO WORK SHALL COMMENCE PRIOR TO CONTRACTOR RECEIVING A WRITTEN NOTICE TO PROCEED (NTP) AND THE ISSUANCE OF A PURCHASE ORDER. PRIOR TO ACCESSING/ENTERING THE SITE YOU MUST CONTACT THE DISH WIRELESS AND TOWER OWNER NOC & THE DISH WIRELESS AND TOWER OWNER CONSTRUCTION MANAGER.

2. "LOOK UP" – DISH WIRELESS AND TOWER OWNER SAFETY CLIMB REQUIREMENT:

THE INTEGRITY OF THE SAFETY CLIMB AND ALL COMPONENTS OF THE CLIMBING FACILITY SHALL BE CONSIDERED DURING ALL STAGES OF DESIGN, INSTALLATION, AND INSPECTION. TOWER MODIFICATION, MOUNT REINFORCEMENTS, AND/OR EQUIPMENT INSTALLATIONS SHALL NOT COMPROMISE THE INTEGRITY OR FUNCTIONAL USE OF THE SAFETY CLIMB OR ANY COMPONENTS OF THE CLIMBING FACILITY ON THE STRUCTURE. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO: PINCHING OF THE WIRE ROPE, BENDING OF THE WIRE ROPE FROM ITS SUPPORTS, DIRECT CONTACT OR CLOSE PROXIMITY TO THE WIRE ROPE WHICH MAY CAUSE FRICTIONAL WEAR, IMPACT TO THE ANCHORAGE POINTS IN ANY WAY, OR TO IMPEDE/BLOCK ITS INTENDED USE. ANY COMPROMISED SAFETY CLIMB, INCLUDING EXISTING CONDITIONS MUST BE TAGGED OUT AND REPORTED TO YOUR DISH WIRELESS AND DISH WIRELESS AND TOWER OWNER POC OR CALL THE NOC TO GENERATE A SAFETY CLIMB MAINTENANCE AND CONTRACTOR NOTICE TICKET.

3. PRIOR TO THE START OF CONSTRUCTION, ALL REQUIRED JURISDICTIONAL PERMITS SHALL BE OBTAINED. THIS INCLUDES, BUT IS NOT LIMITED TO, BUILDING, ELECTRICAL, MECHANICAL, FIRE, FLOOD ZONE, ENVIRONMENTAL, AND ZONING. AFTER ONSITE ACTIVITIES AND CONSTRUCTION ARE COMPLETED, ALL REQUIRED PERMITS SHALL BE SATISFIED AND CLOSED OUT ACCORDING TO LOCAL JURISDICTIONAL REQUIREMENTS.

4. ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS, AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN, AND SHALL MEET ANSI/ASSE A10.48 (LATEST EDITION); FEDERAL, STATE, AND LOCAL REGULATIONS; AND ANY APPLICABLE INDUSTRY CONSENSUS STANDARDS RELATED TO THE CONSTRUCTION ACTIVITIES BEING PERFORMED. ALL RIGGING PLANS SHALL ADHERE TO ANSI/ASSE A10.48 (LATEST EDITION) AND DISH WIRELESS AND TOWER OWNER STANDARDS, INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION, TO CERTIFY THE SUPPORTING STRUCTURE(S) IN ACCORDANCE WITH ANSI/TIA-322 (LATEST EDITION).

5. ALL SITE WORK TO COMPLY WITH DISH WIRELESS AND TOWER OWNER INSTALLATION STANDARDS FOR CONSTRUCTION ACTIVITIES ON DISH WIRELESS AND TOWER OWNER TOWER SITE AND LATEST VERSION OF ANSI/TIA-1019-A-2012 "STANDARD FOR INSTALLATION, ALTERATION, AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS."

6. IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY DISH WIRELESS AND TOWER OWNER PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.

7. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.

8. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.

9. THE CONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES INCLUDING PRIVATE LOCATES SERVICES PRIOR TO THE START OF CONSTRUCTION.

10. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY CONTRACTOR. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING AND EXCAVATION E) CONSTRUCTION SAFETY PROCEDURES.

11. ALL SITE WORK SHALL BE AS INDICATED ON THE STAMPED CONSTRUCTION DRAWINGS AND DISH PROJECT SPECIFICATIONS, LATEST APPROVED REVISION.

12. CONTRACTOR SHALL KEEP THE SITE FREE FROM ACCUMULATING WASTE MATERIAL, DEBRIS, AND TRASH AT THE COMPLETION OF THE WORK. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.

13. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF DISH WIRELESS AND TOWER OWNER, AND/OR LOCAL UTILITIES.

14. THE CONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION FOR SITE SIGNAGE REQUIRED BY LOCAL JURISDICTION AND SIGNAGE REQUIRED ON INDIVIDUAL PIECES OF EQUIPMENT, ROOMS, AND SHELTERS.

15. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE CARRIER'S EQUIPMENT AND TOWER AREAS.

16. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.

17. THE AREAS OF THE OWNERS PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, AND STABILIZED TO PREVENT EROSION AS SPECIFIED ON THE CONSTRUCTION DRAWINGS AND/OR PROJECT SPECIFICATIONS.

18. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.

19. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.

20. CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS AND RADIOS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.

21. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.

22. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

GENERAL NOTES:

1.FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:

CONTRACTOR:GENERAL CONTRACTOR RESPONSIBLE FOR CONSTRUCTION

CARRIER:DISH WIRELESS

TOWER OWNER:TOWER OWNER

2. THESE DRAWINGS HAVE BEEN PREPARED USING STANDARDS OF PROFESSIONAL CARE AND COMPLETENESS NORMALLY EXERCISED UNDER SIMILAR CIRCUMSTANCES BY REPUTABLE ENGINEERS IN THIS OR SIMILAR LOCALITIES. IT IS ASSUMED THAT THE WORK DEPICTED WILL BE PERFORMED BY AN EXPERIENCED CONTRACTOR AND/OR WORKPEOPLE WHO HAVE A WORKING KNOWLEDGE OF THE APPLICABLE CODE STANDARDS AND REQUIREMENTS AND OF INDUSTRY ACCEPTED STANDARD GOOD PRACTICE. AS NOT EVERY CONDITION OR ELEMENT IS (OR CAN BE) EXPLICITLY SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL USE INDUSTRY ACCEPTED STANDARD GOOD PRACTICE FOR MISCELLANEOUS WORK NOT EXPLICITLY SHOWN.

3. THESE DRAWINGS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE MEANS OR METHODS OF CONSTRUCTION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY FOR PROTECTION OF LIFE AND PROPERTY DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, BRACING, FORMWORK, SHORING, ETC. SITE VISITS BY THE ENGINEER OR HIS REPRESENTATIVE WILL NOT INCLUDE INSPECTION OF THESE ITEMS AND IS FOR STRUCTURAL OBSERVATION OF THE FINISHED STRUCTURE ONLY.

4. NOTES AND DETAILS IN THE CONSTRUCTION DRAWINGS SHALL TAKE PRECEDENCE OVER GENERAL NOTES AND TYPICAL DETAILS. WHERE NO DETAILS ARE SHOWN, CONSTRUCTION SHALL CONFORM TO SIMILAR WORK ON THE PROJECT, AND/OR AS PROVIDED FOR IN THE CONTRACT DOCUMENTS. WHERE DISCREPANCIES OCCUR BETWEEN PLANS, DETAILS, GENERAL NOTES, AND SPECIFICATIONS, THE GREATER, MORE STRICT REQUIREMENTS, SHALL GOVERN. IF FURTHER CLARIFICATION IS REQUIRED CONTACT THE ENGINEER OF RECORD.

5. SUBSTANTIAL EFFORT HAS BEEN MADE TO PROVIDE ACCURATE DIMENSIONS AND MEASUREMENTS ON THE DRAWINGS TO ASSIST IN THE FABRICATION AND/OR PLACEMENT OF CONSTRUCTION ELEMENTS BUT IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY THE DIMENSIONS, MEASUREMENTS, AND/OR CLEARANCES SHOWN IN THE CONSTRUCTION DRAWINGS PRIOR TO FABRICATION OR CUTTING OF ANY NEW OR EXISTING CONSTRUCTION ELEMENTS. IF IT IS DETERMINED THAT THERE ARE DISCREPANCIES AND/OR CONFLICTS WITH THE CONSTRUCTION DRAWINGS THE ENGINEER OF RECORD IS TO BE NOTIFIED AS SOON AS POSSIBLE.

6. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING CONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CARRIER POC AND TOWER OWNER.

7. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.

8. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.

9. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.

10. IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY THE CARRIER AND TOWER OWNER PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.

11. CONTRACTOR IS TO PERFORM A SITE INVESTIGATION, BEFORE SUBMITTING BIDS, TO DETERMINE THE BEST ROUTING OF ALL CONDUITS FOR POWER, AND TELCO AND FOR GROUNDING CABLES AS SHOWN IN THE POWER, TELCO, AND GROUNDING PLAN DRAWINGS.

12. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF DISH WIRELESS AND TOWER OWNER

13. CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.

14. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.

dish wireless.

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STATE OF MARYLAND
CHRISTOPHER D. MORIN
No. 24552
PROFESSIONAL ENGINEER
7.19.21

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 NUMBER 24552, EXPIRATION DATE 11/17/21.

DRAWN BY:	CHECKED BY:	APPROVED BY:
GMW	NP	CDM

RFDS REV #: 0

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
A	3/2/21	ISSUED FOR REVIEW
0	4/6/21	ISSUED FOR CONSTRUCTION
1	5/3/21	ISSUED FOR CONSTRUCTION
2	7/19/21	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER
–

DISH WIRELESS PROJECT INFORMATION
DCWDC00428A
–
12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE
GENERAL NOTES

SHEET NUMBER
GN-2

CONCRETE, FOUNDATIONS, AND REINFORCING STEEL:

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318, ACI 336, ASTM A184, ASTM A185 AND THE DESIGN AND CONSTRUCTION SPECIFICATION FOR CAST-IN-PLACE CONCRETE.

2. UNLESS NOTED OTHERWISE, SOIL BEARING PRESSURE USED FOR DESIGN OF SLABS AND FOUNDATIONS IS ASSUMED TO BE 1000 psf.

3. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (f'c) OF 3000 psi AT 28 DAYS, UNLESS NOTED OTHERWISE. NO MORE THAN 90 MINUTES SHALL ELAPSE FROM BATCH TIME TO TIME OF PLACEMENT UNLESS APPROVED BY THE ENGINEER OF RECORD. TEMPERATURE OF CONCRETE SHALL NOT EXCEED 90°f AT TIME OF PLACEMENT.

4. CONCRETE EXPOSED TO FREEZE-THAW CYCLES SHALL CONTAIN AIR ENTRAINING ADMIXTURES. AMOUNT OF AIR ENTRAINMENT TO BE BASED ON SIZE OF AGGREGATE AND F3 CLASS EXPOSURE (VERY SEVERE). CEMENT USED TO BE TYPE II PORTLAND CEMENT WITH A MAXIMUM WATER-TO-CEMENT RATIO (W/C) OF 0.45.

5. ALL STEEL REINFORCING SHALL CONFORM TO ASTM A615. ALL WELDED WIRE FABRIC (WWF) SHALL CONFORM TO ASTM A185. ALL SPLICES SHALL BE CLASS "B" TENSION SPLICES, UNLESS NOTED OTHERWISE. ALL HOOKS SHALL BE STANDARD 90 DEGREE HOOKS, UNLESS NOTED OTHERWISE. YIELD STRENGTH (Fy) OF STANDARD DEFORMED BARS ARE AS FOLLOWS:

#4 BARS AND SMALLER 40 ksi

#5 BARS AND LARGER 60 ksi

6. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:

- CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH 3"
- CONCRETE EXPOSED TO EARTH OR WEATHER:
- #6 BARS AND LARGER 2"
- #5 BARS AND SMALLER 1-1/2"
- CONCRETE NOT EXPOSED TO EARTH OR WEATHER:
- SLAB AND WALLS 3/4"
- BEAMS AND COLUMNS 1-1/2"

7. A TOOLED EDGE OR A 3/4" CHAMFER SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNLESS NOTED OTHERWISE, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.

ELECTRICAL INSTALLATION NOTES:

1. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES/ORDINANCES.

2. CONDUIT ROUTINGS ARE SCHEMATIC. CONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED AND TRIP HAZARDS ARE ELIMINATED.

3. WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC.

4. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC.

4.1. ALL EQUIPMENT SHALL BEAR THE UNDERWRITERS LABORATORIES LABEL OF APPROVAL, AND SHALL CONFORM TO REQUIREMENT OF THE NATIONAL ELECTRICAL CODE.

4.2. ALL OVERCURRENT DEVICES SHALL HAVE AN INTERRUPTING CURRENT RATING THAT SHALL BE GREATER THAN THE SHORT CIRCUIT CURRENT TO WHICH THEY ARE SUBJECTED, 22,000 AIC MINIMUM. VERIFY AVAILABLE SHORT CIRCUIT CURRENT DOES NOT EXCEED THE RATING OF ELECTRICAL EQUIPMENT IN ACCORDANCE WITH ARTICLE 110.24 NEC OR THE MOST CURRENT ADOPTED CODE PRE THE GOVERNING JURISDICTION.

5. EACH END OF EVERY POWER PHASE CONDUCTOR, GROUNDING CONDUCTOR, AND TELCO CONDUCTOR OR CABLE SHALL BE LABELED WITH COLOR-CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2" PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC AND OSHA.

6. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH LAMICOID TAGS SHOWING THEIR RATED VOLTAGE, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING AND BRANCH CIRCUIT ID NUMBERS (i.e. PANEL BOARD AND CIRCUIT ID'S).

7. PANEL BOARDS (ID NUMBERS) SHALL BE CLEARLY LABELED WITH PLASTIC LABELS.

8. TIE WRAPS ARE NOT ALLOWED.

9. ALL POWER AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE COPPER CONDUCTOR (#14 OR LARGER) WITH TYPE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.

10. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE COPPER CONDUCTOR (#6 OR LARGER) WITH TYPE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.

11. POWER AND CONTROL WIRING IN FLEXIBLE CORD SHALL BE MULTI-CONDUCTOR, TYPE SOOW CORD (#14 OR LARGER) UNLESS OTHERWISE SPECIFIED.

12. POWER AND CONTROL WIRING FOR USE IN CABLE TRAY SHALL BE MULTI-CONDUCTOR, TYPE TC CABLE (#14 OR LARGER), WITH TYPE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.

13. ALL POWER AND GROUNDING CONNECTIONS SHALL BE CRIMP-STYLE, COMPRESSION WIRE LUGS AND WIRE NUTS BY THOMAS AND BETTS (OR EQUAL). LUGS AND WIRE NUTS SHALL BE RATED FOR OPERATION NOT LESS THAN 75° C (90° C IF AVAILABLE).

14. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND NEC.

15. ELECTRICAL METALLIC TUBING (EMT), INTERMEDIATE METAL CONDUIT (IMC), OR RIGID METAL CONDUIT (RMC) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.

16. ELECTRICAL METALLIC TUBING (EMT) OR METAL-CLAD CABLE (MC) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.

17. SCHEDULE 40 PVC UNDERGROUND ON STRAIGHTS AND SCHEDULE 80 PVC FOR ALL ELBOWS/90s AND ALL APPROVED ABOVE GRADE PVC CONDUIT.

18. LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID-TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.

19. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION-TYPE AND APPROVED FOR THE LOCATION USED. SET SCREW FITTINGS ARE NOT ACCEPTABLE.

20. CABINETS, BOXES AND WIRE WAYS SHALL BE LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND THE NEC.

21. WIREWAYS SHALL BE METAL WITH AN ENAMEL FINISH AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARDS (WIREMOLD SPECMATE WIREWAY).

22. SLOTTED WIRING DUCT SHALL BE PVC AND INCLUDE COVER (PANDUIT TYPE E OR EQUAL).

23. CONDUITS SHALL BE FASTENED SECURELY IN PLACE WITH APPROVED NON-PERFORATED STRAPS AND HANGERS. EXPLOSIVE DEVICES (i.e. POWDER-ACTUATED) FOR ATTACHING HANGERS TO STRUCTURE WILL NOT BE PERMITTED. CLOSELY FOLLOW THE LINES OF THE STRUCTURE, MAINTAIN CLOSE PROXIMITY TO THE STRUCTURE AND KEEP CONDUITS IN TIGHT ENVELOPES. CHANGES IN DIRECTION TO ROUTE AROUND OBSTACLES SHALL BE MADE WITH CONDUIT OUTLET BODIES. CONDUIT SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. PARALLEL AND PERPENDICULAR TO STRUCTURE WALL AND CEILING LINES. ALL CONDUIT SHALL BE FISHED TO CLEAR OBSTRUCTIONS. ENDS OF CONDUITS SHALL BE TEMPORARILY CAPPED FLUSH TO FINISH GRADE TO PREVENT CONCRETE, PLASTER OR DIRT FROM ENTERING. CONDUITS SHALL BE RIGIDLY CLAMPED TO BOXES BY GALVANIZED MALLEABLE IRON BUSHING ON INSIDE AND GALVANIZED MALLEABLE IRON LOCKNUT ON OUTSIDE AND INSIDE.

24. EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES AND PULL BOXES SHALL BE GALVANIZED OR EPOXY-COATED SHEET STEEL. SHALL MEET OR EXCEED UL 50 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND NEMA 3 (OR BETTER) FOR EXTERIOR LOCATIONS.

25. METAL RECEPTACLE, SWITCH AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY-COATED OR NON-CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.

26. NONMETALLIC RECEPTACLE, SWITCH AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2 (NEWEST REVISION) AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.

27. THE CONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CARRIER AND/OR DISH WIRELESS AND TOWER OWNER BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.

28. THE CONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD LIFE AND PROPERTY.

29. INSTALL LAMICOID LABEL ON THE METER CENTER TO SHOW "DISH WIRELESS".

30. ALL EMPTY/SPARE CONDUITS THAT ARE INSTALLED ARE TO HAVE A METERED MULE TAPE PULL CORD INSTALLED.

dish wireless.

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STATE OF MARYLAND
CHRISTOPHER D. MORIN
No. 24552
PROFESSIONAL ENGINEER
7.19.21

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 NUMBER 24552, EXPIRATION DATE 11/17/21.

DRAWN BY:	CHECKED BY:	APPROVED BY:
GMW	NP	CDM

RFDS REV #: 0

CONSTRUCTION DOCUMENTS

SUBMITTALS

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1	5/3/21	ISSUED FOR CONSTRUCTION
2	7/19/21	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER

-

DISH WIRELESS PROJECT INFORMATION

DCWDC00428A

-

12501-A DALEWOOD DR.
SILVER SPRING, MD 20906

SHEET TITLE

GENERAL NOTES

SHEET NUMBER

GN-3

GROUNDING NOTES:

1. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION AND AC POWER GES'S) SHALL BE BONDED TOGETHER AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.

2. THE CONTRACTOR SHALL PERFORM IEEE FALL–OF–POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR GROUND ELECTRODE SYSTEMS, THE CONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS.

3. THE CONTRACTOR IS RESPONSIBLE FOR PROPERLY SEQUENCING GROUNDING AND UNDERGROUND CONDUIT INSTALLATION AS TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM OR DAMAGE TO THE CONDUIT AND PROVIDE TESTING RESULTS.

4. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH #6 COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.

5. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.

6. EACH CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, #6 STRANDED COPPER OR LARGER FOR INDOOR BTS; #2 BARE SOLID TINNED COPPER FOR OUTDOOR BTS.

7. CONNECTIONS TO THE GROUND BUS SHALL NOT BE DOUBLED UP OR STACKED BACK TO BACK CONNECTIONS ON OPPOSITE SIDE OF THE GROUND BUS ARE PERMITTED.

8. ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT/GROUND BARS AND THE GROUND RING SHALL BE #2 SOLID TINNED COPPER UNLESS OTHERWISE INDICATED.

9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.

10. USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED.

11. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.

12. ALL GROUND CONNECTIONS ABOVE GRADE (INTERIOR AND EXTERIOR) SHALL BE FORMED USING HIGH PRESS CRIMPS.

13. COMPRESSION GROUND CONNECTIONS MAY BE REPLACED BY EXOTHERMIC WELD CONNECTIONS.

14. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO THE BRIDGE AND THE TOWER GROUND BAR.

15. APPROVED ANTIOXIDANT COATINGS (i.e. CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.

16. ALL EXTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.

17. MISCELLANEOUS ELECTRICAL AND NON–ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.

18. BOND ALL METALLIC OBJECTS WITHIN 6 ft OF MAIN GROUND RING WITH (1) #2 BARE SOLID TINNED COPPER GROUND CONDUCTOR.

19. GROUND CONDUCTORS USED FOR THE FACILITY GROUNDING AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON–METALLIC MATERIAL SUCH AS PVC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (i.e., NONMETALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.

20. ALL GROUNDS THAT TRANSITION FROM BELOW GRADE TO ABOVE GRADE MUST BE #2 BARE SOLID TINNED COPPER IN 3/4" NON–METALLIC, FLEXIBLE CONDUIT FROM 24" BELOW GRADE TO WITHIN 3" TO 6" OF CAD–WELD TERMINATION POINT. THE EXPOSED END OF THE CONDUIT MUST BE SEALED WITH SILICONE CAULK. (ADD TRANSITIONING GROUND STANDARD DETAIL AS WELL).

21. BUILDINGS WHERE THE MAIN GROUNDING CONDUCTORS ARE REQUIRED TO BE ROUTED TO GRADE, THE CONTRACTOR SHALL ROUTE TWO GROUNDING CONDUCTORS FROM THE ROOFTOP, TOWERS, AND WATER TOWERS GROUNDING RING, TO THE EXISTING GROUNDING SYSTEM, THE GROUNDING CONDUCTORS SHALL NOT BE SMALLER THAN 2/0 COPPER. ROOFTOP GROUNDING RING SHALL BE BONDED TO THE EXISTING GROUNDING SYSTEM, THE BUILDING STEEL COLUMNS, LIGHTNING PROTECTION SYSTEM, AND BUILDING MAIN WATER LINE (FERROUS OR NONFERROUS METAL PIPING ONLY). DO NOT ATTACH GROUNDING TO FIRE SPRINKLER SYSTEM PIPES.

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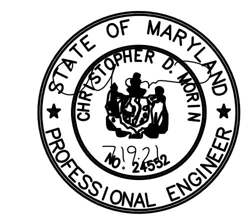

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NUMBER 24552, EXPIRATION DATE 11/17/21.

DRAWN BY:	CHECKED BY:	APPROVED BY:
GMW	NP	CDM

RFDS REV #: 0

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
A	3/2/21	ISSUED FOR REVIEW
0	4/6/21	ISSUED FOR CONSTRUCTION
1	5/3/21	ISSUED FOR CONSTRUCTION
2	7/19/21	ISSUED FOR CONSTRUCTION

A&E PROJECT NUMBER

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DISH WIRELESS PROJECT INFORMATION

DCWDC00428A

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12501–A DALEWOOD DR.
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SHEET TITLE

GENERAL NOTES

SHEET NUMBER

GN-4