Northeast Site Solutions
Victoria Masse
420 Main St Unit 1 Box 2
Sturbridge, MA 01566
victoria@northeastsitesolutions.com

October 25, 2023

Members of the Siting Council
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

RE: Tower Share Application
33 Bald Hill Road, Union CT 06076
Latitude: 41.9741838 N
Longitude: 72.1989287 W
Site#: BOBOS00933A

Dear Ms. Bachman:

This letter and attachments are submitted on behalf of Dish Wireless LLC. Dish Wireless LLC plans to install antennas and related equipment to the lattice tower site located at 33 Bald Hill Road, Union, Connecticut.

Dish Wireless LLC proposes to install three (3) 600/1900/2100 5G MHz antenna and six (6) RRUs, at the 75-foot level of the existing 180-foot lattice tower, one (1) hybrid cable will also be installed. Dish Wireless LLC equipment cabinets will be placed within 5'x7' lease area. Included are plans by Centek, dated October 20, 2023, Exhibit C. Also included is a structural analysis prepared by Centek, dated August 17, 2023 confirming that the existing lattice tower is structurally capable of supporting the proposed equipment. Attached as Exhibit D. This facility was approved by the Connecticut Siting Council, Docket No.159 on June 29, 1993. Please see attached Exhibit A.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies 16-50aa, of Dish Wireless LLC intent to share a telecommunications facility pursuant to R.C.S.A. 16-50j-88. In accordance with R.C.S.A., a copy of this letter is being sent to David D. Eaton, First Selectman, Mathieu J. Silbermann, Zoning Enforcement Officer, as well as the property owner and tower owner.

The planned modifications of the facility fall squarely within those activities explicitly provided for in R.C.S.A. 16-50j-89.

1. The proposed modifications will not result in an increase in the height of the existing structure. The top of the lattice tower is 180-feet; Dish Wireless LLC proposed antennas will be located at a center line height of 75-feet.

2.The proposed modification will not result in the increase of the site boundary as depicted on the attached site plan.

3.The proposed modification will not increase the noise levels at the facility by six decibels or more, or to levels that exceed local and state criteria. The incremental effect of the proposed changes will be negligent.

4.The operation of the proposed antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard. As indicated in the attached power density calculations, the combined site operations will result in a total density of 13.28% as evidenced by Exhibit F.

Connecticut General Statutes 16-50-aa indicates that the Council must approve the shared use of a telecommunications facility provided it finds the shared use is technically, legally, environmentally, and economically feasible and meets public safety concerns. As demonstrated in this letter, Dish Wireless LLC respectfully indicates that the shared use of this facility satisfies these criteria.

A. Technical Feasibility. The existing lattice tower has been deemed structurally capable of supporting Dish Wireless LLC proposed loading. The structural analysis is included in Exhibit D.

B. Legal Feasibility. As referenced above, C.G.S. 16-50aa has been authorized to issue orders approving the shared use of an existing lattice tower such as this lattice tower in Union. Under the authority granted to the Council, an order of the Council approving the requested shared use would permit Dish Wireless LLC to obtain a building permit for the proposed installation. Further, a letter of Authorization is included as Exhibit G, authorizing Dish Wireless LLC to file this application for shared use.

C. Environmental Feasibility. The proposed shared use of this facility would have a minimal environmental impact. The installation of Dish Wireless LLC equipment at the 75-foot level of the existing 180-foot tower would have an insignificant visual impact on the area around the lattice tower. Dish Wireless LLC ground equipment would be installed within the existing facility compound. Dish Wireless LLC shared use would therefore not cause any significant alteration in the physical or environmental characteristics of the existing site. Additionally, as evidenced by Exhibit F, the proposed antennas would not increase radio frequency emissions to a level at or above the Federal Communications Commission safety standard.

D. Economic Feasibility. Dish Wireless LLC will be entering into an agreement with the owner of this facility to mutually agreeable terms. As previously mentioned, the Letter of Authorization has been provided by the owner to assist Dish Wireless LLC with this tower share application.

E. Public Safety Concerns. As discussed above, the water tank is structurally capable of supporting Dish Wireless LLC proposed loading. Dish Wireless LLC is not aware of any public safety concerns relative to the proposed sharing of the existing water tank. Dish Wireless LLC intentions of providing new and improved wireless service through the shared use of this facility is expected to enhance the safety and welfare of local residents and individuals traveling through Union.

Sincerely,

Victoria Masse
Mobile: 860-306-2326
Fax: 413-521-0558
Office: 420 Main Street, Unit 1 Box 2, Sturbridge, MA 01566
Email: victoria@northeastsitesolutions.com

NORTHEAST
SITE SOLUTIONS
Turnkey Wireless Development

www.northeastsitesolutions.com

Attachments
Cc:
David D. Eaton, First Selectman
Town Hall
1043 Buckley Hwy
Union, CT 06076

Mathieu J. Silbermann, Zoning Enforcement Officer
Town Hall
1043 Buckley Hwy
Union, CT 06076

CL&P PROPERTY TAX DEPT, Property and Tower Owner
PO BOX 270
Hartford, CT 06141

ATTACHMENT 1

ORIGINAL

DOCKET NO. 159 - An application of the Department of Public Safety, Division of State Police for a Certificate of Environmental Compatibility and Public Need for the construction, operation, and maintenance of telecommunications facilities located off of Bald Hill Road at an existing Northeast Utilities tower site approximately 2,000 feet north from Route 190 in Union, and at the new Troop C Barracks on Route 74 approximately 2,500 feet west from Exit 69 off of Interstate 84 in Tolland, Connecticut.	:	Connecticut Siting Council June 29, 1993

DECISION AND ORDER

Pursuant to the foregoing Findings of Fact and Opinion, the Connecticut Siting Council (Council) finds that the effects associated with the construction, operation, and maintenance of telecommunications facilities at the proposed sites in Union and Tolland, Connecticut, including effects on the natural environment; ecological integrity and balance; public health and safety; scenic, historic, and recreational values; forests and parks; air and water purity; and fish and wildlife are not disproportionate either alone or cumulatively with other effects when compared to need, are not in conflict with the policies of the State concerning such effects, and are not sufficient reason to deny the application, and therefore directs that a Certificate of Environmental Compatibility and Public Need, as provided by section 16-50k of the General Statutes of Connecticut (CGS), be issued to the Connecticut Department of Public Safety, Division of State Police, for the construction, operation, and maintenance of telecommunications facilities at the proposed sites off of Bald Hill Road in Union and at the new Troop C Barracks in Tolland, Connecticut.

The facilities shall be constructed, operated, and maintained substantially as specified in the Council's record in this proceeding, and subject to the following conditions:

1. The proposed Union self-supporting lattice tower shall be designed no taller than necessary to provide the proposed communications and in no event shall it exceed the proposed height of 180-feet above ground level (AGL) excluding antennas.

2. The proposed Tolland self-supporting lattice tower shall be designed no taller than necessary to provide the proposed communications and in no event shall it exceed the proposed height of 120-feet AGL excluding antennas.

3. The CSP shall apply to the Federal Aviation Administration (FAA) for an amendment to waive the lighting and marking of the Union tower if the FAA so rules that the tower is to be lighted and marked. Copies of the CSP's application for amendment shall be filed with the Council within two (2) weeks of their filing with the FAA. If the FAA rules that the tower must be lighted and marked, the CSP shall submit all lighting and marking options for Council review and approval.

4. The Certificate holder shall prepare Development and Management (D&M) plans for both sites in accordance with sections 16-50j-75 through 16-50j-77 of the Regulations of State Agencies (RSA). The D&M plans shall be submitted to and approved by the Council prior to the commencement of facility construction and shall also include detailed plans for the placement of the towers and equipment buildings, tower heights, access roads, utility line installation, erosion and sediment controls, fencing, and site landscaping.

5. The Certificate holder shall comply with all existing and future radio frequency (RF) standards promulgated by State or federal regulatory agencies. Upon the establishment of any new governmental RF standards, the Certificate holder shall provide such notice to the Council and the facilities granted herein shall be brought into compliance with such standards as soon as practicable.

6. The Certificate holder shall provide the Council a recalculated report of radio frequency power density if and when circumstances in operation cause an increase in the power density above the levels used herein by the Council to render its decision.

7. The Certificate holder shall permit public or private entities to share space on the proposed towers for fair consideration, or shall provide any requesting party with specific legal, technical, environmental, or economic reasons precluding such tower sharing.

8. If either facility does not initially provide, or permanently ceases to provide telecommunications service following completion of construction, this Decision and Order shall be void, and the tower and all associated equipment shall be dismantled and removed or re-application for any new use shall be made to the Council before any such new use is made.

Unless otherwise approved by the Council, this Decision and Order shall be void if all construction authorized herein is not completed within five (5) years of the

effective date of this Decision and Order or within five years after all appeals to this Decision and Order have been resolved.

Pursuant to CGS section 16-50p, we hereby direct that a copy of the Findings of Fact, Opinion, and Decision and Order be served on each person listed below, and notice of issuance shall be published in the Hartford Courant and the Journal Inquirer.

By this Decision and Order, the Council disposes of the legal rights, duties, and privileges of each party named or admitted to the proceeding in accordance with RSA section 16-50j-17.

The party to this proceeding is:

APPLICANT	ITS REPRESENTATIVES
Connecticut State Police	Mr. George L. Davis Emergency Telecommunications Engineer Telecommunications Section Department of Public Safety Division of State Police 294 Colony Street, Bldg. 5 Meriden, CT 06450 L. D. McCallum and Stephen R. Sarnoski Office of the Attorney General MacKenzie Hall 110 Sherman Street Hartford, CT 06105

CERTIFICATION

The undersigned members of the Connecticut Siting Council (Council) hereby certify that they have heard this case, or read the record thereof, in DOCKET NO. 159 - An application of the Department of Public Safety, Division of State Police for a Certificate of Environmental Compatibility and Public Need for the construction, operation, and maintenance of telecommunications facilities located off of Bald Hill Road at an existing Northeast Utilities tower site approximately 2,000 feet north from Route 190 in Union, and at the new Troop C Barracks on Route 74 approximately 2,500 feet west from Exit 69 off of Interstate 84 in Tolland, Connecticut, and voted as follows to approve the proposed sites:

Council Members	Vote Cast
Mortimer A. Gelston Chairman	YES
Commissioner Clifton A. Leonhardt Designee: Gerald J. Heffernan	YES
Commissioner Timothy R.E. Keeney Designee: Brian Emerick	ABSENT
Harry E. Covey	YES
Daniel P. Lynch, Jr.	YES
Gloria Dibble Pond	ABSENT
Paulann H. Sheets	YES
Colin C. Tait	YES
Dana J. Wright	ABSENT

Dated at New Britain, Connecticut, June 29, 1993.

7010E-2

ATTACHMENT 2

BALD HILL RD

Location	BALD HILL RD	**Mblu**	09/ 21/ 23L/ /
Acct#	00039410	**Owner**	CL&P PROPERTY TAX DEPT
Assessment	$409,660	**Appraisal**	$585,220
PID	22	**Building Count**	1

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2018	$585,220	$0	$585,220
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2018	$409,660	$0	$409,660

Owner of Record

Owner	CL&P PROPERTY TAX DEPT	**Sale Price**	$0
Co-Owner	BAUER(UNION-LEASE)	**Certificate**	
Address	PO BOX 270 HARTFORD, CT 06141-0270	**Book & Page**	35/370
		Sale Date	02/13/1992

Ownership History

Ownership History				
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Sale Date**
CL&P PROPERTY TAX DEPT	$0		35/370	02/13/1992

Building Information

Building 1 : Section 1

Year Built:
Living Area: 0
Replacement Cost: $0
Building Percent Good:
Replacement Cost Less Depreciation: $0

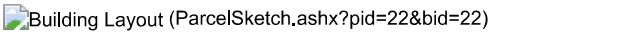
Building Attributes	
Field	**Description**

Style:	Outbuildings
Model:	
Grade:	
Stories:	
Occupancy	
Exterior Wall 1	
Exterior Wall 2	
Roof Structure:	
Roof Cover	
Interior Wall 1	
Interior Wall 2	
Interior Flr 1	
Interior Flr 2	
Heat Fuel	
Heat Type:	
AC Type:	
Total Bedrooms:	
Total Bthrms:	
Total Half Baths:	
Total Xtra Fixtrs:	
Total Rooms:	
Bath Style:	
Kitchen Style:	

Building Photo

(https://images.vgsi.com/photos/UnionCTPhotos//00\00\01\57.jpg)

Building Layout



Building Sub-Areas (sq ft)	Legend
No Data for Building Sub-Areas	

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code	4340
Description	Cell Tower
Zone	RR
Neighborhood	12
Alt Land Appr	No
Category	

Land Line Valuation

Size (Acres)	0
Frontage	0
Depth	0
Assessed Value	$0
Appraised Value	$0

Outbuildings

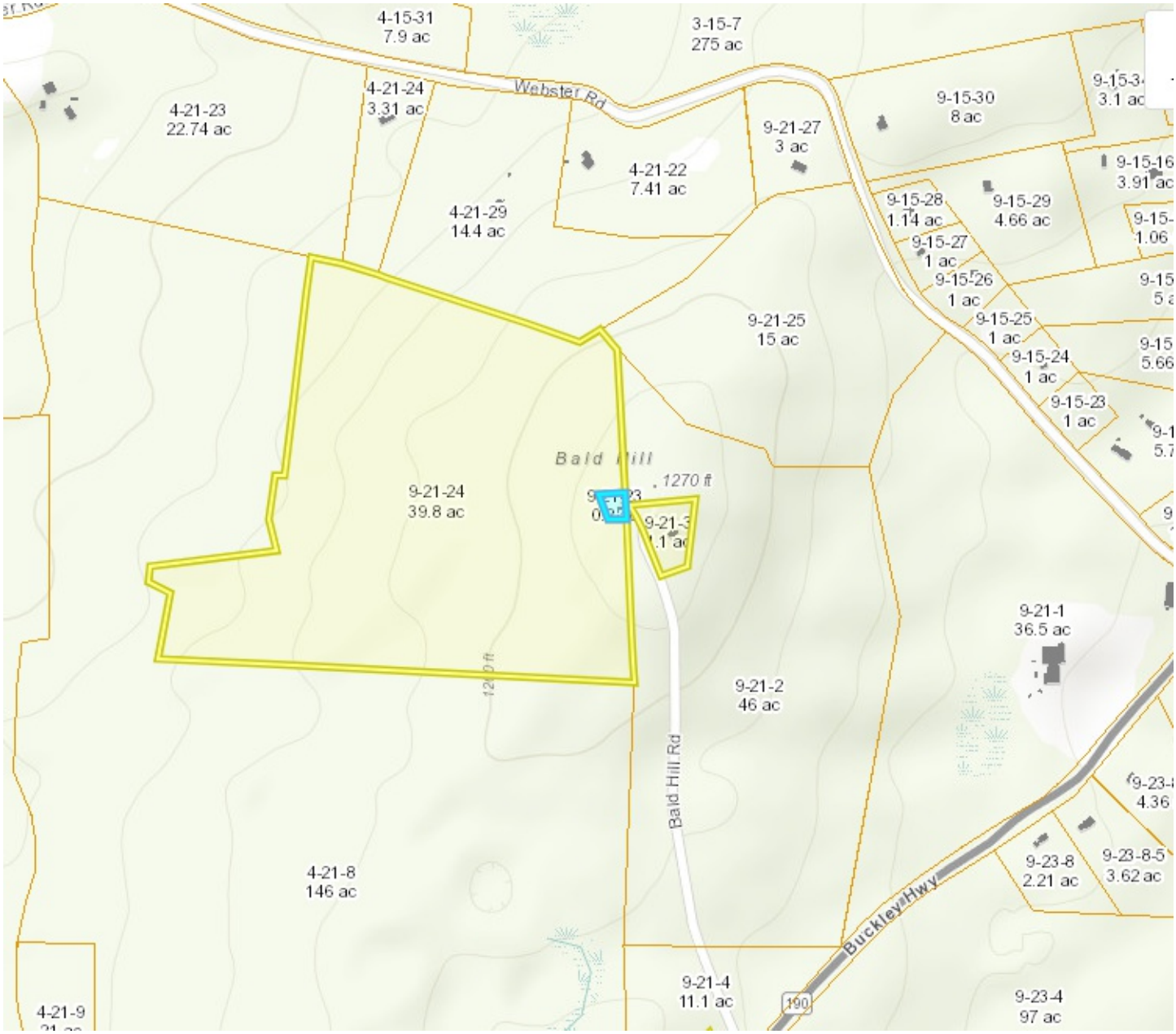
Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
SHD6	PRE FAB SHED			80.00 S.F.	$21,000	1

CELL	CELL TENANT			3.00 UNITS	$504,900	1
FN3	FENCE-6' CHAIN			348.00 L.F.	$1,570	1
SHD6	PRE FAB SHED			220.00 S.F.	$57,750	1

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2022	$615,820	$0	$615,820
2018	$615,820	$0	$615,820
2017	$418,900	$0	$418,900

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2022	$431,080	$0	$431,080
2018	$431,080	$0	$431,080
2017	$293,240	$0	$293,240


4-15-31
7.9 ac
3-15-7
275 ac
Webster Rd
4-21-24
3.31 ac
4-21-23
22.74 ac
4-21-22
7.41 ac
9-21-27
3 ac
9-15-30
8 ac
4-21-29
14.4 ac
9-15-28
1.14 ac
9-15-29
4.66 ac
9-15-27
1 ac
9-15-26
1 ac
9-21-25
15 ac
9-15-25
1 ac
9-15-24
1 ac
9-15-23
1 ac
Bald Hill
1270 ft
9-21-24
39.8 ac
9-21-3
1.1 ac
9-21-1
36.5 ac
1270 ft
9-21-2
46 ac
Bald Hill Rd
4-21-8
146 ac
9-23-8
2.21 ac
9-23-8-5
3.62 ac
Buckley Hwy
9-21-4
11.1 ac
190
9-23-4
97 ac
4-21-9

ATTACHMENT 3

DISH Wireless L.L.C. SITE ID:

BOBOS00933A

DISH Wireless L.L.C. SITE ADDRESS:

BALD HILL ROAD
UNION, CT 06076

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	2022 CT STATE BUILDING CODE/2021 IBC W/ CT AMENDMENTS
ELECTRICAL	2022 CT STATE BUILDING CODE/2020 NEC W/ CT AMENDMENTS

SHEET INDEX

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 SITEPRO ANTENNA MOUNT (SITEPRO P/N: VFA8-HD)
- INSTALL (2) PROPOSED SITEPRO ANTENNA MOUNTS (SITEPRO P/N: CWT8-LL)
- INSTALL PROPOSED JUMPERS
- INSTALL (6) PROPOSED RRUs (2 PER SECTOR)
- INSTALL (1) PROPOSED OVER VOLTAGE PROTECTION DEVICE (OVP)
- INSTALL (1) PROPOSED HYBRID CABLE

GROUND SCOPE OF WORK:

- INSTALL NEW 200A, SINGLE PHASE, 240V RATED UTILITY METER AND NEW 200A/2P CIRCUIT BREAKER. ALL EQUIPMENT TO BE UTILITY APPROVED.
- INSTALL (1) PROPOSED STEEL EQUIPMENT PLATFORM
- INSTALL (1) PROPOSED ICE BRIDGE
- INSTALL (1) PROPOSED PPC CABINET
- INSTALL (1) PROPOSED EQUIPMENT CABINET
- INSTALL PROPOSED POWER CONDUITS
- INSTALL PROPOSED TELCO CONDUITS
- INSTALL (1) PROPOSED TELCO-FIBER BOX
- INSTALL (1) PROPOSED GPS UNIT
- INSTALL (1) PROPOSED SAFETY SWITCH (IF REQUIRED)
- INSTALL (1) PROPOSED FIBER NID (IF REQUIRED)
- INSTALL (1) PROPOSED 200A RATED UTILITY METER

SITE PHOTOS

UNDERGROUND SERVICE ALERT
UTILITY NOTIFICATION CENTER OF (CT)
1-800-922-4455

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:	MT OCHEPETUCK LLC
ADDRESS:	BALD HILL ROAD UNION, CT 06076
SITE TYPE:	SST TOWER
COUNTY:	TOLLAND
LATITUDE (NAD 83):	41.9741838
LONGITUDE (NAD 83):	72.1989287
ZONING JURISDICTION:	CONNECTICUT SITING COUNCIL
ZONING CODE:	RR
PARCEL NUMBER:	09/21/023//
OCCUPANCY GROUP:	N/A
CONSTRUCTION TYPE:	N/A
POWER COMPANY:	EVERSOURCE
TELEPHONE COMPANY:	SOUTHERN NEW ENGLAND TELEPHONE COMPANY

PROJECT DIRECTORY

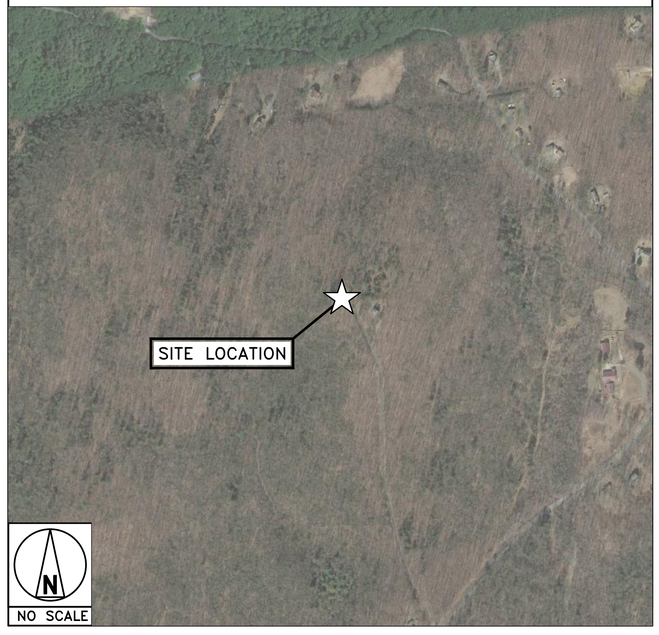
APPLICANT:	DISH Wireless L.L.C. 5701 SOUTH SANTA FE DRIVE LITTLETON, CO 80120
SITE DESIGNER:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD ROAD BRANFORD, CT. 06405 (203) 488-0580
TOWER OWNER:	EVERSOURCE 107 SELDEN STREET BERLIN, CT 06037
SITE ACQUISITION:	DAVID GOODFELLOW (860) 305-3841
CONSTRUCTION MANAGER:	CHAD WILCOX (860) 573-2758
RF ENGINEER:	IRENE RANGEL IRENE.RANGEL@DISH.COM

DIRECTIONS

DIRECTIONS FROM AIRPORT (BDL) TO WIRELESS SITE

1. HEAD NORTHWEST. GO FOR 0.2 MI.
2. CONTINUE STRAIGHT AHEAD. GO FOR 0.3 MI.
3. KEEP RIGHT TOWARD CT-20/I-91. GO FOR 0.1 MI.
4. CONTINUE ON BRADLEY FIELD CONN. GO FOR 0.5 MI.
5. CONTINUE ON CT-20 (BRADLEY FIELD CONN). GO FOR 3.2 MI.
6. TAKE THE EXIT TOWARD HARTFORD ONTO I-91 S (RICHARD P HORAN MEMORIAL HWY). GO FOR 1.3 MI.
7. KEEP RIGHT ONTO I-91 (RICHARD P HORAN MEMORIAL HWY). GO FOR 6.1 MI.
8. TAKE EXIT 35A FOR I-291. GO FOR 5.6 MI.
9. USE THE LEFT LANE TO MERGE ONTO I-84 TOWARD BOSTON. GO FOR 23.4 MI.
10. TAKE EXIT 72 FOR CT-89 TOWARD WESTFORD/ASHFORD. GO FOR 0.2 MI
11. TURN LEFT ONTO CT-89 N. GO FOR 0.6 MI.
12. TURN RIGHT ONTO CT-190 E. GO FOR 0.2 MI.
13. TURN LEFT ONTO BALD HILL RD, UNION CT 06076.

VICINITY MAP



dish wireless.

5701 SOUTH SANTA FE DRIVE
LITTLETON, CO 80120

NSS NORTHEAST SITE SOLUTIONS
Turnkey Wireless Development

CENTEK engineering
Centered on Solutions℠
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

STATE OF CONNECTICUT — LICENSED PROFESSIONAL ENGINEER — CERTIFICATE NO. 15984

DRAWN BY:	CHECKED BY:	APPROVED BY:
LGL	TJR	

RFDS REV #: 0 – 07/07/2023

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
A	08/25/23	ISSUED FOR CLIENT REVIEW
B	09/14/23	REVISED PER CLIENT COMMENTS
0	10/20/23	ISSUED FOR CONSTRUCTION

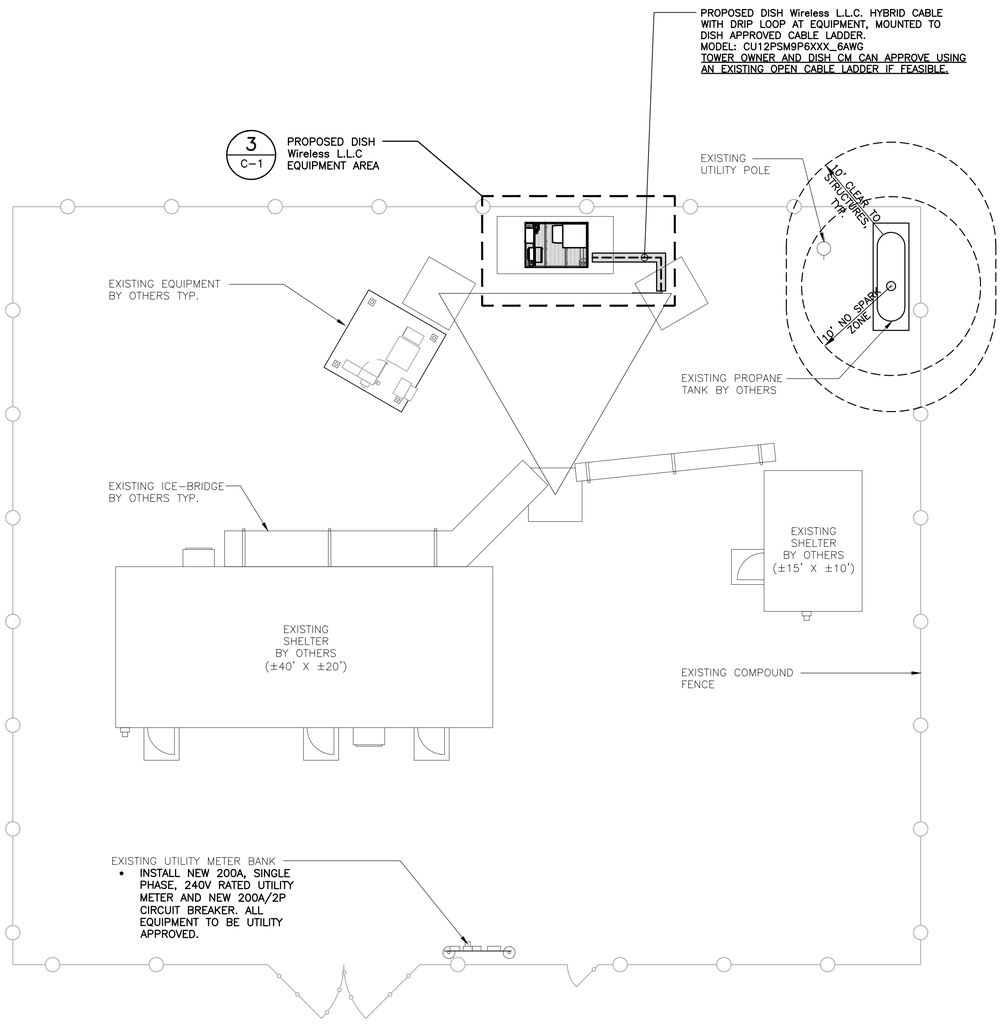
CENTEK PROJECT NUMBER
23009.07

DISH Wireless L.L.C.
PROJECT INFORMATION

BOBOS00933A
BALD HILL ROAD
UNION CT, 06076

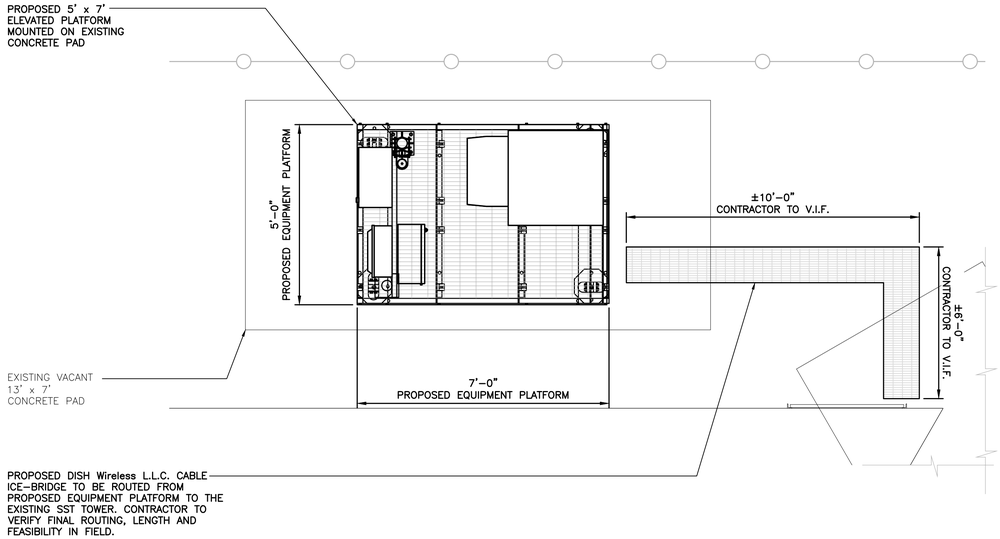
SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1



OVERALL SITE PLAN | 8' 4' 0 8' 16' | 1/8"=1'-0" | 1

AERIAL VIEW PLAN | NO SCALE | 2



ENLARGED SITE PLAN | 12" 6" 0 1' 2' 3' 4' 5' | 1/2"=1'-0" | 3

dish wireless.
5701 SOUTH SANTA FE DRIVE
LITTLETON, CO 80120

NSS NORTHEAST SITE SOLUTIONS
Turnkey Wireless Development

CENTEK engineering
Centered on Solutions℠
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

DRAWN BY:	CHECKED BY:	APPROVED BY:
LGL	TJR	

RFDS REV #: 0 – 07/07/2023

CONSTRUCTION DOCUMENTS

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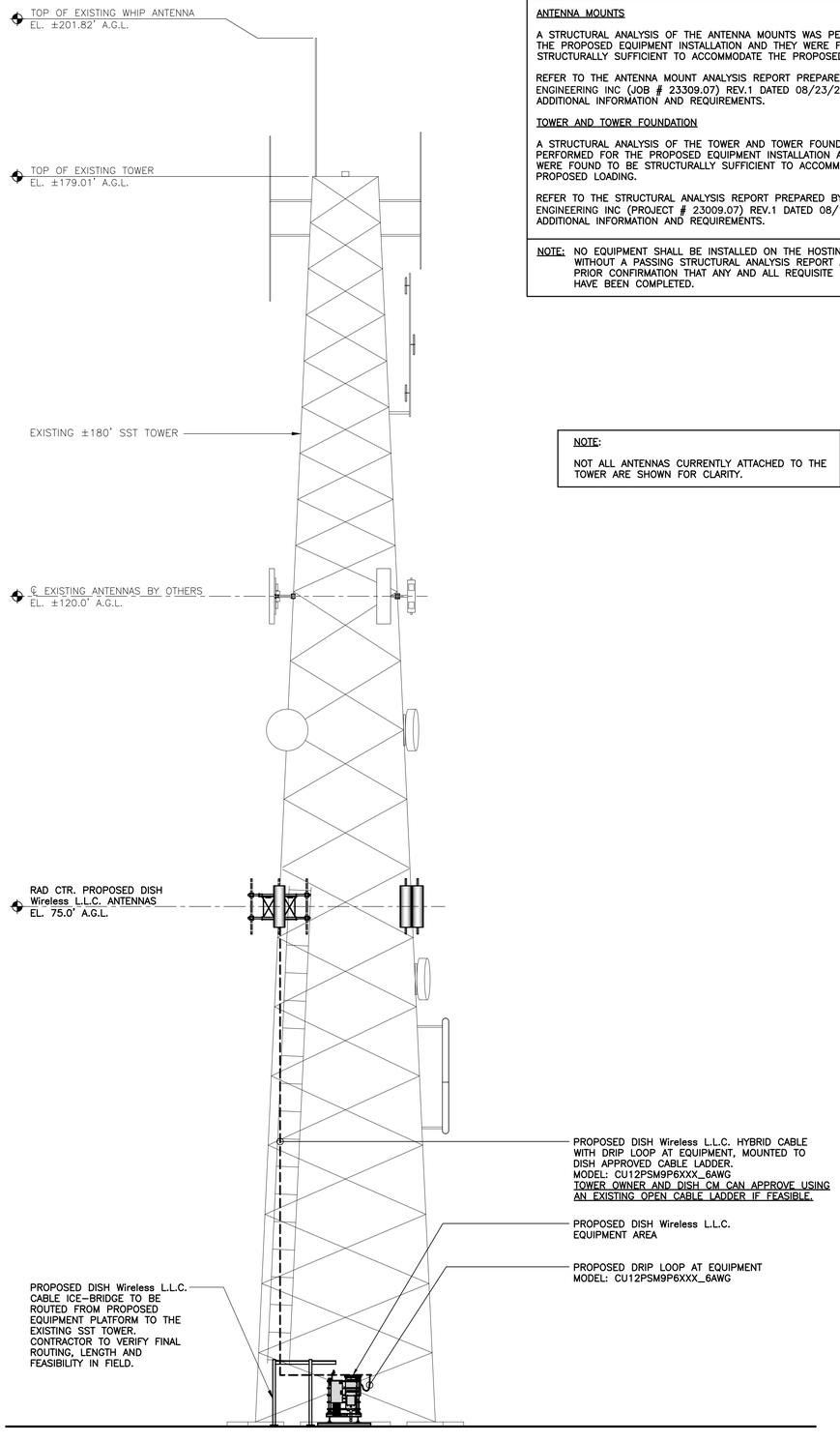
CENTEK PROJECT NUMBER
23009.07

DISH Wireless L.L.C.
PROJECT INFORMATION

BOBOS00933A
BALD HILL ROAD
UNION CT, 06076

SHEET TITLE
OVERALL SITE PLAN

SHEET NUMBER
C-1



TOWER ELEVATION

STRUCTURAL COMPLIANCE

ANTENNA MOUNTS

A STRUCTURAL ANALYSIS OF THE ANTENNA MOUNTS WAS PERFORMED FOR THE PROPOSED EQUIPMENT INSTALLATION AND THEY WERE FOUND TO BE STRUCTURALLY SUFFICIENT TO ACCOMMODATE THE PROPOSED LOADING..

REFER TO THE ANTENNA MOUNT ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING INC (JOB # 23309.07) REV.1 DATED 08/23/23 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

TOWER AND TOWER FOUNDATION

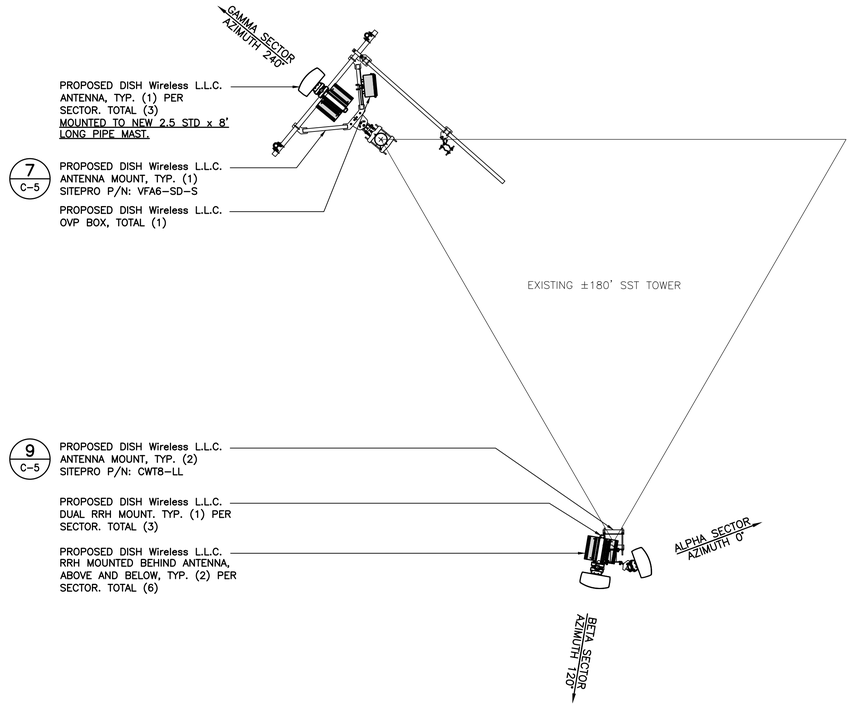
A STRUCTURAL ANALYSIS OF THE TOWER AND TOWER FOUNDATION WAS PERFORMED FOR THE PROPOSED EQUIPMENT INSTALLATION AND THEY WERE FOUND TO BE STRUCTURALLY SUFFICIENT TO ACCOMMODATE THE PROPOSED LOADING.

REFER TO THE STRUCTURAL ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING INC (PROJECT # 23009.07) REV.1 DATED 08/17/23 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

NOTE: NO EQUIPMENT SHALL BE INSTALLED ON THE HOSTING STRUCTURE WITHOUT A PASSING STRUCTURAL ANALYSIS REPORT AND CONTRACTOR PRIOR CONFIRMATION THAT ANY AND ALL REQUISITE MODIFICATIONS HAVE BEEN COMPLETED.

NOTE:

NOT ALL ANTENNAS CURRENTLY ATTACHED TO THE TOWER ARE SHOWN FOR CLARITY.



ALPHA/BETA/GAMMA SECTOR TYP.

ANTENNA CONFIGURATION PLAN

4' 2' 0 4' 8'
1/4"=1'-0"

1

SECTOR	POSITION	ANTENNA						TRANSMISSION CABLE
		EXISTING OR PROPOSED	MANUFACTURER – MODEL NUMBER	TECHNOLOGY	SIZE (HxW)	AZIMUTH	RAD CENTER	FEED LINE TYPE AND LENGTH
ALPHA	A2	PROPOSED	JMA – MX08FRO665-21	n70, n71, n66	72.0" x 20.0"	0°	75'-0"	CU12PSM9P6XXX_6AWG APPROX. 130FT
BETA	B2	PROPOSED	JMA – MX08FRO665-21	n70, n71, n66	72.0" x 20.0"	120°	75'-0"	SHARE WITH ALPHA
GAMMA	C2	PROPOSED	JMA – MX08FRO665-21	n70, n71, n66	72.0" x 20.0"	240°	75'-0"	SHARE WITH ALPHA

SECTOR	POSITION	RRH	
		MANUFACTURER – MODEL NUMBER	TECHNOLOGY
ALPHA	A2	SAMSUNG – RF4450t-71A	n71
	A2	SAMSUNG – RF4451d-70A	n70 | n66
BETA	B2	SAMSUNG – RF4450t-71A	n71
	B2	SAMSUNG – RF4451d-70A	n70 | n66
GAMMA	C2	SAMSUNG – RF4450t-71A	n71
	C2	SAMSUNG – RF4451d-70A	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.
3. ALL HYBRID/COAX LENGTHS TO BE MEASURED AND VERIFIED IN FIELD BEFORE ORDERING.

ANTENNA SCHEDULE

10' 0 10' 20'
1"=10'

1

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DRAWN BY:	CHECKED BY:	APPROVED BY:
LGL	TJR	

RFDS REV #: 0 – 07/07/2023

CONSTRUCTION DOCUMENTS

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CENTEK PROJECT NUMBER
23009.07

DISH Wireless L.L.C.
PROJECT INFORMATION

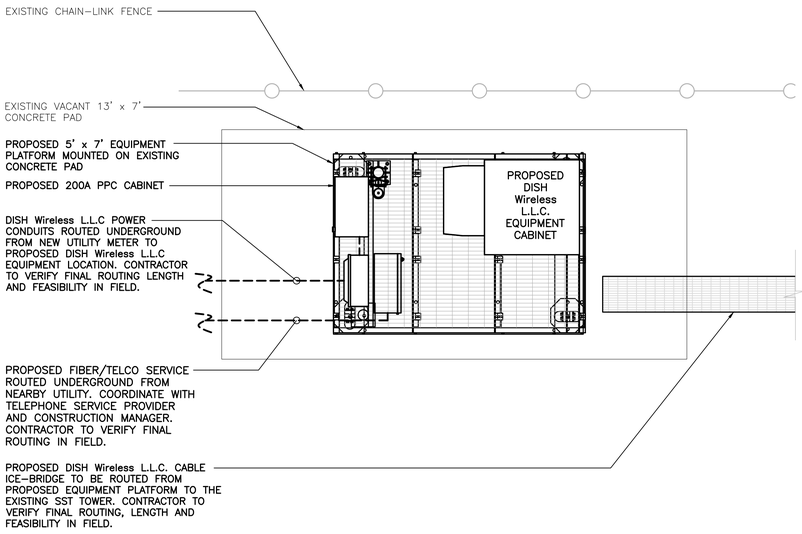
BOBOS00933A
BALD HILL ROAD
UNION CT, 06076

SHEET TITLE
ELEVATION, ANT. LAYOUT AND SCHEDULE

SHEET NUMBER
C-2

NOTE:

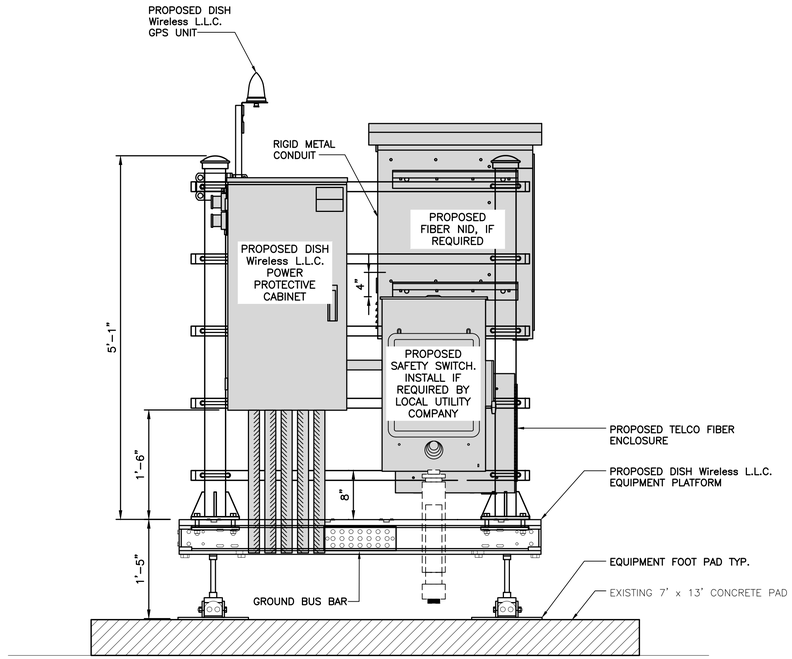
CONSULT WITH DISH CM FOR H-FRAME POSTS AND UNISTRUT PLACEMENTS.



PROPOSED EQUIPMENT PLAN

12" 6" 0 1' 2' 3' 4' 5'
1/2"=1'-0"

1



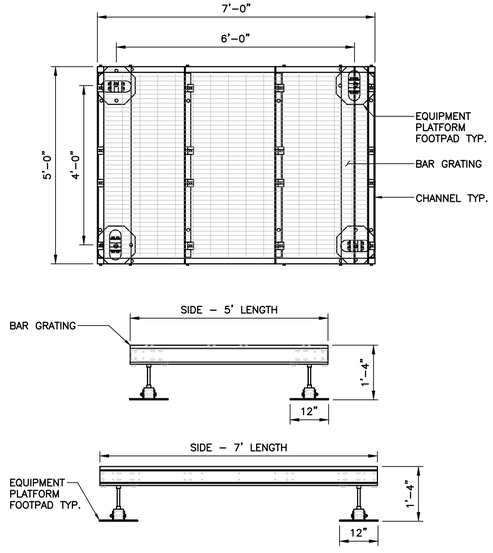
EQUIPMENT ELEVATION

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

2

COMMSCOPE MTC4045LP 5X7 PLATFORM	
DIMENSIONS (HxWxL)	16"X84"X60"
WEIGHT/ VOLUME	423 LBS

NOTE:
GC TO PROVIDE EXTENDED THREAD FOR PLATFORM IF REQUIRED HEIGHT EXCEEDS 17"



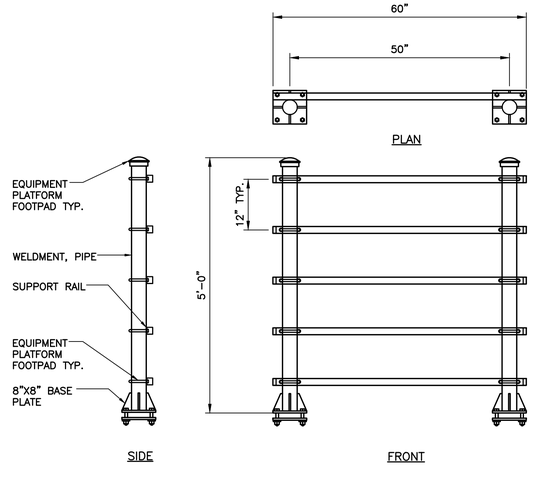
PLATFORM DETAIL

NO SCALE

3

COMMSCOPE MTC4045HFLD H-FRAME	
UNISTRUT/SUPPORT RAILS QTY	5
WEIGHT	59.74 LBS

NOTE:
OR DISH Wireless L.L.C. APPROVED EQUIVALENT



H-FRAME DETAIL

NO SCALE

4

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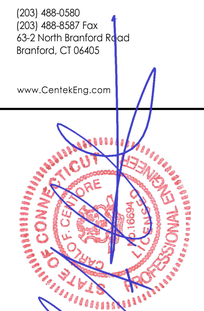

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PROJECT INFORMATION

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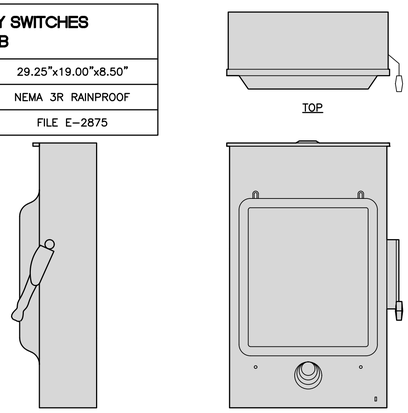
BALD HILL ROAD
UNION CT, 06076

SHEET TITLE
EQUIPMENT PLATFORM AND H-FRAME DETAILS

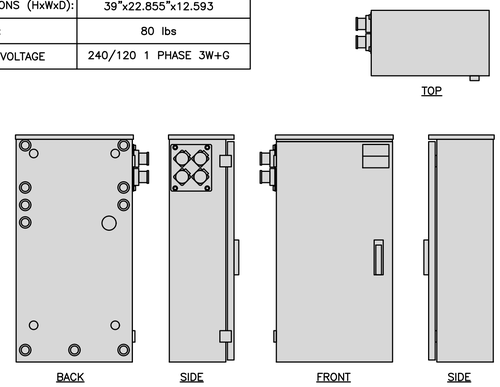
SHEET NUMBER
C-3

SQUARE D SAFETY SWITCHES D224NRB	
ENCLOSURE DIM (HxWxD)	29.25"x19.00"x8.50"
ENCLOSURE TYPE	NEMA 3R RAINPROOF
UL LISTED	FILE E-2875



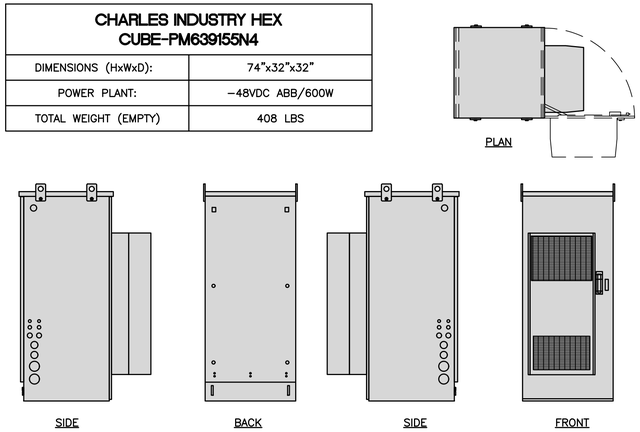
SAFETY SWITCH DETAIL | NO SCALE | 1

RAYCAP PPC RDIAC-2465-P-240-MTS	
ENCLOSURE DIMENSIONS (HxWxD):	39"x22.855"x12.593
WEIGHT:	80 lbs
OPERATING AC VOLTAGE	240/120 1 PHASE 3W+G



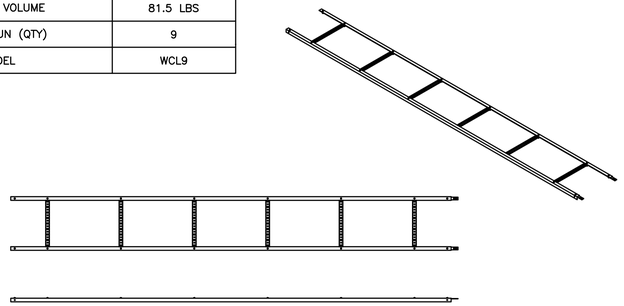
POWER PROTECTIVE CABINET DETAIL | NO SCALE | 2

CHARLES INDUSTRY HEX CUBE-PM639155N4	
DIMENSIONS (HxWxD):	74"x32"x32"
POWER PLANT:	-48VDC ABB/600W
TOTAL WEIGHT (EMPTY)	408 LBS



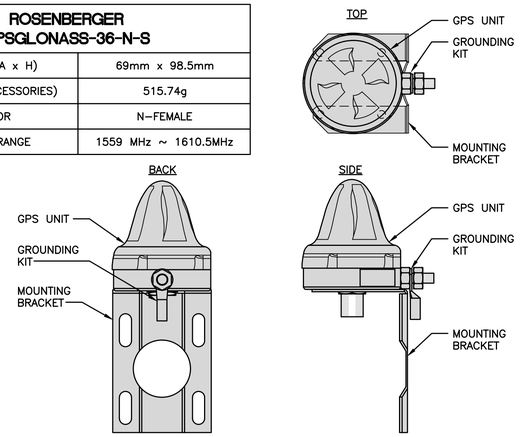
CABINET DETAIL | NO SCALE | 3

SITEPRO1: CABLE LADDER	
DIMENSIONS (LxW) (PER CABLE LADDER SECTION)	237.5"x 29.5"
WEIGHT/ VOLUME	81.5 LBS
CABLE RUN (QTY)	9
MODEL	WCL9

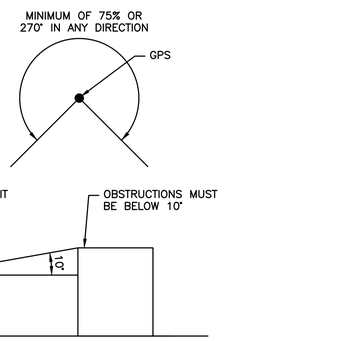


CABLE LADDER DETAIL | NO SCALE | 4

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

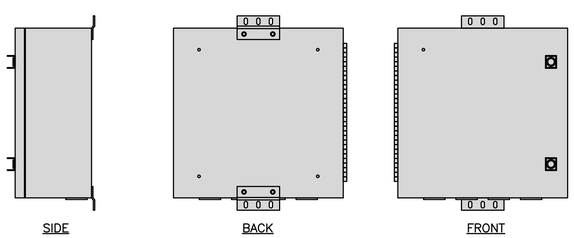


GPS DETAIL | NO SCALE | 5

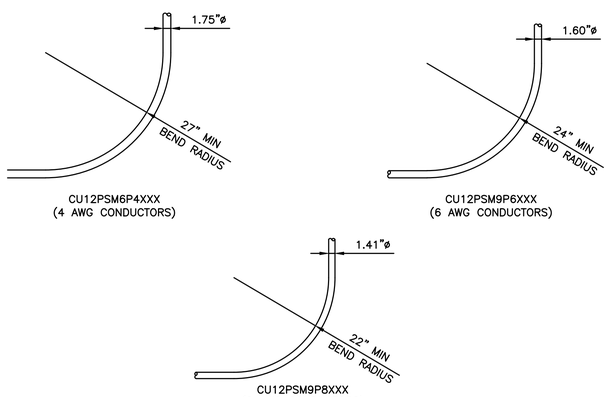


GPS MINIMUM SKY VIEW REQUIREMENTS | NO SCALE | 6

CHARLES CFIT-PF2020DSH1 FIBER TELCO ENCLOSURE	
ENCLOSURE DIMS (HxWxD)	20"x20"x9"
ENCLOSURE WEIGHT	20 lbs
MOUNTING	WALL
COMPLIANCE	TYPE 4

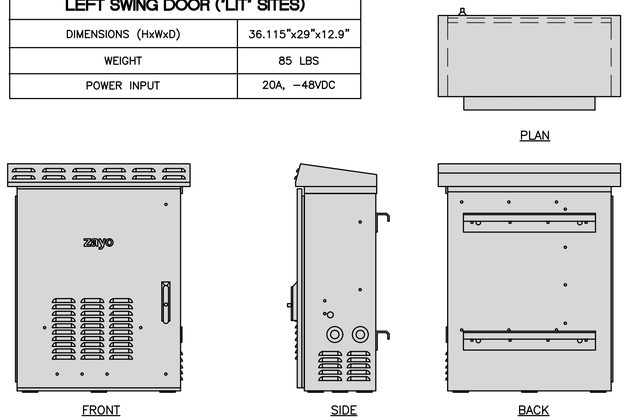


FIBER TELCO ENCLOSURE DETAIL | NO SCALE | 7



CABLES UNLIMITED HYBRID CABLE MINIMUM BEND RADIUSES | NO SCALE | 8

ZAYO 5RU CABINET LEFT SWING DOOR ("LIT" SITES)	
DIMENSIONS (HxWxD)	36.115"x29"x12.9"
WEIGHT	85 LBS
POWER INPUT	20A, -48VDC



FIBER NID ENCLOSURE DETAIL | NO SCALE | 9

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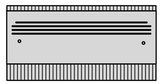
DISH Wireless L.L.C.
PROJECT INFORMATION

BOBOS00933A
BALD HILL ROAD
UNION CT, 06076

SHEET TITLE
TYPICAL EQUIPMENT DETAILS

SHEET NUMBER
C-4

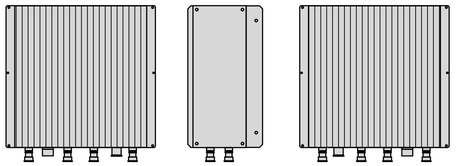
SAMSUNG: RF4450t-71A / SFG-ARR3J601DI	
DIMENSIONS (HxWxD)	16.5"x15.0"x11.0"
WEIGHT	94.58 lbs



PLAN

NOTE:

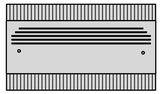
ALL VISIBLE RRH'S SHALL BE WRAPPED IN CONCEALFAB MMW VINYL FILM WRAP (PART #900864-99 OR APPROVED EQUAL



BACK SIDE FRONT

RRH DETAIL | NO SCALE | 1

SAMSUNG: RF4451d-70A / SFG-ARR3KM01DI	
DIMENSIONS (HxWxD)	15.0"x15.0"x8.9"
WEIGHT	61.3 lbs



PLAN

NOTE:

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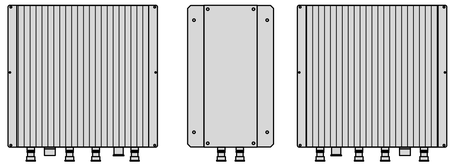
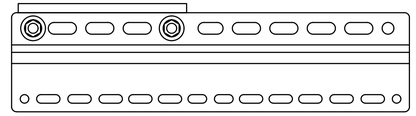


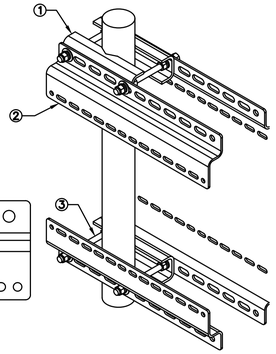
BACK SIDE FRONT

RRH DETAIL | NO SCALE | 2

SABRE DOUBLE Z-BRACKET C10123155	
DIMENSIONS (HxWxD) (1 BRACKET)	5"x20"x1-13/16"
WEIGHT (FULL ASSEMBLY)	35.79 lbs
PACKAGE QUANTITY	4

#	DESCRIPTION
1	PLATE, CHANNEL BRACKET
2	RRH Z BRACKET, 3/16"
3	THREADED ROD ASSEMBLY 1/2"x12"

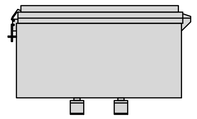




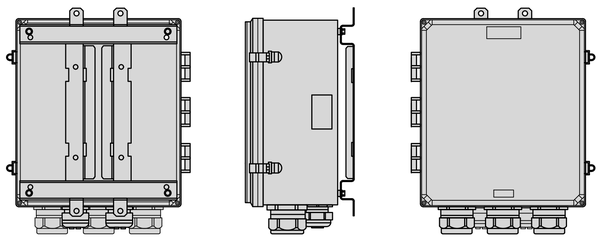
NOTE:
OR DISH Wireless L.L.C. APPROVED EQUIVALENT

RRH MOUNT DETAIL | NO SCALE | 3

RAYCAP RDIDC-9181-PF-48 SURGE PROTECTION DEVICE (OVP)	
DIMENSIONS (HxWxD)	16"x14"x8"
WEIGHT	21 lbs



PLAN

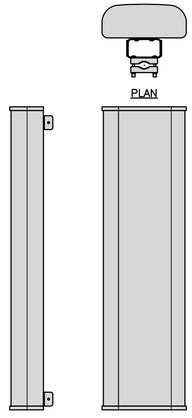


SURGE PROTECTION DEVICE DETAIL (OVP) | NO SCALE | 4

JMA MX08FRO665-21	
DIMENSIONS (HxWxD)	72"x20.0"x8.0"
RF PORTS, CONNECTOR TYPE	8 x 4.3-10 FEMALE
WEIGHT	64.5 lbs
WEIGHT WITH BRACKETS	82.5 lbs

NOTE:

ALL VISIBLE ANTENNAS SHALL BE WRAPPED IN CONCEALFAB MMW VINYL FILM WRAP (PART #900864-99 OR APPROVED EQUAL



PLAN SIDE FRONT

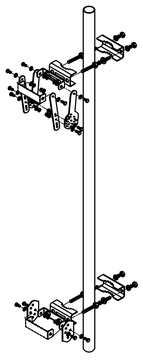
ANTENNA DETAIL | NO SCALE | 5

JMA ANTENNA MOUNT BRACKET #91900318	
TOTAL WEIGHT (WITH BRACKETS)	18 lbs (8.18 Kg)
POLE DIAMETER RANGE	2.5" TO 4.5"

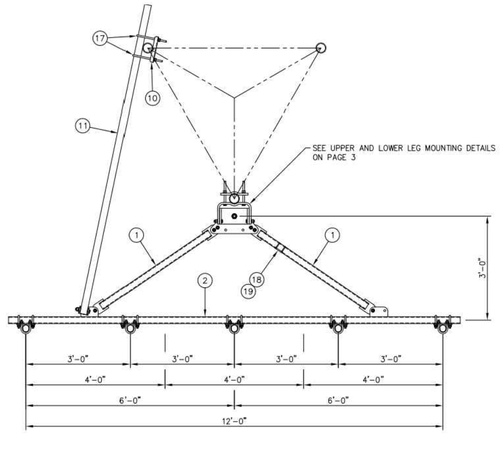
NOTE:
KIT #91900318: TOP AND BOTTOM BRACKETS FOR 4-,6-, AND 8-FOOT ANTENNAS

ANTENNA BRACKET NOT PART OF KIT

NOTE:
OR DISH Wireless L.L.C. APPROVED EQUIVALENT



ANTENNA BRACKET DETAIL | NO SCALE | 6

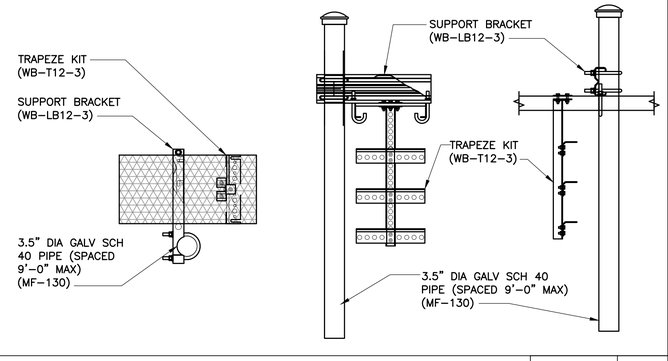


SITEPRO P/N: VFA8-HD

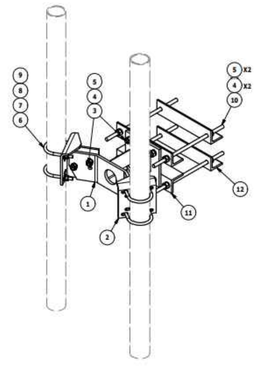
ANTENNA FRAME DETAIL | NO SCALE | 7

COMMSCOPE: WB-K110-B WAVEGUIDE BRIDGE KIT	
DIMENSIONS (HxL)	160"x10'
WEIGHT/VOLUME	325 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 | 8



SITEPRO P/N: CWT8-LL

ANTENNA FRAME DETAIL | NO SCALE | 9

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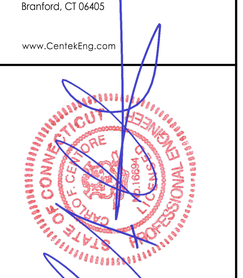

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PROJECT INFORMATION

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BALD HILL ROAD
UNION CT, 06076

SHEET TITLE
TYPICAL EQUIPMENT DETAILS

SHEET NUMBER
C-5

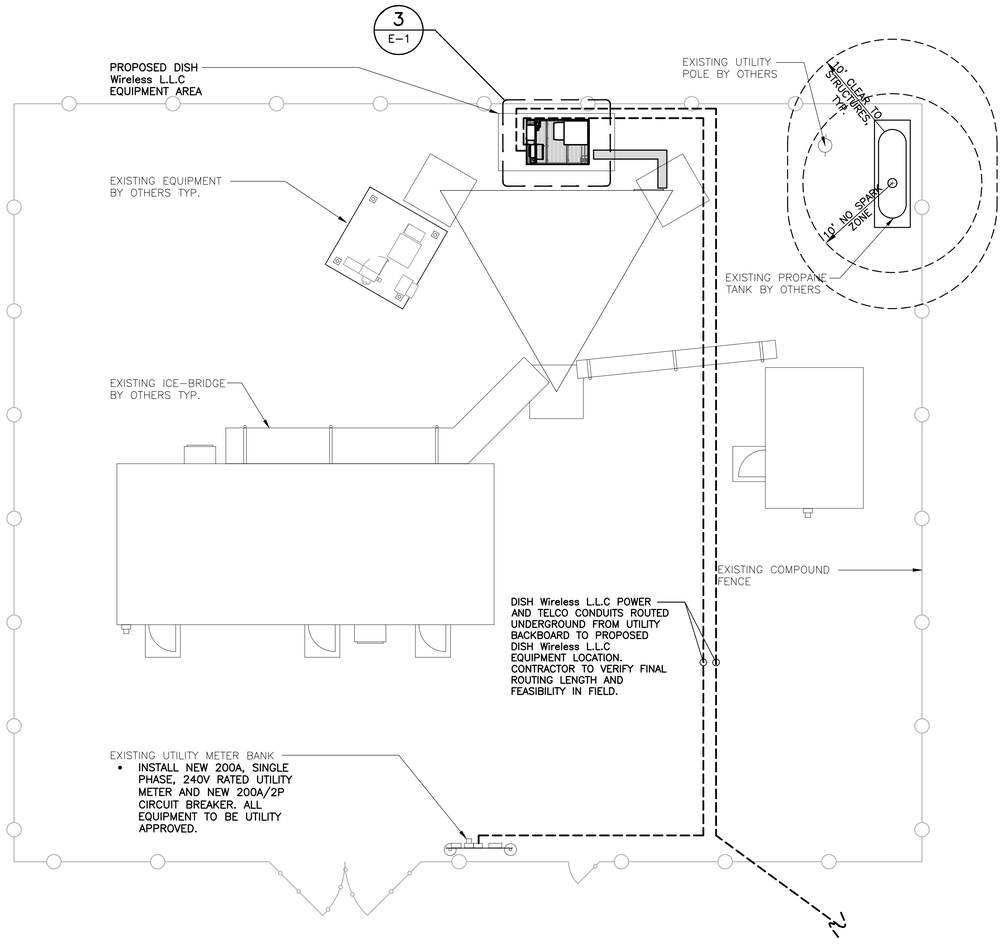
NOTES

1. CONTRACTOR SHALL FIELD VERIFY ALL PROPOSED UNDERGROUND UTILITY CONDUIT ROUTES.
2. ANTENNAS AND MOUNTS NOT SHOWN FOR CLARITY.
3. THE GROUND LEASE PROVIDES BROAD/BLANKET UTILITY RIGHTS. "PWR" AND "FBR" PATH DEPICTED ON C–2 AND E–1 ARE BASED ON BEST AVAILABLE INFORMATION INCLUDING BUT NOT LIMITED TO FIELD VERIFICATION, PRIOR PROJECT DOCUMENTATION AND OTHER REAL PROPERTY RIGHTS DOCUMENTS. WHEN INSTALLING THE UTILITIES PLEASE LOCATE AND FOLLOW EXISTING PATH. IF EXISTING PATH IS NOT AN OPTION, PLEASE NOTIFY TOWER OWNER AS FURTHER COORDINATION MAY BE NEEDED.

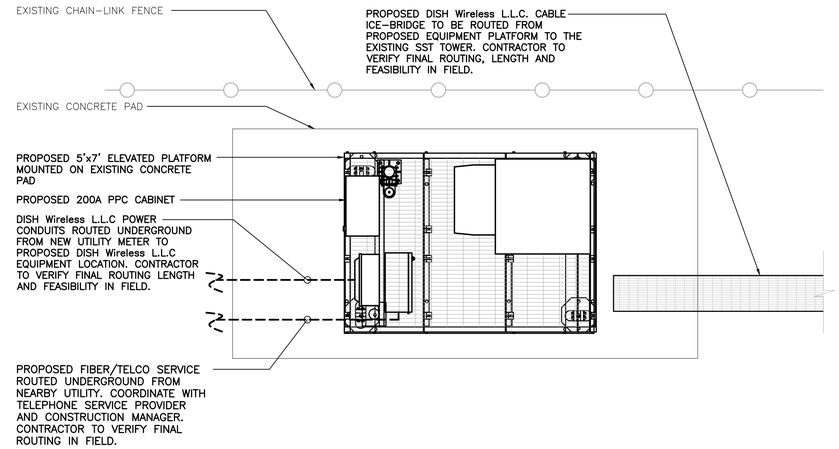
NOTE

CONTRACTOR IS RESPONSIBLE TO VERIFY FINAL CONDUIT ROUTING, LENGTH OF RUN, AND FEASIBILITY.

CONDUIT ROUTING AERIAL VIEW PLAN | NO SCALE | 2



UTILITY ROUTING PLAN | 8' 4' 0 8' 16' 1/8"=1'–0" | 1



ENLARGED SITE PLAN | 12" 6" 0 1' 2' 3' 4' 5' 1/2"=1'–0" | 3

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LGL	TJR	

RFDS REV #: 0 – 07/07/2023

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
A	08/25/23	ISSUED FOR CLIENT REVIEW
B	09/14/23	REVISED PER CLIENT COMMENTS
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CENTEK PROJECT NUMBER
23009.07

DISH Wireless L.L.C.
PROJECT INFORMATION

BOBOS00933A
BALD HILL ROAD
UNION CT, 06076

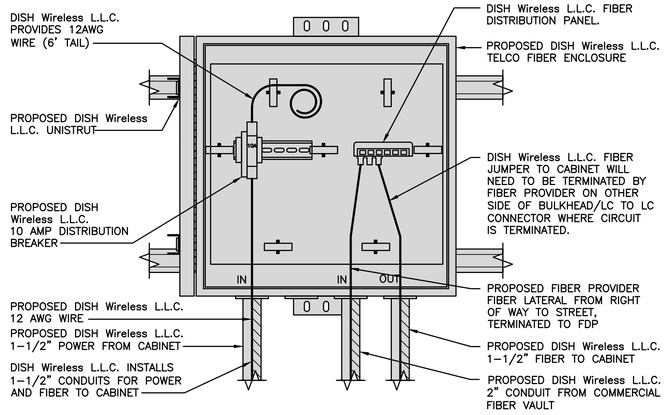
SHEET TITLE
ELECTRICAL AND FIBER ROUTING PLAN WITH NOTES

SHEET NUMBER
E-1

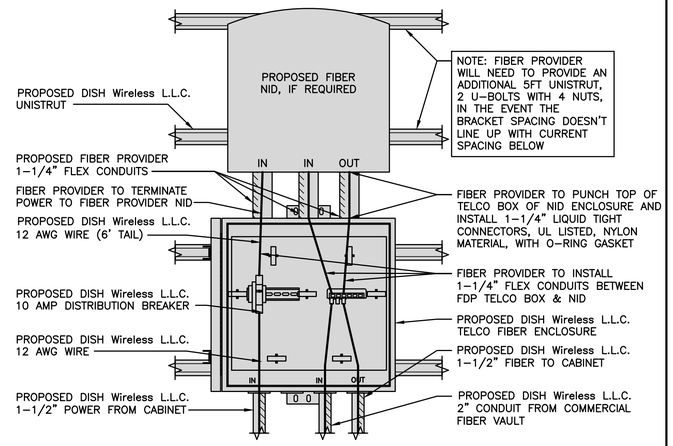
DC POWER WIRING SHALL BE COLOR CODED AT EACH END FOR IDENTIFYING +24V AND −48V CONDUCTORS. RED MARKINGS SHALL IDENTIFY +24V AND BLUE MARKINGS SHALL IDENTIFY −48V.

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 | 1



DARK TELCO BOX - INTERIOR WIRING LAYOUT | NO SCALE | 2



LIT TELCO BOX - INTERIOR WIRING LAYOUT (OPTIONAL) | NO SCALE | 3

NOT USED | NO SCALE | 4

NOT USED | NO SCALE | 5

NOT USED | NO SCALE | 6

NOT USED | NO SCALE | 7

NOT USED | NO SCALE | 8

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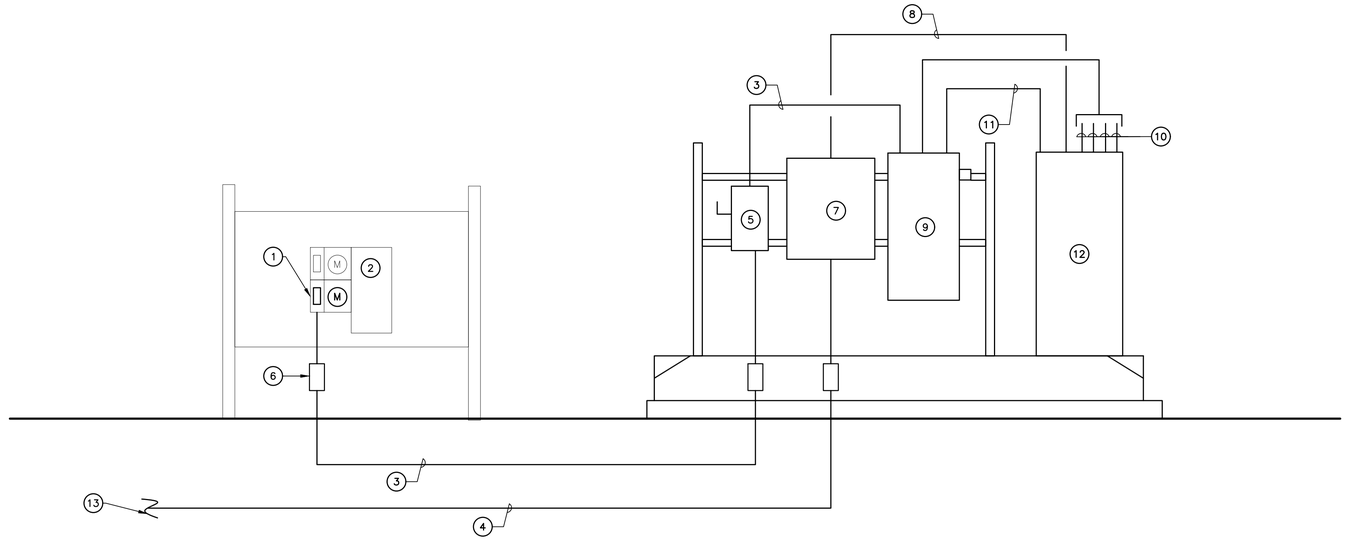
PROJECT INFORMATION

BOBOS00933A
BALD HILL ROAD
UNION CT, 06076

SHEET TITLE
TELCO CABINET DETAILS

SHEET NUMBER
E-2



RISER NOTES

1. EXISTING UTILITY METER SOCKET WITH NEW 200A, SINGLE PHASE, 240V RATED UTILITY METER AND NEW 200A/2P CIRCUIT BREAKER. ALL EQUIPMENT TO BE UTILITY APPROVED.
2. EXISTING EQUIPMENT TO REMAIN.
3. (3) 3/0 AWG, (1) #6 AWG GROUND, 2" CONDUIT. CONTRACTOR TO CONFIRM CONDUIT ROUTING IN FIELD PRIOR TO START OF CONSTRUCTION.
4. (1) 4" CONDUIT WITH PULL ROPES FOR TELEPHONE COMPANY CONDUCTORS. CONDUCTORS PROVIDED BY TELEPHONE COMPANY FROM EXISTING DEMARC TO EQUIPMENT PLATFORM. PROVIDE ALL COUPLINGS, ADAPTERS, SWEEPS, AND ASSOCIATED HARDWARE. MATERIAL SHALL BE PER TELEPHONE COMPANY SPECIFICATIONS.
5. NEW HEAVY DUTY NEMA-3R, 200A/240V, NON FUSED DISCONNECT.
6. EXPANSION COUPLING TYP.
7. NEW DISH Wireless L.L.C. TELCO/FIBER CABINET.
8. CONDUITS AND CONDUCTORS FOR TELCO CONNECTION TO EQUIPMENT CABINET AS REQUIRED BY MANUFACTURER AND CONSTRUCTION MANAGER FOR PROPER OPERATION OF EQUIPMENT
9. NEW 120/240V, 200A/2P, SINGLE PHASE PPC CABINET.
10. 4 SETS OF (3) #10 AWG, (1) #10 AWG GROUND. 3/4" CONDUIT.
11. (1) #12 AWG, (1) #10 AWG GROUND, 3/4" CONDUIT. FOR CONVENIENCE OUTLET
12. NEW DISH Wireless L.L.C. EQUIPMENT CABINET.
13. EXISTING FIBER DEMARC. VERIFY LOCATION IN FIELD.

ELECTRICAL RISER DIAGRAM

NO SCALE | 1

VOLTAGE:	120/240		PHASE:	1	WIRE:	3	PANEL NO.		MDP						
MAIN BUS:	200	AMPS					TOTAL WATTS, L1		11,700						
MAIN BREAKER:	200	A FRAME		200	A TRIP		TOTAL WATTS, L2		11,700	LOC:	EQUIPMENT FRAME				
MOUNTING:	SURFACE						TOTAL WATTS		23,400						

NOTES:

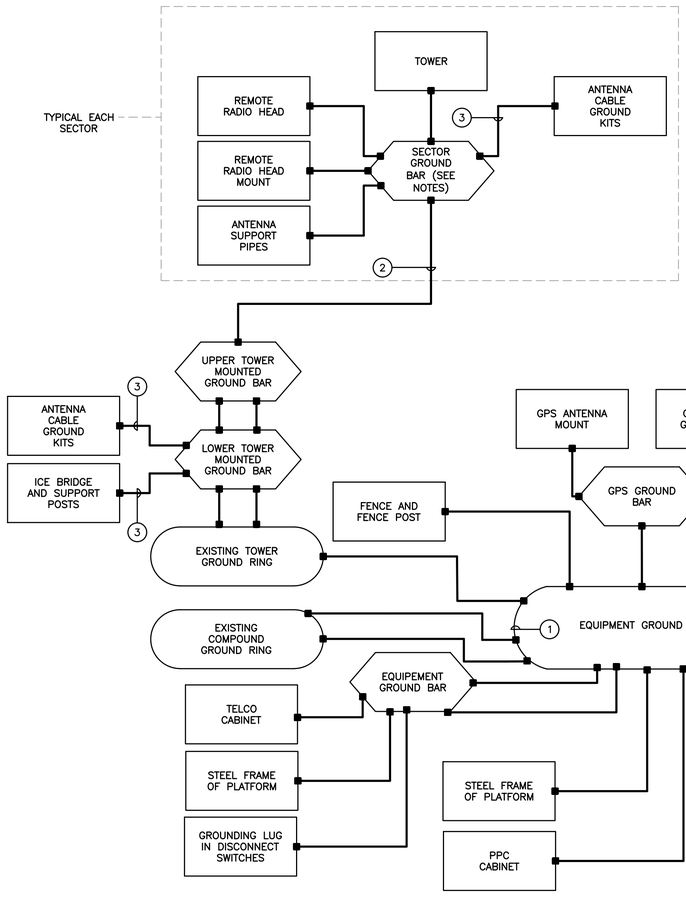
A) PPC SHALL BE 200A, 120/240V, SINGLE PHASE, 3W, 65 KAIC, 200A MCB, 24 POSITION, NEMA 3R ENCLOSURE, LAMINATED ENGRAVED BAKELITE NAMEPLATE, COPPER EQUIPMENT GROUND KIT, INSULATED COPPER SOLID NEUTRAL BAR.

B) BRANCH CIRCUIT BREAKER AND CONDUCTOR SIZE BASED ON SPECIFIC EQUIPMENT. CONFIRM ELECTRICAL REQUIREMENTS PRIOR TO INSTALLATION.

		WATTS LOAD				L1 Y L2 Y		WATTS LOAD				
DIRECTORY	WIRE & CONDUIT	L1	L2	CKT.	AMPS	AMPS	CKT.	L1	L2	WIRE & CONDUIT	DIRECTORY
RECTIFIER #1	3/4" C, 2 #10, #10GND	2,880		1	30/2P	20	2	180		3/4" C, 2 #12, #12GND	CONVENIECE GFCI OUTLET
			2,880	3		20	4		180	3/4" C, 2 #12, #12GND	PPC GFCI OUTLET
RECTIFIER #2	3/4" C, 2 #10, #10GND	2,880		5	30/2P		6			-	SPACE
			2,880	7			8			-	SPACE
RECTIFIER #3	3/4" C, 2 #10, #10GND	2,880		9	30/2P		10			-	SPACE
			2,880	11			12			-	SPACE
RECTIFIER #4	3/4" C, 2 #10, #10GND	2,880		13	30/2P		14			-	SPACE
			2,880	15			16			-	SPACE
SPACE	-			17			18			-	SPACE
SPACE	-			19			20			-	SPACE
SPACE	-			21			22			-	SPACE
SPACE	-			23			24			-	SPACE

ELECTRICAL PANEL SCHEDULE

NO SCALE | 2



ELECTRICAL SCHEMATIC DIAGRAM

NO SCALE | 3

GROUNDING SCHEMATIC NOTES

1. GROUND RING, #2 AWG BCW
2. #2/0 GREEN INSULATED
3. #6 AWG

GENERAL NOTES:

1. ALL SURGE SUPPRESSION EQUIPMENT SHALL BE BONDED TO GROUND PER MANUFACTURER'S SPECIFICATIONS
2. UNLESS OTHERWISE NOTED OR REQUIRED BY CODE, GROUND CONDUCTORS SHOWN SHALL BE #2 AWG (SOLID TINNED BCW – EXTERIOR; STRANDED GREEN INSULATED – INTERIOR).
3. BOND CABLE TRAY AND ICE BRIDGE SECTIONS TOGETHER WITH #6 AWG STRANDED GREEN INSULATED JUMPERS.
4. ALL SECTOR GROUND BARS SHALL BE BONDED TOGETHER WITH #2 AWG SOLID TINNED BCW.
5. BOND ALL EQUIPMENT CABINETS AND BATTERY CABINETS TO GROUND PER MANUFACTURER'S SPECIFICATIONS.
6. ALL BONDS TO TOWER SHALL BE MADE IN STRICT ACCORDANCE WITH SPECIFICATIONS OF TOWER MANUFACTURER OR STRUCTURAL ENGINEER.
7. REFER TO GROUNDING PLAN FOR LOCATION OF GROUNDING DEVICES.
8. REFER TO ALL ELECTRICAL AND GROUNDING DETAILS.
9. COORDINATE ALL TOWER MOUNTED EQUIPMENT WITH OWNER.
10. ALL TOWER MOUNTED AMPLIFIERS AND ASSOCIATED EQUIPMENT SHALL BE BONDED TO THE SECTOR GROUND BAR PER MANUFACTURER'S SPECIFICATIONS.
11. ALL GROUNDING SHALL BE IN ACCORDANCE WITH NEC AND OWNER'S REQUIREMENTS.
12. COORDINATE WITH TOWER OWNER BEFORE INSTALLING ANY GROUNDING ELEMENTS ON TOWER OR BONDING TO EXISTING TOWER GROUND RING.

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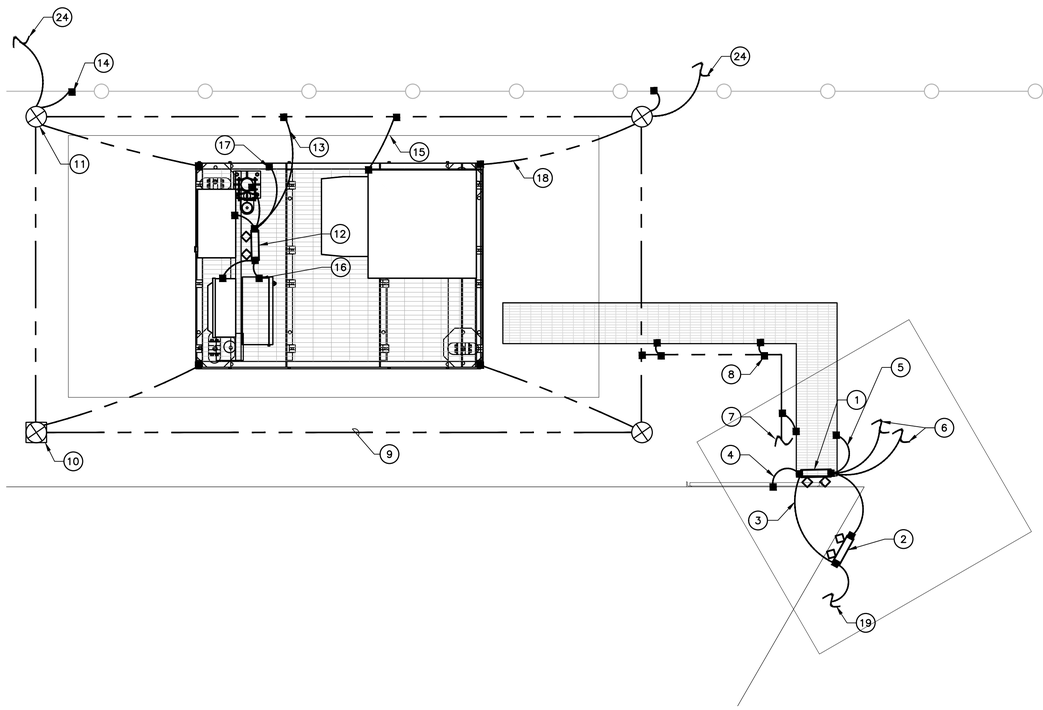
BOBOS00933A
BALD HILL ROAD
UNION CT, 06076

SHEET TITLE
ELECTRICAL RISER, PANEL SCHEDULE, AND SCHEMATIC

SHEET NUMBER
E-3

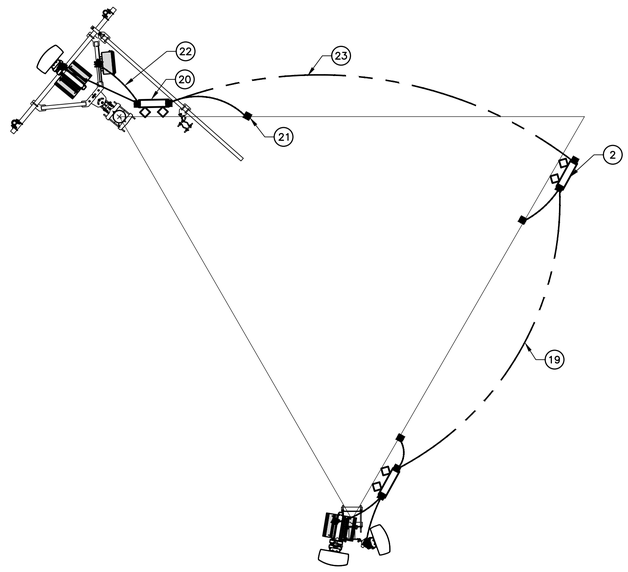


COMPOUND GROUNDING PLAN | NO SCALE | 1

GROUNDING PLAN NOTES:

1. LOWER TOWER MOUNTED GROUND BAR.
2. UPPER TOWER MOUNTED GROUND BAR.
3. BOND LOWER TOWER MOUNTED GROUND BAR TO UPPER TOWER MOUNTED GROUND BAR TYP. 2 LEADS.
4. BOND LOWER TOWER MOUNTED GROUND TO TOWER STEEL
5. BOND LOWER TOWER MOUNTED GROUND BAR TO ICE-BRIDGE POST.
6. CONNECT LOWER TOWER MOUNTED GROUND BAR TO TOWER GROUND RING TYP. 2 LEADS.
7. BOND EQUIPMENT GROUND RING TO TOWER GROUND RING.
8. ICE BRIDGE POST AND COVER. BOND EACH SECTION AND SUPPORT TO GROUND RING.
9. #2 SOLID TINNED BCW GROUND RING (2'-0" FROM OUTSIDE EDGE OF EQUIPMENT PLATFORM FOUNDATION WHEN ROUTED ALONG PLATFORM PERIMETER.) (TYP.).
10. GROUNDING ROD WITH ACCESS (TYP.).
11. GROUNDING ROD (TYP.).
12. MAIN EQUIPMENT GROUND BAR.
13. BOND MAIN GROUND BAR TO GROUND RING.
14. CONNECT FENCE TO GROUNDING RING (TYP. EACH POST WITHIN 6' OF GROUND RING).
15. BOND EQUIPMENT CABINETS TO GROUND RING PER NEC AND MANUFACTURER REQUIREMENTS
16. BOND EQUIPMENT TO GROUND BAR PER NEC AND MANUFACTURER REQUIREMENTS
17. BOND GROUND BAR TO EQUIPMENT PLATFORM STEEL TYP.
18. BOND EQUIPMENT PLATFORM TO GROUND RING TYP. EACH CORNER
19. CONNECT UPPER TOWER MOUNTED GROUND BAR TO SECTOR GROUND BAR TYP.
20. SECTOR GROUND BAR TYP.
21. BOND SECTOR GROUND BAR TO STEEL ANTENNA FRAME.
22. BOND ANTENNA AND ANTENNA APPURTENANCES MOUNTING PIPES TO SECTOR GROUND BAR. (TYPICAL).
23. ALL SECTOR GROUND BARS SHALL BE BONDED TOGETHER WITH #2 AWG SOLID TINNED BCW.
24. CONNECT EQUIPMENT GROUND RING TO EXISTING COMPOUND GROUND RING. CONTRACTOR TO VERIFY LOCATION COMPOUND GROUND RING IN FIELD

GROUNDING PLAN NOTES | NO SCALE | 2



ANTENNA GROUNDING PLAN | NO SCALE | 3

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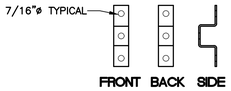
BOBOS00933A
BALD HILL ROAD
UNION CT, 06076

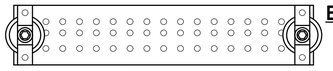
SHEET TITLE
COMPOUND/ANTENNA GROUNDING PLAN AND NOTES

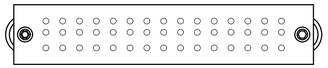
SHEET NUMBER
G-1



BRACKET FOR GROUND BAR-DIMENSIONS

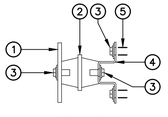
SCALE: 1/8"= 1'-0"

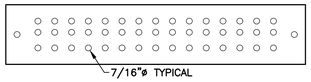




TYPICAL GROUND BAR ASSEMBLY

SCALE: 1/8"= 1'-0"





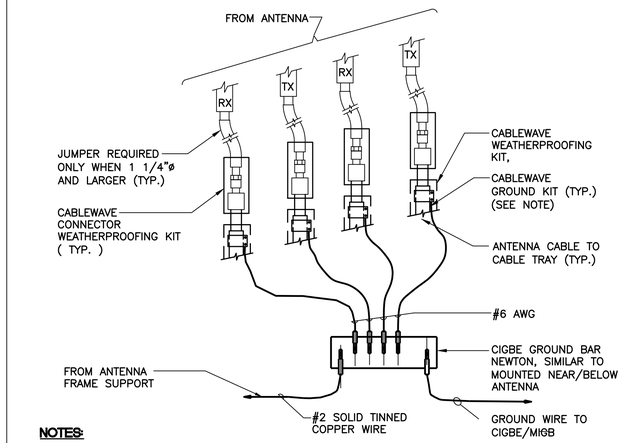
NOTES

1. HIGH CONDUCTIVITY TINNED COPPER BAR 1'-8"Lx4"Wx1/4"D.
2. RED COLORED STANDOFF INSULATOR PLASTIC #1872-1A.
3. STAINLESS STEEL TRUSS SPANNER MACHINE SCREWS, SPLIT LOCKWASHER AND FLAT WASHER.
4. 1"Wx1/8"T STAINLESS STEEL TYPE 304 BRACKET.
5. STAINLESS STEEL TYPE 304 HARDWARE - 3/8"ø EXPANSION BOLT FOR CONCRETE.

TYPICAL GROUND BAR - DIMENSIONS

SCALE: 1/8"= 1'-0"

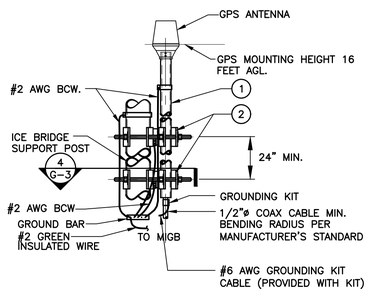
MASTER/EQUIPMENT GROUND BAR DETAIL | NO SCALE | 1



NOTES:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE

CONNECTION OF GROUND WIRES TO GROUND BAR | NO SCALE | 2



GPS ANTENNA MOUNTING BRACKET

BILL OF MATERIALS

ITEM	DESCRIPTION	QUANTITY
1	2-1/2"ø SCH. 40 x 8'-0" LG. MAX SS OR GALV. PIPE	1
2	UNIVERSAL CLAMP SET.	2

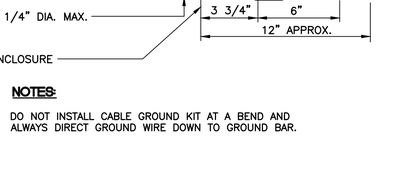
GPS GROUNDING/MOUNTING BRACKET DETAIL | NO SCALE | 3

4 / G-3 SECTION NOT TO SCALE

NOTES

1. THE ELEVATION AND LOCATION OF THE GPS ANTENNA SHALL BE IN ACCORDANCE WITH THE FINAL RF REPORT.
2. THE GPS ANTENNA MOUNT IS DESIGNED TO FASTEN TO A STANDARD 2-1/2" DIAMETER, SCHEDULE 40, GALVANIZED STEEL OR STAINLESS STEEL PIPE. THE PIPE MUST NOT BE THREADED AT THE ANTENNA MOUNT END. THE PIPE SHALL BE CUT TO THE REQUIRED LENGTH (MINIMUM OF 24 INCHES) USING A HAND OR ROTARY PIPE CUTTER TO ASSURE A SMOOTH AND PERPENDICULAR CUT. A HACK SAW SHALL NOT BE USED. THE CUT PIPE END SHALL BE DEBURRED AND SMOOTH IN ORDER TO SEAL AGAINST THE NEOPRENE GASKET ATTACHED TO THE ANTENNA MOUNT.

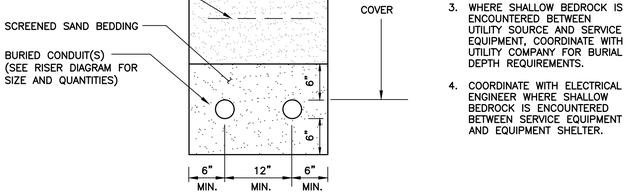
GPS GROUNDING/MOUNTING BRACKET DETAIL | NO SCALE | 4



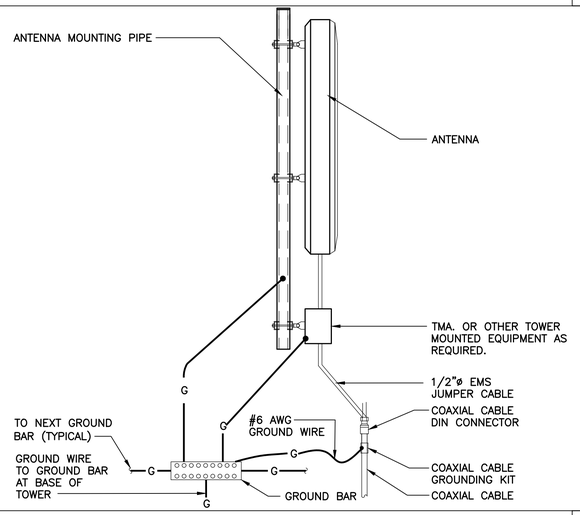
NOTES

1. TINNED COPPER GROUND BAR, 1/4" x 4" x 20", NEWTON INSTRUMENT CO. HOLE CENTERS TO MATCH NEMA DOUBLE LUG CONFIGURATION.
2. INSULATORS, NEWTON INSTRUMENT CAT. NO. 3061-4.
3. 5/8" LOCK WASHERS, NEWTON INSTRUMENT CO. CAT. NO. 3015-8.
4. WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. CAT NO. A-6056.
5. 5/8-11 x 1" STAINLESS STEEL TRUSS SPANNER MACHINE SCREWS.

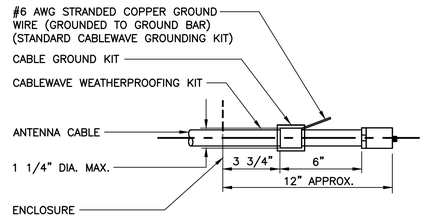
GROUND BAR DETAIL | NO SCALE | 5



EQUIPMENT GROUND BAR DETAIL | NO SCALE | 6



TYPICAL ANTENNA GROUNDING DETAIL | NO SCALE | 7



NOTES:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.

ANTENNA CABLE GROUNDING DETAIL | NO SCALE | 8

NOTES:

1. THE CLEAN FILL SHALL PASS THROUGH A 3/8" MESH SCREEN AND SHALL NOT CONTAIN SHARP STONES. OTHER BACKFILL SHALL NOT CONTAIN ASHES, CINDERS, SHELLS, FROZEN MATERIAL, LOOSE DEBRIS OR STONES LARGER THAN 2" IN MAXIMUM DIMENSION.
2. WHERE EXISTING UTILITIES ARE LIKELY TO BE ENCOUNTERED, CONTRACTOR SHALL HAND DIG AND PROTECT EXISTING UTILITIES.
3. WHERE SHALLOW BEDROCK IS ENCOUNTERED BETWEEN UTILITY SOURCE AND SERVICE EQUIPMENT, COORDINATE WITH UTILITY COMPANY FOR BURIAL DEPTH REQUIREMENTS.
4. COORDINATE WITH ELECTRICAL ENGINEER WHERE SHALLOW BEDROCK IS ENCOUNTERED BETWEEN SERVICE EQUIPMENT AND EQUIPMENT SHELTER.

TYPICAL ELECTRICAL TRENCH DETAIL | NO SCALE | 9

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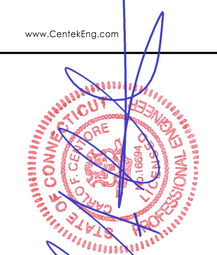


DRAWN BY:	CHECKED BY:	APPROVED BY:
LGL	TJR	

RFDS REV #: 0 - 07/07/2023

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
A	08/25/23	ISSUED FOR CLIENT REVIEW
B	09/14/23	REVISED PER CLIENT COMMENTS
0	10/20/23	ISSUED FOR CONSTRUCTION

CENTEK PROJECT NUMBER
23009.07

DISH Wireless L.L.C.
PROJECT INFORMATION

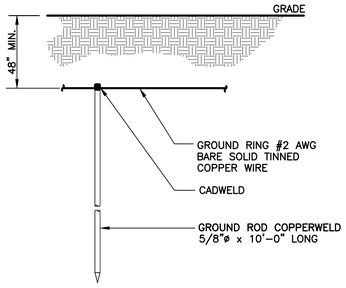
BOBOS00933A
BALD HILL ROAD
UNION CT, 06076

SHEET TITLE
TYPICAL GROUNDING DETAILS

SHEET NUMBER
G-2

NOTES:

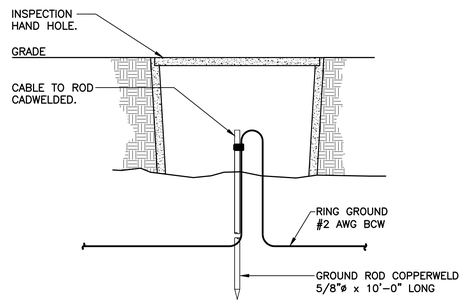
1. USE GROUND PLATE DETAIL IF 10 FT. GROUND ROD DEPTH CANNOT BE ACHIEVED DUE TO LEDGE CONDITION OR IF EXISTING TOWER FOUNDATION IS ENCOUNTERED.



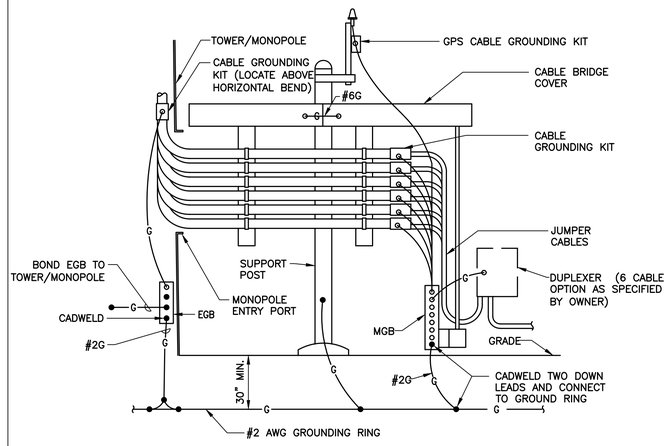
GROUND ROD DETAIL | NO SCALE | 1

NOTES:

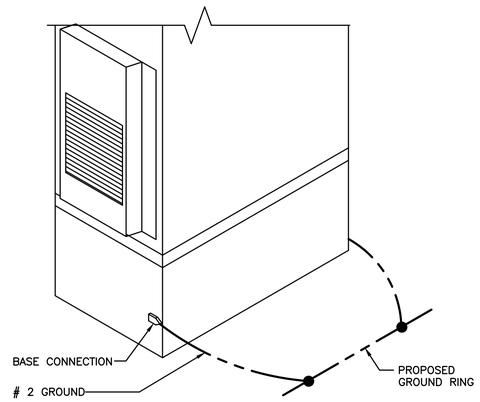
1. INSPECTION HAND HOLE MAY BE CONCRETE OR PVC AND SHALL BE A MINIMUM OF 12" DIA x 18" DEEP.



GROUND ROD WITH ACCESS DETAIL | NO SCALE | 2



ICE-BRIDGE GROUNDING DETAIL | NO SCALE | 3



OUTDOOR CABINET GROUNDING | NO SCALE | 4

NOT USED | 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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ELECTRICAL SPECIFICATIONS

SECTION 16010

1.01. SCOPE OF WORK

A. WORK SHALL INCLUDE ALL LABOR, EQUIPMENT AND SERVICES REQUIRED TO COMPLETE (MAKE READY FOR OPERATION) ALL THE ELECTRICAL WORK INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING:

1. 200A, 240/120V, 1P, 3 WIRE ELECTRIC SERVICE METER FOR OWNER AND ASSOCIATED DISTRIBUTION EQUIPMENT. (AS REQUIRED BY UTILITY CO.)
2. NEW SITE TELEPHONE SERVICE AS SPECIFIED BY TELEPHONE COMPANY.
3. CELLULAR GROUNDING SYSTEMS, CONSISTING OF ANTENNA GROUNDING, GROUND RING, GROUND BARS, ETC.
4. FIELD MEASURE EXISTING ELECTRICAL SERVICES TO CONFIRM AVAILABLE EXISTING POWER.
5. COORDINATE ALL WORK SHOWN, ON THESE PLANS WITH LOCAL UTILITY COMPANIES.

B. LOCAL UTILITY COMPANIES SHALL PROVIDE THE FOLLOWING:

1. TELEPHONE CABLES.
2. SHUTDOWN OF SERVICE (COORDINATE WITH OWNER).

C. CONTRACTOR SHALL CONFER WITH LOCAL UTILITY COMPANIES TO ASCERTAIN THE LIMITS OF THEIR WORK AND SHALL INCLUDE IN BID ANY CHARGES OR FEES MADE BY THE UTILITY COMPANIES FOR THEIR PORTION OF THE WORK AND SHALL PROVIDE AND INSTALL ALL ITEMS REQUIRED, BUT NOT PROVIDED BY UTILITY COMPANY.

D. ELECTRICAL CONTRACTOR SHALL COORDINATE ELECTRICAL INSTALLATION WITH ELECTRIC UTILITY CO. PRIOR TO INSTALLATION.

E. CONTRACTOR SHALL COORDINATE WITH TELEPHONE UTILITY COMPANY FOR LOCATION OF TELEPHONE SERVICE AND TO DETERMINE ANY REQUIRED EQUIPMENT TO BE INSTALLED BY CONTRACTOR.

1.02. GENERAL REQUIREMENTS

A. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE MADE IN STRICT ACCORDANCE WITH ALL LOCAL, STATE AND NATIONAL CODES AND REGULATIONS WHICH MAY APPLY AND NOTHING IN THE DRAWINGS OR SPECIFICATIONS SHALL BE INTERPRETED AS AN INFRINGEMENT OF SUCH CODES OR REGULATIONS.

B. THE ELECTRICAL CONTRACTOR IS TO BE RESPONSIBLE FOR THE COMPLETE INSTALLATION AND COORDINATION OF THE ENTIRE ELECTRICAL SERVICE. ALL ACTIVITIES TO BE COORDINATED THROUGH OWNERS REPRESENTATIVE, DESIGN ENGINEER AND OTHER AUTHORITIES HAVING JURISDICTION OF TRADES.

C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND PAY ALL FEES THAT MAY BE REQUIRED FOR THE ELECTRICAL WORK AND FOR SCHEDULING OF ALL INSPECTIONS THAT MAY BE REQUIRED BY THE LOCAL AUTHORITY.

D. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH THE BUILDING OWNER FOR NEW AND/OR DEMOLITION WORK INVOLVED.

E. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH LOCAL TELEPHONE COMPANY THAT MAY BE REQUIRED FOR THE INSTALLATION OF TELEPHONE SERVICE TO THE PROPOSED CELLULAR SITE.

F. NO MATERIAL OTHER THAN THAT CONTAINED IN THE "LATEST LIST OF ELECTRICAL FITTINGS" APPROVED BY THE UNDERWRITERS' LABORATORIES, SHALL BE USED IN ANY PART OF THE WORK. ALL MATERIAL FOR WHICH LABEL SERVICE HAS BEEN ESTABLISHED SHALL BEAR THE U.L. LABEL.

G. THE CONTRACTOR SHALL GUARANTEE ALL NEW WORK FOR A PERIOD OF ONE YEAR FROM THE ACCEPTANCE DATE BY THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING WARRANTIES FROM ALL EQUIPMENT MANUFACTURERS FOR SUBMISSION TO THE OWNER.

H. DRAWINGS INDICATE GENERAL ARRANGEMENT OF WORK INCLUDED IN CONTRACT. CONTRACTOR SHALL, WITHOUT EXTRA CHARGE, MAKE MODIFICATIONS TO THE LAYOUT OF THE WORK TO PREVENT CONFLICT WITH WORK OF OTHER TRADES AND FOR THE PROPER INSTALLATION OF WORK. CHECK ALL DRAWINGS AND VISIT JOB SITE TO VERIFY SPACE AND TYPE OF EXISTING CONDITIONS IN WHICH WORK WILL BE DONE, PRIOR TO SUBMITTAL OF BID.

I. THE ELECTRICAL CONTRACTOR SHALL SUPPLY THREE (3) COMPLETE SETS OF APPROVED DRAWINGS, ENGINEERING DATA SHEETS, MAINTENANCE AND OPERATING INSTRUCTION MANUALS FOR ALL SYSTEMS AND THEIR RESPECTIVE EQUIPMENT. THESE MANUALS SHALL BE INSERTED IN VINYL COVERED 3-RING BINDERS AND TURNED OVER TO OWNER'S REPRESENTATIVE ONE (1) WEEK PRIOR TO FINAL PUNCH LIST.

J. ALL WORK SHALL BE INSTALLED IN A NEAT AND WORKMAN LIKE MANNER AND WILL BE SUBJECT TO THE APPROVAL OF THE OWNER'S REPRESENTATIVE.

K. ALL EQUIPMENT AND MATERIALS TO BE INSTALLED SHALL BE NEW, UNLESS OTHERWISE NOTED.

L. BEFORE FINAL PAYMENT, THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF PRINTS (AS-BUILTS), LEGIBLY MARKED IN RED PENCIL TO SHOW ALL CHANGES FROM THE ORIGINAL PLANS.

M. PROVIDE TEMPORARY POWER AND LIGHTING IN WORK AREAS AS REQUIRED.

N. SHOP DRAWINGS:

1. CONTRACTOR SHALL SUBMIT SIX (6) COPIES OF SHOP DRAWINGS ON ALL EQUIPMENT AND MATERIALS PROPOSED FOR USE ON THIS PROJECT, GIVING ALL DETAILS, WHICH INCLUDE DIMENSIONS, CAPACITIES, ETC.
2. CONTRACTOR SHALL SUBMIT SIX (6) COPIES OF ALL TEST REPORTS CALLED FOR IN THE SPECIFICATIONS AND DRAWINGS.

O. ENTIRE ELECTRICAL INSTALLATION SHALL BE IN ACCORDANCE WITH OWNER'S SPECIFICATIONS, AND REQUIREMENTS OF ALL LOCAL AUTHORITIES HAVING JURISDICTION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE WITH APPROPRIATE INDIVIDUALS TO OBTAIN ALL SUCH SPECIFICATIONS AND REQUIREMENTS. NOTHING CONTAINED IN, OR OMITTED FROM, THESE DOCUMENTS SHALL RELIEVE CONTRACTOR FROM THIS OBLIGATION.

SECTION 16111

1.01. CONDUIT

A. MINIMUM CONDUIT SIZE FOR BRANCH CIRCUITS, LOW VOLTAGE CONTROL AND ALARM CIRCUITS SHALL BE 3/4". CONDUITS SHALL BE PROPERLY FASTENED AS REQUIRED BY THE N.E.C.

B. THE INTERIOR OF RACEWAYS/ ENCLOSURES INSTALLED UNDERGROUND SHALL BE CONSIDERED TO BE WET LOCATION, INSULATED CONDUCTORS SHALL BE LISTED FOR USE IN WET LOCATIONS. PROVIDE WEATHERPROOF CONSTRUCTION IN WET LOCATIONS.

C. CONDUIT INSTALLED UNDERGROUND SHALL BE INSTALLED TO MEET MINIMUM COVER REQUIREMENTS OF TABLE 300.5.

D. PROVIDE RIGID GALVANIZED STEEL CONDUIT (RMC) FOR THE FIRST 10 FOOT SECTION WHEN LEAVING A BUILDING OR SECTIONS PASSING THROUGH FLOOR SLABS

E. ONLY LISTED PVC CONDUIT AND FITTINGS ARE PERMITTED FOR THE INSTALLATION OF ELECTRICAL CONDUCTORS, SUITABLE FOR UNDERGROUND APPLICATIONS.

CONDUIT SCHEDULE SECTION 16111

CONDUIT TYPE	NEC REFERENCE	APPLICATION	MIN. BURIAL DEPTH (PER NEC TABLE 300.5) [2,3]
EMT	ARTICLE 358	INTERIOR CIRCUITING, EQUIPMENT ROOMS, SHELTERS	N/A
RMC, RIGID GALV. STEEL	ARTICLE 344, 300.5, 300.50	ALL INTERIOR/ EXTERIOR CIRCUITING, ALL UNDERGROUND INSTALLATIONS.	6 INCHES
PVC, SCHEDULE 40	ARTICLE 352, 300.5, 300.50	INTERIOR/ EXTERIOR CIRCUITING AND GROUNDING SYSTEMS, UNDERGROUND INSTALLATIONS, WHERE NOT SUBJECT TO PHYSICAL DAMAGE. [1]	18 INCHES
PVC, SCHEDULE 80	ARTICLE 352, 300.5, 300.50	INTERIOR/ EXTERIOR CIRCUITING AND GROUNDING SYSTEMS, UNDERGROUND INSTALLATIONS, WHERE SUBJECT TO PHYSICAL DAMAGE. [1]	18 INCHES
LIQUID TIGHT FLEX. METAL	ARTICLE 350	SHORT LENGTHS (MAX. 3FT.) WIRING TO VIBRATING EQUIPMENT IN WET LOCATIONS.	N/A
FLEX. METAL	ARTICLE 348	SHORT LENGTHS (MAX. 3FT.) WIRING TO VIBRATING EQUIPMENT IN WET LOCATIONS.	N/A

[1] PHYSICAL DAMAGE IS SUBJECT TO THE AUTHORITY HAVING JURISDICTION.

[2] UNDERGROUND CONDUIT INSTALLED UNDER ROADS, HIGHWAYS, DRIVEWAYS, PARKING LOTS SHALL HAVE MINIMUM DEPTH OF 24".

[3] WHERE SOLID ROCK PREVENTS COMPLIANCE WITH MINIMUM COVER DEPTHS, WIRING SHALL BE INSTALLED IN PERMITTED RACEWAY FOR DIRECT BURIAL. THE RACEWAY SHALL BE COVERED BY A MINIMUM OF 2" OF CONCRETE EXTENDING DOWN TO ROCK.

SECTION 16123

1.01. CONDUCTORS

A. ALL CONDUCTORS SHALL BE TYPE THWN (INT. APPLICATION) AND XHHW (EXT. APPLICATION), 75 DEGREE C, 600 VOLT INSULATION, SOFT ANNEALED STRANDED COPPER. #10 AWG AND SMALLER SHALL BE SPLICED USING ACCEPTABLE SOLDERLESS PRESSURE CONNECTORS. #8 AWG AND LARGER SHALL BE SPLICED USING COMPRESSION SPLIT-BOLT TYPE CONNECTORS. #12 AWG SHALL BE THE MINIMUM SIZE CONDUCTOR FOR LINE VOLTAGE BRANCH CIRCUITS. REFER TO PANEL SCHEDULE FOR BRANCH CIRCUIT CONDUCTOR SIZE(S). CONDUCTORS SHALL BE COLOR CODED FOR CONSISTENT PHASE IDENTIFICATION:

	120/208/240V	277/480V
LINE	COLOR	COLOR
A	BLACK	BROWN
B	RED	ORANGE
C	BLUE	YELLOW
N	CONTINUOUS WHITE	GREY
G	CONTINUOUS GREEN	GREEN WITH YELLOW STRIPE

B. MINIMUM BENDING RADIUS FOR CONDUCTORS SHALL BE 12 TIMES THE LARGEST DIAMETER OF BRANCH CIRCUIT CONDUCTOR.

SECTION 16130

1.01. BOXES

A. FURNISH AND INSTALL OUTLET BOXES FOR ALL DEVICES, SWITCHES, RECEPTACLES, ETC.. BOXES TO BE ZINC COATED STEEL.

B. FURNISH AND INSTALL PULL BOXES IN MAIN FEEDERS RUNS WHERE REQUIRED. PULL BOXES SHALL BE GALVANIZED STEEL WITH SCREW REMOVABLE COVERS, SIZE AND QUANTITY AS REQUIRED. PROVIDE WEATHERPROOF CONSTRUCTION IN WET LOCATIONS.

SECTION 16140

1.01. WIRING DEVICES

A. THE FOLLOWING LIST IS PROVIDED TO CONVEY THE QUALITY AND RATING OF WIRING DEVICES WHICH ARE TO BE INSTALLED. A COMPLETE LIST OF ALL DEVICES MUST BE SUBMITTED BEFORE INSTALLATION FOR APPROVAL.

1. 15 MINUTE TIMER SWITCH – INTERMATIC #FF15M (INTERIOR LIGHTS)
2. DUPLEX RECEPTACLE – P&S #2095 (GFCI) SPECIFICATION GRADE
3. SINGLE POLE SWITCH – P&S #CSB20AC2 (20A-120V HARD USE) SPECIFICATION GRADE
4. DUPLEX RECEPTACLE – P&S #5362 (20A-120V HARD USE) SPECIFICATION GRADE

B. PLATES – ALL PLATES USED SHALL BE CORROSION RESISTANT TYPE 304 STAINLESS STEEL. PLATES SHALL BE FROM SAME MANUFACTURER AS SWITCHES AND RECEPTACLES. PROVIDE WEATHERPROOF HOUSING FOR DEVICES LOCATED IN WET LOCATIONS.

C. OTHER MANUFACTURERS OF THE SWITCHES, RECEPTACLES AND PLATES MAY BE SUBMITTED FOR APPROVAL BY THE ENGINEER.

SECTION 16170

1.01. DISCONNECT SWITCHES

A. FUSIBLE AND NON-FUSIBLE, 600V, HEAVY DUTY DISCONNECT SWITCHES SHALL BE AS MANUFACTURED BY SQUARE "D". PROVIDE FUSES AS CALLED FOR ON THE CONTRACT DRAWINGS. AMPERE RATING SHALL BE CONSISTENT WITH LOAD BEING SERVED. DISCONNECT SWITCH COVER SHALL BE MECHANICALLY INTERLOCKED TO PREVENT COVER FROM OPENING WHEN THE SWITCH IS IN THE "ON" POSITION. EXTERIOR APPLICATIONS SHALL BE NEMA 3R CONSTRUCTION WITH PADLOCK FEATURE.

SECTION 16190

1.01. SEISMIC RESTRAINT

A. ALL DEVICES SHALL BE INSTALLED IN ACCORDANCE WITH ZONE 2 SEISMIC REQUIREMENTS.

SECTION 16195

1.01. LABELING AND IDENTIFICATION NOMENCLATURE FOR ELECTRICAL EQUIPMENT

A. CONTRACTOR SHALL FURNISH AND INSTALL NON-METALLIC ENGRAVED BACK-LIT NAMEPLATES ON ALL PANELS AND MAJOR ITEMS OF ELECTRICAL EQUIPMENT.

B. LETTERS TO BE WHITE ON BLACK BACKGROUND WITH LETTERS 1-1/2 INCH HIGH WITH 1/4 INCH MARGIN.

C. IDENTIFICATION NOMENCLATURE SHALL BE IN ACCORDANCE WITH OWNER'S STANDARDS.

SECTION 16450

1.01. GROUNDING

A. ALL NON-CURRENT CARRYING PARTS OF THE ELECTRICAL AND TELEPHONE CONDUIT SYSTEMS SHALL BE MECHANICALLY AND ELECTRICALLY CONNECTED TO PROVIDE AN INDEPENDENT RETURN PATH TO THE EQUIPMENT GROUNDING SOURCES.

B. GROUNDING SYSTEM WILL BE IN ACCORDANCE WITH THE LATEST ACCEPTABLE EDITION OF THE NATIONAL ELECTRICAL CODE AND REQUIREMENTS PER LOCAL INSPECTOR HAVING JURISDICTION.

C. GROUNDING OF PANELBOARDS:

1. PANELBOARD SHALL BE GROUNDED BY TERMINATING THE PANELBOARD FEEDER'S EQUIPMENT GROUND CONDUCTOR TO THE EQUIPMENT GROUND BAR KIT(S) LUGGED TO THE CABINET. ENSURE THAT THE SURFACE BETWEEN THE KIT AND CABINET ARE BARE METAL TO BARE METAL. PRIME AND PAINT OVER TO PREVENT CORROSION.
2. CONDUIT(S) TERMINATING INTO THE PANELBOARD SHALL HAVE GROUNDING TYPE BUSHINGS. THE BUSHINGS SHALL BE BONDED TOGETHER WITH BARE #10 AWG COPPER CONDUCTOR WHICH IN TURN IS TERMINATED INTO THE PANELBOARD'S EQUIPMENT GROUND BAR KIT(S).

D. EQUIPMENT GROUNDING CONDUCTOR:

1. EACH EQUIPMENT GROUND CONDUCTOR SHALL BE SIZED IN ACCORDANCE WITH THE N.E.C. ARTICLE 250.
2. THE MINIMUM SIZE OF EQUIPMENT GROUND CONDUCTOR SHALL BE #12 AWG COPPER.
3. EACH FEEDER OR BRANCH CIRCUIT SHALL HAVE EQUIPMENT GROUND CONDUCTOR(S) INSTALLED IN THE SAME RACEWAY(S).

E. CELLULAR GROUNDING SYSTEM:

CONTRACTOR SHALL PROVIDE A CELLULAR GROUNDING SYSTEM WITH THE MAXIMUM AC RESISTANCE TO GROUND OF 10 OHM BETWEEN ANY POINT ON THE GROUNDING SYSTEM AS MEASURED BY 3-POINT GROUNDING TEST. (REFER TO SECTION 16960).

PROVIDE THE CELLULAR GROUNDING SYSTEM AS SPECIFIED ON DRAWINGS, INCLUDING, BUT NOT LIMITED TO:

1. GROUND BARS
2. INTERIOR GROUND RING
3. EXTERIOR GROUNDING (WHERE REQUIRED DUE TO MEASURED AC RESISTANCE GREATER THAN SPECIFIED).
4. ANTENNA GROUND CONNECTIONS AND PLATES.

F. CONTRACTOR, AFTER COMPLETION OF THE COMPLETE GROUNDING SYSTEM BUT PRIOR TO CONCEALMENT/BURIAL OF SAME, SHALL NOTIFY OWNER'S PROJECT ENGINEER WHO WILL HAVE A DESIGN ENGINEER VISIT SITE AND MAKE A VISUAL INSPECTION OF THE GROUNDING GRID AND CONNECTIONS OF THE SYSTEM.

G. ALL EQUIPMENT SHALL BE BONDED TO GROUND AS REQUIRED BY N.E.C., MFG. SPECIFICATIONS, AND OWNER'S SPECIFICATIONS.

SECTION 16470

1.01. DISTRIBUTION EQUIPMENT

A. REFER TO CONTRACT DRAWINGS FOR DETAILS AND SCHEDULES.

SECTION 16477

1.01. FUSES

A. FUSES SHALL BE NONRENEWABLE TYPE AS MANUFACTURED BY "BUSSMAN" OR APPROVED EQUAL. FUSES RATED TO 1/10 AMPERE UP TO 600 AMPERES SHALL BE EQUIVALENT TO BUSSMAN TYPE LPN-RK (250V) UL CLASS RK1, LOW PEAK, DUAL ELEMENT, TIME-DELAY FUSES. FUSES SHALL HAVE SEPARATE SHORT CIRCUIT AND OVERLOAD ELEMENTS AND HAVE AN INTERRUPTING RATING OF 200 KAIC. UPON COMPLETION OF WORK, PROVIDE ONE SPARE SET OF FUSES FOR EACH TYPE INSTALLED.

SECTION 16960

1.01. TESTS BY INDEPENDENT ELECTRICAL TESTING FIRM

A. CONTRACTOR SHALL RETAIN THE SERVICES OF A LOCAL INDEPENDENT ELECTRICAL TESTING FIRM (WITH MINIMUM 5 YEARS COMMERCIAL EXPERIENCE IN THE ELECTRICAL TESTING INDUSTRY) AS SPECIFIED BY OWNER TO PERFORM:

TEST 1: THERMAL OVERLOAD AND MAGNETIC TRIP TEST, AND CABLE INSULATION TEST FOR ALL CIRCUIT BREAKERS RATED 100 AMPS OR GREATER.

TEST 2: RESISTANCE TO GROUND TEST ON THE CELLULAR GROUNDING SYSTEM.

THE TESTING FIRM SHALL INCLUDE THE FOLLOWING INFORMATION WITH THE REPORT:

1. TESTING PROCEDURE INCLUDING THE MAKE AND MODEL OF TEST EQUIPMENT.
2. CERTIFICATION OF TESTING EQUIPMENT CALIBRATION WITHIN SIX (6) MONTHS OF DATE OF TESTING. INCLUDE CERTIFICATION LAB ADDRESS AND TELEPHONE NUMBER.
3. GRAPHICAL DESCRIPTION OF TESTING METHOD ACTUALLY IMPLEMENTED.

B. THESE TESTS SHALL BE PERFORMED IN THE PRESENCE AND TO THE SATISFACTION OF OWNER'S CONSTRUCTION REPRESENTATIVE. TESTING DATA SHALL BE INITIALED AND DATED BY THE CONSTRUCTION REPRESENTATIVE AND INCLUDED WITH THE WRITTEN REPORT/ANALYSIS.

C. THE CONTRACTOR SHALL FORWARD SIX (6) COPIES OF THE INDEPENDENT ELECTRICAL TESTING FIRM'S REPORT/ANALYSIS TO ENGINEER A MINIMUM OF TEN (10) WORKING DAYS PRIOR TO THE JOB TURNOVER.

D. CONTRACTOR TO PROVIDE A MINIMUM OF ONE (1) WEEK NOTICE TO OWNER AND ENGINEER FOR ALL TESTS REQUIRING WITNESSING.

SECTION 16961

1.01. TESTS BY CONTRACTOR

A. ALL TESTS AS REQUIRED UPON COMPLETION OF WORK, SHALL BE MADE BY THIS CONTRACTOR. THESE SHALL BE CONTINUITY AND INSULATION TESTS; TEST TO DETERMINE THE QUALITY OF MATERIALS, ETC. AND SHALL BE MADE IN ACCORDANCE WITH N.E.C. RECOMMENDATIONS. ALL FEEDERS AND BRANCH CIRCUIT WIRING (EXCEPT CLASS 2 SIGNAL CIRCUITS) MUST BE TESTED FREE FROM SHORT CIRCUIT AND GROUND FAULT CONDITIONS AT 500V IN A REASONABLY DRY AMBIENT OF APPROXIMATELY 70 DEGREES F.

B. CONTRACTOR SHALL PERFORM LOAD PHASE BALANCING TESTS. CIRCUITS SHALL BE SO CONNECTED TO THE PANELBOARDS SUCH THAT THE NEW LOAD IS DISTRIBUTED AS EQUALLY AS POSSIBLE BETWEEN EACH LOAD AND NEUTRAL. 10% SHALL BE CONSIDERED AS A REASONABLE AND ACCEPTABLE ALLOWANCE. BRANCH CIRCUITS SHALL BE BALANCED ON THEIR OWN PANELBOARDS; FEEDER LOADS SHALL, IN TURN, BE BALANCED ON THE SERVICE EQUIPMENT. REASONABLE LOAD TEST SHALL BE ARRANGED TO VERIFY LOAD BALANCE IF REQUESTED BY THE ENGINEER.

C. ALL TESTS, UPON REQUEST, SHALL BE REPEATED IN THE PRESENCE OF OWNER'S REPRESENTATIVE. ALL TESTS SHALL BE DOCUMENTED AND TURNED OVER TO OWNER. OWNER SHALL HAVE THE AUTHORITY TO STOP ANY OF THE WORK NOT BEING PROPERLY INSTALLED. ALL SUCH DETECTED WORK SHALL BE REPAIRED OR REPLACED AT NO ADDITIONAL EXPENSE TO THE OWNER AND THE TESTS SHALL BE REPEATED.

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G-4

NOTES AND SPECIFICATIONS:

DESIGN BASIS:

GOVERNING CODE: 2021 INTERNATIONAL BUILDING (IBC) AS MODIFIED BY THE 2022 CONNECTICUT STATE BUILDING CODE.

1. DESIGN CRITERIA:

- RISK CATEGORY II (BASED ON IBC TABLE 1604.5)
- NOMINAL/ULTIMATE DESIGN SPEED: 97 MPH (Vasd)
  (EXPOSURE C/ IMPORTANCE FACTOR 1.0 BASED ON ASCE 7-16).

SITE NOTES

1. THE CONTRACTOR SHALL CALL UTILITIES PRIOR TO THE START OF CONSTRUCTION.
2. ACTIVE EXISTING UTILITIES, WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY, PRIOR TO PROCEEDING, SHOULD ANY UNCOVERED EXISTING UTILITY PRECLUDE COMPLETION OF THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
3. THE AREAS OF THE COMPOUND DISTURBED BY THE WORK SHALL BE RETURNED TO THEIR ORIGINAL CONDITION.
4. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
5. IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL PROCEED WITH AFFECTED WORK AFTER CONFLICT IS SATISFACTORILY RESOLVED.

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2021 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2022 CONNECTICUT SUPPLEMENT, INCLUDING THE TIA/EIA-222 REVISION "H" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES." 2022 CONNECTICUT FIRE SAFETY CODE, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
2. SHOULD ANY FIELD CONDITIONS PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL NOT PROCEED WITH ANY AFFECTED WORK.
3. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
4. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SUCH INVESTIGATIONS CONCERNING PHYSICAL CONDITIONS (SURFACE AND SUBSURFACE) AT OR CONTIGUOUS TO THE SITE, WHICH MAY AFFECT PERFORMANCE AND COST OF THE WORK.
5. ALL DIMENSIONS, ELEVATIONS, AND OTHER REFERENCES TO EXISTING STRUCTURES, SURFACE, AND SUBSURFACE CONDITIONS ARE APPROXIMATE. NO GUARANTEE IS MADE FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS, ELEVATIONS AND ANGLES WITH EXISTING CONDITIONS AND WITH ARCHITECTURAL AND SITE DRAWINGS BEFORE PROCEEDING WITH ANY WORK.
6. AS THE WORK PROGRESSES, THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY CONDITIONS WHICH ARE IN CONFLICT OR OTHERWISE NOT CONSISTENT WITH THE CONSTRUCTION DOCUMENTS, AND SHALL NOT PROCEED WITH SUCH WORK UNTIL THE CONFLICT IS SATISFACTORILY RESOLVED.
7. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
8. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
9. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL, AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
10. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN 'AS-BUILT' SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
11. LOCATION OF EQUIPMENT AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS, SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
12. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY.
13. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUB-CONTRACTORS FOR ANY CONDITION PER THE MANUFACTURER'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
14. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
15. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
16. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MANUFACTURER'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
17. ANY AND ALL ERRORS, DISCREPANCIES, AND 'MISSED' ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE DISH Wireless L.L.C. CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO 'EXTRA' WILL BE ALLOWED FOR MISSED ITEMS.
18. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
19. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
20. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
21. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUITS AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND CONFIRMED WITH THE PROJECT MANAGER AND OWNER PRIOR TO THE COMMENCEMENT OF ANY WORK
22. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
23. THE CONTRACTOR SHALL CONTACT 'CALL BEFORE YOU DIG' AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
24. CONTRACTOR SHALL COMPLY WITH THE OWNER'S ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.
25. THE COUNTY/CITY/TOWN MAY MAKE PERIODIC FIELD INSPECTIONS TO ENSURE COMPLIANCE WITH THE DESIGN PLANS, SPECIFICATIONS, AND CONTRACT DOCUMENTS.
26. THE COUNTY/CITY/TOWN MUST BE NOTIFIED (2) WORKING DAYS PRIOR TO CONCEALMENT/BURIAL OF ANY SYSTEM OR MATERIAL THAT WILL PREVENT THE DIRECT INSPECTION OF MATERIALS, METHODS OR WORKMANSHIP. EXAMPLES OF THESE PROCESSES ARE BACKFILLING A GROUND RING OR TOWER FOUNDATION, POURING TOWER FOUNDATIONS, BURYING GROUND RODS, PLATES OR GRIDS, ETC. THE CONTRACTOR MAY PROCEED WITH THE SCHEDULED PROCESS (2) WORKING DAYS AFTER PROVIDING NOTICE UNLESS NOTIFIED OTHERWISE BY THE COUNTY/CITY/TOWN.
27. PRIOR TO THE SUBMISSION OF BIDS, THE CONTRACTOR SHALL VISIT THE 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 ENGINEER ON RECORD, PRIOR TO THE COMMENCEMENT OF ANY WORK.

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)

   A. STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36 (FY = 36 KSI)
   C. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
   D. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
   E. PIPE---ASTM A53 (FY = 35 KSI)
   F. CONNECTION BOLTS---ASTM A325-N
   G. U-BOLTS---ASTM A36
   H. ANCHOR RODS---ASTM F 1554
   I. WELDING ELECTRODE---ASTM E 70XX

2. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.
3. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.
4. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.
5. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.
6. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.
7. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.
8. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.
9. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".
10. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.
11. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.
12. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.
13. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.
14. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.
15. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.
16. FABRICATE BEAMS WITH MILL CAMBER UP.
17. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.
18. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.
19. INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.
20. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

dish wireless.
5701 SOUTH SANTA FE DRIVE
LITTLETON, CO 80120

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Turnkey Wireless Development

CENTEK engineering
Centered on Solutions℠
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63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

DRAWN BY:	CHECKED BY:	APPROVED BY:
LGL	TJR	

RFDS REV #: 0 – 07/07/2023

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
A	08/25/23	ISSUED FOR CLIENT REVIEW
B	09/14/23	REVISED PER CLIENT COMMENTS
0	10/20/23	ISSUED FOR CONSTRUCTION

CENTEK PROJECT NUMBER
23009.07

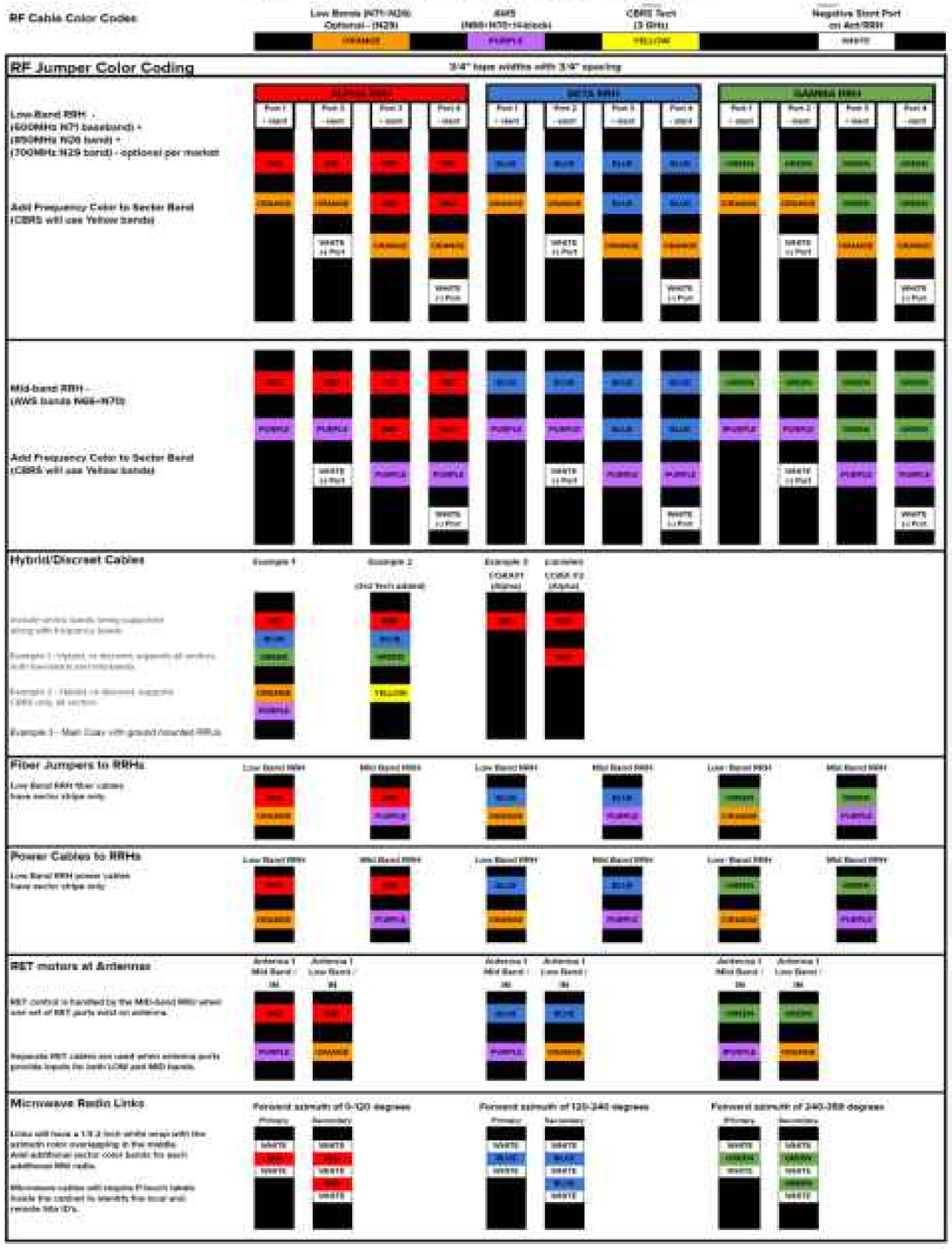
DISH Wireless L.L.C.
PROJECT INFORMATION

BOBOS00933A
BALD HILL ROAD
UNION CT, 06076

SHEET TITLE
SPECIFICATIONS AND NOTES

SHEET NUMBER
GN-1

RF COLOR CODING



RF COLOR CODES

NO SCALE

1

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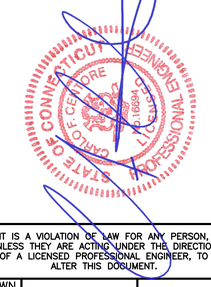

DRAWN BY:	CHECKED BY:	APPROVED BY:
LGL	TJR	

RFDS REV #: 0 – 07/07/2023

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
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CENTEK PROJECT NUMBER
23009.07

DISH Wireless L.L.C.
PROJECT INFORMATION

BOBOS00933A
BALD HILL ROAD
UNION CT, 06076

SHEET TITLE
RF CABLE
COLOR CODES

SHEET NUMBER
RF-1

ATTACHMENT 4

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

180-ft Existing Andrew Lattice Tower

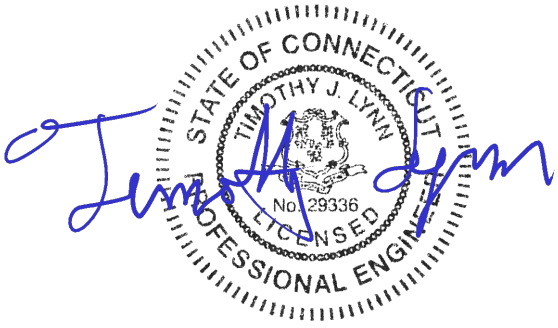
Dish Site #: BOBOS00933A

33 Bald Hill Road
Union, CT

Centek Project No. 23009.07

~~Date: July 19, 2023~~

Rev 1: August 17, 2023



Max Stress Ratio = 61%

Prepared for:

Northeast Site Solutions
1053 Farmington Ave., Unit G,
Farmington, CT 06032

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna installation proposed by Dish on the existing self-supporting lattice tower located in Union, Connecticut.

The host tower is a 180-ft, three legged, tapered lattice tower originally designed and manufactured by Andrew Corporation. The tower geometry and structure member sizes were obtained from the original tower design drawings prepared by Andrew; drawing no. LI-3089-01 approved November 12, 1993.

Antenna and appurtenance information were obtained from a previous structural report prepared by Centek job no.; 18127.23 dated March 6, 2019, a previous structural report prepared by Black & Veatch job no.; 405025 dated September 3, 2020 and a Dish RF Sheet.

The tower is made up of nine (9) tapered vertical steel sections consisting of A572-50 pipe legs. Diagonal lateral support bracing consists of A36 steel angle construction. The vertical tower sections are connected by bolted flange plates while the pipe legs and bracing are connected by bolted and welded gusset connections. The tower face width is 9.50-ft at the top and 26.00-ft at the bottom.

Antenna and Appurtenance Summary

The existing, proposed and future loads considered in this analysis consist of the following:

- EVERSOURCE (Existing):
  Antennas: Two (2) 20' omni (whips) an one (1) Sinclair SD212D-SF3P4SNM dipole leg mounted with an elevation of ±180-ft above finished grade.
  Coax Cables: Four (4) 7/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Existing):
  Antennas: One (1) 4-bay dipole antenna mounted on a 6' side-arm with an elevation of ±177.75-ft above finished grade.
  Coax Cables: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Existing):
  Antennas: One (1) Db Spectra DS9A09F36D-N Omni-directional whip antenna and one (1) Bird TTA mounted on an existing 6' side-arm with an elevation of ±178-ft above finished grade.
  Coax Cables: Two (2) 1-1/4" ∅ and one (1) 1/2" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- STATE POLICE (Existing):
  Antennas: One (1) 10' Omni-directional (whip) mounted on a 6' side-arm with elevations of ±176.5-ft above finished grade.
  Coax Cables: One (1) 1-5/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.

- STATE POLICE (Existing:
  Antennas: One (1) Scala OGT9-806 whip on a 6' side-arm with an elevation of ±174-ft above finished grade to be relocated to the USF12 frame at 172'.
  Coax Cables: One (1) 1-5/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- STATE POLICE (Existing):
  Antennas: Three (3) Sinclair SE414-SWBP2LDF whips and one (1) TX/RX 432E-83I-01T TTAs mounted on a SitePro USF12 sector frame with elevation of ±172-ft above finished grade.
  Coax Cables: Two (2) 1-5/8" ∅ and two (2) 1/2" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- STATE POLICE (Existing):
  Antennas: One (1) RFS 6' dish mounted with a RAD center elevation of ±169.5-ft above finished grade.
  Coax Cables: One (1) WE-65 coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- STATE POLICE (Existing):
  Antennas: One (1) Scala AP14-850/105 panel antenna mounted on a 3' side-arm with a RAD center elevation of 164-ft above finished grade to be relocated to the USF12 frame at 163'.
  Coax Cables: One (1) 1-5/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- STATE POLICE (Existing):
  Antennas: Three (3) Antel WPA-700120-8CF panel antennas and one (1) TX/RX 432E-83I-01T TTA mounted on a SitePro USF12 sector frame with elevation of ±163-ft above finished grade.
  Coax Cables: Two (2) 1-5/8" ∅ and two (2) 1/2" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
  Antennas: One (1) folded di-pole (whip) leg mounted with a RAD center elevation of 151.92-ft above finished grade.
  Coax Cables: One (1) 7/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
  Antennas: Two (2) empty 1' side-arms with a RAD center elevation of ±150-ft above finished grade.
- EVERSOURCE (Existing):
  Antennas: One (1) di-pole (whip) mounted on a 3' side-arm with an elevation of 146-ft above finished grade.
  Coax Cables: One (1) 7/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.

- EVERSOURCE (Existing):
  Antennas: One (1) four bay di-pole and one (1) 10' Omni-directional whip mounted on a 3' side-arm with an elevation of 145-ft above finished grade.
  Coax Cables: One (1) 7/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Existing):
  Antennas: One (1) folded di-pole (whip) leg mounted with a RAD center elevation of 133-ft above finished grade.
  Coax Cables: One (1) 7/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Existing):
  Antennas: One (1) 8' microwave dish pipe mounted with a RAD center elevation of ±130-ft above finished grade.
  Coax Cables: One (1) WE-65 coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- T-MOBILE (EXISTING):
  Antennas: Three (3) RFS APX16DWV-16DWVS panel antennas, three (3) RFS APXVAARR24_43 panel antennas, six (6) TMAs and three (3) Ericsson 4449 B71 B12 remote radio heads mounted on three (3) SitePro XLD WiMAX Tower Mount (SitePro P/N CWT-02) w/ XLD Sector Frame Stabilizer Kit (SitePro P/N SFS-H) with a RAD center elevation of 120-ft above grade level.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables and three (3) 6x12 fiber lines running on a leg/face of the existing tower as specified in Section 3 of this report.
- STATE POLICE (Existing):
  Antennas: One (1) RFS 6' dish and one (1) ice canopy mounted with a RAD center elevations of ±100.42-ft and 109-ft respectively above finished grade.
  Coax Cables: One (1) WE-65 coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- STATE POLICE (Existing):
  Antennas: One (1) RFS 6' dish and one (1) ice canopy mounted with a RAD center elevations of ±100.58-ft and 109-ft respectively above finished grade.
  Coax Cables: One (1) WE-65 coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Existing):
  Antennas: One (1) 6' microwave dish pipe mounted with a RAD center elevation of ±90-ft above finished grade.
  Coax Cables: One (1) WE-65 coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Existing):
  Antennas: One (1) 10' Omni-directional whip mounted on a 6' side-arm with an elevation of 90-ft above finished grade.
  Coax Cables: One (1) 7/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Existing):

Antennas: One (1) 8' dish mounted with a RAD center elevation of ±64-ft above finished grade.
Coax Cables: One (1) WE-65 coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.

- EVERSOURCE (Existing):
  Antennas: One (1) dipole and ground plain (whip) mounted on a 4' sidearm with a RAD center elevation of ±56-ft above finished grade.
  Coax Cables: Two (2) 7/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Existing):
  Antennas: One (1) Decibel DB225F yagi antenna leg mounted with a RAD center elevation of ±50.67-ft above finished grade.
  Coax Cables: One (1) 1/2" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Existing):
  Antennas: One (1) Decibel folded dipole antenna mounted on a 4' sidearm with a RAD center elevation of ±50-ft above finished grade.
  Coax Cables: One (1) 1/2" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Existing):
  Antennas: One (1) Decibel DB212C folded dipole antenna leg mounted with a RAD center elevation of ±28-ft above finished grade.
  Coax Cables: One (1) 1/2" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- **DISH (PROPOSED):**
  Antennas: Three (3) JMA MX08FRO665-21 panel antennas, three (3) Samsung RF4450t-71A remote radio heads, three (3) Samsung RF4451d-70A remote radio heads and one (1) Raycap RD1DC-9181-PF-48 OVP box mounted on one (1) existing 8-ft V-Frame (Sitepro p/n VFA8-HD) and two (2) compact tower mounts (Sitepro p/n CWT8-LL) with a RAD center elevation of ±75-ft above the tower base.
  Coax Cables: One (1) 1-1/4"∅ Hybriflex cable running on the face of the existing tower as specified in Section 3 of this report.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.

Analysis

The existing tower was analyzed using a comprehensive computer program entitled tnxTower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower, and the model assumes that the tower members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for the controlling basic wind speed (3-second gust) with no ice and the applicable wind and ice combination to determine stresses in members as per guidelines of TIA-222-H entitled "Structural Standard for Antenna Support Structures and Antennas", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Load and Resistance Factor Design (LRFD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix P of the CSBC[1] and the wind speed data available in the TIA-222-H Standard.

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA-222-H, gravity loads of the tower structure and its components, and the application of 1.50" radial ice on the tower structure and its components.

Load Cases:	Load Case 1; 130 mph (Ultimate) wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Appendix P of the 2022 CT Building Code]*
	Load Case 2; 50 mph wind speed w/ 1.50" radial ice plus gravity load – used in calculation of tower stresses.	*[Annex B of TIA-222-H]*
	Load Case 3; 101 mph (Nominal) wind speed used for deflection calculation.	

[1] The 2021 International Building Code as amended by the 2022 Connecticut State Building Code (CSBC).

Tower Capacity

- Calculated stresses were found to be within allowable limits.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T9)	0'-0"- 20'-0"	57.4%	**PASS**
Diagonal (T9)	0'-0"- 20'-0"	60.9%	**PASS**

- The tower combined deflection is **0.2033 degrees**.

Deflection Criteria	Proposed (degrees)	Allowable (degrees)	Result
Sway (Tilt)	0.1987	0.5	**n/a**
Twist	0.0431	0.5	**n/a**
Combined	0.2033	0.5	**PASS**

Note 1: Tower deflection calculated utilizing the service wind load combination and nominal wind speed of 101 mph.

Foundation and Anchors

Tower legs are connected to three (3) reinforced concrete pad and pier foundations by means of (6) 1.375" ∅, ASTM A193 Grade B7 anchor bolts per leg, embedded into the concrete foundation structure.

- The tower reactions developed from the governing Load Case were used in the verification of the foundation and anchor bolts:

Leg Reactions	Vector	Proposed Tower Reactions
Leg	Shear	**39 kips**
	Compression	**295 kips**
	Uplift	**251 kips**
Base	Shear	**65 kips**
	Compression	**55 kips**
	Moment	**6227 kip-ft**

- The anchor bolts were found to be within allowable limits.

Tower Section	Component	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	40.5%	**PASS**

- The foundation was found to be within allowable limits.

Foundation	Design Limit	Original Design Reactions[(1)]	Proposed Reactions	Result
(3) Reinf. Conc. Pad and Pier	Uplift	470.3 kips	251 kips	**PASS**
	Compression	569.3 kips	295 kips	**PASS**
	Shear	62.2 kips	39 kips	**PASS**

Note 1: Original design reactions multiplied by 1.35 for comparison to proposed reactions per section 15.6.2 of TIA-222-H

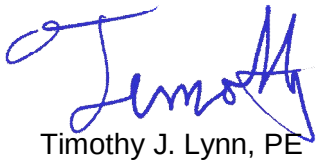
Conclusion

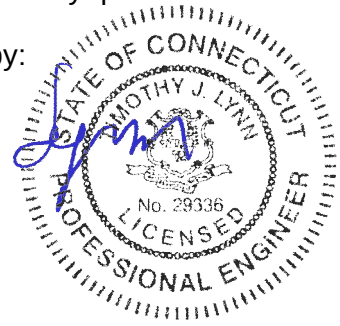
This analysis shows that the subject tower **is adequate** to support the proposed antenna configuration.

The analysis is based, in part, on the information provided to this office by Dish and Eversource. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:





Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Centek Engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the “as new” condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Centek Engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

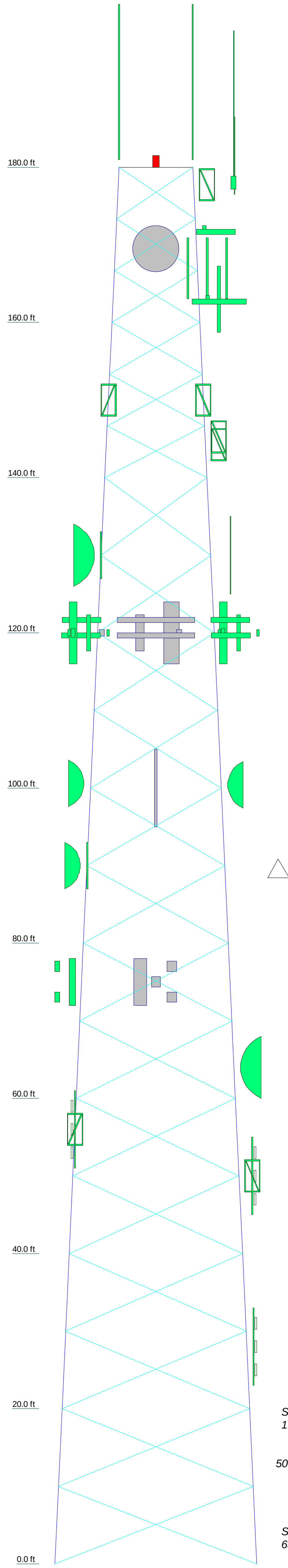
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly RISA Tower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

- tnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-H standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

Section	Legs	Leg Grade	Diagonals	Diagonal Grade	Top Girts	Face Width (ft)	# Panels @ (ft)	Weight (K)
T1	Andrew 5.5625x0.2580	A572-50	L2 1/2x2 1/2x3/16	A36	L2 1/2x2 1/2x3/16	9.5	6 @ 6.66667	1.6
T2	Andrew 6.625x0.2800		2L2x2x3/16		N.A.	11.33		2.3
T3	Andrew 8.625x0.3220		2L2 1/2x2 1/2x3/16			13.17	14 @ 10	3.0
T4						15		3.1
T5						16.83		3.2
T6			2L3x3x3/16			18.67		3.6
T7	Andrew 10.750x0.3650		2L3x3x1/4			20.5		5.2
T8						22.33		5.4
T9			L5x5x5/16			24.17		5.7
						26		33.0



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
20' x 3" Dia Omni (Eversource Existing)	180	Radio 4449 B71 B12 (T-Mobile Existing)	120
20' x 3" Dia Omni (Eversource Existing)	180	APXVAARR24-43 (T-Mobile Existing)	120
Flash Beacon Lighting	180	APXVAARR24-43 (T-Mobile Existing)	120
SD212 (Eversource Existing)	180	(2) TMA 10"x8"x3" (T-Mobile Existing)	120
DS9A09F36D-N (Eversource Existing)	178	(2) TMA 10"x8"x3" (T-Mobile Existing)	120
Tower Top Amplifier (Eversource Existing)	178	Radio 4449 B71 B12 (T-Mobile Existing)	120
4 Bay Di-Pole (Eversource Existing)	177.75	APX16DWV-16DWVS-E-A20 (T-Mobile Existing)	120
6' Side-Arm (Eversource Existing)	177.75	APXVAARR24-43 (T-Mobile Existing)	120
6' Side-Arm (Eversource Existing)	177.75	APX16DWV-16DWVS-E-A20 (T-Mobile Existing)	120
10' x 3" Dia Omni (SP Existing)	176.5	(2) TMA 10"x8"x3" (T-Mobile Existing)	120
OGT9-806 (SP Existing - Relocated)	172	Site Pro WiMAX Tower Mount CWT02 (T-Mobile Existing)	120
Site Pro USF12 (CSP)	172	Ice Canopy (SP Existing)	109
(3) SE-414 (CSP)	172	Ice Canopy (SP Existing)	109
TX/RX 432E-83I-01T (CSP)	172	6 FT DISH (SP Existing)	100.58
6 FT DISH (SP Existing)	169.5	6 FT DISH (SP Existing)	100.42
AP14-850/105 (SP Existing - Relocated)	163	10' x 3" Dia Omni	90
Site Pro USF12 (CSP)	163	6'x4" Pipe Mount (Eversource Existing)	90
(3) WPA-700120-8CF (CSP)	163	6 FT DISH (Eversource Existing)	90
TX/RX 432E-83I-01T (CSP)	163	6' Side-Arm	85
Folded Di-Pole (Eversource Existing)	151.92	Site Pro Compact Tower Mount CWT8 (Dish Proposed)	77
Sidearm (Empty)	150	MX08FRO665-21 (Dish Proposed)	75
Sidearm (Empty)	150	MX08FRO665-21 (Dish Proposed)	75
Di-Pole (Eversource Existing)	146	MX08FRO665-21 (Dish Proposed)	75
3' Sidearm (Eversource Existing)	145.25	RF4450t-71A (Dish Proposed)	75
4 Bay Di-Pole (Eversource Existing)	145	RF4450t-71A (Dish Proposed)	75
3' Sidearm (Eversource Existing)	144.25	RF4450t-71A (Dish Proposed)	75
10' x 3" Dia Omni (inverted) (Eversource Existing)	140	RF4451d-70A (Dish Proposed)	75
Folded Di-Pole (Eversource Existing)	133	RF4451d-70A (Dish Proposed)	75
6'x4" Pipe Mount (Eversource Existing)	130	RF4451d-70A (Dish Proposed)	75
8 FT DISH (Eversource Existing)	130	RD1DC-9181-PF-48 (Dish Proposed)	75
SitePro Horizontal Stabilizer SFS-H (T-Mobile Existing)	122	SitePro VFA8-HD (Dish Proposed)	75
SitePro Horizontal Stabilizer SFS-H (T-Mobile Existing)	122	Site Pro Compact Tower Mount CWT8 (Dish Proposed)	73
SitePro Horizontal Stabilizer SFS-H (T-Mobile Existing)	122	8 FT DISH (Eversource Existing)	64
Site Pro WiMAX Tower Mount CWT02 (T-Mobile Existing)	120	4' Side Mount (Eversource Existing)	56
Site Pro WiMAX Tower Mount CWT02 (T-Mobile Existing)	120	Dipole and Ground Plain (Eversource Existing)	56
APX16DWV-16DWVS-E-A20 (T-Mobile Existing)	120	DB225-F (Eversource Existing)	50.67
Radio 4449 B71 B12 (T-Mobile Existing)	120	4' Side Mount (Eversource Existing)	50
		Folded Di-Pole (Eversource Existing)	50
		DB212-2-C (Eversource Existing)	28

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower designed for Exposure B to the TIA-222-H Standard.
2. Tower designed for a 130 mph basic wind in accordance with the TIA-222-H Standard.
3. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 101 mph wind.
5. Tower Risk Category III.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 60.9%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 295 K
SHEAR: 39 K

UPLIFT: -251 K
SHEAR: 34 K

AXIAL 168 K
SHEAR 19 K
MOMENT 1960 kip-ft
TORQUE 30 kip-ft
50 mph WIND - 1.5000 in ICE

AXIAL 55 K
SHEAR 65 K
MOMENT 6227 kip-ft
TORQUE 56 kip-ft
REACTIONS - 130 mph WIND

Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: **23009.07 - BOBOS00933A**		
Project: **180' Andrew Lattice Tower - Bald Hill Road, Union, CT**		
Client: DISH	Drawn by: TJL	App'd:
Code: TIA-222-H	Date: 08/17/23	Scale: NTS
Path: J:\Jobs\2300900.WI\07_BOBOS00933A\05_Structural\Tower\Backup Documentation\Rev (1)\ERI Files\180-ft_Andrew_Lattice_Tower.eri		Dwg No. E-1

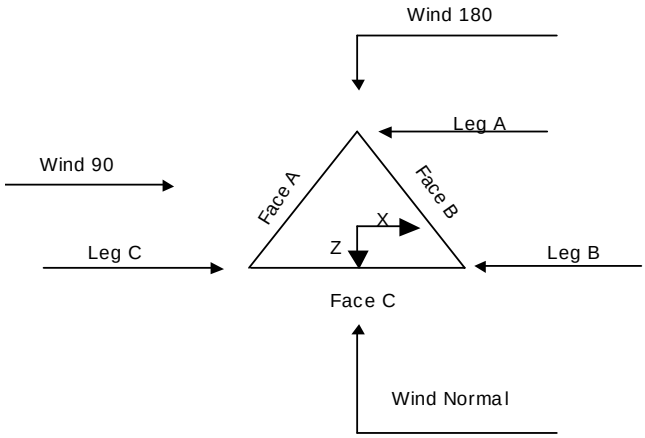
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 9.50 ft at the top and 26.00 ft at the base.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

Tower base elevation above sea level: 0.00 ft.
Basic wind speed of 130 mph.
Risk Category III.
Exposure Category B.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0.00 ft.
Nominal ice thickness of 1.5000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 101 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	180.00-160.00			9.50	1	20.00
T2	160.00-140.00			11.33	1	20.00
T3	140.00-120.00			13.17	1	20.00
T4	120.00-100.00			15.00	1	20.00
T5	100.00-80.00			16.83	1	20.00
T6	80.00-60.00			18.67	1	20.00
T7	60.00-40.00			20.50	1	20.00
T8	40.00-20.00			22.33	1	20.00
T9	20.00-0.00			24.17	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	180.00-160.00	6.67	X Brace	No	Yes	0.0000	0.0000
T2	160.00-140.00	6.67	X Brace	No	No	0.0000	0.0000
T3	140.00-120.00	10.00	X Brace	No	No	0.0000	0.0000
T4	120.00-100.00	10.00	X Brace	No	No	0.0000	0.0000
T5	100.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T6	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000

RF DESIGN SHEET

Issue Date	7/7/2023
Revision	0

RFDS Status	Preliminary
Created By	Sebastian, Arvin

SITE INFORMATION	
DISH Site Number	BOBOS00933A
DISH Site Name	-
Prequal Asset ID	-
AOI	BOS
PEA	7
Latitude	41.973708
Longitude	-72.198903
Address	33 Bald Hill Road
City	Union
State	CT
ZIP Code	06076
County	Tolland
Rad Center (ft)	130
RAD Confirmed	***No Confirmed RAD***
Structure Type	SST

PROJECT ASSIGNMENTS	
Market Manager	Bradford Rainey
Site Development Mgr.	David Goodfellow
RF Engineer	Irene Rangel
Site Acq Specialist/Develop. Cord.	David Goodfellow /
SAQ Vendor/A&E Vendor	NORTHEAST SITE SOLUTIONS LLC / NORTHEAST SITE SOLUTIONS LLC
Asset Owner/Asset #	Private Owner / -
Construction Mgr. (Lead/Field)	Chad Wilcox /
Contractor (General/Tower/Civil)	/ /
Power Company / Transport Provider	EVERSOURCE ELECTRIC /

EMERGENCY CONTACT INFORMATION	
Name	Temporary Emergency Line
Phone	866-624-6874

LEASE AREA	
Dimensions (ft.)	5x7
Type	Steel Platform
Baseband Cabinet	Charles(Amphenol)-H/EX
Dimensions (in)	32" x 32.1" x 74"
Baseband	gNB-CU
Generator Required	No
Make/Model	

DESIGN COMMENTS
This RFDS is Preliminary and should be used for planning purposes only. A final RFDS needs to be received from Market RF before construction.

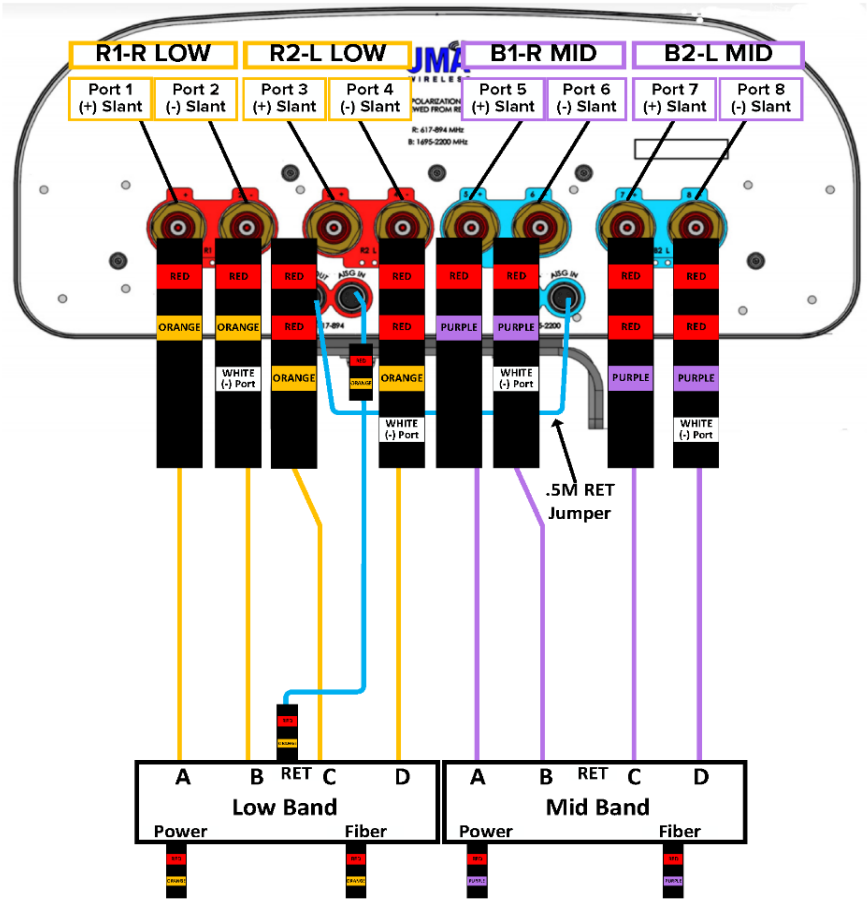
RF EQUIPMENT INFORMATION

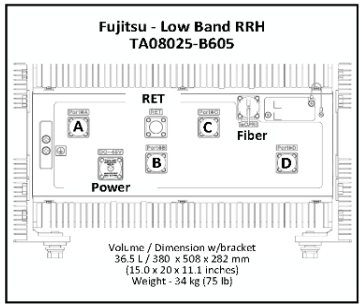
Issue Date/Revision	7/7/2023	**Revision:**	0	**Latitude**	41.973708
Site ID	BOBOS00933A			**Prequal Asset ID**	-
Site Address	33 Bald Hill Road, Union CT 06076			**SOW / RF Comments**	Dish proposes to place 3 antennas, 6 RRUs, 1 junction box(s), and 1 (power/hybrid) cable(s), at the 130 foot RAD. Dish will require a 5x7 lease area for ground equipment. This RFDS is Preliminary and should be used for planning purposes only. A final RFDS needs to be received from Market RF
Structure Type	SST				
sectors >20' apart?	No	***Confirmed RAD?***	***No Confirmed RAD*** 130		

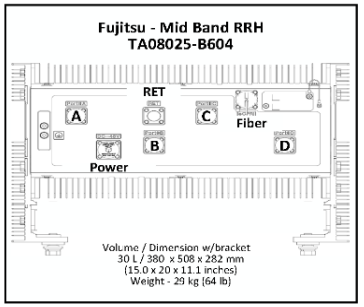
	Sector 1 (alpha)			Sector 2 (beta)			Sector 3 (gamma)		
ANTENNA									
Antenna Mount Position	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
Antenna ID		1			2			3	
Manufacturer		JMA			JMA			JMA	
Model Number		MX08FRO665-21			MX08FRO665-21			MX08FRO665-21	
Dimensions H x W x D (in)		72.0" x 20.0" x 8.0"			72.0" x 20.0" x 8.0"			72.0" x 20.0" x 8.0"	
Weight (lbs.)		64.5			64.5			64.5	
TX Power Output (watts)		40000			40000			40000	
ERP (dBm)		76.02			76.02			76.02	
RAD Centerline Height (ft.)		130			130			130	
Azimuths (True North)		0°			120°			240°	
Mech Down Tilt		0°			0°			0°	
Default Mount		Generic							
LOW BAND/RADIO #1									
Manufacturer		Samsung			Samsung			Samsung	
Model Number		RF4450t-71A			RF4450t-71A			RF4450t-71A	
Dimensions H x W x D (in.)		16.5" x 15.0" x 11.0"			16.5" x 15.0" x 11.0"			16.5" x 15.0" x 11.0"	
Weight (lbs.)		94.58			94.58			94.58	
Location		Antenna			Antenna			Antenna	
Band		n71 |			n71 |			n71 |
Quantity		1			1			1	
Port Assignment		Port 1-4			Port 1-4			Port 1-4	
Elec Down Tilt		2°			2°			2°	
MID BAND/RADIO #2									
Manufacturer		Samsung			Samsung			Samsung	
Model Number		RF4451d-70A			RF4451d-70A			RF4451d-70A	
Dimensions H x W x D (in)		15.0" x 15.0" x 8.9"			15.0" x 15.0" x 8.9"			15.0" x 15.0" x 8.9"	
Weight (lbs.)		61.3			61.3			61.3	
Location		Antenna			Antenna			Antenna	
Quantity		1			1			1	
Band		n70 |n66			n70 |n66			n70 |n66	
Port Assignment		Port 5-8			Port 5-8			Port 5-8	
Elec Down Tilt		2°			2°			2°	
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							
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	160								
OTHER EQUIPMENT									
Type of Equipment									
Manufacturer									
Model Number									
Dimensions H x W x D (in)									
Weight (lbs.)									
Equipment Location									
Quantity									

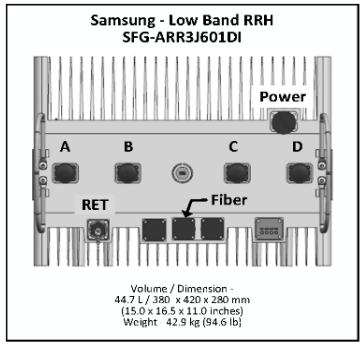
Frequencies	**n29**	**n66**	**n70**	**n71**
Downlink (TX)	-	|2160 - 2165| |2180 - 2200|	|1995 - 2020|	|632 - 652|
Uplink (RX)	-	|1760 - 1765|	|1695 - 1710|	|678 - 698|

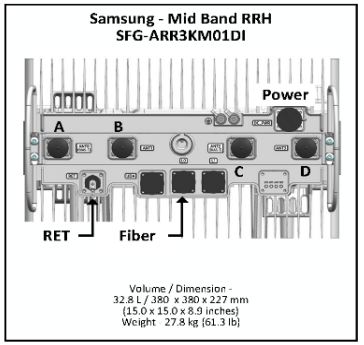
PLUMBING DIAGRAM ANTENNA











Wireless Engineering

Chuck Iversen	SIZE	CAGE CODE	DWG NAME	REV
20 - Sept – 2022		50HD6	MX08FRO665-21-JMA-6ft_ALPHA	1
	SCALE	None	SHEET	1 OF 1

ALPHA SECTOR (1 Antenna)
RRU AND ANTENNA
RF CABLING CONFIGURATION

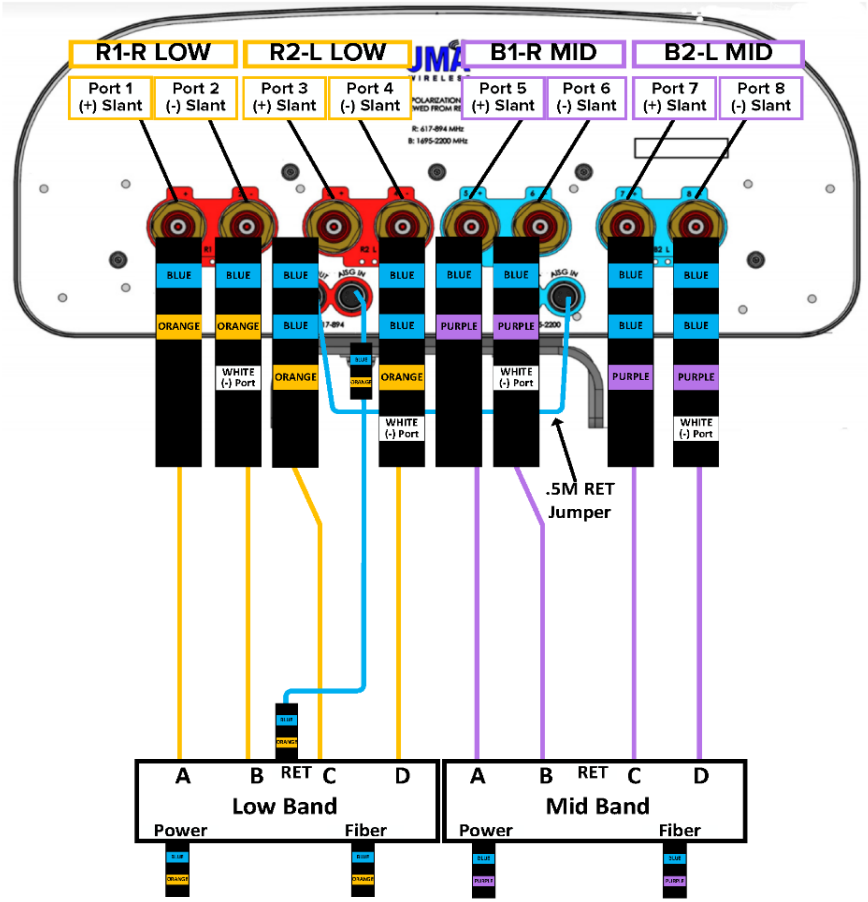
JMA MX08FRO665 -21 - 8 Port - 6ft
LOW/MID Radios
LOW Band RET + .5M Jumper

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)	64.5 (29.3)
Shipping weight, lb (kg)	104 (47.2)
Antenna mounting and downtilt kit included with antenna	91000318
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

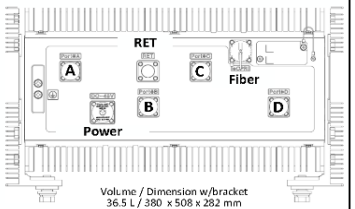
- Refer to the color coding chart for RF Cables
- Check RRH SFPs are 'I-temp' rated, (industrial-temp range)
- RF Connector recommended torque: 50 inch-lbs.
- RET connector recommended torque: 4.3-8.6 inch-lbs.
- Weatherproof boots required on all RF jumpers.
- RET cables require self-sealing tape.
- Protect unused ports with weather-sealing caps.
- **When OOBE filters are used, provide straight-through connectivity (Ant port 1 --> RU port A) with each port and each set of RF jumpers color-coded accordingly.**

Sector Color Bands	Frequency Color Bands	Main Coax
ALPHA SECTOR	LOW BAND (LB)	RET Cable
BETA SECTOR	MID BAND (MB)	RF Jumper - Low Band
GAMMA SECTOR	FUTURE	RF Jumper - Mid Band

PLUMBING DIAGRAM ANTENNA

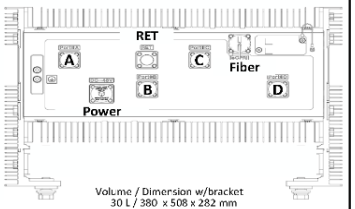


Fujitsu - Low Band RRH
TA08025-B605



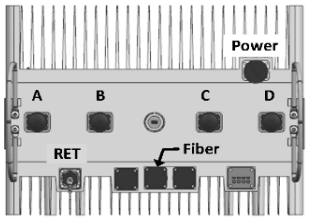
Volume / Dimension w/bracket
36.5 L / 380 x 508 x 282 mm
(15.0 x 20 x 11.1 inches)
Weight - 34 kg (75 lb)

Fujitsu - Mid Band RRH
TA08025-B604



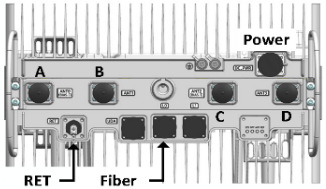
Volume / Dimension w/bracket
30 L / 380 x 508 x 282 mm
(15.0 x 20 x 11.1 inches)
Weight - 29 kg (64 lb)

Samsung - Low Band RRH
SFG-ARR3J601DI



Volume / Dimension -
44.7 L / 380 x 420 x 280 mm
(15.0 x 16.5 x 11.0 inches)
Weight 42.9 kg (94.6 lb)

Samsung - Mid Band RRH
SFG-ARR3KM01DI



Volume / Dimension -
32.8 L / 380 x 380 x 227 mm
(15.0 x 15.0 x 8.9 inches)
Weight 27.8 kg (61.3 lb)

Wireless Engineering

Chuck Iversen	SIZE	CAGE CODE	DWG NAME	REV
		50HD6	MX08FRO665-21-JMA-6ft_BETA	1
20 - Sept – 2022	SCALE	None	SHEET	1 OF 1

BETA SECTOR (1 Antenna)
RRU AND ANTENNA
RF CABLING CONFIGURATION

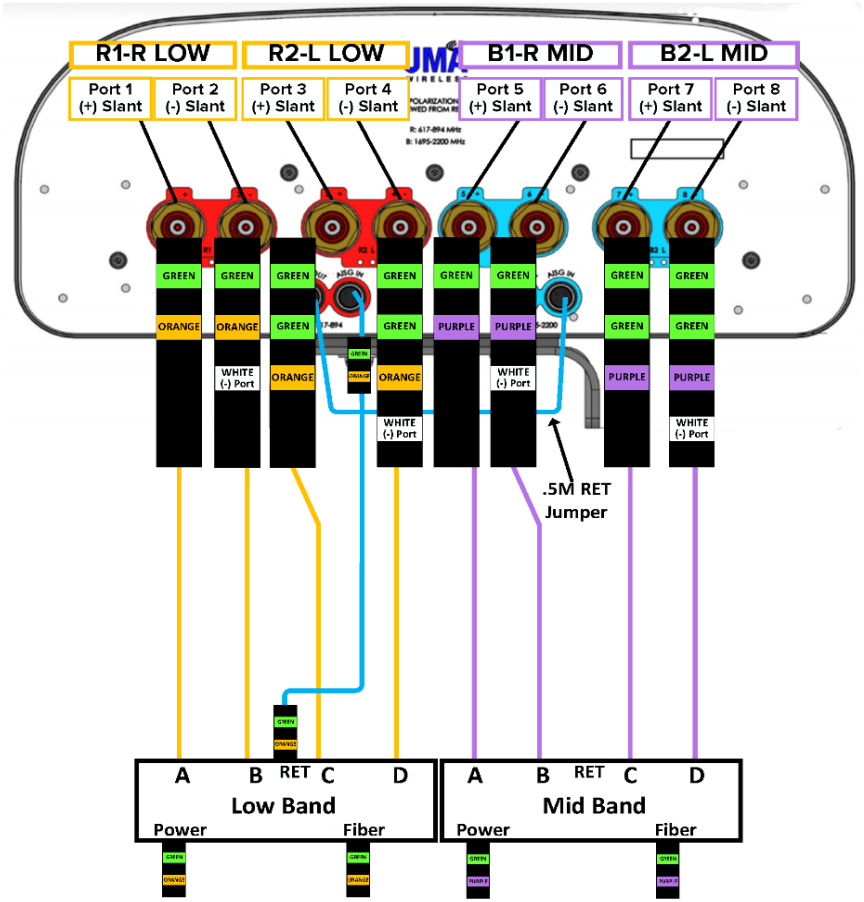
JMA MX08FRO665 -21 - 8 Port - 6ft
LOW/MID Radios
LOW Band RET + .5M Jumper

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)	64.5 (29.3)
Shipping weight, lb (kg)	104 (47.2)
Antenna mounting and downtilt kit included with antenna	019003118
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

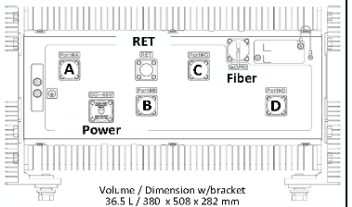
- Refer to the color coding chart for RF Cables
- Check RRH SFPs are 'I-temp' rated. (Industrial-temp range)
- RF Connector recommended torque: 50 inch-lbs.
- RET connector recommended torque: 4.3-8.6 inch-lbs.
- Weatherproof boots required on all RF jumpers.
- RET cables require self-sealing tape.
- Protect unused ports with weather-sealing caps.
- **When OOBE filters are used, provide straight-through connectivity (Ant port 1 --> RU port A) with each port and each set of RF jumpers color-coded accordingly.**

Sector Color Bands	Frequency Color Bands	Main Coax
ALPHA SECTOR	LOW BAND (LB)	RET Cable
BETA SECTOR	MID BAND (MB)	RF Jumper - Low Band
GAMMA SECTOR	FUTURE	RF Jumper - Mid Band

PLUMBING DIAGRAM ANTENNA

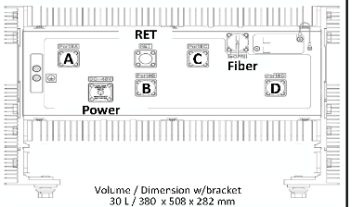


Fujitsu - Low Band RRH
TA08025-B605



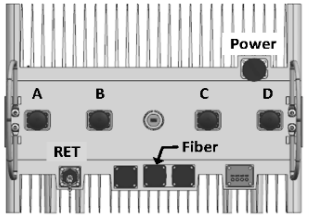
Volume / Dimension w/bracket
36.5 L / 380 x 508 x 282 mm
(15.0 x 20 x 11.1 inches)
Weight - 34 kg (75 lb)

Fujitsu - Mid Band RRH
TA08025-B604



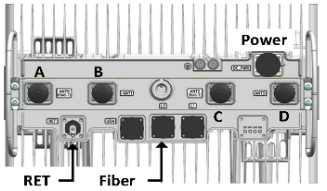
Volume / Dimension w/bracket
30 L / 380 x 508 x 282 mm
(15.0 x 20 x 11.1 inches)
Weight - 29 kg (64 lb)

Samsung - Low Band RRH
SFG-ARR3J601DI



Volume / Dimension -
44.7 L / 380 x 420 x 280 mm
(15.0 x 16.5 x 11.0 inches)
Weight 42.9 kg (94.6 lb)

Samsung - Mid Band RRH
SFG-ARR3KM01DI



Volume / Dimension -
32.8 L / 380 x 380 x 227 mm
(15.0 x 15.0 x 8.9 inches)
Weight 27.8 kg (61.3 lb)

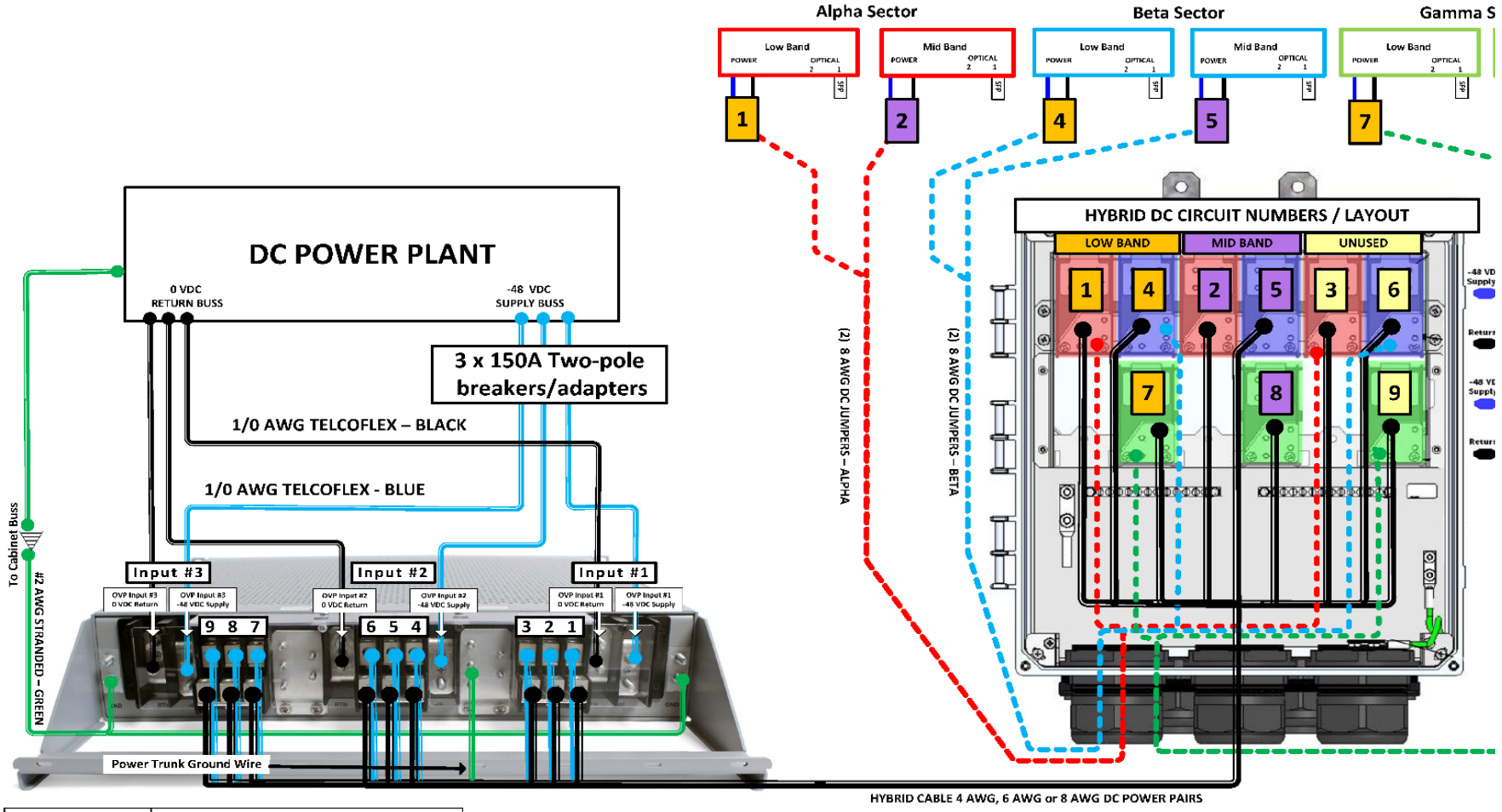
Wireless Engineering	GAMMA SECTOR (1 Antenna) RRU AND ANTENNA RF CABLING CONFIGURATION			
	JMA MX08FRO665 -21 - 8 Port - 6ft LOW/MID Radios LOW Band RET + .5M Jumper			
Chuck Iversen	SIZE	CAGE CODE	DWG NAME	REV
		50HD6	MX08FRO665-21-JMA-6ft_GAMMA	1
20 - Sept – 2022	SCALE None		SHEET	1 OF 1

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)	64.5 (29.3)
Shipping weight, lb (kg)	104 (47.2)
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

- Refer to the color coding chart for RF Cables
- Check RRH SFPs are 'I-temp' rated, (Industrial-temp range)
- RF Connector recommended torque: 50 inch-lbs.
- RET connector recommended torque: 4.3-8.6 inch-lbs.
- Weatherproof boots required on all RF Jumpers.
- RET cables require self-sealing tape.
- Protect unused ports with weather-sealing caps.
- **When OOBE filters are used, provide straight-through connectivity (Ant port 1 --> RU port A) with each port and each set of RF jumpers color-coded accordingly.**

Sector Color Bands	Frequency Color Bands	Main Coax
ALPHA SECTOR	LOW BAND (LB)	RET Cable
BETA SECTOR	MID BAND (MB)	RF Jumper - Low Band
GAMMA SECTOR	FUTURE	RF Jumper - Mid Band

PLUMBING DIAGRAM OVP

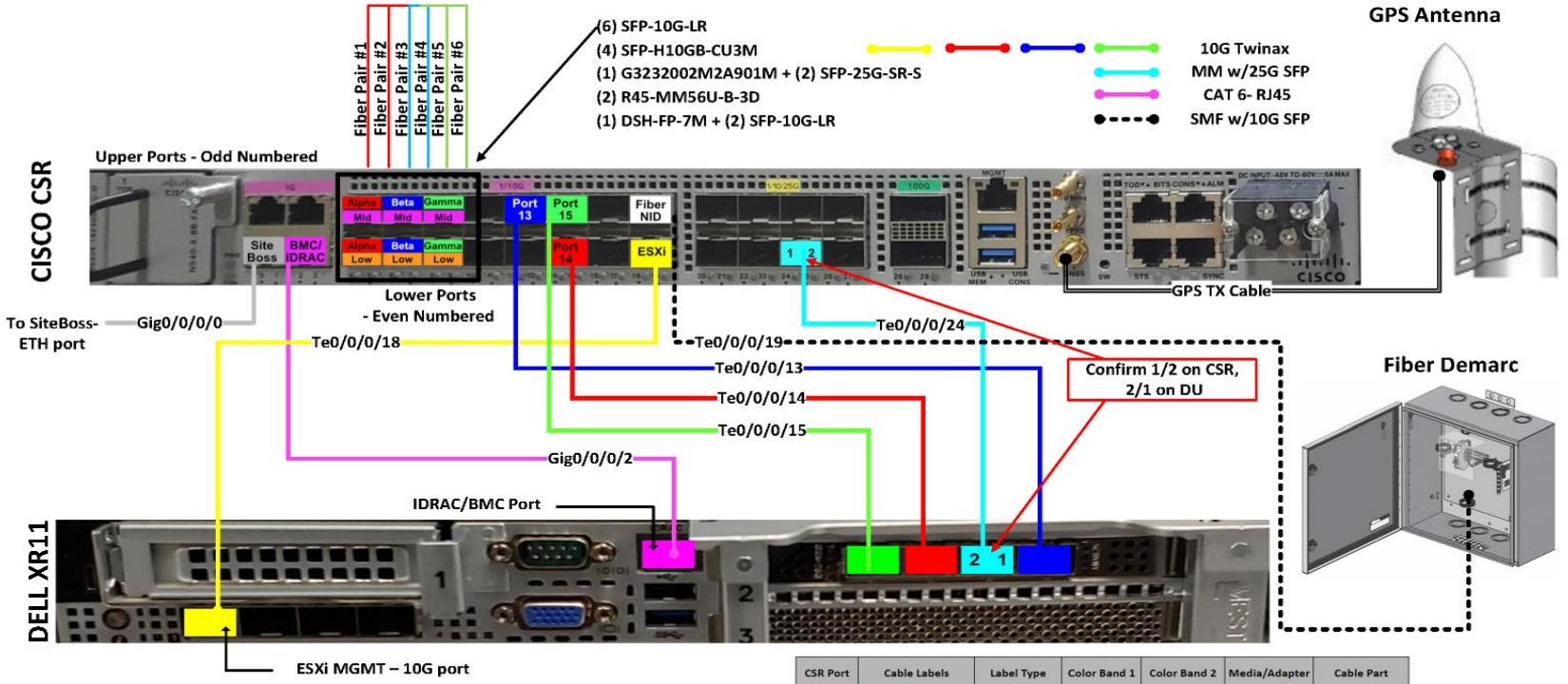


Wireless Engineering	5G Macro Site Communications Diagram			
	Raycap 9303 (3 x 3 Circuits) No Booster Raycap 9181 (TOWER) Top OVP			
Chuck Iversen	SIZE	CAGE CODE	DWG NAME	REV
		50HD6	9303-NoBoost-Tower OVP	1
20 - Nov - 2022	SCALE None		SHEET 1 OF 1	

DC Circuit pair #

RF Color Coding Sector color bands	RF Color Coding Frequency color bands
ALPHA SECTOR	LOW BAND (LB)
BETA SECTOR	MID BAND (MB)
GAMMA SECTOR	UNUSED

PLUMBING DIAGRAM NETWORK



CSR Port	Cable Labels	Label Type	Color Band 1	Color Band 2	Media/Adapter	Cable Part
CSR - Port 0	SiteBoss/ETH port CSR Port 0/16	Tag or Flag	NONE/GREY RIBBON CABLE		Native RJ45	CAT 5
CSR - Port 2	BMC/IDRAC CSR Port 2/17 DU IDRAC port	Tag or Flag	PURPLE		Native RJ46	CAT 5
CSR - Port 4	Alpha Low	Tag or Flag	RED	ORANGE	SFP-10G-LR-S	Hybrid Fiber Pair
CSR - Port 5	Alpha Mid	Tag or Flag	RED	PURPLE	SFP-10G-LR-S	Hybrid Fiber Pair
CSR - Port 6	Beta Low	Tag or Flag	BLUE	ORANGE	SFP-10G-LR-S	Hybrid Fiber Pair
CSR - Port 7	Beta Mid	Tag or Flag	BLUE	PURPLE	SFP-10G-LR-S	Hybrid Fiber Pair
CSR - Port 8	Gamma Low	Tag or Flag	GREEN	ORANGE	SFP-10G-LR-S	Hybrid Fiber Pair
CSR - Port 9	Gamma Mid	Tag or Flag	GREEN	PURPLE	SFP-10G-LR-S	Hybrid Fiber Pair
CSR - Port 13	PTP CSR PORT 13 DU PORT 1	Flag	BLUE		DAC/10G	SFP-H10GB-CU3M
CSR - Port 14	VMWARE-MGMT CSR PORT 14 DU PORT 3	Flag	RED		DAC/10G	SFP-H10GB-CU3M
CSR - Port 15	MIDHAUL CSR PORT 15 DU PORT 4	Flag	GREEN		DAC/10G	SFP-H10GB-CU3M
CSR - Port 18	ESXi CSR PORT 18 DU ESXi MGMT PORT	Flag	YELLOW		DAC/10G	SFP-H10GB-CU3M
CSR - Port 19	To XHAUL NID (CKT ID) CSR PORT 19	Flag	LABEL ONLY		SFP-10G-LR-S (Typically)	SM Fiber
CSR - Port 24	FRONTHAUL CSR PORT 24 DU PORT 2	Flag	LABEL ONLY		SFP-25G-SR-S	G3232002M2A901M

Wireless Engineering	5G Macro Site Communications Diagram			
	Cisco CSR – NCS-540 Lit Fiber-Dell XR11 DU			
Chuck Iversen	SIZE	CAGE CODE 50HD6	DWG NAME CSR-DU-Good CSR-Dell	REV 2
1 - July - 2022	SCALE None		SHEET 1 OF 1	

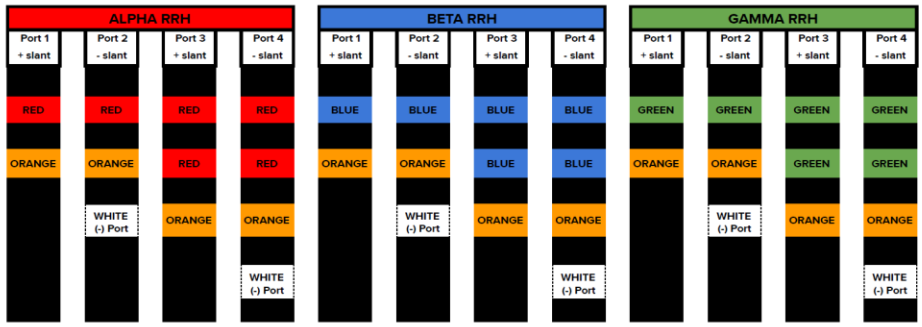
RF COLOR CODING

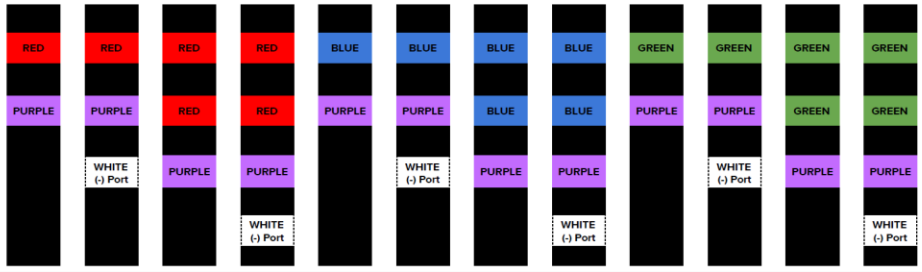
RF Cable Color Codes

Low Bands (N71+N26) Optional - (N29)	AWS (N66+N70+H-block)	CBRS Tech (3 GHz)	Negative Slant Port on Ant/RRH
ORANGE	PURPLE	YELLOW	WHITE

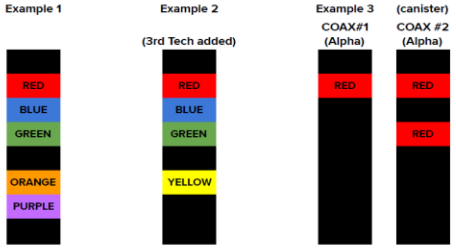
RF Jumper Color Coding

3/4" tape widths with 3/4" spacing



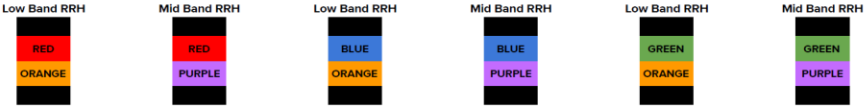


Hybrid/Discreet Cables



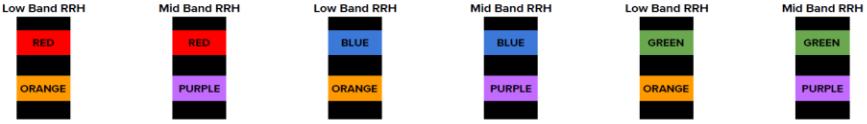
Fiber Jumpers to RRHs

Low Band RRH fiber cables have sector stripe only



Power Cables to RRHs

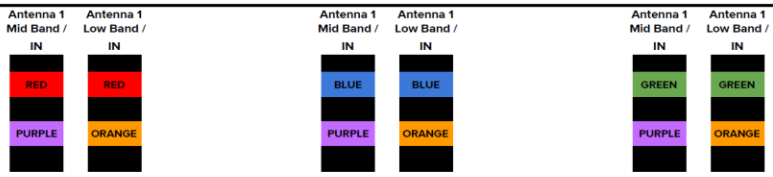
Low Band RRH power cables have sector stripe only



RET motors at Antennas

RET control is handled by the MID-band RRU when one set of RET ports exist on antenna.

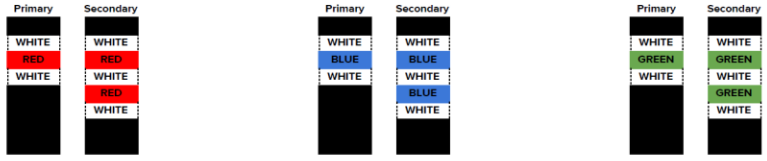
Separate RET cables are used when antenna ports provide inputs for both LOW and MID bands.



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 cables will require P-touch labels inside the cabinet to identify the local and remote Site ID's.



ATTACHMENT 5

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

Antenna Mount Analysis

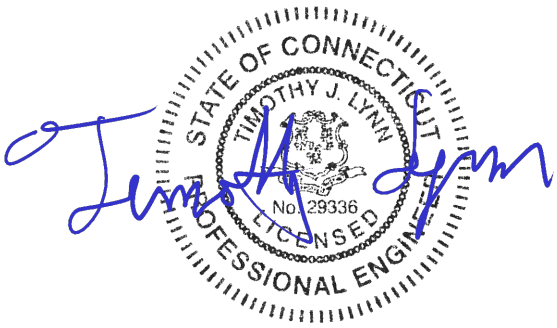
Dish Site #: BOBOS00933A

33 Bald Hill Road
Union, CT

Centek Project No. 23009.07

~~Date: July 19, 2023~~

Rev 1: August 23, 2023



Max Stress Ratio = 29%

Prepared for:

Northeast Site Solutions
1053 Farmington Ave., Unit G,
Farmington, CT 06032

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CENTEK engineering

Centered on Solutions℠

August 23, 2023

Mr. Chuck Regulbuto
Northeast Site Solutions
1053 Farmington Ave., Unit G
Farmington, CT 06032

Re: Structural Letter ~ Antenna Mount
Dish – Site Ref: BOBOS00933A
33 Bald Hill Road
Union, CT

Centek Project No. 23009.07

Dear Mr. Regulbuto,

Centek Engineering, Inc. has reviewed the Dish antenna installation at the above referenced site. The purpose of the review is to determine the structural adequacy of the **proposed mounts, consisting of one (1) V-frame sector mount (SitePro P/N: VFA8-HD) and two (2) dual antenna mounts (SitePro P/N: CWT8-LL)** to support the proposed equipment configuration. The review considered the effects of wind load, dead load and ice load in accordance with the 2021 International Building Code as modified by the 2022 Connecticut State Building Code (CTBC) including ASCE 7-16 and ANSI/TIA-222-H *Structural Standard for Antenna Supporting Structures, Antennas and Small Wind Turbine Support Structures"*.

The loads considered in this analysis consist of the following:

- **Dish:**
  V-Frames: Three (3) JMA MX08FRO665-21 panel antennas, three (3) Samsung RF4450t-71A remote radio heads, three (3) Samsung RF4451d-70A remote radio heads and one (1) Raycap OVP box mounted on one (1) V-Frame and two (2) dual antenna mounts with a RAD center elevation of 75-ft +/- AGL.

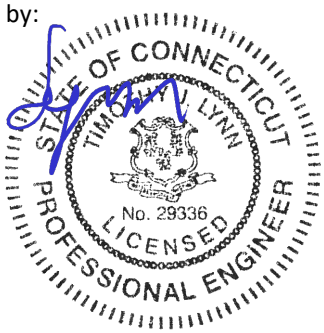
The antenna mounts were analyzed per the requirements of the 2021 International Building Code as modified by the 2022 Connecticut State Building Code considering a Ultimate design wind speed of 130 mph for Union as required in Appendix P of the 2022 Connecticut State Building Code.

A structural analysis of tower and foundation needs to be completed prior to any work.

Based on our review of the installation, it is our opinion that the **subject antenna mounts have sufficient capacity** to support the aforementioned antenna configurations. If there are any questions regarding this matter, please feel free to call.

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer



ATTACHMENT 6

Fox Hill Telecom

Radio Frequency Emissions Analysis Report

Site ID: BOBOS00933A

33 Bald Hill Road
Union, CT 06076

September 29, 2023

Fox Hill Telecom Project Number: 231002

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**13.28 %**

Fox Hill Telecom

September 29, 2023

Dish Wireless
5701 South Santa Fe Drive
Littleton, CO 80120

Emissions Analysis for Site: **BOBOS00933A**

Fox Hill Telecom, Inc ("Fox Hill") was directed to analyze the proposed radio installation for Dish Wireless, LLC (Dish) facility located at **33 Bald Hill Road, Union, CT**, for the purpose of determining whether the emissions from the Proposed Dish radio and antenna installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general population 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 population 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.

Population exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limit for the 600 MHz band is approximately 400 $\mu W/cm^2$. The general population exposure limit for the 1900 MHz (PCS) and 2100 MHz (AWS / AWS-4) bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report the percentage of MPE rather than power density.

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 population/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.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were performed for the proposed upgrades to the Dish Wireless antenna facility located at **33 Bald Hill Road, Union, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65 for far field modeling calculations.

In OET-65, plane wave power densities in the Far Field of an antenna are calculated by considering antenna gain and reflective waves that would contribute to exposure.

Since the radiation pattern of an antenna has developed in the **Far Field** region the power gain in specific directions needs to be considered in exposure predictions to yield an Effective Radiated Power (ERP) in each specific direction from the antenna. Also, since the vertical radiation pattern of the antenna is considered, the exposure calculations would most likely be reduced significantly at ground level, resulting in a more realistic estimate of the actual exposure levels. To determine a worst-case scenario at each point along the calculation radials, each point was calculated using the antenna gain value at each angle of incident and compared against the result using an isotropic radiator at the antenna height with the greater of the two used to yield the more pessimistic far field value for each point along the calculation radial.

Additionally, to model a truly "worst case" prediction of exposure levels at or near a surface, such as at ground-level or on a rooftop, reflection off the surface of antenna radiation power can be assumed, resulting in a potential 1.6 times increase in power density in calculating far field power density values.

With these factors Considered, the worst case **Far Field prediction model** utilized in this analysis is determined by the following equation:

Equation 9 per FCC OET65 for Far Field Modeling

$$S = \frac{33.4\ ERP}{R^2}$$

S = Power Density (in μw/cm^2)
ERP = Effective Radiated Power from antenna (watts)
R = Distance from the antenna (meters)

Predicted far field power density values for all carriers identified in this report were calculated 6 feet above the ground level and are displayed as a percentage of the applicable FCC standards. All emissions values for other carriers were calculated using the same Far Field model outlined above, using industry standard radio configurations and frequency band selection based upon available licenses in this geographic area for emissions contribution estimates.

For each Dish sector the following channel counts, frequency bands and power levels were utilized as shown in *Table 1*:

Technology	Frequency Band	Channel Count	Transmit Power per Channel (W)
5G	n71 (600 MHz)	4	61.5
5G	n70 (AWS-4 / 1995-2020)	4	40
5G	n66 (AWS-4 / 2180-2200)	4	40

Table 1: Channel Data Table

The following **Dish** antennas listed in *Table 2* were used in the modeling for transmission in the 600 MHz (n71) frequency band and the 2100 MHz (AWS 4) frequency bands at 1995-2020 MHz (n70) and 2180-2200 MHz (n66). This is based on feedback from Dish regarding anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below.

Sector	Antenna Number	Antenna Make / Model	Antenna Centerline (ft)
A	1	JMA MX08FRO665-21	75
B	1	JMA MX08FRO665-21	75
C	1	JMA MX08FRO665-21	75

Table 2: Antenna Data

All calculations were done with respect to uncontrolled / general population threshold limits.

RESULTS

Per the calculations completed for the proposed **Dish** configurations *Table 3* shows resulting emissions power levels and percentages of the FCC's allowable general population limit.

Antenna ID	Antenna Make / Model	Frequency Bands	Antenna Gain (dBd)	Channel Count	Total TX Power (W)	ERP (W)	MPE %
Antenna A1	JMA MX08FRO665-21	n71 (600 MHz) / n70 (AWS-4 / 1995-2020) / n66 (AWS-4 / 2180-2200)	11.45 / 16.15 / 16.65	12	566	17,426.72	7.14
						Sector A Composite MPE%	**7.14**
Antenna B1	JMA MX08FRO665-21	n71 (600 MHz) / n70 (AWS-4 / 1995-2020) / n66 (AWS-4 / 2180-2200)	11.45 / 16.15 / 16.65	12	566	17,426.72	7.14
						Sector B Composite MPE%	**7.14**
Antenna C1	JMA MX08FRO665-21	n71 (600 MHz) / n70 (AWS-4 / 1995-2020) / n66 (AWS-4 / 2180-2200)	11.45 / 16.15 / 16.65	12	566	17,426.72	7.14
						Sector C Composite MPE%	**7.14**

Table 3: Dish Emissions Levels

The Following table (*Table 4*) shows all additional carriers on site and their emissions contribution estimates, along with the newly calculated **Dish** far field emissions contributions per this report. FCC OET 65 specifies that for carriers utilizing directional antennas the highest recorded sector value be used for composite site emissions values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. For this site, all three sectors have the same configuration yielding the same results on all three sectors. *Table 5* below shows a summary for each **Dish** Sector as well as the composite emissions value for the site.

Site Composite MPE%	
Carrier	**MPE%**
Dish – Max Per Sector Value	**7.14 %**
T-Mobile	3.75 %
CSP 1	0.01 %
CSP 2	0.01 %
CSP 3	0.03 %
CSP 4	0.03 %
CSP 5	0.03 %
CSP 6	0.01 %
NEU 1	0.04 %
NEU 2	0.04 %
NEU 3	0.11 %
NEU 4	0.01 %
NEU 5	0.01 %
NEU 6	0.01 %
NEU 7	0.02 %
TOU 1	0.02 %
CL&P 1	0.28 %
CL&P 1	1.73 %
Site Total MPE %:	**13.28 %**

Table 4: All Carrier MPE Contributions

Dish Sector A Total:	7.14 %
Dish Sector B Total:	7.14 %
Dish Sector C Total:	7.14 %
Site Total:	13.28 %

Table 5: Site MPE Summary

Table 6 below details a breakdown by frequency band and technology for the MPE power values for the maximum calculated **Dish** sector(s). For this site, all three sectors have the same configuration yielding the same results for all three sectors.

Dish _ Frequency Band / Technology Max Power Values (Per Sector)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
Dish n71 (600 MHz) 5G	4	858.77	75	18.88	n71 (600 MHz)	400	4.72%
Dish n70 (AWS-4 / 1995-2020) 5G	4	1,648.39	75	12.10	n70 (AWS-4 / 1995-2020)	1000	1.21%
Dish n66 (AWS-4 / 2180-2200) 5G	4	1,849.52	75	12.10	n66 (AWS-4 / 2180-2200)	1000	1.21%
						Total:	**7.14 %**

Table 6: Dish Maximum Sector MPE Power Values

Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general population exposure to RF Emissions.

The anticipated maximum composite contributions from the Dish facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general population exposure to RF Emissions are shown here:

Dish Sector	Power Density Value (%)
Sector A:	7.14 %
Sector B:	7.14 %
Sector C:	7.14 %
Dish Maximum Total (per sector):	7.14 %
Site Total:	13.28 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite emissions value for this site, assuming all carriers present, is **13.28 %** of the allowable FCC established general population limit sampled at the ground level. This is based upon the far field calculations performed for all carriers identified in this report.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.

Scott Heffernan
Principal RF Engineer
Fox Hill Telecom, Inc
Worcester, MA 01609
(978)660-3998

ATTACHMENT 7

Christopher Gelinas
Senior Specialist – Real Estate

107 Selden St
Berlin, CT 06037
Office: (860) 665-2008
Christopher.Gelinas@Eversource.com

September 29, 2023

Mr. Chuck Regulbuto
Director of Operations
Northeast Site Solutions
420 Main Street
Sturbridge, MA 01566

RE: **Letter of Authorization**

Project: **Dish Wireless L.L.C.**
Site ID: BOBOS00933A
Bald Hill Rd
Union, CT

Owner: **The Connecticut Light and Power Company d/b/a Eversource Energy**

Dear Mr. Regulbuto

Eversource Energy, owner of the tower facility located at the address identified above, does hereby authorize Dish Wireless, and/ or it's agent to use this authorization letter for the sole purpose of filing and consummating any land-use or building permit application(s) as may be required by the applicable permitting authorities for the Licensee's telecommunication's installation.

Sincerely,

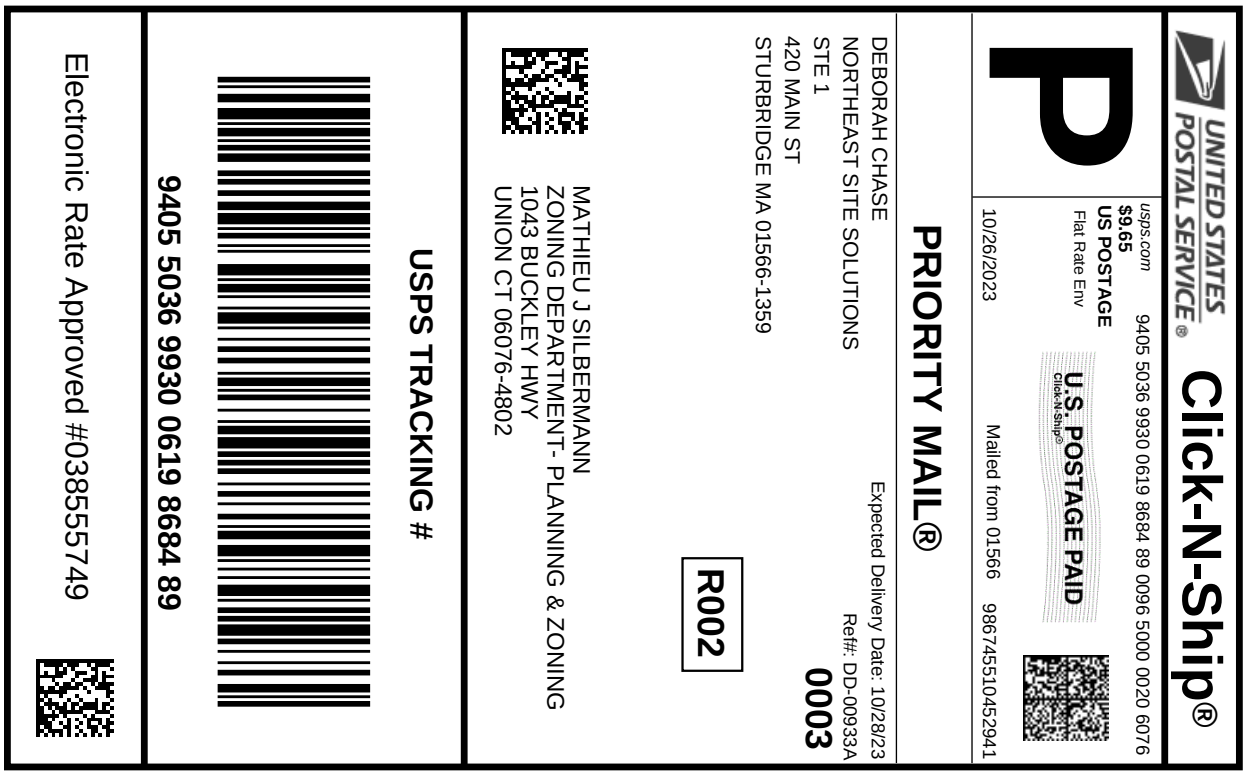
Christopher Gelinas

Christopher Gelinas
Eversource Energy

REF: Dish Wireless

Centek Enginering
CD'S: Project # 23009.07
Rev: C
Dated 8/22/23
Structural: Project # 23009.07
Rev: 1
Dated: 8/17/23

ATTACHMENT 8



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2. **Place your label so it does not wrap around the edge of the package.**
3. **Adhere your label to the package. A self-adhesive label is recommended. If tape or glue is used, DO NOT TAPE OVER BARCODE. Be sure all edges are secure.**
4. **To mail your package with PC Postage®, you may schedule a Package Pickup online, hand to your letter carrier, take to a Post Office™, or drop in a USPS collection box.**
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Trans. #:	596300876
Print Date:	10/26/2023
Ship Date:	10/26/2023
Expected Delivery Date:	10/28/2023

Priority Mail® Postage:	**$9.65**
Total:	**$9.65**

From: DEBORAH CHASE
NORTHEAST SITE SOLUTIONS
STE 1
420 MAIN ST
STURBRIDGE MA 01566-1359

Ref#: DD-00933A

To: MATHIEU J SILBERMANN
ZONING DEPARTMENT- PLANNING & ZONING COMMISSIONER
1043 BUCKLEY HWY
UNION CT 06076-4802

* Retail Pricing Priority Mail rates apply. There is no fee for USPS Tracking® service on Priority Mail service with use of this electronic rate shipping label. Refunds for unused postage paid labels can be requested online 30 days from the print date.

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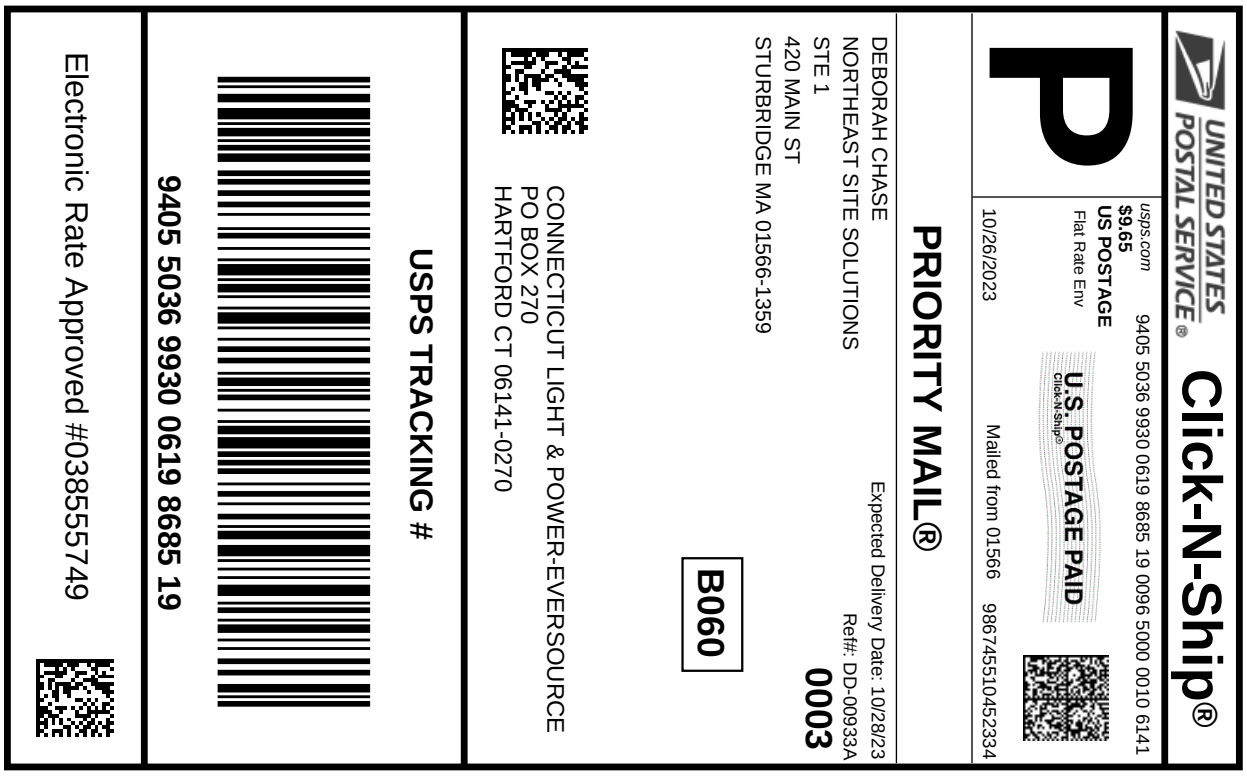

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Trans. #:	596300876
Print Date:	10/26/2023
Ship Date:	10/26/2023
Expected Delivery Date:	10/28/2023

Priority Mail® Postage:	**$9.65**
Total:	**$9.65**

From: DEBORAH CHASE
NORTHEAST SITE SOLUTIONS
STE 1
420 MAIN ST
STURBRIDGE MA 01566-1359

Ref#: DD-00933A

To: CONNECTICUT LIGHT & POWER-EVERSOURCE ENERGY
PO BOX 270
HARTFORD CT 06141-0270

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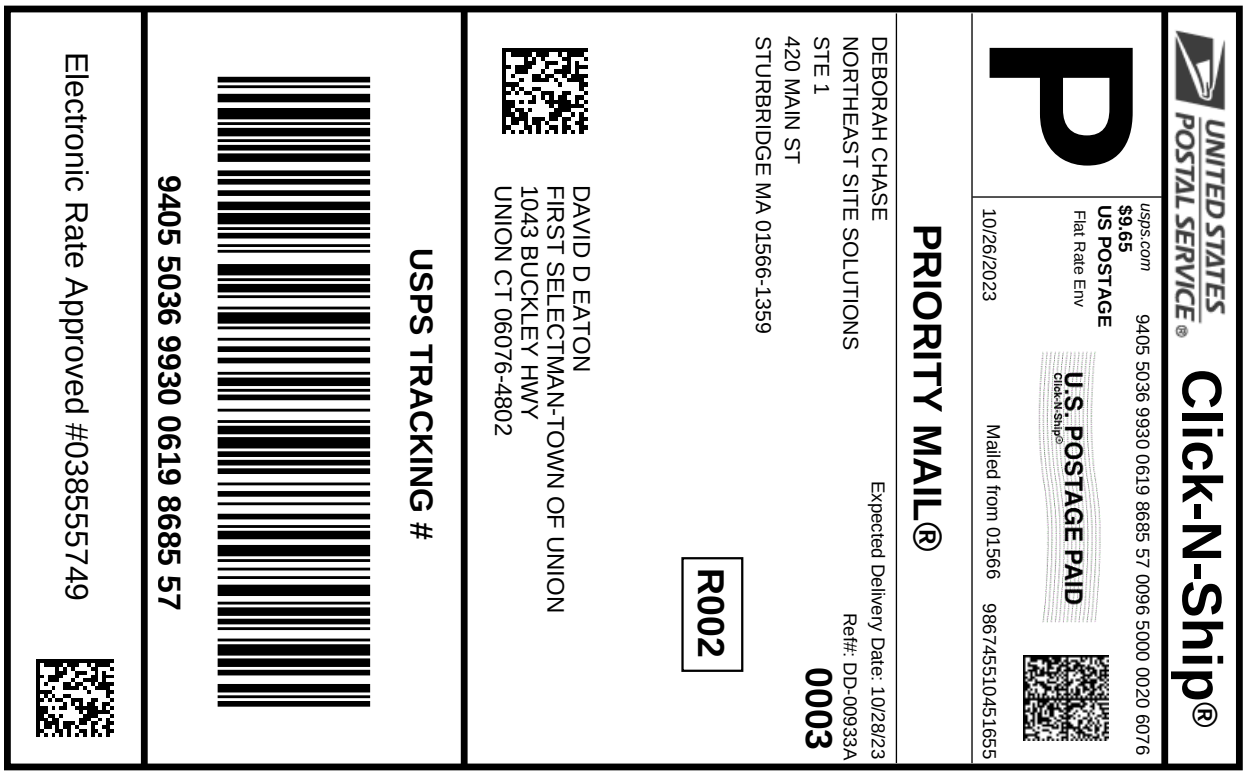

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9405 5036 9930 0619 8685 57

Trans. #:	596300876
Print Date:	10/26/2023
Ship Date:	10/26/2023
Expected Delivery Date:	10/28/2023

Priority Mail® Postage:	**$9.65**
Total:	**$9.65**

From: DEBORAH CHASE
NORTHEAST SITE SOLUTIONS
STE 1
420 MAIN ST
STURBRIDGE MA 01566-1359

Ref#: DD-00933A

To: DAVID D EATON
FIRST SELECTMAN-TOWN OF UNION
1043 BUCKLEY HWY
UNION CT 06076-4802

* Retail Pricing Priority Mail rates apply. There is no fee for USPS Tracking® service on Priority Mail service with use of this electronic rate shipping label. Refunds for unused postage paid labels can be requested online 30 days from the print date.

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BOBOS00933A-UNION

LINCOLN MALL
560 LINCOLN ST STE 8
WORCESTER, MA 01605-1925
(800)275-8777

10/27/2023 11:25 AM

Product	Qty	Unit Price	Price
Prepaid Mail Stafford Springs, CT 06076 Weight: 0 lb 14.10 oz Acceptance Date: Fri 10/27/2023 Tracking #: 9405 5036 9930 0619 8685 57	1		$0.00
Prepaid Mail Stafford Springs, CT 06076 Weight: 0 lb 13.40 oz Acceptance Date: Fri 10/27/2023 Tracking #: 9405 5036 9930 0619 8684 89	1		$0.00
Prepaid Mail Hartford, CT 06141 Weight: 0 lb 13.30 oz Acceptance Date: Fri 10/27/2023 Tracking #: 9405 5036 9930 0619 8685 19	1		$0.00
Grand Total:			$0.00